

Summary Book

Architecture, Lighting, Electrical, Acoustics



Smeal College of Business Building University Park, PA

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Lighting/Electrical Option

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INTRODUCTION

At 210,000 ft², the Smeal College of Business Building is currently the largest academic building at the Pennsylvania State University. More commonly referred to on campus as simply the Business Building, it is a research and educational facility designed to bring the Pennsylvania State University's undergraduate and graduate business programs together under one roof.

The building is divided into two main sections that are connected by a foyer and an atrium. The larger wing makes up the building's north area and is dedicated to the undergraduate program, while the smaller wing to the building's south is dedicated to the MBA program and also contains the Blue Chip Bistro Café. In addition to the usual classrooms and offices typical of a post-secondary education building, some notable spaces include video-conferencing facilities, interview rooms, study rooms, various research laboratories, common areas for each of the two programs, an auditorium, and the Smeal Trading Room.

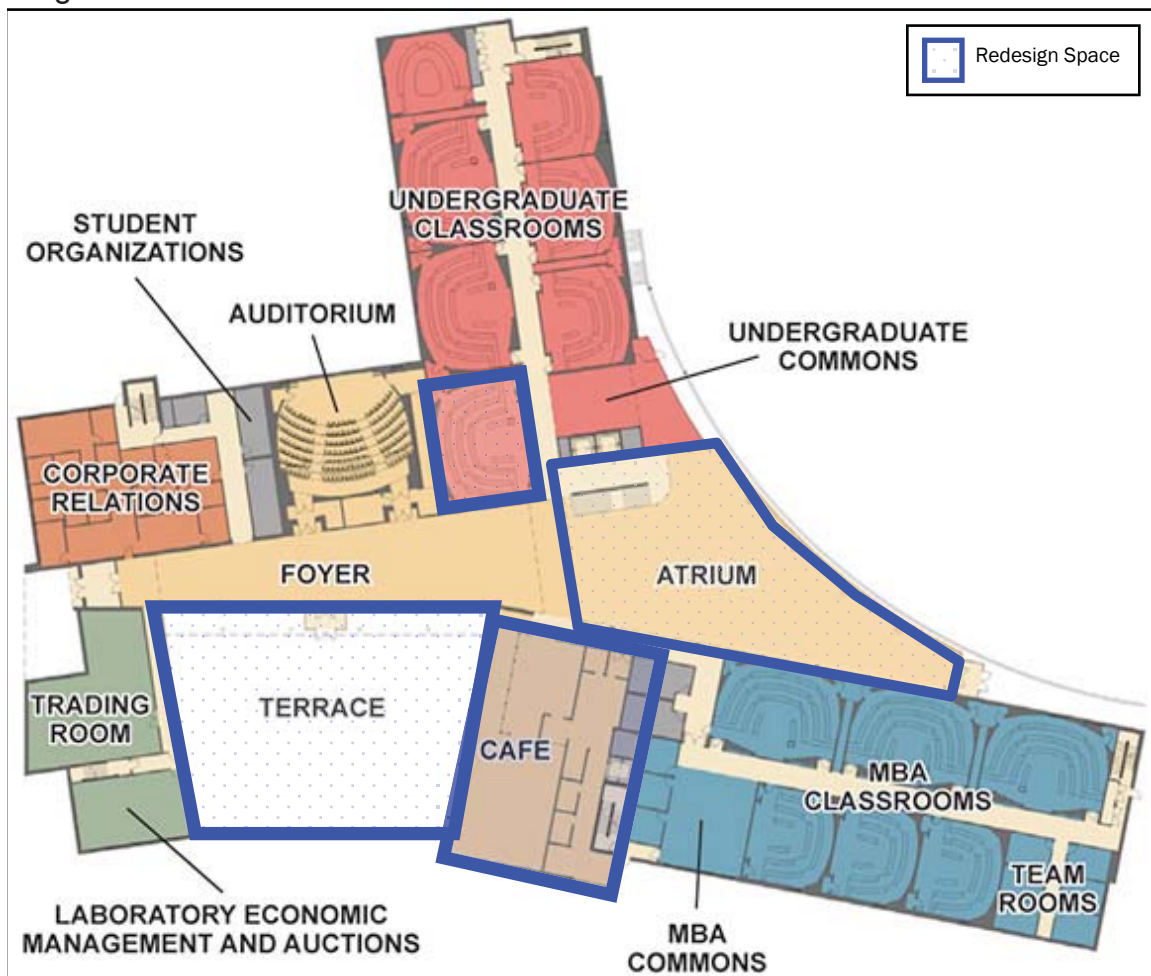


Figure 0.1 – Basic plan view of first floor with thesis spaces highlighted in blue.

GENERAL ASSUMPTIONS

A building that is to become part of a larger campus, such as the Business Building, must often follow a larger set of predetermined design guidelines for either or both the interior and exterior designs in order to ensure the building will fit into and complement the overall campus design. However, for both simplicity purposes and also to allow for greater design opportunities, the work presented in this report does not consider Penn State's University Park campus Master Plan.

Also, the following new designs will require some of the other trades to be redesigned as well however, this report will only focus on the electrical and lighting systems; changes to the mechanical, structural, acoustical, and other affected trades were taken into consideration, but specifics of those areas are beyond the scope of this project.

ARCHITECTURE BREADTH DESIGN CONCEPT

Prior to the construction of the Business Building, both undergraduate and graduate business classes were scattered across campus as Penn State's business department did not have a dedicated building of its own. The primary purpose of this building was to unite the two programs under one roof and finally give the entire department a home of its own. Therefore, the common foundation of my designs for all spaces was this concept of connection and unity. Specifics are outlined as follows:

SPACE	GOAL	HOW ACHIEVED
Atrium	Emphasize atrium as the key element that connects the undergraduate and graduate wings to form a single structure.	Recessed downlights in the ceiling laid out in a grid-like pattern that follows the placement of the columns and the curve of the north curtain wall to highlight the atrium's own set of axes, thereby giving it its own identity.
Classroom	Minimize visual clutter on ceiling.	Implement Armstrong's TechZone ceiling system to help organize equipment in the ceiling.
Café	Brighten up space.	Open up the ceiling in dining area with painted white GWB ceiling.

Terrace	Open up more to rest of campus; create conceptual connection back to campus using tree imagery.	Change brick wall “barricades” at the ground level to the more airy guardrail used at the upper level of the terrace; upright columns and overhangs at entrance (alludes to tree trunks and canopies).
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Figure A.1 – Design Goals Summary

ATRIUM EXISTING

The atrium is a large triangular space open to all levels of the building above grade. The lower level is connected to the rest by the central staircase, which provides access to all the other levels as well. The atrium is situated between the undergraduate and graduate wings as its primary function is to serve as a means of circulation, but the ample seating provided next to the main window transforms the

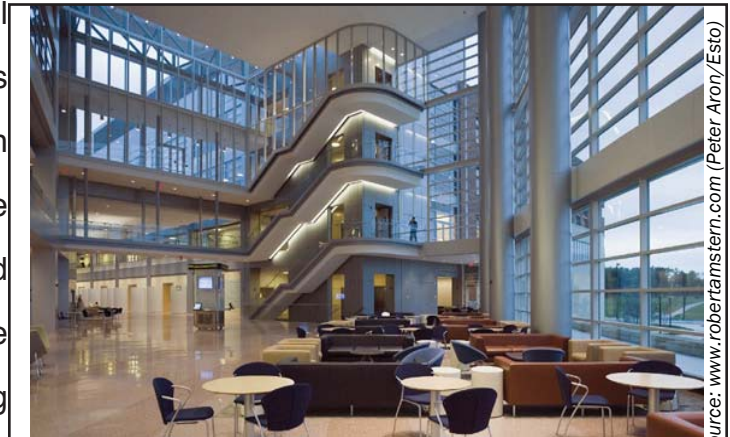


Figure A.2 – Atrium, facing west

atrium into a gathering space as well. Vast amounts of glazing connect occupants to the outdoors, and the openness to all levels links each level to both each other and to the rest of the building.

The intent of the design was to architecturally encompass Smeal’s values of openness, transparency, and community. The atrium is arguably the heart of the Business Building for several reasons, one being the way the various attributes of the atrium synergistically represents those values. For instance,



Figure A.3 – Atrium, facing northeast

the value of “transparency” is shown, not only literally through the clearness of the glazing, but also figuratively in that these horizontal and vertical connections among spaces are not one-sided (i.e., the windows do not just provide a view to the outdoors, but also allow passersby on the outside to look in). Furthermore, the network of these connections also reinforces the value of

The three sides of the atrium form an isosceles triangle with the 120 ft long glazed side acting as the triangle’s base. The other two sides measure about 135 ft long each, bringing the total area of the atrium to roughly 8,100 sq ft. Most of the glazing in the atrium faces true north but additional glazing is also present facing true west at the upper stories. The large, true-north-facing windows are supported by mullions, beams, and six large columns. An assortment of sofas, chairs, and tables are provided along the length of this window, from where students can look out towards Park Avenue unto the Meadow and the new School of Forest Resources building. With the exception of this furniture, the rest of the interior finishes are light in color. An additional feature of the atrium is a digital kiosk, which stands on the middle of the atrium floor by the staircase.

REDESIGN

In order to show that two or more items have been brought together, some of those original items’ individual qualities must still be observable. The first floor plan (see Figure 1.1) clearly shows that the undergraduate and graduate wings of the Business Building lay on their own respective set of axes, but the atrium lays on that of neither, nor is it clear whether or not it actually has a set of its own. The



Figure A.4 – RGB Rendering of Atrium Showing Recessed Downlight Pattern

atrium's ceiling is cut out at its east, west, and south edges, but the east edge does not lead to a skylight

so I restored this section so that the ceiling met the wall.

6" round downlights were then arranged across the ceiling to follow the curve of the atrium's north-facing aluminum and glass curtain wall and spread out into the building according to the spacing of the six columns by the glass (see Figure 1.3 above). This arrangement created a more direct way of drawing attention to the atrium's own set of axes, helping to showcase the atrium as an entity in and of itself. Restoring the ceiling's east edge allowed the downlights to appear to run through the graduate wing, which helps to further emphasize the atrium's existence.

CLASSROOM EXISTING

The Business Building classrooms are located on the lower and first floors of both the undergraduate and graduate wings. They come in three different sizes, but the styles and arrangements of the rooms are generally similar to each other, the only variations being those that are necessary to fit to its respective rooms' dimensions. The spaces are typically used for lectures and can accommodate thirty, forty-five,



Figure A.5 – Typical Classroom

or sixty students, depending on the size of the room. The largest of the three is about 30 ft wide from the front of the classroom to the farthest point in the back, and is about 44 ft long from one side wall to the other.

Geometrically, the room is rectangular at the front with an elliptical curve at the back, and the ceiling is flat except in the area above the highest tier where it steps down (see figure 2.1). The seating arrangement is unusual but designed to provide students with a good view of different areas of the room, such as the lecturer, the chalkboards, and each other. This is accomplished by arranging the seats in semi-circular rows that are raised on tiers. The tiers can be accessed from either end of the semi-circle at the sides of the room, but the otherwise continuous seating also breaks in two places to provide additional and

easier accesses to the seats in the middle area. The two breakpoints respectively occur along an axis from the center of the podium at the front of the room, to where the far corners would be at the back of the room if the room were perfectly rectangular.

REDESIGN

Unlike the other three spaces, the classroom is primarily a workspace so a different approach was taken to design this area. A variety of equipment needed to be installed in the ceiling, including luminaires, diffusers, speakers, and telecommunication devices, so it was very easy for the ceiling to get a cluttered and unorganized appearance (see Figure 2.1). Armstrong's TechZone ceiling system minimizes the clutter by partitioning the ceiling into "zones" for technical equipment hence its name, which as a result helps to create a much cleaner looking ceiling without compromising the space's technical system needs. Armstrong also carries what they call i-ceilings, which are special ceiling panels that integrate other technical equipment into the ceiling panels such as a wireless internet router and sound systems. Therefore, while this report only presents a detailed TechZone system for lighting, it does have the ability to integrate the other three systems (e.g., mechanical, audio, internet) the classroom needs to maintain its existing functions.

After testing various ceiling modules and lighting layout configurations, the 4' x 4' TechZone module proved to have the best fit for optimal lighting of the desk areas. In order to fit the ceiling system, I removed the drop ceiling above the last seating tier to even the ceiling plane across the room, and also removed the wall perimeter lighting cavity at the sides. Please see the Lighting Depth for a drawing and more information about the ceiling.

CAFÉ EXISTING

Though the Business Building is an academic and research facility, various spaces attempt to simulate a realistic "business world" -like atmosphere. The café, located on the south side of the first floor, is one such space as it was designed to have a more upscale feel to it relative to the other cafés on campus. The whole café area in general is rectangular and the layout of the individual spaces is very geometric as well (see figure 3.1). The private kitchen in the southeast corner takes up about a quarter of the

space, however, I have chosen to concentrate on the public spaces only (total of about 2,600 sq ft).

The entire length of the west wall is glazed, which allows daylight to penetrate into the 1,870 sq ft dining area. A set of doors at the middle of this wall lead into the terrace and are left open when the weather is warm. The other entrance, the main entrance, is accessed from the foyer and also leads patrons into the dining area, which can seat over one hundred people. This high seating capacity allows the space to be used for occasional special functions in addition to fulfilling the usual seating needs of a café. Since this café, however, is in an academic building, visual tasks for lighting consideration would not only involve eating but also various aspects of studying as well. These aspects may include reading and writing small print in both pencil and ink. Public wireless internet access is available in the dining area so computer use, particularly that of laptops, should also be taken into consideration.

The food service area, the Blue Chip Bistro, and the coffee bar, Peet's Coffee Bar, are located in separate areas of the café. The bistro is roughly 20 ft wide by 80 ft long (565 sq ft) and operates Monday through Friday from 11:00 AM to 3:00 PM. An assortment of lunch foods, including gourmet pizzas, soups, sandwiches, and even sushi, are displayed in clear cases or on countertops.

The 140 sq ft coffee bar (20 ft wide by 8 ft long) serves coffees, teas, baked goods, and desserts, and is open Monday through Thursday from 7:30 AM to 4:00 PM and on Fridays from 7:30 AM to 3:00 PM. Food and bottled drinks are displayed as shown in figure 3.4, while hot drinks are prepared behind the counter.

REDESIGN

The acoustical wood paneling in the cafe causes the ceiling to look dark and the space to look smaller. In the redesign, the gypsum wallboard of the rest of the ceiling in the cafe was extended to the dining area as well to create a brighter and higher looking ceiling. This will also help the ceiling to look less cluttered with recessed downlights than it would have with the perforations of the wood. However, removing the perforated acoustical wood paneling would change the acoustical properties of the cafe and may need to be examined to ensure the new ceiling design will not create major issues. Acoustics issues are addressed in the Acoustics Breadth portion of this report.

TERRACE EXISTING

Visitors wishing to enter the building through its south entrance are first greeted by the terrace. It functions predominantly as a circulation space, but plant islands, trees, and benches in the area also give it an inviting feeling, helping the terrace to serve as a gathering space as well where students can meet each other or relax in between classes. The primary task that should be taken into account for lighting purposes is general circulation. Reading will occur in the space as well, but in this case it does not need to be considered as a critical task since this is an outdoor space in which the electric lighting would only occur after-hours.

The terrace is shaped like a trapezoid with the shorter of the two parallel sides open to the main part of campus. This “open” end is about 90 ft long and the other side, the northern edge formed by the foyer about 81 ft away, is 115 ft long. The eastern edge of the terrace is formed by a portion of the undergraduate wing and is almost 80 ft long, and the western edge is formed by the café in the graduate wing and is about 86 ft long.

REDESIGN

The terrace is currently sectioned off from the rest of the campus by brick walls. This “enclosing” idea helps to generate the feel of the terrace as actually being an individual space and also helps to form its geometry, but brick walls give the idea of permanent separation, of impenetrability, etc. Therefore, another way of attempting to open up the Business Building to the rest of the campus will be through the redesign of this separation wall. This was achieved in conjunction with the lighting redesign by creating railings in place of the brick walls. These railings still help to define the geometry of the terrace by keeping it outlined, but also keeps the space open at the same time since the railings are light relative to the massiveness of brick walls. These railings also provide an opportunity for enhanced lighting, which help to open up the terrace even further by allowing the lighting design to provide higher illuminance levels.



Figure A.6 – RGB raytraced rendering of terrace with new railings and redesigned lighting

LIGHTING DEPTH OVERALL DESIGN GOALS

- Unobtrusive luminaires; minimize visibility.
- Resonate with and highlight architecture and architectural concepts.

ATRIUM DESIGN CRITERIA AND GOALS

The IESNA Lighting Handbook recommendations for office lobbies, lounges, and reception areas are a horizontal illuminance of 5 fc (category C) and a vertical illuminance of 3 fc (category A). These and IESNA's other design issue recommendations will work well for this space from a general perspective, but due to the large amounts of glazing in this particular atrium, it will be possible and beneficial to reduce the total electric light contribution and use the available daylight to help achieve the desired illuminance levels instead, lowering the overall energy use. However, sufficient lighting is also needed when there is no daylight available as the space is accessible at night as well. The vertical illuminance levels are not necessarily as important during off-hours when there are fewer people around, but the minimum levels recommended for circulation spaces, 3 fc, should still be available at the horizontal plane (the floor) for safety.

The atrium also functions as a lobby so aesthetic design issues are important to keep in mind as well, such as the Appearance of Space and Luminaires, Direct Glare, Point(s) of Interest, and Sparkle/Desirable Reflected Highlights. This design will attempt to minimize the visibility of the luminaires while using the elements that are visible to create points of interest and sparkle. A number of offices are open to the atrium at its east-wall, so another goal was to avoid creating direct glare in those spaces.

SPACE PROPERTIES GENERAL

ITEM	MATERIAL/FINISH	ρ / τ
Floor	Vinyl Tile, dark brownish red	0.20
Ceiling	Painted GWB, white	0.85
Walls	Wood, natural maple	0.57
	Aluminum	0.48
Glazing*	<i>See below for more information</i>	0.70

*Includes curtain walls, interior windows, stair guardrails, and etched glass wall.

Table B.1 – General Atrium Space Surface Reflectances

FURNITURE AND OTHER ELEMENTS

ITEM	MATERIAL/FINISH	ρ
Seating		
Sofas	Fabric, multicolors	0.25
Chairs	Plastic, blue	0.25
Tables		
Round Tables	Wood	0.75
End Tables	Plastic, white	0.80
Table Lamps*		
Body/Base	Metal	0.60
Shade	Plastic, orange	0.55

*Table lamps were treated as furniture elements related to the interior design, not as luminaires; any potential light contributions were ignored.

Table B.2 – Atrium Furniture Reflectances

GLAZING

The performance characteristics for all glazing were based on Viracon’s VE1-2m product and are specified as follows:

U-Value	Shading Coefficient	SHGC ^a	τ ^b
0.29	0.43	0.37	0.70

^a Solar Heat Gain Coefficient

^b Visual Transmittance

Table B.3 – Typical Glazing Properties

- **Type IN:** nominal 1” thick insulated vision sealed unit
 - Minimum ¼” clear exterior lite, low emissive coating on surface #2 heat strengthened or tempered where required by code
 - ½” air space
 - ¼” clear interior lite, heat strengthened tempered as by code
- **Type SP:** Type IN for spandrel applications
 - Minimum ¼” clear exterior lite, low emissive coating on surface #2 heat strengthened or tempered where required by code
 - ½” air space
 - ¼” clear interior lite, heat strengthened tempered as by code

- **Type SG:** nominal 1-1/8" thick insulated vision sealed unit

- Minimum 1/4" clear exterior lite, low emissive coating on surface #2, tempered
- 1/4" air space
- Minimum 3/8" laminated, heat-strengthened, clear, interior lite, consisting of minimum 3/16" clear glass, 0.060" PVB interlayer, minimum 3/16" clear lite

LIGHTING DESIGN PLAN

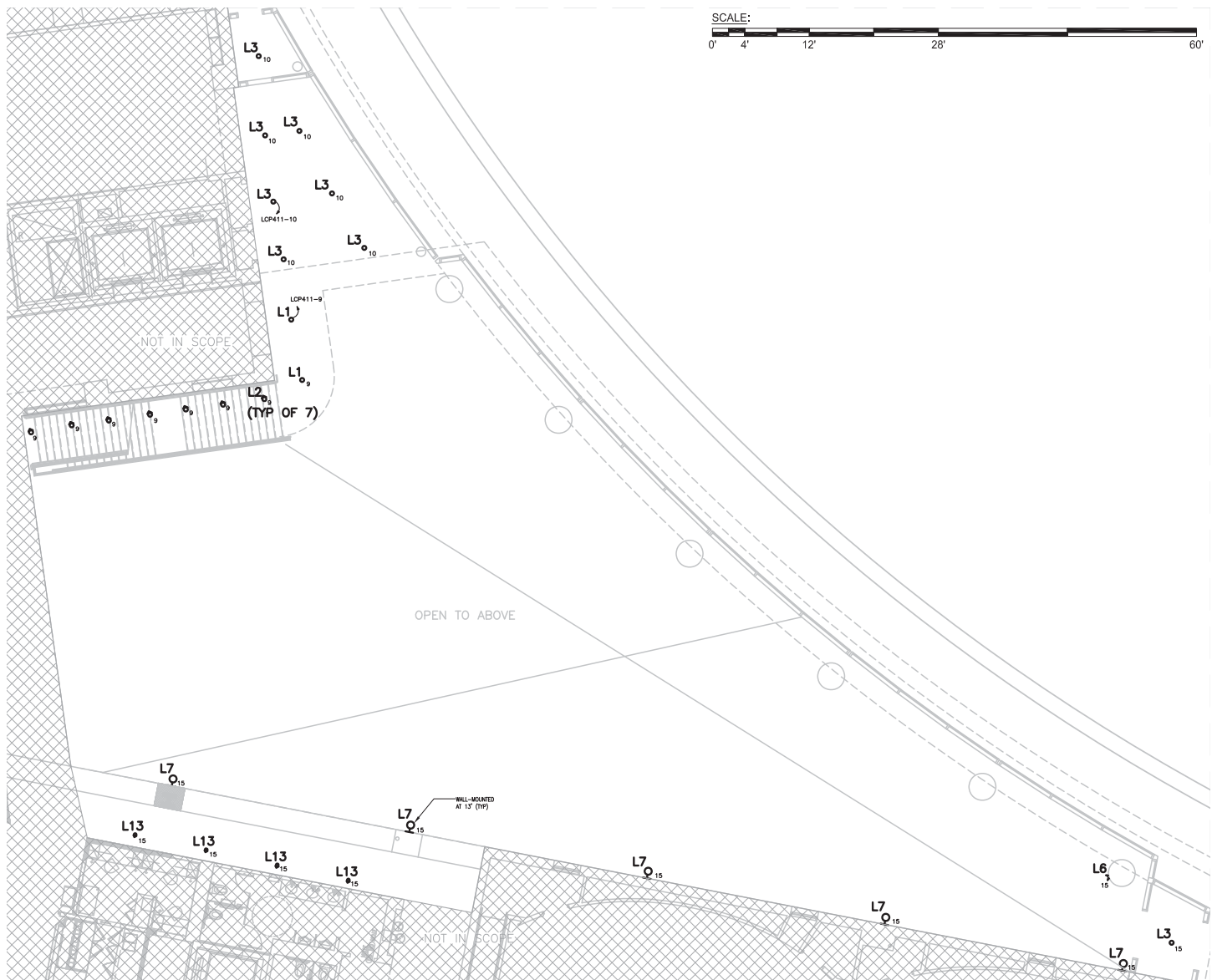
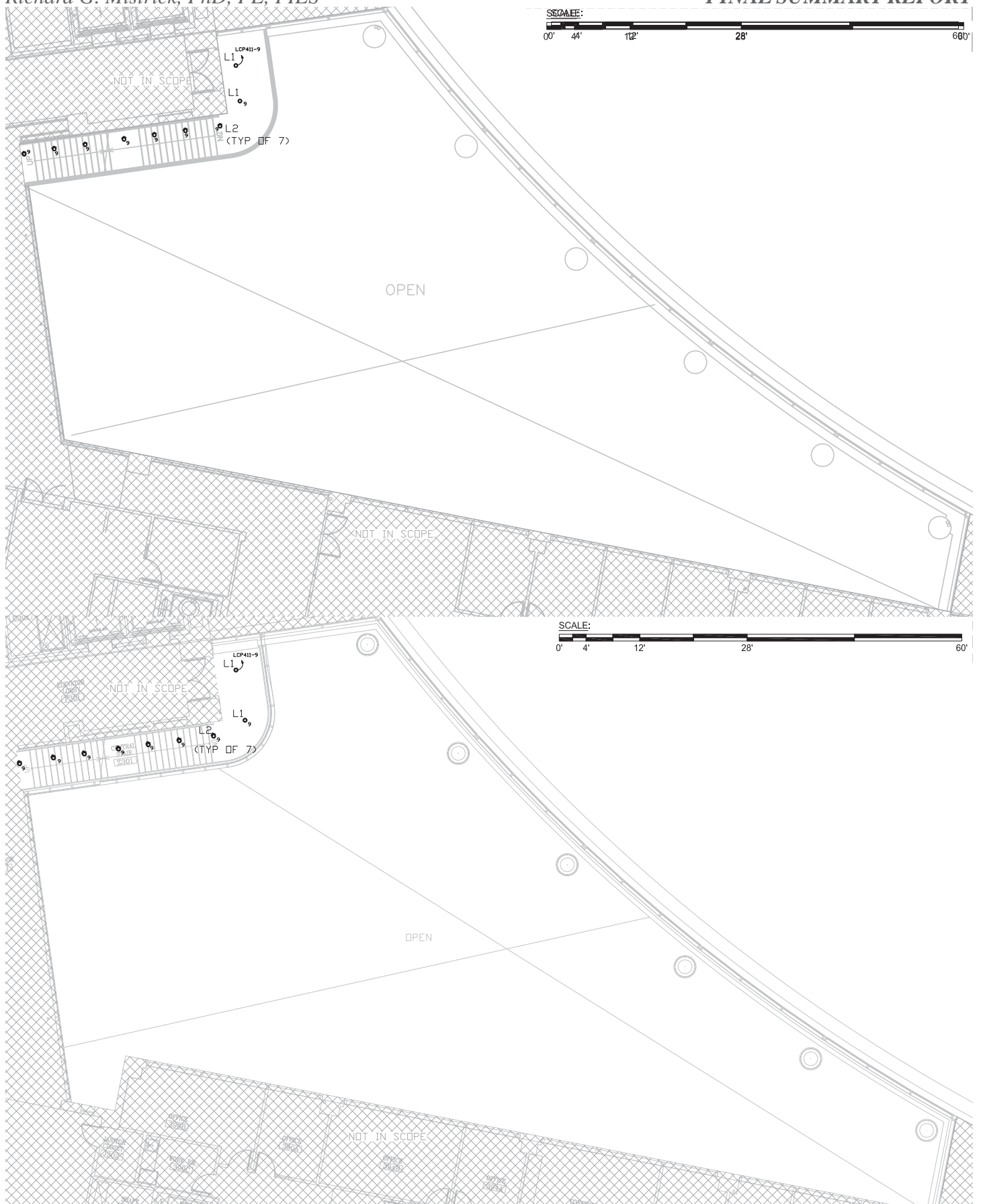


Figure B.4 – Atrium Lighting Plan, 1st Level



Top to Bottom, Figures B.5, B.6 – Atrium lighting plans, 2nd and 3rd levels respectively



Figure B.7 – Atrium lighting plan, 4th level

HARDWARE

Round apertures were chosen to contrast the rest of the building, which is mostly rectilinear, and is repeated throughout the rest of the space to maintain consistency. The lighting design of the atrium is dominated by perimeter lighting; PAR38 metal halide accent lights punch light down along the curved north-facing glazed wall, and wallwashers of the same lamp are found along the other walls of the atrium. Compact fluorescent downlights are used in the areas of the atrium that are not open to all four levels (e.g., the suspended bridge), and a linear cold cathode fixture in a custom aluminum enclosure highlights and illuminates the central staircase. The decorative fixtures in this space include a slim and continuous linear fluorescent fixture used to light a clear etched-glass wall, and incandescent table lamps with slim metal bodies and orange shades that complement the furniture in the lounging area, which can also be manually switched on or off directly by the user.

TYPE	DESCRIPTION	MFR/CATALOG #	LAMPING	VOLTS	LOCATION
L1	Recessed 6" aperture CFL downlight with painted white baffle and integral electronic ballast.	Prescolite #CFQ613EB-STF-602WB	1 Philips: PL-C 13W/835/4P/ALTO	277	Atrium
L2	Recessed 6" aperture CFL wallwasher with integral electronic ballast; use sloped ceiling adapter where applicable.	Prescolite #CFQ613EB-STF-602WW Accessory: SCA6D	1 Philips: PL-C 13W/835/4P/ALTO	277	Atrium staircase
L3	Recessed 6" aperture CFL downlight with painted white reflector and integral electronic multi-watt ballast.	Prescolite #CFT642HEB-STF-602HWC	1 Philips: PL-T 42W/835/4P/ALTO	277	Atrium
L4	Recessed 6" aperture ED17 ceramic metal halide downlight with painted white reflector and integral magnetic dual tap ballast.	Zumtobel #S4D6330-6330R-C-W	1 Philips: ED17P MHC50/U/MP/4K ALTO	277	Atrium open area
L5	Recessed 6" aperture ED17 ceramic metal halide wallwasher with painted white reflector and integral magnetic dual tap ballast.	Zumtobel #S4D6330-6330W-C-W	1 Philips: ED17P MHC50/U/MP/4K ALTO	277	Atrium columns
L6	Adjustable two-headed MR16 line-voltage fixture with diffusing lenses and integral step-down transformer.	Lumiere #903-2-50MR16-120/12-CS-DIF-EXZ	2 Philips 50MRC16/NFL24	120	Atrium
L7	Wall-mounted up/downlight cylinder with integral magnetic 120/12V transformer.	Erco #85033.023 Silver m	2 Philips 35MRC16/SP10	120	Atrium office wall

Table B.8 – Atrium Luminaire Schedule

SYSTEM PERFORMANCES LIGHT LOSS FACTORS

Type	Lamp	Lumens		LLD	Maintenance Category	LDD	BF	TOTAL LLF
		Initial	Design					
L1	CFL	900	775	0.86	IV	0.89	0.98	0.751
L2	CFL	900	775	0.86	IV	0.89	0.98	0.751
L3	CFL	3200	2720	0.85	IV	0.89	0.98	0.741
L4	MH	3600	2450	0.68	IV	0.89	1.00	0.606
L5	MH	3600	2450	0.68	IV	0.89	1.00	0.606
L6	HAL	-	-	0.98	IV	0.89	N/A	0.872
L7	HAL	-	-	0.98	I	0.95	N/A	0.931

Table B.9 – Atrium Light Loss Factor Calculations

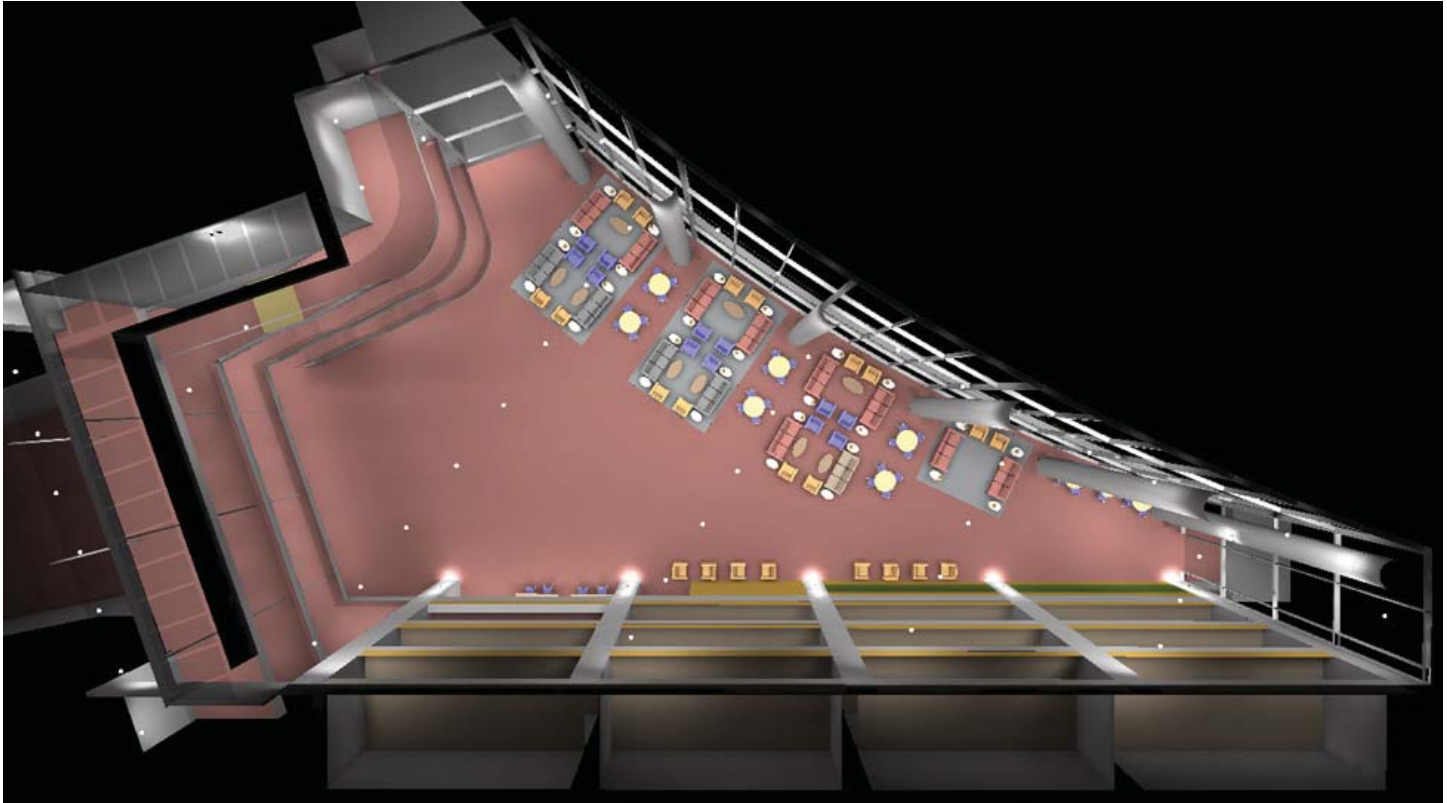


Figure B.10 – RGB Rendering of Atrium Illuminance, Plan View

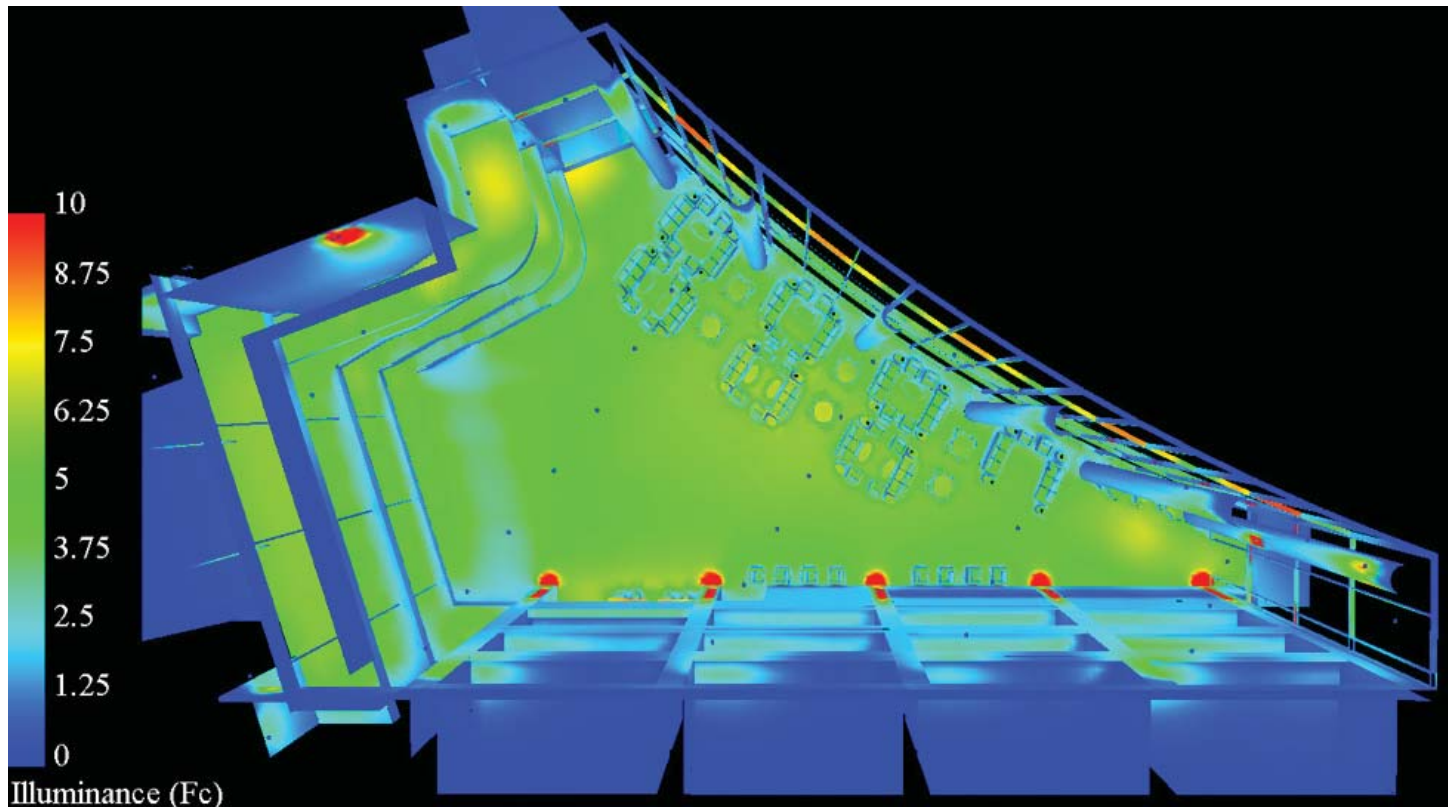


Figure B.11 – Pseudocolor Rendering of Atrium Illuminance, Plan View

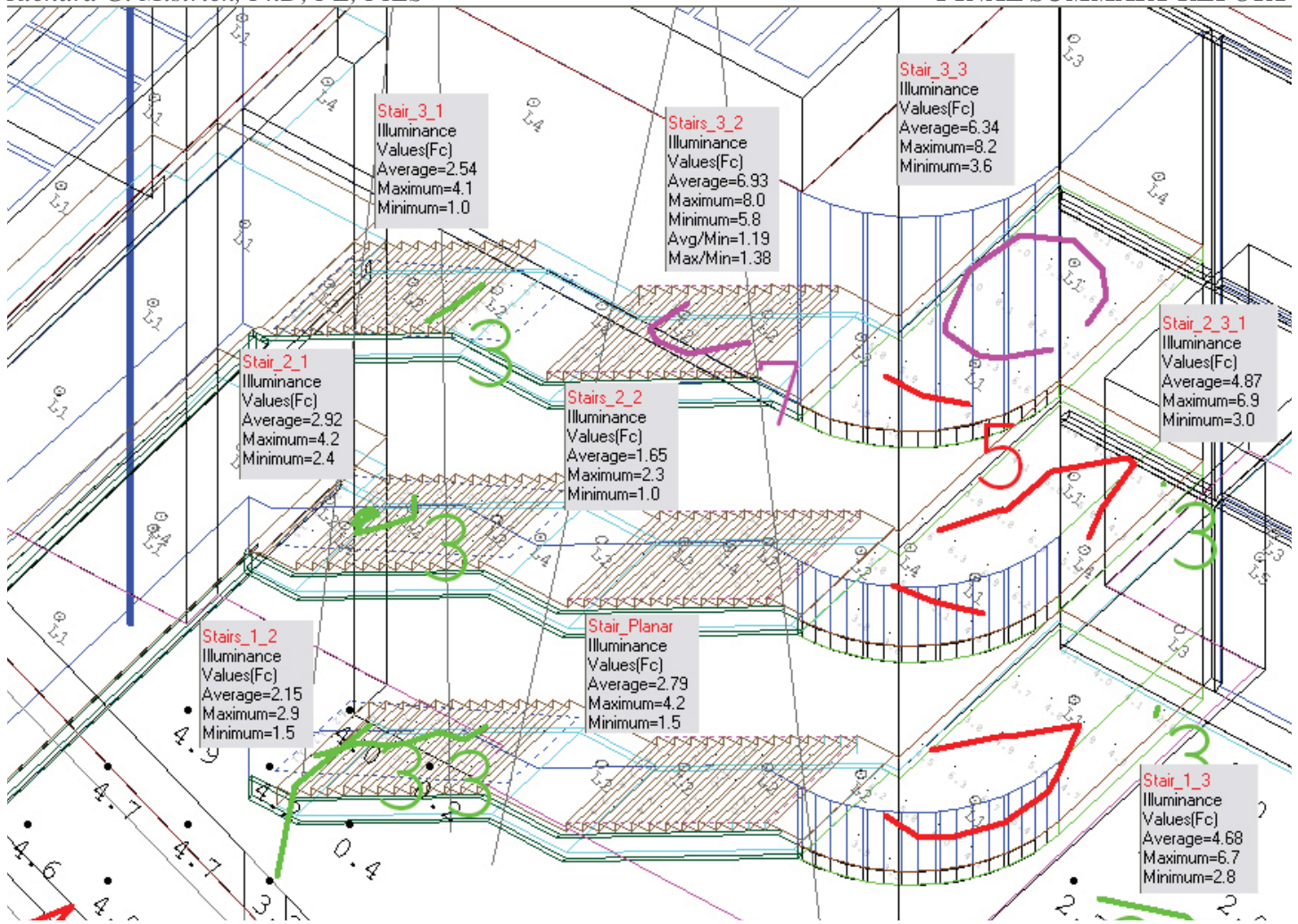


Figure B.12 – Atrium central staircase illuminance calculations

POWER DENSITY

DESIGN				ASHRAE/IESNA 90.1	
Type	QTY	Power	Total	USE	LPD [W/ft ²]
L1	20	16 W	320 W	Atrium – First Three Floors ^a	0.6
L2	18	16 W	288 W	Atrium – Each Additional Floor ^a	0.2
L3	8	47 W	376 W	Additional Interior Lighting Power ^b	0.03
L4	30	50 W	1500 W	TOTAL 1.8	
L5	6	50 W	300 W	^a Table 9.5.1: Lighting Power Densities Using the Space-by-Space Method	
L6	3	100 W	300 W	^b Per article 9.6.3 (a) for decorative lighting as applied to type L7: 380 W / 12180 ft ² = 0.03 W/ft ²	
L7	5	76 W	380 W	Table B.14 – Power Allowance for Atriums	
L13	3	30 W	89 W	COMPLIANCE CHECK	
Total Power			3,553 W	0.29 W/ft ² ≤ 0.83 W/ft ² ✓	
Area			12,180 ft ²		
Power Density			0.29 W/ft ²		

Table B.13 – Atrium Lighting Power Density



Figure B.15 – RGB raytraced rendering of atrium viewed from outside

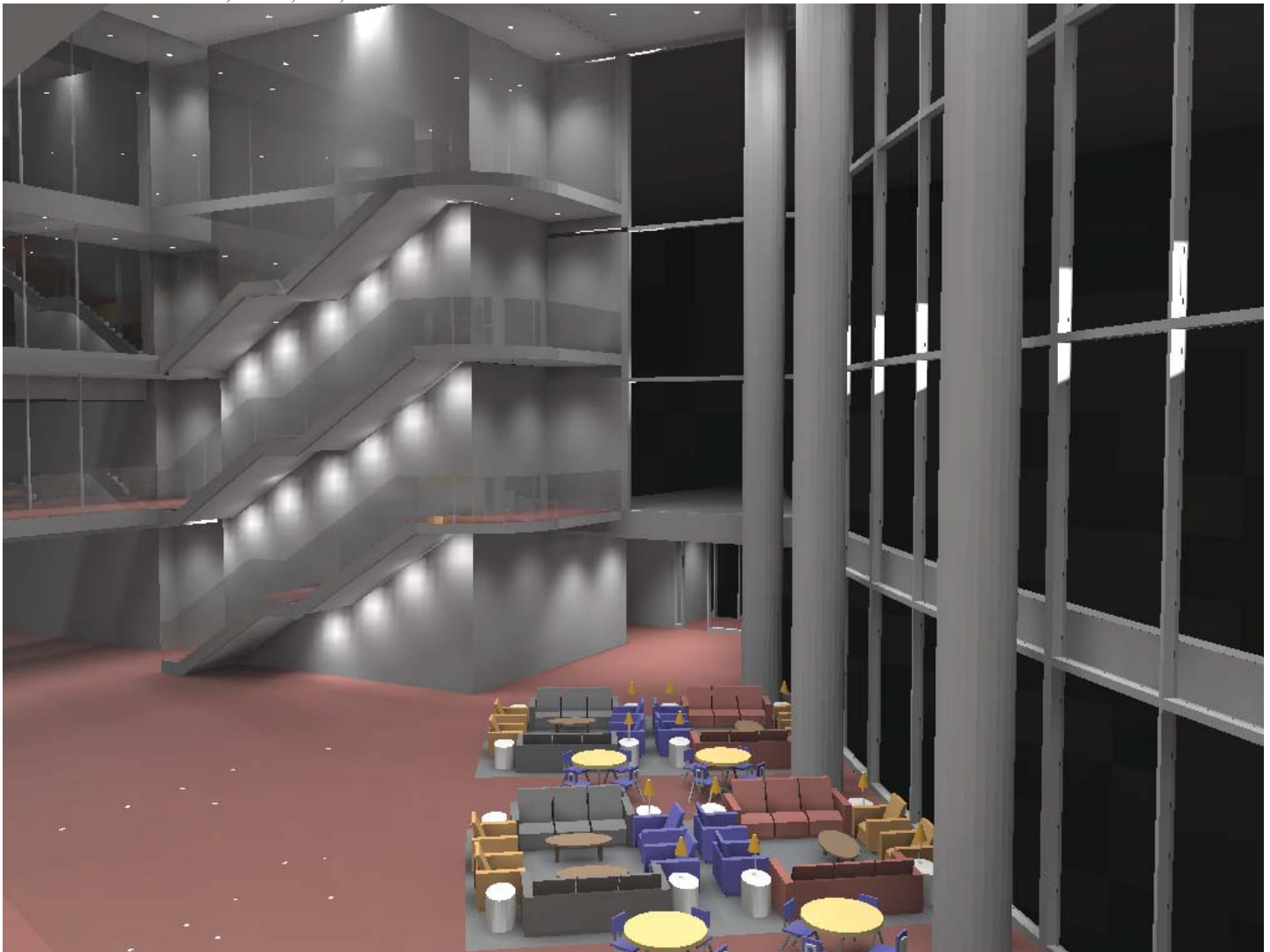


Figure B.16 – RGB raytraced rendering of atrium looking towards central staircase

LARGE CLASSROOM DESIGN CRITERIA

The IESNA horizontal illuminance recommendation for reading handwritten tasks (both #2 or softer lead pencil and ball-point pen) is 30 fc (category D). The vertical illuminance recommendation for a chalkboard is 50 fc (category E) while that for a whiteboard (serving the needs of the two projection screens) is 30 fc (category D). The different vertical illuminance values needed can be met by providing flexible lighting controls.

