Woolly Mammoth Theatre
Washington DC

Kate Feato
Technical Report #1
Lighting Advisor: Dr. Mistrick
Electrical Advisor: Professor Dannerth
04 October 2006

Executive Report

The purpose of this technical report is to collect information about the lighting design of The Woolly Mammoth Theatre in Washington DC and analyze the existing lighting conditions. The report was split up into four sections, one for each space. The four spaces to be discussed are the entrance canopy, the lobby, the theatre and the office suite. The spaces were analyzed and documented.

The first part of each section is the basic information about the architecture and lighting of the space. This includes lighting plans, drawings and sections, finishes/materials and their reflectances, glazing, controls, daylighting integration, luminaire schedule, light loss factors and power density.

Next the specific design criteria for the space were stated. This includes performance considerations such as aesthetic qualities, power allowance, illuminance values, luminance ratios and psychological aspects. Recommendations for criteria were obtained from the IESNA Handbook Ninth Edition and the ASHREA 90.1 standards

The last part of the report is the computer analysis of the existing spaces using AGI 32 version 1.9. The spaces were modeled and the lumianires photometric files were brought in. If the manufacturer of the existing luminaries does not provide photometric files, a comparable fixture was used. From this analysis illuminance values were found and renderings were taken. The results were summarized in a short conclusion.

After performing this analysis, a lot of good information about the existing conditions was found out. The canopy is much brighter than necessary. The lobby has enough light on the upper level, but needs a little more on the lower level. The theatre needs slightly more light on the balcony level. The offices need much more light to have a comfortable work environment. This information will be very helpful when redesigning the lighting systems.

General Lighting Overview

The Woolly Mammoth Theatre Company's mission is to make new, edgy and provocative productions. This sets the stage for the theatre's theme of a 'transparent theatrical laboratory". All of the spaces which are normally hidden from patrons, including rehearsal halls, classrooms, offices and other support spaces, are open to be seen. This will give the patrons a "behind-the-scenes" look at making a live theater production. Throughout the space this theme is portrayed through the lighting, style of architecture and the finishes.

For the lighting of the spaces, ordinary industrial fixtures were used to create extraordinary solutions. The fixtures used in the spaces are simple track fixtures, industrial luminaries and bare par lamps. The lighting of the space is not about glamorous fixtures, but about the emotion they convey.

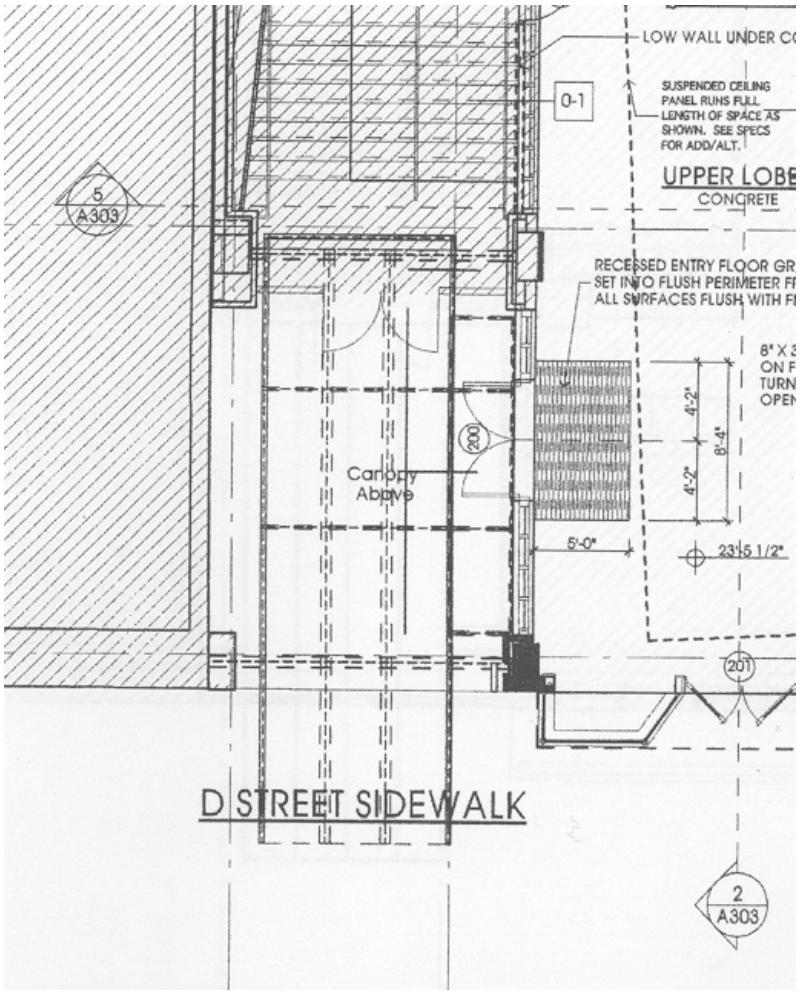
Canopy- Overview

The Woolly Mammoth Theatre sits on a busy street in downtown DC. It has a historic brick façade facing this street and remains very low-key. The doors to this storefront remain closed. To enter the theatre, patrons must go around the corner.

The alley does have a canopy to make it more apparent. The canopy is made of black steel columns/beams and a plastic glazing panel. There is also an area to hang advertisements for upcoming shows. Yet this canopy is not glitzy or glamorous. It has an industrial feel, which will prevail throughout the space.

To light the canopy, eight jelly jars were used for ambient light. Then six bare par lamps were used to shoot down on the front of the canopy and to highlight the posters on the adjacent building wall in the alley.

Canopy- Plan


LOW WALL UNDER C
0-1
SUSPENDED CEILING PANEL RUNS FULL LENGTH OF SPACE AS SHOWN. SEE SPECS FOR ADD/ALT.
UPPER LOBE
CONCRETE
RECESSED ENTRY FLOOR GR
SET INTO FLUSH PERIMETER FF
ALL SURFACES FLUSH WITH FI
5
A303
200
Canopy Above
4'-2"
8'-4"
4'-2"
5'-0"
23'-5 1/2"
201
D STREET SIDEWALK
2
A303

Canopy- Existing Conditions

The surface materials in the space:

- black steel structure — reflectance = 20%
- brick walkway — reflectance = 35%
- semi-translucent polycarbonate panel

Also in the space:

- brick and glass façade of theatre on one side
- concrete block building on other side

Glazing

- Polygal- translucent extruded polycarbonate sheet with internal ribbing and smooth flat exterior surface

Control

- the canopy is controlled by three way switching

Luminaire Schedule

CANOPY LUMINAIRE SCHEDULE						
TYPE	**DESCRIPTION**	**LAMP**	**MANUFACTURER**	**CATALOG NUMBER**	**VOLTS**	**MOUNTING**
A1	JELLY JAR-FLUORESCENT	CF23EL/TWIST	STONCO	VK-1-GC	120	SURFACE
B1	SINGLE SURFACE LAMPHOLDER	60PAR/HIR/FL40	STONCO	30KL + FC11	120	SURFACE

Light Loss Factors

CANOPY LIGHT LOSS FACTORS							
TYPE	**CLEANING INTERVAL**	**MAINTENANCE CATEGORY**	**LLD**	**LDD**	**RSDD**	**BF**	**LLF**
A1	12 MONTHS	V	0.86	0.87	0.89	1.00	0.67
B	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
ASSUMED CLEANING CYCLE OF 12 MONTHS							
RCR = 7.3							

Power Density

The power density for the theatre was calculated to be 1.63 W/SF.

Canopy- Design Criteria

General

The canopy will direct patrons to the entrance of the theatre. The appearance of the luminaires will foreshadow what will be seen throughout the building. There should be accent lighting on the wall of the adjacent building where posters are being displayed. This area should have sparkle and be eye-catching. The steel and glass surfaces should appear to be beautiful.

Illuminance

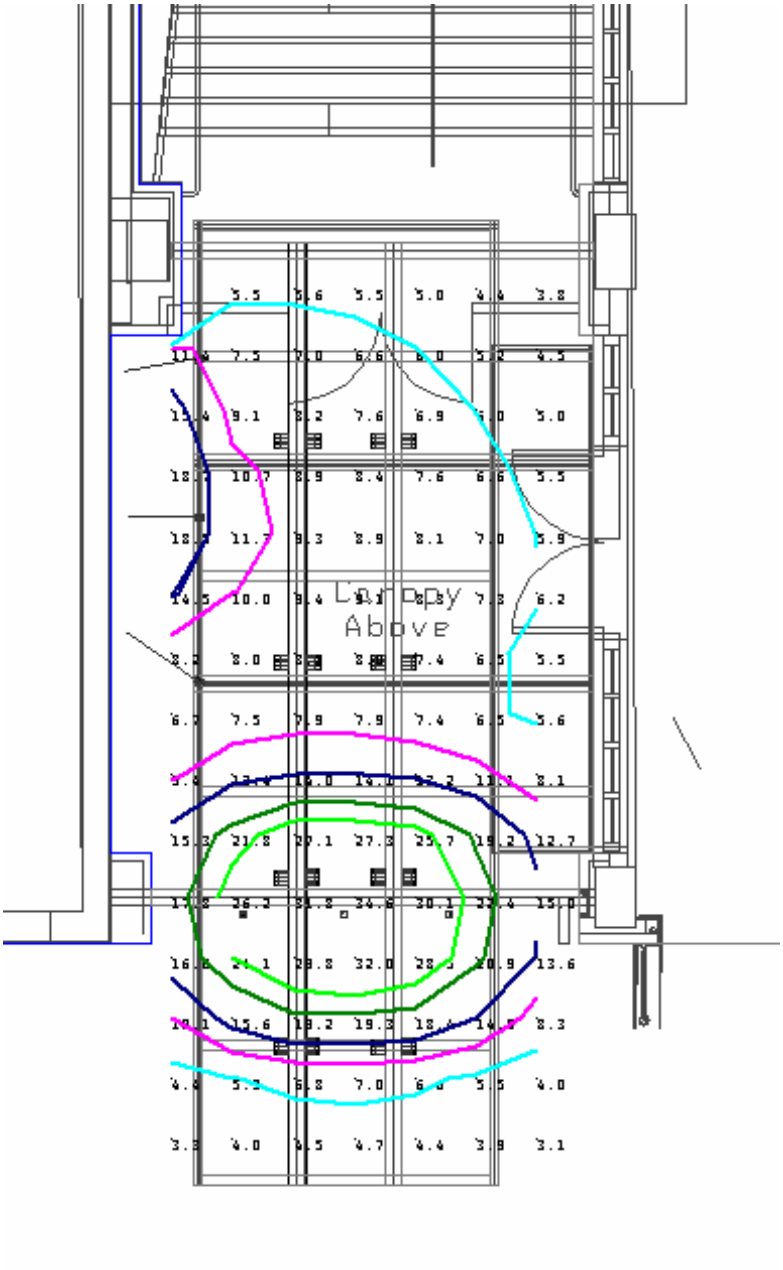
According to IESNA Handbook there should be 5 footcandles of horizontal illuminance and 3 footcandles of vertical illuminance.

