Penn State Architectural Engineering Senior Thesis

Salamander Hospitality Resort and Spa

Luke Renwick – Lighting/Electrical Option

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Salamander Hospitality Resort and Spa

Building Statistics:

Location: Middleburg, VA
Size: 230,000 sq. ft. (2-4 stories)
Cost: $93 million

Owner: Salamander Hospitality
Architect: Architecture Inc. / WATG
MEP: RG Vanderweil Engineers
Structural: Rathgerber/Gross Assoc.
General Contractor: Turner Construction
Landscape Architect: Oculus

Architecture

- 340 acre site in Virginia horse/wine country
- 5 star, 5 diamond resort and spa
- exterior walls: stucco and ruble stone veneer
- roofing material: composite slate shingles made of recycled tires and plastic
- flat roofing is epdm single ply roofing membrane (tpo)

Interior

- 30,000 sq. ft. spa wing
- equestrian-themed restaurant
- grand ballroom
- wine bar
- cooking studio
- 168 luxury guest rooms

Mechanical

- primary vav air system with constant volume for kitchen exhaust
- fan coil units provide heating and cooling to lodging wing.
- dehumidification for spa/pool areas
- heat recovery from spa, laundry, and lodge areas

Structural

- concrete column footers topped with 5" slab on grade
- composite decking over steel framing
- two-way concrete slab on concrete columns with post tensioning

Electrical

- high voltage service and pad mounted transformer provided by utility - stepped down to 480Y/277V
- 650 kw emergency diesel generator: 480Y/277V, 3 ph, 4w.
- 80 kva npower ups: 480-208Y/120V

Lighting

- vast variety of luminaires and light sources including fluorescent, incandescent, halogen, and hid lamps
- numerous custom decorative wall sconces and pendant chandeliers
- programmable dimming





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Executive Summary

The Salamander Resort and Spa is a Five Star/Five Diamond resort under construction in Middleburg, VA. When completed, this resort and spa will be the signature building for Salamander Hospitality. The building boasts luxurious interiors, spas, indoor pools, outdoor pool and terraces, a restaurant, wine bar, ballroom, and 168 guest rooms. Salamander Hospitality has requested that this building be LEED certified in environmental and energy efficient design, making it one of the only LEED certified buildings of its kind. Therefore, an interesting mixture of luxury, energy efficiency, and environmental responsibility make up the design strategies for the building.

The following report covers several topics regarding aesthetics, energy efficiency, cost analysis, and functionality. The main focus is to provide complete lighting design for four spaces throughout the resort and spa. Lighting design criteria, documentation, equipment, graphics, and performance data are provided for the following spaces: the Entry Courtyard, Living Room, Wine Bar, and Grand Ballroom. The lighting designs for all spaces enhance the architecture and interior design while expressing general themes of relaxation and Virginia horse and wine country, which Middleburg is known for. Beyond the aesthics of the lighting redesign, a daylight harvesting study and photosensor control integration analysis was completed in the Living Room and energy savings were maximized.

Existing electrical design was modified to meet the change in lighting design. Branch circuiting panels, feeders, and voltage drop were resized for each space. Also, electrical depth topics are included as additional studies on equipment efficiency, cost, and functionality.

As part of the general goal to enhance the interior spaces and complete interdisciplinary studies in the design industry, an architectural breadth study is included in the form of a fireplace and Wine Bar room layout redesign. In addition, a mechanical breadth redesign and heat recover analysis is also provided.

The lighting design solutions proved to be aesthetically pleasing, decorative, functional, flexible, technical, and energy efficient. With such a design, the Salamander Resort will one day provide an relaxing and enjoyable experience to their guests.

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Building Information and Statistics

Located on a 340-acre site in the heart of Virginia horse and wine country, the five star, five diamond Salamander Hospitality Resort and Spa will be a luxurious and relaxing retreat for all visitors, especially those in the Washington, DC region. The exterior of the resort resembles historical Virginian horse country architecture, with a mixture of stucco and ruble stone veneer and is surrounded by rural landscaping. The interior of the resort is full of elegant spaces, such as the 30,000 square foot spa area, equestrian-themed restaurant, ballroom, wine bar, cooking studio, indoor pools, and 168 luxury guest rooms, including a 2,000 square foot Presidential Suite. All interior spaces are provided with great views out to the countryside and access to outdoor function spaces including the Stallion Barn, Pavilion at the Pond, Grand Lawn, poolside settings, and Herb Garden. Salamander Hospitality owner Sheila Johnson has been dedicated to make the Salamander Resort and Spa the pinnacle of her luxury resort and hotel enterprise.

Building Name: Salamander Hospitality Resort and Spa

Location and Site: Middleburg, VA

Building Occupant: Salamander Hospitality and resort guests

Occupancy Type: Mixed Use – Hospitality: Resort, Spa, Restaurant

Size: 230,000 sq. ft.

Stories Above Grade:

Main Lobby, Spa Wing, Ballroom Wing – 1
Guest Room Wing – 4 + Mechanical Equipment Penthouse

Primary Project Team:

Owner: Salamander Hospitality – Middleburg, VA
General Contractor: Turner Construction – New York, NY
Architect: Architecture Inc. – Reston, VA
Design Architect: Wimberly Allison Tong and Goo – Irvine, CA
MEP Engineer: Vanderweil Engineers, Inc. – Alexandria, VA
Interior Designer: Forrest Perkins – Washington, DC
Structural Engineer: Rathgeber/Goss Associates – Rockville, MD
Landscape Architect: Oculus – Washington, DC

Dates of Construction:

Spring 2004 – 2007 (Davis Construction)
October 2007 – Spring 2011 (Turner Construction)

Cost: Total building cost ≈$93,000,000

Project Delivery Method: Guaranteed Maximum Price

Main Courtyard Entrance

Description:
Guests of the Salamander Resort and Spa will enter the building through this main courtyard, which is bordered by the spa wing and ballroom/restaurant wing. The entrance façade is a mixture of stucco and rubble stone veneer. The stone is a mosaic pattern building stone ranging from 6 x 6 inches to 18 x 18 inches and an average thickness of 4 to 6 inches. The spa, ballroom/restaurant, and tenant room wings of the building have an exterior façade of stucco. Chimneys and dormers project out of the sloped, composite slate roof. Aluminum clad windows of double pane, clear, Low-E insulating glazing (3/4" thick) line the exterior. A main feature to this entrance is the porte cochere where guests will meet a valet to park their vehicles. The landscaping is made up of a central courtyard with bordering planter beds, benches, and three fountain features.

Space Category:
An outdoor space/building façade

Materials:
Stone veneer; Synthetic slate shingles; Painted HDP Column Moldings; Smooth stucco

Dimensions:
Main north façade: 116' x 45'; East/West façade: approx. 120' x 35' each
Area = approximately 14,000 sq.ft.
Perimeter – aprrox. 470 ft.

Figure 1: North Exterior Elevation (NTS)

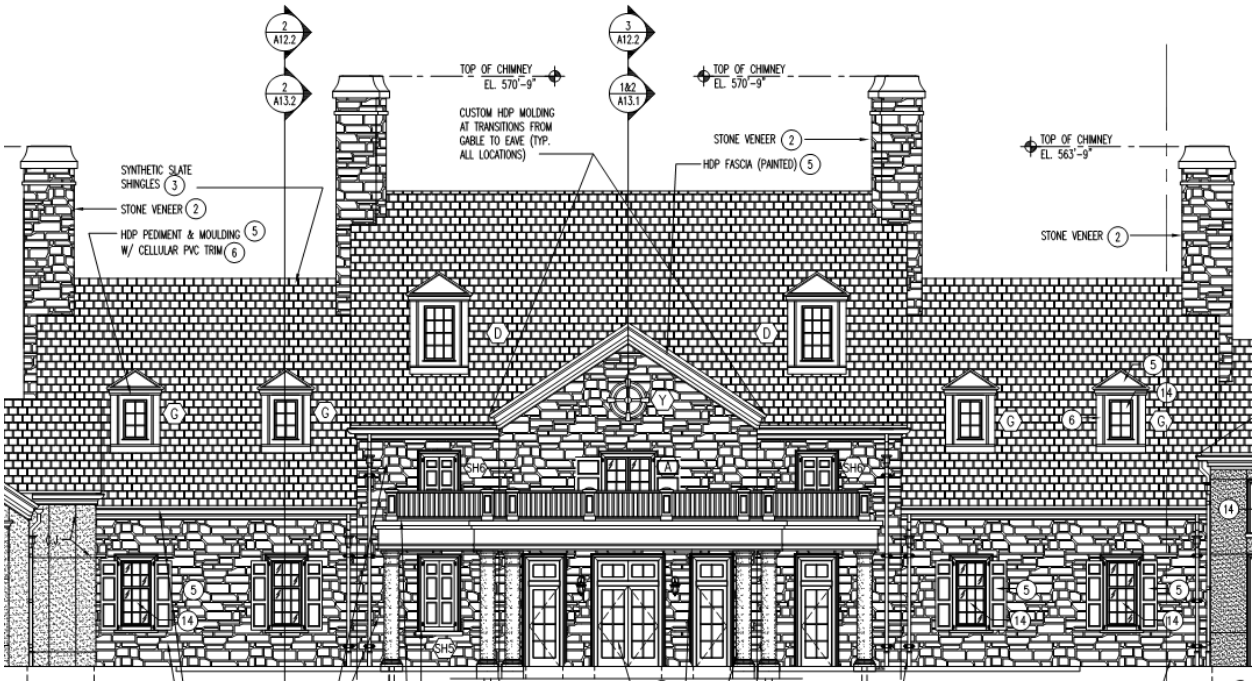


Figure 2: Porte Cochere Elevation (NTS)

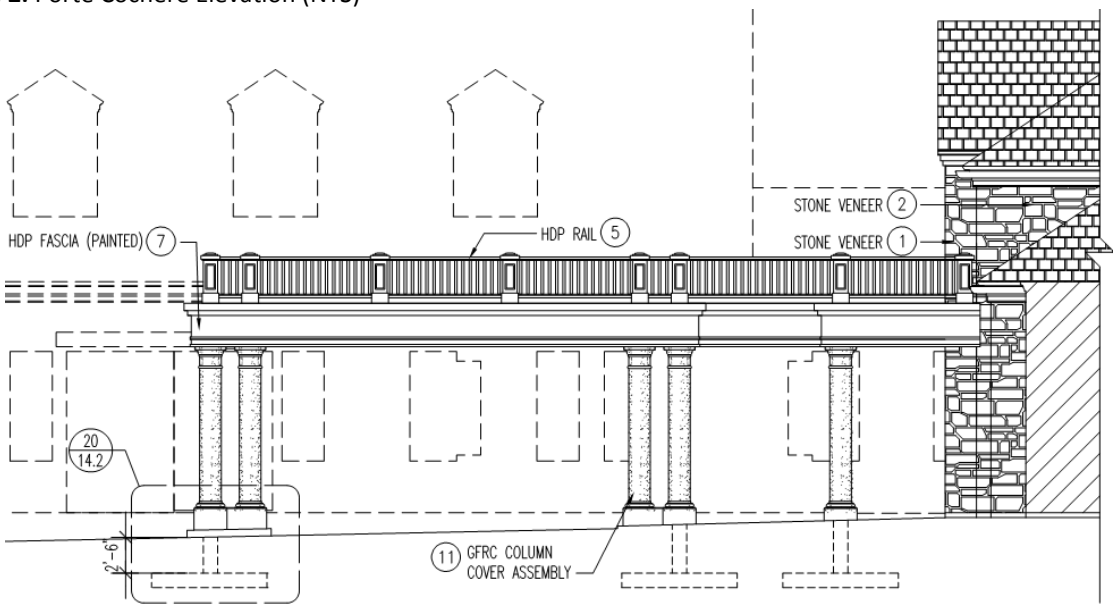


Figure 3: Courtyard Plan (NTS)

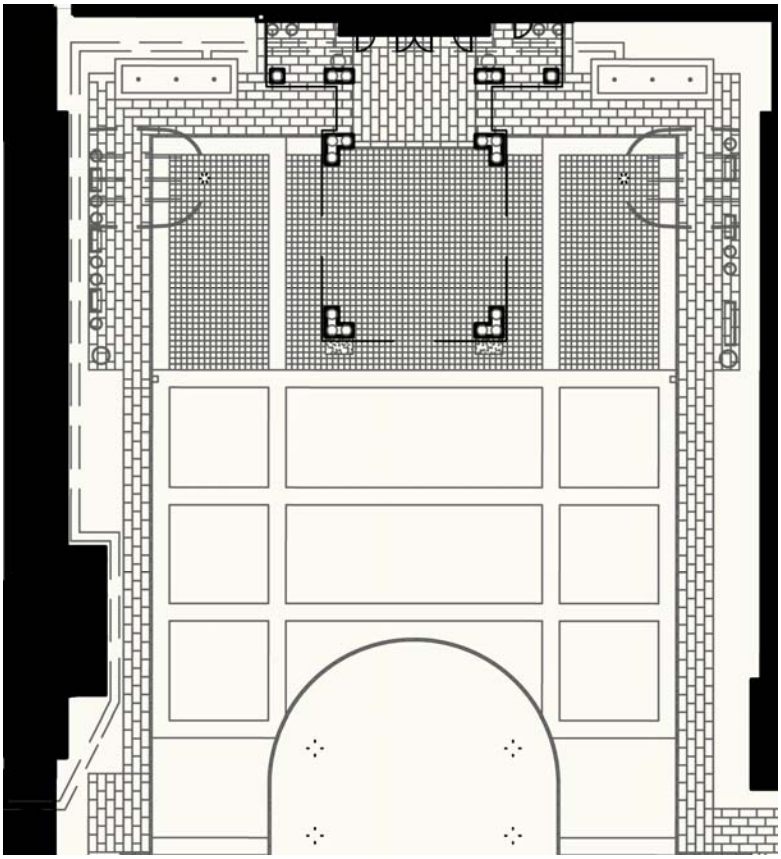


Figure 4: Architectural sketch rendering.

Lighting Design Criteria and Consideration:

- **Psychological Impression**
  - The lighting design for the exterior of the building should be welcoming. It should make those entering the resort feel welcome and comforted to enter the building and begin their stay.

- **Reinforce Architecture, Landscape, and Materials**
  - Lighting should enhance the texture of the stone veneer façade
  - The materials of Virginia horse and wine country architecture should be enhanced, even at night
  - Landscaping should be emphasized in the courtyard space

- **Visual Environment**
  - Attract guests to the main entrance of the building
  - Lead travel from roadside lighting to courtyard landscaping and to the porte cochere entrance
  - Mask the elegance of interiors to landscape and fountain features outside the building

- **Quantitative Visual Performance** (IESNA Lighting Design Guide)
  - Building Exteriors
    - Entrances – Active – Horizontal: **5 fc** on the ground; Vertical: **3 fc** on vertical surfaces
    - Prominent Structures –Horizontal: **5 fc** on the ground; Vertical: **3 fc** on vertical surfaces
  - Gardens
    - General lighting – Horizontal: 5:1 ratio; Vertical: 2:1 ratio
    - Paths– Horizontal: 10:1 ratio; Vertical: 3:1 ratio
    - Trees or Shrubbery Emphasized - Horizontal: 3 **fc** ; Vertical: **3 fc**
    - Decorative structures – Horizontal: **5 fc** ; Vertical: **3 fc**

- **Glare Issues**
  - Pedestrian walkways and seating are throughout the courtyard. The lighting must be oriented as to reduce glare for those in the courtyard – for comfort and for safety with vehicular traffic.
  - Guests driving to the porte cochere must not experience glare to ensure safety of drivers and pedestrians.
  - Windows into the entry, retail area, and adjacent wings of the building must not see direct light.

- **Controls**
  - Exterior lighting must be on a programmable timer switch or daylight sensor.

- **Power Density Allowance**
  - Energy Code Requirements - ASHRAE 90.1-2007
    - Tradable Surfaces-Building entrances and exits-Main entries: **30W/linear ft.** of door width.
    - Tradable Surfaces-Canopies and Overhangs: **1.25W/sq ft.** for attached canopies and overhangs
    - Tradable Surfaces-Walkways:**1.0W/lin. ft.**
    - Tradable Surfaces-Roadways: **0.5W/lin. ft.**
    - Nontradable Surfaces-Building facades: **0.2 W/sq. ft.** for each illuminated wall or surface OR **5 W/linear ft.** for each illuminated wall or surface length.

  - Exterior Building Grounds Lighting -
    All exterior building grounds luminaires that operate at greater than 100watts shall contain lamp s having minimum efficacy of 60 lm/w unless the luminaire is controlled by a motion sensor.

- **Security**
  - Provide adequate lighting for visual surveillance at front entrance.

- **Light Pollution/Sky Glow**
  - Resort is alone on a 340 acre site. Light pollution could affect those sleeping in the lodging wing.
  - Minimize non-target illumination, limit flux above horizontal.

Lighting Plans – See Appendix A

Mounting Details – See Appendix B

Luminaires

Figure5: Luminaire Schedule. Luminaires, lamps, and ballast specifications can be found in Appendix C.

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
A		Troy Lighting	CCD8990OR	Exterior ceiling surface mounted decorative downlight. 14"W x 9"H. Clear seeded glassware. Hand-worked wrought iron metalwork. English bronze finish.	Surface-mounted	Self-ballasted	120	(2) DULUX EL Self-ballasted "Flame" CFL. Candelabra base. CF9EL/B14/C/830/ADP/BL2	18 W
A1		Troy Lighting	CCD8990OR	Exterior ceiling surface mounted decorative downlight. 24"W x 12"H. Clear seeded glassware. Hand-worked wrought iron metalwork. English bronze finish.	Surface-mounted	Self-ballasted	120	(3) DULUX EL Self-ballasted "Flame" CFL. Candelabra base. CF9EL/B14/C/830/ADP/BL2	27 W
B		Troy Lighting	B9491EB	Exterior surface mounted decorative wall sconce. 14"W x 37" H x 14.5"P; 25.75" TCD; solid brass; English Bronze finish; clear glass.	Wall-mounted	Self-ballasted	120	(4) DULUX EL Self-ballasted "Flame" CFL. Candelabra base. CF9EL/B14/C/830/ADP/BL2	36 W
C		BK Lighting	RM-MR-2-BLP-10	Ring Mount Delta Star ™ tree-mounted downlight for moon lighting effect. Solid aluminum body with enclosed, water-proof wireway and heat sink. 1" diameter brass mounting ring for cable or hook mounting. Water-tight seal. Tempered, clear glass lens; hermetically sealed optical compartment. Tamper-resistant, stainless steel harware. Polyester powder coating on aluminum. 40 degree flood distribution.	Tree-mounted: hanging	Remote Transformer	12 VAC	(1) 20W MR-16. 20MR16/FL36-BAB	20 W
D		BK Lighting	HP2 - T635-SP-RD-81-BZP-GS-RM-H35E-120	Ground-recessed spot accent light. Flush with ground: 7" diameter. Sheet molded polyester compound housing. G12 bi-pin base. IP-68 rated vacuum sealed enclosure. Anti-condensation valve. High heat, shock resistant, tempered 1/4" borosilicate flat glass lens. Suitable for walk-over and drive-over applications. Glare shield for pedestrians. Polyester powder coating over aluminum.	Ground recessed	Electronic (remote)	120	(1) 35T6/MH/830	41 W
E		Philips Color Kinetics	523-000030-02	Stone façade eW ® Graze Powercore LED wall grazer. 2.1" x 2.7" x 48". 10 degree beam angle. Low profile extruded anodized aluminum housing. Clear polycarbonate lens. Multi-positional, constant torque locking hinge mounting. IP 66 - Wet environment rated. Dimming capability. 2700K	Surface-mounted under roof overhang.	(Line Voltage)	120	LED Class 2 product	60 W/4 ft.

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
E2		Prudential Lighting	PSM-101 1T8 04' BWE 120 DM	Linear fluorescent strip fixture for dormer interiors. Aluminum body. 4' - 0" die-formed steel housing. White enamel finish.	Surface	Electric dimming	120	Philips Extra long life, extra low mercury: F32T8 TL830 XLL ALTO	35 W
F		Erco	34068.023	Corrosion-resistant cast aluminum housing. Double powder-coated. Hinge with internal wiring - 130 degree tilt. Mounting plate rotatable through 240 degrees. Reflector: aluminum, silver, mirror-finish anodised. IP65.	Cantilever arm - Product # 3450.023 (See Appendix B for mounting detail)	Electronic	120	70W HIT-CE Metal Halide. MC70T6/U/G12/930PB	45 W
G		Erco	33764.023	LED Orientation luminaire. Housing with gasket: stainless steel. Clear prismatic diffuser with circular light aperture. Cover ring: corrosion resistant stainless steel with 1/4" safety glass. IP68.	Ground recessed	33858.023 Control gear.	30 VDC	LED 0.9W 30V DC	0.9 W
H		Philips Color Kinetics	116-000024-01	Ultra-thin, submersible fountain fixture. RGB LED color changing capability. Cast brass housing. 10 degree beam angle. Frosted tempered glass lens.	Fountain wall recessed	PDS-60	24 VDC	Class 2 LEDs	25 W
I		BK Lighting	DS-MR-2-BLP-9-A-360L	Delta Star landscaping flood light. Solid aluminum housing. Full 180 degree vertical adjustment. High temperature silicone O-Ring prividesw water-tight seal. Shock resistant, tempered clear glass lens. Polyester powder coat finish, black color. 45 degree cutoff.	Ground surface	12 VAC remote transformer	12 VAC	(1) 20W MR-16. 20MR16/FL36-BAB	20 W
I2		BK Lighting	S-NS-LED-e22-WFL-BLP-12-360SL	Nite Star (SSL) landscape light. Wide flood, 3000K light with flush mounted lens. Tamper resistand, stainless steel hardware. Aim-and-Lock feature. Black polyester powder coat finish. Integral heat sink. Outdoor/wet-rated.	Ground Surface	Remote Transformer	12 VAC	8W, 12V B-K Solid-State Lighting LED	8 W

Light Loss Factors

Light Loss Factors				
Type	LLD	LDD	BF	LLF Total
A	0.9	0.82	1	0.738
B	0.9	0.82	1	0.738
C	0.9	0.82	1	0.738
D	0.9	0.82	1	0.738
E	0.95	0.85	1	0.8075
F	0.9	0.82	1	0.738
G	0.95	0.85	1	0.8075
I	0.9	0.82	1	0.738

Controls

The exterior courtyard luminaires will be controlled by a time clock within the main Lutron GRAFIK Eye System. This time clock will turn the luminaires on at night and switch them off during the day. See Appendix C for specifications and cut sheets.

Table 1: Control Schedule.

Equipment Schedule					
Type	Product Name	Manufacturer	Product/Catalog Number	Description	Location
EQ-A	Viseo Wallstation	Lutron GRAFIK	OMX-VDC-LF	Lutron GRAFIK 7000 System master control. Wallstation with LCD screen. Every lighting zone and scene programmable. Timeclock included.	"Storage 1117"

Lighting Design –

Design Concept

The architecture of the main entrance façade is very traditional and symmetric in style; therefore, the lighting design concept is to mask that symmetry. Non-uniform lighting throughout the landscape and on the surrounding buildings' facades is used to create interest within the "space."

Desired Space Perceptions

The space should be welcoming. The use of light to accent the landscape and architecture should not only indicate that this area is the entrance to the building, but it should actually catch people's attention and draw them in.

Accent/Texture Issues
The primary architectural elements of the main entrance façade are the porte cochere, the dormers, and the stone veneer façade. It was very important to accent all three of these elements. The great texture of the stone veneer will pop from the wall-grazing luminaires mounted above, under the roof overhang. The porte cochere is accentuated by in-grade recessed luminaires that light the columns. The dormers are accented by flood lights mounted on the roof of the two surrounding buildings (see mounting detail). Also, the interior of each dormer, which is not occupied space, will provide a glow to the outside. Finally, the trees within the central courtyard are accented from below, while the trees adjacent to the porte cochere will give a moonlighting effect to the sidewalk below by the tree-mounted lumianaires above.

Lighting Design Renderings

Figure6: Exterior Rendering

Figure 7: Exterior Rendering

Figure 8: Exterior Rendering

Figure 9: Exterior Rendering

Figure 10: Exterior Illuminance Pseudo Color Rendering (lux)

Performance Graphics

Figure 11: Porte cochere illuminance contours (footcandles).

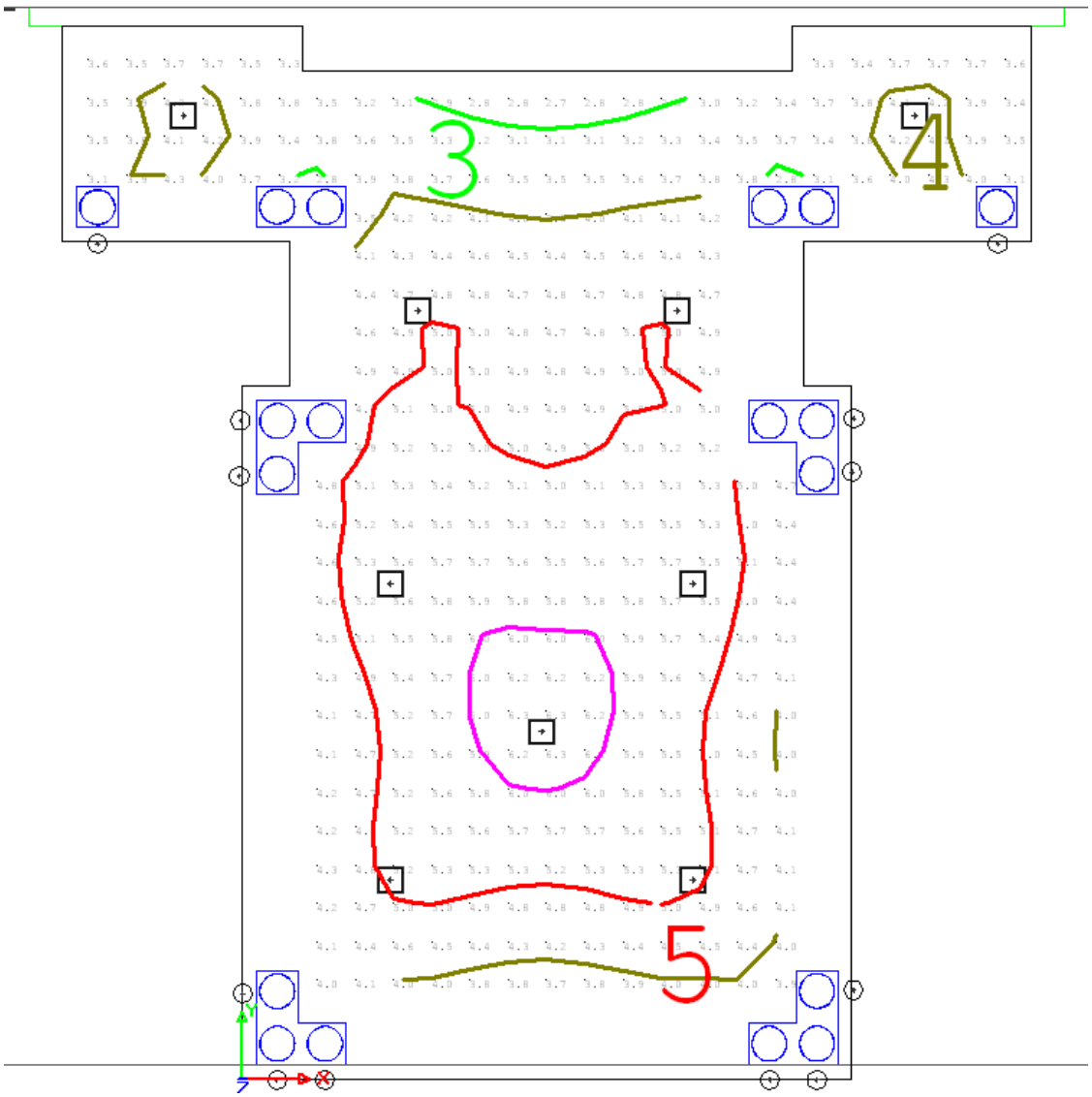


Figure 12: Porte cochere Illuminance Pseudo Color

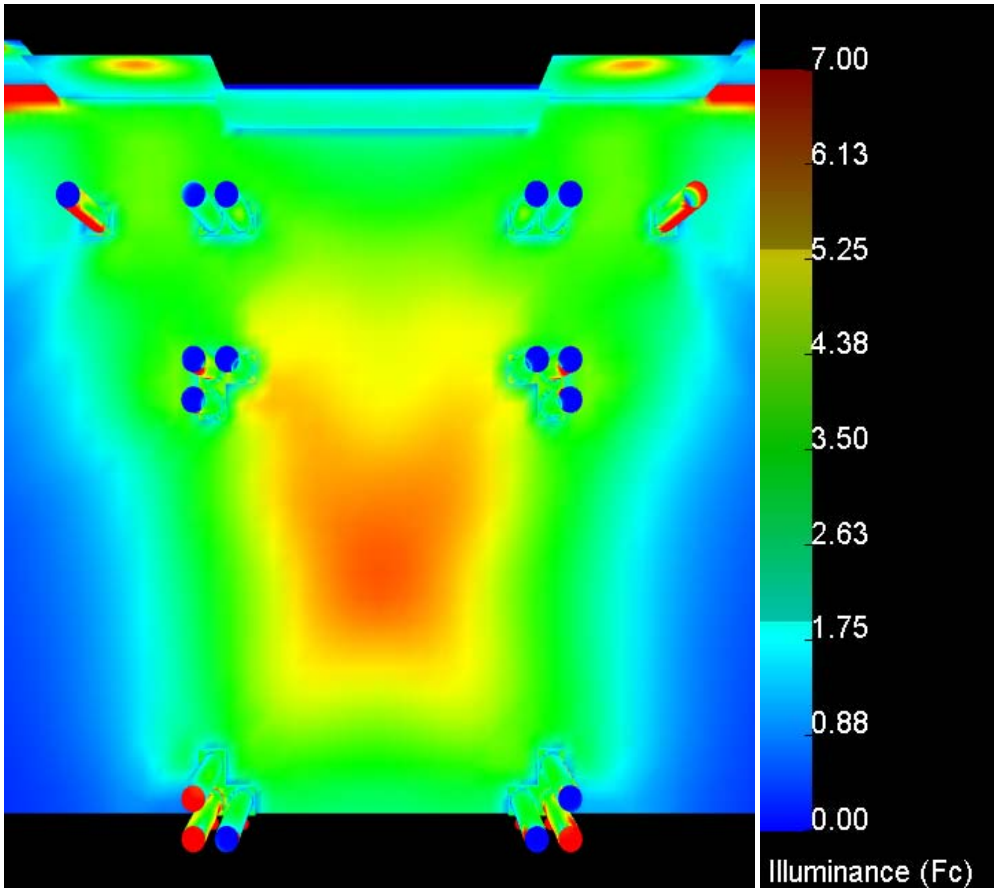


Figure 13: Exterior Illuminance Pseudo Color Rendering (fc)

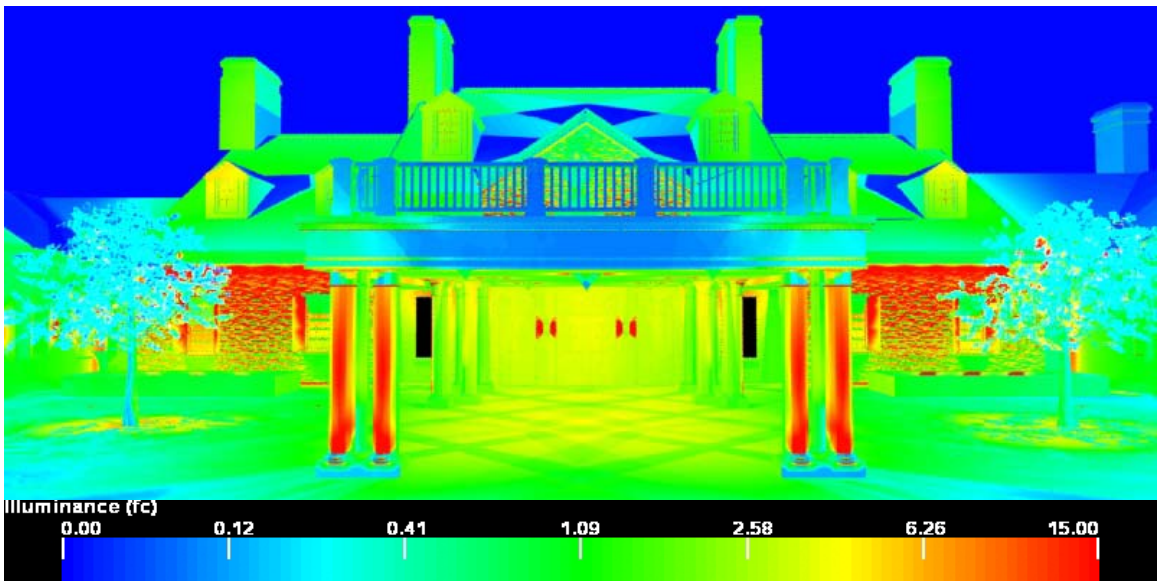
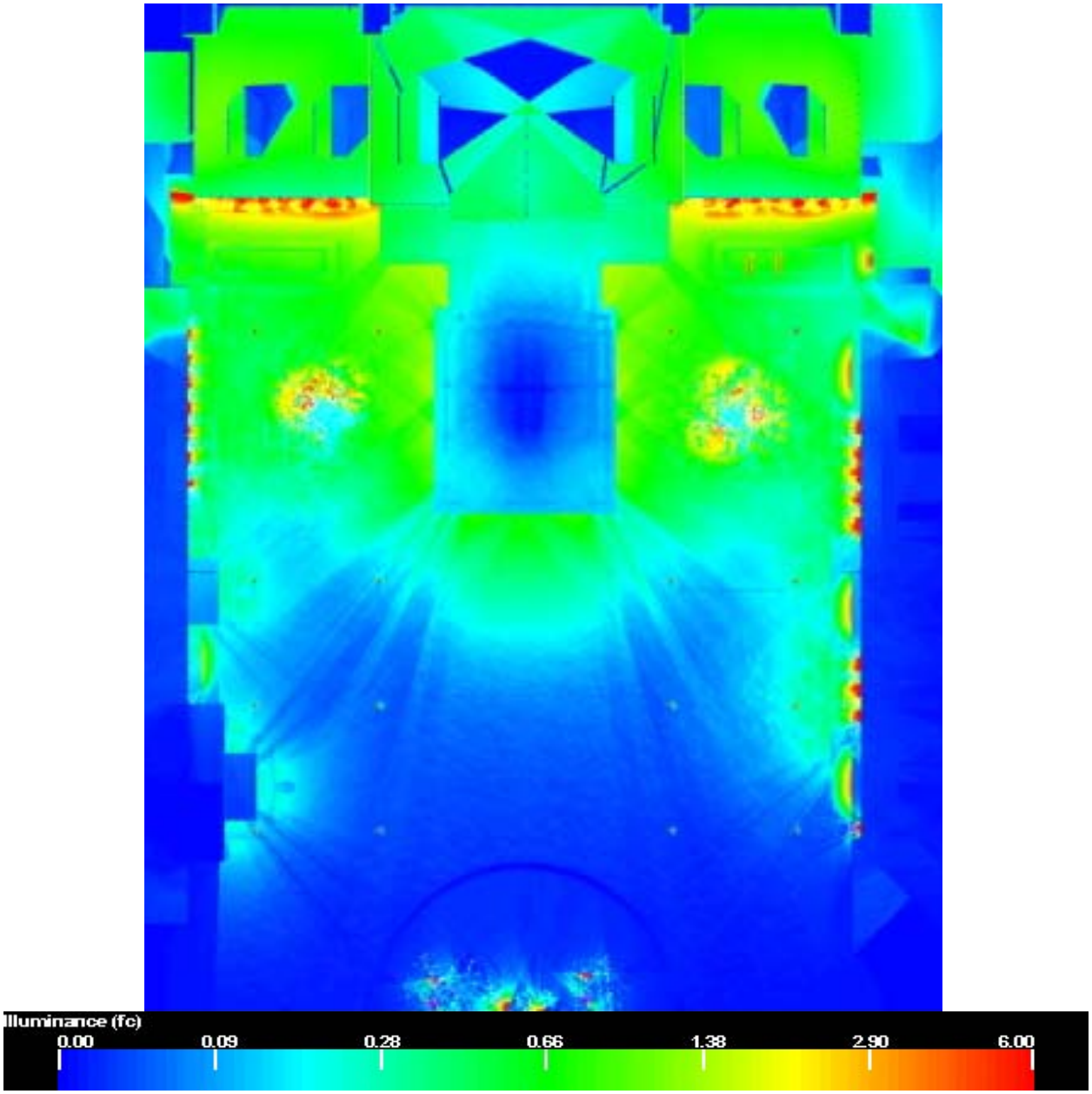


Figure 14: Exterior Illuminance Pseudo Color Rendering (fc)



Energy Code Compliance

Table 2: Energy Calculations – ASHRAE Standard 90.1

ASHRAE Standard 90.1 - Lighting Power Density				
Area	Size	Power Density Allowable	Allowable Wattage	Designed Wattage
Façade (Nontradable)	332.9 ft.	5 W/ft	1665.00	1400
Building Entrance (Tradable)	8 ft.	30 W/lin. Ft.	240	90
Canopies and Overhangs - Porte Cochere (Tradable)	1356 sq. ft.	1.25 W/sq. ft.	1695	924
Walkways (Tradable)	366 ft.	1 W/lin. Ft.	366	501.6
Roadway (Tradable)	284 ft.	0.15 W/lin. Ft.	42.6	12.6
		Total Tradable	**2343.6**	**1528.2**

Performance Summary

The lighting design for the entry courtyard of the Salamander Resort and Spa sets the tone for the luxury brand of the resort itself. With a mixture of architectural emphasis, decorative lantern luminaires, and landscape lighting, the courtyard is brought to life at night. It not only enhances the aesthetics of the courtyard, but the light is functional in bringing guests into the main entry of the building. A definite increasing hierarchy of light levels causes one to walk toward the main entry. There is adequate light for pedestrians along the perimeter paths and orientation luminaires signifying the driveway for vehicular traffic.

Interesting features for the courtyard experience are moonlighting effects from luminaires mounted within trees, fountain lighting that is capable of color-changing for special occasions, and the emphasized texture of the stone veneer by use of the wall-grazing luminaires. While the roof itself is subtly flood-lighted, the warm glow from within dormer windows signifies to guests what experience awaits them.

The lighting design is not only qualitatively functional, but meets illuminance and lighting power density criteria. All surrounding walkways receive at least 1.0 footcandle of light, and the porte cochere canopy receives the 5 footcandles that are recommended for unloading luggage at night. The lighting power density for "tradable" spaces set by ASHRAE 90.1 is 70% of the allowable wattage, meaning that this design is energy efficient.

Electrical Redesign

Specialty lighting within the Salamander Resort and Spa is circuited to and powered by Lutron GP Dimming Panels, which have the ability to power dimmed or non-dimmed circuits to luminaires. All dimming panels used in the electrical engineering design of the resort are 120/208V, 3 phase, 4 wire with main circuit breakers as overcurrent protection.

All panels affected by lighting redesign are shown in Table 2 below, with the panels containing courtyard circuits highlighted in yellow.

Table 3: Dimming panels affected by lighting redesign.

Panels Affected by Lighting Redesign							
Panel Tag	Voltage	N, N/E, E?	Dimming Panel?	Courtyard	Living Room	Wine Bar	Ballroom
DIM213	120/208 3PH, 4W	N	Yes	X			
EDIM211	120/208 3PH, 4W	E	Yes	X	X	X	
DIM211A	120/208 3PH, 4W	N	Yes	X			
DIM211B	120/208 3PH, 4W	N	Yes	X	X	X	
EDIM212	120/208 3PH, 4W	E	Yes				X
DIM212B	120/208 3PH, 4W	N	Yes				X

Lighting Plan

The Entry Courtyard lighting plan with controls and circuiting can be found in Appendix A, drawings E1.1 and E1.2.

Existing Panelboards Affected

Circuits modified by lighting redesign are highlighted in yellow.

DIMMING PANEL "DIM213" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER — LUTRON MOD#: GP60-120-4-M100-20

CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CONCIERGE	01co	AF	INC	DIM	37	7	259
2	CONCIERGE	02co	RCPT– TABLE/FLOOR LAMP	INC	DIM			500
3	CONCIERGE							
4	CONCIERGE	03co	AA	LV	DIM	37	10	370
5	SPARE							
6	SPARE							
7	SPARE							
8	SPARE							
9	SALON	13ps	AA	INC	DIM	37	3	111
10	SALON	14c	SB			20	72	1440
11	SPA	02p	AH–2	LV	DIM	37	6	222
12	SPA	03p	DP–27	INC	DIM	500	1	500
13	SPA	05p	AA; AH–2	LV	DIM	37	5;1	222
14	SPA	06p	AA	LV	DIM	37	2	74
15	SPA	07p	SA	CC	DIM	14W/LFT	15 FT	210

DIMMING PANEL "DIM213" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD#: GP60-120-4-M100-20		
16	SPA	08p	AA	LED	DIM	37	8	296
17	SPA RETAIL	09p	TA/TRACK	LV	DIM	37	20	740
18	SPA RETAIL	09p	TA/TRACK	LV	DIM	150W/2LFT	16 FT	1200
19	SPA RETAIL	10p	SB-1,SD	LV	DIM	5W/3" O.C/9	33 FT/1	669
20	SPA	11p	AH-2	LV	DIM	37	6	222
21	SPA	13p	SD	LV	DIM	0.9W/1.2" O.C.	68 FT	612
22	SPA	14p	DP-21	INC	DIM	600	1	600
23	SPA	16p	SB	LV	DIM	5W/3" O.C.	71 FT	1420
24	SPA	18p	UA	LV	DIM	37	4	148
25	SPA	20p	AJ	LV	DIM	37	10	370
26	SPA	22p	DP-29	INC	DIM	200	1	200
27	SPA	23p	RCPT- TABLE/FLOOR LAMP	INC	DIM			500
28	SPA RETAIL	27p	DS-17				2	150
29	SPA	25p	RCPT- TABLE/FLOOR LAMP	INC	DIM			500
30	COURTYARD	29c						
31	COURTYARD	30c	WB	INC	DIM	180	1	180
32	NORTH CORRIDOR MAITRE'D	31c	AA	LV	DIM	37	4	148
33	SPA	30p	WB	INC	DIM	60	4	148
34	EXTERIOR	44p	EA	LV	DIM	50	4	200
35	EXTERIOR	43p	WE	LV	DIM	60	13	780
36	SPA LOCKER ROOMS	02pr	AC; AC-1	LV	DIM	37	12	444
37	SPA LOCKER ROOMS	03pr	DS-15, DS-17	INC	DIM	75	15	1125
38	SPA LOCKER ROOMS	05pr	AC-1	LV	DIM	37	5	185
39	SPA LOCKER ROOMS	06pr	AC-1	LV	DIM	37	11	407
40	SPA LOCKER ROOMS	07pr	DP-25	INC	DIM	250	2	500
41	SPA LOCKER ROOM	09pr	XH			150	4	600
42	SPA LOCKER ROOMS	08pr	AG	LV	DIM	37	6	222
43	SPA LOCKER ROOMS	10pr	SC	NEON	DIM	6.5W/LFT	45 FT	293
44	SPA LOCKER ROOMS	11pr	AH-2	LV	DIM	37	6	222
45	SPA LOCKER ROOMS	12pr	DP-3	INC	DIM	250	1	250
46	SPA LOCKER ROOMS	13pr	SB-2	LV	DIM	5W/3" O.C.	8	160
47	SPA LOCKER ROOMS	21pr	AA	LV	DIM	37	7	259
48	SPARE							
49	SPA LOCKER ROOMS	31pr	AA	LV	DIM	37	2	74
50	SPA LOCKER ROOMS	32pr	AA	LV	DIM	37	9	333
51	SPA LOCKER ROOMS	33pr	RCPT- TABLE/FLOOR LAMP	INC	DIM			500
52	SPARE							
53	SPA SALON	01ps	DP-33	INC	DIM	150	3	450
54	SPA SALON	03ps	RCPT- TABLE/FLOOR LAMP	INC	DIM			500
55	SPA LOCK	14pr	AC-1			37	5	185
56	SPARE							
57	SPARE							
58	SPARE							
59	SPARE							
60	SPARE							

TOTAL KVA:
TOTAL AMP:
52.4"W x 87H x 14.15"D

DIMMING PANEL "EDIM211" 120/208, 3ø, 4W, 100A MCB – EMERGENCY POWER						LUTRON MOD#: GP36–120–4–M60–20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	03c	AA	LV	DIM	39	37	1443
2	CORRIDOR FIRST FLOOR	06c	AI	LV	DIM	37	4	148
3	CORRIDOR FIRST FLOOR	15c	DP	LV	DIM	200	1	200
4	CORRIDOR FIRST FLOOR	22c	DS–4	INC	DIM	60	4	240
5	CORRIDOR FIRST FLOOR	25c	AA	LV	DIM	37	7	256
6	CORRIDOR FIRST FLOOR	26c	AA/AC–1	LV	DIM	37	7	256
7	CORRIDOR FIRST FLOOR	01c	DP	INC	DIM	200	1	200
8	BILLIARD FIRST FLOOR	01cb	AA	LV	DIM	37	10	370
9	BILLIARD FIRST FLOOR	07cb	AA	LV	DIM	37	2	74
10	PUBLIC RESTROOM FIRST FLOOR	01r	AC–1/AA	LV	DIM	37	12	444
11	COOKING STUDIO FIRST FLOOR	01d	AC–1	TBD	DIM	37	15	555
12	HOTEL SPA CHECK–IN	13c	SC	CC	DIM	5.5 W/LFT	58	319
13	RESTAURANT FIRST FLOOR	05s	DS/DS–1	INC	DIM	75	8	600
14	RESTAURANT FIRST FLOOR	08s	AA–1/AA	LV	DIM	37	10	370
15	RESTAURANT & VEST. FIRST FLOOR	12s	AA	LV	DIM	37	3	111
16	RESTAURANT FIRST FLOOR	14s	AA	LV	DIM	37	4	148
17	RESTAURANT FIRST FLOOR	16s	WB	INC	DIM	60	13	780
18	SPARE							
19	BOARD ROOM FIRST FLOOR	02fra	AE	INC	DIM	150	6	900
20	BOARD ROOM FIRST FLOOR	02frb	AE	INC	DIM	150	6	900
21	CHECK–IN FIRST FLOOR	03ci	AA	LV	DIM	37	12	444
22	LIBRARY FIRST FLOOR	02cr	AA	LV	DIM	37	18	666
23	LIVING ROOM FIRST FLOOR	03cg	AA	LV	DIM	37	4	148
24	LIVING ROOM FIRST FLOOR	07cg	AH–2	LV	DIM	37	6	222
25	LIVING ROOM FIRST FLOOR	11cg	AA	LV	DIM	37	3	111
26	PORTE–CACHERE FIRST FLOOR	02cv	AA	LV	DIM	37	2	74
27*	PORTE–COCHERE FIRST FLOOR	10cv	B	CFL		27	2	54
28	WINE BAR FIRST FLOOR	02cw	AA	LV	DIM	37	18	666
29	RETAIL FIRST FLOOR	02t	AA	LV	DIM	37	9	333
30	PRIVATE DINING FIRST FLOOR	03sp	AA	LV	DIM	37	16	592
31	SPARE							
32	SPARE							
33	SPARE							
34	SPARE							
35	SPARE							
36	SPARE							

TOTAL KVA: 11.69
TOTAL AMP: 32.39
20.2"W x 14.15"D x 67.00"H

DIMMING PANEL "DIM211A" 120/208, 3ø, 4W, 150A MCB – NORMAL POWER						LUTRON MOD#: GP60–120–4–M150–20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	01c	DP	INC	DIM	400	2	800
2	CORRIDOR FIRST FLOOR	02c	AA	LV	DIM	37	6	222
3	CORRIDOR FIRST FLOOR	04c	AA	LV	DIM	37	4	148
4	CORRIDOR FIRST FLOOR	05c	DS–10	INC	DIM	40	4	160
5	CORRIDOR FIRST FLOOR	10c	AF	LV	DIM	37	12	444
6	SPARE							
7	CORRIDOR FIRST FLOOR	21c	DP–6	INC	DIM	160	3	420
8	CORRIDOR FIRST FLOOR	23c	AA	LV	DIM	37	2	74
9	CORRIDOR FIRST FLOOR	24c	DS–6	INC	DIM	75	4	300
10	CORRIDOR FIRST FLOOR	27c	AA	LV	DIM	37	8	296
11*	EXTERIOR COURT YARD FIRST FLOOR	28c	WB	CFL		45	4	180
12	CORRIDOR FIRST FLOOR	32c	SD	LV	DIM	10W/LFT	8' 0"	72
13*	EXTERIOR COURTYARD		G	LED		0.947	18	17.1

DIMMING PANEL "DIM211A" 120/208, 3ø, 4W, 150A MCB – NORMAL POWER						LUTRON MOD#: GP60–120–4–M150–20		
14	BILLIARDS FIRST FLOOR	02cb	DS–5	INC	DIM	120	8	960
15	BILLIARDS FIRST FLOOR	03cb	RCPT – FLOOR/TABLE LAMPS	INC	DIM			500
16*	EXTERIOR FACADE		E	LED	DIM	60.6	16	1091
17	BILLIARDS FIRST FLOOR	04cb	DP–9	INC	DIM	600	3	1800
18	BILLIARDS FIRST FLOOR	05cb	AA	LV	DIM	37	3	111
19	BILLIARDS FIRST FLOOR	06cb	AA	LV	DIM	37	3	111
20	PRIVITE DINING FIRST FLOOR	07sp	AA	LV	DIM	37	4	148
21	PUBLIC RESTROOMS FIRST FLOOR	02r	AC	LV	DIM	37	10	370
22	PUBLIC RESTROOMS FIRST FLOOR	03r	DS–8	INC	DIM	75	13	975
23	PUBLIC RESTROOMS FIRST FLOOR	04r	AC–1	LV	DIM	37	7	259
24	PUBLIC RESTROOMS FIRST FLOOR	05r	AC–1	LV	DIM	37	3	111
25	PRIVITE DINING FIRST FLOOR	06sp	KA			100	4	400
26	COOKING STUDIO FIRST FLOOR	02d	PV	LV	DIM	37	22	814
27	COOKING STUDIO & KIT. FIRST FLOOR	03d	CABINET LTG		DIM			1600
28	COOKING STUDIO FIRST FLOOR	04d	UNDERCABINET LTG		DIM			100
29	RESTAURANT VEST. FIRST FLOOR	12s	AA	LV	DIM	37	2	74
30	RESTAURANT FIRST FLOOR	01s	DP–2	INC	DIM	400	1	400
31	RESTAURANT FIRST FLOOR	02s	DP–2	INC	DIM	400	1	400
32	RESTAURANT FIRST FLOOR	03s	DP–2	INC	DIM	400	1	400
33	RESTAURANT FIRST FLOOR	04s	SC	NEON	DIM	6.5W/LFT	72 FT	468
34	RESTAURANT FIRST FLOOR	07s	AA–1	LV	DIM	37	7	259
35	RESTAURANT FIRST FLOOR	09s	DS–9	INC	DIM	75	8	600
36	RESTAURANT FIRST FLOOR	10s	DP–16	INC	DIM	200	8	1600
37	RESTAURANT FIRST FLOOR	11s	AA	LV	DIM	37	7	250
38	RESTAURANT FIRST FLOOR	13s	AI	LV	DIM	37	2	74
39	RESTAURANT EXTERIOR	15s	JA	LV	DIM	37	23	851
40	RESTAURANT FIRST FLOOR	06s	AA	LV	DIM	37	4	148
41	PRIVATE DINING FIRST FLOOR	01sp	DP–15	INC	DIM	200	2	400
42	PRIVATE DINING FIRST FLOOR	02sp	AA	LV	DIM	37	8	296
43	PRIVATE DINING FIRST FLOOR	04sp	AI	LV	DIM	37	2	74
44	PRIVATE DINING FIRST FLOOR	05sp	DS–	INC	DIM	100	6	600
45	MAITRE D' FIRST FLOOR	31c	AA	LV	DIM	37	4	148
46	BOARD ROOM FIRST FLOOR	01fra	DP–11	INC	DIM	60 x 2	2	240
47	BOARD ROOM FIRST FLOOR	03fra	SA	CC	DIM	14W/LFT	80 FT	1120
48	BOARD ROOM FIRST FLOOR	04fra	AF	LV	DIM	37	22	814
49	BOARD ROOM FIRST FLOOR	05fra	AF–1, AA	LV	DIM	37	2/1	111
50	BOARD ROOM FIRST FLOOR	01frb	DP–11	INC	DIM	60 x 2	2	240
51	BOARD ROOM FIRST FLOOR	03frb	SA	CC	DIM	14W/LFT	80 FT	1120
52	BOARD ROOM FIRST FLOOR	04frb	AF	LV	DIM	37	26	962
53	RETAIL FIRST FLOOR	01t	TC, TRACK	LV	DIM	37	16	592
54	RETAIL FIRST FLOOR	01t	TC, TRACK	LV	DIM	37	16	592
55	RETAIL FIRST FLOOR	01t	TC, TRACK	LV	DIM	37	15	555
56	RETAIL FIRST FLOOR	01t	TC, TRACK	LV	DIM	37	15	555
57	SPARE							
58	RETAIL FIRST FLOOR	03t	DP – (TBD)	INC	DIM	TBD	1	500
59	RETAIL FIRST FLOOR	04t	SB–3	LV	DIM	5W@3" O.C.	46 FT	920
60	RETAIL FIRST FLOOR	05t	KA	LV	DIM		8	216

CIRCUIT #13 – DORMER LIGHTING FIXTURES. CONTROL SHALL BE ON/OFF ON SUNSET/OFF SUNRISE. PHOTOCELL CONTROL.

TOTAL KVA: 28.058
TOTAL AMP: 77.94
52.4"W x 87H x 14.15"D

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD#: GP60–120–4–M100–20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
2	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
3	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
4	CORRIDOR FIRST FLOOR	02c	AA	LV	DIM	37	16	666
5	CORRIDOR FIRST FLOOR	05c	DS–1	INC	DIM	100	12	1200
6	CHECK–IN FIRST FLOOR	01ci	DP–4	INC	DIM	200	2	400
7	CHECK–IN FIRST FLOOR	02ci	RCPT – TABLE/FLOOR LAMPS	INC	DIM		4	500
8	SPARE							
9	SPARE							
10	SPARE							
11	LIBRARY FIRST FLOOR	01cr	DP–6	INC	DIM	320	1	320
12	LIBRARY FIRST FLOOR	03cr	DS–2	INC	DIM	75	12	900
13	LIBRARY FIRST FLOOR	04cr	AA	LV	DIM	37	4	185
14	LIBRARY FIRST FLOOR	05cr	AH	LV	DIM	37	4	148
15	LIBRARY FIRST FLOOR	06cr	RCPT – TABLE/FLOOR LAMPS					500
16	SPARE							
17	LIBRARY FIRST FLOOR	07cr	AA	LV	DIM	37	4	148
18	SPARE							
19	SPARE							
20	LIVING ROOM FIRST FLOOR	01cg	DP–7	INC	DIM	520	2	1040
21	LIVING ROOM FIRST FLOOR	02cg	AA	LV	DIM	37	4	148
22	LIVING ROOM FIRST FLOOR	04cg	DS–3	INC	DIM	75	12	900
23	LIVING ROOM FIRST FLOOR	05cg	SC	CC	DIM	6.5W/LFT	176 FT	1140
24	LIVING ROOM FIRST FLOOR	06cg	AA	LV	DIM	37	10	370
25	LIVING ROOM FIRST FLOOR	08cg	LR	LV	DIM	37	4	148
26	LIVING ROOM FIRST FLOOR	09cg	RCPT – TABLE/FLOOR LAMPS					500
27	SPARE							
28	EXTERIOR FIRST FLOOR	10cg	WC	INC	DIM	60	4	240
29	EXTERIOR FIRST FLOOR	12cg	WB	INC	DIM	60	2	120
30	EXTERIOR FIRST FLOOR	13cg	EB	LV	DIM	20	11	220
31	EXTERIOR FIRST FLOOR	14cg	EA	LV	DIM	50	14	700
32	SPARE							
33	ENTRY FIRST FLOOR	01cv	DP–2	INC	DIM	400	1	400
34	ENTRY FIRST FLOOR	03cv	SE	LV	DIM	37 2/3 LFT	54 FT	666
35	ENTRY FIRST FLOOR	04cv	SB	LV	DIM	15W@3" O.C.	8 FT	160
36	ENTRY FIRST FLOOR	05cv	AA	LV	DIM	37	2	74
37	ENTRY FIRST FLOOR	06cv	AC–1	LV	DIM	37	2	74
38	ENTRY FIRST FLOOR	07cv	AA	INC	DIM	37	3	111
39*	EXTERIOR FIRST FLOOR	08cv	A, A1	CFL	DIM	30, 45	6, 1	225
40*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8
41	VALET FIRST FLOOR	09cv	AF	LV	DIM	37	3	111
42*	EXTERIOR FIRST FLOOR		C	LV	DIM	22.2	6	133.3
43	ENTRY FIRST FLOOR	12cv	AA	LV	DIM	37	2	74
44*	EXTERIOR FIRST FLOOR	13cv	D	LV	DIM	45.6	12	546.7
45*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER							LUTRON MOD#: GP60–120–4–M100–20	
46	WINE BAR FIRST FLOOR	01cw	DP–8	INC	DIM	4 x 40	3	480
47	WINE BAR FIRST FLOOR	03cw	AA	LV	DIM	37	12	444
48	WINE BAR FIRST FLOOR	04cw	DS–4	INC	DIM	TBD	8	840
49	WINE BAR FIRST FLOOR	05cw	AH	LV	DIM	37	8	296
50	WINE BAR FIRST FLOOR	06cw	DP–18	INC	DIM	TBD	4	400
51	WINE BAR FIRST FLOOR	07cw	AA	LV	DIM	37	5	185
52	WINE BAR FIRST FLOOR	08cw	SB	LV	DIM	14W/LFT	20 FT	560
53	WINE BAR FIRST FLOOR	09cw	SD	LV	DIM	0.9W@1.2" O.C.	24 FT	171
54	WINE BAR FIRST FLOOR	10cw	SB–1	LV	DIM	05W@3" O.C.	20 FT	460
55	WINE BAR FIRST FLOOR	11cw	AI	LV	DIM	37	5	185
56	WINE BAR FIRST FLOOR	12cw	SB–1	LV	DIM	5W@3" O.C.	16	160
57	SPARE							
58	SPARE							
59	SPARE							
60	SPARE							

TOTAL KVA: 21.29
TOTAL AMP: 59.14
52.4"W x 87H x 14.15"D

Panelboard Sizing Worksheets/New Panels

The following tables are the modified dimming panelboards with new loads according to lighting redesign. Feeders were resized based on NEC table 310.16. Conduit was sized with the Conduit Sizing Worksheet provided in class.

DIM213

PANELBOARD SIZING WORKSHEET										
Panel Tag---------->					DIM213	Panel Location:			Elec. Rm. 3158	
Nominal Phase to Neutral Voltage------->					120	Phase:			3	
Nominal Phase to Phase Voltage-------->					208	Wires:			4	
DIMMING PANEL "DIM 213" 120/208V, 3Ph., 4W. 90A MCB - Normal Power										
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	5	CONCIERGE	259	w	1.00	259	259	DIM
2	A	LIGHTING	5	CONCIERGE	500	w	1.00	500	500	DIM
3	B	LIGHTING	5	CONCIERGE	0	w	1.00	0	0	
4	B	LIGHTING	5	CONCIERGE	370	w	1.00	370	370	DIM
5	C	SPARE			0	w		0	0	
6	C	SPARE			0	w		0	0	
7	A	SPARE			0	w		0	0	
8	A	SPARE			0	w		0	0	
9	B	LIGHTING	5	SALON	111	w	1.00	111	111	DIM
10	B	LIGHTING	5	SALON	1440	w	1.00	1440	1440	NON DIM
11	C	LIGHTING	5	SPA	222	w	1.00	222	222	DIM
12	C	LIGHTING	5	SPA	500	w	1.00	500	500	DIM
13	A	LIGHTING	5	SPA	222	w	1.00	222	222	DIM
14	A	LIGHTING	5	SPA	74	w	1.00	74	74	DIM
15	B	LIGHTING	3	SPA	210	w	0.90	210	233	DIM
16	B	LIGHTING		SPA	296	w	0.90	296	329	DIM
17	C	LIGHTING	5	SPA	740	w	1.00	740	740	DIM
18	C	LIGHTING	5	SPA	1200	w	1.00	1200	1200	DIM
19	A	LIGHTING	5	SPA	669	w	1.00	669	669	DIM
20	A	LIGHTING	5	SPA	222	w	1.00	222	222	DIM
21	B	LIGHTING	5	SPA	612	w	1.00	612	612	DIM
22	B	LIGHTING	5	SPA	600	w	1.00	600	600	DIM

23	C	LIGHTING	5	SPA	1420	w	1.00	1420	1420	DIM
24	C	LIGHTING	5	SPA	148	w	1.00	148	148	DIM
25	A	LIGHTING	5	SPA	370	w	1.00	370	370	DIM
26	A	LIGHTING	5	SPA	200	w	1.00	200	200	DIM
27	B	LIGHTING	5	SPA	500	w	1.00	500	500	DIM
28	B	LIGHTING	5	SPA RETAIL	150	w	1.00	150	150	NON DIM
29	C	LIGHTING	5	SPA	500	w	1.00	500	500	DIM
30	C	LIGHTING	3	COURTYARD	180	w	0.90	180	200	NON DIM
31	A	LIGHTING	5	COURTYARD	180	w	1.00	180	180	DIM
32	A	LIGHTING	5	NORTH CORRIDOR	148	w	1.00	148	148	DIM
33	B	LIGHTING	5	SPA	148	w	1.00	148	148	DIM
34	B	LIGHTING	5	EXTERIOR	200	w	1.00	200	200	DIM
35	C	LIGHTING	5	EXTERIOR	780	w	1.00	780	780	DIM
36	C	LIGHTING	5	SPA LOCKER RM.	444	w	1.00	444	444	DIM
37	A	LIGHTING	5	SPA LOCKER RM.	1125	w	1.00	1125	1125	DIM
38	A	LIGHTING	5	SPA LOCKER RM.	185	w	1.00	185	185	DIM
39	B	LIGHTING	5	SPA LOCKER RM.	407	w	1.00	407	407	DIM
40	B	LIGHTING	5	SPA LOCKER RM.	500	w	1.00	500	500	DIM
41	C	LIGHTING	5	SPA LOCKER RM.	600	w	1.00	600	600	NON DIM
42	C	LIGHTING	5	SPA LOCKER RM.	222	w	1.00	222	222	DIM
43	A	LIGHTING	3	SPA LOCKER RM.	293	w	0.90	293	326	DIM
44	A	LIGHTING	5	SPA LOCKER RM.	222	w	1.00	222	222	DIM
45	B	LIGHTING	5	SPA LOCKER RM.	250	w	1.00	250	250	DIM
46	B	LIGHTING	5	SPA LOCKER RM.	160	w	1.00	160	160	DIM
47	C	LIGHTING	5	SPA LOCKER RM.	259	w	1.00	259	259	DIM
48	C	SPARE			0	w		0	0	NON DIM
49	A	LIGHTING	5	SPA LOCKER RM.	74	w	1.00	74	74	DIM
50	A	LIGHTING	5	SPA LOCKER RM.	333	w	1.00	333	333	DIM
51	B	LIGHTING	5	SPA LOCKER RM.	500	w	1.00	500	500	DIM
52	B	SPARE			0	w		0	0	NON DIM
53	C	LIGHTING	5	SALON	450	w	1.00	450	450	DIM
54	C	LIGHTING	5	SALON	500	w	1.00	500	500	DIM
55	A	LIGHTING	5	SPA LOCKER RM.	185	w	1.00	185	185	NON DIM
56	A	SPARE			0	w		0	0	
57	B	SPARE			0	w		0	0	
58	B	SPARE			0	w		0	0	
59	C	SPARE			0	w		0	0	
60	C	SPARE			0	w		0	0	
PANEL TOTAL								19.9	20.0	Amps= 55.5

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					5.26	5.29	26%	44.1
PHASE TOTAL	B					6.45	6.51	33%	54.3
PHASE TOTAL	C					8.17	8.19	41%	68.2

LOAD CATAGORIES		Connected			Demand				Ver. 104
		kW	kVA	DF	kW	kVA	PF		
1	receptacles	0.0	0.0	0.70	0.0	0.0			
2	computers	0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting	0.7	0.8	1.00	0.7	0.8	0.90		
4	HID lighting	0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting	18.9	18.9	1.00	18.9	18.9	1.00		
6	HVAC fans	0.0	0.0	0.80	0.0	0.0			
7	heating	0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment	0.0	0.0	0.80	0.0	0.0			
9	unassigned	0.0	0.0	1.00	0.0	0.0			
Total Demand Loads					19.6	19.7			
Spare Capacity		20%			3.9	3.9			
Total Design Loads					23.5	23.6	1.00	Amps=	65.5

65.5A * 1.25 = 81.92A → 90A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #4 AWG + #8 AWG Ground
(Feeder worksheet shown below in Table 4)

DIM213	Conduit Sizing Worksheet	
Total Cross Sectional of Wire Area	0.3662	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	1.25 "	EMT
Calculated IMC Conduit Size (minimum size is 3/4")	1.00 "	IMC
Calculated RMC Conduit Size (minimum size is 3/4")	1.25 "	RMC
Calculated RNC Conduit Size (minimum size is 3/4")	1.25 "	RNC
Ref: 2005 NEC, Tables 4, 5 and 8		

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437	1	0.0366		0.0437		0.017	1	0.0366
6		0.0726		0.0507		0.0590		0.027	0	0
4		0.0973	4	0.0824		0.0814		0.042	4	0.3296

DIM211A

PANELBOARD SIZING WORKSHEET

Panel Tag---------->	DIM211A	Panel Location:	Corridor 2100	
Nominal Phase to Neutral Voltage------->	120	Phase:	3	
Nominal Phase to Phase Voltage-------->	208	Wires:	4	

DIMMING PANEL "DIM211A" 120/208V, 3Ph., 4W. 125A MCB - Normal Power

Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	5	CORRIDOR 1ST FL.	800	w	1.00	800	800	DIM
2	A	LIGHTING	5	CORRIDOR 1ST FL.	222	w	1.00	222	222	DIM
3	B	LIGHTING	5	CORRIDOR 1ST FL.	148	w	1.00	148	148	DIM
4	B	LIGHTING	5	CORRIDOR 1ST FL.	160	w	1.00	160	160	DIM
5	C	LIGHTING	5	CORRIDOR 1ST FL.	444	w	1.00	444	444	DIM
6	C	SPARE			0	w		0	0	
7	A	LIGHTING	5	CORRIDOR 1ST FL.	420	w	1.00	420	420	DIM
8	A	LIGHTING	5	CORRIDOR 1ST FL.	74	w	1.00	74	74	DIM
9	B	LIGHTING	5	CORRIDOR 1ST FL.	300	w	1.00	300	300	DIM
10	B	LIGHTING	5	CORRIDOR 1ST FL.	296	w	1.00	296	296	DIM
11	C	LIGHTING	3	COURTYARD	476	w	0.60	476	793	NON DIM
12	C	LIGHTING	5	CORRIDOR 1ST FL.	72	w	1.00	72	72	DIM
13	A	LIGHTING	9	COURTYARD	96.2	w	0.95	96	101	NON DIM
14	A	LIGHTING	5	BILLIARDS	960	w	1.00	960	960	DIM
15	B	LIGHTING	5	BILLIARDS	500	w	1.00	500	500	DIM
16	B	LIGHTING	9	EXTERIOR	660	w	0.99	660	667	NON DIM
17	C	LIGHTING	5	BILLIARDS	1800	w	1.00	1800	1800	DIM
18	C	LIGHTING	5	BILLIARDS	111	w	1.00	111	111	DIM
19	A	LIGHTING	5	BILLIARDS	111	w	1.00	111	111	DIM
20	A	LIGHTING	5	PRIVATE DINING	148	w	1.00	148	148	DIM
21	B	LIGHTING	5	PUBLIC RESTROOMS	370	w	1.00	370	370	DIM
22	B	LIGHTING	5	PUBLIC RESTROOMS	975	w	1.00	975	975	DIM
23	C	LIGHTING	5	PUBLIC RESTROOMS	259	w	1.00	259	259	DIM
24	C	LIGHTING	5	PUBLIC RESTROOMS	111	w	1.00	111	111	DIM
25	A	LIGHTING	5	PRIVATE DINING	400	w	1.00	400	400	NON DIM
26	A	LIGHTING	5	COOKING STUDIO	814	w	1.00	814	814	DIM
27	B	LIGHTING	5	COOKING STUDIO	1600	w	1.00	1600	1600	DIM
28	B	LIGHTING	5	COOKING STUDIO	100	w	1.00	100	100	DIM
29	C	LIGHTING	5	RESTAURANT VEST.	74	w	1.00	74	74	DIM
30	C	LIGHTING	5	RESTAURANT	400	w	1.00	400	400	DIM

31	A	LIGHTING	5	RESTAURANT	400	w	1.00	400	400	DIM
32	A	LIGHTING	5	RESTAURANT	400	w	1.00	400	400	DIM
33	B	LIGHTING	5	RESTAURANT	468	w	1.00	468	468	DIM
34	B	LIGHTING	5	RESTAURANT	259	w	1.00	259	259	DIM
35	C	LIGHTING	5	RESTAURANT	600	w	1.00	600	600	DIM
36	C	LIGHTING	5	RESTAURANT	1600	w	1.00	1600	1600	DIM
37	A	LIGHTING	5	RESTAURANT	250	w	1.00	250	250	DIM
38	A	LIGHTING	5	RESTAURANT	74	w	1.00	74	74	DIM
39	B	LIGHTING	5	RESTAURANT EXT.	851	w	1.00	851	851	DIM
40	B	LIGHTING	5	RESTAURANT	148	w	1.00	148	148	DIM
41	C	LIGHTING	5	PRIVATE DINING	400	w	1.00	400	400	DIM
42	C	LIGHTING	5	PRIVATE DINING	296	w	1.00	296	296	DIM
43	A	LIGHTING	5	PRIVATE DINING	74	w	1.00	74	74	DIM
44	A	LIGHTING	5	PRIVATE DINING	600	w	1.00	600	600	DIM
45	B	LIGHTING	5	MAITRE D'	148	w	1.00	148	148	DIM
46	B	LIGHTING	5	BOARD RM.	240	w	1.00	240	240	DIM
47	C	LIGHTING	3	BOARD RM.	1120	w	0.90	1120	1244	DIM
48	C	LIGHTING	5	BOARD RM.	814	w	1.00	814	814	DIM
49	A	LIGHTING	5	BOARD RM.	111	w	1.00	111	111	DIM
50	A	LIGHTING	5	BOARD RM.	240	w	1.00	240	240	DIM
51	B	LIGHTING	5	BOARD RM.	1120	w	1.00	1120	1120	DIM
52	B	LIGHTING	5	BOARD RM.	962	w	1.00	962	962	DIM
53	C	LIGHTING	5	RETAIL	592	w	1.00	592	592	DIM
54	C	LIGHTING	5	RETAIL	592	w	1.00	592	592	DIM
55	A	LIGHTING	5	RETAIL	555	w	1.00	555	555	DIM
56	A	LIGHTING	5	RETAIL	555	w	1.00	555	555	DIM
57	B	SPARE		SPARE	0	w		0	0	
58	B	LIGHTING	5	RETAIL	500	w	1.00	500	500	DIM
59	C	LIGHTING	5	RETAIL	920	w	1.00	920	920	DIM
60	C	LIGHTING	5	RETAIL	216	w	1.00	216	216	DIM
PANEL TOTAL								28.0	28.5	Amps= 79.1

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					7.30	7.31	26%	60.9
PHASE TOTAL	B					9.81	9.81	34%	81.8
PHASE TOTAL	C					10.90	11.34	40%	94.5

LOAD CATAGORIES			Connected			Demand				Ver. 104
			kW	kVA	DF	kW	kVA	PF		
1	receptacles		0.0	0.0	0.70	0.0	0.0			
2	computers		0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting		1.6	2.0	1.00	1.6	2.0	0.78		
4	HID lighting		0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting		25.7	25.7	1.00	25.7	25.7	1.00		
6	HVAC fans		0.0	0.0	0.80	0.0	0.0			
7	heating		0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment		0.0	0.0	0.80	0.0	0.0			
9	unassigned		0.8	0.8	1.00	0.8	0.8	0.98		
Total Demand Loads						28.0	28.5			
Spare Capacity			20%			5.6	5.7			
Total Design Loads						33.6	34.2	0.98	Amps=	94.9

94.9 A * 1.25 = 118.6A ➔ 125A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #1 AWG + #6 AWG Ground
(Feeder worksheet shown below in Table 4)

DIM211A	**Conduit Sizing Worksheet**	
Total Cross Sectional of Wire Area	0.6755	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	1.50 "	EMT
Calculated IMC Conduit Size (minimum size is 3/4")	1.50 "	IMC
Calculated RMC Conduit Size (minimum size is 3/4")	1.50 "	RMC
Calculated RNC Conduit Size (minimum size is 3/4")	1.50 "	RNC
Ref: 2005 NEC, Tables 4, 5 and 8		

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437		0.0366		0.0437		0.017	0	0
6		0.0726	1	0.0507		0.0590		0.027	1	0.0507
4		0.0973		0.0824		0.0814		0.042	0	0
3		0.1134		0.0973		0.0962		0.053	0	0
2		0.1333		0.1158		0.1146		0.067	0	0
1		0.1901	4	0.1562		0.1534		0.087	4	0.6248

EDIM211

PANELBOARD SIZING WORKSHEET

Panel Tag---------->	EDIM211	Panel Location:	Corridor 2100
Nominal Phase to Neutral Voltage------->	120	Phase:	3
Nominal Phase to Phase Voltage-------->	208	Wires:	4

