

VIRGINIA
SHIPBUILDING CARRIER AND
ADVANCED
INTEGRATION CENTER

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LIGHTING/ELECTRICAL
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OCTOBER 4, 2010

The following document describes the existing lighting systems and spatial environment considerations, including luminaires and lamps, of the VASCIC Building of Newport News, Virginia. A summarized list of design considerations and criteria was developed for four main spaces. Evaluation of the existing lighting system was concluded.

Executive Summary:

The contents of this report are based on the evaluation of the lighting systems for the Virginia Advanced Shipbuilding Carrier and Integration Center in Newport News, Virginia. Four spaces were analyzed; a large work space (fifth floor open-office area), a special purpose space (the auditorium), a circulation space (the main lobby and staircase), and lastly an exterior space (design of a new exterior gather space).

The purpose of this report is to study the existing conditions of the building in order to generate design considerations and criteria for a proposal of redesign at a later date. For each space, materials, existing lighting equipment, tasks, architecture, and the desired impression were considered. To conclude each space, an evaluation using a lighting analysis program such as AGi 32 was used to provide accurate lighting data that exists currently. Schedules, drafting sheets, photos, and renderings are provided to aid the explanations and evaluations of each space.

Overall, the lighting was designed for a public space. After reviewing the IESNA recommendations for illuminance levels and lighting power density using the space-by-space method (W/FT^2), the atrium space of the lobby was the only space that proved to have a higher lighting power density value than allowed by ASHRAE 90.1-2007.

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General Building Statistics

Building Name: Virginia Advanced Shipbuilding and Carrier Integration Center

Location: Newport News, Virginia

Building Occupant Name: Northrop Grumman

Occupancy/Function: Office/Research/Shipbuilding

Size: 241,000 SF

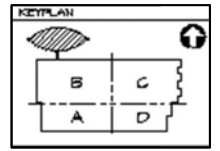
Number of Stories: Office Tower-8, Laboratory-3, Parking Garage-4

Primary Project Teams:

- Owner: Northrop Grumman
- A/S/M/P/F/E: Clark Nexsen Architectural and Engineering

Dates of Construction: December 1999 - February 2002

Project Delivery Method: Design-Bid-Build



Large Work Space | Open Office | Existing Conditions

Description

The Office Tower is comprised of 8 floors intended to hold 80 work stations per floor for office support. It is an open office floor plan where the integration of electrical and technological systems takes place for advanced shipbuilding. Indirectly lit with low partitioning walls and exterior glazing promote an open feeling environment to the worker allowing great views to the exterior.

Existing Room Conditions

Area: Approximately 6376 SF from curtain wall system to interior column line

Dimensions: Approximately 27' 9" x 229' 9" , ceiling height of 10'

Space Category: Office Work

Materials: Refer to Figure 1: Fifth Floor | Open Office Plan | Finish Schedule







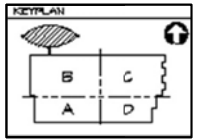
Material/Finish	Manufacturer	Location	Color		Reflectance
Carpet (Accent)/ CPT8	Shaw Contract Group	Open Office Floor		#10483- Indigo	0.12
Paint/ PT1	Benjamin Moore	Partition Walls		#HC-173- Light Grey	0.86
Paint/ PT2	Benjamin Moore	Partition Walls		#1579-Soft Green	0.72
Paint/ PT3	Benjamin Moore	Partition Walls		#1567- Medium Green	0.60
Paint/ PT4	Benjamin Moore	Partition Walls		#1568-Dark Green	0.32
Paint/ PT5	Benjamin Moore	Partition Walls		#1414-Dark Plum	0.25

