

Final Thesis Report

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s. good | the nerman museum

overland park, kansas | feb 16th, 2014



Executive Summary:

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Building Overview:

Location Building name

The Nerman Museum of Contemporary Art

Location and site

Johnson County Community College

Overland Park, KS

Building Occupant Name

The Nerman Museum

Occupancy or function types

Education | Art Gallery | Café

Size

38,190 SF

Number of stories above grade / total levels

2 stories above grade | 2 total

Dates of construction

Start: April 2005

Completion: August 2007

Actual cost information

Approx. \$15 million

Details not released

Project delivery method

Design Bid Build

Lighting Depth:

The lighting depth will focus on five spaces of the Nerman Museum of Contemporary Art: The grounds/exterior, the solarium, the café, the auditorium, and a gallery space.

Cafe

description

The café is located on the first floor, adjacent to the main entrance and the solarium. This makes the space a pivot point as it joins two high traffic areas. Steps are positioned at the entrance, raising the café area and setting it apart from the bordering hallway. Measuring 65' x 25' x 12'(h), the space feels long while it covers around 1,625 SF. Seating for the café is also available in the solarium. The café and solarium are connected by doorway that allows for easy access between the two spaces.

Figure 1.1
1st Floor Plan

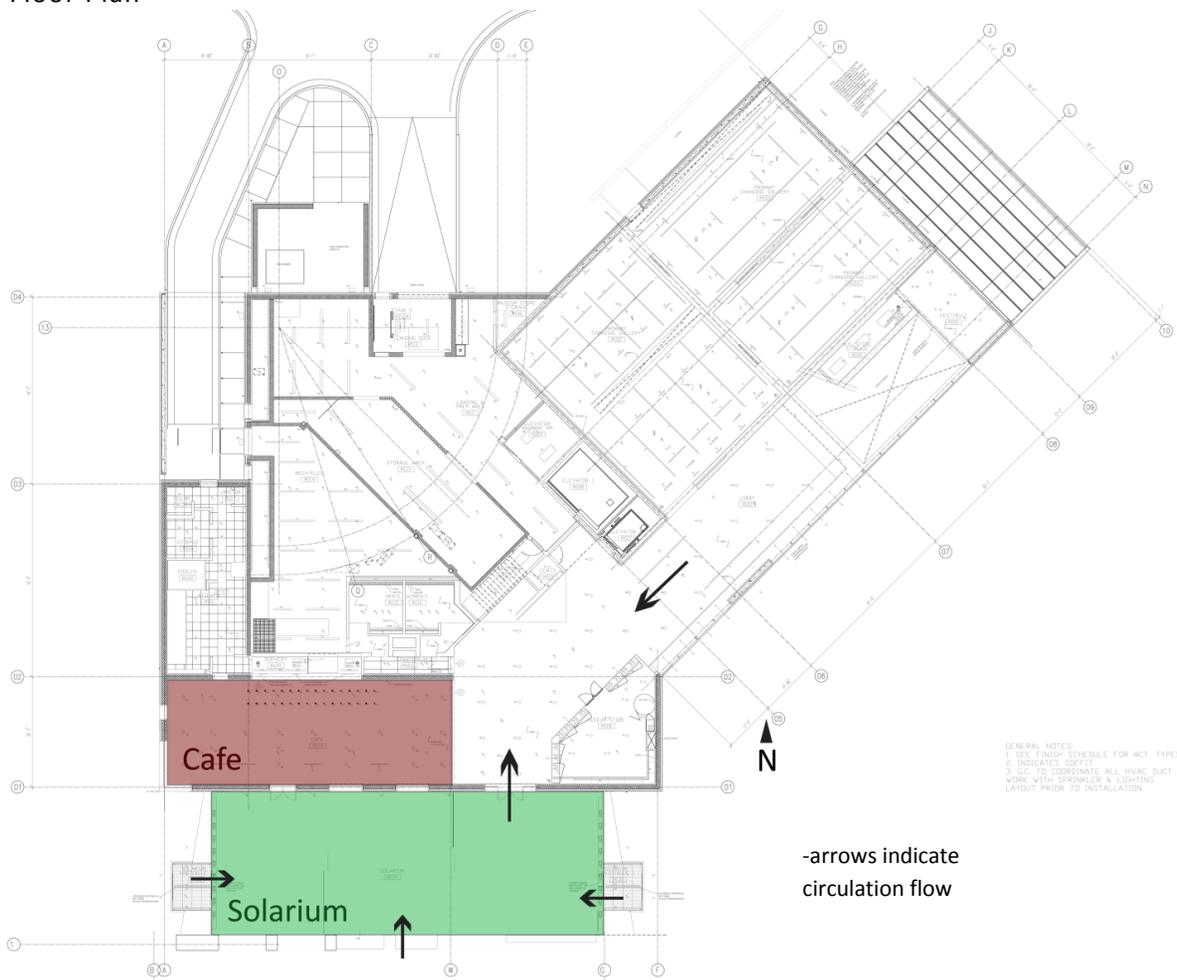


Figure 1.1
Café Floor Plan

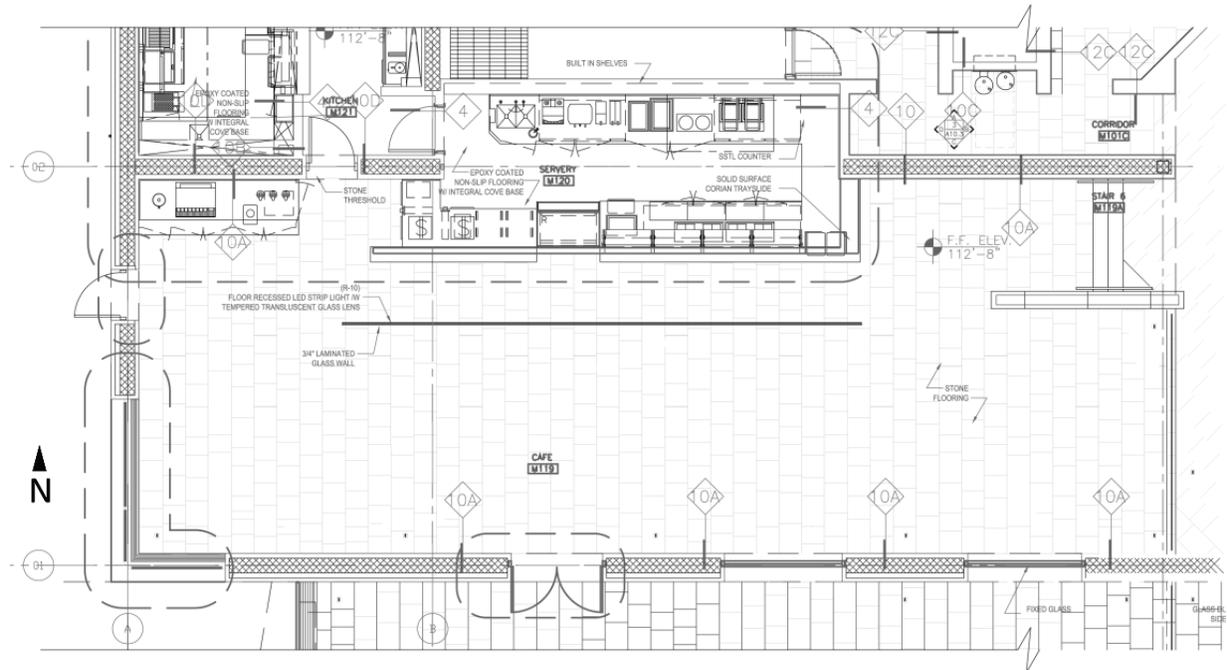


Table 1.1
Café Finishes

Type	Description	Color	Reflectance	Manufacturer
floor	stone	off white	0.6	-
base	aluminum	silver / painted	0.7	-
walls	GWB	off white / painted	0.7	-
ceiling	perf. GWB	off white / painted	0.7	-
window	glazing	glass	t=0.7	-
luminous panel	backlighting ceiling panel	white	t=0.71	Newmat stretch ceiling systems

overall design goals

The main lighting design goals for the café are to create a visually comfort environment while still adding intimacy into the space. Sight lines from the solarium, main hallway, and the outside were considered for reduced glare. Lighted forms dominate the space. Large light sources create intimacy and drama. The luminances of these light forms were not to create a glaring object, but one of visual comfort.