Since this is a classroom, any design issues that would maximize and help to encourage a learning atmosphere will be of importance; comfort is a higher priority than pleasing aesthetics. Applicable IESNA design issues include Direct Glare, Flicker (and Strobe), Light Distribution on Surface, Light Distribution on Task Plane (Uniformity), Reflected Glare, Source/Task/Eye Geometry, and System Control and Flexibility. There are no windows in this space so daylighting integration and control will not be a concern; facial modeling will be important mostly for the podium area where the speaker would be presenting material to the audience in the room.

SPACE PROPERTIES ROOM

ITEM	MATERIAL/FINISH	ρ
Floor	Carpet, dark gray	0.15
Walls		
General	GWB, painted steel gray	0.45
Curved Back Wall	Perforated Acoustic Wood	0.20
Ceiling		
General	GWB, painted white	0.80
Tile	Acoustic Panel, white	0.70
Doors		
Panel	Wood, natural maple	0.35
Frame (back wall)	Wood, painted white	0.70

Table C.1 – Classroom General Surface Reflectances

FURNITURE AND OTHER ELEMENTS

ITEM	MATERIAL/FINISH	ρ
Speaker Podium	Wood, natural maple	0.35
Table		
Legs/Supports	Steel, painted black	0.02
Work Surface	Plastic Laminate, white	0.70
Modesty Panel	Plastic Laminate, gray	0.30
Chairs		
Foundation	Plastic, black	0.03
Seat/Back	Upholstery, deep aqua blue	0.19
Visual Display Projection Screen	Fabric	0.90
Chalkboard		
Board	Porcelain Enamel, black	0.02
Frame/Trim/Accessories	Aluminum	0.57
Projectors	Plastic, black	0.05

Table C.2 – Classroom Furniture Reflectances**LIGHTING DESIGN**

Three different design options were explored for lighting the classroom: striplights.

Option 1 - Fixture type L8A

Implement Armstrong's TechZone ceiling system and utilize its compatible recessed linear fluorescent

Option 2 - Fixture type L8B

Recessed 2'x2' lensed fluorescent troffers, a very simple solution for a common 2'x2' ACT ceiling grid system.

Option 3 - Fixture types L8C & L8D

Suspended linear fluorescent luminaires with direct/indirect lighting distribution for a more uniformly bright ceiling.

TYPE	DESCRIPTION	MFR/CATALOG #	LAMPING	VOLTS	LOCATION
L8A	Armstrong's TechZone ceiling compatible 6" x 48" recessed satin white ceiling slot fixture with frosted acrylic diffuser and Lutron's EcoSystem digital dimming ballast.	Neoray #7ATZ-648R-2T5HO-STG-1DB-SI-SP95 Lutron: EcoSystem Dimming Ballast #EC5 T554 J 277 2	2 Philips F54T5/835/HO/ ALTO	277	Classroom desks
L8B	Recessed 2'x2' direct/indirect fluorescent with Lutron's EcoSystem digital dimming ballast.	Focal Point #FEQ-22-B-2-BX40-D-277-*-*-WP-WH Lutron: EcoSystem Dimming Ballast #EC5 BX40 J 277 2	2 Philips PL-L 40W/830/4P/ RS/IS	277	Classroom desks
L8C	Suspended direct/indirect linear fluorescent pendant luminaire with Lutron's EcoSystem digital dimming ballast.	Axis Lighting #CU-PL-16-T5HO-2-A-0-2-D-277-2-CA36-C Lutron: EcoSystem Dimming Ballast #EC5 T554 J 277 2	2 Philips F54T5/835/HO/ ALTO	277	Classroom desks
L8D	Suspended direct/indirect linear fluorescent pendant luminaire with Lutron's EcoSystem digital dimming ballast.	Axis Lighting #CU-PL-20-T5HO-2-A-0-2-D-277-1-CA36-C Lutron: EcoSystem Dimming Ballast #EC5 T554 J 277 2	2 Philips F54T5/835/HO/ ALTO	277	Classroom desks
L9	3.9" square aperture, recessed low-voltage downlight with integral electronic transformer.	RSA Lighting #AC510-ELC-277 Trim: #ACM5101-WH	1 Philips 35MR16/FL36	277	Classroom entrances
L10	2-lamp 8' linear fluorescent recessed wallwasher with thin white baffles and drywall frame kit accessory; tadem ballast wiring to Lutron EcoSystem digital dimming ballast.	Metalux #RWW-154T5I-277-EB1T-TBW4 Accessory: DF-104-W Lutron: EcoSystem Dimming Ballast #EC5 T554 J 277 2	1 Philips F54T5/835/HO/ ALTO	277	Classroom boards
L11	Same as L9 with adjustable downlight trim.	RSA Lighting #AC510-ELC-277 Trim: #ACM5103-WH	1 Philips 35MR16/FL36	277	Classroom podium

Table C.3 – Classroom Luminaire Schedule

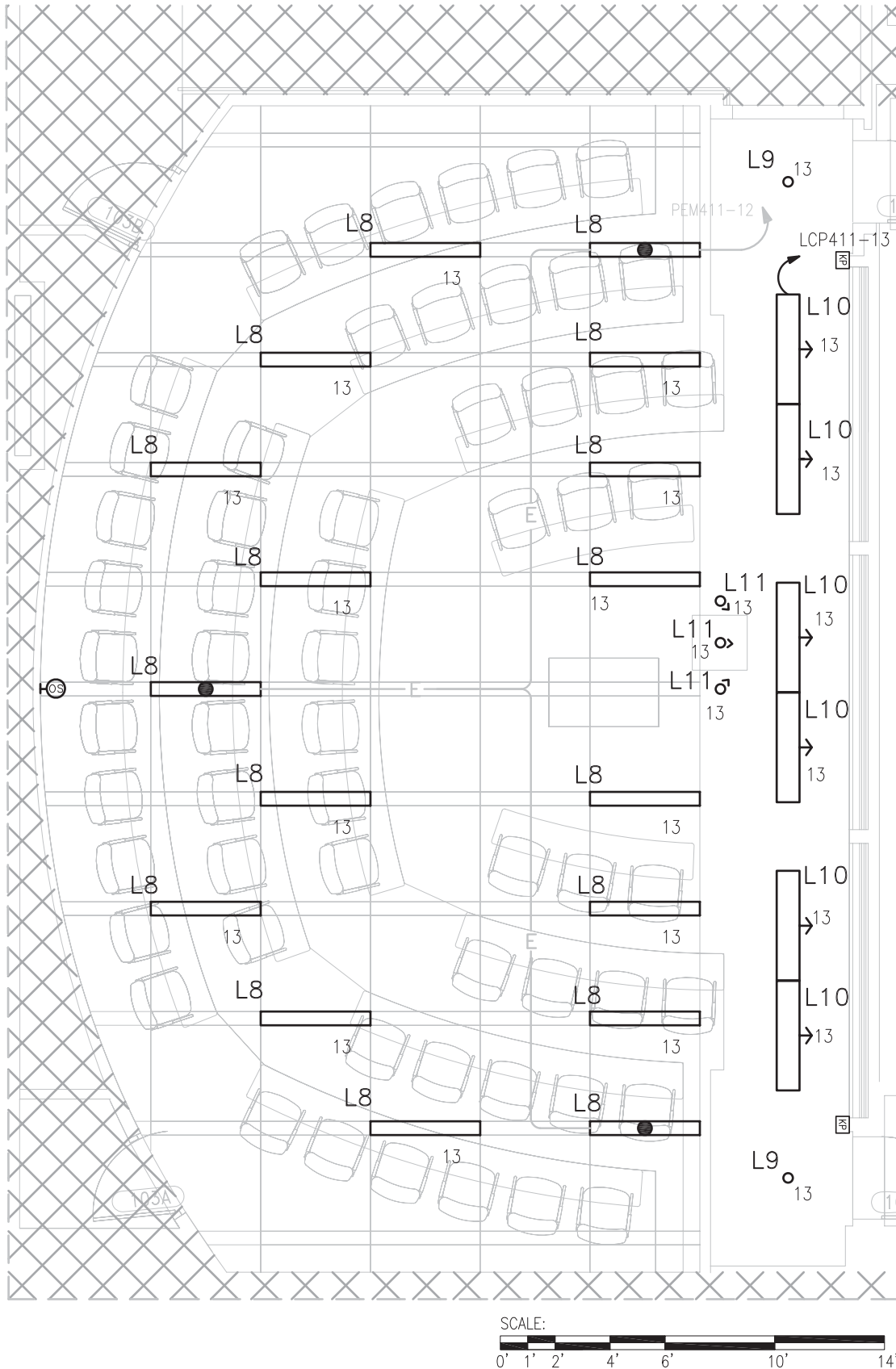


Figure C.4 - Classroom lighting plan, Option 1: recessed linear striplights with TechZone

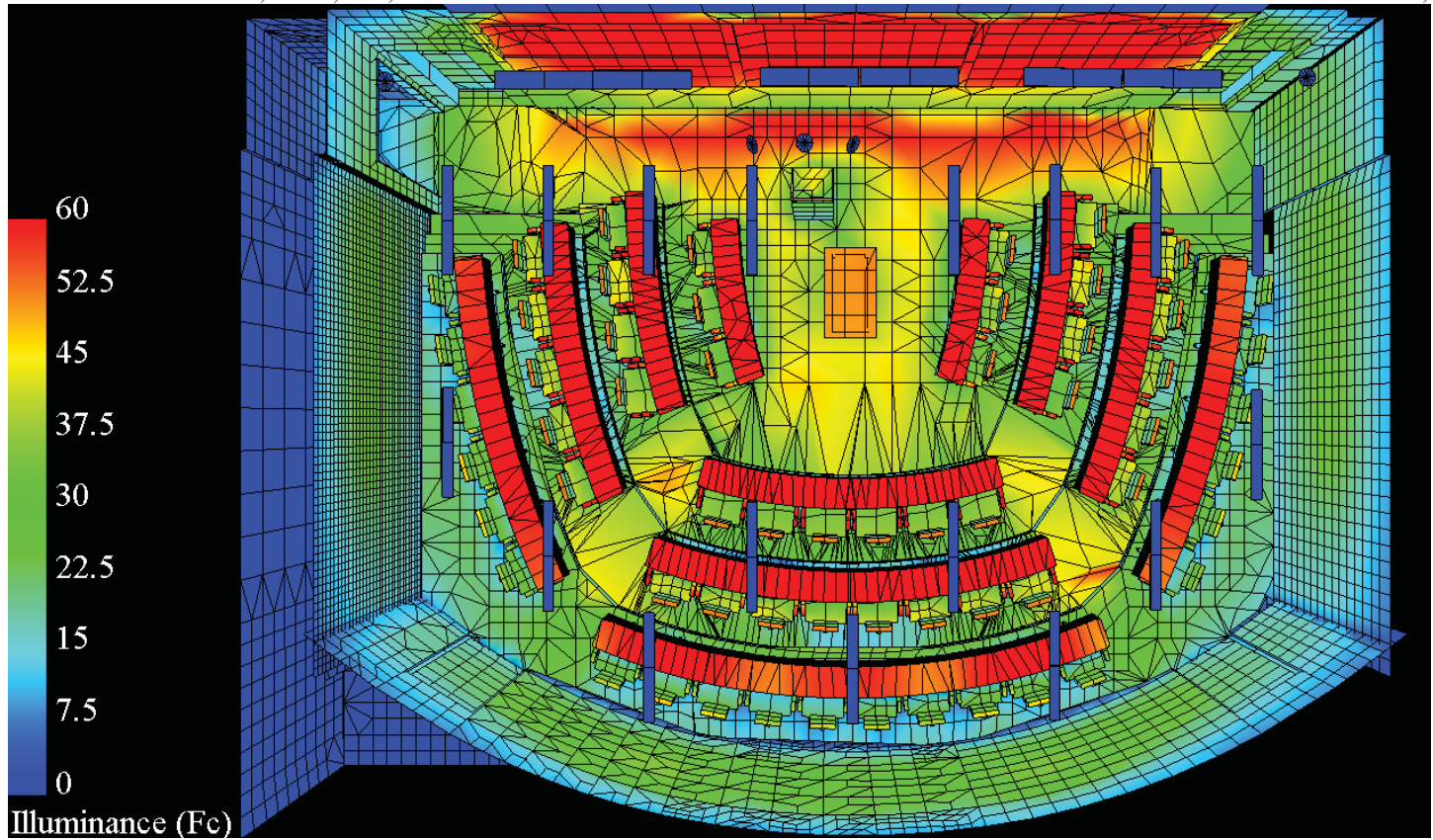


Figure C.5 - Pseudocolor rendering of classroom illuminance, plan view, option 1



Figure C.6 - RGB rendering of classroom, front perspective view, option 1

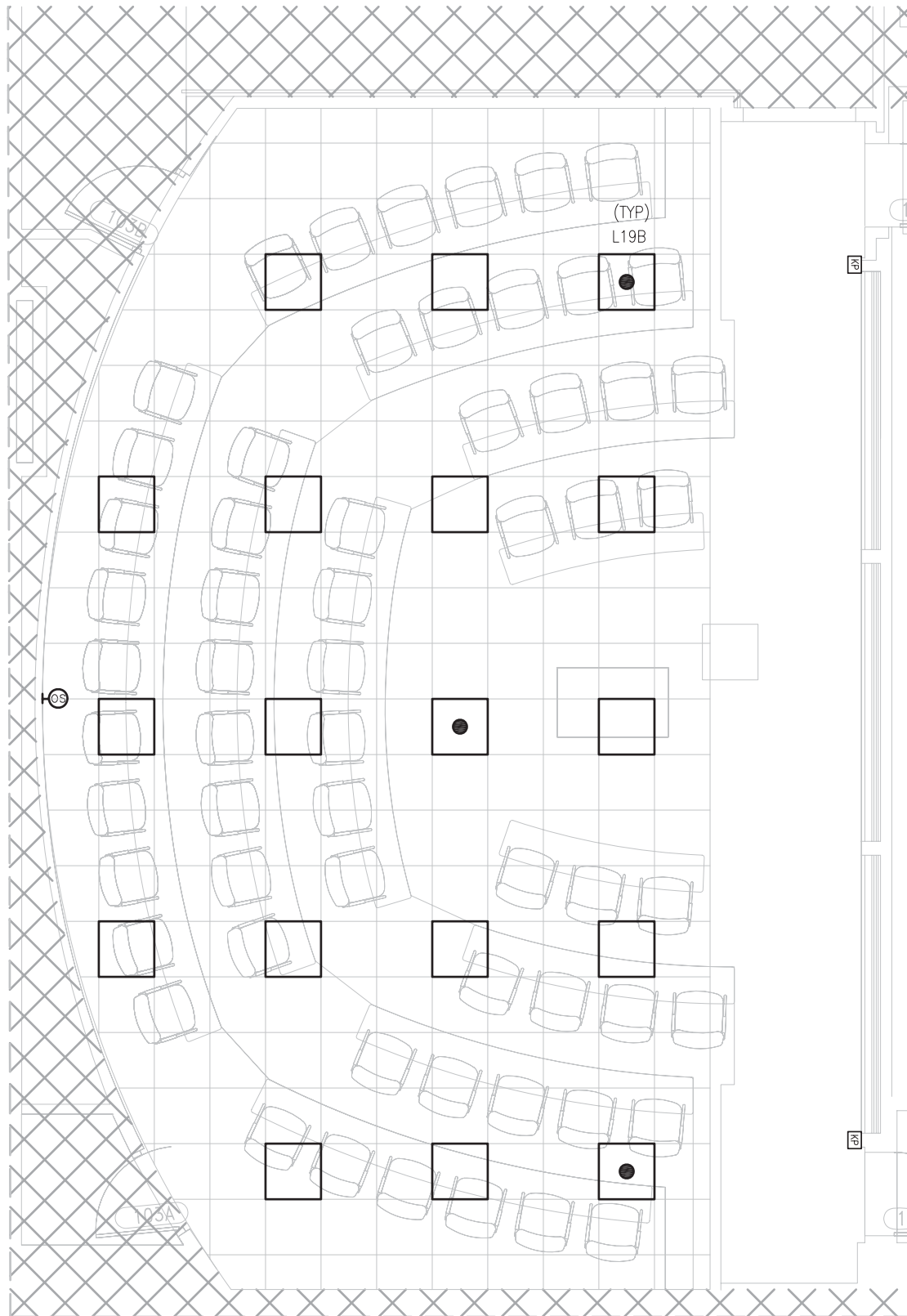


Figure C.7 - Classroom lighting plan, Option 2: recessed lensed troffer for ACT ceiling

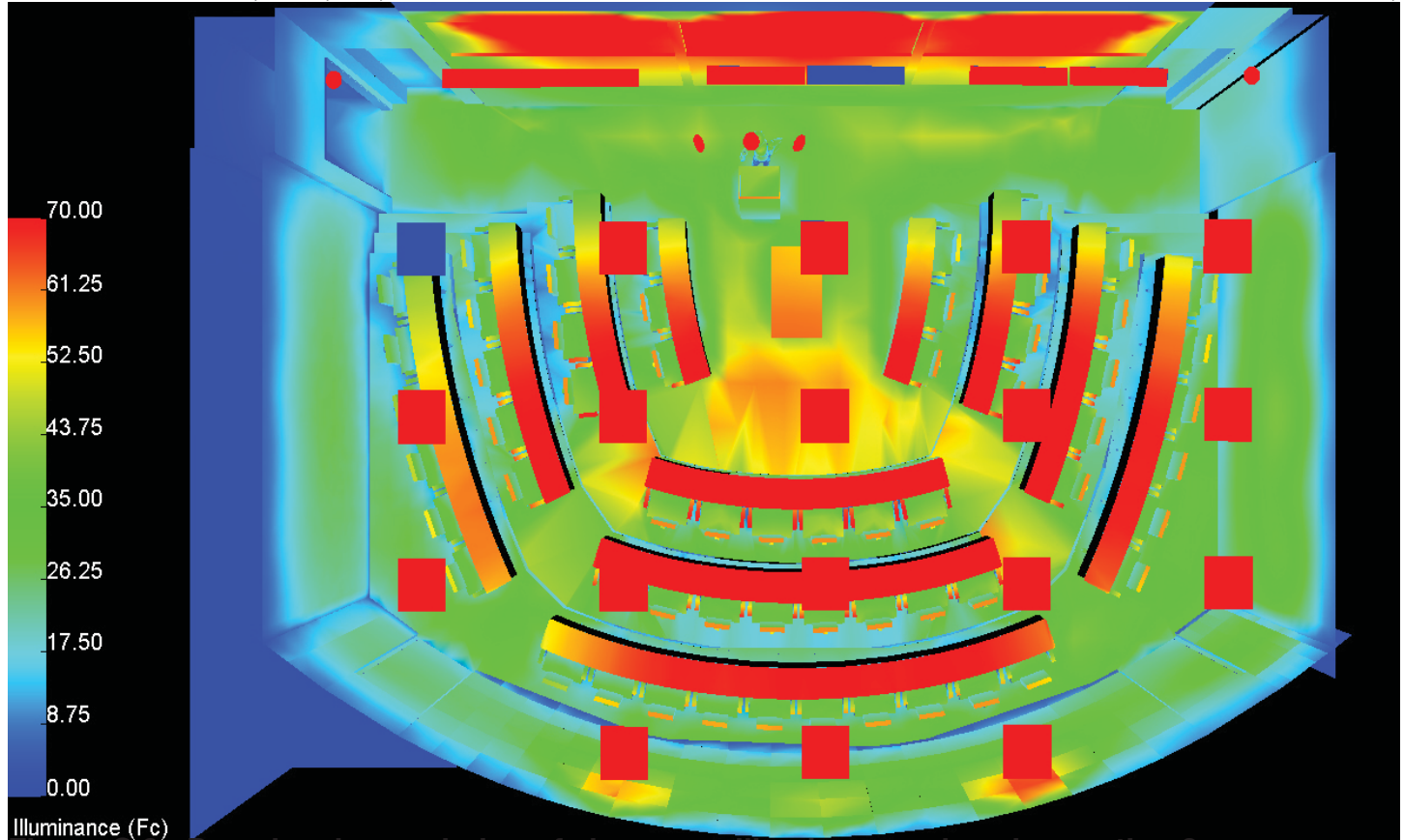


Figure C.8 - Pseudocolor rendering of classroom illuminance, plan view, option 2



Figure C.9 - RGB rendering of classroom, front perspective view, option 2

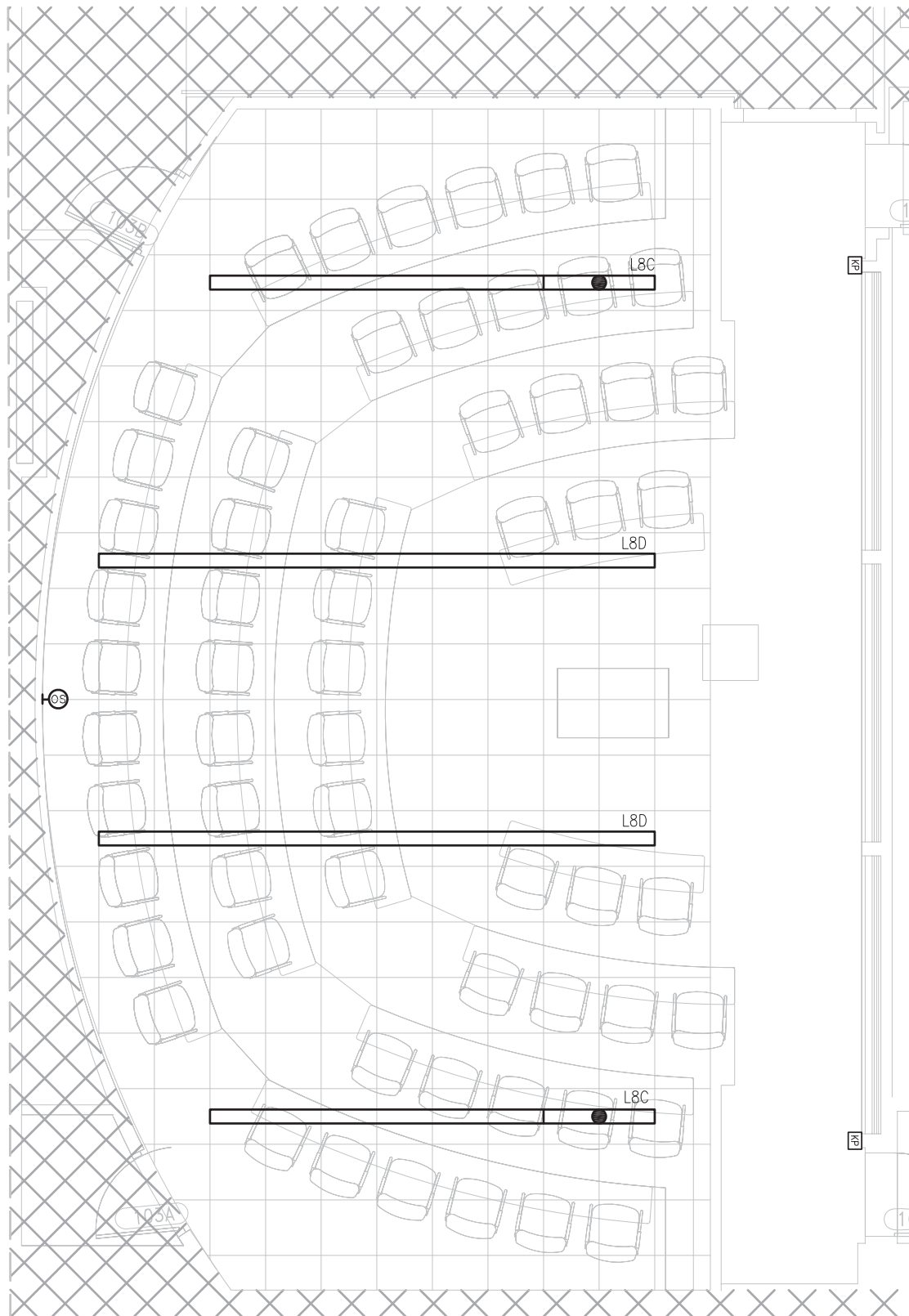


Figure C.10 - Classroom lighting plan, Option 3: direct/indirect linear pendants

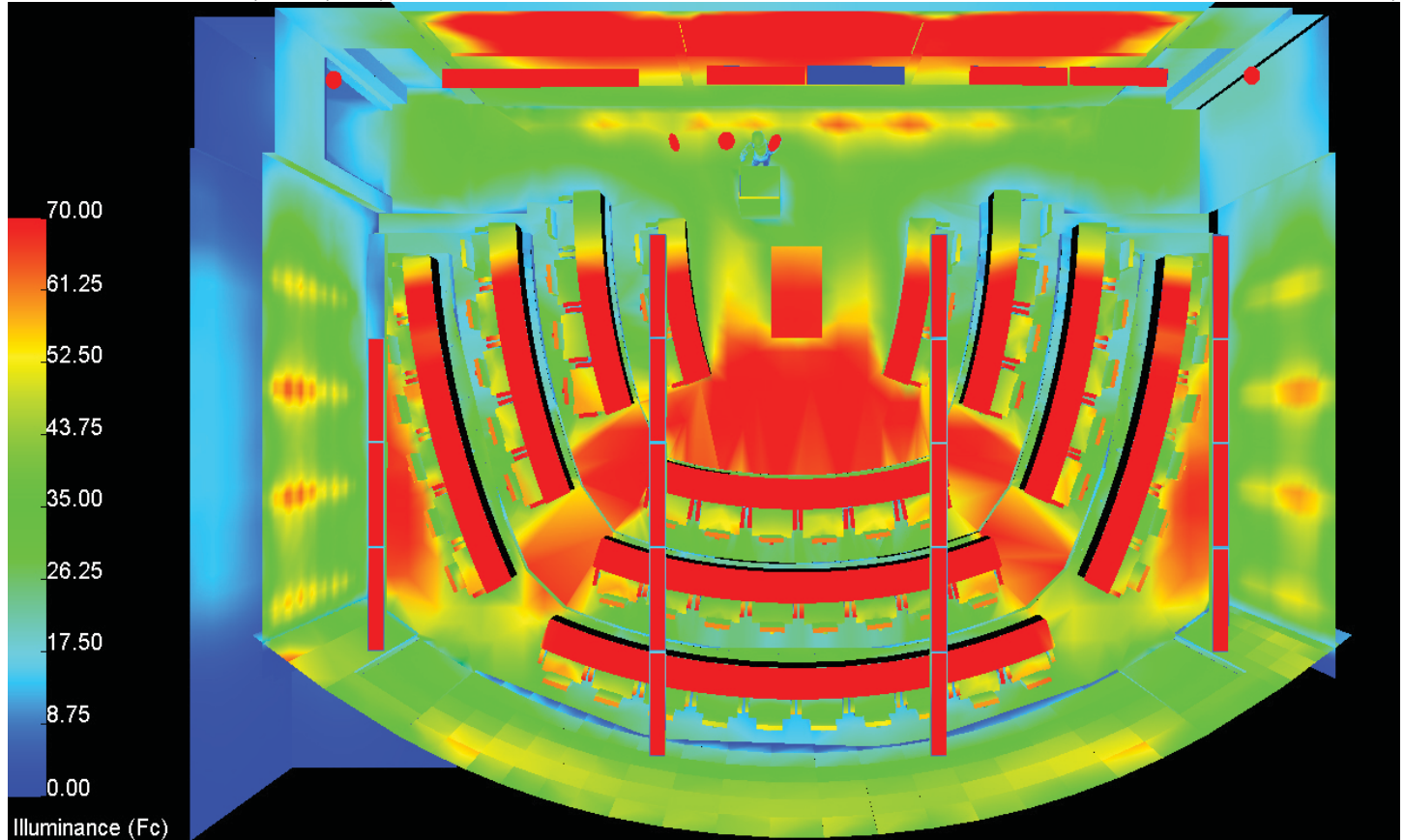


Figure C.11 - Pseudocolor rendering of classroom illuminance, plan view, option 3



Figure C.12 - RGB rendering of classroom, front perspective view, option 3

SYSTEM PERFORMANCE

LIGHT LOSS FACTORS

Type	Lamp	Lumens		LLD	Maintenance Category	LDD	BF	Total LLF
		Initial	Design					
L8A	T5HO	5000	4750	0.95	V	0.88	1.00	0.836
L8B	BIAX	3300	2970	0.90	V	0.89	1.00	0.792
L9C	T5HO	5000	4750	0.95	V	0.89	1.00	0.836
L9D	T5HO	5000	4750	0.95	V	0.89	1.00	0.836
L9	HAL	-	-	0.98	IV	0.89	N/A	0.872
L10	HAL	-	-	0.98	IV	0.89	N/A	0.872
L11	T5HO	5000	4750	0.95	IV	0.89	1.00	0.846
L12	CFL	1200	1020	0.85	IV	0.89	0.95	0.719

Table C.13 – Classroom Light Loss Factor Calculations

POWER DENSITY

DESIGN				ASHRAE/IESNA 90.1	
Type	QTY	Power	Total	USE	LPD
L8A	6	114 W	1,938 W	Classroom/Lecture/Training ^a	1.40 W/ft ²
L8B	18	80 W	1,440 W	Additional Allowance ^b	0.26 W/ft ²
L8C	8	114 W	912 W	TOTAL	1.66 W/ft²
L8D	10	114 W	1140 W	^a Table 9.5.1: Lighting Power Densities Using the Space-by-Space Method	
L9	2	35 W	70 W	^b Per article 9.6.3 (a) for accent lighting as applied to type L11:	
L10	3	35 W	105 W	$342\text{ W}/1330\text{ ft}^2 = 0.26\text{ W/ft}^2$	
L11	3	114 W	342 W	Table C.15 – Power Allowance for Classrooms	
<i>Option 1 Total</i>			2,455 W	1.85 W/ft ²	
<i>Option 2 Total</i>			1,957 W	1.47 W/ft ²	
<i>Option 3 Total</i>			2,569 W	1.93 W/ft ²	
<i>Area</i>			1,330 ft ²		

Table C.14 – Lighting Power Density

COMPLIANCE CHECK

Option 1: 1.85 W/ft² > 1.66 W/ft² ❌

Option 2: 1.47 W/ft² ≤ 1.66 W/ft² ✅

Option 3: 1.93 W/ft² > 1.66 W/ft² ❌

RECOMMENDATION

Option 2, the recessed 2'x2' lensed troffers, is the only design that meets code and therefore is the recommended option for the classroom.

CAFÉ DESIGN CRITERIA AND GOALS

Varieties of tasks are performed in the café, each with different illuminance needs and design issues. Some general tasks include dining, food display, food preparation, and cleaning, and the IESNA recommends certain levels for the cashier areas as well. The following table lists these tasks and their recommended illuminance values and corresponding categories respectively.

TASK	ILLUMINANCE			
	HORIZONTAL		VERTICAL	
Dining	10 fc	C	3 fc	A
Food Display	50 fc	E		
Kitchen				
Counter, general	30 fc	D	5 fc	B
Sink	30 fc	D	5 fc	B
Cleaning	10 fc	C		
Cashier	30 fc	D	3 fc	A

Table D.1 – Café Lighting Design Illuminance Criteria

Although the recommended level for the dining area is 10 fc, a higher light level may be preferable since it is very likely that more visually sensitive tasks such as reading and writing will occur in the space since the café is located in an academic building. The recommended level for a classroom workplane falls under category E, but since the dining area is still primarily a dining area, I found 50 fc to be excessive and decided to aim for something in between, 30 fc, instead. On the other hand, the food display cases and some places in the food serving areas would be acceptable with less light provided by the general system because the respective furniture and equipment already have their own task lighting built-in.

Another condition that alters desired illuminance levels in the café is daylight. Not only are the east and south walls of the café glazed from floor to ceiling, but the café is only open from 7:00 AM to 2:00 PM during the Fall and Spring semesters. This means daylight will just about always be available during the café's peak operating hours (e.g., east wall will let in morning light for those who want to enjoy coffee and breakfast) so daylight harvesting would be possible.

SPACE PROPERTIES

ITEM	MATERIAL/FINISH	ρ/τ
Floor	Terrazzo	0.60
Ceiling	GWB, painted white	0.85
	Wood, perforated	0.30
Walls		
Typical	Wood, natural maple	0.48
Curtain Wall	Aluminum	0.57
	Glass	0.70
Partitions	Wood, natural maple	0.48
	Decorative Glass	0.1-0.3

Table D.2 –General Café Surface Reflectances

FURNITURE AND EQUIPMENT

ITEM	MATERIAL/FINISH	ρ
Chairs	Plastic	0.35
	Metal	0.70
Banquette	Upholstery, multicolored	0.35
Tables	Wood	0.35
Equipment	Stainless Steel	0.44
Countertops	Quartz	0.65
Menu Boards	Paper, laminated	0.65
Cash Registers	Metal	0.44

Table D.3 – Café Furniture and Equipment Reflectances

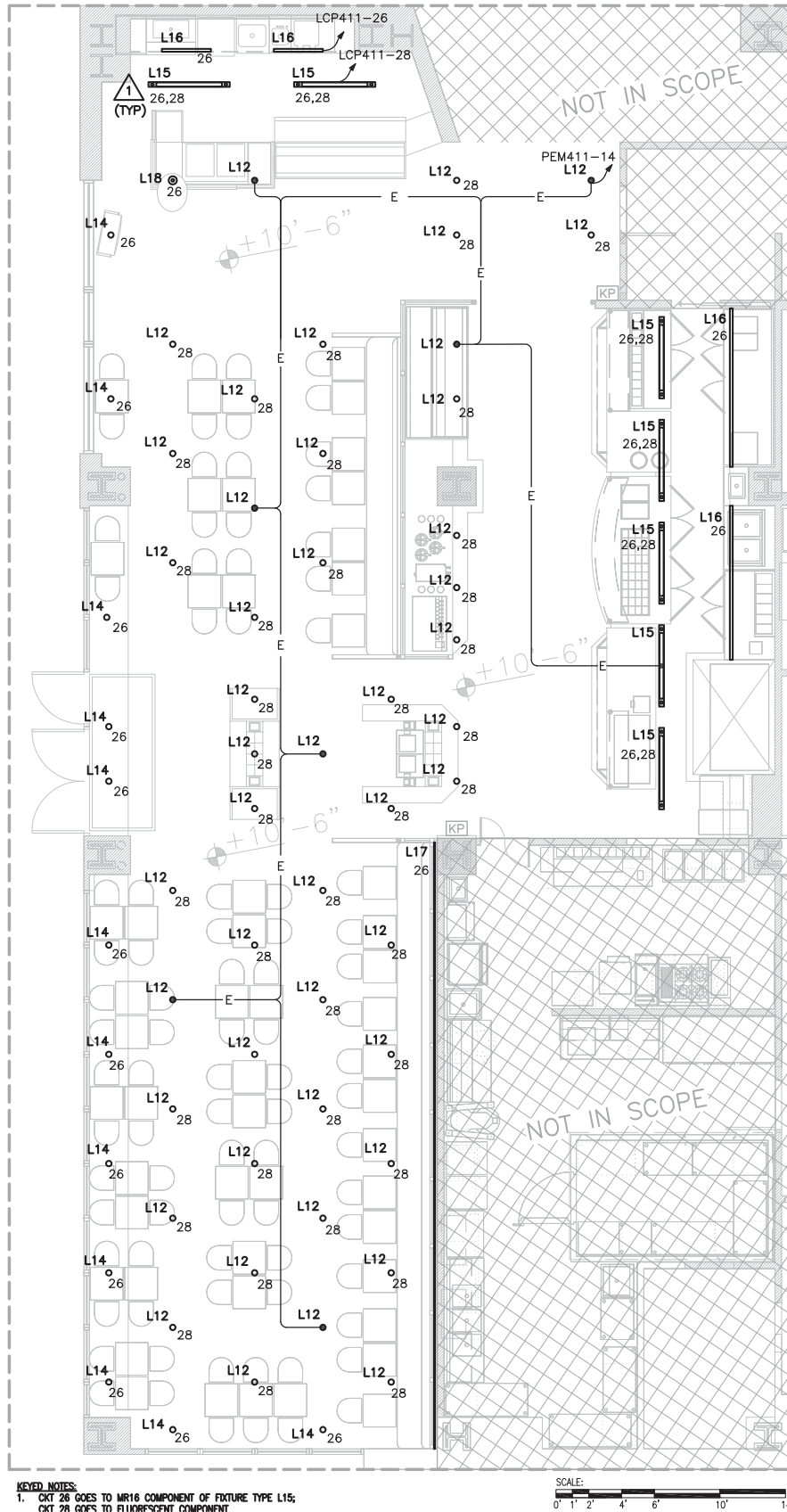


Figure D.4 – Café Lighting Plan

TYPE	DESCRIPTION	MFR/CATALOG #	LAMPING		VOLTS	LOCATION
L12	Recessed 4" dia. aperture CFL downlight with black specular Alzak reflector finish and integral Lutron Hi-lume electronic dimming ballast.	Prescolite #D426EBHDM120-4D5-BL	1	Philips: PL-T 26W/835/4P/ ALTO	277	Cafe general
L13	Recessed 4" dia. aperture CFL wallwasher with integral Lutron Hi-lume electronic dimming ballast.	Prescolite #D426EBHDM120-4D5-BL-WW	1	Philips: PL-T 26W/835/4P/ ALTO	277	Cafe general
L14	Recessed 4" dia. aperture white L.E.D. downlight with integral driver.	Prescolite #D4LED-4D9-WH-WT		L.E.D., white (3K)	277	Cafe windows
L15	Linear fluorescent downlight with regressed lens and MR16 accent lights with llinear spread lenses on extended yoke gimbals; integral electronic transformer included.	Focal Point #FAVB-SRM-1T5HO-2C-277-S-F-2EG-PSL-WH-5'	1	Philips F54T5/835/HO/ ALTO	277	Cafe servery/bar
			2	Philips 35MR16/FL36		
L16	Surface-mounted static white L.E.D. fixture with asymmetric distribution and remote 120 VAC input / 24 VDC output LED driver (driver enclosure by io Lighting).	io Lighting #0.04.I.3K.90.100.1.36.1 LED Driver: by Advance #LEDINTA0024V41FO		LED, white (3K)	277	Cafe
L17	Continuous row striplight; cool-white LED with 10° beam; 24 VDC power supply included.	io Lighting #0.03.I.5K.10.100.1.**.5-5.1		LED, white (5K)	277	Cafe glass wall
L18	Surface-mounted decorative chandelier with integral electronic transformer in 6.5" dia. canopy.	Tech Lighting #700ARIA-32-S	7	10W/T3/G4 base/xenon, frosted/12V	277	Cafe coffee bar

Table D.5 – Café Luminaire Schedule

SYSTEM PERFORMANCE

LIGHT LOSS FACTORS

Type	Lamp	Lumens		LLD	Maintenance Category	LDD	BF	TOTAL LLF
		Initial	Design					
L13	CFL	1200	1020	0.85	IV	0.89	0.95	0.719
L14	LED			0.99	IV	0.89	N/A	0.881
L15	T5HO	5000	4750	0.95	V	0.88	1.00	0.836
	HAL			0.98	V	0.88	N/A	0.862
L16	LED			0.99	V	0.88	N/A	0.871
L17	LED			0.99	V	0.88	N/A	0.871
L18	XEN			0.98	I	0.95	N/A	0.931

Table D.6 – Café Light Loss Factor Calculations

MODEL CALCULATIONS

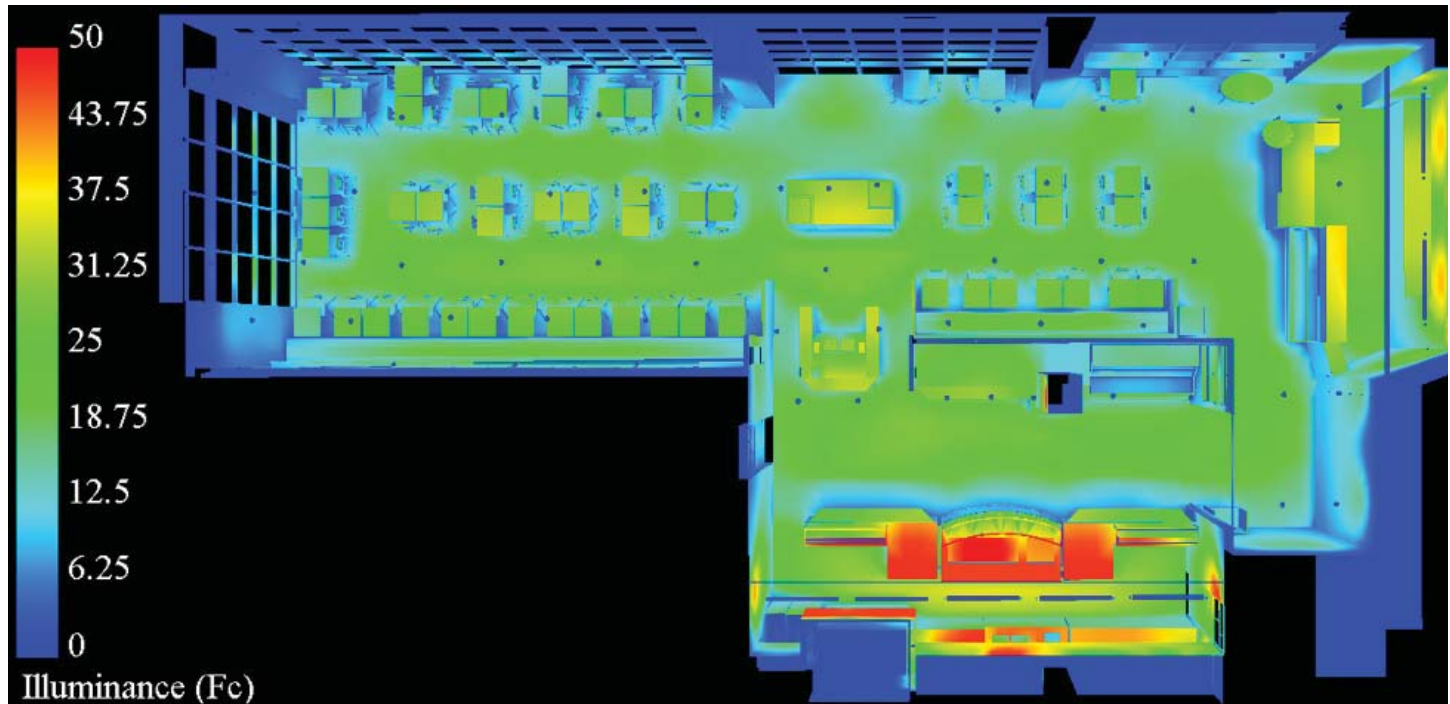


Figure D.7 – Pseudocolor rendering of café illuminance levels, plan view

DESIGN				ASHRAE/IESNA 90.1	
Type	QTY	Power	Total [W]	Element	LPD [W/ft ²]
L12	47	29 W	1363	For Bar Lounge/Leisure Dining ^a	1.4
L14	12	15 W	180	Additional Interior Lighting Power ^b	0.06
L15	7	92 W	490	TOTAL 1.46	
L16	24 ft	12 W/ft	288	<i>^aTable 9.5.1: Lighting Power Densities Using the Space-by-Space Method</i>	
L17	36.5 ft	2.1 W/ft	77	<i>^bPer article 9.6.3 (a) for decorative and accent lighting as applied to fixture types L17 & L18: (77 W + 70 W) / 2630 ft² = 0.06 W/ft²</i>	
L18	1	70 W	70	Table D.9 – Power Allowance for Café	
			Total Power	2867 W	
			Area	2,630 ft ²	
			Power Density	1.09 W/ft ²	
Table D.8 – Café Lighting Power Density					

COMPLIANCE CHECK

1.09 W/ft² ≤ 1.46 W/ft² ✓

TERRACE DESIGN CRITERIA

The IESNA Lighting Handbook’s illuminance recommendations for an active building entrance and that for a terrace area are both 5 fc (category B) for horizontal surfaces and 3 fc (category A) for vertical surfaces. A sculpture and some shrubbery exist on the lower level of the terrace but they are not specially featured elements of the space (i.e., a sculpture garden) and therefore special lighting is not considered necessary. The general Appearance of Space and Luminaires, and Light Pollution considerations are the most important design issues for this particular outdoor area.

