1.5.0 Conference Room

1.5.1 Introduction

The conference room located within the business center on the third floor provides a meeting place for business travelers staying at Broadway Plaza. As the primary workspace for business transactions within Broadway Plaza's walls, the conference room needs to go the extra step to attract business travelers. The space is comparably compact at only 242 sq. ft. Low-e insulating glass (See Architectural Surfaces) is used to provide daylight to the conference room. Three windows at 8' high compose the entire West facade, barring the necessity of the column line in this location. The primary furnishing is a conference table with seating for eight.

1.5.2 Space Layout

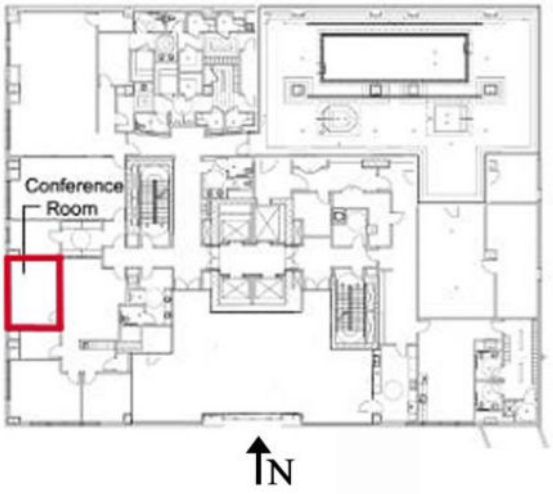


Fig. 1.5.2a: Conference Room Location Within the 3rd Floor

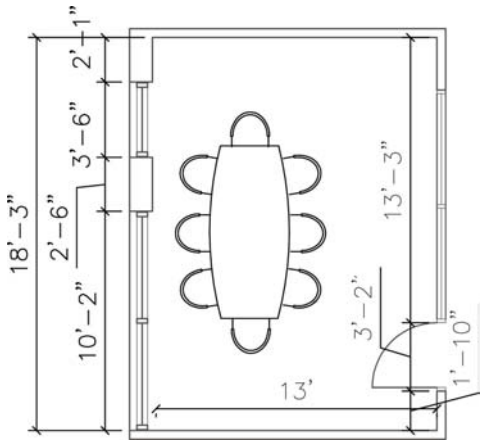


Fig. 1.5.2b: Conference Room Floor Plan With Dimensioning (Total Area: 242 ft^2)

1.5.3 Architectural Surfaces

Floor Finishes

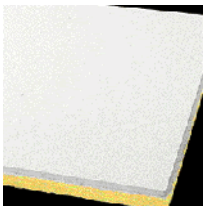
Carpet- C4
MFG: Atlas
Style: Kago
Color: KG25 Tile Blue
Reflectance: 9.5%

Wall Finishes

Wallcovering- WC14
MFG: Maharam
Pattern: Riyual 396690
Color: Canyon
Reflectance: 39.2%

Ceiling Finishes

Acoustical Ceiling Tile
MFG: Armstrong
System: Optima 3251 (2X2)
Color: White
Finish: Textured
Reflectance: 0.90



Glass Types

Glazing Description	Transmittance			Reflectance			ASHRAE U-Value		Shading Coefficient	SHGC	Relative Heat Gain
	Visible Light	Solar Energy	UV	Visible Light-Ex.	Visible Light-Int.	Solar Energy	Winter Nighttime	Summer Daytime			
Solarscreen Low-E Insulating Glass VE 7-85 by Viracon Construction: 1" Total 1/4" Azuria Color,1/2" Airspace, 1/4" VE 85 #3	58%	24%	19%	9%	11%	7%	0.31 Btu/(hr* sqft* degree F)	0.29 Btu/(hr* sqft* degree F)	0.38	0.33	80 Btu/ hr*sqft
Uncoated Monolithic Glass by Viracon Construction: 1/4" Clear	88%	77%	63%	8%	8%	7%	1.02 Btu/(hr* sqft* degree F)	0.92 Btu/(hr* sqft* degree F)	0.94	0.82	201 Btu/ hr*sqft