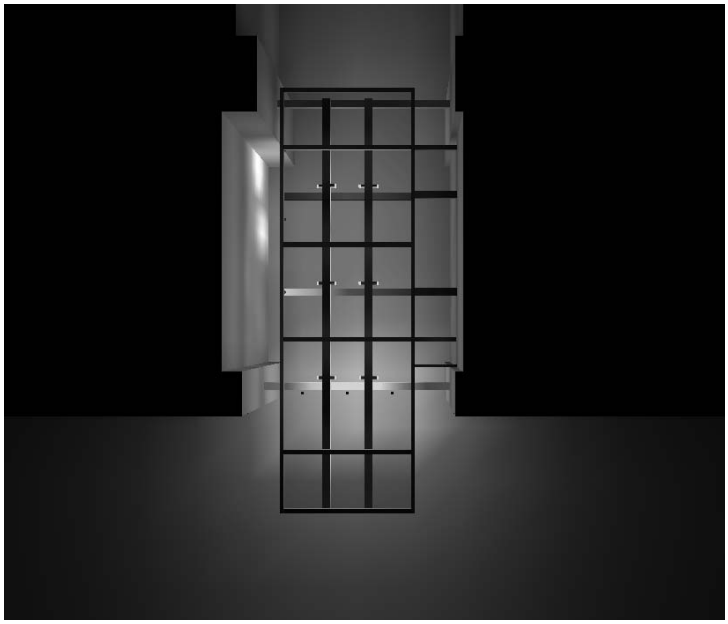
Power Density

According to the ASHREA 90.1- 1999 the power density allowed for an entrance with a canopy is 3 watts/sq. ft.

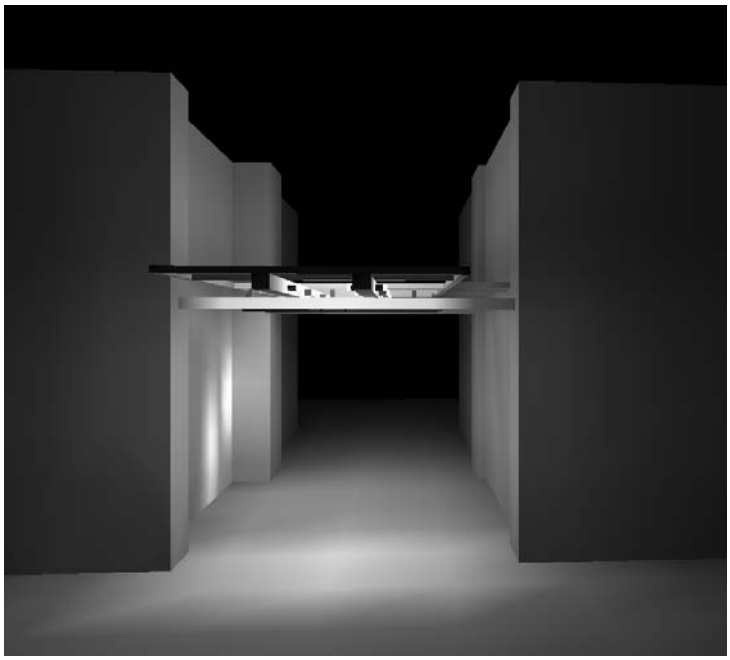
Canopy- Evaluation of Existing Conditions

To evaluate the existing conditions of the lobby, AGI 32 version 1.9 was used to produce illuminance values.

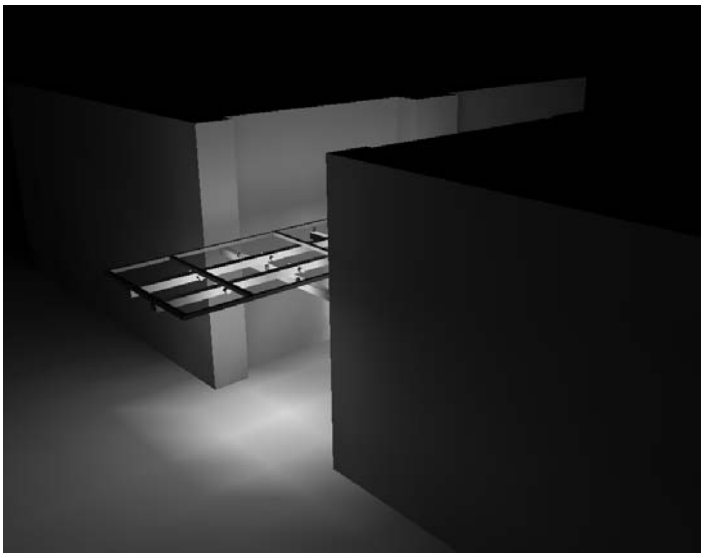




Plan View



Front Elevation



Looking Down

Looking Up

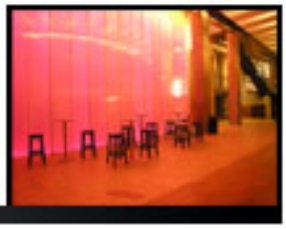
Canopy- Results

Numeric Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min
CalcPts	Illuminance	Fc	11.39	34.6	3.1	3.67

In this evaluation the aiming of the track lighting through the lobby was estimated. Therefore the illuminance levels found may not be the exact existing levels.

The illuminance levels with an average of 11 footcandles are about double the amount needed. The maximum of thirty four footcandles is way to high for the night streetscape.

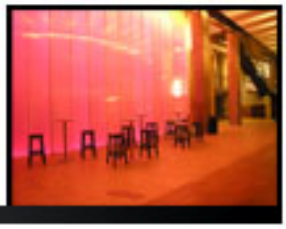
The canopy lighting does draw attention to the entrance of the building. Also the posters hung on the side wall are illuminated for all to see.



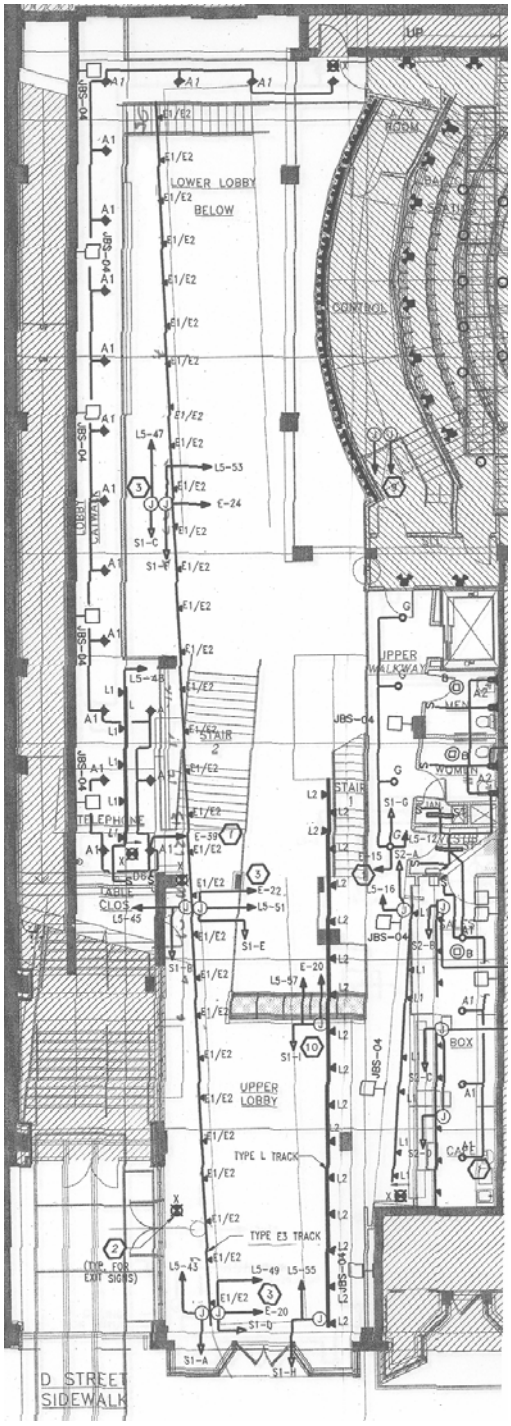
Lobby- Overview

As patrons enter the lobby from the canopy in the alley, they are in for a huge surprise. The theater may even be said to get lost in the cityscape; but once you are inside everything becomes clear. Entering from street level, patrons come in on the second floor. The lobby has a tunnel like feel, extending 130' back and varying widths between 20'-40'. The finishes are unfinished, looking industrial and edgy. There are only a few key colors in the space. On this level there are a ticket booth and café. There is a long balcony referred to as the "lobby catwalk" descending the entire length of the space, where seating is available and art is on display. There are rustic jelly jar fixtures for the ambient light, with track accent lighting. Also extending the length of the space is a white gypsum board ceiling panel. This helps to draw the eye to the back of the space. Track is run along this panel to shoot beams of light, accentuating its length.

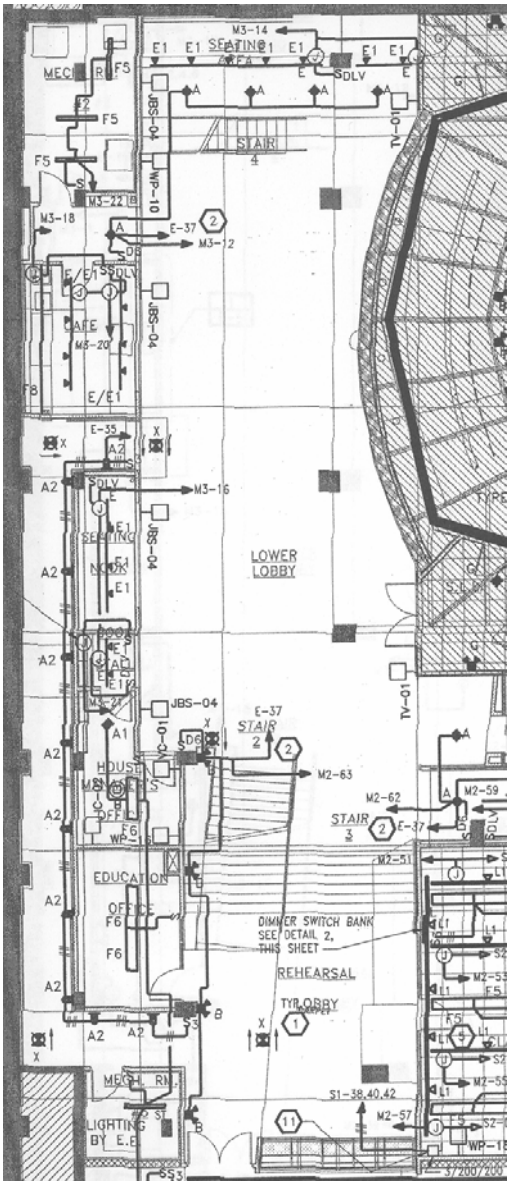
Moving further into the space stairs will take patrons down to the first level, where the lobby is a double-heighted space. The stairs and bridges are cleverly placed to invite movement between the first and second levels of the lobby. On this level there are seating areas, a book stall, a café and the entrances to the orchestra seating. When inside the space, there is no mistake where the theater is. A 22' high curved polycarbonate wall stands between the lobby and theater. This semi-translucent wall has a layer of mylar behind it. It is lit from the back using (46) 100 watt par 38 lamps. Dichroic filters are placed on the fixtures to make this wall the focal point of the lobby. When these color filters are used, all of the white and gray finishes reflect the bright pink and orange of the wall. This makes the space come alive.