SPACE PROPERTIES

GENERAL

ITEM	MATERIAL/FINISH	ρ/τ
Ground	Brick	0.33
	Limestone	0.22
Curtain Wall / Entrance Canopy	Aluminum	0.57
	Glass	0.70
Typical Wall	Brick	0.33
	Limestone	0.22

Table E.1 – General Terrace Surface Reflectances

ITEM	MATERIAL/FINISH	ρ
Benches	Metal	0.60
Sculpture	Bronze	0.37
Café Seating		
Chairs	Metal	0.44
Tables	Metal	0.44
Vegetation		
Bed Frame	Concrete, Dirt	0.22
Trees	Bark, etc.	0.40

Table E.2 – Other Element Reflectances

LIGHTING DESIGN PLAN

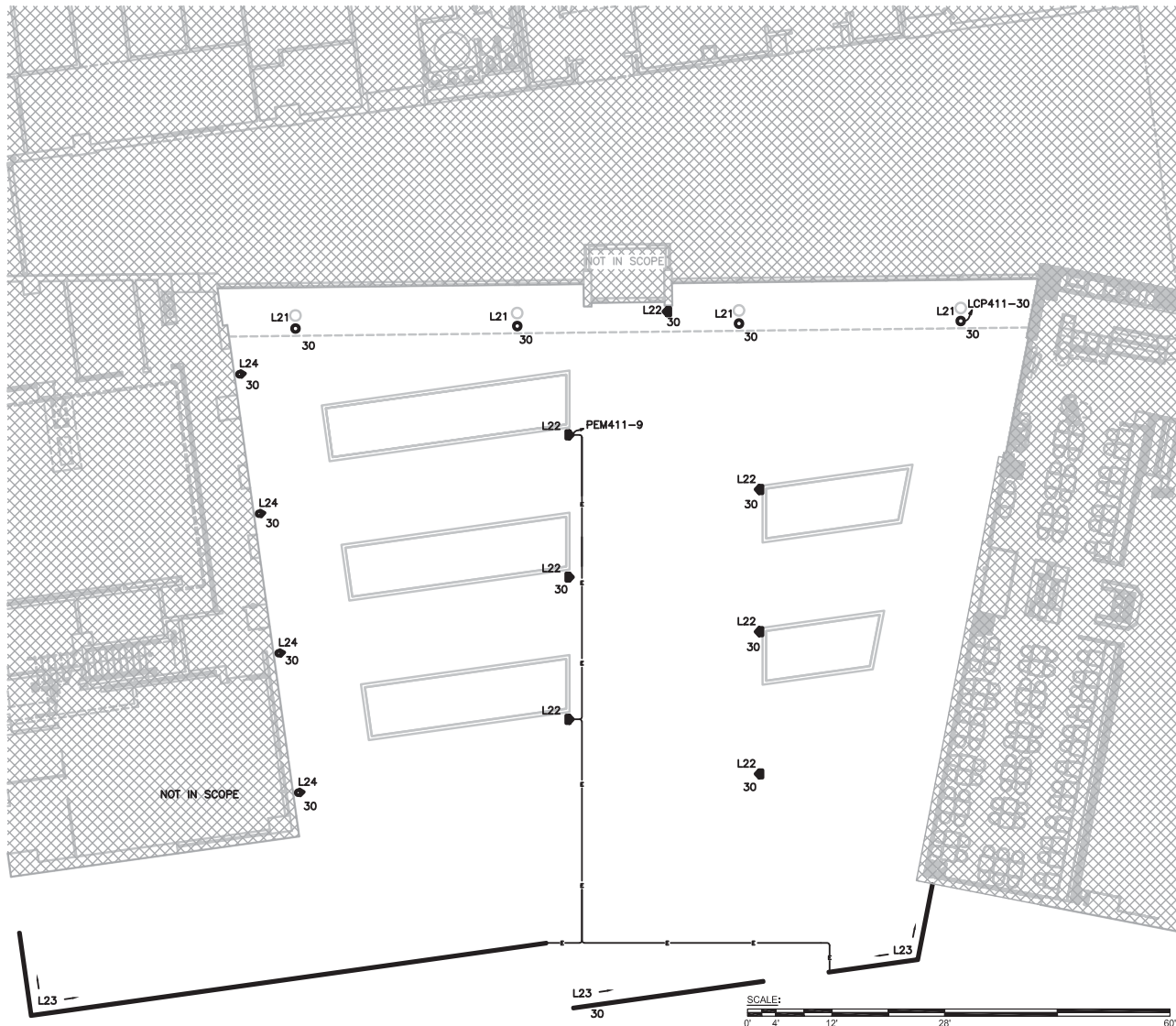


Figure E.3 – Terrace lighting plan, ground level

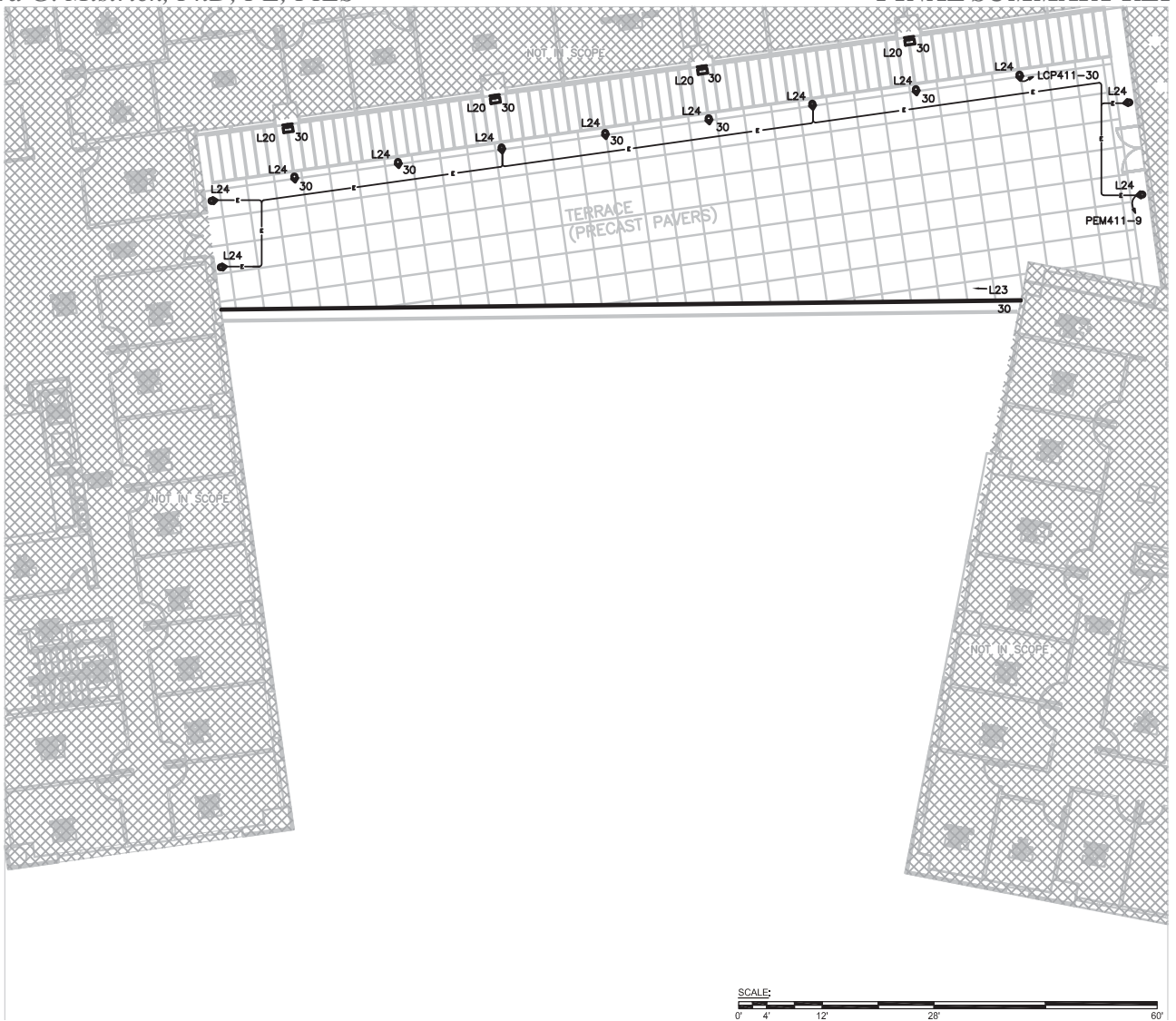


Figure E.4 – Terrace lighting Plan, 3rd level

TYPE	DESCRIPTION	MFR/CATALOG #	LAMPING	VOLTS	LOCATION
L20	Exterior wall-mounted LED floodlight with narrow graze optics and integral power supply.	TIR Systems #DES-CG-NGO- RGB-SLR-DMX	LED, RGB	277	Terrace upper level facade
L21	In-ground-mounted adjustable T4 metal halide uplight with anti-glare cover, sculpture lens, and integral electronic ballast.	Erco #33711.023- 33961.000- 33953.000	1 Philips MasterColor T4 CDM35/TC/830	277	Terrace entrance canopy columns
L22	Free-standing T4 metal halide bollard with glare shield.	Erco #33314.023- 33975.000	1 Philips MasterColor T4 CDM35/TC/830	277	Terrace center path
L23	Handrail integrated LED step light with glare shield and spread lens; 24 VDC power supply included.	io Lighting #0.06.SSS.3.WM. AC.65.5KHO.*.1	LED, white (5K)	277	Terrace outer perimeter
L24	Low-profile T4 metal halide path light with 60° beam spread and integral ballast.	Bega #8717MH	1 Philips MasterColor T4 #CDM35/ TC/830	277	Terrace upper level

Table E.5 – Terrace Luminaire Schedule

SYSTEM PERFORMANCE

LIGHT LOSS FACTORS

Type	Lamp	Lumens		LLD	Maintenance Category	LDD	BF	TOTAL LLF
		Initial	Design					
L20	LED	-	-	0.99	V	0.84	N/A	0.832
L21	MH	3300	2640	0.80	V	0.84	1.00	0.672
L22	MH	3300	2640	0.80	V	0.84	1.00	0.672
L23	LED	-	-	0.99	V	0.84	N/A	0.832
L24	MH	3300	2600	0.79	V	0.84	1.00	0.662

Table E.6 – Terrace Light Loss Factor Calculations

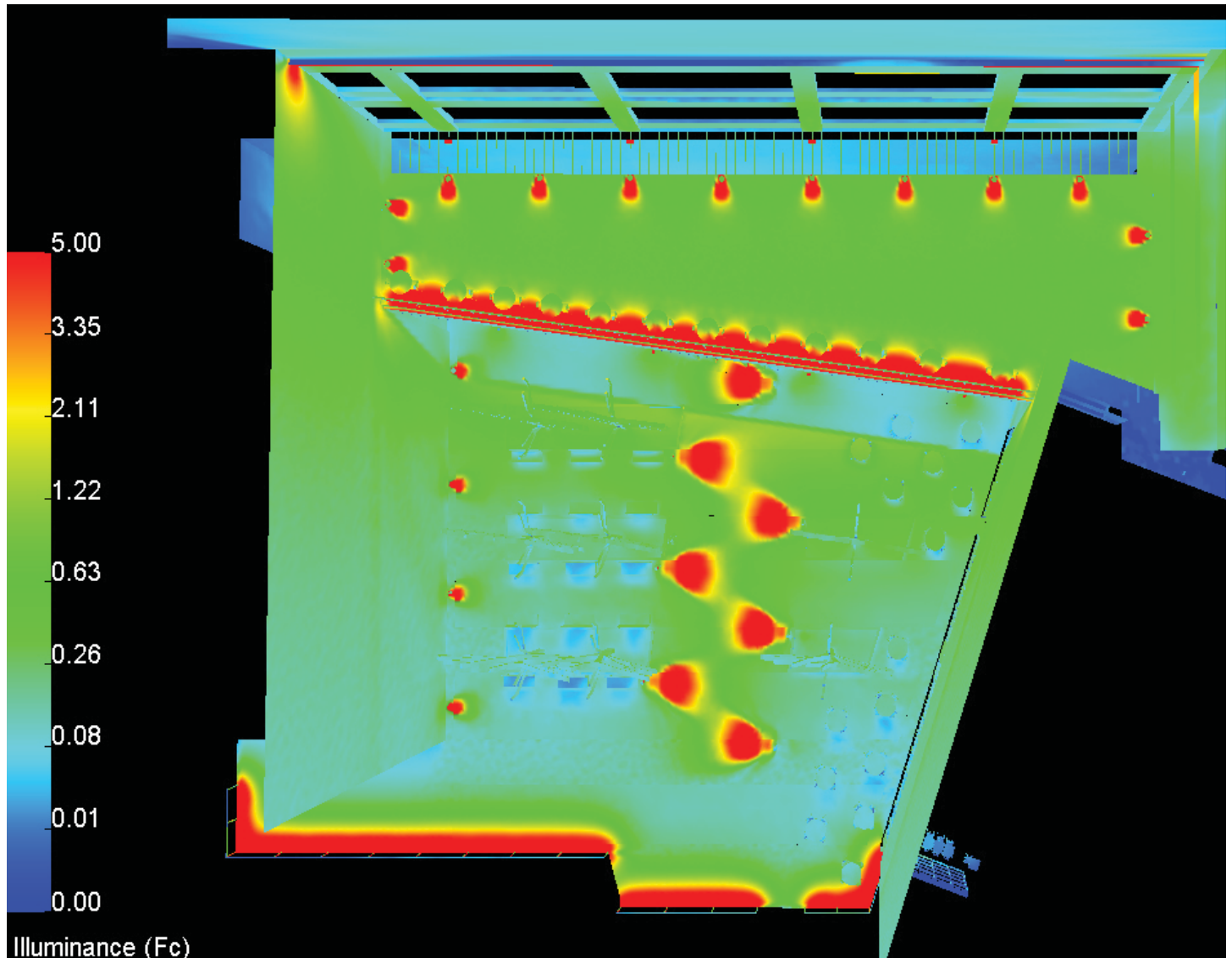


Figure E.7 – Pseudocolor illuminance rendering of terrace, plan view

POWER DENSITY

DESIGN			
TYPE	QTY	POWER	TOTAL
L20	4	99 W	396 W
L21	4	48 W	192 W
L22	6	48 W	288 W
L23	245.75 ft	7.6 W/ft	1,868 W
L24	11	48 W	528 W

Table E.8 – Terrace Lighting Power Density

ASHRAE/IESNA 90.1			
ELEMENT	LPD	DESIGN SPACE	TOTAL POWER
Building Grounds	0.20 ^a W/ft ²	14,260 ft ²	2,852 W
Canopies ^b	1.25 W/ft ²	690 ft ²	862.5 W
Building Façades ^b	5.00 W/LF	380 ft	1,900 W

^aTable 9.4.5: Building Grounds: Walkways 10 feet wide or greater/Plaza areas/Special Feature Areas

^bTable 9.4.5: Lighting Power Densities for Building Exteriors

Table E.9 – Power Allowance for Exterior Lighting

ELEMENT	ASHRAE	DESIGN	OK?
Building Grounds	2,852 W	2,684 W ^a	✓
Canopies	862.5 W	192 W ^b	✓
Building Facades	1,900 W	396 W ^c	✓

^a Types L22, L23, L24

^b Type L21

^c Type L20

Table E.10 – Power Density Compliance Comparison

RENDERINGS

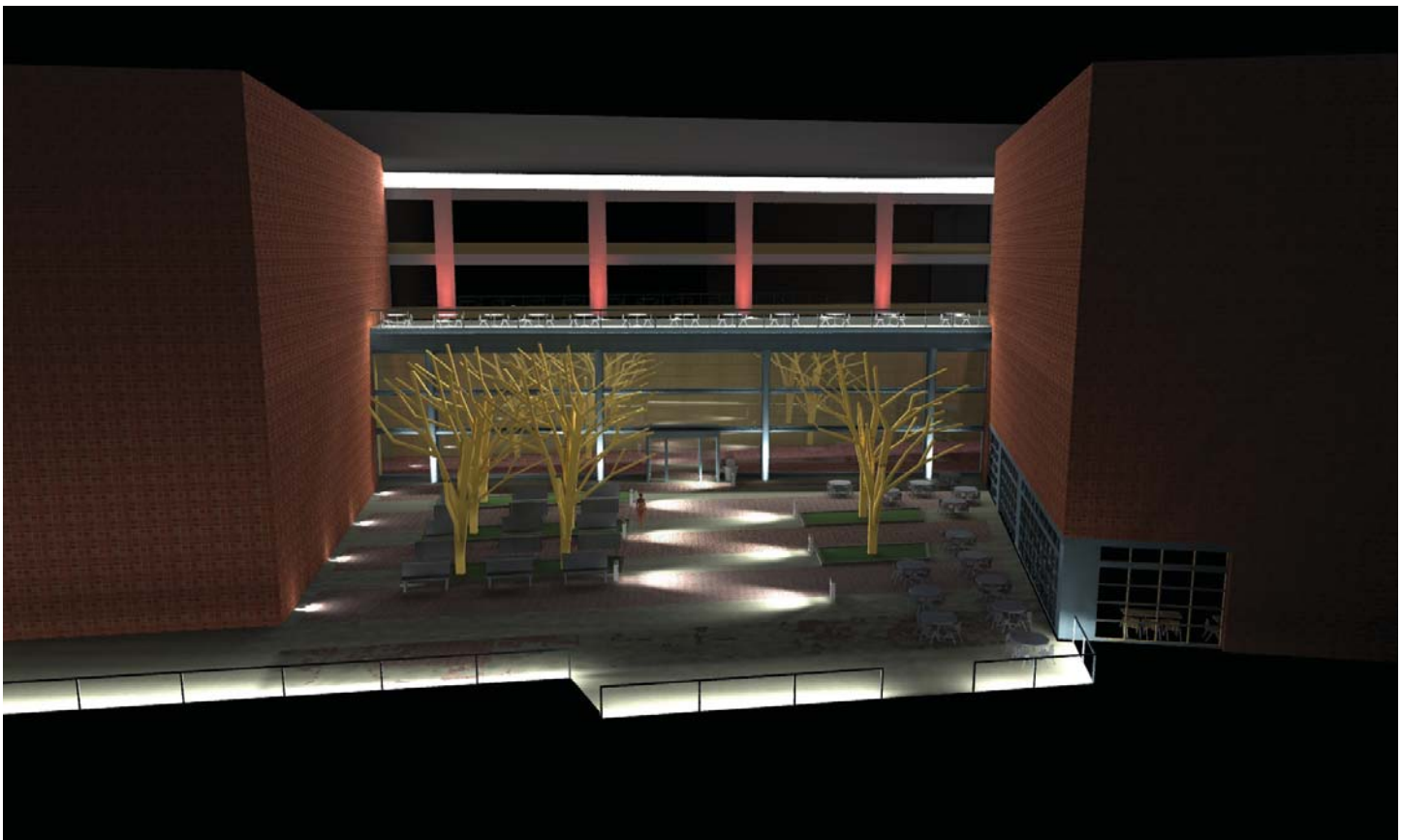


Figure E.11 – RGB raytrace rendering of terrace lighting with red LEDs



Figure E.12 – RGB raytraced rendering of entrance canopy column uplighting



Figure E.13 – RGB raytraced rendering of terrace seating area

ELECTRICAL DEPTH FOUR SPACES

BRANCH CIRCUIT DISTRIBUTION

All four redesigned lighting spaces were circuited to panelboard LCP411. Please see the Introduction at the beginning of this report for general descriptions of each space.

PLANS

The lighting and circuiting layouts have been consolidated into the same plans in an effort to limit paper usage. Please refer to the following for the redesigned branch circuit layouts.

SPACE	FIGURE#
Atrium	B.4, 1st level plan B.5, 2nd level plan B.6, 3rd level plan B.7, 4th level plan
Classroom	C.4
Cafe	D.4
Terrace	E.3, ground level plan E.4, upper level plan

Table F.1 - Index of redesigned lighting branch circuiting plans

FEEDER SCHEDULE																	
TAG	FROM	TO	NO. OF SETS	CONDUIT (PER SET)		CONDUCTORS (PER SET)									SIZE OF OCP	FRAME / SWITCH SIZE	REMARKS
						PHASE			NEUTRAL			GROUND					
				SIZE	TYPE	No.	SIZE	TYPE	No.	SIZE	TYPE	No.	SIZE	TYPE			
1	DP	P	1	1"	EMT	3	4AWG	CU THWN				1	10AWG	CU THWN	60	100A/3P	2
2	DP	P	1	1 1/4"	EMT	3	4AWG	CU THWN	1	4AWG	CU THWN	1	10AWG	CU THWN	60	100A/3P	2
5	DP	P	1	1 1/2"	EMT	3	1AWG	CU THWN				1	8AWG	CU THWN	100	100A/3P	2
6	DP	P	1	1 1/2"	EMT	3	1AWG	CU THWN	1	1AWG	CU THWN	1	8AWG	CU THWN	100	100A/3P	2
10	DP	P	1	2"	EMT	3	1/0AWG	CU THWN	1	1/0AWG	CU THWN	1	6AWG	CU THWN	150	225A/3P	2, 4
12	DP2L	UPS	1	2"	EMT	3	2/0AWG	CU THWN	1	2/0AWG	CU THWN	1	6AWG	CU THWN	175	225A/3P	
18	MS4L	DP	1	3"	EMT	3	250KCMIL	CU THWN	1	250KCMIL	CU THWN	1	4AWG	CU THWN	250	800A/3P	3
20	MS4L	DP	1	3"	EMT	3	350KCMIL	CU THWN	1	350KCMIL	CU THWN	1	4AWG	CU THWN	300	800A/3P	2
24	MS4L	DP	1	4"	EMT	3	600KCMIL	CU THWN	1	600KCMIL	CU THWN	1	3AWG	CU THWN	400	800A/3P	3
26	MS4L	DP4P2	2	3"	EMT	3	250KCMIL	CU THWN	1	250KCMIL	CU THWN	1	2AWG	CU THWN	500	800A/3P	
28	MS4L	DP4L1	2	3"	EMT	3	350KCMIL	CU THWN	1	350KCMIL	CU THWN	1	1AWG	CU THWN	600	800A/3P	
30	MS4L	DP4P1	2	4"	EMT	3	600KCMIL	CU THWN	1	600KCMIL	CU THWN	1	1/0AWG	CU THWN	800	800A/3P	

NOTES:
 1. REFER TO ONE-LINE DIAGRAM FOR FEEDER TAGS
 2. SAME FEEDER TYPE USED IN MULTIPLE AREAS. "DP" INDICATES DISTRIBUTION PANEL, "P" INDICATES POWER PANEL.
 3. FEEDER ALSO USED FROM EMERGENCY/LIFE SAFETY ATS TO RESPECTIVE DISTRIBUTION PANELS.
 4. FEEDER ALSO USED FROM EMERGENCY/LIFE SAFETY XFMR TO RESPECTIVE ATS.

Table F.2 - Typical Feeder Schedule

Due to the large size of this building, only typical feeders have been listed instead of itemizing every application. If "DP" or "P" is listed under the "FROM" and/or "TO" columns in the feeder schedule above, more than one distribution panel or power panel uses that same feeder. Please refer to the one-line diagram at the end of this report for specific feeder application information.

PANELBOARD SCHEDULES

Redesigned circuit loads are highlighted in the following panelboard schedules and sizing worksheets, including loads that were added to spare circuits per requirements.

EXISTING CONDITION PANELBOARD

PANELBOARD SCHEDULE												
VOLTAGE:480Y/277V,3PH,4W SIZE/TYPE BUS:100A SIZE/TYPE MAIN:MLO			PANEL TAG:LCP411 PANEL#P101, Electrical LOCATION::Closet PANEL MOUNTING: SURFACE						MIN. C/B AIC:10K OPTIONS:			
DESCRIP-TION	LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	A	B	C	POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIP-TION
fluorescent lighting	Office	2000	20A/1P	1	*			2	20A/1P	2300	Corridor	fluorescent lighting
fluorescent lighting	Office	2200	20A/1P	3		*		4	20A/1P	2000	Corridor	fluorescent lighting
fluorescent lighting	Office	2000	20A/1P	5			*	6	20A/1P	1200	Corridor	fluorescent lighting
fluorescent lighting	Stair	2000	20A/1P	7	*			8	20A/1P	1400	Corridor	fluorescent lighting
cold cathode lighting	Atrium/Stair	2000	20A/1P	9		*		10	20A/1P	2000	Corridor	fluorescent lighting
fluorescent lighting	Classrm	800	20A/1P	11			*	12	20A/1P	2400	Corridor	fluorescent lighting
fluorescent lighting	Classrm	800	20A/1P	13	*			14	20A/1P	1600	Café	fluorescent lighting
SPARE	0	0	20A/1P	15		*		16	20A/1P	1600	Café	fluorescent lighting
SPARE	0	0	20A/1P	17			*	18	20A/1P	3200	1st fl ATC	fluorescent lighting
SPARE	0	0	20A/1P	19	*			20	20A/1P	1500	1st fl WW	fluorescent lighting
SPARE	0	0	20A/1P	21		*		22	20A/1P	0	0	SPARE
SPARE	0	0	20A/1P	23			*	24	20A/1P	0	0	SPARE
SPARE	0	0	20A/1P	25	*			26	20A/1P	0	0	SPARE
SPACE	0	0	20A/1P	27		*		28	20A/1P	0	0	SPARE
SPACE	0	0	20A/1P	29			*	30	20A/1P	0	0	SPARE
CONNECTED LOAD (KW) - A		11.60							TOTAL DESIGN LOAD (KW)		31.00	
CONNECTED LOAD (KW) - B		9.80							POWER FACTOR		0.95	
CONNECTED LOAD (KW) - C		9.60							TOTAL DESIGN LOAD (AMPS)		39	

Table F.3a - Panelboard schedule for existing panel 'LCP411'

PANELBOARD SIZING WORKSHEET

Panel Tag----->	LCP411	Panel Location:	#P101, Electrical Closet	
Nominal Phase to Neutral Voltage----->	277	Phase:	3	
Nominal Phase to Phase Voltage----->	480	Wires:	4	

Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks			
1	A	fluorescent lighting	3	Office	2000	w	0.95	2000	2105				
2	A	fluorescent lighting	3	Corridor	2300	w	0.95	2300	2421				
3	B	fluorescent lighting	3	Office	2200	w	0.95	2200	2316				
4	B	fluorescent lighting	3	Corridor	2000	w	0.95	2000	2105				
5	C	fluorescent lighting	3	Office	2000	w	0.95	2000	2105				
6	C	fluorescent lighting	3	Corridor	1200	w	0.95	1200	1263				
7	A	fluorescent lighting	3	Stair	2000	w	0.95	2000	2105				
8	A	fluorescent lighting	3	Corridor	1400	w	0.95	1400	1474				
9	B	cold cathode ltg	3	Atrium/Stair	2000	w	0.95	2000	2105				
10	B	fluorescent lighting	3	Corridor	2000	w	0.95	2000	2105				
11	C	fluorescent lighting	3	Classrm	800	w	0.95	800	842				
12	C	fluorescent lighting	3	Corridor	2400	w	0.95	2400	2526				
13	A	fluorescent lighting	3	Classrm	800	w	0.95	800	842	Redesigned			
14	A	fluorescent lighting	3	Café	1600	w	0.95	1600	1684				
15	B	SPARE	3		0	w	0.95	0	0	Updated			
16	B	fluorescent lighting	3	Café	1600	w	0.95	1600	1684				
17	C	SPARE	3		0	w	0.95	0	0	Updated			
18	C	fluorescent lighting	3	1st fl ATC	3200	w	0.95	3200	3368				
19	A	SPARE			0	w	0.95	0	0	Updated			
20	A	fluorescent lighting	3	1st fl WW	1500	w	0.95	1500	1579				
21	B	SPARE				w				Updated			
22	B	SPARE				w				Updated			
23	C	SPARE				w				Updated			
24	C	SPARE				w				Updated			
25	A	SPARE				w				Updated			
26	A	SPARE				w				Updated			
27	B	SPACE				w							
28	B	SPARE				w				Updated			
29	C	SPACE				w							
30	C	SPARE				w				Updated			
PANEL TOTAL								31.0	32.6	Amps=	39.3		
PHASE LOADING										kW	kVA	%	Amps
PHASE TOTAL			A					11.6	12.2	37%	44.1		
PHASE TOTAL			B					9.8	10.3	32%	37.2		
PHASE TOTAL			C					9.6	10.1	31%	36.5		

LOAD CATAGORIES		Connected			Demand			PF	Amps=	Ver. 1.03
		kW	kVA	DF	kW	kVA				
1	receptacles	0.0	0.0		0.0	0.0				
2	computers	0.0	0.0		0.0	0.0				
3	fluorescent lighting	31.0	32.6		31.0	32.6	0.95			
4	HID lighting	0.0	0.0		0.0	0.0				
5	incandescent lighting	0.0	0.0		0.0	0.0				
6	HVAC fans	0.0	0.0		0.0	0.0				
7	heating	0.0	0.0		0.0	0.0				
8	kitchen equipment	0.0	0.0		0.0	0.0				
9	unassigned	0.0	0.0		0.0	0.0				
Total Demand Loads					31.0	32.6				
Spare Capacity					0.0	0.0				
Total Design Loads					31.0	32.6	0.95	Amps=	39.3	

Default Power Factor = 0.80

Default Demand Factor = 1.00

Table F.3b - Panelboard sizing worksheet for existing panel 'LCP411'

PANELBOARD SCHEDULE

VOLTAGE: 480Y/277V, 3PH, 4W SIZE/TYPE BUS: 100A SIZE/TYPE MAIN: MLO			PANEL TAG: LCP411 PANEL LOCATION: #P101 Electrical Closet PANEL MOUNTING: SURFACE						MIN. C/B AIC: 14K OPTIONS:			
DESCRIPTION	LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	A	B	C	POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
fluorescent lighting	Office	2000	20A/1P	1	*			2	20A/1P	2300	Corridor	fluorescent lighting
fluorescent lighting	Office	2200	20A/1P	3		*		4	20A/1P	2000	Corridor	fluorescent lighting
fluorescent lighting	Office	2000	20A/1P	5			*	6	20A/1P	1200	Corridor	fluorescent lighting
fluorescent lighting	Stair	2000	20A/1P	7	*			8	20A/1P	1400	Corridor	fluorescent lighting
fluorescent lighting	Atrium/Stair	2000	20A/1P	9		*		10	20A/1P	329	Vestibule	fluorescent lighting
fluorescent lighting	Classrm	800	20A/1P	11			*	12	20A/1P	2400	Corridor	fluorescent lighting
fluorescent lighting	Classrm	2455	20A/1P	13	*			14	20A/1P	957	Café	fluorescent lighting
fluorescent lighting	Atrium	728	20A/1P	15		*		16	20A/1P	1910	Café	fluorescent lighting
SPARE	0	3601	20A/1P	17			*	18	20A/1P	3200	1st fl ATC	fluorescent lighting
SPARE	0	3601	20A/1P	19	*			20	20A/1P	1500	1st fl WW	fluorescent lighting
SPARE	0	3601	20A/1P	21		*		22	20A/1P	3601	0	SPARE
SPARE	0	3601	20A/1P	23			*	24	20A/1P	3601	0	SPARE
SPARE	0	3601	20A/1P	25	*			26	20A/1P	1028	Café	halogen & LED ltg
SPACE	0	0	20A/1P	27		*		28	20A/1P	1559	Café	fluorescent lighting
SPACE	0	0	20A/1P	29			*	30	20A/1P	1137	terrace	metal halide ltg
CONNECTED LOAD (KW) - A		20.84							TOTAL DESIGN LOAD (KW)		60.31	
CONNECTED LOAD (KW) - B		17.93							POWER FACTOR		0.97	
CONNECTED LOAD (KW) - C		21.54							TOTAL DESIGN LOAD (AMPS)		75	

Table F.4a - Panelboard schedule for redesigned panel 'LCP411'

PANELBOARD SIZING WORKSHEET										
Panel Tag----->					LCP411	Panel Location:			#P101, Electrical Closet	
Nominal Phase to Neutral Voltage----->					277	Phase:			3	
Nominal Phase to Phase Voltage----->					480	Wires:			4	
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks
1	A	fluorescent lighting	3	Office	2000	w	0.95	2000	2105	
2	A	fluorescent lighting	3	Corridor	2300	w	0.95	2300	2421	
3	B	fluorescent lighting	3	Office	2200	w	0.95	2200	2316	
4	B	fluorescent lighting	3	Corridor	2000	w	0.95	2000	2105	
5	C	fluorescent lighting	3	Office	2000	w	0.95	2000	2105	
6	C	fluorescent lighting	3	Corridor	1200	w	0.95	1200	1263	
7	A	fluorescent lighting	3	Stair	2000	w	0.95	2000	2105	
8	A	fluorescent lighting	3	Corridor	1400	w	0.95	1400	1474	
9	B	fluorescent lighting	3	Atrium/Stair	2000	w	0.95	2000	2105	Updated
10	B	fluorescent lighting	3	Vestibule	329	w	0.95	329	346	Updated
11	C	fluorescent lighting	3	Classrm	800	w	0.95	800	842	
12	C	fluorescent lighting	3	Corridor	2400	w	0.95	2400	2526	
13	A	fluorescent lighting	3	Classrm	2455	w	0.95	2455	2584	Updated
14	A	fluorescent lighting	3	Café	957	w	0.95	957	1007	Updated
15	B	fluorescent lighting	3	Atrium	728	w	0.95	728	766	Updated
16	B	fluorescent lighting	3	Café	1909.65	w	0.95	1910	2010	Updated
17	C	SPARE			3601	w	1.00	3601	3601	Updated
18	C	fluorescent lighting	3	1st fl ATC	3200	w	0.95	3200	3368	
19	A	SPARE			3601	w	1.00	3601	3601	Updated
20	A	fluorescent lighting	3	1st fl WW	1500	w	0.95	1500	1579	
21	B	SPARE			3601	w	1.00	3601	3601	Updated
22	B	SPARE			3601	w	1.00	3601	3601	Updated
23	C	SPARE			3601	w	1.00	3601	3601	Updated
24	C	SPARE			3601	w	1.00	3601	3601	Updated
25	A	SPARE			3601	w	1.00	3601	3601	Updated
26	A	halogen & LED ltg	5	Café	1028	w	0.95	1028	1082	Updated
27	B	SPACE			0	w	1.00	0	0	
28	B	fluorescent lighting	3	Café	1559	w	0.95	1559	1641	Updated
29	C	SPACE			0	w	1.00	0	0	
30	C	metal halide ltg	4	terrace	1137	w	1.00	1137	1137	Updated
PANEL TOTAL								60.3	62.1	Amps= 74.7
PHASE LOADING										
PHASE TOTAL								A		
PHASE TOTAL								B		
PHASE TOTAL								C		
								kW	kVA	% Amps
								20.8	21.6	35% 77.8
								17.9	18.5	30% 66.8
								21.5	22.0	36% 79.6

LOAD CATAGORIES		Connected			Demand			Ver. 1.03
		kW	kVA	DF	kW	kVA	PF	
1	receptacles	0.0	0.0		0.0	0.0		
2	computers	0.0	0.0		0.0	0.0		
3	fluorescent lighting	32.9	34.7		32.9	34.7	0.95	
4	HID lighting	1.1	1.1		1.1	1.1	1.00	
5	incandescent lighting	1.0	1.1		1.0	1.1	0.95	
6	HVAC fans	0.0	0.0		0.0	0.0		
7	heating	0.0	0.0		0.0	0.0		
8	kitchen equipment	0.0	0.0		0.0	0.0		
9	unassigned	25.2	25.2		25.2	25.2	1.00	
Total Demand Loads					60.3	62.1		
Spare Capacity					0.0	0.0		
Total Design Loads					60.3	62.1	0.97	Amps= 74.7

Default Power Factor = 0.80

Default Demand Factor = 1.00

Table F.4b - Panelboard sizing worksheet for redesigned panel 'LCP411'

SHORT CIRCUIT PROTECTIVE DEVICE COORDINATION STUDY

A protective device coordination study was performed using overcurrent protection device time/current curves for the redesigned panel 'LCP411' and subsequent equipment upstream, distribution panel 'DP4L2', and main switchboard switchboard 'MS4L'. The distribution panel was redesigned for this report as well so the new overcurrent protection device size was used for this study.

According to the following trip curves figure, the 100 A breaker for 'LCP411' shown in red would trip before the 400 A breaker for 'DP4L2' shown in blue, which would trip before the 3000 A breaker for 'MS4L' shown in green, thereby confirming that the devices are coordinated.

TRIP CURVE COLOR KEY

100A @DP5L2 for LCP411

400A @MS4L for DP4L2

3000A MS4L main

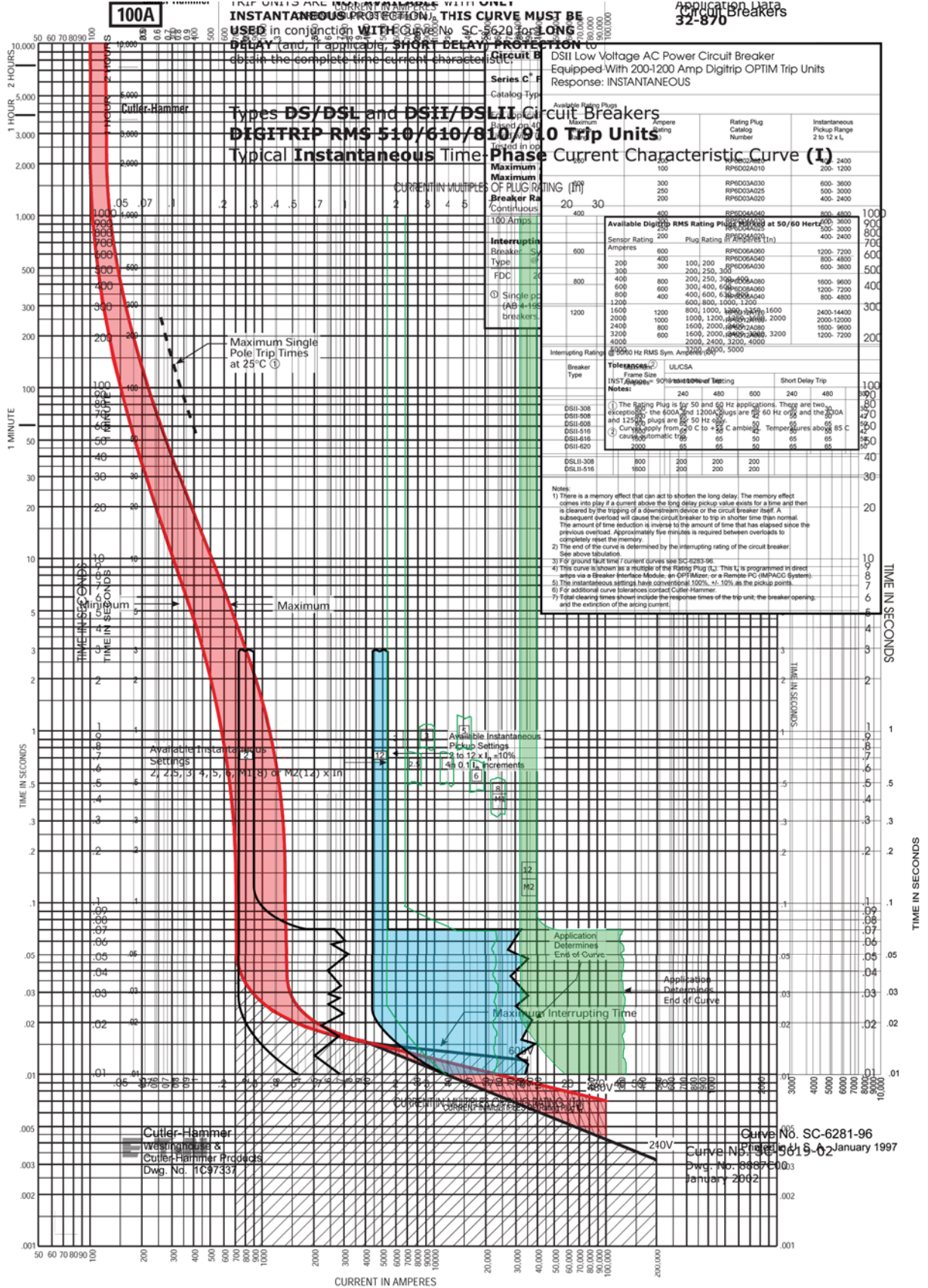


Figure F.5 - Redesigned protective device coordination

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DEPTH TOPICS

COMPARISON FEEDERS: COPPER VS. ALUMINUM

Feeders from main switchboard 'MS4L' were compared for copper versus aluminum. The equivalent aluminum conductor sizes were determined by converting the existing copper sizes via Table 310-16 in the National Electric Code (NEC). The following table presents a cost comparison between the two feeder types.

COPPER PRICING															
TAG	FROM	TO	LENGTH [FT]	NO. OF SETS	CONDUIT (PER SET)		CONDUCTORS (PER SET)						OCP	FRAME / SWITCH SIZE	TOTAL \$
							PHASE/NEUTRAL			GROUND					
					SIZE	TYPE	No.	SIZE	\$/LF	No.	SIZE	\$/LF			
18	MS4L	ATS-EM	50	1	3"	EMT	4	250KCMIL	28.67	1	4AWG	2.12	250	800A/3P	1,539.17
20	MS4L	DP4L2	50	1	3"	EMT	4	350KCMIL	37.33	1	4AWG	2.12	300	800A/3P	1,972.50
20	MS4L	DP4L3	45	1	3"	EMT	4	350KCMIL	37.33	1	4AWG	2.12	300	800A/3P	1,775.25
24	MS4L	ATS-LR	70	1	4"	EMT	4	600KCMIL	47.00	1	3AWG	2.29	400	800A/3P	3,450.30
26	MS4L	DP4P2	250	2	3"	EMT	4	250KCMIL	28.67	1	2AWG	2.72	500	800A/3P	15,691.67
28	MS4L	DP4L1	40	2	3"	EMT	4	350KCMIL	37.33	1	1AWG	3.90	600	800A/3P	3,298.67
30	MS4L	DP4P1	260	2	4"	EMT	4	600KCMIL	28.67	1	1/0AWG	4.08	800	800A/3P	17,030.00
T7P	MS4L	T7	30	1	3"	EMT	3	350KCMIL	28.00	1	4AWG	2.12	800	300A/3P	903.50
T7S	T7	DP2L	15	2	3"	EMT	4	250KCMIL	28.67	1	2AWG	2.72	800	600A/3P	941.50
														TOTAL	46,602.55

Tables F.6 - Copper feeder costs from main switchboard 'MS4L'

ALUMINUM PRICING															
TAG	FROM	TO	LENGTH [FT]	NO. OF SETS	CONDUIT (PER SET)		CONDUCTORS (PER SET)						OCP	FRAME / SWITCH SIZE	TOTAL \$
							PHASE/NEUTRAL			GROUND					
					SIZE	TYPE	No.	SIZE	\$/LF	No.	SIZE	\$/LF			
18	MS4L	ATS-EM	50	1	3"	EMT	4	350KCMIL	18.53	1	3AWG	1.63	250	800A/3P	1,008.17
20	MS4L	DP4L2	50	1	3"	EMT	4	500KCMIL	22.27	1	3AWG	1.63	300	800A/3P	1,194.83
20	MS4L	DP4L3	45	1	3"	EMT	4	500KCMIL	22.27	1	3AWG	1.63	300	800A/3P	1,075.35
24	MS4L	ATS-LR	70	2	4"	EMT	4	350KCMIL	18.53	1	2AWG	1.77	400	800A/3P	2,842.00
26	MS4L	DP4P2	250	2	3"	EMT	4	350KCMIL	18.53	1	1AWG	1.98	500	800A/3P	10,258.33
28	MS4L	DP4L1	40	3	3"	EMT	4	250KCMIL	16.80	1	1/0AWG	2.42	600	800A/3P	2,306.00
30	MS4L	DP4P1	260	3	4"	EMT	4	500KCMIL	22.27	1	3/0AWG	3.05	800	800A/3P	19,747.00
T7P	MS4L	T7	30	1	3"	EMT	3	500KCMIL	16.70	1	3AWG	1.63	800	300A/3P	549.90
T7S	T7	DP2L	15	2	3"	EMT	4	500KCMIL	22.27	1	1AWG	1.98	800	600A/3P	727.50
														TOTAL	39,709.08

Tables F.6 - Aluminum feeder costs from main switchboard 'MS4L'

The aluminum feeders show a 14.8% material cost savings, which has the potential to be even more significantly higher if all the copper conductors in the Smeal Business Building were replaced with aluminum. However, there are other characteristics that need to be evaluated before it can be determined whether or not the cost savings of aluminum over copper is enough to justify the replacement.

