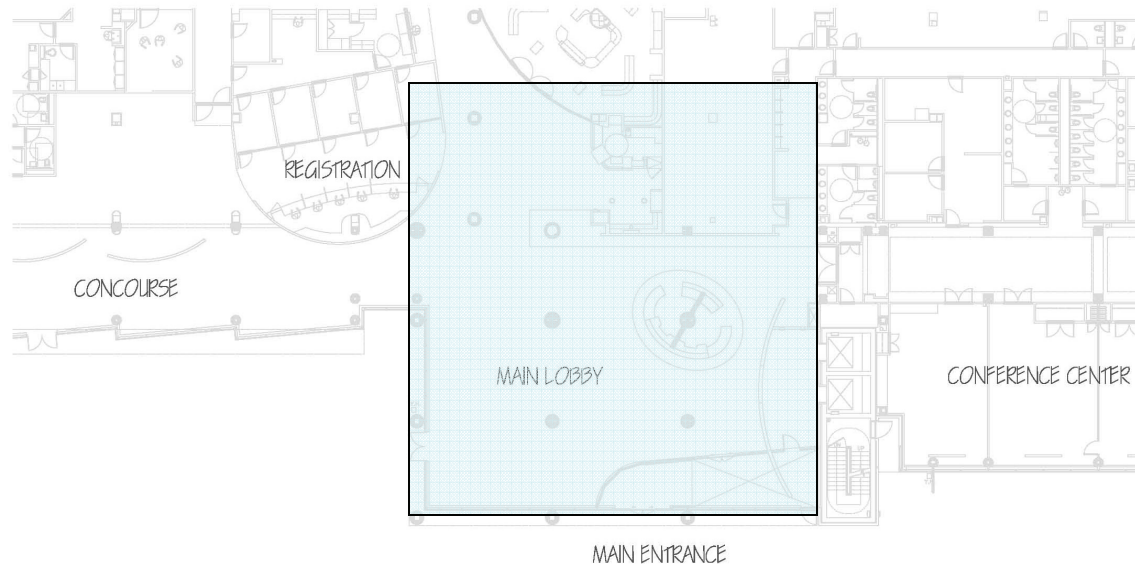


## Lobby – Lighting Space



**Figure 11: Main Lobby space and relationship with surrounding spaces**

### Introduction

The main lobby will serve as the primary entrance to the North Addition of the hospital. The lobby aims to funnel people into the building and distribute them throughout the facility via the adjacent concourses and elevator banks. Not only used for circulation, the space introduces visitors to the facility and needs to represent the function and principles of the hospital. Besides serving as the heart of the circulation system for the building, the main lobby also houses an information kiosk, meeting/reading area, and several pieces of artwork from local D.C. artists. The circulation portions of the space are light wood-tiled flooring and gypsum ceilings. The meeting/reading area has a darker brown tiled carpet and wood-paneled ceiling. The building north wall of the lobby consists of light wood panels and the building east wall is an arced blue mosaic tiled partition that separates the main lobby from one of the elevator banks. The information kiosk has an elliptical cove mimicking the shape of the kiosk desk with a column housed within the interior of the kiosk. All exterior walls are floor to ceiling glass allowing a nice exposure to the true north sky.

## Design Concepts

The design concept for the main lobby was to invite visitors into the hospital and present them with a pleasing, positive feel to their experience. Since many visitors are coming to visit sick loved ones, I wanted the main lobby to give the feeling of health and assurance that their loved ones will be taken care of by a state-of-the-art facility. When taking into consideration the best means to portray health, I came across the picture of a tropical beach shown here. Before medical science had advanced to the level of care we receive now, ill patients were often times sent to tropical climates for both the physical and psychological benefits the tropics have to offer. By emulating this environment in the main lobby, I hope to ease some of the anxiety that is associated with visiting ill loved ones as well as create an overall positive feel to the facility.



**Figure 12: Beach Inspiration**

When considering my global design for the space, I wanted to take advantage of the interesting architectural features and lines created by these features within the space. To do so, I wanted to keep the lighting fixture geometry's impact on the space as minimal as possible, essentially letting the combination of light and architecture "speak" for the space. For the ambient lighting in the circulation spaces, I provided recessed downlights creating an average of 10-15 fc on the floor. The use of recessed downlights minimized the fixture's impact on the space creating a "simple" feel to the ceiling and not intruding upon the space as a semi-recessed or surface-mounted fixture might appear. Over the meeting/reading area, I used a similar philosophy, using recessed downlight, as to not distract from the wood ceiling or the unique curved boundary created by the change of materials from the rest of the lobby to this area. I wanted to achieve 30 fc at the workplane because this seemed like a prime spot for people to sit and read the paper or a book while they wait for someone.

