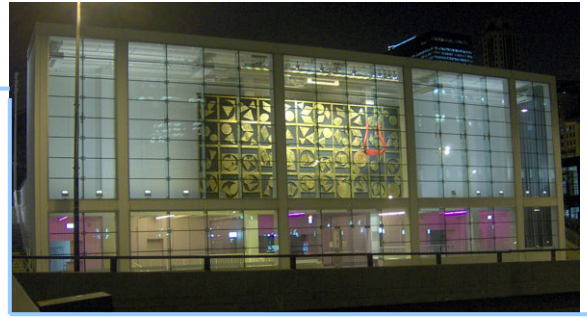


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Technical Assignment #1: Existing Conditions



Executive Summary

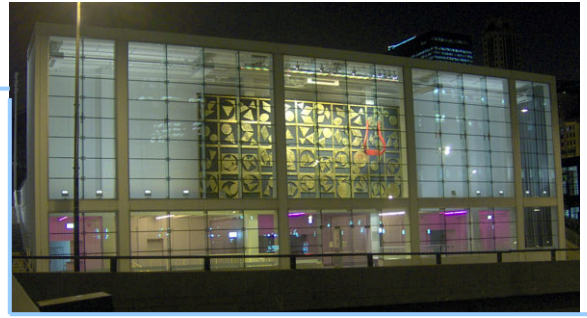
The purpose of this technical assignment is to compile lighting information and make an analysis about the existing spaces. This report will include a list of the equipment used, required illuminance levels, ASHRAE power density limitations, material characteristics and an analysis of how these systems and criteria work within the spaces. All of those items will be discussed in detail relating to design criteria and compared to the existing conditions.

The report begins with an overall design statement and is then broken up by space and will guide you through each space the same way. The sections start with a description of the conditions and then a summarized list of the design criteria layout, equipment used and materials. Then you are taken into an analysis section where renderings are provided and at the end of each section is a short summary discussing the existing design.

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Technical Assignment #1: Existing Conditions



General Design Ideas

The Theater Experience

As a patron enters the building they are beginning their theatrical experience at Harris Theater for Music and Dance. The venue they are going to see will range from a children's choir to professional dance or even an opera. So, the design of the entrance and lobby need to cater to any type of artistic performance and audience. This space needs set the scene and intrigue the person to venture further into the building. During their transition they should be welcomed in the lobby with a cheerful and directing setting that also encourages social interaction with other patrons. They should be drawn into the building and then further into the theater space. As they enter the theater a feeling of excitement should begin to set in and prepare them for the upcoming performance. The theater should be grand and dynamic while pulling your attention to the stage.

The Working Experience

The daily support staff of the theater should be treated with as much class as the patrons of the theater. These employees are not only hosting venues, but they are also marketing those performances. Their office space should be just as an uplifting experience as a theater patron. So, the design ideas from the rest of the theater should be carried into the office area, but modified to encourage productivity.

The Design

The lighting design of a theater should reflect the use of the theater. Harris Theater for Music and Dance hosts dance companies, children's choirs, symphonies and other dramatic productions. Due to the variety of these venues a design theme must be basic and go to the root of these performances. All of these performances carry a common delivery method - they all use "crescendoes" or a climax to show the dynamics of their performance. So, the experience of the space should reflect a crescendo of expression.

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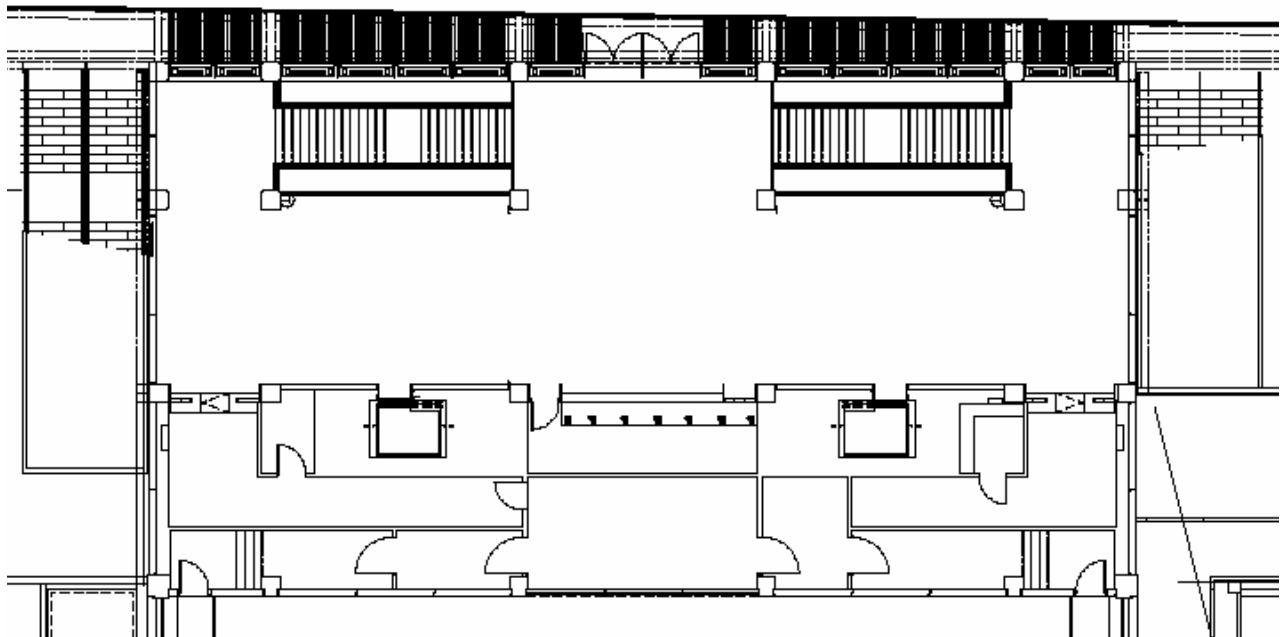


Entrance and First Level Lobby

The main level of the lobby serves as an entrance and building identifying façade. This space is the most important because it gives the first impression of the theater. There is artwork hanging just inside the glazing to announce that the building is a host for the arts. The front wall is completely glazed allowing an interesting view of the interior artwork. Accent lighting is used to highlight and emphasize the artwork which also locates the building from the exterior.