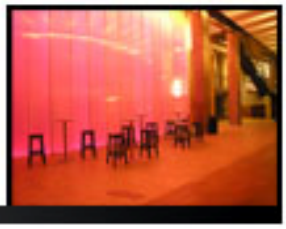
Lobby- Lighting Plans



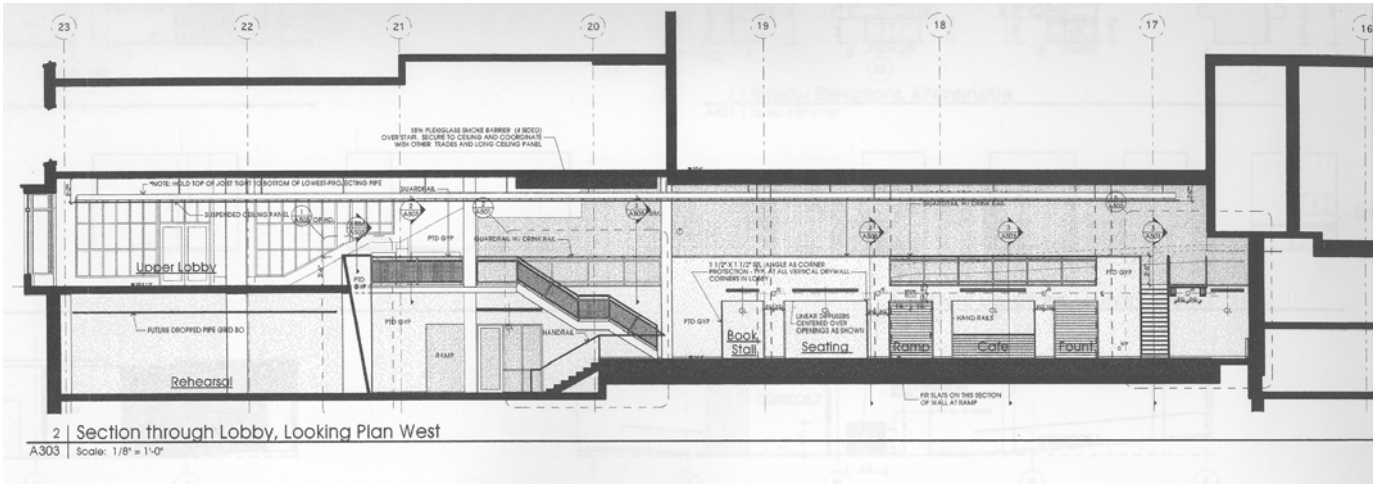
Entry Level



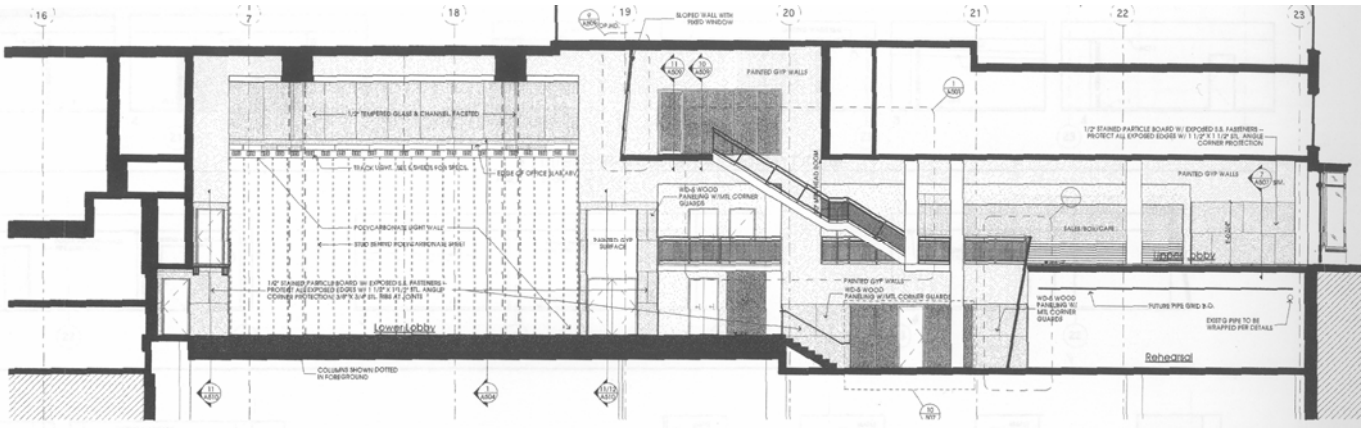
Lower Level



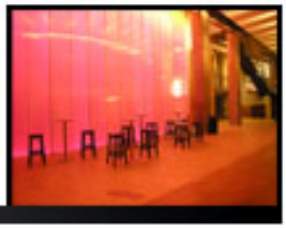
Sections



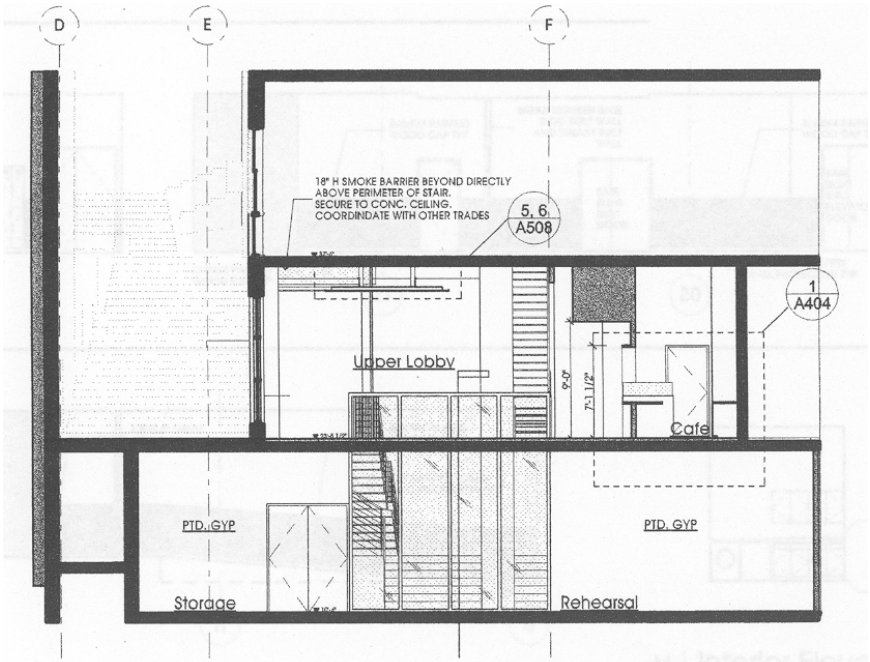
2 | Section through Lobby, Looking Plan West
A303 | Scale: 1/8" = 1'-0"



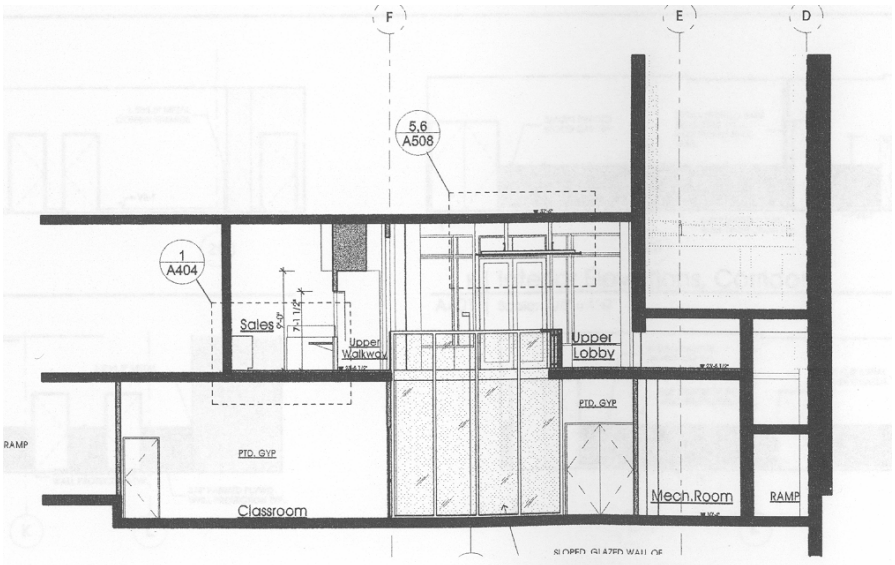
1 | Section through Lobby, Looking Plan East
A303 | Scale: 1/8" = 1'-0"



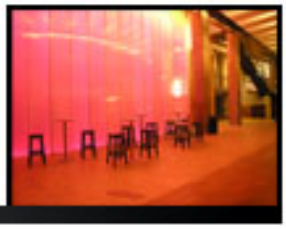
Lobby- Sections



5 | Section through Lobby, Looking Plan North
A303 | Scale: 1/8" = 1'-0"



4 | Section through Lobby, Looking Plan South
A303 | Scale: 1/8" = 1'-0"



Lobby- Existing Conditions

The surface materials in the space:

- concrete slab ceiling- clear finish — reflectance = 20%
- white painted gypsum wall board ceiling panel — reflectance = 95%
- concrete slab floor- clear satin finish — reflectance = 35%
- masonry block walls- clear finish — reflectance = 25%
- white painted gypsum walls — reflectance = 95%
- polycarbonate translucent wall- ice color

Also in the space:

- wood paneling on ticket booth and both café fronts
- plastic laminate counter tops
- blue painted gypsum walls around ticket booth
- orange painted gypsum wall at entry seating area

Glazing

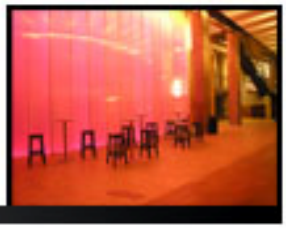
- polygal- translucent extruded polycarbonate sheet with internal ribbing and smooth flat exterior surface

Control

- the lobby is controlled by three way switching and dimmer banks

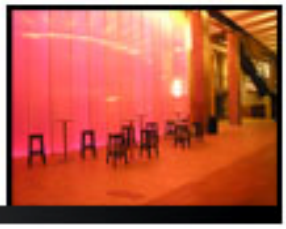
Daylighting

Above the two story high lightwall, the curve continues with glass. This curved third story glass wall (wall to the office suite) faces an exterior glass façade wall, with a gap of three to eight feet. This gap is open to the lobby space. This technique provides daylight to shine through the third story glass façade and down into the lobby.



Lobby- Luminaire Schedule

TYPE	DESCRIPTION	LAMP	MANUFACTURER	CATALOG NUMBER	VOLTS	MOUNTING
A	JELLY JAR	100A 130V	STONCO	VK-1-GC	120	SURFACE
A1	JELLY JAR- FLUORESCENT	CF23EL/TWIST	STONCO	VK-1-GC	120	SURFACE
A2	JELLY JAR- FLUORESCENT SIDE MOUNT	CF23EL/TWIST	STONCO	VK-1-GC	120	SURFACE
B	DOUBLE SURFACE LAMPHOLDER	(2) 60PAR/HIR/FL4	STONCO	(2) 30KL + FC13	120	SURFACE
E	L.V. DOUBLE RUN TRACK	_____	ROSEN	DOUBLE MINI STRUCTURE TRACK	12/120	SURFACE
E1	L.V. TRACK HEAD	Q50MR16/C/NSP15	ROSEN	CANNON 1 800-80	12/120	SURFACE
E2	L.V. TRACK HEAD- UPLIGHT	50AR111/SSP4	LIGHT PROJECTS- ROSEN	LEO 1 800 50	12/120	SURFACE
G	L.V. DOWNLIGHT	Q50MR16/C/NFL 255	RSA LIGHTING	MLV3061 C500	12/120	SURFACE
L	LINE VOLTAGE TRACK	_____	LIGHTOLIER	6000 SERIES TRACK- WHITE	120	SURFACE
L1	LINE VOLTAGE TRACK HEAD	100PAR/HIR/FL40/XL	LIGHTOLIER	8269BL	120	SURFACE
L2	TRACK HEAD- BLUEWALL 1 STORY	100PAR/HIR/FL40/XL	LIGHTOLIER	6284WH + 6487WHZ	120	SURFACE
N	CURVED LINE VOLTAGE TRACK AT LIGHT WALL	_____	TECH LIGHTING	700TTA-XX-S 700TTS?? O6 6" STANDOFF	120	SURFACE
N1	TRACK HEAD AT GLASS WALL	100PAR/HIR/SP10/XL	TECH LIGHTING	700TTSS38-08-S + 700SSLLH38	120	SURFACE
	DICHROIC FILTERS FOR TRACK HEAD	_____	ROSCO	PROVIDE 46 OF EACH STYLE R36500 PRIMARY RED R35055 PRIMARY GREEN R31080 PRIMARY BLUE		

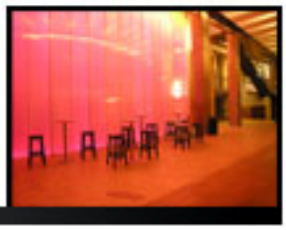


Lobby- Light Loss Factors

LOBBY LIGHT LOSS FACTORS							
TYPE	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	LDD	RSDD	BF	LLF
A	12 MONTHS	V	0.90	0.87	0.92	1.00	0.72
A1	12 MONTHS	V	0.86	0.87	0.92	1.00	0.69
A2	12 MONTHS	V	0.86	0.87	0.92	1.00	0.69
B	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
E1	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
E2	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
G	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
L1	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
L2	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
N1	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
CLEANING CYCLE TO BE ASSUMED TO BE 12 MONTHS							
RCR ESTIMATED TO BE 3.25							

Power Density

The power density for the theatre was calculated to be 5.95 W/SF.