Just as a leaf's biological structure glows by daylight, so do the architectural lighted panels and forms.



tasks + activities

Café Tempo (as it's called), starting at 7am, is open into the evening to all who come to the museum. Patrons as well as passing students can sit down and have a range of different foods. The café also allows for party reservations. It has received a silver medal in the "retail sales-stand-alone" category of the National Association of College and University Food Services Dining Awards. The main activities in this space are dining and serving food.

design criteria

The illuminance values as well as certain design criteria were taken from IESNA Lighting Handbook. The lighting power density values were taken from ASHRAE/IESNA 90.1.

quantity of light

Table 1.1
Café Illuminance (IES recommendations)

Space	E_h (lux)	E_v (lux)
coffee shop	100	30
servery-employee served	500	200

Table 1.1
Café LPD

Space	Allowance
bar lounge/leisure dining	1.31

table 1

quality of light

visual comfort

Since this is a space where patrons and students come to eat and relax, the visual experience has to be pleasing. Lighted vertical surfaces and ceilings provide comfort to the space which creates an inviting place to unwind.

reinforcement of architecture

The geometry of the large window forms in-between the café and solarium serve as inspiration for the back lighted ceiling surfaces illuminating the main seating area. These lighted panels follow the vertical lines of the window up onto and across the ceiling to envelope the space. The lighted cantilevered form projecting out over the servery imitates

the large architectural cantilever at the entrance to the museum. These lighted forms strengthen the minimalist architecture and creates a space full of interest.

creating intimacy

The minimal back lighted forms instill drama into the space. By having such large bright areas and, in contrast, such large dark areas, the café feels intimate and cozy; a place to feel inspired and connected to the people across from you. Creating light as well as shadows provide some visual interest into the space this is fairly plain.

luminances of light sources

Since these back lighted panels provide all of the illumination for the space they need to be bright enough for the café tasks. But these sources should not be overly bright, whereas the luminance should not exceed 150 cd/SF.

modeling of faces

Eating and socializing at the café tables is a personal experience. Therefore the lighting should have quality modeling of faces. Provided area light sources with highlights from track lighting and half height partition walls should give adequate definition on faces.

directionality / circulation

Creating a hierarchy of space relationship within the café is essential for circulation and way finding. The servery, which requires more detailed attention than eating at the seating area, also requires a higher magnitude visual cue. The cantilevered lighted form acts as a beacon to the servery by enclosing the vertical space it surrounds. This leads your eye toward this space while entering.

visual interest

The visual interest for this space comes from the lighted forms and panels. Creating interest also inspires, which is important in any school/museum building.

color temperature + rendering

Since this space receives a lot of daylight, and also needs to be sensitive to artwork and the color rendering of traditional light sources, a middle of the road color temperature was selected throughout the building (3500K). Track lighting, whenever lighting a piece of art, requires a CRI in the 90s, but the general ambient light in the space can be a lower CRI in the 80s.

fixtures and equipment

Table 1.1
Café Equipment Schedule

Type		Manufacturer	Description
	LF1	Newmat	NewLight double-layer ceiling system using TOB/white translucent with T8/clear membranes backlighted with florescent strips
	LF2	Newmat	NewLight double-layer ceiling system using TOB/white translucent with T8/clear membranes backlighted with florescent strips
	LF3	Newmat	NewLight double-layer ceiling system using TOB/white translucent with T8/clear membranes backlighted with florescent strips
	LF4	Newmat	NewLight single-layer ceiling system using TOB/white translucent membrane lighted from bottom of half-height wall with LED strip
	LF5	Newmat	NewLight double-layer ceiling system using TOB/white translucent with T8/clear membranes lighted from wall side with fluorescent strips
	F1	Sylvania	T8 fluorescent 4' length. 3500K 81CRI. 32W
	T2	Edison Price	Hanging LED tack system, 1000 lumen package, artist series 97 CRI. 40 degree beam spread. Dimmable standard driver. 3500K

Detail of Back-Lighted Panels

TBD

Detail of Edge-Lighted Partition Wall

TBD

Detail of Edge-Lighted Cantilevered Form

TBD

controls

The café will be open for breakfast, lunch, and dinner, as well as for special dining events for parties. The lighting, therefore, needs to be highly flexible in scene control. Because of the amount of daylight coming into the space, the control schemes also need to be highly reactive. Due to the solarium receiving an abundance of light during all hours of the day, the café will experience, through the connected windows, an adequate amount of light sufficient enough to allow for dimming and off conditions.

Table 1.1
Café Control Schedule

Manufacturer	Product	Description
Wattstopper	LightSaver Room Dimming Controller	multi-zone automatic dimming control
Wattstopper	LightSaver Photocell	Closed loop daylight sensor
Wattstopper	LightSaver Digital Scene Switch	occupant scene control that provides 16 different scenes on local network

Renderings

Figure 1.1
Café: Pseudo Color Rendering (Plan View)