Copper has a higher ampacity and electrical conductivity than that of aluminum, which means smaller sizes could be used to serve the same loads. Smaller sizes translates to reduced bulk and greater wire flexibility, which means copper wires could also be easier to transport and install than the load equivalent aluminum wires would be to transport and install. Copper is also capable of withstanding greater amounts of abuse, including those incurred during installation like pulling and bending, as well as natural corrosive abuse that would occur over time.

Aluminum is a softer metal with a higher thermal expansion coefficient than copper and more susceptible to corrosion, giving it a shorter lifespan. Aluminum's thermal properties put it at a disadvantage when compared to copper because of the potential to loosen joints and connections from greater expansion and contraction movements of the conductors. This could especially be a problem if the loads passing through the conductors are unsteady; the best place to use aluminum conductors if at all would be from the utility into the building as such loads remain relatively consistent.

Aluminum's greatest advantage over copper is material cost. This may prove highly beneficial in a showroom or tenant fit-out type project because the application would be relatively temporary. University buildings such as the Business Building however, tend to remain in use even long after it should have been renovated or demolished so those projects would suffer from having to do frequent repair and maintenance work due to aluminum's shorter lifespan. Therefore, despite the tempting initial cost savings it is not recommended to use aluminum feeders in the Smeal Business Building.

CHANGES

DISTRIBUTION PANEL REDESIGN

The existing one-line diagram shows that panel 'LCP411' is fed from another lighting panelboard, 'LCP421', which is fed from distribution panel 'DP4L2'. However, the existing panelboard schedule for 'LCP421' does not reflect or reference 'LCP411' at all. Due to this conflicting information, panel 'LCP421' has been disregarded for the purposes of this exercise and replaced with 'LCP411' on distribution panel 'DP4L2'.

Distribution panel 'DP4L2' feeds four 208/120V distribution panels through 75 kVA transformers, one per panel. The actual 208/120 V distribution panel load information was not available so the 75 kVA transformer loaded at 80% was assumed.

The mechanical lift shown on the one-line diagram was also lacking actual load information so its associated feeder size was used to assume one for resizing 'DP4L2'.

Spare circuits were given a load at 65% capacity with a 1.00 power factor and 1.00 demand factor.

PANELBOARD SCHEDULE												
VOLTAGE:480Y/277V,3PH,4W SIZE/TYPER BUS:400A SIZE/TYPER MAIN:MLO			PANEL TAG:DP4L2 PANEL LOCATION:MAIN SWITCHBD RM PANEL MOUNTING: SURFACE						MIN. C/B AIC:65K OPTIONS:			
DESCRIPTION	LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	A	B	C	POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
Ltg Panel	1st fl	20520	100A/3P	1	*			2	60A/3P	8075	lower level	Ltg Panel
-	-	17575		3		*		4		5510	-	-
-	-	20900		5			*	6		2660	-	-
75 kVA xfmr	1st fl	18000	150A/3P	7	*			8	150A/3P	18000	2nd fl	75 kVA xfmr
-	-	18000		9		*		10		18000	-	-
-	-	18000		11			*	12		18000	-	-
75 kVA xfmr	3rd fl	18000	150A/3P	13	*			14	150A/3P	20000	4th fl	75 kVA xfmr
-	-	18000		15		*		16		20000	-	-
-	-	18000		17			*	18		20000	-	-
Mech'l Lift	-	1182	20A/3P	19	*			20	100A/1P	18005		SPARE
-	-	1182		21		*		22	100A/1P	18005		SPARE
-	-	1182		23			*	24	100A/1P	18005		SPARE
SPACE			3P	25	*			26	3P			SPACE
-				27		*		28				-
-				29			*	30				-
CONNECTED LOAD (KW) - A		119.78							TOTAL DESIGN LOAD (KW)		286.83	
CONNECTED LOAD (KW) - B		114.27							POWER FACTOR		0.94	
CONNECTED LOAD (KW) - C		114.75							TOTAL DESIGN LOAD (AMPS)		369	

Table F7a - Panelboard schedule for redesigned distribution panel 'DP4L2'

LOAD CATAGORIES		Connected			Demand				Ver. 1.01
		kW	kVA	DF	kW	kVA	PF		
1	receptacles	216.0	240.0	0.50	108.0	120.0	0.90		
2	computers	0.0	0.0	0.00	0.0	0.0			
3	fluorescent lighting	75.2	79.2	1.00	75.2	79.2	0.95		
4	HID lighting	0.0	0.0	0.00	0.0	0.0			
5	incandescent lighting	0.0	0.0	0.00	0.0	0.0			
6	HVAC fans	3.5	4.4	0.50	1.8	2.2	0.80		
7	heating	0.0	0.0	0.00	0.0	0.0			
8	Spare	54.0	54.0	1.00	54.0	54.0	1.00		
Total Demand Loads					239.0	255.4			
Spare Capacity		20%			47.8	51.1			
Total Design Loads					286.8	306.5	0.94	Amps=	368.9

Table F7b - Panelboard sizing worksheet for redesigned distribution panel 'DP4L2'

The associated overcurrent protection device at main switchboard 'MS4L' should be 400A for the redeisgned 'DP4L2' and its feeder should be 4#500KCMIL+1#3G in 4"C for its 370 A design load. The conductor size was determined via NEC Table 310-16.

ACOUSTICS BREADTH

CAFE REVERBERATION

The ceiling above the dining area of the existing cafe design consisted of acoustical wood paneling but was changed to gypsum wall board as part of the architecture breadth and lighting redesign to brighten up the ceiling and create a cleaner area for mounting recessed downlights. However, the existing wood paneling played a heavy role in the acoustical properties of the room so the new ceiling design must compensate for its removal to ensure a pleasant dining and conversation area will be maintained. This is important because the servery and coffee bar are open to the dining area, as would the outdoor seating area be during warmer days when the doors to that area would be open. This could cause heavy sound transmission to occur between spaces making conversation and other tasks difficult if acoustical treatments are not considered.

The reverberation time for the existing conditions was used as the target range for the new design.

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	GWB	531	0.05	0.04	26.54	21.23
	Perf Wood	1127	0.80	0.50	901.6	563.5
wall	Glass, windows	1574	0.18	0.12	283.3	188.8
	Wood	658	0.10	0.08	65.76	52.61
floor	Terrazzo	1050	0.02	0.02	21.01	21.01
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	1469.9	1115.4
VOLUME	17,406	CF	T₆₀=0.5(V/a)=V/(ΣSa)		0.59	0.78

Table G.1 - Reverberation Time Calculations for Existing Conditions

Reverberation times were then calculated for the new ceiling by removing the wood paneling and allocating the entire ceiling area to gypsum wall board. As was expected, the reverberation time increased significantly.

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	GWB	1658	0.05	0.04	82.89	66.31
wall	Glass, windows	1574	0.18	0.12	283.3	188.8
	Wood	658	0.10	0.08	65.76	52.61
floor	Terrazzo	1050	0.02	0.02	21.01	21.01
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	624.6	597.0
VOLUME	17,406CF		T₆₀=0.5(V/a)=V/(ΣSa)		1.39	1.46

Table G.2 - Reverberation Time Calculations for GWB Only Ceiling

Though the aesthetic of acoustic ceiling tile is not as desired as that of a clean gypsum ceiling, it was considered as a compromise for its acoustical properties since it is light in color.

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	ACT	1658	0.83	0.99	1376	1641
wall	Glass, windows	1574	0.18	0.12	283.3	188.8
	Wood	658	0.10	0.08	65.76	52.61
floor	Terrazzo	1050	0.02	0.02	21.01	21.01
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	1917.7	2171.9
VOLUME	17,406CF		T₆₀=0.5(V/a)=V/(ΣSa)		0.45	0.40

Table G.3 - Reverberation Time Calculations for ACT Only Ceiling

The reverberation time, while shorter than the plain gypsum ceiling, was too short in general so a floor treatment was considered instead while keeping the gypsum ceiling as originally desired for the new ceiling. While it is acknowledged that carpeting the floor would provide a very different look to the space whose existing floor is terrazzo, carpet would enhance the space by adding to the upscale feel around which the cafe was designed.

Wall treatments at the curtain walls was also explored as an option because of its potential to serve two purposes. Since the cafe faces south it would receive much direct daylight; drapery at the curtain walls could help to control some of that daylight while helping to absorb sound at the same time.

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	GWB	1658	0.05	0.04	82.89	66.31
wall	Glass, windows	1574	0.18	0.12	283.3	188.8
	Wood	658	0.10	0.08	65.76	52.61
floor	Carpet, on concrete	1050	0.14	0.37	147.05	388.62
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	750.7	964.6
VOLUME	17,406CF		T₆₀=0.5(V/a)=V/(ΣSa)		1.16	0.90

Table G.4 - Reverberation Time Calculations for GWB Ceiling with Heavy Carpet on Concrete

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	GWB	1658	0.05	0.04	82.89	66.31
wall	drapery, medium	1116	0.49	0.75	546.7	836.7
	Glass, window	458	0.18	0.12	82.45	54.97
	Wood	658	0.10	0.08	65.76	52.61
floor	Terrazzo	1050	0.02	0.02	21.01	21.01
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	970.5	1299.9
VOLUME	17,406CF		T₆₀=0.5(V/a)=V/(ΣSa)		0.90	0.67

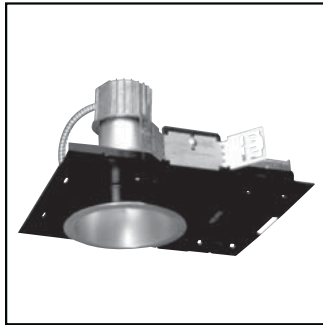
Table G.5 - Reverberation Time Calculations for GWB Ceiling w/ Medium Drapery at Windows

The floor and window treatments both had longer reverberation times in the lower frequency so a combination of treatments were explored to see if a middle ground could be achieved.

SURFACE	MATERIAL	AREA (SF)	ABSORPTION COEFFICIENT		Sa	
			500 Hz	1000 Hz	500 Hz	1000 Hz
ceiling	Plywood, 3/8"	1658	0.17	0.09	281.82	149.20
wall	Glass, windows	1574	0.18	0.12	283.3	188.8
	Wood	658	0.10	0.08	65.76	52.61
floor	Carpet, latex on rubber	1050	0.39	0.34	409.63	357.11
	Seats, upholstered	112	0.56	0.67	62.72	75.04
	Seats, metal	495	0.22	0.39	109.0	193.2
				a=ΣSa	1212.2	1016.0
VOLUME	17,406CF		T₆₀=0.5(V/a)=V/(ΣSa)		0.72	0.86

Table G.6 - Reverberation Time Calculations for Plywood Only Ceiling with Heavy Carpet with Impermeable Latex Backing on Foam Rubber

APPENDIX A EQUIPMENT CUTSHEETS



Featuring **NirtudS-urce** Reflectors

6" Vertical Quad Open &
Wall Wash Downlights

CFQ613EB
CFQ618EB
CFQ626EB

One 13W/18W/26W
Quad Tube 4-Pin Lamp
Non-IC Rated
120V, 208V, 240V, 277V, or 347V

DATE: _____ TYPE: _____
FIRM NAME: _____
PROJECT: _____

**TYPE
L1**

Architektür

Ceiling Cutout: 6 1/4"
Maximum Ceiling Thickness: 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale

APPLICATIONS:

The CFQ6 series offers vertical lamped compact fluorescent downlight and wall wash fixtures that provide superior brightness and glare control. This series is ideal for a wide variety of low to medium height ceiling applications including commercial, retail, and hospitality. The CFQ6 series is compatible with the Signos6 family of architectural elements.

HOUSING:

One-piece painted 18-gauge cold rolled steel platform. Prewired J-box with snap-on cover for easy access. Vented at lamp tip and socket for maximum light output. Same housing accommodates downlight and wall wash downlight reflectors. Diecast aluminum heat sink.

REFLECTOR:

High purity aluminum Alzak Virtual Source® iridescence suppressed reflector. Self-trim standard. Painted white self-trim available. Baffled units standard with painted white self-trim.

BALLAST:

One (1) 13W, 18W, or 26W compact fluorescent encased and potted Class "P" electronic multi-volt (120V through 277V) ballast. HPF and EOL protection standard. Accessible from below ceiling. 347V available.

LAMP:

One (1) 13W (G24q-1 base), 18W (G24q-2 base), or 26W (G24q-3 base) 4-pin quad tube compact fluorescent lamp. Lamp furnished by others.

SOCKET:

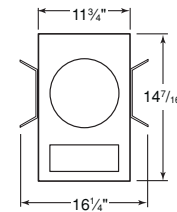
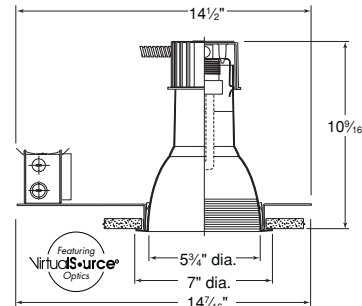
One (1) injection molded socket (vented). Adjusts to three positions, accommodating various lamp sizes and ensuring proper lamp position.

INSTALLATION:

Universal adjustable mounting brackets accommodate 1 1/2" or 3/4" lathing channel or 1/2" EMT (by others), or Prescolite 24" bar hangers (B24 or B6).

LABELS:

UL, CSA listed for damp locations
Approved for through wiring
Non-type I.C.



CATALOG NUMBER:

EXAMPLE: CFQ618EBDM-STF602-B24

HOUSINGS	HOUSING OPTIONS	HOUSING OPTIONS	REFLECTORS	REFLECTOR FINISH	ACCESSORIES
<input type="checkbox"/> CFQ613EB 6", (1) 13W Quad tube, multi-volt electronic ballast <input type="checkbox"/> CFQ618EB 6", (1) 18W Quad tube, multi-volt electronic ballast <input type="checkbox"/> CFQ626EB 6", (1) 26W Quad tube, multi-volt electronic ballast	<input type="checkbox"/> 347V ¹ <input type="checkbox"/> CP Chicago Plenum. Fixture construction and/or specifications may vary. Refer to Chicago Plenum specification sheets on www.prescolite.com for details. (Prefix housing catalog number) <input type="checkbox"/> DM Electronic Analog Dimming Ballast to 3%, 4-wire (120V through 277V) <input type="checkbox"/> SDM ³ Lutron Compact SE Dimming Ballast to 5%, 3-wire (specify voltage/wattage) <input type="checkbox"/> HDM ² Lutron Hi-Lume Dimming Ballast to 1%, 3-wire (specify voltage/wattage)	<input type="checkbox"/> 2DM ² Lutron Tu-Wire Dimming Ballast to 5%, 2-wire (120 volt only) <input type="checkbox"/> 7DM ³ Advance Mark 7 Dimming Ballast to 5%, 4-wire (120V through 277V) <input type="checkbox"/> XDM ³ Advance Mark 10 Dimming Ballast to 5%, 2-wire (specify voltage/wattage) <input type="checkbox"/> EM Emergency battery pack with remote test switch and indicator light (Suffix housing catalog number) (Refer to specification sheet ARCH-CFL-067 for lumen ratings in DC mode) <input type="checkbox"/> FSDFA Fuse kit installed at factory <input type="checkbox"/> RIF1 Radio interference filter (single circuit)	<input type="checkbox"/> STF602 6" Alzak reflector REFLECTOR COLOR <input type="checkbox"/> Blank Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> BL Black Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak	<input type="checkbox"/> Blank Specular <input type="checkbox"/> SS Semi-Specular <input type="checkbox"/> MFC American Matte REFLECTOR OPTIONS <input type="checkbox"/> WT Painted white self-flange <input type="checkbox"/> BC Painted black cone <input type="checkbox"/> WC Painted white cone <input type="checkbox"/> BB Painted black baffle <input type="checkbox"/> WB Painted white baffle <input type="checkbox"/> WW Wall wash reflector <input type="checkbox"/> TRG Trim Ring Gasket (factory installed)	<input type="checkbox"/> B24 Set of two (2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joists up to 24" centers <input type="checkbox"/> FSDFI Fuse kit for field installation <input type="checkbox"/> SCA6D Sloped ceiling adapter (see note on back page) <input type="checkbox"/> Signos6 Architectural glass elements Refer to specification sheets ARCH-SIG-001 through -004

¹Dimming options not available in 347V.
²Not available with 13W or 18W CFL lamps.
³Not available with 13W lamps.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
Web: www.prescolite.com • Tech Support: (888) 777-4832

ARCH-CFL-009



A Division of Hubbell Lighting, Inc.

PHOTOMETRIC DATA

Architektür - 6" Vertical One Lamp Open & TYPE Wall Wash Downlights - CFQ SERIES L1

BALLAST DATA	13W Quad			18W Quad			26W Quad		
	120V	277V	347V	120V	277V	347V	120V	277V	347V
Total System Watts	16W	17W	16W	20W	20W	20W	20W	29W	31W
Input Current (Amps)	0.13	0.06	0.08	0.17	0.08	0.06	0.17	0.11	0.09
Input Frequency in Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power Factor	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%
Ballast Factor	>98%	>98%	1	>98%	>98%	1	>98%	>98%	1
Total Harmonic Distortion	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Min. Starting Temp.	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)

LAMP DATA

	13W Quad	18W Quad	26W Quad
Rated Watts	13W	18W	26W
Rated Lumens	860	1250	1800
Efficacy (LPW)	67	69	69
Rated Life	10,000 hours	10,000 hours	10,000 hours
CRI	82	82	82
Min. Starting Temp.	0° F	0° F	0° F

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average 0°	Average 45°	Average 90°
45°	14576	14603	14312
55°	2995	3261	2463
65°	0	0	0
75°	0	0	0
85°	0	0	0

CFQ626EB-STF602 with Clear Alzak Reflector

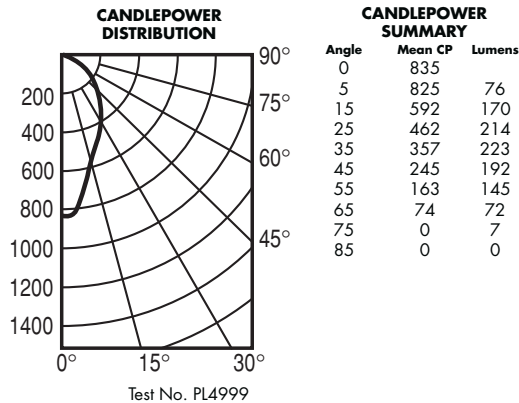
Lower Position

Lamp: One 26W Quad
Spacing Criteria: .7
Efficiency: 61.1%

AVERAGE INITIAL FOOTCANDLES

Multiple Units (Square Array)
Ceiling 80% Wall 50% Floor 20%

26W Quad			
SPACING	RCR1	RCR3	RCR7
7.0	24	19	13
8.0	18	15	10
9.0	14	11	8
10.0	11	9	6
11.0	9	8	5



COEFFICIENTS OF UTILIZATION

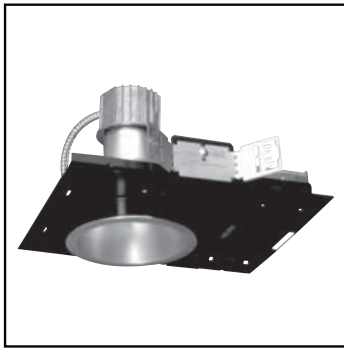
		Zonal Cavity Method																
		% Effective Floor Cavity Reflectance																
		80%		70%		50%		30%		10%								
		20% Effective Floor Cavity Reflectance																
		% Wall Reflectance																
		70	50	30	10	70	50	30	10	50	30	10	50	30	10			
1	Room Cavity Ratio	.69	.67	.65	.63	.67	.65	.64	.62	.63	.61	.60	.60	.59	.58	.58	.57	.57
2		.64	.61	.58	.55	.63	.60	.57	.55	.58	.56	.54	.56	.54	.52	.54	.53	.51
3		.60	.55	.52	.49	.59	.55	.51	.49	.53	.50	.48	.51	.49	.47	.50	.48	.46
4		.56	.51	.47	.44	.55	.50	.47	.43	.49	.45	.43	.47	.45	.42	.46	.44	.42
5		.53	.47	.42	.39	.51	.46	.42	.39	.45	.41	.38	.44	.40	.38	.43	.40	.38
6		.49	.43	.38	.35	.48	.42	.38	.35	.41	.37	.35	.40	.37	.34	.39	.36	.34
7		.46	.39	.34	.31	.45	.38	.34	.31	.38	.34	.31	.37	.33	.31	.36	.33	.31
8		.43	.36	.31	.28	.42	.35	.31	.28	.35	.31	.28	.34	.30	.28	.33	.30	.28
9		.40	.33	.29	.26	.39	.33	.29	.26	.32	.28	.25	.31	.28	.25	.31	.28	.25
10		.38	.31	.26	.23	.37	.30	.26	.23	.30	.26	.23	.29	.26	.23	.29	.25	.23

NOTES

☉ Denotes a Virtual Source reflector.

Refer to www.prescolite.com for additional photometric tests (IES Files).

When ordering a sloped ceiling adapter, specify the degree of slope in 5° increments, max. of 35°. For a more precise degree or wet ceiling applications, please contact factory. Sloped ceiling adapter and housing must be installed at the same time.



Featuring VirtualSource® Reflectors

6" Vertical Quad Open & Wall Wash Downlights

CFQ613EB
CFQ618EB
CFQ626EB

One 13W/18W/26W
Quad Tube 4-Pin Lamp
Non-IC Rated
120V, 208V, 240V, 277V, or 347V

DATE: _____ TYPE: _____
FIRM NAME: _____
PROJECT: _____

Architektür

Ceiling Cutout: 6 1/4"
Maximum Ceiling Thickness: 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale

APPLICATIONS:

The CFQ6 series offers vertical lamped compact fluorescent downlight and wall wash fixtures that provide superior brightness and glare control. This series is ideal for a wide variety of low to medium height ceiling applications including commercial, retail, and hospitality. The CFQ6 series is compatible with the Signos6 family of architectural elements.

HOUSING:

One-piece painted 18-gauge cold rolled steel platform. Prewired J-box with snap-on cover for easy access. Vented at lamp tip and socket for maximum light output. Same housing accommodates downlight and wall wash downlight reflectors. Diecast aluminum heat sink.

REFLECTOR:

High purity aluminum Alzak Virtual Source® iridescence suppressed reflector. Self-trim standard. Painted white self-trim available. Baffled units standard with painted white self-trim.

BALLAST:

One (1) 13W, 18W, or 26W compact fluorescent encased and potted Class 'P' electronic multi-volt (120V through 277V) ballast. HPF and EOL protection standard. Accessible from below ceiling. 347V available.

LAMP:

One (1) 13W (G24q-1 base), 18W (G24q-2 base), or 26W (G24q-3 base) 4-pin quad tube compact fluorescent lamp. Lamp furnished by others.

SOCKET:

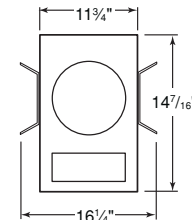
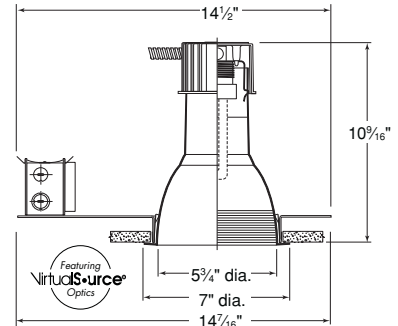
One (1) injection molded socket (vented). Adjusts to three positions, accommodating various lamp sizes and ensuring proper lamp position.

INSTALLATION:

Universal adjustable mounting brackets accommodate 1 1/2" or 3/4" lathing channel or 1/2" EMT (by others), or Prescolite 24" bar hangers (B24 or B6).

LABELS:

UL, CSA listed for damp locations
Approved for through wiring
Non-type I.C.



CATALOG NUMBER:

EXAMPLE: CFQ618EBDM-STF602-B24

HOUSINGS	HOUSING OPTIONS	HOUSING OPTIONS	REFLECTORS	REFLECTOR FINISH	ACCESSORIES
<input type="checkbox"/> CFQ613EB 6", (1) 13W Quad tube, multi-volt electronic ballast <input type="checkbox"/> CFQ618EB 6", (1) 18W Quad tube, multi-volt electronic ballast <input type="checkbox"/> CFQ626EB 6", (1) 26W Quad tube, multi-volt electronic ballast	<input type="checkbox"/> 347V ¹ <input type="checkbox"/> CP Chicago Plenum. Fixture construction and/or specifications may vary. Refer to Chicago Plenum specification sheets on www.prescolite.com for details. (Prefix housing catalog number) <input type="checkbox"/> DM Electronic Analog Dimming Ballast to 3%, 4-wire (120V through 277V) <input type="checkbox"/> SDM ³ Lutron Compact SE Dimming Ballast to 5%, 3-wire (specify voltage/wattage) <input type="checkbox"/> HDM ² Lutron Hi-Lume Dimming Ballast to 1%, 3-wire (specify voltage/wattage)	<input type="checkbox"/> 2DM ² Lutron Tu-Wire Dimming Ballast to 5%, 2-wire (120 volt only) <input type="checkbox"/> 7DM ³ Advance Mark 7 Dimming Ballast to 5%, 4-wire (120V through 277V) <input type="checkbox"/> XDM ³ Advance Mark 10 Dimming Ballast to 5%, 2-wire (specify voltage/wattage) <input type="checkbox"/> EM Emergency battery pack with remote test switch and indicator light (Suffix housing catalog number) [Refer to specification sheet ARCH-CFL-067 for lumen ratings in DC mode] <input type="checkbox"/> FSDFA Fuse kit installed at factory <input type="checkbox"/> RIF1 Radio interference filter (single circuit)	<input type="checkbox"/> STF602 ® 6" Alzak reflector REFLECTOR COLOR <input type="checkbox"/> Blank Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> BL Black Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak	<input type="checkbox"/> Blank Specular <input type="checkbox"/> SS Semi-Specular <input type="checkbox"/> MFC American Matte REFLECTOR OPTIONS <input type="checkbox"/> WT Painted white self-flange <input type="checkbox"/> BC Painted black cone <input type="checkbox"/> WC Painted white cone <input type="checkbox"/> BB Painted black baffle <input type="checkbox"/> WB Painted white baffle <input type="checkbox"/> WW Wall wash reflector <input type="checkbox"/> TRG Trim Ring Gasket (factory installed)	<input type="checkbox"/> B24 Set of two (2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joists up to 24" centers <input type="checkbox"/> FSDFI Fuse kit for field installation <input type="checkbox"/> SCA6D Sloped ceiling adapter (see note on back page) <input type="checkbox"/> Signos6 Architectural glass elements Refer to specification sheets ARCH-SIG-001 through -004

¹Dimming options not available in 347V.
²Not available with 13W or 18W CFL lamps.
³Not available with 13W lamps.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
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ARCH-CFL-009



A Division of Hubbell Lighting, Inc.

PHOTOMETRIC DATA

Architektur - 6" Vertical One Lamp Open & Wall Wash Downlights - CFQ SERIES

**TYPE
L2**

BALLAST DATA	13W Quad			18W Quad			26W Quad		
	120V	277V	347V	120V	277V	347V	120V	277V	347V
Total System Watts	16W	17W	16W	20W	20W	20W	20W	29W	31W
Input Current (Amps)	0.13	0.06	0.08	0.17	0.08	0.06	0.17	0.11	0.09
Input Frequency in Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power Factor	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%
Ballast Factor	>98%	>98%	1	>98%	>98%	1	>98%	>98%	1
Total Harmonic Distortion	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Min. Starting Temp.	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)

LAMP DATA

	13W Quad	18W Quad	26W Quad
Rated Watts	13W	18W	26W
Rated Lumens	860	1250	1800
Efficacy (LPW)	67	69	69
Rated Life	10,000 hours	10,000 hours	10,000 hours
CRI	82	82	82
Min. Starting Temp.	0° F	0° F	0° F

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average 0°	Average 45°	Average 90°
45°	14576	14603	14312
55°	2995	3261	2463
65°	0	0	0
75°	0	0	0
85°	0	0	0

CFQ626EB-STF602 with Clear Alzak Reflector

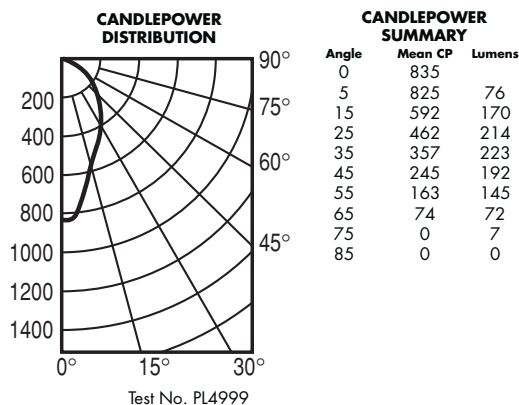
Lower Position

Lamp: One 26W Quad
Spacing Criteria: .7
Efficiency: 61.1%

AVERAGE INITIAL FOOTCANDLES

Multiple Units (Square Array)
Ceiling 80% Wall 50% Floor 20%

26W Quad			
SPACING	RCR1	RCR3	RCR7
7.0	24	19	13
8.0	18	15	10
9.0	14	11	8
10.0	11	9	6
11.0	9	8	5



COEFFICIENTS OF UTILIZATION

Zonal Cavity Method

Room Cavity Ratio	% Effective Floor Cavity Reflectance																
	80%					70%					50%						
	20% Effective Floor Cavity Reflectance																
% Wall Reflectance																	
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	.69	.67	.65	.63	.67	.65	.64	.62	.63	.61	.60	.60	.59	.58	.58	.57	.57
2	.64	.61	.58	.55	.63	.60	.57	.55	.58	.56	.54	.56	.54	.52	.54	.53	.51
3	.60	.55	.52	.49	.59	.55	.51	.49	.53	.50	.48	.51	.49	.47	.50	.48	.46
4	.56	.51	.47	.44	.55	.50	.47	.43	.49	.45	.43	.47	.45	.42	.46	.44	.42
5	.53	.47	.42	.39	.51	.46	.42	.39	.45	.41	.38	.44	.40	.38	.43	.40	.38
6	.49	.43	.38	.35	.48	.42	.38	.35	.41	.37	.35	.40	.37	.34	.39	.36	.34
7	.46	.39	.34	.31	.45	.38	.34	.31	.38	.34	.31	.37	.33	.31	.36	.33	.31
8	.43	.36	.31	.28	.42	.35	.31	.28	.35	.31	.28	.34	.30	.28	.33	.30	.28
9	.40	.33	.29	.26	.39	.33	.29	.26	.32	.28	.25	.31	.28	.25	.31	.28	.25
10	.38	.31	.26	.23	.37	.30	.26	.23	.30	.26	.23	.29	.26	.23	.29	.25	.23

CFQ626EB-STF602 Test No. PL4999

NOTES

☉ Denotes a Virtual Source reflector.

Refer to www.prescolite.com for additional photometric tests (IES Files).

When ordering a sloped ceiling adapter, specify the degree of slope in 5° increments, max. of 35°. For a more precise degree or wet ceiling applications, please contact factory. Sloped ceiling adapter and housing must be installed at the same time.

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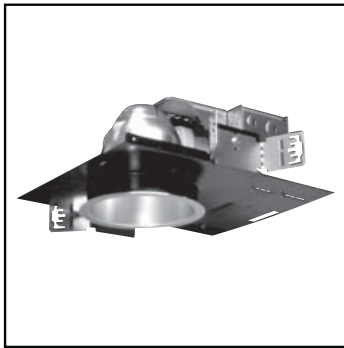
701 Millennium Blvd. • Greenville, SC 29607 U.S.A. • Phone (864) 678-1000

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Specifications subject to change without notice. • Printed in U.S.A. • ARCH-CFL009 • 05/30/07



Hubbell Lighting, Inc.



Featuring VirtualSource® Reflectors

6" Horizontal Triple Open & Wall Wash Downlight CFT632HEB

One 26W, 32W, or 42W Triple Tube 4-Pin Lamp
Non-IC Rated
120V, 208V, 240V, 277V, or 347V

DATE: _____ TYPE: _____
FIRM NAME: _____
PROJECT: _____

Architektür

Ceiling Cutout: 6 1/4"
Maximum Ceiling Thickness: 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale

APPLICATIONS:

The CFT632HEB offers a horizontally lamped compact fluorescent downlight and wall wash fixture that provides superior brightness and glare control. The multi-watt ballast provides the ability to change wattages by simply replacing the lamp. This luminaire is ideal for a wide variety of low to medium height ceiling applications including commercial, retail, and hospitality. The CFT632HEB is compatible with the Signosó family of architectural elements.

HOUSING:

One-piece painted 18-gauge cold rolled steel platform. Prewired J-box with snap-on cover for easy access. Vented at lamp tip and socket for maximum light output. Same housing accommodates downlight and wall wash downlight reflectors.

REFLECTOR:

High purity aluminum Alzak Virtual Source® iridescence suppressed reflector. Self-trim standard. Painted white self-trim available. Baffled units standard with painted white self-trim.

BALLAST:

One (1) compact fluorescent Class 'P' electronic multi-volt (120V through 277V) ballast suitable for operating 26W, 32W, and 42W triple tube lamps. HPF and EOL protection standard. Accessible from below ceiling. 347V available (specify wattage when ordering).

LAMP:

One (1) 26W (GX24q-3 base), 32W (GX24q-3 base), or 42W (GX24q-4 base) 4-pin triple tube compact fluorescent lamp. Lamps furnished by others.

SOCKET:

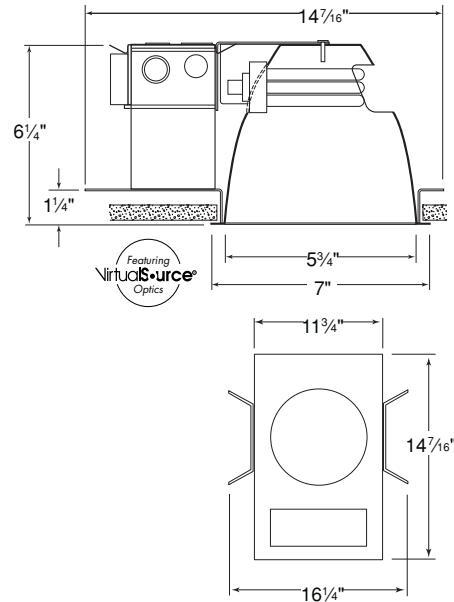
One (1) injection molded socket suitable for 26W, 32W, and 42W triple tube lamps (vented).

INSTALLATION:

Universal adjustable mounting brackets accommodate 1 1/2" or 3/4" lathing channel or 1/2" EMT (by others), or Prescolite 24" bar hangers (B24 or B6).

LABELS:

UL, CSA listed for damp locations
Approved for through wiring
Non-type I.C.



CATALOG NUMBER:

EXAMPLE: CFT632HEBDMEM-STF602HCG-B24

HOUSING	HOUSING OPTIONS	HOUSING OPTIONS	HOUSING OPTIONS	REFLECTOR	REFLECTOR FINISH	ACCESSORIES
<input type="checkbox"/> CFT632HEB ³ 6", (1) 26W/32W/ 42W triple tube, multi-volt electronic ballast	<input type="checkbox"/> 347V ¹ (Specify wattage) <input type="checkbox"/> CP ⁵ Chicago Plenum. Fixture construction and/ or specifications may vary. Refer to Chicago Plenum specification sheets on www. prescolite.com for details. (Prefix housing catalog number) <input type="checkbox"/> DM Electronic Analog Dimming Ballast to 3%, 4-wire (120V through 277V)	<input type="checkbox"/> SDM ³ Lutron Compact SE Dimming Ballast to 5%, 3-wire (specify voltage/wattage) <input type="checkbox"/> HDM ^{2,3} Lutron Hi-Lume Dimming Ballast to 1%, 3-wire (specify voltage/wattage) <input type="checkbox"/> 2DM ^{2,3} Lutron Tu-Wire Dimming Ballast to 5%, 2-wire (120V only) <input type="checkbox"/> 7DM Advance Mark 7 Dimming Ballast to 5%, 4-wire (120V through 277V) <input type="checkbox"/> XDM Advance Mark 10 Dimming Ballast to 5%, 2-wire (specify voltage/wattage)	<input type="checkbox"/> EM Emergency battery pack with remote test switch and indicator light <input type="checkbox"/> FSDFA Fuse kit installed at factory <input type="checkbox"/> RIF1 Radio interference filter (single circuit) <input type="checkbox"/> MW26 Max Wattage label, 26W <input type="checkbox"/> MW32 Max Wattage label, 32W	<input type="checkbox"/> STF602H 6" Alzak reflector <u>REFLECTOR COLOR</u> <input type="checkbox"/> Blank Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> BL Black Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak	<input type="checkbox"/> Blank Specular <input type="checkbox"/> SS Semi-Specular <input type="checkbox"/> MFC American Matte <u>REFLECTOR OPTIONS</u> <input type="checkbox"/> WT Painted white self-flange <input type="checkbox"/> BC ⁴ Painted black cone <input type="checkbox"/> WC ⁴ Painted white cone <input type="checkbox"/> BB ⁴ Painted black baffle <input type="checkbox"/> WB ⁴ Painted white baffle <input type="checkbox"/> WW Wall wash reflector <input type="checkbox"/> TRG Trim Ring Gasket (factory installed)	<input type="checkbox"/> B24 Set of two (2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joists up to 24" centers <input type="checkbox"/> FSDFI Fuse kit for field installation <input type="checkbox"/> SCA6D Sloped ceiling adapter (see note on back page) <input type="checkbox"/> Signosó Architectural glass elements Refer to specification sheets ARCH-SIG-001 through -004

¹Dimming options not available in 347V.

²Not available with 42W lamps.

³For 26W, 32W, or 42W CFL lamps specify CFT626HEB, CFT632HEB, or CFT642HEB housing and add desired dimming option suffix.

⁴Not available with MFC, haze or semi-specular finishes.

⁵Top access required to service ballast for Chicago Plenum.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.

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ARCH-CFL-001



PHOTOMETRIC DATA

Architektür - 6" Horizontal Triple Open & Wall Wash Downlights - CFT632HEB

**TYPE
L3**

BALLAST DATA	26W Triple			32W Triple			42W Triple		
	120V	277V	347V	120V	277V	347V	120V	277V	347V
Total System Watts	28W	28W	38W	35W	35W	42W	44W	47W	48W
Input Current (Amps)	0.23	0.1	0.11	0.29	0.13	0.12	0.36	0.17	0.14
Input Frequency in Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power Factor	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%	>97%
Ballast Factor	>98%	>98%	>98%	>98%	>98%	>98%	>98%	>98%	>98%
Total Harmonic Distortion	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Total Harmonic Distortion	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)

LAMP DATA (One per fixture)

	26W Triple	32W Triple	42W Triple
Rated Watts	26W Triple	32W Triple	42W Triple
Rates Lumens	1800	2400	3200
Efficacy (LPW)	69	75	76
Rated Life	10,000 hours	10,000 hours	10,000 hours
CRI	82	82	82
Min. Starting Temp.	0° F	0° F	0° F

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average 0°	Average 45°	Average 90°
45°	21019	21096	14312
55°	0	0	0
65°	0	0	0
75°	0	0	0
85°	0	0	0

CFT632HEB-STF602H

with Specular Clear Alzak Reflector

Lamp: One 32W Triple

Spacing Criteria:

0° = 1.5

90° = 1.6

Efficiency: 45.1%

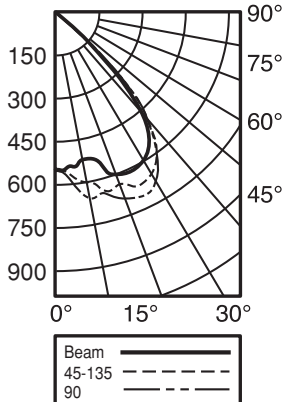
AVERAGE INITIAL FOOTCANDLES

Multiple Units (Square Array)

Ceiling 80% Wall 50% Floor 20%

32W Triple			
SPACING	RCR1	RCR3	RCR7
7.0	20	17	12
8.0	15	13	9
9.0	12	10	7
10.0	10	8	6
11.0	8	7	5

CANDLEPOWER DISTRIBUTION



Test No. PL5221

CANDLEPOWER SUMMARY

Angle	0°	45°	90°
0	540	540	540
5	598	572	535
15	649	638	528
25	700	663	601
35	605	601	557
45	249	249	227
55	0	0	0
65	0	0	0
75	0	0	0
85	0	0	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Floor Cavity Reflectance																												
	80%				70%				50%				30%				10%												
	20% Effective Floor Cavity Reflectance																												
													% Wall Reflectance																
													70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	.51	.50	.49	.48	.50	.49	.48	.47	.47	.46	.46	.45	.45	.44	.44	.43	.43	.44	.43	.43									
2	.49	.47	.45	.43	.48	.46	.44	.43	.44	.43	.42	.43	.42	.41	.42	.41	.41	.42	.41	.40									
3	.46	.43	.41	.39	.45	.42	.40	.39	.41	.40	.38	.40	.39	.38	.39	.38	.37	.39	.38	.37									
4	.44	.40	.38	.36	.43	.40	.37	.36	.39	.37	.35	.38	.36	.35	.37	.36	.34	.37	.36	.34									
5	.41	.37	.35	.33	.40	.37	.34	.32	.36	.34	.32	.35	.33	.32	.35	.33	.32	.35	.33	.32									
6	.39	.35	.32	.30	.38	.34	.32	.30	.34	.31	.30	.33	.31	.29	.32	.30	.29	.32	.30	.29									
7	.36	.32	.29	.27	.36	.32	.29	.27	.31	.29	.27	.30	.28	.27	.30	.28	.27	.30	.28	.27									
8	.34	.29	.27	.25	.34	.29	.26	.24	.29	.26	.24	.28	.26	.24	.28	.26	.24	.28	.26	.24									
9	.32	.27	.24	.22	.31	.27	.24	.22	.26	.24	.22	.26	.23	.22	.25	.23	.22	.25	.23	.22									
10	.30	.25	.22	.20	.29	.25	.22	.20	.24	.22	.20	.24	.21	.20	.23	.21	.20	.23	.21	.20									

CFT632HEB-STF602H

Test No. PL5221

NOTES

☉ Denotes a Virtual Source reflector.

Refer to www.prescolite.com for additional photometric tests (IES Files).

When ordering a sloped ceiling adapter, specify the degree of slope in 5° increments, max. of 35°. For a more precise degree or wet ceiling applications, please contact factory. Sloped ceiling adapter and housing must be installed at the same time.

Note: Use of horizontally-lamped open downlights with amalgam-based CFL lamps in air-handling plenums is not recommended because cool air flow over the lamps will result in reduced light output. Prescolite recommends vertical lamp downlights or use of the regressed lensed trim option for horizontal downlights in these applications to reduce this effect. Refer to Prescolite White Paper WP0003 at www.prescolite.com for more information.



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Hubbell Lighting, Inc.

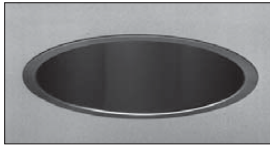
L4

Spec-4

Recessed Metal Halide
(1) ED-17, 100w max.

Open Aperture 6"
Downlight and Wallwasher

online Find it Fast 140

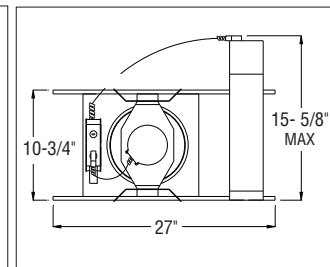
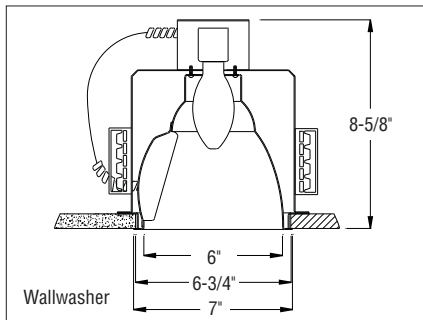
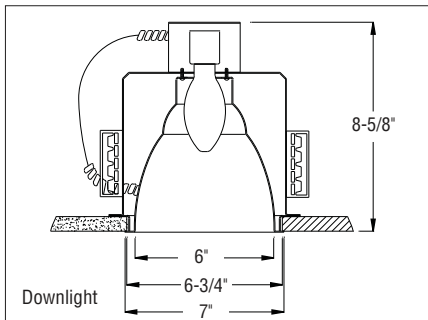


Applications: This luminaire offers excellent brightness control in a 6" aperture. Suitable for use in retail, hotel and atrium areas. This recessed downlight is ideal for use in high ceiling areas that require the illuminating power of a metal halide along with long lamp life. Available in three wattages.

Type: L4
Project: Smeal - Atrium

ORDERING NOTE: Complete unit consists of rough-in and trim section. Indicate trim finish and desired options.

▼ Rough-In	▼ Ballast/Voltage	▼ Trim	▼ Trim Finish	▼ Options
S4D 6330	_____	6330 R	C	W
S4D6330 (1) ED-17 50w S4D6331 (1) ED-17 70w S4D6332 (1) ED-17 100w	(Leave blank for Magnetic Dual Tap Ballast)	6330R Downlight Reflector 6330W Wallwasher Reflector 6330D Double Wallwasher Reflector 6330K Corner Wallwasher Reflector	C Clear Specular Reflector MC Matte Clear Alzak® Reflector MG Matte Champagne Gold Alzak® Reflector MP Matte Pewter Alzak® Reflector MS Matte Straw Alzak® Reflector MW Matte Wheat Alzak® Reflector Add "Q" to the end of trim description for quartz restrrike. For colors of specular reflectors consult factory.	F Fusing W White painted reflector flange Q Quartz Restrike* 9930 Set of two 27" C-channel mounting bars 9952 Set of two 52" C-channel mounting bars 9956 Set of two 28" 10 ga. one piece universal mounting bars *Available on 100w only



IBEW Union Made

Alzak® is a registered trademark of the Aluminum Company of America.