Lobby- Design Criteria

General

The lobby will give the first impression of the theatre to patrons. The appearance should be pleasing to the eye, feeling inviting and exhilarating. In this lobby many tasks will be taking place. Tickets, programs and souvenirs will be bought; and snacks will be eaten. The lobby will provide a space for patrons to wait before and after performances.

The lighting should be very rhythmic, which will encourage flow and movement. There should be many layers of light throughout the space, with visual clues as to where to go. This will guide patrons through the tunnel-like dimensions.

Color rendering and facial modeling are all very important in the lobby. Patrons will be spending time in this space and should look beautiful. There should be points of visual interest and sparkle in the room. This will lead the eye through the space and keep patrons interested.

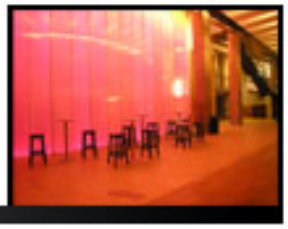
.

Illuminance Values

According to the IESNA 20 footcandles of horizontal illuminance for ambient light is sufficient. Over the seating areas the target illuminance is 30 footcandles for reading programs.

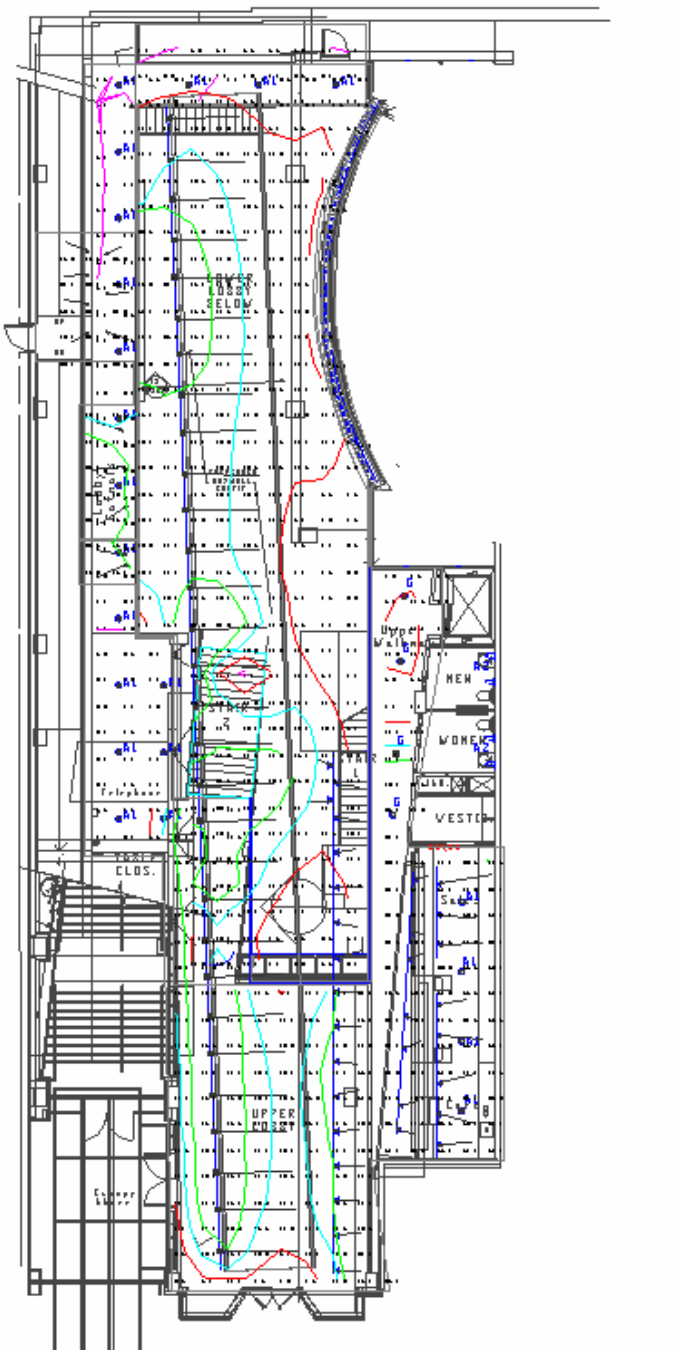
Power Density

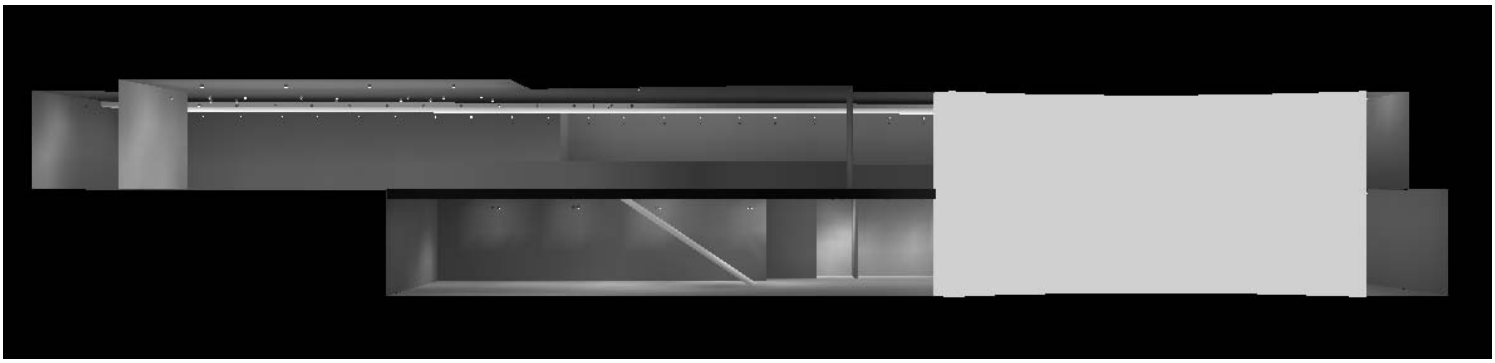
According to Ashrea 90.1, by the space by space method for the lobby of a performing arts building, 1.2 watt/sq. ft are allowed. An additional power of 1.0 watt/sq. ft. is allowed for decorative or accent lighting.



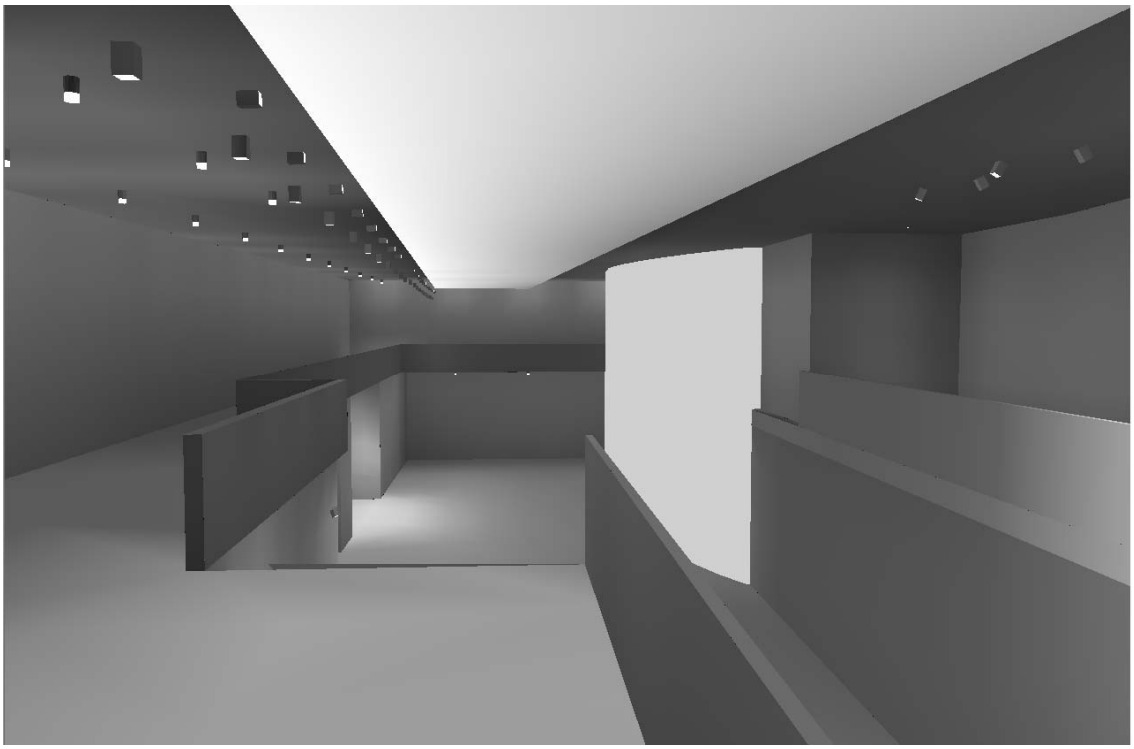
Lobby- Evaluation of Existing Conditions

To evaluate the existing conditions of the lobby, AGI 32 version 1.9 was used to produce illuminance values.

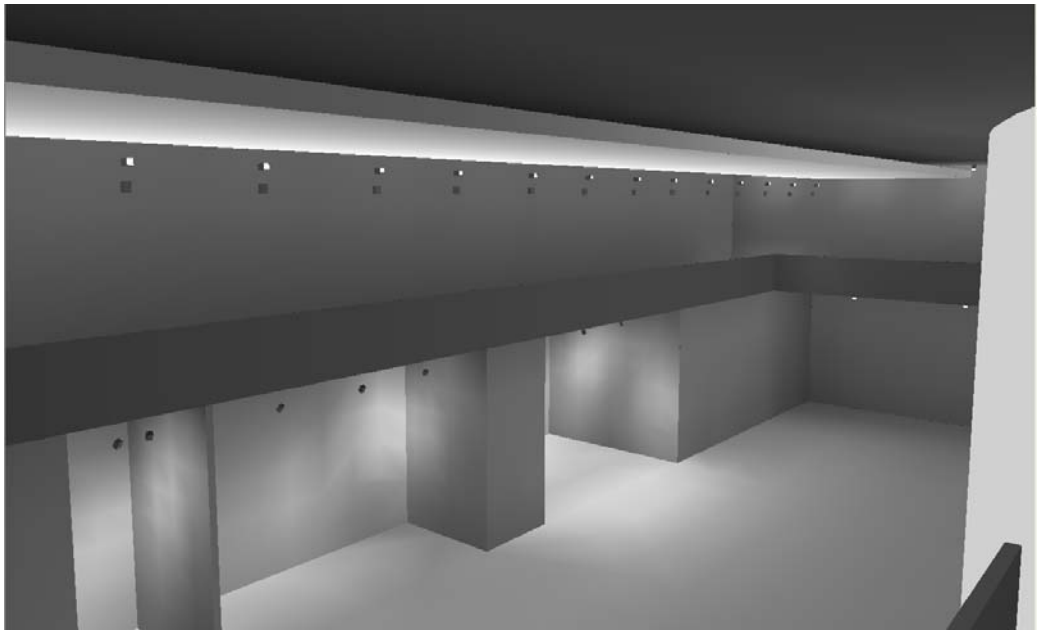




Section Looking East

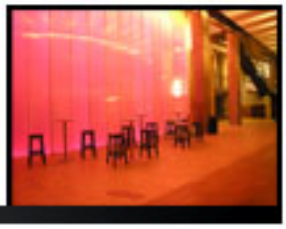


Section Looking North To Lower Lobby



Looking Down At Café and Seating Nook

Looking South At Entrance



Lobby- Results

Numeric Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min
Lobby_UpperFloor	Illuminance	Fc	22.80	84.5	2.9	7.86
Lobby_Lower Level	Illuminance	Fc	16.41	60.7	4.0	4.10

In this evaluation the aiming of the track lighting through the lobby was estimated. Therefore the illuminance levels found may not be the exact existing levels.