Figure 1: Fifth Floor | Open Office Plan | Finish Schedule



Fifth Floor | Open Office Plan

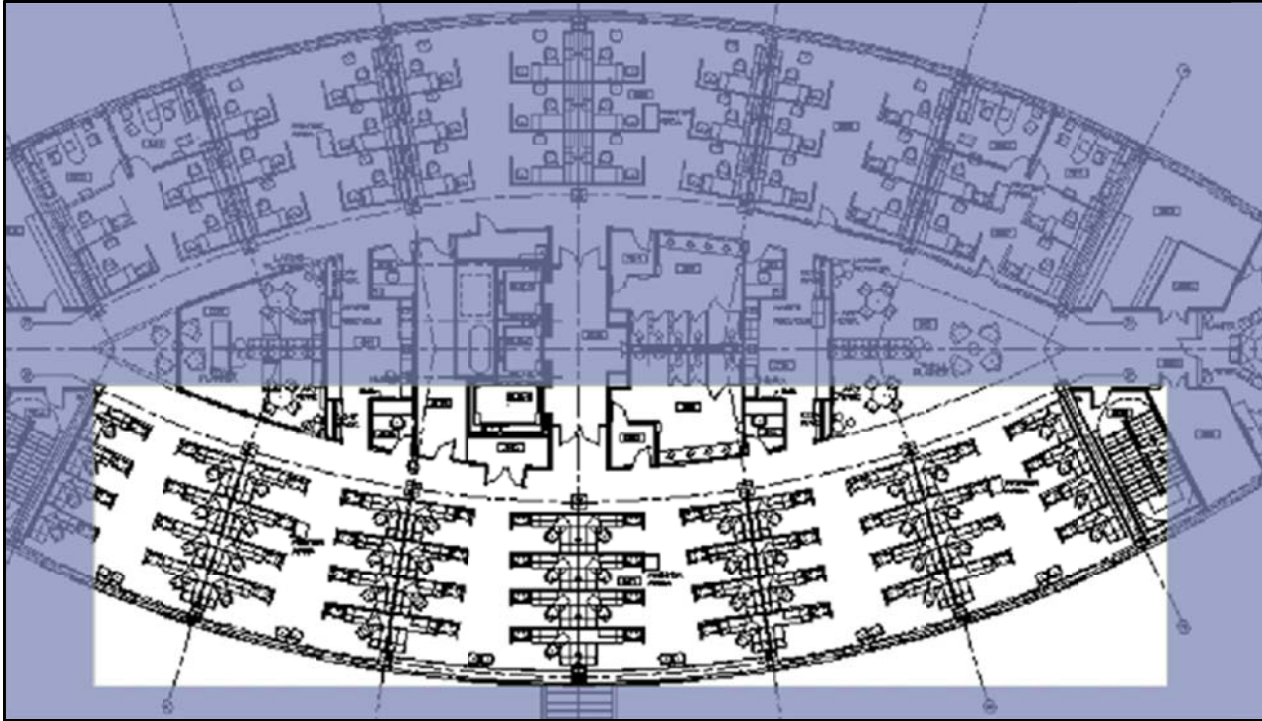


Figure 2: Fifth Floor | Open Office Furniture Plan

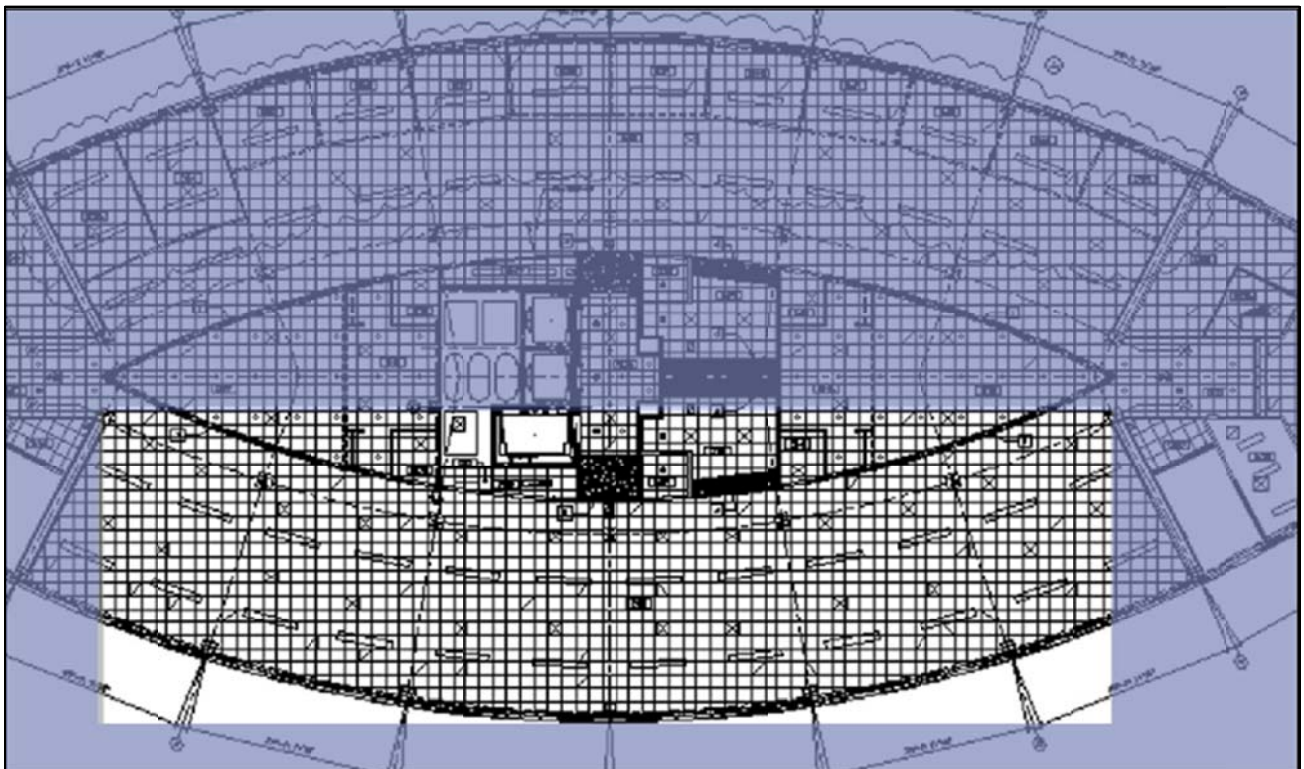


Figure 3: Fifth Floor | Reflected Ceiling Plan

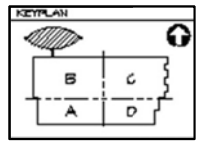


Figure 4: Open Office | Floor Plan with Exterior Views

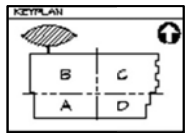


Figure 5: Open Office | Partitioning Walls

Existing Lighting Equipment

The open office areas of the building (floors 3-8) have a typical lighting layout utilizing a task/ambient lighting system (fixture type JJ- Figure 6) as seen in Figure 4 photograph. Each luminaire is 8 ft in length and spaced horizontally 13.4' (161.1887"), and 12.5' (151.267") perpendicularly. Each luminaire is equipped with six 32 W T8 lamps and required to have an integrated dimming ballast. Because this is a work space, controllability is crucial to the occupant. The 24 luminaires are controlled by three switches in the corridor area near the elevator lobby centralized in the center of the building.

Daylighting plays an important role in this space due to an entire glass façade. The curtain wall system consists of two different types of glazing (refer to Figure 5). Both types of glass panels are insulated with low solar heat gain coefficients. Glass type IG-3 includes a grey frit pattern but obtains the same values as for glass type IG-2.



Symbol	Lccation	Mounting	Manufacturer/ Catalog #	#/Lamp Type/ Wattage	Notes
	Open Office Areas	Pendant	Litecontrol/ P-ID-5244T8-PBSS-CWM-LP/ELB-1CNP-FAI/ACC	6-F32T8	8 FT lamp with dimming ballast at 3500K
	Open office Lobby Walls	Wall Mounted	Manning/ DS-77-12	1-26W CFL	Fixtures to be mounted inverted on the wall with lenses to conceal lamps

Figure 6: Open Office | Luminaire Fixture Schedule

Façade Glazing Finishes						
Note Number	Type per Spec	Manufacturer	Description	Transmittance	Solar Gain Coefficient	Visible Reflectance
9	IG-2	<u>Viracon</u>	Insulated mirrored spandrel glass	12%	0.17	32%
11	IG-3	<u>Viracon</u>	Insulated mirrored glass with a medium gray frit pattern	12%	0.17	32%

Figure 7: Open Office | Glazing Finishes



Figure 8: Partial Elevation | Glazing

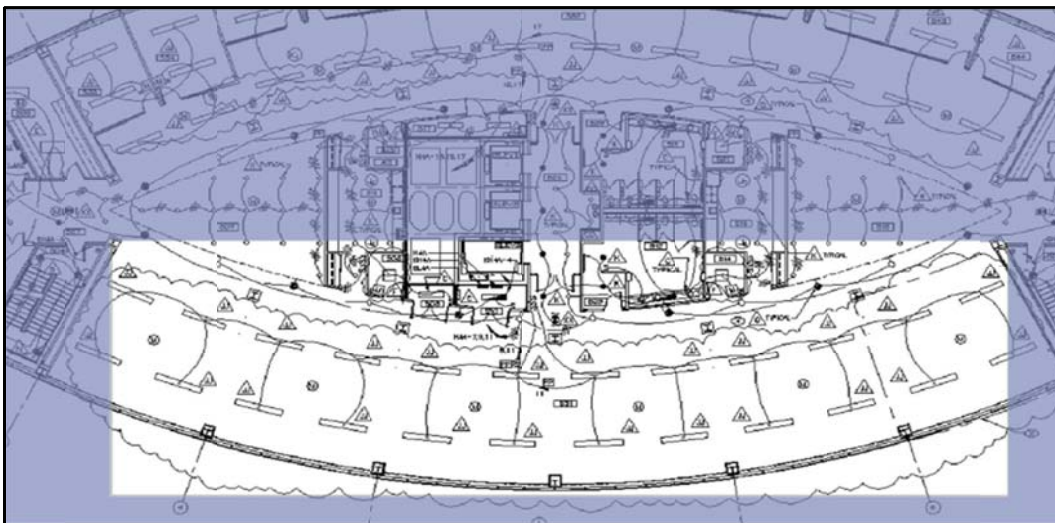
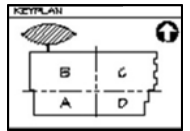


Figure 9: Fifth Floor | Open Office | Lighting Plan



Large Work Space | Open Office | Design Considerations and Criteria

(IESNA Handbook: Office Lighting, Ch. 11, pg. 11-1 to 11-21)

- **Psychological Impression**

The office space is a very task oriented space and therefore should be designed for a public while spacious environment. Uniformity will be important to keep consistent throughout entire space. Highlighting the walls and ceiling will enhance the spaciousness of the environment.

- **Luminous Environment**

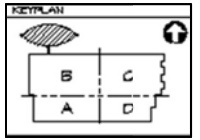
The luminous environment plays an important role in designing for any type of office. Luminous differences and color contrast are necessary for vision which also contributes to an esthetically interesting space. When there are no prolonged visual tasks occurring in the space, it is encouraged to use various brightness levels and attractive colors to catch the eye.

Task lighting is another important feature in the environment when designing using an indirect lighting system. It is important to light the walls and ceiling rather than the floor directly, but it is also critical to have an appropriate amount of light reaching the task surface, in this case a desk. Task lighting can produce smooth pools of light that are not harsh on the eye rather than creating shadows on workstations to distracting or make the occupant feel enclosed rather than in an open, comfortable space.

- **Quantitative Visual Performance (IESNA Lighting Design Guide)**

Intensive VDT Usage

- Horizontal Illuminance- 30 FC (Important for work surface illuminance)
- Vertical Illuminance- 5 FC (Very crucial to avoid glare)



Intermittent VDT Usage

- Horizontal Illuminance- 50 FC
- Vertical Illuminance- 5 FC

Surface Reflectances:

- Partitions: 40-70%
- Furniture: 25-45%
- Floors: 20-40%
- Ceilings: 80% or more

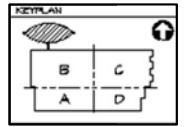
▪ Overall Room Brightness

White or light-colored paint finishes coinciding with washed walls and ceilings can brighten a space and better the attitude of the worker. While washing the walls with light, scalloping can be a consideration to avoid in an office environment as it can be distracting. If scalloping is designed in a rhythmic pattern, or is highlighting a feature on a wall, it can be an interesting and intriguing feature to add to a space.