The artwork at the entrance is illuminated by numerous fixtures. There are incandescent border strip lights as well as spot lights to achieve highlights with a uniform background level of light. Accent lights are also utilized to accent the two tall side walls of the entrance space.

The IESNA Handbook (pg. 15-7) suggests that generally 20fc shall be maintained throughout a lobby space. This guideline should be used as a minimum while the effect of the lighting should be more rhythmic to encourage flow within the space. Entrances and exits are the focus of this space and the light should lead you toward those transitioning areas.



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Technical Assignment #1: Existing Conditions



Entrance and First Level Lobby

Design Criteria:

General

This space should emphasize architectural features and brightness patterns should attract attention while influencing the flow of traffic. Given that there is glazing in this space the levels of light will need to be higher during the day to give the same effect as a night condition. Maintenance should be easy to ensure the intended design is utilized as well. There are two very different tasks taking place in this entrance and lobby space that should be addressed. The entrance is used to identify the building from the exterior as well as invite patrons into the building. The lobby space functions as a waiting space and ticket purchasing area.

Lighting Quality and Mood

The entrance and lobby space should be very inviting and elegant. Warm colors and color temperatures should be used to make the space feel comfortable. Glare should be completely avoided and clarity of the space should be a priority.

Illuminance Levels

The entrance space has very specific accent lighting that should attract your attention from the outside. The luminance of the artwork should be 5 to 10 times brighter than the wall behind. Then the lobby space shall still be bright, but should start a transition into the darker theater space. The following is a list of IESNA recommended levels:

Entrance and Lobby: 20fc-50fc range for ambient Horizontal Illuminance

Power Density

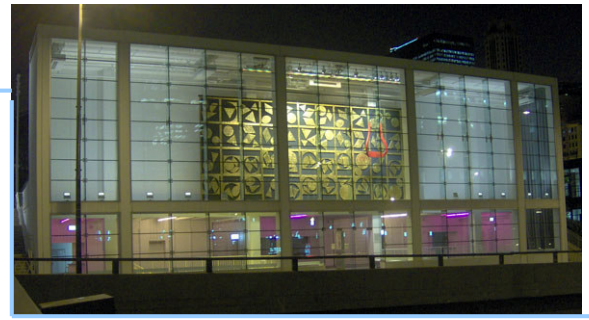
The ASHRAE 90.1 guidelines have recommendations for buildings as a whole or as a space by space method. Using the space by space method:

Power Density: 1.3 W/sq ft for a lobby space

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Technical Assignment #1: Existing Conditions



Entrance and First Level Lobby

Existing Conditions:

Materials

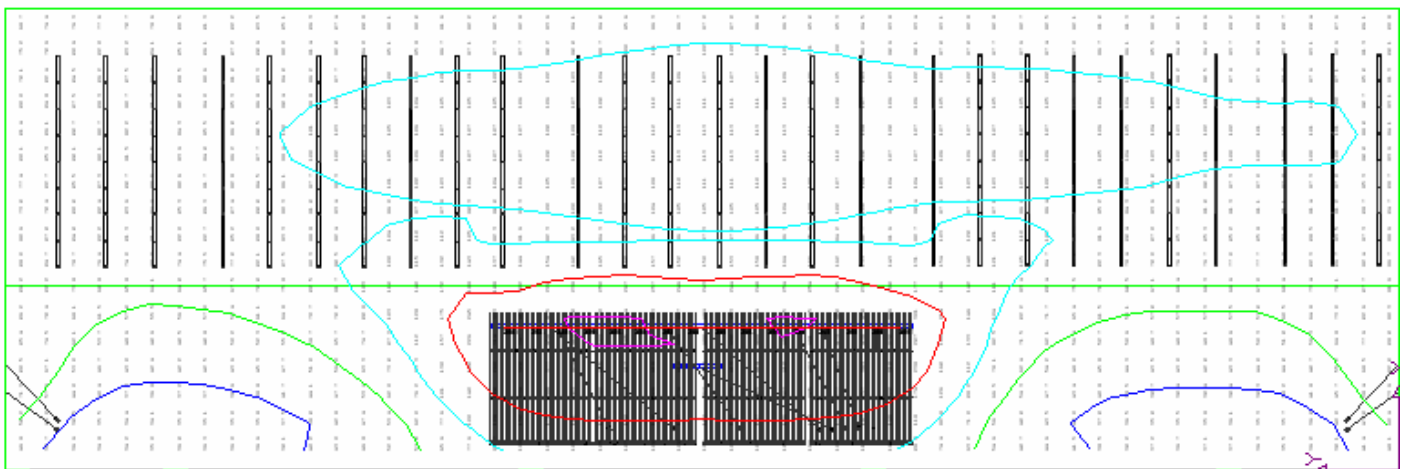
Finishes were all assumed. In the lobby area all walls are painted white and assumed to have a reflectance of 80%. The floor is sealed concrete and was assumed to have a reflectance of 45% and shows some specular qualities. The only color added to this space is by the use of colored light.

Lighting Equipment Schedule

Type	Description	Manufacturer	Catalog Information	Lamps	V	Fxtr Watts	LLF	IES file
SSH1	Wall wash striplight at upper randolph artwork	Lighting & Electronics	65-80, White with white leads	Q50MR16/C/FL 40deg ANSI: EKN (GE lamp only)	12	2000	0.756	E395201
SSH2	Wall wash striplight at upper randolph artwork	Lighting & Electronics	65-80, White with white leads	Q50MR16/NFL 25deg ANSI: EKN (GE lamp only)	12	2000	0.756	E395203
SSPP	Theatrical Spotlight for accent Lighting	Electrical Theater Controls	S4 PAR-EA-Factory White, with white NEMA leads	HPL575/115x, 2000 Hour lamp life	120	575	0.744	S4PARMCMW FL2000
VE-N	Fluorescent Strip Light (1) Lamp	Hubbell Lighting	Cleanroom-air Foil Series CR-X-ST-1-R-CL-A-1-CRS-1	(1) T8 Assumed 32W	120	34	0.666	L5725
VE-NC	Fluorescent Strip Light (1) Lamp 4' and 8' lengths.	Hubbell Lighting Duray	Cleanroom-air Foil Series CR-X-ST&40-1-R-CL-A-1-CRS-1 LS 96 or LS 48 Depending on	(1) T8 Assumed 32W Gel Fits T12 lamp	120	34	0.666	L5725

