THESIS FINAL REPORT | SPRING 2015

UNIVERSITY OF MARYLAND – BALTIMORE
HEALTH SCIENCES FACILITY III

666 W. BALTIMORE ST. BALTIMORE, MD

KENNETH M. MOORE

LIGHTING / ELECTRICAL
THESIS ADVISOR: SHAWN GOOD

Link to project AGI Files at Y: Moore

HEALTH SCIENCES FACILITY III

UNIVERSITY OF MARYLAND – BALTIMORE
666 W. BALTIMORE ST. BALTIMORE, MD 21201

OWNER: **UMB OFFICE OF FACILITIES MANAGEMENT**
ARCHITECT: **HELLMUTH, OBATA, KASSABAUM (HOK)**
CONSTRUCTION MANAGER: **BARTON MALOW COMPANY**
STRUCTURAL ENGINEER: **CAGLEY & ASSOCIATES**
MECHANICAL ENGINEER: **AEI ENGINEERS**

OCCUPANCY: **BUISINESS, RESEARCH FACILITY**
CONSTRUCTION DATES: **JULY 2013 – SEPTEMBER 2017**
BUILDING HEIGHT: **13 STORIES + MEZZANINE & PENTHOUSE**
BUILDING SIZE: **430,000 GSF**
BUILDING COST: **$216 MILLION**
DELIVERY METHOD: **CM AT RISK**

ARCHITECTURE:

- HIGHLY ADVANCED RESEARCH FACILITY
- HOUSES RESEARCH GROUPS FOR THE UNIVERSITY'S SCHOOL OF MEDICINE, PHARMACY, AND DENTISTRY
- FEATURES 7 STORY GLASS ATRIUM, 3 MAIN TOWERS, WITH WET LAB AND DRY LAB
- GREEN ROOF ON ALL TOWERS

STRUCTURAL:

- EXTERIOR MAJORITY IS INSULATED GLASS CURTAIN WALL
- CONCRETE SLAB FOOTING
- STEEL COLUMN AND BEAM FRAMEWORK
- GALVINIZED STEEL ROOKING DECK
- CMU REINFORCING UNDER LOWER BASEMENT

MECHANICAL:

- 100% 2 AHU FOR VIVARIUMS, 2 AHU FOR OFFICES
- 100% 4 AHU FOR LABS, 2 AHU 35% OUTSIDE AIR
- 2 PERIMETER RADIATORS
- GREEN ROOF FILTRATION SYSTEM
- AV UNITS THROUGHOUT

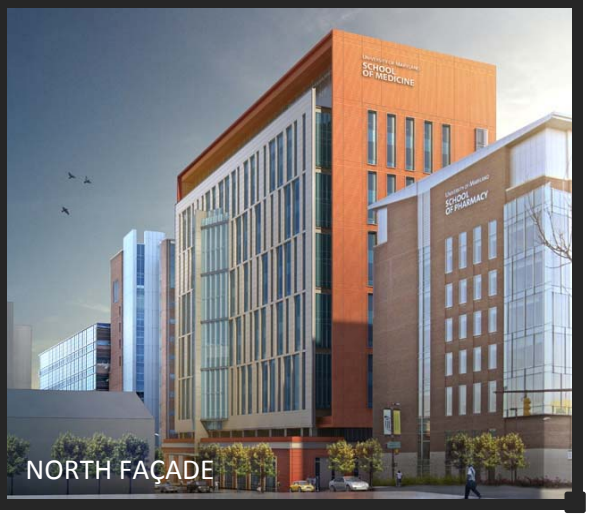
LIGHTING/ELECTRICAL:

- BUILDING DISTRIBUTION IS 480V, 3 PHASE, 4 WIRE
- 120/277 LIGHTING STANDARD
- 277/480 STANDARD PANELBOARD
- 3000A, 277/480 SWITCHBOARD
- 500KVA GENERATOR


SOUTH FAÇADE


WEST ELEVATION


EAST ELEVATION


NORTH FAÇADE

LIGHTING/ELECTRICAL OPTION

KENNETH M. MOORE

http://www.engr.psu.edu/ae/thesis/portfolios/2015/kmm5755/index.html
SHAWN GOOD | ADVISOR

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The following report details the various topics researched and developed throughout the fall and spring semester, as part of the Architectural Engineering Student Individual Thesis. The project is based on the University of Maryland – Baltimore Health Sciences Facility III building. Within, the lighting systems, and electrical systems of the existing project have been re-evaluated, and re-designed. The re-evaluated spaces include:

- CIRCULATION SPACE – ELEVATOR LOBBY
- LARGE WORK SPACE – NANOMEDICINE WORKSTATION
- SPECIAL PURPOSE SPACE – MEETING ROOM
- OUTDOOR SPACE – EXTERIOR PLAZA

In addition to the lighting and electrical depths of study, two breadth studies have been completed. First, the implementation of a rain screen system was evaluated against the existing exterior façade. This system would prove beneficial, but to confirm its effectiveness, a structural summary of the exterior façade has also been studied.

ACKNOWLEDGEMENTS

I would like to thank the following people for their advice, guidance, and support throughout the process of my thesis.

BARTON MALOW COMPANY

FOR PROVIDING PROJECT DOCUMENTS

STAFF MEMBERS OF ARCHITECTURAL ENGINEERING DEPARTMENT

SHAWN GOOD

DR. KEVIN PARFITT

DR. RICHARD MISTRICK

STAFF MEMBERS OF HELLMUTH, OBATA, KASSABAUM

TOM KACZKOWSKI

DAVID ZIOLKOWSKI

KEVIN SEXTON

FAMILY MEMBERS AND FRIENDS

SECTION 1 | PROJECT OVERVIEW

PROJECT OVERVIEW | GENERAL BUILDING DATA

Building: Health Sciences Facility III

Location and Site: University of Maryland – Baltimore
666 W. Baltimore Street, Baltimore, MD 21201

Building Occupant: University Students and Staff

Occupancy Type: Business use Group B, Assembly use Group A-3, Storage use Group S

Size: Approximately 430,000 square feet

Number of Stories above Grade: 10

Total Number of Stories: 13 (Includes the upper and lower basement levels. The Mechanical Penthouse and Mechanical Mezzanine are considered an additional level because it encompasses the entire rooftop structure)

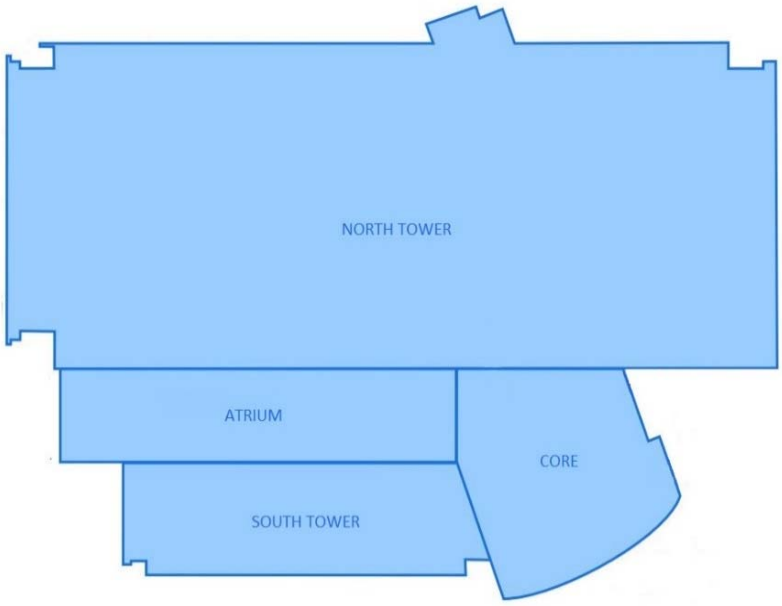
Dates of Construction: July 2013 - September 2017 (including Demo)

Cost Information: $216 million total building construction cost

Project Delivery Method: CM at Risk

Architect: Hellmuth, Obata, Kassabaum (HOK)
Construction Manager: Barton Malow Company
Associate Architect: Design Collective
Mechanical Engineer: AEI Engineers
Plumbing/FA/FP Engineer: WFT Engineers
Structural Engineer: Cagley & Associates
Civil Engineer/Landscape Architect: Site Resources
Lab Planning: Jacobs Consultancy
Interior Architects: Melville Thomas Architects, Inc.
Geotechnical Engineer: Kim Engineering, Inc.

PROJECT OVERVIEW | ARCHITECTURE



The new Health Sciences building for the University of Maryland campus will be a highly advanced research facility. It is designed to house research groups from the university's School of Medicine, Pharmacy, and Dentistry. The building is divided into 4 main sections. First, the 10 story tower (north) that serves as a wet lab for research and office space. A second, smaller tower (south) serves as a dry lab which also features offices and workstations for research. The third section is the main atrium. This 7 story atrium connects the two main towers with open bridges on the upper floors, allowing transference between both buildings. The final east tower (core) is the main connection between all 4 spaces mainly consisting of elevator lobbies, stairwells, and conference room space.

APPLICABLE CODES

- Maryland Building Performance Standards, COMAR 05.02.07 (2012 Edition) and State of Maryland Fire Prevention Code COMAR 29.06.01 (2013 Edition)
- International Building Code (IBC), 2012 Edition
- International Mechanical Code (IMC), 2012 Edition
- International Fire Code (IFC), 2012 Edition
- American with Disabilities Act, Titles II and III (ADA), 2010 Edition
- ASME A17.1, Safety Code for Elevators and Escalators
- NFPA 101 Life Safety Code (LSC), 2009 Edition
- NFPA 70, National Electrical Code (NEC), 2011 Edition
- NFPA 45, Standard for Fire Protection for Laboratories using chemicals, 2011 Edition
- NFPA 72, National Fire Alarm and Signaling Code, 2010 Edition
- NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, 2012 Edition
- NFPA 92B, Smoke Management Systems in Malls, Atriums and Large Spaces, 2009 Edition
- NFPA 1, Fire Code, 2012 Edition

ZONING

Not Applicable: On Campus Location

HISTORICAL REQUIREMENTS

None

PROJECT OVERVIEW | BUILDING ENCLOSURE

FAÇADE

The majority of the southern exterior façade is an insulated glass curtain wall. The north tower is mainly a precast wall with punch out windows. There is a curtain wall that juts out from the precast on the north façade adding an additional feature to the exterior. The rest of the north tower is a combination of 4" nominal brick veneer and composite aluminum metal panels on the penthouse floors. Below is an image of the curtain wall section. The laminated glass units are 9/16" thick with a fritted PVB interlayer.

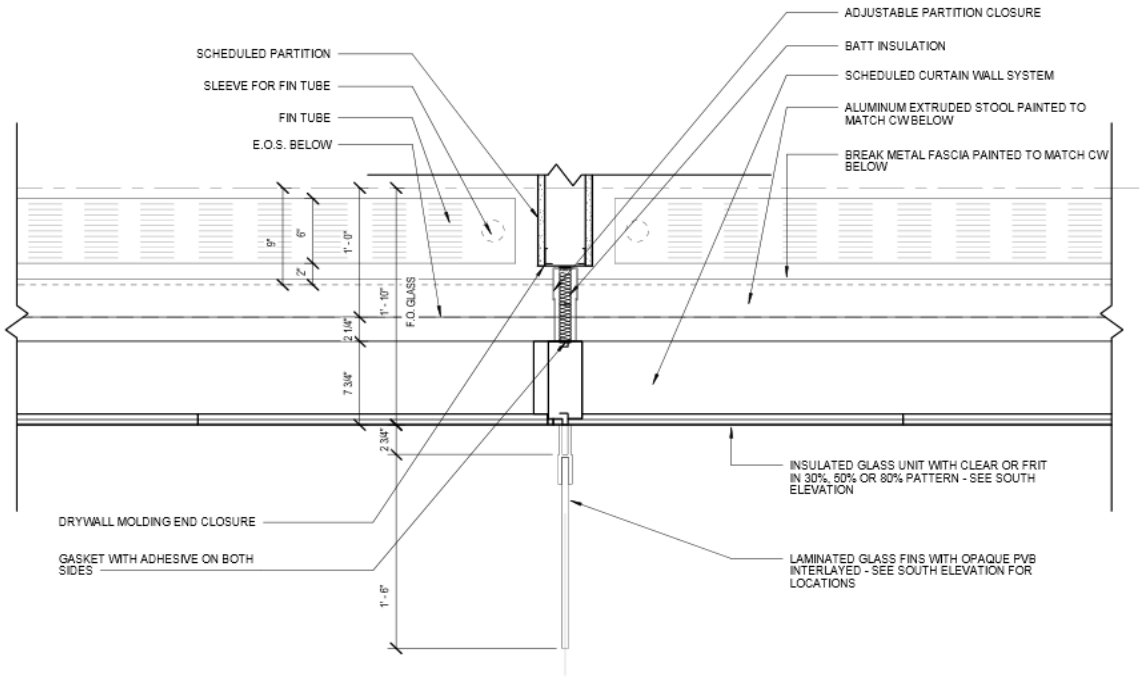


Figure 1: Section view of the southern exterior façade.

ROOFING

The roofing features sloped concrete slab sections for rainwater collection. The North tower is the only space not covered by green roof which consists mostly of exposed precast and hot fluid applied rubberized asphalt. Uncured neoprene flashing is embedded in the roofing membrane.

PROJECT OVERVIEW | SUSTAINABILITY FEATURES

The facility features a green roof on all building towers except for the North Tower. The 2nd floor of the north tower has a small exterior space which also functions as a green roof. Below is an image showing the standard depth of green roof.

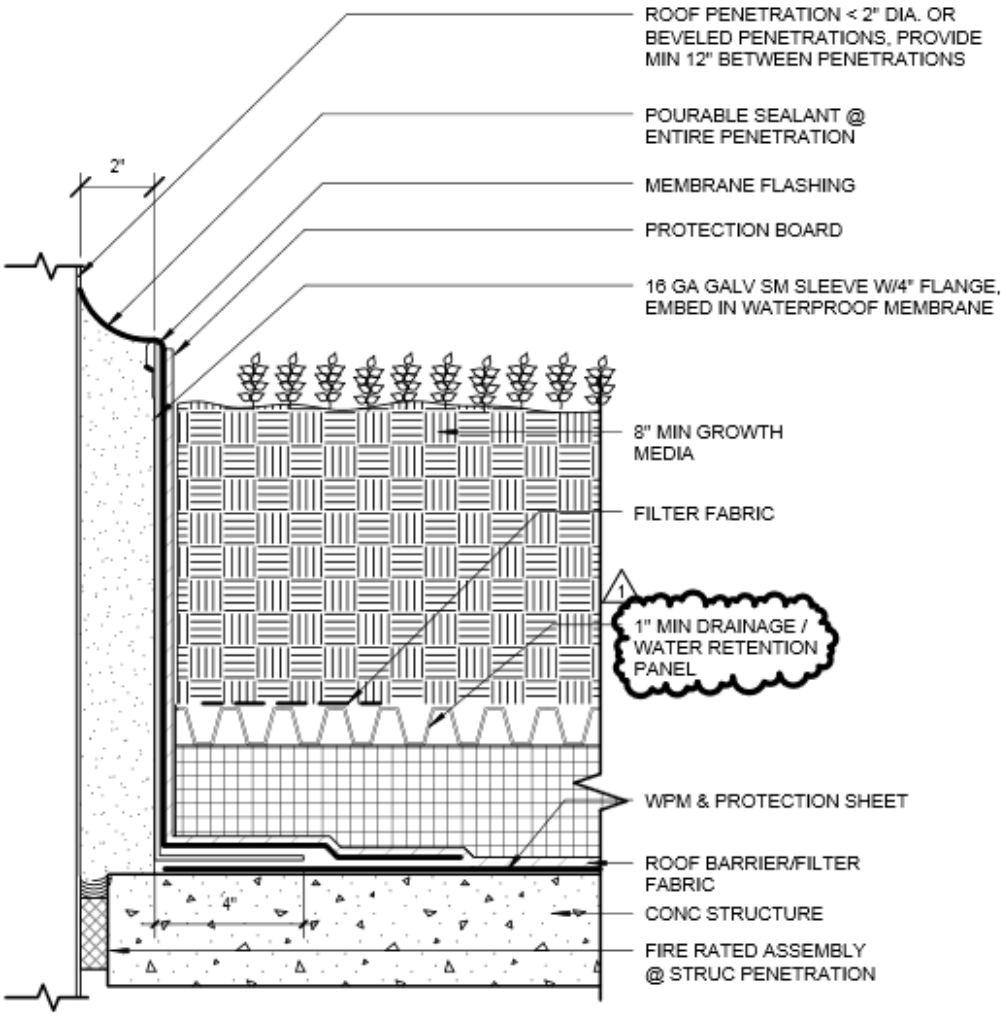


Figure 2: Section view of the north tower green roof.

LIGHTING

The lighting systems are comprised of fluorescent and LED sources. All fluorescent lamps use electronic ballasts, including continuous runs. These are predominantly used throughout the corridors and special offices. The majority of the building fixtures are recessed, and grid mounted. Lighting for railings is also provided in the atrium bridges, and exterior walkways. The exterior plaza fixtures are all LED.

ELECTRICAL

The building features multiple distribution panels to accommodate multiple receptacles, laboratory equipment, and emergency power. There are 2 distribution boards on the first level, and a total of 13 panel boards, one for each floor. Equipment panel board's voltages are 480/277V and 208/120V. General lighting is 120V and 277V. Receptacles are 120V. Emergency power is listed for a business group B, assembly group A-3 classification. The main electrical room is located in the basement. It receives power from the dual redundant 13.2 KV feeders. Of the four main switchgear, 2 serve as backup generators.

MECHANICAL

The building has a large amount of lab space, where research groups are using a myriad of chemicals and contaminants. Because of this, the nanomedicine centers house a series of fume hoods to prevent any contaminants leaving the space. There is also a chilled water system for the equipment in the labs space. The building contains four chilled water systems that service the air handling units. There are four air-handling units that service these labs with a 100% DOAS system at 63000 CFM. The additional two air-handling units service the office and conference spaces. They house a mixed air system with 35% outside air at 38000 CFM. These air handling units are located on the penthouse level.

STRUCTURAL

A geotechnical report was provided by the Kim Engineering subcontractor on the project. The report confirmed all foundations have been placed on undisturbed soil at elevations indicated that have been designed for a net allowable bearing pressure of 5000 PSF, and require placement of structural fill on portions of the site. The facility has a mat foundation due to the high water table location. The mat slab is poured into eight sections, where the form joints already fit together. The superstructure is cast in place concrete spanning an average of 21 ft. The core slabs are 10 in thick while the elevated slabs are 8 in. Shear walls are located at all

stairwells and shafts within the building. All floors and roof decks are galvanized steel. Structural wide flange columns and beams provide the skeletal structure of the building.

The atrium curtain wall features a steel framing plan using HSS6X4X1/4 “mega column” connections. The HSS6X4 truss chords hold the steel column in place at the connection of the corner of the curtain walls. The atrium ceiling contains skylights with a W8X10 and W18X40 beams framework.

FIRE PROTECTION

All stairs, elevators, and shafts are given a two-hour fire rating. Electrical and mechanical room partitions receive a one-hour fire rating. The highest fire rating is for three-hours, only mandated for the oil tank room, as it is considered a hazardous space. According to NFPA 13, all laboratory spaces are considered an ordinary hazard, group 2, however the remaining spaces are considered group 1. The atrium space features a water curtain and sprinkler system in order to protect the storefront windows for each of the levels of the north tower. There are two connections for the fire department to access at the corners of the building. An incoming pipe is located in the basement with a double check backflow preventer.

TRANSPORTATION

There are four entrances to the building. The first is located at the east wall of the atrium with a vestibule connection. This can be considered the main entrance as it is the closest entrance to the drop-off circle. The second is located under the overhang of the south tower connecting to the atrium. A small third entrance is located closest to the exterior plaza on the west side of the building and is a means of egress from the elevator lobby. The final entrance is located at the north end of the central hallway directly connected to the elevator lobby. There is a small pedestrian wheelchair lift at the end of the hallway due to the small set of stairs located there. The elevator lobby features four main elevators and a service elevator for the upper and lower basements. The four main elevators service floors one through nine however only two continue to the tenth floor, and one to the interstitial tenth floor. The penthouse levels, as well as the basements can be accessed via the service elevators that run throughout all the floors of the building. In addition to the elevators, there are 5 main stairwells throughout the building, while only one extends to the roof. These stairwells separate the means of egress from the basements and the upper floors, which is ideal for a building of this size.

TELECOMMUNICATIONS

The facility features a series of projection rooms. The projection systems are low voltage and ceiling mounted. Most rooms feature standard wall outlets, junction boxes, and floor boxes to provide for students and staff. All data connections are routed and serviced at the two IT rooms found on each floor. The building is implemented with an electronic security system. The system is featured on every floor in addition to the exterior. It includes access control intercommunications, and video systems. A card access system is also included for building staff outside of normal business hours.

SPECIAL SYSTEMS

There are no special systems required other than listed above.

SECTION 2 | LIGHTING DEPTH

DESIGN CONCEPT

This research facility is a brand new addition to university and, as such, must reflect a new and innovative design. I was intrigued by the simplicity and scale of the interior architecture, particularly lobby and meeting room space. The building needed a creative lighting design that would extenuate its existing structure. After brainstorming, I decided to apply the concept of bioluminescence, in that I would be showcasing the building's form through internal light.

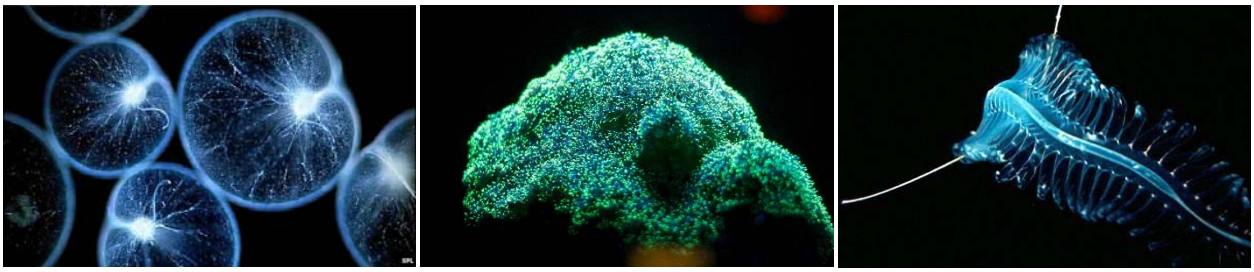


Figure 3: Concept images of bioluminescent plants and animals.

In nature, bioluminescent plants and animals produce their own light in order to function or deter prey. Their bodies form the skeletal structure, and the light emitting chemicals take the form of the structure. Therefore, the concept is that the building is the skeletal structure, and the light is emitting from within forming the body. When applied, the lighting scheme should be simple, unseen (recessed), and should create texture throughout the spaces.

Throughout my design process, I attempted to build off the idea of bioluminescence. I was encouraged by professional designers to address the concept from a more creative standpoint. While my concept was brilliant and creative in thought, it became more and more difficult to encompass the idea when addressing practical solutions to the lighting design. In the end, in order to meet my lighting criteria, I had to implement my practical design in lieu of the creative schematic designs.

SECTION A | ELEVATOR LOBBY

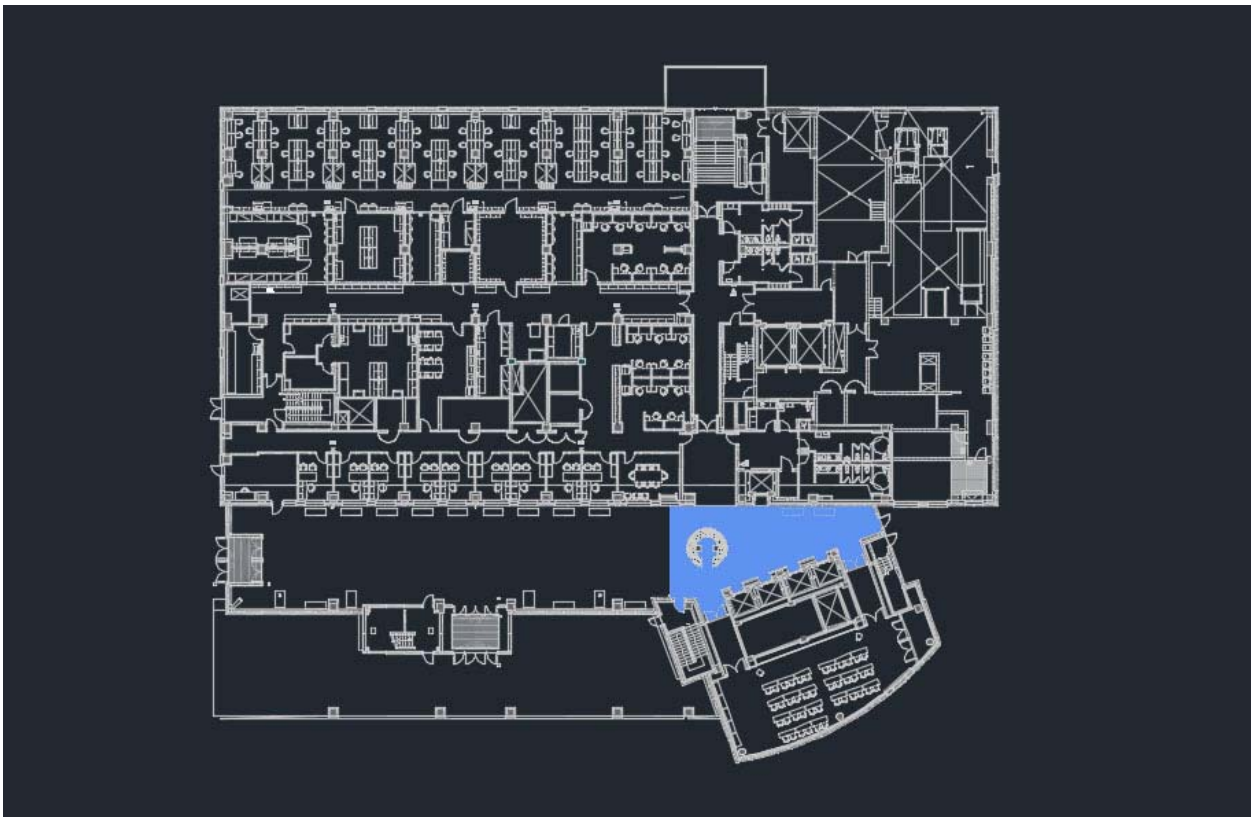


Figure 4: Plan view of the elevator lobby – First level

DETAILED SUMMARY

Space Designation: Elevator Lobby – 1003
Area: 1,206 sq. ft.
Floor Finishes: Terrazzo Tile
Wall Finishes: Painted Gypsum Wall Board, (North Wall Only) Granite, Brick
Ceiling Finishes: Acoustic Panel Ceiling and Gypsum Board Ceiling

The Elevator lobby is connected to the building's main atrium. A central information and check-in desk is situated below the 2nd floor overhang which separates the lobby's ceiling height and the atrium's ceiling height. A total of 4 pedestrian elevators are available to the public, while a 5th staff elevator is located at the north wall of the elevator lobby. This lobby also connects to the meeting room space located on the first floor.

I chose to implement John Flynn's psychological system of Spaciousness within the lobby space. Because of its smaller size in comparison to the atrium, the space it will feel congested. To counteract this psychological experience, I implemented uniform lighting that contours to the architecture, thus expanding the visual environment. Students and staff members should have a sense of openness when greeted with the sight of uniform, vibrantly illuminated walls.

The elevator lobby has a centrally located administration desk. The original design goal was to include LED tape-light underneath the varied exterior shelves. However, it was found to be unnecessary when considering the target average, and was not used in the later design. Below is a sketch to provide greater detail.

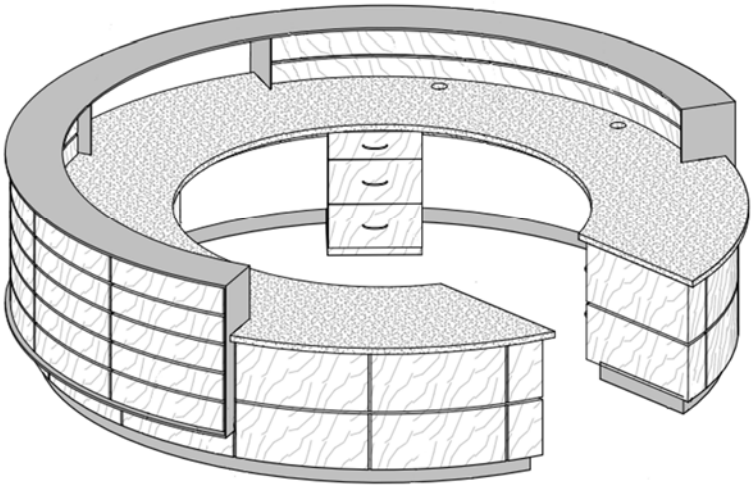


Figure 4: A sketch of the elevator lobby desk.

DESIGN CRITERIA

The elevator lobby is considered a high pedestrian activity area, as this is a research facility on a college campus. It is the central location of the building's circulation. I recommended illuminance targets for both elevator lobbies (during daytime and nighttime hours), and reception lobbies that have been included in the lighting criteria.

Table 22.2 Common Applications Illuminance Recommendations

IES Lighting Handbook, 10th Edition

Circulation, Elevator Lobbies	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
Day	100	30	4:1
Night	50	20	4:1
Distant from Entries	100	30	4:1

E_h @floor; E_v @ 5' AFF. Close proximity to exterior.
Lighting should be designed to assist with adaptation when passing to/from exterior.

Reception Lobbies	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
Desk Top	150	50	4:1

E_h @3'6" AFF; E_v @ 5'AFF

In addition, the reception desk at the junction of the atrium space and the elevator lobby must have adequate lighting to ensure a productive reception workplace, and to provide enough light for patron facial recognition.

Table 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method

ANSI/ASHRAE/IES Standard 90.1-2013

Common Space Types	LPD (W/ft^2)
Elevator Lobby	0.64
General Lobby Space	0.90

The elevator lobby is a continuation of the atrium space and thus, part of the general lobby space. Therefore I assumed the target LPD would be .9 rather than .64.

LIGHT-LOSS FACTORS

Assumed LED Light Loss Factor	
Description	Factor
Lamp Lumen Depreciation	.80
Luminaire Dirt Depreciation	.95
Total Light Loss Factor	**.76**

REFLECTED CEILING PLAN

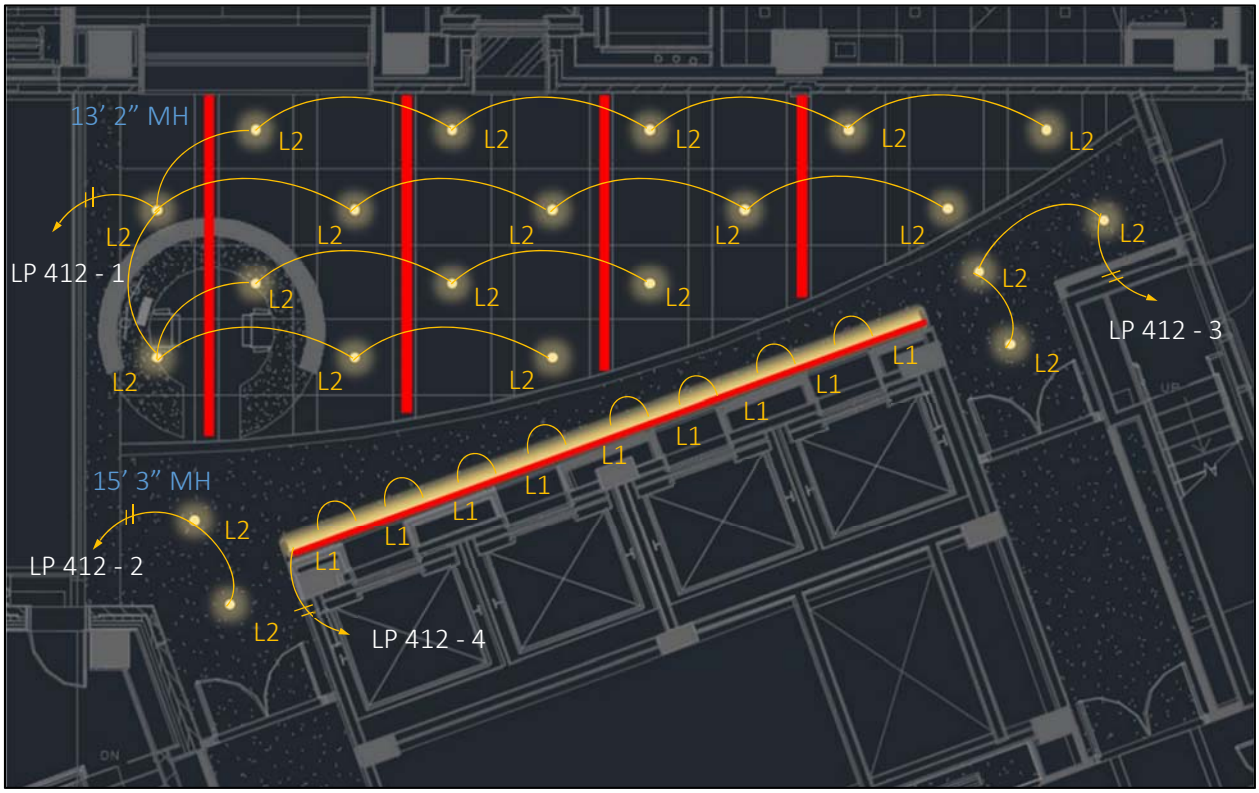


Figure 5: A reflected ceiling plan of the elevator lobby.

Objects in RED are ventilation systems.
Ceiling is 4 X 4 grid.

LUMINAIRE: L1
DESCRIPTION: RECESSED PERIMETER COVE LINEAR FLUORESCENT WALL GRAZER
MANUFACTURER: FOCAL POINT

LUMINAIRE: L2
DESCRIPTION: RECESSED ROUND TRIMLESS DOWNLIGHT
MANUFACTURER: USAI

It was important to avoid the ventilation systems in this space because I knew that the mechanical systems could not be changed. In my research I found that the spacing between the first and second floor was without room to place the ducts in a different position. Therefore, I designed around the systems.

PERFORMANCE DATA

The following calculations were performed in AGI-32 Software.

0 Fc	10 Fc	20 Fc	30 Fc	40 Fc	50Fc

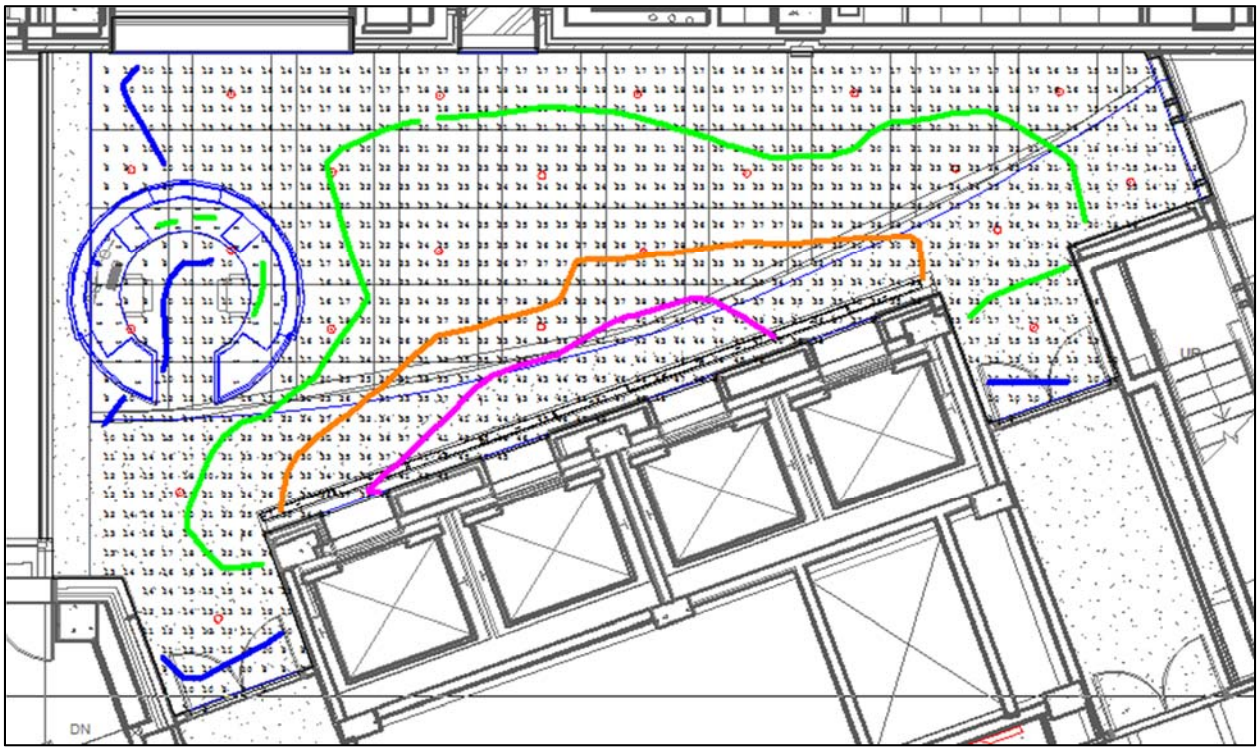


Figure 6: AGI-32 Calculation showing targeted illuminances (fc).

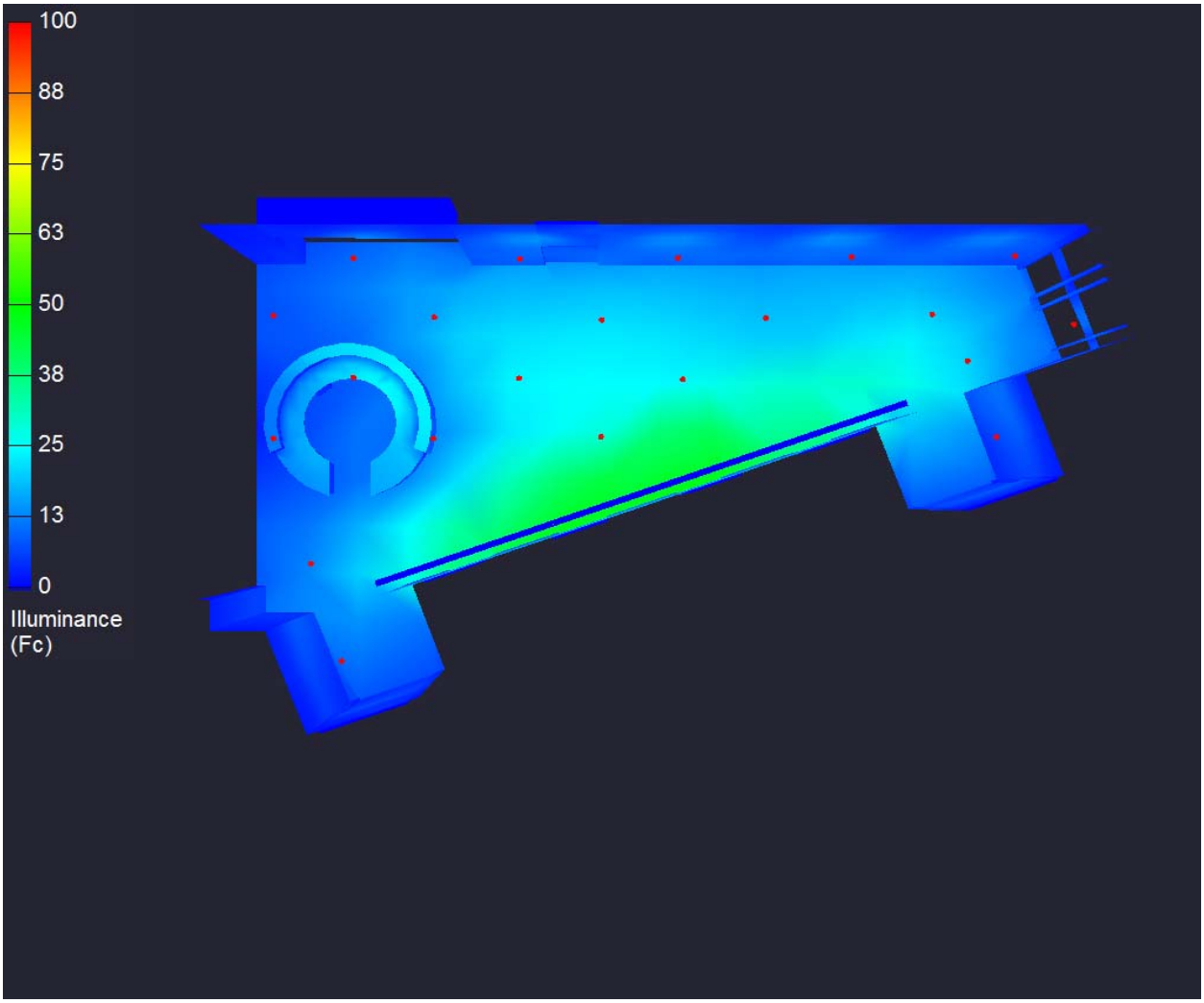


Figure 7: Pseudo rendering of the meeting room from above.

DESIGN SUMMARY

Lighting Criterion	Recommended Value	Achieved Value	Criteria Met
LPD Area Summary	< 0.9 W/ft²	0.843 W/ft²	Yes
Average Target Illuminance	≥ 10 fc	22.3 fc	Yes
Desk Surface Illuminance	15 fc	16.8 fc	Yes

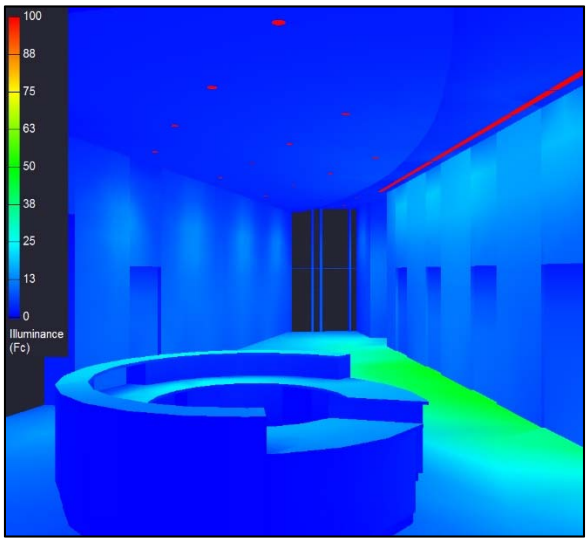


Figure 8: Pseudo rendering of the elevator lobby looking east.

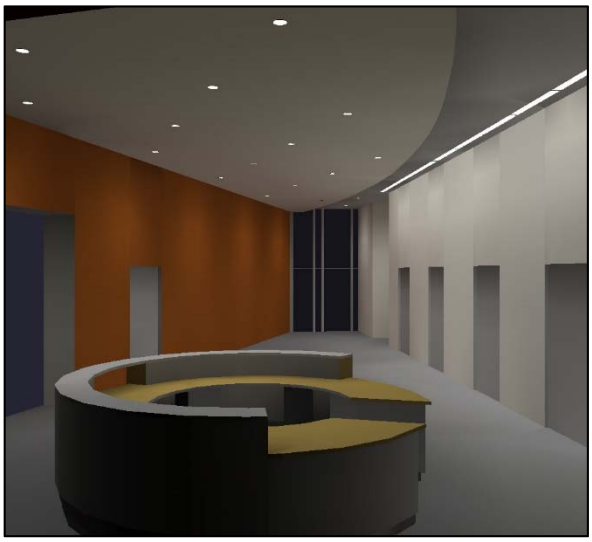


Figure 9: Perspective rendering of the elevator lobby looking east.

The elevator lobby is meant to be the accent of the lobby space. Clearly the addition of the linear wall grazer above the elevators draws the attention of pedestrians to that part of the room. The reception desk is illuminated by the pattern of recessed downlights above, providing it with enough light to meet the criteria I specified. Without the issue of avoiding the ventilation ducts within the space, perhaps I could have implemented a more decorative design. In the end, I am pleased with the results as both the LPD and average target illuminance values were met.

SECTION B | NANOMEDICINE WORKSTAION

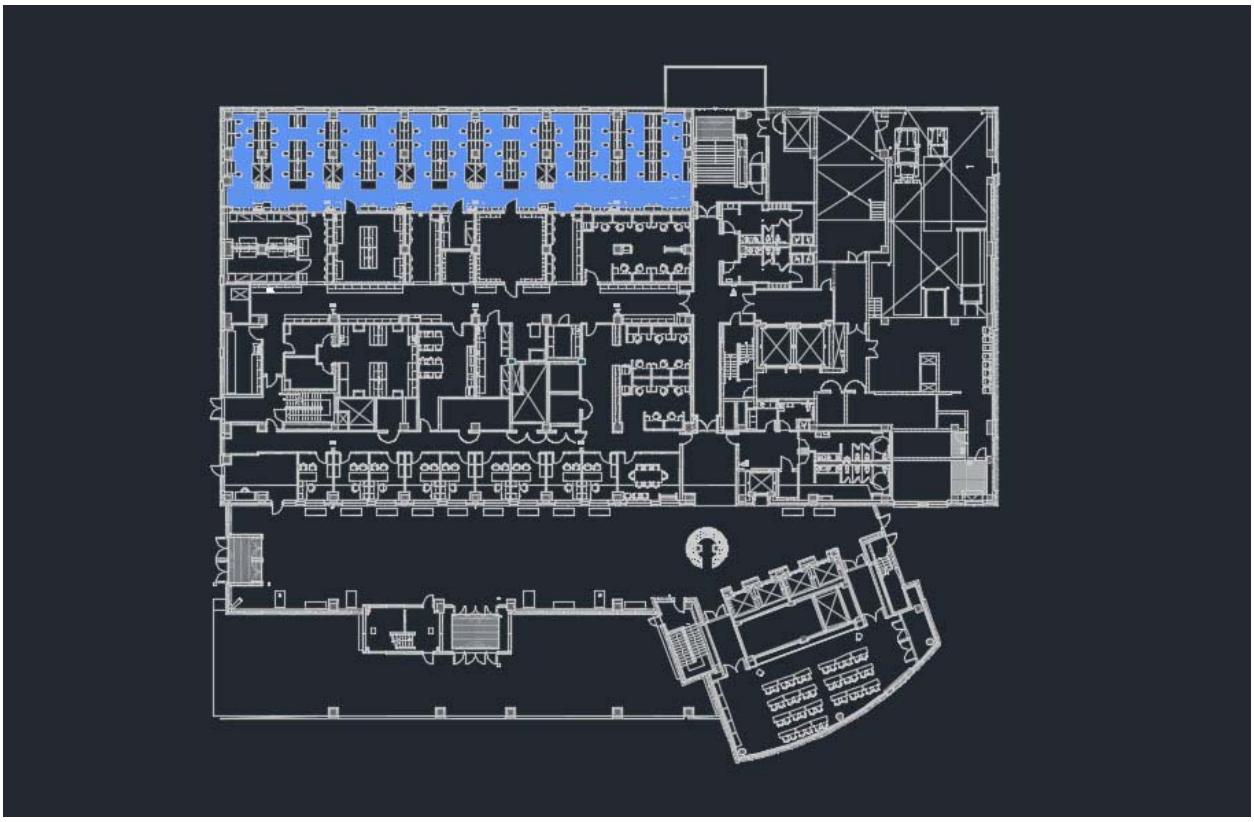


Figure 10: Plan view of nanomedicine workstation – First level

DETAILED SUMMARY

Space Designation: Nanomedicine PDoc/GS/Tech Workstation – 1130, 1140
Area: 4026.3 sq. ft.
Floor Finishes: Vinyl Composition Tile
Wall Finishes: Painted Gypsum Wall Board
Ceiling Finishes: Acoustic Panel Ceiling

The nanomedicine workstation is one of a number of research and development labs within the building. It is expected to be a laboratory where a myriad of chemicals and compounds are synthesized, while also serving as presentation and educational space. The lab is predominantly filled with casework, sinks, benches, and shelving units. The shelving units are attached to the partition of the benches, above the table workspace. These units can be seen in section detail in figure 8. These shelving units can reduce the amount of light hitting the surface of the desk, depending on the placement of the overhead fixture. There are also ten fume hoods within the lab, small ventilation devices that limit human exposure to hazardous materials or fumes. The hoods can be seen in detail in figure 12.

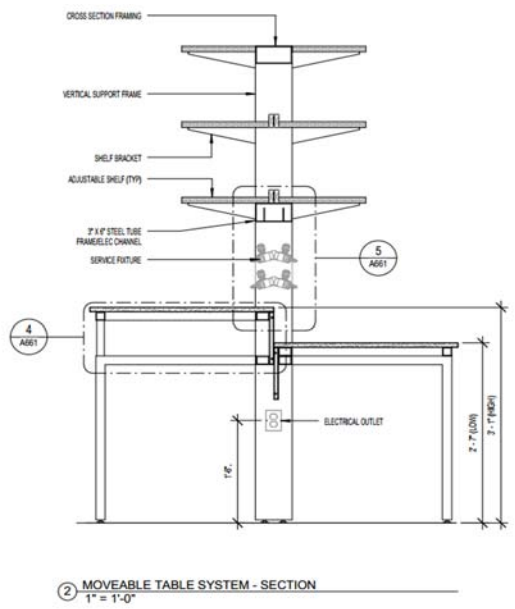


Figure 11: A section view of the workspace shelving and table system.

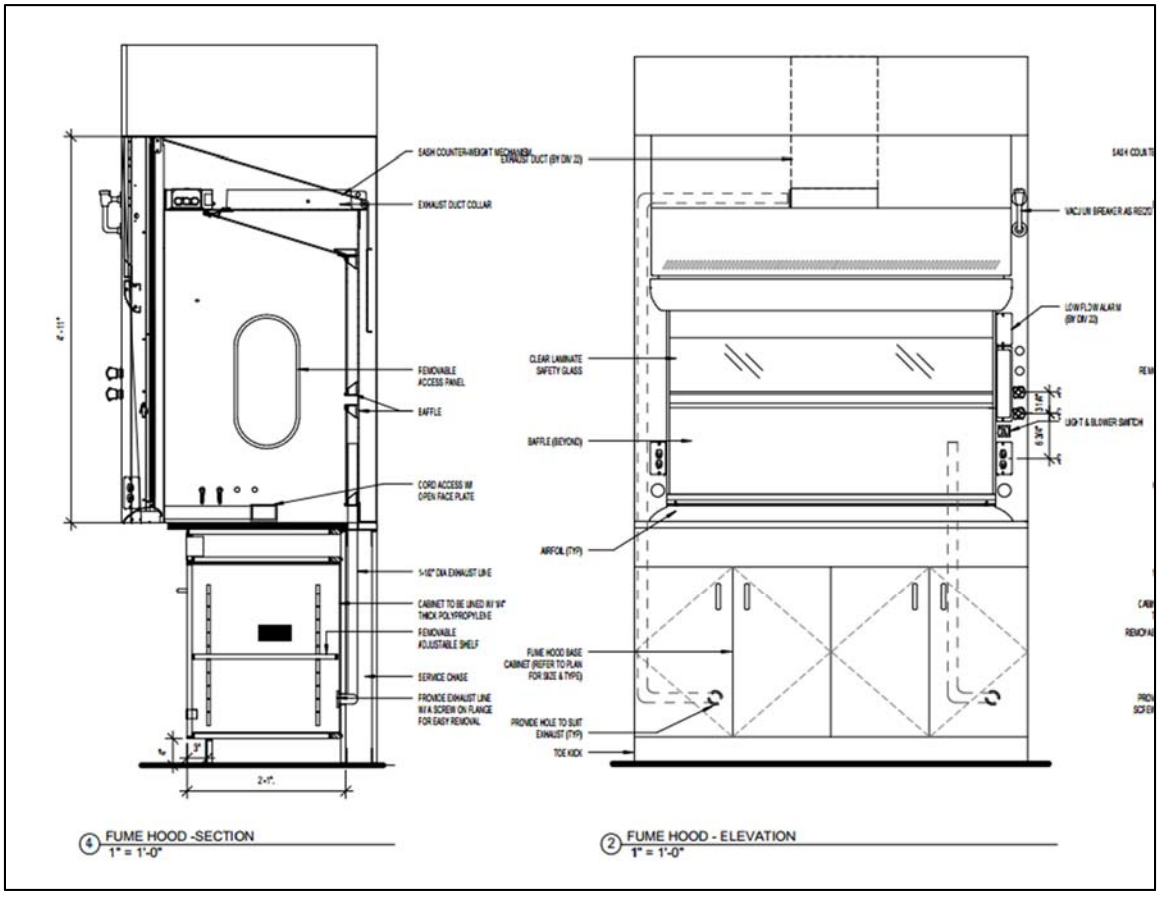


Figure 12: A section view of one of the ten workstation fume hoods.