▪ Design Issues to Consider

- Direct glare
- Vertical Illuminance
- Luminances of room surfaces
- Reflected Glare
- Source/Task/Eye geometry

Indirect lighting should be designed to not have hot spots or excessive luminance on the ceiling. Direct lighting portion of the luminaire should provide diffusing light and adequate shielding to create visual comfort without glare of any type.



- **Power Density Allowances**
 - ASHRAE 90.1-2007 Section 9.6: Space-By-Space Method
 - Open Plan Office – 1.1 W/FT²

Lighting Power Density Calculation							
Space	Ballast	Input Watts	Lamps/Luminaire	# of Luminaires	Total Area	Allowable W/FT ²	Calculated W/FT ²
Office	GE LFL UltraMax Electronic High Efficiency Multivolt Instant Start	215	6	24	6376	1.1 W/FT ²	0.63 W/FT ²

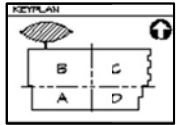
Figure 10: Open Office | Lighting Power Density

Large Work Space | Open Office | Evaluation and Critique

NOTE: All models and calculation analyses are located at azl50175(\aep.coeaccess.psu.edu)(P:)\Fall2010\AE481W\TECH 1 LIGHTING ANALYSIS\Office

In the evaluation of the open office space, many factors were considered. Light Loss Factors (LLFs) were first calculated using the IESNA Lighting Design Handbook 2010 method. Lamp lumen depreciation (LLD), luminaire dirt depreciation (LDD), and ballast factor (BF) were considered. The ballast used for the indirect system a GE LFL ProLine Electronic Standard Instant Start Ballast. The ballast specified is a three-lamp ballast so two ballast are needed for each luminaire housing 6 lamps. Light loss factors are summarized in Figure 11.

Secondly, the lighting design was evaluated based on uniformity of the space, illuminance on the task surface, and the comparison of light on the walls and ceiling verses direct light on the floor. Since the entire open office on one side of the fifth floor is approximately 6676 FT², a 26' x 26' portion was modeled and used for the analysis. Refer to Figure 13 for exact location. Because this was done, the values calculated using AGi32 will be higher than what is designed for a few reasons. There would be less light interaction with ambient light spreading throughout the space, the curtain wall would allow for daylight to penetrate the space, and task lighting would improve the task surface illumination. With these points in mind, the AGi32 results were still acceptable, though the rendered images look very “enclosed” .



Light Loss Factor Breakdown							
Fixture Type	Environment Type	Luminaire Classification	Cleaning Cycle	Lamp Lumen Depreciation	Ballast Factor	Luminaire Dirt Depreciation	Total LLF
JJ	Clean	Other/Semi-Indirect/X	12 month	0.95	0.94	0.9	0.804

Figure 11: Open Office | Light Loss Factor Breakdown

Location	Average FC	Avg/Min	Max/Min	Uniformity Gradient
Desk Surface	33.31	2.31	3.56	2.53
Floor	33.07	4.08	5.8	4.88
Ceiling	43.75	4.25	12.29	4.01
Exterior Wall	18.71	1.61	1.86	N/A

Figure 12: Open Office | Illuminance Values Per Surface

From the above Figure 12, it is clear that the lighting design for the open office is quite acceptable. More light reaches the ceiling than reaches the floor and other surfaces. However, in this chart the amount of light that reached the exterior wall is lower than expected. This would be higher in the actual space because the exterior wall is a curtain wall system which would permit daylight penetration. Also, there is an adequate amount of light that reaches the desk surface which is most important.

Figures 13 and 14 are two views of the open office plan. Depicted here is the adequate amount of light reaching the task surface as well as light on the ceiling and walls.

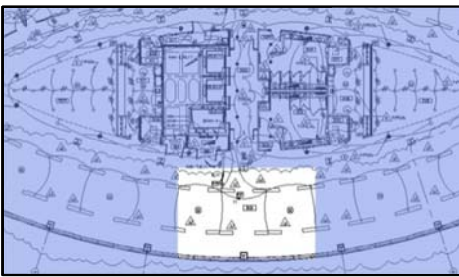
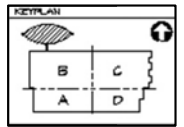