DIMMING PANEL "EDIM211" 120/208V, 3Ph., 4W. 35A MCB - Emergency Power

Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	5	CORRIDOR FIRST FL.	1443	w	1.00	1443	1443	DIM
2	A	LIGHTING	5	CORRIDOR FIRST FL.	148	w	1.00	148	148	DIM
3	B	LIGHTING	5	CORRIDOR FIRST FL.	200	w	1.00	200	200	DIM
4	B	LIGHTING	5	CORRIDOR FIRST FL.	240	w	1.00	240	240	DIM
5	C	LIGHTING	5	CORRIDOR FIRST FL.	256	w	1.00	256	256	DIM
6	C	LIGHTING	5	CORRIDOR FIRST FL.	256	w	1.00	256	256	DIM
7	A	LIGHTING	5	CORRIDOR FIRST FL.	200	w	1.00	200	200	DIM
8	A	LIGHTING	5	BILLIARD FIRST FL.	370	w	1.00	370	370	DIM
9	B	LIGHTING	5	BILLIARD FIRST FL.	74	w	1.00	74	74	DIM
10	B	LIGHTING	5	PUBLIC RESTROOMS	444	w	1.00	444	444	DIM
11	C	LIGHTING	5	COOKING STUDIO	555	w	0.60	555	925	DIM
12	C	LIGHTING	5	HOTEL SPA CHECK-IN	319	w	1.00	319	319	DIM
13	A	LIGHTING	5	RESTAURANT	600	w	0.95	600	632	DIM
14	A	LIGHTING	5	RESTAURANT	370	w	1.00	370	370	DIM
15	B	LIGHTING	5	RESTAURANT	111	w	1.00	111	111	DIM
16	B	LIGHTING	5	RESTAURANT	148	w	0.99	148	149	DIM
17	C	LIGHTING	5	RESTAURANT	780	w	1.00	780	780	DIM
18	C	SPARE				w		0	0	
19	A	LIGHTING		BOARD ROOM	900	w	0.90	900	1000	DIM
20	A	LIGHTING		BOARD ROOM	900	w	0.90	900	1000	DIM
21	B	LIGHTING		CHECK-IN	444	w	0.90	444	493	DIM
22	B	LIGHTING		LIBRARY	666	w	0.90	666	740	DIM
23	C	LIGHTING	9	LIVING ROOM	86	w	0.90	86	96	DIM

24	C	SPARE				w		0	0	DIM	
25	A	SPARE				w		0	0		
26	A	SPARE				w		0	0		
27	B	LIGHTING	3	PORTE-COCHERE	54	w	0.60	54	90	NON-DIM	
28	B	LIGHTING	3	WINE BAR	114	w	0.90	114	127	DIM	
29	C	LIGHTING	5	RETAIL	333	w	1.00	333	333	DIM	
30	C	LIGHTING	5	PRIVATE DINING	592	w	1.00	592	592	DIM	
31	A	SPARE				w		0	0		
32	A	SPARE				w		0	0		
33	B	SPARE				w		0	0		
34	B	SPARE				w		0	0		
35	C	SPARE				w		0	0		
36	C	SPARE				w		0	0		
PANEL TOTAL								10.6	11.4	Amps=	31.6

PHASE LOADING									
PHASE TOTAL	A					4.93	5.16	45%	43.0
PHASE TOTAL	B					2.50	2.67	23%	22.2
PHASE TOTAL	C					3.18	3.56	31%	29.6

LOAD CATAGORIES			Connected			Demand				Ver. 104
			kW	kVA	DF	kW	kVA	PF		
1	receptacles		0.0	0.0	0.70	0.0	0.0			
2	computers		0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting		0.2	0.2	1.00	0.2	0.2	0.78		
4	HID lighting		0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting		7.4	7.8	1.00	7.4	7.8	0.95		
6	HVAC fans		0.0	0.0	0.80	0.0	0.0			
7	heating		0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment		0.0	0.0	0.80	0.0	0.0			
9	unassigned		0.1	0.1	1.00	0.1	0.1	0.90		
Total Demand Loads						7.7	8.2			
Spare Capacity			20%			1.5	1.6			
Total Design Loads						9.2	9.8	0.94	Amps=	27.2

27.2 A * 1.25 = 34A ➔ 35A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #8 AWG + #10 AWG Ground
(Feeder worksheet shown below in Table 4)

EDIM211

Conduit Sizing Worksheet

Total Cross Sectional of Wire Area	0.1675	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	0.75 "	EMT
Calculated IMC Conduit Size (minimum size is 3/4")	0.75 "	IMC
Calculated RMC Conduit Size (minimum size is 3/4")	0.75 "	RMC
Calculated RNC Conduit Size (minimum size is 3/4")	0.75 "	RNC
Ref: 2005 NEC, Tables 4, 5 and 8		

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243	1	0.0211		0.0243		0.011	1	0.0211
8		0.0437	4	0.0366		0.0437		0.017	4	0.1464

DIM211B

PANELBOARD SIZING WORKSHEET										
Panel Tag---------->					DIM211B	Panel Location:		Corridor 2100		
Nominal Phase to Neutral Voltage------->					120	Phase:		3		
Nominal Phase to Phase Voltage-------->					208	Wires:		4		
DIMMING PANEL "DIM211B" 120/208V, 3Ph., 4W. 70A MCB - Normal Power										
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	5	CORRIDOR	1200	w	1.00	1200	1200	DIM
2	A	LIGHTING	5	CORRIDOR	1200	w	1.00	1200	1200	DIM
3	B	LIGHTING	5	CORRIDOR	1200	w	1.00	1200	1200	DIM
4	B	LIGHTING	5	CORRIDOR	666	w	1.00	666	666	DIM
5	C	LIGHTING	5	CORRIDOR	1200	w	1.00	1200	1200	DIM
6	C	LIGHTING	5	CHECK-IN	400	w	1.00	400	400	DIM
7	A	LIGHTING	5	CHECK-IN	500	w	1.00	500	500	DIM
8	A	SPARE				w		0	0	
9	B	SPARE				w		0	0	
10	B	SPARE				w		0	0	
11	C	LIGHTING	5	LIBRARY	320	w	0.60	320	533	DIM
12	C	LIGHTING	5	LIBRARY	900	w	1.00	900	900	DIM
13	A	LIGHTING	5	LIBRARY	185	w	0.95	185	195	DIM
14	A	LIGHTING	5	LIBRARY	148	w	1.00	148	148	DIM
15	B	LIGHTING	5	LIBRARY	500	w	1.00	500	500	DIM
16	B	SPARE				w	0.99	0	0	
17	C	LIGHTING	5	LIBRARY	148	w	1.00	148	148	DIM
18	C	LIGHTING	3	LIVING ROOM	654	w	0.90	654	727	DIM
19	A	LIGHTING	3	LIVING ROOM	608	w	0.90	608	676	DIM
20	A	LIGHTING	9	LIVING ROOM		w	0.90	0	0	DIM
21	B	LIGHTING	9	LIVING ROOM		w	0.90	0	0	DIM
22	B	LIGHTING	9	LIVING ROOM		w	0.90	0	0	DIM
23	C	LIGHTING	9	LIVING ROOM		w	0.90	0	0	DIM
24	C	LIGHTING	3	LIVING ROOM		w	0.90	0	0	DIM
25	A	LIGHTING	9	LIVING ROOM		w	0.90	0	0	DIM
26	A	LIGHTING		LIVING ROOM		w	0.90	0	0	DIM
27	B	SPARE				w		0	0	
28	B	LIGHTING	5	EXTERIOR	240	w	1.00	240	240	DIM
29	C	LIGHTING	5	EXTERIOR	120	w	1.00	120	120	DIM
30	C	LIGHTING	5	EXTERIOR	220	w	1.00	220	220	DIM
31	A	LIGHTING	5	EXTERIOR	700	w	1.00	700	700	DIM
32	A	SPARE				w		0	0	
33	B	LIGHTING	5	ENTRY	400	w	1.00	400	400	DIM
34	B	LIGHTING	5	ENTRY	666	w	1.00	666	666	DIM
35	C	LIGHTING	5	ENTRY	160	w	1.00	160	160	DIM
36	C	LIGHTING	5	ENTRY	74	w	1.00	74	74	DIM
37	A	LIGHTING	5	ENTRY	74	w	1.00	74	74	DIM
38	A	LIGHTING	5	ENTRY	111	w	1.00	111	111	DIM
39	B	LIGHTING	3	EXTERIOR	709	w	0.90	709	788	NON-DIM
40	B	SPARE				w		0	0	
41	C	LIGHTING	5	VALET	111	w	1.00	111	111	DIM
42	C	SPARE				w		0	0	
43	A	LIGHTING	5	ENTRY	74	w	1.00	74	74	DIM
44	A	SPARE				w		0	0	
45	B	SPARE				w		0	0	
46	B	LIGHTING	9	WINE BAR	353	w	0.90	353	392	DIM
47	C	LIGHTING	3	WINE BAR	345	w	0.90	345	383	DIM

48	C	LIGHTING	3	WINE BAR	145	w	0.90	145	161	DIM	
49	A	LIGHTING	9	WINE BAR	278.5	w	0.90	279	309	DIM	
50	A	SPARE	9			w		0	0		
51	B	SPARE				w		0	0		
52	B	SPARE				w		0	0		
53	C	SPARE				w		0	0		
54	C	SPARE				w		0	0		
55	A	SPARE				w		0	0		
56	A	SPARE				w		0	0		
57	B	SPARE				w		0	0		
58	B	SPARE				w		0	0		
59	C	SPARE				w		0	0		
60	C	SPARE				w		0	0		
PANEL TOTAL								14.6	15.2	Amps=	42.2

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL		A				5.08	5.19	34%	43.2
PHASE TOTAL		B				4.73	4.85	32%	40.4
PHASE TOTAL		C				4.80	5.14	34%	42.8

LOAD CATAGORIES			Connected			Demand				Ver. 104
			kW	kVA	DF	kW	kVA	PF		
1	receptacles		0.0	0.0	0.70	0.0	0.0			
2	computers		0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting		2.5	2.7	1.00	2.5	2.7	0.90		
4	HID lighting		0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting		11.5	11.7	1.00	11.5	11.7	0.98		
6	HVAC fans		0.0	0.0	0.80	0.0	0.0			
7	heating		0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment		0.0	0.0	0.80	0.0	0.0			
9	unassigned		0.6	0.7	1.00	0.6	0.7	0.90		
Total Demand Loads						14.6	15.2			
Spare Capacity			20%			2.9	3.0			
Total Design Loads						17.5	18.2	0.96	Amps=	50.6

50.6 A * 1.25 = 63.23A ➔ 70A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #6 AWG + #8 AWG Ground
(Feeder worksheet shown below in Table 4)

DIM211B

Conduit Sizing Worksheet

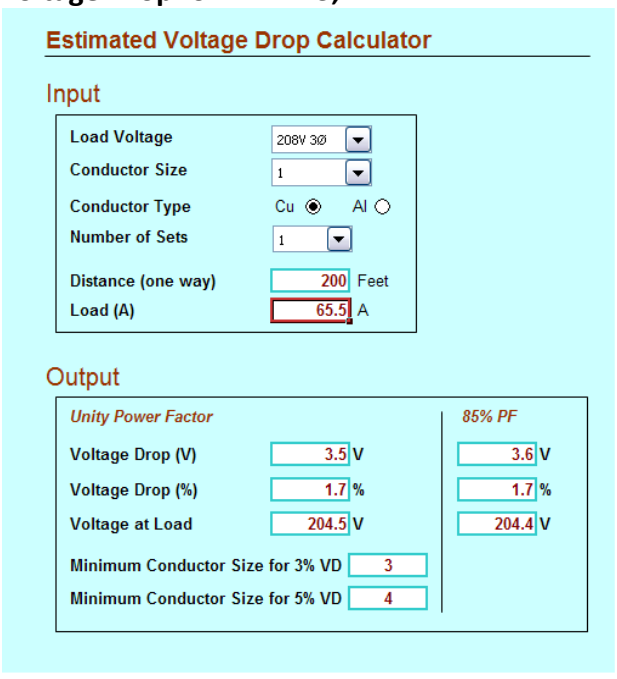
Total Cross Sectional of Wire Area	0.2394	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	1.00 "	EMT
Calculated IMC Conduit Size (minimum size is 3/4")	1.00 "	IMC
Calculated RMC Conduit Size (minimum size is 3/4")	1.00 "	RMC
Calculated RNC Conduit Size (minimum size is 3/4")	1.00 "	RNC
Ref: 2005 NEC, Tables 4, 5 and 8		

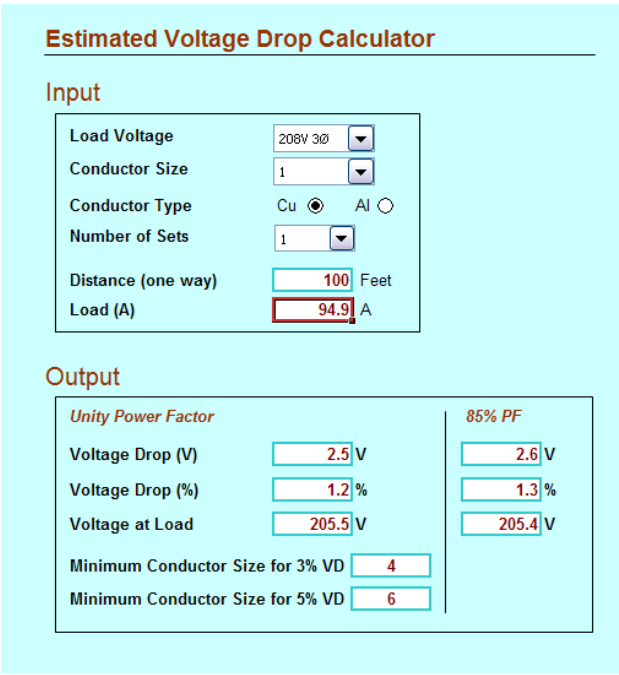
									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437	1	0.0366		0.0437		0.017	1	0.0366
6		0.0726	4	0.0507		0.0590		0.027	4	0.2028

Table 4: Feeder Sizing Worksheet for the Entry Courtyard lighting branch circuit redesign.

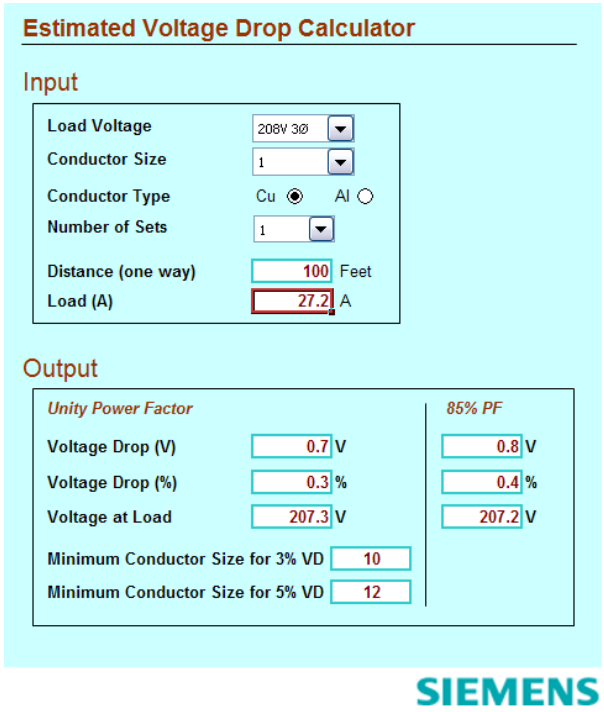
FEEDER SIZING WORKSHEET				
Panelboard Tag	DIM213	DIM211A	EDIM211	DIM211B
Panelboard Voltage	120/208	120/208	120/208	120/208
Calculated Design Load (kW)	23.5	33.6	9.2	17.5
Calculated Design Load (kVA)	23.6	34.2	9.8	18.2
Calculated Design Load (amps)	65.5	94.9	27.2	50.6
Feeder Sizing				
Sets	1	1	1	1
Wire Size				
Phase	#4 AWG	#1 AWG	#8 AWG	#6 AWG
Neutral	#4 AWG	#1 AWG	#8 AWG	#6 AWG
Ground	#8 AWG	#6 AWG	#10 AWG	#8 AWG
Wire Area				
Each Phase	0.0824	0.1562	0.0366	0.0507
Total - Phase Conductors	0.2472	0.4686	0.1098	0.1521
Neutral	0.0824	0.1562	0.0366	0.0507
Ground	0.0366	0.0507	0.0211	0.0366
Total Area	0.3662	0.6755	0.1675	0.2394
Conduit Size	1.25" EMT	1.5" EMT	0.75" EMT	1.0" EMT

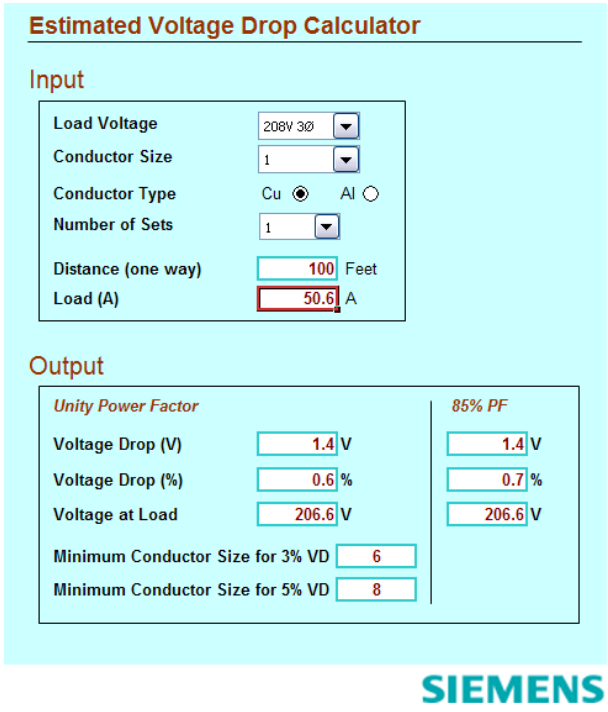
Voltage Drop for DIM213, DIM211A





Voltage Drop for EDIM211, DIM211B





Lutron Dimming Panel Specification Cutsheets:
See Appendix C

The Living Room

Description:
Guests enter the Salamander Resort and Spa through the main entry courtyard, pass through the entry foyer, and are welcomed into the resort by a lobby-like space, called the Living Room. The Living Room is equipped for relaxation. With fine furniture, two fireplaces, and access out to an outdoor terrace, this space sets the tone for the entire resort experience. The hardwood floor is made of stained French oak, which is contrasted in its dark color to the painted "Palace White" and "Putnam Ivory" trim work as well as the white travertine stone of the two fireplaces in the room. Different pieces of furniture sit on two patterned rugs that cover about half of the floor space. The ceiling is painted Putnam ivory on the lower, curved and vaulted ceiling, while the upper rectangular ceiling is a semi-gloss latex Palace white. The walls are painted with a pale blue-green "Rhine River" color. While no specific task is completed here, this space must be pleasant in nature for guests to pass through or relax in while they check in.

Area: 1938 Sq. ft.

Dimension: Approximately 51'-0" x 38'-0" x 22'-0"

Space Category:
A circulation space (lobby)

Materials:

MATERIAL/FINISH	LOCATION	OBJECT	COLOR	REFLECTANCE
French oak	Living Room	Wood floor	Bordeaux	0.3
Semi-gloss Latex Paint	Living Room	Baseboards, Door Casings, Crown Molding	Palace White	0.86
Flat Latex Paint	Living Room	Lower ceiling	Putnam Ivory	0.7
Semi-gloss Latex Paint	Living Room	Cove molding	Palace White	0.86
Eggshell Latex Paint	Living Room	Walls	Rhine River	0.7
White oak	Living Room	Doors		0.5
Flat Latex Paint	Living Room	Ceiling Coffer	Palace White	0.86

Living Room Plans –

Figure15: Living Room Furnishing Plan.

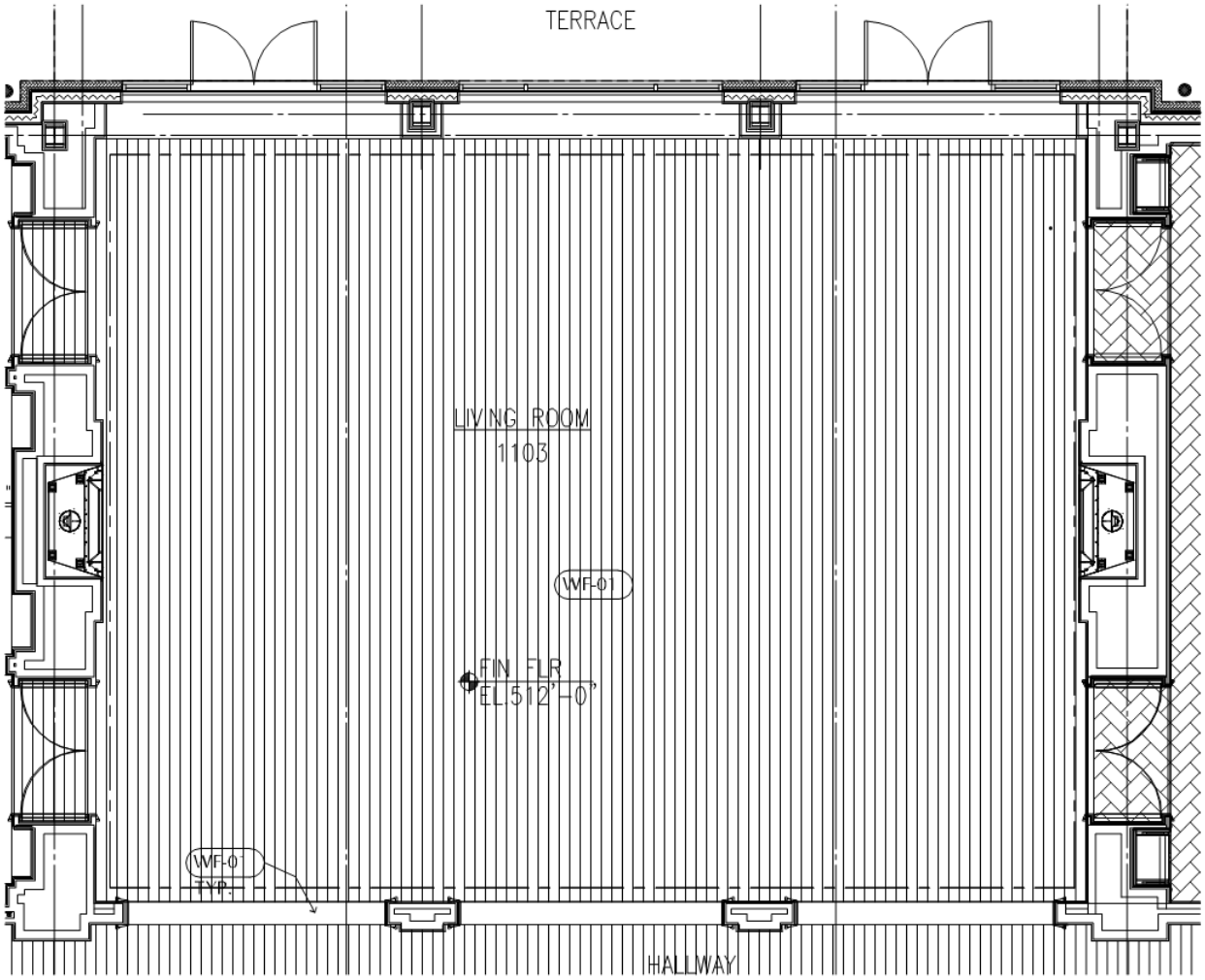


Figure 16: Living Room Furnishing Plan.

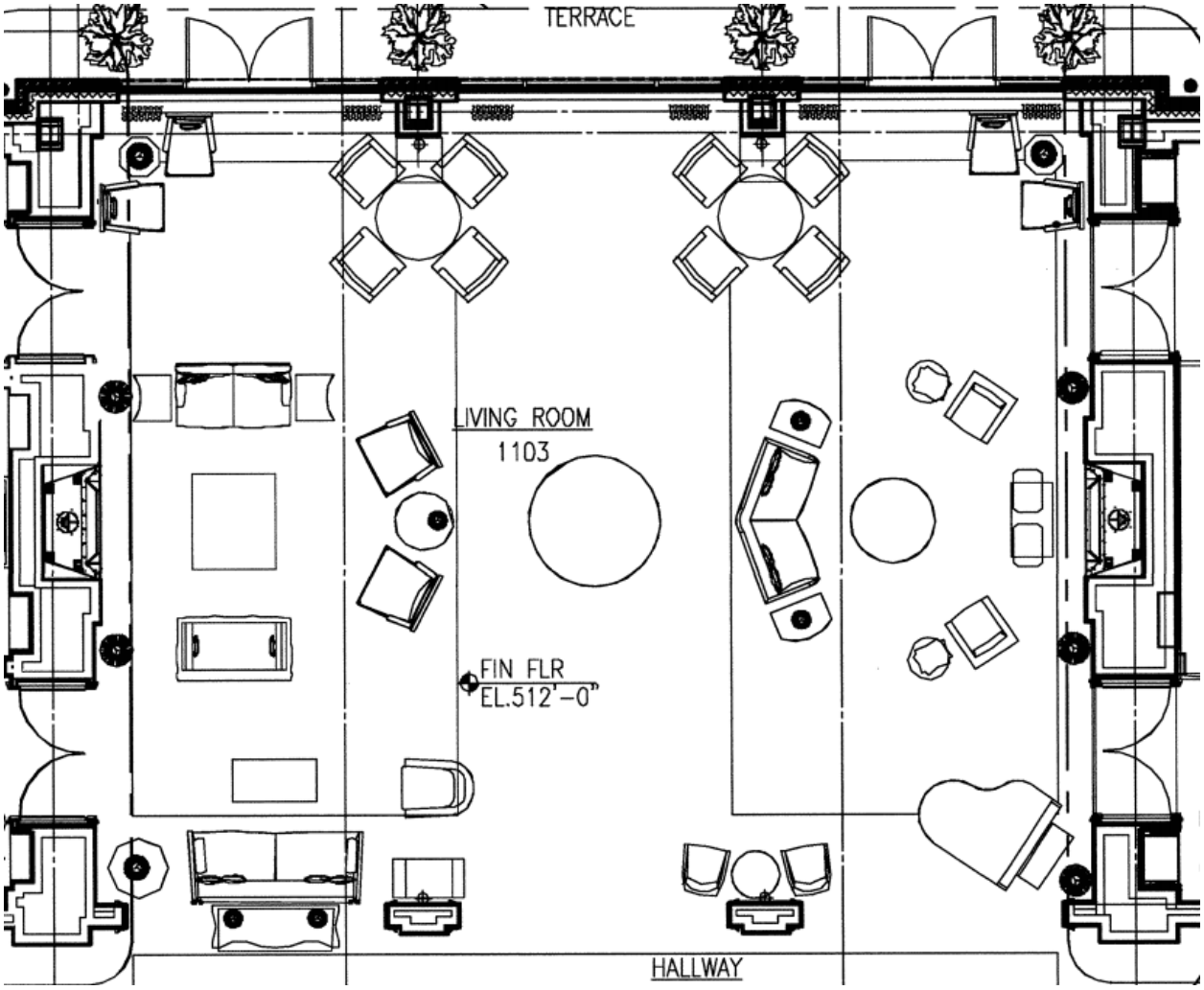


Figure 17: Living Room ceiling plan

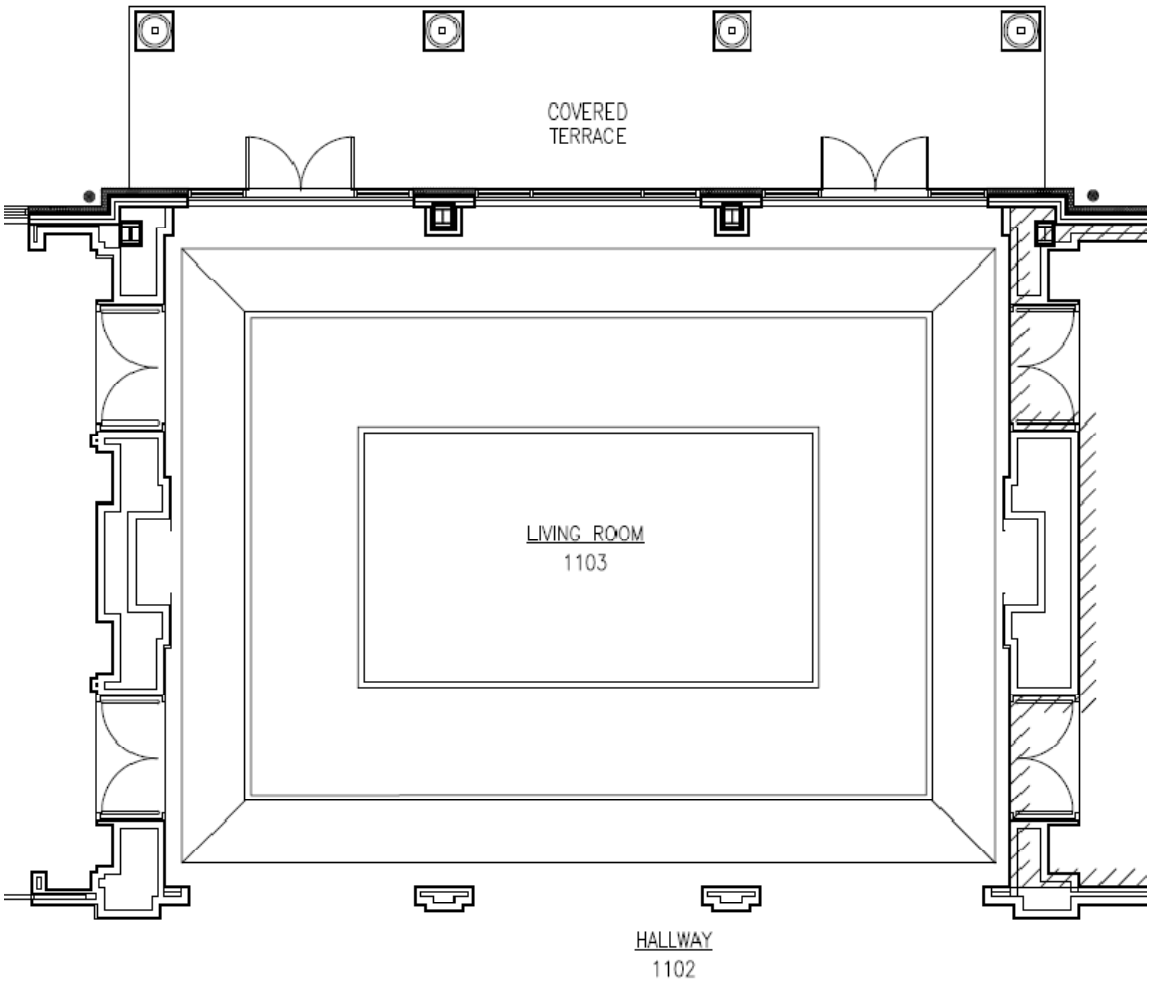
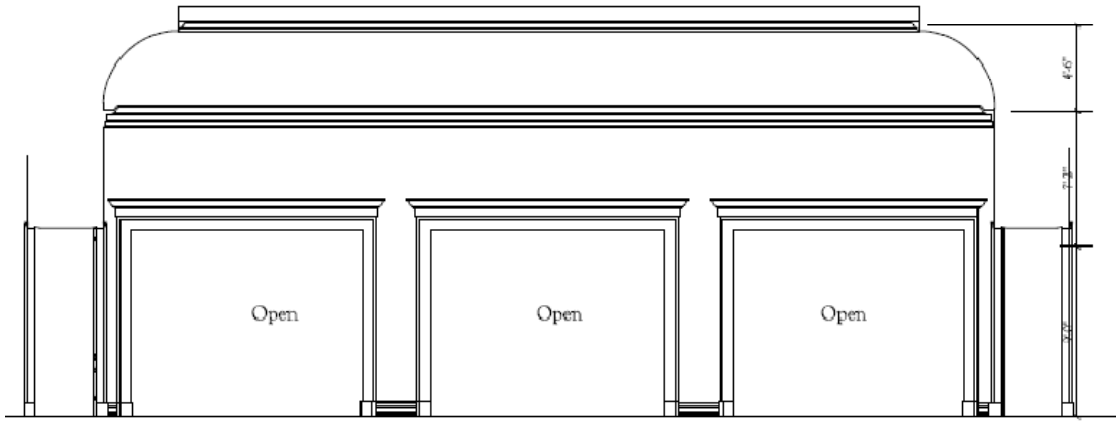


Figure 18: Living Room east elevation.

Figure 19: Living Room north elevation.

Figure 20: Living Room south elevation.



Lighting Design Criteria and Consideration

(*IESNA Handbook*: Interior-Hotels-Lobby-General Lighting)

- **Psychological Impressions**
  - There is no specific task for the Living Room other than a space to sit down and relax. Therefore, the impression the lighting design should strive for is relaxation.

- **Appearance of Space and Luminaires** (Important)
  - Once guests enter the resort, they pass through the entrance foyer and see the Living Room open before them. This is the first complete space they will see. The fine finishes and materials should be masked by the luminaires and enhanced by their lighting. This room sets the tone for the entire resort and spa.

- **Color Appearance (and Color Contrast)** (Important)
  - The light sources in this space should be warmer in CCT to promote relaxation. Also, the "white" painted finishes of the trim-work and ceiling are an ivory and cream-like color. The warmer color of light would complement these finishes well.
  - A use of lighting with high CRI would do justice to the high-end finishes and colors. There are dark browns in this space from the wood floor, a pale blue-green on the walls, and ivory/off-white trimming and surfaces which need to be appropriately conveyed to guests.

- **Daylighting Integration and Control** (Important)
  - Access to the outdoor terrace is made through the glass doors in the Living Room. The two doors and the equally large window between the doors will enable daylight to enter the space. The electric lighting must flexible to accommodate for this. Dimmable luminaires will be necessary.

- **Direct & Reflected Glare** (Important)
  - In order to maintain relaxation in the Living Room space, direct glare from light sources and luminaires must be prevented. Any reading that may take place in this space will require that reflected disability glare is also prevented.

- **Light Distribution on Surfaces** (Important)
  - Vertically, the lighting should be non-uniform to showcase some of the finishes and crown molding. The lower ceiling, which is curved and vaulted up and into the center of the room, could be lighted with a gradient from the cove. Horizontally, the room is divided into two halves of seating areas. The two areas may be uniformly lighted at the furniture surface level.

- **Luminances of Room Surfaces** (Important)
  - The interior design of the Living Room boasts high-end finishes that must be enhanced by lighting. The texture of the decorative trim-work and colors of the ceiling and walls must be visible to those visiting or staying at the Salamander Resort and Spa. The lighting must facilitate visual pleasure to those in the Living Room.

- **Points of Interest** (Important)
  - The seated areas on either side of the room are the main points of interest within the space and must have adequate lighting. However, this furniture is movable. General lighting across the space will suit any furniture layout. Architecturally, the lower ceiling and cove will need to be lighted and act as a point of interest.

- **Horizontal Illuminance** (Important)
  - General lighting within the Living Room requires **10 fc** for simple visual tasks.

- **Vertical Illuminance** (Not applicable)

- **Power Density Allowance:** ASHRAE 90.1 2007
  - For a Lobby in a Hotel: 1.1 W/sq. ft.
  - For a Lounge/Recreational space: 1.2 W/ft.
  - Additional interior lighting power density allowance for spaces in which lighting is specified to be installed in addition to the general lighting of the purpose of decorative appearance (chandeliers and sconces):
    - Additional lighting power shall not exceed 1.0 W/sq.ft.

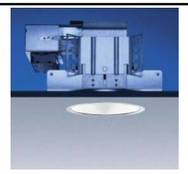
Lighting Plans – See Appendix A

Mounting Details – See Appendix B

Luminaires

Figure 21: Luminaire Schedule. Luminaires, lamps, and ballast specifications can be found in Appendix C.

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
J		Zumtobel	S5D4312 D1 4311R MC	Open recessed downlight. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Spun aluminum reflector with white matte finish.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
J1		Zumtobel	S5D4312 D1 4311W MC	Open recessed downlight/wallwash. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Wallwasher reflector - hydroformed aluminum kicker plate is mounted to the main reflector for wall illumination. Reflector is fully rotatable from below.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
K		Erco	88147.023	Adjustable recessed narrow spot light. 6" aperture. 0-40 degree tilt, 360 degree rotation. Lockable angles. Reflector: aluminum, anodised, mirror-finish. Safety glass. White powder-coated external ring. Flush mounted.	Ceiling Recessed	Electronic	120	20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	24 W
K1		Erco	88148.023	Adjustable recessed spot light. 6" aperture. 0-40 degree tilt, 360 degree rotation. Lockable angles. Reflector: aluminum, anodised, mirror-finish. Safety glass. White powder-coated external ring. Flush mounted.	Ceiling Recessed	Electronic	120	20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	24 W

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
L		DDP	Cwi-24-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 2' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
L1		DDP	Cwi-12-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 1' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
M		2nd Ave.	75606.2.X	"Esther" decorative wall sconce. 13" x 14" x 8". Iron metalwork with bronze finish. Fabric shade, decorative crystal, fiber drip candle covers. Handcrafted. Candelabra base.	Wall surface		120	(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W

Light Loss Factors

Light Loss Factors					
Type	LLD	LDD	RSDD	BF	LLF Total
J	0.932	0.9	0.97	1	0.81
J1	0.932	0.9	0.97	1	0.81
K	0.932	0.9	0.97	1	0.81
K1	0.932	0.9	0.97	1	0.81
L	0.93	0.89	0.9	1	0.74
M	0.96	0.94	0.9	1	0.81
N	0.96	0.94	0.9	1	0.81

Assumptions: Very Clean ; 12 month cleaning period.

Controls

The luminaires in the Living Room are all controlled by a Lutron Grafik Eye system (master control EQ-A). Per ASHRAE90.1, luminaires in the Living Room have automatic shutoff control by Wattstopper occupancy sensors. Passive Infrared sensors are oriented into the room on the south wall to prevent view into the corridor, which could incorrectly turn on luminaires when guests pass by.

While the Grafik Eye wall box can dim all luminaires, automatic dimming control is done using daylight sensor "EQ-D". More information on daylighting control is given in the Daylight Analysis section of this report.

Table 5: Control equipment. Product specifications can be found in Appendix C.

Equipment Schedule					
Type	Product Name	Manufacturer	Product/Catalog Number	Description	Location
EQ-A	Viseo Wallstation	Lutron GRAFIK	OMX-VDC-LF	Lutron GRAFIK 7000 System master control. Wallstation with LCD screen. Every lighting zone and scene programmable. Timeclock included.	"Storage 1117"
EQ-B	Wall-Mounted PIR Occupancy Sensor	Watt Stopper	CX-100	Wall-mounted passive infrared occupancy sensor. 24 VDC. For large areas, can cover up to 2000 sq. ft. Digital time delay adjustable from 15 seconds to 30 minutes.	Living Room/Ballroom "A" & "C"
EQ-D	LightSaver Dimming Photosensor	Watt Stopper	LS-301	Closed loop, ceiling-mounted, low voltage indoor photosensor. 0-10VDC electronic dimming. Controls up to 50 dimming ballasts per zone.	Living Room

Lighting Design

Design Concept

The design concept was to provide a mixture of the following:

- Ambient light to the seating areas – no specific task is being done and furniture layouts are subject to change
- Accent the interior design elements:
  - Accent the curved vault to the ceiling from within the cove below
  - Spot-light the artwork located above the fireplaces as well as the horse statue in the center of the room
  - Provide decorative elements to mask the decorative context of the interior design
  - Wall sconces provide perimeter light
  - Chandeliers provide some indirect light on the 22'-0" high ceiling.

Theme/metaphor

The lighting should convey class in the style of Virginia horse and wine country that is the trademark of Middleburg. Conservative, old-fashioned decoration is prevalent through the Salamander Resort and Spa and the decorative luminaires as well as the lighting itself blend.

Desired space perceptions

The perception of the space is relaxation. This room sets the tone for the entire resort as guests enter the building through the main courtyard.

Accent issues

The ERCO Gimbal (Type K,K1) recessed adjustable spotlight was specified for performance and aesthetic reasons. Accent lighting was desirable above the fireplace; however, a narrow spot was needed to prevent light leakage onto the curved and vaulted portion of the ceiling as well as not to interfere with the cove lighting. This luminaire is recessed cleanly into the flat portion of the ceiling, taking emphasis away from its housing as if it is not there at all.

The curved, vaulted portion of the ceiling was intentionally left at a glow within the cove to accentuate its curvature. Washing the entire curve evenly would flatten it out.

Lighting Design Renderings

Figure 22: Living Room Rendering

Figure 23: Living Room Daylight Rendering – June 21st 6:00 PM.

Figure 24: Living Room Rendering from outdoor terrace looking in.

Performance Graphics

Figure 25: Living Room contours (footcandles).

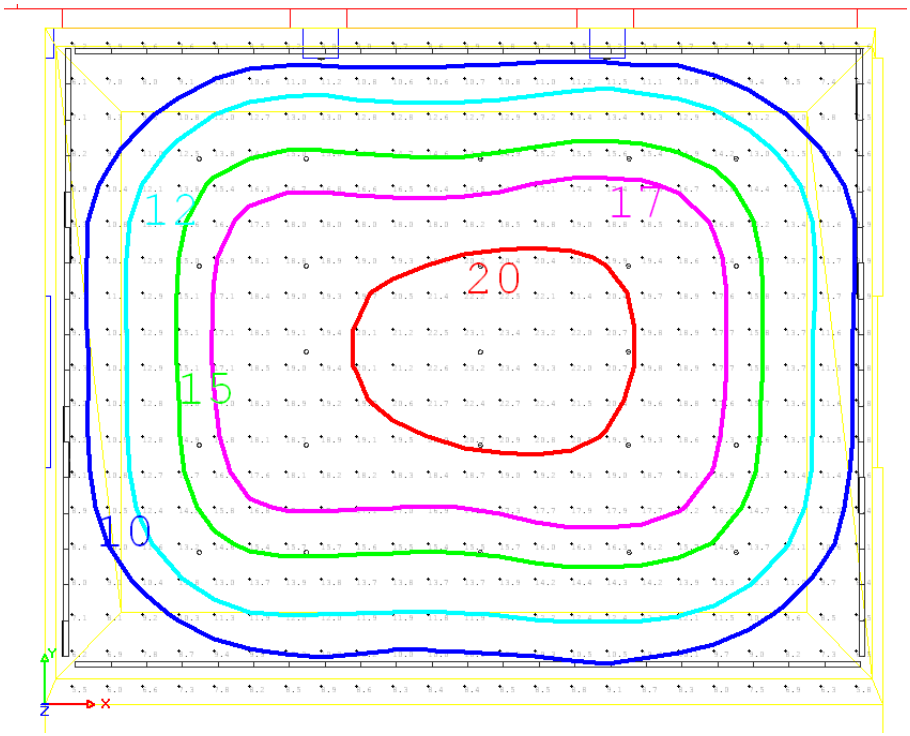


Figure 26: Living Room Pseudo Color Rendering.

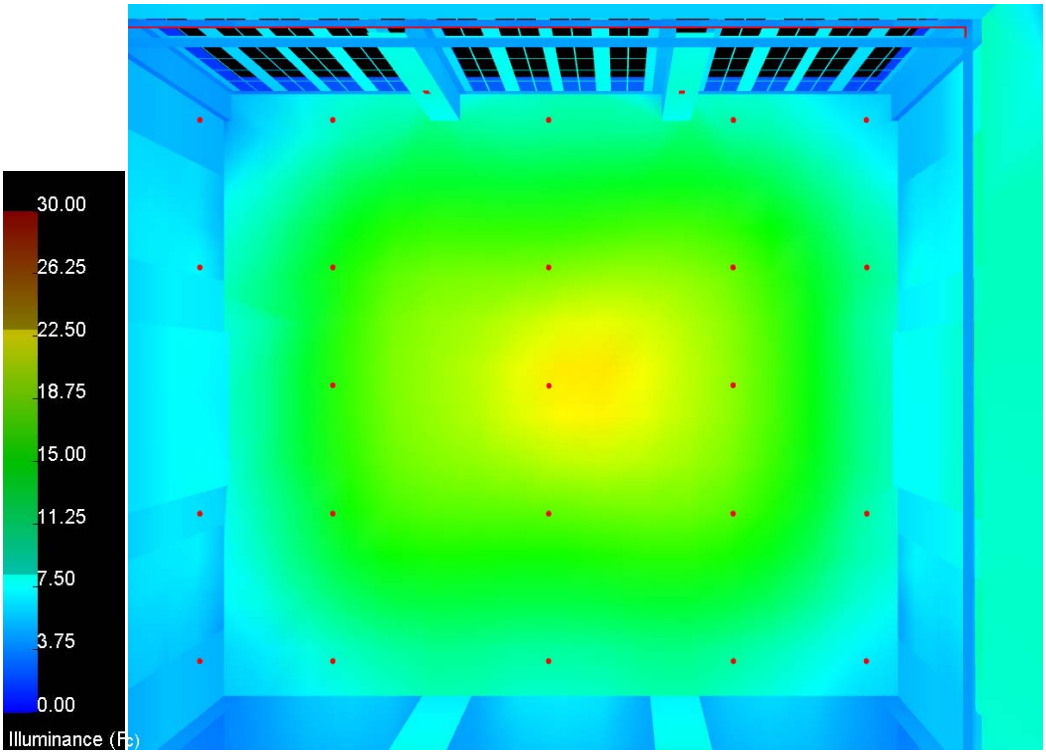


Figure 27: Living Room Pseudo Color Rendering.

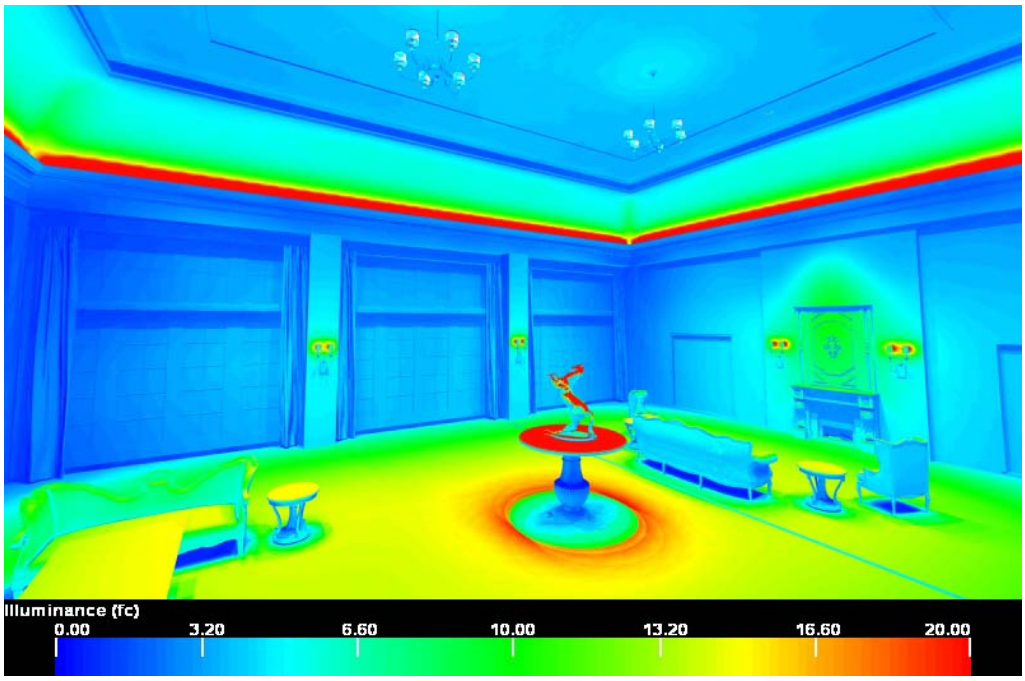
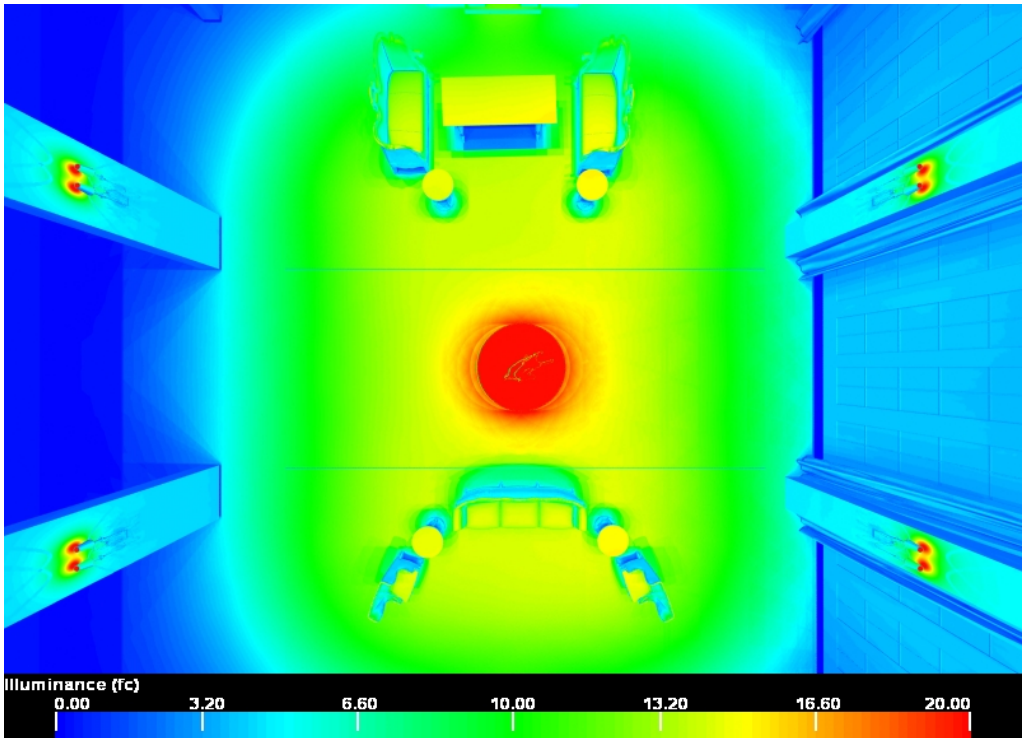


Figure 28: Living Room Pseudo Color Rendering.



Energy Code Compliance

Table 6: Energy Calculations – ASHRAE Standard 90.1

ASHRAE Standard 90.1 - Lighting Power Density			
LUMINAIRE	# OF LUMINAIRES	WATTAGE	TOTAL WATTS
J	27	24	648
K	1	24	24
K1	2	24	48
M	8	5	40
N	2	15	30

LUMINAIRE	LINEAR FEET	W/LF.	TOTAL WATTS
L	172	5	1060

TOTAL WATTS	1850

ASHRAE Standard 90.1 - Lighting Power Density				
Area	Size (sq. ft.)	Power Density Allowable	Allowable Wattage	Designed Wattage
Living Room	1938	1.2 W/sq. ft.	2325.60	1850

W/SQ. FT	0.95

Performance Summary

The lighting design for the Living Room of the Salamander Resort and Spa fulfills its purpose: to provide general lighting to the space as well as accentuate high-end finishes. By putting the interior design on display for guests, this room sets the tone for the entire resort. The curved ceiling structure will be accented by cove lighting and the chandeliers, though decorative, will provide some indirect light on the 22'-0" high flat portion of the ceiling. Decorative sconces will give some non-uniform lighting to the space, and all warm color temperature lamps will give a feeling of relaxation.

In terms of functionality, the downlighting provides general ambient light for any configuration of furniture. Accent lighting is given to artwork above the fireplaces as well as the central horse statue, which establishes the equestrian theme throughout the building. This space has the ability to change throughout the day with daylighting without the problem of direct glare, and the daylighting control system will adjust to that change and save some energy in the process.Quantitatively, the lighting power density is under the 1.2 W/sq.ft. limit given by ASHRAE 90.1 and the average illuminance at 13.8 fc meets the IESNA recommendation of 10 fc.

Electrical Redesign

All panels affected by lighting redesign in the Living Room are shown in Table __ below, highlighted in yellow.

Table 7: Dimming panels affected by lighting redesign.

Panels Affected by Lighting Redesign							
Panel Tag	Voltage	N, N/E, E?	Dimming Panel?	Courtyard	Living Room	Wine Bar	Ballroom
DIM213	120/208 3PH, 4W	N	Yes	X			
EDIM211	120/208 3PH, 4W	E	Yes	X	X	X	
DIM211A	120/208 3PH, 4W	N	Yes	X			
DIM211B	120/208 3PH, 4W	N	Yes	X	X	X	
EDIM212	120/208 3PH, 4W	E	Yes				X
DIM212B	120/208 3PH, 4W	N	Yes				X

Lighting Plan

The Living Room lighting plan with controls and circuiting can be found in Appendix A, drawing E2.1.

Existing Panelboards Affected

Circuits modified by lighting redesign are highlighted in yellow.

DIMMING PANEL "EDIM211" 120/208, 3ø, 4W, 100A MCB – EMERGENCY POWER								LUTRON MOD# GP36–120–4–M60–20
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	03c	AA	LV	DIM	39	37	1443
2	CORRIDOR FIRST FLOOR	06c	AI	LV	DIM	37	4	148
3	CORRIDOR FIRST FLOOR	15c	DP	LV	DIM	200	1	200
4	CORRIDOR FIRST FLOOR	22c	DS–4	INC	DIM	60	4	240
5	CORRIDOR FIRST FLOOR	25c	AA	LV	DIM	37	7	259
6	CORRIDOR FIRST FLOOR	26c	AA/AC–1	LV	DIM	37	7	259
7	CORRIDOR FIRST FLOOR	01c	DP	INC	DIM	200	1	200
8	BILLIARD FIRST FLOOR	01cb	AA	LV	DIM	37	10	370
9	BILLIARD FIRST FLOOR	07cb	AA	LV	DIM	37	2	74
10	PUBLIC RESTROOM FIRST FLOOR	01r	AC–1/AA	LV	DIM	37	12	444
11	COOKING STUDIO FIRST FLOOR	01d	AC–1	TBD	DIM	37	15	555
12	HOTEL SPA CHECK–IN	13c	SC	CC	DIM	5.5 W/LFT	58	319
13	RESTAURANT FIRST FLOOR	05s	DS/DS–1	INC	DIM	75	8	600
14	RESTAURANT FIRST FLOOR	08s	AA–1/AA	LV	DIM	37	10	370
15	RESTAURANT & VEST. FIRST FLOOR	12s	AA	LV	DIM	37	3	111
16	RESTAURANT FIRST FLOOR	14s	AA	LV	DIM	37	4	148
17	RESTAURANT FIRST FLOOR	16s	WB	INC	DIM	60	13	780
18	SPARE							
19	BOARD ROOM FIRST FLOOR	02fra	AE	INC	DIM	150	6	900
20	BOARD ROOM FIRST FLOOR	02frb	AE	INC	DIM	150	6	900

DIMMING PANEL "EDIM211" 120/208, 3ø, 4W, 100A MCB – EMERGENCY POWER								LUTRON MOD# GP36–120–4–M60–20
21	CHECK–IN FIRST FLOOR	03ci	AA	LV	DIM	37	12	444
22	LIBRARY FIRST FLOOR	02cr	AA	LV	DIM	37	18	666
23	LIVING ROOM FIRST FLOOR	03cg	AA	LV	DIM	37	4	148
24	LIVING ROOM FIRST FLOOR	07cg	AH–2	LV	DIM	37	6	222
25	LIVING ROOM FIRST FLOOR	11cg	AA	LV	DIM	37	3	111
26	PORTE–CACHERE FIRST FLOOR	02cv	AA	LV	DIM	37	2	74
27*	PORTE–COCHERE FIRST FLOOR	10cv	B	CFL		27	2	54
28	WINE BAR FIRST FLOOR	02cw	AA	LV	DIM	37	18	666
29	RETAIL FIRST FLOOR	02t	AA	LV	DIM	37	9	333
30	PRIVATE DINING FIRST FLOOR	03ap	AA	LV	DIM	37	16	592
31	SPARE							
32	SPARE							
33	SPARE							
34	SPARE							
35	SPARE							
36	SPARE							

TOTAL KVA: 11.59
TOTAL AMP: 32.39
26.2"W x 14.15"D x 87.00"H

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD#: GP60–120–4–M100–20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
2	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
3	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
4	CORRIDOR FIRST FLOOR	02c	AA	LV	DIM	37	16	666
5	CORRIDOR FIRST FLOOR	05c	DS–1	INC	DIM	100	12	1200
6	CHECK–IN FIRST FLOOR	01ci	DP–4	INC	DIM	200	2	400
7	CHECK–IN FIRST FLOOR	02ci	RCPT – TABLE/FLOOR LAMPS	INC	DIM		4	500
8	SPARE							
9	SPARE							
10	SPARE							
11	LIBRARY FIRST FLOOR	01cr	DP–6	INC	DIM	320	1	320
12	LIBRARY FIRST FLOOR	03cr	DS–2	INC	DIM	75	12	900
13	LIBRARY FIRST FLOOR	04cr	AA	LV	DIM	37	4	185
14	LIBRARY FIRST FLOOR	05cr	AH	LV	DIM	37	4	148
15	LIBRARY FIRST FLOOR	06cr	RCPT – TABLE/FLOOR LAMPS					500
16	SPARE							
17	LIBRARY FIRST FLOOR	07cr	AA	LV	DIM	37	4	148
18	SPARE							
19	SPARE							
20	LIVING ROOM FIRST FLOOR	01cg	DP–7	INC	DIM	520	2	1040
21	LIVING ROOM FIRST FLOOR	02cg	AA	LV	DIM	37	4	148
22	LIVING ROOM FIRST FLOOR	04cg	DS–3	INC	DIM	75	12	900
23	LIVING ROOM FIRST FLOOR	05cg	SC	CC	DIM	6.5W/LFT	176 FT	1140
24	LIVING ROOM FIRST FLOOR	06cg	AA	LV	DIM	37	10	370
25	LIVING ROOM FIRST FLOOR	08cg	LR	LV	DIM	37	4	148
26	LIVING ROOM FIRST FLOOR	09cg	RCPT – TABLE/FLOOR LAMPS					500
27	SPARE							
28	EXTERIOR FIRST FLOOR	10cg	WC	INC	DIM	60	4	240
29	EXTERIOR FIRST FLOOR	12cg	WB	INC	DIM	60	2	120
30	EXTERIOR FIRST FLOOR	13cg	EB	LV	DIM	20	11	220

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD# GP60–120–4–M100–20		
31	EXTERIOR FIRST FLOOR	14cg	EA	LV	DIM	50	14	700
32	SPARE							
33	ENTRY FIRST FLOOR	01cv	DP–2	INC	DIM	400	1	400
34	ENTRY FIRST FLOOR	03cv	SE	LV	DIM	37 2/3 LFT	54 FT	666
35	ENTRY FIRST FLOOR	04cv	SB	LV	DIM	15W@3" O.C.	8 FT	160
36	ENTRY FIRST FLOOR	05cv	AA	LV	DIM	37	2	74
37	ENTRY FIRST FLOOR	06cv	AC–1	LV	DIM	37	2	74
38	ENTRY FIRST FLOOR	07cv	AA	INC	DIM	37	3	111
39*	EXTERIOR FIRST FLOOR	08cv	A, A1	CFL	DIM	30, 45	6, 1	225
40*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8
41	VALET FIRST FLOOR	09cv	AF	LV	DIM	37	3	111
42*	EXTERIOR FIRST FLOOR		C	LV	DIM	22.2	6	133.3
43	ENTRY FIRST FLOOR	12cv	AA	LV	DIM	37	2	74
44*	EXTERIOR FIRST FLOOR	13cv	D	LV	DIM	45.6	12	546.7
45*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8
46	WINE BAR FIRST FLOOR	01cw	DP–8	INC	DIM	4 x 40	3	480
47	WINE BAR FIRST FLOOR	03cw	AA	LV	DIM	37	12	444
48	WINE BAR FIRST FLOOR	04cw	DS–4	INC	DIM	TBD	8	840
49	WINE BAR FIRST FLOOR	05cw	AH	LV	DIM	37	8	296
50	WINE BAR FIRST FLOOR	06cw	DP–18	INC	DIM	TBD	4	400
51	WINE BAR FIRST FLOOR	07cw	AA	LV	DIM	37	5	185
52	WINE BAR FIRST FLOOR	08cw	SB	LV	DIM	14W/LFT	20 FT	560
53	WINE BAR FIRST FLOOR	09cw	SD	LV	DIM	0.9W@1.2" O.C.	24 FT	171
54	WINE BAR FIRST FLOOR	10cw	SB–1	LV	DIM	05W@3" O.C.	20 FT	460
55	WINE BAR FIRST FLOOR	11cw	AI	LV	DIM	37	5	185
56	WINE BAR FIRST FLOOR	12cw	SB–1	LV	DIM	5W@3" O.C.	16	160
57	SPARE							
58	SPARE							
59	SPARE							
60	SPARE							

TOTAL KVA: 21.29
TOTAL AMP: 59.14
52.4"W x 87H x 14.15"D

Panelboard Sizing Worksheets/New Panels

Panels EDIM211 and DIM211B can be found in the Entry Courtyard electrical redesign section.

Voltage Drop for EDIM211

Estimated Voltage Drop Calculator

Input

Load Voltage	208V 3Ø	
Conductor Size	1	
Conductor Type	Cu ◉	Al ○
Number of Sets	1	
Distance (one way)	180	Feet
Load (A)	27.2	A

Output

	Unity Power Factor		85% PF	
Voltage Drop (V)	1.3	V	1.4	V
Voltage Drop (%)	0.6	%	0.7	%
Voltage at Load	206.7	V	206.6	V
Minimum Conductor Size for 3% VD	6			
Minimum Conductor Size for 5% VD	8			

SIEMENS

Voltage Drop for DIM211B

Estimated Voltage Drop Calculator

Input

Load Voltage	208V 3Ø	
Conductor Size	1	
Conductor Type	Cu ◉	Al ○
Number of Sets	1	
Distance (one way)	180	Feet
Load (A)	50.6	A

Output

	Unity Power Factor		85% PF	
Voltage Drop (V)	2.4	V	2.5	V
Voltage Drop (%)	1.2	%	1.2	%
Voltage at Load	205.6	V	205.5	V
Minimum Conductor Size for 3% VD	4			
Minimum Conductor Size for 5% VD	6			

SIEMENS

Living Room Daylighting Analysis – Honors Additional Study

The majority of the north wall of the Living Room is glazing, with two glass doors leading out to a covered terrace. The daylighting influence within this space is worth analyzing, as the change in light throughout the day and year will have a dynamic impact on the overall impression of the room itself. The Salamander Resort and Spa has gone to great efforts to provide interiors that promote enjoyment and relaxation for their guests. The design team has also put effort in making this resort one of the first LEED certified buildings of its type. Therefore, daylight harvesting, glare prevention, and control integration with electric lighting systems is needed in the Living Room.

The following is an analysis of the daylighting environment and its effects on the space itself, data on how often appropriate light levels are reached from daylight only, photosensor integrating and cost savings using switching and dimming systems, and data on the optimal scenario for daylight integration with the electric lighting system.

Environment Data
Middleburg, VA: 33°N latitude, -77° longitude
Polar North correction: rotate building 9° east (See Figure 30)

Figure 29: Polar North Correction for United States.

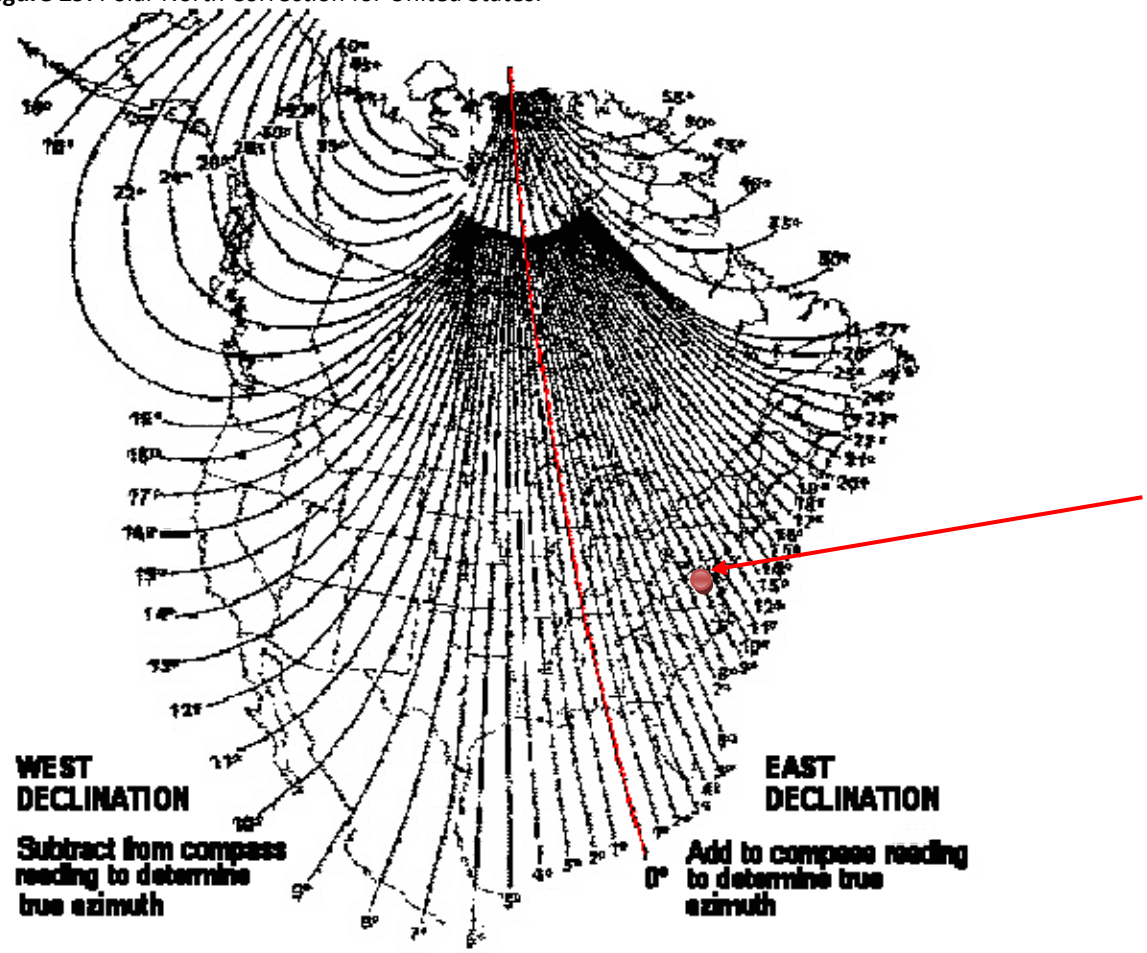


Figure 30: Overall building outline. The Living Room north wall is about 9 degrees west of magnetic north.

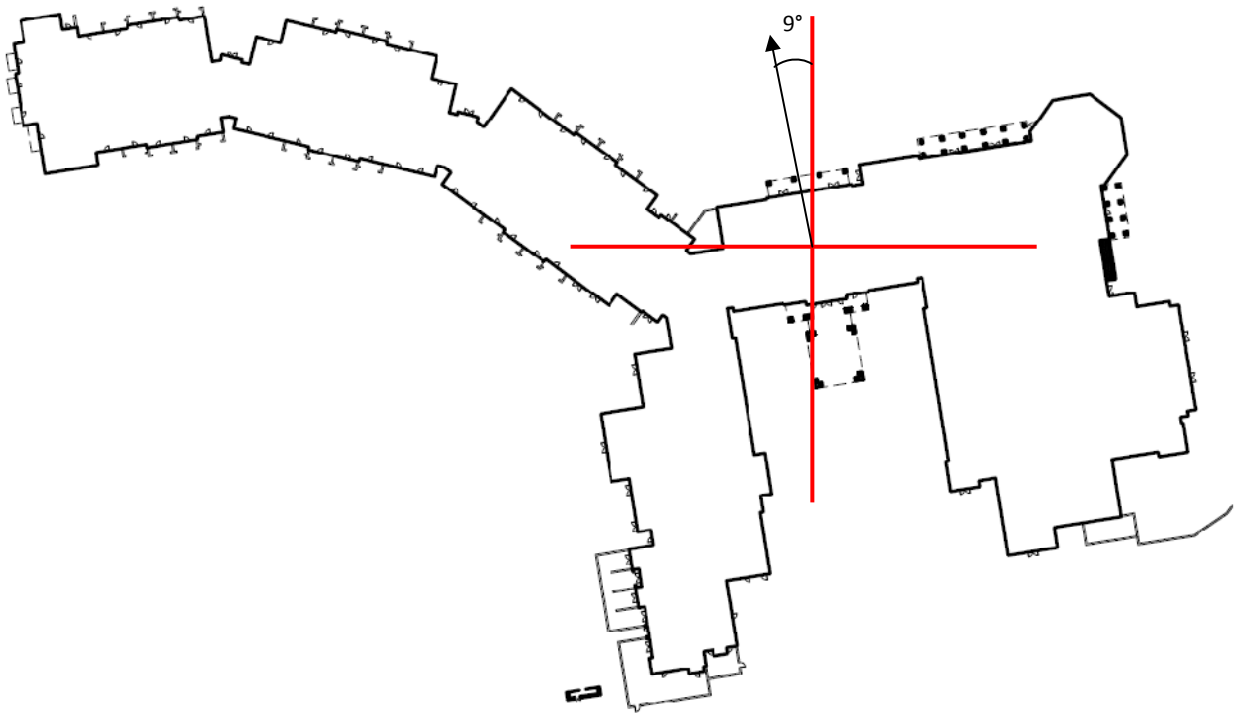


Figure 30 above shows that the building is oriented slightly west of north, with the Living Room north wall facing about 9 degrees west of north. With the polar north correction of 9 degrees, the glazing is facing approximately true polar north (9°NW magnetic north + 9°NE correction to polar north = 0° N).

Using the solar analysis tools in Autodesk Ecotect, the annual sun path and shadowing from building geometry was determined. Figures 31 to 33 show such graphics. Due to the building's orientation to true north and the outdoor terrace overhang, there are only a few hours of the year in which the Living Room will receive direct sunlight. Figure ___ shows the shadow sweep across the building throughout the day for the equinox and solstice conditions. Solar penetration is shown in Figures ___ to ___, where penetration is minimal and only takes place for a few hours of the entire year. Therefore, no change is recommended to the overhang outside although slightly extending the structure in all directions would most likely block sunlight penetration at all times of the year.

Figure 31: Annual sun path diagram for Middleburg, VA in plan view of Salamander Resort and Spa.

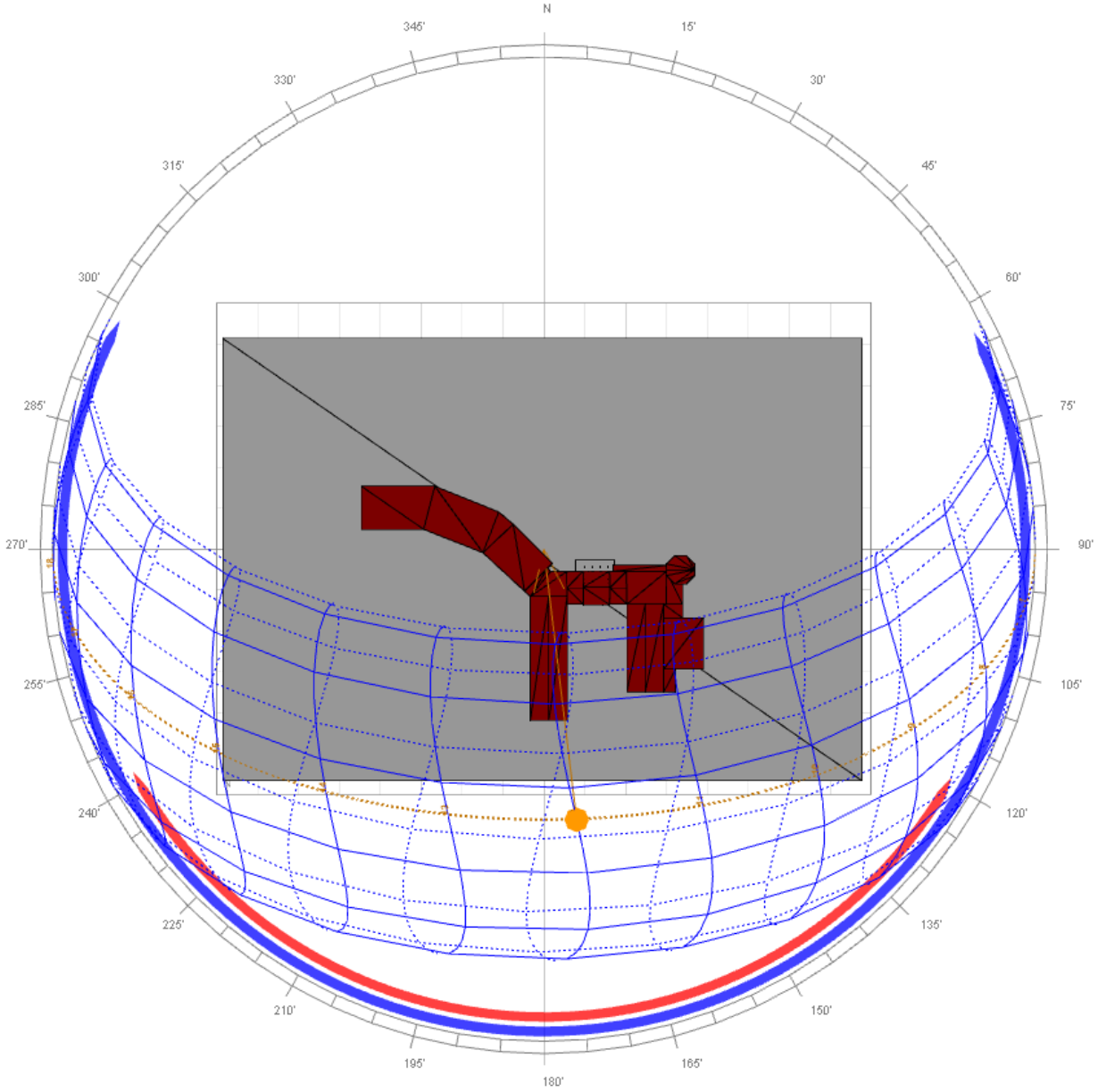


Figure 32: Annual sun path diagram for Middleburg, VA in east view of Salamander Resort and Spa.