- 1. Yoke Assembly** - 18 ga. steel yoke assembly is corrosion protected and fixed to the mounting pan.
- 2. Plaster Frame** - 18 ga. galvanized steel plaster frame has a fixed throat depth of 3/4". For ceiling thickness greater than 3/4" consult factory.

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5/22/07

3. Mounting Bracket - Adjustable butterfly mounting brackets allow for a vertical adjustment of 1-1/2" and accept one piece universal or C-channel mounting bars (ordered as an optional accessory).

4. Junction Box - 14 ga. galvanized junction box. U.L. listed for thru-wiring (4 in and 4 out @ 90°C) and has knock-outs at 7/8" and 1-1/8". Ground wire is supplied. Junction box is accessible from below ceiling. Stand-by battery pack option not offered.

5. Reflector - One piece spun aluminum reflector with 1/2" flat flange with specular clear Alzak® finish. Available in above finishes. A white painted flange is also available. The reflector is secured to the heat sink by two captive screws.

6. Wallwasher Reflector - A

hydroformed aluminum kicker plate is mounted to the main reflector and is available in three specific configurations for wall illumination. Reflector assembly is fully rotatable from below the ceiling insuring proper reflector alignment.

7. Lamp/Socket - (1) ED-17 Metal Halide lamp, 100 watt maximum, for use in open aperture fixtures. A coated lamp provides preferred optical distribution. A fixed position ceramic medium based socket pulse rated for 4Kv is attached to an extruded aluminum heat sink. The heat sink provides heat dissipation for the lamp socket. Lamp supplied by others.

8. Ballast - (1) high reactance circuit type (M110 for 50w, M98 for 70w, M90 for 100w). Regulation of line voltage = ± 5%; lamp wattage ± 10% for 50w, 100w; ± 7% for 70w. Ballast is thermally protected. Dual tap 120/277v.

9. Thermal Protector - A self resetting thermal protector is provided as standard.

10. Weight - Housing - 15 lbs; Trim - 1.0 lbs.

NOTE: National or municipal codes must be followed regarding set back of thermal insulating material from fixture. As a guideline, any insulation materials must be held away from the fixture by a minimum of 3".
Fixtures are not designed for direct contact with thermal insulation.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Technical specification sheets that appear on www.zumtobel.us are the most recent version and supersede all other versions that exist in any other printed or electronic form.

S4-5



Photometric Data

S4D6331 6330R C (1) 70W MH ED-17

6" DOWNLIGHT, SPECULAR REFLECTOR

ITL 39099

Total Luminaire Efficiency 60%

0% Uplight 100% Downlight

Spacing Criteria

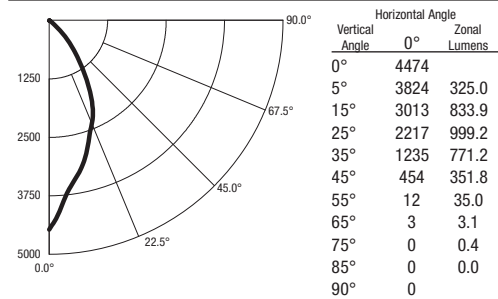
Lateral Plane 0° 90°

0.7 0.7

TOTAL LAMP LUMENS = 5600

INPUT WATTS = 70

Candela Distribution



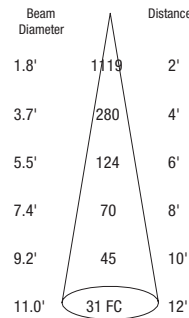
Luminance Data in Candela / Sq. Meter

Angle in Vertical°	Average 0°	Average 45°	Average 90°
45°	35197	35197	35197
55°	1147	1147	1147
65°	389	389	389
75°	0	0	0
85°	0	0	0

Coefficients of Utilization

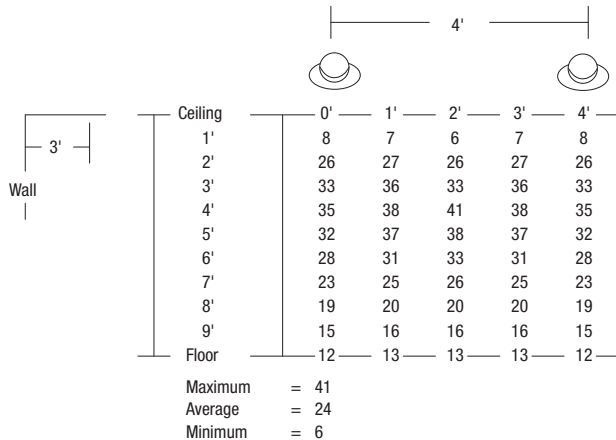
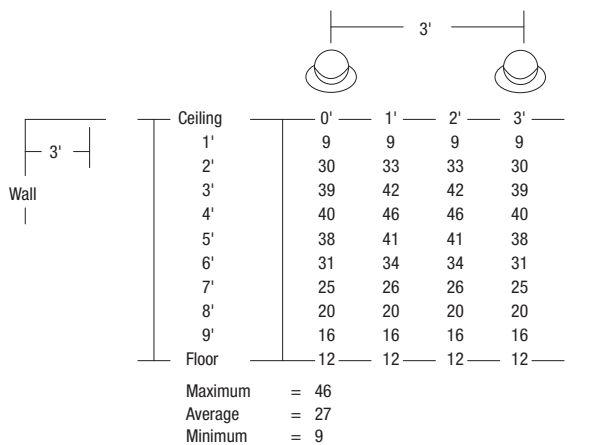
Effective Floor Cavity Reflectance = 20%

pcc	Effective Floor Cavity Reflectance = 20%														
	0.8				0.7				0.5				0.3		
pw	0.7	0.5	0.3	0.1	0.7	0.5	0.3	0.1	0.5	0.3	0.1	0.5	0.3	0.1	
	0	72	72	72	72	70	70	70	70	67	67	67	64	64	64
1	69	67	65	64	67	66	64	63	63	62	61	61	60	59	
2	65	62	60	58	64	61	59	57	59	57	56	57	56	55	
3	62	58	55	52	61	57	54	52	55	53	51	54	52	50	
4	59	54	50	48	57	53	50	48	52	49	47	51	48	46	
5	55	50	47	44	54	50	46	44	49	46	43	48	45	43	
6	53	47	43	41	52	47	43	41	46	43	40	45	42	40	
7	50	44	40	38	49	44	40	38	43	40	37	42	39	37	
8	47	41	38	35	47	41	38	35	40	37	35	40	37	35	
9	45	39	35	33	44	39	35	33	38	35	33	38	35	33	



Beam center footcandles shown in "cone of light" are initial, LLF = 1.0

Wallwash Lighting Data Chart



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S4-5A



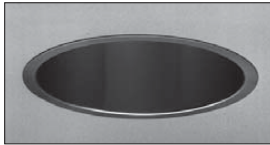
L5

Spec-4

Recessed Metal Halide
(1) ED-17, 100w max.

Open Aperture 6"
Downlight and Wallwasher

online Find it Fast **140**

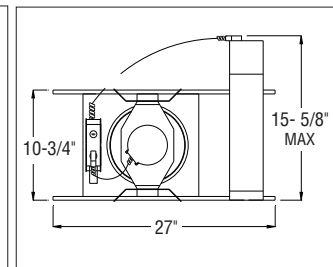
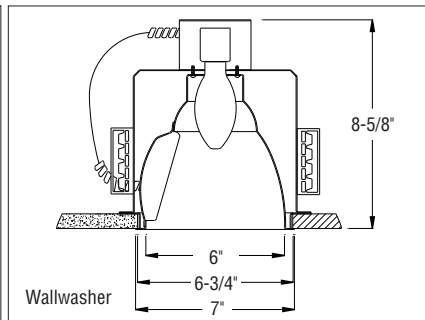
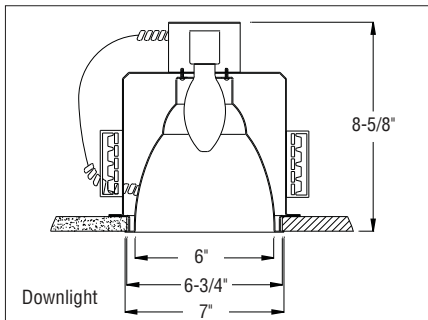


Applications: This luminaire offers excellent brightness control in a 6" aperture. Suitable for use in retail, hotel and atrium areas. This recessed downlight is ideal for use in high ceiling areas that require the illuminating power of a metal halide along with long lamp life. Available in three wattages.

Type: L5
Project: Smeal - Atrium

ORDERING NOTE: Complete unit consists of rough-in and trim section. Indicate trim finish and desired options.

▼ Rough-In	▼ Ballast/Voltage	▼ Trim	▼ Trim Finish	▼ Options
S4D 6330		6330 W	C	W
S4D6330 (1) ED-17 50w S4D6331 (1) ED-17 70w S4D6332 (1) ED-17 100w	(Leave blank for Magnetic Dual Tap Ballast)	6330R Downlight Reflector 6330W Wallwasher Reflector 6330D Double Wallwasher Reflector 6330K Corner Wallwasher Reflector	C Clear Specular Reflector MC Matte Clear Alzak® Reflector MG Matte Champagne Gold Alzak® Reflector MP Matte Pewter Alzak® Reflector MS Matte Straw Alzak® Reflector MW Matte Wheat Alzak® Reflector Add "Q" to the end of trim description for quartz restrrike. For colors of specular reflectors consult factory.	F Fusing W White painted reflector flange Q Quartz Restrike* 9930 Set of two 27" C-channel mounting bars 9952 Set of two 52" C-channel mounting bars 9956 Set of two 28" 10 ga. one piece universal mounting bars *Available on 100w only



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- 1. Yoke Assembly** - 18 ga. steel yoke assembly is corrosion protected and fixed to the mounting pan.
- 2. Plaster Frame** - 18 ga. galvanized steel plaster frame has a fixed throat depth of 3/4". For ceiling thickness greater than 3/4" consult factory.

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5/22/07

- 3. Mounting Bracket** - Adjustable butterfly mounting brackets allow for a vertical adjustment of 1-1/2" and accept one piece universal or C-channel mounting bars (ordered as an optional accessory).
- 4. Junction Box** - 14 ga. galvanized junction box. U.L. listed for thru-wiring (4 in and 4 out @ 90°C) and has knock-outs at 7/8" and 1-1/8". Ground wire is supplied. Junction box is accessible from below ceiling. Stand-by battery pack option not offered.
- 5. Reflector** - One piece spun aluminum reflector with 1/2" flat flange with specular clear Alzak® finish. Available in above finishes. A white painted flange is also available. The reflector is secured to the heat sink by two captive screws.
- 6. Wallwasher Reflector - A**

hydroformed aluminum kicker plate is mounted to the main reflector and is available in three specific configurations for wall illumination. Reflector assembly is fully rotatable from below the ceiling insuring proper reflector alignment.

7. Lamp/Socket - (1) ED-17 Metal Halide lamp, 100 watt maximum, for use in open aperture fixtures. A coated lamp provides preferred optical distribution. A fixed position ceramic medium based socket pulse rated for 4Kv is attached to an extruded aluminum heat sink. The heat sink provides heat dissipation for the lamp socket. Lamp supplied by others.

8. Ballast - (1) high reactance circuit type (M110 for 50w, M98 for 70w, M90 for 100w). Regulation of line voltage = ± 5%; lamp wattage ± 10% for 50w, 100w; ± 7% for 70w. Ballast is thermally protected. Dual tap 120/277v.

9. Thermal Protector - A self resetting thermal protector is provided as standard.

10. Weight - Housing - 15 lbs; Trim - 1.0 lbs.

NOTE: National or municipal codes must be followed regarding set back of thermal insulating material from fixture. As a guideline, any insulation materials must be held away from the fixture by a minimum of 3".
Fixtures are not designed for direct contact with thermal insulation.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Technical specification sheets that appear on www.zumtobel.us are the most recent version and supersede all other versions that exist in any other printed or electronic form.

S4-5



Photometric Data

S4D6331 6330R C (1) 70W MH ED-17

6" DOWNLIGHT, SPECULAR REFLECTOR

ITL 39099

Total Luminaire Efficiency 60%

0% Uplight 100% Downlight

Spacing Criteria

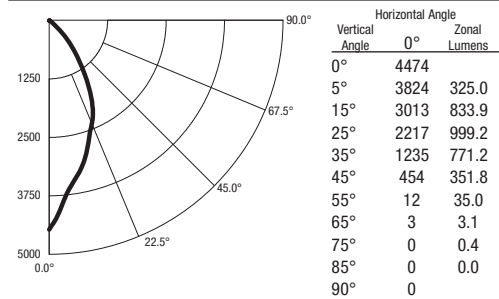
Lateral Plane 0° 90°

0.7 0.7

TOTAL LAMP LUMENS = 5600

INPUT WATTS = 70

Candela Distribution



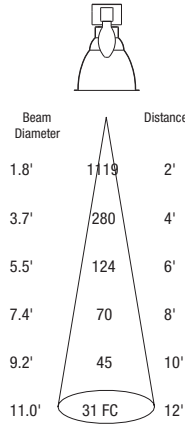
Luminance Data in Candela / Sq. Meter

Angle in Vertical°	Average 0°	Average 45°	Average 90°
45°	35197	35197	35197
55°	1147	1147	1147
65°	389	389	389
75°	0	0	0
85°	0	0	0

Coefficients of Utilization

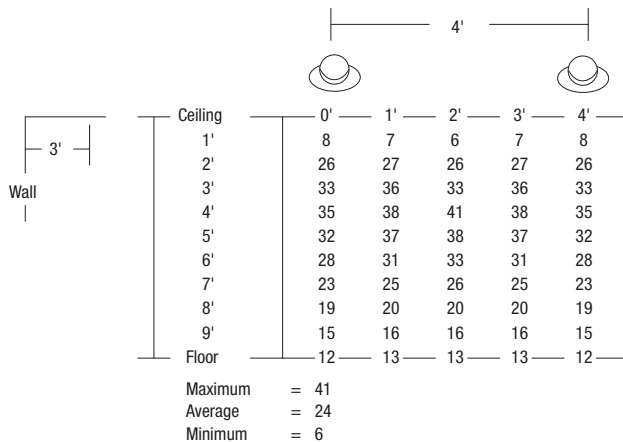
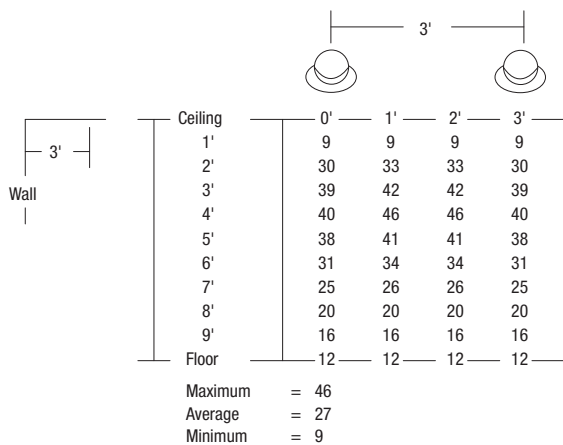
Effective Floor Cavity Reflectance = 20%

pcc	Effective Floor Cavity Reflectance = 20%														
	0.8				0.7				0.5				0.3		
pw	0.7	0.5	0.3	0.1	0.7	0.5	0.3	0.1	0.5	0.3	0.1	0.5	0.3	0.1	
	0	72	72	72	72	70	70	70	70	67	67	67	64	64	64
1	69	67	65	64	67	66	64	63	63	62	61	61	60	59	
2	65	62	60	58	64	61	59	57	59	57	56	57	56	55	
3	62	58	55	52	61	57	54	52	55	53	51	54	52	50	
4	59	54	50	48	57	53	50	48	52	49	47	51	48	46	
5	55	50	47	44	54	50	46	44	49	46	43	48	45	43	
6	53	47	43	41	52	47	43	41	46	43	40	45	42	40	
7	50	44	40	38	49	44	40	38	43	40	37	42	39	37	
8	47	41	38	35	47	41	38	35	40	37	35	40	37	35	
9	45	39	35	33	44	39	35	33	38	35	33	38	35	33	



Beam center footcandles shown in "cone of light" are initial, LLF = 1.0

Wallwash Lighting Data Chart



Zumtobel Lighting Inc. ©2007
3300 Route 9W • Highland, NY 12528-2630
www.zumtobel.us
TEL (845) 691-6262 • (800) 932-0633 • FAX (845) 691-6289
5/22/07

S4-5A



TYPE L6 LUMIÈRE®

DESCRIPTION

Westwood 903 and 903-2 are ultra-compact MR16 line voltage fixtures with integral 12V step down transformer. Both mount directly over any standard 4" wall mounted J-box. Various lenses, louvers and color or dichroic filters can be combined - up to three at once - to create multiple lighting effects. Lumière's exclusive Siphon Protection System (S.P.S.) prevents water from siphoning into the fixture through its own lead wires.

Catalog #	903-2-50MR16-120/12-CS-DIF-EXZ	Type
Project	Smeal	L6
Comments	Atrium	Date
Prepared by	YKH	

SPECIFICATION FEATURES

A ... Material

Housing, hood and mounting stem are precision-machined from corrosion-resistant 6061-T6 aluminum billet, brass or copper. Mounting canopy is constructed from corrosion-resistant silicone aluminum, brass or copper.

B ... Finish Painted

Fixtures constructed from 6061-T6 aluminum are double protected by a chromate conversion undercoating and polyester powdercoat paint finish, surpassing the rigorous demands of the outdoor environment. A variety of standard colors are available. Brass or Copper Fixtures constructed from brass or copper are left unpainted to reveal the natural beauty of the material and will patina naturally over time.

C ... Hood

Hood is removable for easy relamping and accepts up to three internal accessories at once (lenses, louvers, filters) to achieve multiple lighting effects. Weep holes prevent water and mineral stains from collecting on the lens, even in the straight-up position.

D ... Gasket

Housing and hood are sealed with a high temperature silicone o-ring gasket to prevent water intrusion.

E ... Lens

Tempered glass lens, factory sealed with high temperature adhesive to prevent water intrusion and breakage due to thermal shock.

F ... Mounting & Adjustability

Both models mount over standard 4" J-box and are suitable for ceiling or wall mount applications. Integral 120/12V step down transformer connects directly to 120V line voltage. Fully adjustable side-mounted swivel stem provides 200° vertical tilt for easy aiming. Stainless steel aim-locking mechanisms are standard. Lumière's exclusive Siphon Protection System (S.P.S.) prevents water from siphoning into the fixture through its own lead wires.

G ... Hardware

Stainless steel hardware is standard to provide maximum corrosion-resistance.

H ... Socket

Ceramic socket with 250° C Teflon® coated lead wires and GU5.3 bi-pin base.

I ... Electrical

Integral 50 VA class "H" 120/12V step down transformer is standard.

J ... Lamp

Not included. Available from Lumière as an accessory - see reverse side of this page.

K ... Labels & Approvals

UL and cUL listed, standard wet label. Manufactured to ISO 9001-2000 Quality Systems Standard. IBEW union made.

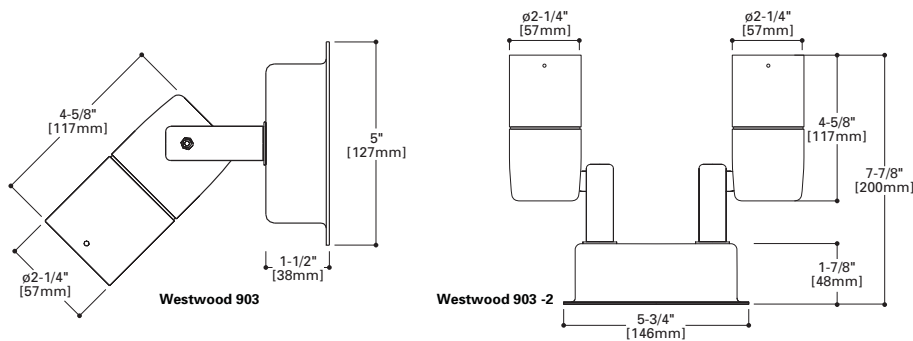
L ... Warranty

Lumière warrants its fixtures against defects in materials & workmanship for three (3) years. Auxiliary equipment such as transformers, ballasts and lamps carry the original manufacturer's warranty.



**WESTWOOD
903
903-2**

50W (max.) MR16
Halogen
Line Voltage
w/ Integral 12V transformer
Wall or Ceiling



Westwood 903/903-2
Lamp=50MR16/NSP (EXT)
CBCP=11,000

Distance to Illuminated Plane	Initial Nadir Footcandles	Beam Diameter
15'0"	45	4'0"
10'0"	102	3'0"
8'0"	159	2'0"
6'0"	283	1'6"
4'0"	638	1'0"
2'0"	2550	0'6"

Lamp Wattage Multiplier
20W x 0.32

Westwood 903/903-2
Lamp=50MR16/NFL (EXZ)
CBCP=3200

Distance to Illuminated Plane	Initial Nadir Footcandles	Beam Diameter
15'0"	13	10'0"
10'0"	29	6'6"
8'0"	45	5'0"
6'0"	81	4'0"
4'0"	181	2'6"
2'0"	725	1'0"

Westwood 903/903-2
Lamp=50MR16/FL (EXN)
CBCP=2000

Distance to Illuminated Plane	Initial Nadir Footcandles	Beam Diameter
15'0"	7	12'0"
10'0"	17	8'0"
8'0"	27	6'6"
6'0"	48	5'0"
4'0"	106	3'0"
2'0"	431	1'6"

Lamp Wattage Multiplier
35W x 0.57
20W x 0.30

Westwood 903/903-2
Lamp=50MR16/WFL (FNV)
CBCP=1200

Distance to Illuminated Plane	Initial Nadir Footcandles	Beam Diameter
15'0"	5	17'0"
10'0"	11	11'6"
8'0"	17	9'0"
6'0"	30	7'0"
4'0"	67	4'6"
2'0"	269	2'0"

LAMP INFORMATION

Lamp	ANSI Code	Watts	Beam Spread	CBCP	°K	Life (hrs.)	Base	Volts
50MR16/NSP	EXT	50	12°	11,000	3050	4000	GU5.3 bi-pin	12
50MR16/NFL	EXZ	50	25°	3200	3050	4000	GU5.3 bi-pin	12
50MR16/FL	EXN	50	40°	2000	3050	4000	GU5.3 bi-pin	12
50MR16/WFL	FNV	50	60°	1200	3050	4000	GU5.3 bi-pin	12

NOTE: Inferior quality lamps may adversely affect the performance of this product. Use only name brand lamps from reputable lamp manufacturers.

NOTES AND FORMULAS

- Beam diameter is to 50% of maximum footcandles, rounded to the nearest half-foot.
- Footcandle values are initial. Apply appropriate light loss factors where necessary.
- Bare lamp data shown. Consult lamp manufacturers to obtain detailed specifications for their lamps.

ORDERING INFORMATION

Sample Number: 903-2-50MR16-120/12-NCP

903	2	50MR16	120/12	CS	DIF-EXZ
-----	---	--------	--------	----	---------

Series
903: MR16 Fully Adjustable Side-Mounted Swivel Westwood Wall Fixture w/Integral Transformer

Source
Halogen
50MR16: 50W Max Halogen MR16, GU5.3 Base

Voltage
120/12: 120V to 12V Integral Step-down Transformer

Finish
Painted
BK- Black
BZ- Bronze
CS- City Silver
VE- Verde
WT- White
Metal
NBR- Brass
NCP- Copper

Accessories

Filters

- F71: Peach Dichroic Filter, 2.00" Dia
- F73: Green Dichroic Filter, 2.00" Dia
- F75: Yellow Dichroic Filter, 2.00" Dia
- F77: Dark Blue Dichroic Filter, 2.00" Dia
- F79: Neutral Density Dichroic Filter, 2.00" Dia
- F22: Red Color Filter, 2.00" Dia
- F44: Green Color Filter, 2.00" Dia
- F66: Mercury Vapor Color Filter, 2.00" Dia

Optical Lenses

- LSL: Linear Spread Lens (elongate standard beam spread), 2.00" Dia
- DIF: Diffused Lens (provide even illumination), 2.00" Dia

Optical Louver

- LVR: Hex Cell Louver (reduce glare), 2.00" Dia

Lamps

- EXZ: 20W MR16 GU5.3 Bi-Pin Very Narrow Spot
- BAB: 20W MR16 GU5.3 Bi-Pin Flood
- FRA: 35W MR16 GU5.3 Bi-Pin Spot
- EXT: 50W MR16 GU5.3 Bi-Pin Narrow Spot
- EXN: 50W MR16 GU5.3 Bi-Pin Flood

- F72: Amber Dichroic Filter, 2.00" Dia
- F74: Medium Blue Dichroic Filter, 2.00" Dia
- F76: Red Dichroic Filter, 2.00" Dia
- F78: Light Blue Dichroic Filter, 2.00" Dia
- F80: Magenta Dichroic Filter, 2.00" Dia
- F33: Blue Color Filter, 2.00" Dia
- F55: Yellow Color Filter, 2.00" Dia

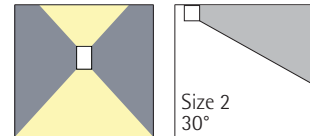
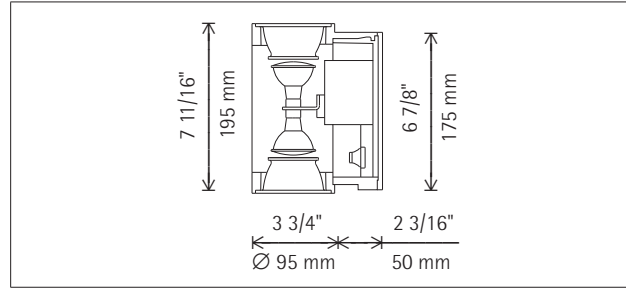
- OSL: Overall Spread Lens (increase beam spread), 2.00" Dia

- Notes: *
- Lamp not included.
 - Includes 12V integral transformer.
 - Consult your Cooper Lighting representative for additional options and finishes.

ERCO

Cylinder Facade luminaire

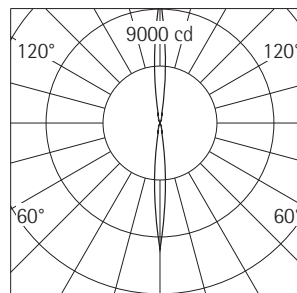
direct/indirect lighting for low-voltage halogen lamps



85033.023 Silver m
2xMRC16 35W 12V GU5.3 10°
2xMRC16 35W 12V GU5.3 36°

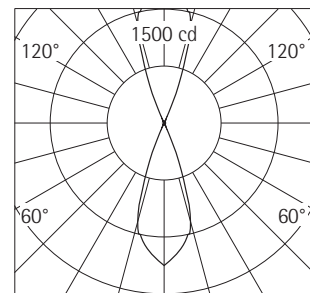
Product description

Housing and wall plate: corrosion-resistant, cast aluminum, No-rinse surface treatment. Double powder-coated. Optimized surface for reduced accumulation of dirt. Upper and lower safety glass. Housing removable for lamp replacement. Tamper-proof screw.
2 cable entries. Through-wiring possible. 3-pole terminal block. Magnetic transformer 120/12V, 60Hz.
Reflectors: aluminum, silver, specular anodized. Softec lenses.
Suitable for wet location (IP65): dust-proof and water jet-proof.
Weight 6.72lbs / 3.05kg



2xMRC16 35W 12V GU5.3 10°

h(ft)	E(fc)	D
3	741	0'6"
6	185	1'1"
9	82	1'7"
12	46	2'1"
15	30	2'7"



2xMRC16 35W 12V GU5.3 36°

h(ft)	E(fc)	D
3	139	1'11"
6	35	3'11"
9	15	5'10"
12	9	7'10"
15	6	9'9"

ERCO Lighting, Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/60Hz
Edition: 11.16.2006
Please download latest version from
www.erco.com/85033.023

TYPE L8A **neoray™**

DESCRIPTION

Crisp white light emits through luminous panels formed by the extruded trims of these regressed ceiling slots. An incomparable design for interiors of distinction.

Soft white, matte acrylic diffuser is regressed 2" above the ceiling plane by heavy gauge extruded aluminum trim with mitered corners. The satin white finish and trim style interfaces precisely with TechZone ceilings.

Catalog #	7ATZ-648R-2T5HO-STG-1DB-SI-SP95	Type	L8
Project	Smeal		
Comments	Classroom		
Prepared by	YKH	Date	

SPECIFICATION FEATURES

A...Construction

20-gauge steel housing.
Extruded regress trim.

B...Shielding

White acrylic lens.

C...Electrical

120, 277, 347, or Universal voltage electronic ballast. Fixtures and electrical components certified to UL and CUL standards.

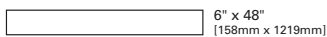
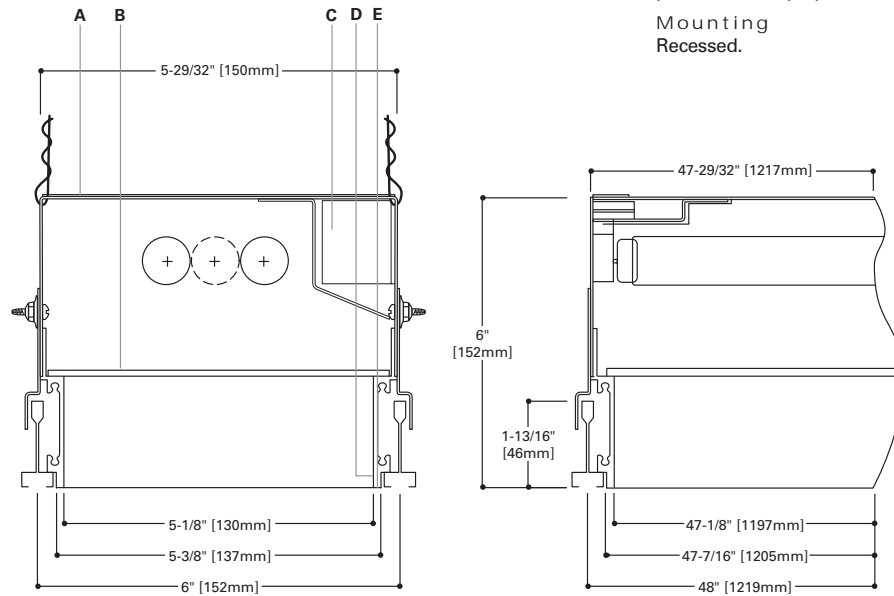
D...Trim

Extruded aluminum regressed trim with mitered corners.

E...Finish

Baked on low gloss white powder coated polyester.

Mounting
Recessed.



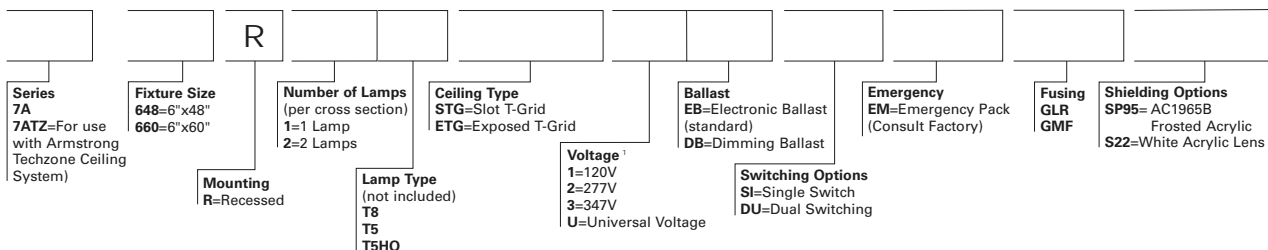
Series 7A
Armstrong® TechZone™
Compatible

1 & 2T8
1 & 2T5
1 & 2T5HO

RECESSED
DIRECT LENSED
REGRESSED TRIM

ORDERING INFORMATION

SAMPLE NUMBER: 7A-124R-2T8-STG-1EB-SI-S95



¹ Not all options available. Please consult your Cooper Lighting Representative for availability.

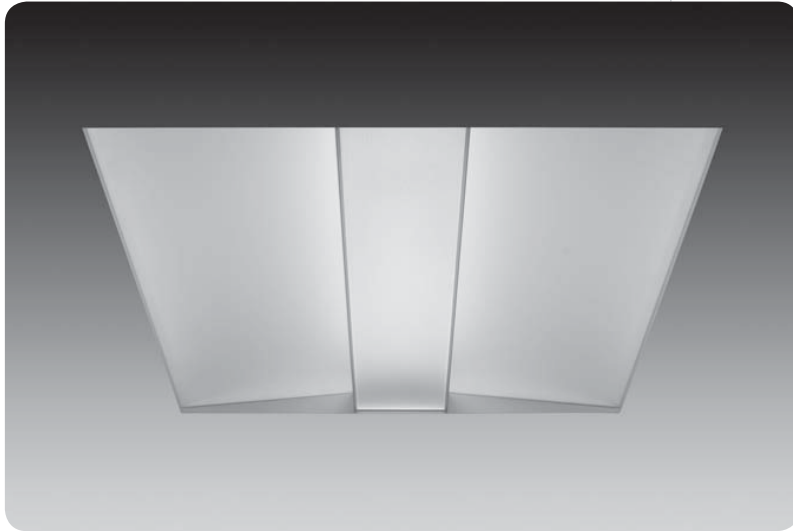
² Consult factory for custom lengths.

NOTE: Specifications and dimensions are subject to change without notice.

TYPE L8B



equation™ 2x2



Patent Pending

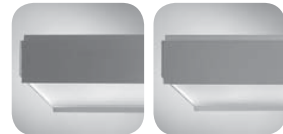
features

Equation blends sleek aesthetics and uniform diffuse illumination while delivering high fixture efficiencies.

Center diffuser features MicroGlow™ prismatic lens technology. Precision molded conical prisms deliver 92% light transmission while controlling high angle brightness.

Patent pending QuickLatch™ hinged diffuser system makes relamping easy.

shielding options



natural anodized side rails

high performance white side rails

details & options



QuickLatch™

air return

suspended

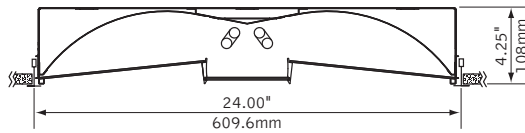
companion luminaire



twelve with MicroGlow™

avenue b with MicroGlow™

dimensional data



Overall height for luminaire with Air Return is 4.90"

lampping options



BIAX LAMPS



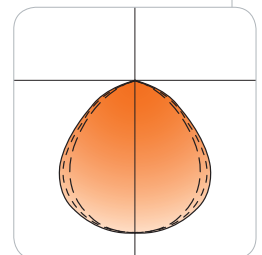
T5/T5HO LAMPS



T8 LAMPS

performance

High Performance White Side Rails
2-Lamp 40W BiAx
74% Efficiency
1899 cd @ 5°



Visit focalpointlights.com for complete photometric data.

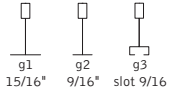
fixture:

project:

mounting information

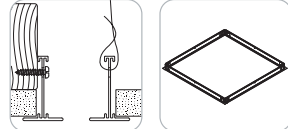
grid

for lay-in grid, specify G1, G2 or G3.



drywall frame kit

specify "DF" Drywall Frame Kit for drywall ceiling conditions.



Use tie-wire or screws to secure frame kit. cut out dimensions: 2': Min: 24.25" Max: 24.563"

specifications

construction

One piece 20 Ga. Steel reflector and housing.
 20 Ga. Steel ends form finishing housing.
 Bottom access 20 Ga. Steel ballast compartment.
 Earthquake brackets supplied as standard.

Weight: 17 lbs

optic

20 Ga. Steel reflectors finished in matte satin white powder coat.
 .080" thick frosted white acrylic diffusers.
 .125" thick MicroGlow™ miniature prism acrylic lens and .120" thick linear spread lens retained with side rails available in natural anodized aluminum or Matte Satin White.

electrical

Electronic ballasts are thermally protected and have a Class "P" rating.
 Optional dimming ballasts available.
 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	FEQ	<u>FEQ</u>
Equation	FEQ	
nominal size	22	<u>22</u>
2' x 2'	22	
distribution	B	<u>B</u>
Bi-Directional	B	
lamp quantity		<u> </u>
One Lamp	1	
Two Lamp	2	
Three Lamp (T5/T5H0 or T8 only)	3	
lamp type		<u> </u>
40 Watt Biax	BX40	
50 Watt Biax	BX50	
55 Watt Biax	BX55	
T5	T5	
T5H0	T5H0	
T8	T8	
ballast		<u> </u>
Electronic Instant Start <20% THD (BX40 only)	E	
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast*	D	
Electronic Step Dimming (T5 & T8 only)	DA	
voltage		<u> </u>
120 Volt	120	
277 Volt	277	
347 Volt	347	
mounting		<u> </u>
(leave blank for suspended fixture)		
15/16" Grid	G1	
9/16" Grid	G2	
9/16" Slot Tee	G3	
suspension		<u> </u>
(leave blank for non-suspended fixture)		
24" Aircraft Cable	C24	
48" Aircraft Cable	C48	
96" Aircraft Cable	C96	
shielding		<u> </u>
Natural Anodized Side Rails	AL	
High Performance White Side Rails	WP	
factory options		<u> </u>
Air Return (Overall height for luminaire with Air Return is 4.90")	AR	
Chicago Plenum	CP	
Drywall Frame Kit (Cut out dimensions: Min: 24.25"/Max: 24.563")	DF	
Emergency Battery Pack*	EM	
HLR/GLR Fuse	FU	
Flex Whip*	FW	
Include 3000K Lamp	L830	
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
Separate Circuit*	SC	
Master Satellite*	MS	
Tandem Wiring*	TW	
Lutron™ Sensor Feed* (EcoSystem ballast required)	SF	
finish	WH	<u>WH</u>
Matte Satin White	WH	

Focal Point LLC | 14141 S. Pulaski Rd. Chicago, IL 60632 | T: 773.247.9494 | F: 773.247.8884 | info@focalpointlights.com | www.focalpointlights.com. Focal Point LLC reserves the right to change specifications for product improvement without notification.

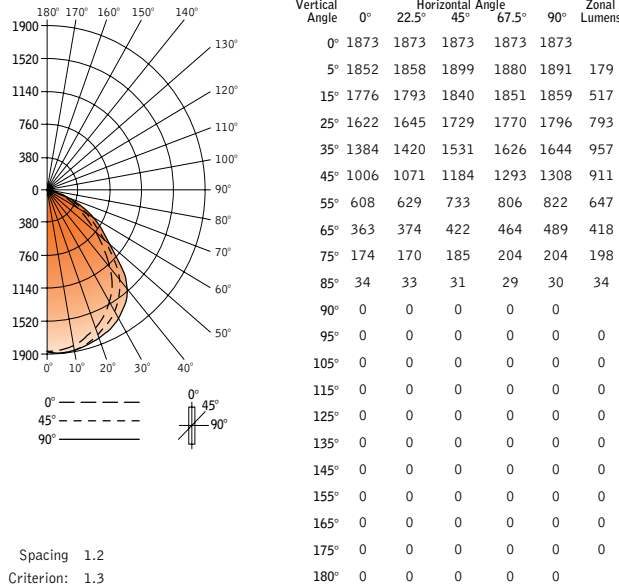
* for more information see Reference section.

high performance white side rails
equation™ 2x2



Filename: FEQ222BX40WP.IES
 Catalog #: FEQ-22-B-2-BX40-S-120-G1-WP-WH
 Efficiency: 74%
 Test #: 13301.0

CANDLEPOWER DISTRIBUTION



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	1490	23.6	32.0
0°-40°	2446	38.8	52.6
0°-60°	4004	63.5	86.0
0°-90°	4654	73.9	100.0
Total Luminaire	0°-180° 4654	73.9	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	4204	4947	5466
55°	3131	3775	4238
65°	2539	2953	3421
75°	1985	2116	2334
85°	1166	1037	1004

CO-EFFICIENTS OF UTILIZATION

Floor	80	70	20	30	10	00
Ceiling	70	50	10	50	10	00
Wall	88	88	88	86	86	86
RCR 0	88	88	88	86	86	86
1	82	79	76	74	71	68
2	76	71	66	63	67	60
3	70	63	58	54	68	62
4	64	57	51	47	63	56
5	59	51	45	40	58	50
6	55	46	40	35	53	45
7	51	41	35	31	49	41
8	47	37	31	27	45	36
9	43	33	27	23	42	33
10	40	30	24	21	39	30

Numbers indicate percentage values of reflectivity.

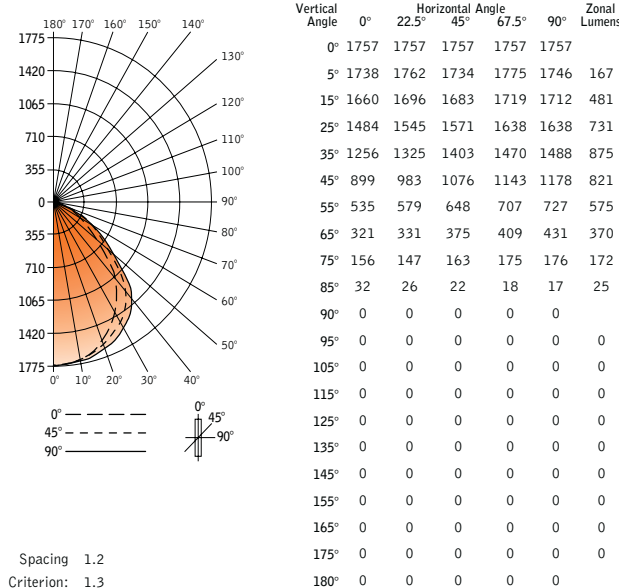
Go to www.focalpointlights.com for additional photometric data.

natural anodized side rails
equation™ 2x2



Filename: FEQ222BX40AL.IES
 Catalog #: FEQ-22-B-2-BX40-S-120-G1-AL-WH
 Efficiency: 67%
 Test #: 13302.0

CANDLEPOWER DISTRIBUTION



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	1379	21.9	32.7
0°-40°	2254	35.8	53.4
0°-60°	3650	57.9	86.6
0°-90°	4217	66.9	100.0
Total Luminaire	0°-180° 4217	66.9	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	3757	4496	4923
55°	2757	3337	3746
65°	2245	2626	3013
75°	1778	1865	2007
85°	1101	745	583

CO-EFFICIENTS OF UTILIZATION

Floor	80	70	20	30	10	00
Ceiling	70	50	10	50	10	00
Wall	80	80	80	78	78	78
RCR 0	80	80	80	78	78	78
1	74	72	69	67	67	64
2	69	64	60	57	67	63
3	64	57	53	49	62	56
4	59	52	46	42	57	51
5	54	46	41	37	53	45
6	50	42	36	32	49	41
7	46	38	32	28	45	37
8	42	34	28	25	41	33
9	39	30	25	21	38	30
10	36	28	22	19	35	27

Numbers indicate percentage values of reflectivity.