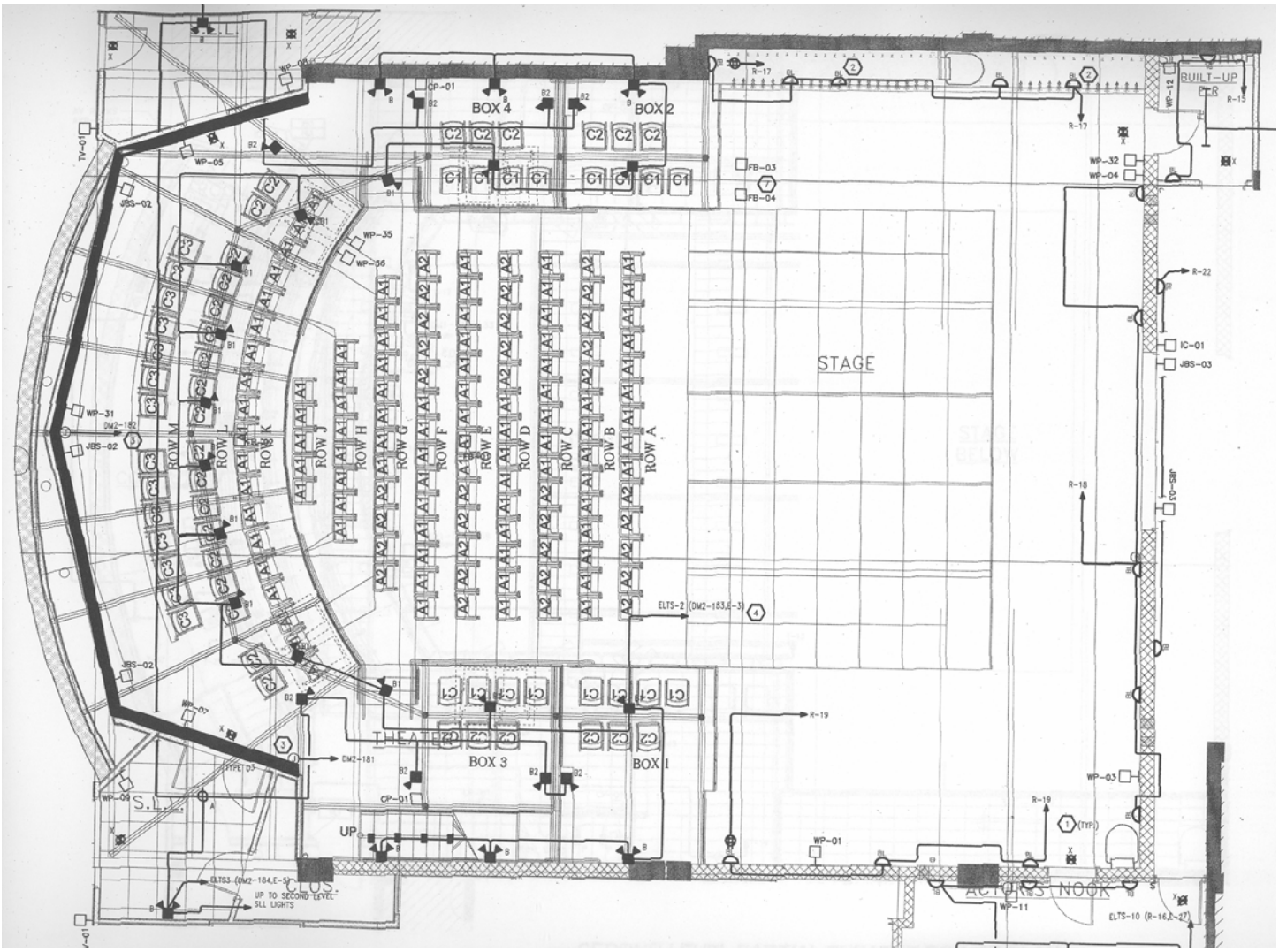
The street level had an average illuminance of 22 footcandles. This is acceptable according the design criteria. The lower level illuminance has an average slighting lower, 16 footcandles. This level should be increased, especially over any seating areas. The lower level is more uniform than the upper level.

Theatre- Overview

Entering the theatre through the main entrance on the orchestra floor, there is no grand entrance. The doors are awkwardly placed behind a concrete column. The theme of the theatre is to be intimate and edgy. It is a 6,000 SF space with seating on two levels, 187 orchestra and 78 balcony plus standing room. The theatre has a courtyard configuration designed to connect the audience and actors in this cozy setting. The space is high and deep, making it very flexible. The main finish throughout the theatre is black. The only color in the space is the maple seat backs, the wood slats on the balcony fronts and the red accent wall at the back of the theatre.

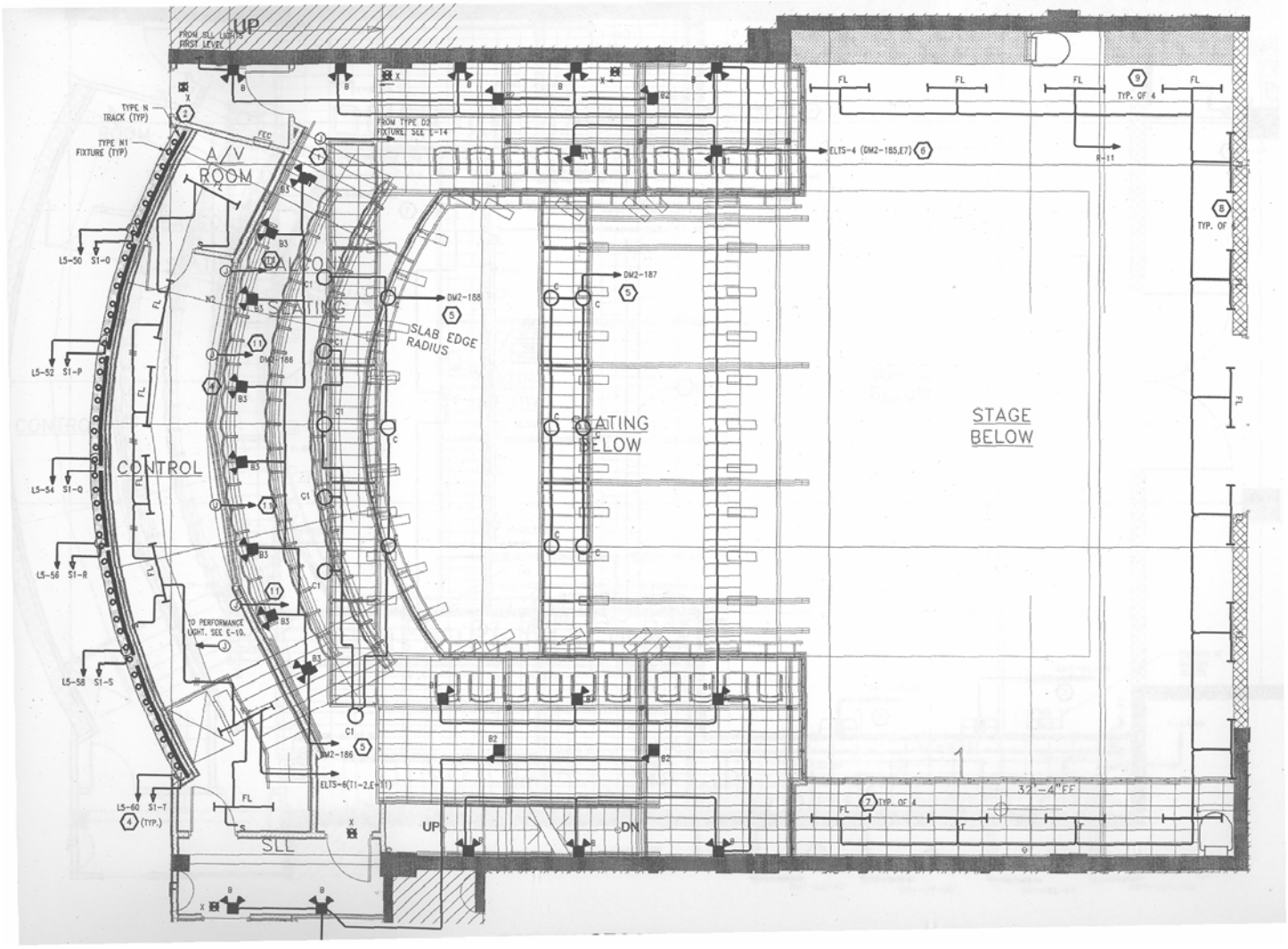
The house lighting for the theatre is simple, keeping with the industrial theme throughout the building. Bare par lamps are spread through both the orchestra and balcony levels. These sources keep the lighting intimate by having nice beams and no light pollution. The main focus is the red wall in the back of the theatre. It is lit with double par lamp holders about four feet on center. It is the brightest in the space.

Theatre- Lighting Plans



First Floor Lighting Plan

Theatre- Lighting Plans



Second Floor Lighting Plan

Theatre- Existing Conditions

The surface materials in the space:

- concrete slab ceiling- clear finish — reflectance = 20%
- concrete block walls- clear finish — reflectance = 20%
- concrete block walls- black stained finish — reflectance = 10%
- concrete wall- clear finish — reflectance = 20%
- concrete wall- black stained finish — reflectance = 10%
- red painted gypsum wall — reflectance = 30%
- concrete slab floor- clear satin finish — reflectance = 30%
- carpet- dark gray — reflectance = 10%

Also in the space:

- light wood paneling on balcony fronts
- black upholstered seats
- black metal catwalks
- metal railings

Controls

- the theatre space is controlled by a dimming system

Theatre- Luminaire Schedule

TYPE	DESCRIPTION	LAMP	MANUFACTURER	CATALOG NUMBER	VOLTS	MOUNTING
A	JELLY JAR	100A 130V	STONCO	VK-1-GC	120	SURFACE
B	DOUBLE SURFACE LAMPHOLDER	(2) 60PAR/HIR/FL4	STONCO	(2) 30KL + FC13	120	SURFACE
B1	SINGLE SURFACE LAMPHOLDER	60PAR/HIR/FL40	STONCO	30KL + FC11	120	SURFACE
B2	SINGLE SURFACE LAMPHOLDER- STEP LIGHT	50PAR20/FL/25	STONCO	920B 9250EB	120	SURFACE
B3	DOUBLE SURFACE LAMPHOLDER UPPER WALL WASH	60 PAR/HIR/SP10 + 60PAR/HIR/FL40 /XL	STONCO/ / NOVA INDUSTRIES	(2) 30KL + FC13/ SKC3825	120	SURFACE
C	HOUSELIGHTS 2 STORY- MOUNTED TO CATWALKS	Q250PAR/FL30	STONCO	3800 B	120	SURFACE
C1	HOUSELIGHTS 1 STORY- MOUNTED TO CATWALKS	90PAR/HIR/FL40 /XL	STONCO	3800 B	120	SURFACE
P	STEP LIGHT	Q10T3/CL	HADCO	RLL1-A	12/120	RECESS

Theatre- Light Loss Factors

THEATRE LIGHT LOSS FACTORS							
TYPE	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	LDD	RSDD	BF	LLF
A	12 MONTHS	V	0.90	0.87	0.90	1.00	0.70
B	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
B1	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
B2	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
B3	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
C	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
C1	12 MONTHS	IV	0.97	0.88	0.96	1.00	0.82
P	12 MONTHS	V	0.97	0.87	0.92	1.00	0.78
ASSUMED CLEANING CYCLE OF 12 MONTHS							
RCR ESTIMATED TO BE 5.5							

Power Density

The power density for the theatre was calculated to be 1.69 W/SF.