DESIGN CRITERIA

Table 24.2 Educational Facilities Illuminance Recommendations

IES Lighting Handbook, 10th Edition

Applications and Tasks	Recommended Maintained Illuminance Targets (lux)		
Classrooms: Science Labs	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
Bench	500	300	1.5:1

E_h @3'; E_v @ 4'6" AFF. Ave:Min based on Table 12.6 Default Illuminance Ratio Recommendations.

Classrooms: Science Labs	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
Demonstration Area	1000	500	3:1

E_h @3' AFF; E_v @ 4'6" AFF

The majority of the workstation space is casework, lab tables, and shelving. Since it is part of an educational facility, the illuminance recommendations for science labs are appropriate. The lighting criteria are such that all of the workstation benches, desks, and demonstration areas have adequate lighting for the staff and students should be able to see what they are doing. The safety of certain projects may be determined by reading and understanding what chemical compounds they are using. Thus, the target illuminance at the desk height must match the criteria. It was my assumption that the workstation space would be considered a workshop space, and thus I selected the following lighting power density.

Table 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method

ANSI/ASHRAE/IES Standard 90.1-2013

Common Space Types	LPD (W/ft^2)
Workshop	1.59

LIGHT-LOSS FACTORS

Assumed Fluorescent Light Loss Factor	
Description	Factor
Lamp Lumen Depreciation	.90
Luminaire Dirt Depreciation	.95
Ballast Factor	1.15
Total Light Loss Factor	**.983**

Assumed LED Light Loss Factor	
Description	Factor
Lamp Lumen Depreciation	.80
Luminaire Dirt Depreciation	.95
Total Light Loss Factor	**.76**

REFLECTED CEILING PLAN

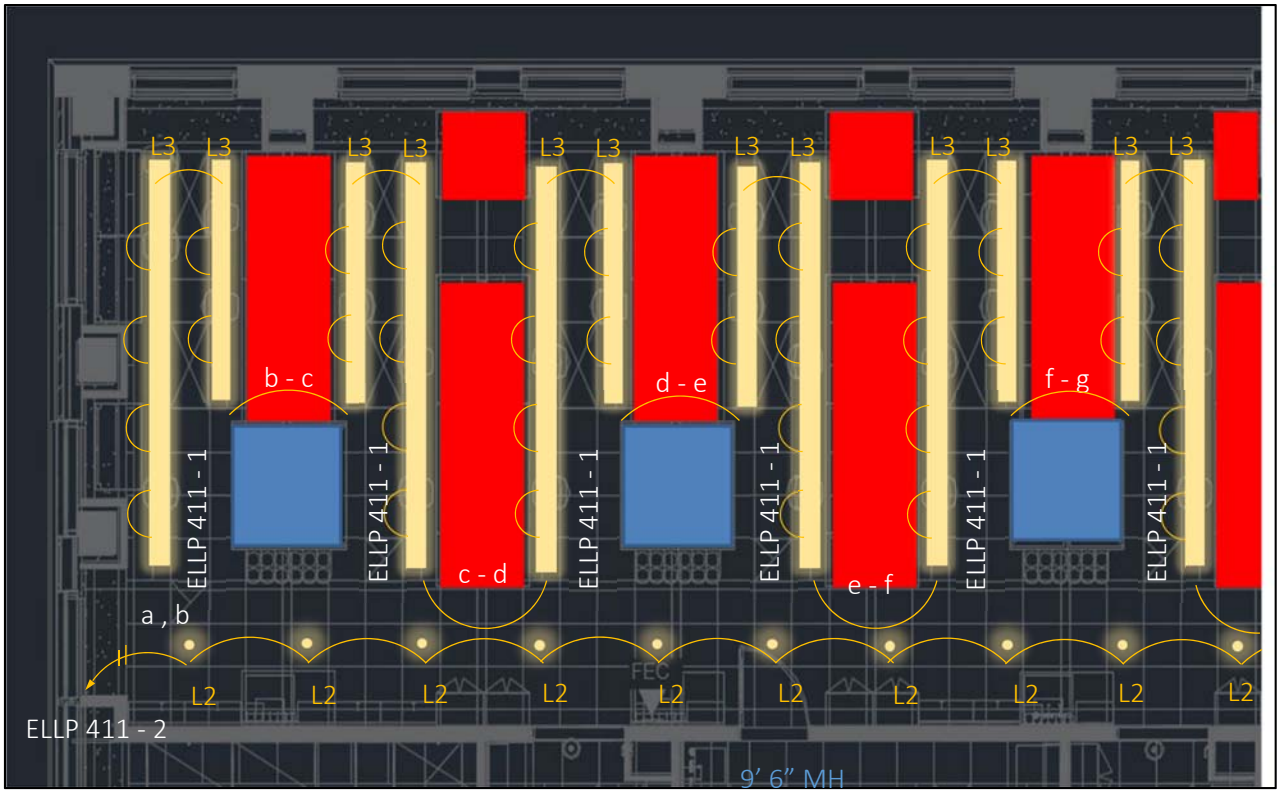


Figure 13: A reflected ceiling plan of the nanomedicine workstation.

Objects in RED are shelving and casework. Objects in BLUE are the fume hoods.
Ceiling is 2 X 2 grid.

LUMINAIRE: L3
DESCRIPTION: 1' x 4' RECESSED VOLUMETRIC DISTRIBUTION LUMINAIRE
MANUFACTURER: LITHONIA

LUMINAIRE: L2
DESCRIPTION: RECESSED ROUND TRIMLESS DOWNLIGHT
MANUFACTURER: USAI

This space proved difficult, as I had to design not only around the ceiling ventilation, but also the fume hoods which encompassed a large portion of the vertical space. The target was the task plane on the desks beneath the shelving units.

PERFORMANCE DATA

The following calculations were performed in AGI-32 Software.

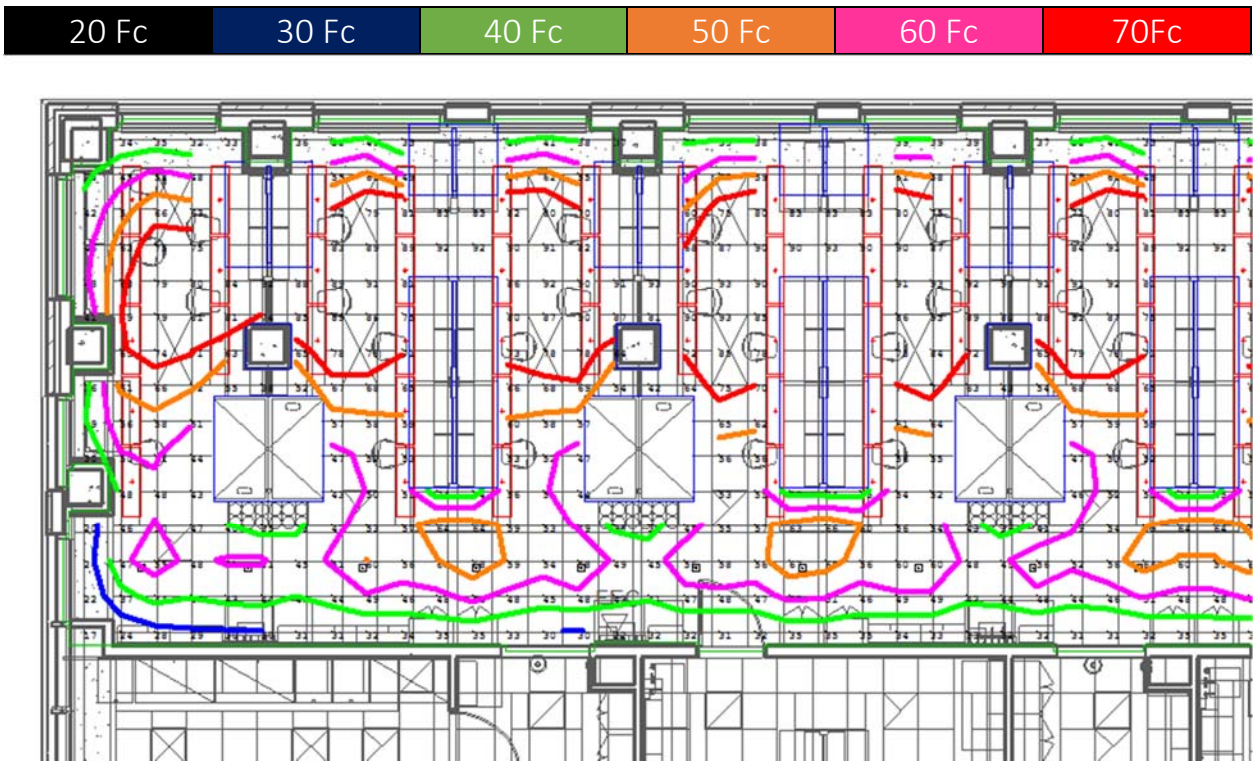


Figure 14: AGI-32 Calculation showing targeted illuminances (fc).

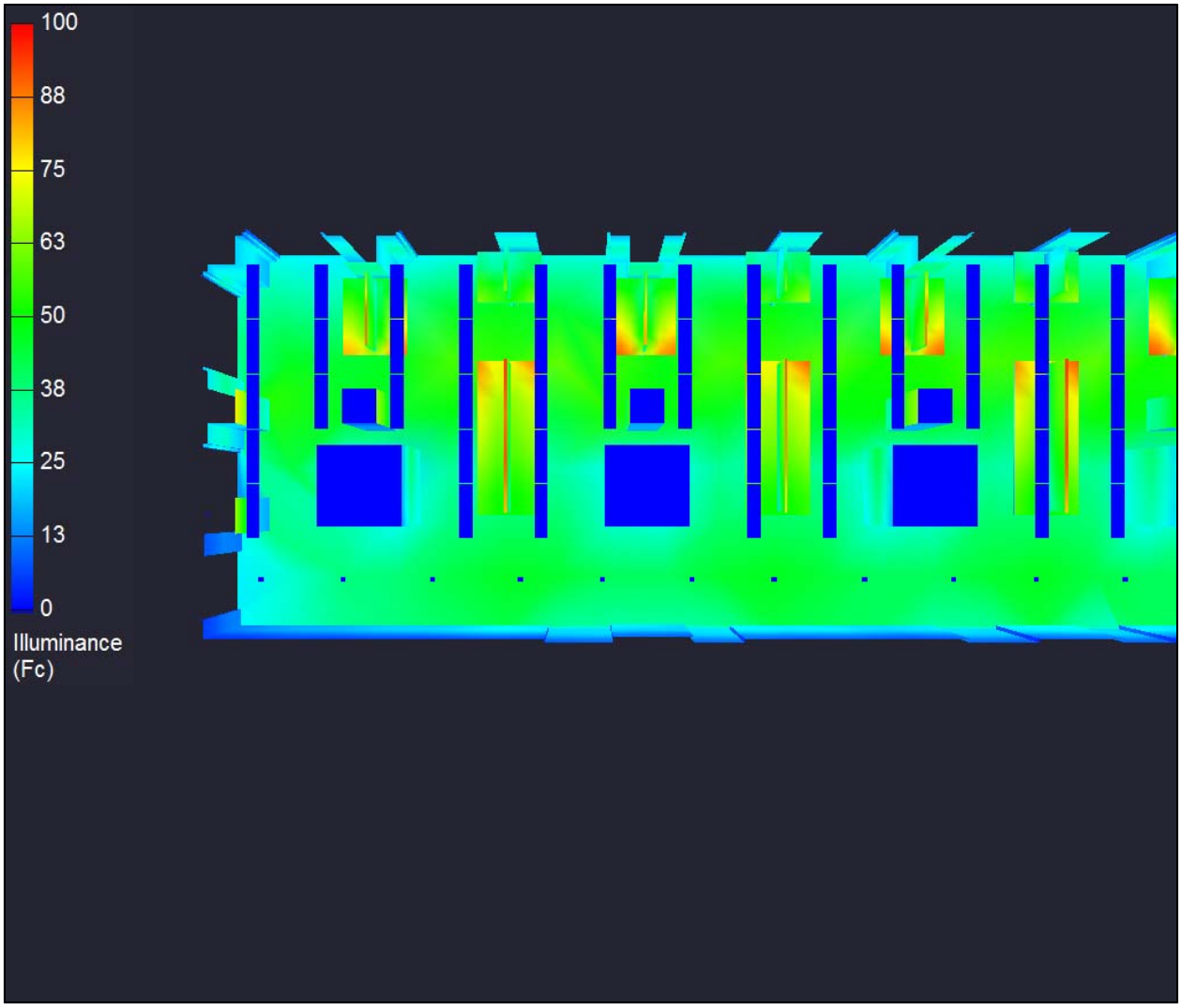


Figure 15: Pseudo rendering of the workstation from above.

DESIGN SUMMARY

Lighting Criterion	Recommended Value	Achieved Value	Criteria Met
LPD Area Summary	< 1.59 W/ft²	0.973 W/ft²	Yes
Average Target Illuminance	≥ 50 fc	62.8 fc	Yes

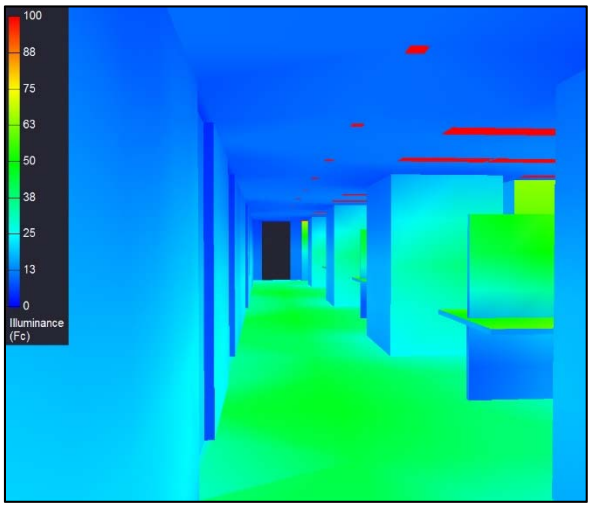


Figure 16: Pseudo rendering of the workstation looking west.

Figure 17: Perspective rendering of the workstation looking west

Both the LPD and the average target illuminance values met the established criterion. The desk and shelving space has enough light in order to perform any task within the laboratory space. In addition, the lighting does not interfere with the fume hoods that are taking up the majority of the vertical space. While it is not the most aesthetically pleasing lighting design, it makes up for its appearance with functionality.

.

SECTION C | MEETING ROOM

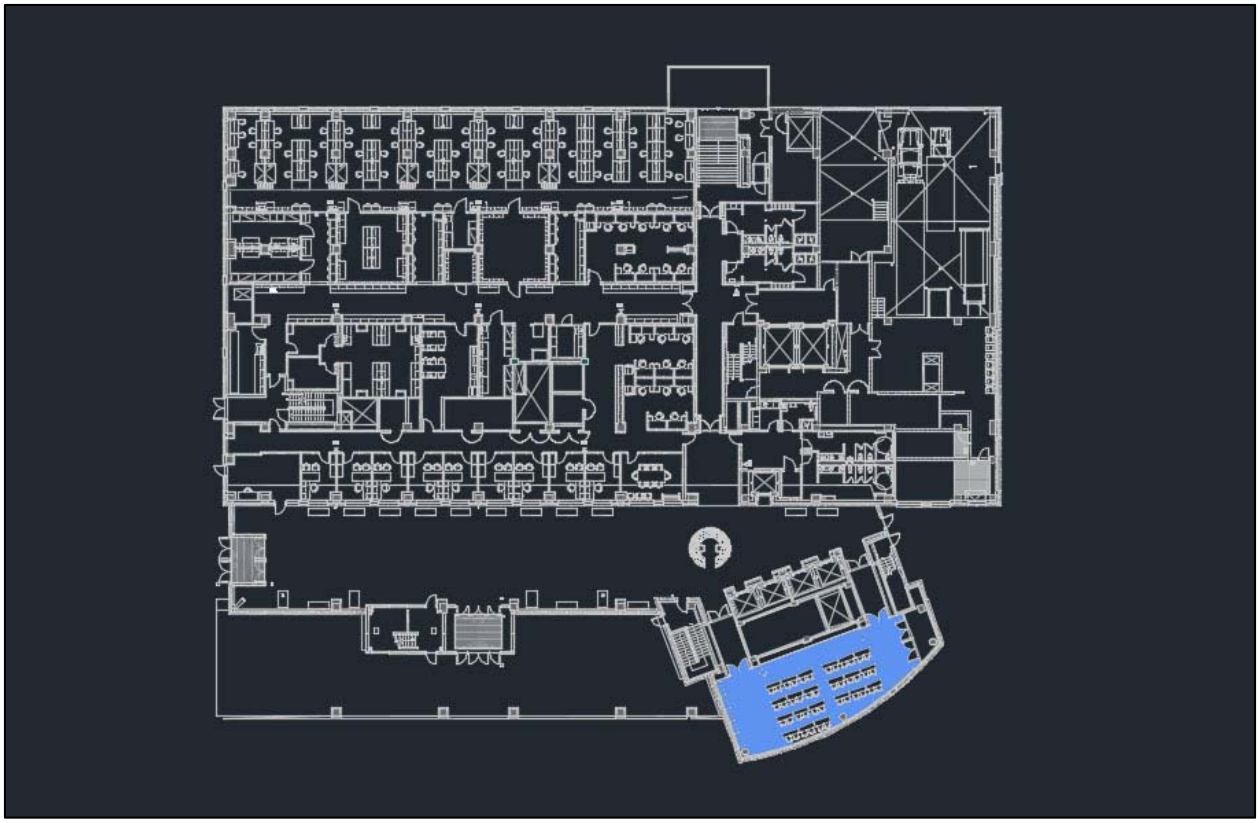


Figure 18: Plan view of the meeting room – First level

DETAILED SUMMARY

Space Designation: Meeting Room – 1010
Area: 1,421 sq. ft.
Floor Finishes: Carpet Tile
Wall Finishes: Veneered Acoustic Panel and Painted Gypsum Wall Board
Ceiling Finishes: Acoustic Panel Ceiling
(Note: Ceiling is Armstrong Techzone Lay-in)

The meeting room is a moderately sized conference room space. Here office staff and building patrons can meet for video conferencing, audiovisual presentations, and lectures. The majority of seating is assumed to be temporary, and can be moved as needed to fit the conferencing event. The north wall of the meeting room features two presentation boards mounted between the structural columns.

DESIGN CRITERIA

Table 22.2 Common Applications Illuminance Recommendations

IES Lighting Handbook, 10th Edition

Applications and Tasks	Recommended Maintained Illuminance Targets (lux)		
Conferencing: Meeting	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
Discourse	300	100	1.5:1

E_h @2'6"; E_v @ 4'AFF maintained for presentation surfaces (vertical poster boards, presentation boards, task surfaces).
Ave:Min based on Table 12.6 Default Illuminance Ratio Recommendations.

Conferencing: Presentation	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
AV	30	30	-

E_h @2'6"; E_v @4' AFF.

The meeting room should maintain a 300lux average so that presenters and listeners alike can see each other, be able to recognize the space, and be able to read and write within the space. Because of the addition of the audio visual equipment at the north wall, the horizontal and vertical targets must also be considered. The general LPD for a conference room is listed below.

Table 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method

ANSI/ASHRAE/IES Standard 90.1-2013

Common Space Types	LPD (W/ft^2)
Conference/Meeting/Multipurpose	1.23

LIGHT-LOSS FACTORS

Assumed LED Light Loss Factor	
Description	Factor
Lamp Lumen Depreciation	.80
Luminaire Dirt Depreciation	.95
Total Light Loss Factor	**.76**

REFLECTED CEILING PLAN

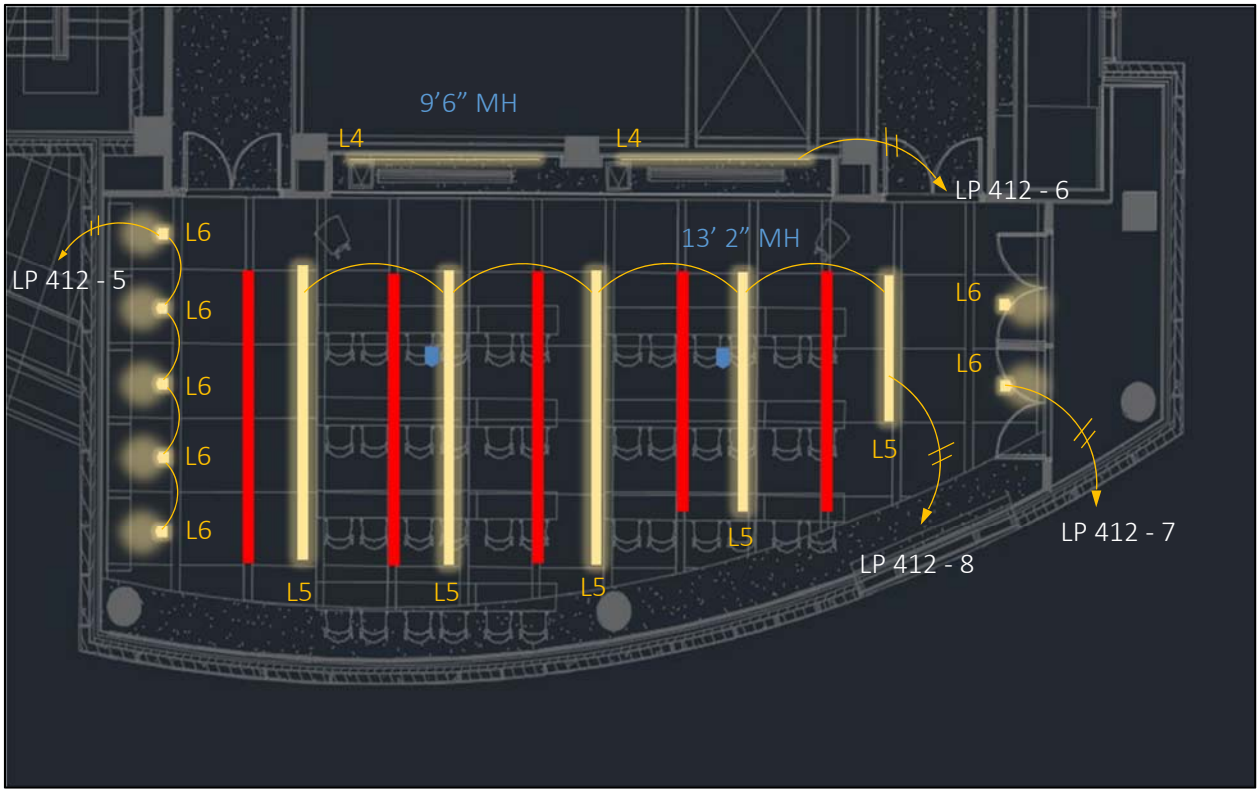


Figure 19: A reflected ceiling plan of the elevator lobby.

Objects in RED are ventilation systems. Objects in BLUE are ceiling mounted projectors. Ceiling is 4 X 4 grid.

LUMINAIRE: L4
DESCRIPTION: LOW WATTAGE LINEAR LED SLOT LUMINAIRE
CONTINUOUS RUN – 4’ LENGTHS
MANUFACTURER: FOCAL POINT

LUMINAIRE: L5
DESCRIPTION: RECESSED LED LINEAR DOWNLIGHT FLUSH LENS
CONTINUOUS RUN – 4’ LENGTHS
MANUFACTURER: FOCAL POINT

LUMINAIRE: L6
DESCRIPTION: RECESSED ROUND TRIMLESS DOWNLIGHT
MANUFACTURER: USAI

PERFORMANCE DATA

The following calculations were performed in AGI-32 Software.

20 Fc	30 Fc	40 Fc	50 Fc	60 Fc	70Fc

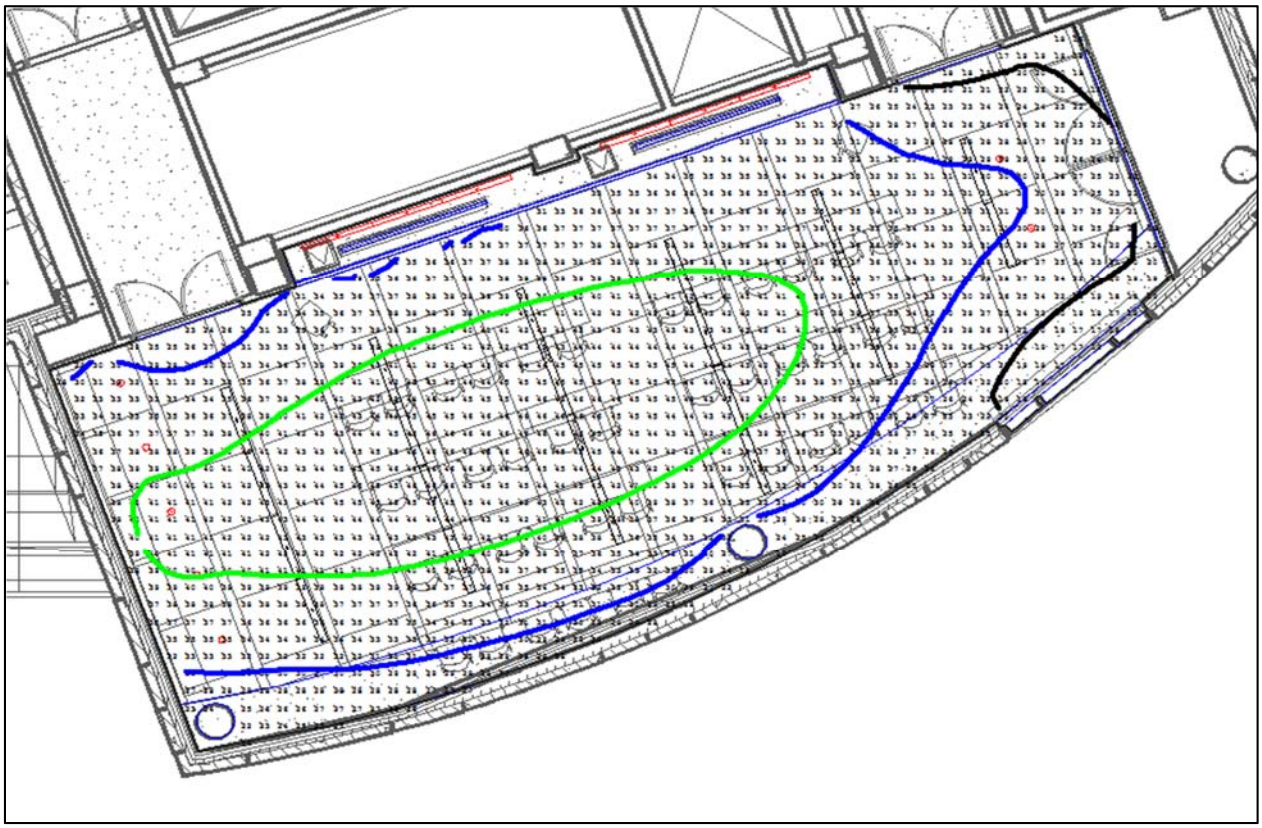


Figure 20: AGI-32 Calculation showing targeted illuminances (fc).

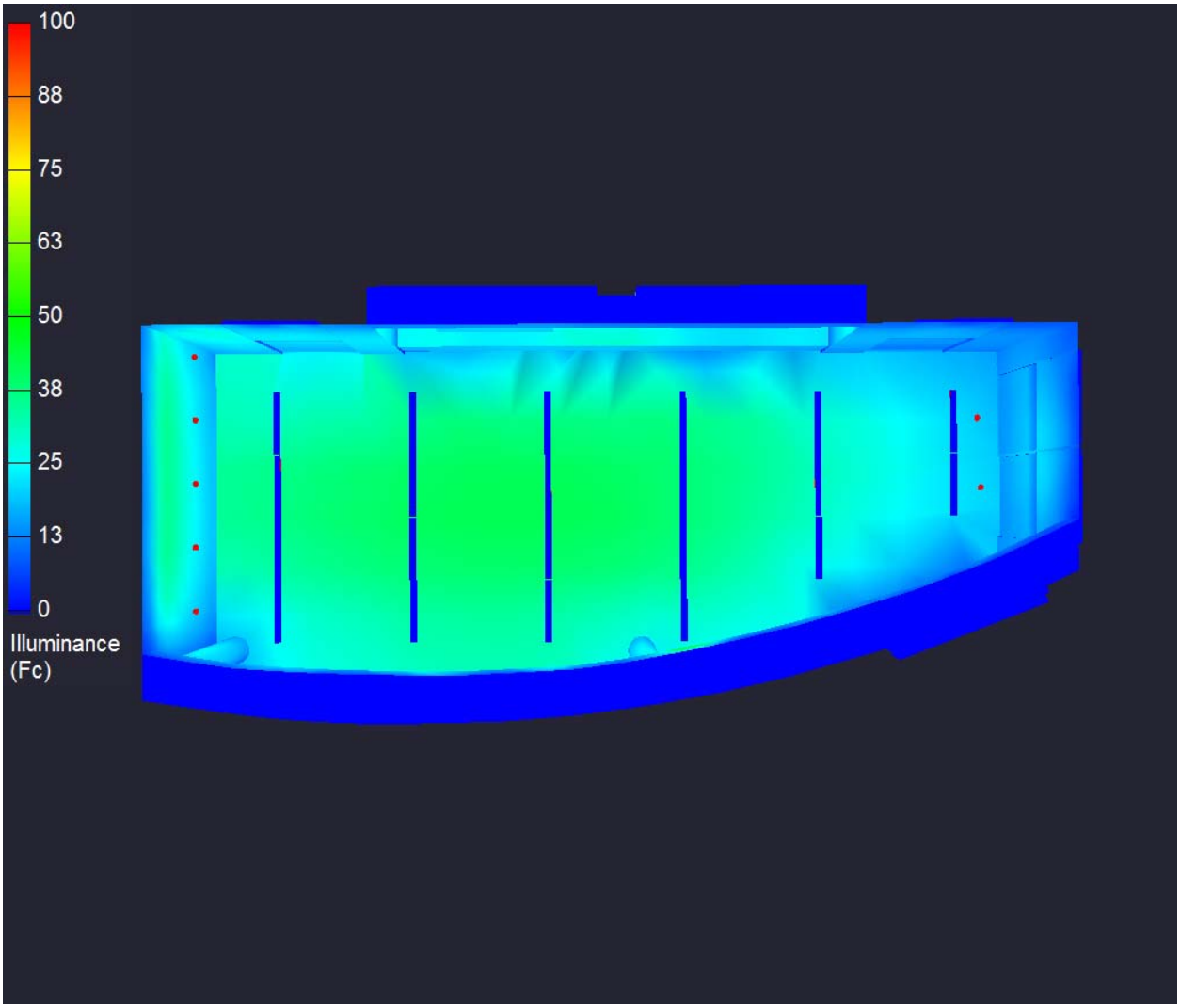


Figure 21: Pseudo rendering of the meeting room from above.

DESIGN SUMMARY

Lighting Criterion	Recommended Value	Achieved Value	Criteria Met
LPD Area Summary	< 1.23 W/ft²	0.685 W/ft²	Yes
Average Target Illuminance	≥ 30 fc	34.9 fc	Yes

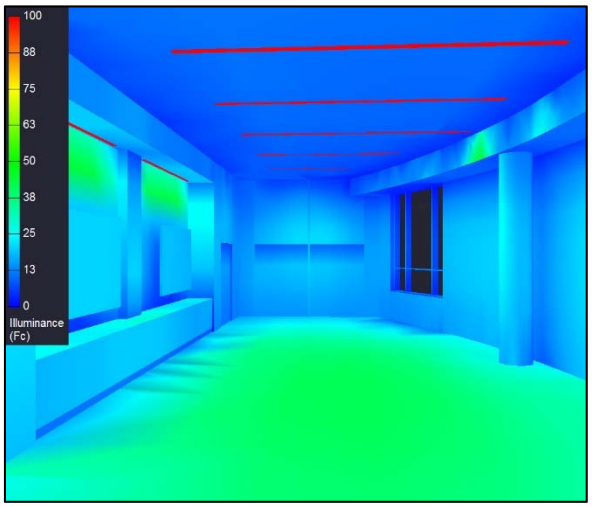


Figure 22: Pseudo rendering of the meeting room looking west.

Figure 23: Perspective rendering of the meeting room looking west

The target illuminance of the meeting room was calculated above the recommended value. In addition, the recommended LPD was also less than that the recommended maximum. Thus, the simple lighting scheme worked well within the small conference space. The Trace fixtures behind the projector screens add a nice balance of illumination in what would have been a dark section of the north wall. The added light adds more to the feeling of spaciousness within the room.

SECTION D | EXTERIOR PLAZA

DETAILED SUMMARY

Area: Approximately 32,704 sq. ft.

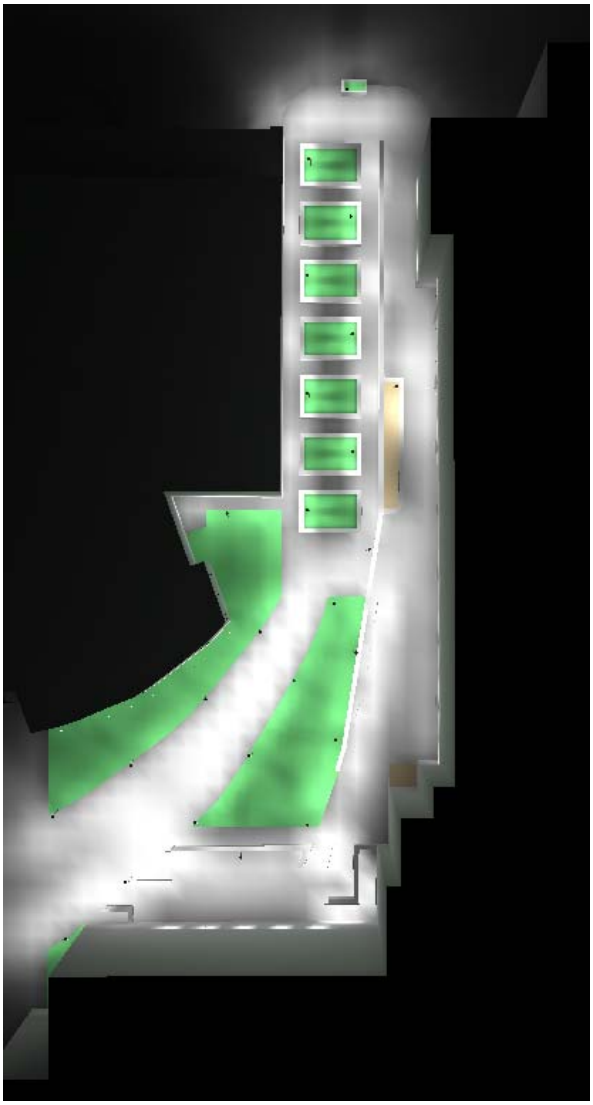


Figure 24: An aerial view of the exterior plaza.

The Health Sciences Facility site is within a block radius of the Schools of Pharmacy and Medicine, and adjacent to the School of Dentistry building. The exterior space is mostly paved walkways. There is a large courtyard space near the south entrance which connects to a pathway that functions as a pedestrian channel through the HSF3 site and the School of Dentistry building. This pathway's slope declines walking from north to south, thus there are a series of stairs and ramps between the paved paths. This heavily trafficked space will need to provide an adequate amount of illumination for pedestrians to travel safely through the campus either during the day, or at night. Up lighting and pathway grazing will be a key element of the exterior space, applying the concept of unseen but powerful light throughout the plaza.

DESIGN CRITERIA

Table 26.4 Nighttime Outdoor Lighting Zone Definitions

IES Lighting Handbook, 10th Edition

Zone	Outdoor Lighting Situation	Definition
LZ3	Moderately High Ambient Lighting	Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security, and/or convenience and it is often uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.

The building site is within one block of the Schools of Pharmacy, Medicine, and Dentistry. Therefore it is safe to assume that the site will be exposed to heavy pedestrian traffic throughout the day. I accounted for high activity when setting my outdoor lighting criteria.

Table 34.2 Retail Illuminance Recommendations

IES Lighting Handbook, 10th Edition

Applications and Tasks	Recommended Maintained Illuminance Targets (lux)		
Plazas and Town Squares: High Activity	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
LZ3	6	2	5:1 (10:1)
(curfew)	4	2	5:1 (10:1)

E_h @pavement; E_v @ 5' AFG in at least the two primary directions of circulation. Coordinate lighting with security cameras.

Ramps, Stairs, and Steps: High Activity	Horizontal (E_h) Targets	Vertical (E_v) Targets	Avg:Min
LZ3	8	4	5:1 (10:1)
(curfew)	6	2	5:1 (10:1)

E_h @treads/landings; E_v @ 5' AFG in at least the two primary directions of circulation. Coordinate lighting with security cameras.
Lighting should address the area of the ramps, steps, and landings. Alternatively, draw attention to the elevation changes with contrast lighting.

The recommended horizontal illuminance at the pavement will be the target illuminance factor for the path of egress. There is a portion of the paved space that inclines north along the path. In addition, there are small stairs located at various positions and must be accounted for based on a separate standard.

Table 9.4.2-2 Individual Lighting Power Allowances for Building Exteriors

ANSI/ASHRAE/IES Standard 90.1-2013

Building Grounds (Zone 3)	LPD (W/ft^2)
Walkways less than 10ft wide	0.8
Plaza Areas	0.16
Stairways	1.00
Landscaping	0.05

The exterior lighting power density must remain within the allowances set in the above criteria. Some of the exterior pathways are greater than 10' wide, while others are less than that width. Thus, I will account for both when considering LPD. In addition, the stairways and landscaping allowances are considered due to the large amount of landscaping space and several small stairwells.

LIGHT-LOSS FACTORS

Assumed LED Light Loss Factor	
Description	Factor
Lamp Lumen Depreciation	.80
Luminaire Dirt Depreciation	.95
Total Light Loss Factor	**.76**

EXTERIOR SITE PLAN

LUMINAIRE: S1
DESCRIPTION: LED AREA LUMINAIRE
MANUFACTURER: LITHONIA

LUMINAIRE: S2
DESCRIPTION: LED LIGHTING INTEGRATED WITHIN HANDRAIL
MANUFACTURER: LUXRAIL

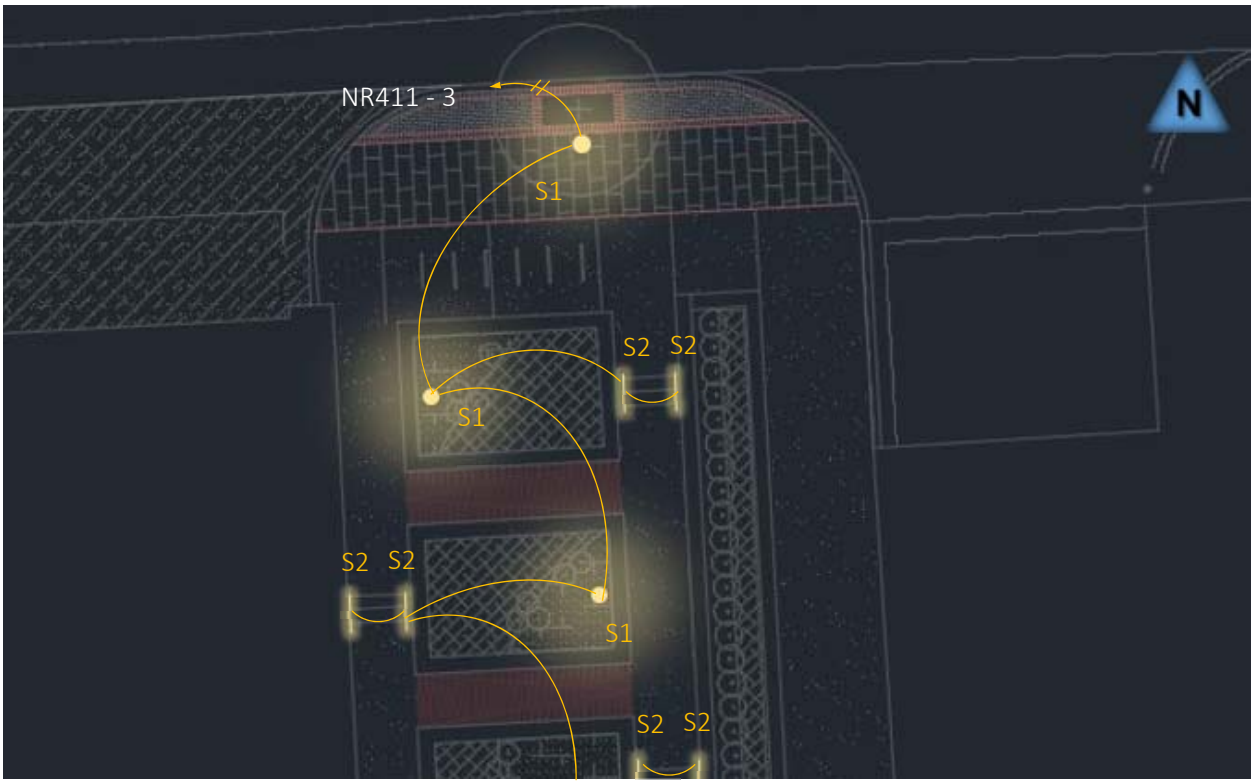


Figure 25: An aerial site plan of the upper exterior plaza.

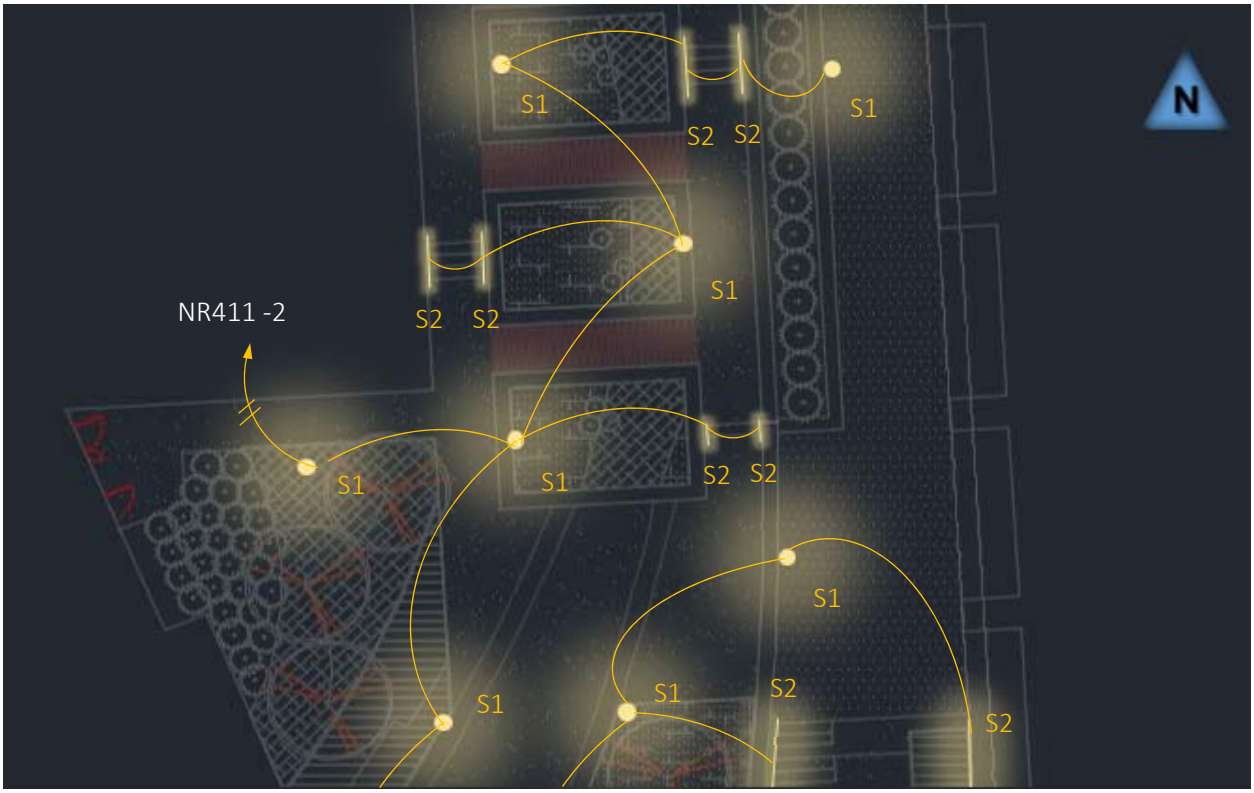


Figure 26: An aerial site plan of the central exterior plaza.

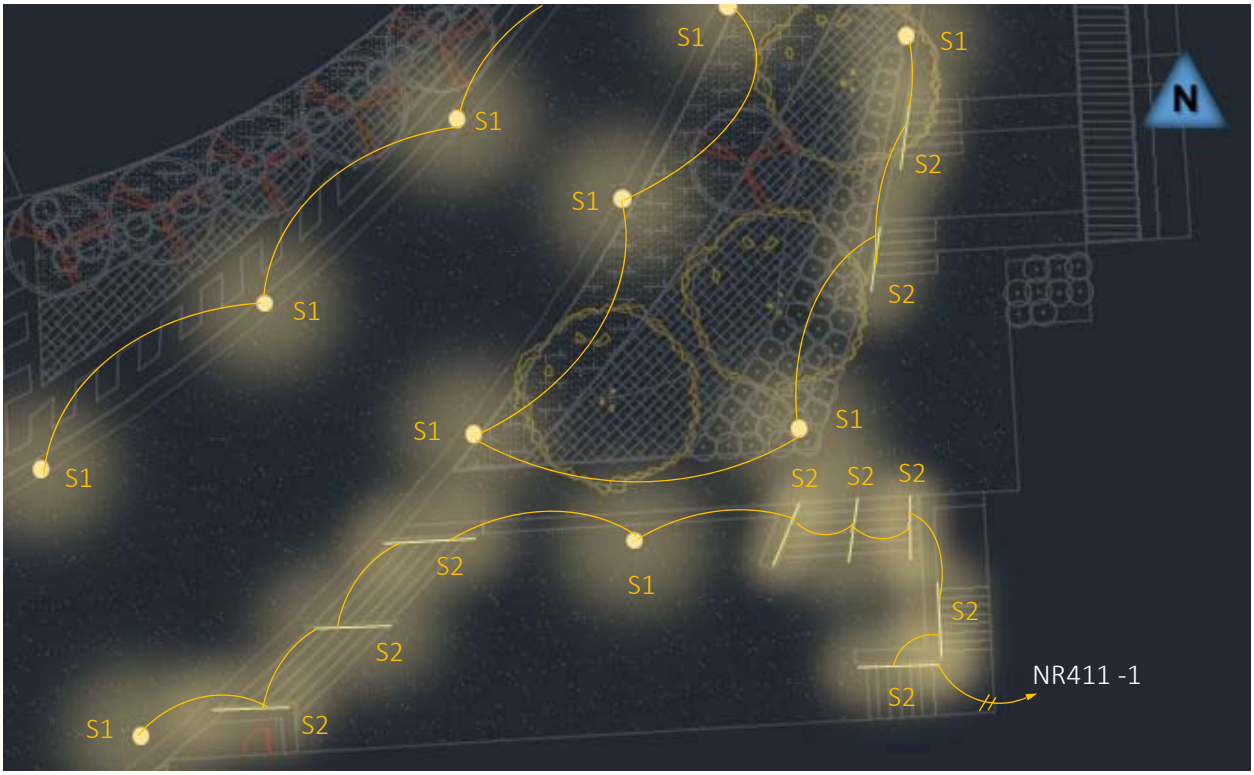


Figure 27: An aerial site plan of the lower exterior plaza.

PERFORMANCE DATA

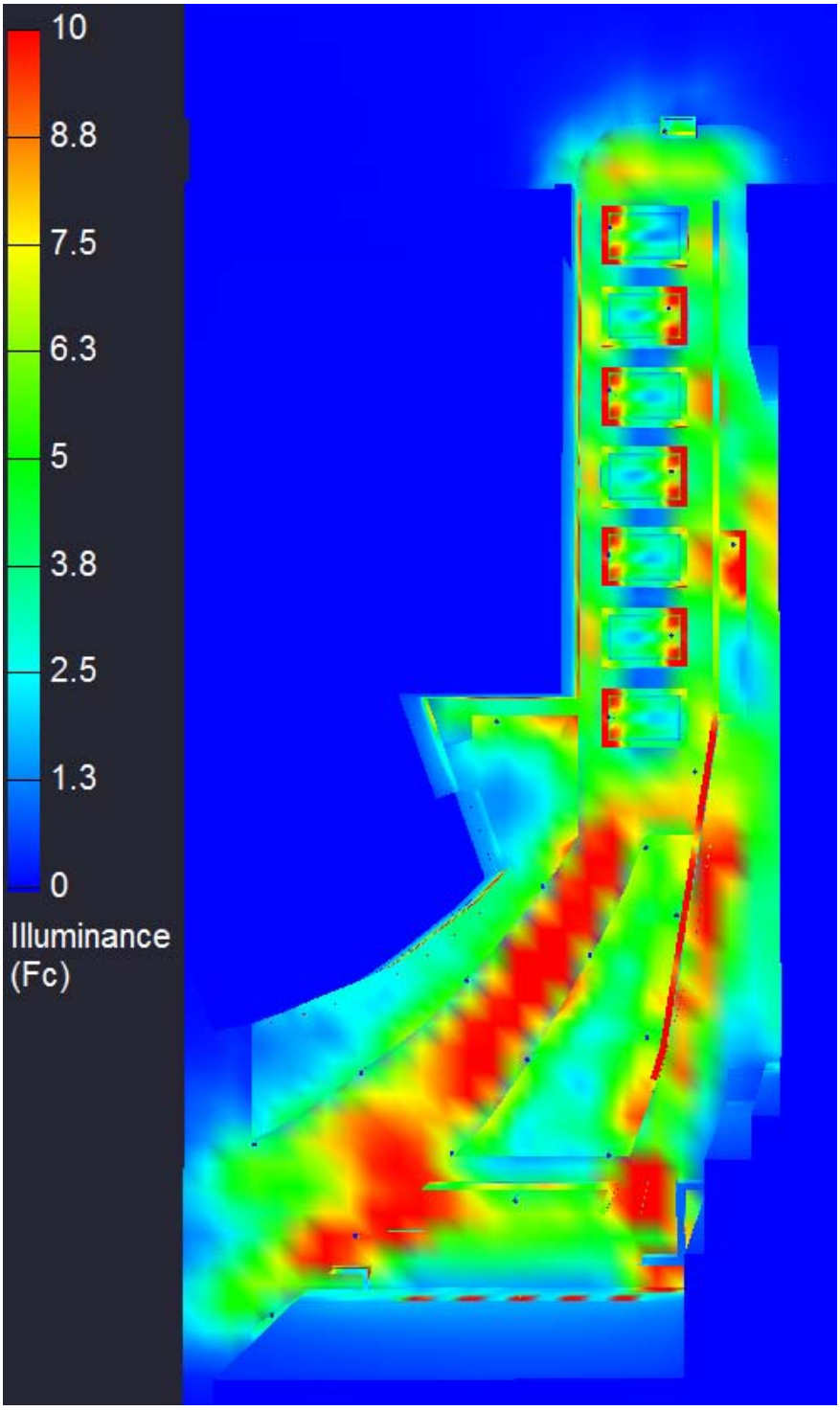


Figure 28: An aerial site pseudo rendering of the exterior plaza.