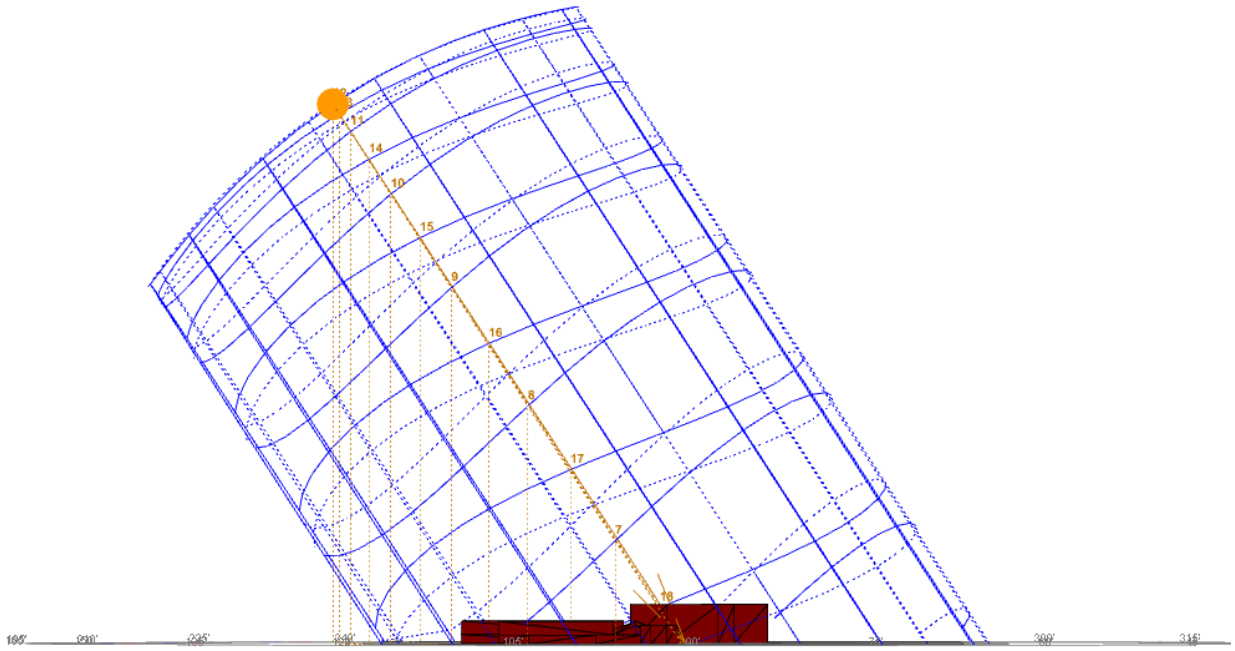


Figure 33: Annual sun path diagram for Middleburg, VA in east view of Salamander Resort and Spa.

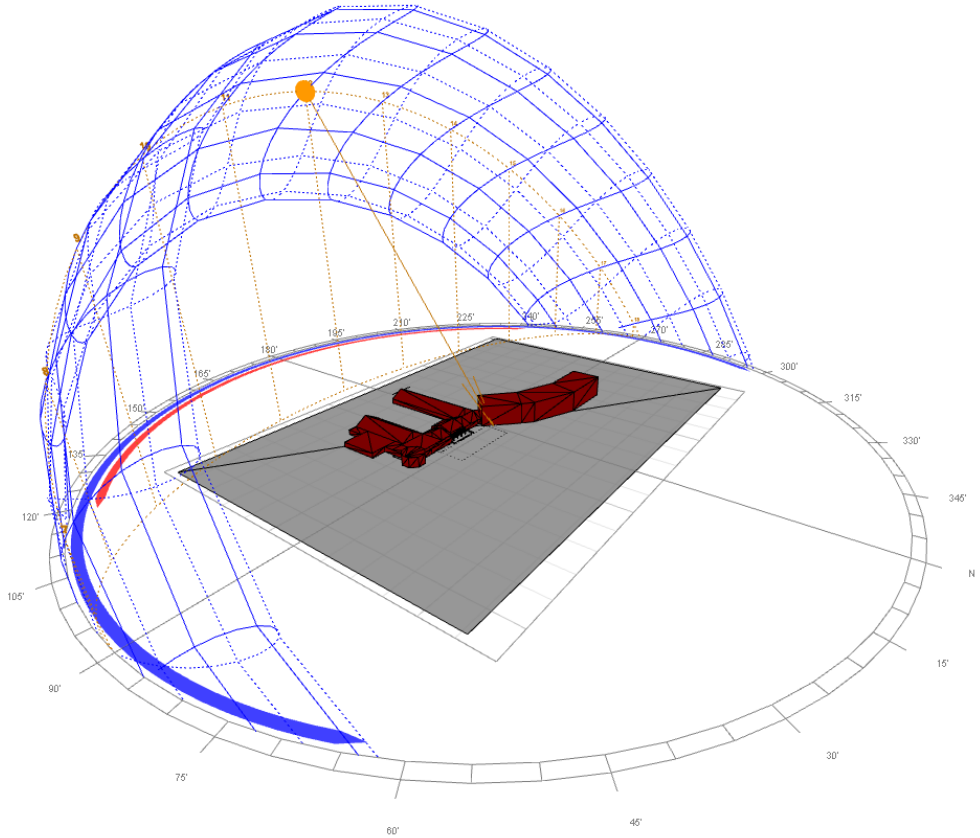
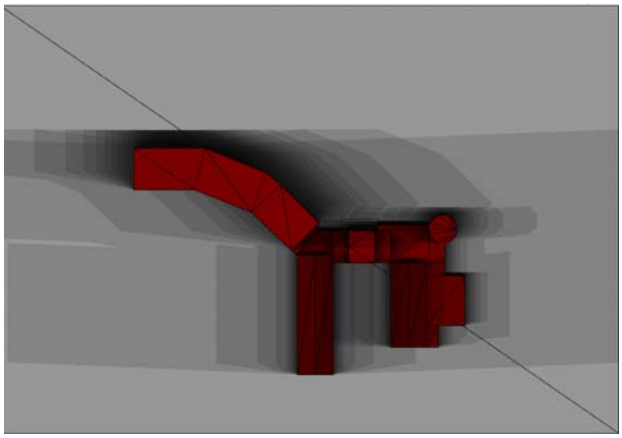
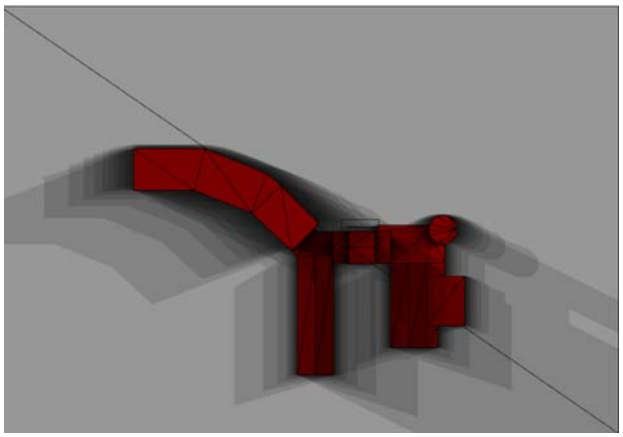


Figure 34: Daily shadow projections for equinox and solstice conditions.

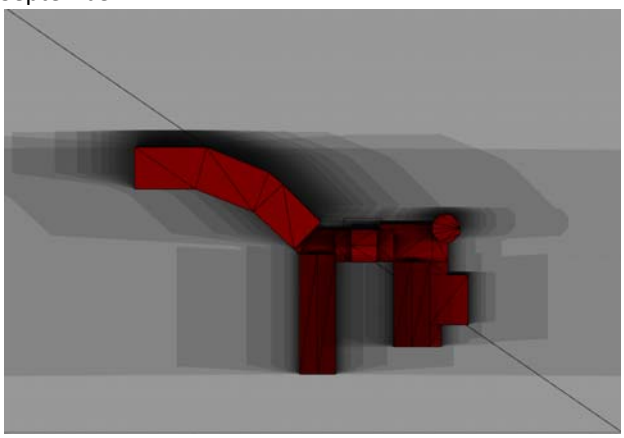
March 21



June 21



September 21



December 21

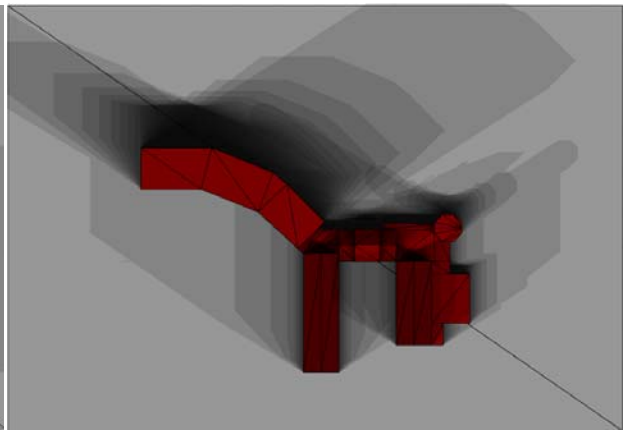


Figure 35: Sunlight penetration conditions for June 21st – 6:00 AM; 7:00 AM; 6:00 PM.

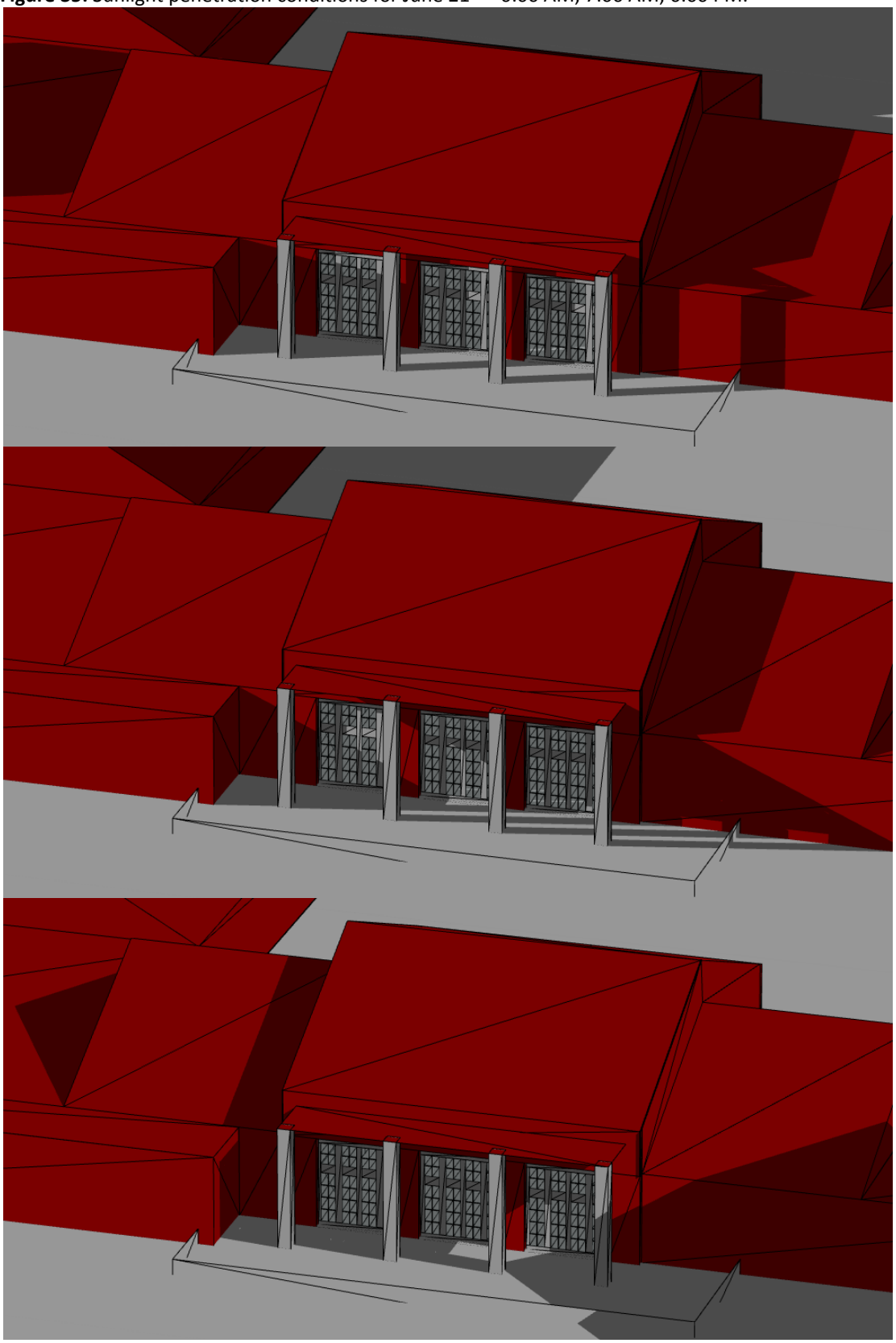


Figure 36: Daylight penetration at 6:00 PM on June 21st (clear sky condition).

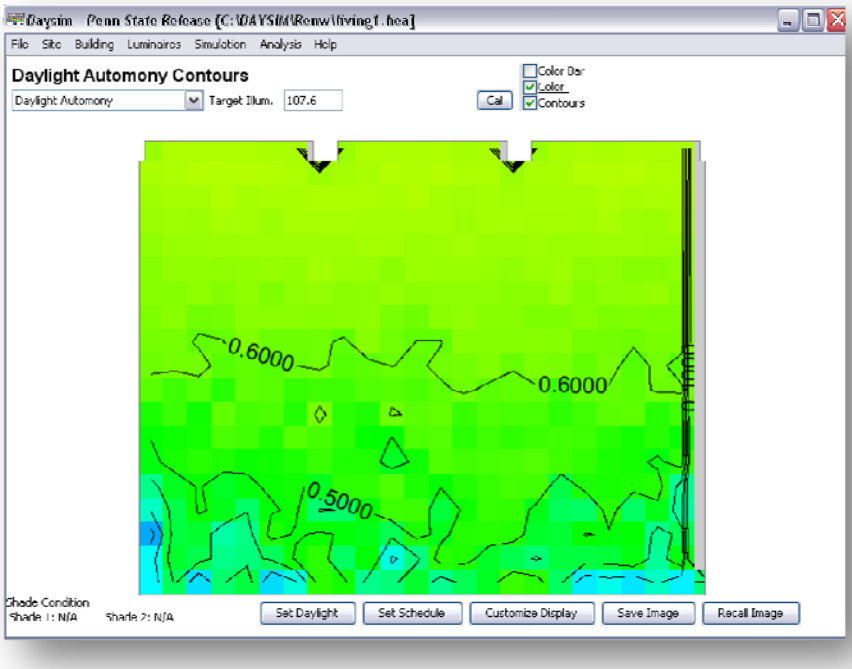
Daylight Autonomy and Continuous Daylight Autonomy

To justify whether daylighting control integration is a valid solution to this room, metrics like Daylight Autonomy (DA) and Continuous Daylight Autonomy (DAcon) had to be determined. The IESNA Lighting Handbook recommends 10 fc. of horizontal illuminance for simple visual tasks in the Living Room; therefore, the number of operable hours over the entire year in which daylight alone can reach this target illuminance is useful information. DA and DAcon for the Living room were calculated using the Penn State version of Daysim.

Figure 37 shows that at a target level of 10 fc., the majority of the room receives this amount of daylight for 50-60% of all the operable hours. Since the Salamander Resort and Spa is open 24 hours, these numbers would be higher if the occupancy schedule was set to daylight hours. However, to calculate energy savings, the 24 hour occupancy schedule is realistic.

Figure 38 shows the DA and DAcon for a practical daytime occupancy schedule of 8:00 AM to 5:00 PM. Pure daylight can provide enough illuminance in the room for the majority of the days over the year. It is now very clear that daylight has an important role in the in environment of the Living room, and in a pleasant, diffuse way. Daylight can reach recommended illuminance levels for most days; therefore, a daylighting control strategy should be designed to save energy on electric lighting. The next step of this analysis was to determine which daylight control strategy would save the most energy.

Figure 37: DA and DAcon for the Living Room – Target level of 10 fc (24 hour occupancy schedule).



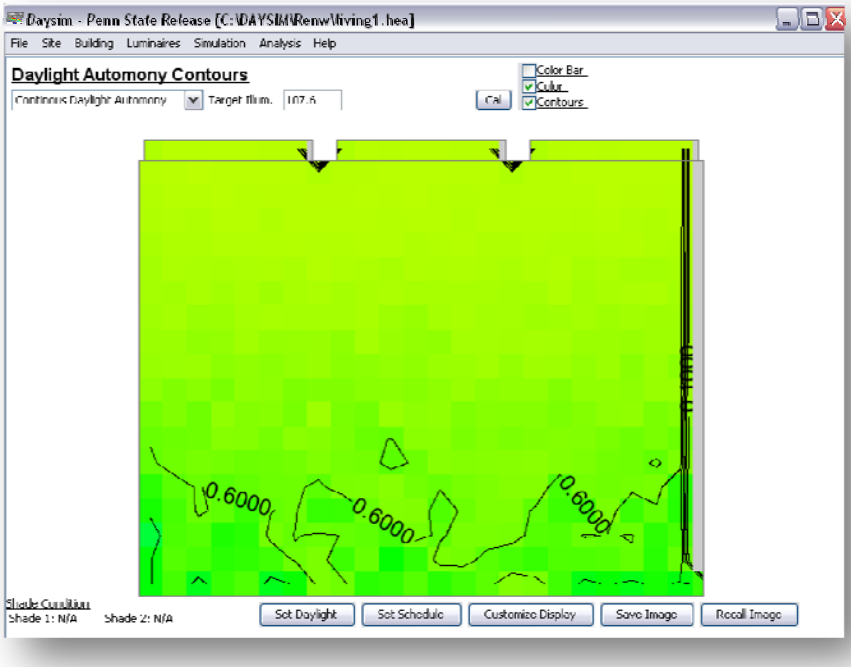
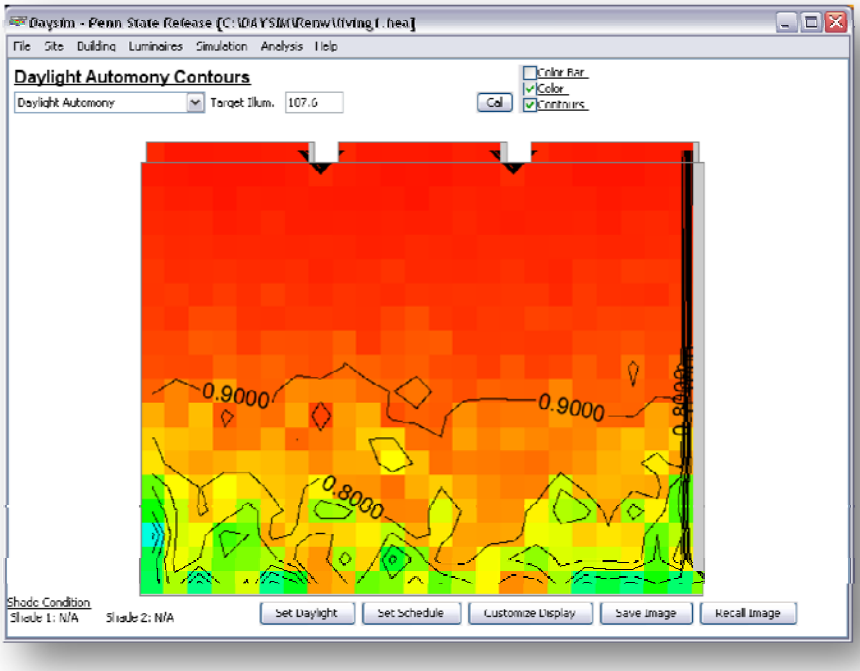
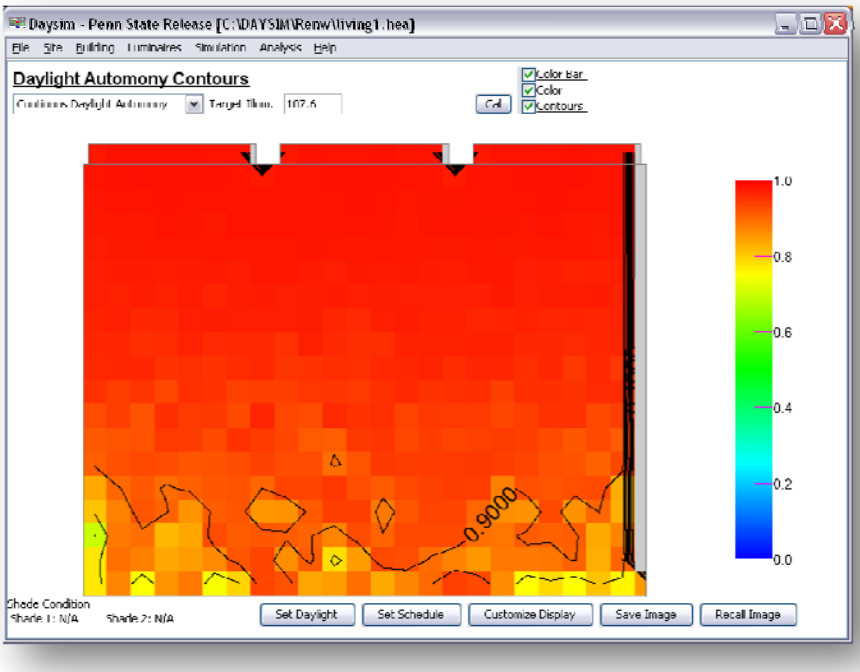


Figure 38: DA and DAcon for the Living Room – Target level of 10 fc (daytime occupancy schedule).

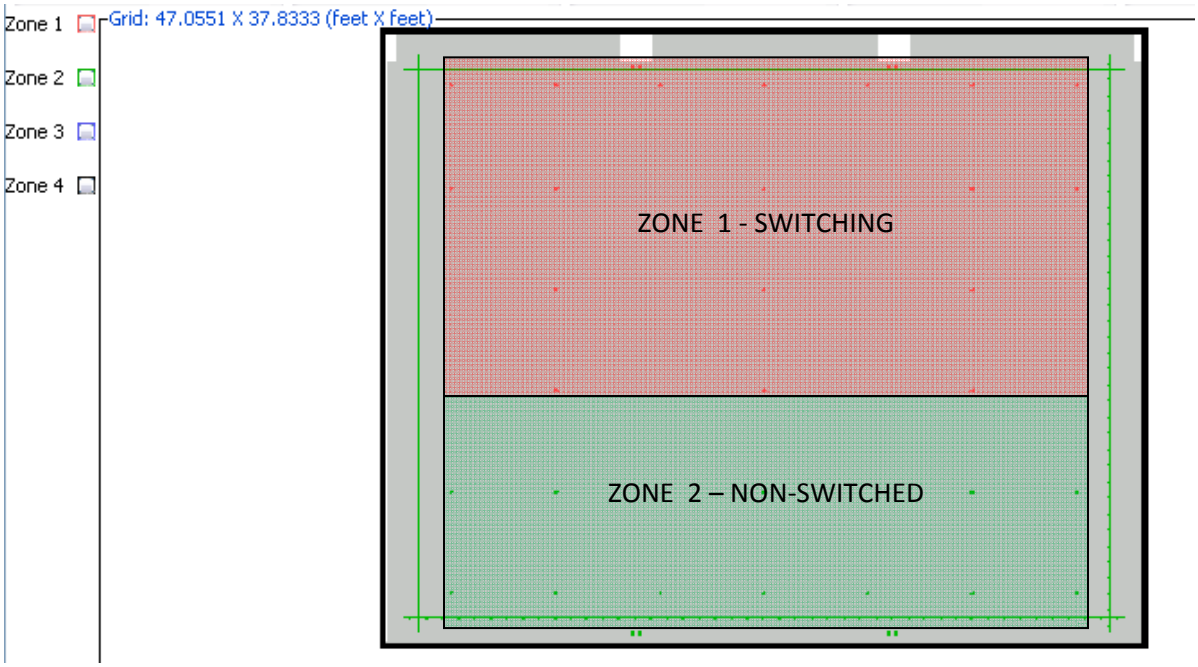




Daylighting Control Strategies

Using a closed loop constant setpoint photosensor located at the center of the room, switching strategies were studied in the Living Room. Figure 39 shows that the sconces and downlights in the northern portion of the room are switched off when the photosensor reads a specific signal/illuminance. The back two rows of downlights as well as the cove lighting are not switched by the photosensor.

Figure 39: Daysim lighting layout and control zones.



The following scenarios (1 – 3) involve switching configurations in which the photosensor is calibrated to switch Zone 1 off and back on at different illuminance levels due to daylight. Although the photosensor is located in the center of the ceiling, it is calibrated from the critical point. This point, shown in Figure 40 is selected based on the area in the room where daylight contribution and non-switched electric light contribution are at a minimum. The objective of this study was to determine which of these switching scenarios resulted in the most energy saved. Figures 41 to 43 detail the OFF/ON settings of the photosensor; the target illuminance of the daylight and electric light combination; the illuminance and signal data for the critical point; the total energy savings for the control zone and total lighting system; and finally a breakdown of how many hours Zone 1 would be switched per year, month, and day.

Scenario #3 results in the most savings because it switches the luminaires off at a lower illuminance level than Scenario #1 and turns the luminaires back on at 25 fc. compared to the 30 fc. target of Scenarios 1 and 2. Therefore, the deadband is longer, resulting in more hours switched off, and ultimately more savings.

Scenarios #4 and #5 shown in Figures 44 and 45 involve dimming with the use of a closed loop proportional photosensor. All luminaires within the Living Room are already capable of dimming by use of Lutron dimming panels and GRAFIK Eye master control, so extra cost due to a dimming control strategy is not an issue. The Zone configuration in Figure 39 was kept constant other than Zone 1 being changed to a dimmed zone instead switched. Due to the amount of daylight exposure to the room and the electric light contribution of the non-dimmed row, the target illuminance was increased to 40 fc. for Scenario #4 and 30fc for Scenario #5.

Figure 40: Critical point selection. Target illuminance = 30 fc.

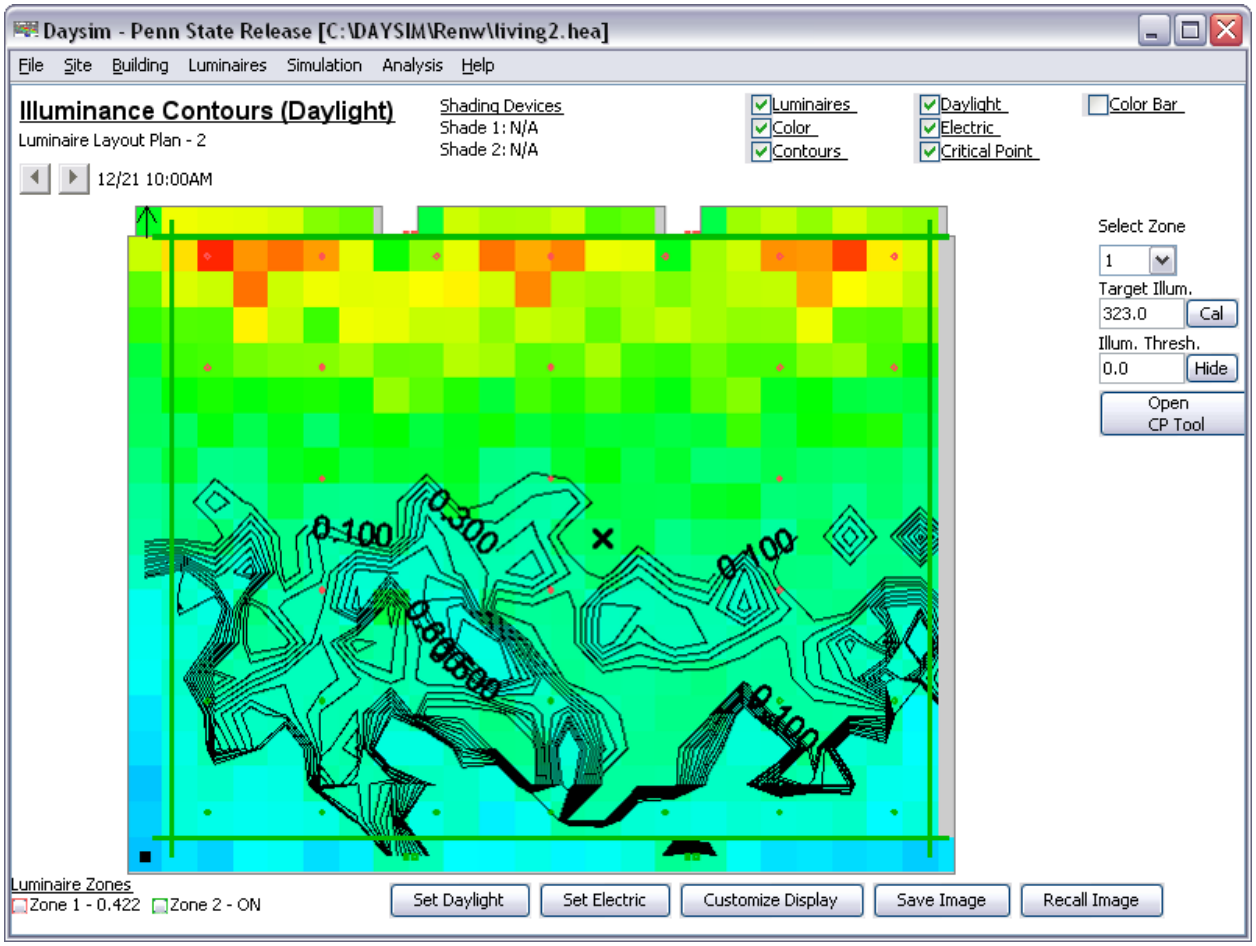


Figure 41: Switching scenario #1.

Switching Scenario #1: 219.67 kWh saved

CRITICAL POINT				
E_{DAYLT}	S_{DAYLT}	$S_{D+NONSW}$	S_{D+ELEC}	S_{D+SW}
210	187	219	241.1	22.1

INPUT
OUTPUT

OFF SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
645.6	574.9

ON SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
376.6	335.4

TARGET ILLUMINANCE
E_{TARGET} (LUX)
323

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	274.04	247.52	274.04	265.2	274.04	265.2	274.04	274.04	265.2	274.04	265.2	274.04	3226.6
Optimal	233.37	206.85	190.5	150.72	149.83	125.96	124.2	144.97	174.14	190.06	235.58	243.1	2169.33
Algorithm	274.04	247.52	274.04	238.68	247.07	205.97	204.64	238.23	263.43	274.04	265.2	274.04	3006.92
Savings	0.0	0.0	0.0	26.52	26.96	59.22	69.39	35.8	1.76	0.0	0.0	0.0	219.67

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	870.6	786.35	870.6	842.52	870.6	842.52	870.6	870.6	842.52	870.6	842.52	870.6	10250.66
Optimal	829.94	745.68	787.06	728.04	746.4	703.29	720.76	741.54	751.46	786.62	812.9	839.66	9193.39
Algorithm	870.6	786.35	870.6	816.0	843.64	783.29	801.21	834.8	840.75	870.6	842.52	870.6	10030.98
Savings	0.0	0.0	0.0	26.52	26.96	59.22	69.39	35.8	1.76	0.0	0.0	0.0	219.67

Statistics

24 HRS/DAY
8760 HRS/YR
3226.6 KWH OF CONTROLLED ZONE
0.368333 KW IN CONTROLLED ZONE
219.67 KWH SAVED
596.3891 HRS SWITCHED OFF/YR

	HOURS SWITCHED											
	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
kWh SAVE	0	0	0	26.5	27.0	59.2	69.4	35.8	1.8	0	0	0
HRS OFF	0	0	0	72.0	73.2	160.8	188.4	97.2	4.8	0	0	0
PER DAY	0	0	0	2.4	2.4	5.4	6.1	3.1	0.2	0	0	0

Figure 42: Switching scenario #2.

Switching Scenario #2: 388.07 kWh saved

CRITICAL POINT				
E_{DAYLT}	S_{DAYLT}	$S_{D+NONSW}$	S_{D+ELEC}	S_{D+SW}
210	187	219	241.1	22.1

INPUT
OUTPUT

OFF SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
538	479.1

ON SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
376.6	335.4

TARGET ILLUMINANCE
EDAYLT (LUX)
323

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	274.04	247.52	274.04	265.2	274.04	265.2	274.04	274.04	265.2	274.04	265.2	274.04	3226.6
Optimal	233.37	206.85	190.5	150.72	149.83	125.96	124.2	144.97	174.14	190.06	235.58	243.1	2169.33
Algorithm	274.04	247.52	264.75	206.41	225.42	193.15	177.68	201.55	234.7	274.04	265.2	274.04	2838.52
Savings	0.0	0.0	9.28	58.78	48.62	72.04	96.35	72.48	30.49	0.0	0.0	0.0	388.07

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	870.6	786.35	870.6	842.52	870.6	842.52	870.6	870.6	842.52	870.6	842.52	870.6	10250.66
Optimal	829.94	745.68	787.06	728.04	746.4	703.29	720.76	741.54	751.46	786.62	812.9	839.66	9193.39
Algorithm	870.6	786.35	861.32	783.73	821.98	770.47	774.24	798.11	812.02	870.6	842.52	870.6	9862.58
Savings	0.0	0.0	9.28	58.78	48.62	72.04	96.35	72.48	30.49	0.0	0.0	0.0	388.07

Statistics

24 HRS/DAY
8760 HRS/YR
3226.6 KWH OF CONTROLLED ZONE
0.3683333 KW IN CONTROLLED ZONE
388.07 KWH SAVED
1053.5837 HRS SWITCHED OFF/YR

	HOURS SWITCHED											
	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
SAVED	0	0	9.3	58.8	48.6	72.0	96.4	72.5	30.5	0	0	0
HRS OFF	0	0	25.2	159.6	132.0	195.6	261.6	196.8	82.8	0	0	0
PER DAY	0	0	0.8	5.3	4.3	6.5	8.4	6.3	2.8	0	0	0

Figure 43: Switching scenario #3.

Switching Scenario #3: 465.86 kWh saved

CRITICAL POINT				
E_{DAYLT}	S_{DAYLT}	$S_{D+NONSW}$	S_{D+ELEC}	S_{D+SW}
210	187	219	241.1	22.1

INPUT
OUTPUT

CONTROL SETTING 5

OFF SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
538	479.1

ON SETTING	
E_{DAYLT} (LUX)	S_{DAYLT}
269	239.5

TARGET ILLUMINANCE
EDAYLT (LUX)
269

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	274.04	247.52	274.04	265.2	274.04	265.2	274.04	274.04	265.2	274.04	265.2	274.04	3226.6
Optimal	209.95	173.7	162.65	131.71	128.17	110.49	106.52	129.5	150.27	167.07	197.57	211.71	1879.38
Algorithm	274.04	247.52	261.22	195.36	212.16	180.77	163.54	182.54	230.28	274.04	265.2	274.04	2760.73
Savings	0.0	0.0	12.81	69.83	61.88	84.42	110.5	91.49	34.91	0.0	0.0	0.0	465.86

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	870.6	786.35	870.6	842.52	870.6	842.52	870.6	870.6	842.52	870.6	842.52	870.6	10250.66
Optimal	806.51	712.53	759.22	709.03	724.74	687.82	703.08	726.07	727.6	763.64	774.89	808.28	8903.44
Algorithm	870.6	786.35	857.78	772.68	808.72	758.09	760.1	779.11	807.6	870.6	842.52	870.6	9784.79
Savings	0.0	0.0	12.81	69.83	61.88	84.42	110.5	91.49	34.91	0.0	0.0	0.0	465.86

Statistics

24 HRS/DAY
8760 HRS/YR
3226.6 KWH OF CONTROLLED ZONE
0.3683333 KW IN CONTROLLED ZONE
465.86 KWH SAVED
1264.8 HRS SWITCHED OFF/YR

	HOURS SWITCHED											
	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
SAVED	0	0	12.8	69.8	61.9	84.4	110.5	91.5	34.9	0	0	0
HRS OFF	0	0	34.8	189.6	168.0	229.2	300.0	248.4	94.8	0	0	0
PER DAY	0	0	1.1	6.3	5.4	7.6	9.7	8.0	3.2	0	0	0

Figure 44: Dimming scenario #1 (Scenario #4).

Dimming Scenario #1: 839.25 kWh saved

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	274.04	247.52	274.04	265.2	274.04	265.2	274.04	274.04	265.2	274.04	265.2	274.04	3226.6
Optimal	264.21	229.78	230.66	178.34	177.68	146.69	140.78	166.16	200.64	221.09	257.72	269.48	2483.28
Algorithm	245.86	220.9	221.99	166.49	180.33	151.63	141.58	164.04	190.87	202.28	240.77	260.52	2387.34
Savings	28.17	26.61	52.04	98.7	93.7	113.56	132.45	109.99	74.32	71.75	24.42	13.51	839.25

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	870.6	786.35	870.6	842.52	870.6	842.52	870.6	870.6	842.52	870.6	842.52	870.6	10250.66
Optimal	860.77	768.62	827.22	755.66	774.24	724.01	737.35	762.72	777.96	817.65	835.04	866.04	9507.34
Algorithm	842.42	759.73	818.56	743.81	776.89	728.95	738.14	760.61	768.19	798.85	818.09	857.09	9411.4
Savings	28.17	26.61	52.04	98.7	93.7	113.56	132.45	109.99	74.32	71.75	24.42	13.51	839.25

Statistics

24	HRS/DAY
8760	HRS/YR
3226.6	KWH OF CONTROLLED ZONE
0.368333	KW IN CONTROLLED ZONE
839.25	KWH SAVED
2278.507	HRS DIMMED OFF/YR

	HOURS DIMMED											
	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
SAVED	28.2	26.6	52.0	98.7	93.7	113.6	132.5	110.0	74.3	71.8	24.4	13.5
HRS OFF	76.5	72.2	141.3	268.0	254.4	308.3	359.6	298.6	201.8	194.8	66.3	36.7
PER DAY	2.5	2.6	4.6	8.9	8.2	10.3	11.6	9.6	6.7	6.3	2.2	1.2

Figure 45: Dimming scenario #2 (Scenario #5).

Dimming Scenario #2: 1174.82 kWh saved

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	274.04	247.52	274.04	265.2	274.04	265.2	274.04	274.04	265.2	274.04	265.2	274.04	3226.6
Optimal	220.2	188.8	175.58	141.02	139.53	118.91	114.9	136.51	160.5	174.79	212.37	221.35	2004.52
Algorithm	221.23	193.16	181.5	138.66	147.66	125.99	121.89	141.72	165.03	178.16	213.11	223.61	2051.77
Savings	52.8	54.35	92.53	126.53	126.37	139.2	152.14	132.31	100.16	95.87	52.08	50.42	1174.82

Energy Tables (KWh)

Controlled Zone | Grand Total

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Base	870.6	786.35	870.6	842.52	870.6	842.52	870.6	870.6	842.52	870.6	842.52	870.6	10250.66
Optimal	816.76	727.63	772.14	718.34	736.09	696.23	711.46	733.07	737.82	771.36	789.69	817.92	9028.58
Algorithm	817.79	731.99	778.06	715.98	744.22	703.31	718.45	738.29	742.35	774.73	790.43	820.18	9075.83
Savings	52.8	54.35	92.53	126.53	126.37	139.2	152.14	132.31	100.16	95.87	52.08	50.42	1174.82

Statistics

		HOURS DIMMED											
		JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
24 HRS/DAY	SAVED KWH	52.8	54.4	92.5	126.5	126.4	139.2	152.1	132.3	100.2	95.9	52.1	50.4
8760 HRS/YR	HRS DIM	143.3	147.6	251.2	343.5	343.1	377.9	413.0	359.2	271.9	260.3	141.4	136.9
3226.6 KWH OF CONTROLLED ZONE	PER DAY	4.6	5.3	8.1	11.5	11.1	12.6	13.3	11.6	9.1	8.4	4.7	4.4
0.368333 KW IN CONTROLLED ZONE													
1174.82 KWH SAVED													
3189.557 HRS DIMMED /YR													

Conclusions

The following conclusions can be made regarding daylighting in the Living Room and photosensor control integration with the electric lighting system:

- Daylight penetration is almost non-existant except for a few hours in June, with two of those hours being early in the morning before most guests will be occupying the space. Therefore, there is no need for automatic shading devices or modifications to the terrace overhang.
- Although glare is not a problem in this space, daylight will have a major role in the appearance of the room throughout the day. For the daytime hours of the day throughout the year, the Living Room receives 10 fc. or more over 80% of the time. A electric lighting control strategy is desirable to save energy by switching or dimming luminaires when their light is not needed.
- Out of several switching configurations studied, the scenarios that saved the most energy had an OFF setting of around 50-60 footcandles and an ON setting of 20-30 footcandles. The dimming configurations saved slightly more energy. Judging by the daylight autonomy figures, the luminaires are likely dimmed to minimum output for most of the day, which may lead to the decision to save money on equipment and switch luminaires. However, the Salamander Resort and Spa already has Lutron dimming panels powering/controlling all specialty lighting. Therefore, the existing dimming system combined with photosensor dimming control of the Living Room will save about 1200 kWh per year.

The Wine Bar

Description:
The wine bar serves an extensive menu of small plates throughout the day and features a list of world-class wines, with an emphasis on those from Virginia's local wineries. This special space features a mixture of fine finishes, reclaimed materials, a painted mural, and an overall relaxing experience. The floor is made of reclaimed bricks while the bar surface is reclaimed wood from a barn with imbedded artifacts. The ceiling consists of stained white oak millwork running in both directions and painted coffers (about 13'x13'). The room has a feel to it of luxury and relaxation mixed with an old-time wine cellar.

Area: 940 Sq. ft.

Dimension: 27'-0" x 36'-0" x 12'-0"

Space Category:
Special Purpose Space

Materials:

MATERIAL/FINISH	OBJECT	COLOR	REFLECTANCE
Quarry Tile	Back bar floor	Golden Flash	0.4
Reclaimed Brick Flooring	Floor	Brick Red	0.1
Flat Latex Paint	Ceiling	Papaya	0.8
Clear Tempered Glass	Cabinet glass	(Clear)	0.86
Eggshell Latex Paint	Walls	NA (Custom Mural by Artist)	0.7
White oak	Doors, baseboards, door trim, cabinets		0.35
Reclaimed barn wood	Bar	NA	0.35

Wine Bar Plans

Figure 46: Wine Bar finish plan

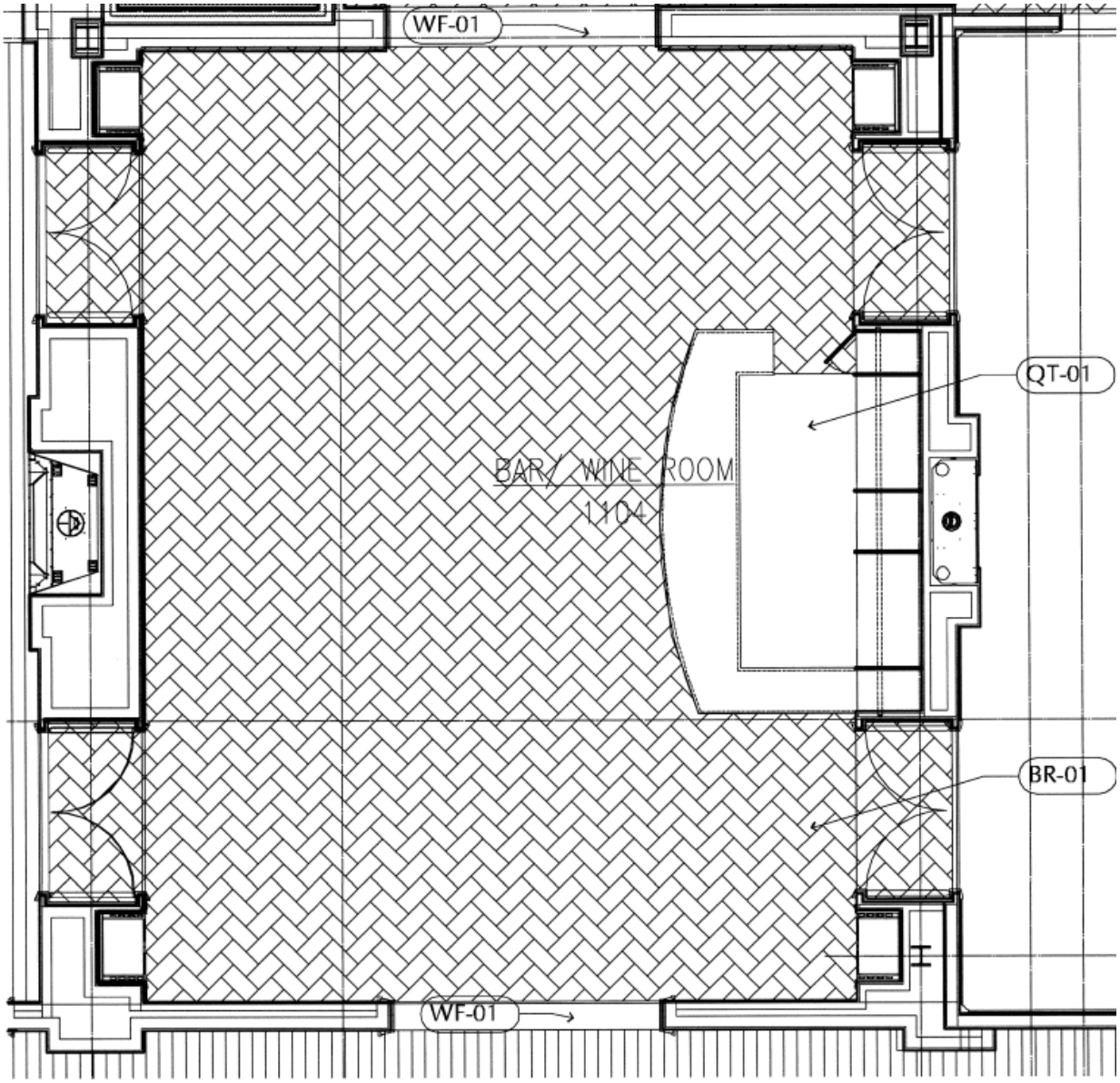


Figure 47: Wine Bar furnishing Plan

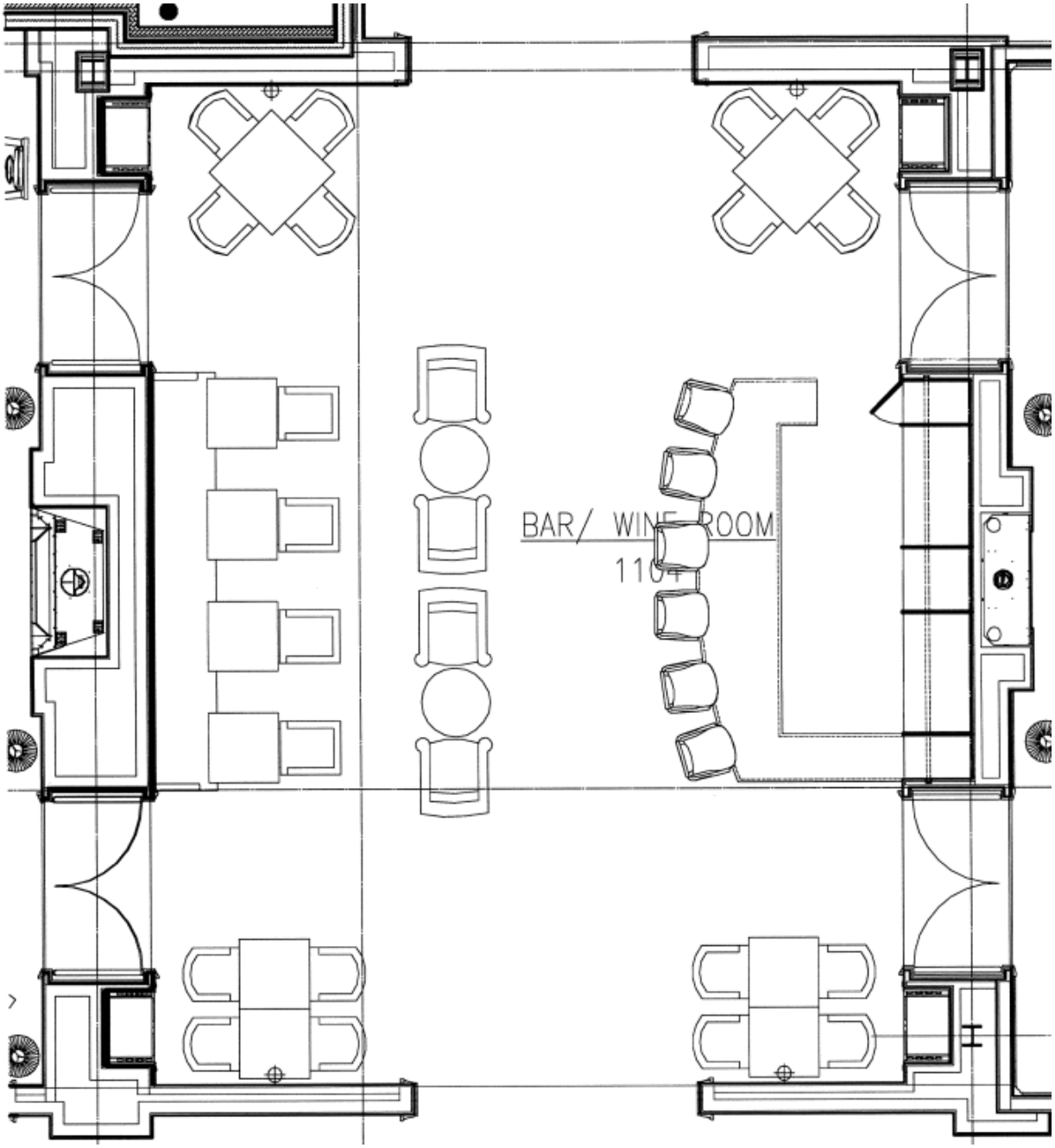
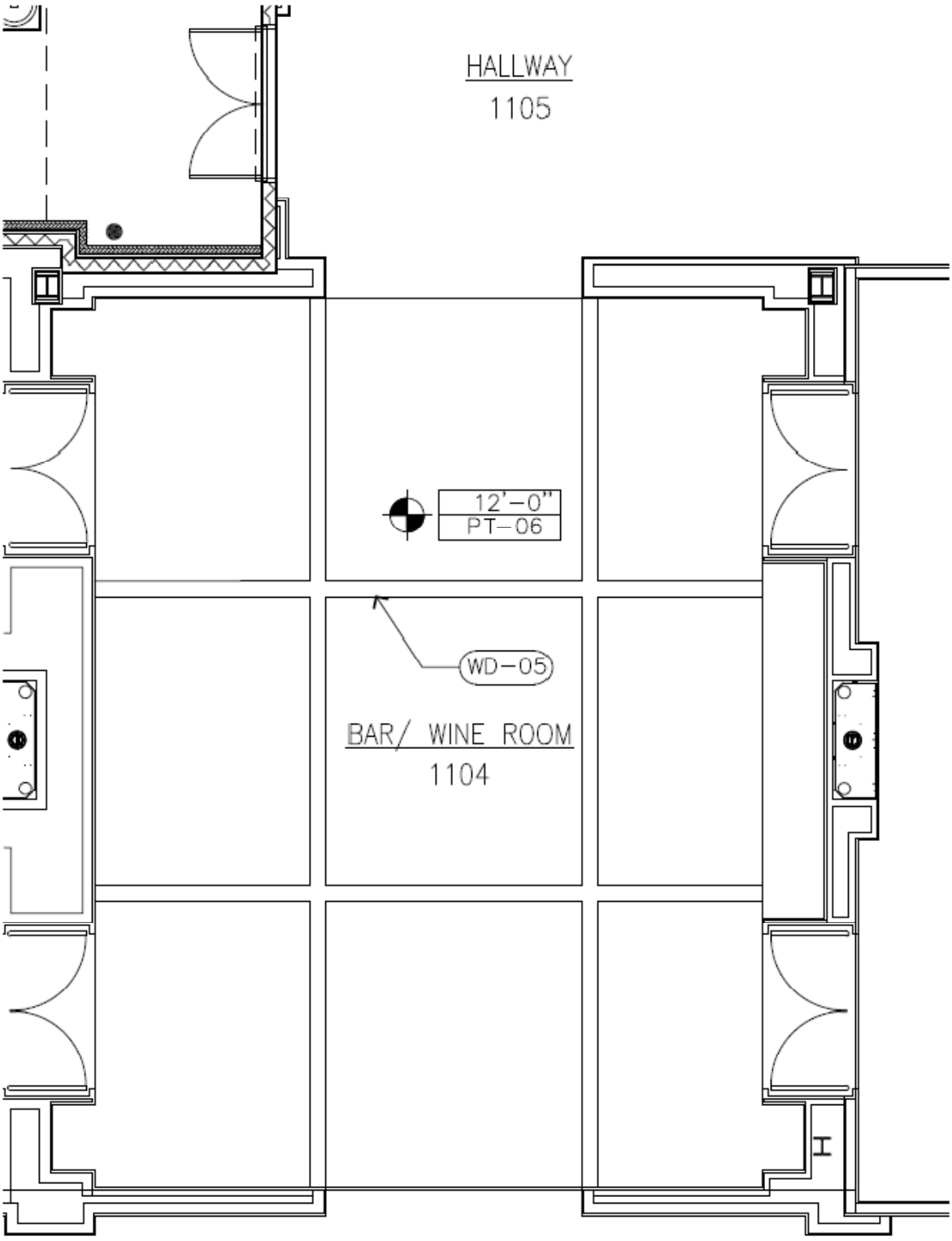


Figure 48: Wine Bar ceiling plan



Wine Bar Elevations –

Figure 49: Wine Bar west elevation.

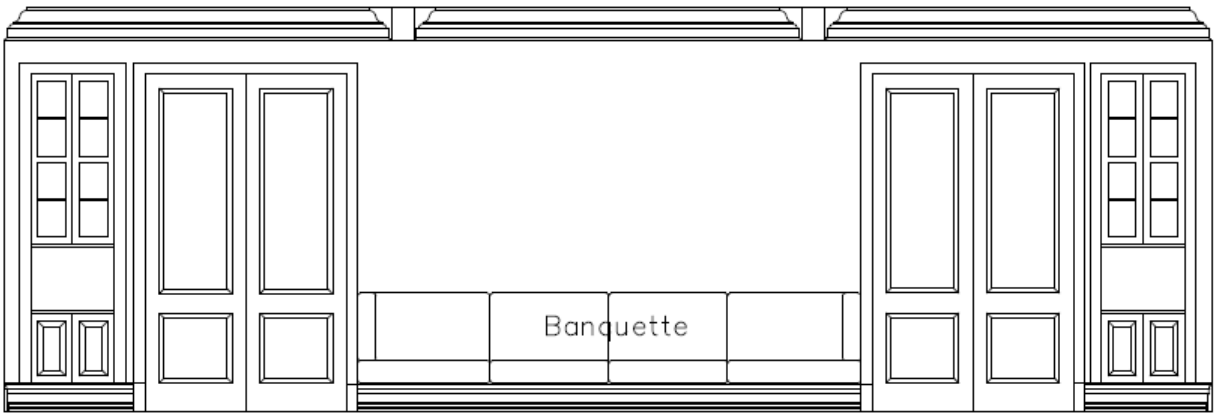


Figure 50: Wine Bar north/south elevation.

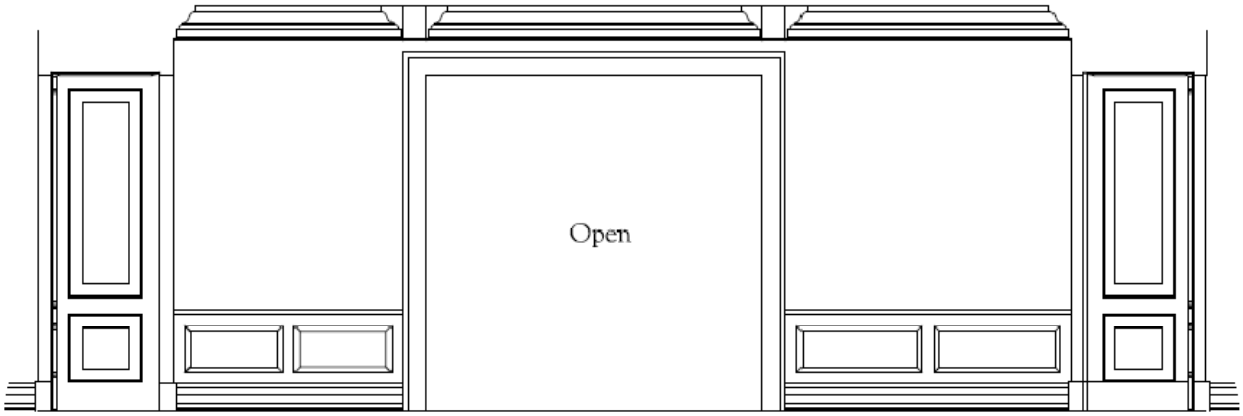


Figure 51: Wine Bar east elevation – wood paneling down.

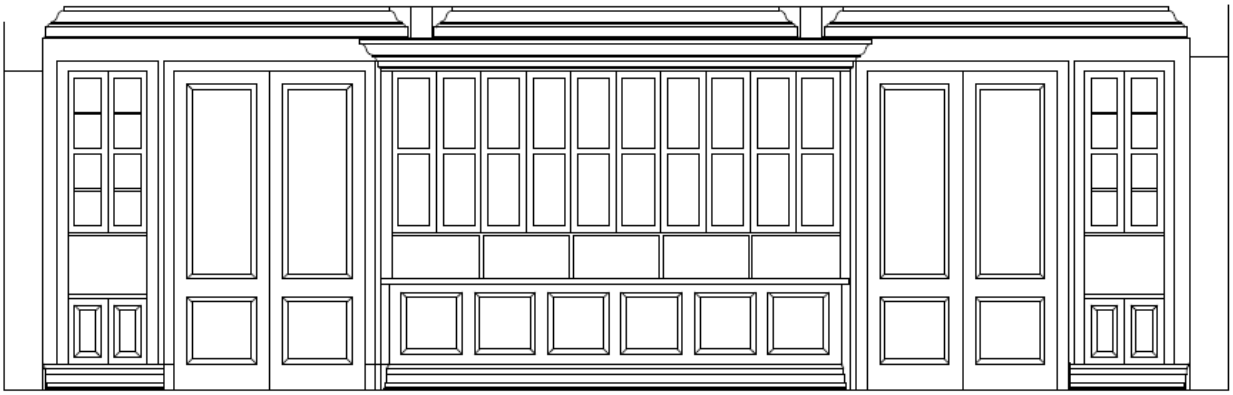
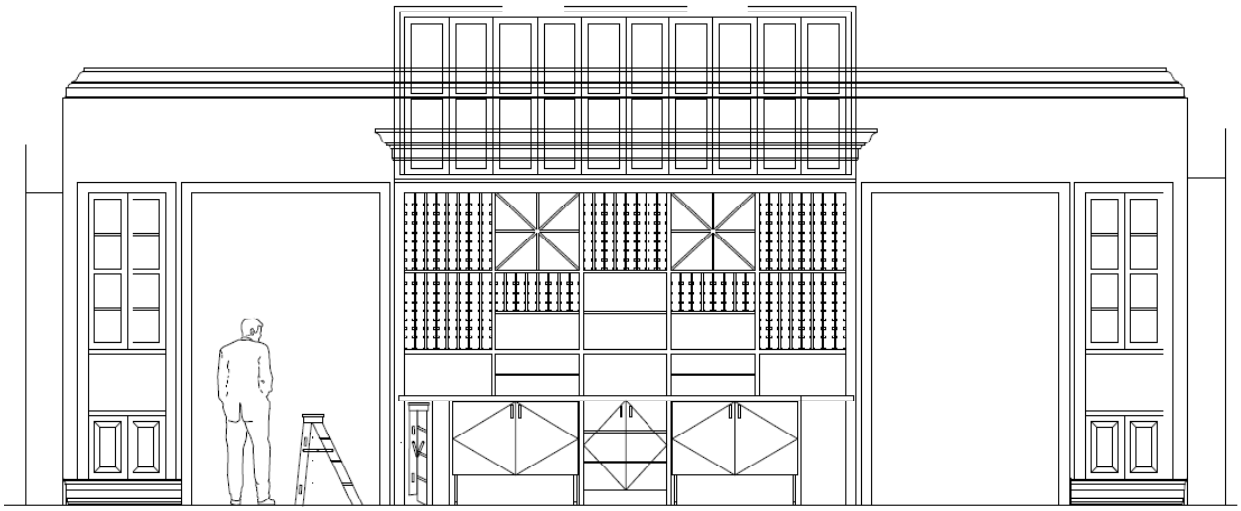


Figure 52: Wine Bar east elevation – wood paneling recessed in ceiling.



Lighting Design Criteria and Consideration

(*IESNA Handbook*: Interior-Food Service Facilities-Dining)

- **Psychological Impressions**
  - The purpose of the Wine Bar is a special space for guest to come eat great snack food, have some world-class wine and relax. Therefore, the impression the lighting design should strive for is relaxation.

- **Appearance of Space and Luminaires** (Important)
  - This room is a special feature within the resort. Guests will expect the lighting to reflect the high-class food and wine being served within the space. With fine wood finishes and furniture, a painted mural, bottles of wine on display, and the bar feature with reclaimed barn wood and artifacts, the appearance of Wine Bar is very important in this case. The luminaires must be decorative in nature with an old-country/wine cellar look to fit within the interior design.

- **Color Appearance (and Color Contrast)** (Very Important)
  - The light sources in this space should be warmer in CCT to promote relaxation. The warmer light also fits better with the wood finishes and red brick flooring.
  - A use of lighting with high CRI is key to the task of eating food. Guests will want their food to look the way the chef meant it to look.

- **Direct & Reflected Glare** (Important)
  - In order to maintain relaxation in the Living Room space, direct glare from light sources and luminaires must be prevented. Menus listing appetizers and wine choices will require that reflected disability glare is also prevented.

- **Points of Interest** (Important)
  - There are several points of interest in the Wine Bar space. Lighting must accent the mural painted on the walls as well as the bar itself. The bar has been detailed with elegant wood trim work, and the casework holding the wine combines this high-end wood finish with clear tempered glass. Lighting will guide guests' vision to these points of interest.

- **Horizontal Illuminance** (Somewhat Important)
  - General lighting within the Wine Bar requires **10 fc** for simple visual tasks.

- **Vertical Illuminance** (Somewhat Important)
  - Vertical surfaces require **3 fc.**

- **Power Density Allowance:** ASHRAE 90.1 2007
  - Dining area-Bar Lounge/Leisure Dining: 1.4 W/sq. ft.
  - Additional interior lighting power density allowance for spaces in which lighting is specified to be installed in addition to the general lighting of the purpose of decorative appearance:
    - Additional lighting power shall not exceed 1.0 W/sq.ft.
  - Total allowable = **2.4 W/SQ. FT.**

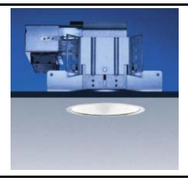
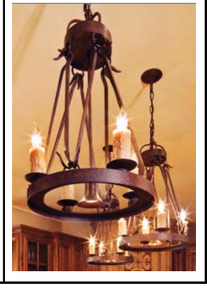
Lighting Plans – See Appendix A

Mounting Details – See Appendix B

Luminaires

Figure 53: Luminaire Schedule. Luminaires, lamps, and ballast specifications can be found in Appendix C.

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
J		Zumtobel	S5D4312 D1 4311R MC	Open recessed downlight. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Spun aluminum reflector with white matte finish.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
J1		Zumtobel	S5D4312 D1 4311W MC	Open recessed downlight/wallwash. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Wallwasher reflector - hydroformed aluminum kicker plate is mounted to the main reflector for wall illumination. Reflector is fully rotatable from below.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
L		DDP	Cwi-24-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 2' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
M2		2nd Ave.	751118.1	"Renzo" wall sconce. 6.5" x 15" x 9". Antique iron gate finish. Handcrafted. Candelabra base.	Wall surface		120	Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	2.5 W
N3		2nd Ave.	01.0750.18.DL	Lakeshore Chandelier with downlight. 18" x 30". "Cajun Spice finish" 3 ft. chain, handcrafted, C2 Canopy.	Pendant mounted		120	(5) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	12.5 W

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
N4		Steven Handelman Studios	CH46.12	"Sirracco" Pendant. Iron. Burnished gold finish (Tier 3). Hammered glass (Tier 1). 12" x 19"	Pendant mounted			(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W
P		Osram Sylvania	BLP/BL04/W3F-865	BACKlight 2G Protect BL04 Chain LED module for signage. 11.8 ft., 120 LEDs per module.	Mounted to wine bar casement	OPTOTRONIC power suply - OT50	10.5 VDC	Osram Sylvania LED - White 6500K	23 W
P1		Osram Sylvania	HF2Narrow Stick 830H	HF2Narrow Stick Compact High Intensity LED Module for edge lighting. 5/8" wide. 10" segments can be connected end-to-end.	Mounted to wine bar casement	OPTOTRONIC power suply - OT96D	24 VDC	Osram Sylvania LED - White 3000K	4.2 W
Q		Philips Color Kinetics	523-000028-18	eW Profile Powercore 2700K. Ultra-low profile, white light LED under cabinet fixture. Direct line voltage. 11" length with end-to-end connections. Clear polycarbonate lens, Extruded aluminum, polycarbonate white powder-coated finish. 0.88" height x 1.7" width.	Under cabinet		120	2700K Class 1M LED	5.5 W

Light Loss Factors

Light Loss Factors					
Type	LLD	LDD	RSDD	BF	LLF Total
J	0.932	0.9	0.97	1	0.813636
J1	0.932	0.9	0.97	1	0.813636
L	0.93	0.89	0.9	1	0.74493
M2	0.96	0.94	0.9	1	0.81216
N3	0.96	0.94	0.9	1	0.81216
N4	0.96	0.94	0.9	1	0.81216
P	0.93	0.89	0.9	1	0.74493
P1	0.93	0.89	0.9	1	0.74493
Q	0.93	0.89	0.9	1	0.74493

Assumptions: Very Clean ; 12 month cleaning period.

Controls

The luminaires in the Wine Bar are all controlled by a Lutron Grafik Eye system. The bartender will have a 5-button preset scene control GRAFIK Wallstation, in which he or she can easily change the lighting scene to suit the time or environment. All dimming and switching capability can be programmed from the main Viseo Wallstation, EQ-A, where specific scenes can be changed at specific times every day. Also in accordance with ASHRAE 90.1 automatic shutoff requirements, a dual technology occupancy sensor is mounted into the ceiling.

Table 8: Control Schedule

Equipment Schedule					
Type	Product Name	Manufacturer	Product/Catalog Number	Description	Location
EQ-A	Viseo Wallstation	Lutron GRAFIK	OMX-VDC-LF	Lutron GRAFIK 7000 System master control. Wallstation with LCD screen. Every lighting zone and scene programmable. Timeclock included.	"Storage 1117"
EQ-E	Dual Technology Ceiling Occupancy Sensor	Watt Stopper	DT-300	Ceiling-mounted dual technology occupancy sensor. Combined benefit of PIR and ultrasonic techonologies. 360 degrees of coverage. 24 VDC/VAC. Light level sensor: 10 to 300 footcandles. 4.5" diameter x 1.02" deep. 40' x 40' coverage.	Wine Bar
EQ-F	GRAFIK Wallstation	Lutron	NTOMX-4S-NRL	5 button preset scene control. 4 scene control plus OFF-button.	Wine Bar/Ballroom

Lighting Design

Design Concept

The design concept was to provide general lighting for daytime activities which distributes an even amount of light to the seating areas and highlights the custom wall mural. During the late afternoon and evening, the Wine Bar will become more active with dining and sampling of fine wines for the local wineries. This scene will be dim, with non-uniform lighting of warm color temperatures mixed throughout the room (suspended glow, wall sconces, cabinet glow, candle light at the tables). The main emphasis, though, is the bar itself. With a mixture of backlighting to make bottles glow, grazing for texture of wine racks/bottles, and under cabinet lighting for glasses and bottles, the bar is the featured element. When the wood panels are lowered to cover the wine racks, cove lighting above the bar continues to establish the bar's upper placement in the hierarchy of interest within the space.

Theme/metaphor

The lighting design coupled with the selection of decorative luminaires has an old-country wine cellar theme. The chandeliers are minimalistic in nature with rustic bronze finishes and ironwork that gives this feel to the space. The lantern-like pendants above the bar as well as the sconces fit in the same style.

Desired space perceptions

The perceptions of the space change throughout the day. During the day, the Wine Bar has a more open feel with a uniform spread of light, with emphasis on the custom painted walls and the bar itself. The dim, non-uniform warm glow of the night lighting scene has a private, more intimate feel for guests to dine with their spouses or families.

Accent issues

Using the wall wash component of Zumtobel downlight/wall wash luminaires (Type J1), light is accenting the interior design of the custom painted mural that covers the walls. Throughout the space, wine bottles are on display in racks and cabinets. These bottles are accented with under cabinet luminaires and backlit within wine racks. The emphasis of the space is clearly wine, so the bottles should be accentuated with light.

Texture emphasis

Within the back bar itself, the vertical wine racks coupled with the shape of the bottles being held provides an interesting element to graze and show texture. By using ultra-thin strips of LED's mounted within the wood casement (See Appendix B), the light grazes up or down the surface of the vertical racks and brings out the bottle/rack geometries.

Lighting Design Renderings

Figure 54: Wine bar rendering - daytime scene.

Figure 55: Wine bar rendering - night dining scene.

Figure 56: Wine bar rendering – night scene.

Figure 57: Wine bar rendering – night scene.

Performance Graphics

Figure 58: Wine bar illuminance contours (footcandles).

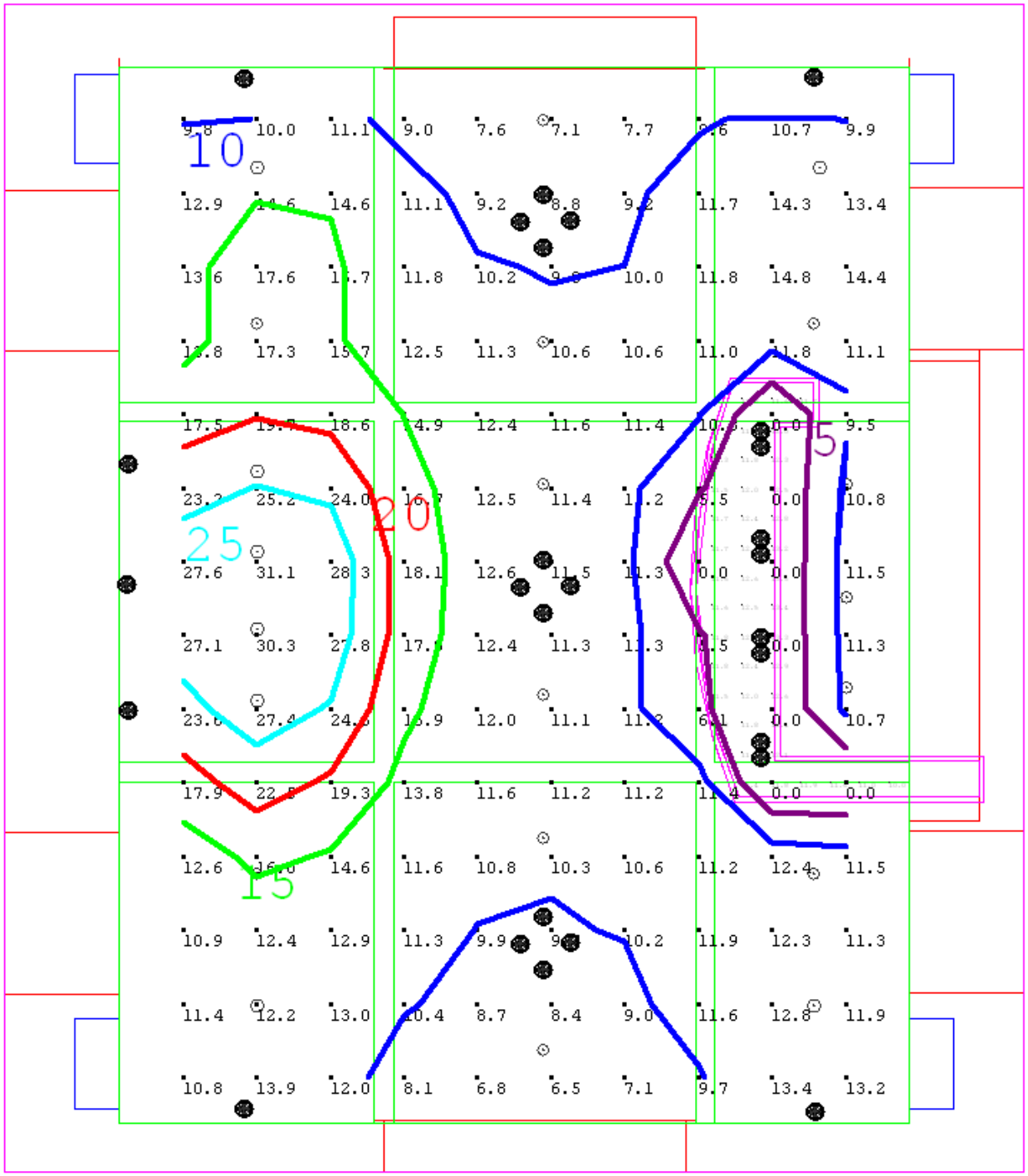
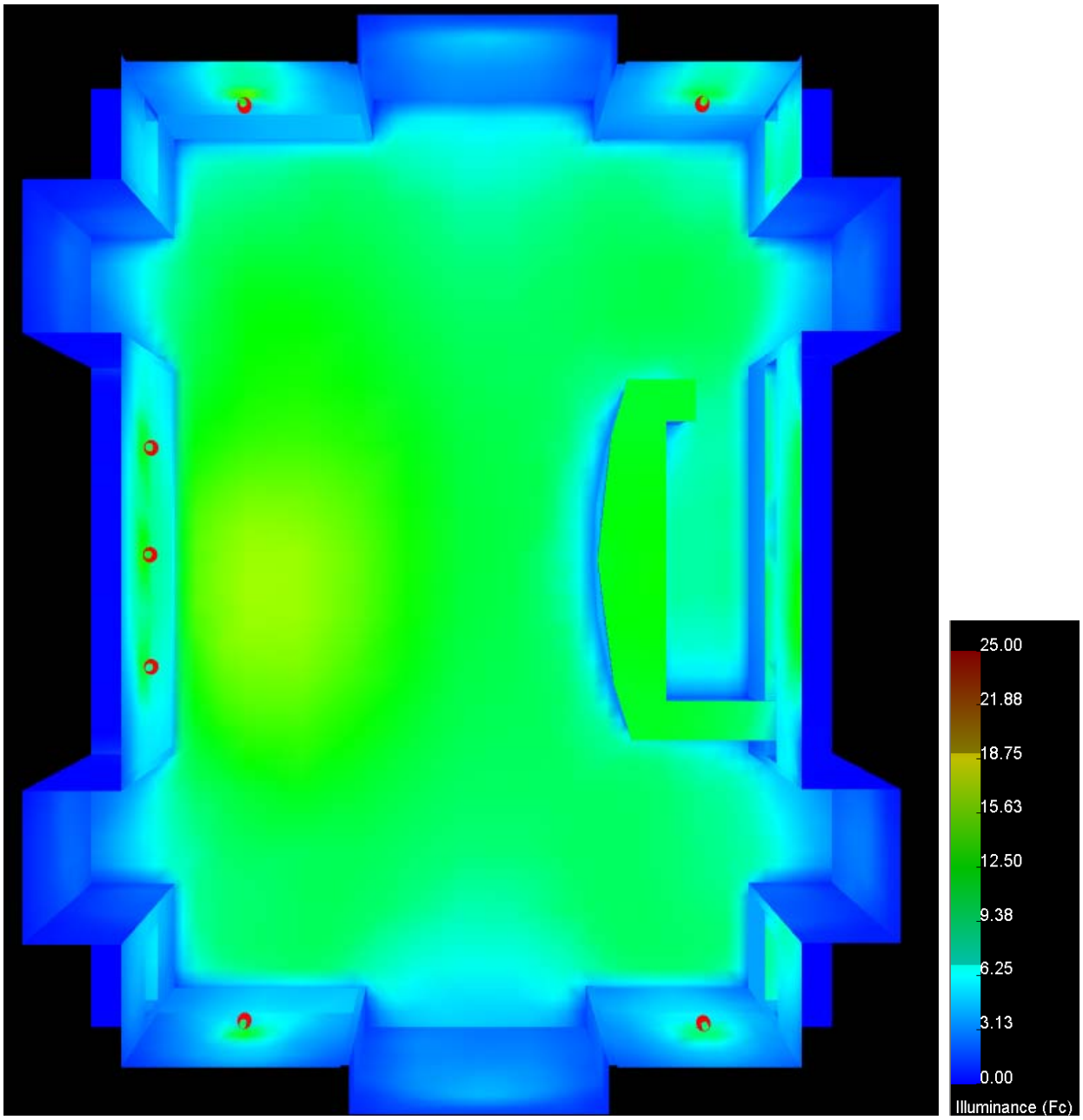


Figure 59: Wine bar illuminance pseudo color (footcandles).