Theatre- Design Criteria

General

Before and after a performance, the theatre house lighting will be on. This lighting should be uniform and comfortable. In this time patrons will be entering and exiting the theatre, finding their seats, reading programs and waiting for the performance to begin.

The lighting should have some accenting or visual interest, as patrons may be waiting lengths of time in their seats. The space should appear to be at a high quality in appearance. Color rendering and facial modeling are very important to achieve this.

Illuminance Values

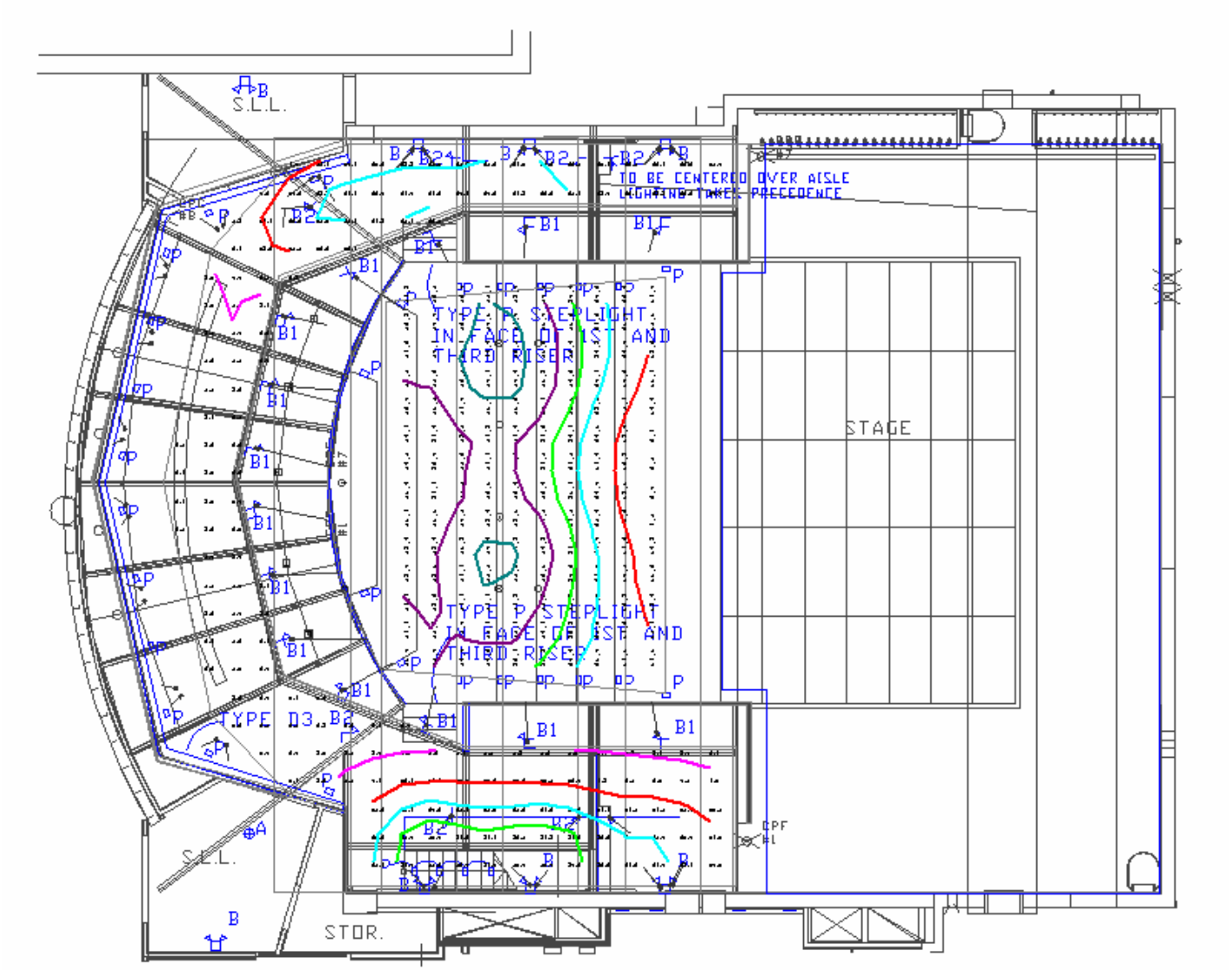
A minimum of 10 to 20 footcandles should be maintained throughout the seating area when a performance is not taking place. The paths of egress should be the brightest areas, leading patrons in and out of the theatre.

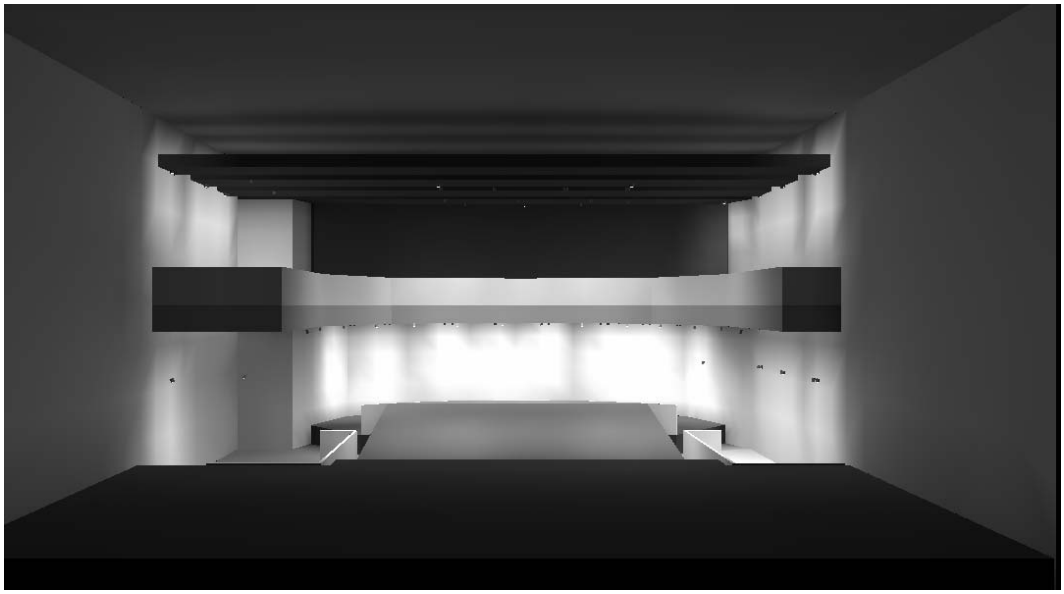
Power Density

According to Ashrea 90.1 the power density for an audience/seating area in a performance space is 1.8 watts/sq. ft.

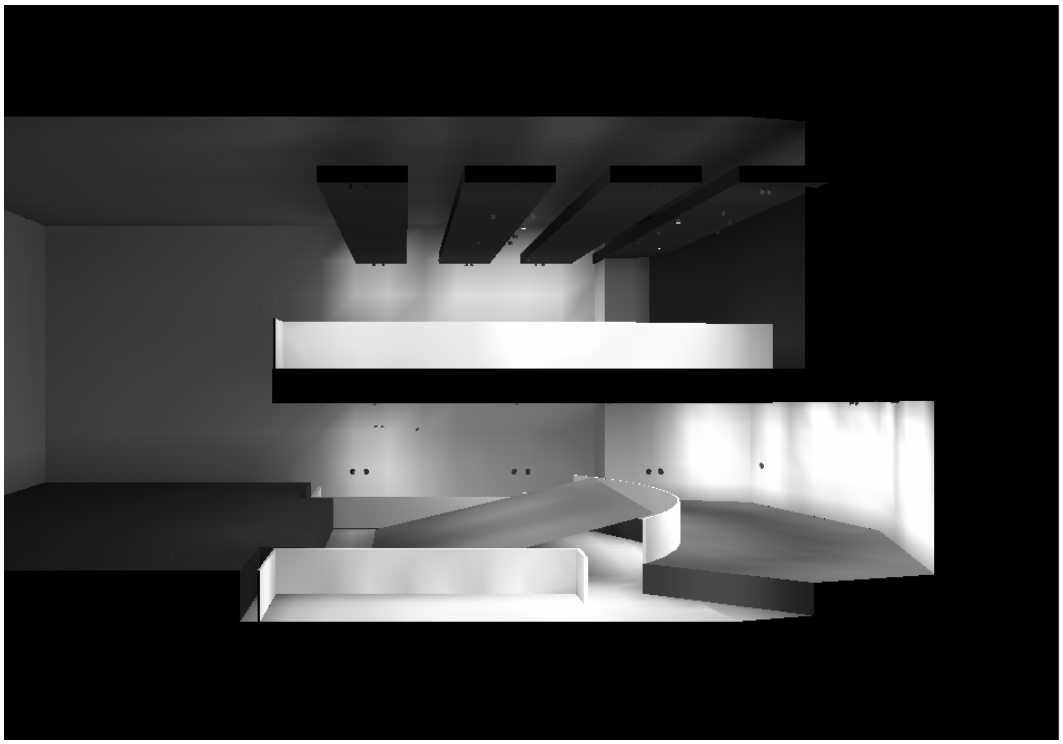
Theatre- Evaluation of Existing Conditions

To evaluate the existing conditions of the lobby, AGI 32 version 1.9 was used to produce illuminance values.