1.5.4 Design Concept

Design Goals

As the major workspace of Broadway Plaza, it was determined that the room must evoke an aesthetically pleasing and professional atmosphere. All luminaires used within the space need to be attractive, and yet not distracting from the primary task of business transactions. The small space also provides the challenge of spatial perception. Although small, the conference room must not appear claustrophobic to those inside. Additionally, as in any presentation space, lighting control must always be in the forefront. Individual control of fixtures, dimming, and daylight must all be considered to create a flexible space for various work atmospheres. Controls must be easy to use by even the most unfamiliar of users, a typical trait of many of the occupants.

Conceptualization and Sketches

To create the clean and attractive atmosphere, two semi-indirect linear fluorescent pendants are used above the table to provide adequate horizontal and vertical illuminance. The reflecting glass diffuser within the center of the luminaire provides for an illuminated ceiling and a comfortable ambience for work. Meanwhile, this same diffuser also reflects adequate light downward along the table for vertical illuminance and clear facial rendering. Although the ceiling itself will not reflect in a VDT monitor due to its proximity, by avoiding an overly luminous ceiling, attention should not be diverted from the task. In relation to this matter, focal points are created to garner attention as well as expand spatial perception. According to Flynn modes, with a variation in wall luminance and lower light levels within the center of a room, a relaxed atmosphere may be achieved. Therefore, an even wall wash of the back wall and spotlighting of the front wall is provided to create luminance variation and increase spatial perception. Figure 1.5.4a displays the integration of an even wash along the back wall with the semi-indirect linear pendant. While the even wash along the back wall provides more ambient light, the front spotlights may be used to provide focus on presentation boards that may be posted there. By selecting spotlights that provide an even distribution along the horizontal plane of the wall, larger presentation boards will be evenly illuminated.

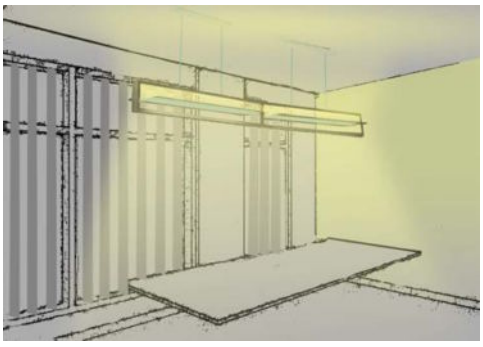


Figure 1.5.4a

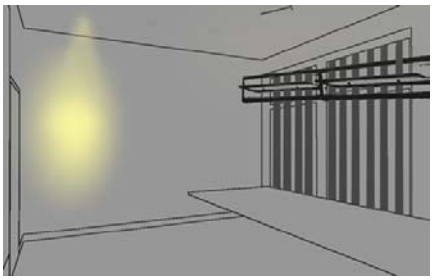


Figure 1.5.4b

Meanwhile, smaller presentations may take advantage of only one spotlight at a time. Figure 1.5.4b illustrates the possibility for a larger display, while Figure 1.5.4c visualizes smaller presentations.

As discussed, lighting control for different presentation scenarios is also provided. Control of the individual spotlights, wall washes and pendants on a dimming system allows for a variety of settings.

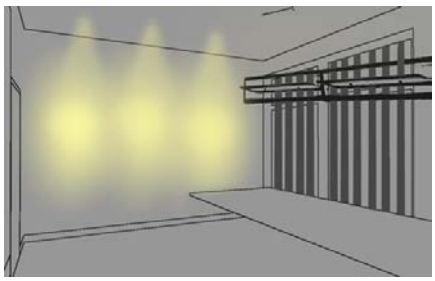


Figure 1.5.4c

Daylight control is also a must within this space. A series of vertical blinds are added to both the interior and exterior windows to allow for darkening of the space for presentation purposes. Vertical blinds are chosen based on their ability to more efficiently integrate daylight along the western orientation.