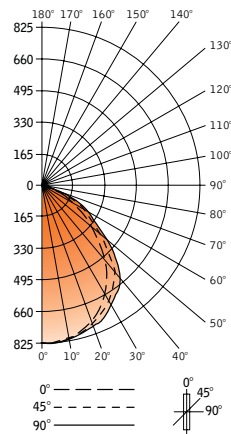
Go to www.focalpointlights.com for additional photometric data.

high performance white side rails
equation™ 2x2



Filename: FEQ222T5WP.IES
 Catalog #: FEQ-22-B-2-T5-S-120-G1-WP-WH
 Efficiency: 73%
 Test #: 13307.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	825	825	825	825	825	
5°	827	825	826	824	821	79
15°	790	792	795	800	800	226
25°	716	724	739	755	760	342
35°	598	610	655	678	685	406
45°	424	448	490	524	551	377
55°	252	265	306	341	346	272
65°	150	153	178	199	204	175
75°	73	71	79	81	81	82
85°	11	10	9	8	9	10
90°	0	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	0

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	646	23.9	32.8
0°-40°	1052	39.0	53.5
0°-60°	1701	63.0	86.4
0°-90°	1968	72.9	100.0
Total Luminaire	1968	72.9	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	1772	2048	2303
55°	1299	1577	1783
65°	1049	1245	1427
75°	834	902	925
85°	373	305	305

Spacing 1.2
 Criterion: 1.3

CO-EFFICIENTS OF UTILIZATION

Floor	Ceiling	Wall	RCR	0	10	20	30	40	50	60	70	80	90
80													
70	50	30	10	70	50	10	50	10	50	10	50	10	00
87	87	87	87	85	85	85	81	81	78	78	74	74	73
1	81	78	75	73	79	76	72	73	70	71	68	68	66
2	75	70	66	62	73	68	61	66	60	64	59	62	57
3	69	63	57	53	67	61	53	59	52	58	51	56	50
4	64	56	51	46	62	55	46	54	45	52	45	50	44
5	59	50	44	40	57	49	40	48	39	47	39	45	38
6	54	45	39	35	53	45	35	43	35	42	34	41	34
7	50	41	35	31	49	40	31	39	30	38	30	37	30
8	46	37	31	27	45	36	27	35	27	34	26	34	26
9	43	33	27	23	42	33	23	32	23	31	23	30	23
10	40	30	24	21	39	30	24	29	21	28	20	28	20

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

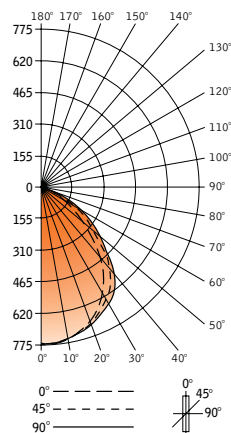
Numbers indicate percentage values of reflectivity.

natural anodized side rails
equation™ 2x2



Filename: FEQ222T5AL.IES
 Catalog #: FEQ-22-B-2-T5-S-120-G1-AL-WH
 Efficiency: 67%
 Test #: 13308.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	776	776	776	776	776	
5°	776	776	776	775	772	74
15°	741	746	747	748	749	212
25°	664	673	688	700	705	318
35°	553	567	607	630	632	376
45°	385	410	459	487	496	348
55°	224	236	280	311	317	246
65°	134	136	161	180	185	158
75°	66	61	68	71	72	71
85°	12	10	9	7	6	10
90°	0	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	0

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	603	22.3	33.3
0°-40°	980	36.3	54.1
0°-60°	1574	58.3	86.8
0°-90°	1812	67.1	100.0
Total Luminaire	1812	67.1	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	1609	1919	2073
55°	1154	1443	1633
65°	937	1126	1294
75°	754	777	822
85°	407	305	203

Spacing 1.3
 Criterion: 1.2

CO-EFFICIENTS OF UTILIZATION

Floor	Ceiling	Wall	RCR	0	10	20	30	40	50	60	70	80	90
80													
70	50	30	10	70	50	10	50	10	50	10	50	10	00
80	80	80	80	78	78	78	75	75	71	71	68	68	67
1	74	72	70	67	73	70	66	68	64	65	62	63	61
2	69	64	61	57	67	63	57	61	55	59	54	57	53
3	64	58	53	49	62	57	49	55	48	53	47	51	47
4	59	52	47	43	57	51	43	49	42	48	41	47	41
5	54	46	41	37	53	46	37	44	36	43	36	42	36
6	50	42	36	33	49	41	32	40	32	39	32	38	32
7	46	38	32	29	45	37	28	36	28	35	28	35	28
8	43	34	29	25	42	34	25	33	25	32	25	31	24
9	39	31	25	22	38	30	22	29	22	29	21	28	21
10	37	28	23	19	36	28	19	27	19	26	19	26	19

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

Numbers indicate percentage values of reflectivity.

OPTICS

LOUVERS/BAFFLES
(65% uplight/35% downlight*)

SLOTTED
(90% uplight/10% downlight)

PERFS
(95% uplight/5% downlight)

FROSTED DIFFUSER
(70% uplight/30% downlight)

BLANK
(100% uplight/no downlight)

PENDANT SPECIFICATIONS

CUBIC

LENGTH w/ ENDCAPS
4' (54 3/8")
8' (102 11/16")
12' (151")

3" ENDCAPS

2 Cubic Sizes are available:
Die-cast Hanger
Cable Hanger

8 3/4" CUBIC (CU)
6 1/2" CUBIC NARROW (CUB)

REFLECTORS

* Refer to page i1.1 and i1.2 - "Light Distribution Guide" for customizing uplight/downlight ratios with variable reflectors

LAMPS

<p>CUBIC (CU)</p> <p>1, 2 or 3 x T8 Lamps</p> <p>1, 2, 3 or 4 x T5/T5HO Lamps</p>	<p>CUBIC NARROW (CUB)</p> <p>1 or 2 x T8 Lamps</p> <p>1, 2 or 3 x T5/T5HO Lamps</p>
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INSTALLATION PAGES

i 1.1 1.2
2.1 2.15

CONSTRUCTION		FINISH	CERTIFICATION
End Cap	Die Cast Zinc (0.100" nominal)	Finish	Anodized, Powder Coated, Lacquered
Side Profile	Extruded Aluminum (0.100" nominal)	Certification	UL listed to U.S. & Canadian standards
Louvers	Die Formed Semi-Specular aluminum (22 gauge)	ELECTRICAL	
Baffles	Die Formed Aluminum (22 gauge)	Ballast Options	Electronic, Dimmable, Emergency
Interior Brackets	Die Formed Sheet Steel (18 gauge)	Emergency	Emergency Battery Pack or Circuit
Hanger	Aircraft Cable	Lamp Options	T8, T5, T5-HO
Suspension	Aircraft Cable or Ø 5/8" Stem	Voltage	120, 277, 347
Cable Grips	Quick Connecting / Release		

PRODUCT ORDERING CODE															
product id	optics	length / ft	lamp	lamp config.	finish	up light	down light	ballast	voltage	circuits	suspension	hanger	other	custom	
CU	PL	4	T8	3	A	0*	0*	E	120	1	I	CA36	C		
CUB	Cubic	4	1	one lamp	0	0	E	electronic	120	1	D	die-cast	C	custom	
+W	Cubic narrow	8	2	two lamps	1	1	ERS	rapid start	277	+E	C	cable		description	
+S	wall	12	3	three lamps	2	2	D	dimming	347		+SM	cable / t-bar	D	dust cover	
+A	surface	S#	4	four lamps	3(CU)	3(CU)		(specify details)				stem (18" std)	B#	batt. pack	
	asymmetric			(CUTS/T5HO only)	4(CU)	4(CU)						(length / inch)	SA#	fuse	
					A	HP								F	(one per ballast)
					AP	FP									
					W	BK									
					C										

DESCRIPTION

3.9" small aperture fixed position square recessed downlight trim. For use with 12V MR16 lamp 50W max., CMHMR16 20W, or ES16 BriteSpot 39W.

For use in downlighting applications where small aperture, recessed ceiling fixtures are desired.

Catalog #	ACM5101-WH	Type
Project	Smeal	L9
Comments	ACM510-ELC-120	Date
Prepared by	YKH	

SPECIFICATION FEATURES

A...Trim

Fixed position downlight trim. 3.9" sq. trim face with 1.7" aperture. Includes bullet plunger retainers for smooth snap-in action during installation and removal of trim for relamping. Helps guard against plaster cracking.

B...Lamp

For use with 12V MR16 lamp 50W max. CMH MR16 20W or ES16 BriteSpot 39W. Lamp not included.

C...Socket

Posi-Grip bi-pin socket for 12V MR16. GX10 for metal halide lamps. (Included with Mini Accurus Housing sold separately)

D...Lens

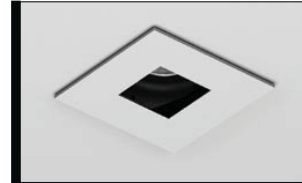
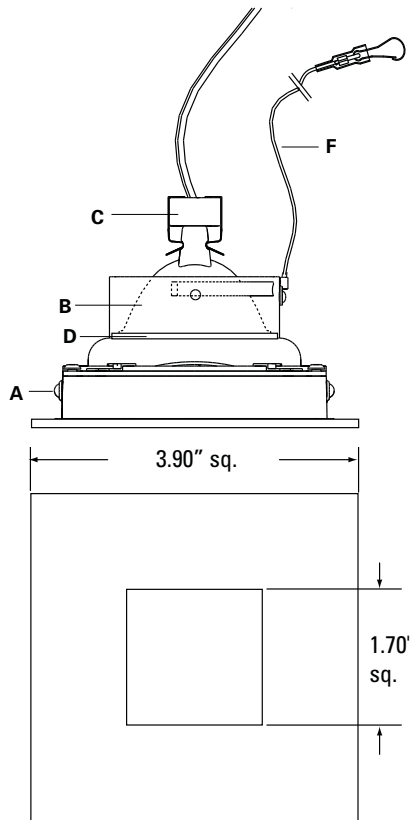
Solite™ soft focus lens included. Can hold up to two (2) optical accessories total.

E...Finish

Trim face is powder coated in white, black, industrial silver, stainless steel or primer finish for painting in existing ceiling color. All other internal components are flat black.

F...Safety

Steel safety cable provided. Attaches to tab inside housing to prevent falling during maintenance or as a result of accidental dislodging of the trim.



**MINI
ACCURUS
RECESSED**

**ACM5101
3.9" sq.
1.7" Aperture
Square Fixed
Downlight Trim**

**FOR 12V MR16 50W max.
CMH MR16 20W
ES16 BriteSpot 39W**

Compatible Housings:

ACM510 / ACM510MH
ACM512IC / ACM512ICMH
ACM514RM / ACM514RMMH



ORDERING INFORMATION

ACM5101	WH
Fixture ACM5101 = 3.9" Recessed Fixed Position Square Downlight Trim 1.7" Aperture	Finish WH = White BK = Black S = Industrial Silver SS = Stainless Steel (painted) PM = Primer

Specifications and Dimensions subject to change without notice.

RSA Lighting • 7945 Orion Ave. • Van Nuys, CA 91406 • 818-349-3030 • FAX 818-349-3031

rev. 091806

DESCRIPTION

New construction housing for Mini Accurus small aperture square trims (ACM5101, ACM5102, ACM5103, ACM5104).

For new construction applications. Insulation must be kept 3" from all sides and at least 1" above the housing.

Catalog #	ACM5101-WH	Type
Project	Smeal	L9
Comments	ACM510-ELC-120	Date
Prepared by	YKH	

SPECIFICATION FEATURES

A...Housing

Housing and plaster frame: 18 gauge CRS with flat black powder coated internal finish. Adjustable plaster frame can accommodate up to 1" ceiling thickness.

B...System Protection:

Thermal protection provided to guard against overheating and misuse of insulation over and around fixture. Vent holes in housing provide cooler operation.

C...Electrical

Integral j-box and low voltage (12V) transformer. 120V input, 12V output. Junction box is U.L. listed for through branch wiring. Includes five 1/2 trade size knockouts (six knockouts when magnetic xfmr. is specified)

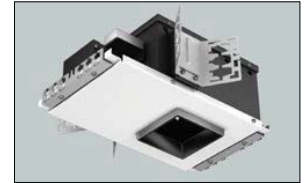
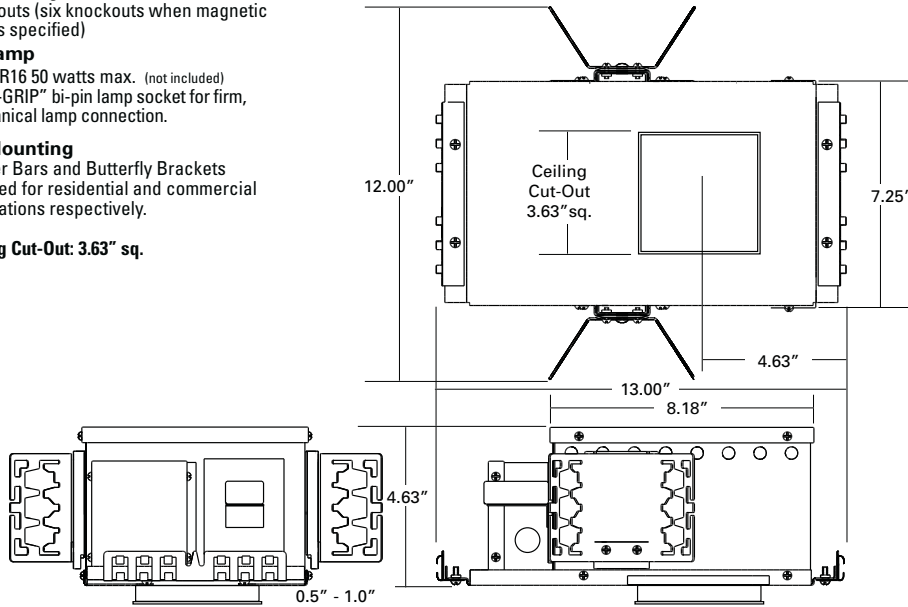
D...Lamp

12V MR16 50 watts max. (not included) "POSI-GRIP" bi-pin lamp socket for firm, mechanical lamp connection.

E...Mounting

Hanger Bars and Butterfly Brackets included for residential and commercial applications respectively.

Ceiling Cut-Out: 3.63" sq.



MINI ACCURUS
ACM510
New Construction Housing for Square Trim
FOR 12V MR16 50 watts max.



ORDERING INFORMATION

ACM510	ELC	120
Housing ACM510 = Mini Accurus New Construction Housing for Square Trim w/ Integral Transformer	Transformer ELC = Electronic MAG = Magnetic	Voltage 120 = 120 volts primary 277 = 277 volts primary

TYPE L10 METALUX®

TYPE:

CATALOG#:

DESCRIPTION

The Metalux Horizon Recessed Wall Wash Series features recessed aesthetics and the latest in Energy Efficient Technology. The clean architectural design incorporates precision-formed aluminum reflector features that produces efficient, uniform and continuous vertical wall illumination.

APPLICATION

The Horizon Recessed Wall Wash Series is specifically designed for effective use in various retail, merchandising and commercial wall washing environments. Horizon is ideal for retail displays, showrooms, corridor walls, art lighting and the elimination of the "Cave Effect" in office lighting applications.

SPECIFICATION FEATURES

A...Construction
Nominal 4-1/2" deep 10" x 4' housing designed for use with T5 and T5 HO lamps. The housing is constructed of die formed code gauge prime cold rolled steel. Housing incorporates a longitudinal flange for grid installation or ceiling tile support. KO's for continuous row mounting.

B...Electrical*
Ballasts are Class "P" and are positively secured. Rotor-lock lampholders ensure positive lamp retention. UL/CUL listed. Suitable for damp locations.

C...Finish
Electrostatically applied baked white polyester powder enamel finish. Multistage cleaning cycle, iron phosphate coating with rust inhibitor. ConveyORIZED application and baking timing accurately controlled at an elevated temperature.

D...Reflector Optical Assembly
The internal aluminum reflector optical assembly incorporates an upper "Scoop" and lower "Kick" reflector design. This design produces uniform even illumination on vertical surfaces. Continuous illumination is maintained to the junction of the wall and the ceiling. Reflectors are precision manufactured from specular low iridescent aluminum in a computer-controlled operation.

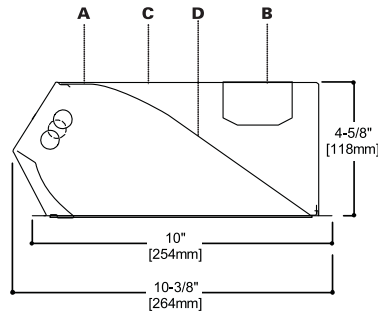


- RWW114 T5
- 214 T5
- 124 T5
- 224 T5
- 128 T5
- 228 T5
- 154 T5
- 254 T5

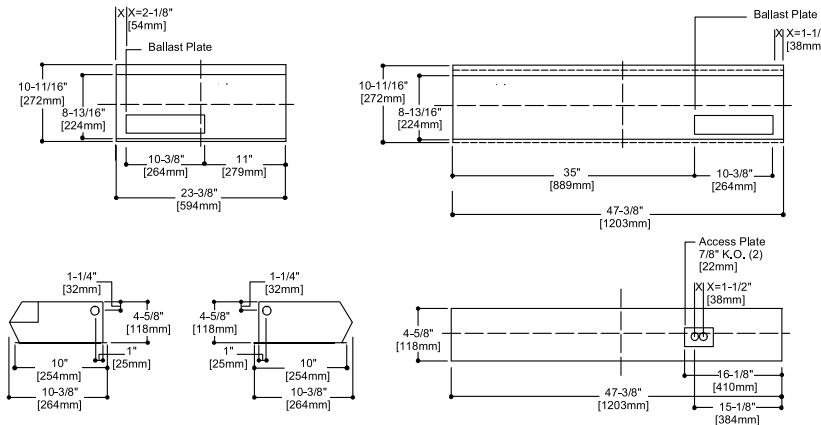
1' X 2' AND 1' X 4' RECESSED WALL WASH

Vertical Illumination Luminaire

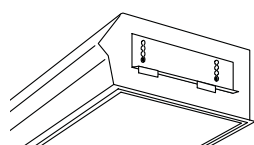
T5 or T5HO Lamps



MOUNTING DATA

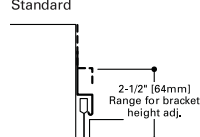


INSTALLATION DATA

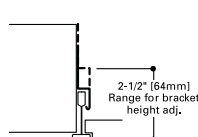


COOPER LIGHTING

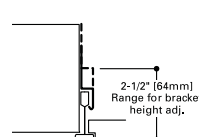
G
Grid/Lay-in Standard



T
Slot Grid



T
Chicago Metallic



ENERGY DATA

- Input Watts:
Electronic Ballast & STD Lamps
- 114 T5 (19)
 - 214 T5 (38)
 - 124 T5 (26)
 - 224 T5 (52)
 - 128 T5 (32)
 - 228 T5 (68)
 - 154 T5 (58)
 - 254 T5 (120)

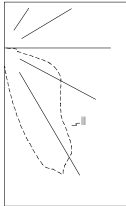
*Reference the lamp/ballast data in the Technical Section for specific lamp/ballast requirements.



ADF020636
(Supersedes ADF991762)

TYPE L10 RWW

PHOTOMETRICS



RWW-214T5MI
 Electronic Ballast
 F14T5/835 Lamps
 1350 Lumens
 Efficiency 76.7%
 Test Report
 #167P119

Candela

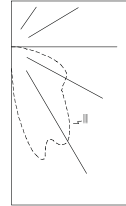
Angle	Along II	45°	Across I
0	180	180	180
5	478	432	185
10	777	631	183
15	1389	968	181
20	1672	1392	176
25	1673	1562	170
30	1602	1653	162
35	1320	1498	151
40	1115	1386	139
45	1018	1092	125
50	969	923	110
55	919	822	94
60	848	741	80
65	739	652	68
70	499	547	49
75	257	330	29
80	229	158	8
85	172	127	0
90	0	0	0

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixture
0-30	461	17.1	22.3
0-40	847	31.4	40.9
0-60	1586	58.7	76.6
0-90	2071	76.7	100.0
0-180	2071	76.7	100.0

Coefficients of Utilization

rc	Effective floor cavity reflectance																					
	80%			70%			50%			30%			10%			0%						
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0				
RCR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
0	91	91	91	91	89	89	89	89	85	85	85	82	82	82	78	78	78	77				
1	84	80	77	74	81	78	75	73	75	72	70	72	70	68	69	68	66	64				
2	76	70	65	60	74	68	64	60	66	62	58	63	60	57	61	58	56	54				
3	69	61	55	50	68	60	54	50	58	53	49	56	52	48	54	50	47	46				
4	63	54	47	42	62	53	47	42	51	46	41	49	45	41	48	44	40	39				
5	57	47	40	35	56	46	40	35	45	39	34	43	38	34	42	37	34	32				
6	53	42	35	30	51	41	35	30	40	34	29	39	33	29	37	33	29	27				
7	48	37	30	25	47	37	30	25	36	30	25	34	29	25	33	28	25	23				
8	44	33	26	22	43	33	26	22	32	26	21	31	25	21	30	25	21	20				
9	40	29	23	18	39	29	23	18	28	22	18	27	22	18	26	21	18	16				
10	37	26	20	16	36	26	20	16	25	20	16	25	19	16	24	19	15	14				



RWW-228T5MI
 Electronic Ballast
 F28T5/835 Lamps
 2900 Lumens
 Efficiency 71.7%
 Test Report
 #167P118

Candela

Angle	Along II	45°	Across I
0	405	405	405
5	947	864	405
10	1720	1364	402
15	2689	2083	397
20	3174	2661	389
25	2770	2997	374
30	2909	2822	355
35	2818	2565	330
40	2359	2615	303
45	1944	2369	276
50	1829	1943	244
55	1768	1580	210
60	1702	1426	175
65	1560	1326	141
70	1182	1159	110
75	767	835	78
80	447	450	50
85	364	274	12
90	0	0	0

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixture
0-30	882	15.2	21.2
0-40	1619	27.9	38.9
0-60	3064	52.8	73.7
0-90	4159	71.7	100.0
0-180	4159	71.7	100.0

Coefficients of Utilization

rc	Effective floor cavity reflectance																					
	80%			70%			50%			30%			10%			0%						
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0				
RCR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
0	85	85	85	85	83	83	83	83	80	80	80	76	76	76	73	73	73	72				
1	78	74	71	68	76	73	70	67	70	67	65	67	65	63	64	63	61	60				
2	71	64	59	55	69	63	58	55	60	57	53	58	55	52	56	53	51	49				
3	64	56	50	46	62	55	50	45	53	48	44	51	47	44	49	46	43	41				
4	58	50	43	38	57	49	43	38	47	42	37	45	41	37	44	40	36	35				
5	53	43	37	32	51	43	36	31	41	35	31	40	35	31	38	34	30	29				
6	48	38	32	27	47	38	31	27	36	31	27	35	30	26	34	30	26	24				
7	44	34	28	23	43	34	27	23	32	27	23	31	26	23	30	26	22	21				
8	41	30	24	19	40	30	24	19	29	23	19	28	23	19	27	22	19	18				
9	37	27	21	16	36	27	21	16	26	20	16	25	20	16	24	19	16	15				
10	34	24	18	14	34	24	18	14	23	18	14	23	18	14	22	17	14	13				

Wall Illuminance

Individual Unit*										Multiple Units*										Continuous Row*													
Ceiling										Ceiling										Ceiling													
0'	1'	2'	3'	4'	5'	6'	7'	8'		0'	1'	2'	3'	4'		0'	1'	2'	3'	4'	5'	6'		0'	1'	2'	3'	4'	5'	6'	7'	8'	
8'	38	31	18	9	4	2	1	1	1	8'	48	44	40	44	48	42	35	24	19	24	35	42	8'	89	88	89	89	89	89	89	89	89	
7'	56	48	32	18	10	5	3	2	1	7'	78	75	71	75	79	63	56	44	38	44	56	63	7'	150	150	150	150	150	150	150	150	150	
6'	39	35	26	17	11	6	4	2	2	6'	64	63	61	63	65	48	45	40	37	40	45	48	6'	125	126	126	126	126	126	126	126	126	
5'	30	27	22	15	10	7	4	3	2	5'	54	54	54	54	55	40	38	35	33	35	38	40	5'	108	108	109	109	109	109	109	109	109	
4'	23	22	18	14	9	7	5	3	2	4'	46	47	48	48	48	34	33	31	31	31	33	34	4'	94	95	95	96	96	96	96	96	96	
3'	17	16	14	11	8	6	4	3	2	3'	37	38	39	39	39	27	27	26	26	27	27	27	3'	76	77	78	78	78	79	79	79	79	
2'	12	12	10	9	7	5	4	3	2	2'	30	31	31	32	32	21	21	21	21	22	22	22	2'	61	62	63	63	64	64	64	64	64	
1'	9	9	8	7	6	5	4	3	2	1'	25	26	26	26	27	18	18	18	18	18	18	18	1'	51	52	53	53	54	54	54	54	54	

*Units located 3' from wall | Fixture Location: 36" from center of luminaire to wall. Mounting Height: 9ft.

ORDERING INFORMATION

SAMPLE NUMBER: RWW-228T5MI

RWW	2	28T5	MI			Options (add as suffix)
Series Horizon Wall Wash	Number of Lamps 1=1-Lamp 2=2-Lamp (Not included)	Reflector Finish MI=Specular Low Iridescent (Standard) I=Semi-Specular Low Iridescent	Voltage ¹ 120=120V 277=277V 347=347V UNV= Universal Voltage 120-277V	Ballast Type EB = Generic Electronic Ballast No. of Ballasts 1 Lamp Size T=T5 Linear (For Specific Electronic Ballast Specify Brand and Catalog Number)	Options TBW2= Thin White Baffle Accessory (2' Fixture) ¹ TBW4= Thin White Baffle Accessory (4' Fixture) ¹ CAL2= Clear Acrylic Lens (2' Fixture) ¹ CAL4= Clear Acrylic Lens (4' Fixture) ¹ GL=Internal Single Element Fusing GM=Dual Element Fusing RIF1=Radio Interference Suppressor REP=Approved by City of New York Bureau of Electrical Control (Submission #98A0640, Calendar #40443) DF-102-W=2' Version, Drywall Frame Kit (Order Individually as Accessory) DF-104-W=4' Version, Drywall Frame Kit (Order Individually as Accessory) (Additional options available. See Accessory Section)	
	Wattage (Length) 14 T5=14W T5 (24") 24 T5=24W T5 HO (24") 28 T5=28W T5 (48") 54 T5=54W T5 HO (48")					

SHIPPING INFORMATION

Catalog No.	Wt.
RWW-114T5	11.0
RWW-214T5	11.5
RWW-128T5	17.5
RWW-228T5	18.0

NOTE See option/accessories sections for additional detailed product data.
 Specifications and Dimensions subject to change without notice.
¹ Field installed accessory ships in separate carton.
² Consult Pre Sales Technical Support

DESCRIPTION

3.9" small aperture adjustable square recessed trim. For use with 12V MR16 lamp 50W max., CMHMR16 20W, or ES16 BriteSpot 39W.

For use in accent lighting applications where small aperture, recessed ceiling fixtures are desired.

Catalog #	ACM5103-WH	Type
Project	Smeal	L11
Comments	ACM510-ELC-120	Date
Prepared by	YKH	

SPECIFICATION FEATURES

A...Recessed Trim

Adjustable trim. 3.9" sq. trim face with 1.7" aperture. Includes bullet plunger retainers for smooth snap-in action during installation and removal of trim for relamping. Helps guard against plaster cracking.

B...Lamp

For use with 12V MR16 lamp 50W max. CMH MR16 20W or ES16 BriteSpot 39W. Lamp not included.

C...Socket

Posi-Grip bi-pin socket for 12V MR16. GX10 for metal halide lamps. (Included with Mini Accurus Housing sold separately)

D...Lens

Solite™ soft focus lens included. Can hold up to two (2) optical accessories total.

E...Finish

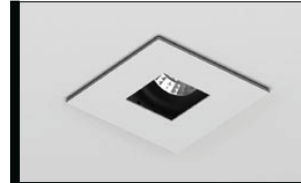
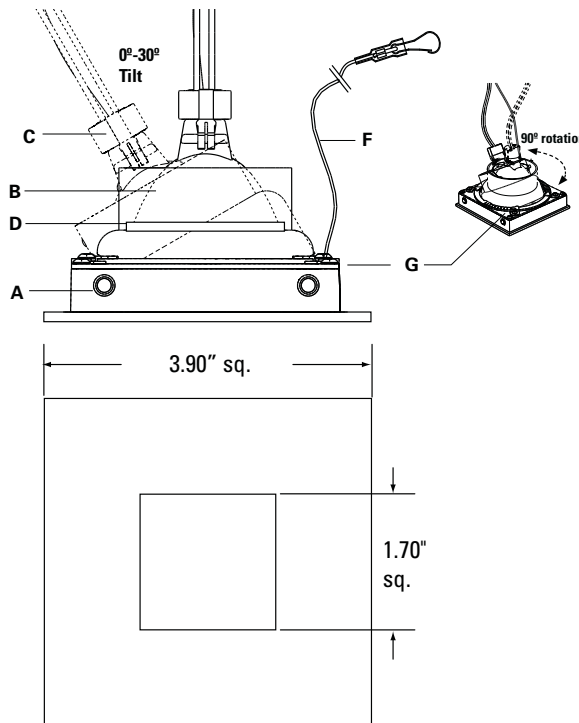
Trim face is powder coated in white, black, industrial silver, stainless steel or primer finish for painting in existing ceiling color. All other internal components are flat black.

F...Safety

Steel safety cable provided. Attaches to tab inside housing to prevent falling during maintenance or as a result of accidental dislodging of the trim.

G...Adjustment

Adjustable from 0° - 30° tilt with mechanical locking. Internal rotation ring with incremental angle indicators provides 90° adjustment on the vertical axis. This makes it possible to illuminate corners and other areas not possible with a traditional square trim.



**MINI
ACCURUS
RECESSED**

**ACM5103
3.9" sq.
1.7" Aperture
Square
Adjustable Trim**

FOR 12V MR16 50W max.
CMH MR16 20W
ES16 BriteSpot 39W

Compatible Housings:

ACM510 / ACM510MH
ACM512IC / ACM512ICMH
ACM514RM / ACM514RMMH



ORDERING INFORMATION

ACM5103	WH
Fixture ACM5103 = 3.9" Recessed Square Adjustable Trim 1.7" Aperture	Finish WH = White BK = Black S = Industrial Silver SS = Stainless Steel (painted) PM = Primer

Specifications and Dimensions subject to change without notice.

RSA Lighting • 7945 Orion Ave. • Van Nuys, CA 91406 • 818-349-3030 • FAX 818-349-3031

rev. 091806

DESCRIPTION

New construction housing for Mini Accurus small aperture square trims (ACM5101, ACM5102, ACM5103, ACM5104).

For new construction applications. Insulation must be kept 3" from all sides and at least 1" above the housing.

Catalog #	ACM5103-WH	Type
Project	Smeal	L11
Comments	ACM510-ELC-120	Date
Prepared by	YKH	

SPECIFICATION FEATURES

A...Housing

Housing and plaster frame: 18 gauge CRS with flat black powder coated internal finish. Adjustable plaster frame can accommodate up to 1" ceiling thickness.

B...System Protection:

Thermal protection provided to guard against overheating and misuse of insulation over and around fixture. Vent holes in housing provide cooler operation.

C...Electrical

Integral j-box and low voltage (12V) transformer. 120V input, 12V output. Junction box is U.L. listed for through branch wiring. Includes five 1/2 trade size knockouts (six knockouts when magnetic xfmr. is specified)

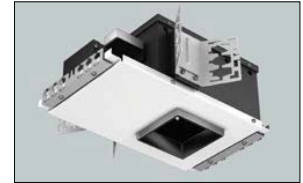
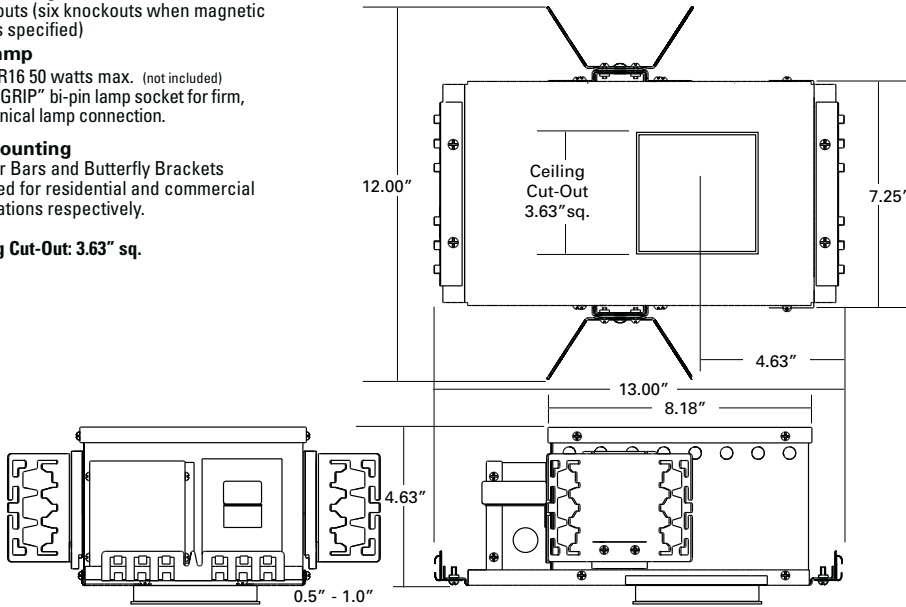
D...Lamp

12V MR16 50 watts max. (not included) "POSI-GRIP" bi-pin lamp socket for firm, mechanical lamp connection.

E...Mounting

Hanger Bars and Butterfly Brackets included for residential and commercial applications respectively.

Ceiling Cut-Out: 3.63" sq.



MINI ACCURUS
ACM510
New Construction Housing for Square Trim
FOR 12V MR16 50 watts max.



ORDERING INFORMATION

ACM510	ELC	120
Housing ACM510 = Mini Accurus New Construction Housing for Square Trim w/ Integral Transformer	Transformer ELC = Electronic MAG = Magnetic	Voltage 120 = 120 volts primary 277 = 277 volts primary



4" Vertical CFL
Open & Wall Wash
Downlight

D432EB

One 13W, 18W, 26W or 32W Triple.
One 13W or 18W Quad.
120V - 277V

Featuring **NirtualSource** Lighting® Reflectors

APPLICATIONS:

The Architektür D4 offers a vertical, nominal 4" specification-grade compact fluorescent downlight and wall wash fixture that provides superior brightness control. This luminaire is ideal for a wide variety of low to medium ceiling height applications including commercial, retail, and hospitality.

HOUSING:

One-piece, 18-gauge galvanized steel platform. Large plaster frame provides superior housing stability in the ceiling. Same housing accommodates downlight and wall wash reflectors. Prewired J-box with snap-on cover for easy access. J-box is elevated and angled 15° to provide 95% visibility from below the ceiling after installation for easy maintenance.

REFLECTOR:

High purity aluminum reflector with iridescence suppressed Alzak finish. Open trims retained with 5-finger grip clip. Wall wash trims retained with integral leaf spring clips and can be rotated 360°. Virtual Source Lighting® optical design provides optimum efficiency and superior brightness control for visual comfort. Wall wash reflectors feature patent-pending VirtuWall Source™ optics for superior wall washing.

BALLAST:

One (1) compact fluorescent Class 'P' electronic HPF, universal voltage (120V through 277V) ballast. End of life protection standard. Accessible from above or below ceiling. Numerous dimming options available.

LAMP:

One (1) 13W (GX24q-1 base), one (1) 18W (GX24q-2 base), one (1) 26W (GX24q-3 base), or one (1) 32W (GX24q-3 base) 4-pin compact fluorescent lamp. Above or below ceiling relamping capability. Lamp furnished by others.

SOCKET:

Injection molded vented lamp socket adjusts to two positions, accommodating various lamp sizes and ensuring precise lamp position. Die cast aluminum heat sink socket cup with tool-less, positive-positioning, reflector-locking spring (patent pending).

INSTALLATION:

Universal adjustable mounting brackets accommodate 1/2" EMT conduit; 1 1/2" or 3/4" lathing channel (by others); or Prescolite 24" bar hangers (B24 or B6).

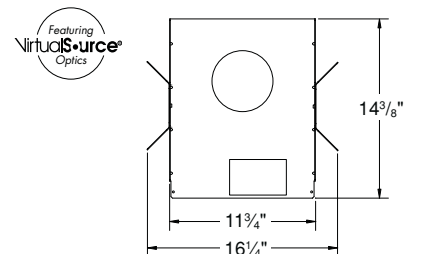
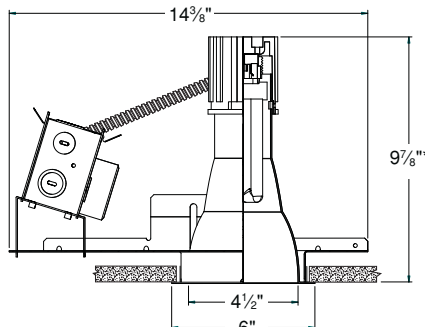
LABELS:

UL, CSA listed for damp locations. Approved for through wiring. Thermally protected. Non-IC rated.

DATE: _____ TYPE: _____
FIRM NAME: _____
PROJECT: _____



Ceiling Cutout: 5"
Maximum Ceiling Thickness: 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale



*maximum

CATALOG NUMBER:

EXAMPLE: D432EBDM-4D5MFC-B24

HOUSING	HOUSING OPTIONS	HOUSING OPTIONS	REFLECTOR	REFLECTOR COLOR	REFLECTOR OPTIONS
<input type="checkbox"/> D413EB 4", (1) 13W Quad or triple tube, multi-volt electronic ballast <input type="checkbox"/> D418EB 4", (1) 18W Quad or triple tube, multi-volt electronic ballast <input type="checkbox"/> D432EB 4", (1) 26W or 32W triple tube, multi-volt electronic ballast	<input type="checkbox"/> 347V ³ <input type="checkbox"/> EM ^{3,4} Emergency battery pack with remote test switch and indicator light <input type="checkbox"/> FSDFA Fuse kit installed at factory <input type="checkbox"/> RIF1 ⁴ Radio interference filter (single circuit) <input type="checkbox"/> MW26 ⁶ Max Wattage label, 26W	<input type="checkbox"/> DM Electronic analog dimming ballast to 3%, 4-wire (120V thru 277V) <input type="checkbox"/> SDM ^{1,5} Lutron Compact SE™ Dimming Ballast to 5%, 3-wire (specify voltage) <input type="checkbox"/> HDM ^{1,2,5} Lutron Hi-Lume® Dimming Ballast to 1%, 3-wire (specify voltage) <input type="checkbox"/> 2DM ^{1,2,5} Lutron Tu-Wire® Dimming Ballast to 5%, 2-wire (120V only) <input type="checkbox"/> 7DM Advance Mark 7™ Dimming Ballast to 3%, 4-wire (120V thru 277V) <input type="checkbox"/> XDM ¹ Advance Mark 10™ Dimming Ballast to 5%, 2-wire (specify voltage)	<input type="checkbox"/> 4D4 Open Alzak reflector (13W or 18W triple) <input type="checkbox"/> 4D5 Open Alzak reflector (13W or 18W quad, or 26W or 32W triple) REFLECTOR FINISH <input type="checkbox"/> BLANK Specular Alzak <input type="checkbox"/> SS Semi-specular Alzak <input type="checkbox"/> MFC American Matte™ Alzak	<input type="checkbox"/> BLANK Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak <input type="checkbox"/> BL Black Alzak	<input type="checkbox"/> TRG Trim ring gasket (factory installed) <input type="checkbox"/> WT Painted white self-flange <input type="checkbox"/> WW VirtuWall Source™ Wall wash ACCESSORIES <input type="checkbox"/> B24 Set of two (2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joists up to 24" centers <input type="checkbox"/> FSDFI Fuse kit for field installation <input type="checkbox"/> SCA5 Sloped ceiling adapter for 4" housing (specify degree of slope and type of ceiling.)

¹Not available with 13W CFL lamp
²Not available with 18W CFL lamp
³347V not available with EM or dimming options.
⁴RIF1 and EM options not offered in combination
⁵For 26W CFL lamp specify D426EB and add desired Lutron dimming option suffix
⁶D432EB only

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
Web: www.prescolite.com • Tech Support: (888) 777-4832

ARCH-CFL-066



PHOTOMETRIC DATA

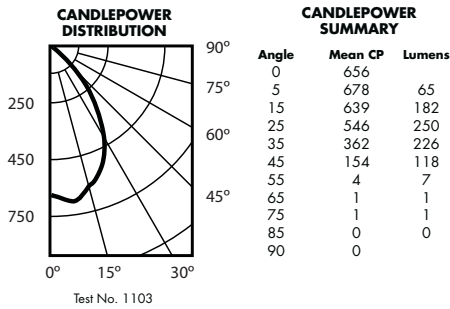
Architektūr D4 - 4" Vertical Open & Wall Wash Downlight

TYPE
L12

BALLAST DATA	18W Triple			26W Triple			32W Triple		
	120V	277V	347V	120V	277V	347V	120V	277V	347V
Total System Watts	20W	20W	21W	29W	29W	31W	36W	36W	36W
Input Current (Amps)	0.17	0.08	0.06	0.24	0.11	0.09	0.31	0.13	0.11
Input Frequency in Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power Factor	>97%	>97%	>98%	>98%	>98%	>98%	>98%	>98%	>98%
Ballast Factor	>105%	>105%	>100%	>110%	>110%	>102%	>98%	>98%	>98%
Total Harmonic Distortion	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Minimum Starting Temp	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)

D432EB-4D5 with Clear Alzak® Reflector

Lamp: One 32W Triple
Spacing Criteria: 1.1
Efficiency: 38.6%



LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average
0°	21218
45°	679
55°	231
65°	376
75°	0
85°	0

AVERAGE INITIAL FOOTCANDLES

Multiple Units (Square Array)
Ceiling 80% Wall 50% Floor 20%

SPACING	RCR1	RRC3	RCR7
7.0	15	13	9
8.0	12	10	7
9.0	9	8	6
10.0	7	6	5
11.0	6	5	4
12.0	5	4	3
13.0	4	4	3
14.0	4	3	2
15.0	3	3	2

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Floor Cavity Reflectance															
	80%					70%					50%					
	20% Effective Floor Cavity Reflectance															
	% Wall Reflectance															
	70	50	30	10	70	50	30	10	50	30	10	50	30	10		
1	.44	.43	.42	.41	.43	.42	.41	.40	.40	.39	.39	.39	.38	.37	.37	.36
2	.41	.39	.38	.36	.40	.39	.37	.36	.37	.36	.35	.36	.35	.34	.34	.34
3	.39	.36	.34	.33	.38	.36	.34	.32	.35	.33	.32	.34	.32	.31	.33	.32
4	.37	.34	.31	.30	.36	.33	.31	.29	.32	.30	.29	.31	.30	.29	.31	.29
5	.35	.31	.29	.27	.34	.31	.28	.27	.30	.28	.27	.29	.28	.26	.29	.27
6	.33	.29	.26	.25	.32	.29	.26	.25	.28	.26	.24	.27	.26	.24	.27	.25
7	.31	.27	.24	.23	.30	.27	.24	.23	.26	.24	.22	.26	.24	.22	.25	.23
8	.29	.25	.23	.21	.29	.25	.22	.21	.24	.22	.21	.24	.22	.21	.24	.22
9	.28	.23	.21	.19	.27	.23	.21	.19	.23	.21	.19	.23	.21	.19	.22	.20
10	.26	.22	.20	.18	.26	.22	.20	.18	.22	.19	.18	.21	.19	.18	.21	.19

Test No. 1103

NOTES

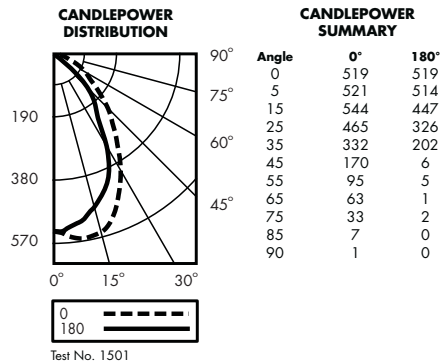
Refer to www.prescolite.com for additional photometric tests (IES Files).

LAMP DATA

	18W triple	26W triple	32W triple
Rated Watts	1200	1800	2400
Rated Lumens	67	69	75
Efficacy (LPW)	10,000 hours	10,000 hours	10,000 hours
Rated Life	82	82	82
CR I	0° F	0° F	0° F
Minimum Starting Temp.			

D432EB-4D5WW with Clear Alzak® Reflector

Lamp: One 32W Triple
Spacing Criteria: 1.0
Efficiency: 27.7%



LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average	Average 90°	Average 180°
45°	31998	11670	1129
55°	22044	2088	1160
65°	19841	945	315
75°	16970	514	1028
85°	10690	0	0

3' DISTANCE FIXTURE MOUNTED OUT FROM WALLS FOOTCANDLE DISTRIBUTION ON WALL SURFACE

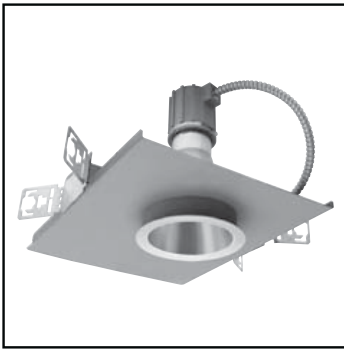
DISTANCE FROM CEILING IN FEET	MULTIPLE UNITS														
	UNITS ON 3' CENTER					UNITS ON 4' CENTER									
1	4.5	3.5	1.7	0.7	0.3	6.2	5.8	6.2	5.2	3.7	5.2				
2	5.7	4.6	2.5	1.2	0.6	8.4	8.1	8.4	6.9	5.5	6.9				
3	6.9	5.5	3.0	1.5	0.6	10.4	9.5	10.4	8.3	6.5	8.3				
4	7.3	6.3	4.0	1.9	0.9	11.6	11.7	11.6	9.2	8.4	9.2				
5	6.1	5.6	4.1	2.6	1.2	11.9	11.6	11.9	8.7	8.7	8.7				
6	4.6	4.4	3.5	2.4	1.6	10.3	10.5	10.3	8.0	7.7	8.0				
7	3.4	3.3	2.7	2.1	1.5	8.9	9.1	8.9	6.8	6.7	6.8				
8	2.6	2.5	2.2	1.7	1.4	7.6	7.8	7.6	5.8	5.9	5.8				
9	2.0	2.0	1.8	1.5	1.2	6.5	6.7	6.5	4.9	5.0	4.9				

D432EB-4D5WW Test No. 1501



Web: www.prescolite.com • Tech Support: (888) 777-4832
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Specifications subject to change without notice. • Printed in U.S.A. • ARCH-FL066 • 05/30/07





Featuring VirtualSource Lighting® Reflectors

4" Vertical CFL
Open & Wall Wash
Downlight
D432EB
One 13W, 18W, 26W or 32W Triple.
One 13W or 18W Quad.
120V - 277V

DATE: _____ TYPE: _____
FIRM NAME: _____
PROJECT: _____



Ceiling Cutout: 5"
Maximum Ceiling Thickness: 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale

APPLICATIONS:

The Architektür D4 offers a vertical, nominal 4" specification-grade compact fluorescent downlight and wall wash fixture that provides superior brightness control. This luminaire is ideal for a wide variety of low to medium ceiling height applications including commercial, retail, and hospitality.