Figure 12: Open Office | Lighting Analysis Area

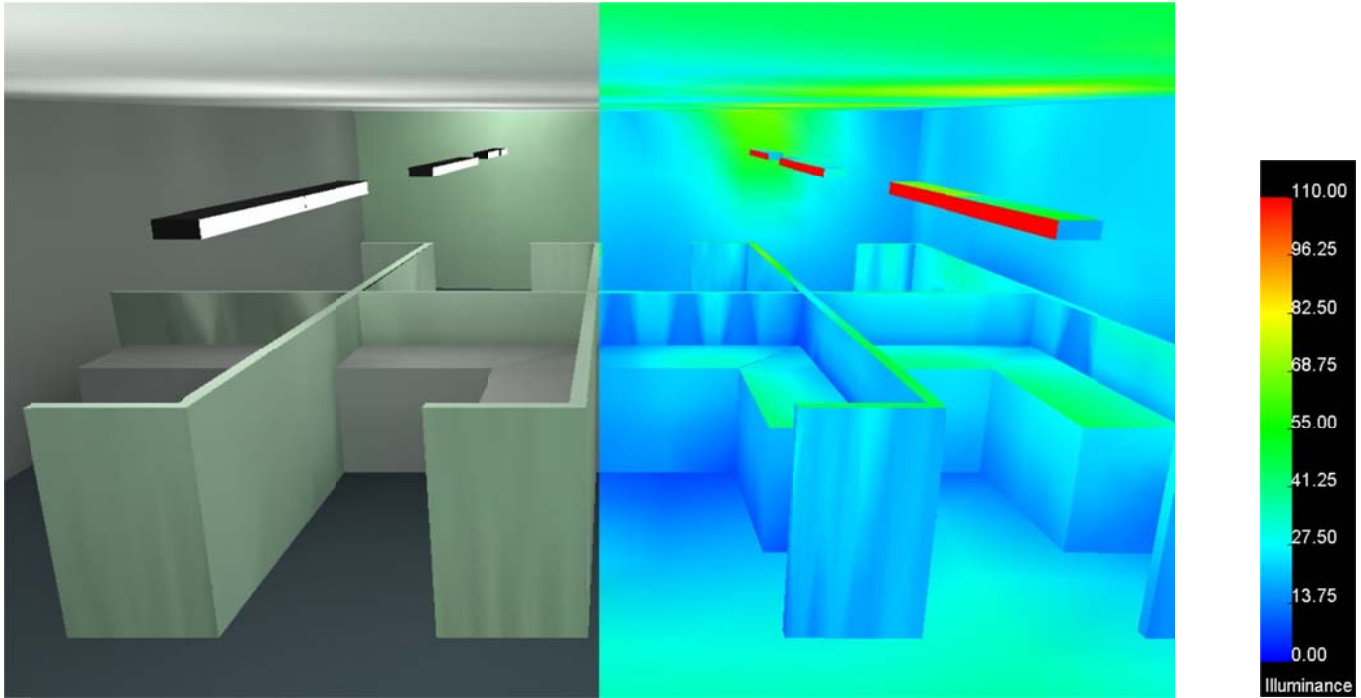


Figure 13: Open Office | Areal Office View 1 | Pseudo RGB Rendering

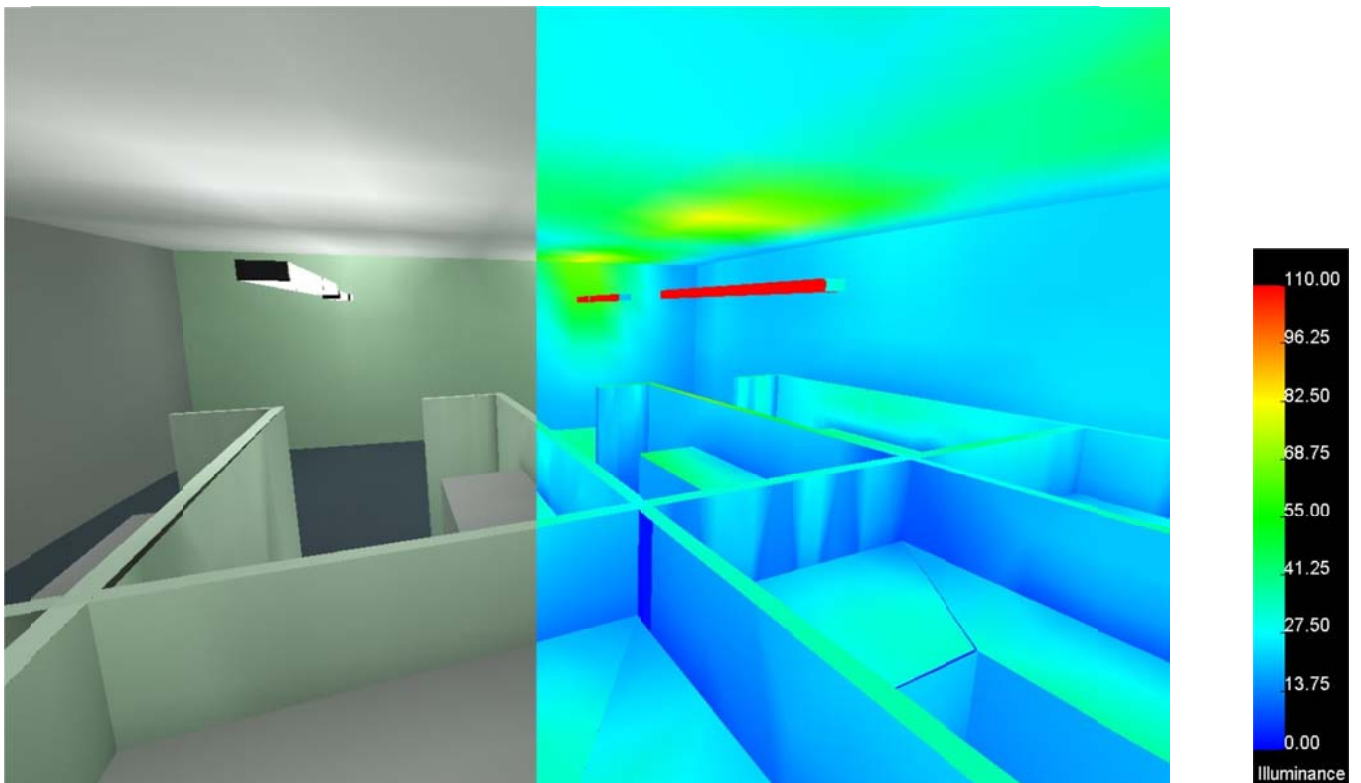
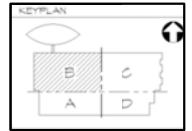


Figure 14: Open Office | Areal Office View 2 | Pseudo RGB Rendering



Special Use | Auditorium | Existing Conditions

Description

The auditorium is located in the Laboratory Wing on the second floor. Capacity at 180 people in twelve rows, it is a multi-use space allowing for presentations, as well as two individual podiums for speakers or perhaps a large meeting. Along the west side of the auditorium, a curtain wall system looks out onto a terrace patio that connects to a large serving cafeteria located just behind the auditorium. Multiple lighting zones are operable from four separate locations to easily cater to the needs of the user.

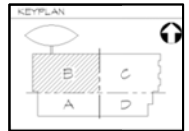
Existing Room Conditions

Area: Approximately 7500 SF

Dimensions: Approximately 92' 11" x 50' 3" , ceiling height of 25' 8"

Space Category: Multi-use space/Auditorium

Materials: Refer to Figure 15: Auditorium | Finish Schedule



Material/Finish	Manufacturer	Location		Color	Refelectance
Wall Covering Fabric/WC7	Designtex	Sout Wall		#RGB1275 -Straw	0.63
Accent Paint/PT8	Benjamin Moore	East Wall		#374-Soft Yellow	0.93
Acoustical Panel Fabric/APF1	Guilford of Maine	West Wall		#553- Blue Plum	0.03
Glass Wall/IG-2	Viracon	North Wall		Transparent, Visible Transmittance: 70%	0.32
Carpet (Accent)/CPT8	Shaw Contract Group	Stage Area		#10483- Indigo	0.12
Carpet/CPT9	Shaw Contract Group	Remaing floor area, steps		#18413- Picasso (Blue Multi)	0.03
Acoustical Ceiling Tile/ACT2	Armstrong World Industries	Stage Ceiling		#1775- White	0.83
Acoustical Ceiling Tile/ACT3	Armstrong World Industries	Ceiling of Seating		#8005- White	0.9
Celing Paint/PT7	Benjamin Moore	Ceiling Paint		Decorator's White	0.86
Countertop Laminate/PL5	Nevamar	Desk Countertop		#ES-6-2T	0.3
Wood Edge/WD1	N/A	Desk Edge		Maple with Clear Finish	0.45

Figure 15: Auditorium | Finish Schedule

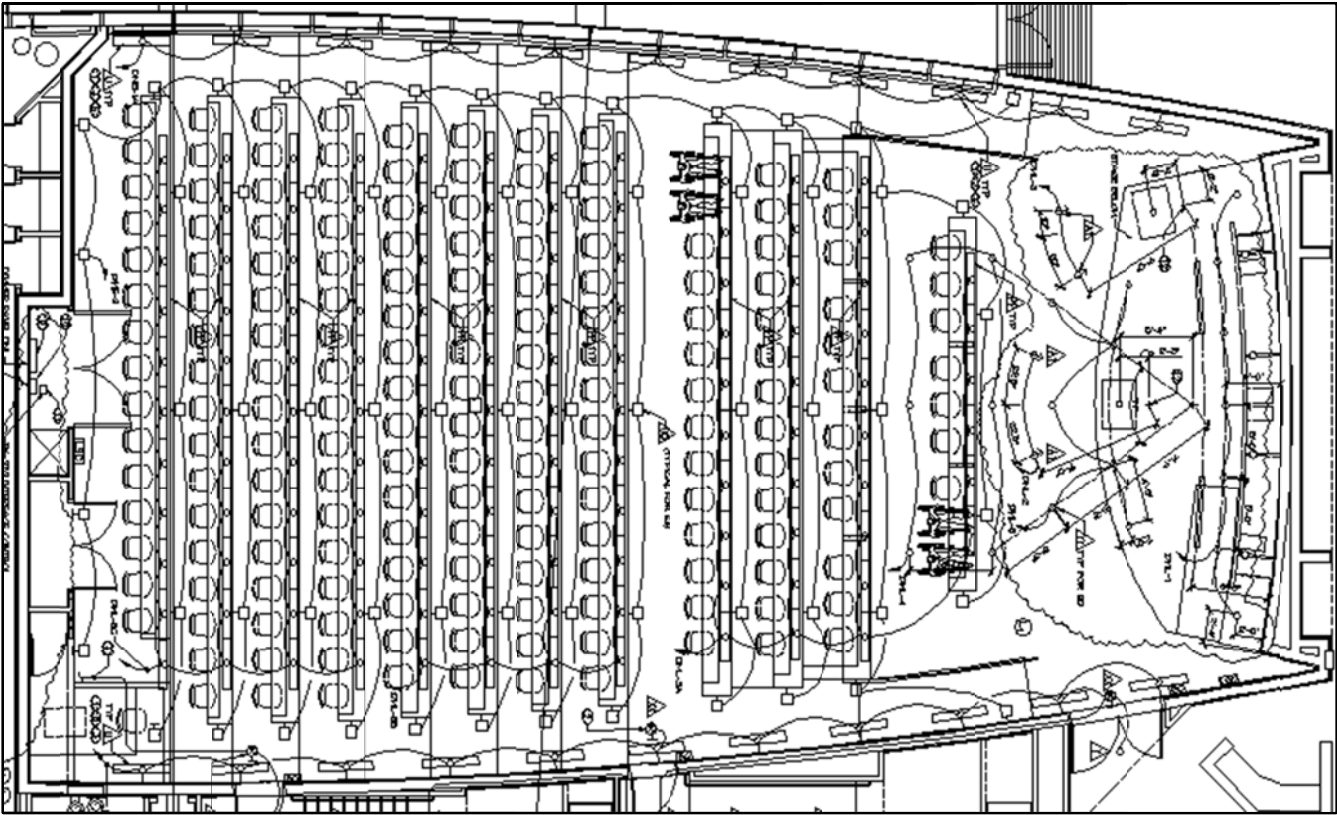
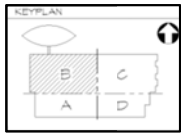