1.5.5 Design Criteria

- Appearance of Space and Luminaires (Very Important)
  Along with the flexibility of the controls and minimization of glare, the appearance of the space should be the ultimate focus of the room. Therefore, fixture selection for aesthetics and the quality of the light is extremely important.
- Color Appearance (and Color Contrast) (Important)
  Poor color rendering is not acceptable when trying to sell a presentation and conduct million dollar business ventures. A CRI of 80 is required for all lamps. Presentation images, furnishings and especially skin tone should all possess good color rendering for a natural appearance.
- Daylighting Integration and Control (Important)
  The West-facing windows allow for daylight to enter the space, but special provisions should be taken to control and eliminate this daylight for presentation and work purposes.
- Direct Glare (Very Important)
  Clearly, with the use of VDT and presentation boards in the conference room, direct glare in monitors or in specular posters should be avoided. Occupants should never be looking directly into a luminaire or experiencing any discomfort.
- Light Distribution on Surfaces (Important)
  Accent should be placed both on the luxurious furnishings in the room as well as on any specific points of interests that may be located here. Points of interest highlighted by light should be created to provide variety in the space.
- Light Distribution on Task Plane (Uniformity) (Important)
  As the conference table can accommodate several occupants, it is important that light levels along the entire table be maintained at a high illuminance level for all tasks to be preformed.
- Luminances of Room Surfaces (Very Important)
  Luminance ratios between VDT and adjacent surfaces should not exceed 1:3 or 3:1. Meanwhile, luminance ratios between the VDT monitor and far surroundings, including the luminous ceiling, should not exceed 1:10 or 10:1.

- Modeling of Faces or Objects (Very Important)
  Facial features should be uniformly lit with illuminance levels that avoid unattractive shadows or extreme brightness. The lighting should create no unflattering shadows nor should features that may be unbecoming be accented
- Reflected Glare (Important)
  As VDT monitors will be used in the space, reflected glare on screens should be avoided at all costs. Unwanted glare may cause eyestrain and discomfort, making it hard to work for long periods of time. Luminaire cut-off angles should be located out of the offending zone of the computer. Additionally, the spotlighting should be aimed at reflection angles that will not travel back into the eyes of the occupant at the table.
- System Control and Flexibility (Very Important)
  As a variety of presentations and work atmospheres are desirable within the space, it is important to take into consideration illuminance values and the location of the light to create that desired atmosphere. Thus, the system must provide different lighting scenes to meet the desired high or low illuminance for business related ventures. Adaptation to the needs of the client is a must.
- Illuminance (Horizontal):
  Horizontal illuminance levels on the conference table should reach between 30 fc-40 fc. Higher light levels are not necessary as meetings will be brief in nature, and writing tasks within the space are also not overly extensive. For presentation purposes, the system should reduce light levels to various degrees from 3 fc to the maximum level.
- Illuminance (Vertical):
  Although it is not important to maintain high vertical illuminances on all surfaces, faces should be uniformly lit to a value of 10 fc for facial rendering. Higher vertical illuminances along the periphery may also be desirable to create a more comfortable atmosphere for working.

1.5.6 Equipment

Luminaire Designation	Description	Mounting	Lamp		Ballast/ Transformer	CRI	CCT	Volts	Watts	Quantity	Comments
			#	Type							
FP1	Linear Fluorescent Indirect-Direct Pendant with Flat Glass Diffuser and Metallic Aluminum Finish	Pendant	2	F28T5/830 ALTO	DIM-ELECTRONIC	85	3000	120	62	2	Luminaire: Lightolier 48228ALU Lamp: Philips Ballast: Lutron Eco 10%
WW1	Linear Fluorescent Wall Washer with White Finish and Aluminum Reflector	Recessed	1	F28T5/830 ALTO	DIM-ELECTRONIC	85	3000	120	32	2	Luminaire: Erco 65040.023 Lamp: Philips Ballast: Lutron Eco 10%
SP1	Low-Voltage Halogen Directional Spotlight with White Cast Aluminum Finish	Recessed	1	50MRC16/FL36	NA	81	3000	120 / 12	50	3	Luminaire: Erco 88045.023 Lamp: Philips