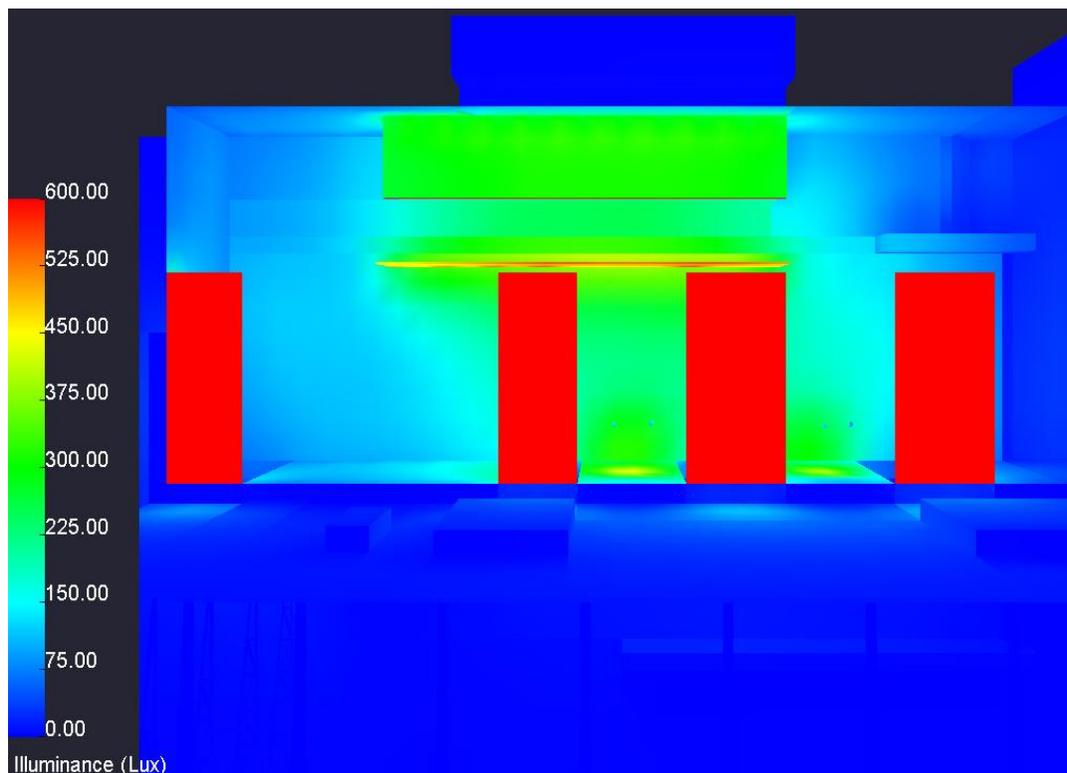


Figure 1.1
Café: Perspective Rendering



calculations

Illuminance

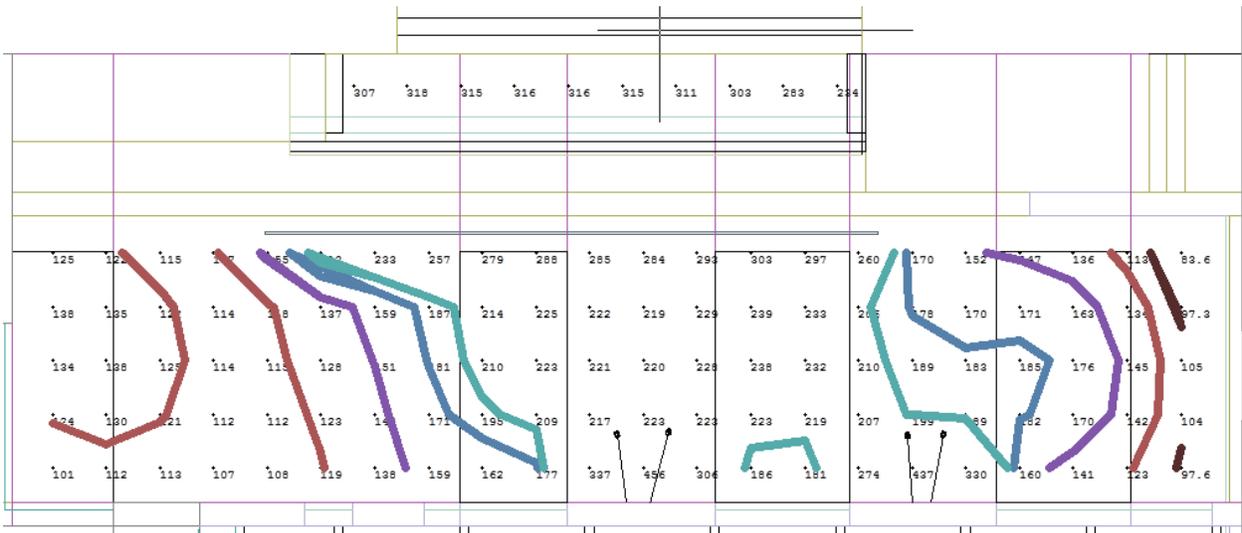


Table 1.1
Café Illuminance Calculation Summary (workplane 1.5')

Space	E_h Recommendation (lux)	E_h Calculated (lux)
coffee shop - eating area	100	183
servery	500	302

Lighting Power Density

Table 1.1
Café Lighting Power Density

Fixture Type	System Wattage	Quantity	Total Watts
LF1		2	
LF2		1	
LF3		1	
LF4		1	
LF5		1	
T1	21	4	84
Total Watts			
Area (SF)			1,625
Watts/SF			
ASHRAE 90.1 compliant?			1.31 -

evaluation

The café

Auditorium

description

The Auditorium is located on the second floor, and is connected to the main staircase and elevators. This space is used for presentations and as a classroom. The different programs in the space are very flexible. The space is geometrically a quarter-circle, making the curved wall the back of the room and focusing the front of the room on the center of the circle. The side walls measure 42' while the radius of the circle is 60'. The ceiling is set up in a radial fan pattern, sloping up in the front of the room and down toward the back. The total square footage is about 3,180 SF. Nine rows of desks are located around the quarter circle and slopes down toward the front of the room.