DESIGN SUMMARY

Lighting Criterion	Recommended Value	Achieved Value	Criteria Met
LPD Area Summary	< 0.8 W/ft²	0.181 W/ft²	Yes
Average Target Illuminance	≥ 6 fc	6.35 fc	Yes

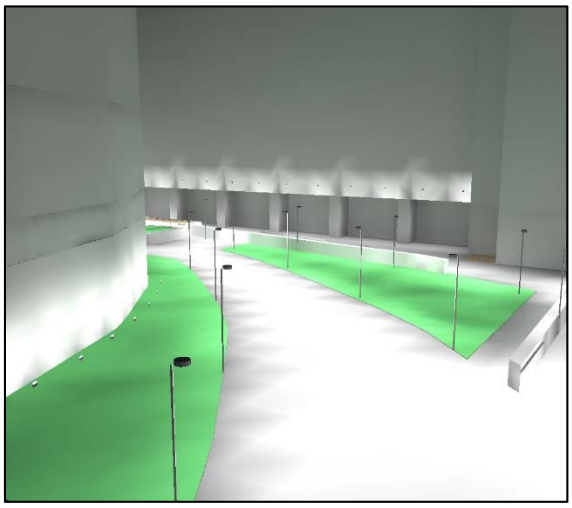


Figure 29: Perspective rendering of the plaza looking north. .

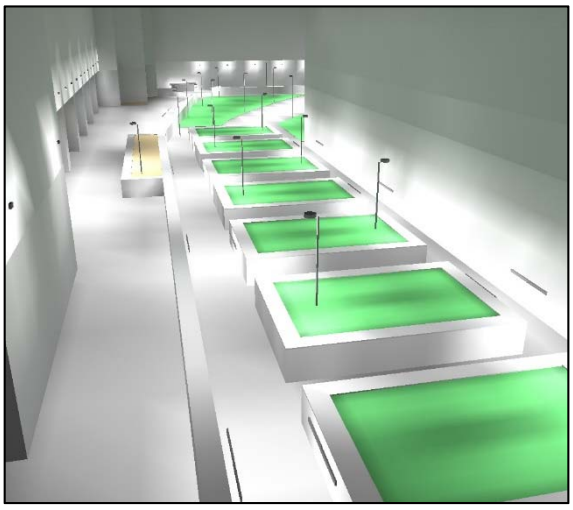


Figure 30: Perspective rendering of the plaza looking south.

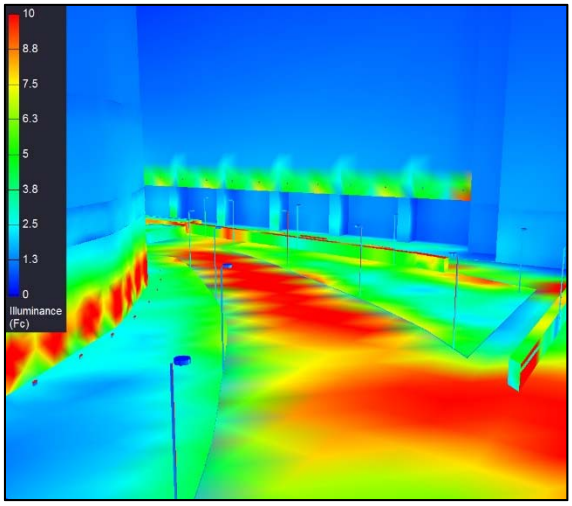


Figure 31: Pseudo rendering of the plaza looking north.

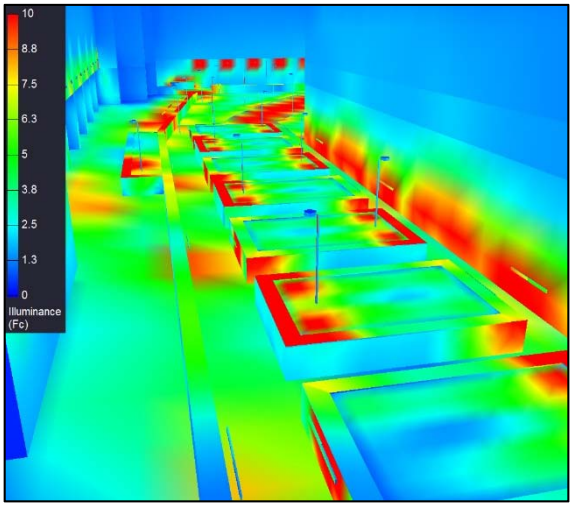


Figure 32: Pseudo rendering of the plaza looking south.

As you can see, the pathway clearly meets the 1 fc average illuminance as specified in the criteria. This will provide enough for safe night-time pedestrian travel.

SECTION 3 | ELECTRICAL DEPTH

The building is projected to receive a LEED Gold rating. The minimum energy performance must exceed ASHRAE 90.1 – 2007 by 10%. The MEP will confirm roughly 25% savings when energy model is completed.

BUILDING UTILIZATION VOLTAGES

Lighting: 120V and 277V | 1 ϕ
Receptacles: 120V | 1 ϕ
Mechanical Equipment: 208/120V and 480/277V | 3 ϕ
Special Equipment: Elevators 120V | 1ϕ

ELECTRICAL SYSTEMS PERCENTAGE

The majority of the building's electrical storage space is in the basement and penthouse levels. In addition, there are IT and electrical rooms at the east and west ends on each floor. The building's IT and electrical rooms are located in the same area of each subsequent floor and are therefore identical in area.

Lower Basement Level = 5376 sq ft.
Upper Basement Level = 5267 sq ft.
Level 1 = 752 sq ft.
Level 2 = 752 sq ft.
Level 3 = 752 sq ft.
Level 4 = 752 sq ft.
Level 5 = 752 sq ft.
Level 6 = 752 sq ft.
Level 7 = 752 sq ft.
Level 8 = 752 sq ft.
Level 9 = 752 sq ft.
Lower Penthouse Level = 5280 sq ft.

Electrical Combined Floor Area = 22,691 sq ft.
Building Total Area = 428,970 sq ft.

22,691 / 428,970 = .05 (5% of the building floor area)

BUILDING LOAD CALCULATION

The Health Science Facility III is classified as Occupancy Business use Group B, Assembly use Group A-3, Storage use Group S by the IBC 2009 Ed. Load calculations provided by the NEC 2011 Ed.

LIGHTING

3.5 VA/SF × 428,970 SF = 1501 kVA
DEMAND FACTOR: 100%

RECEPTACLE

3.5 VA/SF × 428,970 SF = 1501 kVA
10 kVA + (.5 × 1491 kVA) = 755 kVA
DEMAND FACTOR: 100% for first 10kVA, 50% for remainder

MECHANICAL

7 VA/SF × 428,970 SF = 2402 kVA
DEMAND FACTOR: 80%

SPECIAL EQUIPMENT – ELEVATORS

1.1 VA/SF × 428,970 SF = 472 kVA
DEMAND FACTOR: 100%

TOTAL BUILDING LOAD = 5130 kVA

POWER COMPANY RATE SCHEDULE

Baltimore Gas and Electric Company provides the following monthly net rates:
Utility Voltage is 480V | 3ϕ

CUSTOMER CHARGE = $88.00 per month
DEMAND CHARGE = $3.17/kW
DELIVERY SERVICE CHARGE = 0.01584 $/kWh
GL SCHEDULE – TYPE II SOS
- GENERATION RATE = 14.909 c/kWh
- TRANSMISSION RATE = 0.549 c/kWh
- TOTAL SUPPLY RATE = 15.458 c/kWh

BACK-UP POWER LOADS

GENERATOR (LONG – TERM)

- Emergency Lighting = 7.51kVA
- Elevator Systems
- IT Equipment

UNINTERRUPTIBLE POWER SUPPLY (SHORT – TERM)

- Video Surveillance
- Security Access

COMMUNICATION SYSTEMS

Telephone / Data
Fire Alarm
CATV
Access Control – Card Access
Security / Video Surveillance

MAJOR EQUIPMENT

Switchboards
Panel boards
Generators
Transformers
Elevator Motors
Uninterruptible Power Supply (UPS)

CONNECTED BUILDING LOADS

See Appendix C.

EMERGENCY POWER

See Appendix C.

MAIN SERVICE AND DISTRIBUTION EQUIPMENT

Switchgear E/NG5B1 | 13200V
Switchgear NS5B1 | 480Y/277, 3 ϕ, 4 wire
Switchgear ES5B1 | 480Y/277, 3 ϕ, 4 wire
Switchgear ES5B2 | 480Y/277, 3 ϕ, 4 wire
Switchgear ES5P1 | 480Y/277, 3 ϕ, 4 wire
Switchgear ES5P2 | 480Y/277, 3 ϕ, 4 wire
Switchgear ELG4P1 | 480Y/277, 3 ϕ, 4 wire

MAIN SERVICE EQUIPMENT

Single Ended equipment, indoor location.

MAIN SERVICE TRANSFORMER

Typical Dry Type Insulated transformer 480V Delta Primary, 208Y/120V Secondary

STEP DOWN TRANSFORMERS

With exception to the basement and penthouse levels, all floors have either 4 or 5 transformers located in the electrical rooms. Below is a listing of the transformers.

DESIGNATION	VOLTAGE (kVA)
TXB1	112.5
ETXB1	112.5
ELTXB1	45
ETXB2	112.5
ELTXB2	112.5
TX11	112.5
ETX11	75
ETX12	75
TX12	112.5
ELTX11	75
TX21	112.5
ETX21	75
ETX22	75
TX22	112.5
TX31	112.5
ETX31	75
ETX32	75
TX32	112.5
TX41	112.5

ETX41	75
ET432	75
TX42	122.5
ELTX41	15
TX51	112.5
ETX51	75
ET452	75
TX52	112.5
TX61	112.5
ETX61	75
ET462	75
TX62	`112.5
TX71	112.5
ETX71	75
ET472	75
TX72	112.5
ELTX71	15
TX81	112.5
ETX81	75
ET482	75
TX82	112.5
TX91	112.5
ETX91	75
ET492	75
TX92	112.5
TX101	112.5
ETX101	112.5
ET4102	112.5
TX102	112.5
ELTX101	15
ELTXP1	15
ELTXP2	112.5
ETXP1	112.5

PANEL BOARDS

Wall - Mounted with galvanized steel channels.

MAIN RISERS AND FEEDERS

The busses are copper, with bolted feeders.

CONDUCTORS

Copper Conductors throughout the building circuitry.

CONDUIT

General PVC Conduit, insulation 6 inch.

RECEPTACLES

Specification Grade.

SWITCH AND RECEPTACLE FACEPLATES

Switch cast weatherproof cover. Watertight compression used for receptacle box. Additional sealant requirements in architectural drawings.

MOTOR STARTERS

The building's motor starters are individual and non-reversing.

UPS

The UPS sub-division panel is located in the basement of the building. This 208/120V 1 ϕ system operates for the security surveillance and IT components in the building.

ELECTRICAL DEPTH | SYSTEM CHANGES

The addition of a new lighting system had a minimal effect on the building loads on the first floor. Below is a portion of the panel board schedule found in Appendix C. Here, the lighting panel used for the elevator lobby and meeting room are shown.

DESIGNATION	LEVEL	FED FROM	VOLTAGE	CONNECTED LOAD (kVA)	DEMAND (kVA)	TYPE
LP412	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	13.31	16.64	LIGHTING PANEL

LP412 – New Connected Load = 13.42 kVA

The new connected load was slightly higher. Most likely due to the addition of the trace fixtures in the cove space within the meeting room.

Next is the lighting panel that the nanomedicine workstation connects to. Notice that this is a life safety panel rather than a generic lighting panel.

DESIGNATION	LEVEL	FED FROM	VOLTAGE	CONNECTED LOAD (kVA)	DEMAND (kVA)	TYPE
ELLP411	LV 1	ELDP451	480Y/277, 3 PHASE, 4 WIRE	7.51	9.38	LIFE SAFETY LIGHTING PANEL

ELLP411 – New Connected Load = 7.48 kVA

The new connected load was found to be relatively the same as the previous design. This is because the design utilized mainly the same placement of luminaires within the space.

PRODUCT: WATTSTOPPER Isole IDP – 3050 Power Strip with Personal Sensor

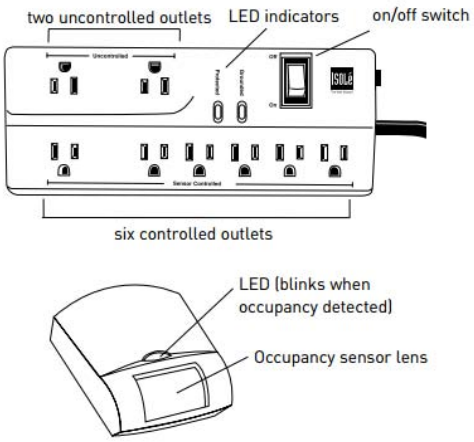


Figure 33: View of the IDP power strip.

The Isole IDP – 3050 is a control system for desktop plug load equipment that can provide additional energy savings within the facility's office and conference spaces.

The power strip features eight outlets. Six are controlleg by the occupancy sensor, while the remaining two are basic uncontrolled outlets.

The personal sensor uses infared (PIR) technology in order to detect occupancy. This sensor can be adjusted by the user to assume a 30 sec to 30 min time delay. With a 120° sensing range (nearly 300 sq. ft. of coverage) this is an ideal system for small office space.

Baltimore Gas and Electric Company provides the following monthly net rates:
Utility Voltage is 480V | 3ϕ

CUSTOMER CHARGE = $88.00 per month
DEMAND CHARGE = $3.17/kW
DELIVERY SERVICE CHARGE = 0.01584 $/kWh
GL SCHEDULE – TYPE II SOS
- GENERATION RATE = 14.909 c/kWh
- TRANSMISSION RATE = 0.549 c/kWh
- TOTAL SUPPLY RATE = 15.458 c/kWh

TOTAL SUPPLY RATE OF THE BUILDING = 15.458 C/KWH

INITIAL STUDY SHOWS NEW SUPPLY RATE = 13.912 C/KWH

SAVING ROUGHLY 10%

The following Economic analysis is performed with the assumption that there is a warranty of 5 years.

Cost per unit = roughly $97.50
Cost of Installation/Labor = roughly $5000.00
Number of Offices = 835
One unit per office = $81412.50 total unit cost

Delivery Service charge) = 0.01584 c/KWh
Electrical Combined Floor Area = 22,691 sq ft. / 300 = 75.6367

Savings per unit = $97.50 - $75.6367 = $21.8633

Initial Cost: ($81412.50) + $5000.00) = $864112.2
(Unit Cost + Labor Cost)

Savings percentage = 10%

Subsequent savings per year: (22,691/13.912) = $1631.04

($1631.04 x 5 year warranty) = $8155.12 saved over 5 years.

The installation of this system is definitely worth the investment as it will provide for at least $8155 worth of energy savings.

SECTION 4 | ARCHITECTURAL BREADTH

ARCHITECTURAL BREADTH | FAÇADE DESIGN STUDY

STUDY: Will the addition of a rain screen prove useful in the new construction?

PRODUCT: Kalzip FC Rain Screen System

This system incorporates non-penetrative and lightweight flat rain screen panels that are suitable for both new construction and refurbishment projects.

Panels have the benefit of being able to be mounted either vertically or horizontally, making them easier and faster to install compared to conventional rain screen panel systems.

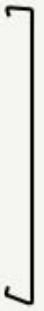
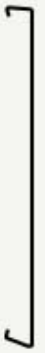
SPECIFICATIONS FROM CUTSHEETS

- Contemporary, visually stunning aesthetics
- Several different profile widths provide flexibility and scope for design
- Highly cost-effective through simple and fast installation techniques
- Optimized panel geometry means low inherent weight and reduced use of materials
- Variable acoustic and thermal insulation options
- A wide range of color and surface finishes with edge folding as standard
- Fully integrated corner panels (optional)
- High structural performance
- Creation of fixed point without the use of screws and rivets

The rain screen façade system not only prevents water penetration in a façade, but also increases the thermal efficiency of the building. By implementing this on both the east and west elevations, the Health Science Facility III

Figure 34: HSF III West Elevation.

Figure 35: HSF III East Elevation.

Profile type:	Kalzip FC 30/250	Kalzip FC 30/300	Kalzip FC 30/350	Kalzip FC 30/400	Kalzip FC 30/450	Kalzip FC 30/500
Profile thickness	1.0 mm 1.2 mm	1.0 mm 1.2 mm	1.0 mm 1.2 mm	1.0 mm 1.2 mm	– 1.2 mm	– 1.2 mm
Micro-ribbed	no	no	no	yes	no	no
						

Based on the brick veneer façade of the east and west elevations it would be beneficial to implement a micro-ribbed Kalzip panel. They can also specify with edge return (a design standard). Because the facades are relatively narrow and combed with windows, this would be the appropriate choice.

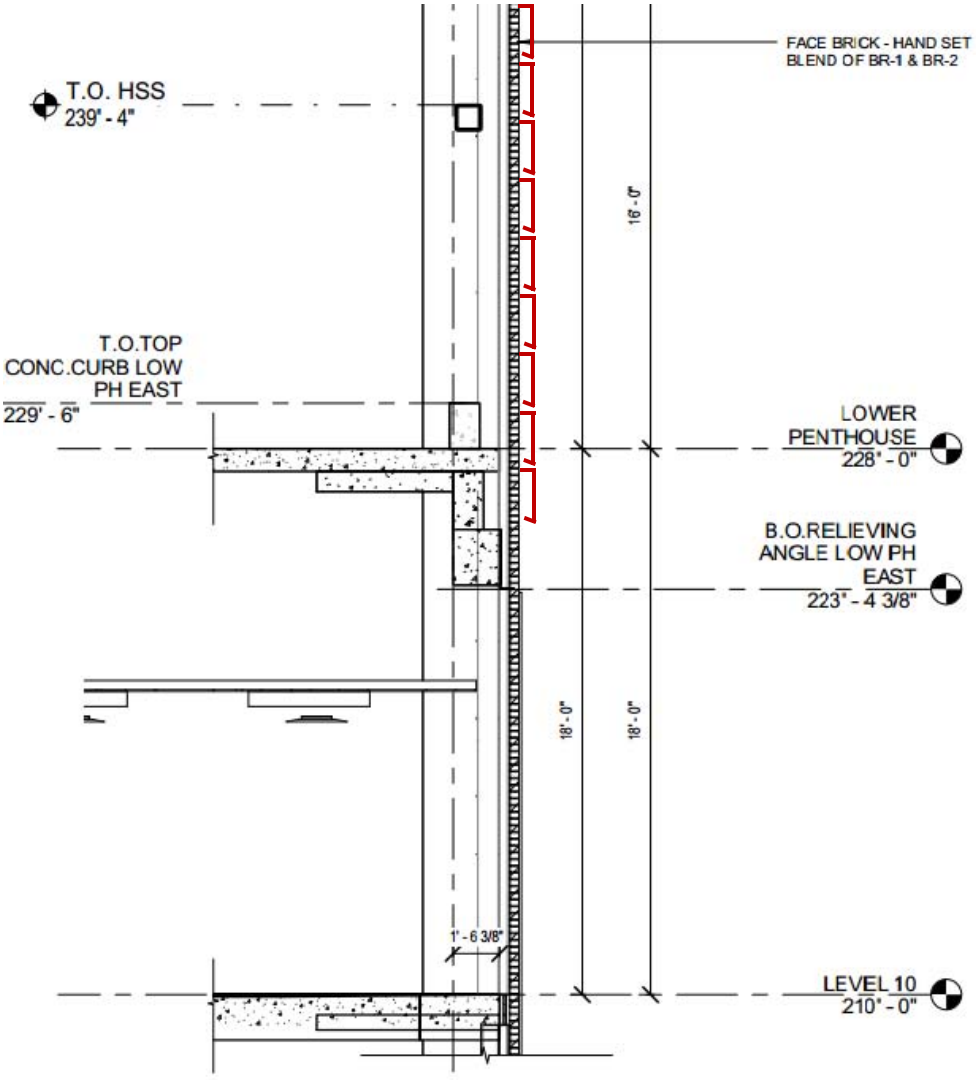


Figure 36: HSF III East Elevation.

RAIN SCREEN COST

For every 1500 sqft of surface area the average rain screen costs roughly $2000.00 - $3000.00. For this study, I will assume $2500.00.

The East exterior surface area = 14395.43 sq ft / 1500 = appx. 8.7
Therefore the total cost for the east exterior will be $21930.71

The West exterior surface area = 13158.43 sq ft / 1500 = appx. 9.6
Therefore the total cost for the west exterior will be $23992.38

The rain screen system can improve the thermal efficiency of the Health Science Facility. Given the high initial cost, it would be up to the university whether they thought the energy savings would be worth the higher initial cost.

SECTION 5 | STRUCTURAL BREADTH

STRUCTURAL BREADTH | NEW LOAD SUMMARY

The following study is to prove whether or not the proposed rain screen will affect the structural load on the building.

Due to the low structural weight of the rain screen, it can be surmised that the advanced weight and placement of the Kalzip façade will not create many issues. Below are some assumed loads for building load calculations.

ASSUMED LOADS

AREA	LIVE LOAD	PARTITIONS
BALCONIES - EXTERIOR	100 PSF	N/A
CATWALKS (MAINTENANCE)	40 PSF	N/A
CLASSROOMS	40 PSF	15 PSF
CORRIDORS	100 PSF	N/A
CORRIDORS - ABOVE 1ST FLOOR	80 PSF	N/A
LAB SPACE	125 PSF	N/A
LIBRARY - READING ROOMS	60 PSF	15 PSF
LIBRARY - STACK ROOMS	150 PSF	N/A
MARQUEES	75 PSF	N/A
MECHANICAL ROOMS	150 PSF	N/A
OFFICES	80 PSF	15 PSF
STAIRS & EXITWAYS	100 PSF	N/A
STORAGE - LIGHT	125 PSF	N/A
STORAGE - HEAVY	250 PSF	N/A
TRUCKING - LOADING DOCK	250 PSF	N/A

AREA	SD LOAD
FLOORS	10 PSF
ROOF	30 PSF
ABOVE MECH. ROOF	20 PSF

Figure 37: Load Spreadsheets provided by contract documents.

Exterior Column Load:

Fc (Lower Basement level – Penthouse) = 5000 PSI

5000 X 13 = 65000 PSI at base of exterior column.

Kalzip = 3psf – panel self weight.

Total area = 14395.43sf + 13158.43sf = 27553.86sf

27553.86 sf x 3psf = 82661.58

The Kalzip structure will be placed along the exterior edge of the east and west façade. The façade weight will not be subjected to any extreme changes in applied weight.

REPORT SUMMARY

The previous report was a brief summary of the upcoming Health Science Facility III. This highly advanced research facility will house groups from the majority of the health science campus including the School of Pharmacy, Dentistry, and medicine. This new lab space will provide ample opportunity in the University of Baltimore's already thriving campus.

The implementation of the new lighting systems proved to be a worthy endeavor. The lighting schemes for all four spaces, including the elevator lobby, the nanomedicine workstation, and the exterior plaza, all met the predetermined criteria that was specified in the schematic design. With the use of less luminaires as the original design, energy savings were potentially made, however, this came at a cost of less illuminance in each space. The requirements were met, however I wish I had been able to implement more of my design concept throughout the spaces.

The electrical study proved that the sizing of the new panel boards was relatively unnecessary, in that the lighting scheme did not change the required load enough to show improvement. Instead, the research into implementing an occupancy sensor controlled office scheme proved to have rewarding energy savings.

The rain screen study was an interesting glimpse into the additional benefits to using sustainable design. While it does have many energy savings benefits, the rain screen may prove too costly for the university to implement.

The structural summary yielded no significant weight change in the exterior façade, therefore the system is worth implementing.

REFERENCES

"Article 5" National Electric Code 2011. NEMA, Print.

"Article 6" National Electric Code 2011. NEMA, Print.

ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings. 2010th ed. ASHRAE. Print.

"Chapter 27- Electrical." International Code Council. International Building Code 2012. Web. 10 Dec. 2014. http://publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_27_section.htm.

Dilaura, D. L., Houser, K. W., Mistrick R. G., Steffy G. R. (2011). The Lighting Handbook (10th ed.). New York, NY: Illuminating Engineering Society.

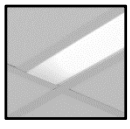
"Isolé IDP-3050 Power Strip with Personal Sensor IDP-3050-A, DI-110" Wattstopper Controls. Web. 10 April 2015. http://www.wattstopper.com/products/sensors/plug-load-controls/idp-3050.aspx#.VUwUVOktGUl

Cover Page Photo: http://www.hok.com/design/type/science-technology/university-of-maryland-baltimore-health-sciences-facility-iii/

Contract Documents and Images provided by Barton Malow Company. Images were taken from project documents in order to showcase specific parts of the Health Science Facility III.

APPENDIX A | LUMINAIRE SCHEDULE

INTERIOR LIGHTING FIXTURES – CLASSIFICATION L

TYPE	SPECIFICATION	MANUFACTURER	LAMP TYPE	QTY. OF LAMPS	LAMP WATTAGE	TOTAL WATTAGE	VOLTAGE
L1 	RECESSED PERIMETER COVE LINEAR FLUORESCENT WALL GRAZER LAMPING (CROSS SECTION): (1) 3'-0"/4'-0" 28 WATT T5 LINEAR. FLUOR. BEAM SPREAD DISTRIBUTION: DOWNLIGHT GRAZE APERTURE SIZE: 6" WIDTH BALLAST: ELECTRIC PROGRAM START < 10% THD CONTROL: PROGRAM RELAY MOUNTING: ACOUSTIC PANEL CEILING LOCATION: ELEVATOR LOBBY	FOCAL POINT: MINI-GRAZER	F28T5	1	28	8 WLF	277
CATALOG NUMBER: FMG-NS-1T5HO-1C-277-S-WH-24'							
L2 	RECESSED ROUND TRIMLESS DOWNLIGHT 1" REGRESS COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE APERTURE SIZE: 4.5" DELIVERED LUMENS: 1500lms LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: 50° FINISH: WHITE CONTROL: 0-10V DIMMING DRIVER MOUNTING: ACOUSTIC PANEL CEILING LOCATION: ELEVATOR LOBBY AND WORKSTATION	USAI: BEVELED 2.0	LED	-	-	20	277
CATALOG NUMBER: LRLD4-9020-M2-30KS-50-NCSM2-277-DIML2							
L3 	1' x 4' RECESSED VOLUMETRIC DISTRIBUTION LUMINAIRE COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE MAXIMUM WATTAGE: 22.9W DELIVERED LUMENS: 1207lms LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: ASYMMETRIC FINISH: MATTE WHITE HOUSING CONTROL: 0-10V ANALOG DIMMING DRIVER MOUNTING: DRYWALL LOCATION: WORKSTATION	LITHONIA: RT5	F28T5	1	28	39	277
CATALOG NUMBER: RT5-1-28T5-MVOLT-GEB115-LPM830P							
L4 	LOW WATTAGE LINEAR LED SLOT LUMINAIRE COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE MAXIMUM WATTAGE: 22.9W DELIVERED LUMENS: 1207lms LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: ASYMMETRIC FINISH: MATTE WHITE HOUSING CONTROL: 0-10V ANALOG DIMMING DRIVER MOUNTING: GRID LOCATION: MEETING ROOM	FOCAL POINT: TRACE	LED	-	-	23 W per 4'	277
CATALOG NUMBER: FTRL-AC-LL1-30K-1C-277-LD1-G-FL-WH-28'							
L5 	RECESSED LED LINEAR DOWNLIGHT FLUSH LENS LAMPING (CROSS SECTION): (1) 3'-0"/4'-0" 28 WATT T5 LINEAR. FLUOR. BEAM SPREAD DISTRIBUTION: DOWNLIGHT GRAZE APERTURE SIZE: 6" WIDTH BALLAST: ELECTRIC PROGRAM START < 10% THD CONTROL: PROGRAM RELAY MOUNTING: ARMSTRONG TECHZONE LAY -IN LOCATION: MEETING ROOM	FOCAL POINT: SEEM 6	F28T5	1	28	8 WLF	277
CATALOG NUMBER: FSM6-FL-2T5-1C-277-S-G1-WH-68'							

INTERIOR LIGHTING FIXTURES – CLASSIFICATION L

TYPE	SPECIFICATION	MANUFACTURER	LAMP TYPE	QTY. OF LAMPS	LAMP WATTAGE	TOTAL WATTAGE	VOLTAGE
L6 	RECESSED ROUND TRIMLESS WALL WASHER 1" REGRESS COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE APERTURE SIZE: 4.5" DELIVERED LUMENS: 950lms LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: WALLWASH FINISH: WHITE CONTROL: 0-10V DIMMING DRIVER MOUNTING: ACOUSTIC PANEL CEILING LOCATION: MEETING ROOM	USAI: BEVELED 2.0	LED	-	-	24	277
CATALOG NUMBER: LRTW4-6024-C2-30KS-NC-277-DIML2							

EXTERIOR LIGHTING FIXTURES – CLASSIFICATION S

TYPE	SPECIFICATION	MANUFACTURER	LAMP TYPE	QTY. OF LAMPS	LAMP WATTAGE	TOTAL WATTAGE	VOLTAGE
S1 	LED AREA LUMINAIRE LAMPING: 63 LEDS (ONE LIGHT ENGINE) COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: SR2 CONTROL: PROGRAM RELAY POLE HEIGHT: 11' LOCATION: EXTERIOR PLAZA	LITHONIA: OMERO	LED	-	-	73 W	277
CATALOG NUMBER: MRP LED-1-63B350/30K-SR2-277-DFL-DBLXD							
S2 	LED LIGHTING INTEGRATED WITHIN HANDRAIL LAMPING: WARM WHITE LED COLOR TEMPERATURE: 3000K COLOR RENDERING INDEX: 80 OR ABOVE MAXIMUM WATTAGE: 3 PER FOOT DELIVERED LUMENS: 219 PER FOOT LED LIFE: L70 AT 50,000 HOURS BEAM SPREAD DISTRIBUTION: ASYMMETRIC CROSS SECTION SIZE: PER HANDRAIL DETAILS FINISH: STAINLESS STEEL POLISHED POWER SUPPLY: FULL RANGE DIMMING CONTROL: PROGRAMMABLE RELAY LOCATION: EXTERIOR PLAZA	IO LIGHTING: LUXRAIL	LED	-	-	3 WLF	277
CATALOG NUMBER: 0-06-SSP-1-WM-NR-ASYM-3K-HR-277V							

APPENDIX B | LIGHTING FIXTURE CUTSHEETS

Mini-Grazer™

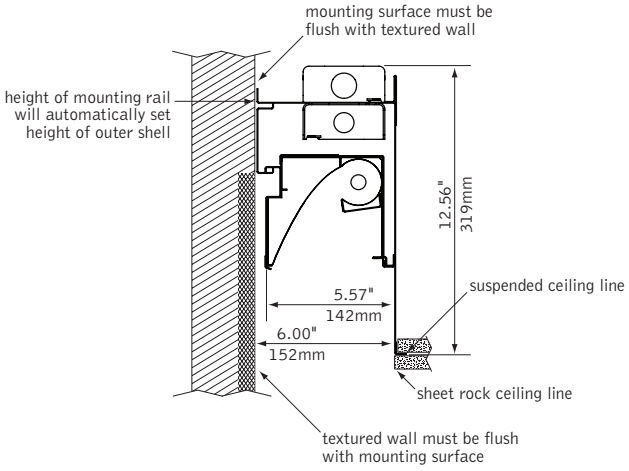
FLUORESCENT

FOCAL POINT®

open optic

baffle

DIMENSIONAL DATA



FEATURES

High performance, T5 or T5HO Fluorescent Wall Grazer.

Nautilus optic designed to highlight textured walls and ceilings evenly from ceiling to floor.

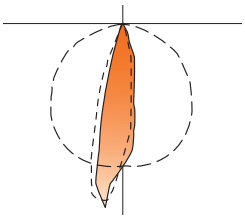
Swing down lamp tray allows for easy lamp accessibility.

Housing creates 6" architectural slot.

Great energy solution that replaces multiple MR16 or PAR lamps commonly used for grazing applications.

Housing designed for drywall or grid ceilings.

PERFORMANCE



1-lamp T5HO

37% Efficient

3734 cd @ 5˚

PRODUCT OVERVIEW

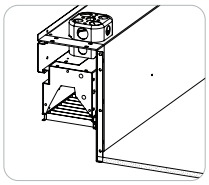
Lumen Output:	919-1864lm
Wattage:	33-63W
Lamping:	T5, T5HO

Visit focalpointlights.com for complete photometric data.

fixture: project:

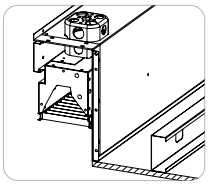
MOUNTING INFORMATION

Grid



Acoustical tile may rest on flange of luminaire.

Drywall

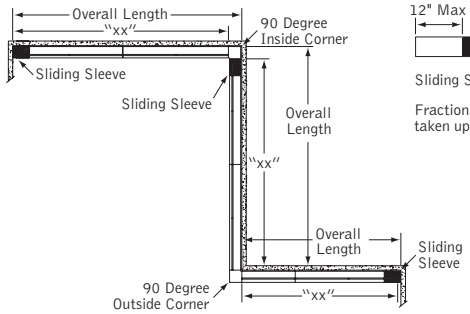


Mount drywall under luminaire and support to ceiling structure.

NOTE: Add drywall thickness to overall height of luminaire.

NOTE: Luminaire must be installed prior to ceiling.

typical run layout



sliding sleeves

Fractional Dimensions up to 12" are taken up by the use of a sliding sleeve.

Luminaires must be installed prior to ceiling.

Start run from corner with any standard luminaire.
Corner to corner runs end with a sliding sleeve.

SPECIFICATIONS

Construction

20 Ga. steel housing. 20 Ga. internal bulkheads. 20 Ga. steel rough–in housings are provided to create wall to wall slot. 20 Ga. steel sliding sleeve. Optional baffle (.650"H x .800" frequency) provides 50° cutoff to lamp and held captive with torsion springs. Luminaires are available in 3' and 4' lengths. 3' unit weight: 24 lbs., 4' unit weight: 26 lbs.

Optic

CNC roll-formed specular .016" thick aluminum.

Electrical

Electronic ballasts are thermally protected and have a Class "P" rating. Consult factory for dimming specifications and availability.

Labels

UL and cUL listed.

Finish

Polyester powder coat applied over a 5-stage pre–treatment.

ORDERING

Luminaire Series		**FMG**
Mini-Grazer	FMG	
Shielding		
No Shielding, Open Optic	NS	
Baffle, White	BB	
Lamping		
One Lamp T5	1T5	
One Lamp T5HO	1T5HO	
Circuit		**1C**
Single Circuit	1C	
Voltage		
120 Volt	120	
277 Volt	277	
347 Volt	347	
Ballast		
Electronic Dimming Ballast*	D	
Electronic Program Start <10% THD	S	
Factory Options		
Air Return	AR	
Chicago Plenum	CP	
Emergency Battery Pack*	EM	
HLR/GLR Fuse	FU	
Include 3000K Lamp*	L830	
Include 3500K Lamp*	L835	
Include 4100K Lamp*	L841	
12" Sliding Sleeve	SS	
Finish		**WH**
Matte White Housing	WH	
Luminaire Length		
Designate overall run length dimension (light modules provided in 3' & 4' lengths)	XX'	
Corner Options		
90–degree Inside Corner	FMG-IC90	
90–degree Outside Corner	FMG-OC90	

NOTE: Not intended for drywall surfaces unless a Level 5 finish is specified.

*For more information visit focalpointlights.com/reference or consult factory.

Mini-Grazer™

FLUORESCENT

FGM3-NS-1T5HO-UNV-S-WH-4’

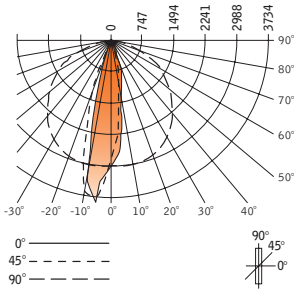
Filename:

Test #: 14016.0

Lumens: 1864lm

Efficiency 37%

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°						
5°						
15°						
25°						
35°						
45°						
55°						
65°						
75°						
85°						
90°						
95°						
105°						
115°						
125°						
135°						
145°						
155°						
165°						
175°						
180°						

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixture
	0-30°	1177	23.5	63.2
	0-40°	1478	29.6	79.3
	0-60°	1813	36.3	97.2
	0-90°	1864	37.3	100
Total Luminaire	0-180°	**1864**	**37.3**	**100**

CO-EFFICIENTS OF UTILIZATION

Floor		20											
Ceiling		80				70		50		30		10	00
Wall		70	50	30	10	50	10	50	10	50	10	50	10	00
RCR	0	44	44	44	44	43	43	41	41	40	40	38	38	37
	1	42	41	40	39	10	39	39	37	37	36	36	35	35
	2	40	38	36	35	37	35	36	34	35	33	34	32	32
	3	38	34	33	32	35	31	34	31	33	30	32	30	29
	4	36	33	30	29	32	29	31	28	31	28	30	28	27
	5	34	30	8	26	30	26	29	26	29	26	28	26	25
	6	32	28	26	24	28	24	28	24	27	24	27	24	23
	7	31	27	24	23	27	23	26	22	26	22	25	22	22
	8	29	25	23	21	25	21	25	21	24	21	24	21	20
	9	28	24	22	20	24	20	23	20	23	20	23	20	19
	10	27	23	20	19	23	19	22	19	22	19	22	19	18

Numbers indicate percentage values of reflectivity.

Go to www.focalpointlights.com for additional photometric data.

note: Photometric testing performed in an independent lab with standard lamps and ballasts. Lamp and ballast type and configuration will affect photometric performance.

mini-grazer™

FOCAL POINT®

features

High performance, T5 or T5HO Fluorescent Wall Grazer.

Nautilus optic designed to highlight textured walls and ceilings evenly from ceiling to floor.

Swing down lamp tray allows for easy lamp accessibility.

Housing creates 6" architectural slot.

Great energy solution that replaces multiple MR16 or PAR lamps commonly used for grazing applications.

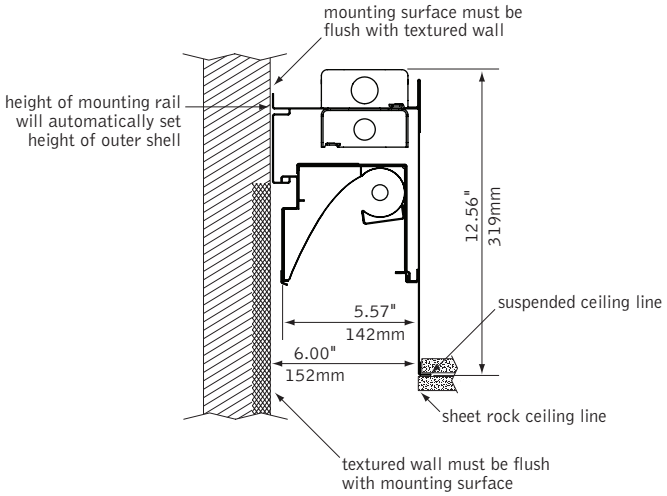
Housing designed for drywall or grid ceilings.

shielding options

open optic

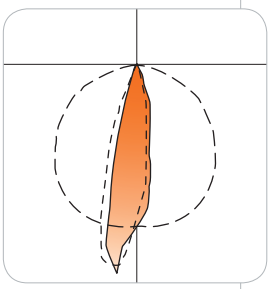
baffle

dimensional data



performance

1-lamp T5HO
37% Efficiency
3734 cd @ 5°



Visit focalpointlights.com for complete photometric data.

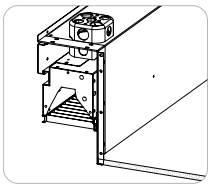
april 2009 A

fixture:

project:

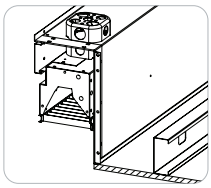
mounting information

Grid



Acoustical tile may rest on flange of luminaire.

Drywall

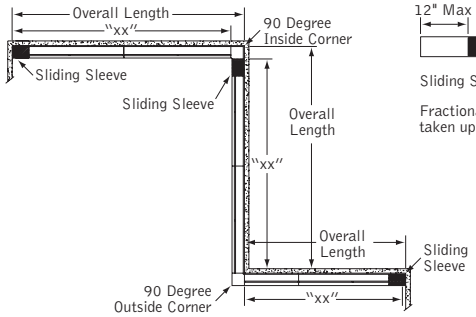


Mount drywall under luminaire and support to ceiling structure.

NOTE: Add drywall thickness to overall height of luminaire.

NOTE: Luminaire must be installed prior to ceiling.

typical run layout



Luminaires must be installed prior to ceiling.

Start run from corner with any standard luminaire.
Corner to corner runs end with a sliding sleeve.

sliding sleeves

Fractional Dimensions up to 12" are taken up by the use of a sliding sleeve.

specifications

construction

20 Ga. steel housing.

20 Ga. internal bulkheads.

20 Ga. steel rough–in housings are provided to create wall to wall slot.

20 Ga. steel sliding sleeve.

Optional baffle (.650"H x .800" frequency) provides 50° cutoff to lamp and held captive with torsion springs.

Luminaires are available in 3' and 4' lengths.

3' unit weight: 24 lbs
4' unit weight: 26 lbs

optic

CNC roll-formed specular .016" thick aluminum.

electrical

Electronic ballasts are thermally protected and have a Class "P" rating.

Consult factory for dimming specifications and availability.

UL and cUL listed.

finish

Polyester powder coat applied over a 5-stage pre–treatment.

ordering

luminaire series		FMG
Mini-Grazer	FMG	
shielding		
No Shielding, Open Optic	NS	
Baffle, White	BB	
lamping		
One Lamp T5	1T5	
One Lamp T5HO	1T5HO	
circuits		1C
Single Circuit	1C	
voltage		
120 Volt	120	
277 Volt	277	
347 Volt	347	
ballast		
Electronic Dimming Ballast*	D	
Electronic Program Start <10% THD	S	
factory options		
Air Return	AR	
Chicago Plenum	CP	
Emergency Circuit*	EC	
Emergency Battery Pack*	EM	
HLR/GLR Fuse	FU	
Include 3000K Lamp	L830	
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
12" Sliding Sleeve	SS	
finish		WH
Matte White Housing	WH	
luminaire length		
Designate overall run length dimension (light modules provided in 3' & 4' lengths)	XX'	
corner options		
90–degree Inside Corner	FMG-IC90	
90–degree Outside Corner	FMG-OC90	

NOTE: Not intended for drywall surfaces unless a Level 5 finish is specified.

* for more information see Reference section.

Focal Point LLC | 4141 S. Pulaski Rd, Chicago, IL 60632 | T: 773.247.9494 | F: 773.247.8484 | info@focalpointlights.com | www.focalpointlights.com.

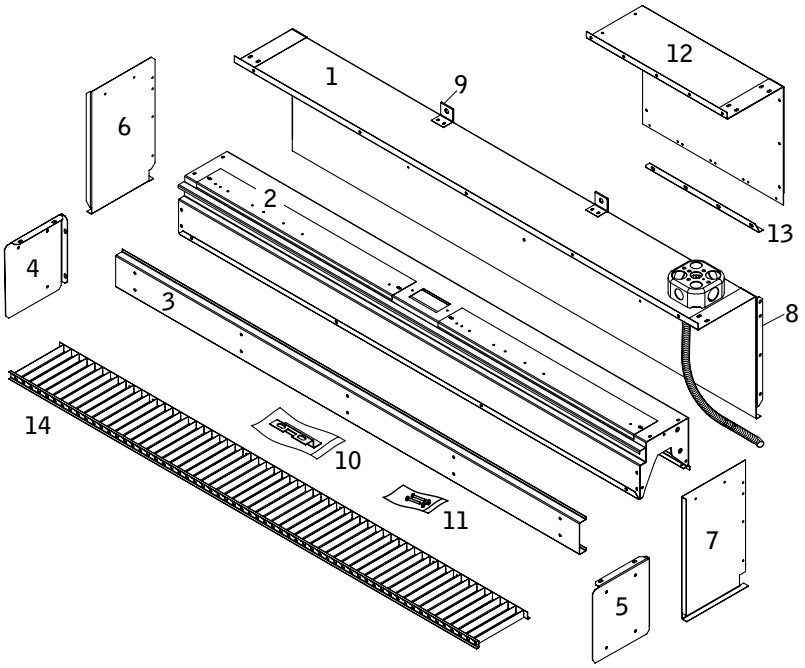
mini-grazer™

FMG

FOCAL POINT

⚠ ROUGH-IN SHELL MUST BE INSTALLED PRIOR TO CEILING ⚠

FOCAL POINT PARTS



KEY

ATTENTION

GLOVES REQUIRED

POWER OFF

POWER ON

PARTS LIST

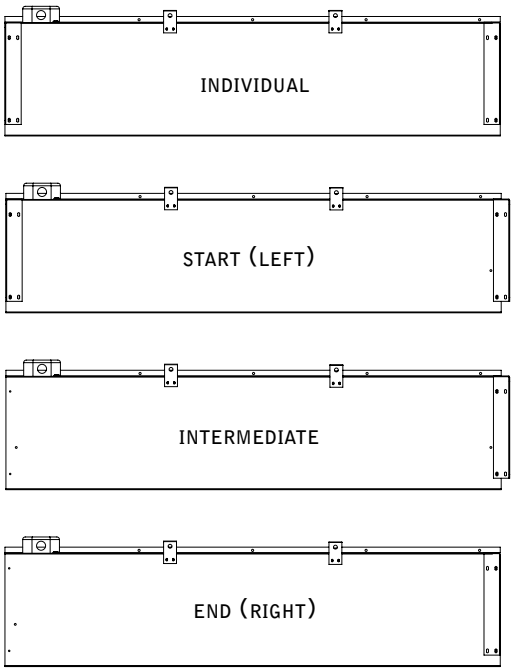
1 ROUGH-IN SHELL
2 LIGHT MODULE
3 WALL RAIL
4 FINISH END, RIGHT
5 FINISH END, LEFT
6 FLANGE END, RIGHT
7 FLANGE END, LEFT
8 JOINER BRACKET
9 MOUNTING BRACKET
10 LOCKING BRACKET (SHIPPED ATTACHED TO END OF LIGHT MODULE)
11 HARDWARE BAG

OPTIONAL

12 SLIDING SLEEVE
13 FINISH FLANGE
14 LOUVER

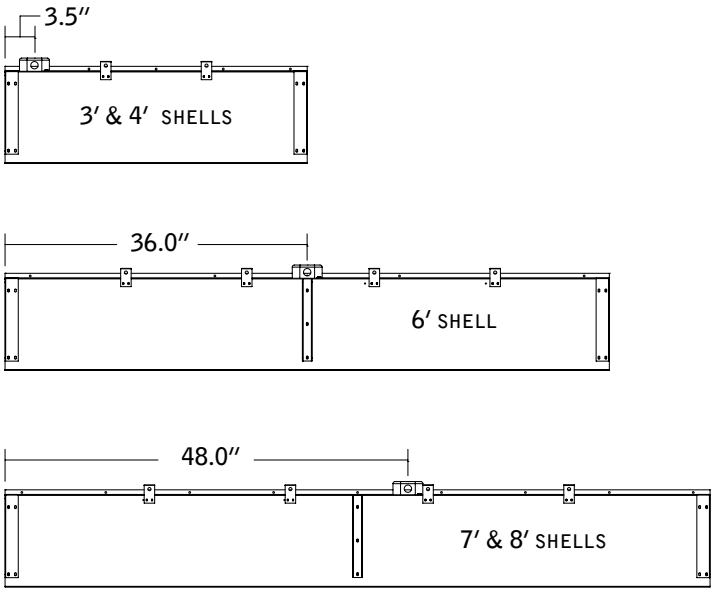
ROUGH-IN SHELL TYPES (4′ SHOWN)

(JOINER BRACKET LOCATION DETERMINES SHELL TYPE)



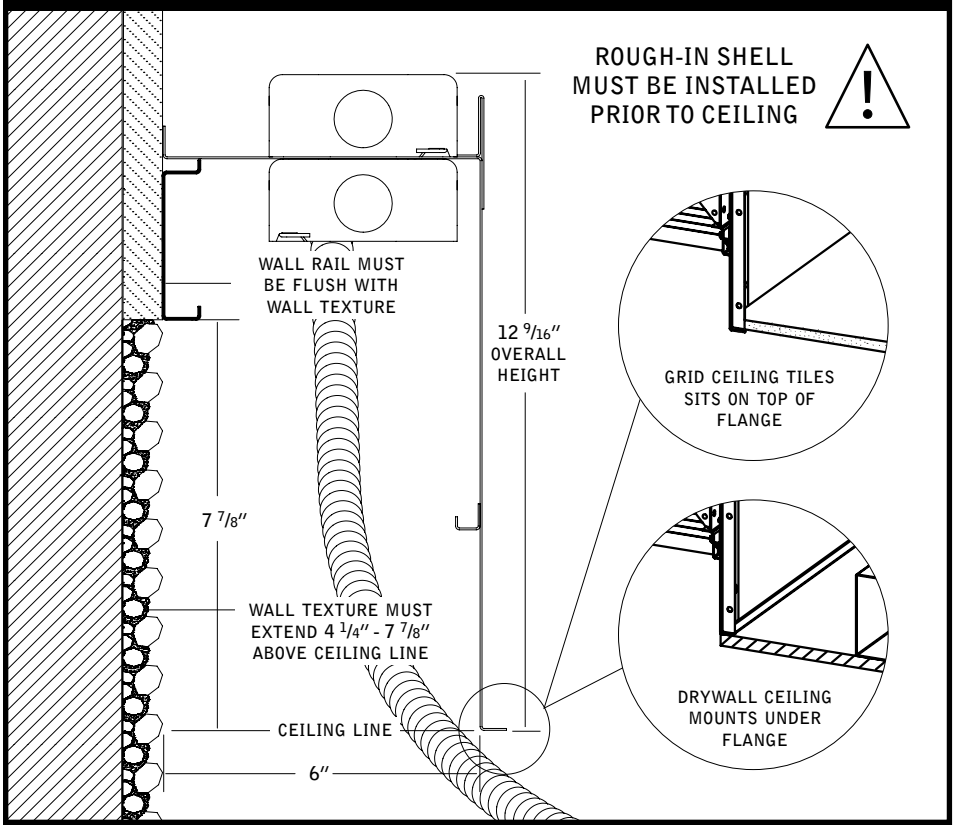
J-BOX LOCATIONS

(ALL SHELLS COMES WITH J-BOX INSTALLED)

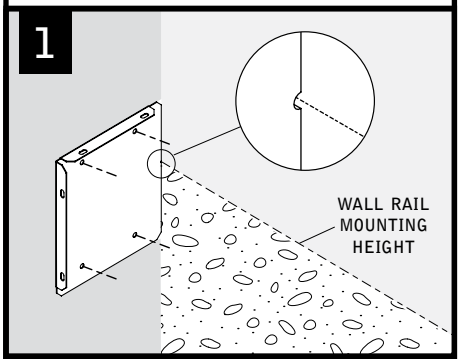


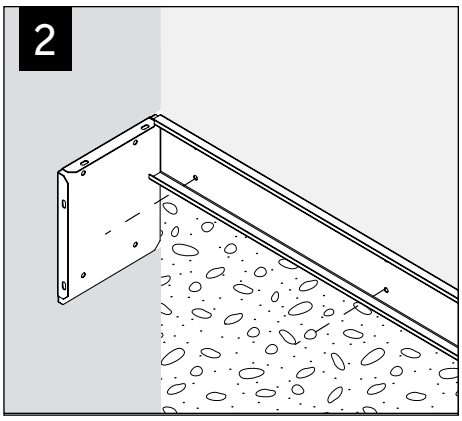
Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

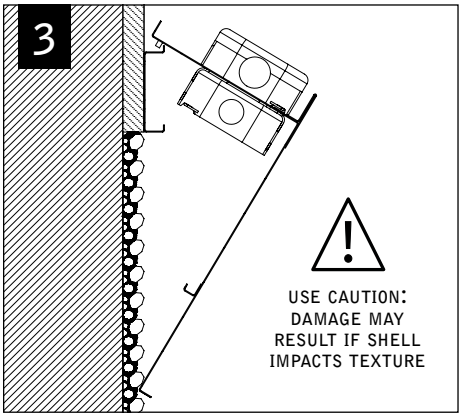
WALL/CEILING PREP

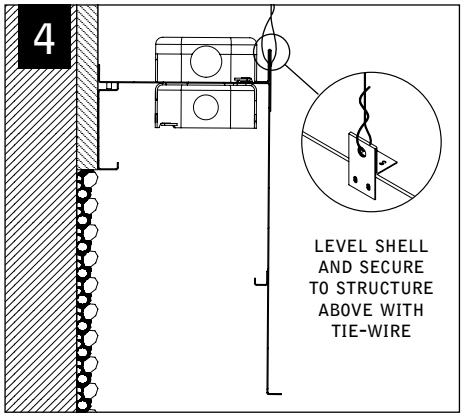


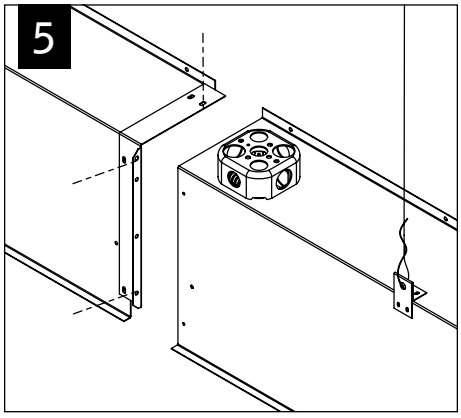
ENDS TERMINATING AT WALL





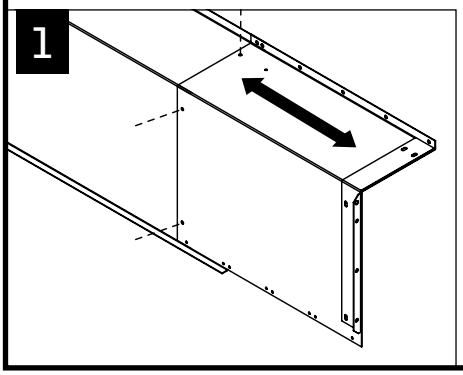


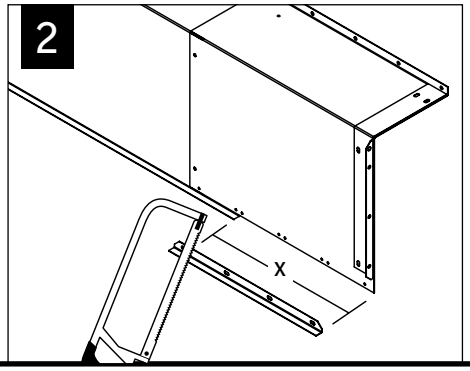


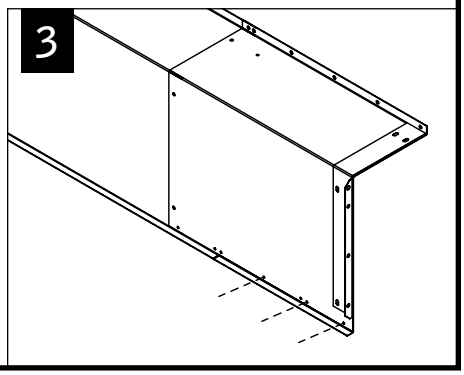


REPEAT STEPS 3 - 5 FOR ALL INTERMEDIATE SHELLS

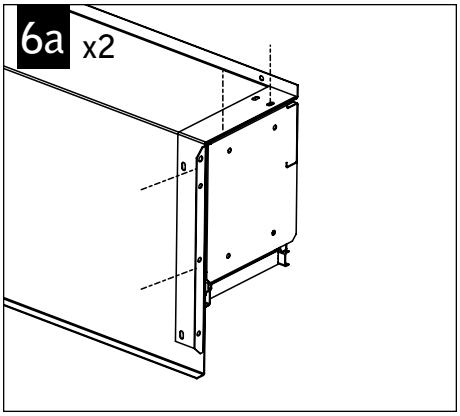
SLIDING SLEEVE - OPTIONAL



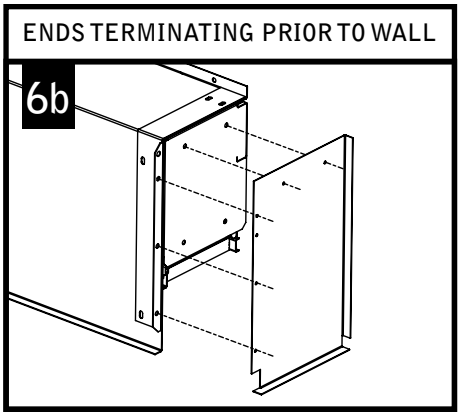


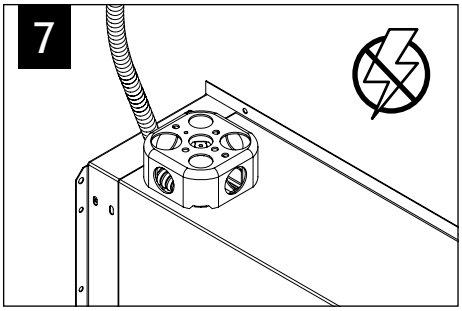


Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.