Lighting Layout

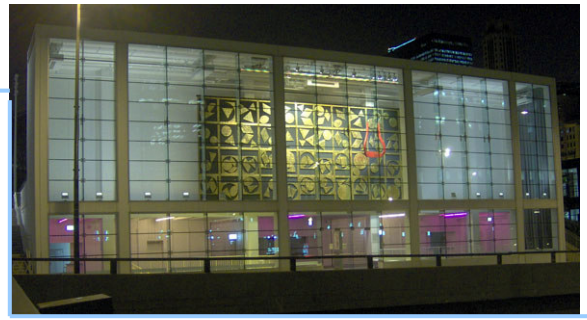
The strips in the lobby area are (4) 4' T8 strip lights, with colored strip lights at the theater entrances. At the immediate entrance are a series of accent lights. There are (9) groups of 40 MR16 fixtures to model the borderlights in that area. Also note the spot lights at the entrance as well as the (4) lights highlighting the two side walls.



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Technical Assignment #1: Existing Conditions



Entrance and First Level Lobby

Illuminance Levels

These levels may be less uniform than the actual existing conditions because on-site aiming was completed at the end of the project. These values reflect my best assumptions for aiming purposes.

Lobby Floor: 116 fc average
 15.5 max/min ratio

Hanging Artwork: 238 fc average
 6.5 max/min ratio

Power Density

The power density for the entrance and lobby space as a whole is significantly higher than is typically allowed. Dimming was not taken into account for this calculation because it is not listed in the design documentation.

Power Density: 9.6 W/sq ft

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Technical Assignment #1: Existing Conditions



Entrance and First Level Lobby

Analysis:

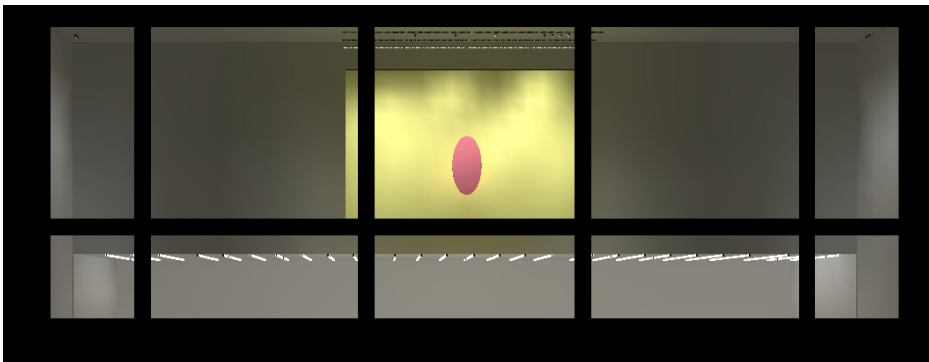
When a row of linear fluorescents intersects with the elevator doors or auditorium doors a colored gel is used to locate the entrance to those doors. This theme is carried through to each typical lobby level as well. The colored gels on the linear fixtures change color depending on the floor to define each floor.

General

The entrance works very well as a sign or identifying architectural element. As you can see from the exterior (left) the ratio of light between the wall and piece of artwork are significant and catch your eye. If you view the calculation grid on the previous page you will notice that the floor of the entrance acts like a marquee. There is a strong pool of light as you notice by those illuminance isolines as well as in the rendering below (right).

Meeting Requirements

This space is very highly illuminated. A daylight study in the future would be interesting to compare to these high levels. Most of the minimum illuminance levels were highly exceeded. This caused a very high power density for this space.



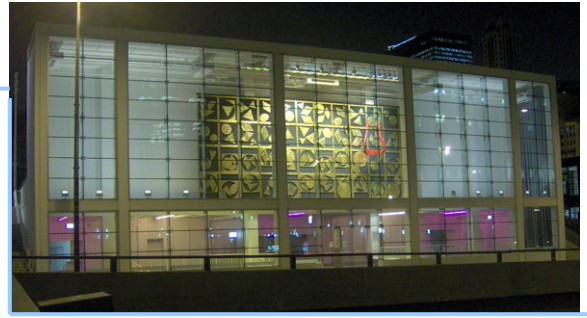
Summary

Aesthetically the entrance space was done well, because there are highlights in appropriate areas that attract your attention. The lobby space behind the entrance does a great job of creating uniformity, but lacks an exciting appearance. The choices of source type and fixture type will make large improvements in this space.

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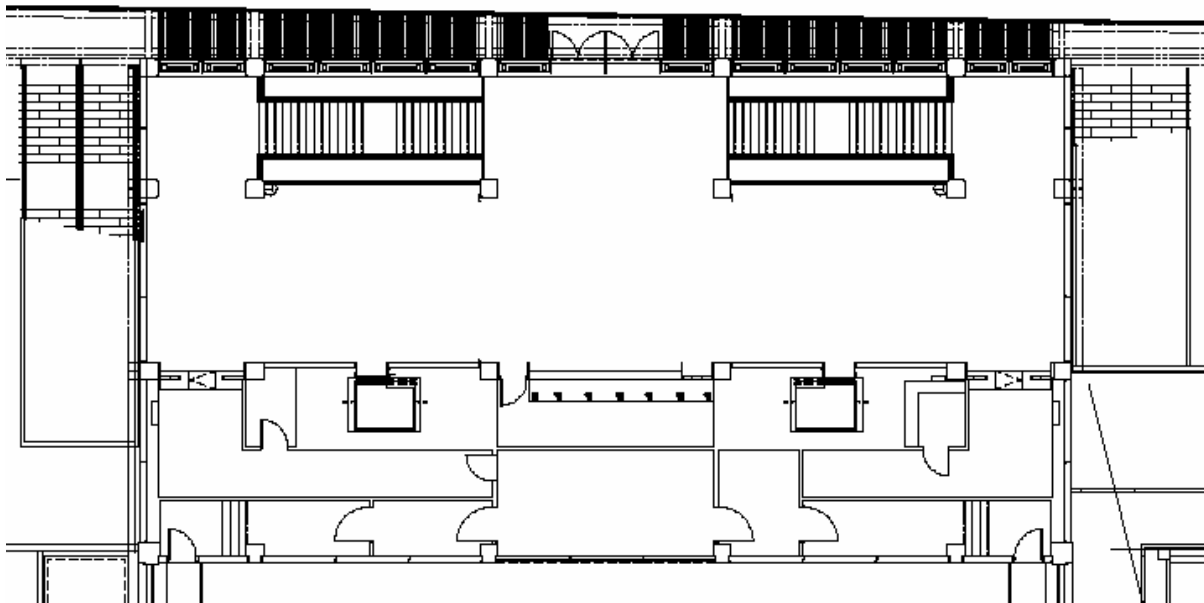
Technical Assignment #1: Existing Conditions



Typical Level Lobby

The typical lobby levels should have a similar quality of light as the first level lobby. These spaces are also used as a transition and directing space and should prepare the patron to enter the theater. The lighting should have less contrast than the entrance, but still highlight interesting architectural features.