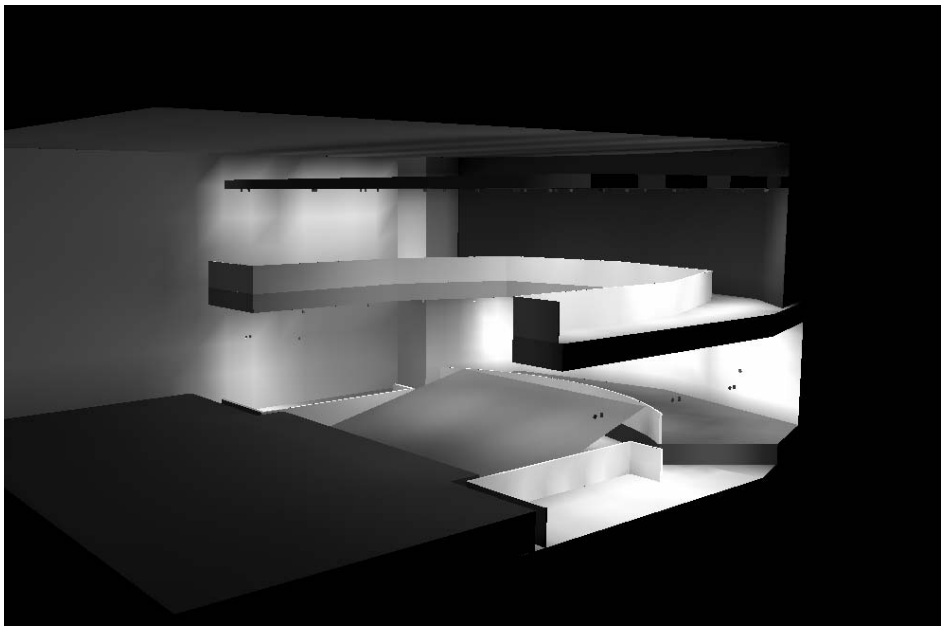




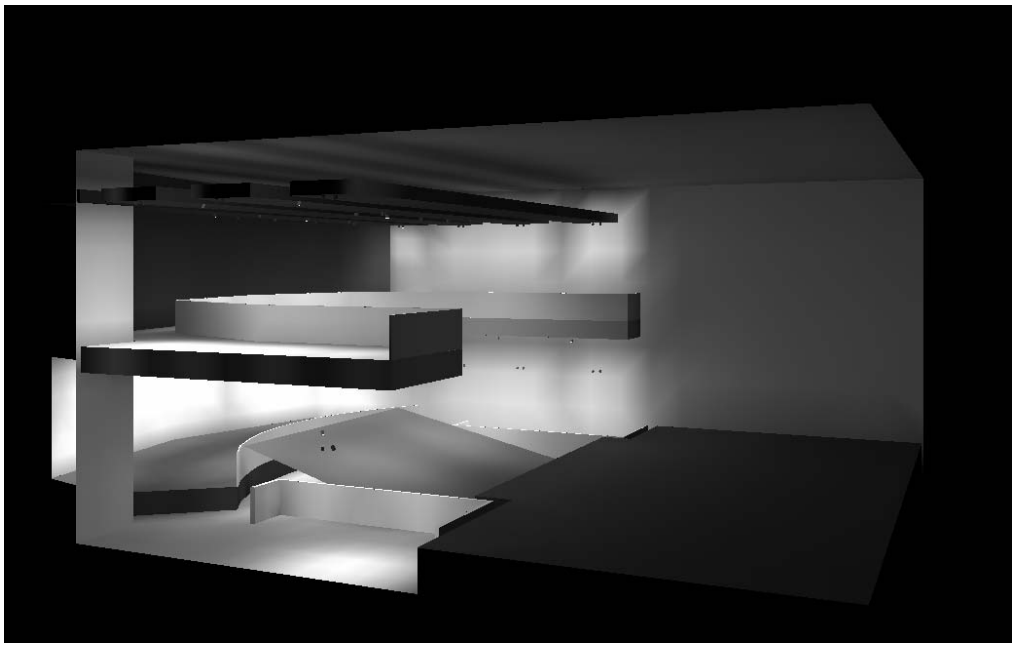
Looking at the House



South Wall Section



Looking From Stage South Corner



Looking From Stage North Corner

Theatre- Results

Numeric Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min
Theatre Orchestra Seating	Illuminance	Fc	37.39	60.0	8.4	4.45
Theatre_Balcony Seating	Illuminance	Fc	14.44	44.2	1.7	8.49

In this evaluation the aiming of the track lighting through the lobby was estimated. Therefore the illuminance levels found may not be the exact existing levels.

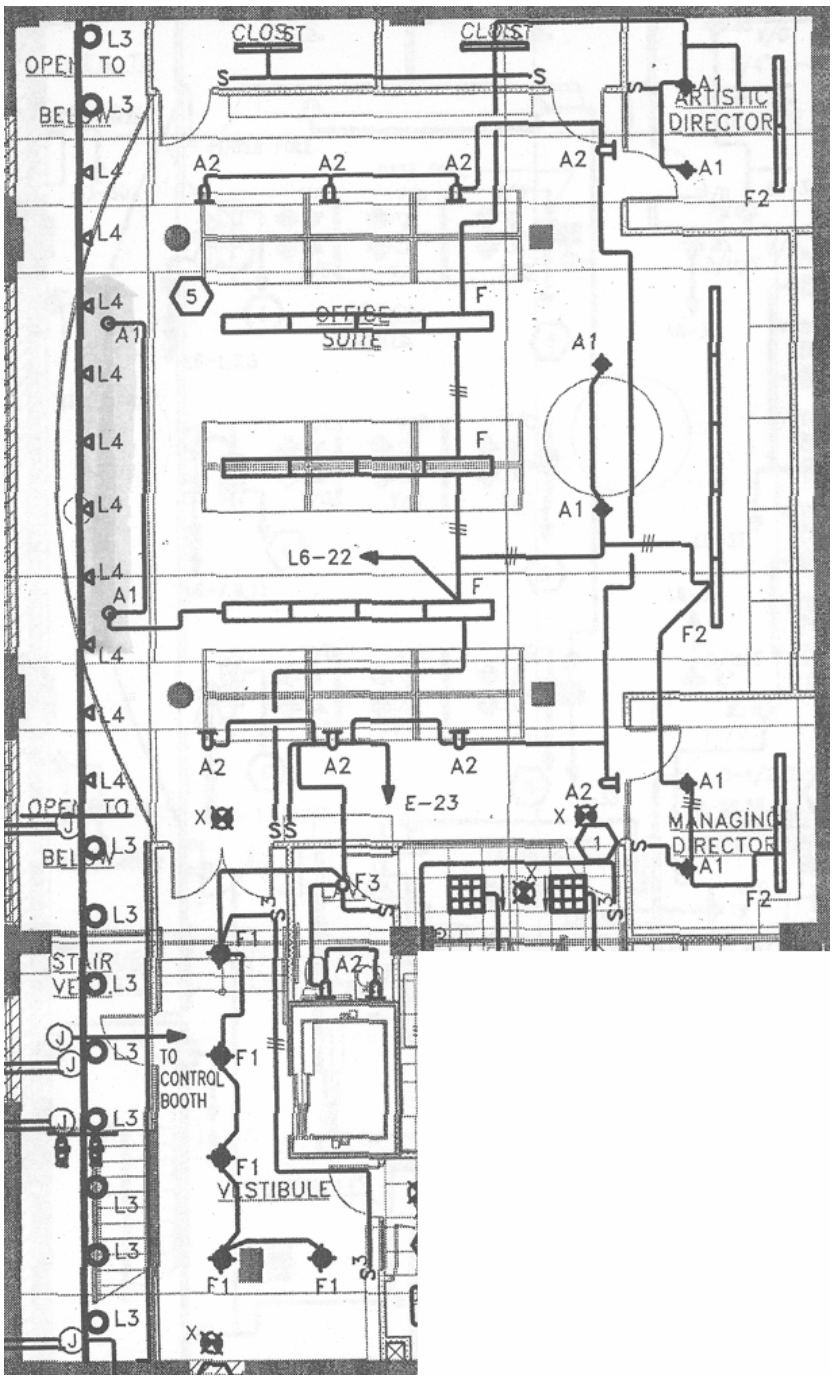
The horizontal illuminance levels found in the orchestra seating area were higher than needed, an average of 37 footcandles. This illuminance was uniform throughout the area. The levels in the balcony seating were too low, having an average of 14 footcandles.

Office- Overview

The office has an open plan with two private offices for the artistic director and the managing director. There are cubicles set up in three sections. It is a comfortable environment for the key personnel of the theatre to do work. The space is rather small but has a spacious feel. This was achieved by using glass for the surrounding interior walls connecting the office to the vestibule, hub area and exterior.

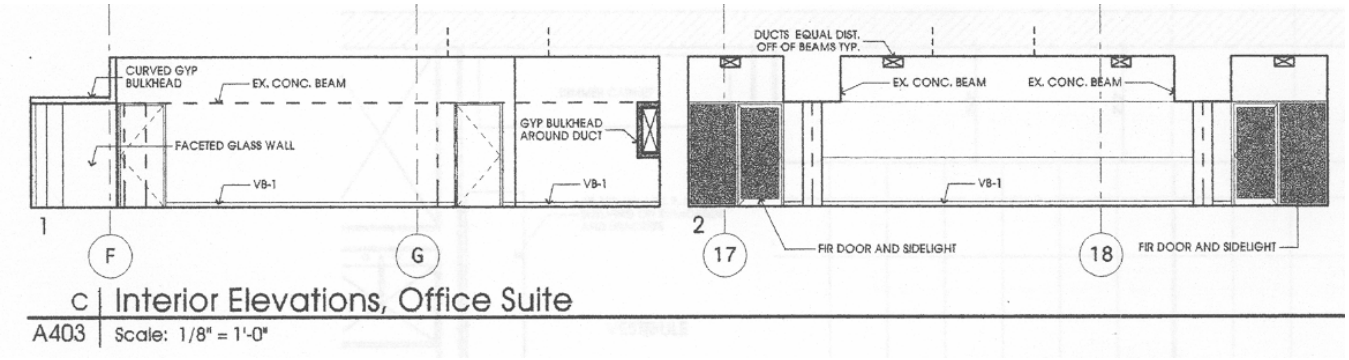
The lighting of the office has the same industrial feel as the rest of the theatre. There are jelly jar fixtures, indirect fluorescents and direct fluorescents. The fluorescents in the office make the space feel slightly less industrial and more like an office workplace.

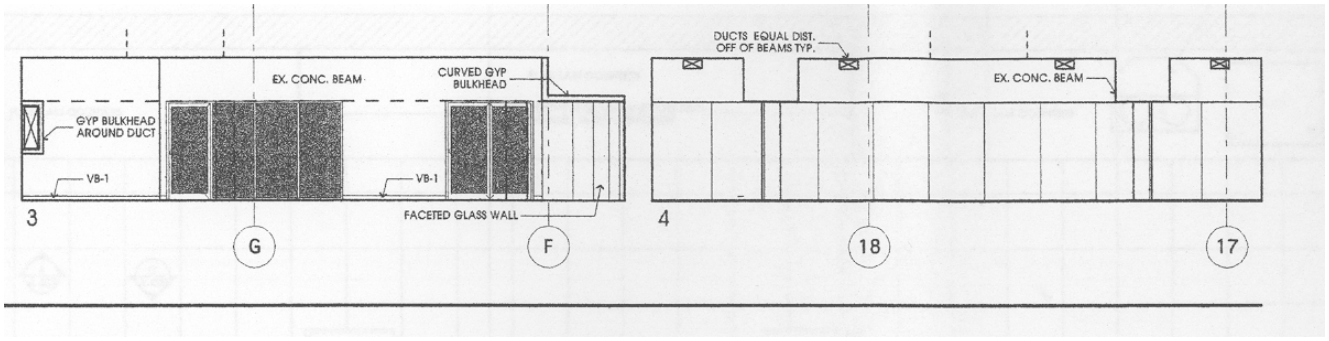
Lighting Plans



Third Floor Lighting Plan

Sections


CURVED GYP BULKHEAD
EX. CONC. BEAM
FACETED GLASS WALL
VB-1
GYP BULKHEAD AROUND DUCT
VB-1
1
F
G
DUCTS EQUAL DIST. OFF OF BEAMS TYP.
EX. CONC. BEAM
EX. CONC. BEAM
VB-1
2
17
FIR DOOR AND SIDELIGHT
18
FIR DOOR AND SIDELIGHT
C | Interior Elevations, Office Suite
A403 | Scale: 1/8" = 1'-0"


EX. CONC. BEAM
CURVED GYP BULKHEAD
GYP BULKHEAD AROUND DUCT
VB-1
VB-1
FACETED GLASS WALL
3
G
F
DUCTS EQUAL DIST. OFF OF BEAMS TYP.
EX. CONC. BEAM
4
18
17

Office- Existing Conditions

The surface materials in the space:

- concrete slab ceiling- clear finish — reflectance = 20%
- orange painted gypsum walls — reflectance = 60%
- carpet- medium gray — reflectance = 25%
- cubicle partitions- light — reflectance = 60%

Glazing:

- ½" tempered glass and channel wall

Controls:

- the office level is controlled by on/off and three way switching

Daylighting:

The office wall above the lobby litewall continues the curve. It is an eight foot high glass wall. The wall faces and exterior glass façade of the theatre. Daylighting is let in through both of the glass walls and dispersed throughout the office area. Also in the middle of the office there is a seven foot diameter skylight dome. This helps to get daylight to the other side of the office where the sunlight coming in through the glass walls do not reach.