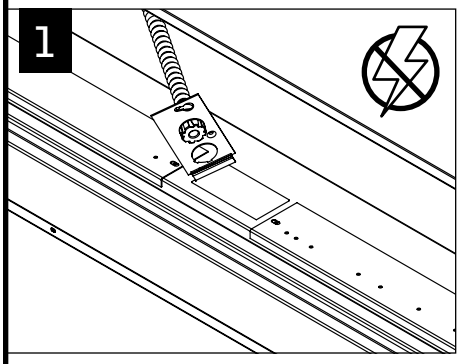
ENDS TERMINATING PRIOR TO WALL



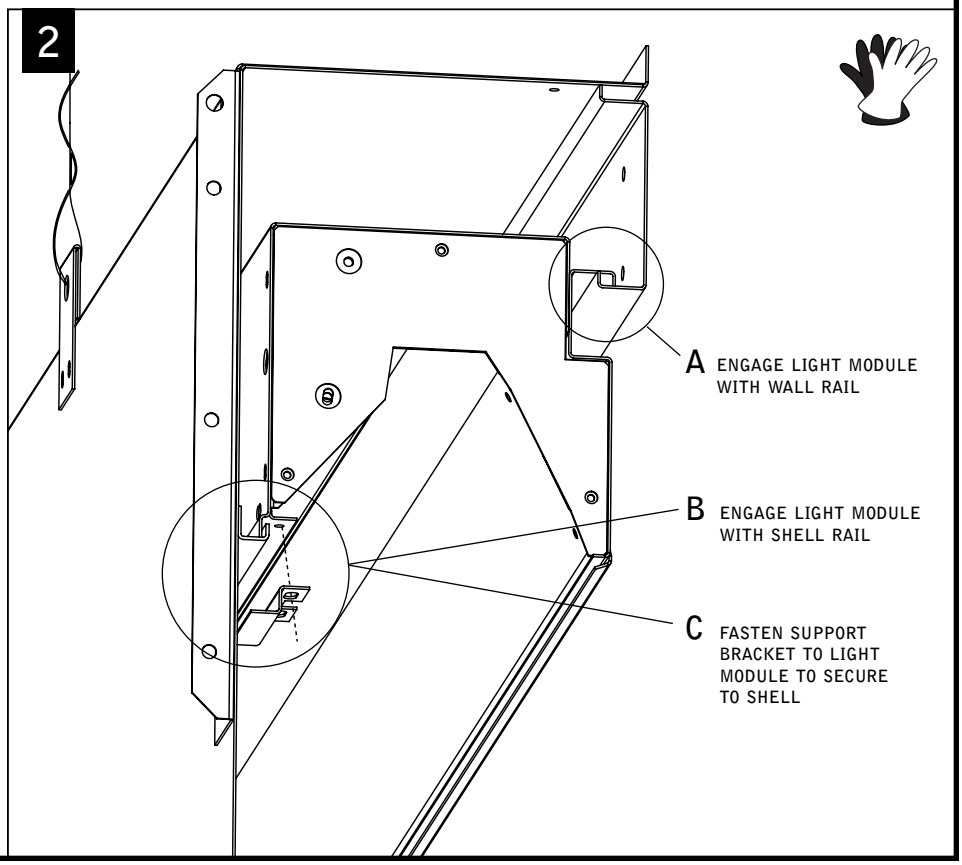


MAKE ELECTRICAL CONNECTIONS BEFORE INSTALLING DRYWALL CEILING

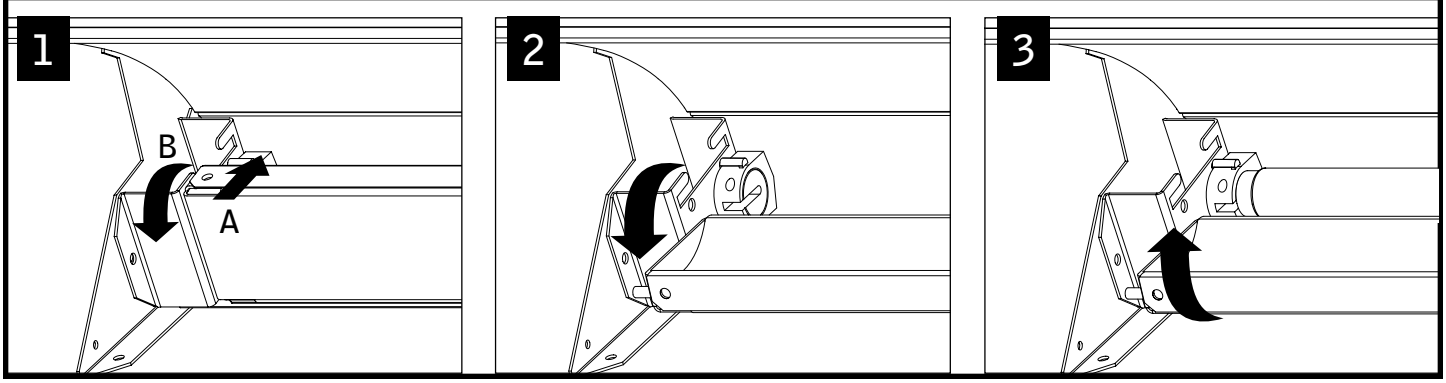
LIGHT MODULE INSTALLATION



MAKE ELECTRICAL CONNECTIONS



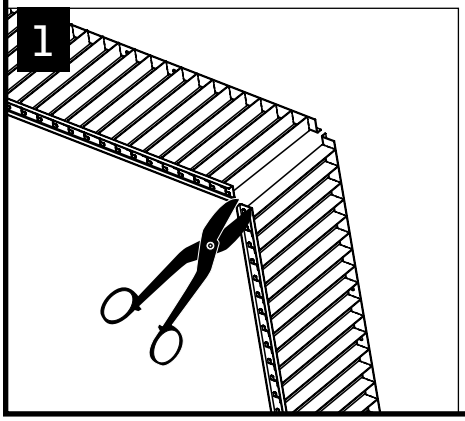
LAMPING



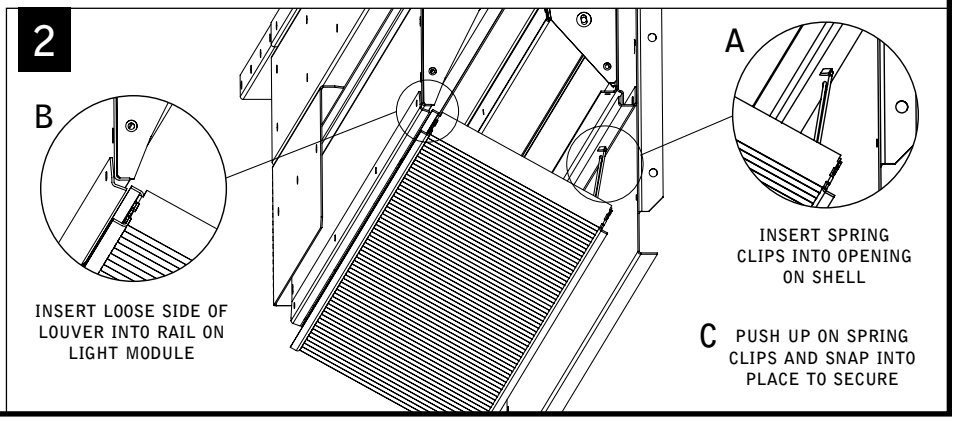
Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

LOUVER (OPTIONAL) 4

1



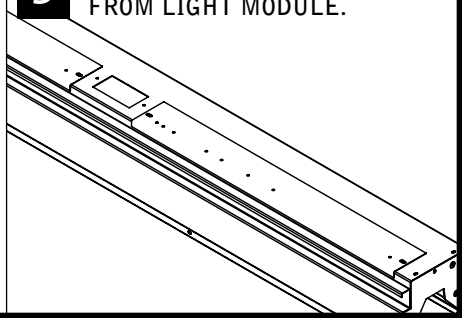
2



BALLAST SERVICE 4

1. PULL DOWN ON SHELL SIDE OF LOUVER TO DISENGAGE.
2. RELEASE SPRING CLIPS AND REMOVE LOUVER.
3. REMOVE SUPPORT BRACKETS TO RELEASE MODULE FROM SHELL.
4. REMOVE LIGHT MODULE FROM SHELL AND DISCONNECT ELECTRICAL.

5 REMOVE BALLAST COVER(S) FROM LIGHT MODULE.



BeveLED® BASIC Trimless

PROJECT INFORMATION

PROJECT _____

_____

DATE _____

TYPE _____

DOWNLIGHT 1021

1" REGRESS

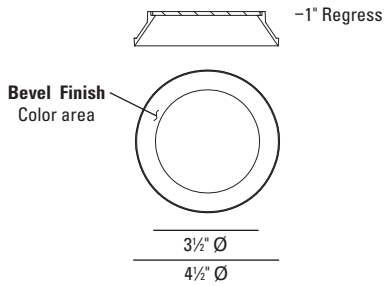
BeveLED Basic Recessed Downlight - Our narrow footprint housing provides an economical architectural solution while delivering high performance with LEDs.

DELIVERED PERFORMANCE

BeveLED Basic DOWNLIGHT 	14 Watts	20 Watts
Color Rendering Index	80+ CRI	80+ CRI
Lumens per Watt	66	59
Source Lumens	1100	1500
Delivered Lumens	**975**	**1250**
Color Consistency	2-Step MacAdam Ellipse	

Performance based on 3000K

1" Regress



CCT MULTIPLIER	2700K	3000K	3500K
Color Rendering Index	80+ CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	1.00	1.00	1.08

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **1021W - B1 - 10 - LSTD4 - 9014 - M2 - 27KS - 30 - NCSM - 277V - DIML2 - CB27**

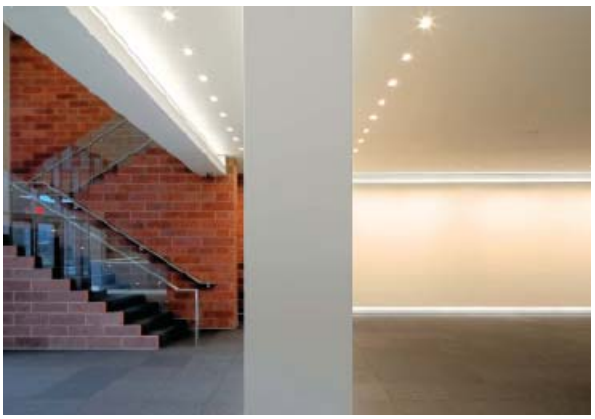
TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		BEVEL FINISH
1021	_____	–	B1	–	

1021	OPTION	BEVEL STYLE	BEVEL FINISH
Round Trimless Downlight 1" Regress	**W** Wet location [1] **EML** Emergency [2] **EMLW** Emergency and wet location [1,2]	**B1** 1" Regress Bevel, Die Cast	**10** White **13** Statuary Bronze **21** Black **28** Metalized Grey **RAL** Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.

[2] not for use with IC housing.



HOUSING ORDERING INFORMATION

HOUSING CODE		WATTAGE		ENGINE CODE		COLOR		REFLECTOR		HOUSING TYPE		VOLTAGE		OPTIONAL DIMMING DRIVER		ACCESSORIES
LRLD4	–		–	M2	–		–		–		–		–		–	

LRLD4	WATTAGE	M2	COLOR	REFLECTOR	HOUSING TYPE	VOLTAGE	OPTIONAL DIMMING DRIVER	ACCESSORIES
	9014 14W LED, 975 lumens **9020** 20W LED, 1250 lumens		**27KS** 2700K, 80+ CRI **30KS** 3000K, 80+ CRI **35KS** 3500K, 80+ CRI 2 Step MacAdam ellipse is standard for all	**30** 30° beam **50** 50° beam **80** 80° beam	**NCSM1** New Construction 5/8"- 1-1/4" Ceiling Thickness **NCSM2** New Construction 1-1/4"- 2-1/4" Ceiling Thickness **IC** Insulation-Contact Rated / Airtight	**120V** **277V**	**DIML2** 0-10V dim, 10% **DIML3** Lutron Hi-Lume 1% 2-wire, 120V only **DIML4** Lutron Hi-Lume 1% 3-wire/ECO **DIML6A** ELDO 0-10V 0.1%, logarithmic **DIML6B** ELDO 0-10V 0.1%, linear **DIML7** ELDO DALI 0.1% **DIML9** TRIAC 15% 2-wire, 120V only **DIML10** ELV 15% 2-wire, 120V only	**CB27** 27" C-Channel Bars **CB52** 52" C-Channel Bars **EML** Emergency battery [3] **EMLW** Emergency battery, wet location [3] **MLXX** - Millwork Adapter [4] XX=Specify Color (10, 13, 21, 28, RAL) Millwork not wet listed [3] NCSM housings require above ceiling access. Not for use with IC housing. [4] N/A with NCSM1 housing

USAI® Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

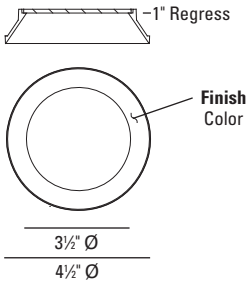
Revised 04/07/2015

BeveLED® BASIC Trimless

DOWNLIGHT 1021

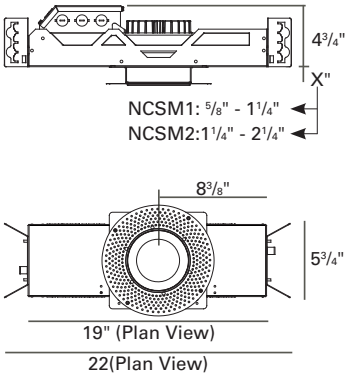
TRIM INFORMATION

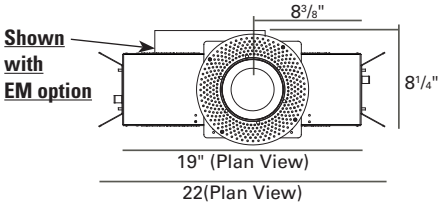
1" Regress



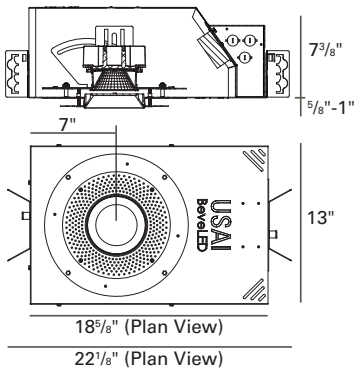
HOUSING INFORMATION

New Construction, Narrow Width - NCSM





IC / Airtight - IC



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel, retained by three ball plungers. Die cast aluminum bevel is available in white, statuary bronze, black, and metalized grey finishes. Custom color available (provide RAL#).

TRIM LENS: Trim is shipped with integral solite lens standard.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 30°, 50° or 80° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 2 lumen packages: 14W (975 delivered lumens) and 20W (1250 delivered lumens). Engine is field replaceable through the aperture without tools.

COLOR: BeveLED is available in 3 color temperatures (2700K, 3000K, 3500K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: Solid state electronic constant current driver with a high power factor provided standard. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML2 and DIML6 drivers source 2mA.

EMERGENCY: Emergency lighting battery pack is provided with remote test switch and require above ceiling access for service. EM option is not available with IC housings.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers.

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC rated housing rated for direct contact with insulation.

MAXIMUM CEILING THICKNESS: As per drawings above. ML option is for 1" max thickness wood with IC housing and for 2-1/4" max thickness wood with NCSM2 housing. Millwork option is not available with NCSM1 housing.

CEILING CUT OUT: 5½" Ø
Millwork: 4-13/16" Ø

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. Millwork Dry/Damp only. NRTL/CSA-US tested to UL standards. IBEW union made.

WARRANTY: 5 years

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.
- Trimless for drywall installation only.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

USAI® Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML2

DIMMING DRIVER WIRING SCHEMES:

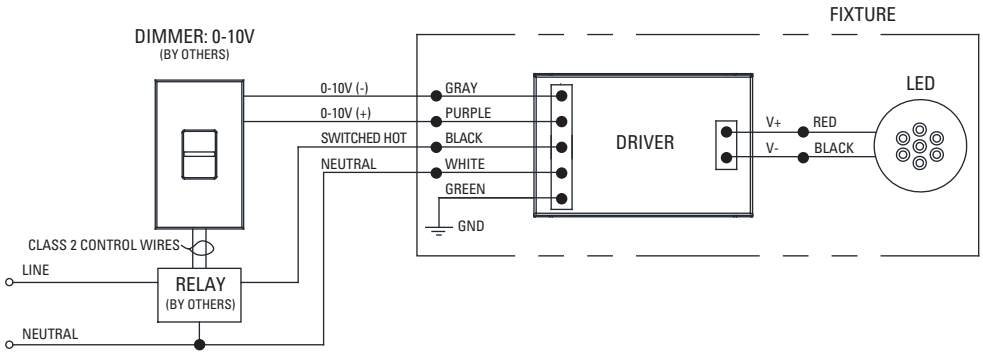
Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML2 LED: 0-10V Dimming Driver Wiring (Dims down to 10%)

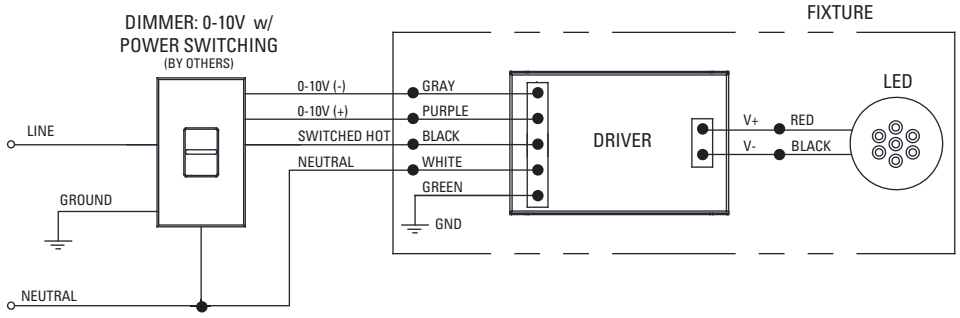
DIML2 Dimmer Compatibility Chart				
Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V / 277V				Use source current per fixture specification sheet to determine number of fixtures per dimmer. Max number of fixtures is limited by dimmer load rating.
Crestron	iLux dimmer expansion module	CLS-EXP-DIMFLV	100% - 10%	
Crestron	DIN Rail dimmer	DIN-4DIMFLV4	100% - 10%	
Crestron	DIN Rail analog output module	DIN-A08	100% - 10%	
Crestron	8 Channel dimmer module	GLX-DIMFLV8	100% - 10%	
Crestron	8 Channel dimmer module	GLXP-DIMFLV8	100% - 10%	
Leviton	IllumaTech dimmer	IP710-DLX	100% - 10%	
Lightolier (Philips)	Vega	V2000FAMU	100% - 10%	
Lutron	Diva	DVTV-XX	100% - 10%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML2
0-10V DIMMING W/RELAY TO SWITCH POWER



DIML2
0-10V DIMMING (NO RELAY)



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-2

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML3

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

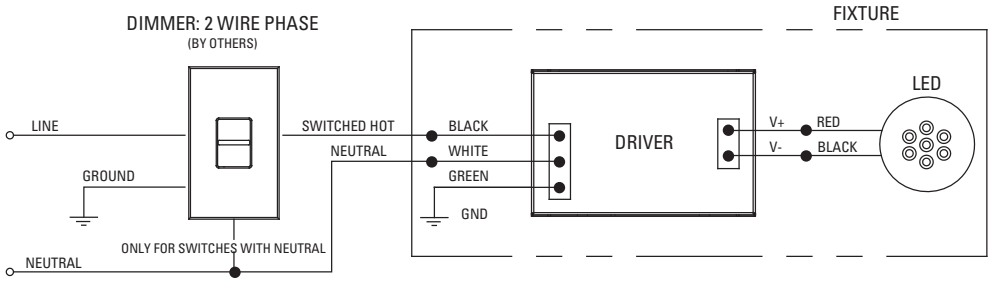
DIML3 LED: Lutron Hi-Lume A-Series 2 Wire Fwd Phase (with neutral) / LED Dimming Driver Wiring (Dims down to 1%) 120V only.

DIML3 Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer* Typical	High Wattage
120V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	ELV10	100% - 1%	1 – 26	1 – 13
ETC	Unison DRd Cabinet	ELV10	100% - 1%	1 – 26	1 – 13
Lutron	Maestro Wireless® dimmer	MRF2-6ND-120-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS adaptive dimmer	HQRD-6NA-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS 60W dimmer	HQRD-6ND-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS 1000 W dimmer	HQRD-10ND-	100% - 1%	1 – 13	1 – 6
Lutron	Stanza® dimmer	SZ-6ND-	100% - 1%	1 – 8	1 – 4
Lutron	RadioRA® 2 adaptive dimmer	RRD-6NA-	100% - 1%	1 – 8	1 – 4
Lutron	RadioRA® 2 1000 W dimmer	RRD-10ND-	100% - 1%	1 – 13	1 – 6
Lutron	HomeWorks® QS wallbox power module	HQRJ-WPM-6D-120-	100% - 1%	1 – 26	1 – 13
Lutron	HomeWorks® wallbox power module	HWI-WPM-6D-120	100% - 1%	1 – 26	1 – 13
Lutron	GRAFIK Eye® QS control unit	QSGR-, QSGRJ-	100% - 1%	1 – 26	1 – 13
Lutron	GRAFIK Eye® 3000 control unit	GRX-3100-, GRX-3500-	100% - 1%	1 – 26	1 – 13
Lutron	RPM-4U module	HW-RPM-4U-120, LP-RPM-4U-120	100% - 1%	1 – 26	1 – 13
Lutron	RPM-4A module	HW-RPM-4A-120, LP-RPM-4A-120	100% - 1%	1 – 26	1 – 13
Lutron	GP dimming panels	Various	100% - 1%	1 – 26	1 – 13
Lutron	Ariadni CL 250W dimmer	AYCL-253P-	100%-1%	1 – 8	1 – 4
Lutron	Diva CL 250W dimmer	DVCL-253P-, DVSCCL-253P-	100%-1%	1 – 8	1 – 4
Lutron	Grafik T CL or RF CL dimmer	GT-250M-, GTJ-250M-	100%-1%	1 – 8	1 – 4

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML3
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-3

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML4

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

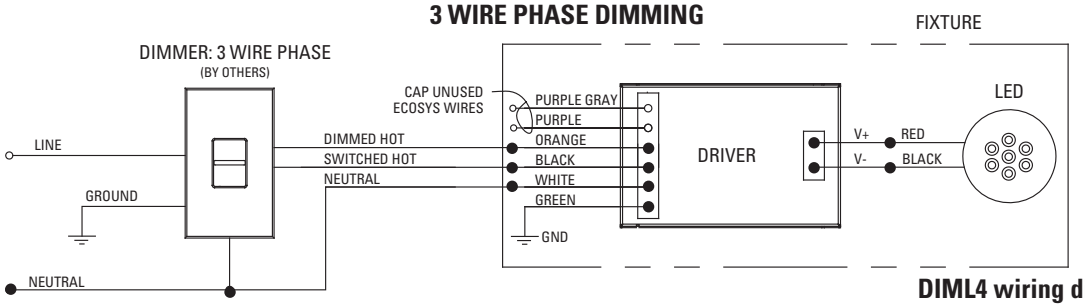
DIML4 LED: Lutron Hi-Lume A-Series LED Driver with 3-Wire FL Control / LED Dimming Driver Wiring (Dims down to 1%)

DIML4 3-Wire Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Control* Typical	Qty Fixtures Per Control* High Wattage
120V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	D20 Dimming module	100% - 1%	1–53	1–26
ETC	Unison DRd Cabinet	D20F Dimming module	100% - 1%	1–53	1–26
Lutron	Nova T	NTF-10-	100%–1%	1–41	1 – 20
Lutron	Nova T	NTF-103P-	100%–1%	1–20	1 – 10
Lutron	Nova	NF-10-	100%–1%	1–41	1 – 20
Lutron	Nova	NF-103P-	100%–1%	1–20	1 – 10
Lutron	Vareo	VF-10-	100%–1%	1–20	1 – 10
Lutron	Skylark	SF-10P-, SF-103P-	100%–1%	1–20	1 – 10
Lutron	Diva	DVF-103P-, DVSCF-103P-	100%–1%	1–20	1 – 10
Lutron	Ariadni	AYF-103P-	100%–1%	1–20	1 – 10
Lutron	Vierti	VTF-6A-	100%–1%	1–15	1 – 7
Lutron	Maestro	MAF-6AM-, MSCF-6AM-	100%–1%	1–15	1 – 7
Lutron	Maestro Wireless	MRF2-F6AN-DV-	100%–1%	1–15	1 – 7
Lutron	RadioTouch	RTA-RX-F-	100%–1%	1–41	1 – 20
Lutron	Spacer System	SPSF-6A-, SPSF-6AM-	100%–1%	1–15	1 – 7
Lutron	Lyneo Lx	LXF-103PL-	100%–1%	1–20	1 – 10
Lutron	RadioRA 2	RRD-F6AN-DV-	100%–1%	1–15	1 – 7
Lutron	HomeWorks QS	HQRD-F6AN-DV	100%–1%	1–15	1 – 7
Lutron	Interfaces	PHPM-3F-120, PHPM-3F-DV, GRX-FDBI-16A	100%–1%	1–41	1 – 20
Lutron	GP Dimming Panels	Various	100%–1%	1–41	1 – 20
277V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	D20 Dimming module	100% - 1%	1–53	1–26
ETC	Unison DRd Cabinet	D20F Dimming module	100% - 1%	1–53	1–26
Lutron	Nova T	NTF-10-277-	100%–1%	1–44	1 – 22
Lutron	Nova T	NTF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Nova	NF-10-277-	100%–1%	1–44	1 – 22
Lutron	Nova	NF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Skylark	SF-12P-277-, SF-12P-277-3	100%–1%	1–33	1 – 16
Lutron	Diva	DVF-103P-277-, DVSCF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Ariadni	AYF-103P-277-	100%–1%	1–44	1 – 22
Lutron	Vierti	VTF-6A-	100%–1%	1–33	1 – 16
Lutron	Maestro	MAF-6AM-277-, MSCF-6AM-277-	100%–1%	1–20	1 – 10
Lutron	Maestro Wireless	MRF2-F6AN-DV-	100%–1%	1–33	1 – 16
Lutron	RadioTouch	RTA-RX-F-	100%–1%	1–88	1 – 44
Lutron	Spacer System	SPSF-6A-277-, SPSF-6AM-277-	100%–1%	1–20	1 – 10
Lutron	Lyneo Lx	LXF-103PL-277-	100%–1%	1–33	1 – 16
Lutron	RadioRA 2	RRD-F6AN-DV-	100%–1%	1–33	1 – 16
Lutron	HomeWorks QS	HQRD-F6AN-DV	100%–1%	1–33	1 – 16
Lutron	Interfaces	PHPM-3F-DV, GRX-FDBI-16A	100%–1%	1–88	1 – 44
Lutron	GP Dimming Panels	Various	100%–1%	1–88	1 – 44

* NOTE: Number of fixtures may be higher if wattage is less than maximum values shown. Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML4
3 WIRE PHASE DIMMING



DIML4 wiring diagrams continued on next page

USAI Lighting
www.usailighting.com
info@usailighting.com
1126 River Road
New Windsor, NY 12553
T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-4

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE

DIML4 Continued

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

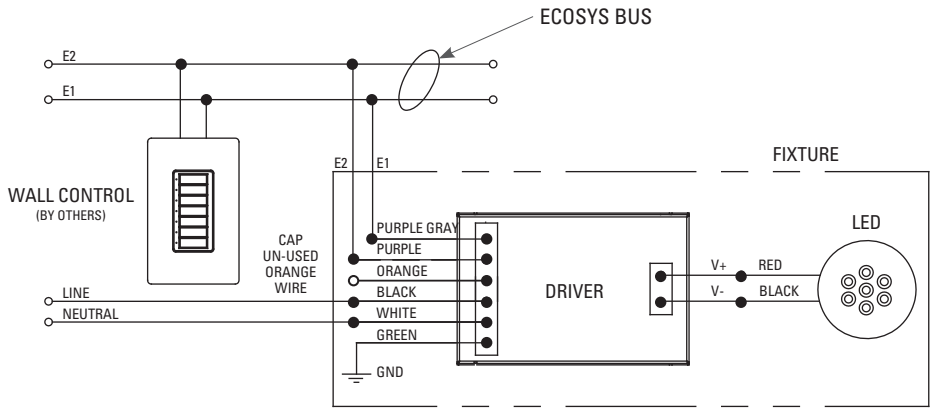
DIML4 LED: Lutron Hi-Lume A-Series LED Driver with Eco System Control / LED Dimming Driver Wiring (Dims down to 1%)

DIML4 3-Wire Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Control* Typical	High Wattage
120V / 277V				40W and Less	41W - 80W
Lutron	PowPak dimming module	RMJ-ECO32-DV-B	100%–1%	1–32	1 – 16
Lutron	Energi Savr Node	QSN-1ECO-S, QSN-2ECO-S	100%–1%	1–64	1 – 32
Lutron	GRAFIK Eye QS (120V ONLY)	QSGRJ-_E, QSGR-_E	100%–1%	1–64	1 – 32
Lutron	Quantum	Various	100%–1%	1–64	1 – 32

* NOTE: Number of fixtures may be higher if wattage is less than maximum values shown. Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML4
ECOSYS CONTROLS



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-4

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML6A, 6B

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML6A LED: EldoLED SOLOdrive 561/S 0-10V control 100%-0.1% linear-programmed dimming driver for use with logarithmic-style controls (e.g., Lutron and others listed in the table below)

DIML6A Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V & 277V				Refer to manufacturer's dimmer load rating for maximum and minimum fixture quantities per dimmer.
Lutron	Diva	DVTV/NFTV/NTFTV with PP-20	99% - 0.1%	
Lutron	Energi Savr Node	QSN-4T16-S	100% - 0.1%	
Lutron	GP Dimming Panels	TVM2 Module	99% - 0.1%	
Lutron	Interfaces	GRX-TVI w/ GRX3503	100% - 0.1%	
Sensor Switch	nIO	nIO EZ	100% - 0.1%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

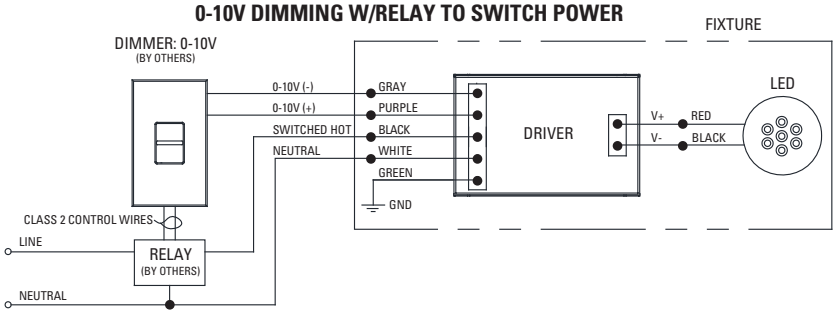
DIML6B LED: EldoLED SOLOdrive 561/S 0-10V control 100%-0.1% logarithmic-programmed dimming driver for use with linear-style controls (e.g., Crestron, non-Lutron, and others listed in the table below)

DIML6B Dimmer Compatibility Chart

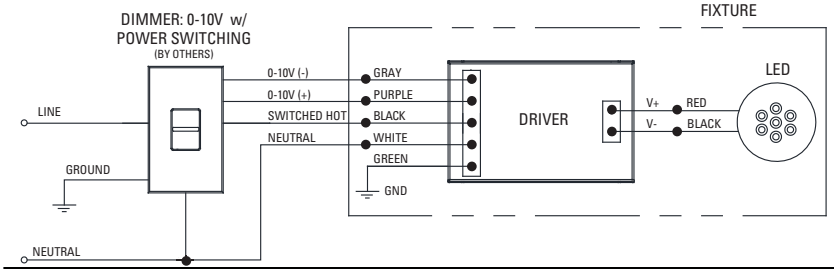
Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V & 277V				Refer to manufacturer's dimmer load rating for maximum and minimum fixture quantities per dimmer.
Bush-Jaeger	Electronic potentiometer	2112U-101	100% - 0.1%	
Jung	Electronic potentiometer	240-10	100% - 0.1%	
Leviton	IllumaTech dimmer	IP710-DLX	100% - 0.1%	
Lightolier (Philips)	Momentum (120V ONLY)	ZP600FAM120	100% - 0.1%	
Merten	Electronic potentiometer	5729	100% - 0.1%	
Pass & Seymour	Titan	CD4FB-W	100% - 0.1%	
Watt Stopper	Miro	DCLV1	100% - 0.1%	
Synergy	Wallbox Dimmers	ISD BC	100% - 0.1%	
ABB	i-bus	SD/S 2.16.1	100% - 0.1%	
Crestron	Modules	GLX-DIMFLV8, GLXP-DIMFLV8	100% - 0.1%	
Crestron	Green Light	GLPAC-DIMFLV4-, GLPAC-DIMFLV8-	100% - 0.1%	
Crestron	Green Light Power Pack	GLPP-DIMFLVEX-PM, GLPP-1DIMFLV2EX-PM, GLPP-1DIMFLV3EX-PM	100% - 0.1%	
Crestron	DIN Rail Analog Output Module	DIN-A08	100% - 0.1%	
Crestron	DIN Rail 0-10V Fluorescent Dimmer	DIN-4DIMFLV4	100% - 0.1%	
Crestron	iLux 0-10V Dimmer Expansion Module	CLS-EXP-DIMFLV	100% - 0.1%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML6A, 6B
0-10V DIMMING W/RELAY TO SWITCH POWER



DIML6A, 6B
0-10V DIMMING (NO RELAY)



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-6

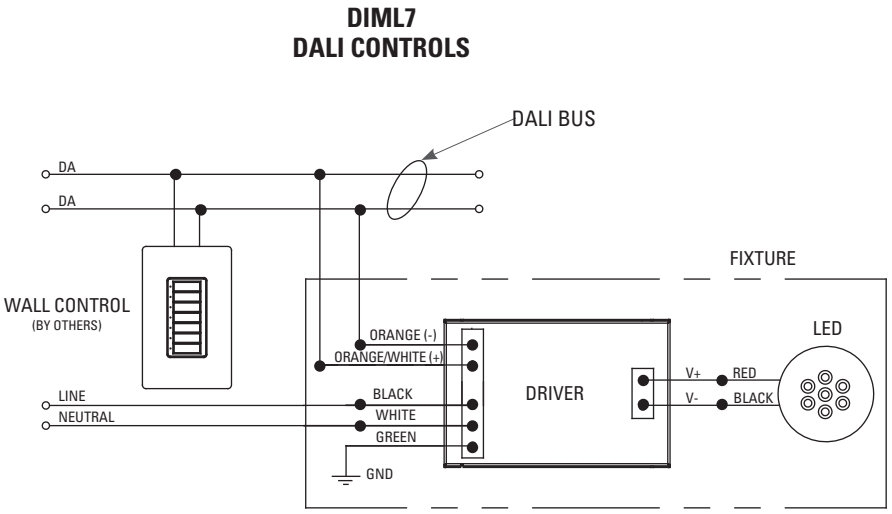
USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML7

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML7 LED: EldoLED DALI Dimming Driver Wiring (Dims down to 0.1%)



www.usailighting.com
info@usailighting.com
1126 River Road
New Windsor, NY 12553
T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-7

USAI Lighting

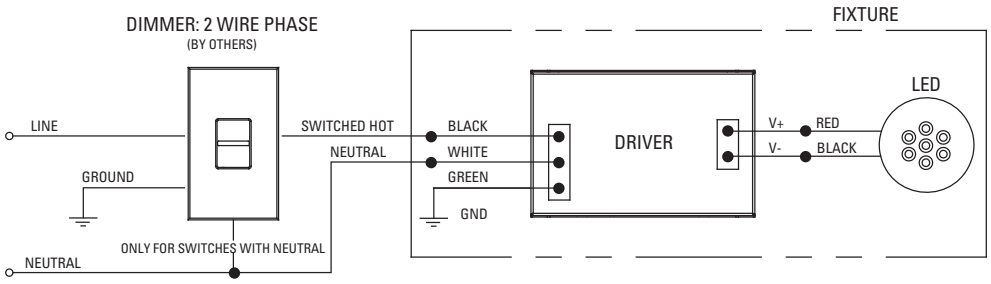
DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML9

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML9 LED: TRIAC Forward Phase Dimming Driver Wiring (Dims down to 15%) 120V Only

DIML9
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-9

USAI Lighting

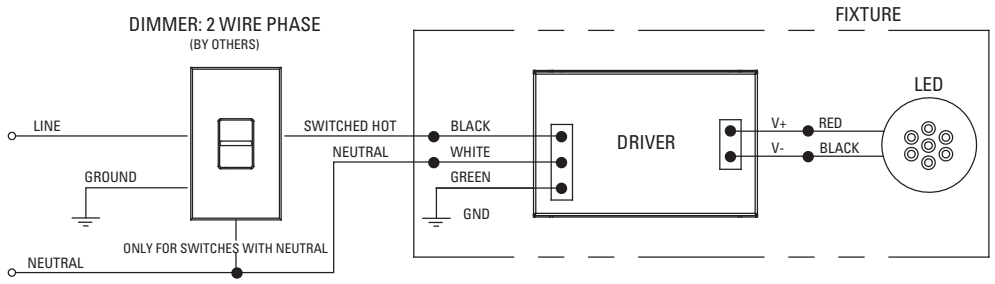
DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML10

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML10 LED: ELV Reverse Phase Dimming Driver Wiring (Dims down to 15%) 120V Only

DIML10
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-10

LITHONIA LIGHTING®

Catalog Number	
Notes	
Type	

FEATURES & SPECIFICATIONS

INTENDED USE — RT5™ is designed for applications that require the extremely energy efficient delivery of comfortable volumetric light from a lay-in fixture that is appealing and shallow in depth. Ideal for offices, schools, hospitals, retail and numerous other commercial applications. **Certain airborne contaminants can diminish integrity of acrylic. Click here for Acrylic Environmental Compatibility table for suitable uses.**

OPTICS — Delivers volumetric lighting by filling the entire volume of space with light, delivering the ideal amount of light to walls, cubicles, work surfaces and people.

Luminous characteristics are carefully managed at high angles to deliver just enough intensity to deliver the volumetric effect.

Regressed, two-piece refractive system obscures and softens the lamp and smoothly washes the reflector with light.

Linear faceted reflector softens and distributes light into the space and minimizes the luminance ratio between the fixture and the ceiling.

Mechanical cut-off across the reflector and fresnel refracton along the refractor provide high angle shielding and a quiet ceiling.

Sloped endplates provide a balanced fixture to ceiling ratio while enhancing the perception of fixture depth.

CONSTRUCTION — Impact modified acrylic prismatic refractor with polymer light diffusing film.

Rugged, one-piece, cold-rolled steel reflector with embossed facets with polyester powder paint after fabrication.

Rigid structure with ballast box and endplates with integral T-bar clips.

Fixtures may be mounted end-to-end.

ELECTRICAL — Highly efficient program start electronic ballasts, Class P, thermally protected, resetting, HPF, non PCB, UL Listed, CSA Certified, sound rated A. Your choice of Premium or Premium XP T5 lamp with enhanced phosphors and 85 CRI. Lamp is TCLP compliant.

S5 option available for use with SIMPLY5™ Lighting Intelligence system with multi-level dimming. See SYNERGY® Lighting Controls specification sheets for more information. Ballast Disconnect provided standard where required to comply with U.S. and Canadian electrical codes.

INSTALLATION — Side mounted ballast tray accessed by removing adjacent ceiling tile. Ballast tray may be removed from fixture during service.

Lamp accessed by squeezing refractor to release from retention tabs.

LISTING — UL Listed (standard). Optional: Canada CSA or cUL. Mexico NOM.

WARRANTY — 1-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

Protected by one or more of US Patents Nos. 7,229,192; D541,467; D541,468; D544,633; D544,634; D544,992; D544,933 and additional patent pending.

Note: Specifications subject to change without notice.

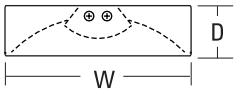
RT5

1'x 4'
One or Two Lamps
Premier and Premier XP T5

SIMPLY5™ LIGHTING INTELLIGENCE

Specifications

Length: 48 (121.8)
Width: 12 (30.5)
Depth: 3-1/8 (7.9)



All dimensions are inches (centimeters) unless otherwise specified.

ORDERING INFORMATION For shortest lead times, configure products using **bolded options**.

Example: RT5 1 28T5 MVOLT GEB10PS LPM835P

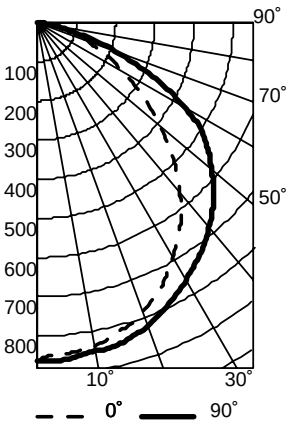
RT5						
Series	**Number of lamps**	**Lamp type**	**Voltage**	**Ballast**	**Lamp[6]**	**Options**
RT5 Recessed T5	**1** 2	**28T5** 28W T5 (46") **54T5HO** 54W T5HO (46")[1]	**MVOLT**[2] 347[3]	**GEB10PS** 1.0 ballast factor, program start[4] GEB95 .95 ballast factor (2-lamp only)[7] GEB95S .95 ballast factor, step dimming (2-lamp only)[7] S5 SIMPLY5™ system[5] GEB80 .80 ballast factor (2-lamp only)[8] GEB80S .80 ballast factor, step dimming (2-lamp only)[8] GEB115 1.15 ballast factor (2-lamp only)[7] GEB115S 1.15 ballast factor (2-lamp only), step dimming[7] GEB90 .90 ballast factor (2-lamp only) GEB90S .90 ballast factor, step dimming (2-lamp only)	**LPM835P** Premier 3500°K lamp[7] LPM830P Premier 3000°K lamp[7] LPM841P Premier 4100°K lamp[7] L835XP Premier 3500°K lamp[7] L830XP Premier 3000°K lamp[7] L841XP Premier 4100°K lamp[7] LP835 3500°K lamp[8] LP830 3000°K lamp[8] LP841 4100°K lamp[8]	GLR Internal fast-blow fuse[9] PWS1836 6' prewire, 3/8" diameter, 18-gauge, 3-wire (n/a with GEB95S)[10] PWS1846 6' prewire, 3/8" diameter, 18-gauge, wire[11] **EL14** Emergency battery pack[12] CSA Listed and labeled to comply with Canadian standards QFC_ Quick-flex cable[9]

Notes

1 For T5HO applications, use GEB10PS, GEB80 or GEB80S ballasts. Not available with 28T5.
2 MVOLT (120-277 volts), 50-60HZ.
3 For 347V use GEB95, GEB95S or GEB10PS ballast only.
4 GEB10PS for use with one-lamp 28T5, and one- and two-lamp 54T5HO.
5 SIMPLY5 includes 13' S5 SSC RELOC® wiring system, specify voltage unless HW (hardwire) or PWS is ordered. Two-lamp = .95 ballast factor; one-lamp = 1.0 ballast factor.
6 Required. All fixtures shipped with lamps installed.
7 28T5 only.
8 54T5HO only.
9 Must specify voltage, 120 or 277.
10 For use with standard ballast.
11 For use with step dimming ballast.
12 See PS1400QD spec sheet for EL lumen output information.

RT5 Volumetric Recessed Lighting, 1' x 4'

RT5 28T5 GEB10PS LPM835P, (1) FP28/835/PM/ECO lamp, 2730 lumens per lamp, s/m 1.2 (along) 1.3 (across), test no. LTL13316



CP Summary

	0°	90
0°	862	862
5°	848	862
15°	814	844
25°	747	792
35°	636	723
45°	492	636
55°	331	523
65°	189	323
75°	85	106
85°	15	13
90	0	0

Coefficients of Utilization

	pf	80%			70%			50%		
RCR	pw	70%	50%	30%	50%	30%	10%	50%	30%	10%
	0	104	104	104	101	101	101	97	97	97
	1	95	91	88	89	86	83	86	83	81
	2	87	80	74	78	73	68	75	71	67
	3	79	70	63	69	62	57	66	61	56
	4	72	62	55	61	54	49	59	53	48
	5	67	56	48	55	47	42	53	46	42
	6	62	50	42	49	42	37	48	41	36
	7	57	45	38	45	37	32	43	37	32
	8	53	41	34	41	34	29	40	33	29
	9	50	38	31	37	31	26	36	30	26
	10	46	35	28	35	28	24	34	28	23

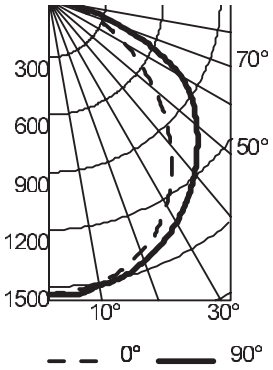
Zonal Lumen Summary

Zone	Lumens	% Lamp	% Fixture
0° - 30°	672	24.6	28.3
0° - 40°	1100	40.3	46.3
0° - 60°	1940	71.1	81.7
0° - 90°	2375	87.0	100.0
90° - 180°	0	0.0	0.0
0° - 180°	2375	87.0	100.0

LER: 74.2 lpw

Efficiency: 87.0%

RT5 2 28T5 GEB95S LPM835P, (2) FP28/835/PM/ECO lamp, 2730 lumens per lamp, s/m 1.2 (along) 1.3 (across), test no. LTL14100



CP Summary

	0°	90°
0°	1540	1540
5°	1527	1547
15°	1463	1499
25°	1333	1405
35°	1120	1270
45°	860	1102
55°	588	920
65°	349	609
75°	159	235
85°	27	18
90°	0	0

	pf	80%			70%			50%		
RCR	pw	70%	50%	30%	50%	30%	10%	50%	30%	10%
	0	92	92	92	90	90	90	86	86	86
	1	85	81	78	79	76	74	76	74	71
	2	77	71	66	69	65	61	67	63	59
	3	70	62	56	61	55	51	59	54	50
	4	64	55	48	54	48	43	52	47	42
	5	59	49	42	48	42	37	47	41	37
	6	55	44	38	44	37	32	42	36	32
	7	51	40	34	40	33	29	38	33	28
	8	47	37	30	36	30	26	35	29	25
	9	44	34	27	33	27	23	32	27	23
	10	41	31	25	31	25	21	30	25	21

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Fix
0° - 30°	1198	21.9	28.
0° - 40°	1951	35.7	46.
0° - 60°	3413	62.5	80.
0° - 90°	4223	77.3	100
90° - 180°	0	0.0	0.0
0° - 180°	4223	77.3	100

Efficiency: 77.3%

LER: 69.1 lpw

*The LER (Luminaire Efficacy Rating) is the lumens per watt rating for this fixture. It is used to compare the energy efficiency of various products. This photometric report is based upon IES testing procedures, as stated in LM-41-1998. The reported lumen rating is based upon lamp manufacturer's published lumen output for the cold spot temperature measured during lamp calibration.

FLUORESCENT: One Lithonia Way Conyers, GA 30012 Phone: 800.858.7763 Fax: 770-929-8789 www.lithonia.com

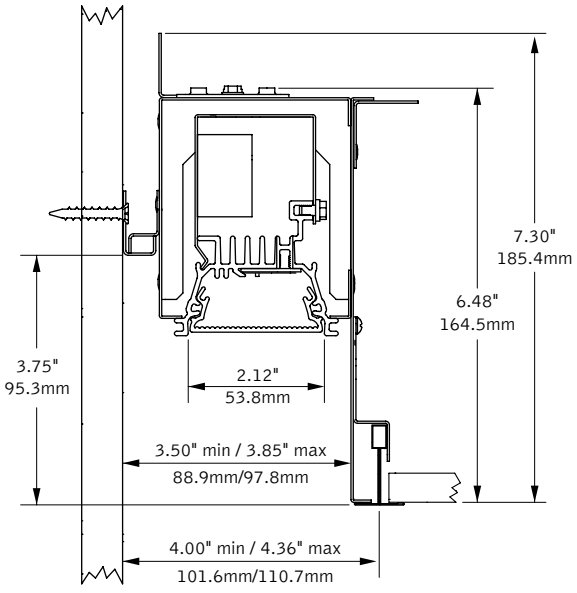
Trace™

LED

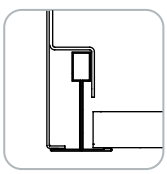
FOCAL POINT®

DIMENSIONAL DATA

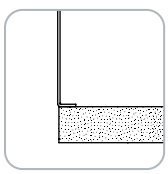
Grid Ceiling Shown



Mounting Details



Grid
15/16" or 9/16" Flat Tee
main runner required at edge.