HOUSING:

One-piece, 18-gauge galvanized steel platform. Large plaster frame provides superior housing stability in the ceiling. Same housing accommodates downlight and wall wash reflectors. Prewired J-box with snap-on cover for easy access. J-box is elevated and angled 15° to provide 95% visibility from below the ceiling after installation for easy maintenance.

REFLECTOR:

High purity aluminum reflector with iridescence suppressed Alzak finish. Open trims retained with 5-finger grip clip. Wall wash trims retained with integral leaf spring clips and can be rotated 360°. Virtual Source Lighting® optical design provides optimum efficiency and superior brightness control for visual comfort. Wall wash reflectors feature patent-pending VirtuWall Source™ optics for superior wall washing.

BALLAST:

One (1) compact fluorescent Class 'P' electronic HPF, universal voltage (120V through 277V) ballast. End of life protection standard. Accessible from above or below ceiling. Numerous dimming options available.

LAMP:

One (1) 13W (GX24q-1 base), one (1) 18W (GX24q-2 base), one (1) 26W (GX24q-3 base), or one (1) 32W (GX24q-3 base) 4-pin compact fluorescent lamp. Above or below ceiling relamping capability. Lamp furnished by others.

SOCKET:

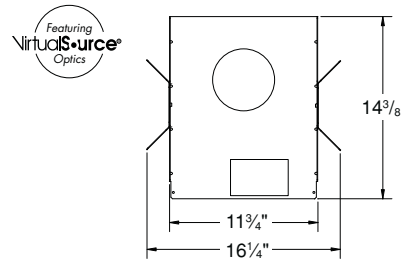
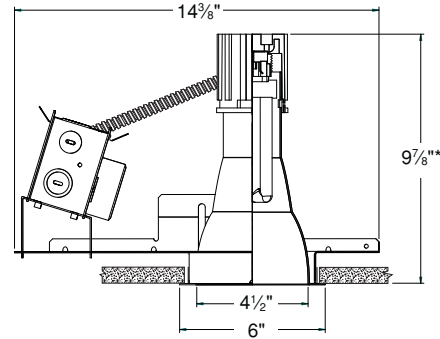
Injection molded vented lamp socket adjusts to two positions, accommodating various lamp sizes and ensuring precise lamp position. Die cast aluminum heat sink socket cup with tool-less, positive-positioning, reflector-locking spring (patent pending).

INSTALLATION:

Universal adjustable mounting brackets accommodate 1/2" EMT conduit; 1 1/2" or 2 1/4" lathing channel (by others); or Prescolite 24" bar hangers (B24 or B6).

LABELS:

UL, CSA listed for damp locations. Approved for through wiring. Thermally protected. Non-IC rated.



*maximum

CATALOG NUMBER:

EXAMPLE: D432EBDM-4D5MFC-B24

HOUSING	HOUSING OPTIONS	HOUSING OPTIONS	REFLECTOR	REFLECTOR COLOR	REFLECTOR OPTIONS
<input type="checkbox"/> D413EB 4", (1) 13W Quad or triple tube, multi-volt electronic ballast <input type="checkbox"/> D418EB 4", (1) 18W Quad or triple tube, multi-volt electronic ballast <input type="checkbox"/> D432EB 4", (1) 26W or 32W triple tube, multi-volt electronic ballast	<input type="checkbox"/> 347V³ EM^{3,4} Emergency battery pack with remote test switch and indicator light <input type="checkbox"/> FSDFA Fuse kit installed at factory <input type="checkbox"/> RIF1⁴ Radio interference filter (single circuit) <input type="checkbox"/> MW26⁶ Max Wattage label, 26W	<input type="checkbox"/> DM Electronic analog dimming ballast to 3%, 4-wire (120V thru 277V) <input type="checkbox"/> SDM^{1,5} Lutron Compact SE™ Dimming Ballast to 5%, 3-wire (specify voltage) <input type="checkbox"/> HDM^{1,2,5} Lutron Hi-Lume® Dimming Ballast to 1%, 3-wire (specify voltage) <input type="checkbox"/> 2DM^{1,2,5} Lutron Tu-Wire® Dimming Ballast to 5%, 2-wire (120V only) <input type="checkbox"/> 7DM Advance Mark 7™ Dimming Ballast to 3%, 4-wire (120V thru 277V) <input type="checkbox"/> XDM¹ Advance Mark 10™ Dimming Ballast to 5%, 2-wire (specify voltage)	<input type="checkbox"/> 4D4 Open Alzak reflector (13W or 18W triple) <input type="checkbox"/> 4D5 Open Alzak reflector (13W or 18W quad, or 26W or 32W triple) <hr/> REFLECTOR FINISH <input type="checkbox"/> BLANK Specular Alzak <input type="checkbox"/> SS Semi-specular Alzak <input type="checkbox"/> MFC American Matte™ Alzak <hr/> ¹ Not available with 13W CFL lamp ² Not available with 18W CFL lamp ³ 347V not available with EM or dimming options. ⁴ RIF1 and EM options not offered in combination ⁵ For 26W CFL lamp specify D426EB and add desired Lutron dimming option suffix ⁶ D432EB only	<input type="checkbox"/> BLANK Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak <input type="checkbox"/> BL Black Alzak	<input type="checkbox"/> TRG Trim ring gasket (factory installed) <input type="checkbox"/> WT Painted white self-flange <input type="checkbox"/> VW VirtuWall Source™ Wall wash <hr/> ACCESSORIES <input type="checkbox"/> B24 Set of two (2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joists up to 24" centers <input type="checkbox"/> FSDFI Fuse kit for field installation <input type="checkbox"/> SCA5 Sloped ceiling adapter for 4" housing (specify degree of slope and type of ceiling.)



A Division of Hubbell Lighting, Inc.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
Web: www.prescolite.com • Tech Support: (888) 777-4832

ARCH-CFL-066

PHOTOMETRIC DATA

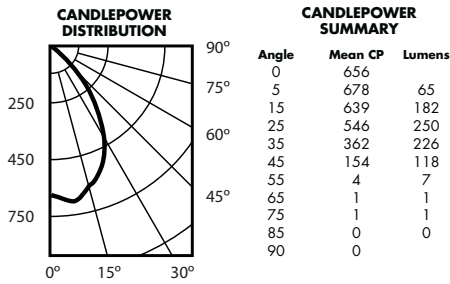
Architektūr D4 - 4" Vertical Open & Wall Wash Downlight

TYPE
L13

BALLAST DATA	18W Triple			26W Triple			32W Triple		
	120V	277V	347V	120V	277V	347V	120V	277V	347V
Total System Watts	20W	20W	21W	29W	29W	31W	36W	36W	36W
Input Current (Amps)	0.17	0.08	0.06	0.24	0.11	0.09	0.31	0.13	0.11
Input Frequency in Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power Factor	>97%	>97%	>98%	>98%	>98%	>98%	>98%	>98%	>98%
Ballast Factor	>105%	>105%	>100%	>110%	>110%	>102%	>98%	>98%	>98%
Total Harmonic Distortion	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Minimum Starting Temp	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)	-18°C (0°F)

D432EB-4D5 with Clear Alzak® Reflector

Lamp: One 32W Triple
Spacing Criteria: 1.1
Efficiency: 38.6%



Test No. 1103

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average
0°	21218
45°	679
55°	231
65°	376
75°	0
85°	0

AVERAGE INITIAL FOOTCANDLES

Multiple Units (Square Array)
Ceiling 80% Wall 50% Floor 20%

SPACING	RCR1	RCR3	RCR7
7.0	15	13	9
8.0	12	10	7
9.0	9	8	6
10.0	7	6	5
11.0	6	5	4
12.0	5	4	3
13.0	4	4	3
14.0	4	3	2
15.0	3	3	2

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Floor Cavity Reflectance																
	80%					70%					50%						
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	.44	.43	.42	.41	.43	.42	.41	.40	.40	.39	.39	.39	.38	.38	.37	.37	.36
2	.41	.39	.38	.36	.40	.39	.37	.36	.37	.36	.35	.36	.35	.34	.35	.34	.34
3	.39	.36	.34	.33	.38	.36	.34	.32	.35	.33	.32	.34	.32	.31	.33	.32	.31
4	.37	.34	.31	.30	.36	.33	.31	.29	.32	.30	.29	.31	.30	.29	.31	.29	.28
5	.35	.31	.29	.27	.34	.31	.28	.27	.30	.28	.27	.29	.28	.26	.29	.27	.26
6	.33	.29	.26	.25	.32	.29	.26	.25	.28	.26	.24	.27	.26	.24	.27	.25	.24
7	.31	.27	.24	.23	.30	.27	.24	.23	.26	.24	.22	.26	.24	.22	.25	.23	.22
8	.29	.25	.23	.21	.29	.25	.22	.21	.24	.22	.21	.24	.22	.21	.24	.22	.21
9	.28	.23	.21	.19	.27	.23	.21	.19	.23	.21	.19	.23	.21	.19	.22	.20	.19
10	.26	.22	.20	.18	.26	.22	.20	.18	.22	.19	.18	.21	.19	.18	.21	.19	.18

D432EB-4D5

Test No. 1103

NOTES

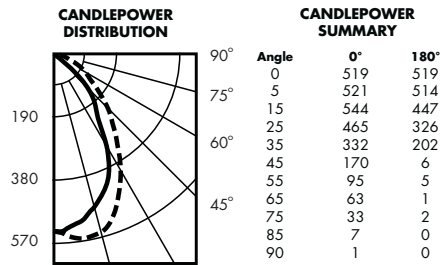
Refer to www.prescolite.com for additional photometric tests (IES Files).

LAMP DATA

	18W triple	26W triple	32W triple
Rated Watts	1200	1800	2400
Rated Lumens	67	69	75
Efficacy (LPW)	10,000 hours	10,000 hours	10,000 hours
Rated Life	82	82	82
CRI	0° F	0° F	0° F
Minimum Starting Temp.			

D432EB-4D5WW with Clear Alzak® Reflector

Lamp: One 32W Triple
Spacing Criteria: 1.0
Efficiency: 27.7%



Test No. 1501

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average	Average 90°	Average 180°
45°	31998	11670	1129
55°	22044	2088	1160
65°	19841	945	315
75°	16970	514	1028
85°	10690	0	0

3' DISTANCE FIXTURE MOUNTED OUT FROM WALLS	MULTIPLE UNITS							
	UNITS ON 3' CENTER				UNITS ON 4' CENTER			

DISTANCE FROM CEILING IN FEET	FOOTCANDLE DISTRIBUTION ON WALL SURFACE															
	4.5	3.5	1.7	0.7	0.3	6.2	5.8	6.2	5.2	3.7	5.2	4.5	3.5	1.7	0.7	0.3
1	4.5	3.5	1.7	0.7	0.3	6.2	5.8	6.2	5.2	3.7	5.2	4.5	3.5	1.7	0.7	0.3
2	5.7	4.6	2.5	1.2	0.6	8.4	8.1	8.4	6.9	5.5	6.9	5.7	4.6	2.5	1.2	0.6
3	6.9	5.5	3.0	1.5	0.6	10.4	9.5	10.4	8.3	6.5	8.3	6.9	5.5	3.0	1.5	0.6
4	7.3	6.3	4.0	1.9	0.9	11.6	11.7	11.6	9.2	8.4	9.2	7.3	6.3	4.0	1.9	0.9
5	6.1	5.6	4.1	2.6	1.2	11.9	11.6	11.9	8.7	8.7	8.7	6.1	5.6	4.1	2.6	1.2
6	4.6	4.4	3.5	2.4	1.6	10.3	10.5	10.3	8.0	7.7	8.0	4.6	4.4	3.5	2.4	1.6
7	3.4	3.3	2.7	2.1	1.5	8.9	9.1	8.9	6.8	6.7	6.8	3.4	3.3	2.7	2.1	1.5
8	2.6	2.5	2.2	1.7	1.4	7.6	7.8	7.6	5.8	5.9	5.8	2.6	2.5	2.2	1.7	1.4
9	2.0	2.0	1.8	1.5	1.2	6.5	6.7	6.5	4.9	5.0	4.9	2.0	2.0	1.8	1.5	1.2

D432EB-4D5WW

Test No. 1501



4" LED Downlight

D4LED

Wet Location
120V, 277V

APPLICATIONS:

Architektür D4LED is a 4" specification grade LED downlight that provides superior brightness control. The D4LED is suitable for a variety of commercial, retail, and institutional applications, including outdoor cold environments.

Fixture should be installed in applications where ambient temperatures do not exceed 50°C (122°F) while illuminated. Installations in applications that exceed this temperature will result in a reduction of lamp life and void product warranty.

HOUSING:

One-piece 18 gauge steel platform. Pre-wired J-Box with snap-on cover for easy access.

REFLECTOR:

High purity spun aluminum reflector with iridescence suppressed Alzak anodized reflector. Reflector/Light Engine assembly is attached to the housing with a Truss head tamper proof screw (tool required). Self flanged reflector. Painted white trim available as option.

LED LIGHT ENGINE:

Each equipped with (4) 3-Watt white Lumileds Luxeon K2 LEDs with integral heat sink that will provide 70% average lumen maintenance at 50,000 hours. LED board is attached to the heat sink with two pin in socket button head tamper proof screws. One #8 tamper proof bit included.

LED DRIVER:

Solid state electronic 700mA, FCC class B compliant, 24V. 50,000 hour minimum anticipated life. Rated for -40°C/F starting temperature.

Stepdown transformer for 277V option.

LABELS:

CSA C/US listed suitable for wet location under covered ceiling. Approved for through wiring. Non-IC rated.

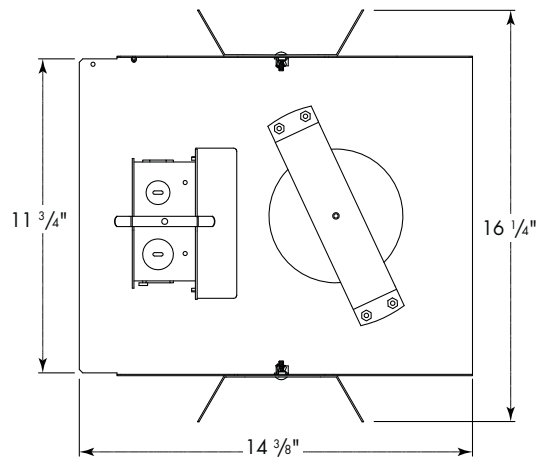
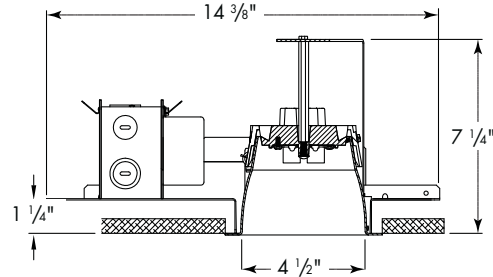
DATE: _____ TYPE: _____

FIRM NAME: _____

PROJECT: _____

Architektür

Ceiling Cutout: 5 3/8"
Contact Factory For Shallow Ceiling
Maximum Ceiling Thickness 1 1/4"
For conversion to millimeters,
multiply inches by 25.4
Not to Scale



CATALOG NUMBER:

EXAMPLE: D4LED277V-4D9MFC

HOUSING	HOUSING OPTIONS	TRIM	REFLECTOR FINISH	REFLECTOR COLOR	REFLECTOR OPTIONS	ACCESSORIES
<input type="checkbox"/> D4LED 4" LED Housing	<input type="checkbox"/> 277V	<input type="checkbox"/> 4D9 4" Open Reflector/Light Engine Assembly	<input type="checkbox"/> BLANK Specular <input type="checkbox"/> SS Semi-Specular <input type="checkbox"/> MFC American Matte	<input type="checkbox"/> BLANK Clear Alzak <input type="checkbox"/> CG Champagne Gold Alzak <input type="checkbox"/> BL Black Alzak <input type="checkbox"/> WE Wheat Alzak <input type="checkbox"/> LW Light Wheat Alzak <input type="checkbox"/> PW Pewter Alzak <input type="checkbox"/> WH' White Paint	<input type="checkbox"/> WT White Trim <input type="checkbox"/> TRG Trim Ring Gasket (factory installed)	<input type="checkbox"/> B24 Set of two(2) 24" bar hangers for T-bar ceilings <input type="checkbox"/> B6 Set of two (2) bar hangers for ceiling joist up to 24" centers <input type="checkbox"/> SCA5 Sloped ceiling adapter for 4" housings. Specify degree of slope and type of ceiling. Slope ceiling adapter and housing must be installed at the same time.

'Requires WT option.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
Web: www.prescolite.com • Tech Support: (888) 777-4832

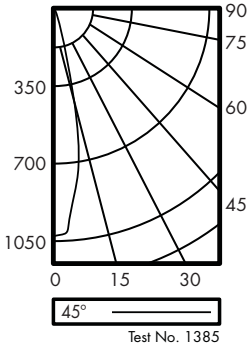
ARCH-LED-001

PHOTOMETRIC DATA

Architektūr - 4" D4LED Downlight **TYPE L14**

D4LED/4D9

Lamp: Four 3-watt White LEDs (Lumileds K2)
Spacing Criteria = 0.4
Efficiency=101.8%**



CANDLEPOWER SUMMARY

Angle	45°
0	1038
5	919
15	414
25	47
35	13
45	6
55	0
65	0
75	0
85	0
90	0

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LAMP	%LUMINAIRE
0-30	219	96.3	94.5
0-40	228	100.2**	98.4
0-60	232	101.8**	100.0
0-90	232	101.8**	100.0
90-180	0	0.0	0.0
0-180	232	101.8**	100.0

LUMINANCE DATA IN CANDELA/SQ. METER

Angle in Vertical	Average
45	1046
55	0
65	0
75	0
85	0

INPUT PARAMETER	VALUE	UNITS
Input Voltage range	120 ± 10%	V
Frequency	60	Hz
Power	15	W
Current	0.125	A
Efficiency	80	%

D4LED/4D9

AVERAGE INITIAL FOOTCANDLES

- Assumptions:
- Multiple Units (Square Array)
 - Ceiling 80% Wall 50% Floor 20%
 - 4 fixtures evenly spaced in the center of the room.
 - The room is square and has a width and length equal to twice the lamp spacing.
 - The lumen depreciation factor is 0.8
 - The dirt depreciation factor is 0.98

3W SPACING	LED RCR1	RCR3	RCR7
7.0	4	4	3
8.0	3	3	3
9.0	3	2	2
10.0	2	2	2
11.0	2	2	1
12.0	1	1	1
13.0	1	1	1
14.0	1	1	1
15.0	1	1	1

OPTICAL CHARACTERISTICS

Color	Color Temperature			Lumens
	Min.	Typ	Max.	TYP
White	5,000 K	5,500 K	6,000 K	57

Test No. 1385

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Floor Cavity Reflectance																			
	80%				70%				50%				30%				10%			
	20% Effective Floor Cavity Reflectance																			
% Wall Reflectance																				
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10			
1	118	115	114	112	115	113	112	110	109	108	107	106	105	104	102	101	101			
2	114	110	107	105	112	109	106	104	105	103	101	102	101	99	100	98	97			
3	110	106	102	99	109	104	101	98	102	99	97	100	97	95	97	96	94			
4	107	102	98	95	105	101	97	94	99	96	93	97	94	92	95	93	91			
5	104	98	94	91	103	97	93	91	96	92	90	94	91	89	93	90	88			
6	101	95	91	88	100	94	90	87	93	89	87	92	89	86	90	88	86			
7	98	92	88	85	97	91	87	85	90	87	84	89	86	84	88	85	83			
8	96	89	85	82	95	89	85	82	88	84	82	87	84	81	86	83	81			
9	93	87	83	80	92	86	82	80	85	82	79	85	82	79	84	81	79			
10	91	84	80	78	90	84	80	78	83	80	77	83	79	77	82	79	77			

D4LED/4D9

Test No. 1385

*LEDs have inherent variances in light output of +/- 10% of rated lumens. The above published data assumes a weighted average of 57 lumens/LED.

**Efficiency > 100% because the luminaire's thermal management causes LED array to produce more lumens when installed in the luminaire than in free air.

NOTES

Refer to www.prescolite.com for additional photometric tests (IES Files).



mr16
avenue® b



FEATURES

Narrow 3" slot, T5/T5HO fluorescent with 2-MR16 halogen lamps (50w max).

Shielding options include corrugated, solid regressed trim, louver as well as flush lens.

Avenue® B with MR16 is a great solution for general illumination that also requires the benefits of accent lighting in a narrow aperture.

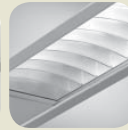
shielding options



corrugated regress trim



solid regressed trim



louver



flush lens

mr16 options



flush mount mr16 (25° adjustment)



extended yoke mr16 (90° adjustment)



snoot



hex louver



linear



prismatic



sand blasted

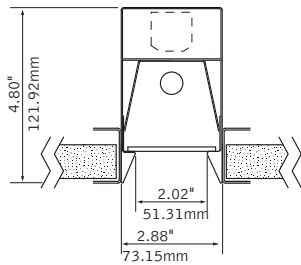


soft focus

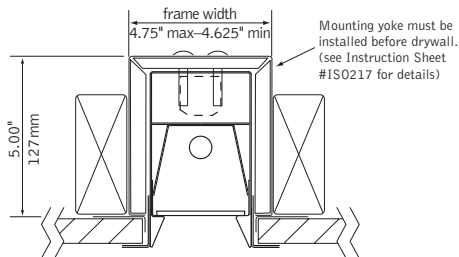
may 2007

DIMENSIONAL DATA

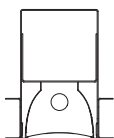
Grid Mount (Regress Trim Shown)



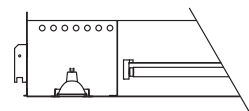
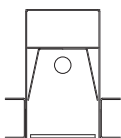
Drywall Flange (Regress Trim Shown)



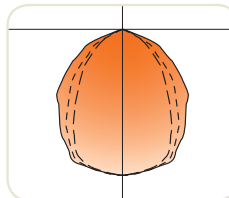
Louver



Flush Lens



PERFORMANCE



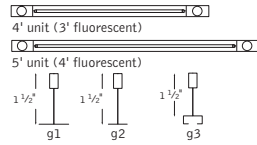
1-Lamp T5
62% Efficiency
1466 cd @ 0°

See Photometric section for additional performance data.

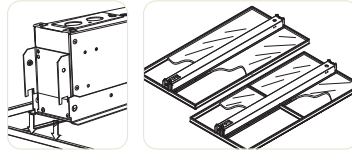
fixture type:
project name:

DETAILS

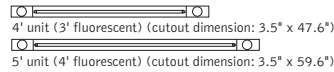
grid



Luminaires cannot be installed in T-bar ceiling systems over 1.5".



drywall



Consult factory for cut-out dimensions.

SPECIFICATIONS

construction

One-piece 20 Ga. steel housing
20 Ga., steel MR16 housing and faceplate.
Two-piece, 20 Ga. spun steel MR16 assembly available in flush mount or with extended yoke.
Corrugated and solid regress trim constructed of 6063-T5 extruded aluminum finished in Matte Satin White.
Grid luminaires include 20 Ga. steel, .5" wide universal flange rail finished in matte satin white.
Drywall flange option is provided with 20 Ga. steel, .5" wide flange kit and 20 Ga. galvanized steel mounting yoke.

4' unit weight: 7 lbs.
5' unit weight: 10 lbs.

optic

22 Ga. steel reflectors finished in High Reflectance White powder coat.
Acrylic lens diffuser .118" thick, frosted clear.
Concave parabolic louver: 1"H x 1" frequency fabricated of low iridescent, semi-specular premium grade aluminum.
MR16 lens: .125" thick tempered clear glass supplied.

electrical

Luminaires are individually wired for specified circuits.
Thru-wiring not available.
Electronic ballasts are thermally protected and have a Class "P" rating.
Electronic 12V, MR16 dimming transformer, 50w max.
Optional DALI and other dimming ballasts available.
Consult factory for dimming specifications and availability.
Thermal protector included.
UL listed for non-insulated ceiling applications only.

emergency

Emergency battery packs provide 90 minutes of illumination.
Initial lumen output for lamp types are as follows:

T5 Lamp: Up to 550 lumens
T5H0 Lamps: Up to 825 lumens

Battery pack requires unswitched hot from same branch circuit as AC ballast.

finish

Polyester powder coat applied over a 5-stage pre-treatment.
Standard luminaire housing finished in Matte Satin White.
MR16 gimbal finished to match housing.

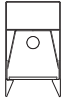
ORDERING

luminaire series	<u>FAVB</u>
Avenue B	FAVB
shielding	<u>SRM</u>
Corrugated Regressed Trim with Lens	CRM
Solid Regressed Trim with Lens	SRM
Flush Lens	FLM
Concave Parabolic Louver	PL
White Concave Parabolic Louver	PW
lampping	<u>1T5HO</u>
(MR16 lamps provided by others)	
One Lamp T5	1T5
One Lamp T5HO	1T5HO
circuits	<u>2C</u>
Dual Circuit	2C
voltage	<u>120</u>
120 Volt	120
277 Volt	277
ballast	<u>*</u>
Electronic Program Start <10% THD	S
Electronic Dimming Ballast	D
(Consult factory for dimming availability)	
mounting	<u>F</u>
15/16" Grid	G1
9/16" Grid	G2
(Attention: For use with 1.5" grid height only. G1 and G2 not compatible for use with tegular tile. Consult factory for custom variations)	
9/16" Slot	G3
Drywall Flange	F
factory options	<u>_____</u>
Chicago Plenum	CP
Emergency Circuit	EC
Emergency Battery Pack	EM
Seismic Brackets	EQ
HLR/GLR Fuse	FU
Include 3000K Lamp	L830
Include 3500K Lamp	L835
Include 4100K Lamp	L841
(MR16 lamps by others)	
mr16	<u>2EG</u>
(50w max.)	
lamp qty. & gimbal type	<u>_____</u>
(Clear lens supplied)	
Flush Gimbal	2FM
Extended Yoke Gimbal	2EG
mr16 options	<u>LSL</u>
Snoot	SN
Hex Louver	HL
Soft Focus Lens	SFL
Linear Spread Lens	LSL
Prismatic Spread Lens	PSL
Sand Blasted Lens	SBL
finish	<u>WH</u>
Matte White Housing	WH
fluorescent & mr16 luminaire length	<u>5'</u>
4' Nominal Housing	4'
(4' housing supplied with 3' fluorescent lamp.)	
5' Nominal Housing	5'
(5' housing supplied with 4' fluorescent lamp.)	

Focal Point L.L.C. 4201 South Pulaski Rd, Chicago, Illinois 60632 | T: 773.247.9494 | F: 773.247.8484 | info@focalpointlights.com | www.focalpointlights.com
Focal Point L.L.C. reserves the right to change specifications for product improvement without notification.

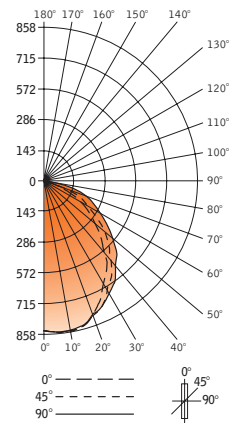
RECESSED

regress with lens
avenue® b



Filename: FAVBSR1T5.IES
Catalog #: FAVB-SR-1T5-1C-120-S-G1-WH-4'
Efficiency: 60%
Test #: 12373.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	703	703	703	703	703	
5°	706	707	707	707	709	68
15°	705	705	703	702	702	199
25°	646	646	640	623	614	294
35°	573	572	541	511	503	340
45°	482	470	420	385	372	330
55°	365	340	285	250	238	264
65°	253	216	163	128	112	171
75°	136	97	43	39	37	70
85°	32	11	11	11	11	15
90°	0	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	0

Spacing 1.3
Criterion: 1.2

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	8112	7068	6261
0°-40°	7573	5913	4938
0°-60°	7124	4590	3154
0°-90°	6253	1977	1701
Total Luminaire	0°-180°	4369	1502 1502

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	561	19.3	32.0
55°	900	31.0	51.4
65°	1494	51.5	85.4
75°	1750	60.3	100.0
85°	2879	57.6	100.0

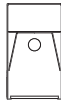
CO-EFFICIENTS OF UTILIZATION

Floor	Ceiling	80	70	20	50	30	10	00								
Wall	70	50	30	10	70	50	10	50	10	60						
RCR	0	72	72	72	72	70	70	70	67	67	64	64	62	62	60	60
1	67	64	62	60	65	63	59	61	57	58	56	56	54	53	53	
2	62	57	54	51	60	56	50	54	49	52	48	51	47	46	46	
3	57	51	47	44	56	51	43	49	43	47	42	46	41	40	40	
4	53	46	41	38	51	45	37	44	37	42	36	41	36	35	35	
5	48	41	36	32	47	40	32	39	32	38	32	37	31	30	30	
6	44	37	32	28	43	36	28	35	28	34	28	33	28	26	26	
7	41	33	28	25	40	33	25	32	25	31	24	30	24	23	23	
8	38	30	25	22	37	30	22	29	21	28	21	27	21	20	20	
9	35	27	22	19	34	27	19	26	19	25	19	25	18	17	17	
10	32	24	20	17	32	24	17	24	19	23	16	22	16	15	15	

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

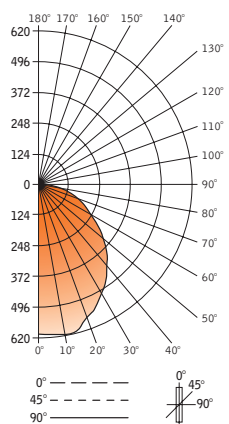
Numbers indicate percentage values of reflectivity.

flush lens
avenue® b



Filename: FAVBFL1T5.IES
Catalog #: FAVB-FL-1T5-1C-120-S-G1-WH-4'
Efficiency: 59%
Test #: 12397.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	610	610	610	610	610	
5°	613	613	613	613	611	59
15°	616	616	616	615	615	175
25°	559	558	556	553	553	257
35°	490	489	487	484	483	306
45°	405	403	402	399	399	311
55°	304	302	299	299	298	269
65°	206	204	201	200	198	200
75°	110	108	108	107	108	114
85°	29	29	25	22	21	28
90°	0	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	0

Spacing 1.3
Criterion: 1.3

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixt
0°-30°	490	16.9	28.5
0°-40°	796	27.4	46.3
0°-60°	1376	47.5	80.1
0°-90°	1718	59.3	100.0
Total Luminaire	0°-180°	1718	59.3 100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	7474	7418	7363
55°	6916	6802	6779
65°	6360	6206	6113
75°	5546	5445	5445
85°	4342	3743	3144

CO-EFFICIENTS OF UTILIZATION

Floor	Ceiling	80	70	20	50	30	10	00								
Wall	70	50	30	10	70	50	10	50	10	60						
RCR	0	71	71	71	71	69	69	69	66	66	63	63	60	60	59	59
1	65	62	60	58	63	61	57	59	55	56	54	54	52	51	51	
2	60	55	51	48	58	54	48	52	46	50	45	48	44	43	43	
3	55	49	44	41	53	48	40	46	40	45	39	43	38	37	37	
4	50	44	39	35	49	43	35	41	34	40	34	39	33	32	32	
5	46	39	33	30	45	38	29	37	29	35	29	34	28	27	27	
6	42	35	29	26	41	34	26	33	25	32	25	31	25	24	24	
7	39	31	26	22	38	31	22	30	22	29	22	28	22	21	21	
8	36	28	23	19	35	27	19	27	19	26	19	25	19	18	18	
9	33	25	20	17	32	25	17	24	17	23	17	23	16	15	15	
10	31	23	18	15	30	22	15	22	15	21	15	21	15	14	14	

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

Numbers indicate percentage values of reflectivity.



line™ 2.0

ASYMMETRIC



Application

io Lighting's **line series 2.0** is a low voltage linear floodlight luminaire that utilizes high brightness LEDs. **series 2.0** may be specified for interior or exterior applications and may be ordered in nominal lengths of 18", 36", 54", and 72". The precise asymmetric beam spread along the perpendicular axis of the fixture is excellent for wall washing, sign lighting or pathway applications. **series 2.0**'s patented optical assembly is designed to practically eliminate stray light, making it perfect for applications where light pollution and/or light trespass are important design considerations.

series 2.0's low profile housing enables the luminaire to be integrated within "tight" architectural details while delivering high intensity illumination.

LEDs are similar to halogen light sources in that they are point sources that can reveal superior definition to three-dimensional objects and sparkle to reflective surfaces.

io ensures that each LED is driven with the proper current and voltage which enables the average rated life to be 50,000 hours at 70% of lamp lumen output. To ensure proper performance, architectural details should allow for ventilation and air flow around the fixture. Ambient temperature surrounding the fixture shall not exceed 120° F.

Light Output

Asymmetric series 2.0's patented optical assembly offers a fixture efficiency in excess of 83%. Refer to light output tables for footcandle values at various distances. Two luminous intensities are available for white light. IES format files may be obtained from the factory or downloaded from www.iolighting.com.

Standard Output

3000K White: 213 lms/ft
5000K White: 300 lms/ft

High Output

3000K White: 320 lms/ft
5000K White: 450 lms/ft

Construction

Heavy-duty aluminum housing provides recommended heat sink requirements for LEDs. Precision optics are composed of a customized acrylic material offering excellent light transmission and UV stability. High strength adhesive bonds the housing and patented optical assembly. **series 2.0** is UL Listed for wet locations.

Mounting Options

series 2.0 may be surface mounted, side surface mounted or surface mounted with field adjustability and lockable aiming. **series 2.0** may not be mounted vertically in exterior applications.

Electrical

All fixtures are pre-wired and pre-assembled for easy installation. 8'-0", 14 AWG electrical feed is side mounted to enable continuous row mounting. Universal 120v - 277v supply required for remote driver. Driver enclosures for interior or exterior applications may be provided by io. 100W advance drivers may be remotely located up to 46'-0" (w/14 AWG), 71'-0" (w/12 AWG) and 120'-0" (w/10 AWG).

Power supply and dimming module must be specified separately. For detailed information, see the **LED Linear** brochure or download the Power Supply specification sheet from www.iolighting.com.

Power Consumption

Standard Output: 12 w/ft

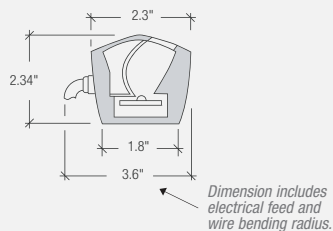
High Output: 17.8 w/ft

Power consumption does not include power supply losses. Consult io driver specification sheets for losses associated with each driver option.

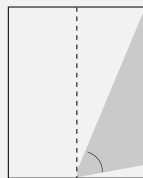
Finish

Anodized aluminum finish is standard. Custom finishes may be available upon request.

Dimensions

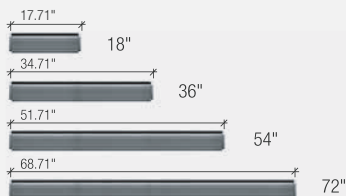


Beam Spread



Asymmetric

Lengths



io Lighting

370 Corporate Woods Pkwy Vernon Hills, IL 60061-3107
T 847.735.7000 F 847.735.7001 E info@iolighting.com W iolighting.com

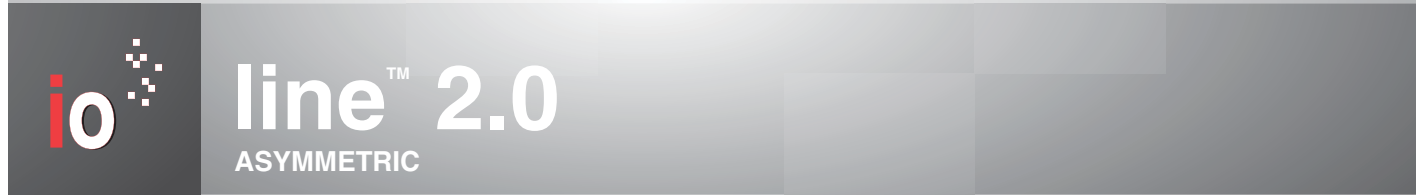
07 APR 2009

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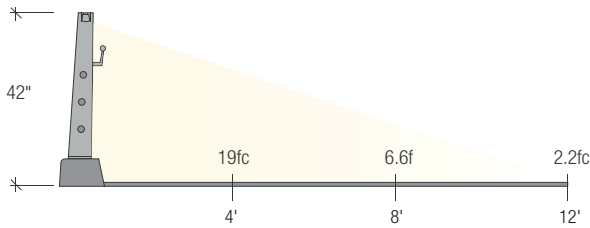
pg 97 of 119



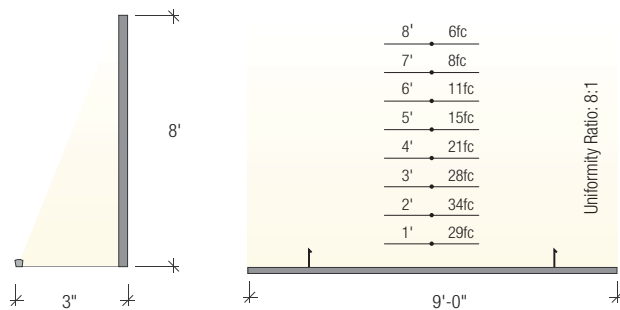
A E 482



BRIDGE / PATHWAY LIGHTING (3000K H.O. WHITE)



SIGN LIGHTING / BUILDING FLOOD LIGHTING (3000K WHITE)



LIGHT OUTPUT CONVERSION TABLE

White Light Output	3000K S.O.	5000K S.O.	3000K H.O.	5000K H.O.
Light Output Multiplier	0.67⁽²⁾	0.94⁽²⁾	1.0⁽²⁾	1.4⁽²⁾

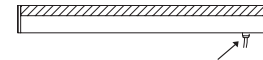
Color Light Output	RED	GREEN	BLUE
Light Output Multiplier	.83⁽¹⁾	1.08⁽¹⁾	0.4⁽¹⁾

IES format photometrics may be downloaded from www.iolighting.com



line series 2.0 is UL Listed for wet locations. It is not rated for submersible applications. line 2.0 should not be mounted in conditions where there is any standing water whatsoever.

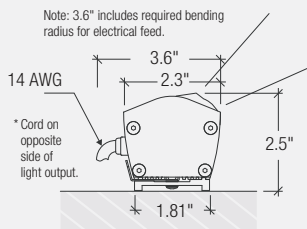
series 2.0's patented optical assembly is designed to practically eliminate stray light, making it perfect for applications where light pollution and/or light trespass are important design considerations.



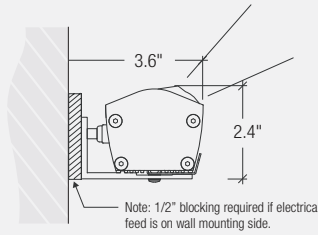
Note: Electrical feed is located on opposing side of lens.

Applications / Light Output

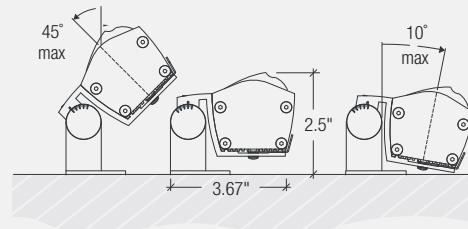
Mounting Options



100 Surface (io part #: LA.BK.SURFMT)



101 Side surface (io part #: LA.BK.WALLMT)



102 Field adjustable with lockable aiming (io part #: LA.BK.ADJMT)

Order Code

Footnotes



1. LIGHT OUTPUT
04 2.0 S.O. (Standard Output)
05 2.0 H.O. (High Output)

2. LOCATION
I Interior
E Exterior

3. COLOR
3K White 3000K ⁽²⁾
5K White 5000K ⁽²⁾
R Red ⁽¹⁾
G Green ⁽¹⁾
B Blue ⁽¹⁾

4. DISTRIBUTION

90 Asymmetric

5. MOUNTING

100 Surface
101 Side surface
102 Field adjustable

6. FINISH

1 Anodized Aluminum
2 Anodized Custom Color

7. LENGTH

UNITS
18 18" (17.71" actual)
36 36" (34.71" actual)
54 54" (51.71" actual)
72 72" (68.71" actual)

FOR CONTINUOUS ROW
Specify length (i.e., 96'-0")
Note: Overall length must be divisible by 18"

8. VOLTAGE / DIMMING

SIDE FEED STANDARD
1 120v
2 277v
3 120v w/dim
4 277v w/dim
5 Other

9. SPECIFY DRIVER / DIMMING

Note: Reference io power supply specification sheet for driver and dimming options. If left blank, io will supply 100 watt drivers.

Footnotes

- Refer to conversion table for output. Available in Standard Output only (12w/ft).
- White light variance between LED's within a single fixture will not exceed +/- 200k.

2007 - io Lighting reserves the right to change specifications for product improvement without notification.





line™ .75

SYMMETRIC



Application

io Lighting's **line series .75** is approximately .75" x .75" in cross section. UL Listed for damp locations, its low profile housing enables functional luminous intensities from "tight" architectural details such as niches, coves & casework. Similar to halogen light sources, LEDs are point sources that offer superior definition to three dimensional objects and sparkle to reflective surfaces.

series .75 is a low voltage linear accent luminaire that may be ordered in incremental nominal lengths that range from 6" to 96". Optional beam spreads along the perpendicular axis of the fixture include 10°, 45°, and 65°. For details on the asymmetric beam spread, see dedicated specification sheet. **io** ensures that each LED is driven with the proper current and voltage which enables the average rated life to be 50,000 hours at 70% of the lamp lumen output. To ensure proper performance, architectural details should allow for ventilation and air flow around the fixture. Ambient temperature surrounding the fixture shall not exceed 120°F.

Light Output

line series .75 is available with two lumen outputs for white light only. Red, green and blue are available in high output only. IES format files may be obtained from the factory or downloaded from www.iolighting.com.

Standard Output

3000K White: 34 lms/ft
5000K White: 40 lms/ft

High Output

3000K White: 170 lms/ft
5000K White: 230 lms/ft

Construction

The light weight, yet durable, extruded aluminum housing provides recommended heat sink requirements for LEDs. Patented optical assembly is composed of a customized acrylic material that offers very high transmissivity, UV stability, and excellent longevity. **series .75** is UL Listed for damp locations only.

Electrical

4'-0" 22 AWG, 600 volt TFFN rated power cords are supplied with strain reliefs. 24 volt 100 watt power supply will be provided as a standard. See daisy chain and remote distance requirements in chart on the lower left hand corner of this specification sheet. Alternate power supply options are available. Consult **io** website or **io** representative for **io** driver specification sheets.

Power supply and dimming module must be specified separately. For detailed information, see the **LED Linear** brochure or download the Power Supply specification sheet from www.iolighting.com.

Power Consumption

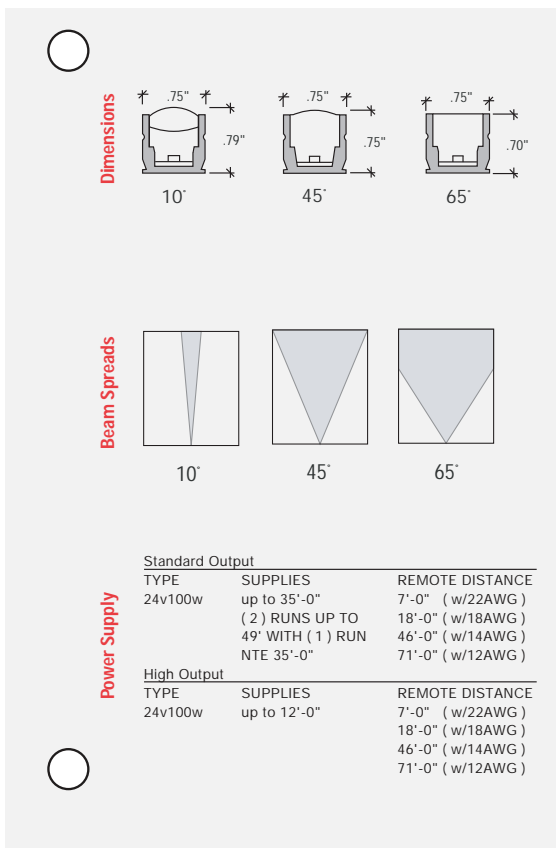
Standard Output: 2.1 w/ft

High Output: 7.6 w/ft

Power consumption does not include power supply losses. Consult **io** driver specification sheets for losses associated with each driver option.