Figure 1.1
2nd Floor Plan

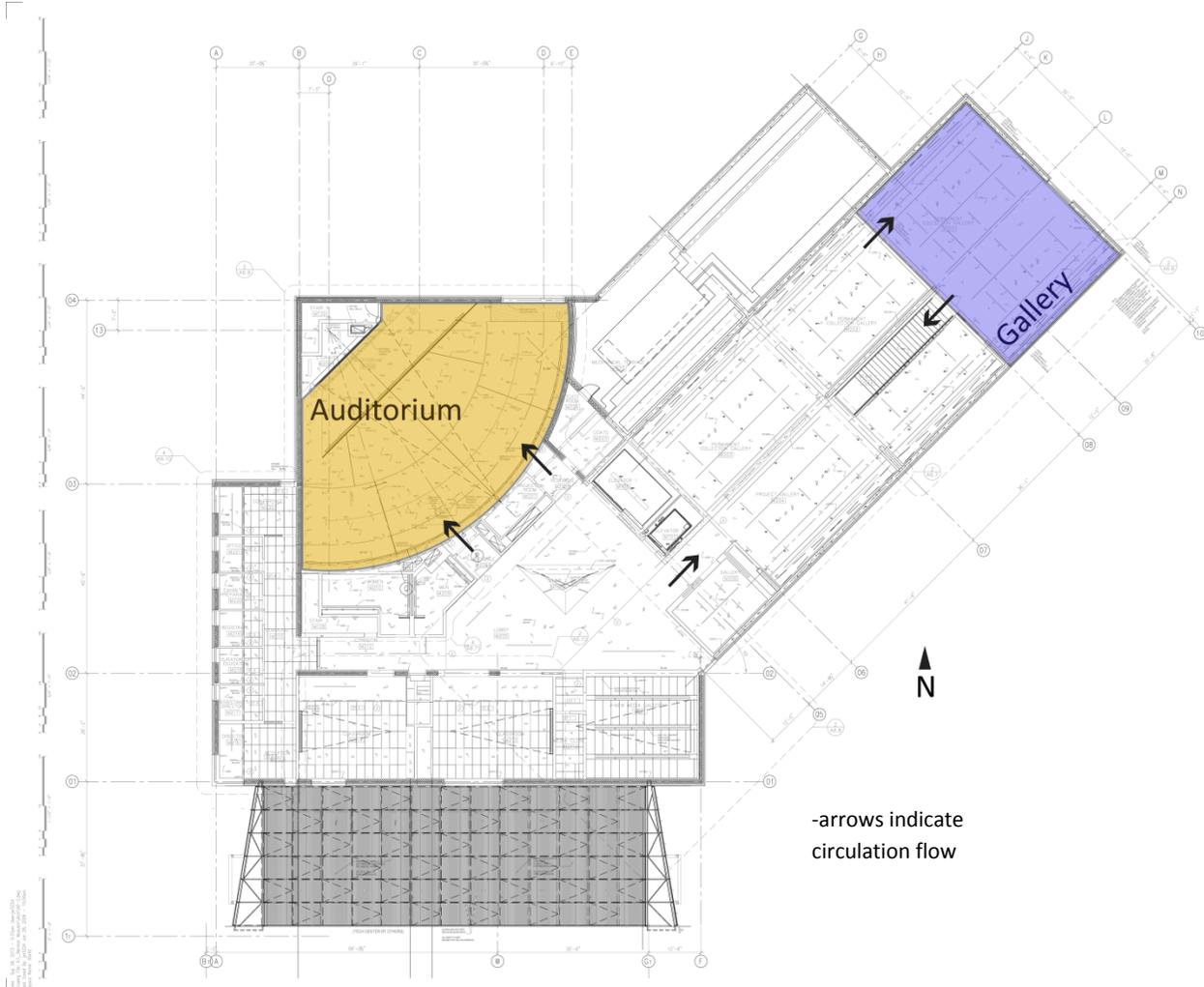


Figure 1.1
Auditorium Floor Plan

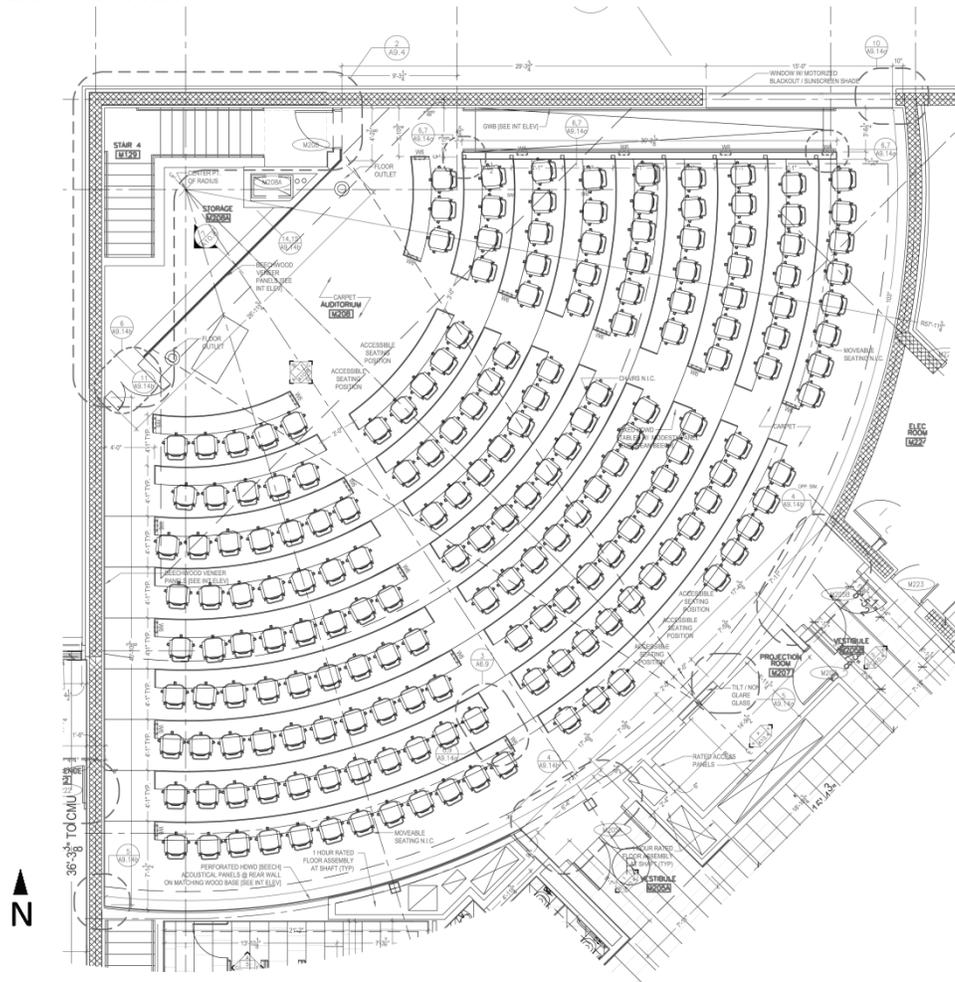


Table 1.1
Auditorium Finishes

Type	Description	Color	Reflectance	Manufacturer
floor	carpet	tan	0.35	-
base	aluminum	silver / painted	0.7	-
walls(side)	GWB / acoustic	off white / painted	0.7	-
walls(front / back)	wood / acoustic	light stain brown	0.5	-
ceiling(behind ceiling panels)	open to metal deck and truss system	grey	0.25	-
window(side)	glazing	glass	t=0.7	-
window(skylight)	diffuse skylight	acrylic	t=0.3	TBD
luminous ceiling panel	backlighting ceiling panel	white	t=0.71	Newmat stretch ceiling systems

overall design goals

The main lighting design goals for the auditorium are to create a relationship with the outside, creating center room focus, providing flexibility to the lighting scheme, creating a general brightness for alertness, and the right amount of illuminance for reading and writing on the desks. By simulating a cheery, overhead sky for the back-lighted ceiling panels, the room be provided with a relationship to the environment. The amount of light will fluctuate a little bit during the day while clouds move overhead. Skylights will provide daylight above the ceiling panels.



Just as a cloudy sky is contrasted by sunlight filtering through, so do the back-lighted ceiling panels.

tasks + activities

The auditorium is mainly used as a classroom throughout the day (8 am – evening classes). Being a part of the Johnson County Community College, the space will need to provide for a variety of different activities. Presentation on art and the work of the Nerman Museum will also take place in the auditorium.

design criteria

The illuminance values as well as certain design criteria were taken from IESNA Lighting Handbook. The lighting power density values were taken from ASHRAE/IESNA 90.1.

quantity of light

Table 1.1

Auditorium Illuminance (IES recommendations)

Space	E_h (lux)	E_v (lux)
av and notes	50	15
av no notes	10	6
feature presentations	10	6
no av	100	40
screen	-	10
speaker face	-	3x audience task
demonstration	1000	500

Table 1.1

Auditorium LPD

Space	Allowance
classroom/lecture/training	1.24

quality of light

relationship to the outside

By reshaping the ceiling and installing skylights above the auditorium, a connection to the outside will be created. As the clouds over head move, and as the sun moves around the building, the ceiling will change slightly in luminance. It is important to feel that connection to the environment because it will reinforce the heart of the Kyu Sung Woo's architecture.

center room focus

Establishing center room focus at the front of the room and the speaker or lecture is very important to any classroom and auditorium. A higher illuminance and luminance will be needed to achieve this hierarchy of space relationship.

flexibility

Since this space will need to house many different functions, the lighting will need to change accordingly. When the function calls for all the lights to be out, and just the AV running, motorized black-out shades will be deployed over the skylights for total darkness (under daylight condition). All fixtures will have dimming capabilities for the teacher to change as they please, with preset scenes also implemented for easy control. It is very import to have a lighting system that changes as much as the different programs occurring in the auditorium space.

brightness for alertness

A general brightness, that will keep the students awake and at attention, is needed for the overall classroom function of this space. During the daytime hours, when the skylights are being used, the illuminance will be brighter than most times. Lighting the ceiling, walls, and highlighting the front of the room will create a brighter room psychologically, even if the illuminance is at a normal level.

task illuminance

Because students will be using this space as a classroom, it is important that they have enough light to see general reading and writing tasks. Therefore the task illuminance at the work plane (2.5' height) will reach the target IES recommendation.

rendering of faces

Since the auditorium will have different lecturers, moving around the front of the room, it is important to light their faces well. Track lighting will highlight their faces from multiple locations in the ceiling, while a soft wash on the front wall will give depth to the scene.