Drywall
Ceiling mounts below housing.

FEATURES

Low wattage LED slot provides glowing transition between wall and ceiling.

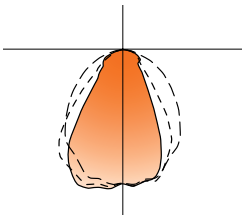
Frosted lens with linear micro prism pattern obscures visibility to LED's and provides continuous, shadow-free illumination.

Housing creates 3" architectural slot.

Premium LEDs operate efficiently on a solid-core module platform to achieve excellent thermal management and reliable operation.

L70 at 50,000 hours

PERFORMANCE



4' Luminaire

Delivered Lumens: 1207lm

Total System Watts: 22.9W

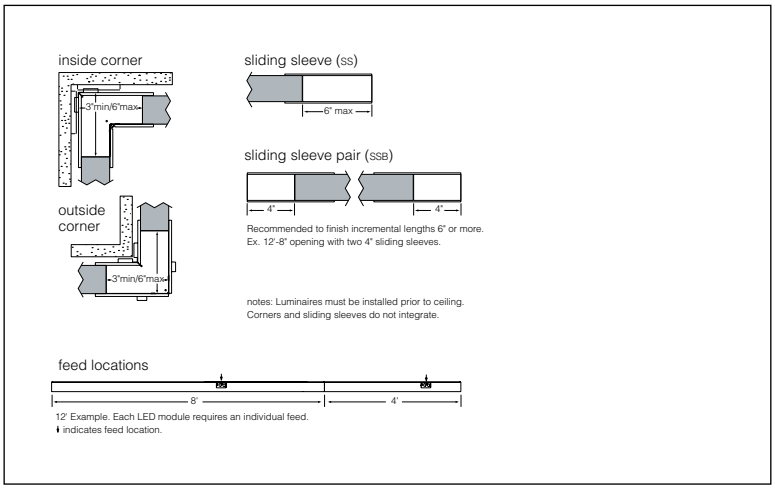
PRODUCT OVERVIEW

Lumen Output:	1207lm
Wattage:	23W per 4'
LPW:	53
SDCM:	3
Lumen Maintenance:	L70 @ 50,000hrs

Photometric performance is measured in accordance with IESNA LM-79.
Visit focalpointlights.com for complete photometric data.

fixture: project:

DETAILS



SPECIFICATIONS

LED System

Proprietary linear LED module incorporates premium LEDs on a solid-core platform to achieve excellent thermal management. Module is available in 3000K, 3500K or 4000K with CRI > 80. 0-10V dimming driver standard. LED module and driver are replaceable from below.

Construction

One piece .07" thick LED module housing of extruded aluminum. 20 Ga. steel outer housing creates floating ceiling effect and adjusts for alignment with walls. 20 Ga. steel internal bulkheads. 20 Ga. steel sliding sleeves and corners. 4' unit weight: 26 lbs.

Optic

Continuous illumination enabled by linear LED modules shielded by ribbed extruded frosted acrylic lens .06" thick with opal satin finish. Extended outer housing provides cutoff to illuminated lens.

Electrical

Standard 120-277V driver includes 0-10V analog dimming. Power factor > .9.

Labels

UL and cUL listed. Suitable for Dry or Damp Locations, indoor use only. Suitable for wood ceiling applications.

Finish

Polyester powder coat applied over a 5-stage pre–treatment.

Lumen Maintenance

L70 at 50,000 hours.

Warranty

LED system rated for operation in ambient environments up to 25°C. 5 year limited warranty.

ORDERING

Luminaire Series		**FTRL**
Trace	FTRL	
Shielding		**AC**
Frosted Acrylic Diffuser	AC	
LED System		**LL1**
Standard Output	LL1	
Color Temperature		
3000K	30K	
3500K	35K	
Circuits		**1C**
Single Circuit	1C	
Voltage		
120 Volt	120	
277 Volt	277	
Driver		
0-10V Dimming	LD1	
Mounting		
Grid	G	
Drywall	XF	
Factory Options		
Chicago Plenum	CP	
Emergency Circuit*	EC	
Flanged Ends	FL	
HLR/GLR Fuse	FU	
Sliding Sleeve	SS	
Sliding Sleeve Pair (3' minimum length)	SSB	
Finish		**WH**
Matte White Housing	WH	
Luminaire Length		
Specify luminaire/row length in 1' increments (2' minimum)	XX'	
Corner Options		
90-degree Inside Corner	FTRL-IC90	
90-degree Outside Corner	FTRL-OC90	

*For more information visit focalpointlights.com/reference or consult factory.

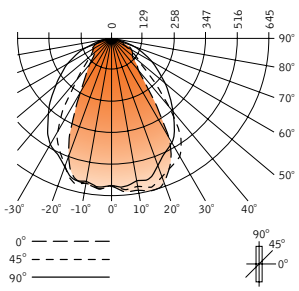
Trace®™

LED

FTRL-AC-LL1-L30-1C-120-LD1-G-WH-4'

Filename:	FTRLLL1L30G.IES	Lumens:	1207lm
Test #:	16610.0	System Watts:	22.9W
		LPW:	53

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	601	601	601	601	601	
5°	629	619	608	614	616	59
15°	645	629	594	607	588	173
25°	572	581	521	502	378	243
35°	311	499	459	331	170	242
45°	153	258	347	146	95	194
55°	111	133	245	86	90	143
65°	71	95	157	77	71	88
75°	31	46	73	46	38	48
85°	5	11	15	16	11	16
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Fixture
	0-30°	475	39.4
	0-40°	717	59.4
	0-60°	1054	87.3
	0-90°	1207	100
Total Luminaire	0-180°	**1207**	**100**

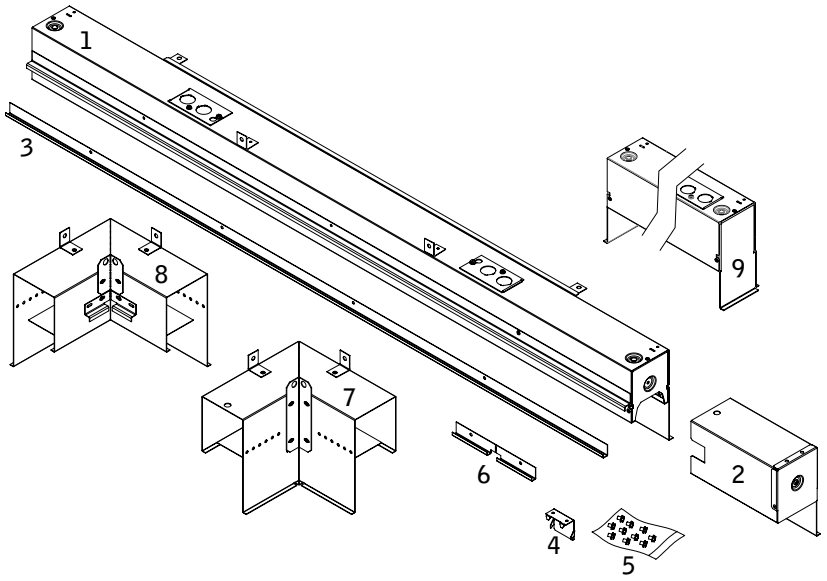
Go to www.focalpointlights.com for additional photometric data.

trace™
FTRL

FOCAL POINT

⚠ MUST BE INSTALLED PRIOR TO DRYWALL /HARD CEILING ⚠
READ ALL INSTALLATION INSTRUCTIONS BEFORE BEGINNING INSTALLATION

FOCAL POINT PARTS



KEY

ATTENTION

POWER OFF

POWER ON

PARTS LIST

1 HOUSING

2 SLIDING SLEEVE (SS)
(SHIPPED INSTALLED. SSB INDICATES A SLIDING SLEEVE AT BOTH ENDS)

3 J-RAIL

4 JOINER BRACKET

5 HARDWARE BAG

6 CORNER J-RAIL

7 INSIDE CORNER
(SHIPPED INSTALLED.)

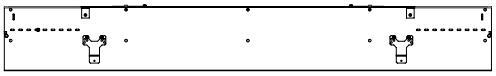
8 OUTSIDE CORNER
(SHIPPED INSTALLED.)

9 FINISH FLANGES
(SHIPPED INSTALLED)

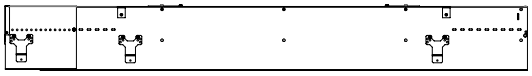
BY OTHERS

GRID CEILING - 15/16" OR 9/16" FLAT TEE MAIN RUNNER REQUIRED FOR FINISH EDGE.

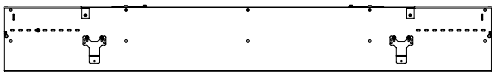
HOUSING TYPES (4' SHOWN)



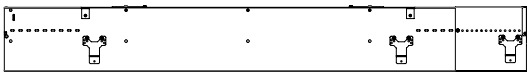
INDIVIDUAL (MAY INCLUDE SLIDING SLEEVES)



START (SHOWN WITH SLIDING SLEEVE)



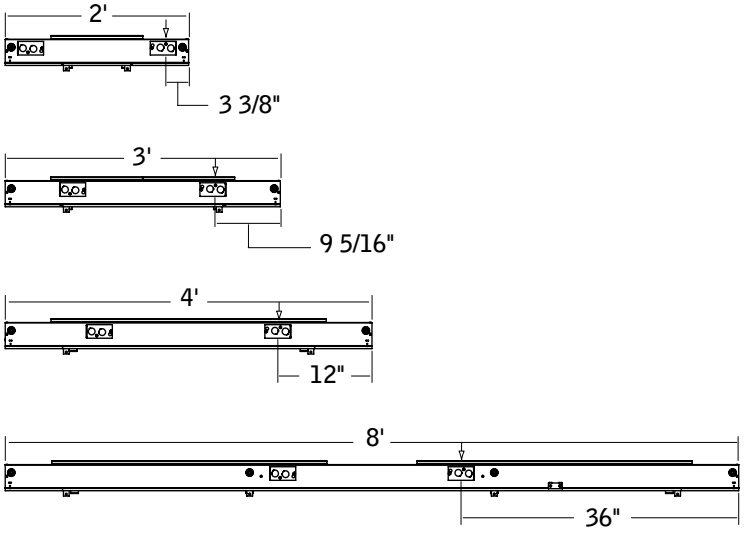
INTERMEDIATE



END (SHOWN WITH SLIDING SLEEVE)

FEED LOCATIONS

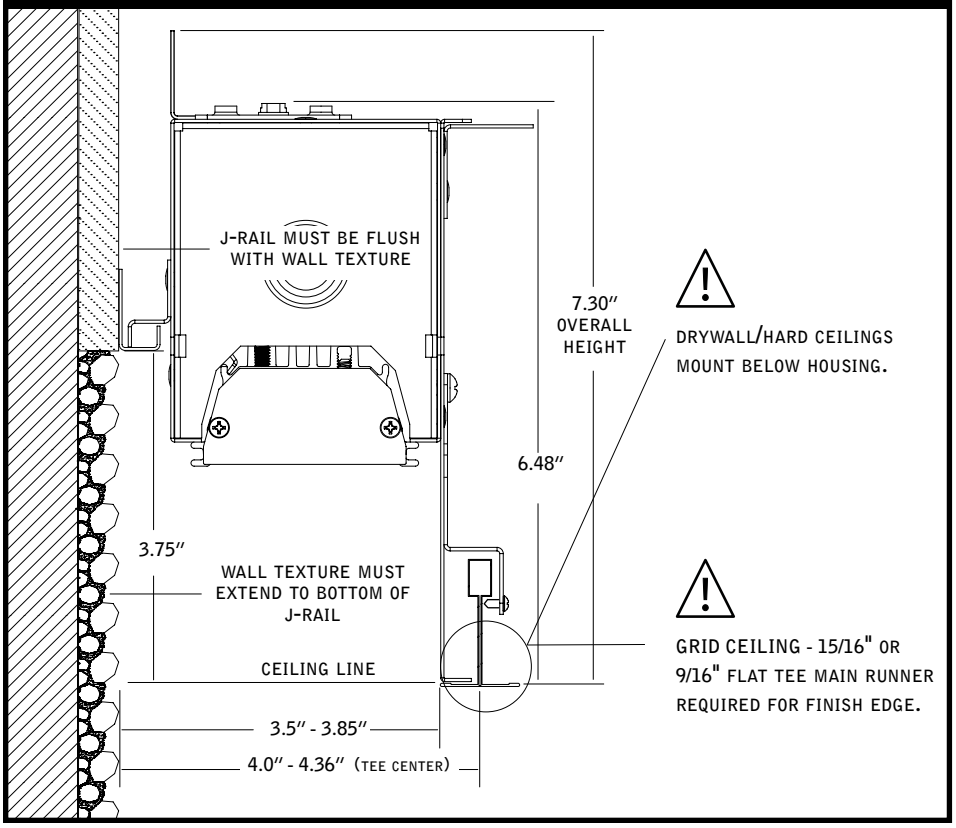
INDICATES FEED LOCATION



THRU-WIRING NOT AVAILABLE. EACH HOUSING SECTION REQUIRES ITS OWN FEED.

Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

WALL/CEILING PREP



BASIC INSTALLATION

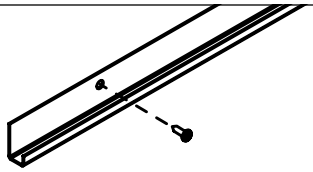
STEPS 1-8

SLIDING SLEEVES SEE PG 3
CORNERS SEE PG 4

FOCAL POINT RECOMMENDS STARTING WITH CORNER INSTALLATION IF APPLICABLE

SLIDING SLEEVE PAIRS (SSB) START & END WITH A SLIDING SLEEVE

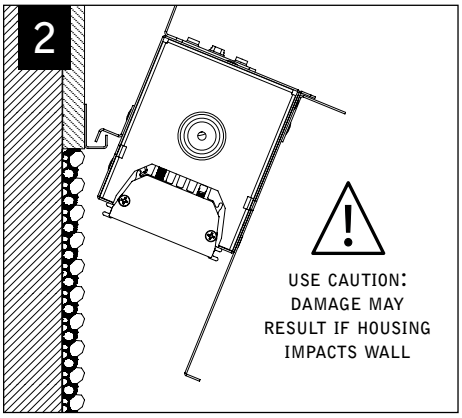
1



MOUNT J-RAIL TO WALL

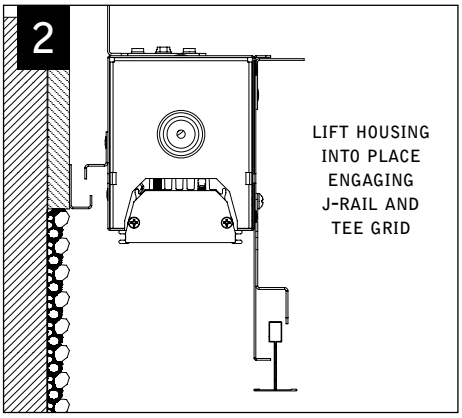
DRYWALL/HARD CEILING

2

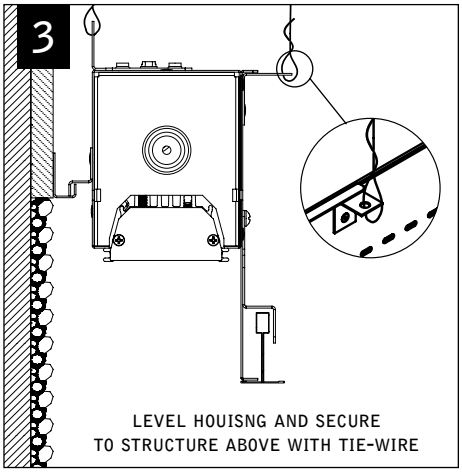


GRID

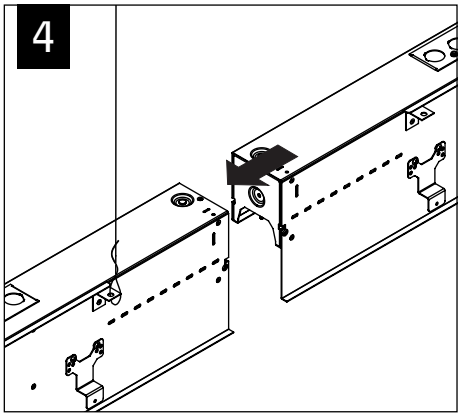
2



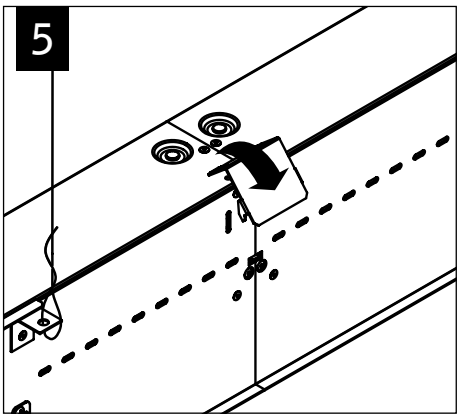
3



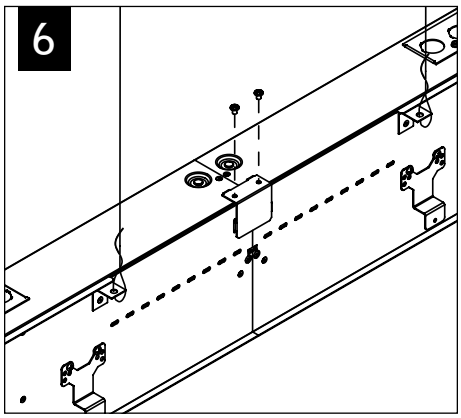
4



5



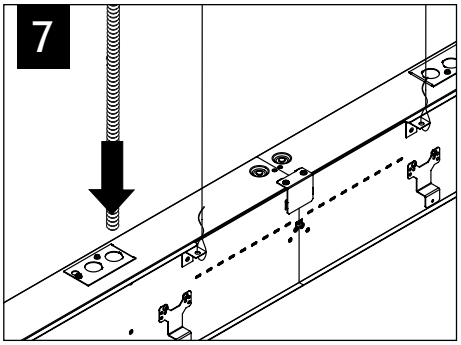
6



REPEAT STEPS 2 - 6 FOR EACH HOUSING SECTION

Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

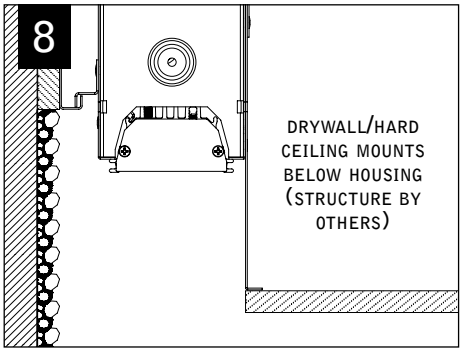
7



MAKE ELECTRICAL CONNECTIONS

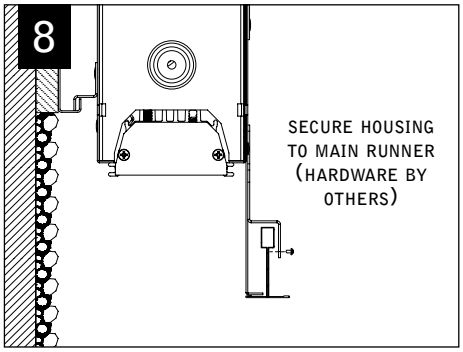
DRYWALL/HARD CEILING

8



GRID

8



SLIDING SLEEVES

⚠ MAX LENGTH 6" PER SLEEVE

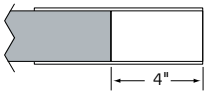
⚠ SLIDING SLEEVES & CORNERS DO NOT INTEGRATE

SINGLE SLIDING SLEEVE (SS):

EXAMPLE:

20' 4" RUN LENGTH - 20' HOUSING =

4" SLIDING SLEEVE

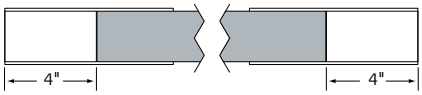


SLIDING SLEEVE PAIR (SSB):

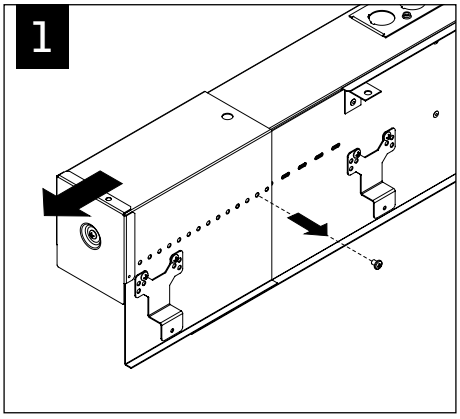
EXAMPLE:

(20' 8" RUN LENGTH - 20' HOUSING) / 2 =

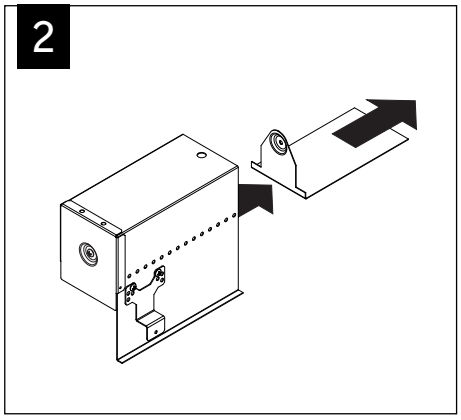
4" SLIDING SLEEVE ON EACH END



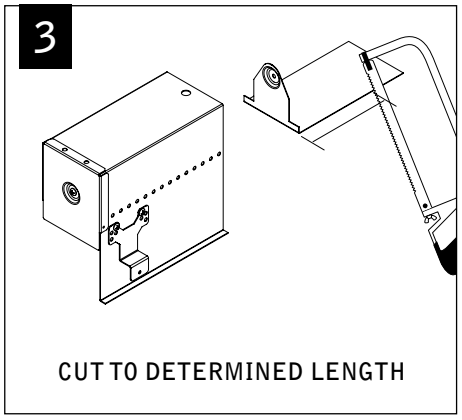
1



2

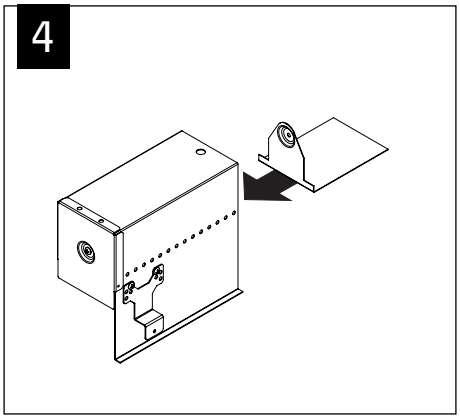


3

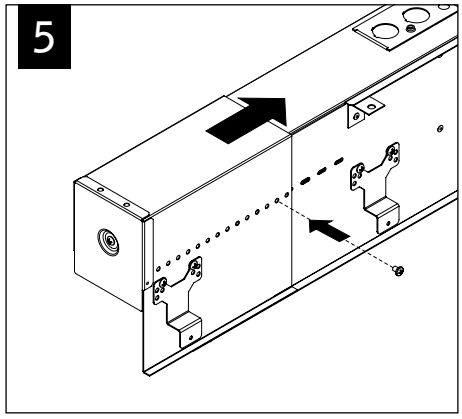


CUT TO DETERMINED LENGTH

4



5

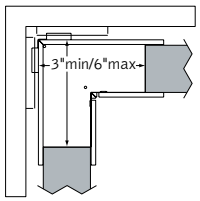


Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

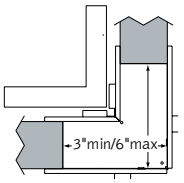
CORNERS

3" MIN / 6" MAX PER SIDE

INSIDE CORNER:

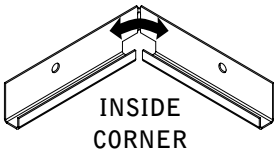


OUTSIDE CORNER:

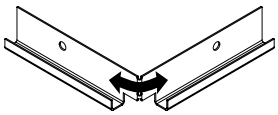


CORNERS &
SLIDING SLEEVES
DO NOT INTEGRATE

1

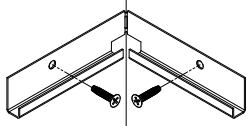


INSIDE
CORNER



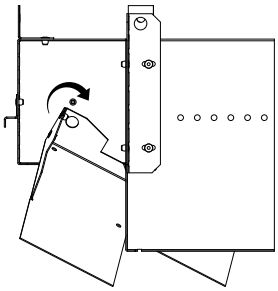
OUTSIDE CORNER

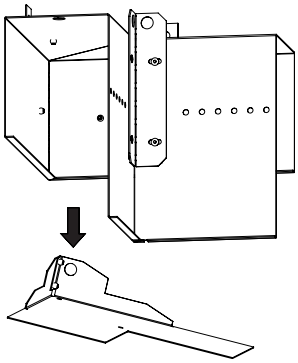
2



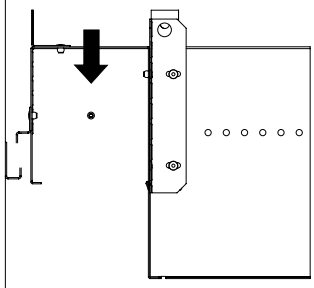
INSIDE CORNER SHOWN

3



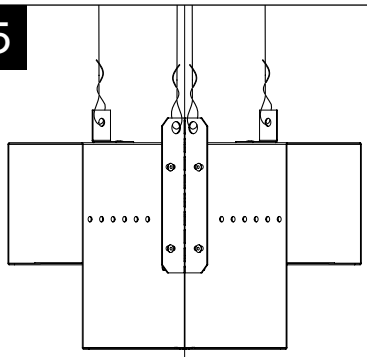


4

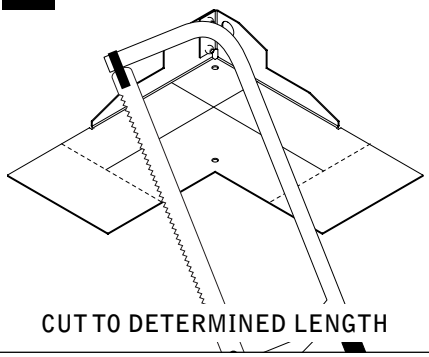


LIFT HOUSING INTO PLACE
ENGAGING J-RAIL

5

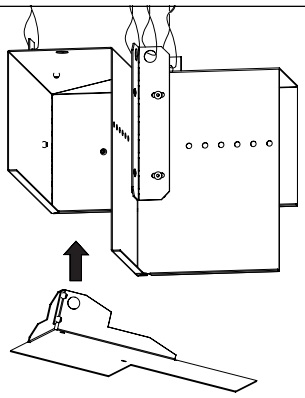


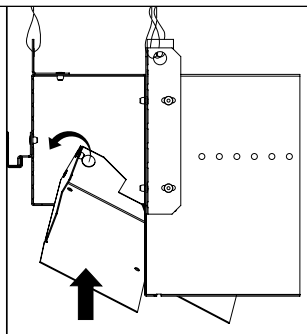
6



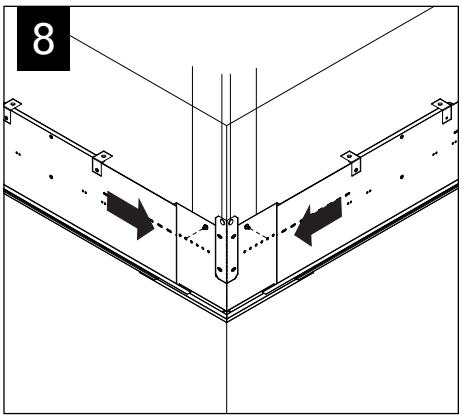
CUT TO DETERMINED LENGTH

7



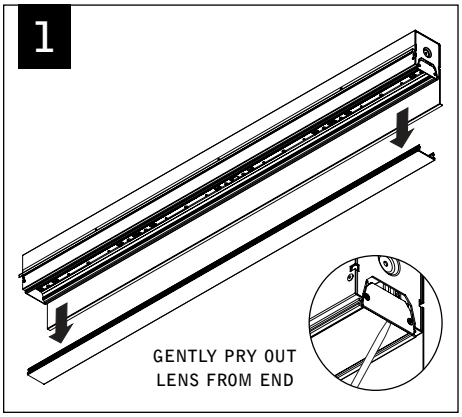


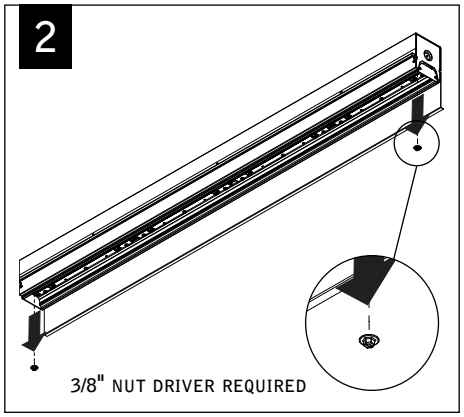
8

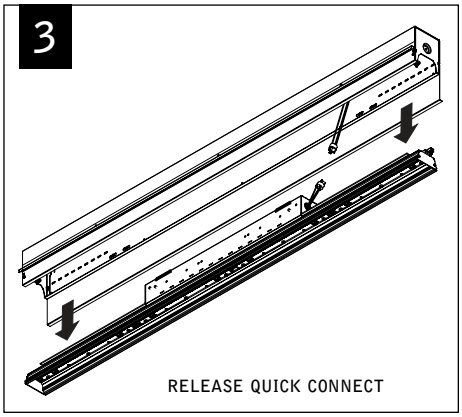


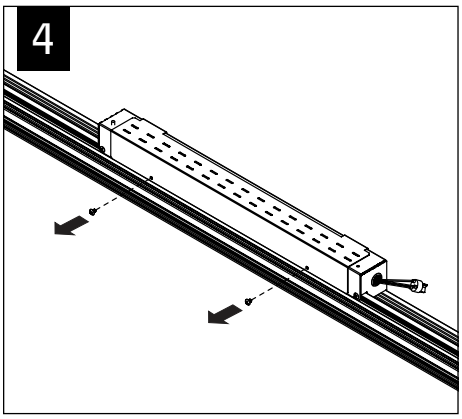
Luminaires must be installed by a qualified electrician (check with local and national codes for proper installation).
To prevent electrical shock, disconnect electrical supply before installation or servicing.

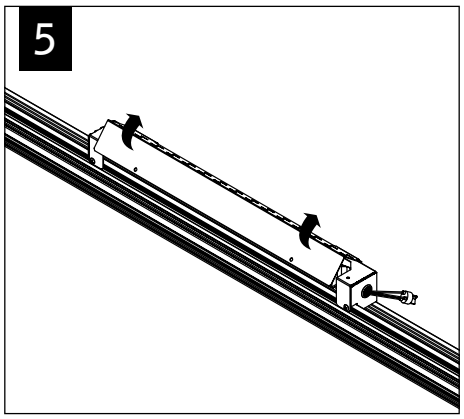
SERVICE

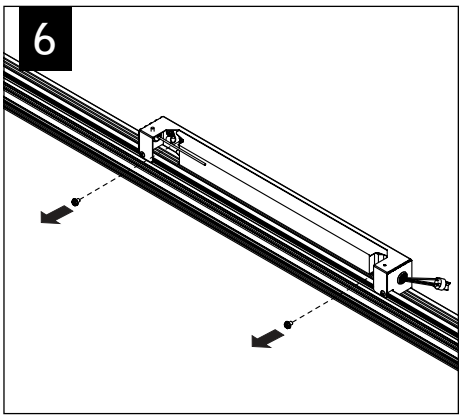








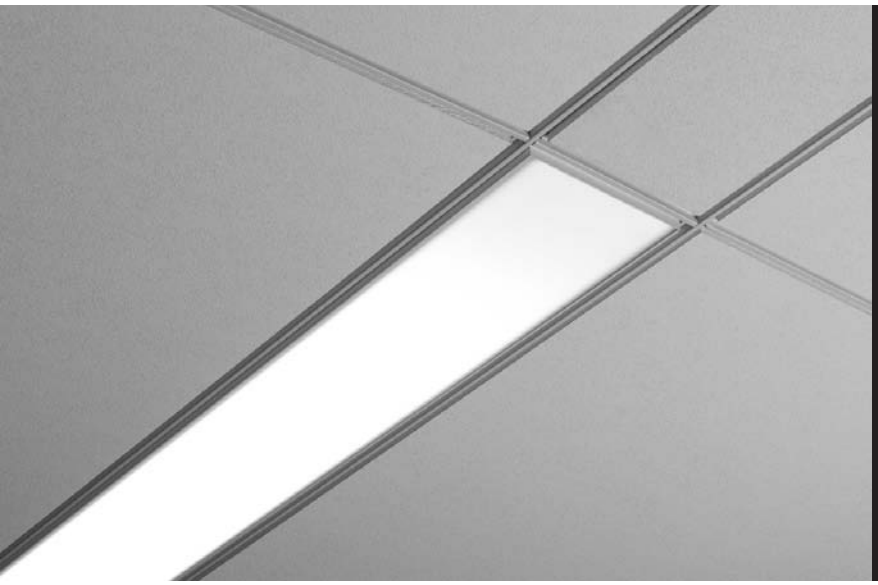


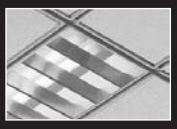


Seem® 6

FLUORESCENT GRID

FOCAL POINT®

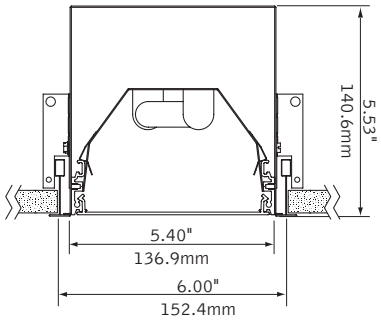




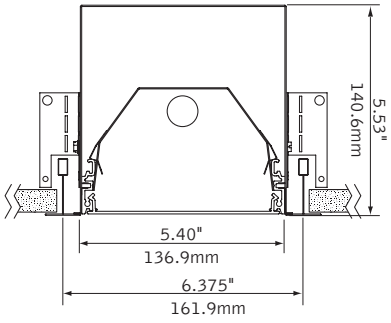
parabolic louver

DIMENSIONAL DATA

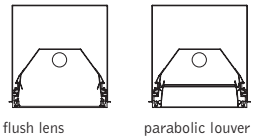
9/16" grid



15/16" grid



shielding options



flush lens | parabolic louver

FEATURES

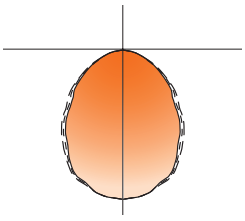
Narrow 6" aperture slot fluorescent luminaire that integrates with the ceiling for a clean unobtrusive aesthetic.

Frosted acrylic flush lens provides even illumination, high performance lens also available for increased efficiency. Parabolic Louver also available.

Allows for individual and continuous row mount in grid applications.

Available in 1 or 2 lamp T5, T5HO or T8 configurations, Seem 6 provides continuous illumination by combining 3' and 4' staggered lamps. Specify 1 lamp for even appearance and minimal lamp image, or 2 lamps when higher light levels are required.

PERFORMANCE



PRODUCT OVERVIEW

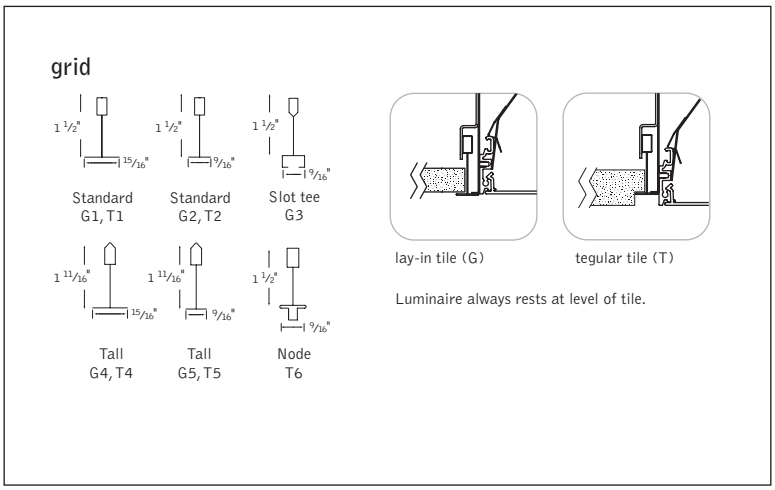
Lumen Output:	1730-7190lm
Wattage:	33-120W
Lamping:	T5, T5HO, T8

1-Lamp T5 High Performance Lens	1-Lamp T5 Flush Satin Lens
73% Efficient	**60% Efficient**
922 cd @ 0˚	**619 cd @ 5˚**

Visit focalpointlights.com for complete photometric data.

fixture: project:

MOUNTING INFORMATION



SPECIFICATIONS

Construction

Die–formed one-piece 20 Ga. steel housing with extruded aluminum reflector and lens attachment rails. 16 Ga. internal bulkhead. 20 Ga. steel end caps. Earthquake brackets supplied as standard.

Lengths 6' and longer configured with staggered lamps (6' & 8' T8 configured with non-staggered lamps). 1-lamp T8: 4.47" overlap, 2-lamp T8: 9.35" overlap, 1-lamp T5/T5HO: 4.35" overlap, 2-lamp T5/T5HO: 2.00" overlap.

2' unit weight: 9lbs., 3' unit weight: 13lbs., 4' unit weight: 17lbs., 5' unit weight: 20lbs., 6' unit weight: 23lbs., 8' unit weight: 31lbs.

Optic

Reflectors fabricated of 20 Ga. steel finished in High Reflectance White powder coat. Flush satin lens: extruded acrylic lens .07" thick with satin finish. High performance flush lens: extruded acrylic lens .07" thick with increased light transmission. Paraboic louver: .75"H x 1.5" frequency fabricated of low iridescent, semi-specular premium grade aluminum.

Electrical

Luminaires are pre–wired with factory installed branch circuit wiring and over-molded quick connects. Electronic fluorescent ballasts are thermally protected and have a Class "P" rating. Optional dimming ballasts available.

Labels

UL and cUL listed.

Finish

Housing: High reflectance white pre-paint. Aluminum Rails: Polyester powder coat applied over a 5-stage pre-treatment.

ORDERING

Luminaire Series		**FSM6**
Seem 6	FSM6	
Shielding		_____
Flush Satin Lens	FL	
High Performance Flush Lens (lamp image may be visible)	FLXP	
Parabolic Louver	PL	
Lamping		_____
One Lamp T8	1T8	
Two Lamp T8	2T8	
One Lamp T5	1T5	
Two Lamp T5	2T5	
One Lamp T5HO	1T5HO	
Two Lamp T5HO	2T5HO	
Circuit		_____
Single Circuit	1C	
Dual Circuit (2-lamp luminaires only)	2C	
Voltage		_____
120 Volt	120	
277 Volt	277	
347 Volt	347	
Ballast		_____
Electronic Instant Start (T8 only) (maximum <20% THD)	E	
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast*	D	
Ceiling Configurations (9/16" grid = 6.000" tee spacing 15/16" grid = 6.375" tee spacing)		_____
Std. 15/16" Lay-in	G1	
Std. 15/16" Tegular	T1	
Std. 9/16" Lay-in	G2	
Std. 9/16" Tegular	T2	
9/16" Slot-tee Tegular	G3	
Tall 15/16" Lay-in	G4	
Tall 15/16" Tegular	T4	
Tall 9/16" Lay-in	G5	
Tall 9/16" Tegular	T5	
Node 9/16" Tegular	T6	
Factory Options		
Chicago Plenum	CP	_____
Emergency Circuit*	EC	_____
Emergency Battery Pack*	EM	_____
Flex Whip*	FW	_____
HLR/GLR Fuse	FU	_____
Include 3000K Lamp*	L830	
Include 3500K Lamp*	L835	
Include 4100K Lamp*	L841	
Finish		**WH**
Matte White Housing	WH	
Luminaire Length (designed to fit standard grid lengths)		_____
Specify luminaire/row length in 1' increments (lengths 6' and longer configured with staggered lamps. 6' & 8' 2-lamp T8 configured with non-staggered lamps)	X'	

*For more information visit focalpointlights.com/reference or consult factory.

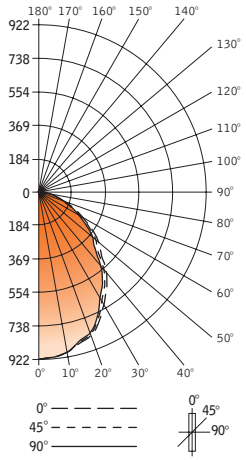
Seem® 6

FLUORESCENT - HIGH PERFORMANCE FLUSH LENS

FSM6-FLXP-1T5-1C-120-S-WH-4'

Filename: FSM6FLXP1T5.IES
Test #: 16086.0
Lumens: 2110lm
Efficiency 73%

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	922	922	922	922	922	
5°	916	918	916	915	916	88
15°	865	865	862	859	856	244
25°	792	790	781	771	770	361
35°	657	653	639	623	617	401
45°	484	476	459	444	437	356
55°	361	355	341	326	320	306
65°	224	220	210	202	199	209
75°	113	111	108	103	102	114
85°	31	29	29	28	27	31
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixture
	0-30°	639	23.9	32.8
	0-40°	1094	37.7	51.8
	0-60°	1756	60.5	83.2
	0-90°	2110	72.8	100
Total Luminaire	0-180°	**2110**	**72.8**	**100**

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	4371	4145	3946
55°	4019	3796	3563
65°	3385	3173	3007
75°	2788	2665	2517
85°	271	2125	1978

CO-EFFICIENTS OF UTILIZATION

Floor		20												
Ceiling		80				70			50		30		10	00
Wall		70	50	30	10	70	50	10	50	10	50	10	00	
RCR	0	87	87	87	87	85	85	85	81	81	77	77	74	74	73
	1	80	77	74	72	78	76	74	73	69	70	67	67	65	63
	2	74	69	64	61	72	67	60	65	59	63	57	60	56	55
	3	68	61	56	52	67	60	51	58	51	56	50	55	49	47
	4	63	55	49	45	61	54	45	52	44	51	43	49	43	41
	5	58	49	43	39	56	48	38	47	38	45	38	44	37	36
	6	53	44	38	34	52	44	34	42	33	41	33	40	33	31
	7	49	40	34	30	42	40	30	38	30	37	29	36	29	28
	8	46	36	30	26	45	36	26	35	26	34	26	33	26	24
	9	42	33	27	23	41	32	23	31	23	31	23	30	22	21
	10	39	30	24	20	38	29	20	29	20	28	20	27	20	19

Numbers indicate percentage values of reflectivity.

Go to www.focalpointlights.com for additional photometric data.

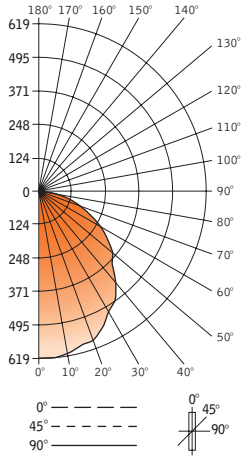
Seem® 6

FLUORESCENT - FLUSH LENS

FSM6-FL-1T5-1C-120-S-WH-4'

Filename: FSM6FL1T5.IES
Test #: 16085.0
Lumens: 1740lm
Efficiency 60%

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	617	617	617	617	617	
5°	619	617	617	617	617	59
15°	592	592	592	592	592	168
25°	559	558	558	559	559	259
35°	492	492	492	492	492	309
45°	384	384	384	384	385	298
55°	311	311	311	313	311	280
65°	212	212	212	213	213	211
75°	115	116	118	118	118	124
85°	31	32	31	32	32	35
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixture
	0-30°	485	16.7	27.9
	0-40°	794	27.4	45.6
	0-60°	1371	47.3	78.8
	0-90°	1740	60.0	100
Total Luminaire	0-180°	**1740**	**60.0**	**100**

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	3468	3468	3477
55°	3462	3462	3462
65°	3203	3203	3218
75°	2837	2911	2911
85°	2271	2271	2344

CO-EFFICIENTS OF UTILIZATION

Floor		20												
Ceiling		80				70			50		30		10	00
Wall		70	50	30	10	70	50	10	50	10	50	10	00	
RCR	0	71	71	71	71	70	70	70	67	67	64	64	61	61	60
	1	66	63	61	58	64	62	57	59	56	57	54	55	52	51
	2	60	55	52	48	59	54	48	52	47	50	46	48	45	43
	3	55	49	44	41	54	48	40	46	40	45	39	43	38	37
	4	51	44	39	35	49	43	34	41	34	40	34	39	33	32
	5	46	39	33	29	45	38	29	37	29	36	29	34	28	27
	6	43	35	29	26	41	34	26	33	25	32	25	31	25	24
	7	39	31	26	22	38	31	22	30	22	29	22	28	22	20
	8	36	28	23	19	35	27	19	27	19	26	19	25	19	18
	9	33	25	20	17	32	25	17	24	17	23	16	23	16	15
	10	32	23	18	15	30	22	15	22	15	21	15	21	14	13

Numbers indicate percentage values of reflectivity.

Go to www.focalpointlights.com for additional photometric data.

note: Photometric testing performed in an independent lab with standard lamps and ballasts. Lamp and ballast type and configuration will affect photometric performance.

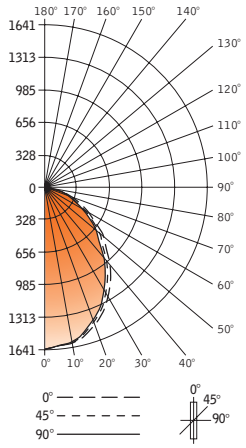
Seem® 6

FLUORESCENT - HIGH PERFORMANCE FLUSH LENS

FSM6-FLXP-2T5-1C-120-S-WH-4'

Filename: FSM6FLXP2T5.IES
Test #: 16084.0
Lumens: 3712lm
Efficiency 64%

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	1641	1641	1641	1641	1641	
5°	1615	1614	1612	1612	1609	154
15°	1552	1547	1540	1529	1526	436
25°	1395	1385	1362	1341	1330	631
35°	1151	1138	1106	1072	1063	695
45°	869	853	816	787	771	634
55°	641	627	598	570	561	537
65°	400	390	371	355	345	369
75°	198	196	187	179	177	198
85°	55	55	52	50	49	57
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixture
	0-30°	1221	21.0	32.9
	0-40°	1915	33.0	51.6
	0-60°	3087	53.2	83.2
	0-90°	3712	64.0	100
Total Luminaire	0-180°	**3712**	**64.0**	**100**

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	7848	7369	6963
55°	7136	6657	6246
65°	6044	5606	5213
75°	4885	4614	4367
85°	4030	3810	3590

CO-EFFICIENTS OF UTILIZATION

Floor		20												
Ceiling		80				70			50		30		10	00
Wall		70	50	30	10	70	50	10	50	10	50	10	00	
RCR	0	76	76	76	76	74	74	74	71	71	69	69	65	65	64
	1	71	68	66	63	69	66	62	64	60	61	59	59	57	56
	2	65	60	57	53	63	59	53	57	51	55	50	53	49	48
	3	60	54	49	46	59	53	45	51	44	50	44	48	43	42
	4	55	48	43	39	54	48	39	46	39	45	38	43	38	36
	5	51	43	38	34	50	43	34	41	33	40	33	39	33	31
	6	47	39	34	30	46	38	30	37	29	36	29	35	29	28
	7	43	35	30	26	42	35	26	34	26	33	26	32	26	24
	8	40	32	27	23	39	31	23	31	23	30	23	29	22	21
	9	37	29	24	20	36	28	20	28	20	27	20	26	20	19
	10	34	26	21	18	34	26	18	25	18	25	18	24	18	16

Numbers indicate percentage values of reflectivity.

Go to www.focalpointlights.com for additional photometric data.

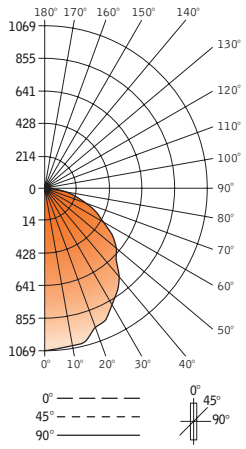
Seem® 6

FLUORESCENT - FLUSH LENS

FSM6-FL-2T5-1C-120-S-WH-4'

Filename: FSM6FL2T5.IES
Test #: 16083.0
Lumens: 3020lm
Efficiency 52%

CANDELPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	1069	1069	1069	1069	1069	
5°	1062	1062	1061	1061	1062	101
15°	1046	1046	1046	1046	1046	297
25°	958	958	958	958	958	443
35°	838	838	838	838	836	526
45°	670	670	668	670	671	519
55°	543	541	546	546	543	488
65°	369	369	371	372	373	368
75°	204	204	204	204	206	216
85°	57	57	57	57	57	62
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixture
	0-30°	841	14.5	27.9
	0-40°	1368	23.6	45.3
	0-60°	2374	40.9	78.6
	0-90°	3020	52.1	100
Total Luminaire	0-180°	**3020**	**52.1**	**100**

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	6050	6032	6059
55°	6045	6079	6045
65°	5575	5606	5636
75°	5033	5033	5082
85°	4176	4176	4176

CO-EFFICIENTS OF UTILIZATION

Floor		20												
Ceiling		80				70			50		30		10	00
Wall		70	50	30	10	70	50	10	50	10	50	10	00	
RCR	0	62	62	62	62	61	61	61	58	58	55	55	53	53	52
	1	57	55	53	51	56	53	50	51	48	49	47	47	45	44
	2	52	48	45	42	51	47	41	45	40	44	39	42	39	37
	3	48	43	39	35	47	42	35	40	34	39	34	38	33	32
	4	44	38	33	30	43	37	30	36	29	35	29	34	29	28
	5	40	33	29	25	39	33	25	32	25	31	25	30	25	23
	6	37	30	25	22	36	29	22	29	22	28	22	27	21	20
	7	34	27	22	19	33	27	19	26	19	25	19	24	19	18
	8	31	24	20	17	30	24	17	23	17	22	16	22	16	15
	9	29	22	17	14	28	21	14	21	14	20	14	20	14	13
	10	27	20	16	13	26	19	13	19	13	18	13	18	13	12

Numbers indicate percentage values of reflectivity.

Go to www.focalpointlights.com for additional photometric data.

note: Photometric testing performed in an independent lab with standard lamps and ballasts. Lamp and ballast type and configuration will affect photometric performance.