Since so much of the façade is directly related to the exterior environment through the floor to ceiling windows, I wanted to draw people into the space and give them a better sense of the depth of the space by washing the back wall with recessed linear fluorescent wallwash fixtures. Entering from the outside and adjusting to the drastic changes in light levels during the day can sometimes be confusing and disorienting. By lighting the back wall, one can more efficiently gain their bearings while decreasing the "cave effect" of such a deep space relative to its height. This lit back wall is similar to the bright horizon of a tropical beach assisting the beachgoer with their orientation. Also, I wanted to highlight the curved art wall since it is such a bold statement both artistically and geometrically with the main lobby. Again, I used recessed linear fluorescent wallwash fixtures to create an even wash of the mosaic wall.

For the information kiosk, I wanted to take advantage of the elliptical cove and column to call attention to the importance of the desk and its function. Using the light as a sign to potential visitors, the kiosk has more of a prominence in the space. To accentuate the desks, I used adjustable recessed downlights to provide 50 fc on the workplane since information and accuracy of communication is imperative to the operation and effectiveness of the desk. I also placed an LED cove within the inner elliptical raised ceiling. A translucent material was applied to the column, with an air gap behind it, to also give the appearance of the column “glowing”. Metaphorically, this represents the palm tree on that tropical beach. The interest created by the lighting of the desk also helps to break up the depth of the room and create more interest in the center of the lobby, otherwise a rather plain portion of the space.

## Design Criteria

- **Luminance of Room Surfaces** – Luminance of room surfaces is essential in a lobby with glass walls to the exterior. Walls need to be lit so the space does not seem dim and “cave-like” as the sun penetrates into the space. Also, whether night or day, illuminating the walls invites people into the space as well as make it look more spacious.
- **Appearance of Space and Luminaires** - Appearance of space and luminaires should be considered because the lobby is the first impression of a building. The lobby must invite people into the space and make them feel welcome. Improperly lit architectural features and ugly, obtrusive luminaires takes away from the initial impression of the facility. Visitors are probably there to see family and loved ones in the care of the hospital. If the lobby does not look like it is maintained properly, people may not think as highly of the facility that is caring for their loved ones.
- **Modeling of Faces/Objects** - Modeling of faces/objects is important since human interaction is very prevalent in this space. People meet and gather in the lobby throughout the day and need to properly recognize others.
- **Light Distribution on Surfaces** - Light distribution on surfaces needs consideration since the lobby is a very multi-functional space. The lobby has people entering/exiting the building, sitting and reading, engaging in conversation, and an information kiosk which all require differing light levels. Therefore, certain zones need to be considered for their specific tasks and should be lit accordingly.
- **Daylight Integration** - Daylight integration and control needs to be considered since the exterior wall is a glass curtain wall. Controls are important for power savings and proper transitional lighting levels to assist in the eye’s need to adjust to different lighting conditions inside. Dimming and zonal controls can be a way to more accurately control the lighting environment to match the exterior conditions most effectively.

- **Color Appearance** - Color appearance is important for both proper facial recognition and for maintaining correct color characteristics on the numerous paintings, decorative wall finishes, and feature art wall.
- **Reflected Glare** – Especially in the meeting/reading area, reflected glare needs consideration because veiling reflections can occur on the reading task if the lighting system is improperly designed. The more directional light downward, typically the less reflected glare. However, geometry of fixtures also plays a roll. Avoiding severe hot spots on the ceiling from indirect lighting will decrease glare as well.
- **Horizontal Illuminance** – 10 fc (circulation), 30 fc (reading)
- **Vertical Illuminance** – 3 fc
- **Maximum Power Density** – 1.3 W/ft<sup>2</sup> (lobby), 1.2 W/ft<sup>2</sup> (reading)  
(ASHRAE Standard 90.1)