visual interest

Creating some visual interest is fairly important because this is a school building and museum. The visual scale and brightness of the ceiling will provide the some additional visual interest to the space that is already rich with interesting architecture.

color temperature

Staying consistent with 3500K color temperature for the light sources is very important. When moving from space to space, a constant feel or tone is needed to create a total visual experience.

fixtures and equipment

Table 1.1
Auditorium Equipment Schedule

Type		Manufacturer	Description
	F2	Bartco	4 foot linear fluorescent strip. Integral ballast. (1) T8 lamp.
	F3	Bartco	4 foot linear fluorescent strip. Integral ballast. (2) T8 lamp.
	L2	Indy (Juno)	Pendant mount LED 9 inch cylinder downlight. 2000 lumen package. 31 watts. Open aperture with integral driver.
	L3	Indy (Juno)	Pendant mount LED 9 inch cylinder downlight. 2800 lumen package. 46 watts. Open aperture with integral driver.
	L4	Lumenpulse	1 foot LED strip. 8.5 watts/foot, Regular Output. 10x60 degree beam spread. Integral driver with standard dimming.
	L5	Lumenpulse	4 foot LED strip. 8.5 watts/foot, Regular Output. 10x60 degree beam spread. Integral driver with standard dimming.
	T4	Edison Price	Hanging LED tack system, integrated with fabric panel system, 1500 lumen package, 80+ CRI. 20 degree beam spread. Dimmable standard driver. 3500K
	T5	Edison Price	Hanging LED tack system, integrated with fabric panel system, 1500 lumen package, 80+ CRI. 40 degree beam spread. Dimmable standard driver. 3500K

Detail of Fabric Ceiling Panel System

TBD

Detail of Cylinder Spacing and Setback with Fabric Panel System

TBD

controls

TBD

Table 1.1

Auditorium Control Schedule

Manufacturer	Product	Description

Renderings

Figure 1.1

Auditorium: Pseudo Color Rendering (Nighttime)(Perspective View)

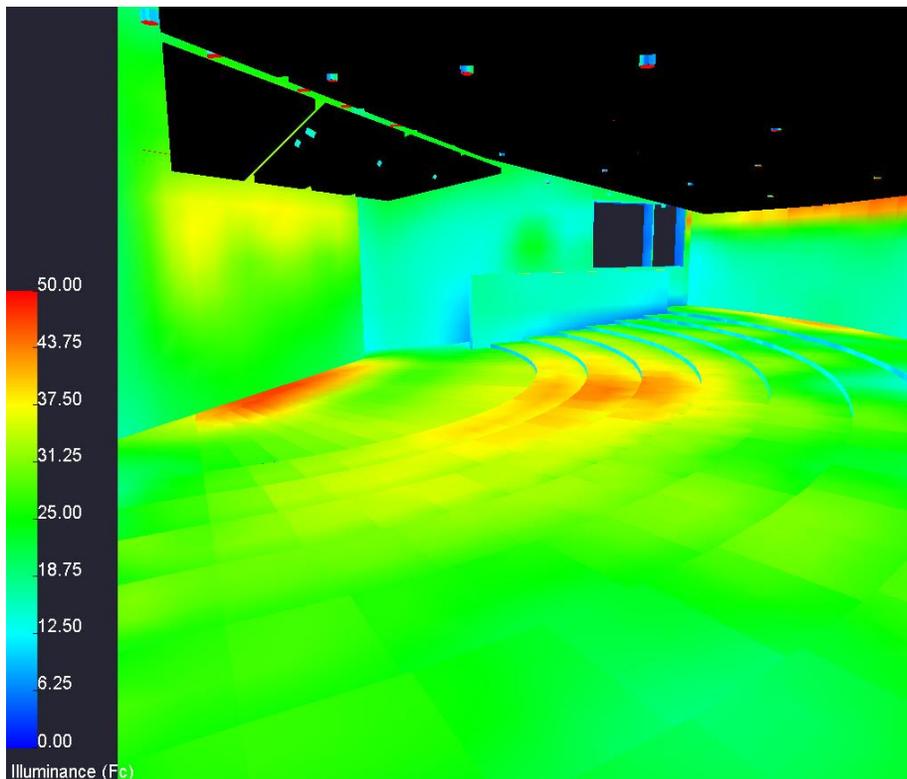


Figure 1.1
Auditorium: Nighttime Perspective Rendering #1

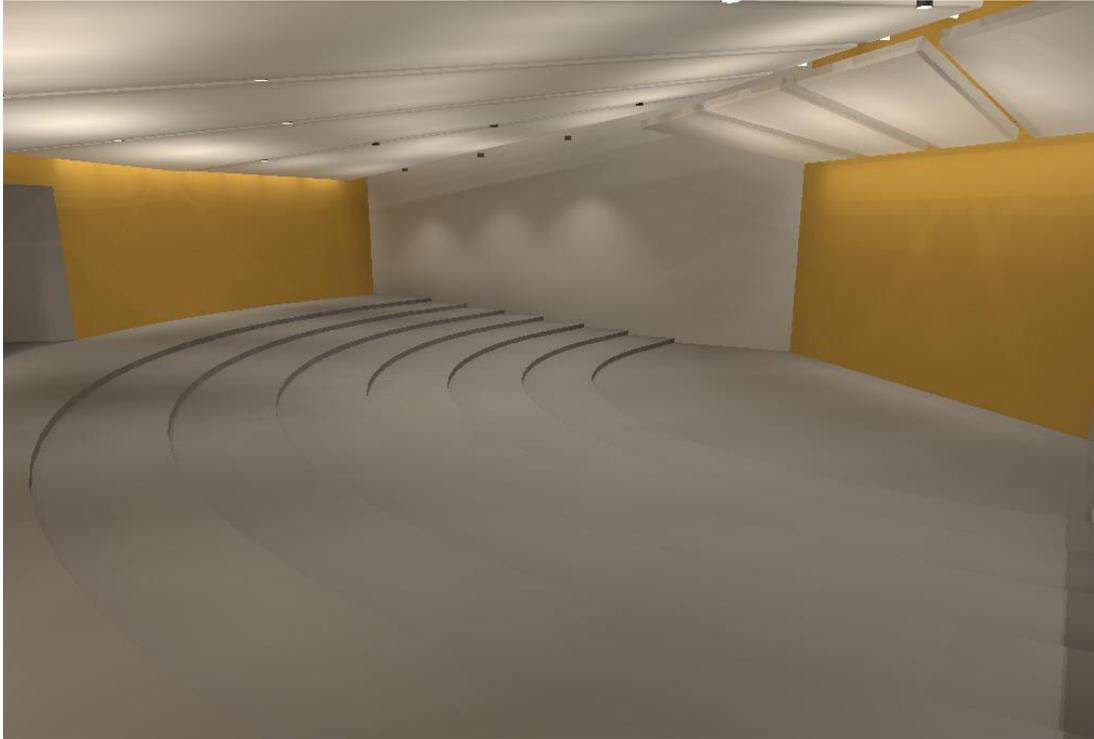


Figure 1.1
Auditorium: Nighttime Perspective Rendering #2



calculations

Illuminance

Figure 1.1

Auditorium: Illuminance Grid Points with Isolines (Nighttime)