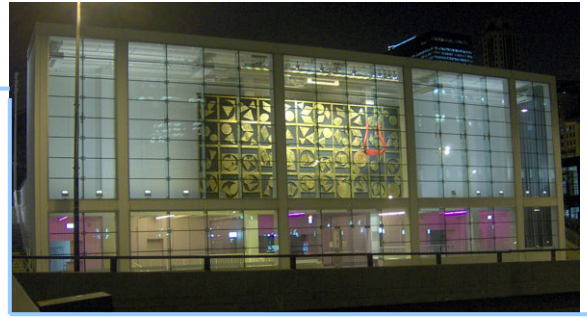
Each typical level of the lobby spaces mimics the first level at the entrance. Linear strip lights are used in the same fashion and the color of the linear strip lights changes on each level. This space shall also maintain a minimum 20fc on the floor of the lobby space, but also highlight important elements with varying light levels.



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Technical Assignment #1: Existing Conditions



Typical Level Lobby

Design Criteria:

General

This space should be fairly uniform, but also influence the direction of pedestrian traffic. The stairs, entrances and exits are great opportunities for changing light levels to add rhythm and interest to the space. The walls and ceiling in these spaces are white which allows for the use of colored light to add dynamics and rhythm.

Lighting Quality and Mood

The typical lobby spaces should be very similar to the first level lobby, but also define which level you are on. There are only views to the outside on the first floor of the lobby, so the other floors should be designed to give you a sense of location. The use of color on the walls or ceiling should be utilized for color because they are painted white. Warm colors and color temperatures should be used to make the space feel comfortable and inviting. As mentioned in the entrance portion: Glare should be completely avoided and clarity of the space should be a priority.

Illuminance Levels

The lobby space should maintain a minimum of 20fc on the floor of the space. The spaces near the entrances, exits and stairs should have a higher illuminance to guide you to those areas.

Power Density

The ASHRAE 90.1 guidelines have recommendations for buildings as a whole or as a space by space method. Using the space by space method:

Power Density: 1.3 W/sq ft for a lobby space

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Technical Assignment #1: Existing Conditions



Typical Level Lobby

Existing Conditions:

Materials

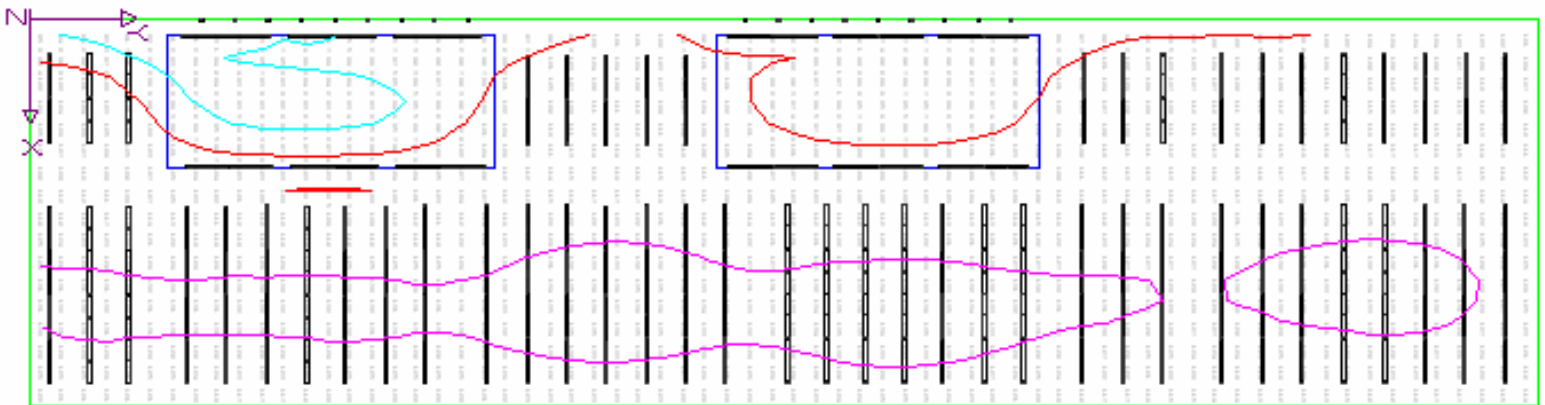
Finishes were all assumed. In the lobby area all walls are painted white and assumed to have a reflectance of 80%. The floor is sealed concrete and was assumed to have a reflectance of 45% and shows some specular qualities. The only color added to this space is by the use of colored light.

Lighting Equipment Schedule

Type	Description	Manufacturer	Catalog	Lamps	V	Fxtr Watts	LLF	IES file
VE-N	Fluorescent Strip Light (1) Lamp	Hubbell Lighting	Cleanroom-air Foil Series CR-X-8T-1-R-CL-A-1-CRS-1	(1) T8 assumed 32W	120	34	0.666	L5725
VE-NC	Fluorescent Strip Light (1) Lamp 4' and 8' lengths. Sleeves and	Hubbell Lighting Duray	Cleanroom-air Foil Series CR-X-8T&40-1-R-CL-A-1-CRS-1 LS 96 or LS 48 Depending on Location	(1) T8 assumed 32W Gel Fits T12 lamp	120	34	0.666	L5725

Lighting Layout

The fixtures used in this space are all linear T8 strip lights. The openings in the ceiling locate the stairways as well as strip lights that are mounted on the beams in the stairwell. There are also fixtures mounted on the wall next to the stairwells that imitate windows or daylight. There is some special attention to the stairwells by mounting fixtures horizontally on the sides of the stairs.