## Fixture Schedule:

### Lighting Fixture Schedule

Type	Description	Manufacturer/Catalog No.	Lamps	CCT	Voltage	Notes
B3	6" OPEN DOWNLIGHT, HORIZONTAL LAMP, ALUMINUM REFLECTOR AND SELF-FLANGED TRIM	GOTHAM #AF-1/26TRT-6AR-277	(1) CFL26TRT	3500K	277	
B4	6" OPEN DOWNLIGHT, HORIZONTAL LAMP, ALUMINUM REFLECTOR AND SELF-FLANGED TRIM	GOTHAM #AF-1/42TRT-6AR-277	(1) CFL42TRT	3500K	277	1
C1	2' RECESSED LINEAR WALLWASH, 2" APERTURE, BLACK METAL DIFFUSER, GRID CEILING	PEERLESS #LWAR9-G-1-24T5HO-HOL-U2-277	(1) F24T5HO	3500K	277	
C2	4' RECESSED LINEAR WALLWASH, 2" APERTURE, BLACK METAL DIFFUSER, GRID CEILING	PEERLESS #LWAR9-G-1-28T5-HOL-U4-277	(1) F28T5	3500K	277	
D2	4" RECESSED ADJUSTABLE SPOT, BLACK POWDER-COAT FINISH, WHITE TRIM	ERCO #88111.000	(1) 50W GY6.35	3000K	12	
D3	ADJUSTABLE WALLWASH SPOT, TRACK/CEILING MOUNTED, WHITE FINISH, INTEGRATED ELECTRONIC TRANSFORMER	ERCO #72103.000	(1) 75W GY6.35	3000K	12	2
F1	6" COLOR CHANGING LED COVE STRIP, COLOR ADJUSTING CAPABILITIES, VENTED PLASTIC HOUSING	COLOR KINETICS i-COLOR COVE NXT 6"	INCLUDED	1000-10000K	120	3,5
F2	6" COLOR CHANGING LED COVE STRIP, COLOR ADJUSTING CAPABILITIES, VENTED PLASTIC HOUSING	COLOR KINETICS i-COLOR COVE NXT 6"	INCLUDED	1000-10000K	120	3,4

- NOTES:**
1. PROVIDE DIMMING BALLAST AS SPEC'D WITH FIXTURE IN APPENDIX A
  2. FIXTURE COMES WITH 75W OPTION EVEN THOUGH SPEC SHEET DOES NOT REFLECT THAT
  3. INTEGRAL STEP-DOWN TRANSFORMER INCLUDED WITH FIXTURES
  4. SEE INCLUDED DETAIL OF FIXTURE FOR MOUNTING SPECIFICS

\* All fixtures in this space are switched by keyed switches (based upon their circuiting) located in an adjacent janitor's closet due to the extensive public access to the space.

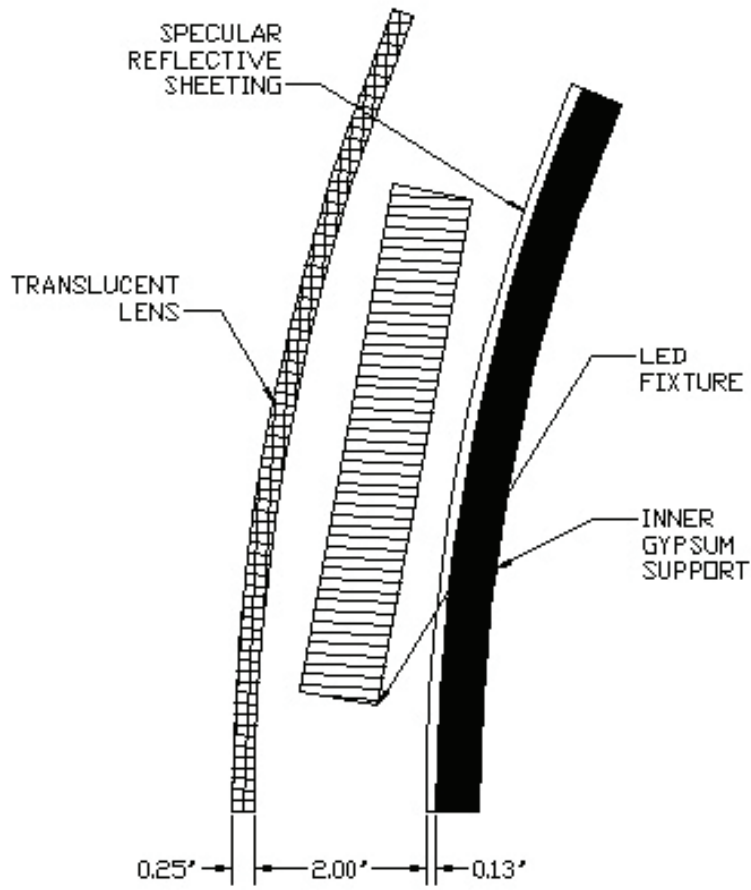
## Light Loss Factors:

### Light Loss Factors

Type	Fixture	Lamp	Lamp Data		Ballast Data			LLF's			
			Initial Lumens	Mean Lumens	Input Watts	Ballast Factor	Dimming	LLD	LDD	RSDD	Total LLF
B3	6" gotham downlight	(1) CF26TRT	1710	1440	29	1.1	-	0.84	0.88	0.97	0.791
B4	6" gotham downlight	(1) CF42TRT	3200	2690	45	0.95	x	0.84	0.88	0.97	0.682
C1	2' peerless wallwash	(1) F24T5HO	2000	1880	27	1.02	-	0.94	0.88	0.97	0.818
C2	4' peerless wallwash	(1) F28T5	2900	2726	*63	1.03	-	0.94	0.88	0.97	0.826
D2	Erco adjustable spot	(1) 50W 12V GY6.35	850	-	50	1	-	0.97	0.88	0.97	0.828
D3	Erco Parscan spot	(1) 50W 12V GY6.35	950	-	50	1	-	0.97	0.88	0.97	0.828
F1,F2,F3	LED Cove	-	45	-	6.9/l.f.	1	-	1.00	0.86	0.97	0.834