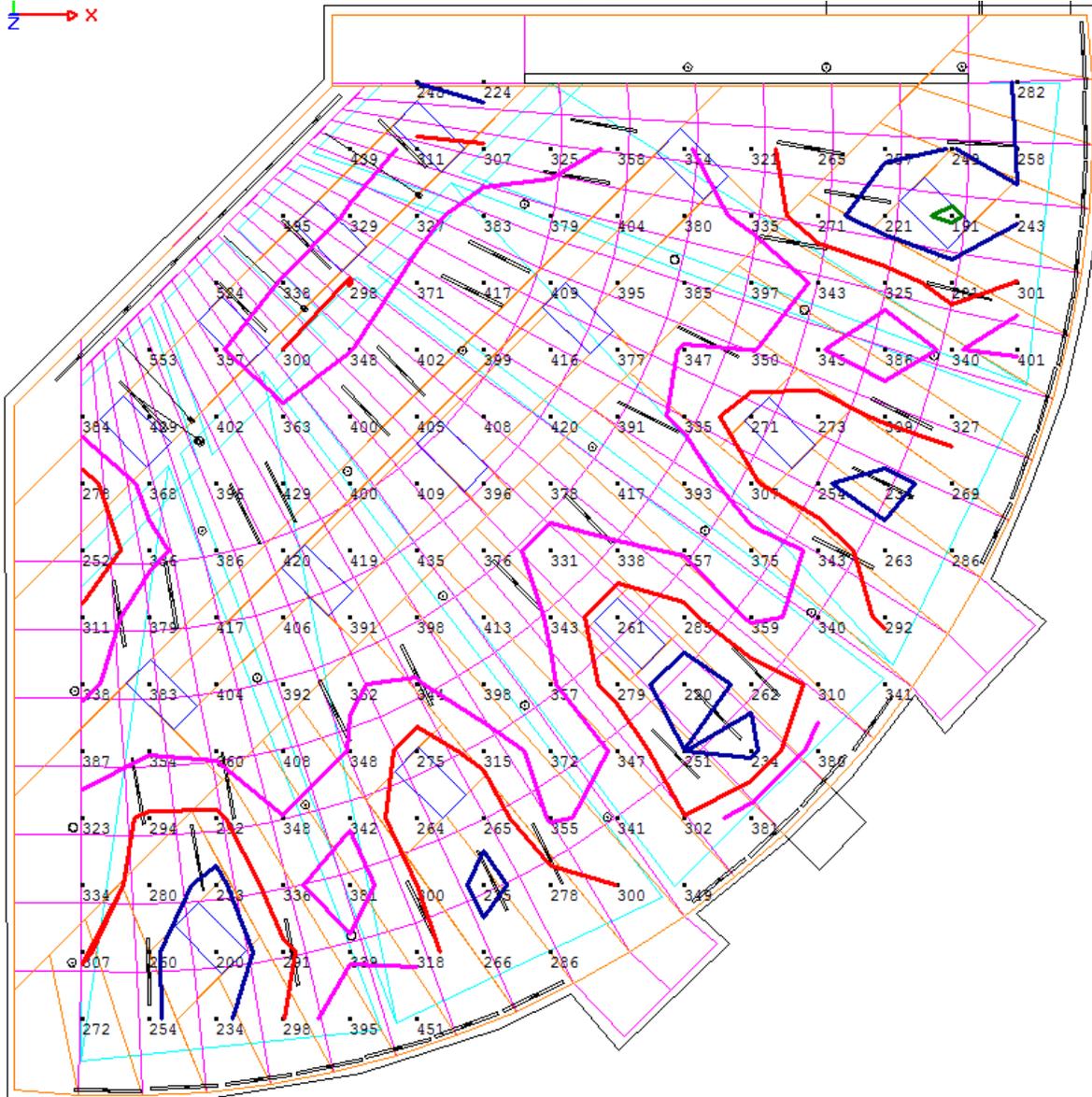


Table 1.1

Auditorium Illuminance Calculation Summary (workplane 1.5')

Space	E_h Recommendation (lux)	E_h Calculated (lux)
classroom reading and writing	300	336

Lighting Power Density

Table 1.1

Auditorium Lighting Power Density

Fixture Type	System Wattage	Quantity	Total Watts
F2	33	32	1,056
F3	66	7	462
L2	31	13	403
L3	46	10	460
L4	8.5	76	646
L5	34	6	204
T4	23	1	23
T5	23	3	69
Total Watts			3323
Area (SF)			3350
Watts/SF			0.99
ASHRAE 90.1 compliant?			1.24 - Yes

evaluation

The Auditorium

Gallery

description

The Gallery of study is located on the second floor, in the cantilever part of the building. This gallery is also the only gallery with a side window making it problematic with glare issues. There are two entrances and/or exits for this gallery. One is through another adjacent gallery, and the other is through a doorway and down a set of stairs that lead to the main first floor hallway. It measures 51' x 36' x 16'(h). This makes the space one large box that amounts to 1,836 SF. Art work can be found on all four sides as well as the potential for sculpture in the middle of the space.