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Technical Assignment #1: Existing Conditions



Typical Level Lobby

Illuminance Levels

Lobby Floor: 116 fc average
 15.5 max/min ratio

Power Density

Power Density: 1.7 W/sq ft

Analysis:

General

The space is very uniformly lit and the intent to illuminate a wall similar to a window is very interesting. The aesthetics of the space could use some improvement and the line of colored light could be implemented in a better way. Washing some of the white walls in the space would be very interesting.

Meeting Requirements

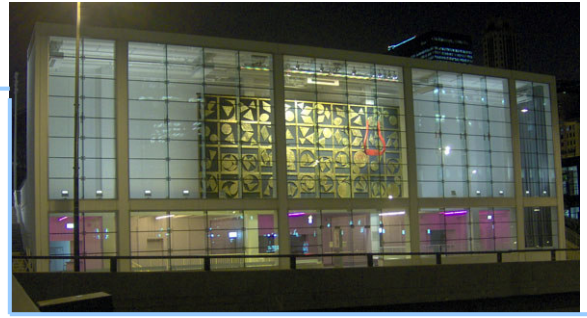
This space is very highly illuminated. Dimming of this space would help bring down the high illuminance levels. The power density is also high, but might be due to the ballast chosen. This equipment was not documented so it was assumed to be a (1) lamp ballast with 34W per each 32W T8 lamp.



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Technical Assignment #1: Existing Conditions



Typical Level Lobby

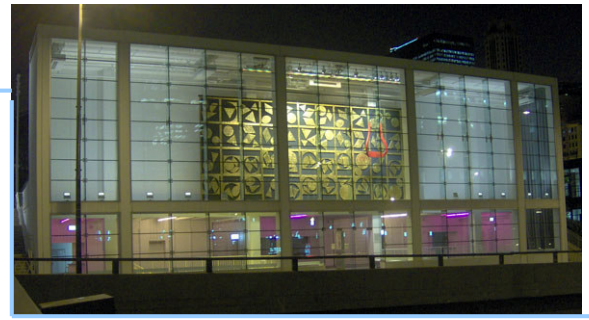
Summary

This space has room for improvement. The minimum illuminance levels were exceeded to a point that it feels very uncomfortable. The fixtures are a high glare source and provide an industrial look in a space that should be more formal. This venue is used mostly at night time, so this type of lighting may be a little too extreme. Improvements in the type of fixture as well as more energy efficient fixtures will bring this space many improvements.

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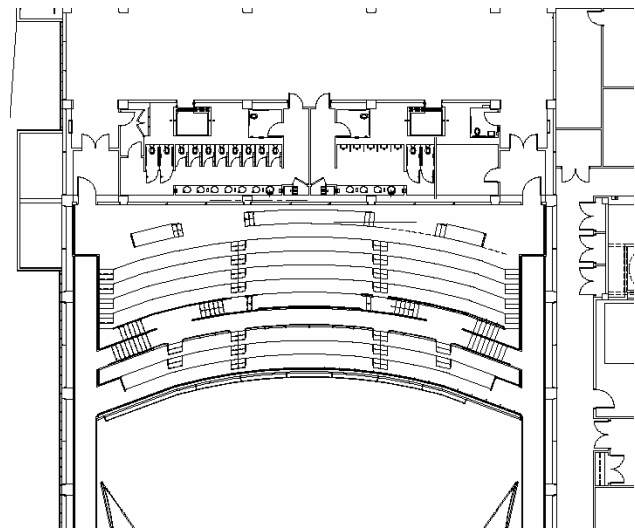
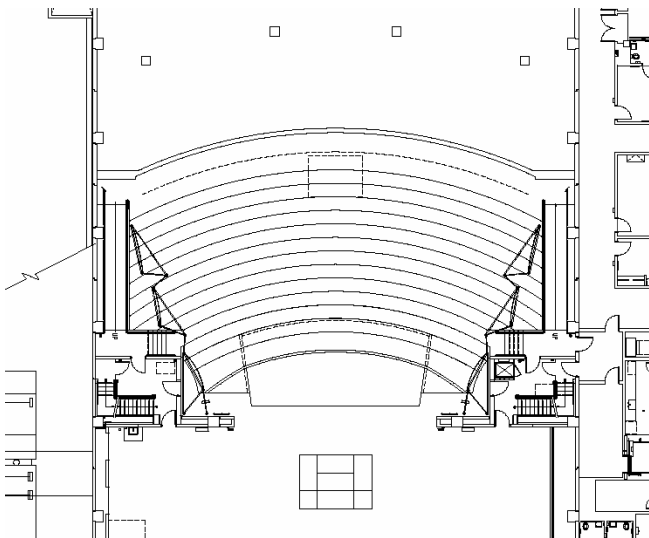
Technical Assignment #1: Existing Conditions



Theater Seating Area

The seating areas in the theater are comprised of 3 different levels. The first and lowest level is right behind the orchestra area. Then there are two balcony levels at the back of the theater. This theater is finished very simply. All walls, the floor, and the ceiling are painted black or dark gray. The only color added to this space is on the side walls and is achieved using high intensity wall washers with a colored lens.

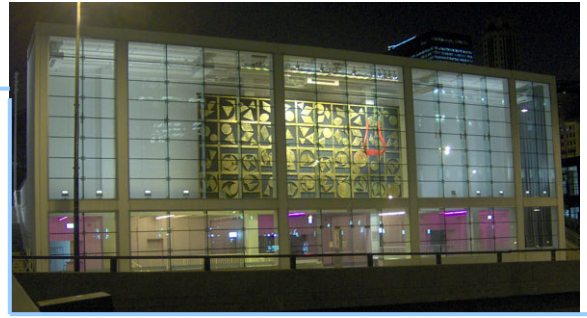
The lighting in this space should have layers. Technically, the most important is the egress lighting that also guides patrons to their seats. The other layers of light are more important to the feeling of the space. The seating area should have a level of lighting that is just high enough to read a program and recognize faces from across the theater. Then, the third layer of light is the decorative lighting in the theater. This layer of light should be highly dynamic, but low in contrast. In order to prepare the patron for the upcoming performance, the lighting should not be too bright.