Finish

Anodized aluminum finish is standard. Custom finishes may be available upon request.



io Lighting

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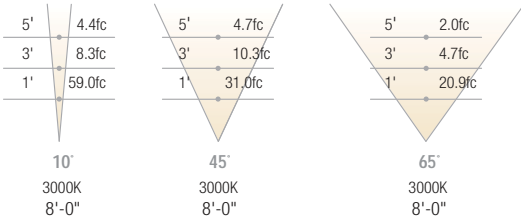
A E 482



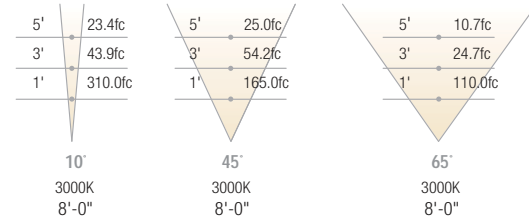
line™ .75
SYMMETRIC

Light Output / Distributions / Electrical Feed Options

STANDARD OUTPUT



HIGH OUTPUT



ELECTRICAL END FEED OPTIONS



2 End feed 3 Right side feed 4 Left side feed 5 Bottom feed

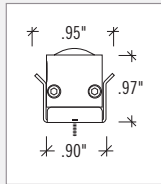
LIGHT OUTPUT CONVERSION TABLE

White Light Output	3000K S.O.	5000K S.O.	3000K H.O.	5000K H.O.
Light Output Multiplier	0.2 ⁽²⁾	0.24 ⁽²⁾	1.0 ⁽²⁾	1.35 ⁽²⁾

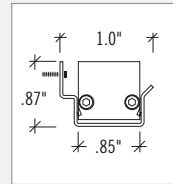
Color Light Output	RED	GREEN	BLUE
Light Output Multiplier	0.47 ⁽¹⁾	0.71 ⁽¹⁾	0.24 ⁽¹⁾

IES format photometrics may be downloaded from www.iolighting.com

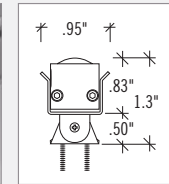
Mounting Options



100 Surface (io part #: SA.BK.SURF)



101 Side surface (io part #: SA.BK.WALL)



102 Field adjustable (io part #: SA.BK.ADJUST)

Order Code

0	03									
io	1	2	3	4	5	6	7	8	9	10
1. LINE SERIES	4. DISTRIBUTION	7. LENGTH	8. ELECTRICAL FEED	9. VOLTAGE / DIMMING						
03 .75 S.O. or H.O.	10 10 degree 45 45 degree 65 65 degree	UNITS (ACTUAL) 01 6" (6.26") ⁽³⁾ 02 12" (11.95") ⁽³⁾ 03 18" (17.7") ⁽³⁾ 04 24" (23.26") ⁽³⁾ 05 30" (28.95") ⁽³⁾ 06 36" (34.7") ⁽³⁾ 07 42" (40.26") ⁽³⁾ 08 48" (45.95") ⁽³⁾ 09 54" (51.7") ⁽³⁾ 10 60" (57.26") ⁽³⁾ 11 66" (62.95") ⁽³⁾ 12 72" (68.7") ⁽³⁾ 13 78" (79.95") ⁽³⁾ 14 84" (85.7") ⁽³⁾ 15 90" (91.26") ⁽³⁾ 16 96" (96.95") ⁽³⁾	2 End feed 3 Right side feed 4 Left side feed 5 Bottom feed <i>FOR CONTINUOUS ROW</i> 2-2 Right end feed Left end feed 3-4 Right side feed Left side feed 5-5 Right bottom feed Left bottom feed	1 120v 2 277v 3 120v w/dim 4 277v w/dim 5 Other	10. SPECIFY DRIVER / DIMMING Note: Reference io power supply specification sheet for driver and dimming options. If left blank, io will supply 100 watt drivers. Download Power Supply specification sheet from www.iolighting.com					
2. LOCATION I Interior E Exterior (Note: Rated for damp locations face down only)	5. MOUNTING 100 Surface 101 Side surface 102 Field adjustable	6. FINISH 1 Anodized Aluminum 2 Anodized Custom Color								
3. COLOR 3K White 3000K (Standard) ⁽²⁾ 3KHO White 3000K (High Output) ⁽²⁾ 5K White 5000K (Standard) ⁽²⁾ 5KHO White 5000K (High Output) ⁽²⁾ R Red ⁽¹⁾ G Green ⁽¹⁾ B Blue ⁽¹⁾										

Footnotes

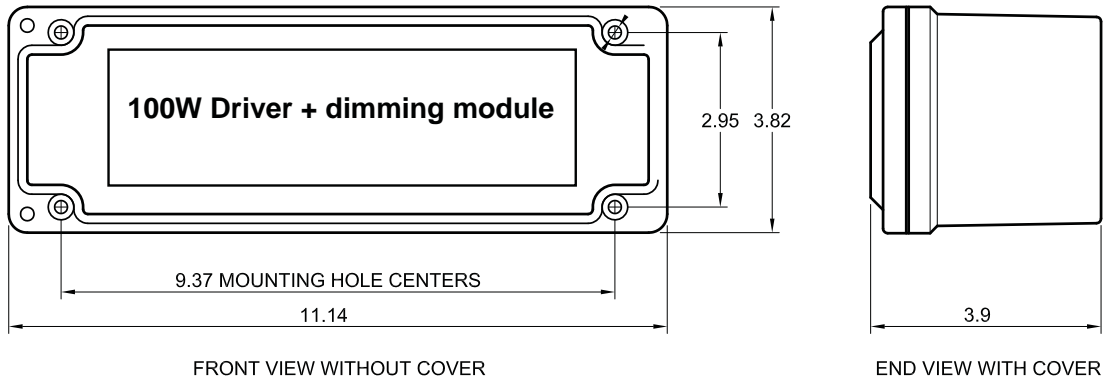
1. Refer to conversion table for output.
2. White light variance between LED's within a single fixture will not exceed +/- 200K.

3. "Actual" length provided includes end feed and non-feed endcaps. Add .27 to each length when electrical feeds occur on both endcaps (for continuous row mounting).

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LINE 2.0 Driver Enclosure for 100W Driver + dimming module



ENCLOSURE CONSTRUCTION

ENCLOSURE MATERIAL - HOT COMPRESSION MOLDED FIBERGLASS REINFORCED POLYESTER (THERMOSET)
GASKET - POURED POLYURETHANE SEAMLESS GASKET
COVER SCREWS - RECESSED CAPTIVE STAINLESS STEEL

ENCLOSURE INDUSTRY STANDARDS

TEMP RANGE (-40F TO +250F) (-40C TO +120C)
FLAMMABILITY RATING UL94-5V
SELF EXTINGUISHING NON-FLAME PROPAGATING





Universal Outdoor Drivers for 12V and 24V LED systems



Applications

- Orientation/Step Lighting
- Architectural Lighting
- Channel Letters
- Contour Lighting
- Edge Lighting



LEDs have evolved into a practical, flexible light source for a wide variety of illumination applications. Common LED products available in the market today are configured in a series-parallel array – designed to be powered by a suitable 24vdc driver – which allows flexibility to connect variable load levels. These operating voltages have become the standard in the industry.

The Brain Behind the Bright Idea

Xitanium LED drivers from Advance are designed specifically for 24V LED systems and incorporate features that enable broad commercialization of end-use solid-state lighting products.

Features

- UL Class 2
- UL Outdoor Damp location rated - IP 66
- Ultra small, compact size
- Extreme low temperature Performance (-40°C)
- Generous high temperature capability (+60°C)
- Tightly regulated output (1% line, 5% load)
- 5 year warranty

Powered by Advance

Benefits

- Limited output voltage and current plus isolation for safe operation
- Fully potted for moisture resistance and thermal benefits
- Facilitates new, low-profile fixture design
- Allows use in any outdoor application
- Margin flexibility to facilitate fixture design
- Consistent light output across line and load levels
- Peace of mind for your new products and for end users...from the industry's most trusted component maker
- Advance is preferred by end users – Enhance the value of your product

Quick Selection Table

Catalog Number	Description	Application
LEDINTA0024V41FO	Intellivolt 100 Watt 24Vdc Outdoor	• 24Vdc LED Systems

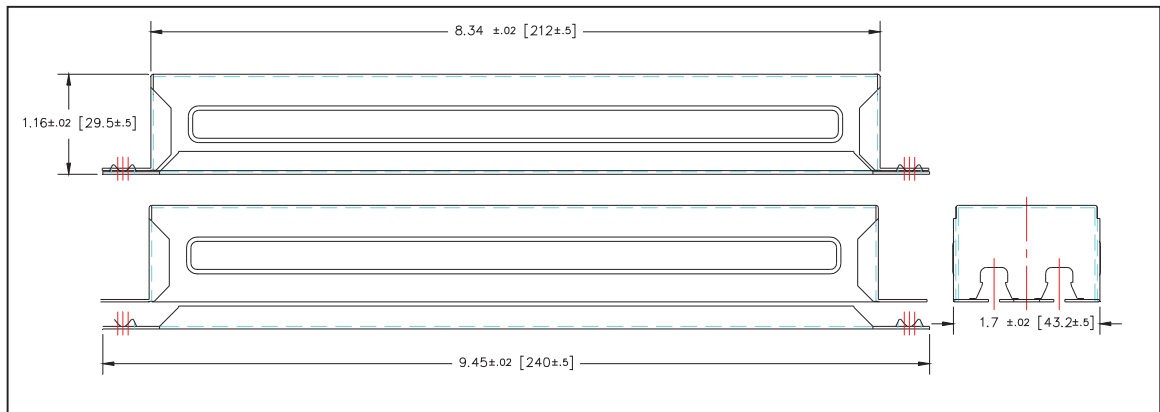
LED Driver Specifications

Description	Catalog Number	Input			Output			Case Temp Max (°C)	Figure	Weight (Grams)
		Volts (V)	Power Max (W)	Current Max (A)	Power Max (W)	Voltage Nom (V)	Current Max (A)			
100 Watt	LEDINTA0024V41FO	120	117.0	0.98	100.0	24.0	4.1	90	A	640
		230		0.51						
		277		.042						

Total Harmonic Distortion: 20% max
 Power Factor: 90% min
 Line Regulation: 1% output variation across input voltage range
 Load Regulation: 5% output variation across input voltage range
 Current Crest Factor: 1.5 max
 Environmental Protection: IP66 outdoor rated
 EMI: FCC47 SubPart15, CISPR15 and CISPR22 Class A
 Protection: Meet UL1310 for Class 2; Inherent short-circuit protection, self-limited; overload protected; 3.2KV output insulation
 AC Input and DC Output: 2 (0.78mm²) Solid Copper Wires, 15cm long

Dimensions

Fig. A

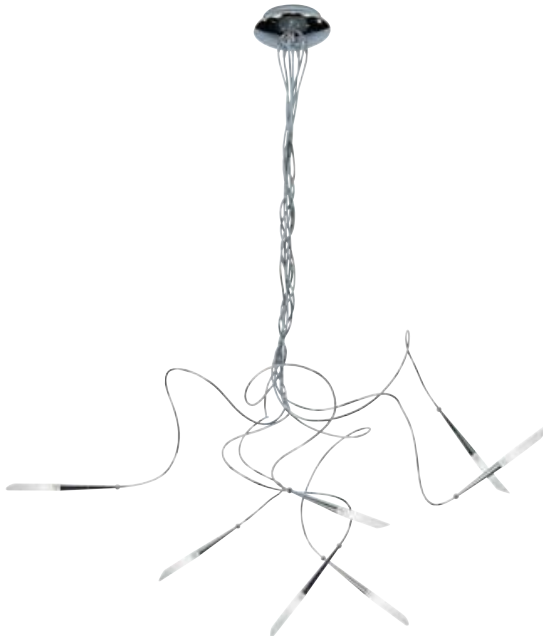


Advance, A Division of Philips Electronics North America · 10275 W Higgins Road · Rosemont, IL 60018 · USA
 Tel: + 1 847 390-5205 · Fax: + 1 847 390-5264 · Revised 09/05PJJ

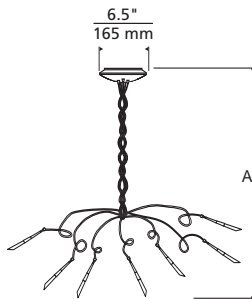
CEILING COLLECTION

Aria

cc_aria_spec.pdf



ARIA
Shown approximately 5% actual size.



DESCRIPTION

Seven hand-bendable rods, each tipped with a frost-white cylinder. 6.5" diameter round canopy houses a 12 volt 150 watt electronic transformer with short circuit protection. Aria is shipped with the stem intertwined; individual rods may be bent and arranged later.

INSTALLATION

This product can mount to either a 4" square electrical box with round plaster ring or an octagonal electrical box (not included).

DIMMING

Dimmable with a standard incandescent dimmer (not included).

FINISH

Chrome, satin nickel.

LAMP

Seven low-voltage, 12 volt Xenon bi-pin lamps of up to 20 watts each (included).

ACCESSORY

None.

WEIGHT

6.35-7.31 lb./2.88-3.32 kg. ±

ORDERING INFORMATION

700ARIA	LENGTH (A)	FINISH
	32 32"	C CHROME
	44 44"	S SATIN NICKEL
	56 56"	
	68 68"	

700ARIA _____

FIXTURE TYPE: _____

JOB NAME: _____

August 2005 Specifications subject to change without notice.



7400 Linder Avenue T 847.410.4400
Skokie, Illinois 60077 F 847.410.4500
www.techlighting.com





DESTINY™

Destiny CG



features	<ul style="list-style-type: none"> • Effective grazing illumination up to 30' with smooth gradient • Effective projector flood light up to 30' • Available with narrow or wide asymmetric optics • Uniform color mixing with 48 Luxeon® LEDs • DMX512 compatibility for dynamic color control • TIR® Thermal management system protects electronic components from heat damage • Robust construction suitable for outdoor applications • Operational and environmental benefits of LED technology
----------	---

standard specifications	OPTICS	Narrow Graze, Wide Graze, 22°, 45°
	LIGHT SOURCE	48 Luxeon® high flux LEDs
	DISTRIBUTION	Asymmetric narrow beam surface graze
	SETBACK DISTANCE	9", 10", 11" (to luminaire centerline)
	FINISH	3 standard powdercoat finishes: black, silver and white
	POWER SUPPLY	100 VAC to 240 VAC Integral power supply, auto ranging (50-60 Hz)

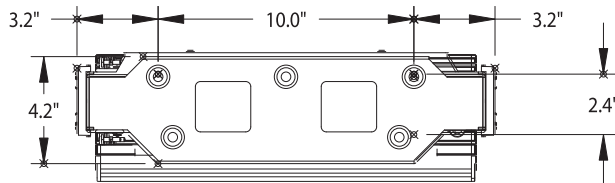
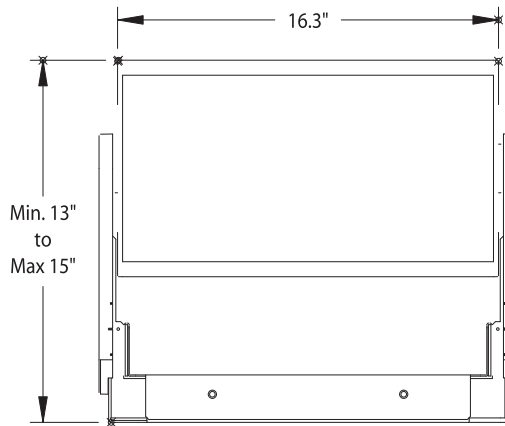
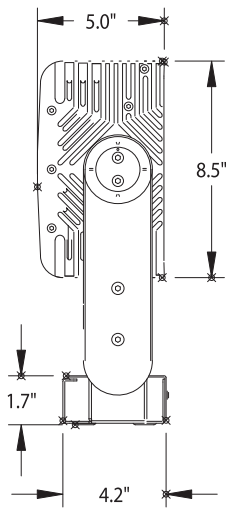
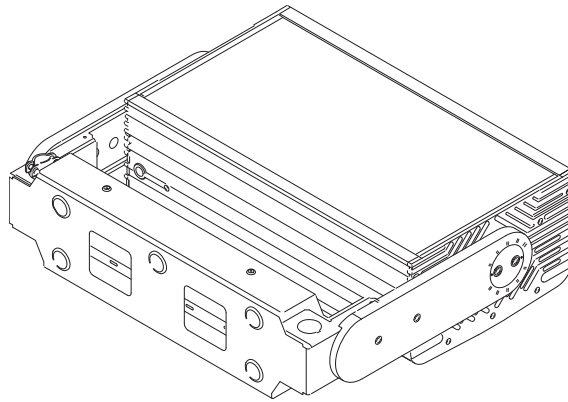
standard order codes	DES — CG — _____ — _____ — _____ — _____ — DMX
	SERIES PRODUCT OPTIC LED LIGHT COLOR FINISH NETWORK
	Destiny™ Destiny CG NGO Narrow Graze Optic 16 red WGO Wide Graze Optic 16 blue 22° 22° beam angle 48 red 45° 45° beam angle 48 green BLU 48 blue ABR 48 amber WWH 48 warm white, 3300K CWH 48 cool white, 5500K



TIR Systems Ltd. is a member of the Luxeon Lighting Network
Product information subject to change. For up to date product information, please log on to www.tirsys.com

TIR Systems Ltd. 1 800 663 2036
7700 Riverfront Gate T 604 294 8477
Burnaby BC F 604 294 3733
Canada V5J 5M4 www.tirsys.com

STANDARD



Product information subject to change. For up to date product information, please log on to www.tirsys.com

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Canada V5J 5M4 www.tirsys.com

CUT-311-002.01 Destiny CG_Narrow - Wide_imp version_Mar 2005 Page 2

technical specifications	mechanical	HOUSING	Extruded aluminum; PSU and controller are integral to the luminaire			
		MOUNTING	Wall, ceiling or floor mount; powdercoated stainless steel bracket Variable setback (9", 10", or 11") and ± 180° rotation of luminaire			
	electrical	INPUT VOLTAGE	100 VAC to 240 VAC			
		MAX INPUT POWER	MODEL	OUTPUT COLOR (ON FULL)	LUMINAIRE INPUT POWER	LUMINAIRE INPUT CURRENT (100 VAC)
			Standard model	Red	35W	0.35 A
			Standard model	Green	35W	0.35 A
			Standard model	Blue	35W	0.35 A
		Standard model	White	99W	0.99 A	
		Single color option	Red, Green, Blue Amber, White	99W	0.99 A	
		CONNECTIONS	AC: Industrial grade AC cable; 16/3 DATA: Individually shielded 24 AWG twisted pair + bare drain for input and output DMX 10' standard cable whip length			
environmental	TEMPERATURE RANGE	-40°F to 104°F (-40°C to 40°C) operating temperature -4°F to 104°F (-20°C to 40°C) starting temperature				
	CERTIFICATION	CUL/UL/CE				
	INGRESS PROTECTION	IP66 Rated				



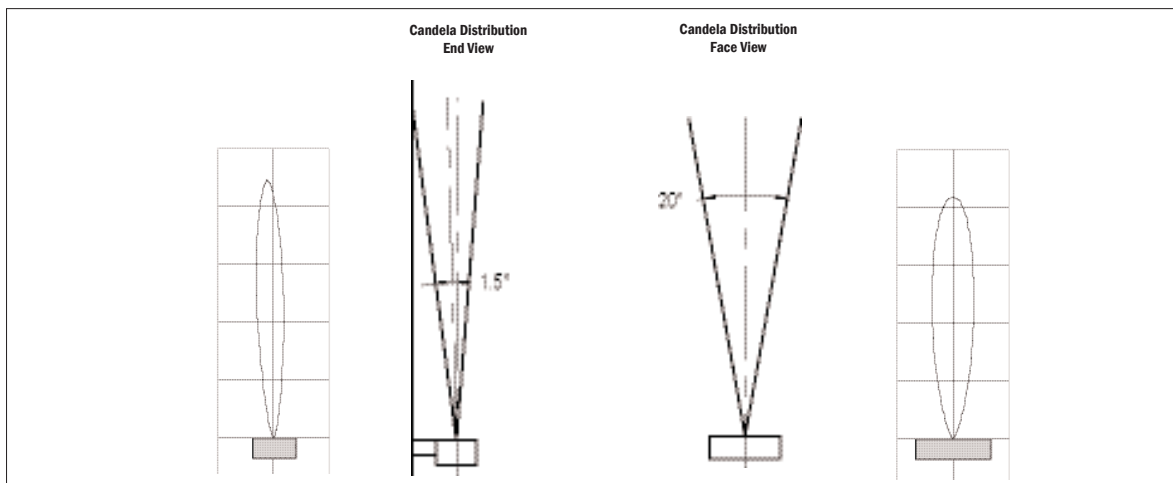
Product information subject to change. For up to date product information, please log on to www.tirsys.com

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CUT-311-002.01 Destiny CG_Narrow - Wide_imp version_Mar 2005 Page 3

narrow graze illuminance distribution	Throw Distance (ft)	10 " SETBACK		Vertical Illuminance (fc)
	20	1.3	1.5	1.3
	19	1.4	1.6	1.4
	18	1.6	1.7	1.6
	17	1.8	1.8	1.8
	16	1.9	2.1	1.9
	15	2.3	2.4	2.3
	14	2.5	2.7	2.5
	13	2.8	3.0	2.8
	12	3.0	3.3	3.0
	11	3.5	4.0	3.5
	10	3.8	4.5	3.8
	9	4.2	5.3	4.2
	8	4.8	6.2	4.8
	7	5.3	7.6	5.3
	6	6.1	8.6	6.1
	5	5.7	9.8	5.7
	4	5.3	10.5	5.3
	3	4.8	11.6	4.8
2	4.0	12.7	4.0	
1	2.2	8.8	2.2	
0	0	0	0	
	Centerline-1'	Centerline	Centerline+1'	

narrow graze photometrics	BEAM WIDTH	2', nominal		
	BEAM ANGLE	20° (face to surface)		
	THROW DISTANCE	CENTERLINE GRADIENT RATIO	VERTICAL ILLUMINATION AT THROW DISTANCE (fc) - RGB WHITE	
	20'	8.5:1	1.5	
	15'	5.3:1	2.4	
	10'	2.8:1	4.5	



Product information subject to change. For up to date product information, please log on to www.tirsys.com

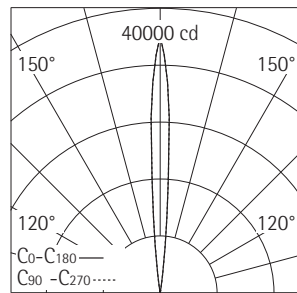
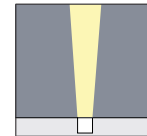
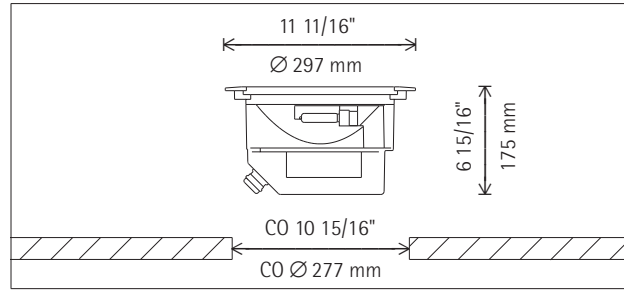
TIR Systems Ltd. 1 800 663 2036
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Burnaby BC F 604 294 3733
Canada V5J 5M4 www.tirsys.com

CUT-311-002.01 Destiny CG_Narrow - Wide_imp version_Mar 22 2005 Page 4

ERCO

Tesis In-ground luminaire

Adjustable uplight for metal halide lamps



T4 39W G8.5 3300lm

h(ft)	E(fc)	D	
		C0	C90
30	40	3'8"	3'8"
24	63	2'11"	2'11"
18	111	2'2"	2'2"
12	251	1'6"	1'6"
6	1002	0'9"	0'9"

33711.023 Reflector silver
T4 39W G8.5 3300lm
ECG

Product description

Size 7
Housing: corrosion-resistant, cast aluminum, No-rinse surface treatment. Black double powder-coated. Mounting by means of an adjustable bar. Clamp extension up to 1 3/8" / 35mm.
Electronic control gear 120V/277V, 60Hz. Cable, L 39" / 1m.
High Beam reflector: aluminum, silver anodized, specular. Cut-off angle 80°. Anti-glare cover: metal. Beam adjustable up to 15°. Without spill light.
Screw-fastened cover ring with flush safety glass: corrosion resistant stainless steel.
Safety glass: 1/2" / 12mm, clear.
Can be driven over by vehicles with pneumatic tyres. Load 10116lb.wt / 45kN.
Suitable for wet location (IP68): dust-proof.
Weight 11.68lbs / 5.30kg
Temperature on the cover glass 146°F / 63°C

ERCO Lighting, Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/277V, 60Hz
Edition: 11.15.2006
Please download latest version from
www.erco.com/33711.023

ERCO

Tesis In-ground luminaire

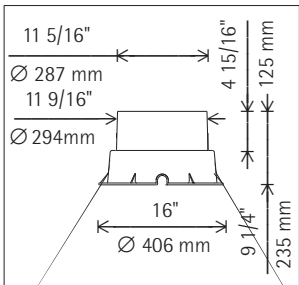
Accessories



33961.000
 Housing for recessed mounting
 Corrosion-resistant, cast aluminum,
 No-rinse surface treatment. Black,
 double powder-coated. 2 cable en-
 tries.
 Weight 8.38lbs / 3.80kg



33957.000
 Skintone filter



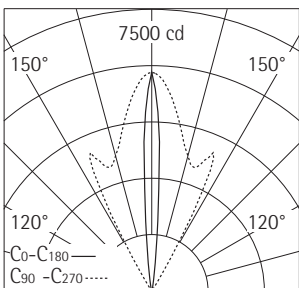
33955.000
 Daylight conversion filter



33951.000
 Domed glass
 To hinder accumulation of dirt.
 Load 1125lb.wt / 5kN.



33953.000
 Sculpture lens



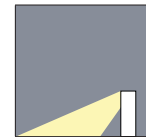
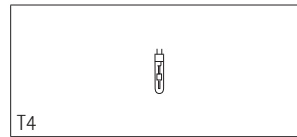
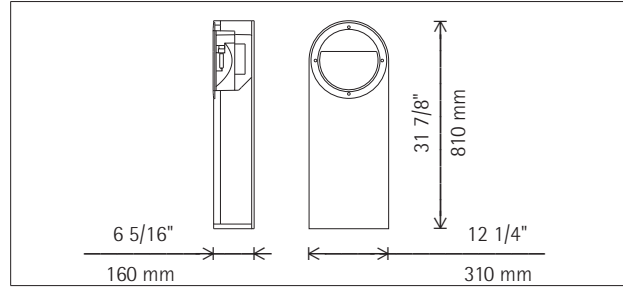
T4 39W G8.5 3300lm

h(ft)	E(fc)	D	
		C0	C90
30	6	4'2"	30'7"
24	10	3'4"	24'5"
18	18	2'6"	18'4"
12	40	1'8"	12'3"
6	162	0'10"	6'1"

ERCO

Visor III Bollard luminaire

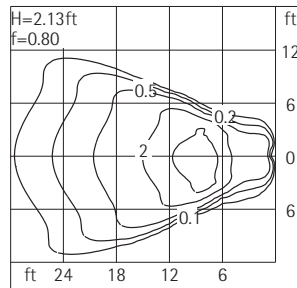
Open area lighting for metal halide lamps



33314.023 Graphit m
T4 39W G8.5 3300lm
ECG

Product description

Housing: corrosion-resistant aluminum, No-rinse surface treatment. Double powder-coated. Removable cover with integral floor washlight. Optimized surface for reduced accumulation of dirt. Base plate for mounting on concrete plinth or ground socket: corrosion-resistant cast aluminum. Floor washlight: corrosion-resistant, cast aluminum, No-rinse surface treatment. Black double powder-coated. Electronic control gear 120V/277V, 60Hz. Through-wiring possible. 5-pole terminal block. Asymmetric reflector system: aluminum, silver anodized, specular. Anti-glare cover: metal. No direct light emission. Screw-fastened cover with sculpture lens as safety glass: corrosion resistant stainless steel. Suitable for wet location (IP55): dust-proof and water jet-proof. Weight 24.69lbs / 11.20kg. Housing temperature 144°F / 62°C. Temperature on the cover glass 144°F / 62°C



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info.us@erco.com

Technical Region: 120V/277V, 60Hz
Edition: 11.15.2006
Please download latest version from
www.erco.com/33314.023

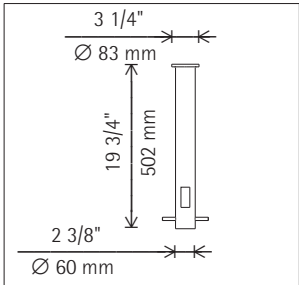
ERCO

Visor III Bollard luminaire

Accessories



33975.000
Ground socket
Metal, hot-dip galvanized.
Cable entry.
Weight 3.86lbs / 1.75kg





luxrail™



Application

ANSI and ADA compliant, **luxrail** is an indoor/outdoor LED based handrail that delivers functional illumination. Two intensities may be specified: standard output & 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, (i.e. theatres, themed environments). 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, 45, and 65 degree beam spreads. The 45 and 65 degree beam patterns are most suitable for illuminating pathways while the 10 degree beam spread offers accent lighting to optional glass or stainless steel cable railing infills. Reference page 8 (**luxrail** brochure) for information regarding infill options. **io** ensures that each LED is driven with the proper current and voltage which enables the average rated life to be 50,000 hours at 70% of lamp lumen output. Ambient temperature surrounding the fixture shall not exceed 120°F.

Light Output

Two luminous intensities are available for white light. IES format files may be obtained from the factory or downloaded from www.iolighting.com.

Standard Output:
3000K White: 34 lms/ft
5000K White: 40 lms/ft

High Output:
3000K White: 170 lms/ft
5000K White: 230 lms/ft

Construction

luxrail may be post mounted or wall mounted. 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. The lighting fixture component of the **luxrail** is a stand alone unit and is available in incremental nominal lengths that range from 6" to 60". Vandal resistant access chamber allows units to be removed for maintenance purposes.

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.

The light fixture's housing is made of a light weight, yet durable aluminum, providing the recommended heat sink requirements for the LEDs. Housing, patented optical assembly and stainless steel end caps are bonded to prevent water infiltration.

Electrical

luxrail houses a low voltage LED based light fixture which is integrated into the underside of the handrail. It comes complete with the linear light fixture installed in the handrail. 24 volt 100 watt power supplies are provided as a standard. See daisy chain and remote distance requirements in chart on the lower left hand corner of this specification sheet.

Power supply and dimming module must be specified separately. For detailed information, see **luxrail** brochure or download the Power Supply specification sheet from www.iolighting.com.

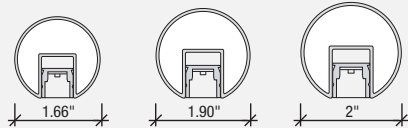
Power Consumption

Standard Output: 2.1 w/ft

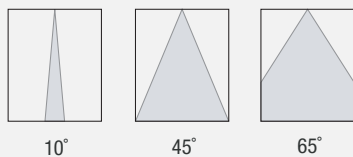
High Output: 7.6 w/ft

Power consumption does not include power supply losses. Consult **io** driver specification sheets for losses associated with each driver option.

Dimensions



Beam Spreads



Power Supply

Standard Output		
TYPE	SUPPLIES	REMOTE DISTANCE
24v100w	up to 35'-0"	7'-0" (w/22AWG)
	(2) RUNS UP TO	18'-0" (w/18AWG)
	49' WITH (1) RUN	46'-0" (w/14AWG)
	NTE 35'-0"	71'-0" (w/12AWG)
High Output		
TYPE	SUPPLIES	REMOTE DISTANCE
24v100w	up to 12'-0"	7'-0" (w/22AWG)
		18'-0" (w/18AWG)
		46'-0" (w/14AWG)
		71'-0" (w/12AWG)

io Lighting

370 Corporate Woods Pkwy Vernon Hills, IL 60061-3107

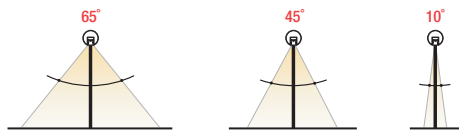
T 847.735.7000 F 847.735.7001 E info@iolighting.com W iolighting.com

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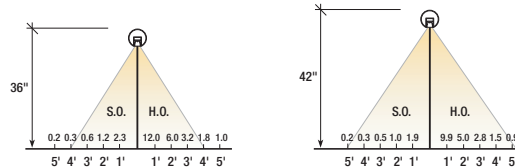




BEAM SPREAD OPTIONS

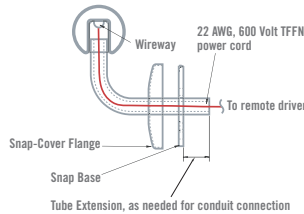
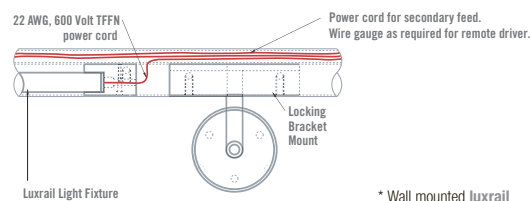


LIGHT OUTPUT - 65 DEGREE WARM WHITE



Light Output / Distributions

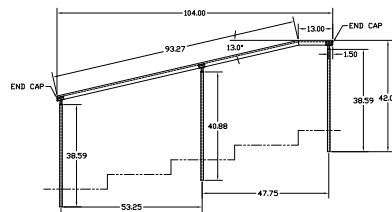
WALL MOUNT DETAILS*



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

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

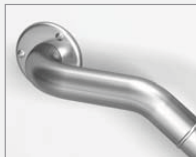
POST MOUNT APPLICATION



Mounting / Infill Options



PM (post mounted)



WM (end feed)



WM (wall mount intermediate)



Glass infill
(glass provided by others)



Stainless steel cable infill

Order Code

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

1. PRODUCT FAMILY

06 luxrail

2. ALLOY / FINISH

SSS Stainless Steel Satin
SSP Stainless Steel Polished

3. SIZE

1 1.66" O.D. (1 1/4" pipe size)
[available for SS & CAA]

3. SIZE CONT.

2 1.90" O.D. (1 1/2" pipe size)
[available for SS & CAA]
3 2.0" O.D. [available for SS]

4. MOUNTING

PM Post Mounted
WM Wall or Guard Rail Mounted

5. INFILL

AC Aircraft Cable (5)
GL Glass (provided by others)
C Custom
NR Not Req'd

6. LIGHT DISTRIBUTION

10 10 Degree
45 45 Degree
65 65 Degree
NI Handrail only (not illuminated)

7. LIGHT COLOR

3k Warm White (5)
5k Cool White (5)
3kHO Warm White (5)
5kHO Cool White (5)
R Red (4)
G Green (4)
B Blue (4)

8. LENGTH

Provide overall length of each handrail section. Reference Footnote #2

9. VOLTAGE / DIMMING

1 120v
2 277v
3 120v w/dim
4 277v w/dim
5 Other

10. SPECIFY DRIVER / DIMMING²¹

Note: Reference io power supply specification sheet for driver and dimming options. If left blank, io will supply 100 watt drivers.

Footnotes

- Footnotes
1. See io luxrail brochure to specify driver separately.
2. Each handrail application will be somewhat 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 LED's within a single fixture will not exceed +/- 200K.
4. High Output only - 8w/ft.
5. Aircraft cable available for flat surfaces only.

2007 - io Lighting reserves the right to change specifications for product improvement without notification.



Drive over luminaires for special applications

Outer housing: Constructed of high tensile strength, copper free die cast aluminum alloy.

Inner housing: Constructed of copper free die cast aluminum alloy, die cast aluminum clamping ring/cover/guard, removable for relamping, secured together with four (4) heavy stainless steel bolts which provide a pressure seal to gasket and glass. Two (2) captive socket head stainless steel screws secure inner housing cover to outer housing.

Enclosure: One piece heavy die cast aluminum cover with clear borosilicate focusing lens with cast aluminum guard. Molded, one piece, high temperature silicone rubber gasket.

Electrical: G 8.5 porcelain bi-pin lampholder with stainless steel contacts. Magnetic HPF ballast available 120V or 277V - specify.

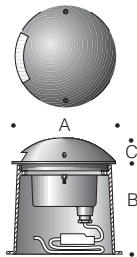
Inner housing pre-wired with three (3) feet of 18/3 waterproof cable, cable clamp, and waterproof cable gland entry into housing. A separate waterproof wiring box for power supply must be provided (by contractor).

Finish: Standard finish is an eight step process consisting of two coats of gray high solids, UV stabilized polyurethane, one with light texture over a phosphate base. Custom colors are not available.

U.L. listed, suitable for wet locations and vehicle drive over. Protection class: IP 67.

Luminaires are designed to withstand loads of up to 8,800 lbs. at speeds up to 12 mph when installed on a proper foundation. Proper drainage must be provided.

Type:
 BEGA Product #:
 Project:
 Voltage:
 Color:
 Options:
 Modified:



High strength aluminum alloy, stainless steel, and bronze construction. Optical lens made from clear borosilicate glass. U.L. listed, suitable for wet locations. IP 67. Finish: Gray.



	Lamp	Lumen	A	B	C
8853MH	Single 60° 1 39W T4 G8.5	3300	8 ¹ / ₁₆	6 ⁷ / ₈	2 ³ / ₁₆

BEGA/US 1000 BEGA Way, Carpinteria, CA 93013 [P] 805-684-0533 [F] 805-684-6682
 ©Copyright BEGA/US 2005 updated 2/06

EcoSystem™ Multiple Control Input Ballasts

TYP FLUORESCENT BALLAST

Digital electronic dimming ballasts maximize the benefits of a lighting management system. EcoSystem Ballasts offer 100% to 10% dimming; ideal for use where saving energy, increasing flexibility, and maximizing productivity are the goals of the lighting design.

Features

- Continuous, flicker-free dimming from 100% to 10%
- Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation)
- Communicates status and sensor inputs over the EcoSystem Bus
- Programmed rapid start design ensures full rated lamp life while dimming and cycling
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range
- Frequency of operation ensures that ballast does not interfere with infrared devices
- End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life
- Ultra-quiet operation
- Nonvolatile memory restores all ballast settings after power failure
- Ballasts maintain consistent light output for differing lamp lengths (i.e. 4', 3', 2' have same relative output)
- 100% performance tested at factory



EcoSystem case type G



EcoSystem case type J

EcoSystem™

Five Control Input

Digital Dimming Ballasts

EcoSystem Ballasts d-2 11.11.06

Specifications

TYP FLUORESCENT BALLAST

Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Meets ANSI C62.41 Category A surge protection standards up to and including 4 kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001.2000

Performance

- Operating Voltage: 120 or 277 V~ at 60 Hz
- Grounding: ballast and fixture must be properly grounded for proper dimming.
- Dimming Range: 100% to 10% measured relative light output
- Lamp Starting: programmed rapid start
- Lamp Current Crest Factor: less than 1.7
- Light Output Variation: Constant $\pm 2\%$ light output for line voltage variations of $\pm 10\%$
- Lamp Life: Average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .85 for T8 lamps and equal to 1.0 for T5 lamps
- Power Factor: 0.95 minimum
- Total Harmonic Distortion (THD): Less than 20%
- Inaudible in a 27 dBA ambient
- Maximum Inrush Current: 3 A per ballast at 277 V~, 7A per ballast at 120 V~
- Class 2 Output: +20V=, 50mA max.

Environment

- Minimum lamp starting temperature: 50 °F (10 °C)
- Temperature operating range: 50-140 °F (10-60 °C)
- Relative humidity: less than 90% non-condensing
- Sound Rating: inaudible in a 27 dB ambient
- Maximum ballast case temperature: 75 °C (167 °F)

Ballast Wiring & Mounting

- Ballast is grounded by a mounting screw to the fixture
- Terminal blocks on the ballast accept the following wire gauges:
Power Wiring, Lamp Wiring, and EcoSystem Bus:
only one #18 AWG solid
Class 2 Sensors:
only one #22 AWG solid
- Only one wire per terminal
- Class 2 sensor wiring must be separated from all power and Class 1 wiring, consult all applicable local and national codes.
- See Class 2 Sensor Wiring Details page
- Ballast mounts using two screws (or sheet metal feature and one screw) within a fluorescent fixture.

Lamp Seasoning

Refer to your lamp company for lamp seasoning requirements prior to dimming.

Job Name: <input type="text" value="Smeal - Cafe"/>	Model Numbers: <input type="text" value="EC5 T554 J 120 1"/>	<input type="text"/>
Job Number: <input type="text"/>	<input type="text"/>	<input type="text"/>

EcoSystem™




Five Control Input

Digital Dimming Ballasts


EcoSystem Ballasts d-3 11.11.06

Digital Ballast Models

**TYP FLUORESCENT
BALLAST**

Lamp Type	Lamp Watts (length)	Lamps per ballast	Case Type	120 VOLTS		277 VOLTS	
				Ballast Current (Amps)	Model Number	Ballast Current (Amps)	Model Number
 <p>T8 linear and U-bent</p>	17 W (24")	1	J	.19	EC5 T817 J 120 1	.08	EC5 T817 J 277 1
		2	J	.31	EC5 T817 J 120 2	.15	EC5 T817 J 277 2
	25 W (36")	1	J	.24	EC5 T825 J 120 1	.12	EC5 T825 J 277 1
		2	J	.43	EC5 T825 J 120 2	.19	EC5 T825 J 277 2
	32 W (48")	1	J	.25	EC5 T832 J 120 1	.11	EC5 T832 J 277 1
			J	.48	EC5 T832 J 120 2	.21	EC5 T832 J 277 2
		2	G	.49	EC5 T832 G 120 2L	.21	EC5 T832 G 277 2L
		3	G	.74	EC5 T832 G 120 3L	.31	EC5 T832 G 277 3L
	 <p>T5 linear</p>	14 W (21.6")	1	J	.16	EC5 T514 J 120 1	.07
2			J	.28	EC5 T514 J 120 2	.12	EC5 T514 J 277 2
21 W (33.4")		1	J	.22	EC5 T521 J 120 1	.09	EC5 T521 J 277 1
		2	J	.40	EC5 T521 J 120 2	.18	EC5 T521 J 277 2
28 W (45.3")		1	J	.28	EC5 T528 J 120 1	.12	EC5 T528 J 277 1
		2	J	.53	EC5 T528 J 120 2	.23	EC5 T528 J 277 2
 <p>T5 HO linear high output</p>	24 W (21.6")	1	J	.26	EC5 T524 J 120 1	.13	EC5 T524 J 277 1
		2	J	.45	EC5 T524 J 120 2	.20	EC5 T524 J 277 2
	39 W (33.4")	1	J	.38	EC5 T539 J 120 1	.17	EC5 T539 J 277 1
		2	J	.76	EC5 T539 J 120 2	.31	EC5 T539 J 277 2
	54 W (45.3")	1	J	.50	EC5 T554 J 120 1	.22	EC5 T554 J 277 1
		2	J	1.0	EC5 T554 J 120 2	.43	EC5 T554 J 277 2

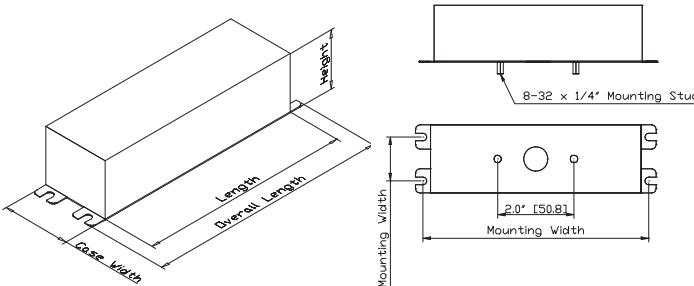
Job Name: Smeal - Cafe	Model Numbers: EC5 T554 J 120 1	
Job Number:		

	e-Vision® Electronic Ballast for Metal Halide Lamps	Catalog Number IMH-39-J TYP MH For 39W Metal Halide Lamps ANSI M130	BALLAST
		120-277V 50/60Hz Electronic Status: Preliminary	

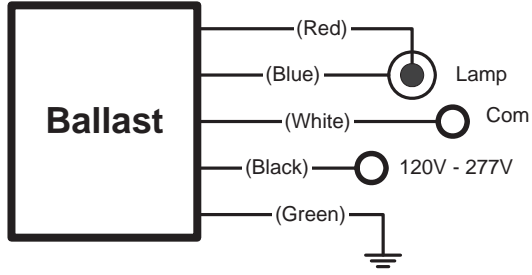
DIMENSIONS AND DATA

Lamp Data		Input Volts	Catalog Number*	Line Current (Amps)	Input Power (W)	Ballast Factor	Max THD (%)	Min Power Factor	Wiring Dia	Figure	Weight (lb)	Max Distance to Lamp (ft)
Number	Watts											
39W Watt Lamp, ANSI Code M130 Minimum Starting Temp -30°C/-20°F												
1	39	120	IMH-39-J-xxx	0.39	46	1.0	15%	0.95	3	J	0.9	5
		277		0.18	45							

Figure J


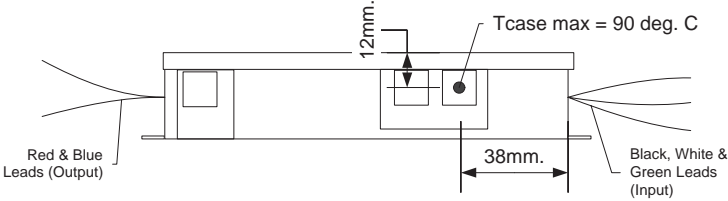


CASE LENGTH = 5.51" [140mm]
 MOUNTING LENGTH = 5.71" [145mm]
 MOUNTING WIDTH = 1.08" [27mm]
 OVERALL LENGTH = 5.87" [149mm]
 CASE WIDTH = 1.81" [46mm]
 HEIGHT = 1.18" [30mm]



Wiring Diagram 3

Ballast Case must be Grounded

Case Temperature Measurement Location

INSTALLATION & APPLICATION NOTES:

- Maximum allowable case temperature is 90°C. See figure above for measurement location
- Ignition pulse is 4 kV max
- All leads are 9 inches long
- Ballast output will shutdown after 20 minutes if lamp fails to ignite
- Power must be cycled off – then on, after replacing lamp
- Connect the red lead to the center terminal of the lamps when using screw base lamps

***Ordering Information**

Order Suffix	Description
-LF	Ballast with side exit leads and mounting feet

Data is based on tests performed by Advance transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.