Figure 1.1
2nd Floor Plan

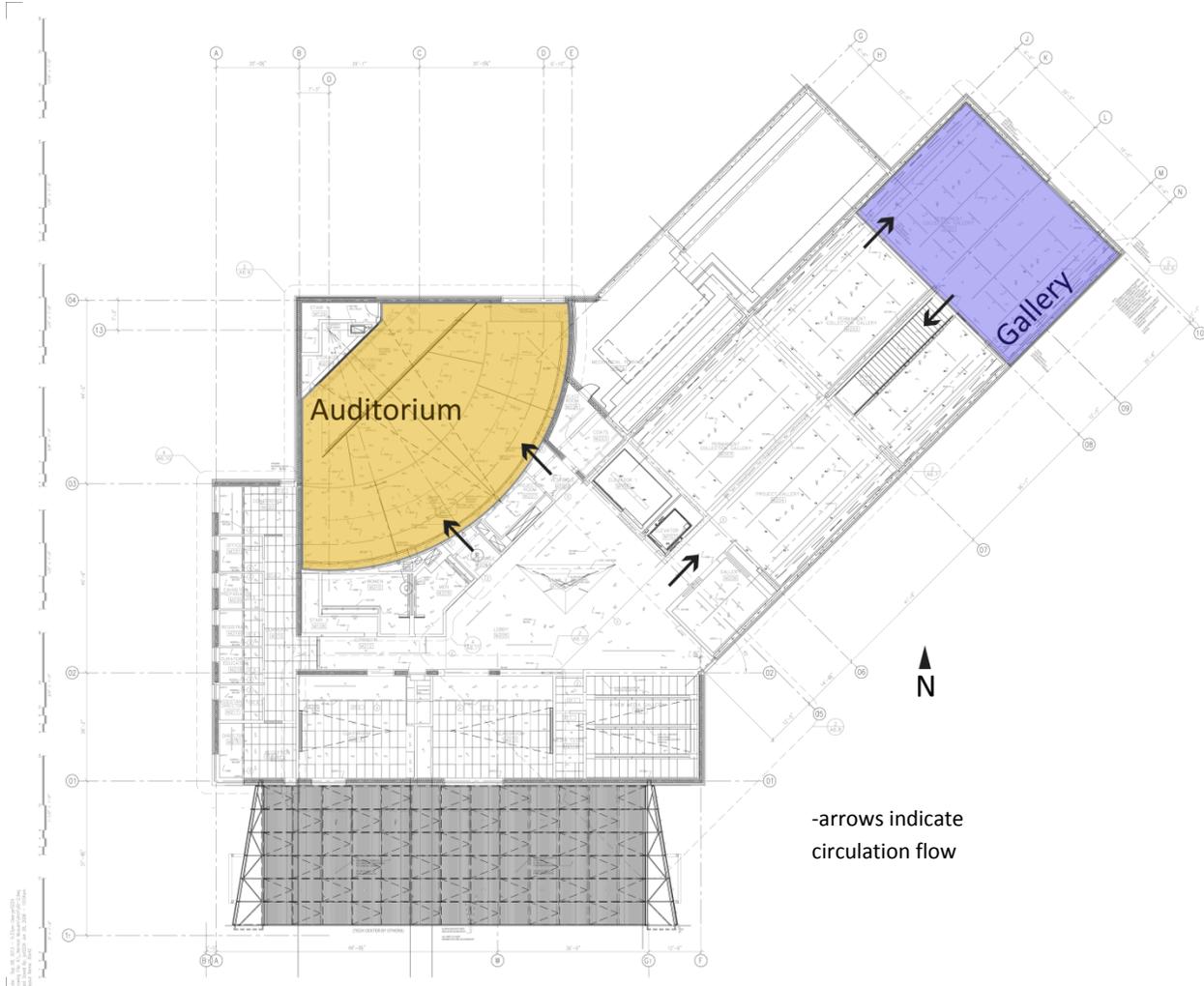


Figure 1.1
Gallery Floor Plan

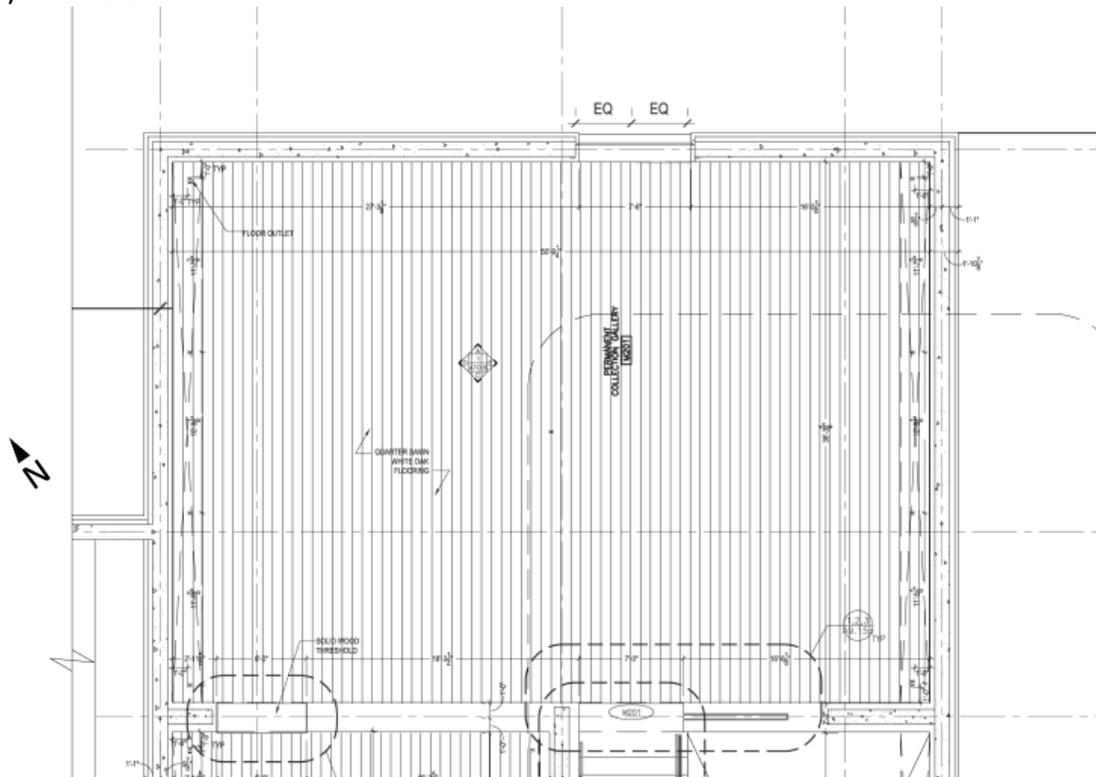


Table 1.1
Gallery Finishes

Type	Description	Color	Reflectance	Manufacturer
floor	stone	brown	0.6	-
base	aluminum	silver / painted	0.7	-
walls	GWB	off white / painted	0.7	-
ceiling	perf. GWB	off white / painted	0.7	-
window	glazing	glass	t=0.7	-
fabric panel	stretched fabric over track system	fairly translucent	openness= TBD	TBD

overall design goals

The main design objective for the gallery, first and foremost, is to compel the artwork to stand out. The lighting will also take into account the contrast, particularly during daytime hours, reinforcing architectural form, protecting the artwork from harmful electromagnetic light, and creating an overall pleasant space to look at art in. The ceiling will be reconfigured to have three drop down fabric panels. The track lighting will be integrated into the framing system. These fabric panels will be grazed at the edge of the frame to create a gradient sky. This strengthens the connection to the buildings environment.

Just as a sky's horizon is painted with a gradient, so do the grazed fabric ceiling panels.



tasks + activities

The main activities in this space will be to view the artwork. During off hours, the lighting will have to accommodate work conditions to change or alter art in the space.

design criteria

The illuminance values as well as certain design criteria were taken from IESNA Lighting Handbook. The lighting power density values were taken from ASHRAE/IESNA 90.1.

quantity of light

Table 1.1

Gallery Illuminance (IES recommendations)

Space	E_h (lux)	E_v (lux)
art(high sensitivity)- moderate focals	-	50
art(low sensitivity)- moderate focals	-	200
art(no sensitivity)- moderate focals	-	1000
gallery general- moderate focals	$0.1 \times E_v$ of art w/ ≥ 10	-
security	30	30
work light	150	30

Table 1.1

Gallery LPD

Space	Allowance
gallery - artwork	1.05

quality of light

contrast

TDB

flexibility

TDB

architectural form

TDB

luminances visual surfaces

TDB

protecting the artwork

TDB

color rendering

TDB

visual interest

TDB

color temperature

Since this space receives a lot of daylight, and also needs to be sensitive to artwork and the color rendering of traditional light sources, a middle of the road color temperature was selected throughout the building (3500K). Track lighting, whenever lighting a piece of art, requires a CRI in the 90s, but the general ambient light in the space can be a lower CRI in the 80s.

fixtures and equipment

Table 1.1
Gallery Equipment Schedule

Type	Manufacturer	Description
	F2 Bartco	4 foot linear fluorescent strip. Integral ballast. (1) T8 lamp.