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Technical Assignment #1: Existing Conditions



Theater Seating Area

Design Criteria:

General

The house lights in this space should give a uniform quality of light for identifying seats and short reading tasks. Safety is also important because of the varying heights on walkways and around the seating area. Maintenance should be closely considered because of the varying floor levels as well. The controls and different layers of light should also consider options for set up and clean up of performances. Another consideration should be glare of the fixtures and also reflected glare of a program or other item for reading.

Lighting Quality and Mood

The theater space is very important to the overall experience of a patron. The quality of light should be dynamic, but this should be done using color and not contrast. Contrast should be slowly changing gradients to make the space more calm and relaxing to prepare the audience to focus on the performance. During the performance the house lights will be turned down and/or off. So, the lighting levels should not be too bright because the audience will need to adjust quickly to the performance setting.

Illuminance Levels

The following is the recommended IESNA illuminance level(s) from Chapter 15:

Seating Area: 10 fc to 20 fc before and after performances

These values should be used as a minimum and levels should be varied along the walls and entrances/exits.

Power Density

The ASHRAE 90.1 guidelines have recommendations for buildings as a whole or as a space by space method. Using the space by space method:

Power Density: 0.9 W. sq ft

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Technical Assignment #1: Existing Conditions



Theater Seating Area

Existing Conditions:

Materials

All walls, floor and ceiling were assumed to have a reflectance of 10%. All of those items are painted black.

Lighting Equipment Schedule

Type	Description	Manufacturer	Catalog	Lamps	V	Extr Watts	LLF	Quantity	IES file
SSBBB	Assymetrical wall washer - shadowbox	Winona	P1-SS-Q250-SS-1-SGB-SB-MOD-COL-COLOR GLASS	Q250D3	120	250	0.687	24	BAL10749
SSCCC	Theater Spotlight for accent lighting	Electrical Theater Controls	410 with NEMA L5-15 Plug	HPL575/115x, 2000 Hour lamp life	120	575	0.655	10	5410HID
SSDDD	Step light in audience chamber	Lumiere	1201-BK or (C00232)	30W	120	30	0.68	22	201-35MR11-12-NFL30
SSP1	Theatrical Fixture used for Audience Houselighting	Strand Lighting	3380 Presnel with 1350 Assec. Clip, 1108 Color Frame, 1406 Barndoor & 1500 Safety Cable. NEMA L5-15	Q750W (BTN)	120	750	0.744 (BF = .88)	22	HD7500QT4-10760L1-Q5OOT4
SSP2	Theatrical Fixture used for Audience Houselighting	Strand Lighting	3380 Presnel with 1350 Assec. Clip, 1108 Color Frame, 1406 Barndoor & 1500 Safety Cable. NEMA L5-15	Q500W (BTL)	120	500	0.744	13	HD7500QT4-10760L1-Q5OOT5

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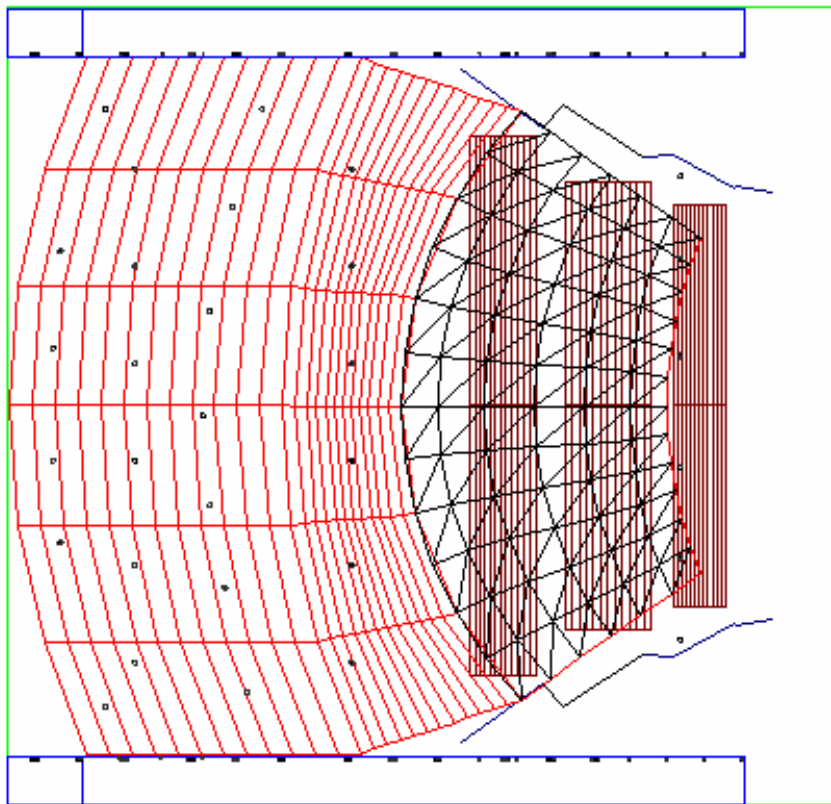
Technical Assignment #1: Existing Conditions



Theater Seating Area

Lighting Layout

The downlights used throughout the seating area are mounted at a height just below the first balcony and then also from the ceiling/catwalk height above the upper balcony. To highlight the walls there are wall washers mounted just below both levels of the walkway. These are the colored lights that add blues and yellows to the walls of this space.