Energy Code Compliance

Table 9: Energy Calculations – ASHRAE Standard 90.1

ASHRAE Standard 90.1 - Lighting Power Density			
LUMINAIRE	# OF LUMINAIRES	WATTAGE	TOTAL WATTS
J	13	23	299
J1	7	23	161
M2	7	2.5	17.5
N3	3	12.5	37.5
N4	4	5	20
P	2	23	46
P1	28	4.2	216
Q	14	5.5	77

LUMINAIRE	LINEAR FEET	W/LF.	TOTAL WATTS
L	15	4	156

TOTAL WATTS	691

ASHRAE Standard 90.1 - Lighting Power Density				
Area	Size (sq. ft.)	Power Density Allowable	Allowable Wattage	Designed Wattage
Living Room	938	2.4 W/sq. ft.	2251.20	691

W/SQ. FT	0.74

Performance Summary

Overall, whether during the day or night, the lighting design within the Wine Bar room provides appropriate light for its use and gives guests a special experience during their time in the space. During the day, an appropriate amount of general horizontal illuminance is provided for simple visual tasks. IESNA recommends 10 fc. for such activities – this design at full output gives an average of about 13 fc. Qualitatively during the day, there is emphasis put on the custom painted wall mural by use of wall washing luminaires.

At night, an intimate, relaxing feel is created through non-uniform lighting, warm glow from cabinets, sconces, and chandeliers. Candle light at the tables and the dim illumination from overhead will be enough for guests to order food and wine. The main emphasis of the space is the bar itself, and the lighting design lets guests know this by use of a mixture of lighting strategies. Accent on wine bottles through under cabinet lighting and backlighting mixed with grazing of wine racks and bottles to provide texture will definitely put focus on the bar and away from the dim glow of the tables. This strategy is successful in giving the feeling of privacy.

Attention has been made to make sure that sources lighting the back bar bottles and racks will not be seen from guests sitting at the bar. Also, the use of extremely low profile luminaires to light the back bar elements will prevent major modifications to the architecture for installation (See Appendix B).

While the theme of the space is that of old-country style mixed with a wine cellar feel, decorative allowances provide the space with a high-end lighting power density limit of 2.4 W/sq. ft. However, the use of LED products and compact fluorescent luminaires has resulted in a low energy solution of under 0.8 W/sq.ft.

Electrical Redesign

All panels affected by lighting redesign in the Wine Bar are shown in Table 10 below, highlighted in yellow.

Table 10: Dimming panels affected by lighting redesign.

Panels Affected by Lighting Redesign							
Panel Tag	Voltage	N, N/E, E?	Dimming Panel?	Courtyard	Living Room	Wine Bar	Ballroom
DIM213	120/208 3PH, 4W	N	Yes	X			
EDIM211	120/208 3PH, 4W	E	Yes	X	X	X	
DIM211A	120/208 3PH, 4W	N	Yes	X			
DIM211B	120/208 3PH, 4W	N	Yes	X	X	X	
EDIM212	120/208 3PH, 4W	E	Yes				X
DIM212B	120/208 3PH, 4W	N	Yes				X

Lighting Plan

The Wine Bar lighting plan with controls and circuiting can be found in Appendix A, drawing E3.1.

Existing Panelboards Affected

Circuits modified by lighting redesign are highlighted in yellow.

DIMMING PANEL "EDIM211" 120/208, 3ø, 4W, 100A MCB – EMERGENCY POWER						LUTRON MOD# GP36-120-4-M60-20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	03c	AA	LV	DIM	39	37	1443
2	CORRIDOR FIRST FLOOR	06c	AI	LV	DIM	37	4	148
3	CORRIDOR FIRST FLOOR	15c	DP	LV	DIM	200	1	200
4	CORRIDOR FIRST FLOOR	22c	DS-4	INC	DIM	60	4	240
5	CORRIDOR FIRST FLOOR	25c	AA	LV	DIM	37	7	259
6	CORRIDOR FIRST FLOOR	26c	AA/AC-1	LV	DIM	37	7	259
7	CORRIDOR FIRST FLOOR	01c	DP	INC	DIM	200	1	200
8	BILLIARD FIRST FLOOR	01cb	AA	LV	DIM	37	10	370
9	BILLIARD FIRST FLOOR	07cb	AA	LV	DIM	37	2	74
10	PUBLIC RESTROOM FIRST FLOOR	01r	AC-1/AA	LV	DIM	37	12	444
11	COOKING STUDIO FIRST FLOOR	01d	AC-1	TBD	DIM	37	15	555
12	HOTEL SPA CHECK-IN	13c	SC	CC	DIM	5.5 W/LFT	58	319
13	RESTAURANT FIRST FLOOR	05s	DS/DS-1	INC	DIM	75	8	600
14	RESTAURANT FIRST FLOOR	08s	AA-1/AA	LV	DIM	37	10	370
15	RESTAURANT & VEST. FIRST FLOOR	12s	AA	LV	DIM	37	3	111
16	RESTAURANT FIRST FLOOR	14s	AA	LV	DIM	37	4	148
17	RESTAURANT FIRST FLOOR	16s	WB	INC	DIM	60	13	780
18	SPARE							
19	BOARD ROOM FIRST FLOOR	02fra	AE	INC	DIM	150	6	900
20	BOARD ROOM FIRST FLOOR	02frb	AF	INC	DIM	150	6	900

DIMMING PANEL "EDIM211" 120/208, 3ø, 4W, 100A MCB – EMERGENCY POWER						LUTRON MOD# GP36-120-4-M60-20		
21	CHECK-IN FIRST FLOOR	03ci	AA	LV	DIM	37	12	444
22	LIBRARY FIRST FLOOR	02cr	AA	LV	DIM	37	18	666
23	LIVING ROOM FIRST FLOOR	03cg	AA	LV	DIM	37	4	148
24	LIVING ROOM FIRST FLOOR	07cg	AH-2	LV	DIM	37	6	222
25	LIVING ROOM FIRST FLOOR	11cg	AA	LV	DIM	37	3	111
26	PORTE-COCHERE FIRST FLOOR	02cv	AA	LV	DIM	37	2	74
27*	PORTE-COCHERE FIRST FLOOR	10cv	B	CFL		27	2	54
28	WINE BAR FIRST FLOOR	02cw	AA	LV	DIM	37	18	666
29	RETAIL FIRST FLOOR	02t	AA	LV	DIM	37	9	333
30	PRIVATE DINING FIRST FLOOR	03sp	AA	LV	DIM	37	16	592
31	SPARE							
32	SPARE							
33	SPARE							
34	SPARE							
35	SPARE							
36	SPARE							

TOTAL KVA: 11.89
TOTAL AMP: 32.39
26.2"W x 14.15"D x 87.00"H

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER								LUTRON MOD#: GP60–120–4–M100–20
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
2	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
3	CORRIDOR FIRST FLOOR	01c	DP–5	INC	DIM	400	3	1200
4	CORRIDOR FIRST FLOOR	02c	AA	LV	DIM	37	16	666
5	CORRIDOR FIRST FLOOR	05c	DS–1	INC	DIM	100	12	1200
6	CHECK–IN FIRST FLOOR	01ci	DP–4	INC	DIM	200	2	400
7	CHECK–IN FIRST FLOOR	02ci	RCPT – TABLE/FLOOR LAMPS	INC	DIM		4	500
8	SPARE							
9	SPARE							
10	SPARE							
11	LIBRARY FIRST FLOOR	01cr	DP–6	INC	DIM	320	1	320
12	LIBRARY FIRST FLOOR	03cr	DS–2	INC	DIM	75	12	900
13	LIBRARY FIRST FLOOR	04cr	AA	LV	DIM	37	4	185
14	LIBRARY FIRST FLOOR	05cr	AH	LV	DIM	37	4	148
15	LIBRARY FIRST FLOOR	06cr	RCPT – TABLE/FLOOR LAMPS					500
16	SPARE							
17	LIBRARY FIRST FLOOR	07cr	AA	LV	DIM	37	4	148
18	SPARE							
19	SPARE							
20	LIVING ROOM FIRST FLOOR	01cg	DP–7	INC	DIM	520	2	1040
21	LIVING ROOM FIRST FLOOR	02cg	AA	LV	DIM	37	4	148
22	LIVING ROOM FIRST FLOOR	04cg	DS–3	INC	DIM	75	12	900
23	LIVING ROOM FIRST FLOOR	05cg	SC	CC	DIM	6.5W/LFT	176 FT	1140
24	LIVING ROOM FIRST FLOOR	06cg	AA	LV	DIM	37	10	370
25	LIVING ROOM FIRST FLOOR	08cg	LR	LV	DIM	37	4	148
26	LIVING ROOM FIRST FLOOR	09cg	RCPT – TABLE/FLOOR LAMPS					500
27	SPARE							
28	EXTERIOR FIRST FLOOR	10cg	WC	INC	DIM	60	4	240
29	EXTERIOR FIRST FLOOR	12cg	WB	INC	DIM	60	2	120
30	EXTERIOR FIRST FLOOR	13cg	EB	LV	DIM	20	11	220

DIMMING PANEL "DIM211B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD# GP60–120–4–M100–20		
31	EXTERIOR FIRST FLOOR	14cg	EA	LV	DIM	50	14	700
32	SPARE							
33	ENTRY FIRST FLOOR	01cv	DP–2	INC	DIM	400	1	400
34	ENTRY FIRST FLOOR	03cv	SE	LV	DIM	37 2/3 LFT	54 FT	666
35	ENTRY FIRST FLOOR	04cv	SB	LV	DIM	15W@3" O.C.	8 FT	160
36	ENTRY FIRST FLOOR	05cv	AA	LV	DIM	37	2	74
37	ENTRY FIRST FLOOR	06cv	AC–1	LV	DIM	37	2	74
38	ENTRY FIRST FLOOR	07cv	AA	INC	DIM	37	3	111
39*	EXTERIOR FIRST FLOOR	08cv	A, A1	CFL	DIM	30, 45	6, 1	225
40*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8
41	VALET FIRST FLOOR	09cv	AF	LV	DIM	37	3	111
42*	EXTERIOR FIRST FLOOR		C	LV	DIM	22.2	6	133.3
43	ENTRY FIRST FLOOR	12cv	AA	LV	DIM	37	2	74
44*	EXTERIOR FIRST FLOOR	13cv	D	LV	DIM	45.6	12	546.7
45*	EXTERIOR FLOOD LIGHTS		F	MH		88.9	2	177.8
46	WINE BAR FIRST FLOOR	01cw	DP–8	INC	DIM	4 x 40	3	480
47	WINE BAR FIRST FLOOR	03cw	AA	LV	DIM	37	12	444
48	WINE BAR FIRST FLOOR	04cw	DS–4	INC	DIM	TBD	8	840
49	WINE BAR FIRST FLOOR	05cw	AH	LV	DIM	37	8	296
50	WINE BAR FIRST FLOOR	06cw	DP–16	INC	DIM	TBD	4	400
51	WINE BAR FIRST FLOOR	07cw	AA	LV	DIM	37	5	185
52	WINE BAR FIRST FLOOR	08cw	SB	LV	DIM	14W/LFT	20 FT	560
53	WINE BAR FIRST FLOOR	09cw	SD	LV	DIM	0.9W@1.2" O.C.	24 FT	171
54	WINE BAR FIRST FLOOR	10cw	SB–1	LV	DIM	05W@3" O.C.	20 FT	460
55	WINE BAR FIRST FLOOR	11cw	AI	LV	DIM	37	5	185
56	WINE BAR FIRST FLOOR	12cw	SB–1	LV	DIM	5W@3" O.C.	16	160
57	SPARE							
58	SPARE							
59	SPARE							
60	SPARE							

TOTAL KVA: 21.29
TOTAL AMP: 59.14
52.4"W x 87H x 14.15"D

Panelboard Sizing Worksheets/New Panels

Panels EDIM211 and DIM211B can be found in the Entry Courtyard electrical redesign section.

Voltage Drop for EDIM211

Estimated Voltage Drop Calculator

Input

Load Voltage	208V 3Ø	
Conductor Size	1	
Conductor Type	Cu ◉	Al ○
Number of Sets	1	
Distance (one way)	140	Feet
Load (A)	27.2	A

Output

	Unity Power Factor		85% PF	
Voltage Drop (V)	1.0	V	1.1	V
Voltage Drop (%)	0.5	%	0.5	%
Voltage at Load	207.0	V	206.9	V
Minimum Conductor Size for 3% VD	8			
Minimum Conductor Size for 5% VD	10			

SIEMENS

Voltage Drop for DIM211B

Estimated Voltage Drop Calculator

Input

Load Voltage	208V 3Ø	
Conductor Size	1	
Conductor Type	Cu ◉	Al ○
Number of Sets	1	
Distance (one way)	140	Feet
Load (A)	50.6	A

Output

	Unity Power Factor		85% PF	
Voltage Drop (V)	1.9	V	2.0	V
Voltage Drop (%)	0.9	%	0.9	%
Voltage at Load	206.1	V	206.0	V
Minimum Conductor Size for 3% VD	6			
Minimum Conductor Size for 5% VD	8			

SIEMENS

The Grand Ballroom

Description:
The grand ballroom is a multifunctional space that can satisfy social gatherings, meetings, wedding receptions, etc. Comfortable accommodating up to 340 guests, the ballroom has features of five large decorative custom chandeliers, custom wall sconces, elegant finishes and materials, and access to an outdoor terrace. The space is designed to accommodate dances with retractable theater lighting equipment installed. The floor is covered with custom designed carpeting, while the walls are covered with fabric upholstery. The ceiling is constructed as two levels – a painted white lower ceiling and a yellow "Pittsfield Buff" colored upper coffered ceiling.

Area: 5,000 Sq. ft.

Dimension: 91'-0" x 55'-0"

Space Category: Large Work Space

Materials:

MATERIAL/FINISH	OBJECT	COLOR	REFLECTANCE
Axminster Carpet	Ballroom floor	Custom	0.3
Flat Latex Paint	Lower Ceiling	Timid White	0.9
Flat Latex Paint	Ceiling Coffer	Pittsfield Buff	0.81
Semi-gloss Latex Paint	Baseboards, door trim, crown molding, cove molding	Parchment	0.86
White oak	Doors		0.86
Wall Upholdstery	Walls	NA	0.5

Grand Ballroom plans and elevations –

Figure60: Ballroom ceiling plan.

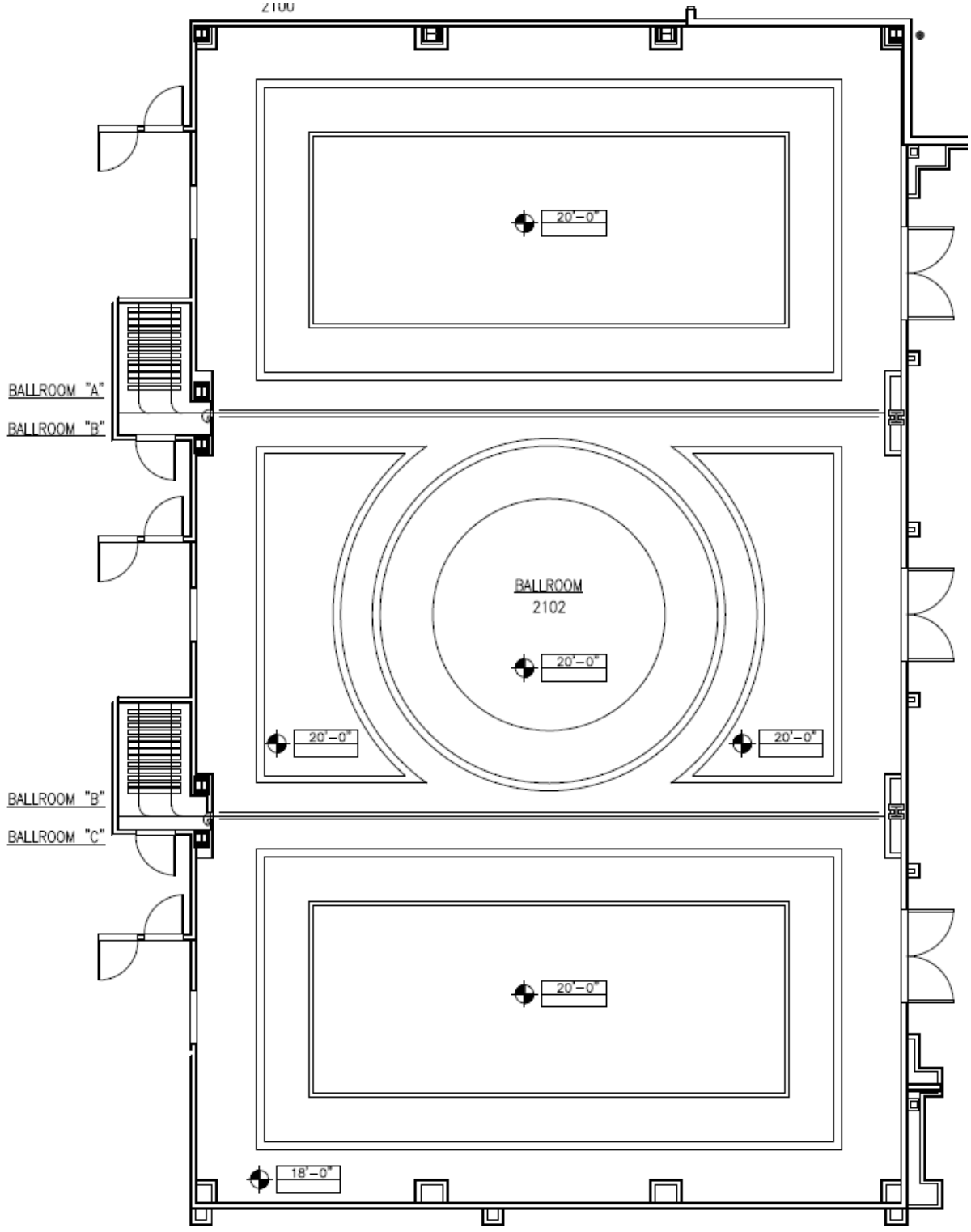


Figure 61: Ballroom east elevation.

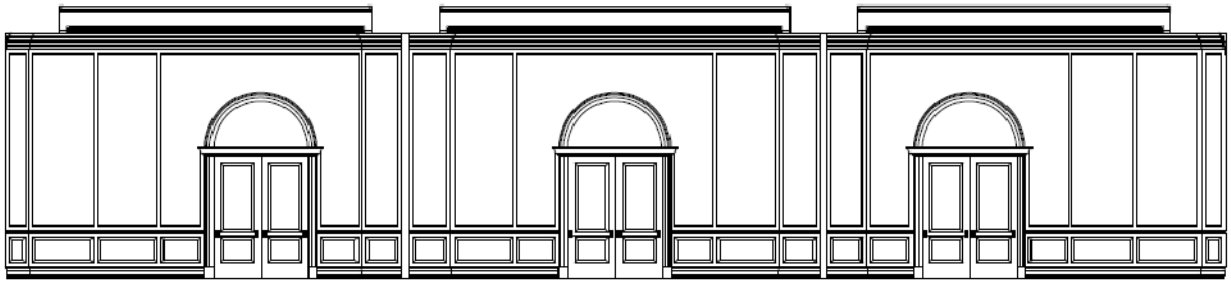


Figure 62: Ballroom north/south elevation.

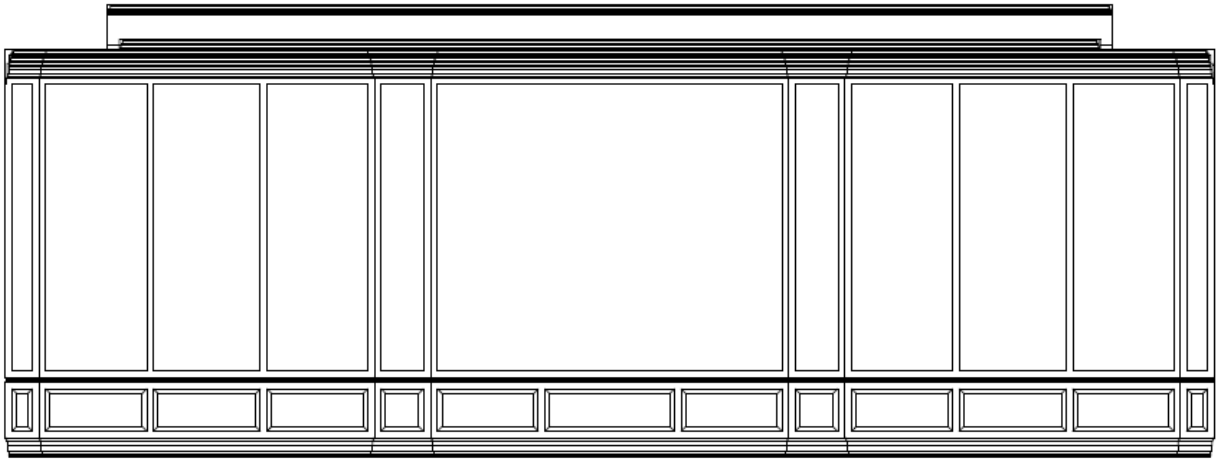
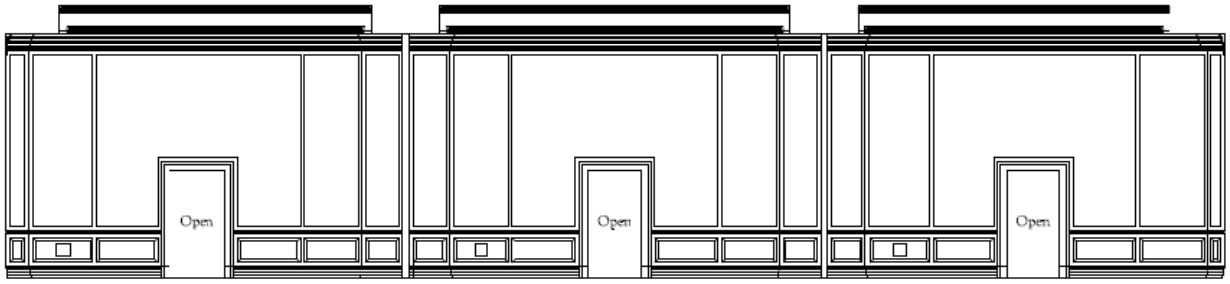


Figure 63: Ballroom west elevation.



Lighting Design Criteria and Consideration

(*IESNA Handbook*: Interior-Dance Halls/Discotheques-Ballrooms/social events)

- **Psychological Impressions**
  - Depending on the function taking place in the ballroom, the lighting design in this space can promote more than one psychological impression. During conferences with multiple activities happening at once, the lighting can create a public feeling with the use of uniform ambient light.
  - During a wedding reception where dancing and celebration would take place, a festive lighting atmosphere must be created with lower ambient light and sparkle and possible color-changing capabilities.

- **Appearance of Space and Luminaires** (Very Important)
  - The ballroom is a highly decorative space. The upholstery-covered walls, painted walls, custom-designed carpeting, and detailed millwork and crown molding must all be on display. The lighting equipment must accomplish this and also enhance the appearance. It is very important that the interior design of the space be on display and do justice to the elegance that Salamander Hospitality has gone through so much effort to promote. Lighting along the perimeter to highlight the walls and crown molding is desirable. Luminaires within the ceiling area must highlight the furniture in the room.

- **Color Appearance (and Color Contrast)** (Very Important)
  - This exciting space is equipped with colorful paints and wood finishes that must be rendered correctly to promote high aesthetics. Also, the clothing that guests wear into the ballroom will require appropriate color rendering. Therefore, light sources with high Color Rendering Index will be required.

- **Light Distribution on Surfaces** (Important)
  - During functions that are public in nature, the ballroom will require an even distribution of light on the horizontal and vertical surfaces, promoting public and spacious feelings. For more intimate activities, the lighting will need to change accordingly. See "Points of Interest."

- **Luminances of Room Surfaces** (Important)
  - As discussed above, the color appearance of the paints, fabrics, and wood finishes in the space are very important. Luminances of these surfaces must be high enough to recognize their unique and beautiful qualities. For public, open activities, vertical room surfaces must have higher luminances.

- **Modeling of Faces or Objects** (Important)
  - Activities in the ballroom are all very social. It is important that vertical illumination allow facial recognition between those in the space. Avoiding harsh facial shadows is also desirable.

- **Points of Interest** (Important)
  - The points of interest in this space are not specified due to the flexibility of activities that can be held in the ballroom. Therefore, the lighting design must also be flexible to accent points of interest no matter where the important objects may be.

- The interior design in the ballroom has created a few points of interest itself. The decorative chandeliers must receive light from the ceiling cavity to appropriately appear to those in the room. Also, custom wood-carved horses in the wooden arch-work above the doors in the ballroom will create a point of interest. Grazing these wood carvings will aid in the artistry.

- **Sparkle/Desirable Reflected Highlights** (Very Important)
  - It is very important that the lighting design has the ability to create sparkle for festive events like wedding receptions. The deliberate use of sparkle will add to the excitement of the space. This must come directly from the luminiares due to the beige-colored wall upholstery, which will not reflect a considerable amount of light.

- **System Control and Flexibility** (Very Important)
  - As stated before, it is imperative that the lighting system have control and flexibility to accommodate the flexibility of tasks that will take place in the ballroom. Conferences, wedding receptions, dances, meetings, etc. all require different preset light settings.

- **Horizontal Illuminance** (Somewhat Important)
  - General lighting within the Grand Ballroom requires **5 fc** for simple visual tasks.

- **Vertical Illuminance** (Somewhat Important)
  - Vertical surfaces require **3 fc.**

- **Power Density Allowance:** ASHRAE 90.1 2007
  - Conference/Meeting/Multipurpose space: 1.3 W/sq. ft.
  - Additional interior lighting power density allowance for spaces in which lighting is specified to be installed in addition to the general lighting of the purpose of decorative appearance (chandeliers and sconces):
    - Additional lighting power shall not exceed 1.0 W/sq.ft.
  - Total allowable = **2.3 W/SQ. FT.**

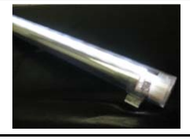
Lighting Plans – See Appendix A

Mounting Details – See Appendix B

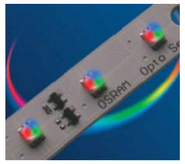
Luminaires

Figure 64: Luminaire Schedule. Luminaires, lamps, and ballast specifications can be found in Appendix C.

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
J		Zumtobel	S5D4312 D1 4311R MC	Open recessed downlight. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Spun aluminum reflector with white matte finish.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
J1		Zumtobel	S5D4312 D1 4311W MC	Open recessed downlight/wallwash. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Wallwasher reflector - hydroformed aluminum kicker plate is mounted to the main reflector for wall illumination. Reflector is fully rotatable from below.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
L		DDP	Cwi-24-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 2' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
M1		2nd Ave.	75835.2.X	"Josephine" decorative wall sconce. 18" x 21" x 9". Iron metalwork with Autumn Leaf finish. Decorative crystal, fiber drip candle covers. Handcrafted. Candelabra base.	Wall surface		120	(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W

Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
N1		2nd Ave.	87809.30.X	"Annabella" decorative chandelier. 30" Diameter x 45" height. Candelabra base, corinth finish. 3 ft. chain. Crystal decoration, fiber drip candle covers, handcrafted.	Pendant mounted		120	(8) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	20 W
N2		2nd Ave.	87618.42.X	"Minuet" decorative chandelier. 42" Diameter x 60" height. Candelabra base, pompei gold finish. 160 lbs. Fiber drip candle covers. Gold dipped crystal decoration.	Pendant mounted		120	(16) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	40 W
O		Osram Sylvania	LNRCLRMX/LM01M/RGB	LINEARlight Colormix Rigid Colormixing LED Module. 0.45" wide x 0.14" deep x 18" long. Each LED contains individually powered red, green, and blue chip. RGB dimmable by pulse width modulation. Ideal for areas with space limitations.	See Appendix B	OPTOTRONIC	24 VDC	Osram Sylvania RGB LEDs	8 W

Light Loss Factors

Light Loss Factors					
Type	LLD	LDD	RSDD	BF	LLF Total
E	0.93	0.89	0.9	1	0.74493
J	0.932	0.9	0.97	1	0.813636
J1	0.932	0.9	0.97	1	0.813636
L	0.93	0.89	0.9	1	0.74493
M1	0.96	0.94	0.9	1	0.81216
N1	0.96	0.94	0.9	1	0.81216
N2	0.96	0.94	0.9	1	0.81216
O	0.93	0.89	0.9	1	0.74493

Controls

The luminaires in the Ballroom are all controlled by a Lutron Grafik Eye system, with the ability to create dynamic color changing effects with a Lutron DMX512 Interface. Since the ballroom is divisible by three, each section (A,B, C) is controlled separately if needed by individual 5-button preset scene control. When the whole ballroom is used, the room will be controlled by one GRAFIK wallstation. Automatic shutoff is enabled by use of passive infrared occupancy sensors.

Table 11: Control Schedule

Equipment Schedule					
Type	Product Name	Manufacturer	Product/Catalog Number	Description	Location
EQ-A	Viseo Wallstation	Lutron GRAFIK	OMX-VDC-LF	Lutron GRAFIK 7000 System master control. Wallstation with LCD screen. Every lighting zone and scene programmable. Timeclock included.	"Storage 1117"
EQ-B	Wall-Mounted PIR Occupancy Sensor	Watt Stopper	CX-100	Wall-mounted passive infrared occupancy sensor. 24 VDC. For large areas, can cover up to 2000 sq. ft. Digital time delay adjustable from 15 seconds to 30 minutes.	Living Room/Ballroom "A" & "C"
EQ-C	Ceiling mounted PIR Occupancy Sensor	Watt Stopper	CI-300	Ceiling-mounted passive infrared occupancy sensor. 24 VDC. 360 degrees of coverage. 4.5" x 1.02". Coverage of 44' x 44'	Ballroom "B"
EQ-F	GRAFIK Wallstation	Lutron	NTOMX-4S-NRL	5 button preset scene control. 4 scene control plus OFF-button.	Wine Bar/Ballroom
EQ-G	DMX512 Control Interface	Lutron	LUT-DMX	DMX512 Control Interface. Allows GRAFIK Eye lighting controls to operate lighting and other equipment that uses the DMX512 protocol, including LED-based systems.	Ballroom

Lighting Design

Design Concept

The design concept is different for each scene. The general ambient lighting scene concept involves uniform ambient light. A uniform wash on the vertical walls and across the horizontal floor is necessary for general use in the space. The dining setting concept is of a dim glow. A combination of switched off and dimmed luminaires combine with decorative wall sconces, chandeliers, cove lighting, and perimeter non-uniform lighting to deliver a subtle glow to the users in the room. When weddings, dances, or special functions add decorations and fabrics to the walls, the low-profile color-changing LED luminaires recessed in the perimeter molding will give a dynamic effect to the space .

Theme/metaphor

The theme is of class and elegance.

Desired space perceptions

The first scene shown below is a general ambient lighting scene that would give a *public* perception. A general distribution of light across the horizontal and vertical surfaces gives this feel. The second scene ,the "dining scene," is a *private* space perception. This scene dims downlights and adds glow to the walls in a much more non-uniform way.

Accent issues

The Zumtobel combined downlight/washlight luminaires recessed in the lower portion of the ceiling had to be pushed toward the center of the room in order to provide a uniform wash on the walls. It is important for the public high ambient light scene to give a uniform distribution of light onto all surfaces. The cove elements and light accent the subtractive and multidimensional nature of the ceiling. Fabrics and linens that will be draped over the walls for special events will be accented with white light from the perimeter slot luminaires (Type O) and will pop with color during dances or exciting theatrical events.

Texture Issues

The custom carved horse heads above each of the doors on the east wall provide an interesting texture and creative interior element to the space. Shown in Appendix C, a linear grazing luminaire is hidden in the cove-like crown molding above each door.

Lighting Design Renderings

Figure 64: Ballroom general ambient setting (Public)

Figure 65: Ballroom dining setting – downlights dimmed to 10%, sconces switched on, perimeter glow switched on.

Figure 66: Ballroom dark projection screen setting – downlights switched off.

Performance Graphics

Figure 67: Ballroom illuminance contours (footcandles).

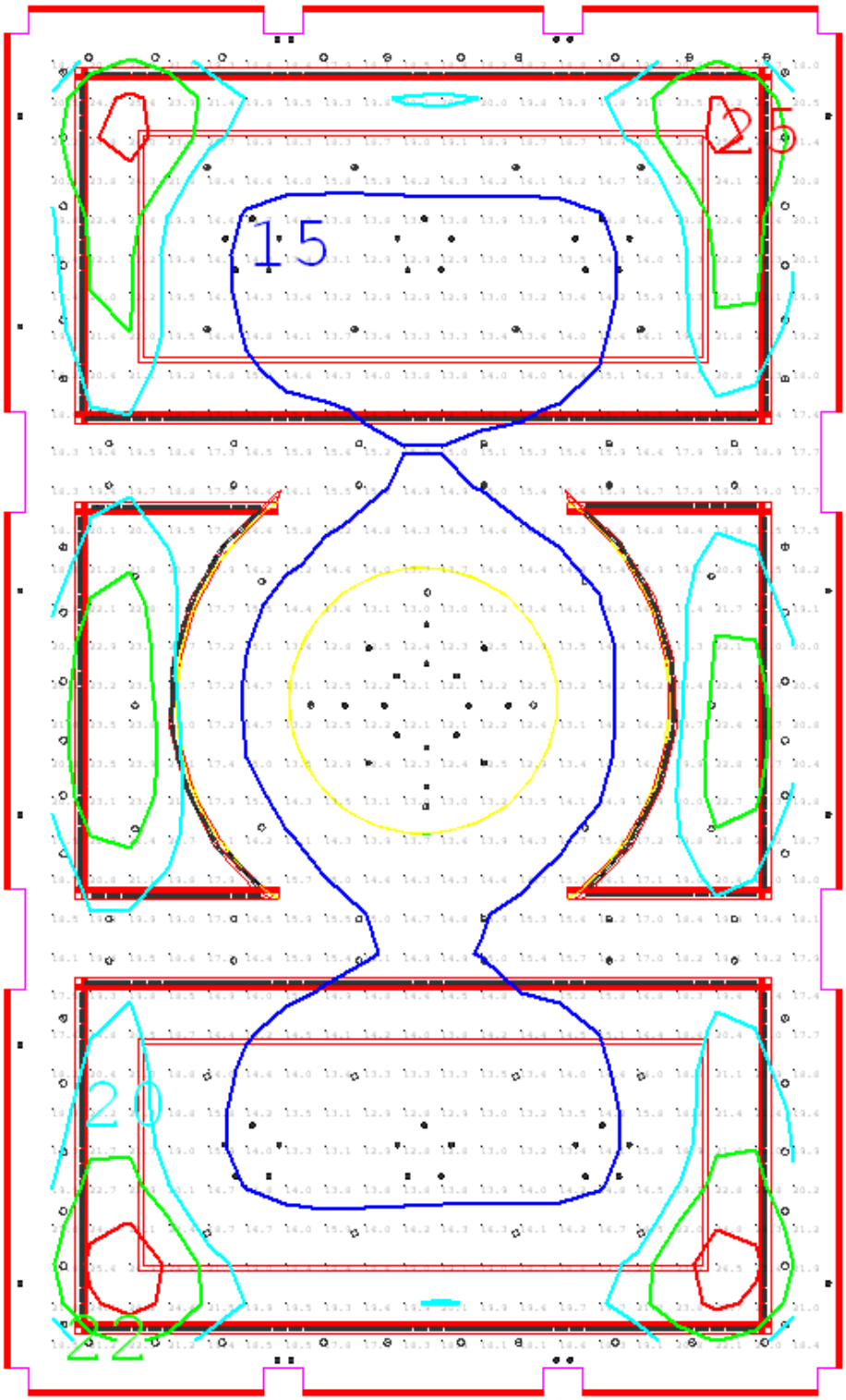
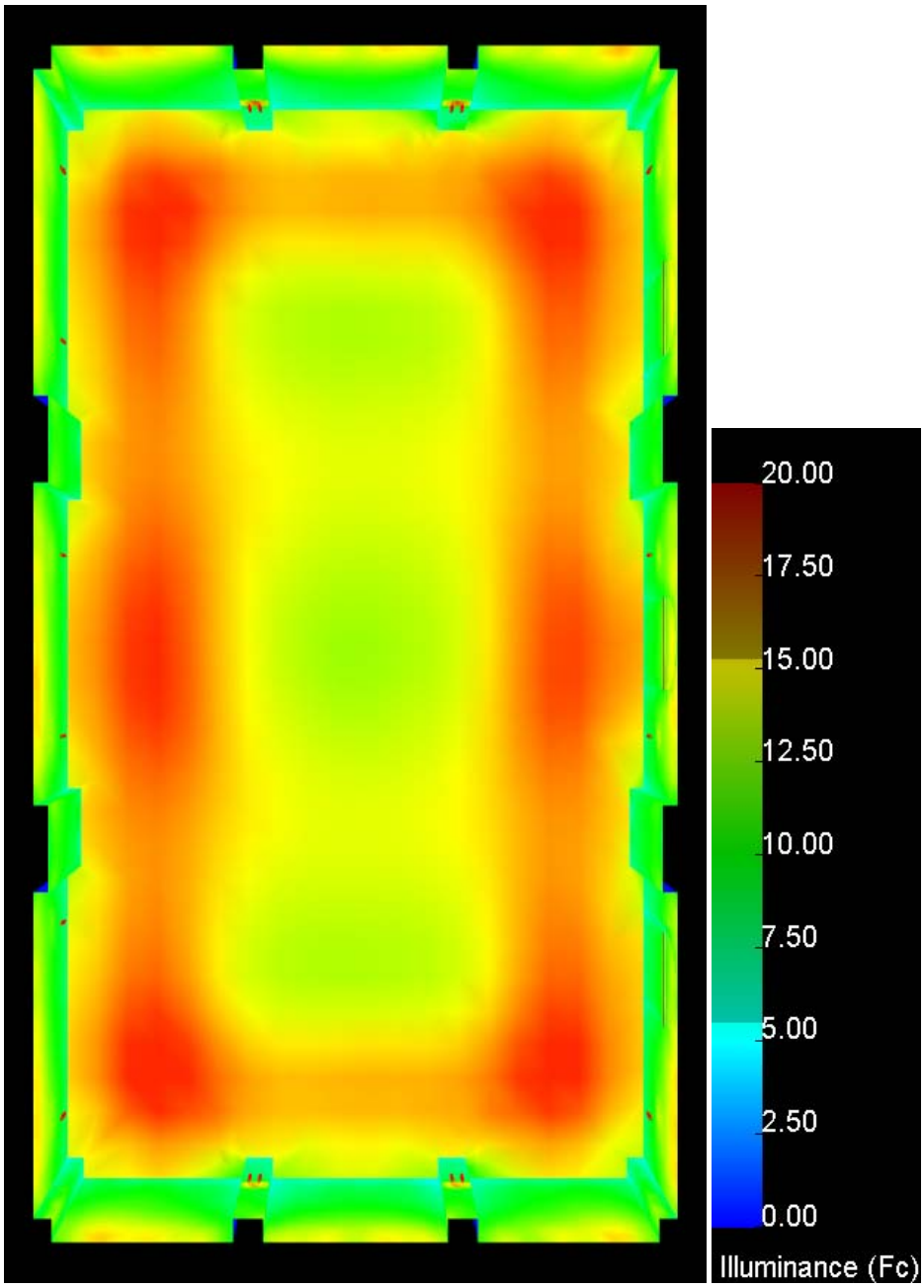


Figure 68: Ballroom illuminance pseudocolor.



Energy Code Compliance

Table 12: Energy Calculations – ASHRAE Standard 90.1

ASHRAE Standard 90.1 - Lighting Power Density			
LUMINAIRE	# OF LUMINAIRES	WATTAGE	TOTAL WATTS
J	54	24	1296
J1	52	24	1248
M1	14	5	70
N1	1	48	48
N2	6	25	150
O	40	12	480

LUMINAIRE	LINEAR FEET	W/LF.	TOTAL WATTS
L	500	4	2600

TOTAL WATTS	5412

ASHRAE Standard 90.1 - Lighting Power Density				
Area	Size (sq. ft.)	Power Density Allowable	Allowable Wattage	Designed Wattage
Living Room	5000	2.3 W/sq. ft.	11500.00	5412

W/SQ. FT	1.08

Performance Summary

The Grand Ballroom is a multifunctional, flexible space. Therefore, the lighting design in the ballroom is also flexible in nature. With GRAFIK Eye controls and color-changing ability, this space can be transformed into a convention with high ambient uniform lighting to a wedding reception with dining and dance lighting capability. The lighting also highlights the decorative architectural and interior design elements. Cove lighting and decorative chandeliers provide decoration, sparkle and glow overhead. Decorative sconces give appropriate glow and non-uniformity for dining scene settings.

Quantitatively, with use of low color temperature compact fluorescent lamps and LED luminaires, the lighting design is only slightly above 1.0 W/sq.ft., which is far lower than the 2.3 W/sq.ft. allowed. An average of 22 fc. across the horizontal plane is enough light for visual tasks completed in this space. The lighting design is functional, aesthetically pleasing, and energy efficient.

Electrical Redesign

All panels affected by lighting redesign in the Ballroom are shown in Table __ below, highlighted in yellow.

Table 13: Dimming panels affected by lighting redesign.

Panels Affected by Lighting Redesign							
Panel Tag	Voltage	N, N/E, E?	Dimming Panel?	Courtyard	Living Room	Wine Bar	Ballroom
DIM213	120/208 3PH, 4W	N	Yes	X			
EDIM211	120/208 3PH, 4W	E	Yes	X	X	X	
DIM211A	120/208 3PH, 4W	N	Yes	X			
DIM211B	120/208 3PH, 4W	N	Yes	X	X	X	
EDIM212	120/208 3PH, 4W	E	Yes				X
DIM212B	120/208 3PH, 4W	N	Yes				X

Lighting Plan

The Ballroom lighting plan with controls and circuiting can be found in Appendix A, drawing E4.1.

Existing Panelboards Affected

Circuits modified by lighting redesign are highlighted in yellow.

DIMMING PANEL "EDIM212" 120/208, 3ø, 4W, 70A MCB – EMERGENCY POWER — LUTRON MOD#: GP36-120-4-M70-20

CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	CORRIDOR	03c	AA	LV	DIM	37	53	1961
2		03c						
3		06c	AI	LV	DIM	37	4	148
4		10c	WD	INC	DIM	60	4	240
5	SPARE			LV	DIM	37	7	256
6	MEETING ROOM 2112	04fma	AE	INC	DIM	150	8	1200
7	MEETING ROOM 2111	04fmb	AE	INC	DIM	150	8	1200
8	MEETING ROOM 2115	04fmc	AE	INC	DIM	150	8	1200
9		08fmc	AA	LV	DIM	37	4	148
10	PUBLIC RESTROOM	01r	AC-1	LV	DIM	37	15	555
11	PUBLIC RESTROOM	07r	AF	LV	DIM	37	8	296
12	SPARE							
13	BALLROOM A	02fba	AB	INC	DIM	250	8	2000
14		02fba						
15		08fba	AA	LV	DIM	37	1	37
16	BALLROOM B	02fbq	AB	INC	DIM	250	8	2000
17		02fba						
18		08fba	AA	LV	DIM	37	1	37
19	BALLROOM A	02fbb	AB	INC	DIM	250	8	2000
20		02fbb						
21		08fbb	AA	LV	DIM	37	2	74
22	BALLROOM C	02fbc	AB	INC	DIM	250	8	2000
23		02fbc						
24		08fbc	AA	LV	DIM	37	2	74
25	SPARE							
26	PRE-FUNCTION	02fp	AA	LV	DIM	37	10	370
27		04fp	AA	LV	DIM	37	5	185
28		06fp	AA-2	LV	DIM	37	6	222
29		08fp	AA	LV	DIM	37	9	333
30		09fp	WD	INC	DIM	60	6	360
31		12fp	AA	LV	DIM	37	6	222
32	SPARE							
33	SPARE							
34	SPARE							
35	SPARE							
36	SPARE							

TOTAL KVA: 16.98
TOTAL AMP: 47.2
26.2"W x 14.15"D x 87.00"H

DIMMING PANEL "DIM212B" 120/208, 3ø, 4W, 100A MCB – NORMAL POWER						LUTRON MOD#: GP48-120-4-M100-20		
CIRCUIT NUMBER	AREA/ROOM	CUSTOMER ZONE	FIXTURE TYPE	LOAD TYPE	CONTROL TYPE	LOAD PER FIXTURE (W/VA)	No. OF FIXTURES	TOTAL LOAD (W/VA)
1	BALLROOM "A"	01fba	DP-13	INC	DIM	600	2	1200
2		03fba	DS – (TBD)	INC	DIM		2	200
3		04fba	SA	CC	DIM	6.5W/LFT	100FT	650
4		05fba	AH	LV	DIM	37	12	444
5		06fba	AD	INC	DIM	100	20	2000
6		06fba						
7		07fba	SB-2	LV	DIM	5W@3" O.C.	7 FT	140
8		09fba	ZZ JP	INC	DIM	575	1	575
9		10fba	JP	INC	DIM	575	1	575
10		11fba	JP	INC	DIM	575	1	575
11		12fba	ZZ JP	INC	DIM	575	1	575
12		13fba	JP	INC	DIM	575	1	575
13		14fba	JP	INC	DIM	575	1	575
14	BALLROOM "B"	01fbb	DP-22	INC	DIM	1200	1	1200
15		03fbb	DS – (TBD)	INC	DIM		2	200
16		04fbb	SA	CC	DIM	6.5W/LFT	237FT	1540
17								
18		05fbb	AH	LV	DIM	37	12	444
19		06fbb	AD	INC	DIM	100	11	1100
20		07fbb	SB-2	LV	DIM	5W@3" O.C.	7 FT	140
21		15fbb	ZZ JP	INC	DIM	575	1	575
22		16fbb	JP	INC	DIM	575	1	575
23		17fbb	JP	INC	DIM	575	1	575
24		18fbb	ZZ JP	INC	DIM	575	1	575
25		19fbb	JP	INC	DIM	575	1	575
26		20fbb	JP	INC	DIM	575	1	575
27		27fbb	AH	LV	DIM	37	12	444
28	BALLROOM "A"	01fbc	DP-13	INC	DIM	600	2	1200
29		03fbc	DS – (TBD)	INC	DIM		2	200
30		04fbc	SA	CC	DIM	6.5W/LFT	100FT	650
31		05fbc	AH	LV	DIM	37	12	444
32		06fbc	AD	INC	DIM	100	20	2000
33		06fbc						
34		07fbc	SB-2	LV	DIM	5W@3" O.C.	7 FT	140
35		21fbc	ZZ JP	INC	DIM	575	1	575
36		22fbc	JP	INC	DIM	575	1	575
37		23fbc	JP	INC	DIM	575	1	575
38		24fbc	ZZ JP	INC	DIM	575	1	575
39		25fbc	JP	INC	DIM	575	1	575
40		126bc	JP	INC	DIM	575	1	575
41	SPARE							
42	SPARE							
43	SPARE							
44	SPARE							
45	SPARE							
46	SPARE							
47	SPARE							
48	SPARE							

TOTAL KVA: 24.6
TOTAL AMP: 68.3
52.4"W x 87H x 14.15"D

Panelboard Sizing Worksheets/New Panels

The following tables are the modified dimming panelboards with new loads according to lighting redesign. Feeders were resized based on NEC table 310.16. Conduit was sized with the Conduit Sizing Worksheet provided in class.

EDIM212

PANELBOARD SIZING WORKSHEET										
Panel Tag---------->					EDIM212	Panel Location:		Storage 2108		
Nominal Phase to Neutral Voltage------->					120	Phase:		3		
Nominal Phase to Phase Voltage-------->					208	Wires:		4		
DIMMING PANEL "EDIM212" 120/208V, 3Ph., 4W. 40A MCB - Emergency Power										
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	5	CORRIDOR	962	w	1.00	962	962	DIM
2	A	LIGHTING	5	CORRIDOR	1036	w	1.00	1036	1036	DIM
3	B	LIGHTING	5	CORRIDOR	222	w	1.00	222	222	DIM
4	B	LIGHTING	5	CORRIDOR	420	w	1.00	420	420	DIM
5	C	SPARE				w		0	0	
6	C	LIGHTING	5	MEETING ROOM 2112	1200	w	1.00	1200	1200	DIM
7	A	LIGHTING	5	MEETING ROOM 2111	1200	w	1.00	1200	1200	DIM
8	A	LIGHTING	5	MEETING ROOM 2115	1500	w	1.00	1500	1500	DIM
9	B	LIGHTING	5	MEETING ROOM 2115	148	w	1.00	148	148	DIM
10	B	LIGHTING	5	PUBLIC RESTROOMS	555	w	1.00	555	555	DIM
11	C	LIGHTING	5	PUBLIC RESTROOMS	259	w	0.60	259	432	DIM
12	C	SPARE				w		0	0	
13	A	LIGHTING	3	BALLROOM	96	w	0.95	96	101	DIM
14	A	SPARE				w		0	0	
15	B	LIGHTING	5	PRE-FUNCTION	370	w	1.00	370	370	DIM
16	B	LIGHTING	5	PRE-FUNCTION	222	w	1.00	222	222	DIM
17	C	LIGHTING	5	PRE-FUNCTION	222	w	1.00	222	222	DIM
18	C	LIGHTING	5	PRE-FUNCTION	360	w	1.00	360	360	DIM
19	A	SPARE				w		0	0	
20	A	SPARE				w		0	0	
21	B	LIGHTING	5	PRE-FUNCTION	222	w	1.00	222	222	DIM
22	B	SPARE				w		0	0	
23	C	SPARE				w		0	0	
24	C	SPARE				w		0	0	
25	A	SPARE				w		0	0	
26	A	SPARE				w		0	0	
27	B	SPARE				w		0	0	
28	B	SPARE				w		0	0	
29	C	SPARE				w		0	0	
30	C	SPARE				w		0	0	
31	A	SPARE				w		0	0	
32	A	SPARE				w		0	0	
33	B	SPARE				w		0	0	
34	B	SPARE				w		0	0	
35	C	SPARE				w		0	0	
36	C	SPARE				w		0	0	
PANEL TOTAL								9.0	9.2	Amps= 25.5

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					4.79	4.80	52%	40.0
PHASE TOTAL	B					2.16	2.16	24%	18.0
PHASE TOTAL	C					2.04	2.21	24%	18.4

LOAD CATAGORIES			Connected			Demand				Ver. 104
			kW	kVA	DF	kW	kVA	PF		
1	receptacles		0.0	0.0	0.70	0.0	0.0			
2	computers		0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting		0.1	0.1	1.00	0.1	0.1	0.95		
4	HID lighting		0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting		8.9	9.1	1.00	8.9	9.1	0.98		
6	HVAC fans		0.0	0.0	0.80	0.0	0.0			
7	heating		0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment		0.0	0.0	0.80	0.0	0.0			
9	unassigned		0.0	0.0	1.00	0.0	0.0			
Total Demand Loads						9.0	9.2			
Spare Capacity			20%			1.8	1.8			
Total Design Loads						10.8	11.0	0.98	Amps=	30.6

30.6 * 1.25 = 38.22 A ➔ 40A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #8 AWG + #10 AWG Ground
(Feeder worksheet shown below in Table 14)

EDIM212 **Conduit Sizing Worksheet**

Total Cross Sectional of Wire Area	0.1675	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	0.75 "	EMT
Calculated IMC Conduit Size (minimum size is 3/4")	0.75 "	IMC
Calculated RMC Conduit Size (minimum size is 3/4")	0.75 "	RMC
Calculated RNC Conduit Size (minimum size is 3/4")	0.75 "	RNC
Ref: 2005 NEC, Tables 4, 5 and 8		

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243	1	0.0211		0.0243		0.011	1	0.0211
8		0.0437	4	0.0366		0.0437		0.017	4	0.1464

DIM212B

PANELBOARD SIZING WORKSHEET

Panel Tag---------->				DIM212B	Panel Location:			Storage 2108		
Nominal Phase to Neutral Voltage------->				120	Phase:			3		
Nominal Phase to Phase Voltage-------->				208	Wires:			4		
DIMMING PANEL "DIM212B" 120/208V, 3Ph., 4W. __A MCB - Emergency Power										
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Control Type
1	A	LIGHTING	9	BALLROOM-A	680	w	0.95	680	716	DIM
2	A	LIGHTING	9	BALLROOM-A	531	w	0.95	531	559	DIM
3	B	LIGHTING	3	BALLROOM-A	270	w	0.90	270	300	DIM
4	B	LIGHTING	3	BALLROOM-A	520	w	0.90	520	578	DIM
5	C	LIGHTING	3	BALLROOM-B	592	w	0.90	592	658	DIM
6	C	LIGHTING	9	BALLROOM-B	738	w	0.95	738	777	DIM
7	A	LIGHTING	9	BALLROOM-B	350	w	0.95	350	368	DIM
8	A	LIGHTING	3	BALLROOM-C	680	w	0.90	680	756	DIM
9	B	LIGHTING	9	BALLROOM-C	531	w	0.95	531	559	DIM
10	B	LIGHTING	9	BALLROOM-C	270	w	0.95	270	284	DIM
11	C	LIGHTING	3	BALLROOM-C	520	w	0.90	520	578	DIM
12	C	SPARE				w		0	0	
13	A	SPARE				w		0	0	
14	A	SPARE				w		0	0	
15	B	SPARE				w		0	0	
16	B	SPARE				w		0	0	
17	C	SPARE				w		0	0	
18	C	SPARE				w		0	0	
19	A	SPARE				w		0	0	
20	A	SPARE				w		0	0	
21	B	SPARE				w		0	0	
22	B	SPARE				w		0	0	
23	C	SPARE				w		0	0	
24	C	SPARE				w		0	0	
25	A	SPARE				w		0	0	
26	A	SPARE				w		0	0	
27	B	SPARE				w		0	0	
28	B	SPARE				w		0	0	
29	C	SPARE				w		0	0	
30	C	SPARE				w		0	0	
31	A	SPARE				w		0	0	
32	A	SPARE				w		0	0	
33	B	SPARE				w		0	0	
34	B	SPARE				w		0	0	
35	C	SPARE				w		0	0	
36	C	SPARE				w		0	0	
PANEL TOTAL								5.7	6.1	Amps= 17.0

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					2.24	2.40	39%	20.0
PHASE TOTAL	B					1.59	1.72	28%	14.3
PHASE TOTAL	C					1.85	2.01	33%	16.8

LOAD CATAGORIES			Connected			Demand				Ver. 104
			kW	kVA	DF	kW	kVA	PF		
1	receptacles		0.0	0.0	0.70	0.0	0.0			
2	computers		0.0	0.0	0.90	0.0	0.0			
3	fluorescent lighting		2.6	2.9	1.00	2.6	2.9	0.90		
4	HID lighting		0.0	0.0	1.00	0.0	0.0			
5	incandescent lighting		0.0	0.0	1.00	0.0	0.0			
6	HVAC fans		0.0	0.0	0.80	0.0	0.0			
7	heating		0.0	0.0	1.25	0.0	0.0			
8	kitchen equipment		0.0	0.0	0.80	0.0	0.0			
9	unassigned		3.1	3.3	1.00	3.1	3.3	0.95		
Total Demand Loads						5.7	6.1			
Spare Capacity			20%			1.1	1.2			
Total Design Loads						6.8	7.4	0.93	Amps=	20.4

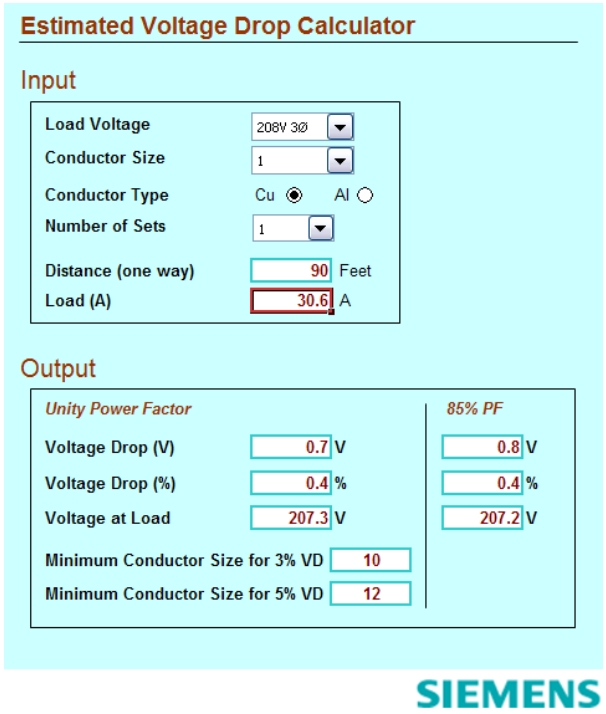
20.4 * 1.25 = 25.55 A ➔ 35A CIRCUIT BREAKER; 100A BUS BARS
Feeder: (4) #8 AWG + #10 AWG Ground
(Feeder worksheet shown below in Table 14)

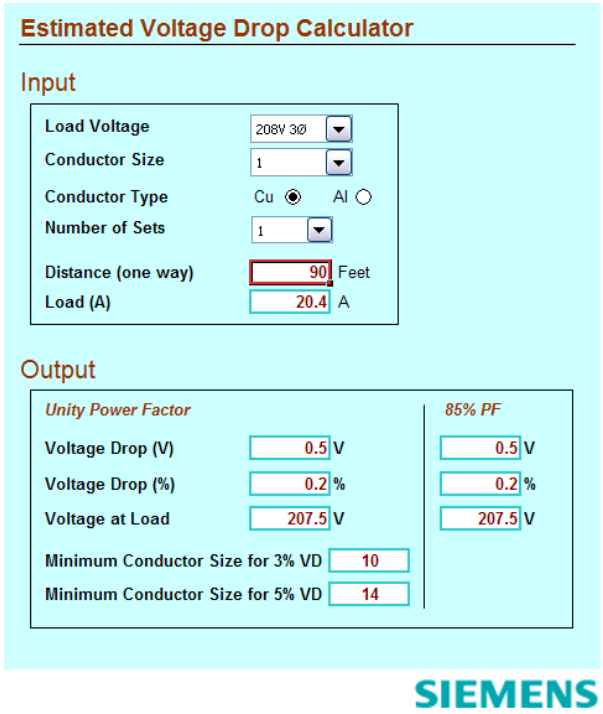
DIM212B	Conduit Sizing Worksheet										
Total Cross Sectional of Wire Area									0.1675	sq. inches	
Calculated EMT Conduit Size (minimum size is 3/4")									0.75 "	EMT	
Calculated IMC Conduit Size (minimum size is 3/4")									0.75 "	IMC	
Calculated RMC Conduit Size (minimum size is 3/4")									0.75 "	RMC	
Calculated RNC Conduit Size (minimum size is 3/4")									0.75 "	RNC	
Ref: 2005 NEC, Tables 4, 5 and 8											
									Totals		
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area	
	No.	Area	No.	Area	No.	Area	No.	Area			
14		0.0139		0.0097		0.0139		0.004	0	0	
12		0.0181		0.0133		0.0181		0.006	0	0	
10		0.0243	1	0.0211		0.0243		0.011	1	0.0211	
8		0.0437	4	0.0366		0.0437		0.017	4	0.1464	

Table 14: Feeder Sizing Worksheet for the Entry Courtyard lighting branch circuit redesign.

FEEDER SIZING WORKSHEET		
Panelboard Tag	EDIM212	DIM212B
Panelboard Voltage	120/208	120/208
Calculated Design Load (kW)	10.8	6.8
Calculated Design Load (kVA)	11.9	7.4
Calculated Design Load (amps)	30.6	20.4
Feeder Sizing		
Sets	1	1
Wire Size		
Phase	#8 AWG	#8 AWG
Neutral	#8 AWG	#8 AWG
Ground	#10 AWG	#10 AWG
Wire Area		
Each Phase	0.0366	0.0366
Total - Phase Conductors	0.1098	0.1098
Neutral	0.0366	0.0366
Ground	0.0211	0.0211
Total Area	0.1675	0.1675
Conduit Size	0.75" EMT	0.75" EMT

Voltage Drop for EDIM212, DIM212B

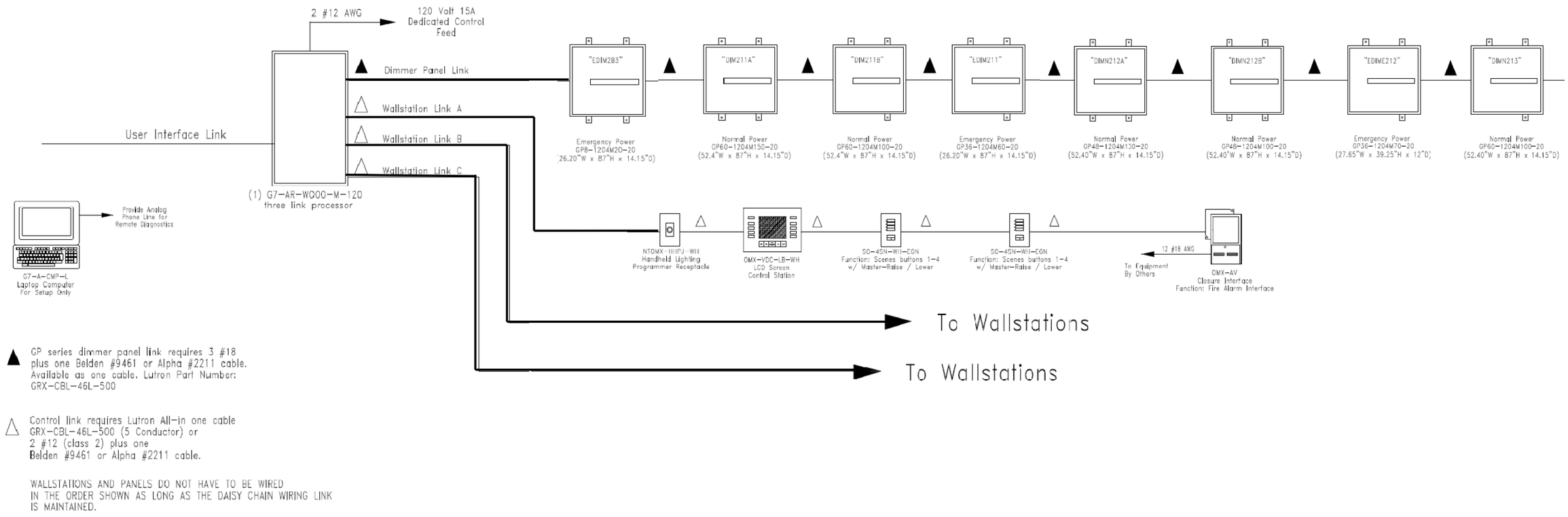




Dimming Control Diagram

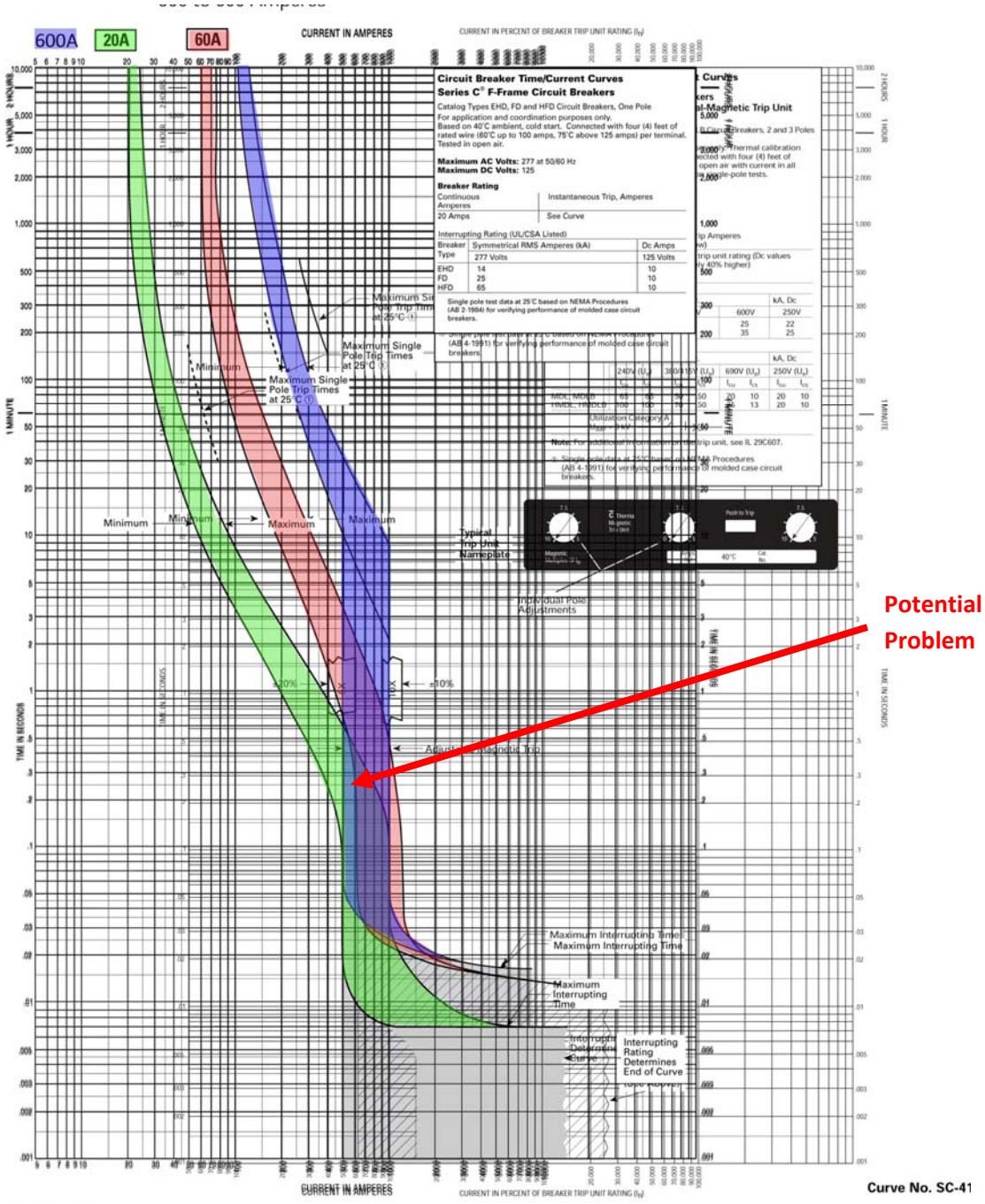
The Salamander Resort and Spa specialty lighting is completely powered by Lutron GP Dimming Panels (See Appendix C for specifications). The control portion of the lighting is done by a GRAFIK Eye system. The general dimming control diagram is shown in Figure 69 below.

Figure 69: GRAFIK Eye 7000 Dimming Control Diagram.



Overcurrent Device Coordination Study

- Main Switchboard – MSB
  - 3200AT
- Distribution Panel – DN4G4A
  - 600A MLO
- Branch Circuit Panel – N414A
  - 60A MLO



There is a potential problem between the minimum trip rating of the 600A breaker and the 60A breaker, where the minimum trip rating falls slightly below the minimum trip rating of the 60A breaker.

Short Circuit Calculation

SHORT CIRCUIT ANALYSIS - PER UNIT METHOD							
		SYSTEM VOLTAGE		480			
		BASE kVA		2500			
		AVAILABLE FAULT (kVA) - UTILITY COMPANY (ASSUMED)		100000	∑ X	∑ R	∑ Z	I_{SC} (A)
UTILITY PRIMARY								
		$X(p.u.) = (KVA_{base})/(UTILITY\ S.C.\ KVA)$	=	0.025	0.025	0	0.025	120281.3
TRANSFORMER SECONDARY								
%Z=	5.5	$X_{(p.u.)} = (\%X*KVA_{base})/(100*KVA_{xfmr})$	=	0.0548	0.0798	0.0046	0.0799	37615.83
X/R=	12	$R_{(p.u.)} = (\%R*KVA_{base})/(100*KVA_{xfmr})$	=	0.0046				
%X=	5.481							
%R=	0.457							
Kva=	2500							
SWITCHBOARD MSB								
WIRE=	600	$X_{(p.u.)} = (L*X_L*KVA_{base})/(1000^2*\#\ of\ Sets*kV^2)$	=	0.005024	0.0848	0.0074	0.0852	35313.61
LENGTH=	80	$R(p.u.) = (L*R*KVA_{base})/(1000^2*\#\ of\ Sets*kV^2)$	=	0.002789				
SETS=	8							
X=	0.00046							
R=	0.00026							
DISTRIBUTION PANEL DN4G4A								
WIRE=	600	$X_{(p.u.)} = (L*X_L*KVA_{base})/(1000^2*\#\ of\ Sets*kV^2)$	=	0.150716	0.2356	0.0910	0.2525	11907.99
LENGTH=	600	$R_{(p.u.)} = (L*R*KVA_{base})/(1000^2*\#\ of\ Sets*kV^2)$	=	0.083659				
SETS=	2							
X=	0.01389							
R=	0.00771							

Electrical Depth Topic: Static vs. Rotary Uninterruptable Power Supply (UPS)

The following analysis compares advantages and disadvantages of static and rotary uninterruptible power sources. The electrical engineering design of the Salamander Resort and Spa currently specifies a Liebert N-Power-80 Double Conversion Static UPS of 80 kVA. The purpose of this comparative analysis is to determine whether a static or rotary UPS should be specified in the context of this building. Multiple electrical design sources state that at 80kVA, the vast majority of UPS systems specified are static. This study will analyze whether the latest technology in "battery free" flywheel UPS's are worth substituting the existing static device. The defining factors for making a conclusion are the following: efficiency, cost, maintenance, and environmental impact.

Being that different UPS systems are optimized by different building sizes and applications, it is important in this study to understand the context and specific application of the UPS in the Salamander Resort and Spa. While the resort is large (230,000 sq.ft.), it does not contain typical critical equipment found in hospitals or data centers, where UPS systems are needed to maintain clean power flow between power failures and emergency generator start-up. However, security is an important issue for this luxury resort. Therefore, the UPS specified for the Salamander Resort and Spa contains two panels that provide circuits of uninterruptible power to security racks, cabinets, receptacles and plug strips that are critical to the safety of the resort. Salamander Hospitality is clearly concerned with security; therefore, the most reliable UPS system at the lowest cost is desirable. This analysis will determine whether that UPS system is a static or rotary structure.

The main difference between static and rotary UPS systems is the way the critical power is generated and supplied to critical loads. Piller Power Systems even markets a "Hybrid Rotary" UPS, which combines batteries and a flywheel. The question remains, "which system is the best?" In an Eaton white paper titled, "Emerging UPS Standby Power Sources," the following conclusions are made:

A. Static UPS- Lead Acid Batteries
   - Advantages
     - Suitable for long idle time and sudden, rapid use at high current
     - Lead acid ideal for high amounts of current on short notice
     - High amount of backup time (5-15 minutes) at low price
     - Most cost effective standby power storage solution currently available
   - Disadvantages
     - Large in size and extremely heavy: medium sized UPS systems can weigh 5-8 tons.
     - High Maintenance costs: marketed as "maintenance free"; however, need to be inspected at least twice a year by specialists at about $1,000+ per year.
     - High replacement costs: 4-5 year service life. Must budget to replace batteries 2-3 times over the lifespan of the UPS.
     - High disposal costs: contain highly toxic sulfuric acid. Disposal is tightly regulated and very expensive.

- Battery reliability must be tested, which permanently reduces capacity and operating life each time.

B. Flywheels – under normal operation, power spins a large disk. The disk continues to spin under a power outage, generating DC power during generator start-up until the disk finally stops spinning.
   - Advantages
     - Compact size: significantly smaller and lighter than batteries
     - Environmental impact: do not contain ecologically-harmful chemicals
     - Long lifespan: Ten-year service life. Can be used hundreds or thousands of times without affecting performance or service life.
     - Lower maintenance overhead: simple mechanism requiring less maintenance and at a lower cost of service.
   - Disadvantages
     - Lower backup time: typically can maintain standby energy for only 30 seconds, compared to 15 minutes from batteries. Multiple flywheels add time but also cost.
     - Higher cost: purchase price of the average flywheel UPS system is about double the initial cost of the average lead acid battery-based system.

Presently, static systems are primarily used based on the disparity between backup times. The fifteen minutes that batteries can provide compared to 30 seconds with a flywheel seems to be quite a deciding factor. However, under specification section 16231 – Packaged Engine Generator, section 2.2D8: the start time is required to comply with NFPA 110, Type 10 system requirements. Under NFPA 110, Type 10, the maximum time between a utility outage and the standby generator supplies power is 10 seconds or less. This begs the question of why batteries of 15-minute capacity are even necessary? The 30 seconds provided by a flywheel rotary system would cover the gap between outage and emergency power. The issue of initial cost is still in favor static systems, with rotary flywheel UPS's costing as much as double up front.

In a study complete by Dr. Ian F. Bitterlin from Prism Power in Watford, UK, a group of flywheel energy storage UPS products were compared against battery energy storage UPS products for relative reliability in terms of Mean Time Between Failures (MTBF) and total cost of ownership. Figure 1 below shows the results of MTBF over service life between a flywheel and battery. A 10-year battery is proven to decrease by half MTBF at 8 years. It is then replaced and full MTBF is restored, creating the "saw-tooth" graph in Figure 70. Dr. Bitterlin's research data of Relative Reliability in MTBF between flywheel and batter products is shown in Figure 71. The two rows highlighted in blue are battery UPS products.

Figure 70: Mean Time Between Failure vs. Service life for flywheels and batteries in terms of energy storage/backup for UPS systems.