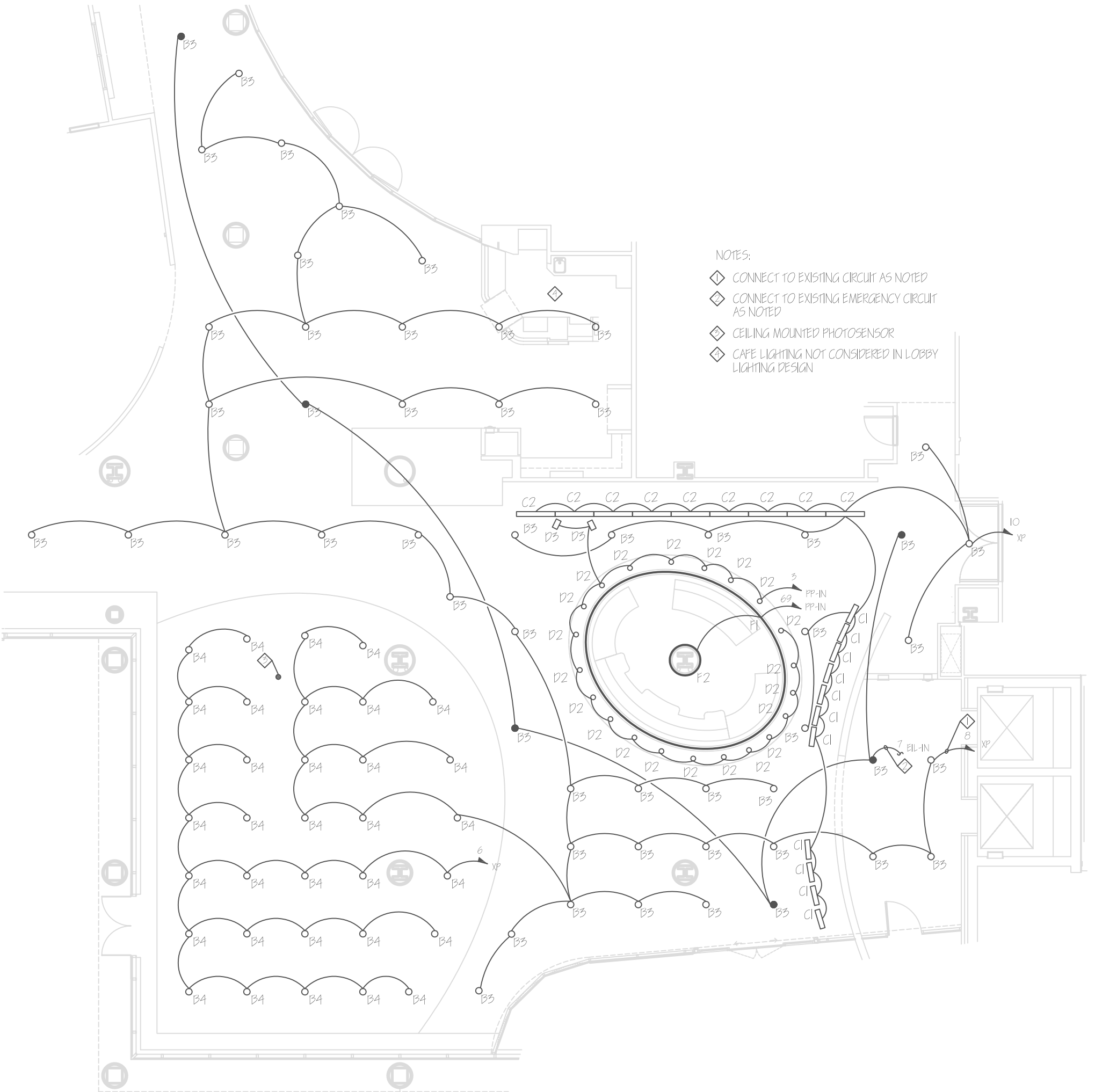
\* Input watts reflects a 2-lamp ballast

# LED Column Installation Detail:



**Figure 13: Column LED Installation Detail**

# Lighting Plan




**MAIN LOBBY**  
 SCALE: 3/32" = 1'-0"

Power Density:

<b>Power Density Calcs</b>			
<b>Circulation Spaces</b>			
Fixture	Ballast Watts/Fixture	Quantity	Total
B3	29	54	1566
C1	27	11	297
C2	63	9	567
D2	50	21	1050
D3	50	2	100
F1	6.9	52	359
F2	6.9	12	83
Total Watts:			4022
Power Density (W/ft <sup>2</sup> ):			0.84

<b>Power Density Calcs</b>			
<b>Reading Space</b>			
Fixture	Ballast Watts/Fixture	Quantity	Total
B4	45	34	1530
Total Watts:			1530
Power Density (W/ft <sup>2</sup> ):			0.97

Calculation Grids:

<b>Calc Grids</b>					
<b>Main Lobby</b>					
Description	Plane Height (ft)	Average (fc)	Maximum (fc)	Minimum (fc)	Max/Min (fc)
Circulation Floor	0	15	44	7.3	6.0
Reading Area	2.5	31	40	14	2.9
Kiosk Desktop	2.5	61	100	35	2.9
Art Wall (vertical)	-	34	64	8	8.0



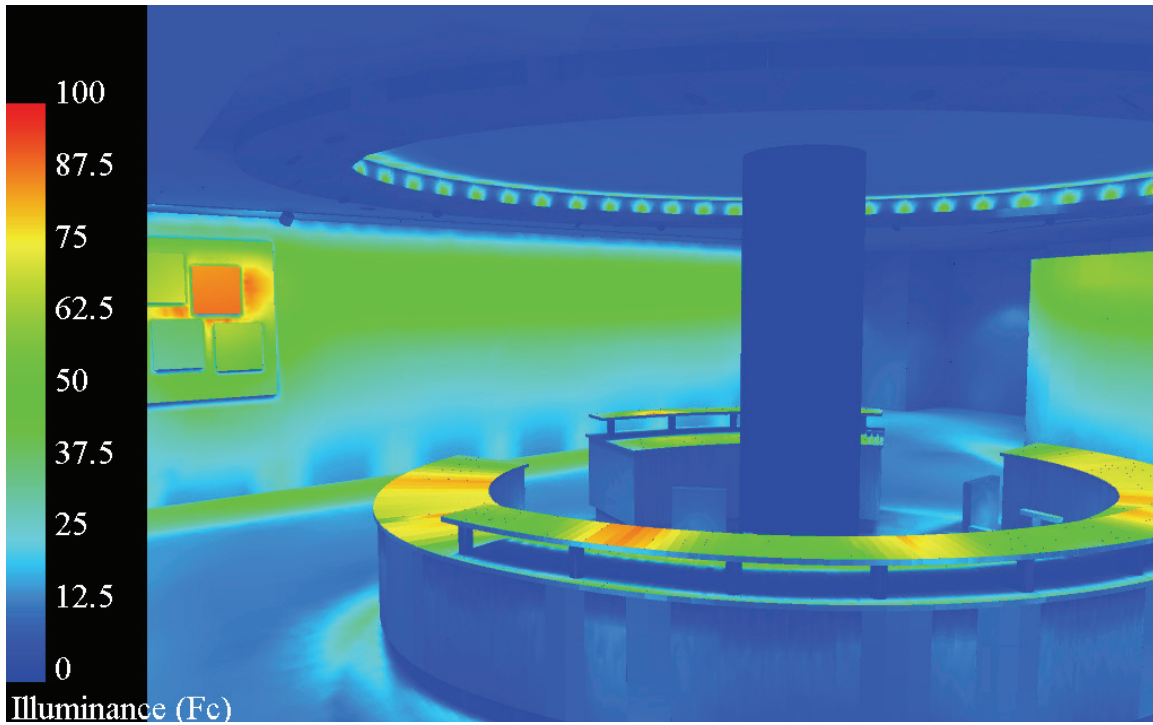


Figure 14: Main Lobby Illuminance Pseudo-Rendering

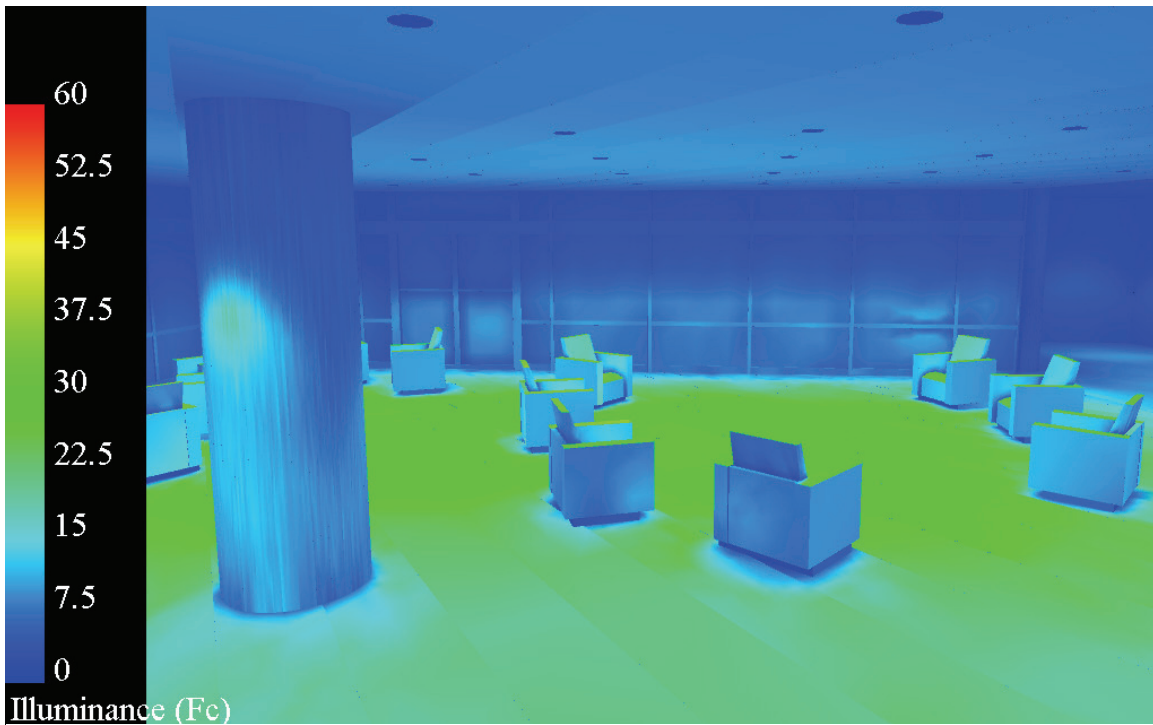


Figure 15: Main Lobby Illuminance Pseudo-Rendering

Renderings:



**Figure 16: Main Lobby Rendering**



**Figure 17: Main Lobby Information Kiosk Rendering**



**Figure 18: Main Lobby Rendering**



**Figure 19: Main Lobby Meeting/Reading Area Rendering**

## Daylight Study

### Goal

Determine whether or not dimming the reading area fixtures with daylight dimming controls would be beneficial to the hospital monetarily. Two options were considered: dimming all fixtures in the reading area, dimming a portion of them while leaving the furthest fixtures from the windows on continuously. Furthermore, the comparison was made between shutting off fixtures that went below  $BF = .05$  or leaving them run after they have already dimmed to no light output. The following analysis and conclusion will detail this investigation.