Figure 16: Auditorium | Furniture Floor Plan

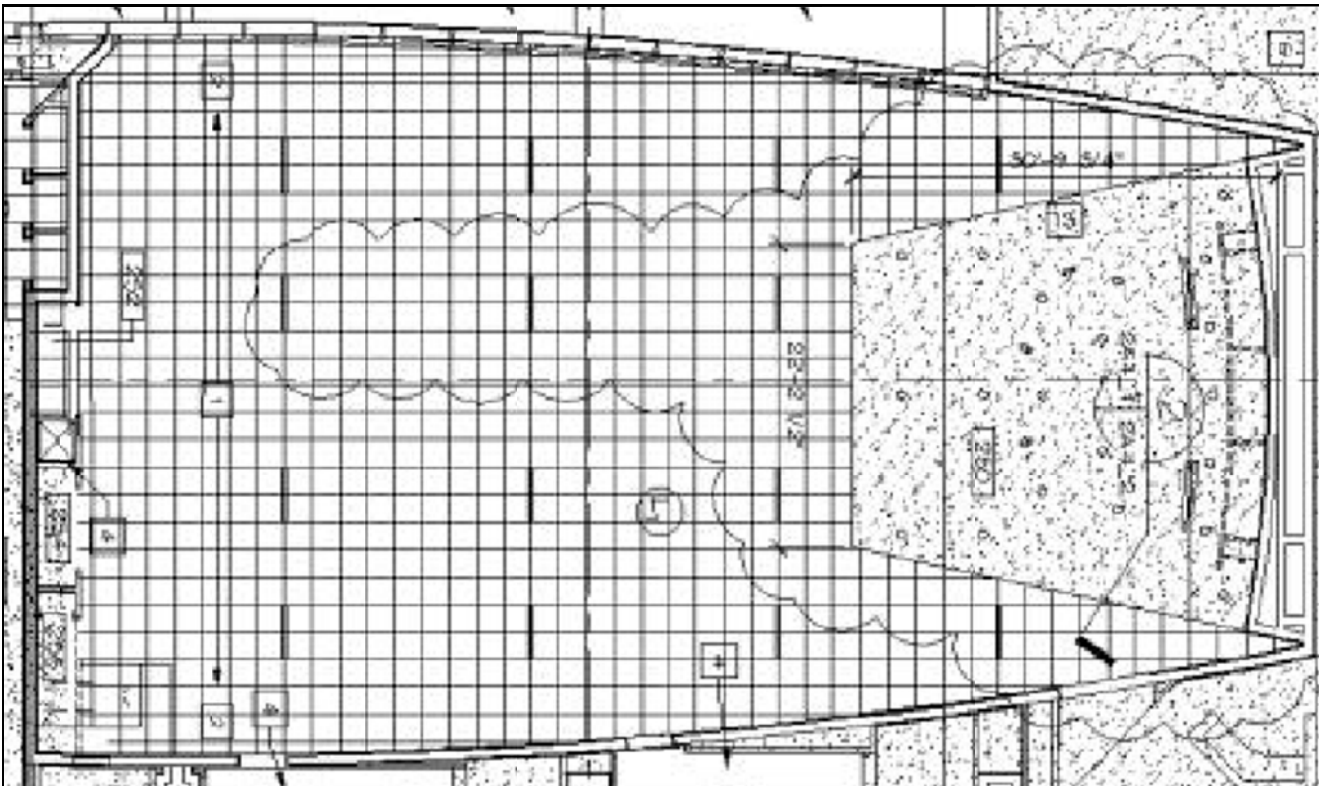


Figure 17: Auditorium | Reflected Ceiling Plan

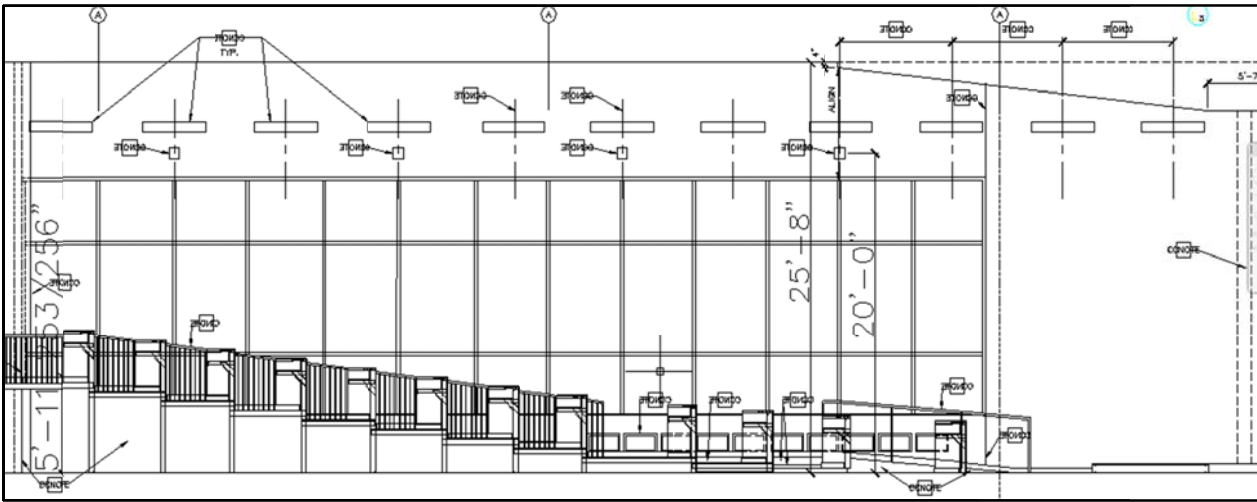
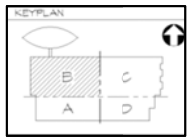


Figure 18: Auditorium | N-S Section

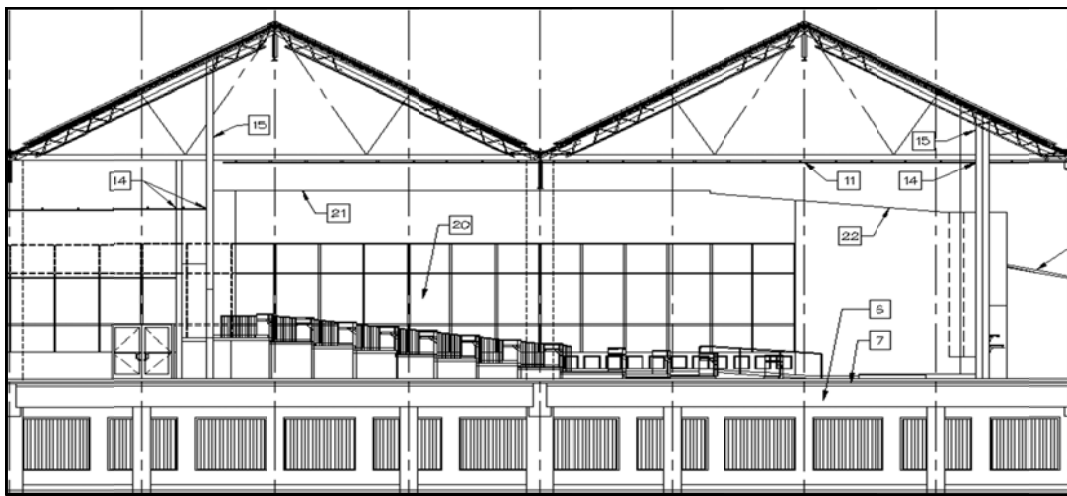


Figure 19: Auditorium | N-S Building Section Looking at Glass Wall

Existing Lighting Equipment

The entrance to the auditorium faces the north side curtain wall. Figure 19 illustrates this view. For general illumination, wall mounted indirect lighting with four-50W Biax lamps with and 3500K color temperature. Once you enter the space, you are confronted with two options of travel. Choosing right leads you down towards the stage area and choosing left leads you to the upper level seating. Recessed walkway luminaires housing one 9W compact fluorescent lamp and have a tempered glass lense instead of the standard baffle for safety reasons. Once approaching the stage area, recessed spot and flood lights illuminate the stage, highlight podium locations, and provide illumination infront of the projection screen when not in use. Because the