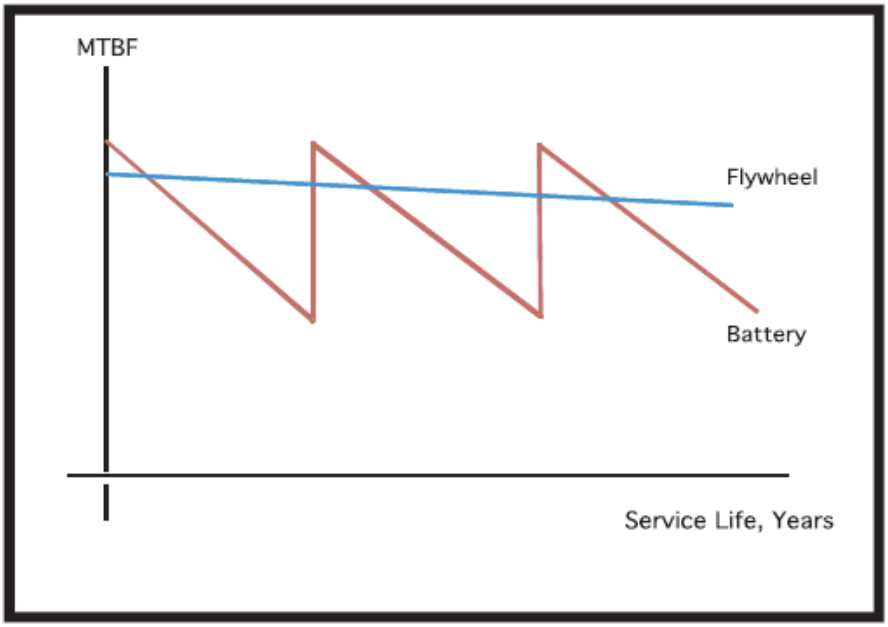


Figure 71: Mean Time Between Failure vs. Service life for flywheels and batteries in terms of energy storage/backup for UPS systems.

Energy Storage	Relative Reliability	Availability
KST-Rotabloc	100.0%	99.9968%
Active Power CSDC	41.7%	99.9953%
Piller Powerbridge	41.1%	99.9953%
10-Year VRLA Multi-String	40.7%	99.9829%
Vycon VDC	26.8%	99.9892%
Pentadyne	25.5%	99.9775%
5-Year VRLA Single-String	4.1%	99.8289%

At first glance, this data shows a competitive edge for flywheel systems. Unfortunately, all the flywheel products listed in Figure 2 are for applications that require more power than the Salamander Resort and Spa. As the sizes of rotary UPS products decrease, so do the efficiencies of those products. The KST-Rotabloc shown in Figure 2 drops from 96.2% efficiency at 1500 kVA to 92.5% efficiency at 200kVA (www.keitec.com). The Liebert 80kVA NPower static UPS specified in the Salamander Resort and Spa lists an efficiency of 92-93.5%.

This analysis also led to a discovery that all commercially available flywheel products are for slightly larger applications than the Salamander Resort and Spa. Therefore, availability is a real problem for finding a viable rotary replacement for the static UPS specified in this building.

Conclusions

Table 1 shows the conclusions made from research between static UPS systems and "battery free" flywheel UPS systems. While maintenance costs are cheaper for flywheels and batteries have much higher associated costs, the first costs can be double the price of a static system. (American Power Conversion Symmetra PX 80kW Scalable to 80kW N+1 with Premium XR Battery is listed at $71,100.00) Rotary UPS efficiencies are listed as higher than static; however, at 80kVA those efficiencies drop lower than the NPower static UPS. Backup time is the largest disparity between the two technologies. Batteries can provide 15 minutes of backup time, while the best flywheels can only provide 30 seconds. However, it was discovered that 30 seconds would actually cover the 10 seconds that the generator needs to start up.

While flywheel technologies may have a promising future, currently due to cost, efficiency, and no commercial true rotary products available the size of 80kVA, the Salamander Resort and Spa is recommended to use a static UPS.

	Static	Rotary
Efficiency	X	
Cost	X	
Maintenance		X
Backup Time	X	
Environmental Impact		X
Availability	X	

Sources:

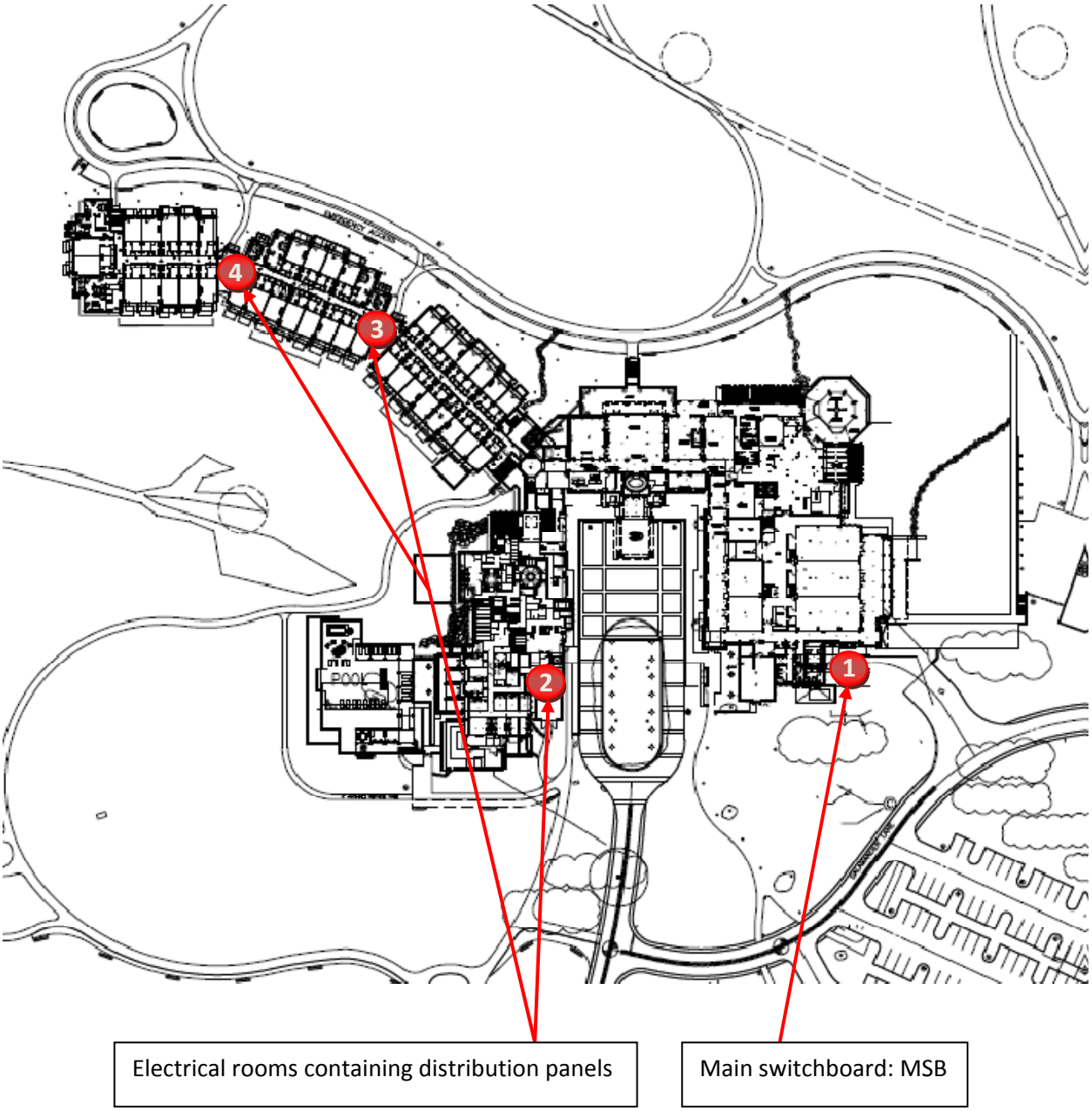
1. "Emerging UPS Standby Power Sources," by Ed Spears – Eaton Corporation: White Paper 10, December 2009.
2. "Flywheel Energy Storage: an alternative to batteries in UPS Systems," by Dr. Ian F. Bitterlin – Prism Power.
3. KPS Rotary UPS brochure. http://www.keyitec.com.
4. www.liebert.com

Electrical Depth Topic #2: Long Run Copper Feeders vs. Electrical Bus Duct

The goal of this analysis was to complete a study that would provide data for an economical engineering decision. Specifically, the Salamander Resort and Spa distributes power from the main electrical room, "Main Distribution Frame," by use of feeders only. While feeders are cost effective for short runs between electrical equipment, the hypothesis is that a lower cost solution may be available for long distances between equipment. This analysis provides cost comparisons between the use of long-run feeders and busduct from the main switch board to distribution panels.

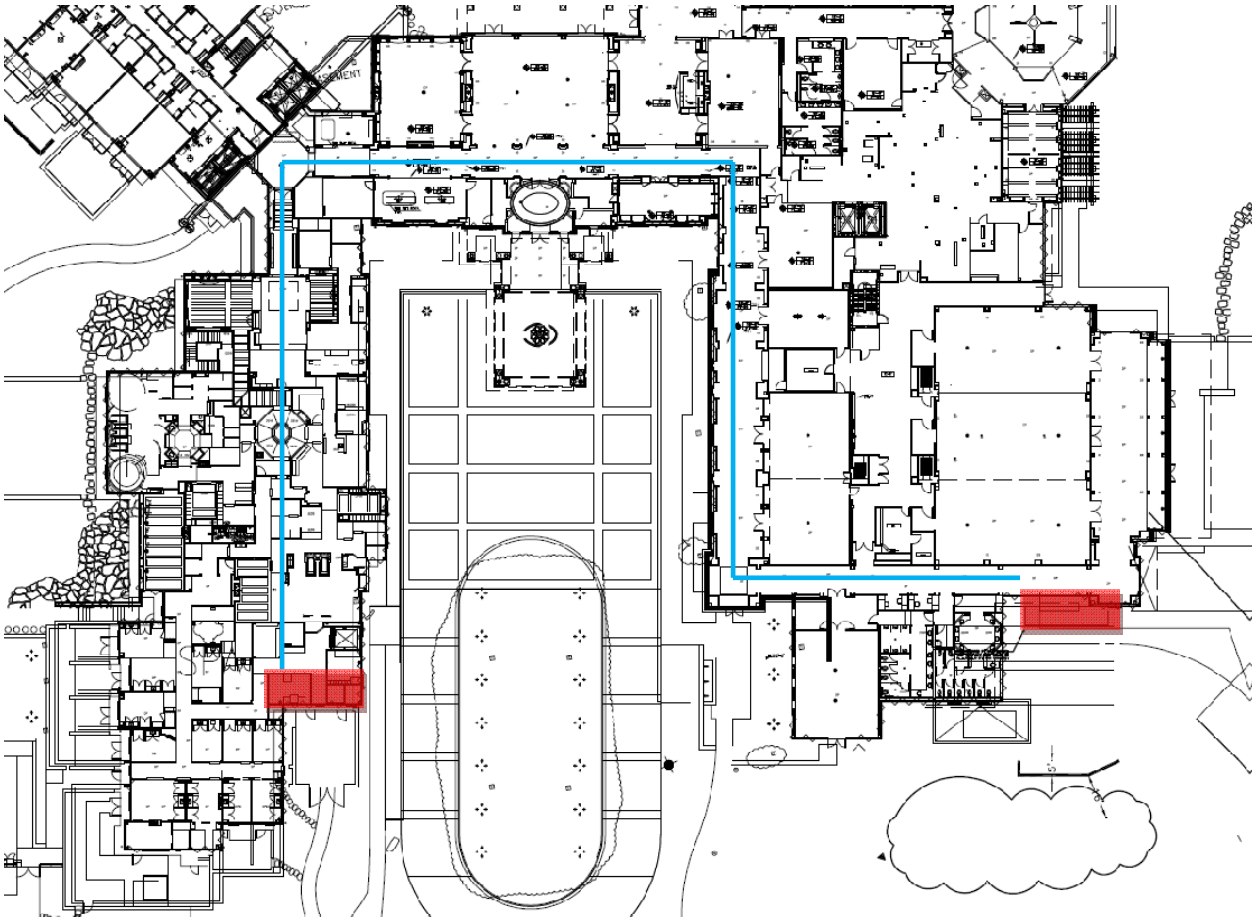
There are four main electrical rooms in the Salamander Resort and Spa: the Main Distribution Frame room, which contains the main switchboard, "MSB" ; Mechanical Room 3B20, containing distribution panels "DN4B3" and "DN4B3A" ; Electrical/Telecommunications Room 4G53, containing distribution panel "DN4G4A" ; and Electrical/Telecommunications Room 4G56, containing distribution panel "DN4G4B." Figure 72 shows the location of these rooms. Using the existing feeder design plus four other busduct designs, the five scenarios and their respective costs were compared to find the most economical solution. The five scenarios are described in detail below.

Figure 72: Locations of main electrical equipment.



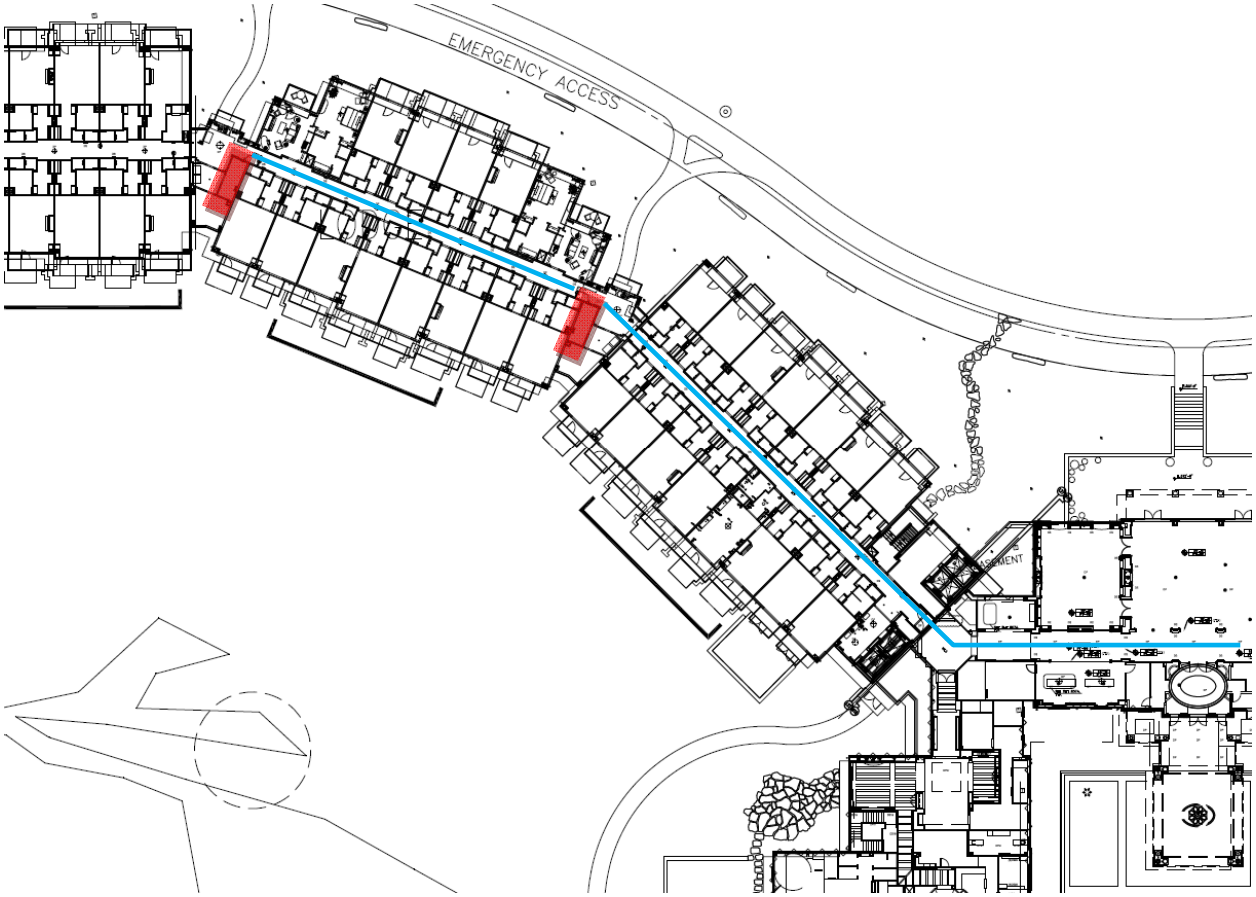
1. Main Distribution Frame Room 2B03 – Main Switchboard "MSB"
2. Mechanical Room 3B20 – Distribution Panels "DN4B3" and "DN4B3A"
3. Electrical/Telecommunications Room 4G53 – Distribution Panel "DN4G4A"
4. Electrical/Telecommunications Room 4G56– Distribution Panel "DN4G4B"

Figure 73: Distance from MSB to DN4B3/DN4B3A = 610 ft.



An appropriate path was determined for the runs of busduct. Distances, as well as the number of turns for elbow fittings, are cost-determining factors. From MSB to DN4B3 and DN4B3A, there is a distance of 610 feet with three elbow fittings and a end box to tap off and distribute power from the busduct down to the panels.

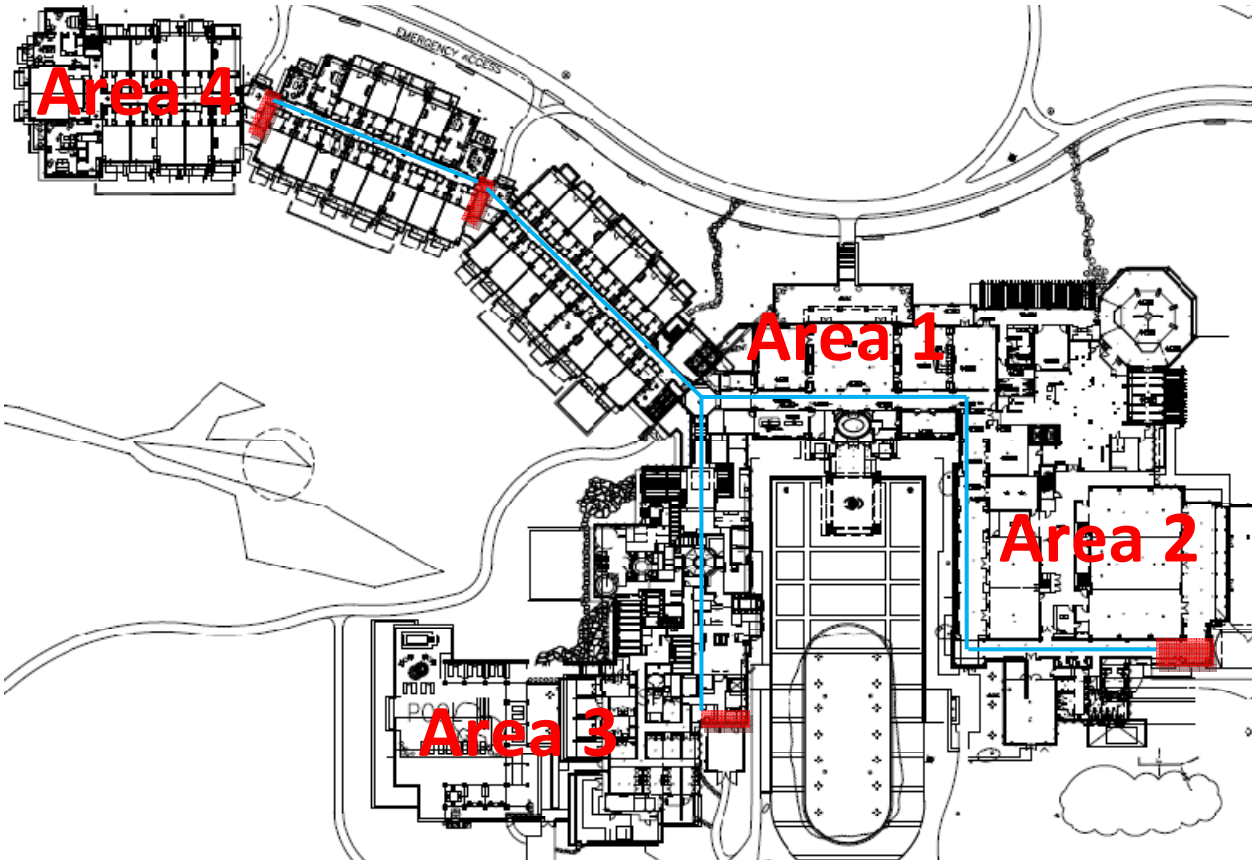
Figure 74: Distance from MSB to DN4G4A = 600 ft.; Distance from MSB to DN4G4B = 741 ft. ; Distance from DN4G4A to DN4G4A = 141 ft.



Power is distributed to these electrical rooms in Area 4 of the building, which is the Lodge wing of the building. The ground level electrical rooms contain the distribution panels, which then distribute power vertically to branch circuit panels in floors 1-4.

Analysis Scenarios

- **Scenario #1:** Existing scenario – Feeders from MSB to DN4B3/DN4B3A/DN4G4A/DN4G4B
- **Scenario #2:** Separate bus duct – (1) Busduct from Main Distribution Frame to Mech. Rm. 3B20; (1) Busduct from Main Dist. Frame to 4G53; (1) Busduct from ELEC/TELE Rm. 4G53 to ELEC/TELE Rm.4G56
- **Scenario #3:** (1) Large busduct + tap-offs to panels – (1) Busduct from Main Dist. Frame to corridor between Area 3 and Area 4; Tap-off to DN4B3/DN4B3A; Tap-off to DN4G4A/DN4G4B
- **Scenario #4:** Scenario #2 with Aluminum Busduct
- **Scenario #5:** Scenario #3 with Aluminum Busduct



Results

Scenario # 1: Feeders to Distribution Panels

- [Cost of Phase wires + cost of neutral wires + cost of ground wires] * [total distance/100] + [Cost of conduit * distance]

FEEDER COST DATA													
FEEDER NUMBER	FROM	TO	# OF SETS	WIRE SIZE - PHASE	WIRE SIZE - NEUTRAL	WIRE SIZE - GROUND	CONDUIT SIZE	DISTANCE (ft.)	PHASE COST/100FT	NEUTRAL COST/100FT	GROUND COST/100FT	CONDUIT COST/LF.	TOTAL COST
12	MSB	DN4B3	1	(3) 600KCMIL	(1) 600 KCMIL	(1) 3AWG	4"	670	5550	1850	260	34.5	$74,437.00
22	MSB	DN4B3A	1	(3) 600KCMIL	(1) 600 KCMIL	(1) 3AWG	4"	670	5550	1850	260	34.5	$74,437.00
14	MSB	DN4G4B	3	(3) 500KCMIL	(1) 500 KCMIL	(1) 2/0AWG	3-1/2"	741	4950	1650	555	31.5	$229,080.15
15	MSB	DN4G4A	2	(3) 600KCMIL	(1) 600 KCMIL	(1) 1/0AWG	4"	600	5550	1850	455	34.5	$135,660.00

TOTAL** $513,614.15

Scenario # 2: Individual Busduct to Distribution Panels

- [Cost of transition elbows/tees/etc. + Cost of End Box/Cable Tap Box] + [Cost of Feeder within busduct/ft. * Distance]

BUS DUCT COST DATA - Scenario 2							
FROM	TO	SIZE	DISTANCE	TRANSITION COST	END BOX/CABLE TAP BOX	FEEDER Cost/LF.	TOTAL COST
MSB	DN4G4A	1200A	600	6225	2450	380	$236,675.00
DN4G4A	DN4G4B	600A	141	0	1725	219	$32,604.00
MSB	DN4B3/DN4B3A	800A	610	5100	1931	268	$170,511.00

TOTAL** $439,790.00

Scenario # 3: Large Busduct Tapping-Off to Distribution Panels

- [Cost of transition elbows/tees/etc. + Cost of End Box/Cable Tap Box] + [Cost of Feeder within busduct/ft. * Distance]

BUS DUCT COST DATA - Scenario 3							
FROM	TO	SIZE	DISTANCE	TRANSITION COST	END BOX/CABLE TAP BOX	FEEDER Cost/LF.	TOTAL COST
MSB	CORRIDOR BETWEEN AREA 3 & 4	2000A	426	5850	3425	620	$273,395.00
TAP OFF TO	DN4G4A	1200A	175	0	2450	380	$68,950.00
DN4G4A	DN4G4B	600A	141	0	1725	219	$32,604.00
TAP OFF TO	DN4B3/DN4B3A	800A	182	0	1925	219	$41,783.00

TOTAL** $416,732.00

Scenario # 4: Scenario #2 with Aluminum Busduct

BUS DUCT COST DATA - Scenario 2 (Aluminum)							
FROM	TO	SIZE	DISTANCE	TRANSITION COST	END BOX/CABLE TAP BOX	FEEDER Cost/LF.	TOTAL COST
MSB	DN4G4A	1200A	600	6225	2525	270	$170,750.00
DN4G4A	DN4G4B	600A	141	0	1825	201	$30,166.00
MSB	DN4B3/DN4B3A	800A	610	4200	2025	237	$150,795.00

TOTAL** $351,711.00

Scenario # 5: Scenario #3 with Aluminum Busduct

BUS DUCT COST DATA - Scenario 3 (Aluminum)							
FROM	TO	SIZE	DISTANCE	TRANSITION COST	END BOX/CABLE TAP BOX	FEEDER Cost/LF.	TOTAL COST
MSB	CORRIDOR BETWEEN AREA 3 & 4	2000A	426	5750	3700	535	$237,360.00
TAP OFF TO	DN4G4A	1200A	175	0	2525	270	$49,775.00
DN4G4A	DN4G4B	600A	141	0	1825	201	$30,166.00
TAP OFF TO	DN4B3/DN4B3A	800A	182	0	2025	237	$45,159.00
TOTAL**	$362,460.00						

**NOTE: Cost figures taken from RS Means Electrical Cost Data (2009)

Comparison:

Scenario	Total Cost
#1: MSB to Distribution Panels via Feeders	**$513, 614.15**
#2: Individual Busduct to Distribution Panels	**$439.790.00**
#3: Large Busduct with Tap-offs to Panels	**$416,732.00**
#4: Scenario #2 with Aluminum Busduct	**$351,711.00**
#5: Scenario #3 with Aluminum Busduct	**$362,460.00**

Conclusion:

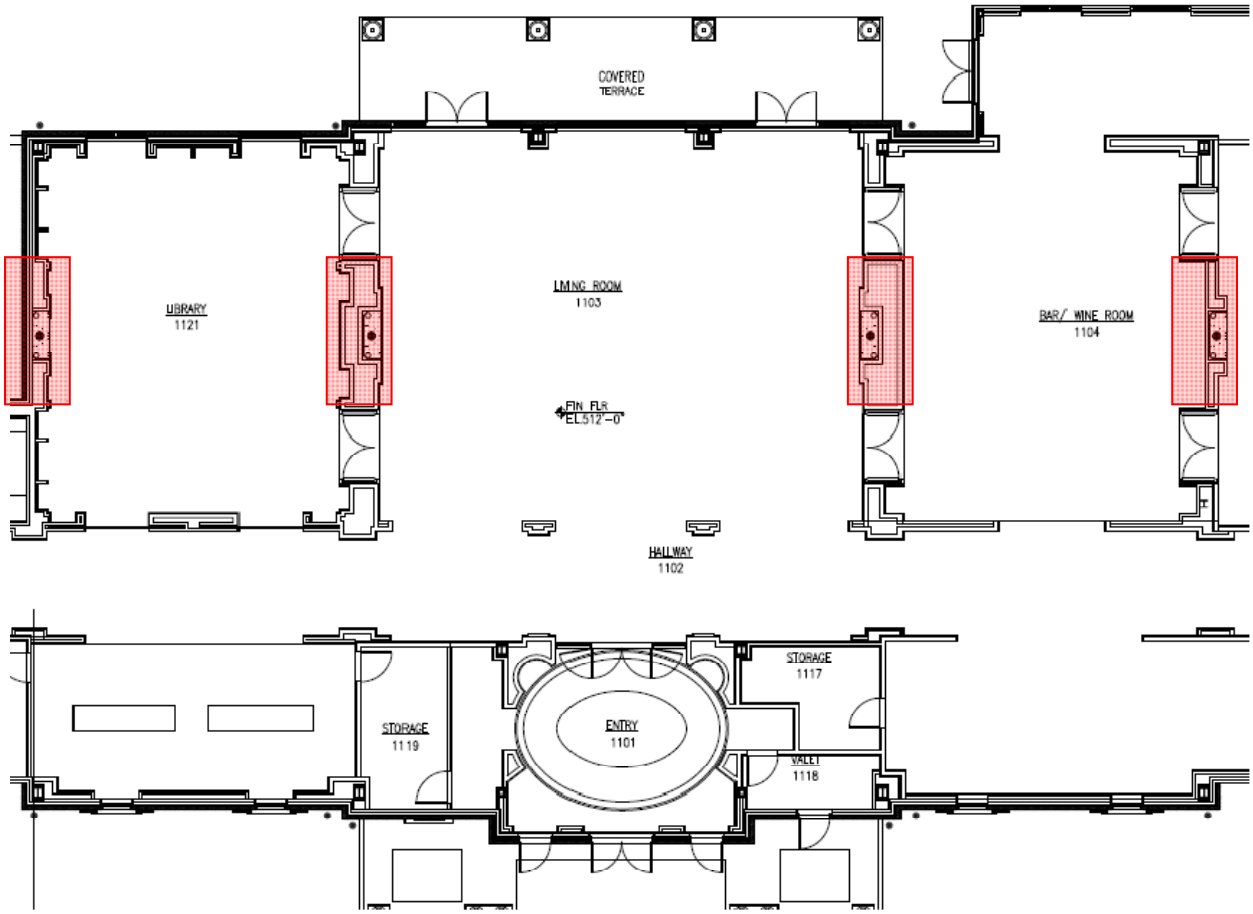
From the results of this analysis, the recommended scenario would be to distribute power from the main electrical room to distribution panels using smaller individual runs of aluminum busduct. This design would save **$161,903.15**.

Architectural Breadth Topic: Fireplace Design

During a personal tour of the construction site of the Salamander Resort and Spa in August 2009, the mechanical contractor spoke of problems with the constructability of the fireplaces. Mechanical engineers designed exhaust ductwork to fit within the fireplace chimneys; however, this space was tight to begin with, causing problems early on in construction. A considerable amount of money went into change orders to prefabricate the fireplace ductwork systems before installation.

As an architectural breadth topic, the design goal will be to increase the shaft size within the fireplace and chimney to make mechanical ductwork construction feasible. Also, aesthetics and sustainable design will play a part in this change. Being that the fireplace on the eastern wall of the Living Room shares a wall with the Wine Bar, opening the fireplace to both rooms could create two completely different and unique features for guests. The Living Room fireplace design will be ornate and clean in appearance, while the Wine Bar side of the fireplace will have a rougher look with reclaimed stone and ruble from a local stone manufacturer attached as a veneer. The Wine Bar has rustic features like a reclaimed wood barn door as the bar surface; therefore, this aesthetic will mold in the room nicely and add a feature to the interior environment.

Figure 74a: Locations of fireplaces highlighted in red.



In Figure 74b, the plan view of the fireplace redesign is shown. By opening up the fireplace on the Wine Bar side, the chimney shaft area was nearly doubled, which will clearly improve constructability and prevent costly change orders for prefabrication. Figures 74c and 74d show the elevation view of the Wine Bar-side fireplace design.

Figure 74b: Fireplace redesign plan.

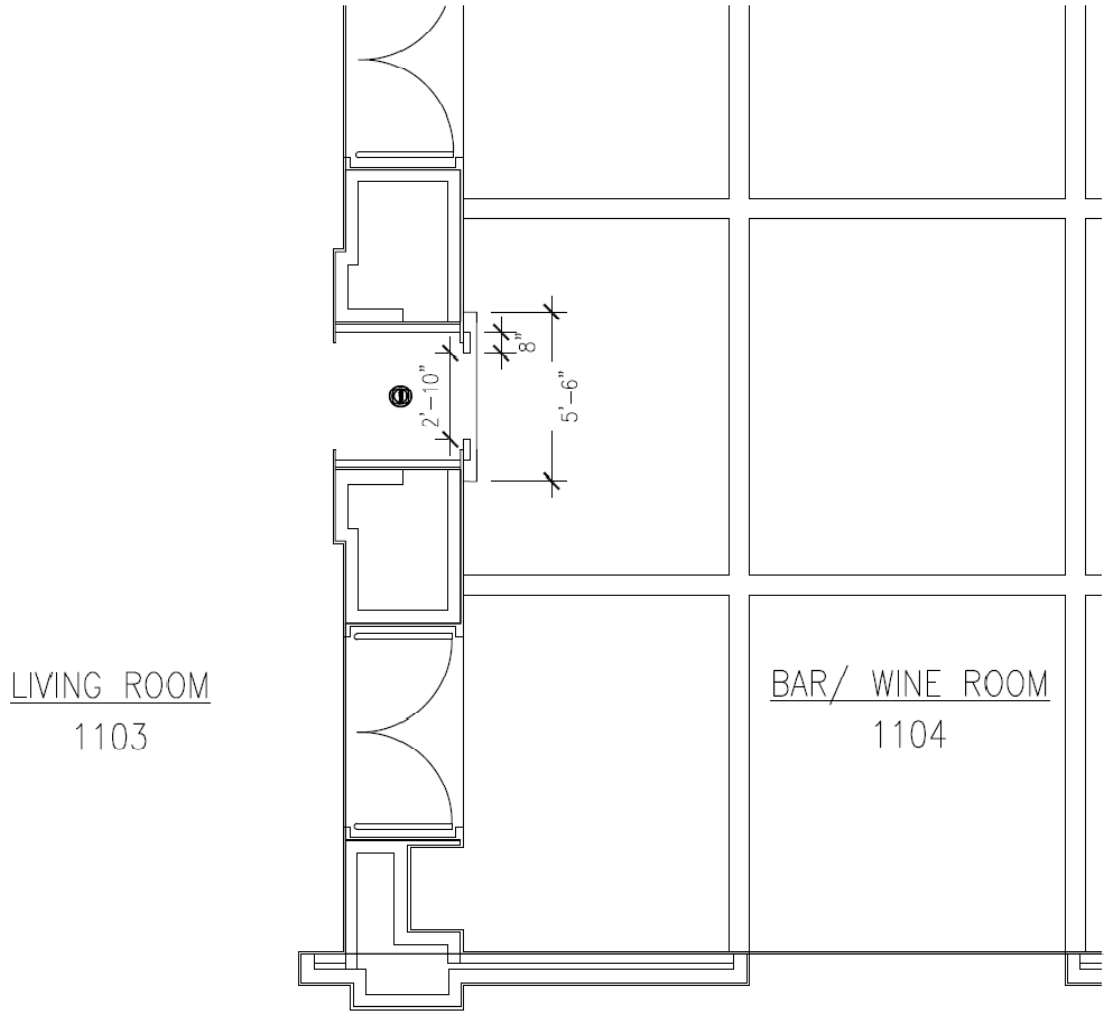


Figure 74c: Fireplace redesign elevation.

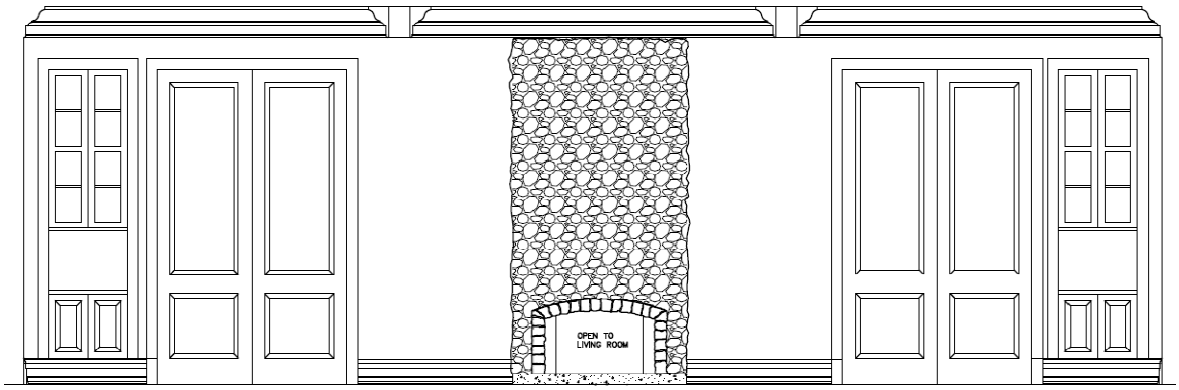
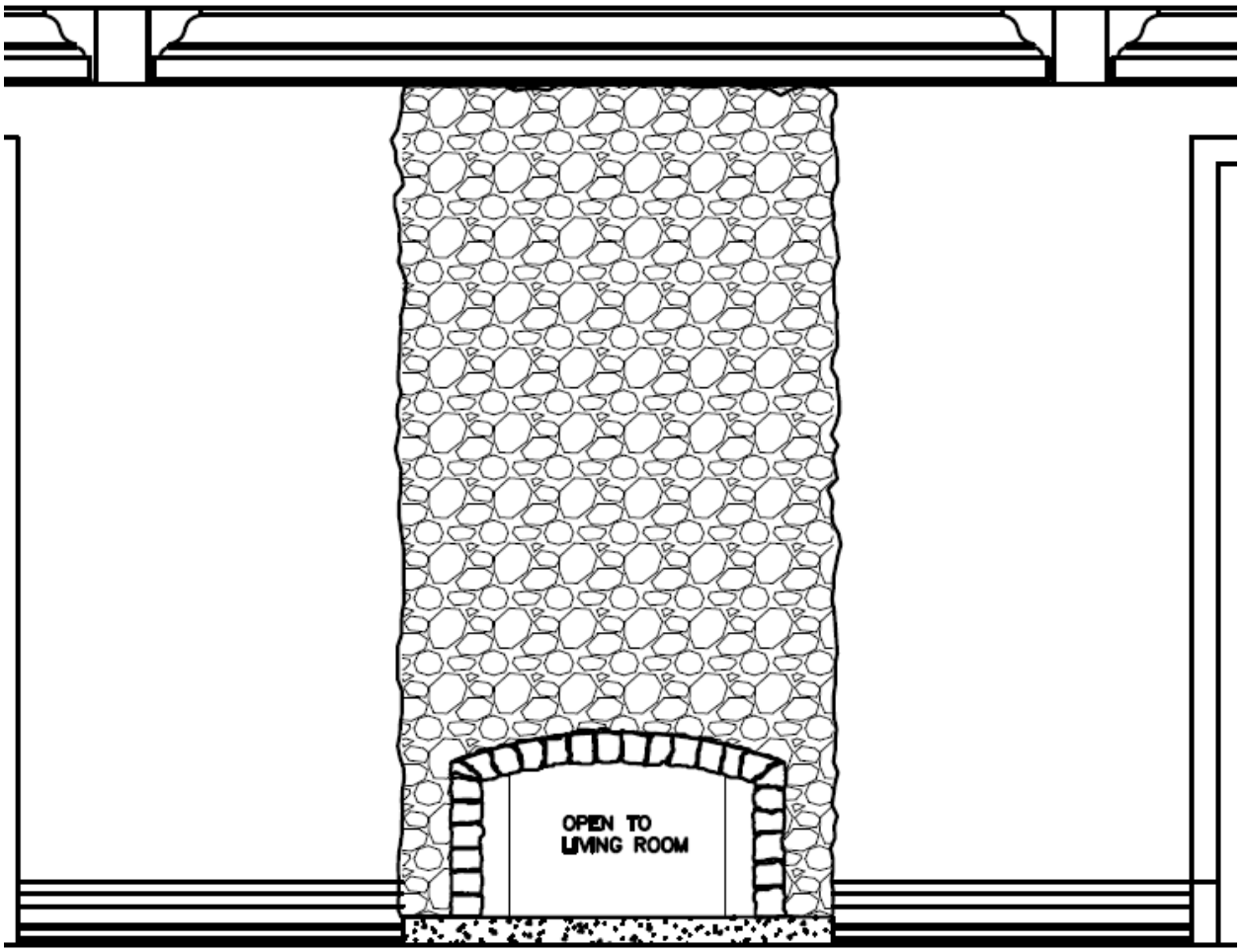


Figure 74d: Fireplace redesign elevation.



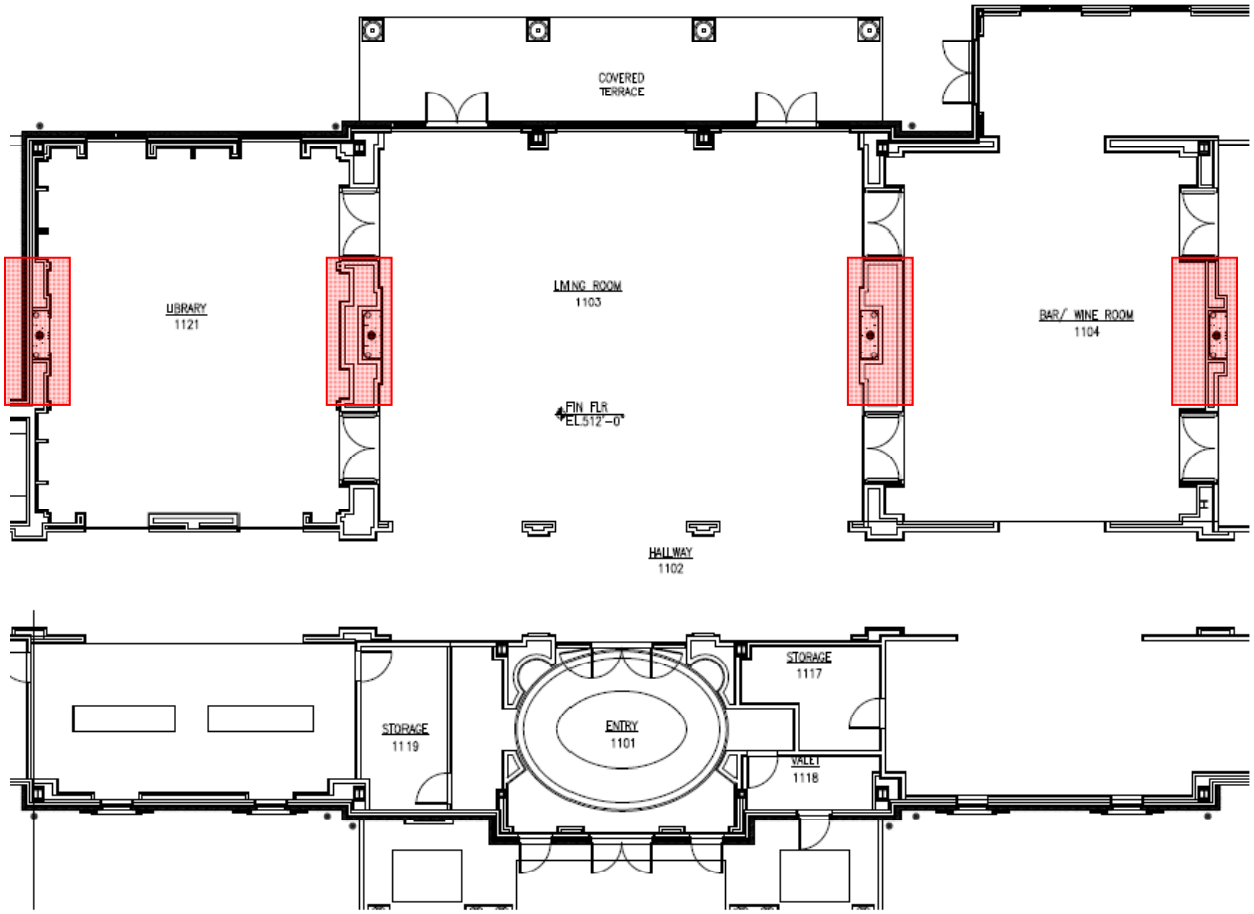
Adding to the sustainability goal of the Salamander Resort and Spa design team, this fireplace and rock wall feature will be a mixture of reclaimed stone and brick. Materials will be from local Virginia fireplace manufacturer Fireplace Solutions and are shown below in Figure 74e.

Figure 74e: Fireplace Solutions - materials.

Mechanical Breadth Topic: Fireplace Exhaust Heat Recovery

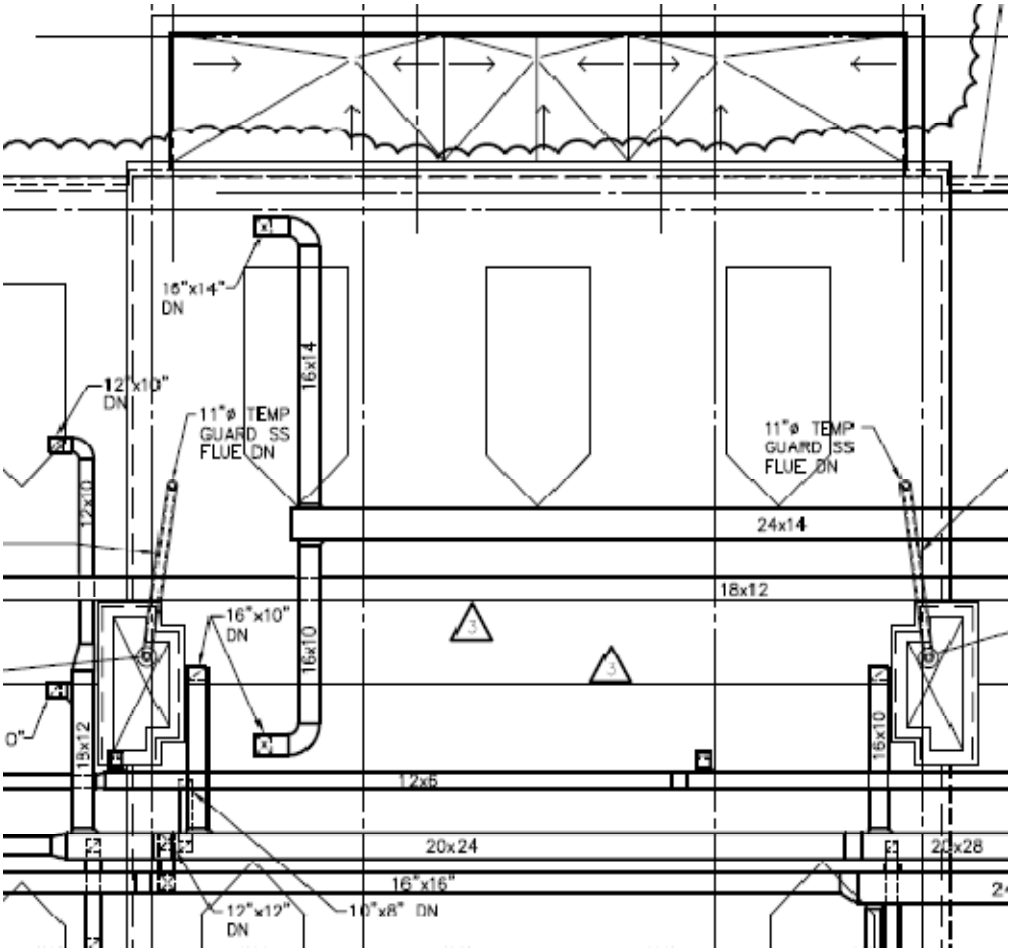
In the "Front of House" space of the Salamander Resort and Spa, which includes the Living Room, Wine Bar, Library, and Billiards rooms, fireplaces are an architectural feature of the interior design. Shown in Figure 75, the areas highlighted by red represent those fireplaces. This breadth study contains the mechanical engineering strategies to develop a heat recovery system that would provide full demand load temperature difference to the preheat coil in air handling unit AHU-2. Using AHU-2 demand data within the mechanical equipment schedules, the heat recovery loop was sized to meet MBH demand when all fireplaces are running. This will offset heat needed from the boiler and therefore save energy and cost in the long-run.

Figure 75: Locations of fireplaces highlighted in red.



The existing mechanical engineering design with the fireplaces (Figure 76) is to exhaust the fireplaces horizontally to the back façade of the building using an 11” flue. The heat recovery will consist of a loop that harnesses fireplace exhaust heat and directs that higher temperature to the preheat coil of AHU-2. The method of this design consisted of determining target demand in MBH, calculating pressure drop for the loop; determining the appropriate flow rate in gallons per minute, sizing the recirculation pump for the loop, and calculating energy/cost savings based on an assumed usage schedule. The heat recovery schematic is shown in Figure ___.

Figure 76: Existing mechanical design. 11” diameter flue to outside.



Assumptions:

- Air handling unit Entering Water Temperature (EWT): 140 °F
- Air handling unit Leaving Water Temperature (LWT): 180 °F
- Total MBH demand to recover = 480 MBH
- 70% efficient heat recovery

Pressure Drop Calculation:

Pipe Length
270 ft. * 4ft./100ft. = **10.8 ft.**

Fittings - "Equivalent Length" Method (Figure 10-22a-b, Table 10-2, *Advanced HVAC)*
(4) 90° elbows: K = 30ft; friction factor = 0.018
30*0.018 = 0.54 ft. ➔ Equivalent length = 8ft. * 4 fittings = **32ft.**

Coils
(5) * 5psi * 1/0.443 = **11.5 ft.**

Total Head = 54.3 ft.

Determining GPM to achieve 480 MBH of recovery

	Fireplace Coil Heat Recovery			
	GPM	EWT °F	LWT °F	MBH Recovered
FPC-1	6	140	180	120
FPC-2	6	140	180	120
FPC-3	6	140	180	120
FPC-4	6	140	180	120
	24			**480**

Equations Used

MBH= 500 x GPM x ΔT

Sizing Recirculation Pump

Figure 77: Pump Sizing graph.

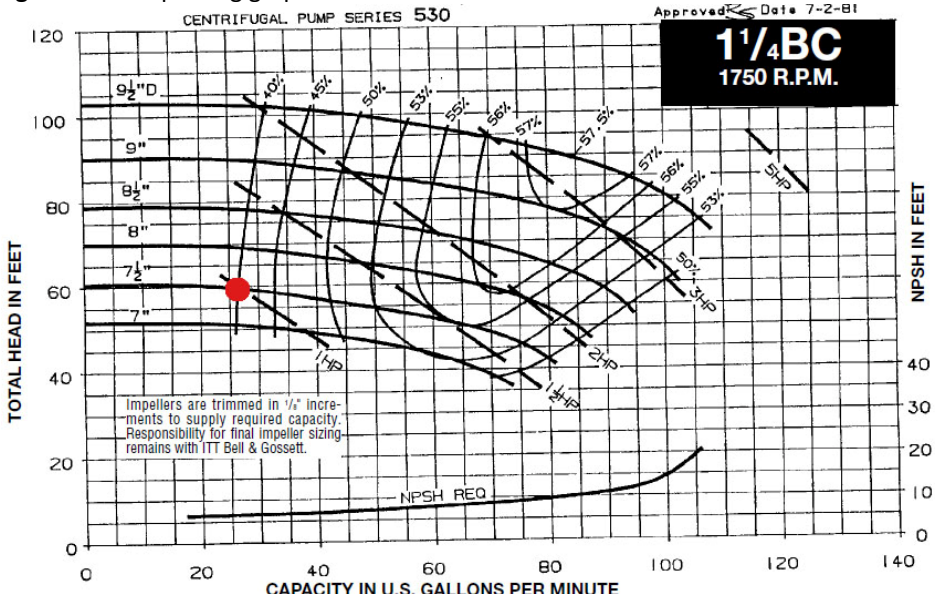
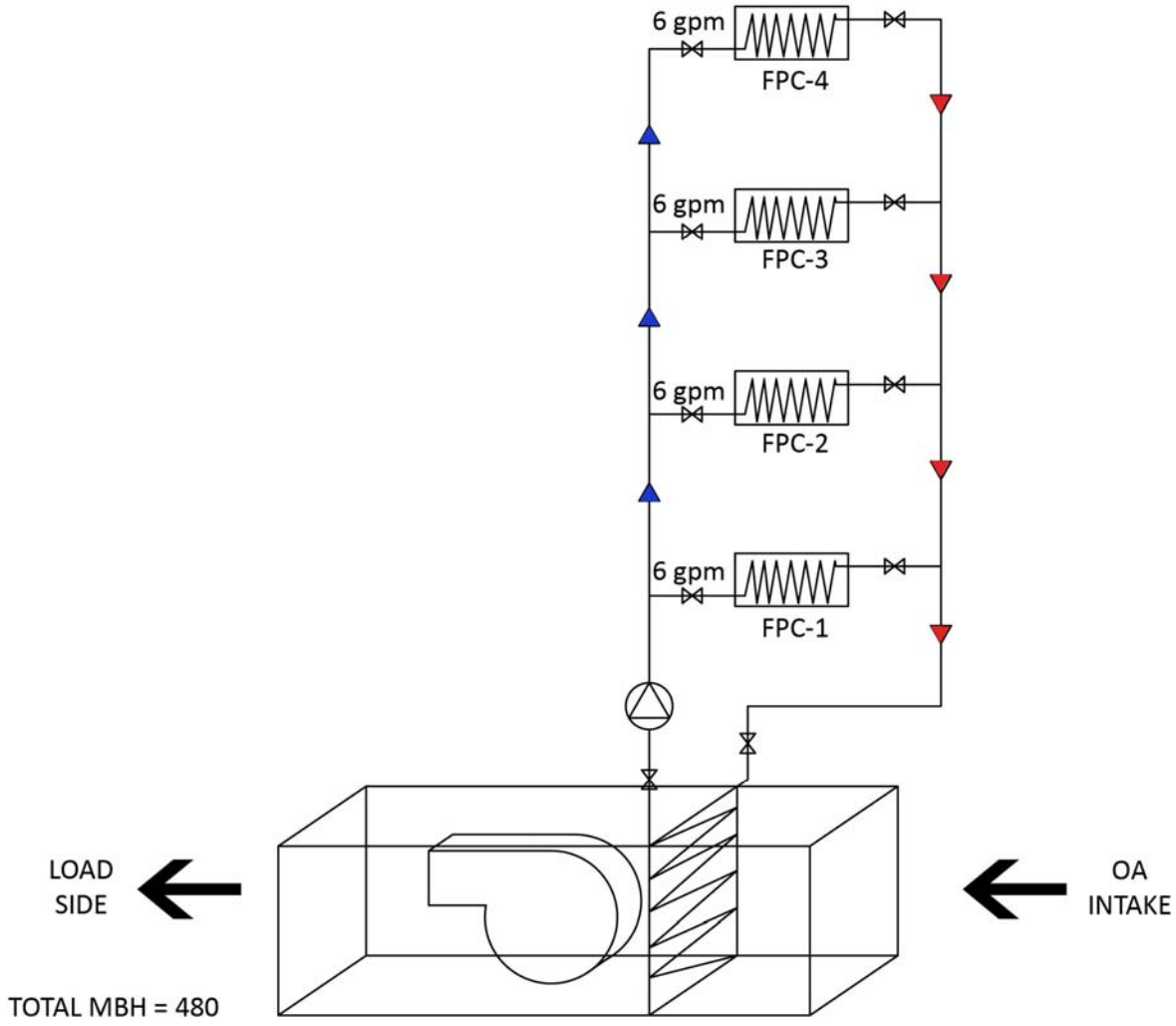


Table 14: Heat recovery pump schedule.

Heat Recovery Pumps													
Unit	Manufact.	Frame Size	Service	Type	GPM	Total Head (f.t. H_20)	VFD	Emer. Power	Min Casing Size Disc x Inlet x Impel.	Motor Data at 60 Hz			
										HP	RPM	Volts	Phase
HRP-1	Bell & Goss.	143T	AHU-2	End Suction	25	55	Y	Y	1.5"x2"x7.5"	3	1750	480	3

Figure 78: Fireplace heat recovery loop schematic. **FPC =** Fireplace Coil



Concluding Remarks

In conclusion, great efforts have been made with architectural and interior design to create a luxurious experience for guests at the Salamander Resort and Spa that also conveys the Middleburg, old-country equestrian/wine country feel. Luxurious finishes, millwork, paints and furniture fill the rooms and the opportunities for relaxation and enjoyment are abundant. It goes without saying that the lighting design is absolutely necessary to enhance this architecture and make spaces come to life at night. The Entry Courtyard lighting design is multi-dimensional with landscape lighting, wall grazing, glow from within the building, and perimeter decorative lanterns. Together this outdoor entry area turns into a space to both enjoy and facilitate entry to the building. The Living Room design is welcoming and sets the tone of warm color temperatures and the feeling of relaxation throughout the resort. The Wine Bar is a special room with its own identity. It has a wine cellar feel with wood finishes, exposed brick flooring, and a reclaimed barn door as the bar surface itself. The decorative luminaires have a unique, rustic and antique look that add to the interior design while providing sparkle and dim light. The unique back bar wine racks are made a focal point to the room, with a mixture of grazing, accenting, and backlighting techniques to emphasize the wine. Finally, the Grand Ballroom will bring a multitude of people and events to the Salamander Resort and Spa. The lighting design is aesthetically pleasing with decorative chandeliers and wall sconces, cove lighting of the 20'-0" high ceiling and a specialty low-profile perimeter slot light feature recessed in the millwork for events allowing dynamic and color-changing lighting. The flexibility of lighting within the ballroom will allow for large open conventions, dances, wedding receptions, dinners, film-watching, etc.

The Salamander Resort and Spa design team is striving to make this resort one of the only LEED certified buildings of its kind. Therefore, energy-efficient design is necessary. All four spaces involved in this body of work were below or considerably below lighting power density allowances set forth by ASHRAE 90.1. By using compact fluorescent lamps and LED lamps/luminaires, the wattage demand was decreased while holding warm color temperature and dimming capabilities constant. Illuminance criteria were also satisfied for all spaces, allowing tasks like reading a menu while sitting at the wine bar. Using daylight and solar study software, it was determined that the Living Room receives enough diffuse daylight throughout the year to light the space on its own. Based on occupancy schedules and the electric lighting system, a photosensor dimming control system was calibrated to save about 1200 kWh per year in this room.

Electrical design was also improved in this work. Branch circuit lighting loads fed by Lutron GP dimming panels were consolidated to reduce panel sizes and the number of branch circuits required. Also, a cost comparative analysis of long-run feeders and electrical bus duct revealed that use of bus duct for long runs from the main switchboard to distribution panels can save up to $160,000.

Finally, breadth studies were completed to analyze alternate design techniques to disciplines in the construction industry outside of lighting and electrical design. An architectural breadth was completed, showing the effects of opening the back side of the Living Room fireplace and making a feature within the Wine Bar, and a heat recovery loop and pump system was sized to recover fireplace exhaust heat for air handler preheating in the winter.

References

Software Tools:

AGI32
Autodesk 3D Studio Max 2010
AutoCAD 2010
Autodesk Ecotect
Penn State Daysim version 2_22
Adobe Photoshop
Siemens Electrical Design Tools

Handbooks/Text:

ASHRAE Standard 90.1 – 2007: Energy Standard for Building Except Low-Rise Residential Buildings. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Atlanta, GA. 2007.

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The IESNA Lighting Handbook: Reference & Application, 9th Edition. Illuminating Engineering Society of North America. New York, NY. 2000.

National Fire Protection Association. *NFPA 70* - National Electric Code. 2008 Edition. Quincy, Massachusetts: National Fire Protection Association, 2007. Print.

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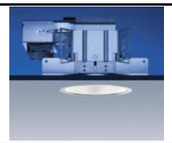
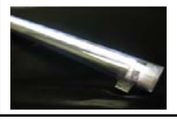
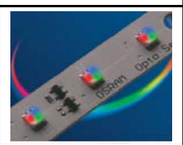
Thank you most especially to **my family** and **my Kristin**, for unending support and love in which I could never do without.

Appendix A:
Lighting Plans

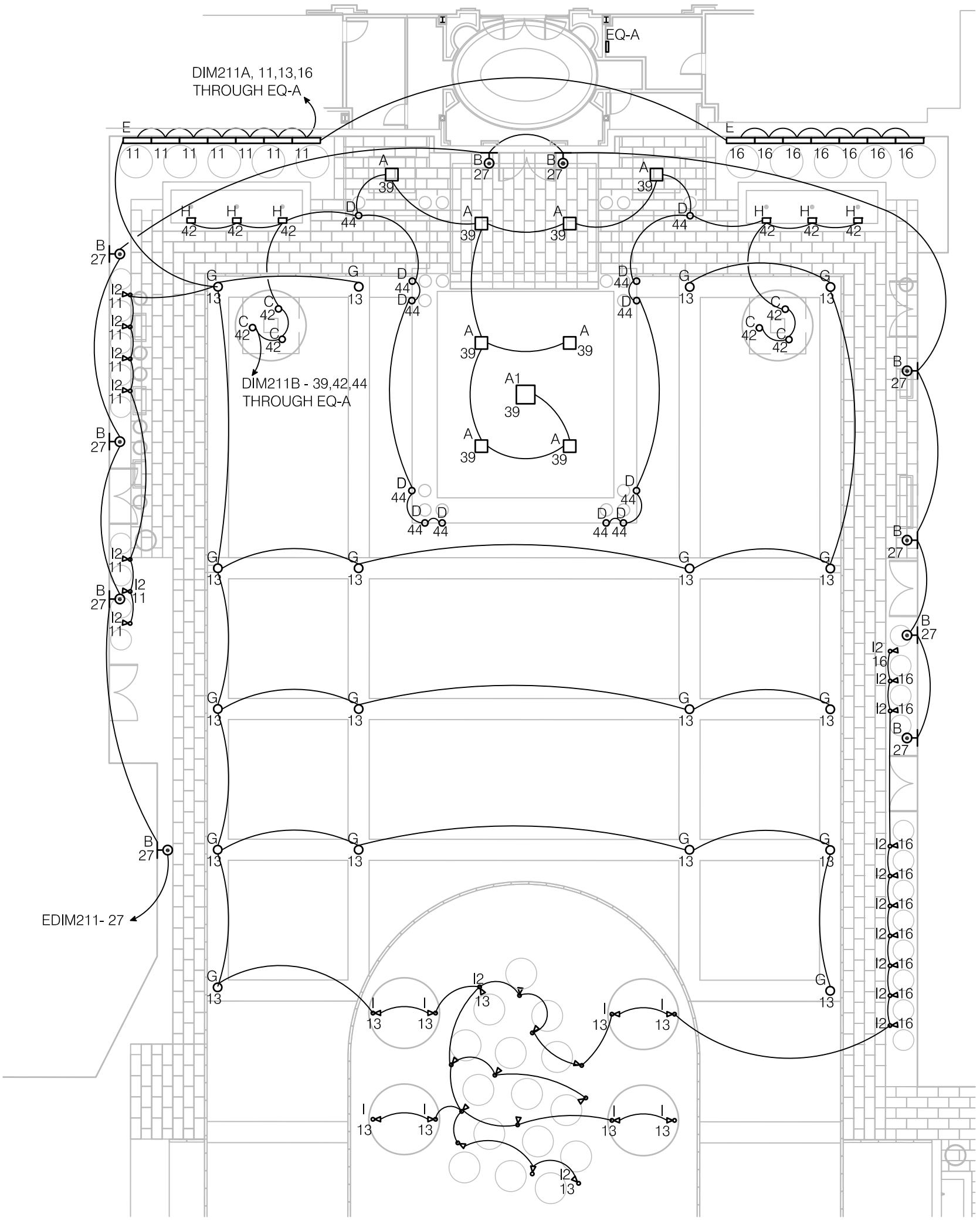
Luminaire Schedule

Type		Manufacturer	Catalog Number	Description	Mounting	Ballast/ Power Supply	Voltage	Lamp	Wattage
A		Troy Lighting	CCD8990OR	Exterior ceiling surface mounted decorative downlight. 14"W x 9"H. Clear seeded glassware. Hand-worked wrought iron metalwork. English bronze finish.	Surface-mounted	Electronic	120	20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	24 W
A1		Troy Lighting	CCD8990OR	Exterior ceiling surface mounted decorative downlight. 24"W x 12"H. Clear seeded glassware. Hand-worked wrought iron metalwork. English bronze finish.	Surface-mounted	Electronic	120	(2)20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	48 W
B		Troy Lighting	B9491EB	Exterior surface mounted decorative wall sconce. 14"W x 37" H x 14.5"P; 25.75" TCD; solid brass; English Bronze finish; clear glass.	Wall-mounted	Self-ballasted	120	(4) DULUX EL Self-ballasted "Flame" CFL. Candelabra base. CF9EL/B14/C/830/ADP/BL2	36 W
C		BK Lighting	RM-MR-2-BLP-10	Ring Mount Delta Star ™ tree-mounted downlight for moon lighting effect. Solid aluminum body with enclosed, water-proof wireway and heat sink. 1" diameter brass mounting ring for cable or hook mounting. Water-tight seal. Tempered, clear glass lens; hermetically sealed optical compartment. Tamper-resistant, stainless steel harware. Polyester powder coating on aluminum. 40 degree flood distribution.	Tree-mounted: hanging	Remote Transformer	12 VAC	(1) 20W MR-16. 20MR16/FL36-BAB	20 W
D		BK Lighting	HP2 - T635-SP-RD-81-BZP-GS-RM-H35E-120	Ground-recessed spot accent light. Flush with ground: 7" diameter. Sheet molded polyester compound housing. G12 bi-pin base. IP-68 rated vacuum sealed enclosure. Anti-condensation valve. High heat, shock resistant, tempered 1/4" borosilicate flat glass lens. Suitable for walk-over and drive-over applications. Glare shield for pedestrians. Polyester powder coating over aluminum.	Ground recessed	Electronic (remote)	120	(1) 35T6/MH/830	41 W
E		Philips Color Kinetics	523-000030-02	Stone façade eW ® Graze Powercore LED wall grazer. 2.1" x 2.7" x 48". 10 degree beam angle. Low profile extruded anodized aluminum housing. Clear polycarbonate lens. Multi-positional, constant torque locking hinge mounting. IP 66 - Wet environment rated. Dimming capability. 2700K	Surface-mounted under roof overhang.	(Line Voltage)	120	LED Class 2 product	60 W/4 ft.
E2		Prudential Lighting	PSM-101 1T8 04' BWE 120 DM	Linear fluorescent strip fixture for dormer interiors. Aluminum body. 4' - 0" die-formed steel housing. White enamel finish.	Surface	Electric dimming	120	Philips Extra long life, extra low mercury: F32T8 TL830 XLL ALTO	35 W
F		Erco	34068.023	Corrosion-resistant cast aluminum housing. Double powder-coated. Hinge with internal wiring - 130 degree tilt. Mounting plate rotatable through 240 degrees. Reflector: aluminum, silver, mirror-finish anodised. IP65.	Cantilever arm - Product # 3450.023 (See Appendix B for mounting detail)	Electronic	120	70W HIT-CE Metal Halide. MC70T6/U/G12/930PB	45 W

G		Erco	33764.023	LED Orientation luminaire. Housing with gasket: stainless steel. Clear prismatic diffuser with circular light aperture. Cover ring: corrosion resistant stainless steel with 1/4" safety glass. IP68.	Ground recessed	33858.023 Control gear.	30 VDC	LED 0.9W 30V DC	0.9 W
H		Philips Color Kinetics	116-000024-01	Ultra-thin, submersible fountain fixture. RGB LED color changing capability. Cast brass housing. 10 degree beam angle. Frosted tempered glass lens.	Fountain wall recessed	PDS-60	24 VDC	Class 2 LEDs	25 W
I		BK Lighting	DS-MR-2-BLP-9-A-360L	Delta Star landscaping flood light. Solid aluminum housing. Full 180 degree vertical adjustment. High temperature silicone O-Ring privides water-tight seal. Shock resistant, tempered clear glass lens. Polyester powder coat finish, black color. 45 degree cutoff.	Ground surface	12 VAC remote transformer	12 VAC	(1) 20W MR-16. 20MR16/FL36-BAB	20 W
I2		BK Lighting	S-NS-LED-e22-WFL-BLP-12-360SL	Nite Star (SSL) landscape light. Wide flood, 3000K light with flush mounted lens. Tamper resistand, stainless steel hardware. Aim-and-Lock feature. Black polyester powder coat finish. Integral heat sink. Outdoor/wet-rated.	Ground Surface	Remote Transformer	12 VAC	8W, 12V B-K Solid-State Lighting LED	8 W
J		Zumtobel	S5D4312 D1 4311R MC	Open recessed downlight. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Spun aluminum reflector with white matte finish.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
J1		Zumtobel	S5D4312 D1 4311W MC	Open recessed downlight/wallwash. 4" aperture. Vertical CFL lamp orientation. 20 gauge galvanized, die-formed plaster frame. Adjustable butterfly mounting brackets. Wallwasher reflector - hydroformed aluminum kicker plate is mounted to the main reflector for wall illumination. Reflector is fully rotatable from below.	Ceiling Recessed	Electric dimming	120	Sylvania Dulux Ecologic: CFT18DT/E/IN/827/ECO	23 W
K		Erco	88147.023	Adjustable recessed narrow spot light. 6" aperture. 0-40 degree tilt, 360 degree rotation. Lockable angles. Reflector: aluminum, anodised, mirror-finish. Safety glass. White powder-coated external ring. Flush mounted.	Ceiling Recessed	Electronic	120	20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	24 W
K1		Erco	88148.023	Adjustable recessed spot light. 6" aperture. 0-40 degree tilt, 360 degree rotation. Lockable angles. Reflector: aluminum, anodised, mirror-finish. Safety glass. White powder-coated external ring. Flush mounted.	Ceiling Recessed	Electronic	120	20W HIT-TC-CE Metal Halide. MC20TC/U/G6.5/830PB	24 W
L		DDP	Cwi-24-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 2' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
L1		DDP	Cwi-12-60-27K	LED CoveWash luminaire. Low-profile linear fixture with linear parabolic reflector and thin film diffusers. 1.0" deameter clear extruded acrylic housing (UV resistant). Diffuse end caps to prevent shadows. 1' - 0" length	Cove surface mounted	24VDC Class 2	24 VDC	LED	4W/ft
M		2nd Ave.	75606.2.X	"Esther" decorative wall sconce. 13" x 14" x 8". Iron metalwork with bronze finish. Fabric shade, decorative crystal, fiber drip candle covers. Handcrafted. Candelabra base.	Wall surface		120	(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W

M1		2nd Ave.	75835.2.X	"Josephine" decorative wall sconce. 18" x 21" x 9". Iron metalwork with Autumn Leaf finish. Decorative crystal, fiber drip candle covers. Handcrafted. Candelabra base.	Wall surface		120	(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W
M2		2nd Ave.	751118.1	"Renzo" wall sconce. 6.5" x 15" x 9". Antique iron gate finish. Handcrafted. Candelabra base.	Wall surface		120	Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	2.5 W
N		2nd Ave.	87948.36	"Jenna" custom decorative chandelier. 36" x 24". Candelabra base, antique iron gate finish. Fabric shade, fiber drip candle covers, handcrafted.	Pendant mounted		120	(6) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	15 W
N1		2nd Ave.	87809.30.X	"Annabella" decorative chandelier. 30" Diameter x 45" height. Candelabra base, corinth finish. 3 ft. chain. Crystal decoration, fiber drip candle covers, handcrafted.	Pendant mounted		120	(8) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	20 W
N2		2nd Ave.	87618.42.X	"Minuet" decorative chandelier. 42" Diameter x 60" height. Candelabra base, pompei gold finish. 160 lbs. Fiber drip candle covers. Gold dipped crystal decoration.	Pendant mounted		120	(16) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	40 W
N3		2nd Ave.	01.0750.18.DL	Lakeshore Chandelier with downlight. 18" x 30". "Cajun Spice finish" 3 ft. chain, handcrafted, C2 Canopy.	Pendant mounted		120	(5) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	12.5 W
N4		Steven Handelman Studios	CH46.12	"Sirracco" Pendant. Iron. Burnished gold finish (Tier 3). Hammered glass (Tier 1). 12" x 19"	Pendant mounted		120	(2) Philips EnduraLED Candle LED lamps. 3BA END/CL WW 120V 8/I	5 W
O		Osram Sylvania	LNRCLRMX/LM01M/RGB	LINEARlight Colormix Rigid Colormixing LED Module. 0.45" wide x 0.14" deep x 18" long. Each LED contains individually powered red, green, and blue chip. RGB dimmable by pulse width modulation. Ideal for areas with space limitations.	See Appendix B	OPTOTRONIC	24 VDC	Osram Sylvania RGB LEDs	10 W

P		Osram Sylvania	BLP/BL04/W3F-865	BACKlight 2G Protect BL04 Chain LED module for signage. 11.8 ft., 120 LEDs per module.	Mounted to wine bar casement	OPTOTRONIC power suply - OT50	10.5 VDC	Osram Sylvania LED - White 6500K	23 W
P1		Osram Sylvania	HF2Narrow Stick 830H	HF2Narrow Stick Compact High Intensity LED Module for edge lighting. 5/8" wide. 10" segments can be connected end-to-end.	Mounted to wine bar casement	OPTOTRONIC power suply - OT96D	24 VDC	Osram Sylvania LED - White 3000K	4.2 W
Q		Philips Color Kinetics	523-000028-18	eW Profile Powercore 2700K. Ultra-low profile, white light LED under cabinet fixture. Direct line voltage. 11" length with end-to-end connections. Clear polycarbonate lens, Extruded aluminum, polycarbonate white powder-coated finish. 0.88" height x 1.7" width.	Under cabinet		120	2700K Class 1M LED	5.5 W



E1.1

COURTYARD LIGHTING PLAN

SCALE: 1/16" = 1'-0"