Office- Luminaire Schedule

TYPE	DESCRIPTION	LAMP	MANUFACTURER	CATALOG NUMBER	VOLTS	MOUNTING
A1	JELLY JAR-FLUORESCENT	CF23EL/TWIST	STONCO	VK-1-GC	120	SURFACE
A2	JELLY JAR-FLUORESCENT SIDE MOUNT	CF23EL/TWIST	STONCO	VK-1-GC	120	SURFACE
F	OFFICE PENDANT	(2) FP28/830	LIGHTOLIER	SL106APIU	120	SURFACE
F2	SIGN LIGHT-OFFICE	F32T8/SPX30	CRESCENT	OD-1-32T8-120-	120	SURFACE
L	LINE VOLTAGE TRACK	_____	LIGHTOLIER	6000 SERIES TRACK- WHITE	120	SURFACE
L3	TRACK HEAD-BLUE WALL 2	Q250PAR/FL30	LIGHTOLIER	6284WH + 6487WHZ	120	SURFACE
L4	TRACK HEAD-BLUE WALL .5 STORY	45PAR/HIR/FL40 XL	LIGHTOLIER	6284WH + 6487WHZ	120	SURFACE

Light Loss Factors

OFFICE SUITE LIGHT LOSS FACTORS							
TYPE	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	LDD	RSDD	BF	LLF
A1	12 MONTHS	V	0.86	0.87	0.93	1.00	0.69
A2	12 MONTHS	V	0.86	0.87	0.93	1.00	0.69
F	12 MONTHS	II	0.93	0.94	0.93	1.00	0.81
F2	12 MONTHS	IV	0.94	0.88	0.97	0.88	0.71
L3	12 MONTHS	IV	0.97	0.88	0.97	1.00	0.83
L4	12 MONTHS	IV	0.97	0.88	0.97	1.00	0.83
ASSUMED CLEANING CYCLE OF 12 MONTHS							
RCR = 1.7							

Power Density

The power density for the theatre was calculated to be 1.41 W/SF.

Office- Design Criteria

General

The lighting in the office should be very comfortable. The workplane should be uniformly lit. In the office there is intermittent use of VDTs. Direct and reflected glare should be avoided completely. Also the luminances of surfaces and contrast must be carefully analyzed. The luminance ratio in the immediate task area should be 3:1.

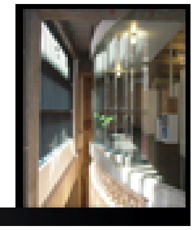
Daylighting should be integrated into the office. It is important to not have direct sunlight hitting the workplane creating direct glare. The open plan office has moveable cubicles, and therefore the lighting should be flexible.

Illuminance

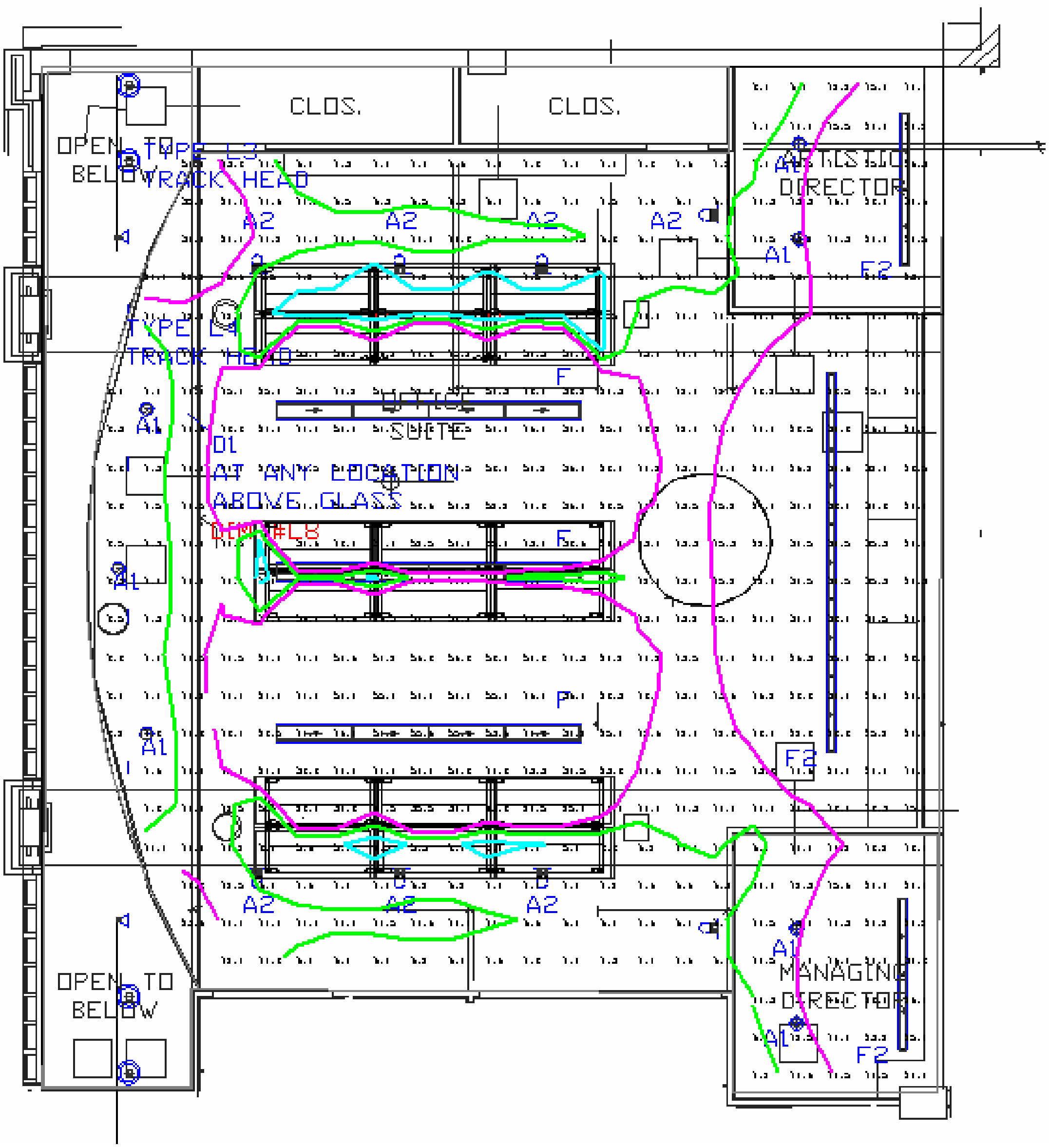
According to the IESNA Lighting Handbook the illuminance on the workplane for an office should be 30 footcandles.

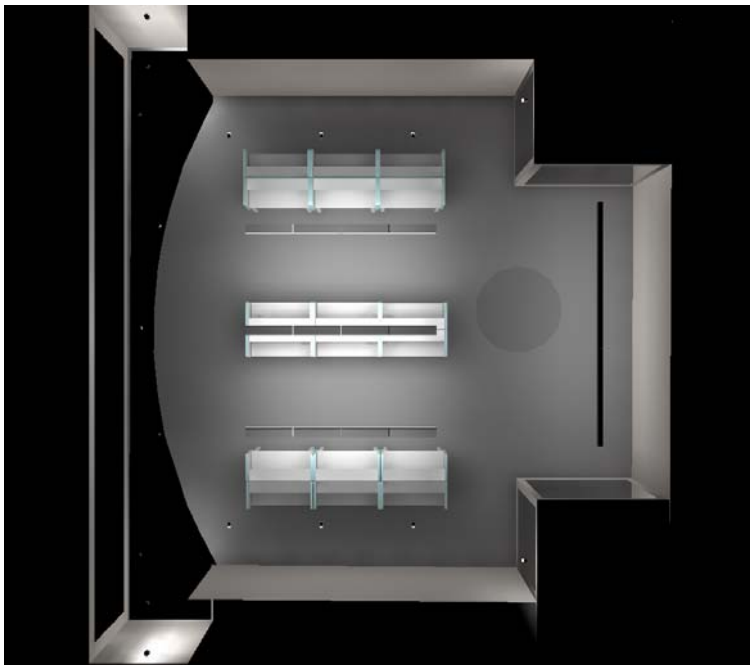
Power Density

According to Ashrea 90.1 the power density allowed in an open plan office is 1.3 watts/sq. ft.



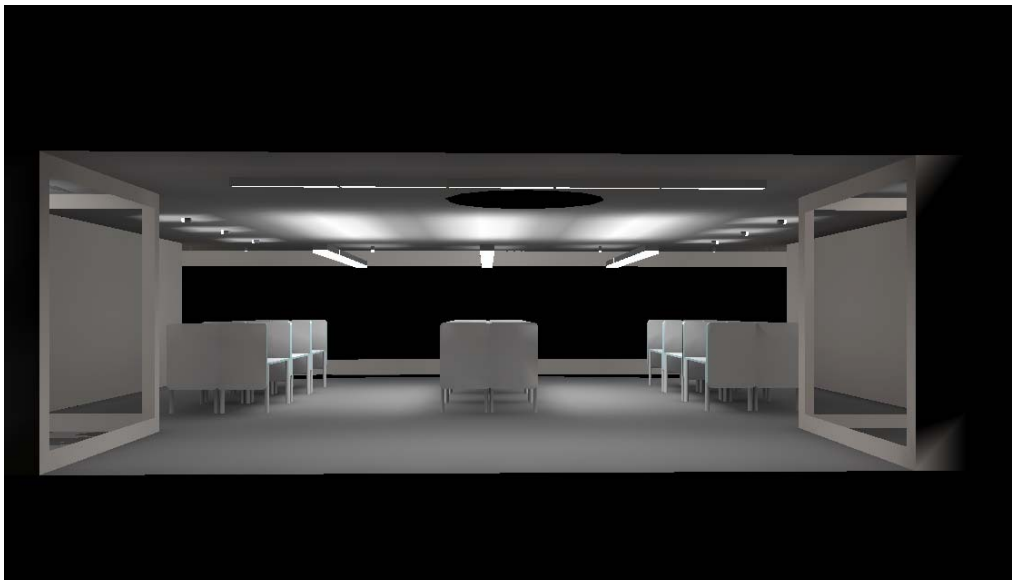
Office- Evaluation of Existing Conditions





Plan View

Looking From North Wall



Looking from West Wall

Looking From North East Wall

Office- Results

Numeric Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min
CalcPts	Illuminance	Fc	15.94	48.1	0.5	31.88

The average illuminance for the office is 16 footcandles. This is not taking any daylight into account. This level is much too low for a work environment. In the existing condition each cubicle has task lighting on each desk. The task lighting may bring the illumination up to 30 footcandles for that small area, but it would be better to have a uniform 30 footcandles throughout the space.

With daylight the space has much more light. The skylight dome has diffuse glass, and therefore direct glare is not an issue. The glass façade does let in direct sunlight, but the cubicles are arranged so it does not hit the work service. The daylight makes the space feel much more spacious and well lit than it is at night.

All files for this technical report are located in P:\Thesis\TechReport1