auditorium is used for many different functions, undercounter lighting was necessary for the occupants to see their work surface in the case of a presentation where the majority of lighting is dimmed or turned off. The luminaire fixture schedule is shown in Figure 20 and luminaire locations are noted in Figure 16.






Symbol	Location	Mounting	Manufacturer/ Catalog #	#/Lamp Type/ Wattage	Notes
	Interior of exterior walls in the auditorium	Surface	SPI/ EX16853277BFT	4-50W BIAx	Provide integral dimming ballast
	Walkway lights in auditorium	Recessed Wal	Cole/ T158-J-277-HPF	1-9W CFL	24" AFF, provide tempered glass diffuser in lieu of louver faceplate where indicated
	Undercounter task lighting in auditorium	Surface	Alkco/ HP-213	2-13W T5	Mount on underside of task countertop
	Downlight overhead podiums in auditorium	Recessed	Prescolite/ 84X-ST842	150W PAR 38 flood	
	Downlight aimed at two podiums separately	Recessed	Prescolite/ 98HF-5	1-Q250W PAR 38 SP	

Figure 20: Auditorium | Luminaire Schedule

Lighting Control System

Because of its versatility, the auditorium requires multiple lighting zones. Figure 21 provides the lighting control diagram. Figure 18 defines the dimmer zones and zone intensity settings and Figure 19 defines the intensity settings per zone.

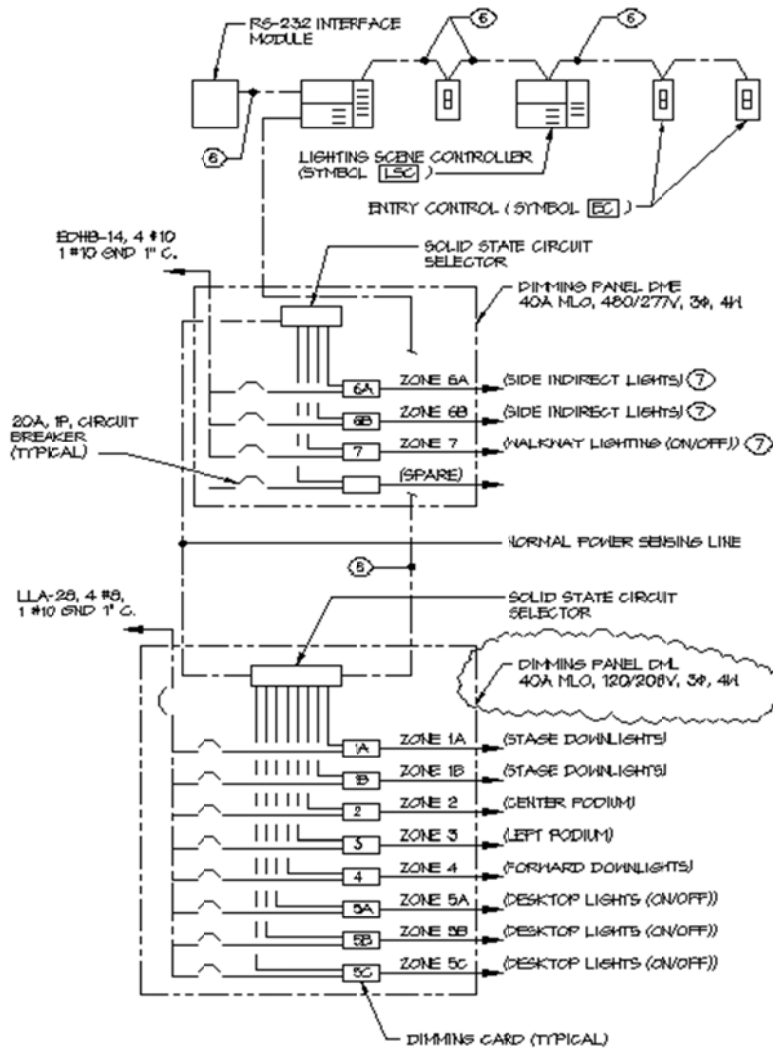
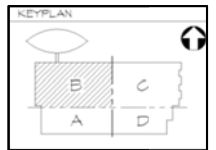


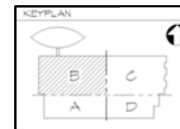
Figure 21: Auditorium | Lighting Control Diagram

DIMMER ZONE CONTROL SCHEDULE		
CONTROL ZONE	DIMMER CARD(S)	ZONE DESCRIPTION
1	1	STAGE DOWNLIGHTS
2	2	CENTER PODIUM
3	3	LEFT PODIUM
4	4	FORWARD DOWNLIGHTS
5	5A, 5B, 5C	DESKTOP LIGHTS
6	5A, 6B	SIDE INDIRECTS
7	7	WALKWAY LIGHTS
8	8	STAGE DOWNLIGHTS

Figure 22: Auditorium | Dimmer Zone Control Schedule

ZONE INTENSITY SETTING								
SCENE SELECT	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8
1	90%	90%	90%	70%	OFF	100%	OFF	N/A
2	90%	90%	90%	70%	ON	100%	OFF	N/A
3	OFF	OFF	OFF	OFF	OFF	OFF	ON	N/A
4	OFF	OFF	OFF	OFF	ON	20%	ON	N/A
5	OFF	OFF	ON	OFF	ON	20%	ON	N/A
6	SPARE	-	-	-	-	-	-	N/A
7	SPARE	-	-	-	-	-	-	N/A
8	SPARE							

Figure 23: Auditorium | Zone Intensity Chart



From Figure 21, the lighting control system consists of two dimmer panels (DML and DME), three entry control panels (EC panels), and two lighting scene control panels (LSC panels). The dimmer panels are both located in the back of the auditorium in the sound booth. Dimmer panel DML control zones 1A through 5C and dimmer panel DME controls the remaining zones 6A through 7 with a spare zone for future needs. The lighting scene controllers are located on the left side of the stage and the on the back wall. These scene controllers are connected to the dimmer panels which control the different zone options for the space. The entrance controllers are located at each of the three doors on the south wall of the auditorium. Refer to Figure 24 for exact locations specified above.