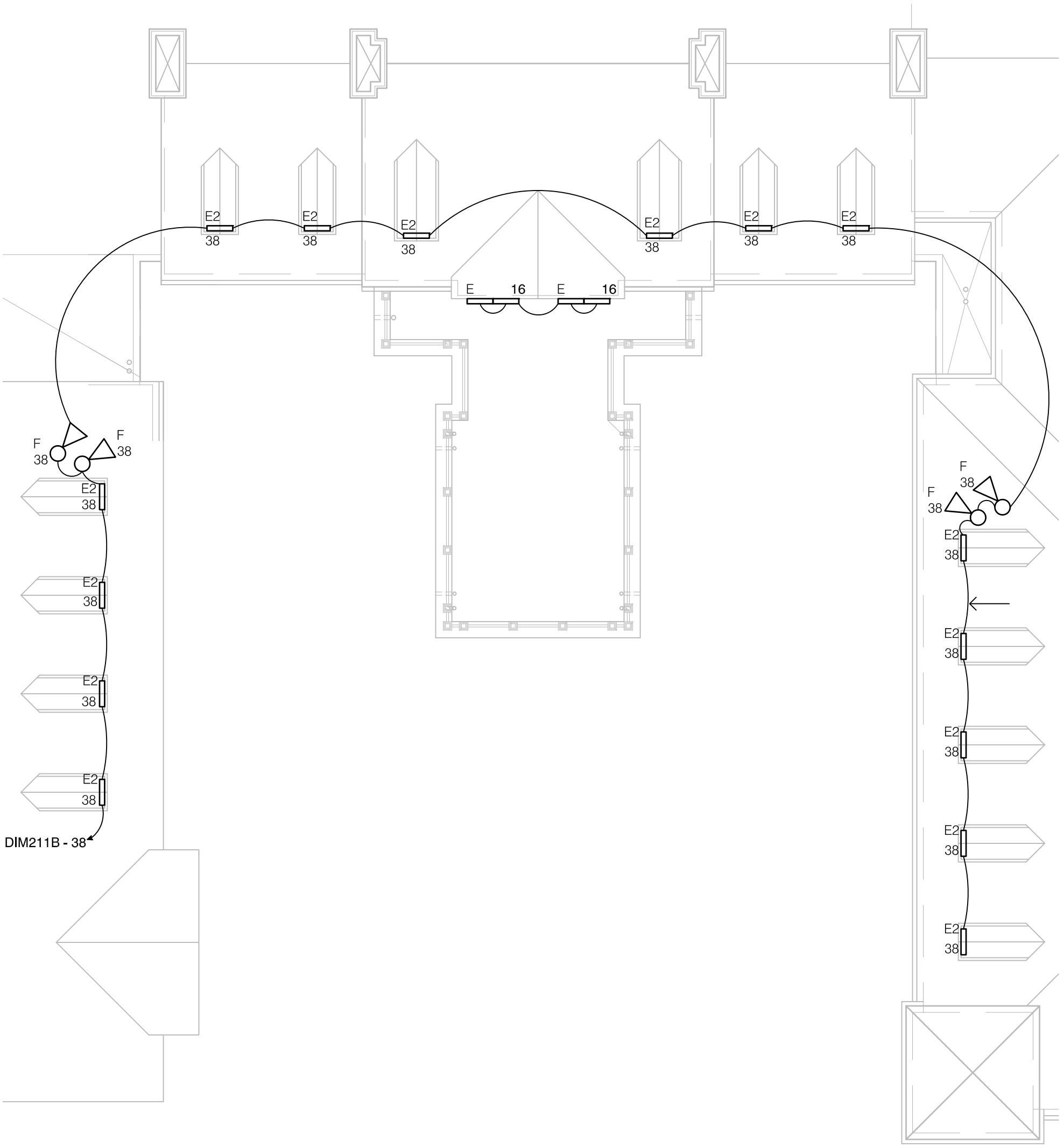
AE CAPSTONE SENIOR THESIS

LUKE RENWICK

SALAMANDER HOSPITALITY HOTEL AND SPA

MIDDLEBURG, VA

APRIL 7, 2010



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APRIL 7, 2010

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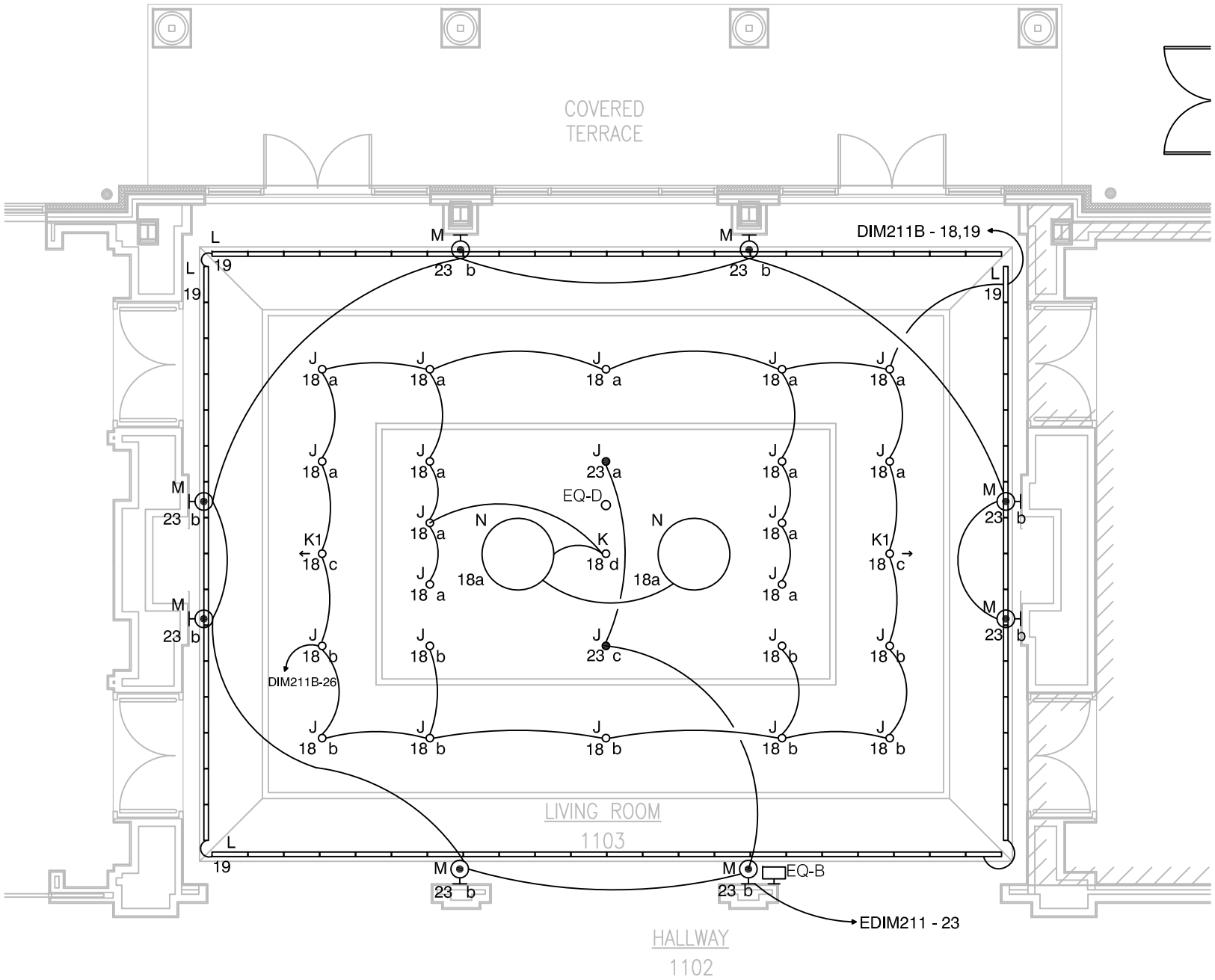
AE CAPSTONE
SENIOR THESIS

SCALE: 1/16" = 1'-0"

COURTYARD
LIGHTING PLAN

E1.2



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APRIL 7, 2010

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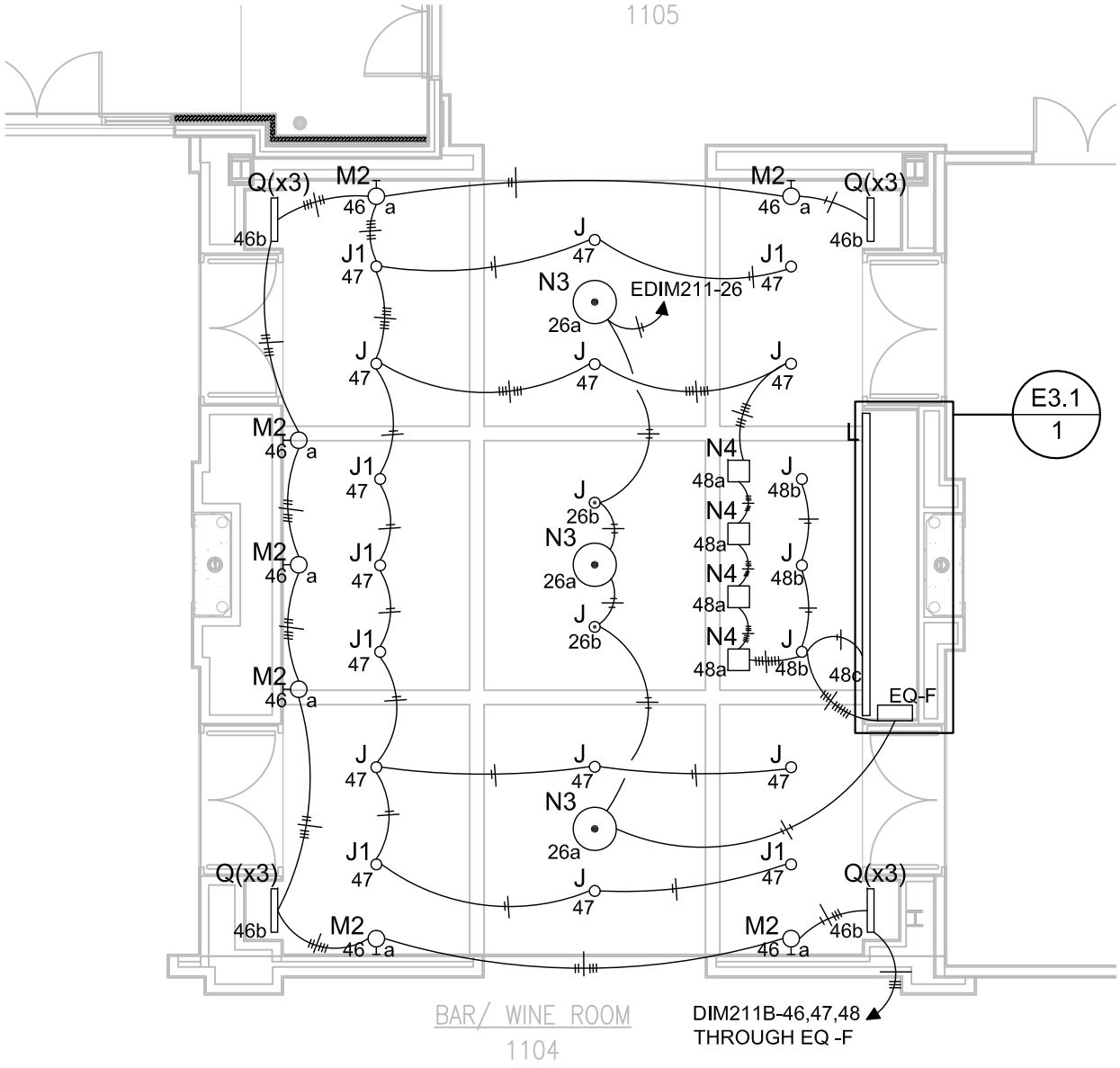
AE481–CAPSTONE
SENIOR THESIS

SCALE: 1/8" = 1'–0"

LIVING ROOM
LIGHTING PLAN

E2.1



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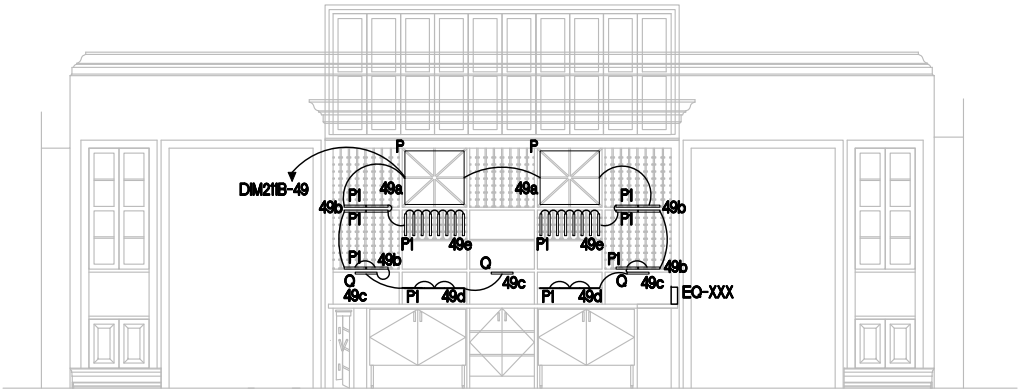
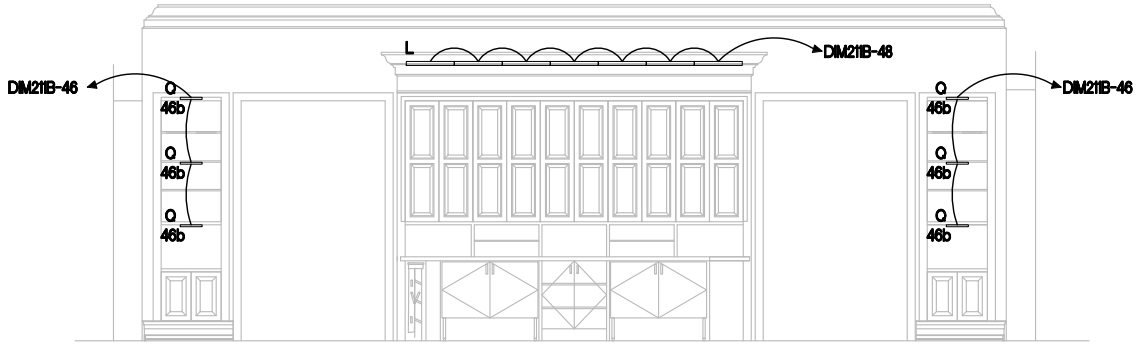
AE481–CAPSTONE
SENIOR THESIS

SCALE: $\frac{1}{4}$" = 1'–0"

WINE BAR
LIGHTING PLAN

E3.1





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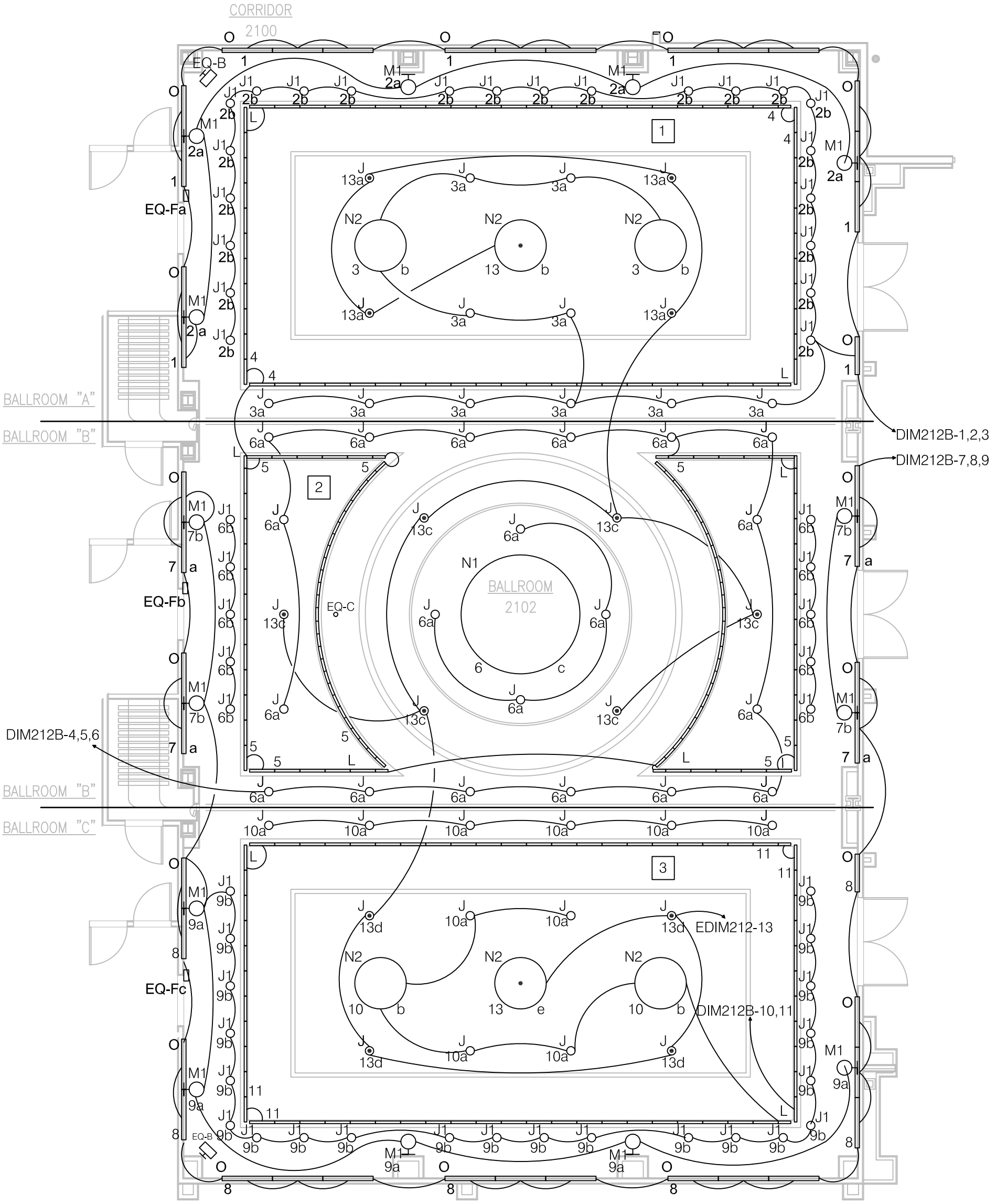
LUKE RENWICK

AE481–CAPSTONE
SENIOR THESIS

SCALE: $\frac{1}{4}$" = 1'–0"

WINE BAR
LIGHTING

E3.1



GENERAL NOTES:

If partitions OPEN:
All luminaires
controlled by EQ-Fb.

KEY NOTES:

1. If partitions closed:
   Luminaires in Ballroom "A"
   controlled by EQ-Fa.
2. If partitions closed:
   Luminaires in Ballroom "B"
   controlled by EQ-Fb.
3. If partitions closed:
   Luminaires in Ballroom "C"
   controlled by EQ-Fc.

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BALLROOM
LIGHTING PLAN

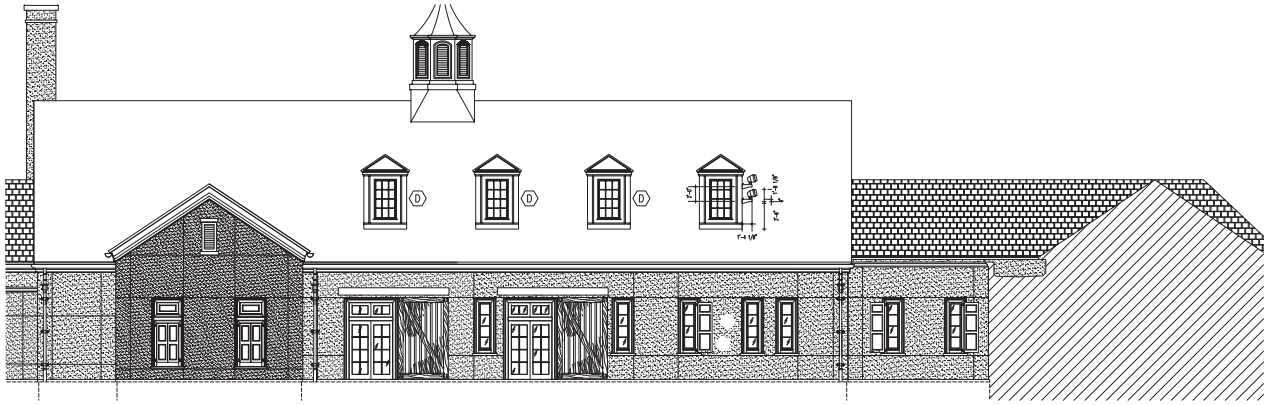
SCALE: 1/4" = 1'-0"

AE CAPSTONE
SENIOR THESIS

LUKE RENWICK

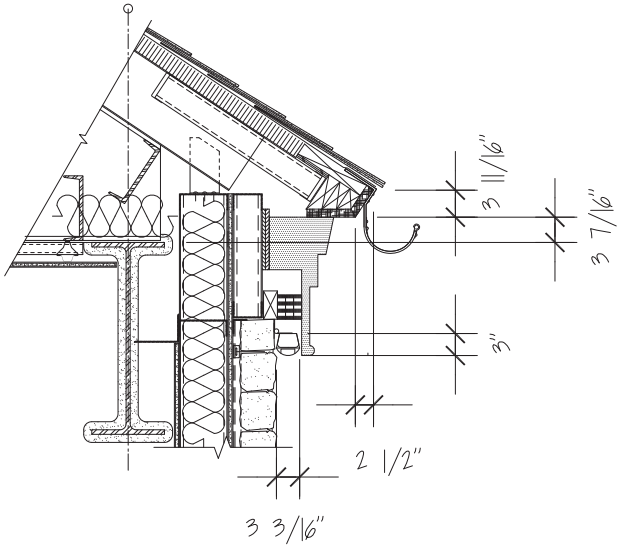
E4.1

Appendix B:
Mounting Details



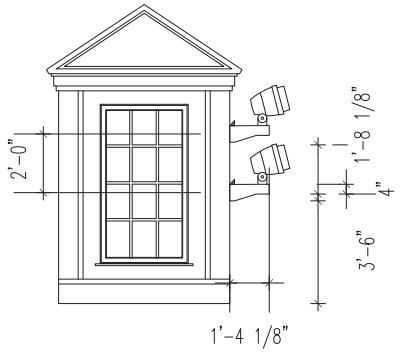
1 DORMER MOUNTING DETAIL – ELEVATION

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



1 FACADE WALL-GRAZING DETAIL

SCALE: 1" = 1'-0"



1 DORMER MOUNTING DETAIL – ENLARGED

SCALE: 1/2" = 1'-0"

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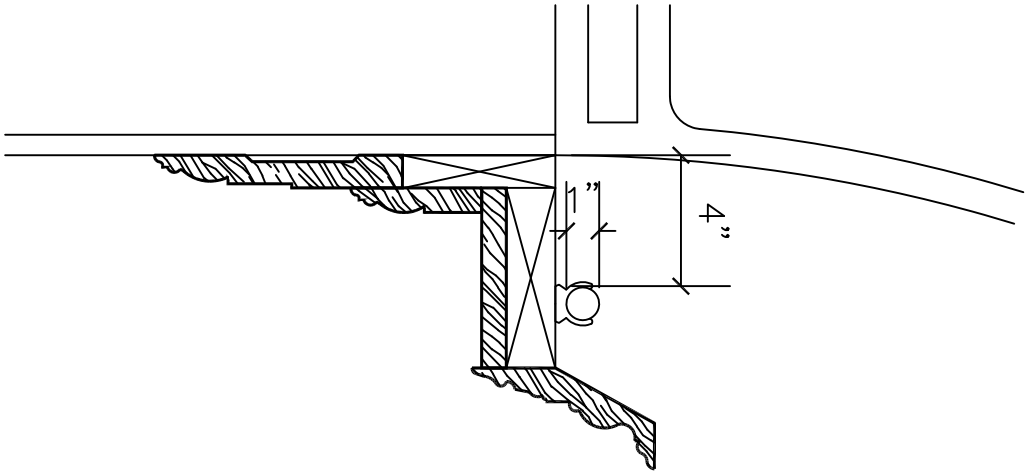
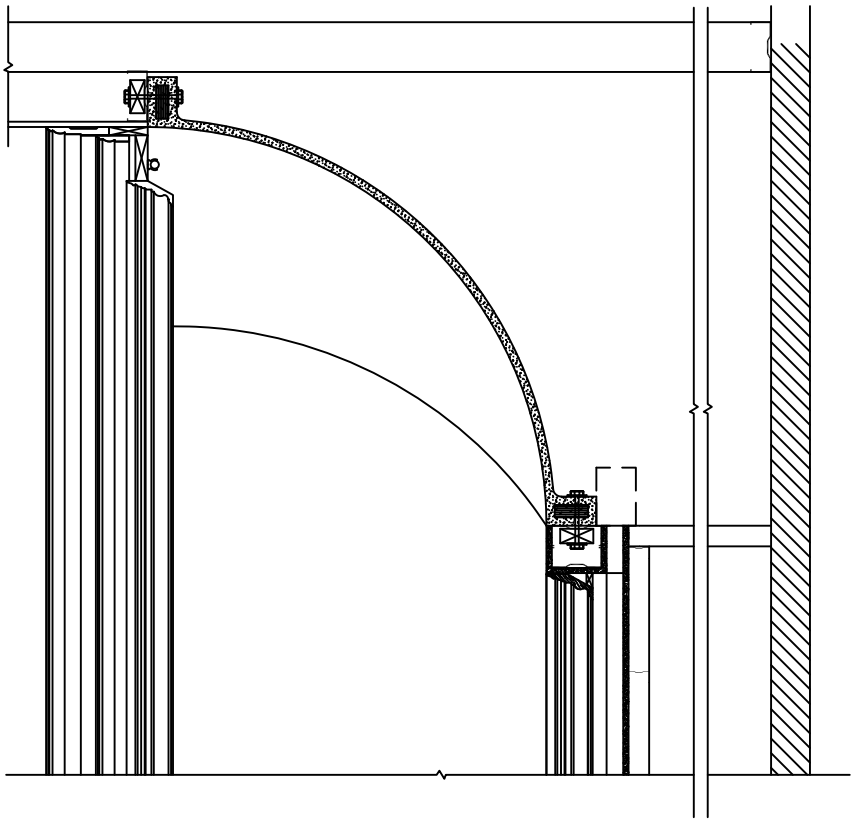
SCALE: $\frac{1}{4}$" = 1'-0"

COURTYARD DETAILS

E1.3





E2.2

LIVING ROOM DETAILS

NTS

AE481-CAPSTONE SENIOR THESIS

LUKE RENWICK

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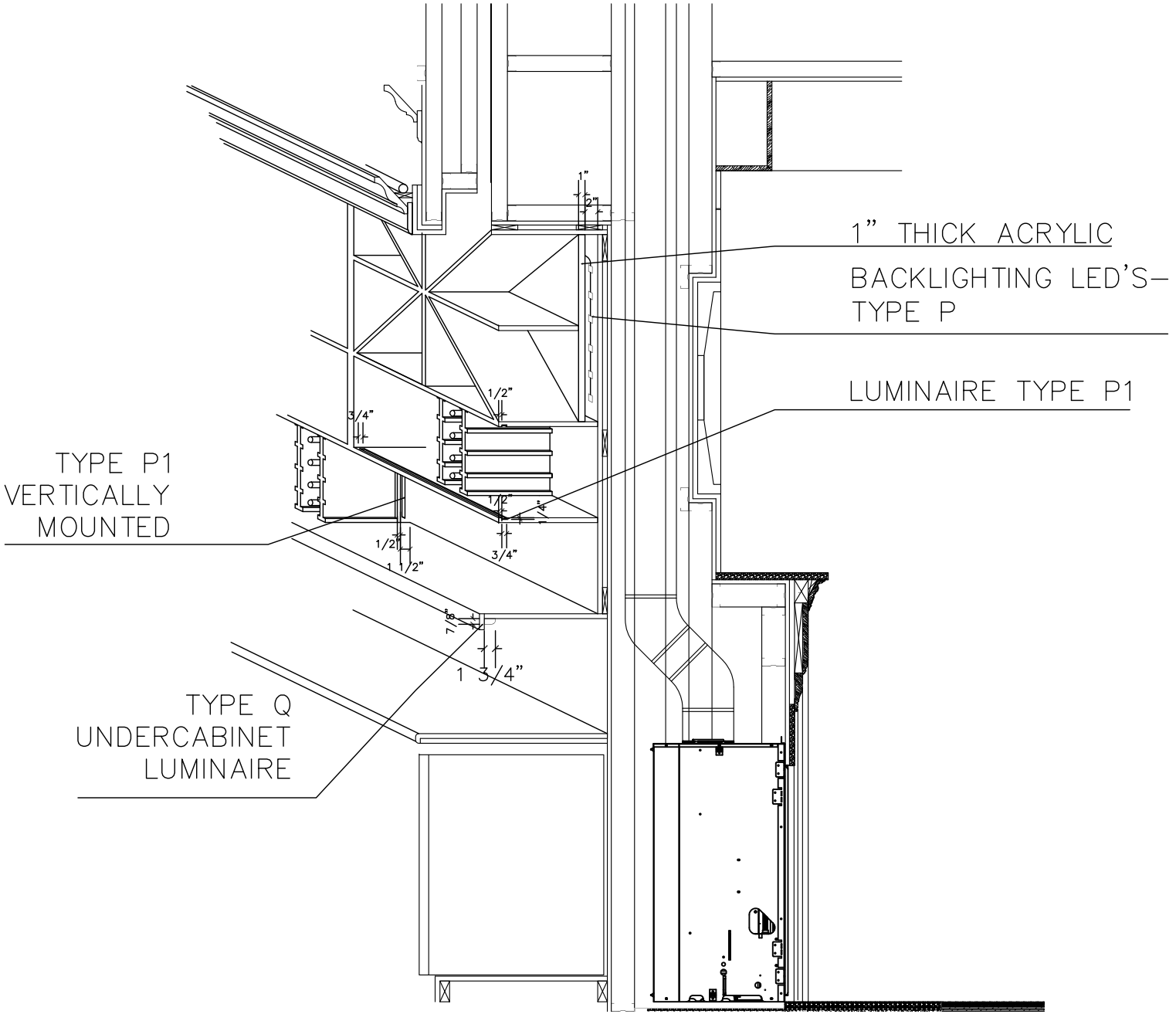

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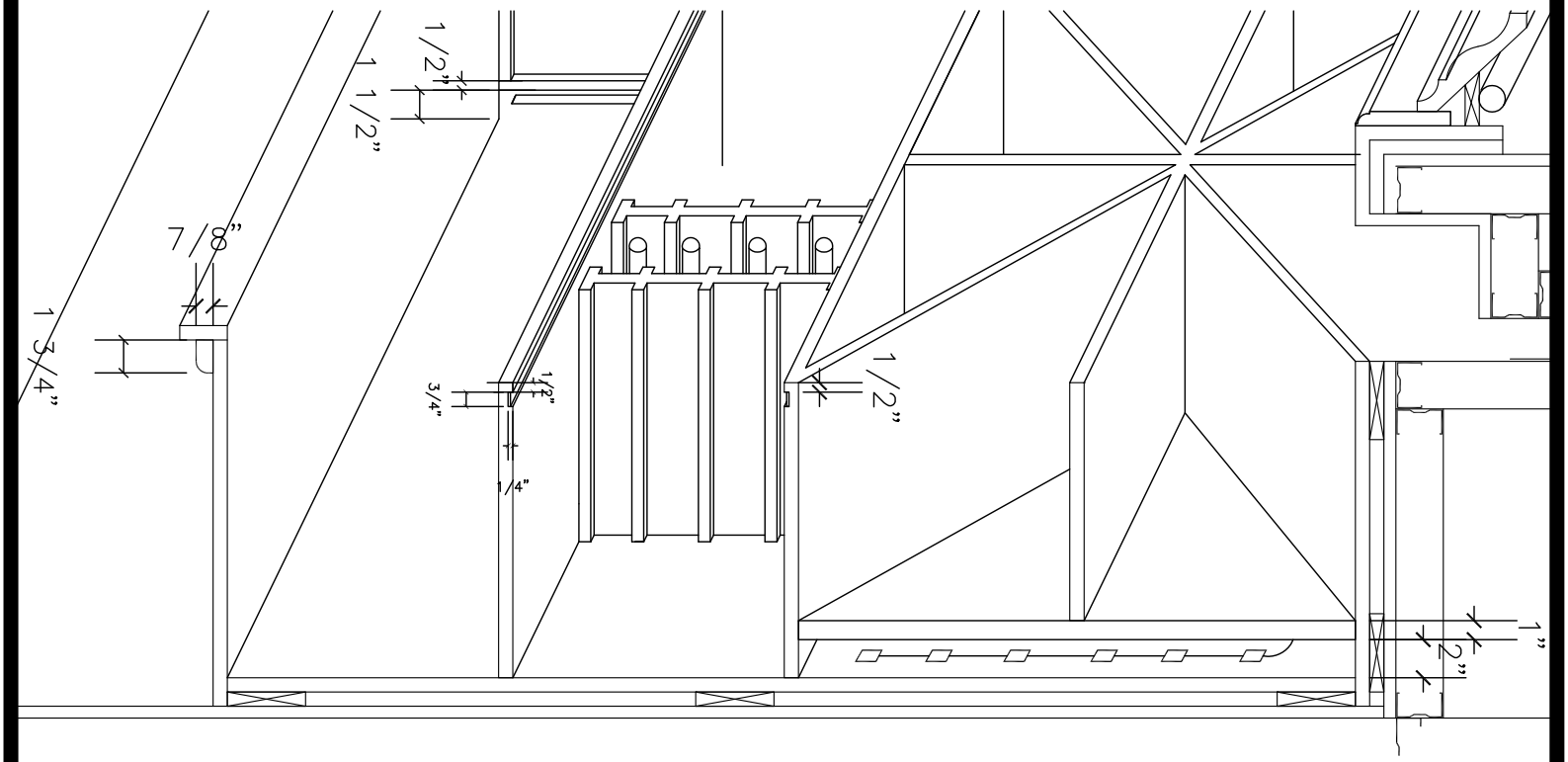
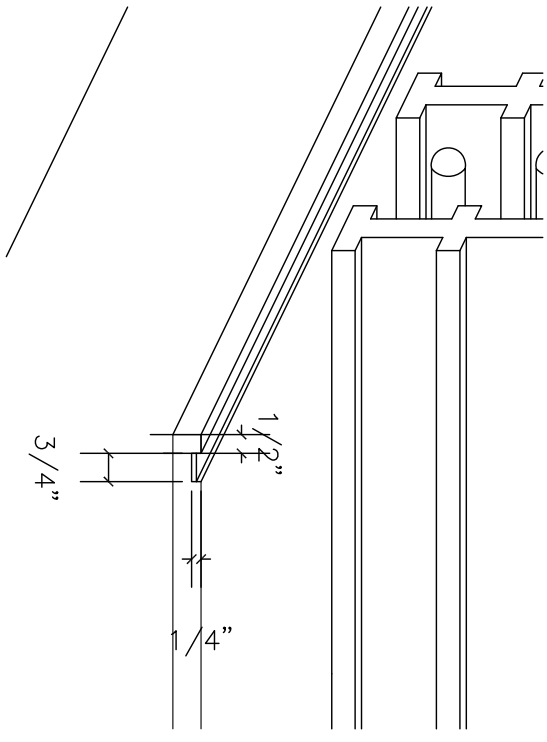
AE481–CAPSTONE
SENIOR THESIS

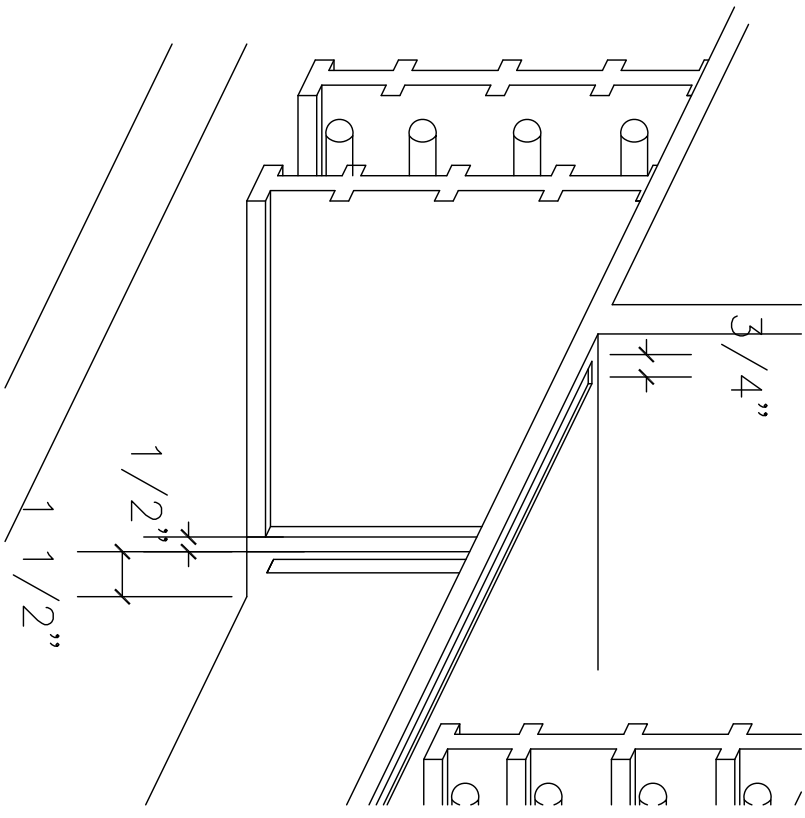
NTS

WINE BAR
DETAILS

E3.3







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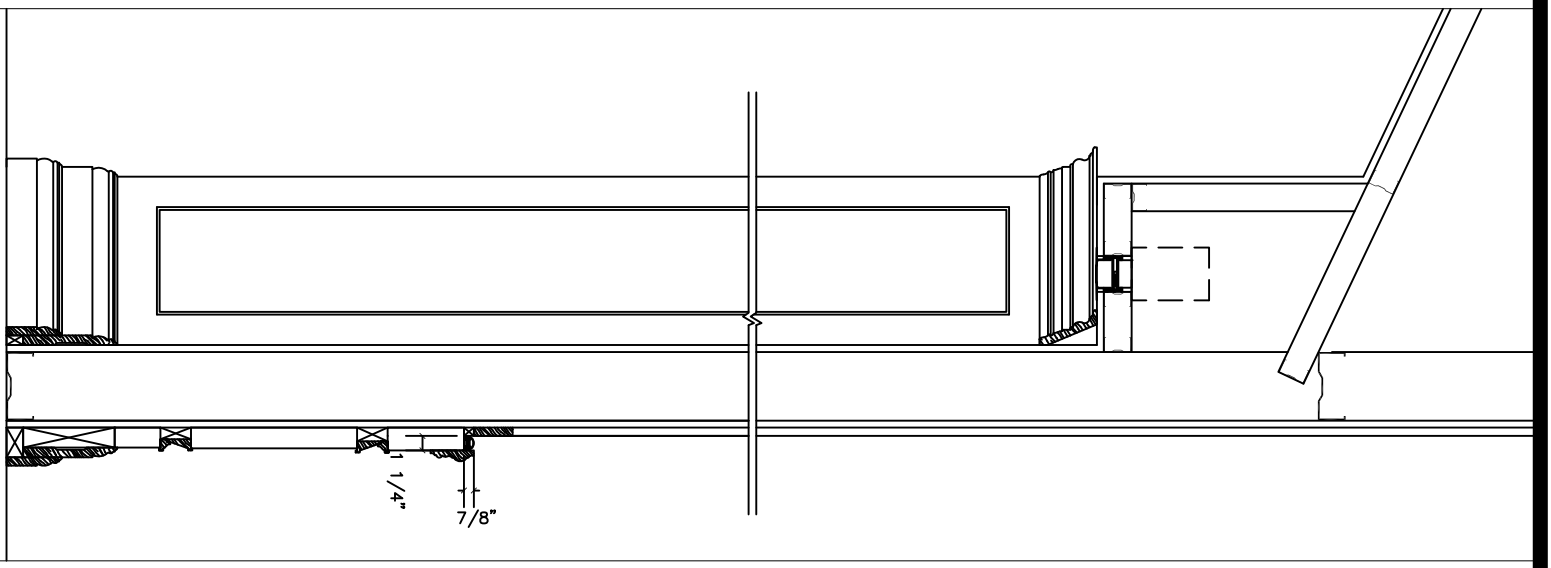
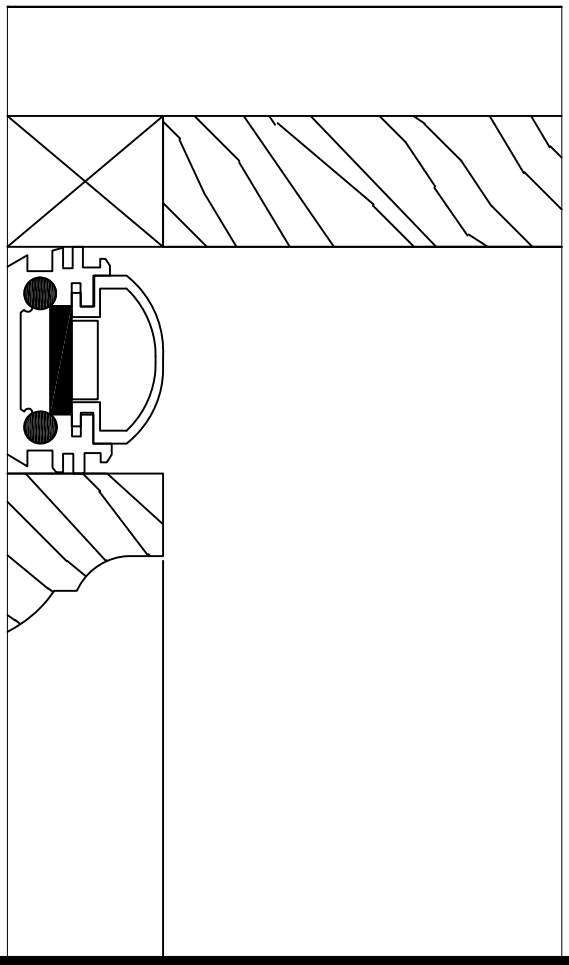
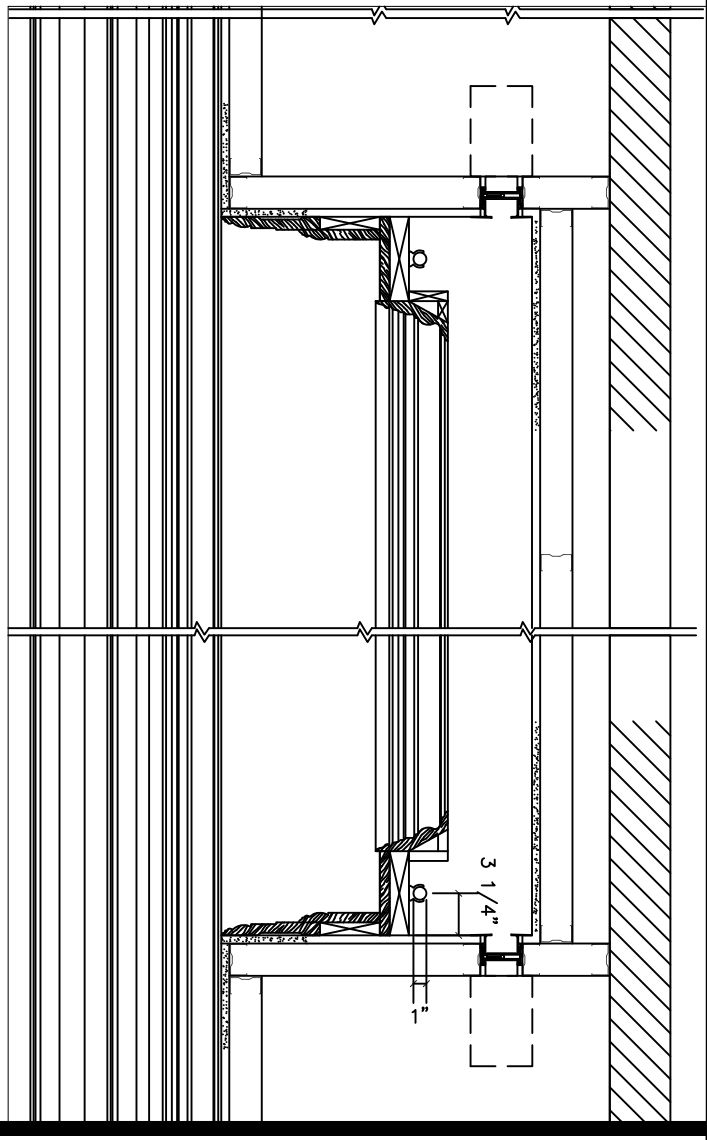
APRIL 7, 2010

LUKE RENWICK	
AE481-CAPSTONE SENIOR THESIS	
NTS	
WINE BAR DETAILS	
E3.4	







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AE481-CAPSTONE SENIOR THESIS

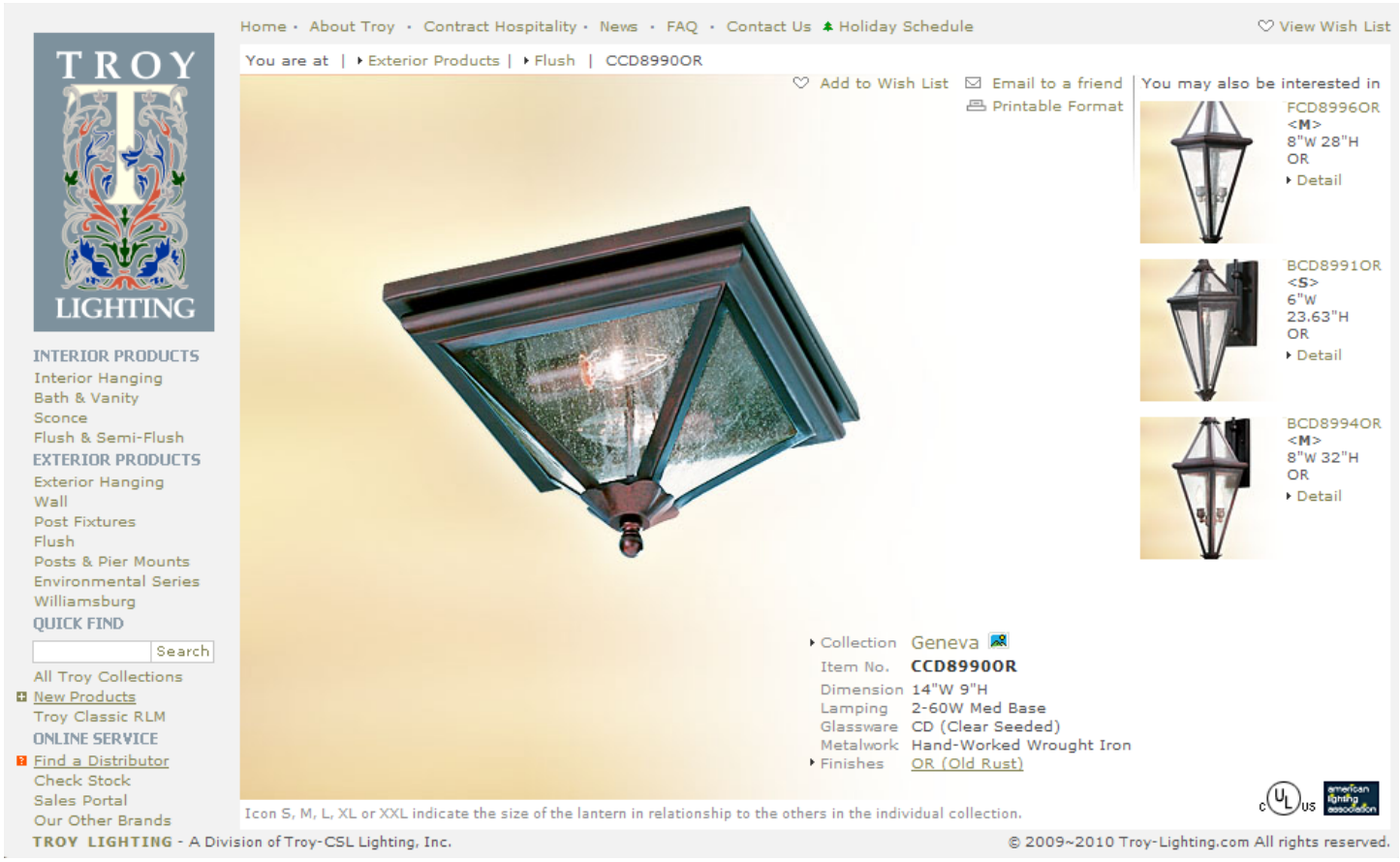
NTS

BALLROOM DETAILS

E4.2

Appendix C:

Luminaire, Ballast, Equipment Cut-Sheets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View Wish List
TROY LIGHTING
You are at | Exterior Products | Flush | CCD8990OR
Add to Wish List
Email to a friend
Printable Format
You may also be interested in
FCD8996OR
<M>
8"W 28"H
OR
Detail
BCD8991OR
<S>
6"W
23.63"H
OR
Detail
BCD8994OR
<M>
8"W 32"H
OR
Detail
INTERIOR PRODUCTS
Interior Hanging
Bath & Vanity
Sconce
Flush & Semi-Flush
EXTERIOR PRODUCTS
Exterior Hanging
Wall
Post Fixtures
Flush
Posts & Pier Mounts
Environmental Series
Williamsburg
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All Troy Collections
New Products
Troy Classic RLM
ONLINE SERVICE
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Sales Portal
Our Other Brands
Collection Geneva
Item No. CCD8990OR
Dimension 14"W 9"H
Lamping 2-60W Med Base
Glassware CD (Clear Seeded)
Metalwork Hand-Worked Wrought Iron
Finishes OR (Old Rust)
Icon S, M, L, XL or XXL indicate the size of the lantern in relationship to the others in the individual collection.
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- Collection: Dorchester
- Item No.: **B9495EB** <L>
- Dimension: 14"W 37"H 14.5"P 25.75"TCD
- Lamping: 4-60W Cand Base
- Glassware: Clear
- Metalwork: Solid Brass
- Finishes: EB (English Bronze)

Icon S, M, L, XL or XXL indicate the size of the lantern in relationship to the others in the individual collection.

You may also be interested in

F9498EB
<M>
11.25"W
21"H
EB
▸ Detail

B9494EB
<M>
11.25"W
20.25"H
EB
▸ Detail

B9491EB
<S>
7.5"W
22.5"H
EB
▸ Detail

TROY LIGHTING

INTERIOR PRODUCTS
Interior Hanging
Bath & Vanity
Sconce
Flush & Semi-Flush
EXTERIOR PRODUCTS
Exterior Hanging
Wall
Post Fixtures
Flush
Posts & Pier Mounts
Environmental Series
Williamsburg
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New Products
Troy Classic RLM
ONLINE SERVICE
Find a Distributor
Check Stock
Sales Portal
Our Other Brands

- Collection: Dorchester
- Item No.: **B9493EB** <M>
- Dimension: 11.25"W 30.5"H 11.5"P 21.5"TCD
- Lamping: 3-60W Cand Base
- Glassware: Clear
- Metalwork: Solid Brass
- Finishes: EB (English Bronze)

Icon S, M, L, XL or XXL indicate the size of the lantern in relationship to the others in the individual collection.

You may also be interested in

B9490EB
<S>
7.5"W
16.25"H
EB
▸ Detail

F9499EB
<L>
14"W
26"H
EB
▸ Detail

P9497EB
<L>
14"W
29"H
EB
▸ Detail

TROY LIGHTING

INTERIOR PRODUCTS
Interior Hanging
Bath & Vanity
Sconce
Flush & Semi-Flush
EXTERIOR PRODUCTS
Exterior Hanging
Wall
Post Fixtures
Flush
Posts & Pier Mounts
Environmental Series
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SALAMANDER RESORT AND SPA LUMINAIRE TYPE: B

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TROY LIGHTING

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- Collection: Dorchester
- Item No.: **B9495EB** <L>
- Dimension: 14"W 37"H 14.5"P 25.75"TCD
- Lamping: 4-60W Cand Base
- Glassware: Clear
- Metalwork: Solid Brass
- Finishes: EB (English Bronze)

You may also be interested in

F9498EB <M> 11.25"W 21"H EB · Detail

B9494EB <M> 11.25"W 20.25"H EB · Detail

B9491EB <S> 7.5"W 22.5"H EB · Detail

Icon S, M, L, XL or XXL indicate the size of the lantern in relationship to the others in the individual collection.

INTERIOR PRODUCTS
Interior Hanging
Bath & Vanity
Sconce
Flush & Semi-Flush

EXTERIOR PRODUCTS
Exterior Hanging
Wall
Post Fixtures
Flush
Posts & Pier Mounts
Environmental Series
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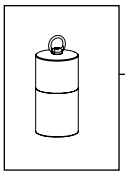

MR-16 Halogen

RING MOUNT DELTA STAR™

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	C
CATALOG NUMBER:	RM-MR-2-BLP-10
LAMP(S):	20MR16/FL36-BAB
NOTES:	

CATALOG NUMBER LOGIC

		RM	MR	2		BLP		10		
Example	-	**RM**	- **MR**	- **6**	-	**WHP**	-	**10**	-	**11**

Material

Blank - Aluminum
B - Brass

Series

RM - Ring Mount Delta Star

Source

MR - MR16

Lamp

0 - By Others
1 - ESX(20W), 12° Spot
2 - BAB(20W), 40° Flood
3 - FRB(35W), 12° Spot
4 - FRA(35W), 23° N. Flood
5 - FMW(35W), 40° Flood
15 - EYR(42W), 12° Spot
16 - EYS(42W), 25° N. Flood
17 - EYP(42W), 40° Flood
6 - EXT(50W), 13° Spot
7 - EXZ(50W), 26° N. Flood
8 - EXN(50W), 40° Flood
9 - FNV(50W), 60° W. Flood

Finish

Aluminum & Brass Finish

Powder Coat Color	Satin	Wrinkle
Bronze	**BZP**	**BZW**
Black	**BLP**	**BLW**
White (Gloss)	**WHP**	**WHW**
Aluminum	**SAP**	—
Verde	—	**VER**

Brass

Machined	**MAC**
Polished	**POL**
Mitique™	**MIT**

Also available in Premium Finishes See submittal SUB-1439-00 for Premium Finishes

Lens Type

9 - Clear (Standard) **10** - Spread* **12** - Soft Focus* **13** - Rectilinear*

Shielding

11 - Honeycomb Baffle*

* Accomodates up to 2 Lens/Shielding media

LAMP DATA

BK No.	Lamp Watts	Description	Rated Life (hrs.)	Center Beam Candlepower	Beam Angle	Beam Type
1	20	ESX	4,000	4,000	12°	Spot
2	20	BAB	4,000	500	40°	Flood
3	35	FRB	5,000	7,600	12°	Spot
4	35	FRA	5,000	2,300	23°	Narrow Flood
5	35	FMW	5,000	1,100	40°	Flood
15	42	EYR	5,000	7,500	12°	Spot
16	42	EYS	5,000	2,600	25°	Narrow Flood
17	42	EYP	5,000	1,100	40°	Flood
6	50	EXT	5,000	9,800	13°	Spot
7	50	EXZ	5,000	3,200	26°	Narrow Flood
8	50	EXN	5,000	1,600	40°	Flood
9	50	FNV	5,000	700	60°	Wide Flood

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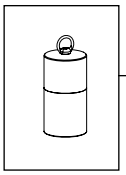
SUBMITTAL DATE 04-01-08

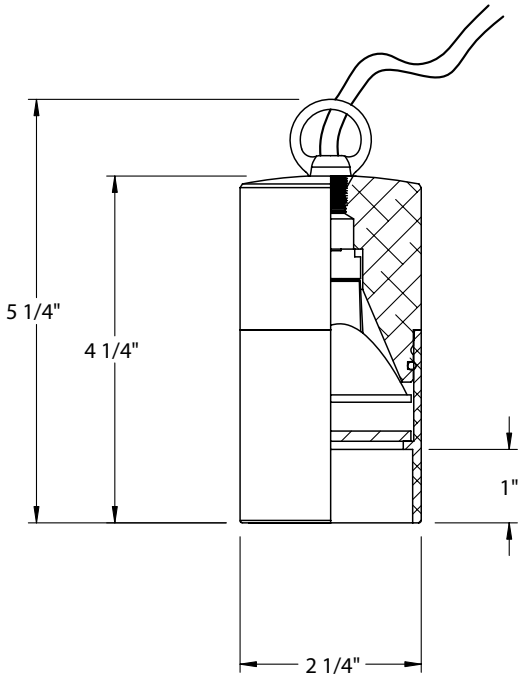
DRAWING NUMBER SUB-1146-00



RING MOUNT DELTA STAR™

MR-16 Halogen

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	C



SPECIFICATIONS

Body
Fully machined from solid, copper-free aluminum. Also available in solid machined brass. Unibody design provides enclosed, water-proof wireway and heat sink to maximize lamp life. 1" diameter Brass Mounting Ring allows for cable or hook mounting. High temperature, silicone 'O' Ring provides water-tight seal.

Cap
Machined from copper-free aluminum. Also available in machined brass. 1" deep cutoff with flush mounted lens. Accommodates up to (2) lens or louver media.

Lens
Shock resistant, tempered, clear glass lens is factory adhered to fixture cap and provides hermetically sealed optical compartment.

Lamp
For use with 50 watt maximum, MR-16 lamp.*
**Except GE Light Q42MR16/C/VNSP9 (EZY).*

Transformer
For use with 12 VAC remote transformer.

Socket
Specification grade, ceramic body lamp holder. GU5.3 base. Nickel allow contacts and heat resistant, spring loaded, stainless steel lamp retaining clips.

Wiring
Teflon® coated wire, 18AWG, 600V, 250° C rated and certified to UL 1659 standard. Leads extended 12" beyond brass mounting ring.

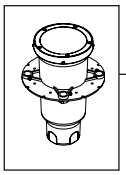
Hardware
Tamper-resistant, stainless steel hardware.

Finish
StarGuard® (Pat. Pend.), a 15 stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating. Brass components are available in powder coat or handcrafted metal finish.

Warranty
5 year limited warranty.

Listings
ARL and CSA listed to UL 1838 standard. Suitable for indoor or outdoor use. Suitable for use in wet locations.

**Teflon is a registered trademark of DuPont Corporation.*



Precision²

T-6 Metal Halide • Remote Ballast (RD)

HP²

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	D
CATALOG NUMBER:	HP2-T635-SP-RD-81-BZP-GS-RM-H35E-120
LAMP(S):	CDM35/T6/830
NOTES:	

CATALOG NUMBER LOGIC

		HP2			RD								
Example	- **HP2**	- **T670**	- **SP**	- **RD**	- **82**	- **VER**	- **13**	- **AH**	- **RM**	- **H70M**	- **120**	-	

Material

Blank - Aluminum **B** - Brass **S** - Stainless Steel

Faceplate

HP2 - Flush

OptiLock®

T635 - T6 Metal Halide (35W) **T670** - T6 Metal Halide (70W)

Reflector

SP - Spot **MS** - Medium Spot **FL** - Flood

Housing

RD - Requires Remote Ballast

Lamp Type

0 - By Others **81** - (35W) Metal Halide T-6 / 830 **82** - (70W) Metal Halide T-6 / 830

Finish

Aluminum & Brass Faceplates

Powder Coat Color	Satin	Wrinkle
Bronze	**BZP**	**BZW**
Black	**BLP**	**BLW**
White (Gloss)	**WHP**	**WHW**
Aluminum	**SAP**	—
Verde	—	**VER**

Brass Faceplates

Machined	**MAC**
Polished	**POL**
Mitique™	**MIT**

Stainless Faceplates

Machined	**MAC**
Polished	**POL**
Brushed	**BRU**

Also available in Premium Finishes. See submittal SUB-1439-00 for Premium Finishes.

Accessory *Select up to 2. Requires Accessory Holder.*

10 - Spread Lens **11** - Honeycomb Baffle **13** - Rectilinear Lens

Option

AH - Accessory Holder (Accommodates up to 2 Media)
CPC - Concrete Pour Collar (HP2 Only,) Material and Finish to Match Faceplate. May be Field Installed prior to permanent installation of side conduit connectors. Included with ICEE™ Lens option.
DG - Dome Glass Lens (Replaces Flat Glass. Not Driveover Rated)
GS - Glare Shield*
HD - Half Dome*
ICEE - ICEE™ Lens (HP2 Only. Faceplate standard aluminum only. Concrete Pour Collar included.) Options DG, GS, HD, RG and RO not available with ICEE™ lens.
RG - Rock Guard*
RO - Rock Guard with Optical Opening*
TC - Traction Control Lens (Replaces Flat Glass)
* HP2 Only. Material and Finish to Match Faceplate. Dome lens included.

Remote Ballast Housing

RM - Remote Wall Mount **HP2RM**- Remote In-Grade (Flush)* **CO2RM** - Remote In-Grade (Flange)*
* Material and Finish to Match Fixture

Ballast Type

H35M - (35W) Magnetic **H70M** - (70W) Magnetic **H35E** - (35W) Electronic **H70E** - (70W) Electronic

Input Voltage

120 - 120 Volt **277** - 277 Volt **MT** - 120/208/240/277 Volt Multi Tap
Electronic Ballast Only

Ballast Option

CPC - Concrete Pour Collar (HP2RM Only) Material and Finish to Match Faceplate. May be Field Installed prior to permanent installation of side conduit connectors.

LAMP DATA

BK No.	Lamp Watts	Description	Rated Life	Initial Lumens	Mean Lumens	CRI	CCT(K)
81	35	35T6/MH/830	12,000	3,300	2,600	81	3,000
82	70	70T6/MH/830	12,000	6,600	4,950	81	3,000

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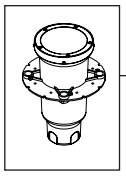
SUBMITTAL DATE 8-7-09

DRAWING NUMBER SUB-1358-00



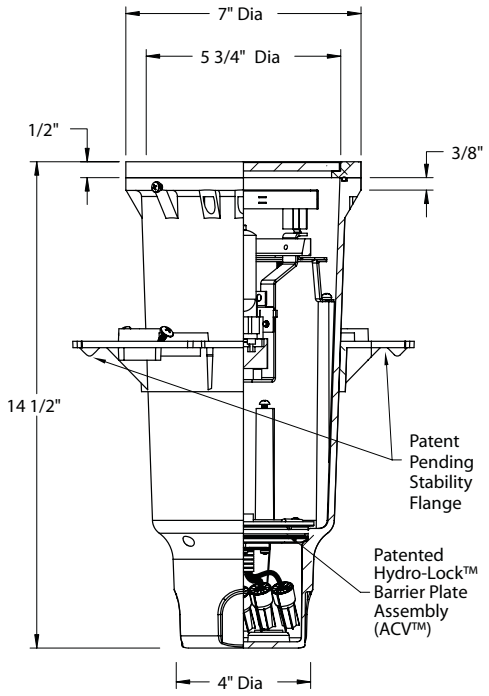
Precision²

HP²

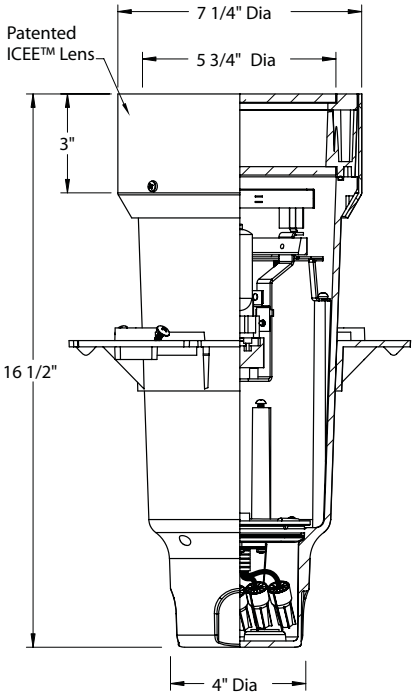
T-6 Metal Halide • Remote Ballast (RD)

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	D

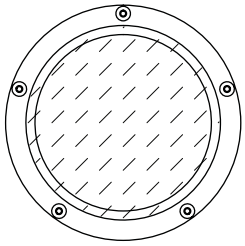
SIDE VIEW



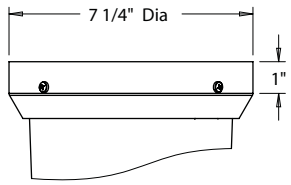
SIDE VIEW WITH ICEE™ LENS OPTION



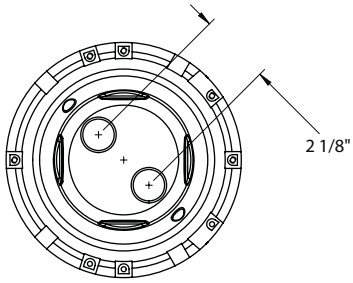
FACEPLATE



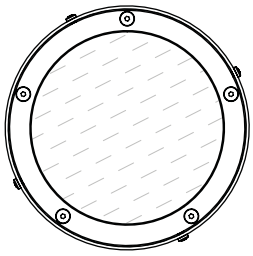
TOP SIDE VIEW



BOTTOM VIEW



ICEE™ LENS FACEPLATE



SPECIFICATIONS

GreenSource Initiative™
Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy, produced onsite. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFC's). RoHs compliant.

Fixture Housing
Corrosion-free composite, made from high strength, thermo-formed, sheet molded polyester compound. Glass reinforced, flame retardant and UV stabilized. (2) Bottom-Entry, 3/4" NPT female conduit entries with knockout plugs and (4) side flats for 1/2" or 3/4" conduit adapters.

Stability Flange (Patent Pending)
Corrosion-free composite flange projects into installation substrate to reinforce housing stability. Integral REBAR saddles simplify installation onto concrete form. (4) Orthogonal bosses permit use of 1/2" PCV conduit or EMT to simplify vertical position and leveling of housing. Pre-set self-tapping screws anchor housing at proper elevation.

Aiming
Dual axis OptiLock® stainless steel aiming bracket rotates 360° and provides vertical adjustment up to 14° from nadir. Positive lock action ensures optical orientation.

Socket
Specification grade ceramic body lamp holder rated for 5kV starting pulse. G12 bi-pin base, nickel-plated contacts and stainless steel, heat resistant lamp retaining clips.

Remote Ballast
For use with remote metal halide ballast. See ballast technical data to determine lamp-to-ballast distance and wiring requirements prior to detailing field installation of any remote wiring.

Wiring / Connectors
Teflon® coated wire, 18 gauge, 600V, 250°C rated and certified to UL1659 standard. OptiLock® and gear tray quick disconnects. Patented HydroLock® with anti-siphon valve (ASV™) wireway. (3) Water-Tight connectors supplied for line connection. Maximum (2) #10 & (1) #18. Minimum (1) #12 & (1) #18.

Water Management
Self Evacuating Airtight Lamp Module (S.E.A.L.™). IP-68 rated, vacuum sealed enclosure. Patented Anti-Condensation Valve (ACV™) eliminates condensation from optical chamber. High temperature silicone 'O' Ring at faceplate. Patented HydroLock® technology provides fail safe water barrier between junction box and interior components. Anti-siphon valve (ASV™) prevents "wicking" through conductor insulation.

Lens
High heat, shock resistant, tempered 1/4" borosilicate flat glass lens. Suitable for walk-over and drive-over applications.

Patented ICEE™ Lens Option
ICEE™ (Interstice Cooling Evacuated Enclosure) is a significant advancement in the science of temperature management. Effectively reduces surface lens temperatures without compromising lumen output or optical control. Increases overall fixture depth by 2". Available with aluminum faceplates only. Supplied with 5-3/4" dia. lens only. Includes Concrete Pour Collar.

Faceplate
Solid, 1/2" machined 6061T6 aluminum with (5) black oxide, captive, stainless steel mounting screws. Faceplate options include solid, 1/2" machined brass and solid, 1/2" machined stainless steel.

Finish
StarGuard® (Patent Pending), a 15 stage, chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating. Brass components are available in powder coat or handcrafted metal finish. Stainless steel components are available in handcrafted metal finish. RoHs compliant.

Listings
ETL Listed to ANSI/UL Standard 1598 and Certified to CAN/CSA Standard C22.2 No. 250.

®Teflon is a registered trademark of DuPont Corporation

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SUBMITTAL DATE	DRAWING NUMBER
8-7-09	SUB-1358-00

Date: _____ Type: E

Firm Name: _____

Project: SALAMANDER RESORT AND SPA

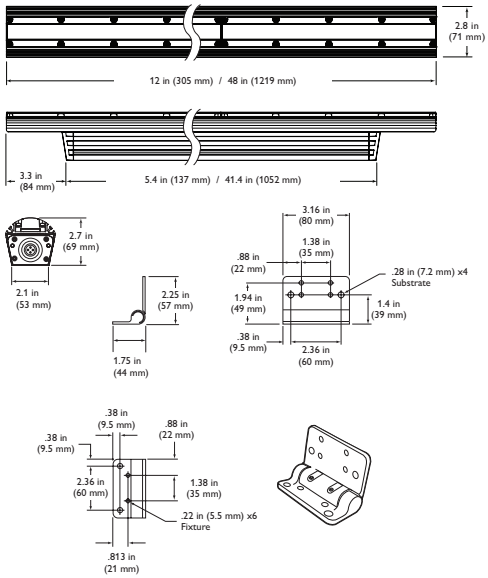
eW Graze Powercore

2700 K, 10° x 60° Lens

Linear, LED surface light for wall washing and grazing

eW® Graze Powercore is a linear lighting fixture optimized for surface grazing and wall-washing applications requiring high-quality white or solid color light. Featuring Powercore® technology, eW Graze Powercore processes power directly from line voltage, eliminating the need for low-voltage, external power supplies. Fixtures are available in eight color temperatures, ranging from a warm 2700 K to a cool 6500 K, and five solid colors. eW Graze Powercore offers superior illumination quality and dramatic energy savings for new installations and retrofit upgrades. A space-efficient, low-profile aluminum housing and flexible mounting options allow discrete placement within a wide range of compact architectural details

- Tailor light output to specific applications — eW Graze Powercore is available in standard 1 ft and 4 ft exterior-rated housings, and standard 10° x 60° and 30° x 60° beam angles.
- High-performance illumination and beam quality — eW Graze Powercore offers superior beam quality for striation-free saturation as close as 6 in (152 mm) from fixture placement. eW Graze Powercore accommodates end-to-end or incremental placement without visible light scalloping between fixtures.
- Supports new applications for white light— Long-life LEDs (50,000 hours at 70% lumen maintenance) significantly reduce or eliminate maintenance problems, allowing the use of white or solid color lighting in spaces where bulb maintenance may be limited or unfeasible.
- Universal power input range — eW Graze Powercore accepts line voltage input of 100, 120, 220 – 240, and 277 VAC.
- Versatile installation options — Constant torque locking hinges offer simple position control from various angles without special tools. The low-profile extruded aluminum housing accommodates installation within architectural niches of many different shapes and sizes.



- Wide range of build-to-order configurations — Additional fixture lengths, beam angles, color temperatures up to 6500 K, and solid colors (Royal Blue, Blue, Green. Amber, and Red) are available as build-to-order configurations. See the eW Graze Powercore Ordering Information sheet for complete details.
- "Cool lighting" functionality — eW Graze Powercore fixtures do not heat illuminated surfaces, discharge infrared radiation or emit ultraviolet light.
- Dimming capable — Patented DIMand™ technology offers smooth dimming capability with many ELV-type dimmers.
- Trouble-free, code-compliant installation — IP66, UL wet location ratings. UL / cUL, CE, FCC, RoHS, WEEE certified.

For detailed product information, please refer to the eW Graze Powercore Product Guide at www.colorkinetics.com/ls/essentialwhite/ewgraze/

A Green Flagship Product

Our Green Flagship Products offer significantly improved environmental performance in two or more of the following Green Focal Areas: weight, energy consumption, hazardous substances, packaging, recycling, disposal, and lifetime reliability.

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	1 ft (305 mm)	4 ft (1.2 m)
Output	Beam Angle	10° x 60°	
	Color Temperature	2700 K (+375 / -300)	
	Lumens†	404	1616
	Efficacy (Lm/W)	26.9	
	Mixing Distance	6 in (152 mm) to uniform beam saturation	
	Lumen Maintenance‡	100,000+ hours L_{70} @ 25° C 50,000 hours L_{70} @ 50° C	
Electrical	Input Voltage	100 / 120 / 220 – 240 / 277 VAC, 50 / 60 Hz	
	Power Consumption	15 W maximum at full output, steady state	60 W maximum at full output, steady state
Control		Commercially available ELV control dimmers	
Physical	Dimensions *(Height x Width x Depth)*	2.7 x 12 x 2.8 in (69 x 305 x 71 mm)	2.7 x 48 x 2.8 in (69 x 1219 x 71 mm)
	Weight	2.7 lb (1.2 kg)	10.8 lb (4.9 kg)
	Housing	Extruded anodized aluminum	
	Lens	Clear polycarbonate	
	Fixture Connectors	Integral male / female waterproof connectors	
	Mounting	Multi-positional, constant torque locking hinges	
	Temperature	-40° – 122° F (-40° – 50° C) Operating -4° – 122° F (-20° – 50° C) Startup	
	Humidity	0 – 95%, non-condensing	
	Fixture Run Lengths*	88 @ 110 VAC 97 @ 20 VAC 180 @ 220 VAC 197 @ 240 VAC	*Configuration:* *1 ft (305 mm) fixtures installed end-to-end, 20 A circuit, standard 50 ft (15.2 m) Leader Cable*
Certification and Safety	Certification	UL / cUL, FCC Class A, CE, RoHS, WEEE	
	LED Class	Class 2 LED product	
	Environment	Dry / Damp / Wet Location, IP66	

† Lumen measurement complies with IES LM-79-08.

‡ L_{70} = 70% maintenance of lumen output. (When light output drops below 70% of initial output.)

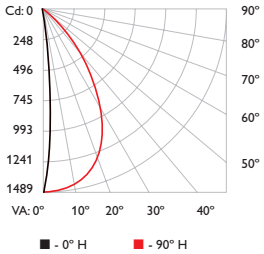
* These figures, provided as a guideline, are accurate for this configuration only. Changing the configuration can affect the fixture run lengths.

OPTIBIN® CK TECHNOLOGY | POWERCORE® CK TECHNOLOGY | DIMAND® CK TECHNOLOGY

Photometrics

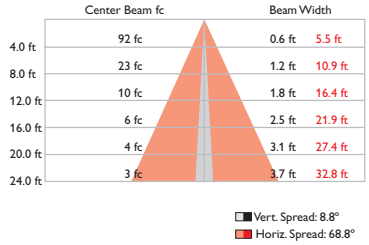
2700 K, 1 ft, 10° x 60° lens

Polar Candela Distribution



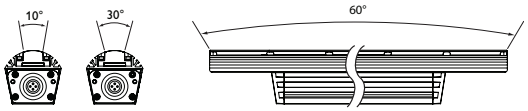
	0	22.5	44	67.5	90
0	1478	1478	1478	1478	1478
5	617	679	880	1235	1478
15	80	88	131	460	1384
25	37	43	61	139	1140
35	22	25	36	67	715
45	11	12	23	43	271
55	4	5	12	27	70
65	1	2	6	13	25
75	1	1	1	5	9
85	1	0	0	1	1
90	0	0	0	0	0

Illuminance at Distance



For lux multiply fc by 10.7

Power Consumption	15 W
Lumens	404
Efficacy	26.9 Lm/W



Fixtures

Item	Beam Angle	Voltage	Size	Item Number	Philips 12NC
eW Graze Powercore 2700 K	10° x 60°	120 VAC	1 ft	523-000030-00	910503700276
			4 ft	523-000030-02	910503700278
		277 VAC	1 ft	523-000030-08	910503700284
			4 ft	523-000030-10	910503700286
		220 – 240 VAC	1 ft	523-000030-16	910503700292
			4 ft	523-000030-18	910503700294
		100 VAC	1 ft	523-000030-24	910503700300
			4 ft	523-000030-26	910503700302

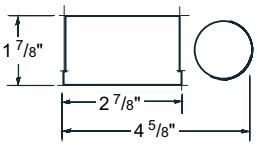
Use Item Number when ordering in North America.