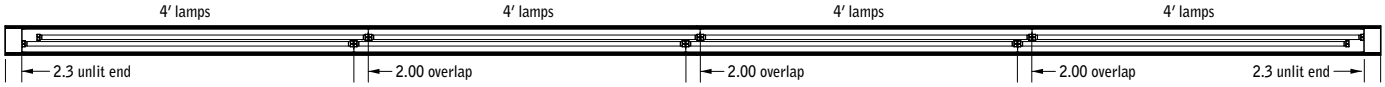
Seem® 4 & 6

FLUORESCENT RECESSED RUN GUIDE

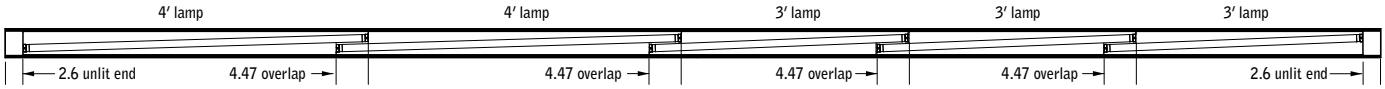
FOCAL POINT®

EXAMPLE 16' RUN

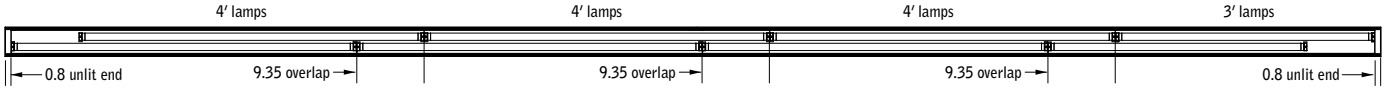
1-T5/T5HO



2-T5/T5HO (May exhibit noticeable socket shadows, color of lamp ends may be visible through lens)



1-T8



2-T8 (May exhibit noticeable socket shadows, color of lamp ends may be visible through lens)

Notes:

- Lamp overlap is consistent throughout run.
- Unlit ends vary to provide even light throughout run.
- Standard configurations listed, consult factory for additional options.
- 2T5HO not available with Seem 4

Seem® 4 & 6

FLUORESCENT RECESSED RUN GUIDE

FOCAL POINT®

Nominal run length (ft)	1-T5/T5HO (4.35" overlap)			2-T5/T5HO (2.00" overlap)			1-T8 (4.47" overlap)			2-T8 (9.35" overlap)		
	Lamp quantity		Unlit ends (in)	Lamp quantity		Unlit ends (in)	Lamp quantity		Unlit ends (in)	Lamp quantity		Unlit ends (in)
	3'	4'		3'	4'		3'	4'		3'	4'	
6		2	0.3*	4		0.2	2		1.8	4		0.1*
7		2	0.3*	2	2	0.3	1	1	1.8	4		0.8
8	3		0.5		4	0.4		2	1.8	2	2	0.8
9	2	1	0.6	6		1.1	3		4.0		4	0.9
10	1	2	0.6	4	2	1.2	2	1	4.1	6		0.8
11		3	0.8	2	4	1.3	4		0.3	4	2	0.8
12	2	2	0.3*		6	1.3	3	1	0.3	8		0.1*
13	5		0.7	6	2	2.1	2	2	0.3		6	0.8
14	4	1	0.8	4	4	2.2	1	3	0.3	6	2	0.8
15	3	2	0.8	2	6	2.3		4	0.3	4	4	0.8
16	2	3	1.0		8	2.3	3	2	2.6	2	6	0.8
17	1	4	1.1	6	4	3.0	2	3	2.6		8	0.8
18		5	1.1	4	6	3.1	1	4	2.6	6	4	0.8
19	6	1	0.8	2	8	3.2	7		1.0	4	6	0.8
20	5	2	0.8		10	3.3	6	1	1.0	2	8	0.8
21	4	3	1.0	6	6	4.0	5	2	1.1		10	0.8
22	3	4	1.1	4	8	4.1	4	3	1.1	6	6	0.8
23	9		1.1	2	10	4.2	3	4	1.1	4	8	0.8
24	1	6	0.9		12	4.3	2	5	1.1	2	10	0.8
25	7	2	1.3	12	4	0.1*	1	6	1.1		12	0.8
26	6	3	1.2	18		0.3		7	1.2	6	8	0.8
27	5	4	1.3	16	2	0.3	10		1.8	4	10	0.8
28	11		1.0	14	4	0.4	9	1	1.8	2	12	0.8
29	10	1	1.1	12	6	0.6	8	2	1.8		14	0.8
30	9	2	1.2	10	8	0.7	7	3	1.8	6	10	0.8
31	8	3	1.3		16	0.2	6	4	1.8	4	12	0.8
32	7	4	1.4	6	12	0.8	5	5	1.8	2	14	0.8
33	13		1.2	4	14	0.9	4	6	1.8		16	0.8
34	12	1	1.2	2	16	1.1	3	7	1.9	6	12	0.8
35	11	2	1.3		18	1.1	2	8	1.9	4	14	0.8
36	10	3	1.4	6	14	1.8	1	9	1.9	2	16	0.8
37	9	4	1.5	4	16	1.9	7	5	0.3		18	0.9
38	15		1.3	2	18	2.0	6	6	0.3	6	14	0.8
39	14	1	1.3		20	2.1	5	7	0.4	4	16	0.8
40	13	2	1.4	6	16	2.8	4	8	0.4	2	18	0.8
41	12	3	1.6	4	18	2.8	3	9	0.4		20	0.9
42	11	4	1.7	2	20	2.9	2	10	0.4	6	16	0.8
43	10	5	1.8		22	3.1	1	11	0.4	4	18	0.9
44	9	6	1.9	6	18	3.7		12	0.4	2	20	0.9
45	8	7	1.9	26	4	0.1*	3	10	2.7		22	0.9
46	7	8	2.1	32	0	0.7*	2	11	2.7	6	18	0.9
47	13	4	1.8	22	8	0.3*	1	12	2.7	4	20	0.9
48	19		1.5	20	10	0.4*	7	8	1.1	2	22	0.9

* special lamp stagger to decrease end darkness.
note: 2T5HO not available with Seem 4

BeveLED 2.0

PROJECT INFORMATION

PROJECT _____

_____

DATE _____

TYPE _____

WALL WASH 3251

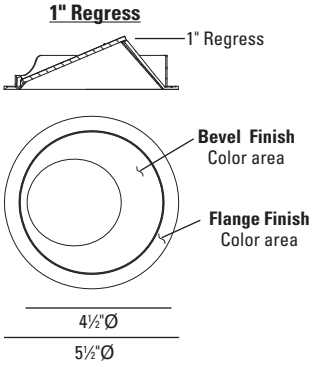
1" Regress

BeveLED 2.0 Recessed Wall Wash - It's a Downlight, Adjustable and Wall Wash - all in one housing - interchangeable anytime. The BeveLED 2.0 provides maximum delivered lumens and optical performance through the optimization of thermal, optical and LED science in the smallest possible aperture.

DELIVERED PERFORMANCE

BeveLED 2.0 WALL WASH	12 Watts		16 Watts		24 Watts		33 Watts	
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Lumens per Watt	42	38	44	36	40	33	36	30
Source Lumens	1150	1000	1575	1300	2175	1800	2725	2275
Delivered Lumens	**500**	**450**	**700**	**575**	**950**	**800**	**1200**	**1000**
Color Consistency	2-Step MacAdam Ellipse							

Performance based on 3000K



CCT MULTIPLIER	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.91	0.78	1.00	.83	1.00	1.09

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3251W - B1- 10 - LRTW4 - 6012 - C2 - 27KS - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		FLANGE FINISH	
3251	_____	–		–		

3251 Round Wall Wash 1" Regress	**W**	Wet location [1]	**B1** 1" Regress Bevel, Die Cast	**01** Clear Matte (w/ AC Bevel)
	EML	Emergency	**AB1** 1" Regress Bevel, Black	**02** Black Anodized (W/ AB Bevel)
	EMLW	Emergency and wet location [1]	**AC1** 1" Regress Bevel, Clear Matte	**10** White
				13 Statuary Bronze
				21 Black
				28 Metalized Grey
				RAL Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.

HOUSING ORDERING INFORMATION

HOUSING CODE	WATTAGE	ENGINE CODE	COLOR	HOUSING TYPE	VOLTAGE	OPTIONAL DIMMING DRIVER	ACCESSORIES
LRTW4	–	– C2	–	–	–	–	–

LRTW4	**6012** 12W LED, 500 lumens	**C2**	**27KS** 2700K, 80+ CRI	**NC** New Construction	**120V**	**DIML2** 0-10V dim, 10%	**CB27** 27" C-Channel Bars
	6016 16W LED, 700 lumens		**30KS** 3000K, 80+ CRI	**CP** Chicago Plenum [2]	**277V**	**DIML3** Lutron Hi-Lume 1% 2-wire, 120V only	**CB52** 52" C-Channel Bars
	6024 24W LED, 950 lumens		**35KS** 3500K, 80+ CRI	**IC** Insulation-Contact Rated / Airtight [2]		**DIML4** Lutron Hi-Lume 1% 3-wire/ECO	**EML** Emergency battery [4]
	6033 33W LED, 1200 lumens		**40KS** 4000K, 80+ CRI			**DIML6A** ELDO 0-10V 0.1%, logarithmic [3]	**EMLW** Emergency battery, wet location [4]
			27KH 2700K, 90+ CRI			**DIML6B** ELDO 0-10V 0.1%, linear [3]	
			30KH 3000K, 90+ CRI			**DIML7** ELDO DALI 0.1% [3]	
						DIML8 ELDO DMX 0.1% [3]	
						DIML9 TRIAC 15% [3] 2-wire, 120V only	
						DIML10 ELV 15% [3] 2-wire, 120V only	

2 Step MacAdam ellipse is standard

[2] Not available with EM

[3] Note: N/A with 33W

[4] For use with NC housings only.

USAI®

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

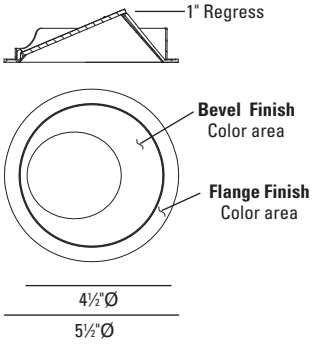
Revised 03/31/2015

BeveLED2.0

WALL WASH 3251

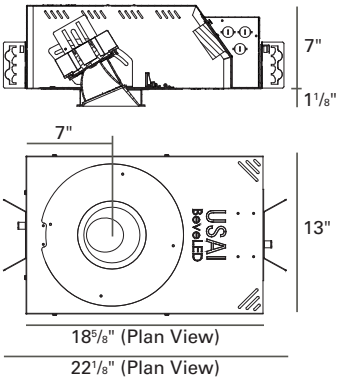
TRIM INFORMATION

1" Regress

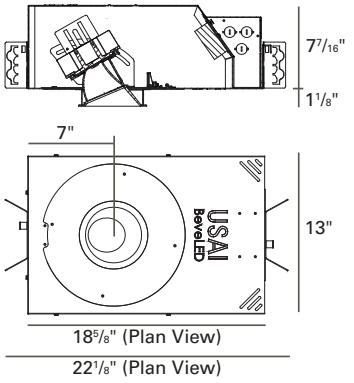


HOUSING INFORMATION

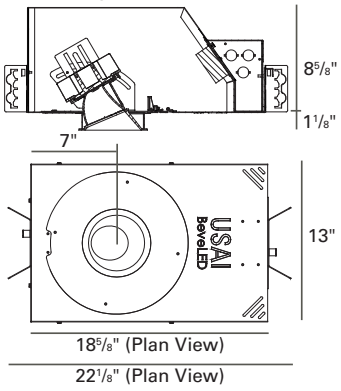
New Construction
Universal Style Housing - NC



Chicago Plenum (12W, 16W & 24W) - CP
IC / Airtight (12W, 16W & 24W) - IC



Chicago Plenum (33W) - CP
IC / Airtight (33W) - IC



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self flanged and available in white, statuary bronze, black, and metalized grey finishes. Also available in black or clear matte bevel with self finish or painted flange. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with micro diffusion wall wash lens.

REFLECTOR: Proprietary precision injection molded wall wash reflector.

ADJUSTMENT: 362° horizontal rotation, lockable.

FIELD REPLACEABLE LIGHT ENGINE: Available in 4 lumen packages: 12W (500 delivered lumens), 16W (700 lm), 24W (950 lm) and 33W (1200 lm). Engine is field replaceable through the aperture without tools.

COLOR: BeveLED is available in 4 color temperatures (2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: Solid state electronic constant current driver with a high power factor provided standard. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML2 and DIML6 dimming drivers source 2mA.

EMERGENCY: Emergency lighting battery pack with remote test switch is serviceable through aperture for NC housings. Bodine BSL26C provides 200mA for 90 minutes; delivers ~275-300 lumens. EMLW wet location option is available with B1 trim only and requires remote test switch. EM option is available with NC housings only.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers.

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made.

WARRANTY: 5 years

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

USAI®

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/31/2015

DELIVERED PERFORMANCE

3251 / 3351 16W 30KS

Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance: 20%

RCC %:	80				70				50			30			10			0
RW %:	70	50	30	0	70	50	30	0	50	30	20	50	30	20	50	30	20	0
RCR: 0	1.19	1.19	1.19	1.19	1.16	1.16	1.16	1.00	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	1.00
1	1.11	1.08	1.04	1.01	1.09	1.05	1.02	.90	1.01	.99	.97	.97	.95	.94	.94	.92	.91	.89
2	1.03	.97	.91	.87	1.01	.95	.90	.79	.92	.87	.84	.88	.85	.82	.86	.83	.80	.78
3	.96	.87	.81	.75	.94	.86	.80	.70	.83	.78	.73	.80	.76	.72	.78	.74	.71	.69
4	.89	.79	.72	.66	.87	.78	.71	.63	.75	.69	.65	.73	.68	.64	.71	.67	.63	.61
5	.83	.72	.64	.59	.81	.71	.64	.56	.69	.63	.58	.67	.61	.57	.65	.60	.57	.55
6	.77	.66	.58	.52	.76	.65	.58	.51	.63	.57	.52	.62	.56	.51	.60	.55	.51	.49
7	.72	.60	.53	.47	.71	.60	.52	.46	.58	.52	.47	.57	.51	.47	.56	.50	.46	.45
8	.68	.56	.48	.43	.66	.55	.48	.42	.54	.47	.43	.53	.47	.42	.52	.46	.42	.41
9	.64	.52	.44	.39	.62	.51	.44	.39	.50	.44	.39	.49	.43	.39	.48	.43	.39	.37
10	.60	.48	.41	.36	.59	.48	.41	.36	.47	.40	.36	.46	.40	.36	.45	.40	.36	.34

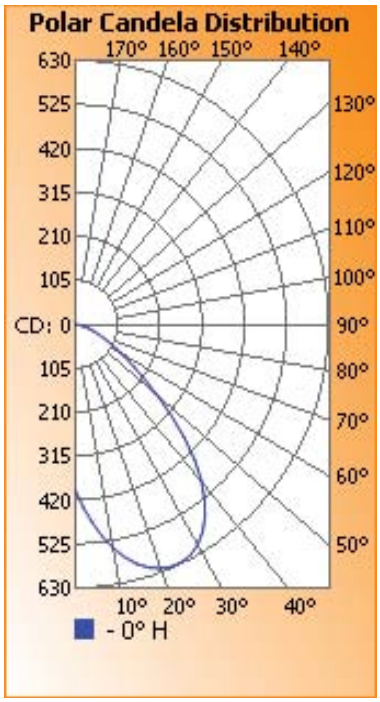
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	271.3	41.8%
0-40	411.0	63.4%
0-60	595.8	91.9%
60-90	52.8	8.1%
70-100	15.8	2.4%
90-120	0	0%

Illuminance at a Distance

	Center Beam fc	Beam Width	
2.0ft	98.7 fc	2.0 ft	2.0 ft
4.0ft	24.7 fc	4.0 ft	4.0 ft
6.0ft	11.0 fc	6.0 ft	6.0 ft
8.0ft	6.2 fc	8.0 ft	8.0 ft
10.0ft	3.9 fc	10.0 ft	10.0 ft
12.0ft	2.7 fc	12.0 ft	12.0 ft
14.0ft	2.0 fc	14.0 ft	14.0 ft
16.0ft	1.5 fc	16.0 ft	16.0 ft

Vert. Spread: 53.2°
Horiz. Spread: 53.1°



3251 / 3351 33W 30KS

Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance: 20%

RCC %:	80				70				50			30			10			0
RW %:	70	50	30	0	70	50	30	0	50	30	20	50	30	20	50	30	20	0
RCR: 0	1.19	1.19	1.19	1.19	1.16	1.16	1.16	1.00	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	1.00
1	1.11	1.08	1.04	1.01	1.09	1.05	1.02	.90	1.01	.99	.97	.97	.95	.94	.94	.92	.91	.89
2	1.03	.97	.91	.87	1.01	.95	.90	.79	.92	.87	.84	.88	.85	.82	.86	.83	.80	.78
3	.96	.87	.81	.75	.94	.86	.80	.70	.83	.78	.73	.80	.76	.72	.78	.74	.71	.69
4	.89	.79	.72	.66	.87	.78	.71	.63	.75	.69	.65	.73	.68	.64	.71	.67	.63	.61
5	.83	.72	.64	.59	.81	.71	.64	.56	.69	.63	.58	.67	.61	.57	.65	.60	.57	.55
6	.77	.66	.58	.52	.76	.65	.58	.51	.63	.57	.52	.62	.56	.51	.60	.55	.51	.49
7	.72	.60	.53	.47	.71	.60	.52	.46	.58	.52	.47	.57	.51	.47	.56	.50	.46	.45
8	.68	.56	.48	.43	.66	.55	.48	.42	.54	.47	.43	.53	.47	.42	.52	.46	.42	.41
9	.64	.52	.44	.39	.62	.51	.44	.39	.50	.44	.39	.49	.43	.39	.48	.43	.39	.37
10	.60	.48	.41	.36	.59	.48	.41	.36	.47	.40	.36	.46	.40	.36	.45	.40	.36	.34

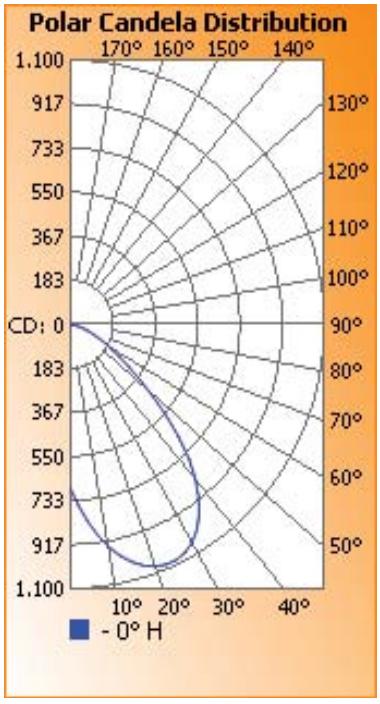
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	472.3	41.8%
0-40	715.5	63.4%
0-60	1,037.3	91.9%
60-90	92.0	8.1%
70-100	27.6	2.4%
90-120	0	0%

Illuminance at a Distance

	Center Beam fc	Beam Width	
2.0ft	171.9 fc	2.0 ft	2.0 ft
4.0ft	43.0 fc	4.0 ft	4.0 ft
6.0ft	19.1 fc	6.0 ft	6.0 ft
8.0ft	10.7 fc	8.0 ft	8.0 ft
10.0ft	6.9 fc	10.0 ft	10.0 ft
12.0ft	4.8 fc	12.0 ft	12.0 ft
14.0ft	3.5 fc	14.0 ft	14.0 ft
16.0ft	2.7 fc	16.0 ft	16.0 ft

Vert. Spread: 53.2°
Horiz. Spread: 53.1°



USAI®

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML2

DIMMING DRIVER WIRING SCHEMES:

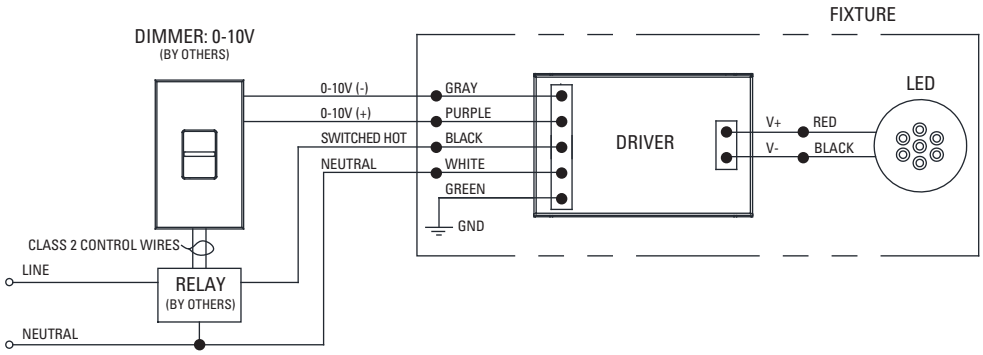
Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML2 LED: 0-10V Dimming Driver Wiring (Dims down to 10%)

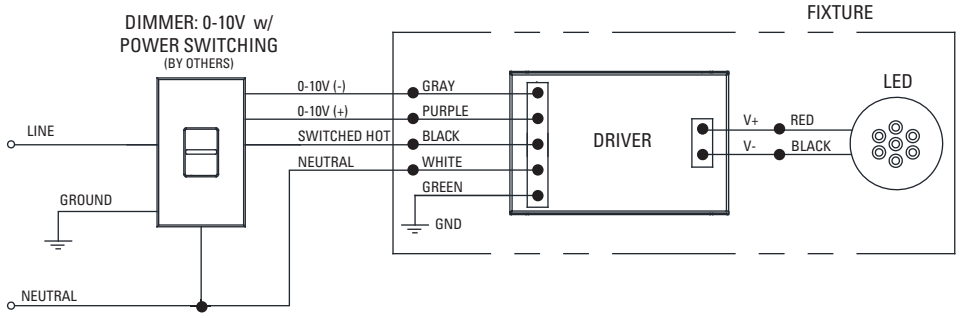
DIML2 Dimmer Compatibility Chart				
Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V / 277V				Use source current per fixture specification sheet to determine number of fixtures per dimmer. Max number of fixtures is limited by dimmer load rating.
Crestron	iLux dimmer expansion module	CLS-EXP-DIMFLV	100% - 10%	
Crestron	DIN Rail dimmer	DIN-4DIMFLV4	100% - 10%	
Crestron	DIN Rail analog output module	DIN-A08	100% - 10%	
Crestron	8 Channel dimmer module	GLX-DIMFLV8	100% - 10%	
Crestron	8 Channel dimmer module	GLXP-DIMFLV8	100% - 10%	
Leviton	IllumaTech dimmer	IP710-DLX	100% - 10%	
Lightolier (Philips)	Vega	V2000FAMU	100% - 10%	
Lutron	Diva	DVTV-XX	100% - 10%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML2
0-10V DIMMING W/RELAY TO SWITCH POWER



DIML2
0-10V DIMMING (NO RELAY)



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-2

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML3

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

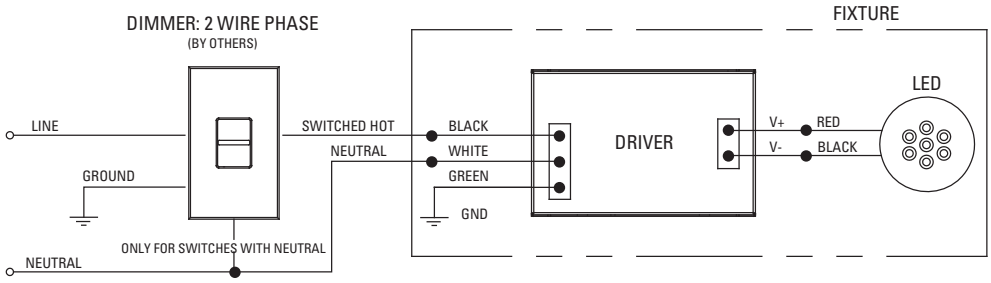
DIML3 LED: Lutron Hi-Lume A-Series 2 Wire Fwd Phase (with neutral) / LED Dimming Driver Wiring (Dims down to 1%) 120V only.

DIML3 Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer* Typical	High Wattage
120V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	ELV10	100% - 1%	1 – 26	1 – 13
ETC	Unison DRd Cabinet	ELV10	100% - 1%	1 – 26	1 – 13
Lutron	Maestro Wireless® dimmer	MRF2-6ND-120-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS adaptive dimmer	HQRD-6NA-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS 60W dimmer	HQRD-6ND-	100% - 1%	1 – 8	1 – 4
Lutron	HomeWorks® QS 1000 W dimmer	HQRD-10ND-	100% - 1%	1 – 13	1 – 6
Lutron	Stanza® dimmer	SZ-6ND-	100% - 1%	1 – 8	1 – 4
Lutron	RadioRA® 2 adaptive dimmer	RRD-6NA-	100% - 1%	1 – 8	1 – 4
Lutron	RadioRA® 2 1000 W dimmer	RRD-10ND-	100% - 1%	1 – 13	1 – 6
Lutron	HomeWorks® QS wallbox power module	HQRJ-WPM-6D-120-	100% - 1%	1 – 26	1 – 13
Lutron	HomeWorks® wallbox power module	HWI-WPM-6D-120	100% - 1%	1 – 26	1 – 13
Lutron	GRAFIK Eye® QS control unit	QSGR-, QSGRJ-	100% - 1%	1 – 26	1 – 13
Lutron	GRAFIK Eye® 3000 control unit	GRX-3100-, GRX-3500-	100% - 1%	1 – 26	1 – 13
Lutron	RPM-4U module	HW-RPM-4U-120, LP-RPM-4U-120	100% - 1%	1 – 26	1 – 13
Lutron	RPM-4A module	HW-RPM-4A-120, LP-RPM-4A-120	100% - 1%	1 – 26	1 – 13
Lutron	GP dimming panels	Various	100% - 1%	1 – 26	1 – 13
Lutron	Ariadni CL 250W dimmer	AYCL-253P-	100%-1%	1 – 8	1 – 4
Lutron	Diva CL 250W dimmer	DVCL-253P-, DVSCCL-253P-	100%-1%	1 – 8	1 – 4
Lutron	Grafik T CL or RF CL dimmer	GT-250M-, GTJ-250M-	100%-1%	1 – 8	1 – 4

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML3
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-3

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML4

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

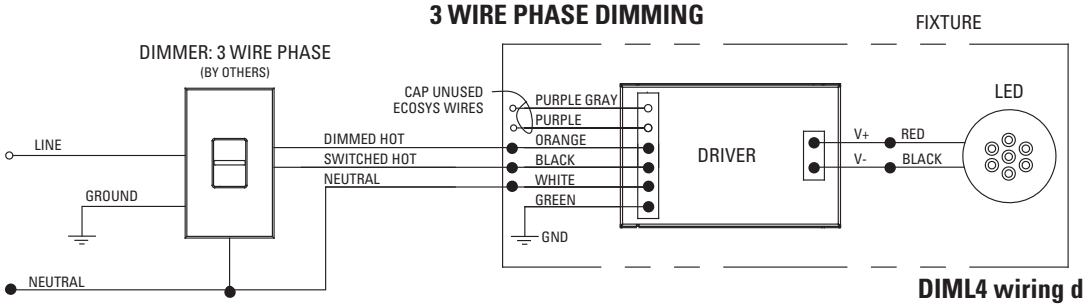
DIML4 LED: Lutron Hi-Lume A-Series LED Driver with 3-Wire FL Control / LED Dimming Driver Wiring (Dims down to 1%)

DIML4 3-Wire Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Control* Typical	Qty Fixtures Per Control* High Wattage
120V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	D20 Dimming module	100% - 1%	1–53	1–26
ETC	Unison DRd Cabinet	D20F Dimming module	100% - 1%	1–53	1–26
Lutron	Nova T	NTF-10-	100%–1%	1–41	1 – 20
Lutron	Nova T	NTF-103P-	100%–1%	1–20	1 – 10
Lutron	Nova	NF-10-	100%–1%	1–41	1 – 20
Lutron	Nova	NF-103P-	100%–1%	1–20	1 – 10
Lutron	Vareo	VF-10-	100%–1%	1–20	1 – 10
Lutron	Skylark	SF-10P-, SF-103P-	100%–1%	1–20	1 – 10
Lutron	Diva	DVF-103P-, DVSCF-103P-	100%–1%	1–20	1 – 10
Lutron	Ariadni	AYF-103P-	100%–1%	1–20	1 – 10
Lutron	Vierti	VTF-6A-	100%–1%	1–15	1 – 7
Lutron	Maestro	MAF-6AM-, MSCF-6AM-	100%–1%	1–15	1 – 7
Lutron	Maestro Wireless	MRF2-F6AN-DV-	100%–1%	1–15	1 – 7
Lutron	RadioTouch	RTA-RX-F-	100%–1%	1–41	1 – 20
Lutron	Spacer System	SPSF-6A-, SPSF-6AM-	100%–1%	1–15	1 – 7
Lutron	Lyneo Lx	LXF-103PL-	100%–1%	1–20	1 – 10
Lutron	RadioRA 2	RRD-F6AN-DV-	100%–1%	1–15	1 – 7
Lutron	HomeWorks QS	HQRD-F6AN-DV	100%–1%	1–15	1 – 7
Lutron	Interfaces	PHPM-3F-120, PHPM-3F-DV, GRX-FDBI-16A	100%–1%	1–41	1 – 20
Lutron	GP Dimming Panels	Various	100%–1%	1–41	1 – 20
277V Only				40W and Less	41W - 80W
ETC	Sensor+ Cabinet	D20 Dimming module	100% - 1%	1–53	1–26
ETC	Unison DRd Cabinet	D20F Dimming module	100% - 1%	1–53	1–26
Lutron	Nova T	NTF-10-277-	100%–1%	1–44	1 – 22
Lutron	Nova T	NTF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Nova	NF-10-277-	100%–1%	1–44	1 – 22
Lutron	Nova	NF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Skylark	SF-12P-277-, SF-12P-277-3	100%–1%	1–33	1 – 16
Lutron	Diva	DVF-103P-277-, DVSCF-103P-277-	100%–1%	1–33	1 – 16
Lutron	Ariadni	AYF-103P-277-	100%–1%	1–44	1 – 22
Lutron	Vierti	VTF-6A-	100%–1%	1–33	1 – 16
Lutron	Maestro	MAF-6AM-277-, MSCF-6AM-277-	100%–1%	1–20	1 – 10
Lutron	Maestro Wireless	MRF2-F6AN-DV-	100%–1%	1–33	1 – 16
Lutron	RadioTouch	RTA-RX-F-	100%–1%	1–88	1 – 44
Lutron	Spacer System	SPSF-6A-277-, SPSF-6AM-277-	100%–1%	1–20	1 – 10
Lutron	Lyneo Lx	LXF-103PL-277-	100%–1%	1–33	1 – 16
Lutron	RadioRA 2	RRD-F6AN-DV-	100%–1%	1–33	1 – 16
Lutron	HomeWorks QS	HQRD-F6AN-DV	100%–1%	1–33	1 – 16
Lutron	Interfaces	PHPM-3F-DV, GRX-FDBI-16A	100%–1%	1–88	1 – 44
Lutron	GP Dimming Panels	Various	100%–1%	1–88	1 – 44

* NOTE: Number of fixtures may be higher if wattage is less than maximum values shown. Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML4
3 WIRE PHASE DIMMING



DIML4 wiring diagrams continued on next page

USAI Lighting
www.usailighting.com
info@usailighting.com
1126 River Road
New Windsor, NY 12553
T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-4

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE

DIML4 Continued

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

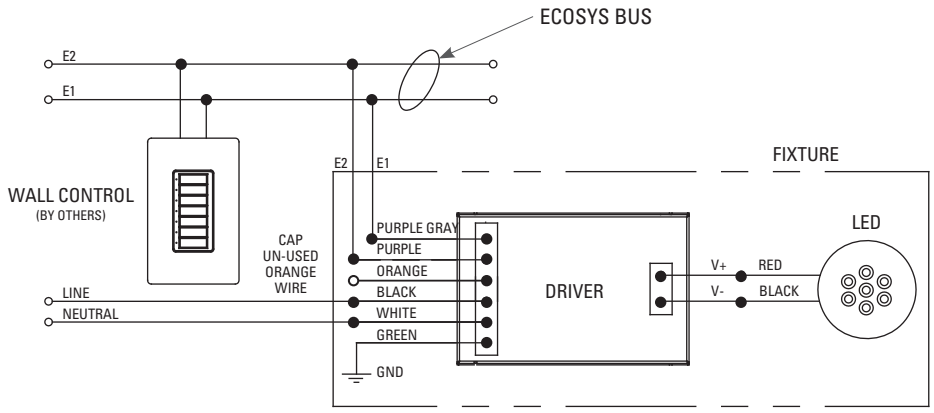
DIML4 LED: Lutron Hi-Lume A-Series LED Driver with Eco System Control / LED Dimming Driver Wiring (Dims down to 1%)

DIML4 3-Wire Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Control* Typical	High Wattage
120V / 277V				40W and Less	41W - 80W
Lutron	PowPak dimming module	RMJ-ECO32-DV-B	100%–1%	1–32	1 – 16
Lutron	Energi Savr Node	QSN-1ECO-S, QSN-2ECO-S	100%–1%	1–64	1 – 32
Lutron	GRAFIK Eye QS (120V ONLY)	QSGRJ-_E, QSGR-_E	100%–1%	1–64	1 – 32
Lutron	Quantum	Various	100%–1%	1–64	1 – 32

* NOTE: Number of fixtures may be higher if wattage is less than maximum values shown. Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML4
ECOSYS CONTROLS



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-4

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML6A, 6B

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML6A LED: EldoLED SOLOdrive 561/S 0-10V control 100%-0.1% linear-programmed dimming driver for use with logarithmic-style controls (e.g., Lutron and others listed in the table below)

DIML6A Dimmer Compatibility Chart

Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V & 277V				Refer to manufacturer's dimmer load rating for maximum and minimum fixture quantities per dimmer.
Lutron	Diva	DVTV/NFTV/NTFTV with PP-20	99% - 0.1%	
Lutron	Energi Savr Node	QSN-4T16-S	100% - 0.1%	
Lutron	GP Dimming Panels	TVM2 Module	99% - 0.1%	
Lutron	Interfaces	GRX-TVI w/ GRX3503	100% - 0.1%	
Sensor Switch	nIO	nIO EZ	100% - 0.1%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

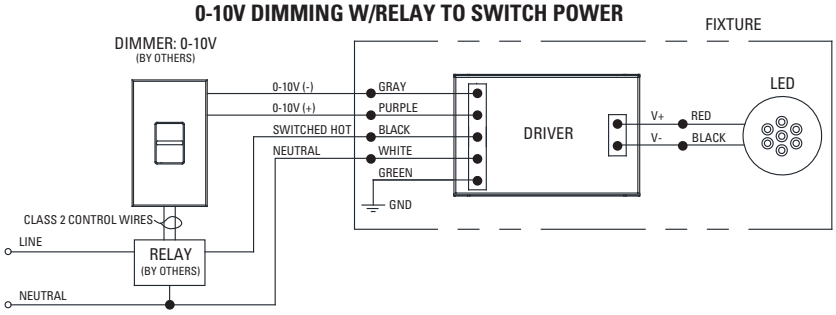
DIML6B LED: EldoLED SOLOdrive 561/S 0-10V control 100%-0.1% logarithmic-programmed dimming driver for use with linear-style controls (e.g., Crestron, non-Lutron, and others listed in the table below)

DIML6B Dimmer Compatibility Chart

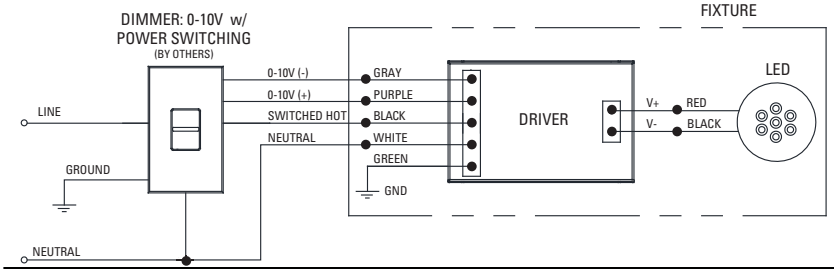
Manufacturer	Product	Part Number	Dimmed Light Output Range	Qty Fixtures Per Dimmer*
120V & 277V				Refer to manufacturer's dimmer load rating for maximum and minimum fixture quantities per dimmer.
Bush-Jaeger	Electronic potentiometer	2112U-101	100% - 0.1%	
Jung	Electronic potentiometer	240-10	100% - 0.1%	
Leviton	IllumaTech dimmer	IP710-DLX	100% - 0.1%	
Lightolier (Philips)	Momentum (120V ONLY)	ZP600FAM120	100% - 0.1%	
Merten	Electronic potentiometer	5729	100% - 0.1%	
Pass & Seymour	Titan	CD4FB-W	100% - 0.1%	
Watt Stopper	Miro	DCLV1	100% - 0.1%	
Synergy	Wallbox Dimmers	ISD BC	100% - 0.1%	
ABB	i-bus	SD/S 2.16.1	100% - 0.1%	
Crestron	Modules	GLX-DIMFLV8, GLXP-DIMFLV8	100% - 0.1%	
Crestron	Green Light	GLPAC-DIMFLV4-, GLPAC-DIMFLV8-	100% - 0.1%	
Crestron	Green Light Power Pack	GLPP-DIMFLVEX-PM, GLPP-1DIMFLV2EX-PM, GLPP-1DIMFLV3EX-PM	100% - 0.1%	
Crestron	DIN Rail Analog Output Module	DIN-A08	100% - 0.1%	
Crestron	DIN Rail 0-10V Fluorescent Dimmer	DIN-4DIMFLV4	100% - 0.1%	
Crestron	iLux 0-10V Dimmer Expansion Module	CLS-EXP-DIMFLV	100% - 0.1%	

* NOTE: Refer to dimmer manufacturer's documentation for installation instructions and circuit details.

DIML6A, 6B
0-10V DIMMING W/RELAY TO SWITCH POWER



DIML6A, 6B
0-10V DIMMING (NO RELAY)



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-6

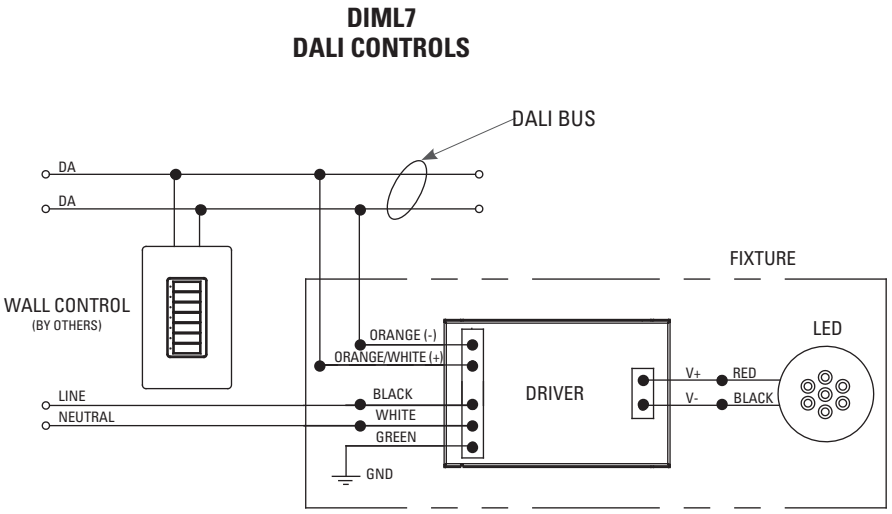
USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML7

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML7 LED: EldoLED DALI Dimming Driver Wiring (Dims down to 0.1%)



www.usailighting.com
info@usailighting.com
1126 River Road
New Windsor, NY 12553
T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-7

USAI Lighting

DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML8

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

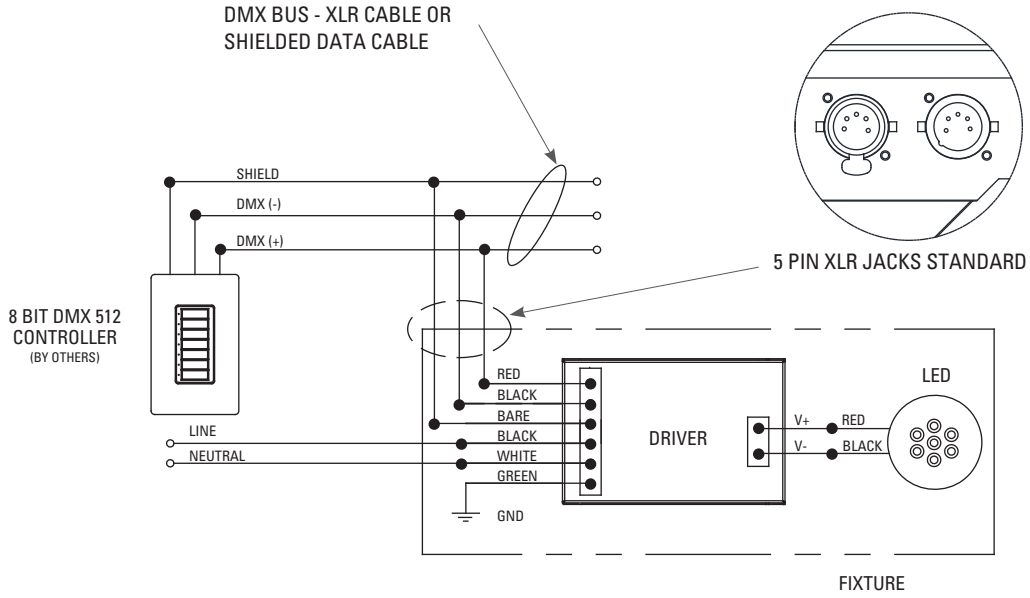
DIML8 LED: EldoLED DMX Dimming Driver Wiring (Dims down to 0.1%)

DMX BUS - XLR CABLE OR
SHIELDED DATA CABLE

The data cable used must meet the following requirements:

- type: shielded, 2-conductor twisted pair
- maximum capacitance between conductors: 30 pF/ft
- maximum capacitance between conductor and shield: 55 pF/ft
- maximum resistance: 0.02 ohms/ft
- normal impedance: 100-140 ohms
- conductive core: 24 AWG is recommended

If 3-wire data cables are preferred, we suggest a Belden 9841 or equivalent cable which meets the specifications for EIA RS-485 applications. Do not use standard microphone cables: they cannot transmit DMX512 data reliably over long distances. NOTE: DMX link termination device (by others) should be used on last fixture in line on a circuit to avoid signal loss.



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-8

USAI Lighting

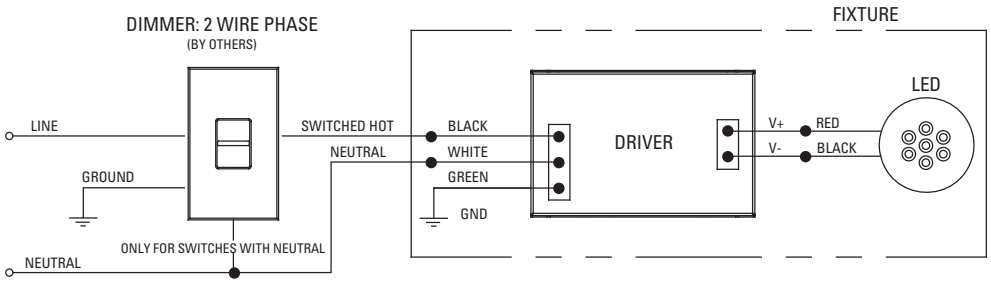
DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML9

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML9 LED: TRIAC Forward Phase Dimming Driver Wiring (Dims down to 15%) 120V Only

DIML9
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-9

USAI Lighting

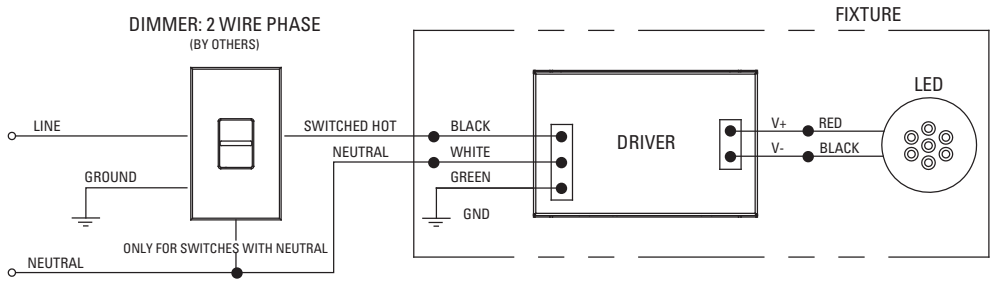
DIMMING DRIVER COMPATIBILITY SELECTION GUIDE
DIML10

DIMMING DRIVER WIRING SCHEMES:

Note: Wiring diagrams are examples of typical installations intended to illustrate the number of wires that must be run to fixture. These diagrams are not intended to specify all equipment necessary for a given dimming circuit. Refer to specific dimmer manufacturer's documentation for details.

DIML10 LED: ELV Reverse Phase Dimming Driver Wiring (Dims down to 15%) 120V Only

DIML10
2 WIRE PHASE DIMMING



USAI Lighting

www.usailighting.com
info@usailighting.com

1126 River Road
New Windsor, NY 12553

T 845–565–8500
F 845–561–1130

Revised 03/20/2015
I2-264-10

MRP LED
LED Area Luminaire

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

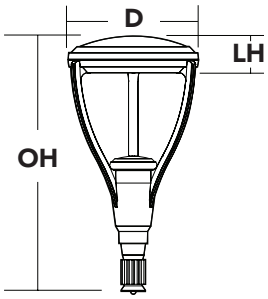
EPA: 1.125 ft² *(0.105 m²)*

Luminaire Height: 6-3/8″ *(16.2 cm)*

Overall Height: 32″ *(81.3 cm)*

Diameter: 18″ *(45.7 cm)*

Weight (max): 37.5 lbs *(17 kg)*



Introduction

The Omero™ family of luminaires blends a traditional round dayform with contemporary, low-profile styling to accent architectural elements in a variety of applications.

The MRP LED combines the latest in LED technology with the designer aesthetic of the Omero™ family for stylish, high-performance illumination that lasts. The MRP LED is ideal for replacing 100-250W metal halide in area lighting applications with typical energy savings of 65% and expected service life of over 100,000 hours.

Ordering Information

EXAMPLE: MRP LED 1 63B350/40K SR5 MVOLT DDBXD

MRP LED							
Series	**Light Engines**	**Performance Package** [1]	**Distribution**	**Voltage**	**Mounting**	**Options**	**Finish** *(required)*
MRP LED	1 One engine (49 or 63 LEDs)	**350 mA options:** 49B350/30K 3000K 49B350/40K 4000K 49B350/50K 5000K 63B350/30K 3000K 63B350/40K 4000K 63B350/50K 5000K **530 mA options:** 49B530/30K 3000K 49B530/40K 4000K 49B530/50K 5000K 63B530/30K 3000K 63B530/40K 4000K 63B530/50K 5000K	SR2 Type II SR3 Type III SR4 Type IV SR5 Type V	MVOLT [2] 120 [2] 208 [2] 240 [2] 277 [2] 347 480	**Shipped included** (blank) Fits 4″OD round pole **Shipped separately** [3] MRPT20 2-3/8″ tenon slipfitter MRPT25 2-7/8″ tenon slipfitter MRPT30 3-1/2″tenon slipfitter MRPT35 4″tenon slipfitter MRPF3 3″OD round pole adapter MRPF5 5″OD round pole adapter [4]	**Shipped installed** PER NEMA twist-lock receptacle only (no controls) DMG 0-10V dimming driver (no controls) [5] SF Single fuse (120, 277, 347V) [6] DF Double fuse (208, 240, 480V) [6] DFL Diffusing lens BL30 Switched dimming, 30% [7] BL50 Switched dimming, 50% [7]	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white

Accessories

Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V) [8]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V) [8]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V) [8]
SC U	Shorting cap [8]
MRPT20 DDBXD U	2-3/8″ tenon slipfitter (specify finish)
MRPT25 DDBXD U	2-7/8″ tenon slipfitter (specify finish)
MRPT30 DDBXD U	3-1/2″ tenon slipfitter (specify finish)
MRPT35 DDBXD U	4″ tenon slipfitter (specify finish)
MRPF3 DDBXD U	3″ OD round pole adapter (specify finish)
MRPF5 DDBXD U	5″ OD round pole adapter (specify finish) [4]

For more control options, visit DTL and ROAM online.

NOTES

1. Configured with 4000K (40K) provides the shortest lead times. Consult factory for 3000K (30K) and 5000K (50K) lead times.
2. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120, 208, 240 or 277 options only when ordering with fusing (SF, DF options).
3. Also available as a separate accessory; see Accessories information at left.
4. Maximum pole wall thickness is 0.156″.
5. Not available with 347 or 480V.
6. Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option.
7. Requires an additional switched line. Dimming driver standard. MVOLT only.
8. Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item.

LITHONIA LIGHTING

One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • Fax: 770.918.1209 • www.lithonia.com

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Actual performance may differ as a result of end-user environment and application. Actual wattage may differ by +/- 8% when operating between 120-480V +/- 10%. Contact factory for performance data on any configurations not shown here.

Light Engines	Drive Current (mA)	Performance Package	System Watts	Dist. Type	40K (4000K, 67 CRI)				
					Lumens	B	U	G	LPW
1 (49 LEDs)	350	49B350/--K	58 W	SR2	5043	1	3	1	87
				SR3	5024	1	3	1	85
				SR4	5032	1	3	1	85
				SR5	5218	2	3	1	87
1 (63 LEDs)	350	63B350/--K	73 W	SR2	6167	1	3	1	84
				SR3	6408	2	3	1	85
				SR4	6368	1	3	1	85
				SR5	6577	3	3	1	88
	530	63B530/--K	109W	SR2	8269	2	3	2	76
				SR3	8208	2	3	2	76
				SR4	8196	2	3	2	76
				SR5	8671	3	3	1	80

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	**77°F**	**1.00**
30°C	86°F	1.00
40°C	104°F	0.99

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the **MRP LED 1 63B530** platform in a **40°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	1.0	0.95	0.92	0.87

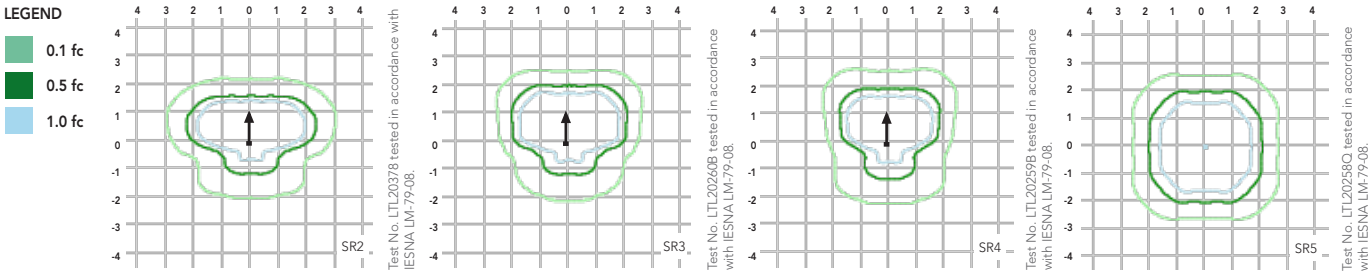
Electrical Load

Light Engines	Drive Current (mA)	System Watts	Current (A)					
			120	208	240	277	347	480
1 (49)	350	58W	0.54	0.31	0.27	0.23	0.19	0.13
1 (63)	350	73W	0.68	0.39	0.34	0.29	0.23	0.17
	530	109W	1.01	0.58	0.50	0.44	0.35	0.25

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's MRP LED homepage.

Isofootcandle plots for the MRP LED 1 63B530/40K. Distances are in units of mounting height (20').



FEATURES & SPECIFICATIONS

INTENDED USE
Streets, walkways, parking lots and surrounding areas.

CONSTRUCTION
Single-piece die-cast aluminum housing with nominal wall thickness of .012". Die-cast top access doorframe has impact-resistant, tempered glass lens (3/16" thick). Doorframe is fully gasketed with one-piece tubular silicone.

FINISH
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Standard Super Durable colors include dark bronze, black, natural aluminum and white. Available in textured and non-textured finishes.

OPTICS
Precision acrylic refractive optics for optimum light distribution through the flat glass lens. Light engines are available in standard 4000K (67 CRI) or optional 3000K (80 CRI) or 5000K (67 CRI) configurations.

ELECTRICAL
Light engine consists of 49 or 63 high-efficacy LEDs mounted to a metal-core circuit board and aluminum heat sink, ensuring optimal thermal management and long life. Class 1 electronic driver has a power factor >90%, THD <20%, and has an expected life of 100,000 hours with <1% failure rate. Easily-serviceable surge protection device meets a minimum Category C Low for operation (per ANSI/IEEE C62.41.2).

INSTALLATION
Standard post-top mounting configuration fits into a 4" OD open pole top (round pole only). Multiple options and accessories are available for other mounting needs.

LISTINGS
CSA certified to U.S. and Canadian standards. Luminaire is IP65 rated. Rated for -40°C minimum ambient. **U.S. Patent No. D556,357.**

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 to confirm which versions are qualified.

WARRANTY
Five year limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

Note: Specifications subject to change without notice.