 <p>30° In AT3 Channel</p>	L1	Acolyte	LED RibbonLyte static white 3500K. AT3 Channel with 30 degree beam spread. 1.5 watts per foot.
	T1	Edison Price	Hanging LED tack system, integrated with fabric panel system, 1000 lumen package, artist series 97 CRI. 20 degree beam spread. Dimmable standard driver. 3500K
	T2	Edison Price	Hanging LED tack system, integrated with fabric panel system, 1000 lumen package, artist series 97 CRI. 40 degree beam spread. Dimmable standard driver. 3500K
	T3	Edison Price	Hanging LED tack system, integrated with fabric panel system, 1000 lumen package, artist series 97 CRI. 60 degree beam spread wall washer. Dimmable standard driver. 3500K

Detail of Fabric Panel System

TDB

Detail of Track Integration into Fabric Panel System

TDB

controls

TDB

Table 1.1
Gallery Control Schedule

Manufacturer	Product	Description

Renderings

Figure 1.1

Gallery: Pseudo Color Rendering (Nighttime)(Perspective View)

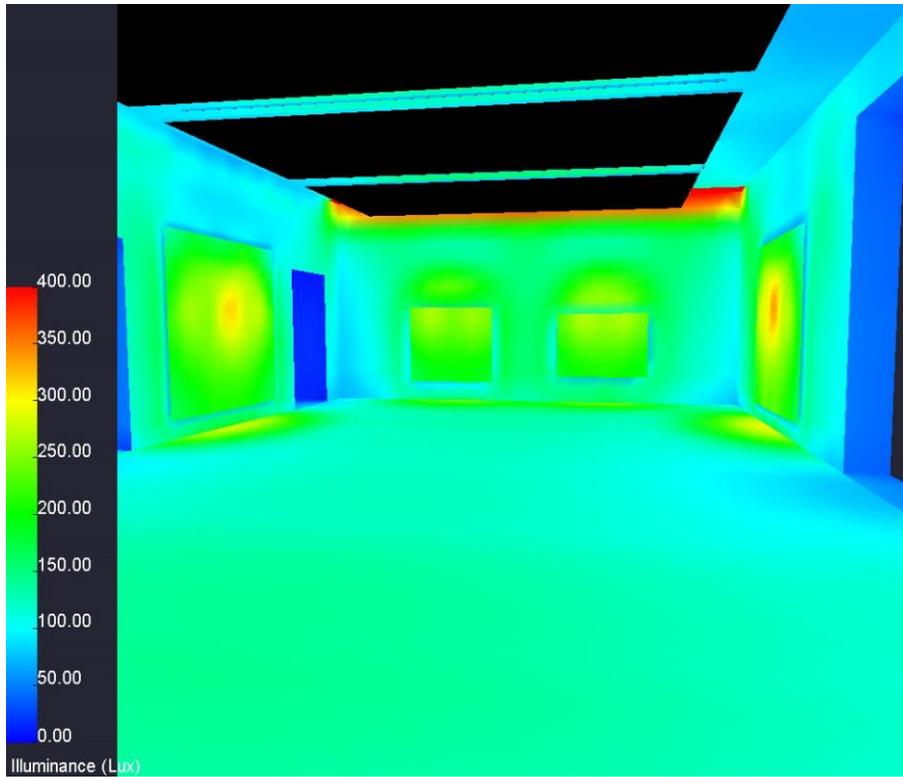


Figure 1.1

Gallery: Daytime Perspective Rendering (June 20th 1:00 p.m. – Overcast sky)



Figure 1.1

Gallery: Nighttime Perspective Rendering



calculations

Illuminance

Figure 1.1

Gallery: Illuminance Grid Points with Isolines (Nighttime)

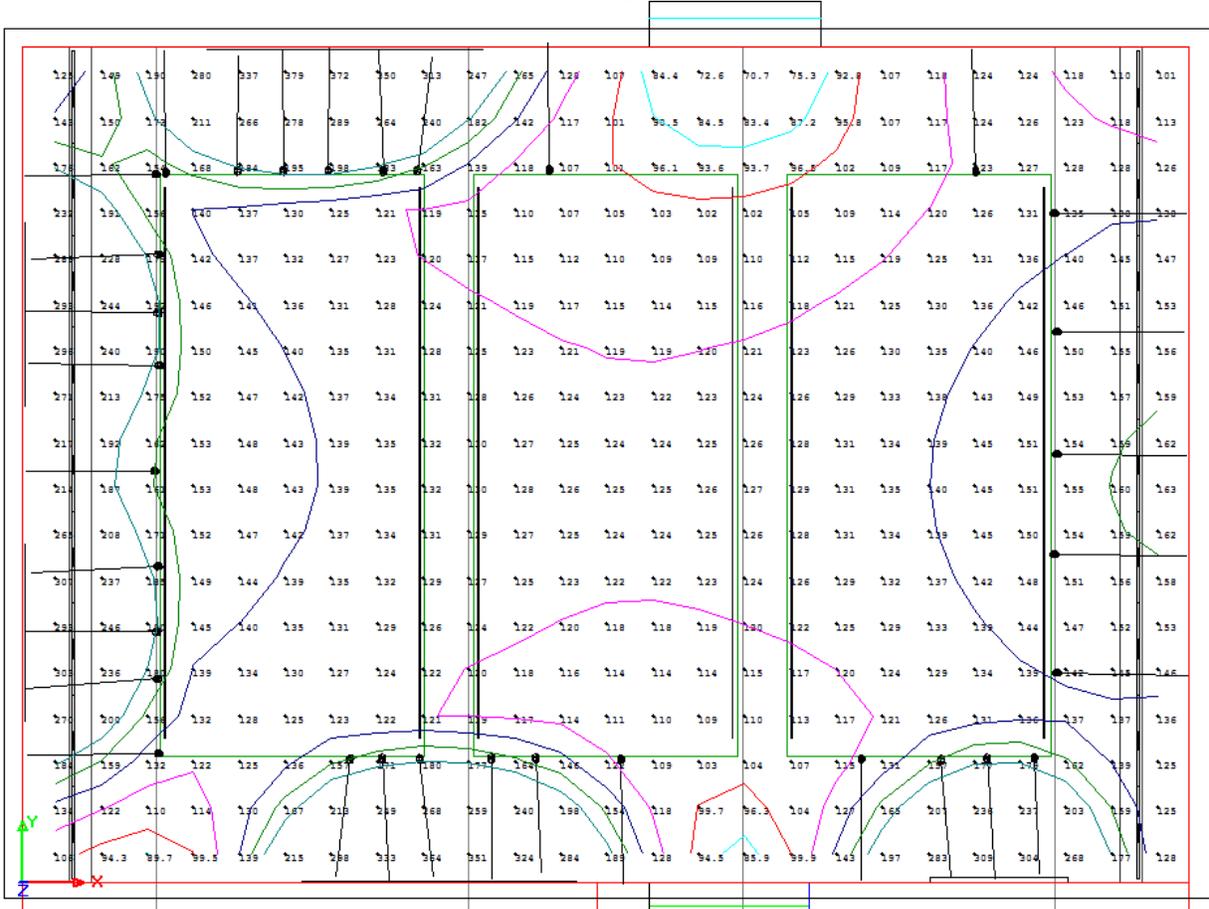


Table 1.1

Gallery Illuminance Calculation Summary (workplane 1.5')

Space	E_h Recommendation (lux)	E_h Calculated (lux)
gallery floor space	20	115
artwork (typical)	200 (E_v)	305(E_v)

Lighting Power Density

Table 1.1

Gallery Lighting Power Density

Fixture Type	System Wattage	Quantity	Total Watts
F1	33.5	18	603
L1	4.4	72	316.8
T1	21	12	252
T2	21	7	147
T3	21	13	273
Total Watts			1592
Area (SF)			1,990
Watts/SF			0.8
ASHRAE 90.1 compliant?			1.05 - Yes

The LPD currently lighting the gallery falls under the ASHRAE requirement of 1.05 W/SF. By just calculating the total wattage of the F1 and L1 fixtures, and comparing it to the area and W/SF needed for the space, there could be a maximum of **55** track (T1, T2, T3) fixtures to light the artwork. This is assuming the track fixtures to have a system-wattage of 21W. At the moment there are a total of 32 track fixtures. This will allow for much needed flexibility in this gallery for different size art work and for added sculptures to the gallery floor area.

evaluation

The Gallery