Illuminance Levels

Main Walkway: 17fc average
Front Seating Area: 12 fc average

Power Density

Power Density: 2.62 W/sq ft

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Theater Seating Area

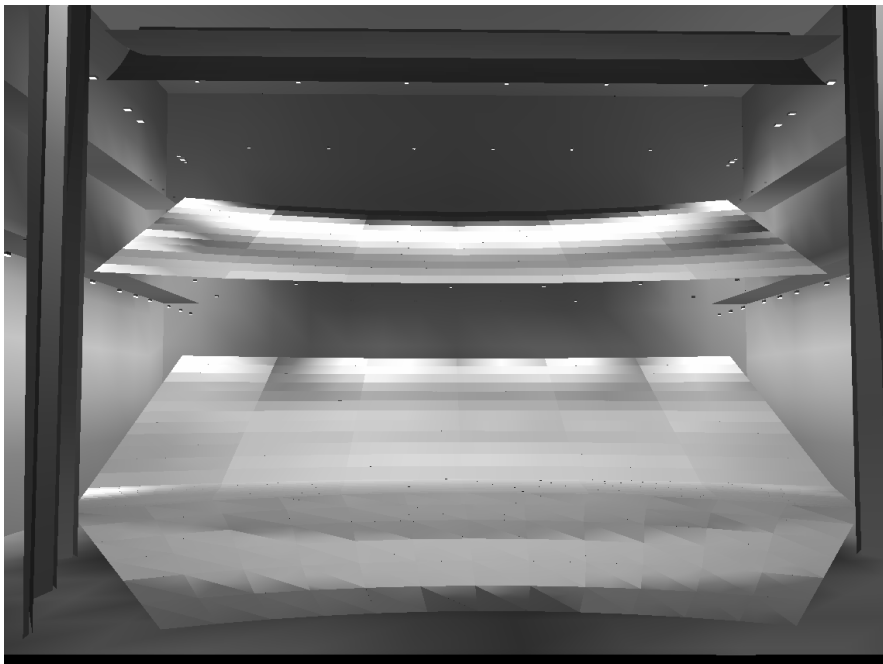
Analysis:

General

The intent of this space is very interesting. The side walls are illuminated and are existing in blue and yellow colors. They define the two levels of seating and bring to life a very dark space. The lighting should also highlight some major architectural elements of the space. There are some missed opportunities on the dropped ceiling and acoustical panels are the front of the theater seating area.

Meeting Requirements

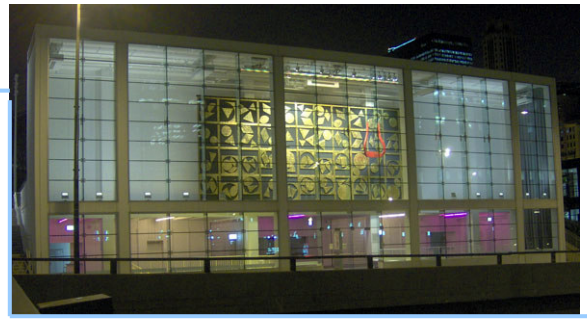
Overall the illuminance levels meet those that are required by the average of the space. The uniformity over the seating area is lacking, but could be due to assumptions made while aiming the downlights in the space. The wall washers do illuminate the walls, but the luminance ratios between the seating and the walls appear opposite of what they should. The seating area appears brighter than the walls, when it should actually be the opposite.



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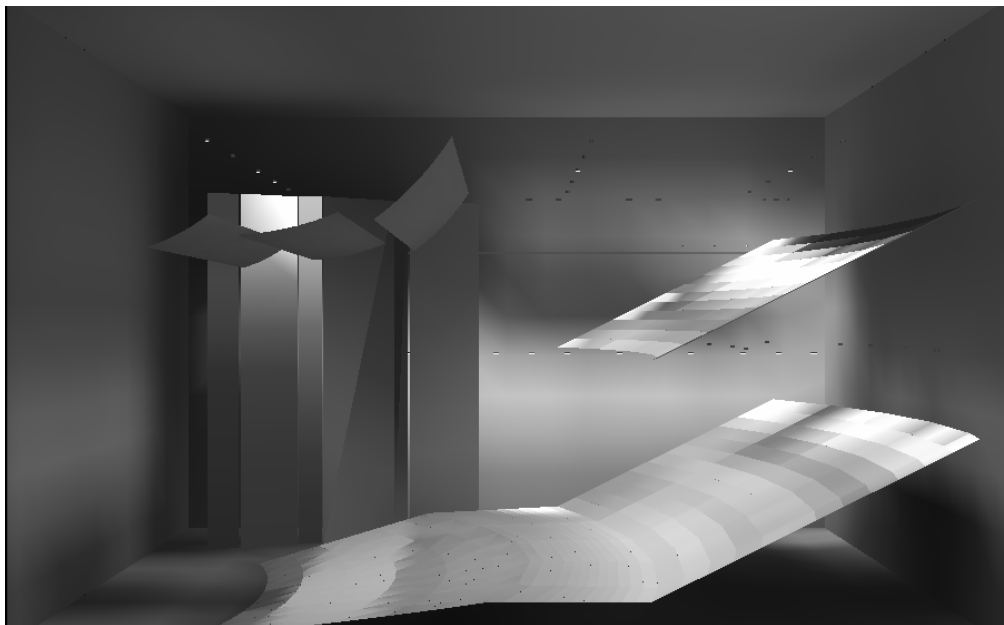
Technical Assignment #1: Existing Conditions



Theater Seating Area

Summary

The uniformity in this space is lacking, but it is difficult to maintain because all of the finishes are black. Due to the dark finishes in this space it is difficult to achieve the illuminance levels needed with a desired power density. The power density is higher than it should be, but does not take into account dimming of the house lights.

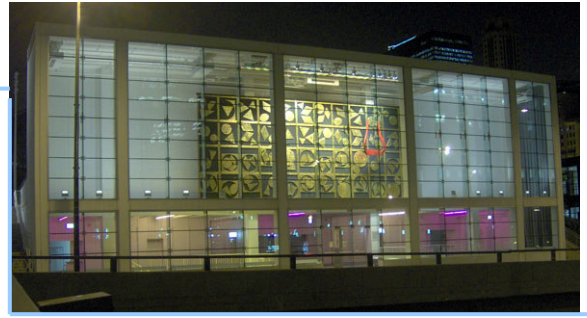


Maintenance in this space is a concern. The incandescent fixtures used above the seating area are difficult to reach by ladder or other equipment. They also need replaced frequently because of the type of source and also because they are used during set up and clean up of the space.

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Technical Assignment #1: Existing Conditions



Private Office Area

The private offices are used by the administrative staff to the theater. They use computers daily and work from their desks most of the time. These spaces also include a conference space and a visiting office. These spaces should be finished well to show of the reputation of the theater. Integrating daylight to these spaces is important to create a comfortable working environment and the spaces should also reflect the lighting theme from the public areas of the theater. The supporting staff is also marketing the visiting venues, so their office spaces should be artistic like the rest of the theater.