1-year warranty

luxrail™

INTERIOR/EXTERIOR APPLICATIONS

Application

ANSI and ADA compliant, **luxrail** is an indoor/outdoor LED-based handrail that delivers functional illumination. Three intensities may be specified: standard output, mid output, and high output. The standard light output version delivers illuminance levels appropriate for exterior applications (2 footcandles at grade) as well as for dark interior environments with low ambient illumination levels (e.g., themed environments, theatres and residential areas). The high output version delivers illuminance levels applicable to interior environments – providing in excess of 10 footcandles along the path of egress (ANSI required for stair treads). Independent photometric test reports and IES Format data are available at **www.iolighting.com**.

luxrail's standard handrail gripping surfaces are circular in cross section and meet 2004 ADAAG (Americans with Disability Act Accessibility Guidelines). Patented optical assemblies deliver 10˚, 25˚, and 55˚ beam spreads, as well as an asymmetric option. The 25˚ and 55˚ beam patterns are most suitable for illuminating pathways, while the 10˚ beam spread offers accent lighting for optional glass or stainless steel cable railing infills. Reference page 54 of this catalog for information regarding infill options. Projected average rated life is 50,000 hours at 70% of lamp lumen output. Contact factory for IES LM-80 compliance. To ensure proper performance, architectural details should allow for ventilation and air flow around the fixture. Ambient temperature surrounding the fixture shall not exceed 122˚F *(50˚C).*

Light Output

Three luminous intensities are available for white light. All values below represent the initial raw lumens of the LED. IES format photometry of Lighting Facts labels represent actual light output measured in lumens and candle power. Light output losses include optical, thermal and power supply inefficiencies. IES LM-79 format files may be obtained from the factory or downloaded from **www.iolighting.com.** Results are typical measurements. For 90+ CRI, please consult factory for pricing and availability.

Initial Lumens

	Standard Output	Mid Output	High Output
2700K White:	72 lms/ft	181 lms/ft	253 lms/ft
3000K White:	81 lms/ft	203 lms/ft	284 lms/ft
3500K White:	83 lms/ft	206 lms/ft	289 lms/ft

Non-standard color temperatures available as a custom offering for a modest additional cost and lead-time.

Construction

luxrail may be post mounted or wall mounted. **io** recommends installation be completed by a qualified handrail installer. Mounting hardware (post or wall) is typically required up to 5' O.C., depending on the handrail alloy. Final post and wall bracket spacing must be determined by a licensed architect or structural engineer. **luxrail** is available in stainless steel and aluminum. Vandal resistant access chamber allows units to be removed for maintenance purposes. The LED light fixture inside the caprail is UL Listed for wet locations. Handrail alloy options include stainless steel and aluminum. Contact factory for maintenance guidelines.

All handrail component parts are engineered for quick installation. Field welding or cutting is typically not required. All parts are prefabricated to field dimensions and are assembled in the field with mechanical connection or epoxy. Contact **io** Lighting for recommended handrail installers.

Electrical

luxrail houses a low voltage LED-based light fixture that is integrated into the underside of the handrail. 24 volt 100 watt power supplies are provided as a standard. For detailed information regarding daisy chain limitations, remote distance limitations, power supply options, and dimming options consult the **io** website **(www.iolighting.com)** or an **io** representative.

Driver Remote Distance

7'-0" (2.1m) w/22 AWG
18'-0" (5.5m) w/18 AWG
46'-0" (14.0m) w/14 AWG
71'-0" (21.6m) w/12 AWG

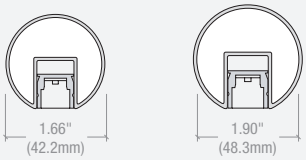
Dimming modules must be specified separately. For detailed information download the power supply specification sheet from **www.iolighting.com**.

Power Consumption

Power consumption does not include power supply losses.

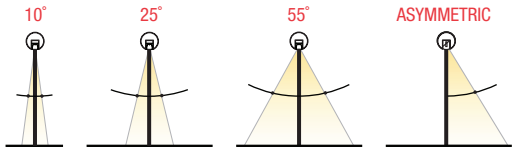
Standard Output	Mid Output	High Output
1.02 w/ft	2.54 w/ft	3.81 w/ft

Dimensions

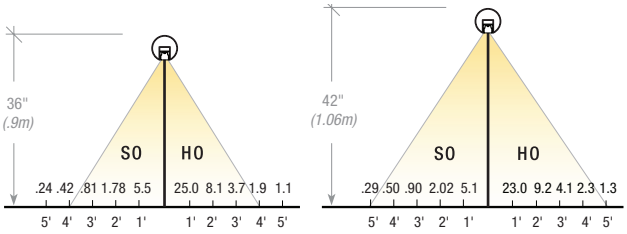


Label references 36" **luxrail** fixture with a 55˚ beam spread in High Output 3000K. Lighting Facts for additional beam spreads and light output levels may be obtained from **io** Lighting.

BEAM SPREAD OPTIONS

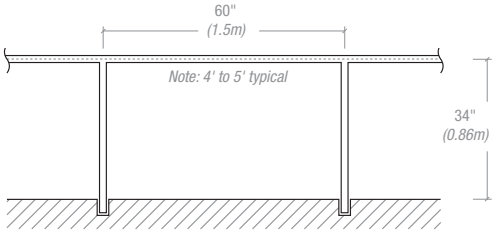


LIGHT OUTPUT - 55 DEGREE WARM WHITE



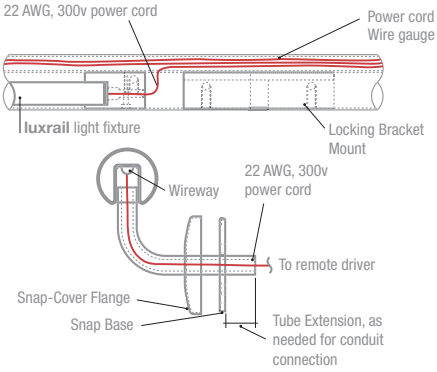
Calculation assumes 12'0" run length. All footcandle values are initial.

POST MOUNT APPLICATION



Note: Will depend on alloy and diameter specifications.

WALL MOUNT DETAILS*



* Wall mounted **luxrail** may be mounted to new or existing guardrail (by others).

Post and wall bracket spacing must be determined by a licensed architect or structural engineer.

io Lighting recommends a qualified handrail installer be on site during install.

LIGHT OUTPUT CONVERSION TABLE

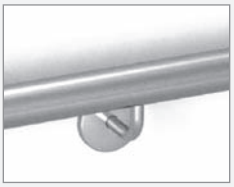
	Standard Output	Mid Output	High Output
2700K White	**0.25**(1)	**0.69**(1)	**0.94**(1)
3000K White	**0.27**(1)	**0.73**(1)	**1.00**(1)
3500K White	**0.29**(1)	**0.78**(1)	**1.06**(1)

*Note: Visit **www.iolighting.com** or contact an **io** representative for IES format photometrics.*

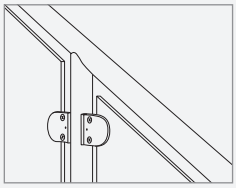
Light Output / Distributions

Mounting / Infill Options

PM *(POST MOUNTED)*



WM *(WALL MOUNT INTERMEDIATE)*



GLASS INFILL
(glass provided by others)

STAINLESS STEEL CABLE INFILL
(only available on flat surfaces)

Order Code

0	.	06	.		.		.		.		.		.		.		.		.		.	
io		1		2		3		4		5		6		7		8		9		10		11

1. PRODUCT FAMILY
06 luxrail

2. ALLOY / FINISH
SSS Stainless steel satin
SSP Stainless steel polished
CAA Clear anodized aluminum

3. SIZE
1 1.66" O.D. (1¼" pipe size) (available in SS only)
2 1.90" O.D. (1½" pipe size) (available for SS & CAA)

4. MOUNTING
PMC Post mount concrete
PMW Post mount wood
PMS Post mount stone
WM Wall or guard rail mounted

5. INFILL
AC Stainless steel cable (4)
GL Glass (provided by others)
C Custom
NR Not required

6. LIGHT DISTRIBUTION
10 10 Degree
25 25 Degree
55 55 Degree
ASYM Asymmetric
NI Handrail only (not illuminated)

7. LIGHT COLOR
27K Warm White
27KMO Warm White
27KHO Warm White
3K Warm White (3)
3KMO Warm White (3)
3KHO Warm White (3)
35K Warm White
35KMO Warm White
35KHO Warm White
CC Custom Color(6)

8. LENGTH
GB2 Grab Bar 2' nominal(6)
GB3 Grab Bar 3' nominal(6)
GB4 Grab Bar 4' nominal(6)
GB5 Grab Bar 5' nominal(6)
HR Hand Rail length in Feet / Inches (provide overall length of each handrail section)(2)(5)
HRC Hand Rail Curved length in Feet / Inches (provide overall length of each handrail section)(2)(5)

9. VOLTAGE / DIMMING
1 120v
2 277v
3 120v w/dim
4 277v w/dim
5 Other (International voltage)

10. SPECIFY DRIVER / DIMMING(1)
*Note: If not specified otherwise, **io** will supply 100 watt drivers. Download Power Supply specification sheet from **www.iolighting.com**.*

11.
CE Available upon request.

Footnotes

1. ***Power Supply Specification Sheet** may be downloaded from **www.iolighting.com**.*
2. *Each handrail application will be custom to accommodate varying field conditions and design requirements. Shop drawings will be required to manage specifics of each handrail section.*
3. *White light variance between LEDs is equal to or better than 3-step MacAdam Binning.*
4. *Stainless Steel cable available for flat surfaces only.*
5. *Detailed elevation drawings of handrail section are required for quote.*
6. *Non-standard color temperature and CRI are available. Consult factory for availability.*

luxrail applications
youtube.com/iolighting

APPENDIX C | PANELBOARD SCHEDULE

TABLE 1 | ELECTRICAL SYSTEM LOADS

DESIGNATION	LEVEL	FED FROM	VOLTAGE	CONNECTED LOAD (kVA)	DEMAND (kVA)	TYPE
E/NG5B1	LB		13200	12636.23	11453.25	SWITCHGEAR
NS5B1	LB		480Y/277, 3 PHASE, 4 WIRE	2384.71	1538.68	SWITCHGEAR
ES5B1	LB	E/NG5B1	480Y/277, 3 PHASE, 4 WIRE	2679.11	2632.29	SWITCHGEAR
ES5B2	LB	E/NG5B1	480Y/277, 3 PHASE, 4 WIRE	2574.03	2536.60	SWITCHGEAR
DP4B1	LB	NS5B1	480Y/277, 3 PHASE, 4 WIRE	180.41	128.35	DISTRIBUTION PANEL
DP2B1	LB	NTXB1	208Y/120, 3 PHASE, 4 WIRE	77.40	44.65	DISTRIBUTION PANEL
LP4B1	LB	DP4B1	480Y/277, 3 PHASE, 4 WIRE	24.98	31.22	LIGHTING PANEL
Q4B1	LB	DP4B1	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
Q4B2	LB	DP4B1	480Y/277, 3 PHASE, 4 WIRE	89.43	58.53	EQUIPMENT PANEL
Q4B3	LB	DP4B1	480Y/277, 3 PHASE, 4 WIRE	66.00	44.00	EQUIPMENT PANEL
LAB2B1	LB	DP2B1	208Y/120, 3 PHASE, 4 WIRE	28.16	19.08	LAB MODULE PANEL
LAB2B2	LB	DP2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
LAB2B3	LB	DP2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
RP2B1	LB	DP2B1	208Y/120, 3 PHASE, 4 WIRE	31.36	20.88	RECEPTACLE + SMALL LOADS
RP2B2	LB	DP2B1	208Y/120, 3 PHASE, 4 WIRE	17.88	14.69	RECEPTACLE + SMALL LOADS
EDP4B10	LB	ES5B1	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY DISTRIBUTION PANEL
EDP2B4	LB	ETXB4	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY DISTRIBUTION PANEL
Q4B3	LB	DP4B1	480Y/277, 3 PHASE, 4 WIRE	66.00	44.00	EQUIPMENT PANEL
ELAB2B6	LB	EDP2B4	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL
EDP4B5	LB	ES5B1	480Y/277, 3 PHASE, 4 WIRE	403.81	411.61	EMERGENCY DISTRIBUTION PANEL
ELAB2B7	LB	EDP2B5	208Y/120, 3 PHASE, 4 WIRE	4.80	6.00	EMERGENCY LAB MODULE PANEL
ELAB2B8	LB	EDP2B5	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL
EDP4B1	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	266.85	292.83	EMERGENCY DISTRIBUTION PANEL
EDP4B2	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	494.67	527.10	EMERGENCY DISTRIBUTION PANEL
EDP4B3	LB	ES5B1	480Y/277, 3 PHASE, 4 WIRE	339.21	371.63	EMERGENCY DISTRIBUTION PANEL
EDP4B4	LB	ES5B1	480Y/277, 3 PHASE, 4 WIRE	102.10	115.61	EMERGENCY DISTRIBUTION PANEL
EDP4B5	LB	ES5B1	480Y/277, 3 PHASE, 4 WIRE	403.81	411.61	EMERGENCY DISTRIBUTION PANEL
EDP4B6	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	384.27	416.69	EMERGENCY DISTRIBUTION PANEL
EDP4B7	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	211.76	237.74	EMERGENCY DISTRIBUTION PANEL
EDP4B8	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	134.68	154.64	EMERGENCY DISTRIBUTION PANEL
EDP4B9	LB	ES5B2	480Y/277, 3 PHASE, 4 WIRE	164.80	166.00	EMERGENCY DISTRIBUTION PANEL
EQ4B1	LB	EDP4B1	480Y/277, 3 PHASE, 4 WIRE	33.50	33.50	EMERGENCY EQUIPMENT + MECH
EQ4B2	LB	EDP4B9	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY EQUIPMENT + MECH
EQ4B4	LB	EDP4B9	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY EQUIPMENT + MECH
EDP2B1	LB	ETXB1	208Y/120, 3 PHASE, 4 WIRE	3.06	3.06	EMERGENCY DISTRIBUTION PANEL
EDP2B2	LB	ETXB2	208Y/120, 3 PHASE, 4 WIRE	64.52	64.17	EMERGENCY DISTRIBUTION PANEL

EDP2B3	LB	ETXB3	208Y/120, 3 PHASE, 4 WIRE	2.88	3.60	EMERGENCY DISTRIBUTION PANEL
ERP2B1	LB	EDP2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY RECEPTACLE + SMALL LOADS
ERP2B2	LB	EDP2B2	208Y/120, 3 PHASE, 4 WIRE	14.52	14.17	EMERGENCY RECEPTACLE + SMALL LOADS
ELAB2B1	LB	EDP2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL
ELAB2B2	LB	EDP2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL
ELAB2B3	LB	EDP2B1	208Y/120, 3 PHASE, 4 WIRE	3.06	3.06	EMERGENCY LAB MODULE PANEL
ELAB2B4	LB	EDP2B3	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL
ELAB2B5	LB	EDP2B3	208Y/120, 3 PHASE, 4 WIRE	2.88	3.60	EMERGENCY LAB MODULE PANEL
EB2B1	LB	50 KVA UPS	208Y/120, 3 PHASE, 4 WIRE	12.50	12.25	EMERGENCY BAS PANEL
EB2B2	LB	EB2B1	208Y/120, 3 PHASE, 4 WIRE	3.00	3.00	EMERGENCY BAS PANEL
EB2B3	LB	EB2B1	208Y/120, 3 PHASE, 4 WIRE	9.50	9.50	EMERGENCY BAS PANEL
ELQ4B1	LB	ELDP4P1	480Y/277, 3 PHASE, 4 WIRE	27.26	29.55	LIFE SAFETY EQUIPMENT PANEL
ELRP2B1	LB	ELTXB1	208Y/120, 3 PHASE, 4 WIRE	8.40	8.88	LIFE SAFETY RECEPTACLE + SMALL LOADS
ELLP4B1	LB	ELDP451	480Y/277, 3 PHASE, 4 WIRE	10.44	13.06	LIFE SAFETY LIGHTING PANEL
ELDP2B1	LB	ELTXB2	208Y/120, 3 PHASE, 4 WIRE	218.44	114.94	LIFE SAFETY DISTRIBUTION PANEL
ELIT2B1	LB	ELDP2B1	208Y/120, 3 PHASE, 4 WIRE	64.46	37.23	LIFE SAFETY COMMUNICATION PANEL
DP211	LV 1	NTX11	208Y/120, 3 PHASE, 4 WIRE	98.68	60.60	DISTRIBUTION PANEL
DP212	LV 1	NTX12	208Y/120, 3 PHASE, 4 WIRE	21.06	15.78	DISTRIBUTION PANEL
LP411	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	17.10	21.38	LIGHTING PANEL
LP412	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	13.31	16.64	LIGHTING PANEL
Q411	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	24.50	24.90	EQUIPMENT PANEL
Q412	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	52.26	55.17	EQUIPMENT PANEL
LAB211	LV 1	DP211	208Y/120, 3 PHASE, 4 WIRE	27.50	18.75	LAB MODULE PANEL
LAB212	LV 1	DP211	208Y/120, 3 PHASE, 4 WIRE	19.42	14.71	LAB MODULE PANEL
LAB213	LV 1	DP211	208Y/120, 3 PHASE, 4 WIRE	14.52	12.26	LAB MODULE PANEL
LAB214	LV 1	EXT12	208Y/120, 3 PHASE, 4 WIRE	15.04	12.52	LAB MODULE PANEL
LAB215	LV 1	DP212	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
RP211	LV 1	DP211	208Y/120, 3 PHASE, 4 WIRE	37.24	29.88	RECEPTACLE + SMALL LOADS
RP212	LV 1	DP212	208Y/120, 3 PHASE, 4 WIRE	21.06	15.78	RECEPTACLE + SMALL LOADS
EDP211	LV 1	ETX11	208Y/120, 3 PHASE, 4 WIRE	58.32	37.46	EMERGENCY DISTRIBUTION PANEL
EDP212	LV 1	ETX12	208Y/120, 3 PHASE, 4 WIRE	30.56	23.58	EMERGENCY DISTRIBUTION PANEL
EQ411	LV 1	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	22.72	24.30	EMERGENCY EQUIPMENT PANEL
ELAB211	LV 1	EDP211	208Y/120, 3 PHASE, 4 WIRE	17.68	13.84	EMERGENCY LAB MODULE PANEL
ELAB212	LV 1	EDP211	208Y/120, 3 PHASE, 4 WIRE	17.32	13.66	EMERGENCY LAB MODULE PANEL
ELAB213	LV 1	EDP211	208Y/120, 3 PHASE, 4 WIRE	23.32	19.96	EMERGENCY LAB MODULE PANEL
ELAB214	LV 1	EDP212	208Y/120, 3 PHASE, 4 WIRE	10.18	10.18	EMERGENCY LAB MODULE PANEL
ELAB215	LV 1	EDP212	208Y/120, 3 PHASE, 4 WIRE	10.98	10.49	EMERGENCY LAB MODULE PANEL
ELAB216	LV 1	EDP212	208Y/120, 3 PHASE, 4 WIRE	9.40	9.40	EMERGENCY LAB MODULE PANEL
ELLP411	LV 1	ELDP451	480Y/277, 3 PHASE, 4 WIRE	7.51	9.38	LIFE SAFETY LIGHTING PANEL

ELIT211	LV 1	ELDP2B1	208Y/120, 3 PHASE, 4 WIRE	39.62	24.99	LIFE SAFETY COMMUNICATION PANEL
ELF211	LV 1	ELTX11	208Y/120, 3 PHASE, 4 WIRE	13.96	12.88	LIFE SAFETY PANEL
DP221	LV 2	NTX21	208Y/120, 3 PHASE, 4 WIRE	115.32	62.66	DISTRIBUTION PANEL
DP222	LV 2	NTX22	208Y/120, 3 PHASE, 4 WIRE	69.08	39.97	DISTRIBUTION PANEL
LP421	LV 2	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	13.41	16.76	LIGHTING PANEL
LP422	LV 2	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	7.19	8.99	LIGHTING PANEL
Q421	LV 2	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	47.60	48.00	EQUIPMENT PANEL
Q422	LV 2	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	19.60	20.00	EQUIPMENT PANEL
LAB221	LV 2	DP221	208Y/120, 3 PHASE, 4 WIRE	26.70	18.35	LAB MODULE PANEL
LAB222	LV 2	DP221	208Y/120, 3 PHASE, 4 WIRE	31.36	20.68	LAB MODULE PANEL
LAB223	LV 2	DP221	208Y/120, 3 PHASE, 4 WIRE	31.06	20.53	LAB MODULE PANEL
LAB224	LV 2	DP222	208Y/120, 3 PHASE, 4 WIRE	11.54	10.77	LAB MODULE PANEL
LAB225	LV 2	DP22	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
LAB226	LV 2	DP222	208Y/120, 3 PHASE, 4 WIRE	22.26	16.13	LAB MODULE PANEL
RP221	LV 2	DP221	208Y/120, 3 PHASE, 4 WIRE	26.20	18.10	RECEPTACLE + SMALL LOADS
RP222	LV 2	DP222	208Y/120, 3 PHASE, 4 WIRE	35.28	23.07	RECEPTACLE + SMALL LOADS
EB221	LV 2	EB2B1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY BAS PANEL
EDP221	LV 2	ETX21	208Y/120, 3 PHASE, 4 WIRE	14.74	12.37	EMERGENCY DISTRIBUTION PANEL
EDP222	LV 2	ETX22	208Y/120, 3 PHASE, 4 WIRE	26.20	21.40	EMERGENCY DISTRIBUTION PANEL
EQ421	LV 2	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	6.32	7.90	EMERGENCY EQUIPMENT + MECH
ELAB221	LV 2	EDP221	208Y/120, 3 PHASE, 4 WIRE	9.44	9.44	EMERGENCY LAB MODULE PANEL
ELAB222	LV 2	EDP221	208Y/120, 3 PHASE, 4 WIRE	3.72	3.72	EMERGENCY LAB MODULE PANEL
ELAB223	LV 2	EDP221	208Y/120, 3 PHASE, 4 WIRE	1.58	1.58	EMERGENCY LAB MODULE PANEL
ELAB224	LV 2	EDP222	208Y/120, 3 PHASE, 4 WIRE	4.66	4.66	EMERGENCY LAB MODULE PANEL
ELAB225	LV 2	EDP222	208Y/120, 3 PHASE, 4 WIRE	12.18	12.18	EMERGENCY LAB MODULE PANEL
ELAB226	LV 2	EDP222	208Y/120, 3 PHASE, 4 WIRE	9.36	9.36	EMERGENCY LAB MODULE PANEL
ELLP421	LV 2	ELDP451	480Y/277, 3 PHASE, 4 WIRE	3.46	4.32	LIFE SAFETY LIGHTING PANEL
ELIT221	LV 2	ELDP2B1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
DP231	LV 3	NTX31	208Y/120, 3 PHASE, 4 WIRE	127.10	68.55	DISTRIBUTION PANEL
DP232	LV 3	NTX32	208Y/120, 3 PHASE, 4 WIRE	80.30	45.58	DISTRIBUTION PANEL
LP431	LV 3	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	17.25	21.56	LIGHTING PANEL
LP432	LV 3	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	9.24	11.55	LIGHTING PANEL
Q431	LV 3	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	42.00	42.40	EQUIPMENT PANEL
Q432	LV 3	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	20.00	20.40	EQUIPMENT PANEL
LAB231	LV 3	DP231	208Y/120, 3 PHASE, 4 WIRE	32.06	21.03	LAB MODULE PANEL
LAB232	LV 3	DP231	208Y/120, 3 PHASE, 4 WIRE	37.36	23.68	LAB MODULE PANEL
LAB233	LV 3	DP231	208Y/120, 3 PHASE, 4 WIRE	21.28	15.64	LAB MODULE PANEL
LAB234	LV 3	DP232	208Y/120, 3 PHASE, 4 WIRE	22.52	16.26	LAB MODULE PANEL
LAB235	LV 3	DP232	208Y/120, 3 PHASE, 4 WIRE	27.84	18.92	LAB MODULE PANEL

LAB236	LV 3	DP232	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
RP231	LV 3	DP231	208Y/120, 3 PHASE, 4 WIRE	36.40	23.20	RECEPTACLE + SMALL LOADS
RP232	LV 3	DP232	208Y/120, 3 PHASE, 4 WIRE	29.94	20.40	RECEPTACLE + SMALL LOADS
EQ431	LV 3	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	6.32	7.90	EMERGENCY EQUIPMENT + MECH
EDP231	LV 3	ETX31	208Y/120, 3 PHASE, 4 WIRE	36.66	23.33	EMERGENCY DISTRIBUTION PANEL
EDP232	LV 3	ETX32	208Y/120, 3 PHASE, 4 WIRE	44.26	30.43	EMERGENCY DISTRIBUTION PANEL
ELAB231	LV 3	EDP231	208Y/120, 3 PHASE, 4 WIRE	15.10	12.55	EMERGENCY LAB MODULE PANEL
ELAB232	LV 3	EDP231	208Y/120, 3 PHASE, 4 WIRE	11.50	10.75	EMERGENCY LAB MODULE PANEL
ELAB233	LV 3	EDP231	208Y/120, 3 PHASE, 4 WIRE	10.06	10.03	EMERGENCY LAB MODULE PANEL
ELAB234	LV 3	EDP231	208Y/120, 3 PHASE, 4 WIRE	17.82	17.21	EMERGENCY LAB MODULE PANEL
ELAB235	LV 3	EDP232	208Y/120, 3 PHASE, 4 WIRE	11.98	10.99	EMERGENCY LAB MODULE PANEL
ELAB236	LV 3	EDP232	208Y/120, 3 PHASE, 4 WIRE	14.46	12.23	EMERGENCY LAB MODULE PANEL
ELLP431	LV 3	ELDP451	480Y/277, 3 PHASE, 4 WIRE	5.70	7.12	LIFE SAFETY LIGHTING PANEL
ELIT231	LV 3	ELDP2B1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
DP241	LV 4	NTX41	208Y/120, 3 PHASE, 4 WIRE	118.44	64.22	DISTRIBUTION PANEL
DP242	LV 4	NTX42	208Y/120, 3 PHASE, 4 WIRE	110.12	60.49	DISTRIBUTION PANEL
LP441	LV 4	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	16.99	21.24	LIGHTING PANEL
LP442	LV 4	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	9.94	12.43	LIGHTING PANEL
Q441	LV 4	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	47.60	48.00	EQUIPMENT PANEL
Q442	LV 4	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	21.60	22.00	EQUIPMENT PANEL
LAB241	LV 4	DP241	208Y/120, 3 PHASE, 4 WIRE	32.04	21.02	LAB MODULE PANEL
LAB242	LV 4	DP241	208Y/120, 3 PHASE, 4 WIRE	37.96	23.98	LAB MODULE PANEL
LAB243	LV 4	DP241	208Y/120, 3 PHASE, 4 WIRE	20.26	15.13	LAB MODULE PANEL
LAB244	LV 4	DP242	208Y/120, 3 PHASE, 4 WIRE	27.08	18.54	LAB MODULE PANEL
LAB245	LV 4	DP242	208Y/120, 3 PHASE, 4 WIRE	30.40	20.20	LAB MODULE PANEL
LAB246	LV 4	DP242	208Y/120, 3 PHASE, 4 WIRE	30.38	20.19	LAB MODULE PANEL
RP241	LV 4	DP241	208Y/120, 3 PHASE, 4 WIRE	28.18	19.09	RECEPTACLE + SMALL LOADS
RP242	LV 4	DP242	208Y/120, 3 PHASE, 4 WIRE	22.26	16.56	RECEPTACLE + SMALL LOADS
EDP241	LV 4	ETX41	208Y/120, 3 PHASE, 4 WIRE	53.36	31.68	EMERGENCY DISTRIBUTION PANEL
EDP242	LV 4	ETX42	208Y/120, 3 PHASE, 4 WIRE	54.36	38.78	EMERGENCY DISTRIBUTION PANEL
EQ441	LV 4	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	12.64	14.22	EMERGENCY EQUIPMENT + MECH
ELAB241	LV 4	EDP241	208Y/120, 3 PHASE, 4 WIRE	19.28	14.64	EMERGENCY LAB MODULE PANEL
ELAB242	LV 4	EDP241	208Y/120, 3 PHASE, 4 WIRE	15.58	12.79	EMERGENCY LAB MODULE PANEL
ELAB243	LV 4	EDP241	208Y/120, 3 PHASE, 4 WIRE	18.50	14.25	EMERGENCY LAB MODULE PANEL
ELAB244	LV 4	EDP242	208Y/120, 3 PHASE, 4 WIRE	22.24	19.42	EMERGENCY LAB MODULE PANEL
ELAB245	LV 4	EDP242	208Y/120, 3 PHASE, 4 WIRE	19.66	18.13	EMERGENCY LAB MODULE PANEL
ELAB246	LV 4	EDP242	208Y/120, 3 PHASE, 4 WIRE	12.46	11.23	EMERGENCY LAB MODULE PANEL
ELLP441	LV 4	ELDP451	480Y/277, 3 PHASE, 4 WIRE	6.06	7.58	LIFE SAFETY LIGHTING PANEL
ELIT241	LV 4	ELDP2B1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL

ELF241	LV 4	ELTX41	208Y/120, 3 PHASE, 4 WIRE	3.00	3.00	LIFE SAFETY PANEL
DP251	LV 5	NTX51	208Y/120, 3 PHASE, 4 WIRE	2.64	2.77	DISTRIBUTION PANEL
DP252	LV 5	NTX52	208Y/120, 3 PHASE, 4 WIRE	2.08	2.22	DISTRIBUTION PANEL
LP451	LV 5	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	2.71	3.39	LIGHTING PANEL
LP452	LV 5	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	1.26	1.57	LIGHTING PANEL
Q451	LV 5	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
Q452	LV 5	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
RP251	LV 5	DP251	208Y/120, 3 PHASE, 4 WIRE	2.64	2.77	RECEPTACLE + SMALL LOADS
RP252	LV 5	DP252	208Y/120, 3 PHASE, 4 WIRE	2.08	2.22	RECEPTACLE + SMALL LOADS
EDP251	LV 5	ETX51	208Y/120, 3 PHASE, 4 WIRE	1.08	1.08	EMERGENCY DISTRIBUTION PANEL
EDP252	LV 5	ETX52	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY DISTRIBUTION PANEL
EQ451	LV 5	BUSWAY	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY EQUIPMENT + MECH
EB251	LV 5	EB2P1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY BAS PANEL
ELAB251	LV 5	EDP251	208Y/120, 3 PHASE, 4 WIRE	1.08	1.08	EMERGENCY LAB MODULE PANEL
ELLP451	LV 5	ELDP451	480Y/277, 3 PHASE, 4 WIRE	2.55	3.18	LIFE SAFETY LIGHTING PANEL
ELIT251	LV 5	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
ELDP451	LV 5	ATS-1	480Y/277, 3 PHASE, 4 WIRE	85.61	93.42	LIFE SAFETY DISTRIBUTION PANEL
ELDP452	LV 5	ELDP451	480Y/277, 3 PHASE, 4 WIRE	27.04	20.20	LIFE SAFETY DISTRIBUTION PANEL
DP261	LV 6	NTX61	208Y/120, 3 PHASE, 4 WIRE	2.11	2.24	DISTRIBUTION PANEL
DP262	LV 6	NTX62	208Y/120, 3 PHASE, 4 WIRE	2.30	2.44	DISTRIBUTION PANEL
LP461	LV 6	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	2.78	3.47	LIGHTING PANEL
LP462	LV 6	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.92	1.15	LIGHTING PANEL
Q461	LV 6	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
Q462	LV 6	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
RP261	LV 6	DP261	208Y/120, 3 PHASE, 4 WIRE	2.11	2.24	RECEPTACLE + SMALL LOADS
RP262	LV 6	DP262	208Y/120, 3 PHASE, 4 WIRE	2.30	2.44	RECEPTACLE + SMALL LOADS
EDP261	LV 6	ETX61	208Y/120, 3 PHASE, 4 WIRE	1.08	1.08	EMERGENCY DISTRIBUTION PANEL
EDP262	LV 6	ETX62	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY DISTRIBUTION PANEL
EQ461	LV 6	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY EQUIPMENT + MECH
ELAB261	LV 6	EDP261	208Y/120, 3 PHASE, 4 WIRE	1.08	1.08	EMERGENCY LAB MODULE PANEL
ELLP461	LV 6	ELDP451	480Y/277, 3 PHASE, 4 WIRE	2.21	2.76	LIFE SAFETY LIGHTING PANEL
ELQ461	LV 6	ELDP4P1	480Y/277, 3 PHASE, 4 WIRE	36.58	38.87	LIFE SAFETY EQUIPMENT PANEL
ELIT261	LV 6	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
DP271	LV 7	NTX71	208Y/120, 3 PHASE, 4 WIRE	114.80	62.40	DISTRIBUTION PANEL
DP272	LV 7	NTX72	208Y/120, 3 PHASE, 4 WIRE	115.80	63.33	DISTRIBUTION PANEL
LP471	LV 7	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	14.82	18.53	LIGHTING PANEL
LP472	LV 7	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	8.73	10.91	LIGHTING PANEL
Q471	LV 7	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	29.60	30.00	EQUIPMENT PANEL
Q472	LV 7	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	24.40	24.80	EQUIPMENT PANEL

LAB271	LV 7	DP271	208Y/120, 3 PHASE, 4 WIRE	35.44	22.72	LAB MODULE PANEL
LAB272	LV 7	DP271	208Y/120, 3 PHASE, 4 WIRE	34.06	22.03	LAB MODULE PANEL
LAB273	LV 7	DP271	208Y/120, 3 PHASE, 4 WIRE	30.64	20.32	LAB MODULE PANEL
LAB274	LV 7	DP272	208Y/120, 3 PHASE, 4 WIRE	26.36	18.18	LAB MODULE PANEL
LAB275	LV 7	DP272	208Y/120, 3 PHASE, 4 WIRE	28.94	19.47	LAB MODULE PANEL
LAB276	LV 7	DP272	208Y/120, 3 PHASE, 4 WIRE	42.28	26.14	LAB MODULE PANEL
RP271	LV 7	DP271	208Y/120, 3 PHASE, 4 WIRE	14.66	12.33	RECEPTACLE + SMALL LOADS
RP272	LV 7	DP272	208Y/120, 3 PHASE, 4 WIRE	18.22	14.54	RECEPTACLE + SMALL LOADS
EDP271	LV 7	ETX71	208Y/120, 3 PHASE, 4 WIRE	34.32	22.16	EMERGENCY DISTRIBUTION PANEL
EDP272	LV 7	ETX72	208Y/120, 3 PHASE, 4 WIRE	31.12	24.26	EMERGENCY DISTRIBUTION PANEL
EQ471	LV 7	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	6.32	7.90	EMERGENCY EQUIPMENT + MECH
ELAB271	LV 7	EDP271	208Y/120, 3 PHASE, 4 WIRE	12.84	11.42	EMERGENCY LAB MODULE PANEL
ELAB272	LV 7	EDP271	208Y/120, 3 PHASE, 4 WIRE	10.40	10.20	EMERGENCY LAB MODULE PANEL
ELAB273	LV 7	EDP271	208Y/120, 3 PHASE, 4 WIRE	11.08	10.54	EMERGENCY LAB MODULE PANEL
ELAB274	LV 7	EDP272	208Y/120, 3 PHASE, 4 WIRE	14.56	14.56	EMERGENCY LAB MODULE PANEL
ELAB275	LV 7	EDP272	208Y/120, 3 PHASE, 4 WIRE	4.66	4.66	EMERGENCY LAB MODULE PANEL
ELAB276	LV 7	EDP272	208Y/120, 3 PHASE, 4 WIRE	11.90	11.20	EMERGENCY LAB MODULE PANEL
ELLP471	LV 7	ELDP451	480Y/277, 3 PHASE, 4 WIRE	3.82	4.77	LIFE SAFETY LIGHTING PANEL
ELIT271	LV 7	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
ELF271	LV 7	ELTX71	208Y/120, 3 PHASE, 4 WIRE	3.00	3.00	LIFE SAFETY PANEL
DP281	LV 8	NTX81	208Y/120, 3 PHASE, 4 WIRE	114.20	62.10	DISTRIBUTION PANEL
DP282	LV 8	NTX82	208Y/120, 3 PHASE, 4 WIRE	104.72	57.79	DISTRIBUTION PANEL
LP481	LV 8	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	15.14	18.93	LIGHTING PANEL
LP482	LV 8	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	8.94	11.18	LIGHTING PANEL
Q481	LV 8	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	32.80	33.20	EQUIPMENT PANEL
Q482	LV 8	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	29.20	29.60	EQUIPMENT PANEL
LAB281	LV 8	DP281	208Y/120, 3 PHASE, 4 WIRE	34.00	22.00	LAB MODULE PANEL
LAB282	LV 8	DP281	208Y/120, 3 PHASE, 4 WIRE	32.62	21.31	LAB MODULE PANEL
LAB283	LV 8	DP281	208Y/120, 3 PHASE, 4 WIRE	30.64	20.32	LAB MODULE PANEL
LAB284	LV 8	DP282	208Y/120, 3 PHASE, 4 WIRE	26.00	18.00	LAB MODULE PANEL
LAB285	LV 8	DP282	208Y/120, 3 PHASE, 4 WIRE	23.18	16.59	LAB MODULE PANEL
LAB286	LV 8	DP282	208Y/120, 3 PHASE, 4 WIRE	38.32	24.16	LAB MODULE PANEL
RP281	LV 8	DP281	208Y/120, 3 PHASE, 4 WIRE	16.94	13.47	RECEPTACLE + SMALL LOADS
RP282	LV 8	DP282	208Y/120, 3 PHASE, 4 WIRE	17.22	14.04	RECEPTACLE + SMALL LOADS
EDP281	LV 8	ETX81	208Y/120, 3 PHASE, 4 WIRE	34.32	22.16	EMERGENCY DISTRIBUTION PANEL
EDP282	LV 8	ETX82	208Y/120, 3 PHASE, 4 WIRE	25.94	18.22	EMERGENCY DISTRIBUTION PANEL
EQ481	LV 8	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	6.32	7.90	EMERGENCY EQUIPMENT + MECH
ELAB281	LV 8	EDP281	208Y/120, 3 PHASE, 4 WIRE	12.84	11.42	EMERGENCY LAB MODULE PANEL
ELAB282	LV 8	EDP281	208Y/120, 3 PHASE, 4 WIRE	10.22	10.11	EMERGENCY LAB MODULE PANEL

ELAB283	LV 8	EDP281	208Y/120, 3 PHASE, 4 WIRE	11.26	10.63	EMERGENCY LAB MODULE PANEL
ELAB284	LV 8	EDP282	208Y/120, 3 PHASE, 4 WIRE	9.02	9.02	EMERGENCY LAB MODULE PANEL
ELAB285	LV 8	EDP282	208Y/120, 3 PHASE, 4 WIRE	4.66	4.66	EMERGENCY LAB MODULE PANEL
ELAB286	LV 8	EDP282	208Y/120, 3 PHASE, 4 WIRE	12.26	11.13	EMERGENCY LAB MODULE PANEL
EB281	LV 8	EB2P1	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY BAS PANEL
ELLP481	LV 8	ELDP451	480Y/277, 3 PHASE, 4 WIRE	3.48	4.35	LIFE SAFETY LIGHTING PANEL
ELIT281	LV 8	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
DP291	LV 9	NTX91	208Y/120, 3 PHASE, 4 WIRE	111.32	60.66	DISTRIBUTION PANEL
DP292	LV 9	NTX92	208Y/120, 3 PHASE, 4 WIRE	104.48	57.94	DISTRIBUTION PANEL
LP491	LV 9	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	15.07	18.83	LIGHTING PANEL
LP492	LV 9	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	8.67	10.83	LIGHTING PANEL
Q491	LV 9	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	30.80	31.20	EQUIPMENT PANEL
Q492	LV 9	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	27.20	27.60	EQUIPMENT PANEL
LAB291	LV 9	DP291	208Y/120, 3 PHASE, 4 WIRE	34.00	22.00	LAB MODULE PANEL
LAB292	LV 9	DP291	208Y/120, 3 PHASE, 4 WIRE	32.98	21.49	LAB MODULE PANEL
LAB293	LV 9	DP291	208Y/120, 3 PHASE, 4 WIRE	30.64	20.32	LAB MODULE PANEL
LAB294	LV 9	DP292	208Y/120, 3 PHASE, 4 WIRE	26.00	18.00	LAB MODULE PANEL
LAB295	LV 9	DP292	208Y/120, 3 PHASE, 4 WIRE	22.82	16.41	LAB MODULE PANEL
LAB296	LV 9	DP292	208Y/120, 3 PHASE, 4 WIRE	38.54	24.27	LAB MODULE PANEL
RP291	LV 9	DP291	208Y/120, 3 PHASE, 4 WIRE	13.70	11.85	RECEPTACLE + SMALL LOADS
RP292	LV 9	DP292	208Y/120, 3 PHASE, 4 WIRE	17.12	14.26	RECEPTACLE + SMALL LOADS
EDP291	LV 9	ETX91	208Y/120, 3 PHASE, 4 WIRE	33.68	21.84	EMERGENCY DISTRIBUTION PANEL
EDP292	LV 9	ETX92	208Y/120, 3 PHASE, 4 WIRE	25.72	18.61	EMERGENCY DISTRIBUTION PANEL
EQ491	LV 9	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	6.32	7.90	EMERGENCY EQUIPMENT + MECH
ELAB291	LV 9	EDP291	208Y/120, 3 PHASE, 4 WIRE	12.20	11.10	EMERGENCY LAB MODULE PANEL
ELAB292	LV 9	EDP291	208Y/120, 3 PHASE, 4 WIRE	10.40	10.20	EMERGENCY LAB MODULE PANEL
ELAB293	LV 9	EDP291	208Y/120, 3 PHASE, 4 WIRE	11.08	10.54	EMERGENCY LAB MODULE PANEL
ELAB294	LV 9	EDP292	208Y/120, 3 PHASE, 4 WIRE	8.66	8.66	EMERGENCY LAB MODULE PANEL
ELAB295	LV 9	EDP292	208Y/120, 3 PHASE, 4 WIRE	4.66	4.66	EMERGENCY LAB MODULE PANEL
ELAB296	LV 9	EDP292	208Y/120, 3 PHASE, 4 WIRE	12.40	11.45	EMERGENCY LAB MODULE PANEL
ELLP491	LV 9	ELDP451	480Y/277, 3 PHASE, 4 WIRE	3.66	4.57	LIFE SAFETY LIGHTING PANEL
ELIT291	LV 9	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
DP2101	LV 10	NTX101	208Y/120, 3 PHASE, 4 WIRE	34.83	22.64	DISTRIBUTION PANEL
DP2102	LV 10	NTX102	208Y/120, 3 PHASE, 4 WIRE	22.10	16.30	DISTRIBUTION PANEL
LP4101	LV 10	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	20.73	25.91	LIGHTING PANEL
LP4102	LV 10	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	24.16	30.20	LIGHTING PANEL
Q4101	LV 10	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EQUIPMENT PANEL
DP4101	LV 10	600 FRAME	480Y/277, 3 PHASE, 4 WIRE	354.30	348.50	DISTRIBUTION PANEL
LAB2101	LV 10	DP2101	208Y/120, 3 PHASE, 4 WIRE	9.74	9.74	LAB MODULE PANEL

LAB2102	LV 10	DP2101	208Y/120, 3 PHASE, 4 WIRE	8.01	8.01	LAB MODULE PANEL
LAB2103	LV 10	DP2102	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	LAB MODULE PANEL
LAB2104	LV 10	DP2102	208Y/120, 3 PHASE, 4 WIRE	5.54	5.54	LAB MODULE PANEL
RP2101	LV 10	DP2101	208Y/120, 3 PHASE, 4 WIRE	17.08	13.64	RECEPTACLE + SMALL LOADS
RP2102	LV 10	DP2102	208Y/120, 3 PHASE, 4 WIRE	16.56	13.53	RECEPTACLE + SMALL LOADS
EDP2101	LV 10	ETX101	208Y/120, 3 PHASE, 4 WIRE	44.96	27.48	EMERGENCY DISTRIBUTION PANEL
EDP2102	LV 10	ETX102	208Y/120, 3 PHASE, 4 WIRE	11.52	10.76	EMERGENCY DISTRIBUTION PANEL
EQ4101	LV 10	BUSWAY	480Y/277, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY EQUIPMENT + MECH
ELAB2101	LV 10	EDP2101	208Y/120, 3 PHASE, 4 WIRE	12.92	11.46	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELAB2102	LV 10	EDP2101	208Y/120, 3 PHASE, 4 WIRE	14.58	12.29	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELAB2103	LV 10	EDP2101	208Y/120, 3 PHASE, 4 WIRE	17.46	13.73	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELAB2104	LV 10	EDP2102	208Y/120, 3 PHASE, 4 WIRE	4.28	4.28	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELAB2105	LV 10	EDP2102	208Y/120, 3 PHASE, 4 WIRE	0.00	0.00	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELAB2106	LV 10	EDP2102	208Y/120, 3 PHASE, 4 WIRE	7.24	7.24	EMERGENCY LAB MODULE PANEL (2 SECTION)
ELLP4101	LV 10	ELDP451	480Y/277, 3 PHASE, 4 WIRE	9.70	12.12	LIFE SAFETY LIGHTING PANEL
ELIT2101	LV 10	ELDP2P1	208Y/120, 3 PHASE, 4 WIRE	38.12	24.24	LIFE SAFETY COMMUNICATION PANEL
ELF2101	LV 10	ELTX101	208Y/120, 3 PHASE, 4 WIRE	3.00	3.25	LIFE SAFETY PANEL
ES5P1	LV LP	E/NG5B1	480Y/277, 3 PHASE, 4 WIRE	3273.32	3123.02	SWITCHGEAR
ES5P2	LV LP	E/NG5B1	480Y/277, 3 PHASE, 4 WIRE	1725.05	1078.18	SWITCHGEAR
ELG4P1	LV LP	GEN -1	480Y/277, 3 PHASE, 4 WIRE	1120.39	940.57	LIFE SAFETY SWITCHGEAR
EDP4P1	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	385.00	388.35	EMERGENCY DISTRIBUTION PANEL
EDP4P2	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	372.81	374.04	EMERGENCY DISTRIBUTION PANEL
EDP4P3	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	459.35	412.05	EMERGENCY DISTRIBUTION PANEL
EDP4P4	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	574.74	600.72	EMERGENCY DISTRIBUTION PANEL
EDP4P5	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	584.13	610.11	EMERGENCY DISTRIBUTION PANEL
EDP4P6	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	335.60	351.61	EMERGENCY DISTRIBUTION PANEL
EDP4P7	LV LP	ES5P1	480Y/277, 3 PHASE, 4 WIRE	561.68	587.66	EMERGENCY DISTRIBUTION PANEL
EDP2P1	LV LP	ETXP1	208Y/120, 3 PHASE, 4 WIRE	92.17	76.57	EMERGENCY DISTRIBUTION PANEL
ERP2P1	LV LP	EDP2P1	208Y/120, 3 PHASE, 4 WIRE	25.35	18.07	EMERGENCY RECEPTACLE + SMALL LOADS
ERP2P2	LV LP	EDP2P1	208Y/120, 3 PHASE, 4 WIRE	16.82	13.50	EMERGENCY RECEPTACLE + SMALL LOADS
EB2P1	LV LP	50 KVA UPS	208Y/120, 3 PHASE, 4 WIRE	15.50	12.75	EMERGENCY BAS PANEL
EB2P2	LV LP	EB2P1	208Y/120, 3 PHASE, 4 WIRE	5.50	5.50	EMERGENCY BAS PANEL
EB2P3	LV LP	EB2P1	208Y/120, 3 PHASE, 4 WIRE	10.00	10.00	EMERGENCY BAS PANEL
LP4P1	LV LP	EDP4P1	480Y/277, 3 PHASE, 4 WIRE	12.28	15.35	LIGHTING PANEL
ELF2P1	LV LP	ELTXP1	208Y/120, 3 PHASE, 4 WIRE	4.08	4.08	LIFE SAFETY PANEL
ELDP4P1	LV LP	ATS-4	480Y/277, 3 PHASE, 4 WIRE	98.76	101.67	LIFE SAFETY DISTRIBUTION PANEL
ELDP4P2	LV LP	ATS-2	480Y/277, 3 PHASE, 4 WIRE	447.16	230.38	LIFE SAFETY DISTRIBUTION PANEL
ELDP4P3	LV LP	ATS-3	480Y/277, 3 PHASE, 4 WIRE	339.21	359.16	LIFE SAFETY DISTRIBUTION PANEL
ELDP2P1	LV LP	ELTXP2	208Y/120, 3 PHASE, 4 WIRE	228.72	120.44	LIFE SAFETY DISTRIBUTION PANEL

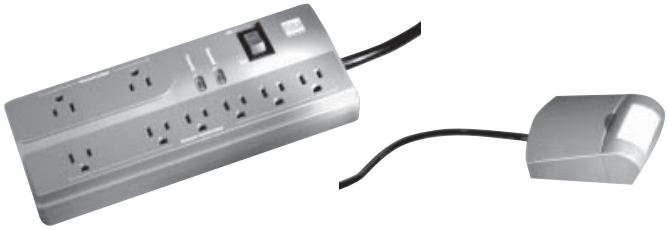
EQ4P1	LV UP	EDP4P2	480Y/277, 3 PHASE, 4 WIRE	48.93	51.21	EMERGENCY EQUIPMENT + MECH
EQ4P2	LV UP	EDP4P3	480Y/277, 3 PHASE, 4 WIRE	144.00	77.00	EMERGENCY EQUIPMENT + MECH
			TOTALS	40909.65	36007.49	
			SUBTRACTED SWITCHGEAR	14516.81	12704.90	

APPENDIX D | WATTSTOPPER INSTALLATION AND SPECIFICATION

IDP-3050-A
version 2

8 Outlet Power Strip with Personal Sensor

Installation Instructions



SPECIFICATIONS

UL & cUL listed

Power Strip
- Electrical rating 125VAC, 12A, 50/60Hz
- Dry contact relay 12A
- Grounded LED ..... indicates correct wiring and grounding
- Protected LED .... indicates functioning of surge protection
- Eight outlets ..... six controlled, two uncontrolled
- 8 foot cord ..... black
- UL 1449 rating 400V
- Circuit ..... High Energy, Multi-stage hybrid
- Noise filtration 0-25dB (94.38%)
- Joule rating ..... 740 Joules
- Maximum surge amperage ..... 48,000 Amps
- Protection modes ..... L-N, L-G, N-G
- Response time ..... instantaneous
- Let through voltage 140V
- Initial clamping voltage 200V

Personal Sensor .... DI-110 passive infrared occupancy sensor
- Supply Voltage ..... 12VDC Typical
- Time Delay Adjustment ..... 30 seconds to 30 minutes

WattStopper

US Patents:
4,787,722
5,455,487
5,598,042

legrand®

Santa Clara, CA 95050

DESCRIPTION

The Watt Stopper Isolé IDP-3050-A is an advanced energy saving control system, designed for general office use. It combines an eight-outlet power strip with the DI-110 personal sensor. The IDP-3050-A controls power used by plug load devices, and provides surge protection. Its use reduces energy costs and helps the environment by turning power-consuming devices off based on occupancy.

THE POWER STRIP

Functionally, the power strip provides surge protection. It also filters noise caused by electromagnetic interference (EMI) and radio frequency interference (RFI).

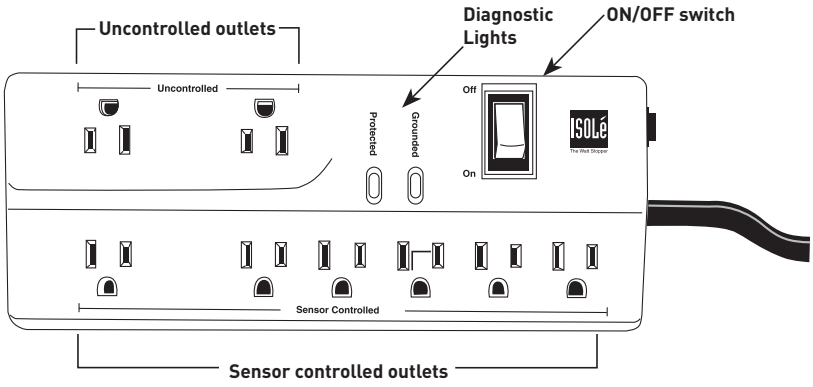
Outlets

Six of the power strip's eight outlets are controlled by the personal sensor and the remaining two are uncontrolled.