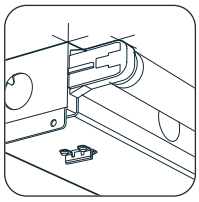
Accessories

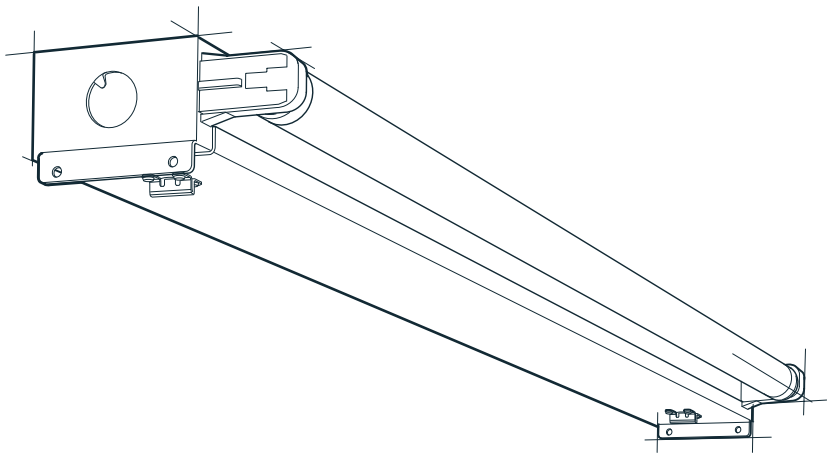
Item	Type	Size	Item Number	Philips 12NC
Leader Cable	UL / cUL	50 ft (15.2 m)	108-000041-00	910503700320
	CE		108-000041-01	910503700320
Jumper Cable	UL / cUL	End-to-End	108-000039-00	910503700314
		1 ft (305 mm)	108-000039-01	910503700315
		5 ft (1.5 m)	108-000039-02	910503700316
	CE	End-to-End	108-000040-00	910503700317
		1 ft (305 mm)	108-000040-01	910503700318
		5 ft (1.5 m)	108-000040-02	910503700319
Glare Shield		1 ft (305 mm)	120-000081-00	910503700745
		2 ft (610 mm)	120-000081-01	910503700746
		3 ft (914 mm)	120-000081-02	910503700747
		4 ft (1.2 m)	120-000081-03	910503700748

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.colorkinetics.com

DAS-000009-01 R04 07-09







ordering

series	lamp rows	nominal length	color/finish	voltage	options
PSM-101					
	1T8	02'	BWE* white enamel	120	AL
		03'	YGW gloss white	277	EML*
		04'	Y__ premium color	347	EMH*
		06'	CC custom color		DM
		08'	*standard		RSE
		R__*			10THD
		*row length			B__
					FH
					*consult factory for fixture lengths < 4'

Applications Concealed coves, perimeter systems, merchandising, warehouses.

Features A unique side-mounted 1-lamp T8 strip light. An aluminum body is optional with dimming ballasts and emergency batteries also available.

Construction The housing, available in 2-, 3-, 4-, 6- or 8-foot standard lengths, is made of die-formed, 20-gauge steel.

Finish The standard exterior body color is white enamel (BWE) or optional gloss white (YGW) using polyester powder paint. Refer to **Defining Section** for optional paint colors.

Electrical T8 fixtures have instant-start electronic ballasts with less than 20% THD. Fixtures are U.L. Damp labeled (non-emergency) and I.B.E.W. manufactured. Maximum ballast size available: 2 3/8" width x 1 1/2" height.

Mounting Fixture is to be surface-mounted.

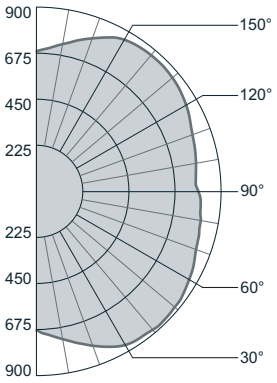
Options **AL**: aluminum body; **EML**: emergency battery (T8=600 lumens); **EMH**: emergency battery (T8=1200 lumens); **DM**: dimming (consult factory); **RSE**: rapid-start electronic; **10THD**: ballast with < 10% total harmonic distortion; **B_**: specific ballast, specify manufacturer and catalog number (consult factory); **FH**: fixture fusing (slow blow).

0811 P-142

photometric data

PSM-101-1T8-04-BWE

Report # LSI16334 D=50.9% I=49.1%
Lamp Lumens: 3000 Input Watts: 33



Candlepower Summary

Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Output Lumens
0	679	679	679	679	679	
5	674	676	696	696	705	34
15	648	668	717	746	768	101
25	596	645	740	806	841	168
35	523	610	751	848	881	228
45	429	557	729	851	891	270
55	320	493	682	831	881	291
65	201	404	622	801	854	291
75	92	3265	559	757	828	374
85	15	235	516	735	811	259
90	0	204	503	718	796	
95	13	223	500	712	787	252
105	94	309	544	740	807	271
115	204	404	611	785	833	287
125	323	496	673	819	863	289
135	433	562	724	838	875	268
145	528	620	751	838	869	227
155	601	653	745	791	831	168
165	652	675	724	744	763	101
175	677	681	702	696	703	34
180	686	686	686	686	686	

Zonal Lumen Summary

Zone	% Lamp	% Luminaire
0-90	50.06	50.90
90-180	48.30	49.10

Efficiency = 98.4%

Luminance Summary (cd/m²)

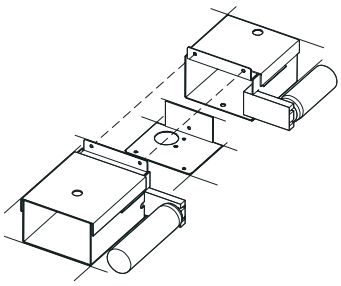
Angle	0°	45°	90°
45	12019	11659	12083
55	11052	11346	12054
65	9422	11125	12166
75	7042	11169	12707
85	3409	12169	13944

Coefficients of Utilization (%)

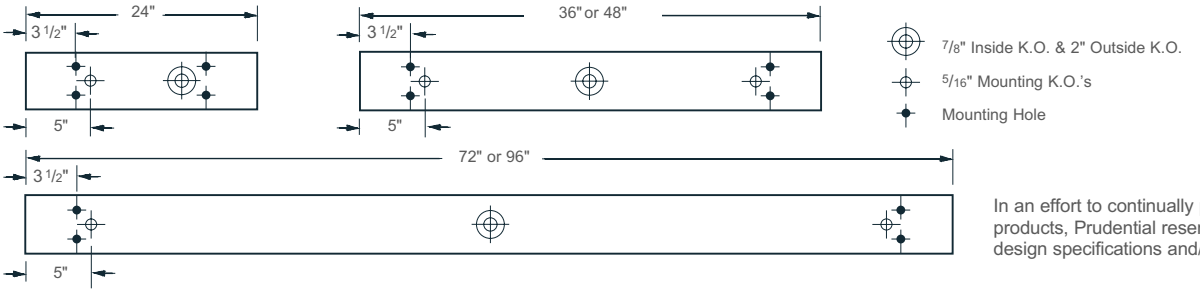
Floor	effective floor cavity reflectance = .20										
Ceiling	80				70				50		
Wall	**70**	**50**	**30**	**10**	**70**	**50**	**30**	**10**	**50**	**30**	**10**
RCR **0**	106	106	106	106	98	98	98	98	82	82	82
1	95	90	85	81	87	83	79	75	70	67	64
2	85	77	70	65	78	71	65	60	60	55	52
3	78	67	60	53	71	62	55	50	53	47	43
4	71	59	51	45	65	55	47	42	46	40	36
5	64	52	44	37	59	48	41	35	41	35	30
6	59	46	38	32	54	43	35	30	36	30	26
7	54	41	33	27	50	38	31	26	33	26	22
8	50	37	29	24	46	34	27	22	29	23	19
9	46	33	26	20	42	31	24	19	26	21	16
10	43	30	23	18	39	28	21	17	24	18	14

installation

Adjoining Detail



Mounting Locations

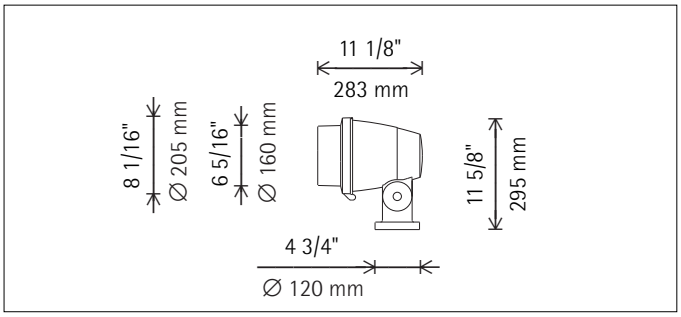


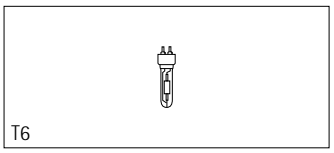
In an effort to continually provide the highest quality products, Prudential reserves the right to change design specifications and/or materials, without notice.

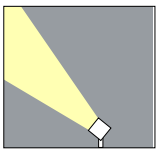
Beamer II Projector

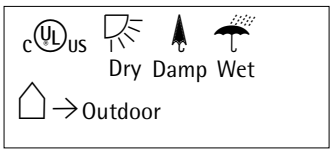
SALAMANDER RESORT AND SPA
TYPE: F

with mounting bracket for metal halide lamps



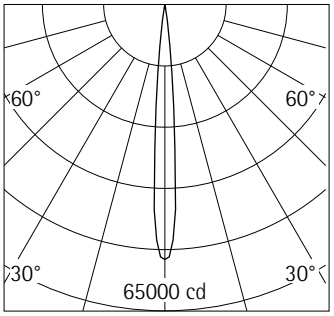






34068.023 Graphit m
T6 39W G12 3500lm
ECG
Spot reflector

Product description
For mounting on accessories.
Housing, hinge and mounting bracket: corrosion-resistant, cast aluminum, No-rinse surface treatment. Double powder-coated. Optimized surface for reduced accumulation of dirt. Hinge with internal wiring, 130° tilt. Graduated disc: stainless steel.
Electronic control gear 120V/277V, 60Hz. Heat-resistant cable with plug.
Reflector: aluminum, silver anodized, specular.
Screw-fastened snoot with safety glass: corrosion-resistant cast aluminum, double powder-coated. Cross-baffle: metal, black lacquered. Cut-off angle 50°. Without spill light.
Mounting accessories to be ordered separately.
Weight 12.35lbs / 5.60kg
Maximum wind load area 0.65ft^2



T6 39W G12 3500lm

h(ft)	E(fc)	D 9°
6	1503	0'11"
12	376	1'11"
18	167	2'10"
24	94	3'9"
30	60	4'9"

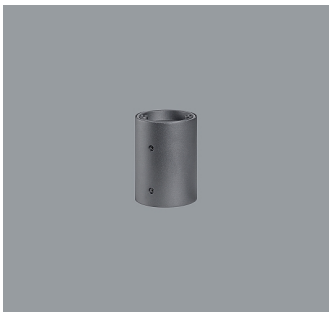
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/277V, 60Hz
We reserve the right to make technical and design changes.
Edition: 03.11.2009
Current version under
www.erco.com/34068.023

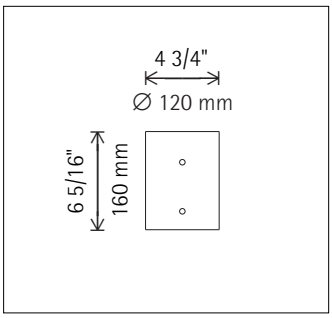
ERCO

Beamer II Projector

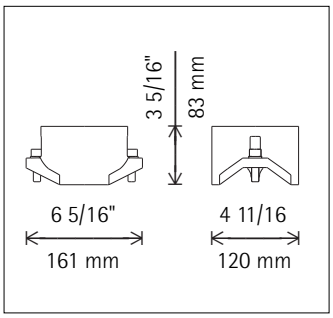
Accessories

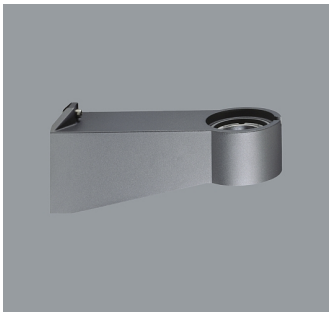


34961.023
Adapter sleeve
for posts ø 3 1/2" / 89mm.
Housing: corrosion-resistant, cast aluminum, No-rinse surface treatment.
Graphit m, double powder-coated.
Screw mounting.
3-pole terminal block for luminaire connection. Through-wiring possible.
Luminaire rotatable through 360°.
Suitable for wet location (IP44) in connection with mounted luminaire.
Weight 4.30lbs / 1.95kg
→Outdoor
Dry Damp Wet

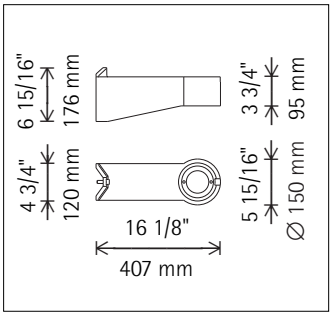


34957.023
Side-mounted sleeve
Mounting on adapter sleeve.
Housing: corrosion-resistant, cast aluminum, No-rinse surface treatment.
Graphit m double powder-coated.
1 cable entry. 3-pole terminal block for luminaire connection.
Luminaire rotatable through 360°.
Suitable for wet location (IP65) in connection with mounted luminaire.
Weight 1.98lbs / 0.90kg
Dry Damp Wet





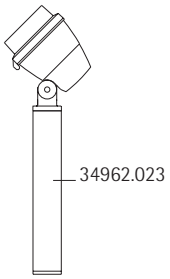
34950.023
Cantilever arm
For mounting on adapter sleeve or wall.
For standing luminaire installation.
Housing: corrosion-resistant, cast aluminum, No-rinse surface treatment.
Graphit m, double powder-coated.
Inspection cover: corrosion-resistant, cast aluminum, graphit m, double powder-coated.
1 cable entry. 3-pole terminal block for luminaire connection.
Luminaire rotatable through 360°.
Suitable for wet location (IP44) in connection with mounted luminaire.
Weight 8.62lbs / 3.91kg
→Outdoor
Dry Damp Wet



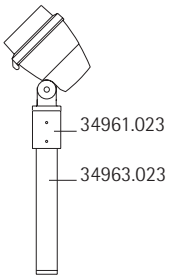
ERCO

Beamer Projector

Mounting accessories



∅ 120



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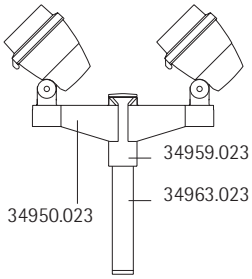

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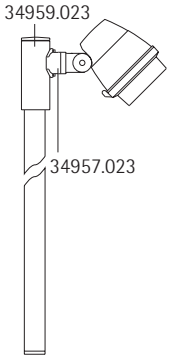
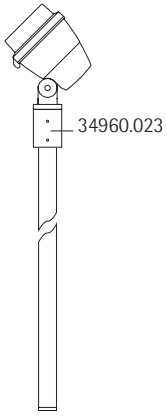
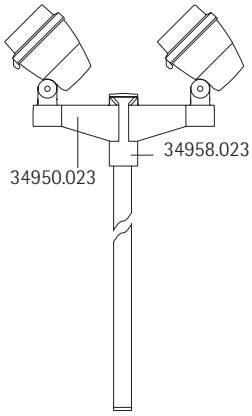


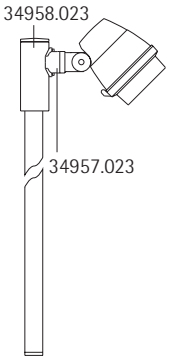
∅ 89



∅ 76

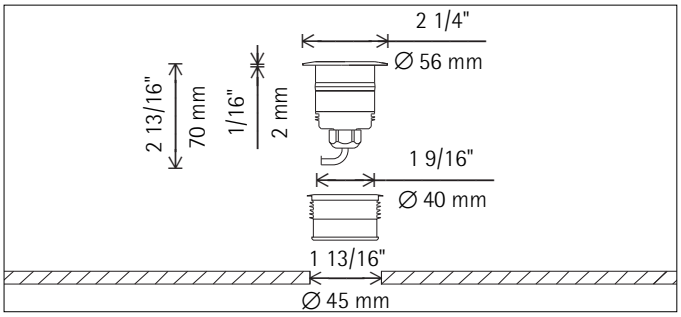


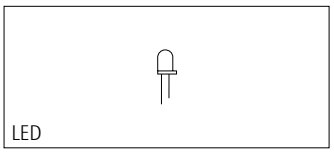
∅ 76

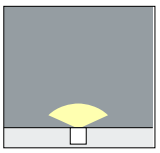


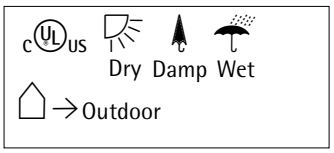
∅ 76

LED orientation luminaire









33764.023
LED daylight white
LED 0.9W 30V DC

Product description
Housing with gasket: stainless steel.
Installation bush with ribs: plastic.
Cable, L 19 11/16" / 500mm.
Clear prismatic diffuser with circular light aperture.
Cover ring: corrosion resistant stainless steel, with 1/4" / 6mm safety glass.
Load 1124lb.wt / 5kN.
Control gear to be ordered separately.
Suitable for wet location (IP68): dust-proof.
Weight 0.35lbs / 0.16kg

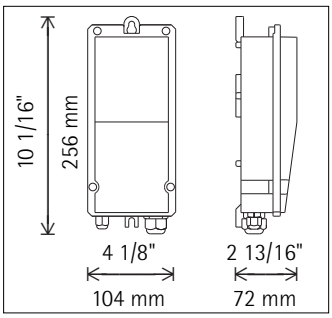
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 03.11.2009
Current version under
www.erco.com/33764.023

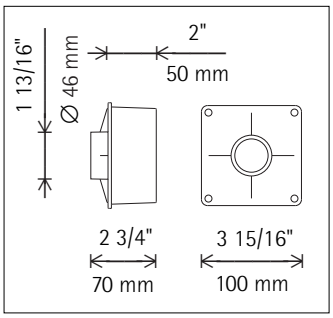
LED orientation luminaire

Accessories

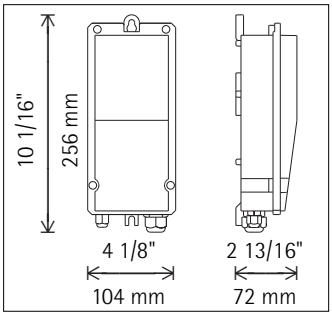
33858.023
Control gear
for max. 10 orientation luminaires.
Input voltage 100V-240V AC, 120V-250V DC.
Output voltage 30V DC.
Functions: dimming. Pulsating and flashing at three speeds.
Suitable for wet location (IP65): dust-proof and water-jet proof.
Weight 1.32lbs / 0.60kg
→Outdoor
Dry Damp Wet

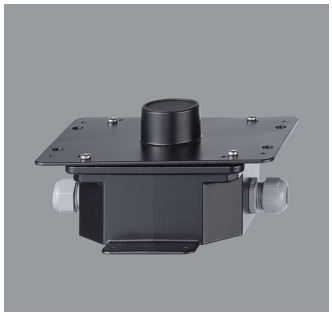


33873.000
Housing for recessed mounting
for mounting in plaster.
Weight 0.20lbs / 0.09kg

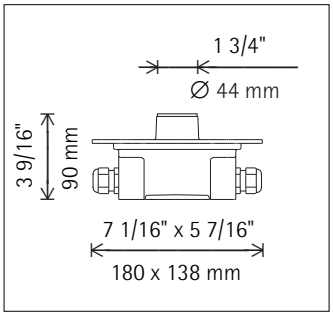


33859.023
Control gear
for max. 10 orientation luminaires.
Input voltage 100V-240V AC, 120V-250V DC.
Output voltage 30V DC.
24V DC input for emergency power operation.
Functions: dimming. Pulsating and flashing at three speeds.
Suitable for wet location (IP65): dust-proof and water-jet proof.
Weight 1.32lbs / 0.60kg
→Outdoor
Dry Damp Wet





33893.023
Recessed housing IP67
for installation in concrete floors or compressed natural ground with 1" / 25mm floor covering.
Cast aluminum, black, double powder-coated.
2 cable entries with IP67 ports.
Through-wiring possible.
Suitable for wet location (IP67): dust-proof and protected against immersion damage.
→Outdoor
Dry Damp Wet



Date: _____ Type: H

Firm Name: _____

Project: SALAMANDER RESORT AND SPA

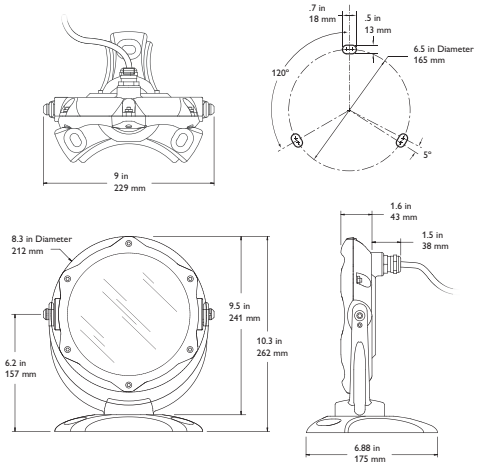
C-Splash 2

Submersible, color-changing LED spotlight for fresh and salt water

Higher Output

C-Splash 2 is an ultra-thin, submersible fixture designed to provide vibrant color and color-changing light in fresh and saltwater locations to a depth of 15 ft (4.6 m). With its watertight cast brass housing and silicon bronze adjusting hardware, C-Splash 2 is perfect for water-based applications such as fountains and theme park installations, as well as for applications situated in harsh environments.

- Rugged and watertight — Cast brass housing and yoke with silicon bronze adjusting hardware is designed for submersion in fresh or salt water to a depth of 15 ft (4.6 m). This IP68-rated fixture is also able to withstand water treated with bromine or chlorine.
- Two beam angles — The frosted tempered glass lens offers a soft-edge beam of light at 22°, while the clear glass lens offers extended light projection at 10°.
- Unified power and data cable — Each C-Splash 2 fixture comes with a 60 ft (18.3 m) unified power and data cable to minimize wiring. C-Splash 2 is intended for use with PDS-150e and PDS-60 24V power / data supplies.
- Industry-leading controls — C-Splash 2 works seamlessly with the complete line of Philips controllers, including iPlayer 3 and Light System Manager, as well as third-party DMX controllers.
- Versatile light positioning — Locking base and pivot allows vertical and horizontal rotation through a full 360°.
- Temperature monitoring — C-Splash 2 has a temperature monitoring feature that automatically interrupts operation to protect the fixtures from damage due to extreme operating temperatures.



- High output, underwater — This submersible fixture offers the full range 16.7 million RGB colors and an output of over 500 lumens. Long-life LEDs significantly reduce or eliminate required maintenance, a major advantage for underwater installations.

For detailed product information, please refer to the ColorReach Powercore Product Guide at www.colorkinetics.com/ls/rgb/csplash2/

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	Clear Lens	Frosted Lens
Output	Beam Angle	10°	22°
	Lumens†	583	515
	Color Range	16.7 million additive RGB colors; continuously variable intensity	
	Lumen Maintenance‡	50,000+ hours L50 @ 50° C (full output)	
Electrical	Input Voltage	24 VDC	
	Power Consumption	25 W maximum at full output, steady state	
Control	Interface	PDS-150e 24V (DMX or Ethernet) PDS-60 24V (DMX, Pre-programmed, or Ethernet)	
	Control System	Philips full range of controllers, including Light System Manager and iPlayer 3, or third-party DMX controllers	
Physical	Dimensions *(Height x Width x Depth)*	10.3 x 9 x 1.6 in (262 x 229 x 41 mm)	
	Weight	22 lb (10 kg)	
	Housing	Cast brass	
	Lens	Clear tempered glass	Tempered ground glass
	Fixture Connections	60 ft (18.3 m) unified power / data cable	
	Temperature	-40° – 122° F (-40° – 50° C) Operating -4° – 122° F (-20° – 50° C) Startup	
	Humidity	0 – 100%	
	Cable Length	60 ft (18.3 m) standard 150 ft (45.7 m) maximum 400 ft (121.9 m) total per power / data supply	
	Maximum Fixtures Per Power / Data Supply	PDS-150e 24V: 6 (1 per port) PDS-60 24V: 2 (1 per port)	
Certification and Safety	Certifications	UL / cUL, CE	
	LED Class	Class 2 LED product	
	Environment	Dry / Damp / Wet, IP68	

† Lumen measurement complies with IES LM-79-08 testing procedures

‡ L50 = 50% maintenance of lumen output. (When light output drops below 50% of initial output.) Ambient temperature specified.

Fixtures and Accessories

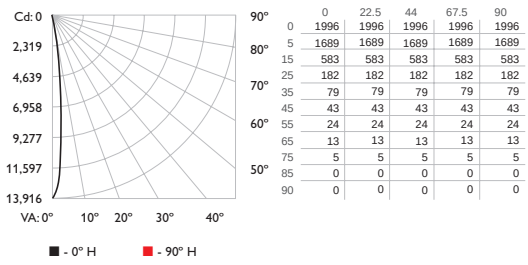
Item	Type	Item Number	Philips 12NC
C-Splash 2	10° clear lens	116-000024-01	910503700617
	22° frosted lens	116-000024-00	910503700616
PDS-150e 24V	DMX / Ethernet	109-000008-01	910503700092
PDS-60 24V	Pre-programmed	109-000017-00	910503700096
	DMX / Ethernet	109-000017-03	910503700097
Light System Manager	Ethernet	103-000015-02	910503700221
iPlayer 3	NA Power Cord	103-000019-00	910403327101
	EU Power Cord	103-000019-01	910503700392
ColorDial Pro	DMX	103-000025-00	910503700790
Synchronizer	DMX	103-000001-00	—
Multi Synchronizer	DMX	103-000002-00	—

Use Item Number when ordering in North America.

Photometrics

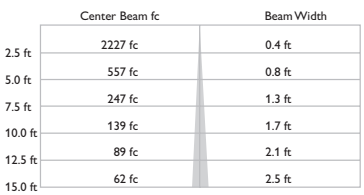
10° clear lens

Polar Candela Distribution



	0	22.5	44	67.5	90
0	1996	1996	1996	1996	1996
5	1689	1689	1689	1689	1689
15	583	583	583	583	583
25	182	182	182	182	182
35	79	79	79	79	79
45	43	43	43	43	43
55	24	24	24	24	24
65	13	13	13	13	13
75	5	5	5	5	5
85	0	0	0	0	0
90	0	0	0	0	0

Illuminance at Distance



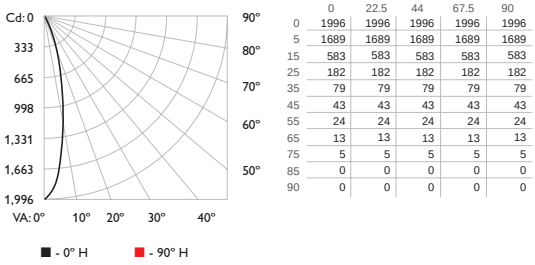
118 ft (36 m) ■ Beam Spread: 9.6°
1 fc maximum distance

For lux multiply fc by 10.7

LED	Lumens	Watts	Efficacy
RGB	583	25	23.3

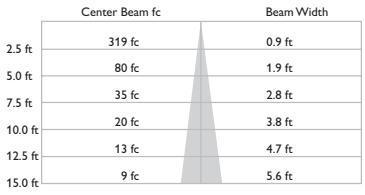
22° frosted lens

Polar Candela Distribution



	0	22.5	44	67.5	90
0	1996	1996	1996	1996	1996
5	1689	1689	1689	1689	1689
15	583	583	583	583	583
25	182	182	182	182	182
35	79	79	79	79	79
45	43	43	43	43	43
55	24	24	24	24	24
65	13	13	13	13	13
75	5	5	5	5	5
85	0	0	0	0	0
90	0	0	0	0	0

Illuminance at Distance



44.6 ft (13.6 m) ■ Beam Spread: 21.3°
1 fc maximum distance

C-Splash 2 fixtures are part of a complete low-voltage system which includes fixtures and:

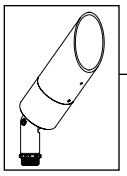
- One or more power / data supplies
- One leader cable to connect each power / data supply output to a fixture
- Any Philips controller, including Light System Manager and iPlayer 3, or a third-party DMX controller

For detailed product information, please refer to the C-Splash 2 Product Guide at www.colorkinetics.com/ls/rgb/csplash2/

LED	Lumens	Watts	Efficacy
RGB	515	25	20.6

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.colorkinetics.com

DAS-000033-01 R01 10-09



MR-16 Halogen

DELTA STAR™

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	I
CATALOG NUMBER:	DS-MR-2-BLP-9-A-360L
LAMP(S):	20MR16/FL36-BAB
NOTES:	

CATALOG NUMBER LOGIC

		DS	MR							
Example	-	**DS**	- **MR**	- **6**	- **WHP**	- **10**	- **11**	- **E**	-	**360SL**

Material
- **Blank** - Aluminum
- **B** - Brass

Series
- **DS** - Delta Star™

Source
- **MR** - MR16

Lamp
- **0** - By Others
- **1** - ESX(20W), 12° Spot
- **2** - BAB(20W), 40° Flood
- **3** - FRB(35W), 12° Spot
- **4** - FRA(35W), 23° N. Flood
- **5** - FMW(35W), 40° Flood
- **15** - EYR(42W), 12° Spot
- **16** - EYS(42W), 25° N. Flood
- **17** - EYP(42W), 40° Flood
- **6** - EXT(50W), 13° Spot
- **7** - EXZ(50W), 26° N. Flood
- **8** - EXN(50W), 40° Flood
- **9** - FNV(50W), 60° W. Flood

Finish

Aluminum & Brass Finish

Powder Coat Color	Satin	Wrinkle
Bronze	**BZP**	**BZW**
Black	**BLP**	**BLW**
White (Gloss)	**WHP**	**WHW**
Aluminum	**SAP**	—
Verde	—	**VER**

Brass

Machined	**MAC**
Polished	**POL**
Mitique™	**MIT**

Also available in Premium Finishes
See submittal SUB-1439-00 for Premium Finishes

Lens Type
- **9** - Clear (Standard)
- **10** - Spread*
- **12** - Soft Focus*
- **13** - Rectilinear*

Shielding
- **11** - Honeycomb Baffle**

Cap Style
- **A** - 45°
- **B** - 90°
- **D** - 45° Less weephole (for Interior Use Only)
- **E** - 90° Less weephole (for Interior Use Only)

Options
- **360SL** - 360SL™ Knuckle Mounting System

* Accomodates up to 2 Lens/Shielding media

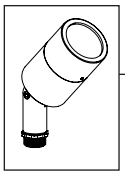
LAMP DATA

BK No.	Lamp Watts	Description	Rated Life (hrs.)	Center Beam Candlepower	Beam Angle	Beam Type
1	20	ESX	4,000	4,000	12°	Spot
2	20	BAB	4,000	500	40°	Flood
3	35	FRB	5,000	7,600	12°	Spot
4	35	FRA	5,000	2,300	23°	Narrow Flood
5	35	FMW	5,000	1,100	40°	Flood
15	42	EYR	5,000	7,500	12°	Spot
16	42	EYS	5,000	2,600	25°	Narrow Flood
17	42	EYP	5,000	1,100	40°	Flood
6	50	EXT	5,000	9,800	13°	Spot
7	50	EXZ	5,000	3,200	26°	Narrow Flood
8	50	EXN	5,000	1,600	40°	Flood
9	50	FNV	5,000	700	60°	Wide Flood

B-K LIGHTING
40429 Brickyard Drive • Madera, CA 93636 • USA
559.438.5800 • FAX 559.438.5900
www.bklighting.com • info@bklighting.com

SUBMITTAL DATE 08-31-09

DRAWING NUMBER SUB-117D-06



BK SOLID STATE LIGHTING

the power of e

NITE STAR™

PROJECT:	SALAMANDER RESORT AND SPA
TYPE:	I2
CATALOG NUMBER:	S-NS-LED-e22-WFL-BLP-12-360SL
NOTES:	

CATALOG NUMBER LOGIC

S	NS	LED	e22	WFL	BLP	12		360SL
Example	**- NS**	**- LED**	**- e23**	**- SP**	**- BZW**	**- 12**	**- 11**	**- 360SL**

Material
Blank - Aluminum
B - Brass
S - Stainless Steel

Series
NS - Nite Star™

Source
LED - **'e'** Technology with Integral Driver

LED Type
e22 - 8WLED/3K
e23 - 8WLED/4K
e24 - 8WLED/Red
e25 - 8WLED/Green
e26 - 8WLED/Blue
e27 - 8WLED/Amber

Optics*
NSP - Narrow Spot (Red Indicator)
SP - Spot (Green Indicator)
MFL - Medium Flood (Yellow Indicator)
WFL - Wide Flood (Blue Indicator)

Finish

Aluminum & Brass Finish

Powder Coat Color	Satin	Wrinkle
Bronze	**BZP**	**BZW**
Black	**BLP**	**BLW**
White (Gloss)	**WHP**	**WHW**
Aluminum	**SAP**	—
Verde	—	**VER**

Brass Finish

Machined	**MAC**
Polished	**POL**
Mitique™	**MIT**

Stainless Finish

Machined	**MAC**
Polished	**POL**
Brushed *Interior Use Only*	**BRU**

Also available in Premium Finishes
See submittal SUB-1439-00

Lens Type
12 - Soft Focus Lens
13 - Rectilinear Lens

Shielding
11 - Honeycomb Baffle

Option
360SL - 360SL™ Rotational Knuckle Mounting System

LM79 DATA

BK No.	CCT (Typ.)	Input Watts (Typ.)	CRI (Typ.)
e22	3100K	8.4	80
e23	4100K	8.4	66
e24	Red (627nm)	7.9	~
e25	Green (530nm)	8.4	~
e26	Blue (470nm)	8.4	~
e27	Amber (590nm)	7.9	~

L70 DATA

Minimum Rated Life (hrs.) 70% of initial lumens (L_{70})
50,000
50,000
50,000
50,000
50,000
50,000

*OPTICAL DATA

Beam Type	Angle	Visual Indicator
Narrow Spot	14°	Red Dot
Spot	18°	Green Dot
Medium Flood	25°	Yellow Dot
Wide Flood	36°	Blue Dot

B-K LIGHTING
40429 Brickyard Drive • Madera, CA 93636 • USA
559.438.5800 • FAX 559.438.5900
www.bklighting.com • info@bklighting.com

SUBMITTAL DATE 1-11-10

DRAWING NUMBER SUB000929

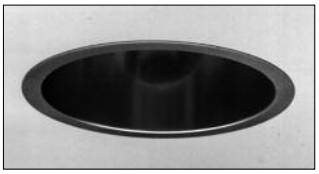
SPEC-5

Vertical Compact Fluorescent (1) 13W or (1) 18W Triple Tube

Open Recessed Downlight and Wallwasher

4"

online Find it Fast 113



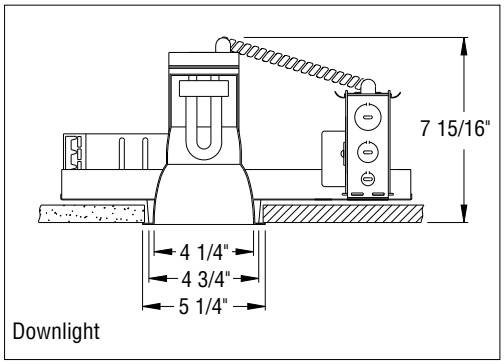
Applications: A vertical CFL fixture is the ideal choice for use in offices and lobbies which demand a low brightness aperture with high efficiency and lumen output. The 4" aperture makes this fixture ideal for use in any general downlighting application. Available in two wattages with a standard electronic ballast.

Type: J

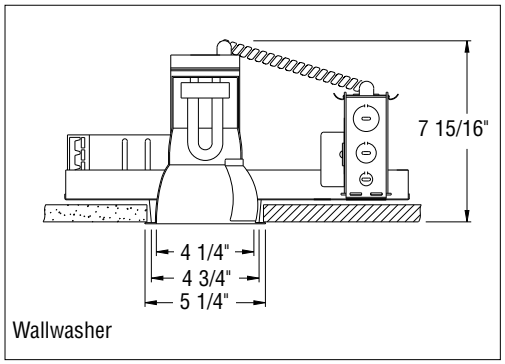
Project: SALAMANDER RESORT AND SPA

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

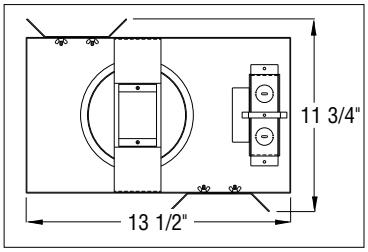
▼ Rough-In	▼ Ballast/Voltage	▼ Trim	▼ Trim Finish	▼ Options
S5D 4312	**D1**	**4311 R**	**MC**	
S5D4311 (1) 13W Triple Tube **S5D4312** (1) 18W Triple Tube	**U** 120/277v **S3** 347v **D1** Dimming 120v* **D2** Dimming 277v* ***Not available on 13W.**	**4311R** Downlight Reflector **4311W** Wallwasher Reflector	**C** Clear Specular Reflector **MC** Matte Clear Alzak® Reflector	**F** Fusing **W** White painted reflector flange **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 **E4** Stand-by Battery Pack 120/277v



Downlight



Wallwasher



(Ceiling Opening = 4 3/4")

c UL us LISTED

Suitable for damp locations
Fixtures with stand-by battery packs are rated for dry locations only
Approved for thru-wiring
Above ceiling access not required
Thermally protected

IBEW Union Made

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

1. Yoke Assembly - 16 gauge steel yoke assembly is corrosion protected and fixed to the mounting pan.

2. Plaster Frame - 20 gauge galvanized, die-formed plaster frame has a fixed throat depth of 3/4".

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 gauge galvanized junction box is U.L. listed for thru wiring (4 in and 4 out at 90°C) and has 7/8" and 1 1/8" knockouts. Ground wire is supplied. Junction box is accessible from below ceiling.

5. Stand-by Battery Pack - IOTA I-42, mounted on junction box cover. An external test light/switch assembly, supplied, to be located on ceiling near fixture. Operates on 120v or 277v, 60Hz only.

6. Reflector - One piece spun aluminum reflector with 1/2" flat flange with low iridescence, specular clad finish. Clear specular and matte clear Alzak® finishes are available. A white painted flange is also available. The reflector is secured to the yoke assembly by 2 captive screws.

7. Wallwasher Reflector - A hydroformed aluminum kicker plate is mounted to the main reflector for wall illumination. Reflector assembly is fully rotatable from below ceiling ensuring proper reflector alignment.

8. Lamp/Socket - One 13W or 18W triple tube compact fluorescent lamp with a GX24q-1 (13W) or a GX24q-2 (18W) socket. Lamp supplied by others.

9. Ballast - One (1) lamp, thermally protected Class P electronic ballast is supplied. Dimming ballast is Lutron Compact SE (5%).

10. Weight - Housing: 5.25 lbs. Trim: Downlight-0.25 lbs.; Wallwasher-0.30 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.**

Zumtobel Lighting Inc. ©2008
3300 Route 9W • Highland, NY 12528-2630
www.zumtobel.us
TEL (845) 691-6262 • (800) 932-0633 • FAX (845) 691-6289
10/1/08

ZUMTOBEL

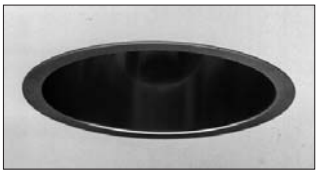
SPEC-5

Vertical Compact Fluorescent (1) 13W or (1) 18W Triple Tube

Open Recessed Downlight and Wallwasher

4"

online Find it Fast 113



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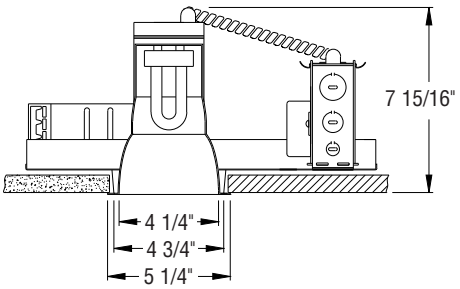
Type: J

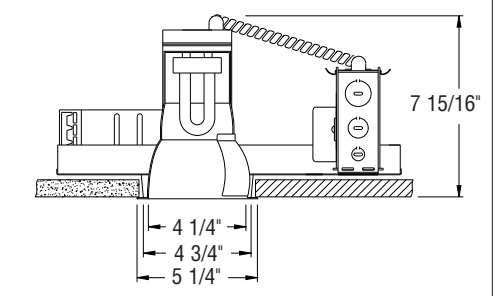
Project: SALAMANDER RESORT AND

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

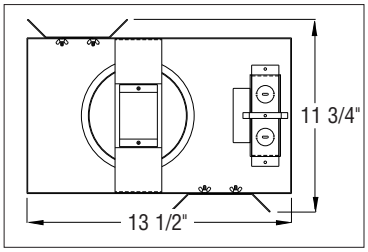
▼ Rough-In	▼ Ballast/Voltage	▼ Trim	▼ Trim Finish	▼ Options
S5D 4312	D1	4311 W	MC	
S5D4311 (1) 13W Triple Tube **S5D4312** (1) 18W Triple Tube	**U** 120/277v **S3** 347v **D1** Dimming 120v* **D2** Dimming 277v* ***Not available on 13W.**	**4311R** Downlight Reflector **4311W** Wallwasher Reflector	**C** 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 **(for colors of specular reflectors, consult factory)**	**F** Fusing **W** White painted reflector flange **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 **E4** Stand-by Battery Pack 120/277v



Downlight



Wallwasher



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c UL us
LISTED

Suitable for damp locations
Fixtures with stand-by battery packs are rated for dry locations only
Approved for thru-wiring
Above ceiling access not required
Thermally protected

IBEW Union Made

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9. Ballast - One (1) lamp, thermally protected Class P electronic ballast is supplied. Dimming ballast is Lutron Compact SE (5%).

10. Weight - Housing: 5.25 lbs. Trim: Downlight-0.25 lbs.; Wallwasher-0.30 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.

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5/22/07

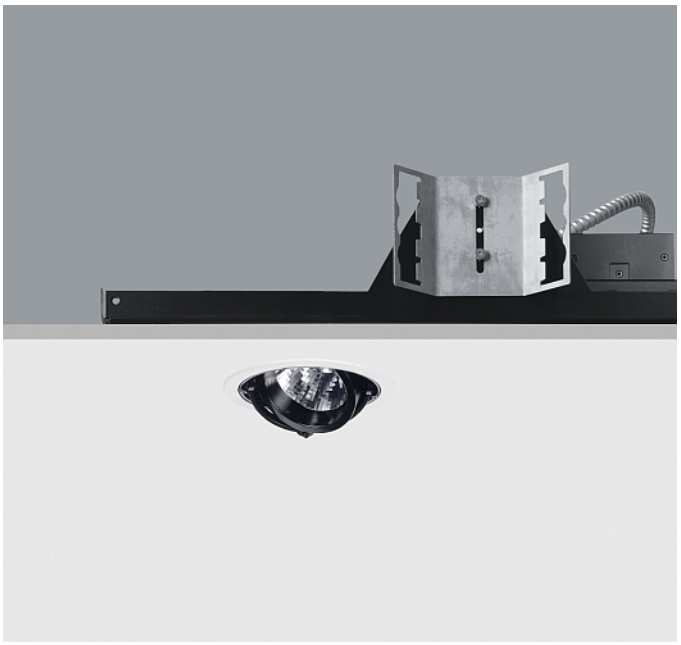
ZUMTOBEL

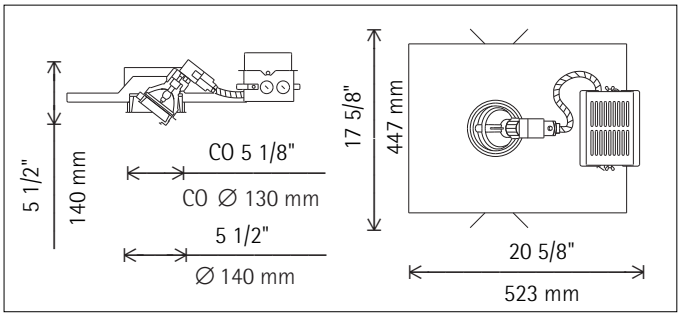
ERCO

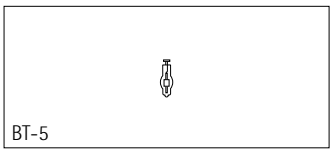
Gimbal Recessed spotlight

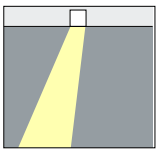
SALAMANDER RESORT
TYPE: K

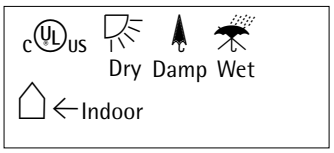
for metal halide lamps





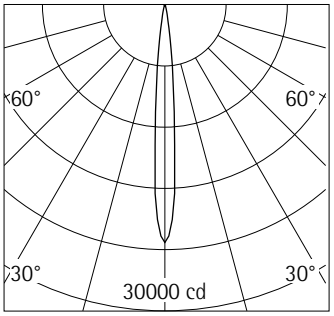






88147.023 Reflector silver
BT-5 20W PGJ5 1650lm
ECG
Spherolit reflector, narrow spot

Product description
Size 4
Luminaire: cast aluminum, black powder-coated.
Mounting ring: plastic, white (RAL9002), with multigroove baffle, cast aluminum, black powder-coated.
Fixing springs. Cardanic suspension of the luminaire in the mounting ring. 0°-40° tilt. Pivots are to be locked.
Mounting plate for preinstallation with junction box for through-wiring.
Electronic control gear 120V, 60Hz on top of junction box. Snap-in plug for connection between junction box and luminaire.
Reflector: aluminum, anodized, specular. Safety glass.
Anti-glare ring: plastic, black.
Type Non IC luminaire.
Insulation materials must be kept away from the luminaire by a minimum of 3". Thermally protected luminaire. Luminaires protected with disconnecting switch. Suitable for damp location. Removal of luminaire allows access to junction box from below.
Max. ceiling thickness 3/4".
Weight 7.72lbs / 3.50kg



BT-5 20W PGJ5 1650lm

h(ft)	E(fc)	D
		9°
3	2590	0'6"
6	648	0'11"
9	288	1'5"
12	162	1'11"
15	104	2'4"

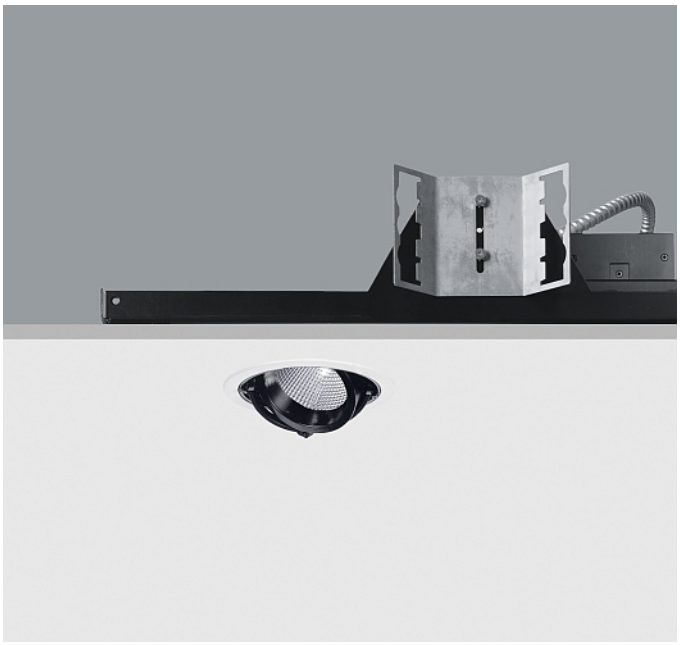
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

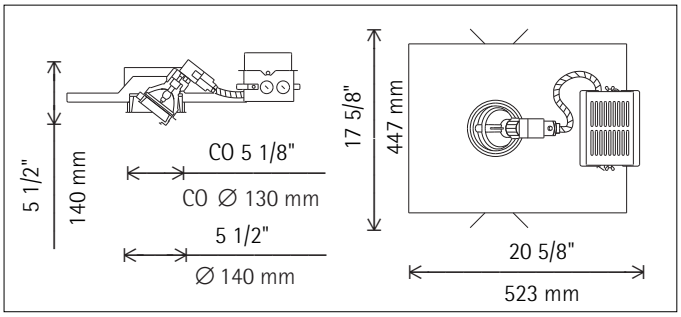
Technical Region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 03.11.2009
Current version under
www.erco.com/88147.023

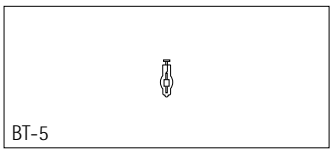
ERCO

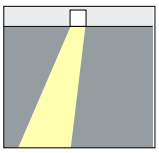
Gimbal Recessed spotlight

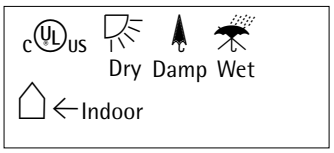
for metal halide lamps

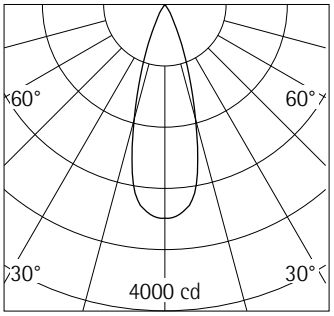












BT-5 20W PGJ5 1650lm

h(ft)	E(fc)	D
		32°
3	310	1'9"
6	78	3'5"
9	34	5'2"
12	19	6'11"
15	12	8'7"

88148.023 Reflector silver
BT-5 20W PGJ5 1650lm
ECG
Spherolit reflector, flood

Product description
Size 4
Luminaire: cast aluminum, black powder-coated.
Mounting ring: plastic, white (RAL9002), with multigroove baffle, cast aluminum, black powder-coated.
Fixing springs. Cardanic suspension of the luminaire in the mounting ring. 0°-40° tilt. Pivots are to be locked.
Mounting plate for preinstallation with junction box for through-wiring.
Electronic control gear 120V, 60Hz on top of junction box. Snap-in plug for connection between junction box and luminaire.
Reflector: aluminum, anodized, specular. Safety glass.
Anti-glare ring: plastic, black.
Type Non IC luminaire.
Insulation materials must be kept away from the luminaire by a minimum of 3". Thermally protected luminaire. Luminaires protected with disconnecting switch. Suitable for damp location. Removal of luminaire allows access to junction box from below.
Max. ceiling thickness 3/4".
Weight 7.72lbs / 3.50kg

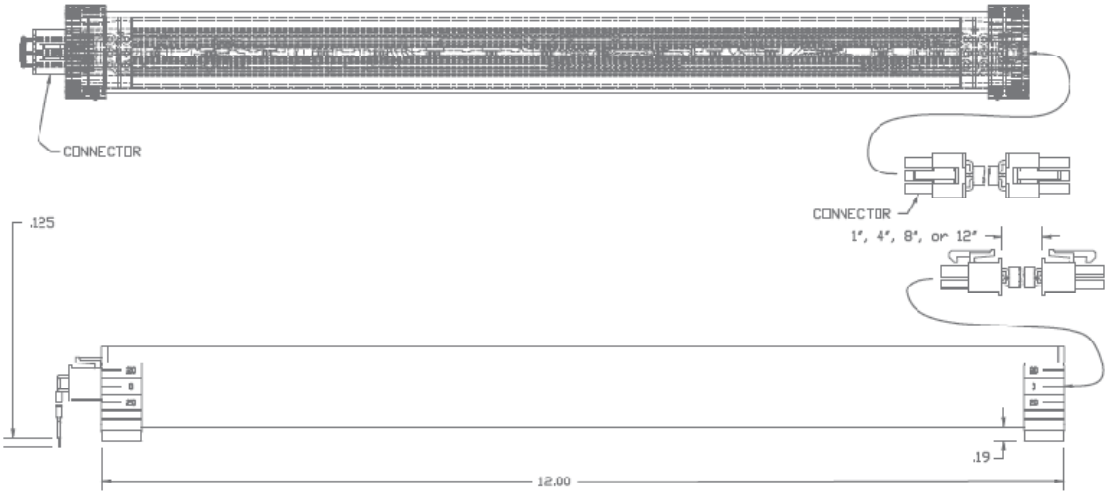
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 03.11.2009
Current version under
www.erco.com/88148.023

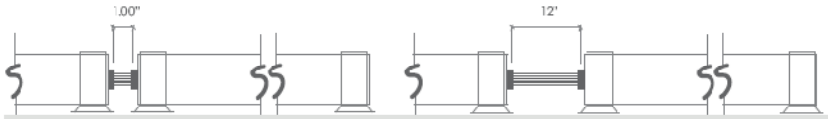
SALAMANDER RESORT AND SPA
TYPE: L

MECHANICAL PROFILE

All fixtures may be wall, ceiling or ground mounted in face up or face down position.



Clear mounting clip designed with a unique angle indicator mark. Feature allows convenient and accurate install of fixtures on jobsite.



Tandem mounting of fixtures from **1.00" min** space up to **12"** between fixtures. Contact factory for custom lengths.

Tolerances: .xx" ± .025"

SPECIFICATION INFORMATION

CWi	-	24	-	60	-	27k
MODEL		**LENGTH** [1]		**BEAM ANGLE** [2]		**COLOR** [3]
LED CoveWash Interior	**CWi**	12"	**12**	100° x 120°	**100**	Warm White **27K**
		24"	**24**	80° x 120°	**80**	Warm White **30K**
				60° x 100°	**60**	Neutral White **35K**
				50° x 120°	**50**	Cool White **42K**
				Custom Angle (Consult Factory)	**CA**	Cool White **53K**
						Daylight **63K**
						Custom Color (Consult Factory) **CK**

For additional accessory parts, please refer to the part numbers below

ACCESSORIES

Jumper Cables [4] **504435-XX**
Power Cables [5] **504488-XX**

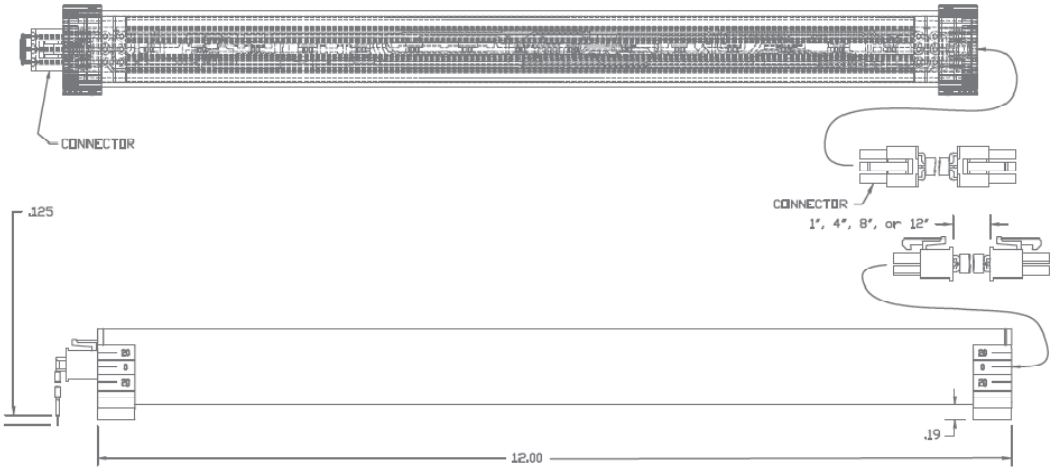
1. Cascade up to 20 feet.
2. Refer to photometric chart.
3. Contact factory for color options. Color temperature may vary +/-200K.
4. Replace XX with corresponding jumper length in 1", 4", 8" and 12".
5. Replace XX with corresponding power cable length in 6ft or 10ft.

SALAMANDER RESORT AND SPA

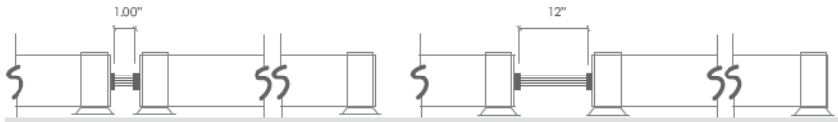
TYPE: L2

MECHANICAL PROFILE

All fixtures may be wall, ceiling or ground mounted in face up or face down position.



Clear mounting clip designed with a unique angle indicator mark. Feature allows convenient and accurate install of fixtures on jobsite.



Tandem mounting of fixtures from **1.00" min** space up to **12"** between fixtures. Contact factory for custom lengths.

Tolerances: .xx" ± .025"

SPECIFICATION INFORMATION

CWI	-	12	-	60	-	27k

MODEL

LED Cove Wash Interior — **CWi**

LENGTH [1]

12"	**12**
24"	**24**

BEAM ANGLE [2]

100° x 120°	**100**
80° x 120°	**80**
60° x 100°	**60**
50° x 120°	**50**
Custom Angle (Consult Factory)	**CA**

COLOR [3]

Warm White	**27K**
Warm White	**30K**
Neutral White	**35K**
Cool White	**42K**
Cool White	**53K**
Daylight	**63K**
Custom Color (Consult Factory)	**CK**

For additional accessory parts, pease refer to the part numbers below

ACCESSORIES

Jumper Cabes [4] **504435-XX**

Power Cables [5] **504488-XX**

1. Cascade up to 20 feet.
2. Refer to photometric chart.
3. Contact factory for color options. Color temperature may vary +/-200K.
4. Replace XX with corresponding jumper length in 1", 4", 8" and 12".
5. Replace XX with corresponding power cable length in 6ft or 10ft.

SALAMANDER RESORT AND SPA
TYPE: M

Esther

2nd Ave Part No.: 75606.2.X

MSRP: $546

Dimensions: 13 in. W x 14 in. H x 8 in. P

Wattage: 40w per bulb

Socket Type: Candelabra

Bulb Type: Incandescent

# of Bulbs: 2

# of Tiers: 1

Voltage: 120v

Features:
Crystal
Decorative Accents
Fabric Shade
Fiber Drip Candle Covers
Handcrafted

More Product Options...

- **Single**

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: M1

Josephine

2nd Ave Part No.: 75835.2.X

MSRP: $897

Dimensions: 18 in. W x 21 in. H x 9 in. P

Wattage: 60w per bulb

Socket Type: Candelabra

Bulb Type: Incandescent

# of Bulbs: 2

Voltage: 120v

Finish(shown): Autumn Leaf

Box Weight: 7 lbs.

Box Size: 18 X 18 X 16

Features:
Crystal
Decorative Accents
Fiber Drip Candle Covers
Handcrafted
Scrollwork
Uplight

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: M2

Renzo

2nd Ave Part No.: 751118.1

MSRP: $717

Dimensions: 6.5 in. W x 15 in. H x 9 in. P

Wattage: 40w per bulb

Socket Type: Candelabra

Bulb Type: Incandescent

# of Bulbs: 1

Voltage: 120v

Finish(shown): Antique Iron Gate

Box Weight: 8 lbs.

Box Size: 18 X 18 X 10

Features:
Handcrafted
Scrollwork
Honey Amber CC

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: N

Jenna

2nd Ave Part No.: 87948.36

MSRP: $2,124

Dimensions: 36 in. W x 24 in. H

Wattage: 40w per bulb

Socket Type: Candelabra

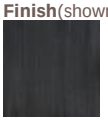
Bulb Type: Incandescent

# of Bulbs: 6

# of Tiers: 1

Voltage: 120v

Finish(shown): Antique Iron Gate



Box Weight: 37 lbs.

Box Size: 36 X 36 X 37

Features:
Decorative Accents
Fabric Shade
Fiber Drip Candle Covers
Finials
Handcrafted
Scrollwork
Uplight

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: N1

Annabella Chandelier - 30"

2nd Ave Part No.: 87809.30.X

Please call for trade discount

Dimensions: 30 in. D x 45 in. H

Wattage: 60w per bulb

Socket Type: Candelabra

Bulb Type: Incandescent

# of Bulbs: 8

# of Tiers: 1

Voltage: 120v

Finish(shown): Corinth

Chain: 3 ft.

Features:
Crystal
Custom
Fiber Drip Candle Covers
Handcrafted
Scrollwork

Availabilty: Custom 6-8 weeks

Installation: Dry Locations

Listing: UL

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: N2

Minuet

2nd Ave Part No.: 87618.42.CX

MSRP: $14,505

Dimensions: 42 in. W x 60 in. H

Wattage: 60w per bulb

Socket Type: Candelabra

Bulb Type: Incandescent

# of Bulbs: 16

# of Tiers: 2

Voltage: 120v

Finish(shown): Pompeii Gold

Box Weight: 160 lbs.

Box Size: 46 X 46 X 49

Features:
Decorative Accents
Fiber Drip Candle Covers
Gold Dipped Crystal
Handcrafted
Scrollwork
Uplight

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: N3

Lakeshore Chandelier W/downlight 18"

2nd Ave Part No.: 01.0750.18.DL

MSRP: $2,775

Dimensions: 18 in. D x 30 in. H

Wattage: 40/60w per bulb

Socket Type: Medium/Candelabra

Bulb Type: Incandescent

# of Bulbs: 5

# of Tiers: 1

Voltage: 120v

Finish(shown): Cajun Spice

Hanging weight: 23 lbs.

Box Weight: 26 lbs.

Box Size: 24 X 24 X 32

Chain: 3 ft.

Family: Lakeshore

Features:
Handcrafted
Ivory CC

Canopy: C2 Canopy

Availabilty: Standard 4-6 weeks

Installation: Dry Locations

Listing: UL

2ndave.com / 800.843.1602

Available In: (click on links below to view thumbnails)

SALAMANDER RESORT AND SPA
TYPE: N4

{SIRRACCO CHANDELIER 12 INCHES: IRON CHANDELIERS}

Back | How To Order | Order Now | Contact Us | Shades | Finish Choices | Glass Choices

Product #:**CH46.12**

Price: **$745.00** *

This price includes standard Black Finish and Clear Glass (Where the product has glass).

Chandelier

Available in these mounting configurations:

Available in the following sizes:

Width: **12 inches**
Height: **19 inches**

Length: All chandeliers come with 3' chain standard. Extra chain is $6.00/ft. Please specify (OHA) overall height on all chandeliers. That is the distance desired from the point of attachment at the ceiling to where you want the bottom of the chandelier to hang.

Point of Attachment to Top:**"**

Point of Attachment to Bottom:**"**

Canopy Size: **5.5**

Weight:**20 lbs.**

Max Wattage: **3(60)**

Upgrade Finish

Tier 1: **$56.00** (Tier 1 Finish choices)

Tier 2: **$64.00** (Tier 2 Finish choices)

Tier 3: **$76.00** (Tier 3 Finish choices)

Upgrade Glass

Tier 1: **$28.00** (Tier 1 Glass choices)

Tier 2: **$38.00** (Tier 2 Glass choices)

LINEARlight Colormix

Rigid Colormixing LED Module

Key Features & Benefits

- Each Multi LED contains an individually powered red, green and blue chip; this unique method of colormixing achieves excellent color consistency and uniformity
- Modules may be field cut to achieve a customized fit
- LEDs are closely spaced to minimize hot spots in shallow installations
- RGB dimmable by pulse width modulation, a method that maintains consistent lumen output and color
- Long life: up to 50,000 hours when temperature at Tc point is maintained at 40ºC

SYLVANIA LINEARlight Colormix modules provide dynamic control of colored illumination. Each individual LED contains red, green, and blue chips in one LED package. LINEARlight Colormix is optimally paired with OPTOTRONIC® 24Vdc Power Supplies and RGB 3CH DIM and OT RGB Sequencer controllers or OT RGB DMX to yield an infinite choice of colors, including white. This unique method of colormixing within each LED achieves better color consistency and uniformity than by combining separate, colored LEDs. LINEARlight Colormix modules are easily configured with available connector accessories.

These dynamic features enable the systems to be used in a wide range of large scale applications, including edge lighting of transparent and diffusing materials, illuminating facades and coves and architectural applications. These modules are ideal for wherever temperatures or space limitations prevent the use of conventional means of illumination.

Product Offering

Ordering Abbreviation	Wattage	Color
LNRCLRMX/LM01M/RGB 1.48FT	8.3	RGB

Application Information

Applications

- Accent lighting
- Backlighting
- Controlled color sequencing
- Cove lighting
- Edge lighting

Specfications and Certifications

RoHS compliant

Specification Data

Catalog # LNRCLRMX/LM01M/RGB Type 0

Project SALAMANDER RESORT AND SPA

Comments

Prepared by Date

Ordering Information

Item Number	Ordering Abbreviation	Module Length (ft)	No. of LEDs	Power (W)	Voltage (Vdc)	Current (Amps)	Wavelength	Watts/ft	Lumens (lm)
70080	LNRCLRMX/LM01M/RGB	1.48	30						
	Red Channel			1.8	24	0.075	617nm	1.2	32
	Green Channel			3.6	24	0.15	525nm	2.4	51
	Blue Channel			2.9	24	0.12	467nm	2.0	8

Note:
All data is related to entire module measured at Tc point of 25°C. Data reflects statistical mean values. Actual data may differ depending on variances in the manufacturing process. End users need to take into account the lumen depreciation as the temperature rises with various thermal management solutions installed.

Ordering Guide

LNRCLRMX	/	LM01M	/	RGB
Module Name LINEARlight Colormix		Style		Red, Green, Blue, Colormix

Power Supply Information

Application	OPTOTRONIC® Power Supply	Ordering Code	Qty.	OPTOTRONIC RGB Control Interface	Ordering Code	Qty.	Max. length of LINEARlight Colormix Strip	No. of Modules	Controllers
Colormixing, Color Changing, Sequencing	OT20/120-240/24S	51512	1	OT RGB 3CH DIM OT RGB Sequencer OT DMX RGB	51517 51518 51600	1	2.9 ft.	2	*Three 0-10V controllers or 100 K ohm potentiometers required ** DMX controller
	OT50/120/24LP	51598	1				8.9 ft.	6	
	OT75/120-277/24E	51514	1				13.3 ft.	9	
	OT96/120-277/24D	51510	1				14.8 ft.	10	
	OT96/120-277/24	51511	1				14.8 ft.	10	
	OT240/120-240/24/CH3	51515	1				3 x 13.3 ft.	3 x 9	

*Please contact SYLVANIA for a list of approved 0-10V controllers.
** DMX controller is only compatible with OT DMX RGB.
Notes:
1. A maximum of 5 modules can be connected in a single run. Please reference the "Wiring Diagram" in this document for specifics.
2. This table is for indoor applications. For outdoor applications reduce the number of modules by one.
3. OPTOTRONIC power supplies are optimally paired with SYLVANIA LED modules and are specifically designed with protection features for safe operation.

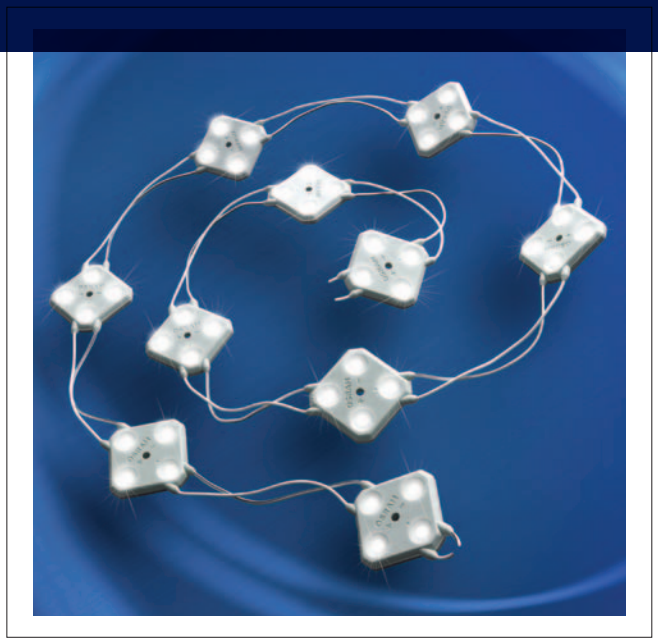
Minimum and Maximum Ratings

Parameter	Symbol	Values
Operating Temperature at Tc point	T_{op}	-30 to +75°C (-22 to +162°F)
Storage Temperature Range	T_{stg}	-30 to +80°C (-22 to +176°F)
Voltage Range	V_{max}	23 – 25Vdc
Reverse Voltage	V_R	25Vdc

Notes:
1. Exceeding maximum ratings may damage the LED module and pose potential safety hazards.
2. Elevated operating temperatures can be expected to negatively impact the service life in terms of lumen output.
3. Incorrect wiring may damage the LED module.
4. Not intended for use with constant current power supplies.

BACKlight 2G Protect BL04

Chain LED Module for Signage



BACKlight 2G Protect BL04 LED modules are a durable, energy efficient, long life alternative to neon sources. These LED modules are IP66 rated with special encapsulation that protects against heavy rainfall. Their flexible chain configuration makes them ideally suited to fit contours and curves typical of channel letter signs. These LED modules are quickly and easily configured as a neon retrofit or in new signs. Available in 6500K white, the BACKlight 2G BL04 module can be used in a wide variety of applications.

Each BACKlight 2G Protect BL04 LED board features four high brightness LEDs. Installation can be accomplished with available mounting accessories or a center mounting hole that allows the module to be installed with either M4 screws or snap-in connectors. The BACKlight 2G Protect BL04 LED modules are optimally paired with OPTOTRONIC® 10.5Vdc power supplies.

Key Features & Benefits

- Small height and wide beam angle allow for creation of extremely low-profile lettering with uniform illumination
- Flexible cables enable luminance to be adjusted fitting into the complex contours of a channel letter
- Installation “from the reel” and simple connection to control gear reduces installation costs
- Circuit boards are conformally coated and housed (IP66 rated) to protect against dust, moisture and dripping water
- Chain design allows for easy retro fit installations or installations in new signs
- Mounting holes allow for installation by screw, rivet, or snap-in mounting accessories
- Dimmable by pulse width modulation, a method that maintains consistent lumen output and color
- Long life: up to 50,000 hours (L_{50}) when temperature at Tc point is maintained at 40°C minimizing maintenance frequency

Product Offering

Ordering Description	Wattage	Color
BLP/BL04/W3F-865	22	6500K

Application Information

Applications

- Backlighting advertising panels
- Channel letters
- Cove lighting
- Displays
- Effect lighting
- Signs

Specifications and Certifications

RoHS compliant

Specification Data

Catalog # BLP/BL04/W3F-865 Type P

Project SALAMANDER RESORT AND SPA

Comments

Prepared by Date

Ordering Information

Item Number	Ordering Abbreviation	Module Length	Circuit Board Spacing	No. of LEDs	Power (W)	Voltage (Vdc)	Module Current (Amps)	Color	Color Temperature	Lumens (lm)	Lumens/ft	Watts/ft
70355	BLP/BL04/W3F-865	11.8 ft.	4.72in.	120	22	10.5	2.1	White	6500K	440	37.2	1.8

Notes:
1. All data is related to the entire module. Data reflects statistical mean values. Actual data may differ depending on variances in the manufacturing process. End users need to take into account the lumen depreciation as the temperature rises with various thermal management solutions installed.
2. There are two modules per reel. Data is for a single module of 120 LEDs.

Ordering Guide

BLP	/	BL04	/	W3F	/	8	65
BACKlight Protect		BACKlight 2nd Generation		White-3rd Generation Fine Bin		CRI 8>80	Color Temp 65 = 6500K

Power Supply Information

Maximum Length and Number of Boards per Power Supply

Item Number	OT20 (51599)		OT25 (51505)		OT50 (51509)	
	Max. Length (ft)	Max. No. of Boards	Max. Length (ft)	Max. No. of Boards	Max. Length (ft)	Max. No. of Boards
70355	11	27	13	33	27	68

Notes:
1. A maximum of 30 coupons can be connected on a single load.
2. OPTOTRONIC® power supplies are optimally paired with SYLVANIA LED modules and are specifically designed with protection features for safe operation.
3. The module is designed to work with constant voltage power supplies only. Reference the power supply PIB # ECS049 for product specification information.
4. One 23.6 ft long reel contains two separate 11.8 ft long modules. See “wiring diagram” for power supply configurations.
5. Installation with more than one LED chain on one OPTOTRONIC 50W has to be realized by either feeding the power to the center or by splitting the power feed to contact groups of single LED chains.
6. These values are an approximation based on the typical "power" values listed under the "Ordering Information" parameters. To accurately determine the maximum LED load, evaluate the application based on the application note “Determining the maximum LED load on a constant voltage power supply“ LED026. This document can be found at www.sylvania.com.

Minimum and Maximum Ratings

Parameter	Values
Operating Temperature at Tc point	-20... +85°C (-4 to +185°F)
Storage Temperature Range	-20... +85°C (-4 to +185°F)
Voltage Range (all colors)	10 – 11 V_{dc}
Maximum Reverse Voltage	0

Notes:
1. Exceeding maximum ratings for operating and storage temperature will reduce the expected lifetime or destroy the LED module.
2. Exceeding maximum ratings for operating voltage will cause hazardous overload and likely destroy the LED module.
3. The temperature of the LED module must be measured at the Tc point according to -1 in a thermally constant status with a temperature sensor or a temperature sensitive label. For exact location of the Tc point see “Assembly Diagram”.

HF²Narrow Stick
Compact High Intensity LED Module

The SYLVANIA HF²Narrow Stick LED module is an innovative module comprised of a closely packed array of small, discrete LEDs on boards under 5/8" wide. The module is designed to provide highly uniform, intense illumination and is available in 4" and 10". The module is also available in a half power version for most lengths and color temperatures.

HF²Narrow Stick modules may be conveniently connected end-to-end through the integrated 2-pin connectors. These modules are optimally paired with SYLVANIA OPTOTRONIC® 24 Vdc power supplies and may be dimmed using the OPTOTRONIC OT-DIM control interface.