		
FP1 Lightolier-Soli Zontio	WW1 Erco- Fluorescent Wallwasher	SP1 Erco- Quadra Spotlight

Controls

Lutron's Graphik Eye 3000: Infrared Preset Lighting Control controls the conference room. This system allows for remote and wall-mounted control of four preset scenes for various meeting atmospheres as well as dimmability and control of individual fixtures. The optional hand-held remote may also be used to permit control from any point within the room. Even the most unfamiliar of users may call-up a lighting scenario or control each fixture alone if he or she so desires. Additionally, a Wattstopper CI-200 360° Passive Infrared Occupancy Sensor is installed, shutting the lighting off after an unoccupied period of 10 minutes or more.

Control	Control Description	Zone
R14	Lower lamps of (2) FP1 fixtures, Dimmable 10-100%	a
R14	Upper lamps of (2) FP1 fixtures, Dimmable 10-100%	b
R14	(2) WW1 fixtures, Dimmable 10-100%	c
R14	(1) SP1 fixture, Dimmable 25-100%	d
R14	(1) SP1 fixture, Dimmable 25-100%	e
R14	(1) SP1 fixture, Dimmable 25-100%	f

1.5.7 Lighting Plans

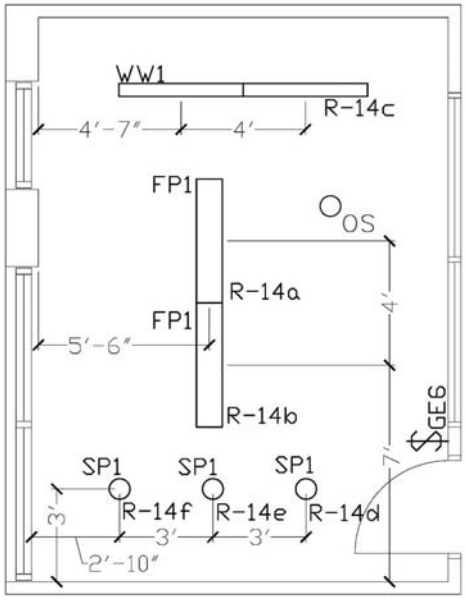


Figure 1.5.7a: Lighting Plan Showing Layout, Fixture Designation, Circuiting, and Dimensioning

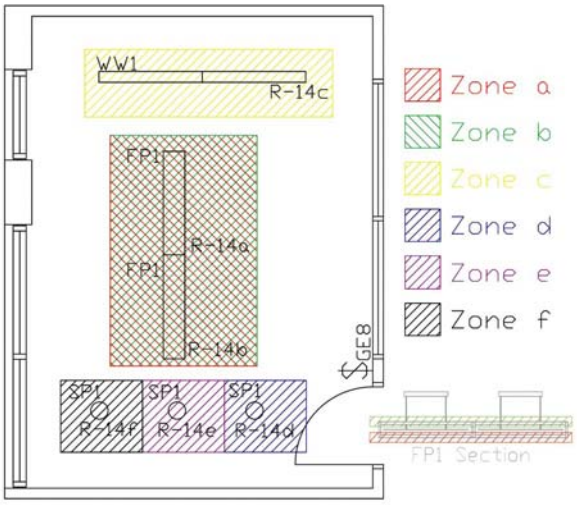


Figure 1.5.7b: Control Plan (FP1 Section Showing Zone a (lower lamps) and Zone b (upper lamps))