Switches

The power strip has an ON/OFF switch to turn on or off its outlets.

CAUTION: RISK OF ELECTRIC SHOCK. DO NOT PLUG INTO ANOTHER RELOCATABLE POWER TAP. This device features an internal protection that will disconnect the surge protective component at the end of its useful life but will maintain power to the load now unprotected.



Call 800.879.8585 for Technical Support

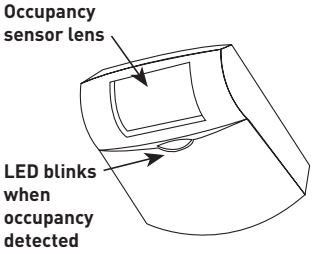
Diagnostic Lights

"Protected" LED indicator: When the surge protector is operating correctly, the LED indicator labeled "Protected" is lit. When unlit, this LED indicates the occurrence of a power disturbance or fault within the unit.

WARNING
When the surge protector fails (LED unlit) power to the Sensor Controlled outlets is disabled. The Uncontrolled outlets maintain power but the loads connected to them are unprotected.

"Grounded" LED indicator: Another LED indicator, labeled "Grounded," is lit when the wall outlet is properly wired and grounded.The surge protection will not operate if the power strip is not properly grounded.

THE DI-110 PERSONAL SENSOR

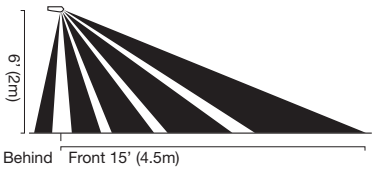


The DI-110 personal sensor uses passive infrared technology to detect occupancy within a workspace. When the sensor detects occupancy, it automatically turns on the power strip's six controlled outlets. It turns off these outlets when the workspace becomes unoccupied and the user-set time delay elapses. (See "Time Delay Setting.") Uncontrolled outlets are continuously powered by the power strip and remain on regardless of occupancy.

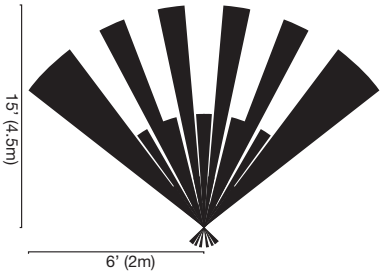
Personal Sensor Placement

The sensor uses a multi-segmented Fresnel lens to view a coverage area. Position the sensor to have a clear view of motion (especially hand motion) in the workspace. Make sure that it does not view open doors or entrances where people passing by may be detected.

The diagrams below show the sensor's coverage pattern. They illustrate the areas where the sensor will best sense motion. Use the diagrams as a general reference to determine the position and orientation of the sensor.



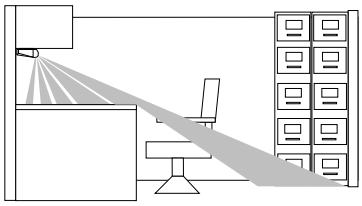
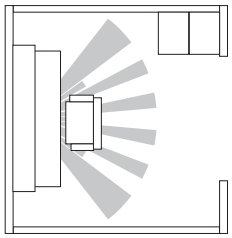
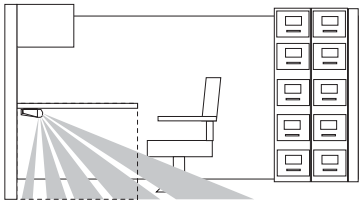
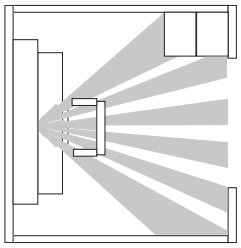
Side view



Overhead view

DI-110 Office Placement Examples

These diagrams give examples of sensor placement in a workspace while illustrating typical coverage patterns and coverage ranges.

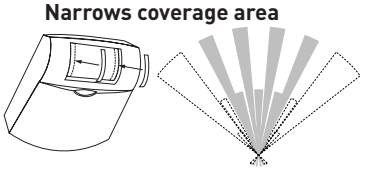
	Side views	Overhead views
Mounted under binder bin		
Mounted under desk		

Altering Coverage Ranges

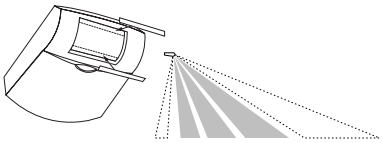
The IDP-3050-A package also includes strips of tape, used to mask areas of the sensor lens. Masking the lens allows the user to alter or refine coverage areas.

To narrow coverage, place tape on left or right sides of the lens. To shorten coverage, place tape on the top or bottom of the lens. See the illustrations here as examples.

Narrows coverage area



Shortens coverage area



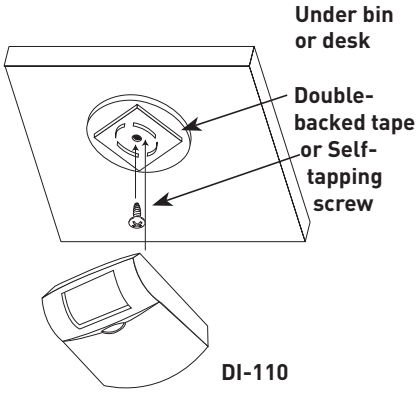
Call 800.879.8585 for Technical Support

PERSONAL SENSOR MOUNTING

Note: When determining mounting locations, verify that the connecting cable from the personal sensor will comfortably reach the cable socket on the power strip.

The DI-110 is usually mounted under a desk or binder bin as shown in the office placement example diagrams. However, it can be mounted to any flat surface.

1. Attach the mounting plate to the desired location with the provided self-tapping screw or double-backed tape.
2. Snap the sensor onto the mounting plate.



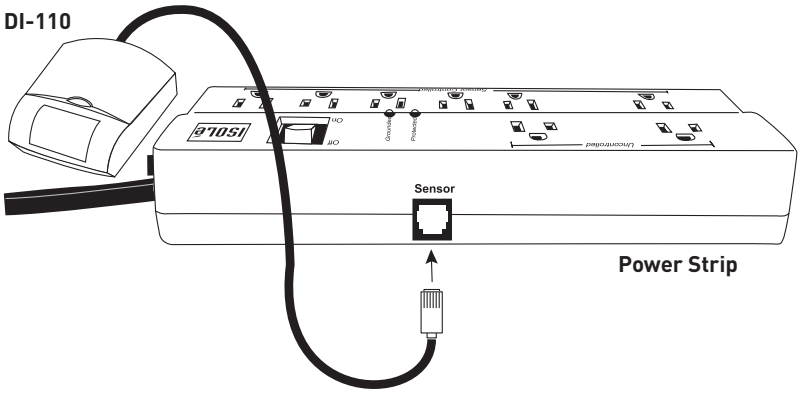
INSTALLATION

DI-110 Personal Sensor

- Plug one end of the provided cable into the back of the DI-110 and the other end of the cable into the side of the power strip.

CAUTIONS

Follow local building and safety codes when installing this product. Plug only the Isolé personal sensor into the power strip's jack-otherwise, damage may result. Never plug any devices that must remain on throughout the day (e.g., cpu) into the controlled outlets.



Power Strip

- Plug the power cord into a 120VAC wall receptacle.

Call 800.879.8585 for Technical Support

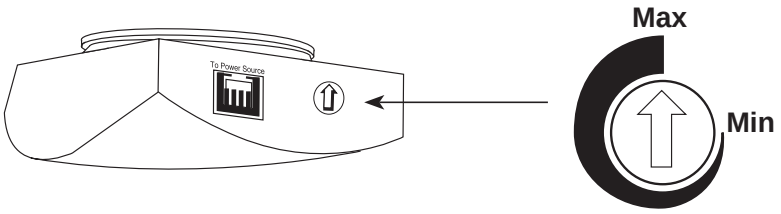
Time Delay Setting

The personal sensor automatically turns off all controlled devices after a workspace becomes vacant and a pre-set time interval, or time delay, elapses. This setting is user-adjustable.

Turning the trimpot dial, located on the back on the sensor, clockwise or counterclockwise adjusts the time delay. The range for adjustment is 30 seconds to 30 minutes.

- To adjust to 30 seconds (minimum), turn the dial completely counterclockwise.
- To adjust to 30 minutes (maximum), turn the dial completely clockwise.
- To adjust to 15 minutes, turn the dial half way between its maximal clockwise and counterclockwise positions.

Note: Use a small screwdriver to make adjustments.



Initial Warm-up

The personal sensor requires an initial warm-up period of up to two minutes whenever the power strip is turned on. During this time, all connected devices will remain on, regardless of occupancy or the time delay setting.

TROUBLESHOOTING

Devices do not turn on with occupancy. If the LED, labeled "Grounded," is not lit:

- Make certain that the power strip is securely plugged into a properly grounded and wired outlet. Check that the ON/OFF switch is in the "ON" position.
- Make certain that the cable connection between the personal sensor and the power strip is secure.
- Make certain that the personal sensor is positioned to view the desired coverage area. (See "Personal Sensor Placement.")

Devices turn on without occupancy.

The sensor may be detecting people outside of the workspace.

- Reorient the sensor so that it does not view beyond the boundaries of the workspace.

The controlled devices turn off when the workspace is occupied.

- Change the personal sensor's location or orientation within the workspace to increase the sensor's detection of motion, especially hand motion. (See "Personal Sensor Placement.")
- Increase the personal sensor's time delay setting. (See "Time Delay Setting.")

The Protected LED is not lit.

- Turn the power strip off and then on. If the Protected LED remains off, the surge suppression feature has stopped working. Devices requiring surge protection should not be plugged into the power strip's outlets when the Protected LED is unlit. The power strip may need to be replaced. Call Technical Support.

The Grounded LED is not lit.

- Electrical outlet may not be functioning properly. Switch to a properly grounded electrical outlet. Report to facility manager or engineer for verification and repair.

These suggestions should help solve most problems. For further assistance, call Technical Support at 800.879.8585.

Call 800.879.8585 for Technical Support

ORDERING INFORMATION

Catalog#	Description
IDP-3050-A	Eight outlet Power Strip with DI-110 Personal Sensor

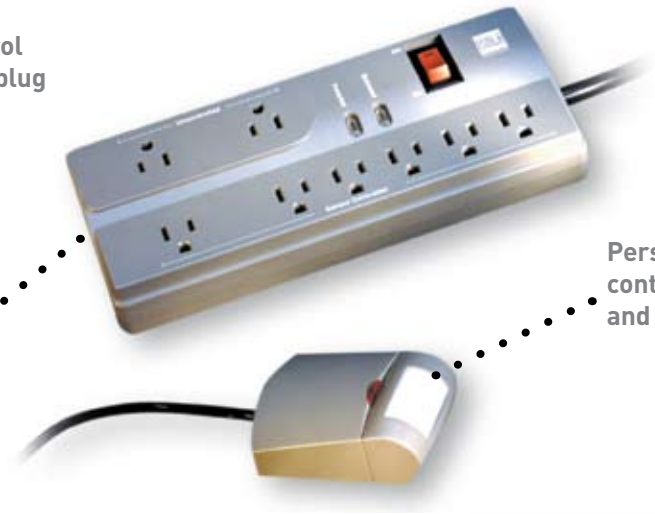
WARRANTY INFORMATION

Watt Stopper/Legrand warranties its products to be free of defects in materials and workmanship for a period of five (5) years. There are no obligations or liabilities on the part of Watt Stopper/Legrand for consequential damages arising out of, or in connection with, the use or performance of this product or other indirect damages with respect to loss of property, revenue or profit, or cost of removal, installation or reinstallation.

2800 De La Cruz Boulevard, Santa Clara, CA 95050
Technical Support: 800.879.8585
www.wattstopper.com
08955r2 01/2008

Please Recycle

Isolé IDP-3050 Power Strip with Personal Sensor



PROJECT

LOCATION/TYPE

Product Overview

Description

The Isolé IDP-3050 is an energy-saving control system that provides maximum surge and noise suppression while keeping plug load equipment off when there is no occupancy. It consists of an eight-outlet power strip and a personal occupancy sensor.

Operation

The IDP-3050 turns plug load devices on and off based on occupancy. The personal sensor connects to the eight-outlet power strip with the attached cable. The power strip contains six outlets controlled by occupancy and two outlets that are uncontrolled. The IDP-3050 automatically turns all controlled devices on when the workspace is occupied, and off when the workspace has been unoccupied for the user-defined time delay. Uncontrolled devices remain on regardless of occupancy.

Surge Suppression

The power strip provides a high degree of surge suppression that protects connected equipment against threats like power surges, lightning strikes and voltage spikes. It features a resettable circuit breaker and two LEDs that indicate that the outlet is wired and grounded properly and the surge protection is functioning.

Application

The IDP-3050 is ideal for controlling task lighting and computer monitors. Additional devices for the controlled outlets include space heaters, fans and other equipment that can be turned off during unoccupied periods. Devices such as CPUs and fax machines should be plugged into the uncontrolled outlets. Applications include workstations, open office cubicles, offices and engineering stations.

Features

Power Strip

- Eight outlets; six controlled, two uncontrolled
- Surge and noise suppression protects desktop equipment
- Ground protected for safety; will not operate without a grounded outlet
- Two LEDs to indicate: 1) correct wiring and grounding; 2) surge protection is functioning
- Installation requires no hardwiring
- Flat offset plug for wire management
- One uncontrolled outlet and one controlled outlet are wall-transformer-enabled
- Plugs into a standard three-prong outlet

Personal Sensor

- Uses latest passive infrared (PIR) technology to detect occupancy
- User-adjustable time delay of 30 seconds to 30 minutes
- Multi-level Fresnel lens for superior occupancy detection
- 120° coverage, up to 300 square feet
- ASIC technology reduces components and enhances reliability
- Instantaneous response time

WattStopper®
www.wattstopper.com
800.879.8585

Specifications

Power Strip:

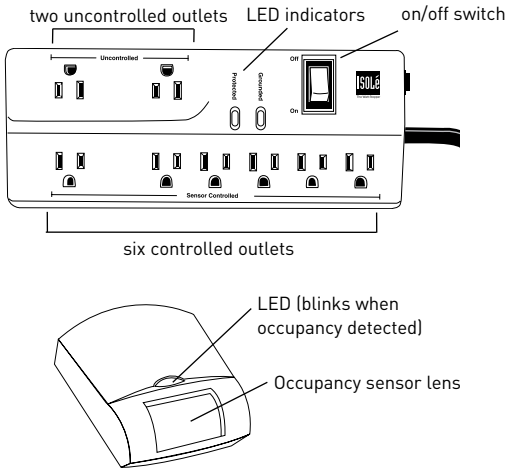
- Electrical rating: 120VAC, 12A, 50/60 Hz
- 12A dry contact relay
- 6 ft. black cord
- Transformer provides power to sensor
- Mounts with screws or double-sided tape
- UL 1449 3rd Edition rating: 600V
- Circuit: High-energy, multistage hybrid
- Noise filtration: 0-25db (94.38%)
- Joule rating: 740 joules
- Maximum surge amperage: 48,000 Amps
- Protection modes: 500V L-N, 600V L-G, 600V N-G
- Response time: instantaneous
- Let-through voltage: 140V
- Initial clamping voltage: 200V
- UL and cUL listed
- Five year warranty

Personal Sensor:

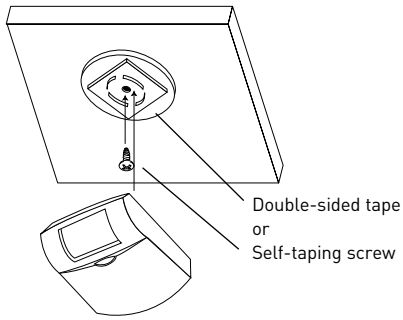
- 9 ft. connector cable
- Supply voltage: 12 VDC
- 30 sec. to 30 min. Time Delay via Trim Pot (30 min. default)
- UL and cUL listed
- Five year warranty

Controls & Mounting

Product Controls



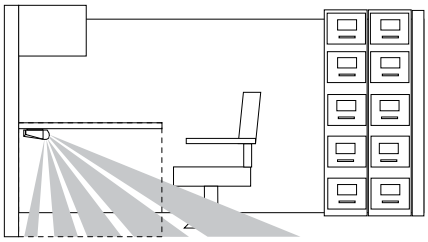
Personal Sensor Mounting



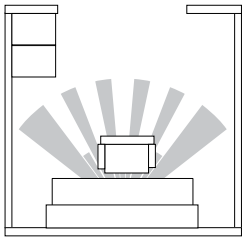
Sensor mounts under desk or binder bin with double-sided tape or self-taping screw

Coverage

Side Coverage Pattern



Overhead Coverage Pattern



Ordering Information

Catalog No.	Description
IDP-3050-A	Eight-outlet power strip with personal sensor
DI-110	Auto-on personal sensor

Products are dark grey

APPENDIX E | KALZIP FAÇADE SYSTEM

Kalzip® FC rainscreen system

Contents

FC rainscreen - simple, flexible and economical

Product and system characteristics

New build and refurbishment

Kalzip FC rainscreen is a non-penetrative façade system that incorporates a fast-to-install lightweight flat rainscreen panel, suitable for both new build and refurbishment projects.

The main feature of the system is its flexibility which allows the installation of the profiles to be carried out in two directions, either from the top down or from the bottom up.

The choice of panel mounting direction one of the unique benefits which enables not only easier and faster installation compared to conventional panel systems but also allows scaffolding or subsequent construction work to be coordinated independently from the installation process. The system's innovative design and technical capabilities also allow individual panels to be removed and installed without compromising the adjoining panels or the overall integrity of the façade system.

The Battenberg comprehensive school before (left) and after (right) renovation
Battenberg (D)

before

after

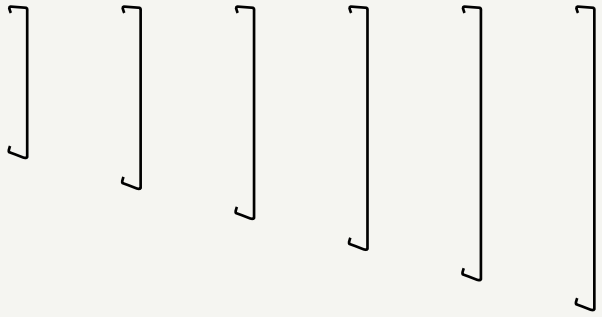
Features and benefits

- Contemporary, visually stunning aesthetics
- Several different standard profile widths provide flexibility and scope for design
- Highly cost-effective through simple and fast installation techniques
- Total flexibility with installation sequence
- Panels are supported by the proprietary modular click rail or mono-click bracket without the need for screws or rivets.
- Planning information and a range of CAD details are available for standard wall build-ups and sub-constructions.
- Optimised panel geometry means low inherent weight and reduced use of materials
- Variable acoustic and thermal insulation options
- A wide range of colour and surface finishes with edge folding as standard
- Fully integrated internal and external corner panels (optional)
- High structural performance
- Creation of fixed point with a specially designed fixed point clamp, which allows panel adjustment after installation.

System options and components

Panel widths

Profile type:	Kalzip FC 30/250	Kalzip FC 30/300	Kalzip FC 30/350	Kalzip FC 30/400	Kalzip FC 30/450	Kalzip FC 30/500
Profile thickness	1.0 mm 1.2 mm	1.0 mm 1.2 mm	1.0 mm 1.2 mm	1.0 mm 1.2 mm	– 1.2 mm	– 1.2 mm
Micro-ribbed	no	no	no	yes	no	no



Profile example

Kalzip FC
with edge return
(supplied as standard)

Kalzip FC
without edge return
(on application)

Transition panels

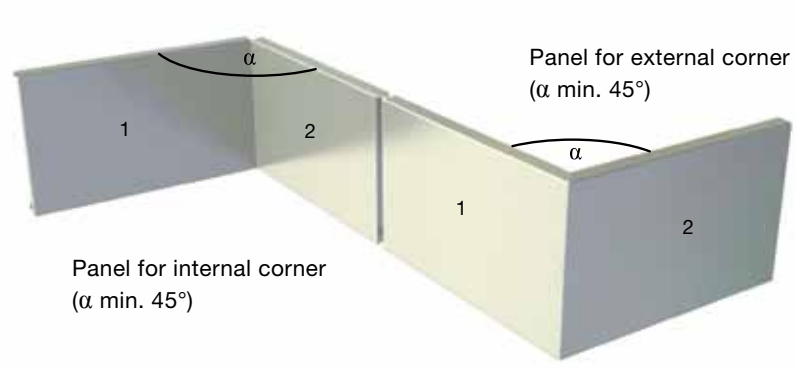
For profile type:	Kalzip FC 30/250	Kalzip FC 30/300	Kalzip FC 30/350	Kalzip FC 30/400	Kalzip FC 30/450	Kalzip FC 30/500
Front face dimension	280 mm	330 mm	380 mm	430 mm	480 mm	530 mm

Transition panels,
upper fold (left)
lower fold (right)

Corner panels

Corner panels can be manufactured as internal and external corners with different angles.

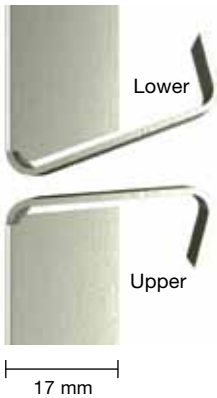
Specification
Leg 1: min. 150 mm/max. 1.000 mm
Leg 2: min. 300 mm/max. 2.000 mm



Edge return

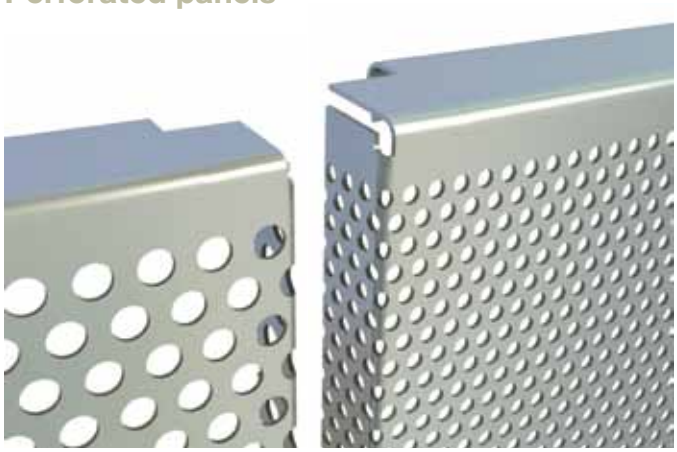
FC panels are supplied as standard with edge returns on both sides without surcharge.

Panels can also be manufactured without edge return on enquiry.



edge return
dimensions

Perforated panels



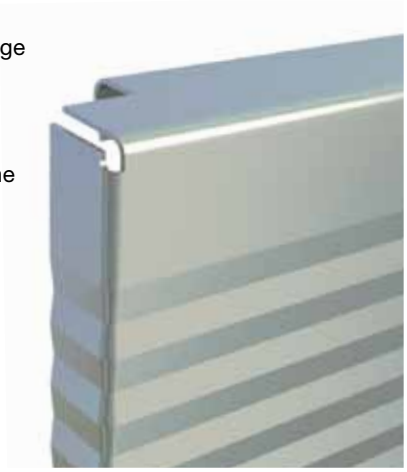
RV 6-8
Hole pattern:
min. 45 % / max. 48 %
depending on panel width
Hole diameter: 6 mm

RV 3-5
Hole pattern:
min. 29 % / max. 31 %
depending on panel width
Hole diameter: 3 mm

Micro-ribbed panel

Kalzip FC 30/400 with edge return and micro-rib

Start of micro-rib:
20 mm from the end of the panel



Technical data

Surfaces

- Four standard colours, others are available on application for material thickness 1.0 mm and 1.2 mm
- Available in polyester and pvdf finishes
- Further RAL, NCS and special colours are available on application

Note: all surfaces are delivered as standard with a protective film.

Materials

EN AW-3004, EN AW-3005 or EN AW-6025

Dimensions

Length: min. 400 mm / max. 6,000 mm
other profile lengths available on request

Load-bearing capacity values

Load-bearing capacity values are based on Eurocode 9 and DIN 18807 in accordance with building authority approval no. Z-14.1-581 issued by the German Institute of Building Technology

Tolerances

Sheet length according to Kalzip works standard

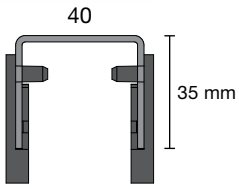
L 0.4 – 4.00 m	+2/-2 mm*
L > 4.00 – 8.00 m	+3/-3 mm*

System options and components

NE modular click rail (non-load bearing)

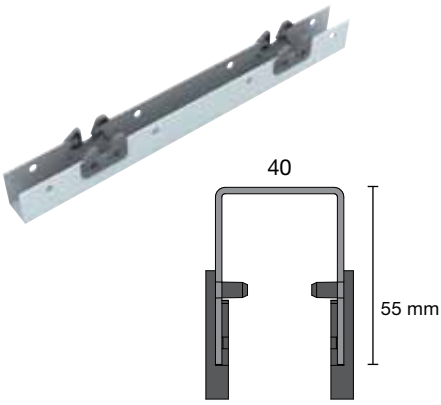
The NE modular click rail is a non-load-bearing rail and must be fixed at every joint position. The geometry corresponds to the mono-click bracket.

Pre-drilled as mono-click bracket below



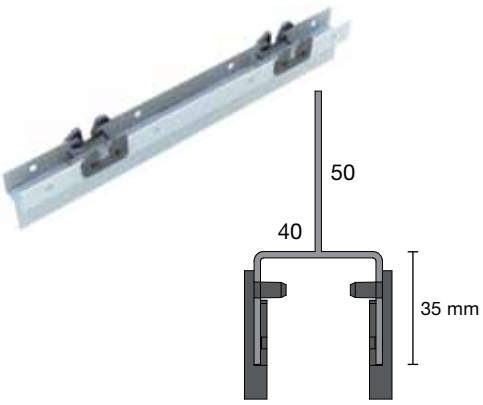
SE modular click rail (load bearing)

The SE modular click rail is a self-supporting rail that can be used as load-bearing profile and can be fastened to a sub-construction independent of the joint position.



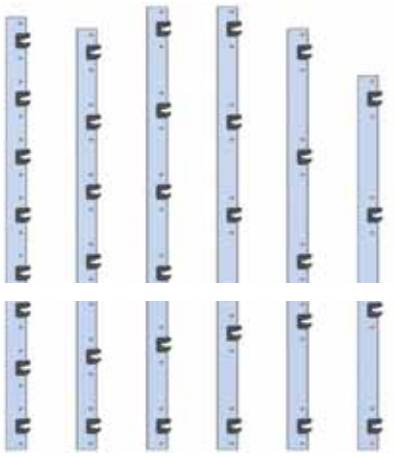
SEL modular click rail (load bearing)

The SEL modular click rail is also a load-bearing rail and can be fastened directly to L wall holders thanks to the 50 mm long web. A further support profile is not necessary.



Standard lengths

Modular click rails (NE, SE, SEL)



Type	250	300	350	400	450	500
Length in mm	2.950	2.900	3.000	3.000	2.900	2.700
Number of hook-in points	12	10	9	8	7	6

Mono-click bracket

The mono-click bracket is used in particular for rainscreen areas with changing panel widths or with complex connection details. It must always be fastened with two screws or rivets.

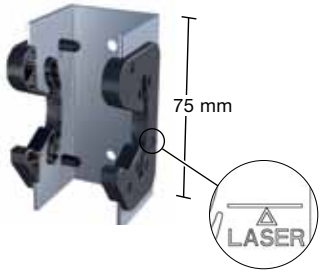
Setting out tool

With the aid of the setting out tool, modular click rails mounted above one another, can be adjusted to fit the installation width of the FC panels with no additional measurement. The tool can be easily adjusted to the panel dimension.

Plastic Inlay

The plastic inlays are provided with a laser line, which ensures the simple and accurate placement of the modular click rails.

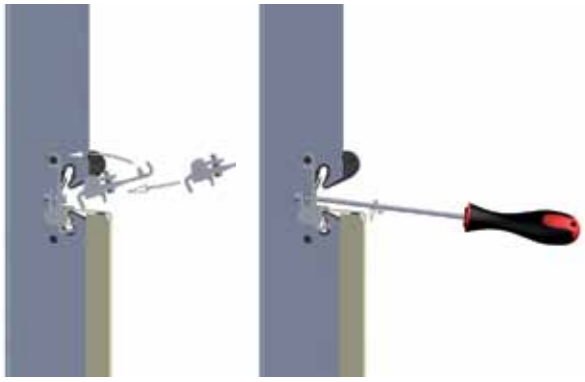
Mono-click bracket with plastic inlay
Length: 75 mm
Drilled hole:
central distance: 50 mm
hole diameter: 5.2 mm



System accessories

Fixed point clamp

In order to guarantee a uniform vertical joint, each FC panel must be fixed in position by a fixed point clamp. After the installation and alignment of the panel, the fixed point clamp can be loosened and fixed again, if necessary through the horizontal panel joint.

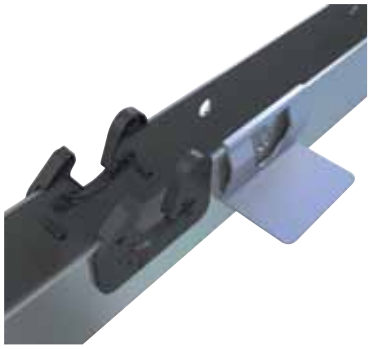


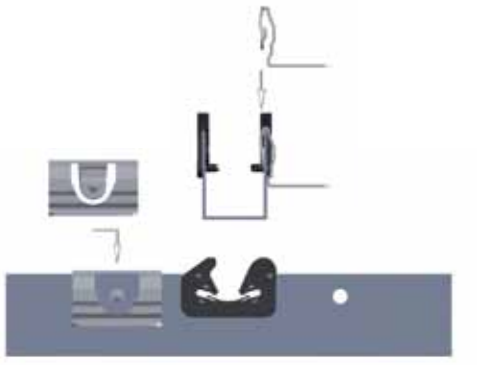
Guidance snapper

The guidance snappers ensure a constant gap between the panels and guarantee a uniform joint. Use of the guidance snapper is necessary for short panels and corner panels. Further information can be found in the installation manual.

Flashing support

The flashing support is snapped into the modular rail, for simple and quick installation of flashings.





Number and arrangement when fastening vertical joint strips: approx 1.5-off per m (offset arrangement)

The system in detail

Kalzip FC rainscreen system

Panels

Delivery options

1 FC panel
2 FC corner panel
3 Micro-rib surface (FC 30/400 only)
4 Perforation Rv 3-5
5 Perforation Rv 6-8
6 FC panel luminaire

System sub-construction

Variants

7 Mono click bracket
8 SEL modular click rail
9 NE modular click rail
10 SE modular click rail

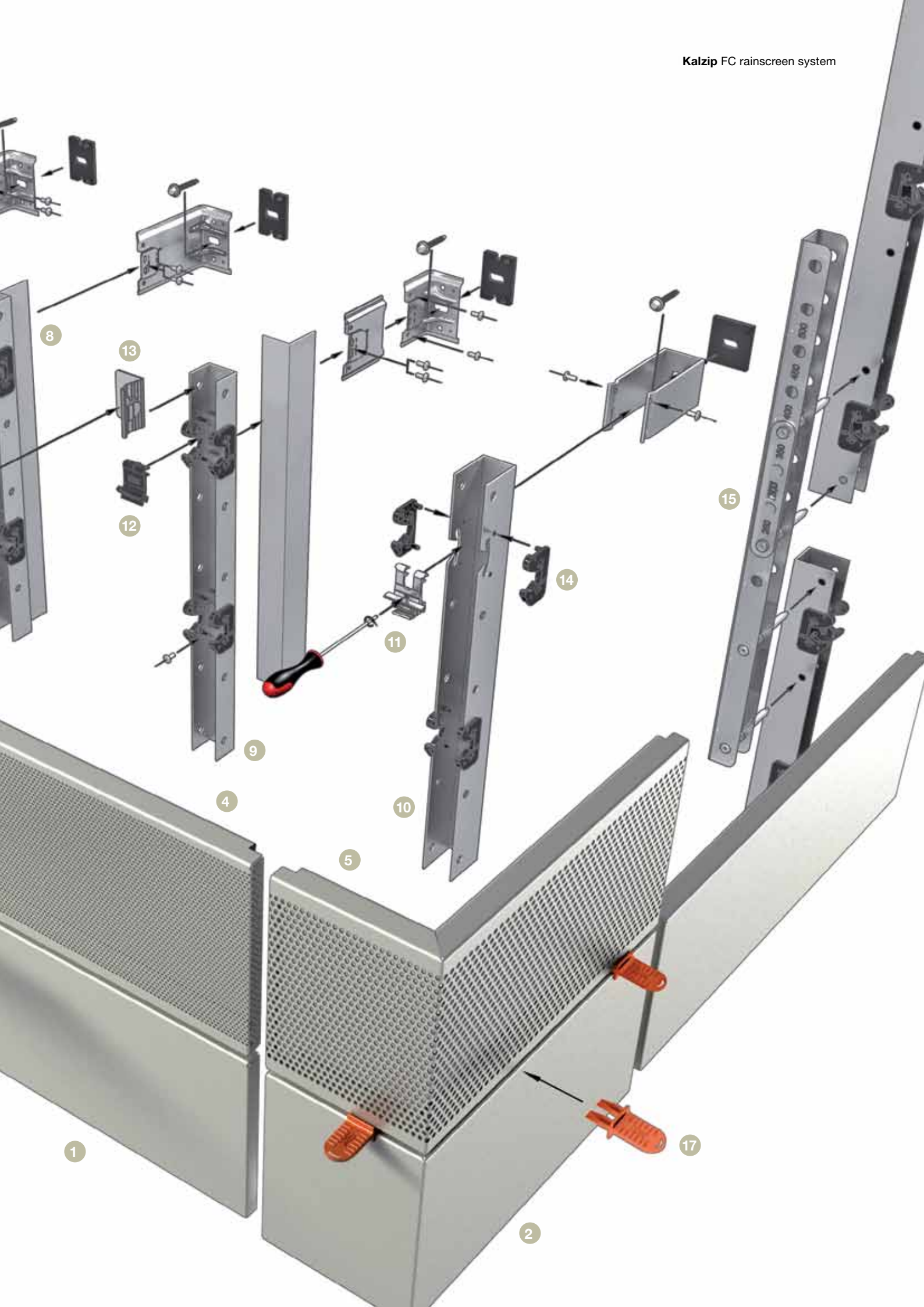
System accessories

Parts and components

11 Fixed point clamp
12 Guidance snapper
13 Flashing support
14 Plastic inlays
15 Setting out tool
16 Panel removal tool
17 Plastic wedges

System depth with mono-click bracket, NE and SEL modular click rail

System depth with SE modular click rail


8
13
12
11
14
15
9
4
10
5
1
17
2

Sub-constructions

1 Mono-click bracket on vertical sub-construction

This version offers high flexibility for variable installation widths and in particular in joint areas (e.g. windows, openings, upper and lower junctions and terminations). The vertical L-rail is fastened with brackets to the support structure. The rail can be supplied pre-punched in a system pattern.

2 NE modular click rail on a vertical sub-construction

The NE modular click rail is fastened to vertical support profiles. Alignment takes place in two steps with this system. A flat plane is created with the support profile; the modular rail then only needs to be adjusted in height. This guarantees correct alignment of the system.

3 SEL modular click rail on individual wall brackets

The SEL modular click rail is a combination of support rail and modular rail. In conjunction with brackets, it can be used directly as a complete sub-construction.
Since this system consists of only two components, it is very economical in terms of both material usage and installation times.

4 SE modular click rail on U wall bracket

This system consists of a supporting modular click rail and U-profile wall brackets. Since this system consists of only two components, it is very economical in terms of both material usage and installation times. However, alignment and adjustment of the rail should be carried out by experienced fitters.

5 SE modular click rail on a horizontal sub-construction

The most suitable construction for use with typical SFS frame systems.

6 SE modular click rail on a structural cassette

The supporting SE modular click rail can also be used on steel cassettes / decks. The rails are spaced according to the load / span of the FC panels and on the other in accordance with the requirements for the steel cassettes / deck. The steel cassettes must be mounted flat. Shims will be required for line and level of the system.

4

5

6

Designing with the FC rainscreen system

Design variants

A Narrow flashing

B Wide flashing

C No flashing

D Overlapping flashing

Detail numbers

The FC rainscreen system can be used in principle with all existing support structures and wall constructions. 10 standard details in 4 different sub-construction variants have been developed for 6 different system solutions as examples.

These are available as pdf or dwg files in the literature section at www.kalzip.com.

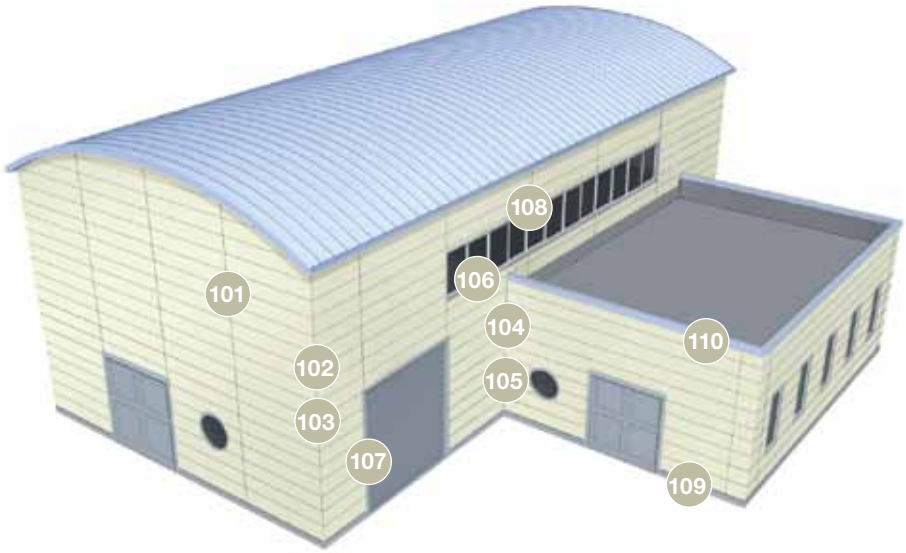
Selection takes place according to the following procedure

1. Selection of the suitable sub-construction (p. 12/13)
2. Selection of the design variant
3. Selection of the required detail

Details

Number	Description
101	Vertical joint
102, 103	External corner 90°
104, 105	Internal corner 90°
106	Window cill

Number	Description
107	Door / window jamb
108	Door / window head
109	Cill
110	Parapet



Bi-directional panel installation

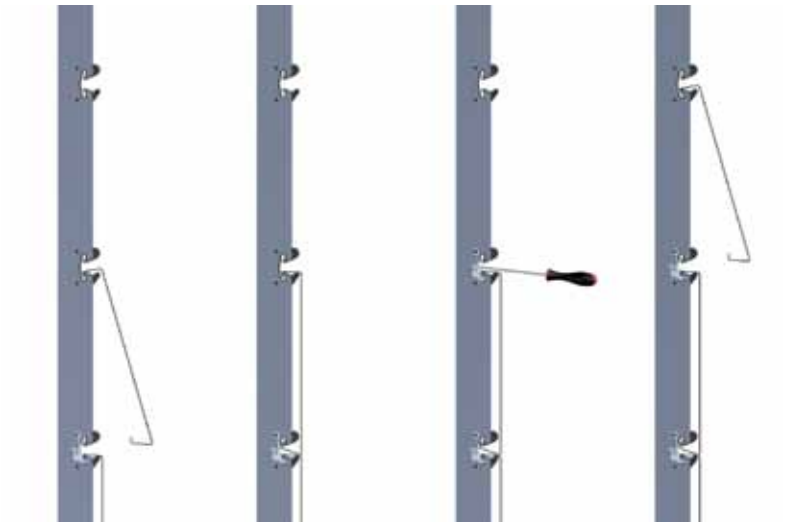
Installation from bottom to top

Step 1 Hook in panel

Step 2 Click in panel

Step 3 Click in fixed point clamp, adjust panel, tighten fixed point clamp.

Step 4 Install next panel

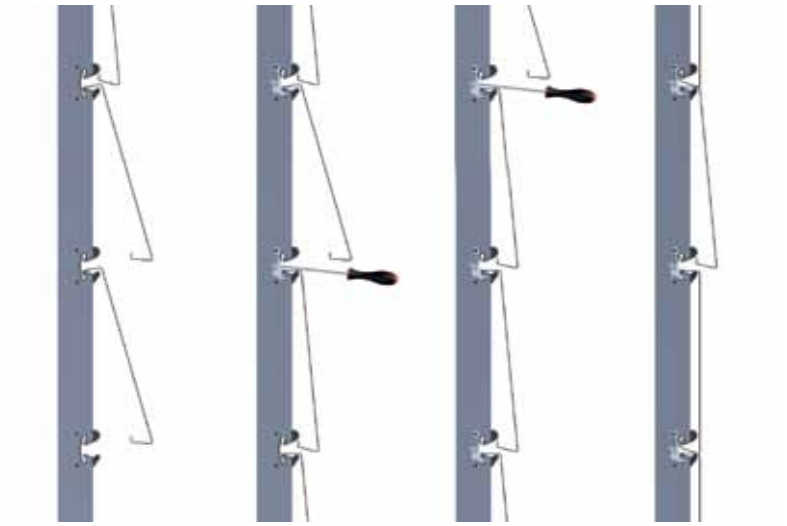


Installation from top to bottom

Step1 Hook in panels

Step 2 and 3 The upper panel must be removed a little from the front in order to install the fixed point clamp.
Click in fixed point clamps, adjust panels, tighten fixed point clamps

Step 4 Click in panels



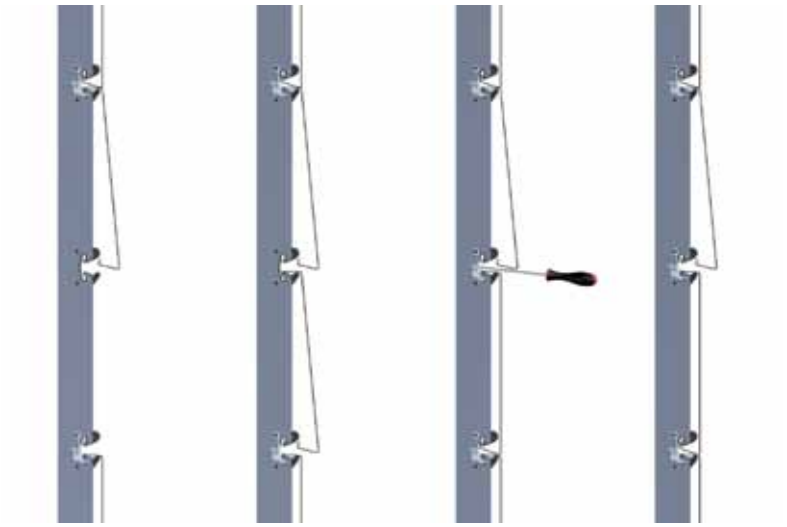
In the middle of the area

Step 1 Unhook the panel above the panel to be installed.

Step 2 Hook in panel

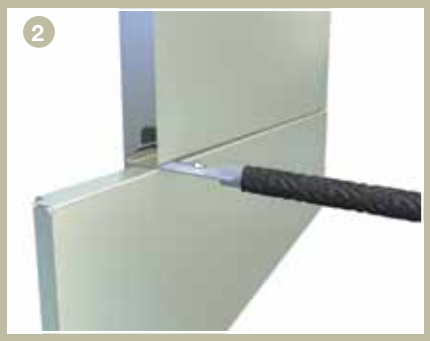
Step 3 Click in fixed point clamp, adjust panel, tighten fixed point clamp.

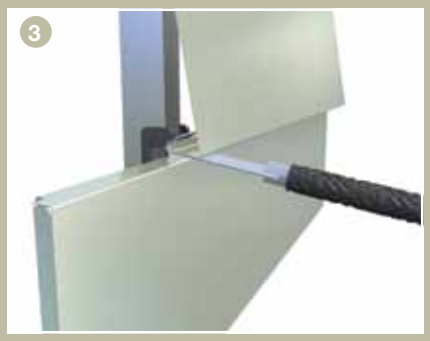
Step 4 Click in panel



Panel removal

In case of damage, the FC rainscreen allows the replacement of individual panels without having to dismantle the entire façade. A panel can be removed quickly and simply using the specially developed tools from the Kalzip FC tool kit. The panel removal tool is inserted into the joint, pushed up to the first modular rail and the panel is then levered out. This process is repeated on each rail. More detailed information can be found in the FC installation manual.





Summary of system benefits

1 Innovative click system

With the FC rainscreen system the alignment of the rainscreen takes place within the sub-construction. The rainscreen panels then only need to be hooked and clicked in, and their position secured with the fixed point clamp.

2 Variable installation

In areas where the FC panels cannot be installed directly due to scaffolding, missing panels or other reasons, these can be installed later with no additional expenditure. Building progress is not hindered and additional costs due to longer scaffolding times are avoided.

3 Easy to install

If the vertical joint pattern does not meet the requirements of the building owner or the architect after completion of the work, the panels can be subsequently adjusted (through the joint).

4 Flexible system

Different panel widths, special edged panels or special joint panels can be integrated into the system and require no separate sub-constructions or fasteners. This makes the FC rainscreen system particularly flexible for planners and contractors.

5 Simple to dismantle

A special feature is the option to remove and reinstall individual FC panels without damage and without having to dismantle the entire rainscreen area. This also allows elements to be integrated that have to be serviced from time to time.

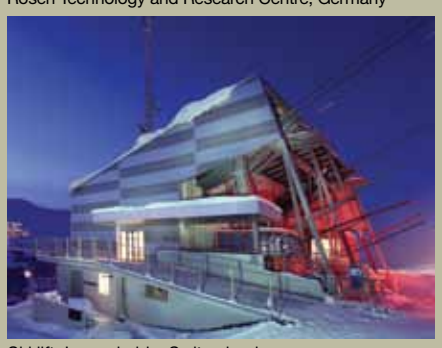
Kalzip FC rainscreen system international projects

The following is a snapshot of the Kalzip FC rainscreen system from around the world. Visit our on-line gallery at www.kalzip.com to view further examples of inspiring metal architecture.

Rathfriland Fire Station, Northern Ireland


Rosen Technology and Research Centre, Germany


Spirit of Spice, Germany


Ski lift, Lenzerheide, Switzerland


VESPE, Germany

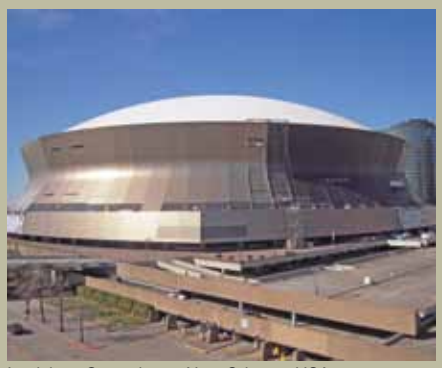
Rekord Fenster, Austria

Vocational School, Germany

Heinrich Meier GmbH Mühlacker, Germany

Lanxess Bitterfeld, Germany

Comprehensive School Battenberg, Germany



Louisiana Superdome, New Orleans, USA

Helmholtz-Institut, Germany

Einkaufszentrum, Germany

www.kalzip.com

Kalzip Ltd
Haydock Lane
Haydock
St Helens
Merseyside WA11 9TY
T: +44 (0) 1942 295500
F: +44 (0) 1942 295508
E: enquiries.uk@kalzip.com

English

Kalzip

Kalzip FC Façade System – Typical NBS Format Specification Clauses

Technical Information

TIS-NBS-FC-373
19 August 2010 – Issue 1

NBS Specification Clauses – Kalzip FC Façade System

Introduction

This technical information sheet gives NBS format specification clauses for a typical Kalzip FC Façade Rainscreen Cladding System.
The specification clauses are based upon **NBS section H92 – *Rainscreen Cladding.***

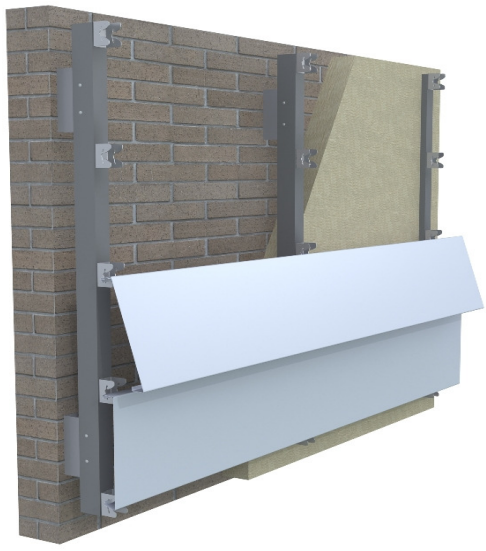
The specification clauses shown are based on the following build up:

- Aluminium Façade Panel
- Modular Click Rail /Bracket within Air Cavity
- Support System
- Thermal Insulation Layer
- Thermal Break
- Internal Leaf

Other variations would require the clauses to be amended accordingly

Note:
NBS format specification clauses can be tailored to suit individual projects and performance requirements. Please consult the relevant Kalzip Regional Sales Manager.

Modular Click Rail /Bracket; are secured vertically and fixed to a suitable substructure as per project specific requirements. The Horizontal Support Rail is fixed to these vertical angles with stainless steel rivets. A range of fittings and accessories are available, which enable the construction of complimentary window reveal, head and cill details. Corners can be formed with metal profiles.



H92 RAIN-SCREEN CLADDING/COVERING

To be read with Preliminaries/General conditions

TYPES OF CLADDING/COVERING SYSTEM

120 Rainscreen Cladding

- Manufacturer: Kalzip Ltd
  Haydock Lane
  Haydock
  St Helens
  Merseyside
  WA11 9TY
- Telephone: 01942 295500
  Fax: 01942 295508
- Product reference: Kalzip FC Façade System
- Panel Length: minimum 1,500 mm; maximum 10,000 mm
- Panel Thickness: *0.8 mm* (250 mm high); or
  1.0 mm (250 mm, 300 mm, 350 mm, 400 mm, or 450 mm high); or
  1.2 mm (250 mm, 300 mm, 350 mm, 400 mm, 450mm, or 500mm high)
- Panel Edge Return: Folded
- Panel Profile Depth: 30 mm
- Panel Material: *Stucco Embossed Aluminium EN AW 6025 (AlMg2.5SiMnCu)*; or
  Painted Aluminium EN AW 3004 (AlMn1Mg1); or
  Painted Aluminium EN AW 3005 (AlMn1Mg0.5)
- Panel Finish: *Non-Perforated*; or
  Perforated; or
  Micro-Ribbed
- Panel Colour: Project specific
- Panel Joint: Open
- Protective Film: Remove corner of protective film before installation of each panel.
  Remove protective film within three weeks of installation

• Panel Fixing:	Clipped to: *Vertical Structurally Effective Modular Click Rail*; or *Vertical Structurally Non-Effective Modular Click Rail*; or *Mono-Click Bracket*
• *Click Rail/ Mono-Click Bracket Material:*	Aluminium with Plastic Insert
• *Click Rail/Mono-Click Bracket Thickness*	1.5 - 2.0 mm
• *Click Rail/Mono-* • *Click Bracket Width*	40 mm
• *Click Rail/*Mono-Click Bracket Depth	*35.2 mm* (Structurally Non-Effective); or *55.2 mm* (Structurally Effective); or *35.2 mm* (Mono-Click Bracket)
• Click Rail Height:	*2930 mm* (250 mm Panel Height); or *2880 mm* (300 mm, 450 mm Panel Height); or *2980 mm* (400 mm Panel Height); or *2680 mm* (500 mm Panel Height)
• Air Gap:	Not less than 38 mm, as CWCT requirements for labyrinth jointed rainscreen systems. This 38 mm to be measured from the rear face of the Kalzip FC Façade panel
• Breather Paper:	TBC
• Insulation:	Depth to suit Building Regulations
• VCL:	TBC
• Support System:	*U-Section Wall Bracket*; or *Proprietary Adjustable Aluminium Sub-construction*; or *Horizontal Sub-construction*
• Accessories:	As per Kalzip Ltd's standard details and recommendations
• Internal Wall:	Design by others