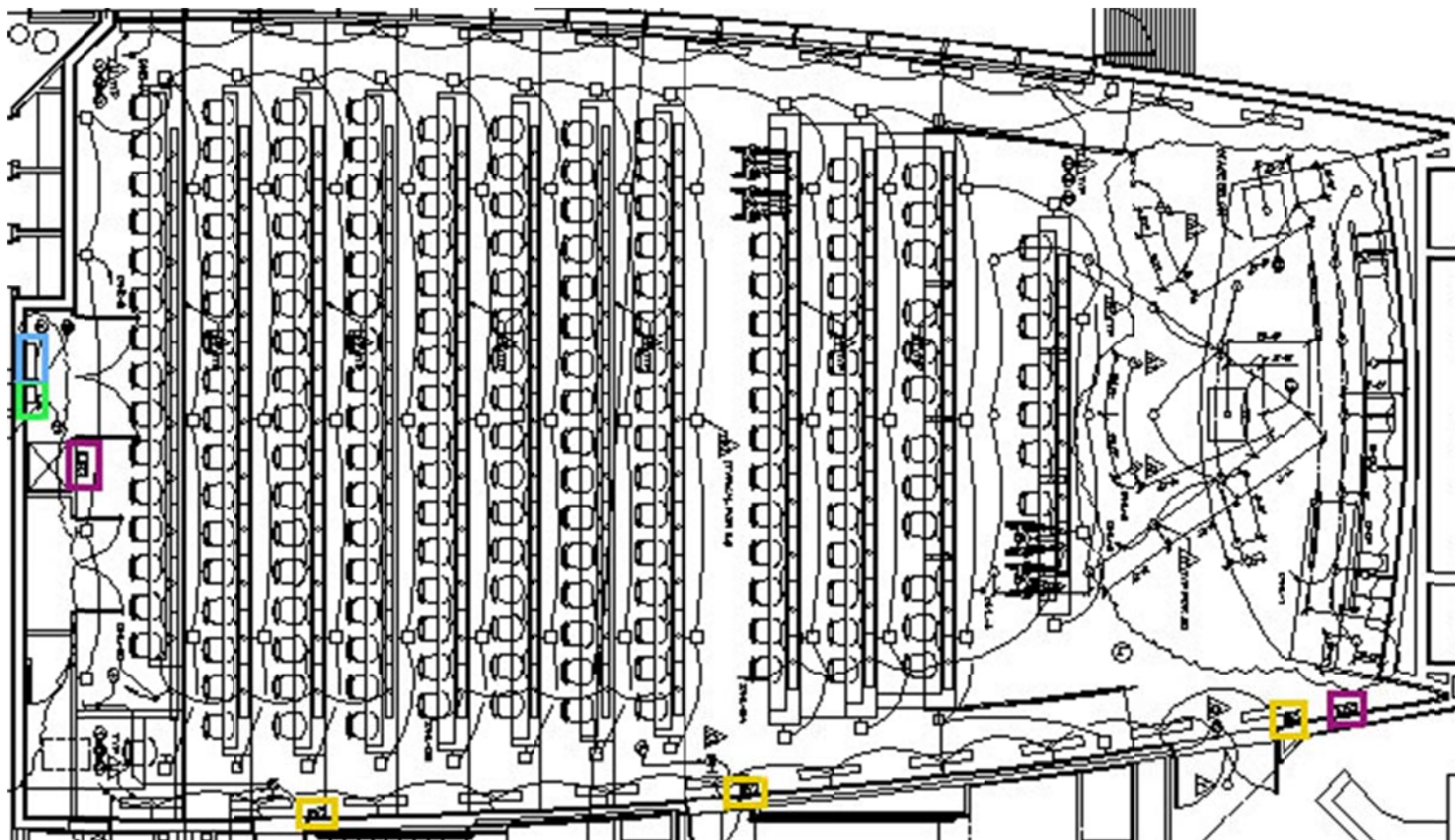
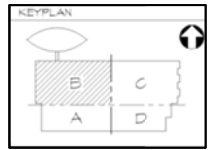


Figure 24: Auditorium | Control Panel Locations

Location Key:

	Dimmer Panel DML Location		Entry Control System (EC)
	Dimmer Panel DME Location		Lighting Scene Controller Location (LSC)



Special Use | Auditorium | Design Considerations and Criteria

(IESNA Lighting Design Guide)

▪ Psychological Impression

There is no set task for this space because it is used for many different activities. However, reading, and watching presentations or speakers will most likely be common for all the uses of the space. Therefore, illumination of the task surface and the vertical illuminance (the presenters) will be the main drive for the lighting design of this space. Another consideration is the projection screen located at the front of the auditorium. Illumination of this surface will not be necessary, but considering the amount of light to fall on the surface can be used to address glare issues.

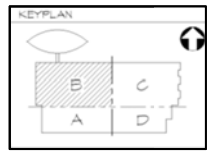
▪ Quantitative Visual Performance

- Assembly: Horizontal- 10 FC
- Social Activity: Horizontal- 5 FC

Stated in the IESNA Lighting Design Handbook, task plane illumination is not considered important. However, it was earlier mentioned in this section, there is no predetermined task for this space, but there is a common task. For this reason, task plane illumination will be considered important to a degree and will have controllability via zone selection.

▪ Lighting Controls

Controllability of this space will be an important driving factor for the lighting design. Selecting proper zones will need to be carefully specified for ease of use. Another consideration under this section is the curtain wall system on the north face of the auditorium. Though daylighting will not be a huge issue, this may be a distraction to the users while the space is being occupied. For this reason, a shading system may be necessary for privacy.



- **Power Density Allowance**
 - ASHRAE 90.1-2007 Section 9.6: Space-By-Space Method
 - Auditorium: Audience/Seating – 0.9 W/FT²

Lighting Power Density Calculation										
Space	Fixture Type	Ballast	Input Watts	Lamps/Luminaire	# of Luminaires	Total Watts/ Luminaire Type	Total Space Watts	Total Area	Allowable W/FT ²	Calculated W/FT ²
Auditorium	U	GE CFL Electronic Program/Rapid Start	57 W	4	22	1254 W	18033 W	7500 FT ²	0.9 W/FT ²	0.83 W/FT ²
	OO	Self Ballasted	9 W	1	65	585 W				
	PP	GE LFL Ultra Start Electronic Program/Rapid Start	34 W	2	124	372 W				
	YY	N/A (150W PAR 38)	150 W	1	20	3000 W				
	A1	N/A (250W PAR 38)	250 W	1	4	1000 W				

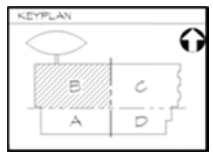
Figure 25: Auditorium | Lighting Power Densities

Special Use | Auditorium | Evaluation and Critique

NOTE: All models and calculation analyses are located at azl50175(\\aep.coeaccess.psu.edu)(P:)Fall 2010\AE 481W\TECH 1 LIGHTING ANALYSIS\Auditorium

In the evaluation for the auditorium, many factors were considered. First, Light Loss Factors (LLF) were determined. IESNA Lighting Handbook 2010 was used to derive values. Refer to Figure 21 for a breakdown of LLFs. Second, illuminance values on the floor, work plane, stage, and projection screen analyzed. Refer to Figure 22 for illuminance values on the surfaces in question. Lastly, spacial appearance was considered. Did the space provide an overall uniform quality of light? In areas that required higher illuminance values, were they met? Did the lighting design provide an overall acceptable design for the task at hand?

Evaluating the illuminance of the floor, work plane, stage, and projection screen proved to be adequate for the task of the space. However, the uniformity gradient of the stage area was rather high. This is probably caused from the spot lighting on the podium positions to highlight only the speaker. The spot lights created areas of high illuminance on the stage area which would contribute to a value showing a quality of uniformity that is not desired.