Design Criteria:

General

A comfortable working environment and uniform illuminance levels are very important in this work space. The appearance of the space is also very important to adding comfort for the occupants. Glare should be considered carefully because this space is used for VDT and for those people who are working in the space

Illuminance Levels

The following is the recommended IESNA illuminance level(s) from Chapter 15:

Workplane in an office: 30 fc

This value should be used as a minimum for the workplane, but higher values are desired at the desk and other task areas. Lighting the walls is also important, especially in the conference area. An illuminance of 10-20 fc on the walls is desired to makes the space feel more open, because only one office has views to the outside.

Power Density

The ASHRAE 90.1 guidelines have recommendations for buildings as a whole or as a space by space method. Using the space by space method:

Power Density: 1.1 W/ sq ft

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Technical Assignment #1: Existing Conditions



Private Office Area

Existing Conditions:

Materials

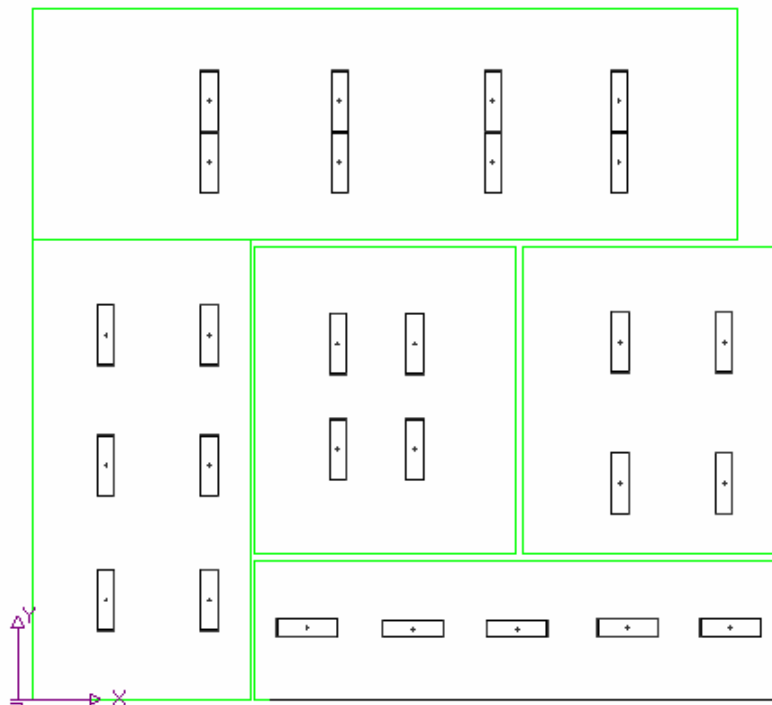
Finishes were all assumed. In the lobby area all walls are painted white and assumed to have a reflectance of 95%. The floor is sealed concrete and was assumed to have a reflectance of 45% and shows some specular qualities. The only color added to this space is by the use of colored light.

Lighting Equipment Schedule

Type	Description	Mounting	Manufacturer	Catalog	Lamps	V	Fxtr Watts	LLF	IES file
VE-K	Open Reflector Fluorescent with Chain Hangers (2) Lamps	Pendant (Chain)	Hubbell Lighting	Open Reflector - Premium Grade imperial series: 4'-0" Long with chain hangers IM-04-2-R-PA-A-1-ICCH	(2) T8 assumed 32w	120	68	0.666 BF=.87	L5747
VE-J	Fluorescent Strip with asymmetrical reflector (2) lamps	Surface	Hubbell Lighting	Wide Channel Strip-C series 4' long with CAR4 reflector C240A-2F40T12-48 Rapid Start	(2) T8 assumed 32w	120	68	0.666 BF=.88	

Lighting Layout

The layout of these industrial pendant fixtures varies between each office. The same fixture was used independent of the shape of the space.



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Technical Assignment #1: Existing Conditions

Private Office Area



Illuminance Levels

Main Walkway: 55 fc – 68 fc on average in each space
Uniformity Ratio: 19.8 max/min worst case
2.1 max/min best case

Power Density

Power Density: 1.2 W/sq ft

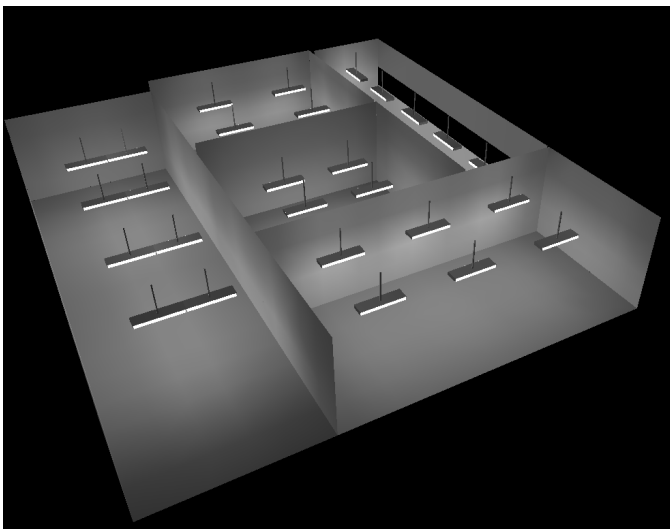
Analysis:

General

These offices were treated like every other non-public space in this theater. These are the offices of the administrative support staff of the theater and deserve nicer finishes or at a minimum a more comfortable lighting design. The fixtures used are parabolic industrial strip lights which bring a lot of direct glare into this space. One of the main offices also has the potential to integrate daylighting and/or dimming. All of these spaces were treated the same, even though they will be used differently. The conference area should be defined as its own space, and the office areas should also take on their own personalities.

Meeting Requirements

Overall the illuminance levels are higher than required. They also lack uniformity over the workplane which can cause problems where people are working at a desk all day. Notice the dark shadows in the corner of the offices (right).



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Technical Assignment #1: Existing Conditions

Private Office Area

Summary

The uniformity and interest in this space is lacking. By choosing fixtures that better fit the space in dimensions a uniform illuminance could have been reached on the work plane. The fixtures in this space should also be more aesthetically pleasing, because the finishes in the office should be comfortable. Glare is definitely an issue in this space because the parabolic industrial fixtures have an open bottom that is visible from desk level.

Additionally, daylight was not considered in these spaces. There are windows in one office which should be integrated with the lighting design. The spaces without windows should be designed to add a feeling of openness and warmer colors, because they lack views to the outside.