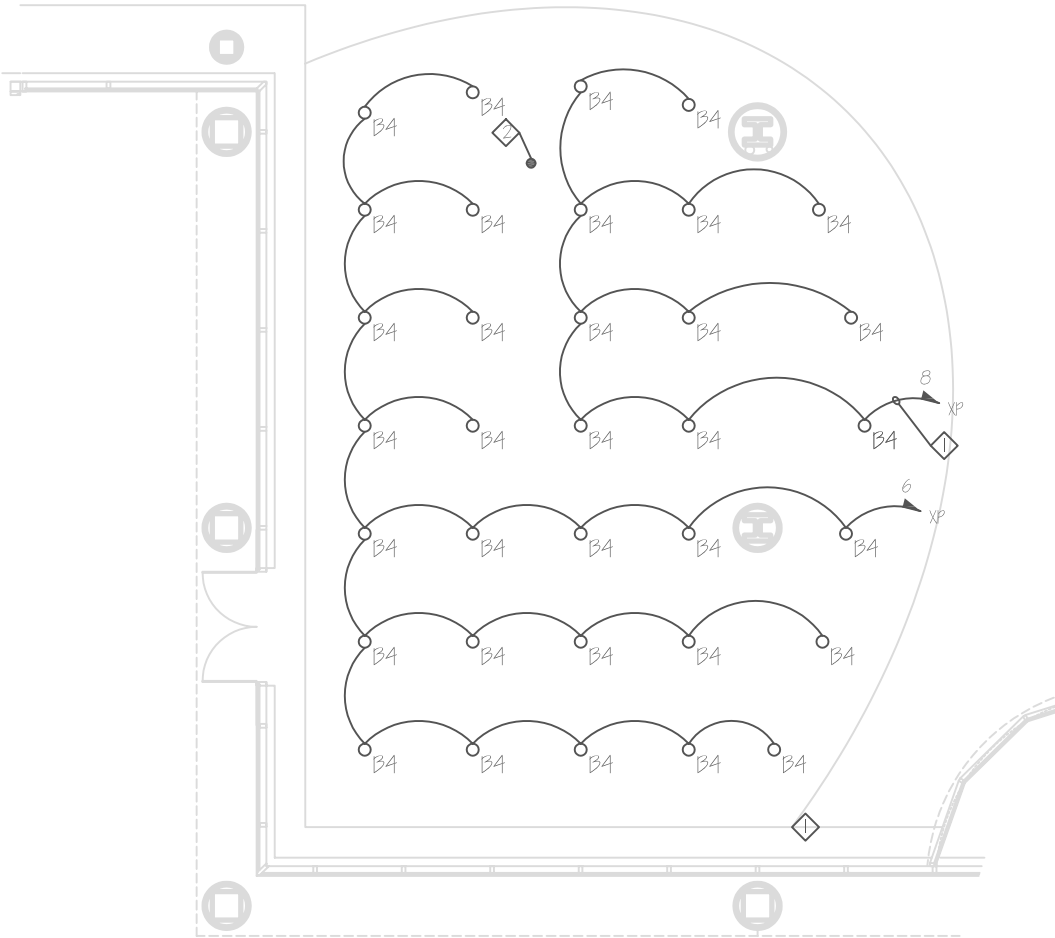
### Assumptions/Notes

- 1) Difference between dimming ballast and standard electronic ballast is \$60
- 2) One zone of control will be used
- 3) Weather data based upon Washington, D.C.
- 4) Building entrance faces magnetic north
- 5) AGI32 was used for daylight calculations in conjunction with Excel spreadsheet 'Daylighting Analysis.xls' located on enclosed CD-ROM

# Lighting Plan

NOTES:

- ◊ CONNECT TO EXISTING CIRCUIT AS NOTED
- ◊ CEILING MOUNTED PHOTOSENSOR



 MAIN LOBBY  
SCALE: 3/32" = 1'-0"

## Weather Data:

<b>Washington, D.C. Weather Data</b>			
	<b>Overcast</b>	<b>Partly Cloudy</b>	<b>Clear</b>
<b>Oct. 22 - Feb. 21</b> (Jan 21 analysis date)	64	29	29
<b>Feb. 22 - April 21</b> <b>Aug. 22 - Oct. 21</b> (Mar. 21 analysis date)	54	34	33
<b>April 22 - Aug. 21</b> (May 21 analysis date)	50	43	29

## Utility Rates:

<b>Utility Rates</b>		
	<b>June-Oct</b>	<b>Nov-May</b>
\$/kWh:	0.08333	0.09602
* \$/kW:	-	-

\* Demand savings were ignored due to the negligible savings with respects to the entire hospital demand

Annual Energy Consumption:

<b>Annual Energy Consumption - kW</b> <b>no fixture shut-off</b>									
Month	Overcast			Partly Cloudy			Clear		
	No Controls	All Dim	Selective Dim	No Controls	All Dim	Selective Dim	No Controls	All Dim	Selective Dim
<b>Oct. 22 - Feb. 21</b> (Jan 21 analysis)	979.2	967.7	927.9	443.7	371.1	297.3	443.7	366.5	300.5
<b>Feb. 22 - April 21</b> <b>Aug. 22 - Oct. 21</b> (Mar. 21 analysis)	991.4	939.8	868.0	624.2	456.0	356.0	605.9	460.7	348.6
<b>April 22 - Aug. 21</b> (May 21 analysis)	1071.0	963.0	885.0	921.1	552.4	477.7	621.2	389.9	326.5
<b>Totals:</b>	3041.6	2870.6	2680.9	1989.0	1379.5	1131.0	1670.8	1217.2	975.6

<b>Annual Energy Consumption - kW</b> <b>fixture shut-off below BF = .05</b>									
Month	Overcast			Partly Cloudy			Clear		
	No Controls	All Dim	Selective Dim	No Controls	All Dim	Selective Dim	No Controls	All Dim	Selective Dim
<b>Oct. 22 - Feb. 21</b> (Jan 21 analysis)	979.2	967.7	927.9	443.7	371.1	297.3	443.7	366.5	300.5
<b>Feb. 22 - April 21</b> <b>Aug. 22 - Oct. 21</b> (Mar. 21 analysis)	991.4	939.8	868.0	624.2	456.0	301.3	605.9	460.7	333.4
<b>April 22 - Aug. 21</b> (May 21 analysis)	1071.0	963.0	885.0	921.1	552.4	378.8	621.2	370.2	279.8
<b>Totals:</b>	3041.6	2870.6	2680.9	1989.0	1379.5	977.4	1670.8	1197.5	913.7

Annual Energy Savings:

Annual Energy Savings no fixture shut-off						
	No Controls		All Dim		Selective Dim	
	KWh	Cost	KWh	Cost	KWh	Cost
January	474.3	45.54	435.1	41.78	390.8	37.52
February 1-21	306.0	29.38	280.7	26.95	252.3	24.23
February 22-28	146.9	14.10	124.4	11.94	106.4	10.21
March	569.2	54.65	483.5	46.42	414.9	39.84
April 1-21	385.6	37.02	324.3	31.14	276.4	26.54
April 22-30	192.8	18.51	142.5	13.68	126.6	12.16
May	664.0	63.76	492.2	47.26	437.7	42.03
June	642.6	53.55	465.9	38.83	413.3	34.44
July	664.0	55.33	480.0	40.00	424.7	35.39
August 1-21	449.8	37.48	324.7	27.06	286.9	23.91
August 22-31	183.6	15.30	151.2	12.60	127.3	10.61
September	550.8	45.90	455.2	37.93	382.2	31.85
October 1-21	449.8	37.48	318.0	26.50	265.5	22.12
October 22-31	153.0	12.75	136.8	11.40	119.8	9.99
November	459.0	44.07	417.7	40.10	372.0	35.72
December	474.3	45.54	435.1	41.78	390.8	37.52
	<b>Total Cost:</b>	610.38		495.37		434.07
	<b>Savings:</b>			115.01		176.31

Annual Energy Savings fixture shut-off below BF=.05						
	No Controls		All Dim		Selective Dim	
	KWh	Cost	KWh	Cost	KWh	Cost
January	474.3	45.54	435.1	41.78	390.8	37.52
February 1-21	306.0	29.38	280.7	26.95	252.3	24.23
February 22-28	146.9	14.10	124.4	11.94	102.2	9.82
March	569.2	54.65	483.5	46.42	398.8	38.29
April 1-21	385.6	37.02	324.3	31.14	264.4	25.39
April 22-30	192.8	18.51	142.5	13.68	116.5	11.19
May	664.0	63.76	492.2	47.26	403.4	38.74
June	642.6	53.55	465.9	38.83	376.0	31.33
July	664.0	55.33	480.0	40.00	386.5	32.21
August 1-21	449.8	37.48	324.7	27.06	261.2	21.76
August 22-31	183.6	15.30	151.2	12.60	119.9	10.00
September	550.8	45.90	455.2	37.93	363.6	30.30
October 1-21	449.8	37.48	318.0	26.50	253.7	21.14
October 22-31	153.0	12.75	136.8	11.40	119.8	9.99
November	459.0	44.07	417.7	40.10	372.0	35.72
December	474.3	45.54	435.1	41.78	390.8	37.52
	<b>Total Cost:</b>	610.38		495.37		415.14
	<b>Savings:</b>			115.01		195.24



## Payback Period:

Payback Period		
Type	Number Dimming Ballasts	Payback Period (yrs)
All Dim (shut-off)	34	17.7
Selective Dim (shut-off)	23	7.8
All Dim (no shut-off)	34	17.7
Selective Dim (no shut-off)	23	7.1

## Comments

Although the installation of a dimming system could save as much as \$195/yr, the best payback period for any four of the system is still over seven years. With a payback period above five years, the savings become minimal and don't begin to accrue until a good distance into the future. For the reading area space in the main lobby, I would not recommend the installation of dimming controls in the space for two reasons: the payback period is too long for such a minimal savings and initial investment could probably be invested more effectively in some other component of the hospital. However, if the dimming system was added to the entire 1<sup>st</sup> floor public spaces (main lobby, corridors, concourse, conference rooms, etc.), the larger system's payback and investment characteristics may be substantial enough to overlook the higher payback period. In this specific case, I would not recommend installing a system of this magnitude in the main lobby.

## Space Conclusion

Overall, the proposed lighting design for this space successfully achieved my design goals. The art wall stands out due to the wallwashers and becomes one of the prominent features of the space. The kiosk presents itself as a crucial function of the space due to the cove and backlit column while still having plenty of light on the workplane. Although the elliptical cove looks a little “spotty” with its distribution, I believe this can be attributed to computer program limitations more so than geometry of the cove setup. I believe the back wall is lit well enough to create a boundary to the “back” of the lobby when entering from the main entrance and nicely mirrors the pedestrian motion from the concourse to the conference center. The spotlights aimed at the artwork on the back wall also create another point of interest for those waiting or walking through the space. The meeting/reading area has a nice even distribution of light on the workplane without causing too much disruption in the wood-paneled ceiling.

Although the daylight study did not return favorable results, power density in both the circulation areas and meeting/reading area were well below the ASHRAE Standards. The efficiency of the design should contribute to energy conservation for the project.