Control	Control Description	Zone
R14	Lower lamps of (2) FP1 fixtures, Dimmable 10-100%	a
R14	Upper lamps of (2) FP1 fixtures, Dimmable 10-100%	b
R14	(2) WW1 fixtures, Dimmable 10-100%	c
R14	(1) SP1 fixture, Dimmable 25-100%	d
R14	(1) SP1 fixture, Dimmable 25-100%	e
R14	(1) SP1 fixture, Dimmable 25-100%	f

Preset Control	Description	Zones
1	**General Meeting:** Pendant and back wall wash	a,b,c
2	**Presentation:** Three spotlights and back wall wash	c,d,e,f
3	**Presentation/Note-taking:** Lower lamps on pendant and middle spotlight	a,e
4	**Projector Presentations** (Portable white board may be brought in): Back wash only	c

1.5.8 Circuiting

Luminaire	Watts	# used	VA Load
FP1	62	2	124
WW1	32	2	64
SP1	50	3	150
Lighting Load			338
X Demand Factor (1.25)			
Total VA			422.5

Circuit	Load (VA)	Wire Size	Breaker Size
R14	338	12 AWG	20 A

1.5.9 Analysis

ASHRAE 90.1 Power Density

ASHRAE 90.1 Power Density Allowance: 1.5 W/sq.ft.

Design Watts: 338 W
Total Room Area: 242 sq.ft.
Power Density: 1.40 W/sq.ft

Satisfies ASHRAE 90.1 Power Density Requirements

Light Loss Factors

Luminaire Designation	Maintenance Category	Cleaning/ Atmosphere	Initial Lms/ Luminaire	Design Lms/ Luminaire	LLD	LDD	RSDD	Ballast Factor	Total LLF
FP1	II	Very Clean- 12 Months	5800	5500	0.95	0.97	0.94	1.00	0.86
WW1	IV	Very Clean- 12 Months	2900	2750	0.95	0.94	0.97	1.00	0.86
SP1	IV	Very Clean- 12 Months	900	855	0.95	0.94	0.97	1.00	0.87

Critical Design Performance

In terms of illuminance, several areas are certainly more critical. The conference table should reach 30 fc and possess a fairly even illuminance over the surface. Figure 1.5.9a displays the contour illuminance grid for the conference table when all lights are being utilized. Illuminance and uniformity goals are verified by the study.
Figures 1.5.9b-d display the distributions along the end walls. Although the wall wash (Figure 1.5.9b) is not completely even over the entire surface, the overall high illuminance values over a great portion of the wall provide an attractive ambient light. Figure 1.5.9c, meanwhile, displays the use of one spotlight for smaller presentations. While there is a clear hotspot, the distribution is not pinpoint. In fact, the diameter of the 25 fc band is over 4 feet in length. Meanwhile, when all three spotlights are used (Figure 1.5.9d) large or small presentations may be almost uniformly lit as well. All three spotlights blend to form a band of illuminance, creating a focal point for presentations posted on the wall.

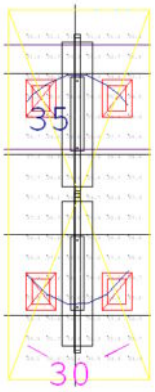


Figure 1.5.9a (Conference Table)

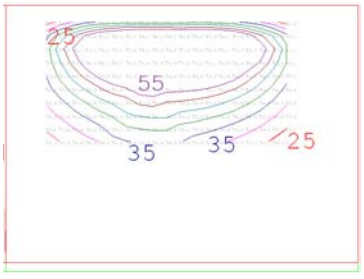


Figure 1.5.9b (Back Wall Wash)

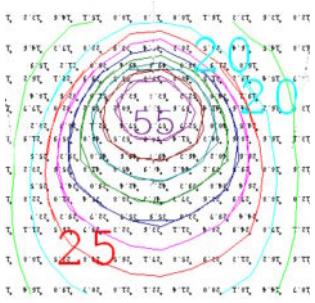


Figure 1.5.9c (One Spotlight)