Key Features & Benefits

- Highly dense LED spacing creates a virtually linear light source
- Narrow profile allows for easy installation in tight spaces
- Available in full and half output versions allowing for choice and customization
- Dimmable by pulse width modulation, a method that maintains consistent lumen output and color
- Long life: up to 50,000 hours (L_{70}) when temperature at Tc point is maintained below 85ºC
- IES files are available at www.sylvania.com and Photopia files are available at www.ltioptics.com/sylvania

Product Offering

Ordering Abbreviation	Wattage	Color
HF2Narrow Stick 830H	1.7	3000K
HF2Narrow Stick 835H	1.7	3500K
HF2Narrow Stick 840H	1.7	4000K
*HF2Narrow Stick 729	3.4	2900K
HF2Narrow Stick 830	3.4	3000K
*HF2Narrow Stick 735	3.4	3500K
HF2Narrow Stick 835	3.4	3500K
*HF2Narrow Stick 740	3.4	4000K
HF2Narrow Stick 840	3.4	4000K
*HF2Narrow Stick 729H	4.2	2900K
HF2Narrow Stick 830H	4.2	3000K
*HF2Narrow Stick 735H	4.2	3500K
HF2Narrow Stick 835H	4.2	3500K
*HF2Narrow Stick 740H	4.2	4000K
HF2Narrow Stick 840H	4.2	4000K
*HF2Narrow Stick 729	8.4	2900K
HF2Narrow Stick 830	8.4	3000K
HF2Narrow Stick 835	8.4	3500K
*HF2Narrow Stick 740	8.4	4000K
HF2Narrow Stick 840	8.4	4000K

* Product being discontinued

Application Information

Applications

- Accent lighting
- Cove lighting
- Edge lighting
- Under cabinet lighting

Specifications and Certifications

c UL us The SYLVANIA HF²Narrow Stick is UL2108 Recognized for US and Canada Class 2 Unit (UL file # E247649)

RoHS compliant

SEE THE WORLD IN A NEW LIGHT SYLVANIA

Specification Data

Catalog # HF2Narrow Stick 830H Type P1

Project SALAMANDER RESORT AND SPA

Comments

Prepared by Date

Ordering Information

Item Number	Ordering Abbreviation	Length	No. of LEDs	Power (W)	Voltage (Vdc)	Current (mA)	Color Temperature	Initial Lumens	Beam Angle	CRI
70392	HF2Narrow Stick 830H	4"	24	1.7	24	70	3000K	86	120°	85
70393	HF2Narrow Stick 835H	4"	24	1.7	24	70	3500K	88	120°	85
70394	HF2Narrow Stick 840H	4"	24	1.7	24	70	4000K	102	120°	85
70372	*HF2Narrow Stick 729	4"	42	3.4	24	140	2900K	164	150°	70
70492	HF2Narrow Stick 830	4"	42	3.4	24	140	3000K	172	120°	85
70373	*HF2Narrow Stick 735	4"	42	3.4	24	140	3500K	168	150°	70
70473	HF2Narrow Stick 835	4"	42	3.4	24	140	3500K	176	120°	85
70374	*HF2Narrow Stick 740	4"	42	3.4	24	140	4000K	196	150°	70
70493	HF2Narrow Stick 840	4"	42	3.4	24	140	4000K	205	120°	85
70375	*HF2Narrow Stick 729H	10"	54	4.2	24	175	2900K	205	150°	70
70495	HF2Narrow Stick 830H	10"	54	4.2	24	175	3000K	215	120°	85
70376	*HF2Narrow Stick 735H	10"	54	4.2	24	175	3500K	210	150°	70
70496	HF2Narrow Stick 835H	10"	54	4.2	24	175	3500K	220	120°	85
70391	*HF2Narrow Stick 740H	10"	54	4.2	24	175	4000K	245	150°	70
70497	HF2Narrow Stick 840H	10"	54	4.2	24	175	4000K	257	120°	85
70369	*HF2Narrow Stick 729	10"	102	8.4	24	350	2900K	410	150°	70
70436	HF2Narrow Stick 830	10"	102	8.4	24	350	3000K	430	120°	85
70472	HF2Narrow Stick 835	10"	102	8.4	24	350	3500K	441	120°	85
70371	*HF2Narrow Stick 740	10"	102	8.4	24	350	4000K	490	150°	70
70422	HF2Narrow Stick 840	10"	102	8.4	24	350	4000K	514	120°	85

* Product being discontinued

Notes:

1. All data is related to the entire module. Data reflects statistical mean values. Actual data may differ depending on variences in the manufacturing process.
2. Delivered lumens per board subject to change based on shipments of lumens per LED of 3 to 9 lumens.
3. Color coordinates for the 3000K (x=.4562, y=.4260), (x=.4299, y=.4165), (x=.4147, y=.3814), (x=.4373, y=.3893). Color coordinates for the 3500K (x=.4299, y=.4165), (x=.3996, y=.4015), (x=.3889, y=.3690), (x=.4147, y=.3814). Color coordinates for the 4000K (x=.4006, y=.4044), (x=.3736, y=.3874), (x=.3670, y=.3578), (x=.3898, y=.3716).
4. **Dry location** use only.

Ordering Guide

HF2	Narrow Stick	7	29	H
High Flux Second Generation	Module Name	CRI 7 > 70 8 > 80	Color Temperature 29 = 2900K 30 = 3000K 35 = 3500K 40 = 4000K	Half Power

Power Supply Information

Maximum Number of Modules per Power Supply

	OT17 (51622)	OT20 (51512)	OT50 (51598)	OT75 (51514)	OT96D (51510)	OT96 (51511)	OT240 (51515)
All 10" (102 LEDs) Item Numbers	1	2	5	8	10	10	8 / chnl
All 4" (42 LEDs) Item Numbers	4	5	13	20	25	25	21 / chnl
All 10" (H, 54 LEDs) Item Numbers	3	4	10	16	20	20	17 / chnl
All 4" (H, 24 LEDs) Item Numbers	9	10	26	40	51	51	42 / chnl

Notes:

1. For the 10" 102 LED version, 5 LED modules can be operated on a single feed. For the 10" 54 LED version and the 4" 42 LED version, 10 LED modules can be operated on a single feed. For the 4" 24 LED version, 24 LED modules can be operated on a single feed.
2. OPTOTRONIC® power supplies are optimally paired with SYLVANIA LED modules and are specifically designed with protection features for safe operation.
3. The module is designed to work with Constant Voltage power supplies only. Reference the Power Supply PIB #ECS050 for product specific information.
4. These values are an approximation based on the typical "power" values listed under the "Ordering Information" parameters. To accurately determine the maximum LED load, evaluate the application based on the application note "Determining the Maximum LED Load on a Constant Voltage Power Supply" LED026. This document can be found at www.sylvania.com.
4. HF²Narrow Stick modules can be dimmed when used with the OT DIM, or OTRGBDIM controllers. Because of the power consumed by these controllers, an additional de-rating of the overall "maximum" load must be factored into the above chart. To determine this de-rating (wattage) value please reference Step 8 of this same App. Note #LED026.

Date: _____ Type: Q

Firm Name: _____

Project: SALAMANDER RESORT AND SPA

White

eW Profile Powercore 2700 K

Ultra-low profile, white light LED under cabinet fixture

A Green Flagship Product
Our Green Flagship Products offer significantly improved environmental performance in two or more of the following Green Focal Areas: weight, energy consumption, hazardous substances, packaging, recycling, disposal, and lifetime reliability.

eW® Profile Powercore is a direct line voltage under cabinet LED fixture for common task lighting and display case applications. Available in 2700 K or 4000 K color temperatures, eW Profile Powercore is suitable for new installations and retrofit upgrades requiring superior illumination quality with dramatic energy savings. Onboard Powercore® digital power processing technology maximizes output efficiency and eliminates the need for external power supplies. Combined with an ultra low profile housing, three fixture lengths, versatile jumper options, and housing colors to match any environment, eW Profile Powercore offers an unprecedented level of contractor-friendly installation.

- Onboard Powercore® technology — eW Profile Powercore fixtures process power input directly from line voltage. Clip or track mounting options and standard line-neutral-ground wiring dramatically simplify installation.
- Industry-leading quality — Long-life LEDs provide 55,000 hours of use at 70% lumen maintenance.
- Exceptional illumination performance — Meets IESNA illumination intensity specifications for optimal usability and safety in task lighting applications.
- Energy cost savings — Consumes just 5.5 watts of energy per fixture and can support a continuous run up to 50 ft (15.2 m) in length.

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	9.25 in (actual) 11 in (effective)	19.25 in (actual) 21 in (effective)	39.25 in (actual) 41 in (effective)
Output	Beam Angle	110° x 110°		
	Lumens	150	264	524
	Color Temperature	2700 K (+475 / -200)		
	Efficacy (lm / W)	25.0	26.4	26.2
	Mixing Distance	2 in (51 mm) to uniform light		
	CRI	71	72	73
	Lumen Maintenance	55,000 hours L_{70}* @ 25° C 31,000 hours L_{70}* @ 50° C		
Electrical	Input Voltage	100 / 120 / 220 – 240 VAC, 50 / 60 Hz		
	Power Consumption	5.5 W max. at full output, steady state 6 W peak in-rush	10 W max. at full output, steady state 13 W peak in-rush	20 W max. at full output, steady state 25 W peak in-rush
	Power Factor	≥ 95		
Control		Commercially available ELV, trailing edge, or reverse-phase control dimmer		
Physical	Dimensions *(Height x Width x Depth)*	.88 x 9.25 x 1.7 in (22 x 235 x 43 mm)	.88 x 19.25 x 1.7 in (22 x 489 x 43 mm)	.88 x 39.25 x 1.7 in (22 x 997 x 43 mm)
	Weight	7 oz (198 g)	13 oz (369 g)	1.6 lbs (728 g)
	Housing	Extruded aluminium, polycarbonate, White, Black, or Gray powder-coated finish		
	Lens	Clear polycarbonate		
	Fixture Connections	Integral male / female connectors		
	Operating Temperature	-4° – 122° F (-20° – 50° C)		
	Humidity	0 – 95%, non-condensing		
	Maximum Fixture Run Length	Up to 50 ft (15.3 m) of fixtures on a single circuit, ≤ 324 W		
Certification and Safety	Certification	UL / cUL, FCC Class B, CE		
	LED Class	Class 1M LED product		
	Environment	Dry / Damp Location, IP50		

* Lumen measurement complies with IES LM-79-08

OPTIBIN® CK TECHNOLOGY | POWERCORE® CK TECHNOLOGY | DIMAND® CK TECHNOLOGY

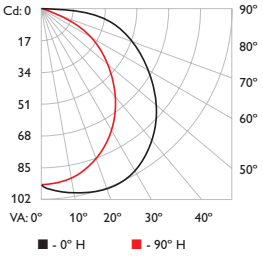
For detailed product information, please refer to eW Profile Powercore Product Guide at www.colorkinetics.com/ls/essentialwhite/ewprofilep/

PHILIPS

eW Profile Powercore 19.25 in, 2700 K Photometrics

Power Consumption – 10 W, Lumens – 264, Efficacy – 26.4 lm / W

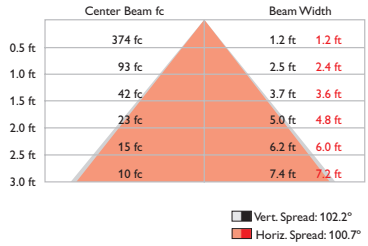
Polar Candela Distribution

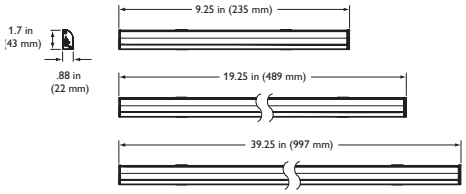


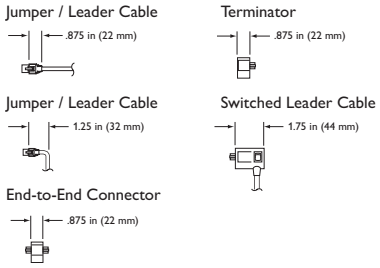
	0	22.5	44	67.5	90
0	93	93	93	93	93
5	98	97	96	94	93
15	101	100	98	93	89
25	101	99	95	88	81
35	96	93	88	80	70
45	87	84	77	67	55
55	74	71	63	51	40
65	60	56	48	35	24
75	44	41	32	21	11
85	29	27	19	9	2
90	15	14	9	2	0

For lux multiply fc by 10.7

Illuminance at Distance







For detailed product information, please refer to eW Profile Powercore Product Guide at www.colorkinetics.com/ls/essentialwhite/ewprofilep/

Fixtures and Accessories

Item	Housing Color	Temp.	Size	Item Number	Philips 12NC
eW Profile Powercore, 100 VAC	White	2700 K	9.25 in (235 mm) (effective 11 in)	523-000026-18	910503700407
			19.25 in (489 mm) (effective 21 in)	523-000026-19	910503700408
			39.25 in (997 mm) (effective 41 in)	523-000026-20	910503700409
eW Profile Powercore, 120 VAC	White	2700 K	9.25 in (235 mm) (effective 11 in)	523-000027-18	910503700425
			19.25 in (489 mm) (effective 21 in)	523-000027-19	910503700426
			39.25 in (997 mm) (effective 41 in)	523-000027-20	910503700427
eW Profile Powercore, 220 – 240 VAC including Leader Cable and Terminator	White	2700 K	9.25 in (235 mm) (effective 11 in)	523-000028-36	910503700528
			19.25 in (489 mm) (effective 21 in)	523-000028-37	910503700529
			39.25 in (997 mm) (effective 41 in)	523-000028-38	910503700530
eW Profile Powercore, 220 – 240 VAC including End-to-End Connector	White	2700 K	9.25 in (235 mm) (effective 11 in)	523-000028-18	910503700443
			19.25 in (489 mm) (effective 21 in)	523-000028-19	910503700444
			39.25 in (997 mm) (effective 41 in)	523-000028-20	910503700445
Mounting Track	White		25 @ 9 in (229 mm)	120-000064-02	910503700273
			25 @ 19 in (483 mm)	120-000064-00	910503700271
			24 @ 39 in (991 mm)	120-000064-01	910503700272
Jumper Cable, 100 / 220 – 240 VAC	White		6 in (152 mm)	108-000035-05	910503700265
			12 in (305 mm)	108-000035-06	910503700266
			18 in (457 mm)	108-000035-07	910503700267
			5 ft (1.5 m)	108-000035-08	910503700268
Jumper Cable, 120 VAC	White		6 in (152 mm)	108-000035-00	910503700260
			12 in (305 mm)	108-000035-01	910503700261
			18 in (457 mm)	108-000035-02	910503700262
			5 ft (1.5 m)	108-000035-03	910503700263
End-to-End Connector, Quantity 5	White		.875 in (22 mm)	108-000035-10	910503700368
"Y" Jumper Cable and Terminator, 100 / 220 – 240 VAC	White		16.5 in (419 mm)	108-000035-09	910503700269
"Y" Jumper Cable and Terminator, 120 VAC	White		16.5 in (419 mm)	108-000035-04	910503700264
Switched Portable Leader Cable and Terminator, 120 VAC	White		10 ft (3 m)	108-000034-00	910503700258
Leader Cable and Terminator, 100 / 220 – 240 VAC	White		10 ft (3 m)	108-000034-01	910503700259
Permanent Wiring Compartment and Terminator, 120 VAC	White		1.125 x 1.75 x 3.5 in (29 x 45 x 89 mm) *(Height x Width x Depth)*	120-000065-00	910503700270
Switched Permanent Wiring Compartment and Terminator, 120 VAC	White		.875 x 2 x 4.25 in (22 x 51 x 108 mm) *(Height x Width x Depth)*	120-000065-04	910503701022

Use Item Number when ordering in North America.

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.colorkinetics.com

DAS-000005-01 R07 02-10

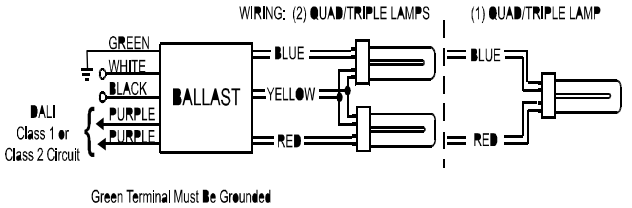
PHILIPS ADVANCE

IDL-2S26-M5-BS@120	
Brand Name	ROVR
Ballast Type	Electronic Dimming
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
* CFTR18W/GX24Q	1	18	50/10	0.19	07/23	0.03/1.00	10	0.99	1.6	4.35
CFTR18W/GX24Q	2	18	50/10	0.34	11/41	0.03/1.00	10	0.99	1.6	2.44

Wiring Diagram



Diag. 165

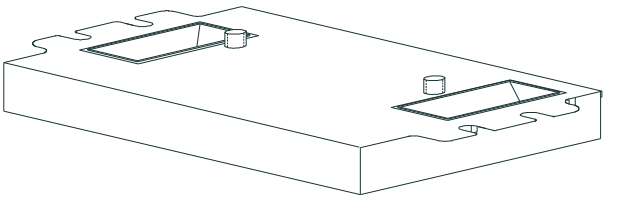
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0	0
White	0	0
Blue	0	0
Red	0	0
Yellow	0	0
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	3.00 "	1.18 "	2.00 "
4 49/50	3	1 9/50	2
12.6 cm	7.6 cm	3 cm	5.1 cm

Revised 10/23/2007

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

Revised: 3/4/2009

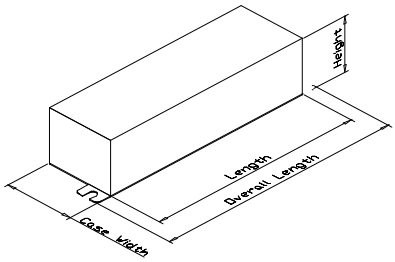
PHILIPS ADVANCE

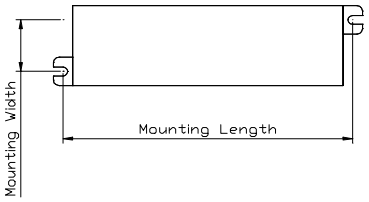
e-Vision® Electronic Ballast for Metal Halide Lamps

Catalog Number: RMH-G20-K
For 20W Metal Halide Lamps
ANSI M156
120V 50/60Hz Electronic
Status: RELEASED

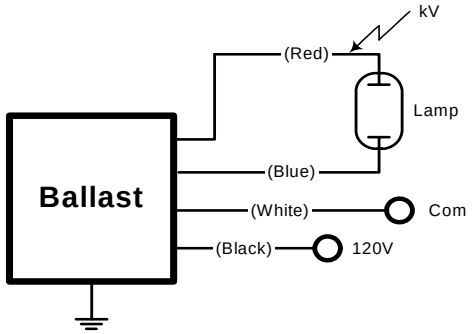
DIMENSIONS AND DATA

Lamp Number	Lamp Watts	Input Volts	Catalong Number*	Line Current (Amps)	Input Power (Watts)	Min Power Factor	Wiring Diag	Fig.	Weight (lb)	Max. Distance to Lamp (ft)
20W Watt Lamp, ANSI Code M156 Minimum Starting Temp -30°C/-20°F										
1	20	120	RMH-G20-K-XXX	0.21	24	0.9	4	K	0.4	6



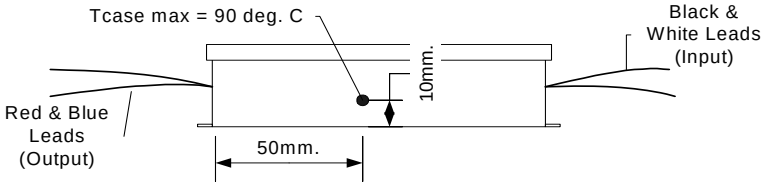


Case Figure	Overall Length	Case Length	Case Width	Height	Mountin Length	Mounting Width
K	119mm [4.74"]	104mm [4.1"]	33mm [1.1"]	30mm [1.2"]	114mm [4.5"]	13.5mm [0.5"]



Ballast Case must be Grounded

Wiring Diagram 4



Case Temperature Measurement Location

INSTALLATION & APPLICATION NOTES:

1. Maximum allowable case temperature is 90°C. See figure above for measurement location
2. Ignition pulse is 2 kV max
3. All leads are 9 inches long
4. Ballast output will shutdown after 20 minutes if lamp fails to ignite
5. Power must be cycled off – then on, after replacing lamp
6. Connect the red lead to the center terminal of lamp when using screw base lamps

***Ordering Information**

Order Suffix	Description
-LF	Ballast with side exit leads and mounting feet, Leads exit either end
-LFS	Ballast with side exit leads and mounting feet, Leads exit same end

Data is based on tests performed by Philips Advance in a controlled environment and is 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.

Philips Lighting Electronics N.A.
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Revised: 3/5/2009

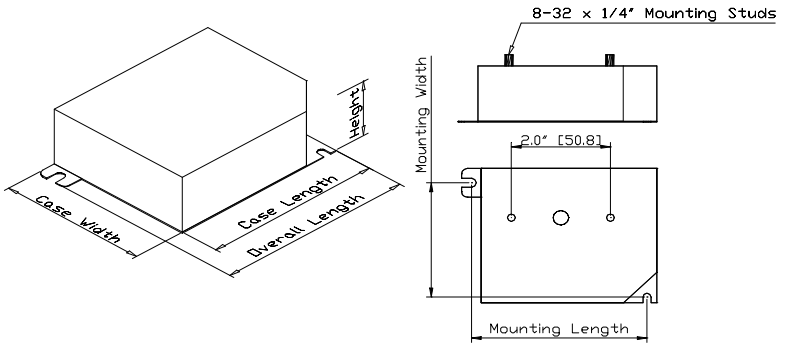
PHILIPS ADVANCE

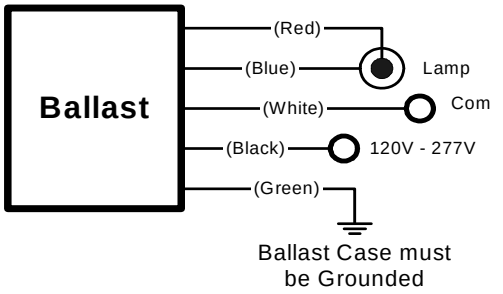
e-Vision® Electronic Ballast for Metal Halide Lamps

Catalog Number: IMH-39-G
For 39W Metal Halide Lamps
ANSI M130
120-277 50/60Hz Electronic
Status: RELEASED

DIMENSIONS AND DATA

Lamp Number	Lamp Watts	Input Volts	Catalong Number*	Line Current (Amps)	Input Power (Watts)	Min Power Factor	Wiring Diag	Fig.	Weight (lb)	Max. Distance to Lamp (ft)
39W Watt Lamp, ANSI Code M130 Minimum Starting Temp -30°C/-20°F										
1	39	120	IMH-39-G-XXX	0.39	46	0.9	3	G	0.9	5
		277		0.18	45					

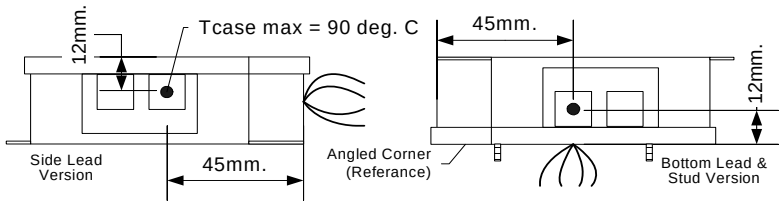




Ballast Case must be Grounded

Wiring Diagram 3

Case Figure	Overall Length	Case Length	Case Width	Height	Mountin Length	Mounting Width
G	97mm [3.8"]	90mm [3.5"]	77mm [3.0"]	30mm [1.2"]	87mm [3.4"]	67mm [2.6"]



Case Temperature Measurement Location

INSTALLATION & APPLICATION NOTES:

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

***Ordering Information**

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

Data is based on tests performed by Philips Advance in a controlled environment and is 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.

Philips Lighting Electronics N.A.
10275 West Higgins Road • Rosemont, IL 60018 • www.philips.com/advance
Tel: 800-322-2086 • Fax: 800-423-1882 • Customer Support: 800-372-3331 • OEM Support: 866-915-5886

LED Dimming Driver

LP1090-XX-YZ-E / LP1060-XX-YZ-E Switch-Mode LED Driver	
Total Power	60 - 96 Watts
Input Voltages	90-264 VAC or 100-277VAC
Number of Outputs	One

Product Specifications

ANZ#: Z151a, February 26, 2009

SPECIAL FEATURES

- UL1310 / UL48 Class 2 recognized
- Provides 0-10V Dimming Control
- Compatible with standard ballast dimmer
- Meet IP66 standards
- Suitable for damp or dry locations
- Suitable for wet location with adequate end plate and connectors
- Built-in wiring compartments for easy installation (selected models)
- Compact, lightweight w/ aluminum case
- Active PFC to conserve power consumption

ENVIRONMENTAL

Operating temperature: -30 to 70 ° C
(De-rating : 2% per ° C from 50°C)
Storage temperature: -40 to 85 ° C
Humidity (Non-Condensing): 5% to 95%
Cooling: Convection
Vibration Frequency: 5 to 50 Hz
MTBF: >100,000 Hours at full load and 25°C ambient conditions (MIL-217F)
EMC : Compliant to 47CFR, Part 2, Part15 and Cispr PUB, 22 Class B

ELECTRICAL SPECIFICATIONS

Input range	90 to 264 VAC(60W) ; 100-277VAC(96W)
Frequency	47 to 63 Hz
Power Factor	> 0.95 at full load, 115VAC
Crest Factor	1.5 max.
Inrush current	40.0 Amps maximum at 230VAC, cold start, 25° C
Input current	1.5Amps maximum at 90VAC
Efficiency	85% typical at 230VAC and maximum load
EMI filtering	47CFR, Part 2, Part 15 and Cispr PUB, 22 Class A
Maximum power	96W
Current Adjust range	30 ~ 50%
Load regulation	±3%
Leakage Current	0.2mA @ 110VAC, 0.4mA @ 230VAC
Hold up time	Half cycle minimum at 120 VAC and 80% of rated load
Protection	Over-voltage, Over-current, Over-power and Short circuit protection: Auto-recovery

SAFETY

UL	UL1310 / UL48 Class 2
CE	Certified

MODEL INFORMATION – SINGLE OUTPUT

Model Numbers	Constant Voltage Mode Output		Total output (Watts)
	Adjust range (Vdc)	Current range (A)	
LP1090-24-YZ-E	18 ~ 24	1.5 ~ 4.00	96
LP1090-19-YZ-E	12 ~ 19	2.0 ~ 5.00	60 ~ 95
LP1060-24-YZ-E	20 ~ 24	1.5 ~ 2.50	60
LP1060-12-YZ-E	10 ~ 12	2.5 ~ 5.00	60

MECHANICAL DRAWING

Model Information – Single DC output
LP1090-XX-YZ-E / LP1060-XX-YZ-E

XX – DC outputs
Y – AC input side plate options, refer to drawing for more details
Z – G = Gland
E – Aluminum enclosure length, 290mm, refer to drawing for more details

100W Single Output Switching Power Supply

PLN-100 series

Features :

- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in active PFC function
- IP64 design for indoor or outdoor installations
- UL1310 Class 2 power unit
- Cooling by free air convection
- 100% full load burn-in test
- Suitable for LED lighting and moving sign applications.
- High realibility
- 2 years warranty

(for 48V only) (except for 48V) IP64

SPECIFICATION

MODEL		PLN-100-12	PLN-100-15	PLN-100-20	PLN-100-24	PLN-100-27	PLN-100-36	PLN-100-48
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	27V	36V	48V
	RATED CURRENT Note.6	5A	5A	4.8A	4A	3.55A	2.65A	2A
	CURRENT RANGE Note.6	0 ~ 5A	0 ~ 5A	0 ~ 4.8A	0 ~ 4A	0 ~ 3.55A	0 ~ 2.65A	0 ~ 2A
	RATED POWER Note.6	60W	75W	96W	96W	95.85W	95.4W	96W
	RIPPLE & NOISE (max.) Note.2	150mVp-p	150mVp-p	150mVp-p	150mVp-p	150mVp-p	150mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	0% ~ -15%						
	CURRENT ADJ. RANGE	3% ~ -25%						
	VOLTAGE TOLERANCE Note.3	±3.0%	±3.0%	±3.0%	±3.0%	±3.0%	±2.0%	±2.0%
	LINE REGULATION	±1.0%						
	LOAD REGULATION	±2.0%						
	SETUP, RISE TIME	1200ms, 80ms/230VAC 1200ms, 80ms/115VAC at full load						
	HOLD UP TIME (Typ.)	60ms/230VAC 30ms/115VAC at full load						
INPUT	VOLTAGE RANGE Note.5	90 ~ 264VAC						
	FREQUENCY RANGE	47 ~ 63Hz						
	POWER FACTOR (Typ.)	PF>0.95/230VAC PF>0.98/115VAC at full load						
	EFFICIENCY (Typ.)	83%	85%	87%	87%	87%	87%	87%
	AC CURRENT (Typ.)	12V:0.8A/115VAC 0.4A/230VAC		15V:0.9A/115VAC 0.45A/230VAC		20V ~ 48V:1.1A/115VAC 0.55A/230VAC		
	INRUSH CURRENT (Typ.)	COLD START 40A/230VAC						
	LEAKAGE CURRENT	0.5mA / 240VAC						
PROTECTION	OVER CURRENT Note.4	95 ~ 100%						
		Protection type : Constant current limiting, recovers automatically after fault condition is removed						
	OVER VOLTAGE	13 ~ 16V	16.5 ~ 20V	22 ~ 27V	27 ~ 34V	29 ~ 36V	39 ~ 48V	52 ~ 64V
		Protection type : Shut down and latch off o/p voltage, re-power on to recover						
	OVER TEMPERATURE	90℃ ±10℃ (RTH2)						
		Protection type : Shut down o/p voltage, re-power on to recover						
ENVIRONMENT	WORKING TEMP.	-30 ~ +50℃ (Refer to output load derating curve)						
	WORKING HUMIDITY	20 ~ 90% RH non-condensing						
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH						
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)						
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes						
SAFETY & EMC	SAFETY STANDARDS	UL1310 Class 2, TUV EN60950-1, CAN/CSA C22.2 No. 223-M91(except for 48V),IP64 approved						
	WITHSTAND VOLTAGE	I/P-O/P:4.25KVDC						
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms/500VDC						
	EMI CONDUCTION & RADIATION	Compliance to EN55015, EN55022 (CISPR22) Class B						
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3						
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN61547, EN55024, light industry level, criteria A						
OTHERS	MTBF	303.1Khrs min. MIL-HDBK-217F (25℃)						
	DIMENSION	200*70.5*35mm (L*W*H)						
	PACKING	0.52Kg; 20pcs/11.4Kg/0.76CUFT						

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. Please refer to OLP characteristics.
5. Derating may be needed under low input voltage. Please check the derating curve for more details.
6. This is the maximum possible output current and power. Over load protection may be activated slightly below this level to comply with the requirement of UL1310 class 2.

OPTOTRONIC®
Electronic 24V DC
LED Power Supplies

Power Supply Guide

OT6/100-120/24CE
OT17/120-277/24E
OT20/120-240/24S
OT30/120/24CORD
OT50/120/24LP
OT75/120-277/24E
OT96/120-277/24D
OT96/120-277/24
OT240/120-240/24/CH3

LED power supplies compatible with:
24V LED Modules

Key System Features

- Class 2 output
- Long life
- Short circuit and overload protection
- Remote mounting possible
- OT6, OT17, & OT75 models are rated for outdoor, damp locations
- OT96 & OT240 models are IP66 rated for wet locations

Application Information

OSRAM OPTOTRONIC
power supplies are ideally suited for:

- Low & medium power applications
- Signs
- Compact installations
- Path and roadway marking
- Backlighting
- Step and seat marking
- Effect lighting
- Panel lighting
- Ambience lighting inside furniture
- Wall washing
- General lighting

OSRAM OPTOTRONIC power supplies are compact and electronically stabilized. The wide range of input voltage, on select models, from 100 to 277 VAC enables worldwide use on single-phase AC power lines. These supplies are available with 24VDC outputs.

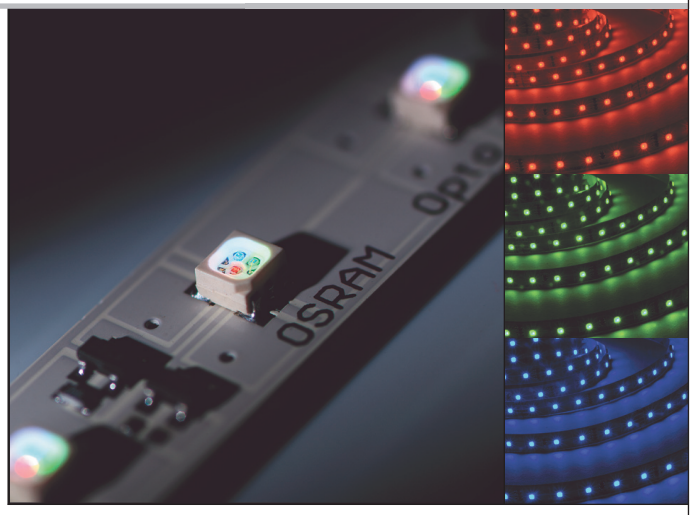
OPTOTRONIC power supplies are protected against open circuit, short circuit, overload and overheating conditions. They meet the highest industry standards.

System Information

OSRAM SYLVANIA has introduced a full line of LED modules (Light Emitting Diodes) and power supply products.

LED modules can be used in a wide variety of applications due to our variable module design, module geometries, and range of available colors.

The LEDs are available in many different configurations to meet the demands of these applications. For additional information about OSRAM LED systems, contact OSRAM SYLVANIA or visit www.sylvania.com/LED.



SPECIFICATION DATA

Catalog #	Date	Type
Project	Prepared by	
Comments		

OPTOTRONIC LED Power Supplies (DC Output)

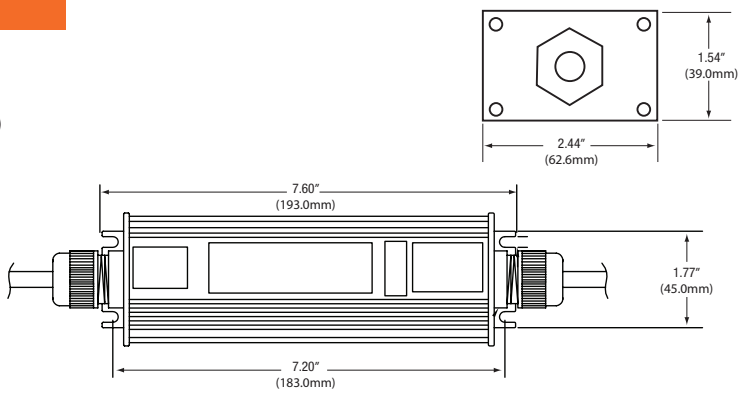
Item Number	Description	Nominal Input Voltage (VAC)	Nominal Input Current (Amps)	Power Factor	Nominal Input Power (W)	Output Voltage (VDC)	Output Power Range (W)	Max. Line Ripple (V)	UL/ETL file#	Location Rating
51503	OT6/100-120/24CE	120	0.11	0.55	7.1	24.0±0.5	0.9-6	±0.2V	E258264	Damp
51622	OT17/120-277/24E	120 277	0.19 0.10	0.92	21	24.0±0.5	0.8-17	±1.0V	E220096	Damp
51512	OT20/120-240/24S	120 240	0.38 0.19	0.5	23	24.0±1.0	0.9-20	±0.2V	E258264	Dry
51521	OT30/120/24CORD	120	0.63	0.5	38	24.0±1.0	1-30	±1.5V	3137489	Dry
51598	OT50/120/24LP	120	0.47	0.99	56	24.0±0.5	0.9-50	±0.2V	E248522	Dry
51514[3]	OT75/120-277/24E	120 277	0.76 0.33	0.99	90	24.0±0.5	0.9-75	±0.2V	E258264	Damp
51510	OT96/120-277/24D	120 277	0.91 0.39	0.99	108	24.0±0.5	0.8-96	±1.0V	E220096	Dry
51511	OT96/120-277/24	120 277	0.91 0.39	0.99	108	24.0±0.5	0.8-96	±1.0V	E220096	WET[2]
51515	OT240/120-240/24/CH3	120 240	2.39 1.19	0.99	285	24.0±0.5	0.8-240	±1.0V	E220096	WET[2]

1: All power supplies can be remote mounted up to 32 feet. Although it is possible to exceed the remote mounting distance, the installer and/or end user must take precautions to prevent and/or test the effects of EMI (electromagnetic interference).
2: Use wiring rated and marked PLTC, CL3R, and "sun resistant"
3: 51514 replaces 51513 (OT75/120/24), which is discontinued

OT96 Case (Dry Rated)

Packaging:
Quantity: 20 pieces/carton
Weight: 1.6 lbs each (approx.)
33 lbs/carton

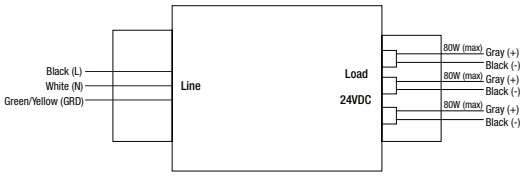
Wiring: Leads only
(12" 18AWG wire)
Input: Black (L), White (N), & Green/Yellow (GRD)
Output: Red (+) & Black (–)

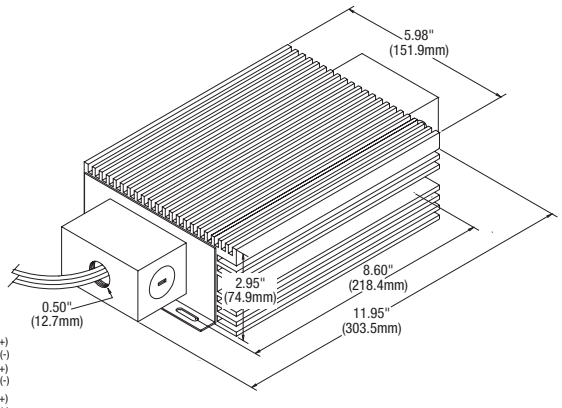


OT240 Case

Packaging:
Quantity: 5 pieces/carton
Weight: 11 lbs each (approx.)
53 lbs/carton

Wiring: Leads only
(6.9" 18AWG wire)





OPTOTRONIC®

24V DC LED Power Supplies

Specifications

Class 2 Outputs
Input Voltage Range (Min/Max):
OT6: 90 - 132 VAC
OT20 & OT240: 108 - 254 VAC
OT30 & OT50: 108 - 132 VAC
OT17, OT75 & OT96: 100 - 305 VAC
Input Frequency: 50/60Hz
Ambient Temp. Range:
-20°C through +50°C
OT30: -20°C through +45°C
OT75/120-277: -25°C through +60°C
OT17, OT96 & OT240: -30°C through +70°C
Max. Case Temp:
OT30: 45°C
OT6, OT50: 70°C
OT20: 75°C
OT17, OT75, OT96 & OT240: 90°C

OT6, OT17, OT20, OT75: UL 1310, UL48 Recognized for US & Canada Class 2 Unit
OT96 & OT240: UL48 Recognized for US & Canada Class 2 Unit
OT50: UL1310 Recognized for US & Canada Class 2 Unit

OT30: ETL listed and conforms to UL1310

OT6, OT75 are CSA approved
FCC 47CFR Part 15 compliant RoHS compliant

Life / Warranty

OPTOTRONIC LED Power Supply Products are covered by our OPTOTRONIC power supply warranty. For additional details, refer to our latest version of the warranty bulletin.

OSRAM SYLVANIA
National Customer Service and Sales Center
1-800-LIGHTBULB
(1-800-544-4828)
www.sylvania.com

Specifications subject to change without notice.

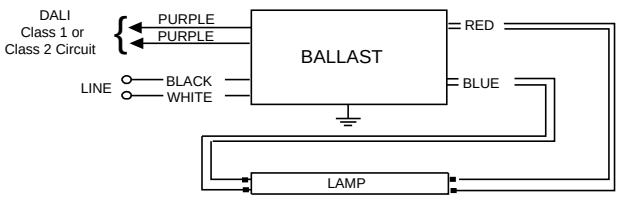
PHILIPS
ADVANCE

IDA-132-SC@277V	
Brand Name	ROVR
Ballast Type	Electronic Dimming
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
F17T8	1	17	50/10	0.07	07/20	0.03/1.00	10	0.99	1.7	5.00
F25T8	1	25	50/10	0.10	07/27	0.03/1.00	10	0.99	1.7	3.70
* F32T8	1	32	50/10	0.13	08/35	0.03/1.00	10	0.99	1.7	2.86

Wiring Diagram

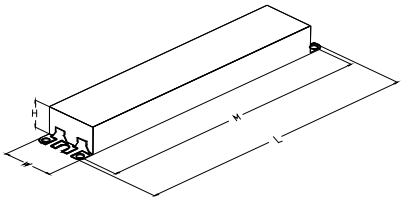


Diag. 55B

The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	1.7 "	1.18 "	8.90 "
9 1/2	1 7/10	1 9/50	8 9/10
24.1 cm	4.3 cm	3 cm	22.6 cm

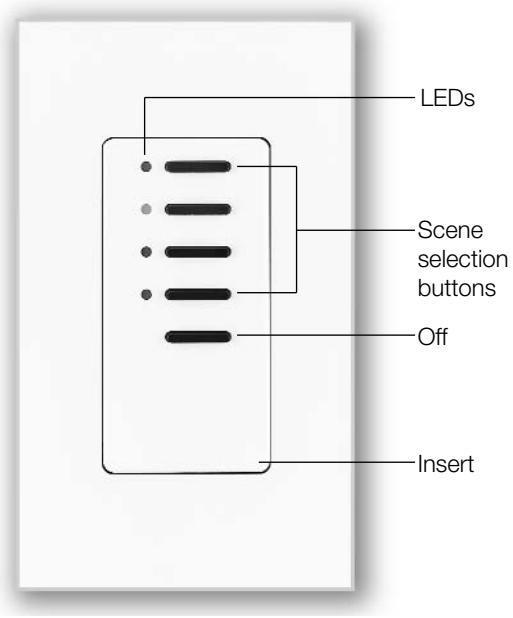
Revised 02/01/2008

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is 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.

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

Color and Finish Codes

NTOMX-4S-NRL-__-__
5-Button Wallstation



Description

- Recalls preset light levels for four scenes plus Off.
- Starts or stops one to four sequences.
- Off button turns all lights off.
- May be custom-configured for other functions.
- Works with GRAFIK 5000/6000/7000 Systems.

Finish and Engraving Options

- Available with engraving to meet specific project needs.
- Available in a “no-insert” version for a sleeker look.
- Green LEDs are standard. Amber LEDs are optional.

Job Name:	Model Numbers:	
Job Number:		

Specifications

Power

Low-voltage type Class 2 (PELV).
Operating voltage: 32 V Direct Current.

Key Design Features

- Meets IEC 801-2. Tested to withstand 15kV electro-static discharge without damage or memory loss.
- Faceplate snaps on with no visible means of attachment.
- Can be ganged to share a common faceplate with NovaT* and Vareo Dimmers. Counts as a “small control” for ganging.

System Communications and Capacity

- Low-voltage type Class 2 (PELV) wiring connects Wallstations to Processor Panel.
- Up to 32 Wallstations, Control Units, and/or Control Interfaces may be connected per Class 2 (PELV) wiring link.

Terminals

Accept up to two #18 AWG (1.0mm^2) typical.

Environment

32-104°F (0-40°C). Relative humidity less than 90% non-condensing.

Color and Finish Codes

Matte Finishes
Standard – Ship in 48 hours

White	WH
Ivory	IV
Beige	BE
Gray	GR
Brown	BR
Black	BL

Metal Finishes
Ship in 4 to 6 weeks

Bright Brass	BB
Bright Chrome	BC
Bright Nickel	BN
Satin Brass	SB
Satin Chrome	SC
Satin Nickel	SN
Antique Brass	QB
Antique Bronze	QZ

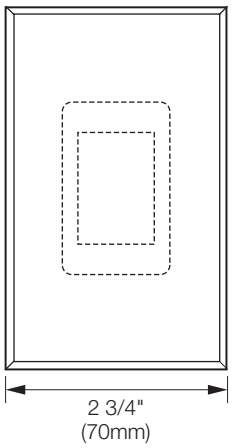
Anodized Aluminum Finishes
Ship in 4 to 6 weeks

Clear	CLA
Black	BLA
Brass	BRA
Engraving	E
No Insert	NI

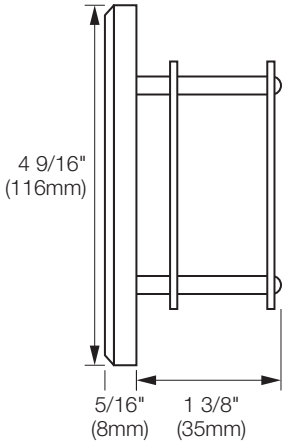
Also available:
-Custom Controls
-Color Matching
Ship in 4 to 6 weeks. Pricing may vary depending on finishes.

Dimensions

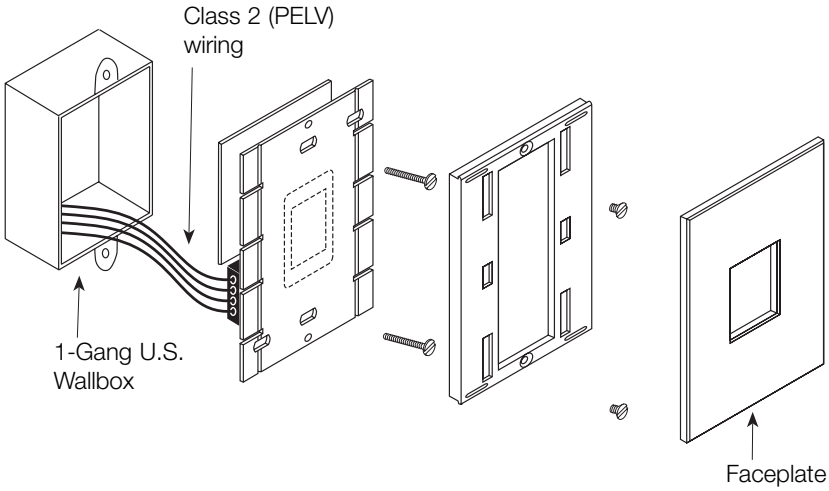
Front View



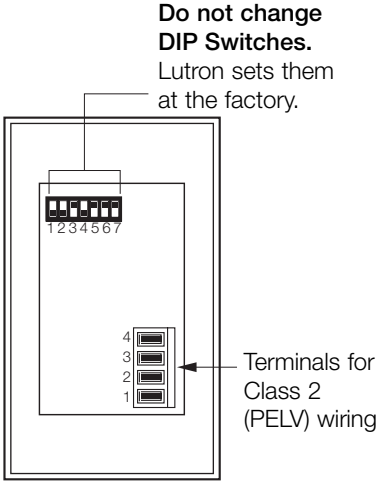
Side View



Mounting

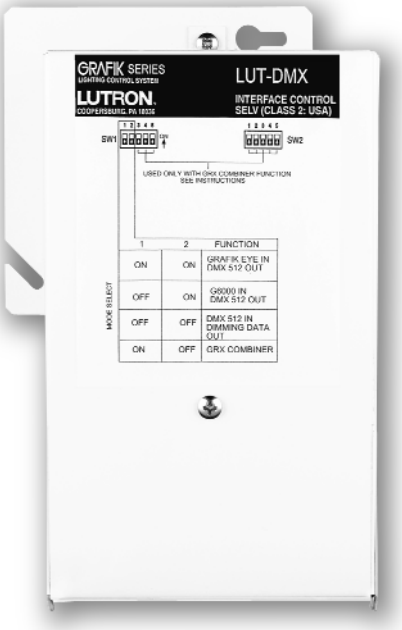


Back View



Job Name:	Model Numbers:	
Job Number:		

LUT-DMX
DMX512 Control Interface



Description

- Allows GRAFIK Eye lighting controls to operate lighting and other equipment that uses the DMX512 protocol, including:
  - Strobes, fiber optic lighting, and LED-based lamps.
  - Fogger machines.
  - Animated characters and motorized fixtures.
- Converts GRAFIK zone intensities into DMX512 channel settings. Each zone is assigned to a DMX512 channel.
- Works with GRAFIK Eye 3000 and 4000 Series Control Units, as well as GRAFIK 5000/6000/7000 Systems (see DIP switches 1 and 2). Interface does not require an address.

Example of Usage

A DMX512-controlled fiber optic fixture is setup so that:

- Channel 5 controls color channel or dial setting.
- Channel 6 controls shutter open/close.

The Control Unit's scenes are setup so that:

- Zone 5 intensity = desired fiber optic color.
- Zone 6 intensity = desired shutter open/close.

When a scene is selected at the Control Unit:

- DMX512 Interface converts new scene's zone intensities into DMX512 channel settings.
- Fiber optics automatically change color and shutter open/close.

Job Name:	Model Numbers:	
Job Number:		

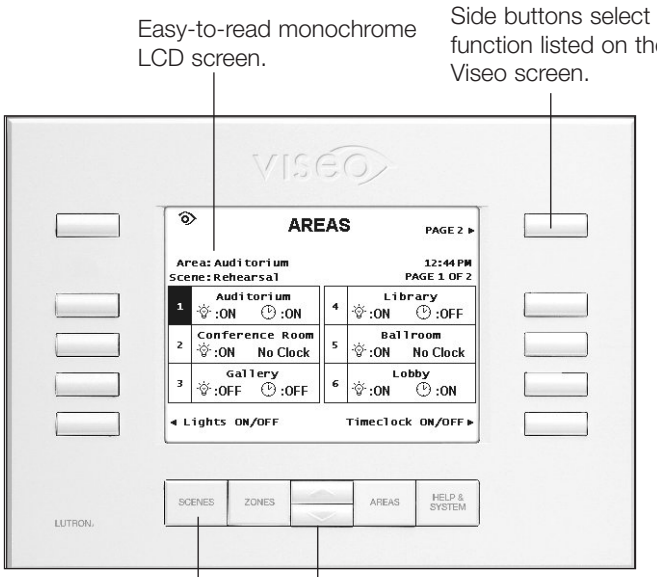
LUT-ELI-3PH
Emergency Lighting Interface

Description

- The LUT-ELI-3PH is UL924 Listed as “Emergency Lighting and Power Equipment.”
- The LUT-ELI-3PH is to be used in conjunction with Lutron *GRAFIK* Systems GP, LP dimming panels, XP switching panels (Circuit Selector), RadioTouch® Controllers, EcoSystem® Bus Supplies, Quantum® Bus Supplies, XPS, and LCP Controllers.
- The LUT-ELI-3PH senses the normal (non-essential) line voltage on all three phases (3PH) of normal power. When one or more phases of power are lost, the LUT-ELI-3PH will send a signal to the *RadioTouch* Controller, Circuit Selector, *EcoSystem* Bus Supply, *Quantum* Bus Supply, LCP Controller, or XPS Controller with emergency (essential) power, causing it to enter the emergency lighting mode. Any lights controlled by these devices will go to the emergency light level setting (factory set to 100% intensity). When normal power is restored, the lights will return to their previous intensities.
- The interface mounts to a standard 4 x 4 in (102 x 102 mm) junction box. It is powered by the *RadioTouch*, GP, XP, LP, LCP, or XPS panel’s 24 V⎓ supply. The interface can detect 100 to 347 V~ 50/60 Hz.
- For use with an EcoSystem or Quantum Bus Supply, a separate 24 V⎓ power supply must be used.

Job Name:	Model Numbers:	
Job Number:		

OMX-VDC-LB/OMX-VDC-LF
Viseo® Wallstation



Description

The Viseo Wallstation provides local access to the Lighting Control System.

- Works with GRAFIK 5000™, GRAFIK 6000®, GRAFIK 7000™ Systems.
- Program, monitor, and operate every lighting zone* and scene of a space that is controlled by an individual Processor. For multiple Processor applications, contact Lutron.
- Offers an effective alternative to PC's and other plug-in devices for day-to-day operations.
- Automatically downloads data from your system without reprogramming.
- Modify preset light levels.
- View the lighting status of all the areas in the system.
- View the timeclock status of all the areas in the system
- Take control of any lighting zone* or group of lighting zones* in any area; fine tune in 1% increments with graphic and numeric feedback.
- Program changes to preset light levels, including fade and delay times, in any area.
- Menus and help screens can be displayed in one of 7 languages: English, French, German, Italian, Spanish, Portuguese, or Dutch.

Design Options

Monochrome Color Options:

- High contrast blue/white - OMX-VDC-LB
- Neutral black/white - OMX-VDC-LF

* Does not display Lighting Zone Controller or OMX-3600 zone information.

Job Name:	Model Numbers:	
Job Number:		

COMMERCIAL OCCUPANCY SENSORS & CONTROLS

CX-100 Series Passive Infrared Ceiling/Wall Sensors

PROJECT SALAMANDER RESORT AND SPA

LOCATION/TYPE

Product Overview

Description

WattStopper's CX-100 Series Passive Infrared (PIR) Ceiling/Wall Sensors detect occupancy to control lighting in a wide variety of applications. These sensors provide superior coverage and performance with great energy savings.

Operation

CX-100 Series Sensors are 24 VDC and control lighting systems through WattStopper power packs. Utilizing the latest PIR technology, they turn lights on when a difference is detected between infrared energy from a human body in motion and the background space. After the area is vacated and the time delay elapses, lighting automatically turns off.

Coverage Choices

The CX-100 Series Sensors are available with a choice of coverage patterns. The standard lens offers coverage up to 1000 square feet for typical desktop activity. When using the CX-100/105-1 or -3 lens, motion moving toward sensors will begin to be detected at 55 to 60 feet.

Applications

The CX sensors are ideal for large areas and can cover up to 2000 square feet of walking motion. By choosing the proper lens pattern for each application, the sensors can reliably cover large offices, computer rooms, classrooms, aisleways, warehouses and open offices where coverage cut-off is desired. Corner mounting to a wall or ceiling adds versatility and more control to the coverage.

Features

- ASIC technology reduces components and enhances reliability
- Pulse Count Processing eliminates false off without reducing sensitivity
- Detection Signature Analysis eliminates false triggers and provides immunity to RFI and EMI
- Digital time delay adjustable from 15 seconds to 30 minutes
- Adjustable sensitivity enables occupancy detection to match the level of activity for each space
- LED indicates occupancy detection
- The CX-100's integrated light level sensor can create bi-level control for added energy savings
- Multilevel Fresnel lens for superior desktop occupancy detection with four lens patterns
- Isolated relay can interface with HVAC, EMS and monitoring systems, or with an additional lighting load
- Dual-element, temperature compensated pyroelectric sensor
- Swivel mounting bracket for convenient corner mounting to wall or ceiling
- Qualifies for ARRA-funded public works projects

COMMERCIAL OCCUPANCY SENSORS & CONTROLS

CI-300 Series Passive Infrared Ceiling Sensors

PROJECT SALAMANDER RESORT AND SPA

LOCATION/TYPE

Product Overview

Description

WattStopper's CI-300 Passive Infrared (PIR) Ceiling Sensors automatically turn lighting on and off based on occupancy. The sensor mounts on the ceiling with a flat, low-profile appearance and provides 360 degrees of coverage.

Operation

CI-300 Series Sensors operate on 24 VDC, VAC or halfwave rectified. Utilizing the latest PIR technology, they automatically turn lighting on when a difference is detected between infrared energy from a human body in motion and the background space. When no occupancy is detected for the length of the time delay, lighting automatically turns off. For manual-on operation, the CI-300 will operate with a low-voltage momentary switch.

Auto Set

The CI-300 Series Sensors require no adjustment at installation. Auto set continuously monitors the controlled space to identify usage patterns. Based on this information, the units automatically adjust time delay and sensitivity settings for optimal performance and energy efficiency. Sensors assign short delays (as low as five minutes) for times when the space is usually vacant, and longer delays (up to 30 minutes) for busier times.

Applications

CI-300 Series Sensors have the flexibility to work in a variety of applications that include open office spaces, computer rooms, conference rooms, classrooms and warehouses. Areas with high ceilings or with two-level lighting can also be controlled. The convenient mounting system keeps installation costs down to speed up the product's payback.

Features

- Advanced control logic based on RISC microcontroller provides:
  - Detection Signature Processing to eliminate false triggers and provide immunity to RFI and EMI
  - Walk-through Mode turns lights off three minutes after the area is initially occupied – ideal for brief visits such as mail delivery
  - Built-in light level sensor featuring simple, one-step setup
- LED indicates occupancy detection
- CI-300 Series Sensors work with low-voltage momentary switches for manual control
- DIP switch simplifies sensor adjustments
- Clip-mounting system simplifies ceiling tile installation
- Plug terminal wiring system for quick and easy installation
- Available with isolated relay for integration with BAS or HVAC
- Qualifies for ARRA-funded public works projects

DT-300 Series Dual Technology Ceiling Sensors

PROJECT SALAMANDER RESORT AND SPA

LOCATION/TYPE

Product Overview

Description

The DT-300 Series Dual Technology Ceiling Sensors combine the benefits of passive infrared (PIR) and ultrasonic technologies to detect occupancy. Sensors have a flat, unobtrusive appearance and provide 360 degrees of coverage.

Operation

Low voltage DT-300 Series sensors utilize a WattStopper power pack to turn lights on when both PIR and ultrasonic technologies detect occupancy. They can also work with a low voltage switch for manual-on operation. PIR technology senses motion via a change in infrared energy within the controlled area, whereas ultrasonic uses 40KHz high frequency ultrasound. Once lights are on, detection by either technology holds them on. When no occupancy is detected for the length of the time delay, lights turns off. DT-300 Series Sensors can also be set to trigger lights on when either technology or both detect occupancy, or to require both technologies to hold lighting on.

Auto Set

The DT-300 requires no adjustment at installation. Auto set continuously monitors the controlled space to identify usage patterns. Based on these patterns, the unit automatically adjusts time delay and sensitivity settings for optimal performance and energy efficiency. Sensors assigns short delays (as low as five minutes) for times when the space is usually vacant, and longer delays (up to 30 minutes) for busier times.

Application

DT-300 Series Dual Technology Sensors have the flexibility to work in a variety of applications, where one technology alone could cause false triggers. Ideal applications include classrooms, open office spaces, large offices and computer rooms. The DT-300 Series mounting system makes them easy to install in ceiling tiles or to junction boxes, providing the flexibility to be used in a wide range of spaces.

Features

- Advanced control logic based on RISC microcontroller provides:
  - Detection Signature Processing eliminates false triggers and provides immunity to RFI and EMI
  - Walk-through mode turns lights off three minutes after the area is initially occupied – ideal for brief visits such as mail delivery
  - Available with built-in light level sensor featuring simple, one-step setup
- Sensors work with low-voltage momentary switches to provide manual control
- Patented ultrasonic diffusion technology spreads coverage to a wider area
- LEDs indicate occupancy detection
- Uses plug terminal wiring system for quick and easy installation
- Eight occupancy logic options provide the ability to customize control to meet application needs
- Available with isolated relay for integration with BAS or HVAC
- Qualifies for ARRA-funded public works projects

DAYLIGHTING SENSORS & CONTROLS

LightSaver® LS-301 Dimming Photosensor

Automatic dimming based on ambient light levels

All setup performed remotely with handheld

Controls standard 0-10 VDC electronic dimming ballasts

Optional occupant adjustment via handheld remote

Single zone control

Closed loop daylighting control

PROJECT SALAMANDER RESORT AND SPA

LOCATION/TYPE

Product Overview

Description

The LightSaver LS-301 is a closed loop, ceiling mount, low voltage indoor photosensor that works with standard, 0-10 VDC electronic dimming ballasts to dim lighting as daylight increases.

Operation

The LS-301 mounts on a ceiling and utilizes a spectral filtering system to measure daylight and electric light levels. A closed loop daylighting system, the LS-301 measures the total light level from daylight and electric light in the controlled area to adjust electric lighting levels. As the daylight contribution increases, the lights dim down. The photosensor utilizes sliding setpoint control, which responds to the different spatial distribution qualities of electric light and daylight. The LS-301 calculates the required light level for current daylight contribution based on two setpoints. One represents the target level when no daylight is present (night setpoint) and the other when significant daylight is present (day setpoint).

Adjustment via Handheld Remote Control

All LS-301 adjustments are made with one of two handheld remotes. The FDR-301-S provides five buttons for initial set-up, which is easily completed by first raising or lowering electric light levels to desired levels, then programming this target level into the photosensor. The LSR-301-P provides three buttons for occupants to adjust light levels. With this optional tool, users can increase target light levels by up to 25% or reduce them to the lamp/ballast minimum level. Pressing the "Auto" button returns the control to programmed levels.

Applications

The LS-301 is designed to blend into its surroundings when installed in any environment. It provides one zone of daylighting control in a private office or classroom. In these applications, the LS-301 can be combined with an occupancy sensor. Often, it is possible for the LS-301 to share a single power pack with occupancy sensor(s).

Features

- Provides precise control of lighting to maintain desired light level
- Extremely linear photocell response with greater than 1% accuracy
- Designed to measure light as the human eye perceives it, eliminating "overreporting" illumination levels provided by daylight
- California Title 24-2008 compliant
- Separate handheld remote controls for setup and occupant adjustment to prevent tampering
- Boosts energy savings by reducing maximum lamp output, often resulting in a 20% reduction or more compared with lights at full output
- Achieves lumen maintenance by holding target light level as lamp output decreases over time
- Qualifies for use on ARRA-funded public works projects

BAB 20W GU5.3 MR16 36D 1CT

Product family description

Low-voltage halogen burner optically positioned in a glass reflector with or without front glass.

Features/Benefits

- Dichroic reflector coating is heat-transmitting and light-reflecting.
- UV-Block burner.
- Color temperature 3000K.
- Lifetime 3000 hours.
- Universal burning position.
- Variety of wattages and beam spreads.

Applications

- Ideal for retail stores, hotels, restaurants, museums and art gallery lighting.

Notes

- Rated average life is the length of operation (in hours) at which point an average of 50% of the lamps will still be operational and 50% will not. (93)

Product data	
Product Number	378034
Full product name	BAB 20W GU5.3 MR16 36D 1CT
Ordering Code	378034
Pack type	1 Lamp in a Folding Carton
Pieces per Sku	1
Skus/Case	50
Pack UPC	046677378035
EAN2US	
Case Bar Code	50046677378030
Successor Product number	
ANSI Code Halogen	BAB
Base	GU5.3
Bulb	MR16 [MR 16inch/50mm]
Execution	Open
Operating Position	Universal [Any or Universal (U)]
Packing Type	1CT [1 Lamp in a Folding Carton]
Packing Configuration	10X5F
Ordering Code	20MR16/FL36-BAB

PHILIPS

DULUX® D/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
26	T (T4)	5.2	124	GX24Q-3	20767	**CF26DT/E/827/ECO**	CFTR26W/GX24Q/827	50	12000	2700	82	1800	1548	1,2,5,6, 7,12,20
					20995	**CF26DT/E/835/ECO/BL/1**	CFTR26W/GX24Q/835	50	12000	3500	82	1800	1548	1,2,5,6, 7,12,20
32	T (T4)	5.8	147	GX24Q-3	20768	**CF32DT/E/827/ECO**	CFTR32W/GX24Q/827	50	12000	2700	82	2400	2064	1,2,5,6, 7,12,18,20

DULUX T/E/IN AMALGAM, 4-PIN ECOLOGIC COMPACT FLUORESCENT LAMPS

For electronic ballast for high and low temperature applications. Lamps have End-of-Lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F @35°C/95°F	Approx Lumens Mean @25°C/77°F @35°C/95°F	Symbols & Footnotes
18	T (T4)	4.4	111	GX24Q-2	20875	**CF18DT/E/IN/827/ECO**	CFTR18W/GX24Q/827	50	12000	2700	82	1164 1200	1001 1032	1,2,5,6, 7,12,20,21
					20876	**CF18DT/E/IN/830/ECO**	CFTR18W/GX24Q/830	50	12000	3000	82	1164 1200	1001 1032	1,2,5,6, 7,12,20,21
					20877	**CF18DT/E/IN/835/ECO**	CFTR18W/GX24Q/835	50	12000	3500	82	1164 1200	1001 1032	1,2,5,6, 7,12,20,21
					20878	**CF18DT/E/IN/841/ECO**	CFTR18W/GX24Q/841	50	12000	4100	82	1164 1200	1001 1032	1,2,5,6, 7,12,20,21
26	T (T4)	5.0	126	GX24Q-3	20879	**CF26DT/E/IN/827/ECO**	CFTR26W/GX24Q/827	50	12000	2700	82	1746 1800	1501 1548	1,2,5,6, 7,12,20,21
					20880	**CF26DT/E/IN/830/ECO**	CFTR26W/GX24Q/830	50	12000	3000	82	1746 1800	1501 1548	1,2,5,6, 7,12,20,21
					20881	**CF26DT/E/IN/835/ECO**	CFTR26W/GX24Q/835	50	12000	3500	82	1746 1800	1501 1548	1,2,5,6, 7,12,20,21
					20882	**CF26DT/E/IN/841/ECO**	CFTR26W/GX24Q/841	50	12000	4100	82	1746 1800	1501 1548	1,2,5,6, 7,12,20,21
32	T (T4)	5.6	142	GX24Q-3	20883	**CF32DT/E/IN/827/ECO**	CFTR32W/GX24Q/827	50	12000	2700	82	2328 2400	2002 2064	1,2,5,6, 7,12,18,20,21
					20884	**CF32DT/E/IN/830/ECO**	CFTR32W/GX24Q/830	50	12000	3000	82	2328 2400	2002 2064	1,2,5,6, 7,12,18,20,21
					20885	**CF32DT/E/IN/835/ECO**	CFTR32W/GX24Q/835	50	12000	3500	82	2328 2400	2002 2064	1,2,5,6, 7,12,18,20,21
					20886	**CF32DT/E/IN/841/ECO**	CFTR32W/GX24Q/841	50	12000	4100	82	2328 2400	2002 2064	1,2,5,6, 7,12,18,20,21
42	T (T4)	6.5	163	GX24Q-4	20887	**CF42DT/E/IN/827/ECO**	CFTR42W/GX24Q/827	50	12000	2700	82	3104 3200	2670 2752	1,2,5,6, 7,12,18,20,21
					20888	**CF42DT/E/IN/830/ECO**	CFTR42W/GX24Q/830	50	12000	3000	82	3104 3200	2670 2752	1,2,5,6, 7,12,18,20,21
					20871	**CF42DT/E/IN/835/ECO**	CFTR42W/GX24Q/835	50	12000	3500	82	3104 3200	2670 2752	1,2,5,6, 7,12,18,20,21
					20890	**CF42DT/E/IN/841/ECO**	CFTR42W/GX24Q/841	50	12000	4100	82	3104 3200	2670 2752	1,2,5,6, 7,12,18,20,21
57	T (T4)	7.76	197	GX24Q-5	20895	**CF57DT/E/IN/827/ECO**	CFTR57W/GX24Q/827	50	12000	2700	82	4171 4300	3587 3698	1,2,5,6, 12,18,20,21
					20896	**CF57DT/E/IN/830/ECO**	CFTR57W/GX24Q/830	50	12000	3000	82	4171 4300	3587 3698	1,2,5,6, 12,18,20,21
					20897	**CF57DT/E/IN/835/ECO**	CFTR57W/GX24Q/835	50	12000	3500	82	4171 4300	3587 3698	1,2,5,6, 12,18,20,21

F32T8 TL830 XLL ALTO

Product family description

Extra long life, extra low mercury

Features/Benefits

- Extra Long Life
- Outstanding lumen performance
- Better for the environment
- Significantly reduce maintenance and recycling costs by extending the relamping cycle.
- Up to 67% longer life than an industry standard T8 lamp.
- Warranty period: 48 months
- 95% lumen maintenance and reduced lamp-end blackening
- Only 1.7mg of mercury with ALTO II™Technology
- Reduced impact on the environment without sacrificing performance

Applications

- Ideal for applications where longer relamp cycles would be beneficial.

Notes

- Rated average life under specified test conditions with lamps turned off and restarted no more frequently than once every 3 operating hours. Lamp life is appreciably longer if lamps are started less frequently. (202)
- Average life under engineering data with lamps turned off and restarted once every 12 operating hours.(241)
- Approximate Initial Lumens. The lamp lumen output is based upon lamp performance after 100 hours of operating life, when the output is measured during operation on a reference ballast under standard laboratory conditions. (203)
- For expected lamp lumen output, commercial ballast manufacturers can advise the appropriate Ballast Factor for each of their ballasts when they are informed of the designated lamp. The Ballast Factor is a multiplier applied to the designated lamp lumen output. (204)
- Design Lumens are the approximate lamp lumen output at 40% of the lamp's Rated Average Life. This output is

PHILIPS

Philips EnduraLED™
Candle LED Lamps

Ideal for wall sconces and decorative fixtures

EnduraLED™

Energy saving elegance

Philips EnduraLED™ candles offer decorative, energy-saving ambience with the elegant effect of incandescent candles. The unique design provides light in all directions, giving lighting designers an alternative to incandescent sources.

High efficacy LED decorative light

- Instant-on light
- Emits virtually no UV/IR light in the beam
- Lasts 15,000 hours rated average life[1,2]
- Supplies light in both clear and frosted designs
- Save over 13 watts of energy when compared to a 15W incandescent*
- Similar ambience as traditional incandescent candles
- Contains no mercury

Easy to experience

- Lowers maintenance costs by reducing re-lamp frequency
- Installs into existing candelabra base fixtures
- 3-year warranty period

(1,2 See back page for footnote.)
* 2.5W EnduraLED candle compared to a 15W incandescent. Light output from the 2.5W EnduraLED candle is only 30 lumens compared to 110 lumens for a typical 15W incandescent candle.

PHILIPS
sense and simplicity

Philips EnduraLED™ Candle LED Lamps

Ordering, Electrical and Technical Data (Subject to change without notice)

Product Number	Ordering Code	Nom. Watts	Volts	Lamps per SKU	Description	Bulb Type	Base	Rated Avg. Life (Hrs.)[1,2,3]	Approx. Lumens[4]	CRI	Color Temp. (Kelvin)	MOL (In.)
40605-8	3BA9 END/CL WW 120V 8/1	2.5	120	1	EnduraLED BA9 2.5W Candelabra Base Clear Lamp	BA9	Candelabra	15,000	30	80	3000	4.1
40606-6	3BA9 END/FR WW 120V 8/1	2.5	120	1	EnduraLED BA9 2.5W Candelabra Base Frosted Lamp	BA9	Candelabra	15,000	30	80	3000	4.1
40607-4	3B10½ END/CL WW 120V 8/1	2.5	120	1	EnduraLED B10½ 2.5W Candelabra Base Clear Lamp	B10½	Candelabra	15,000	30	80	3000	4.0
40608-2	3B10½ END/FR WW 120V 8/1	2.5	120	1	EnduraLED B10½ 2.5W Candelabra Base Frosted Lamp	B10½	Candelabra	15,000	30	80	3000	4.0

Shipping Data (Subject to change without notice)

Product Number	SKU UPC (0-46677)	Outer Bar Code (5-00-46677)	Case Qty.	Case Weight (lbs.)	Case Cube (cu. ft.)	Pallet Qty.	SKUs Per Layer	Layers High	SKU Dimensions (W x D x H)(In.)	Case Dimensions (W x D x H)(In.)	Pallet Dimensions (W x D x H)(In.)
40605-8	40605-9	40605-4	8	0.8	0.06	3840	640	6	1.4 x 1.4 x 4.2	3.4 x 6.5 x 4.7	39.0 x 46.3 x 28.1
40606-6	40606-6	40606-1	8	0.8	0.06	3840	640	6	1.4 x 1.4 x 4.2	3.4 x 6.5 x 4.7	39.0 x 46.3 x 28.1
40607-4	40607-3	40607-8	8	0.8	0.06	3840	640	6	1.4 x 1.4 x 4.2	3.4 x 6.5 x 4.7	39.0 x 46.3 x 28.1
40608-2	40608-0	40608-5	8	0.8	0.06	3840	640	6	1.4 x 1.4 x 4.2	3.4 x 6.5 x 4.7	39.0 x 46.3 x 28.1

1) Rated average life is the length of operation (in hours) at which point an average of 50% of the lamps will still be operational and 50% will not.
2) Rated average life based on engineering testing and probability analysis.
3) Lifetime testing consistent with IES LM-80, Lumen Maintenance Procedure.
4) Photometric testing consistent with IES LM-79.

Energy Efficiency

Estimated Lighting Costs Using a Standard 15W Incandescent Candle		
Present Wattage		15 W
x Annual Operating Hours		3000 hrs
	=	45,000 watts per year
÷1,000	=	45 kWh per year
x kWh rate of $0.10	=	$5 per year
x 100 lamps per space	=	$450 annual energy cost per space

Estimated Lighting Costs Using a Philips 2.5W EnduraLED Candle		
Present Wattage		2.5 W
x Annual Operating Hours		3000 hrs
	=	7500 watts per year
÷1,000	=	7.5 kWh per year
x kWh rate of $0.10	=	$1 per year
x 100 lamps per space	=	$75 annual energy cost per space
Total Estimated Annual Energy Costs†	=	$375

† Based on 100 lamps per space operating at 3,000 hours per year.

This energy saving example shows an application of 100 lamps in a space currently using a 15W incandescent candle, operating 3,000 hours per year at a cost of $0.10 per kWh.‡ Your actual costs may vary depending on your geographic region.

As you can see, replacing 100 15W incandescent lamps with the Philips EnduraLED 2.5W candle can provide significant energy cost savings of $375 per year! Potential savings from the reduction in HVAC costs as a result of using a lower wattage lamp that emits less heat is an additional benefit not included in this example.

‡ Light output from the 2.5W EnduraLED candle is only 30 lumens compared to 110 lumens for a typical 15W incandescent candle.

WARNINGS AND CAUTIONS

- Suitable for use in open luminaires (fixtures).
- Do not use in outdoor fixtures.
- Do not use in enclosed fixtures.
- Not for use with dimmers.
- Do not use with emergency exit fixtures or emergency lights.
- Turn off power before changing lamp.

CAUTION: Risk of electric shock. Use in dry location only.

NOTES: This device complies with Part 18 of the FCC rule. This product may cause interference with other devices. If interference occurs, change the location of the products involved. This RFLD device complies with Canadian ICES-005.

Printed in USA 1/10

P-6027

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A Division of Philips Electronics North America Corporation

Philips Lighting
281 Hillmount Road
Markham, Ontario
Canada L6C 2S3
1-800-555-0050
A Division of Philips Electronics Ltd.

MasterColor CDM-T 20W/830 T6 1CT

Product family description

Range of single-ended T6 high-efficiency ceramic metal halide lamps with a stable color over lifetime and a crisp, sparkling light.

Features / Benefits

- Excellent color rendering.
- Superior color stability over life within +- 200K.
- Lamp to lamp color consistency over life.
- Higher lumen maintenance than standard metal halide.
- Warm (3K) or fresh white (4K) color impression.
- High lamp efficacy (up to 93 lumens per watt) for energy saving and low heat.
- Universal operating position.
- Compact lamp dimensions for high beam intensities.
- No shut off required in 24-hour-a-day/7-day-a-week operations (relamp fixtures at or before the end of rated life).
- Long lamp life compared to incandescent and halogen lamps.

Applications

- Accent and General lighting in retail, offices and public buildings. Decorative outdoor: floodlighting and pedestrian areas.

Notes

- Requires a ballast specified or approved for Philips Metal Halide lamp or one designed to the indicated ANSI Standard. A pulse ignitor is required. Sockets and wiring must withstand starting pulse. (391)
- Supply volts must be +/- 5% of rated ballast line volts for reactor type and +/- 10% for CWA or electronic ballasts. (392)
- UV filtered design (FadeBlock™). (396)
- Operate only on thermally protected ballasts (397)

PHILIPS

MasterColor CDM-T 35W/830 T6 1CT

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PHILIPS