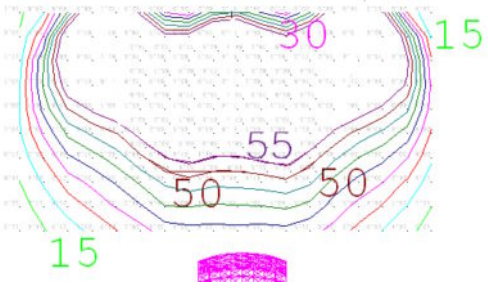


Figure 1.5.9d (Three Spotlights)

In relation to vertical illuminance for facial rendering, uniformity of 14 fc and 20 fc is maintained across the two faces seated at the end and side of the table. These values are above the criteria of 10 fc set forth for the design. Faces are rendered well with no dark shadows to highlight unsightly features. A summary of pertinent illuminance values can be found below.

Illuminance Value Summary (fc)								
	Table	Washed Wall	Face	Face	Floor Near Door	Ceiling Above Pendant	1 Spotlight	3 Spotlights
Average	35.4	46.79	20.1	14	11.49	17.27	68.45	48.36
Maximum	39.8	79.6	21.5	15.1	14.6	27.5	86.6	89
Minimum	29	22.6	18.8	12.9	8.9	10.7	45.3	11.3
Avg/Min	1.22	2.07	1.07	1.09	1.29	1.61	1.51	4.28
Max/Min	1.37	3.52	1.14	1.17	1.64	2.57	1.91	7.88
Coeff. Of Var.	0.08	0.32	0.05	0.06	0.15	0.26	0.17	0.45
Unif. Gradient	1.06	1.8	1.07	1.07	1.15	1.42	1.19	2.48

1.5.10 Renderings

Figure 1.5.10a: View of the Front of Room

Figure 1.5.10b: View of the Rear of Room

Preset Scene Rendering

As stated in the control section, several preset scenes are available. In addition to these scenes, control of each zone for light level and on/off is also available so that the user may coordinate an atmosphere perfect for his or her tasks.

Preset Control	Description	Zones
1	**General Meeting:** Pendant and back wall wash	a,b,c
2	**Presentation:** Three spotlights and back wall wash	c,d,e,f
3	**Presentation/Note-taking:** Lower lamps on pendant and middle spotlight	a,e
4	**Projector Presentations** (Portable white board may be brought in): Back wash only	c

Figure 1.5.10c: Preset # 1
General Meeting
Pendant and Back Wash

Figure 1.5.10d: Preset # 2
Presentation
Three Spotlights and
Back Wall Wash

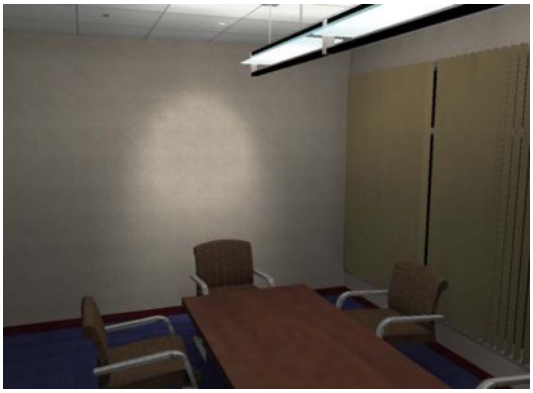


Figure 1.5.10e: Preset # 3
Presentation/Note-taking
Lower Pendant Lamps and
Middle Spotlight

Figure 1.5.10f: Preset # 4
Projector Presentation
Back Wall Wash

1.5.11 Conclusions

The conference room lighting design strives to create a professional and pleasing atmosphere in which to work. After analysis, it is proven that it does indeed meet these goals. Combining easy control and a variety of lighting atmospheres, each client should be able to find a lighting condition that is suitable to his or her needs. Target illuminance values and uniformity are met while focal attention may be brought to the task at hand. Faces are modeled without unsightly features while the luminaires themselves are aesthetically appealing.