Light Loss Factor Breakdown							
Fixture Type	Environment Type	Luminaire Classification	Cleaning Cycle	Lamp Lumen Depreciation	Ballast Factor	Luminaire Dirt Depreciation	Total LLF
U	Clean	Other/ Semi-Indirect/X	12 month	0.95	0.96	0.90	0.82
OO	Clean	Other/Semi-Direct/ W	12 month	0.95	0.90	0.92	0.79
PP	Clean	Other/ Semi-Direct/W	12 month	0.95	0.90	0.97	0.83
YY	Clean		12 month	0.95	0.90	0.97	0.83
A1	Clean	Open unvented/ Direct/ W	12 month	0.80	0.90	0.97	0.79

Figure 26: Auditorium | Light Loss Factors

Location	Average FC	Avg/Min	Max/Min	Uniformity Gradient
Floor	7.44	1.43	2.2	2.05
Work Plane	9.3	4.9	6.43	9.31
Stage/Podium	30.9	19.21	64.41	22.35
Projection Screen	7.24	1.23	2.42	2.42

Figure 27: Auditorium | Illuminance Values

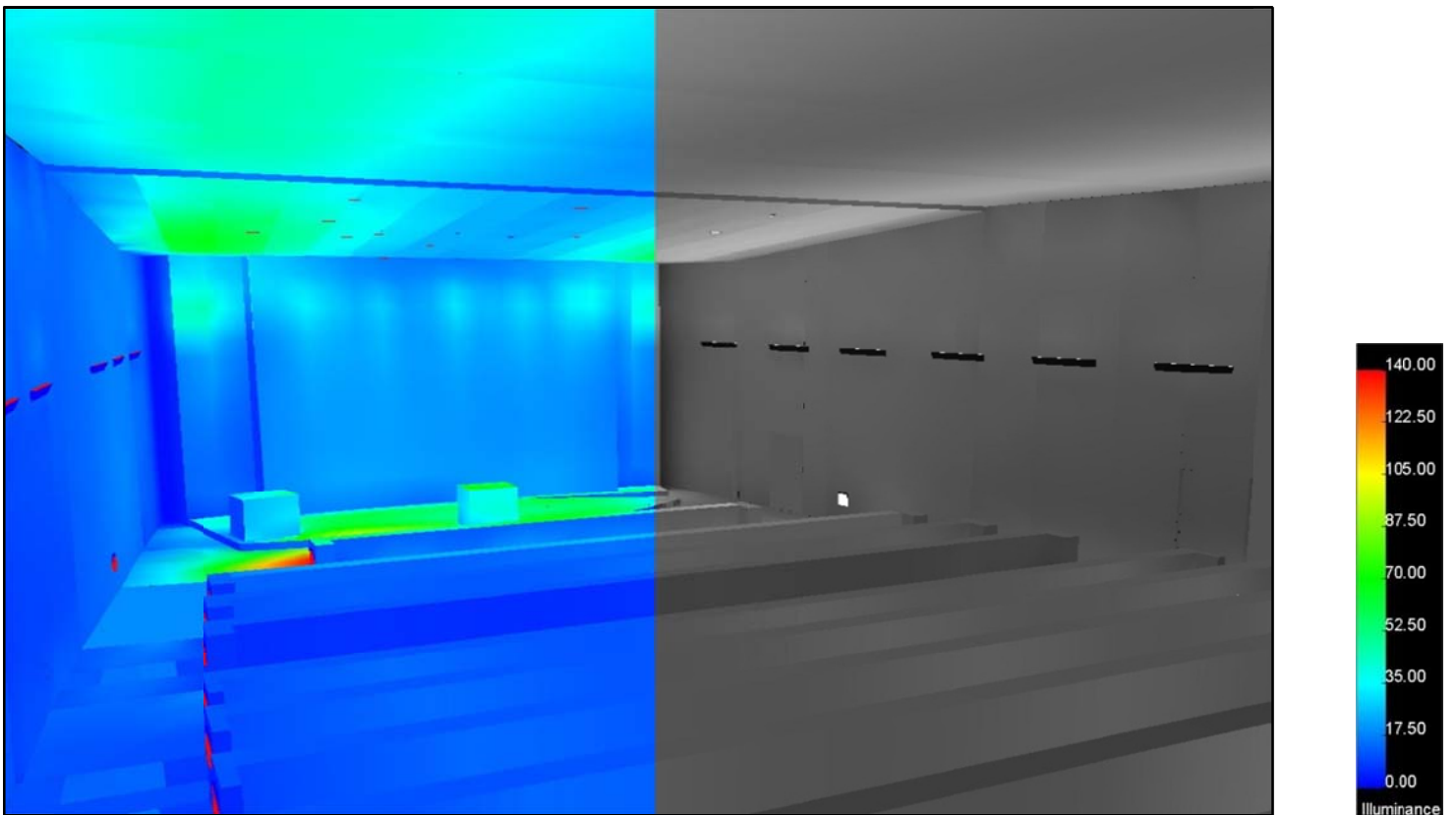


Figure 28: Auditorium | Pseudo Color and RGB Rendering Combined

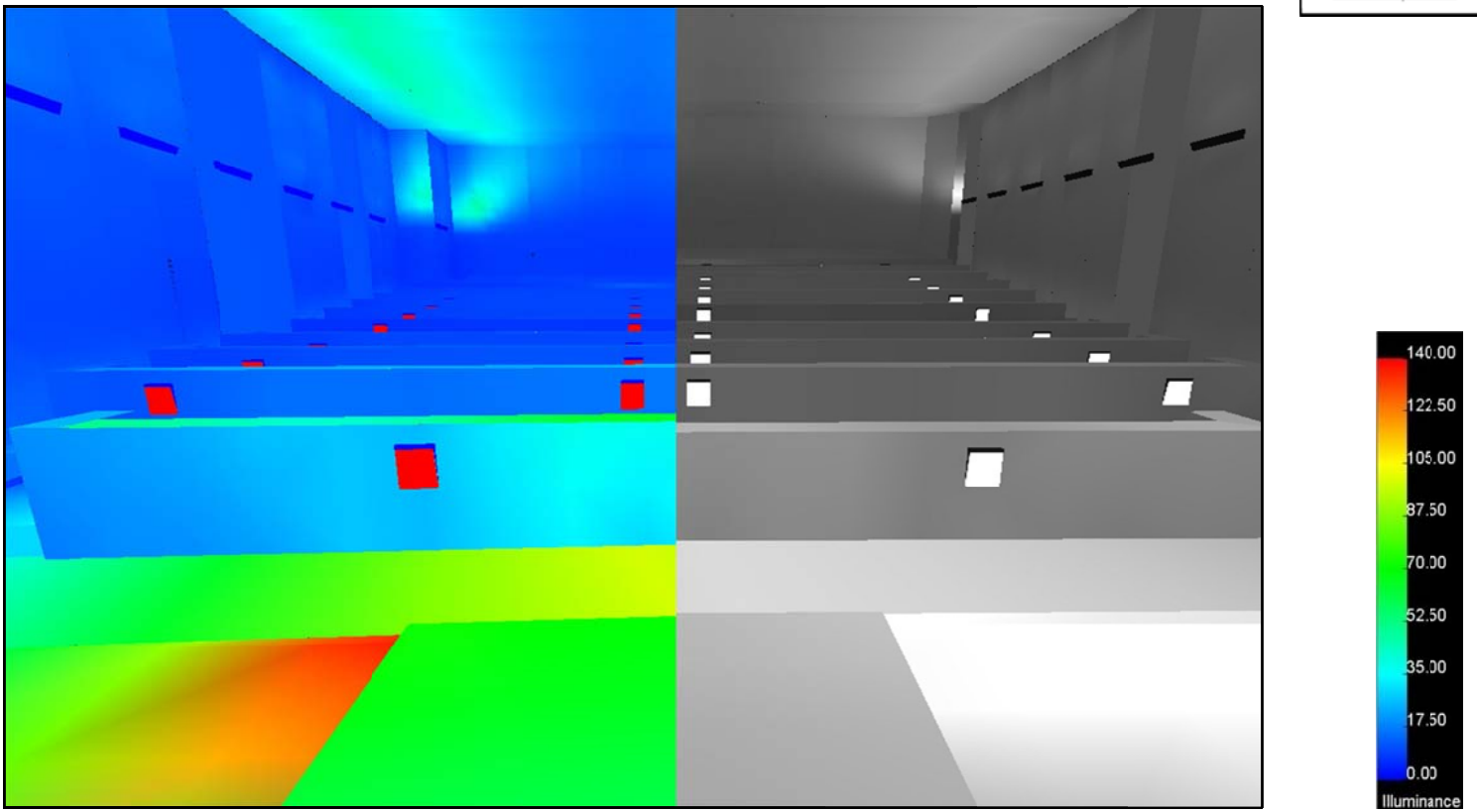
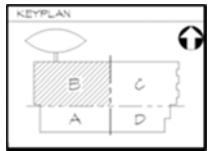


Figure 29: Auditorium | Center Podium Pseudo and RGB Rendering Combined

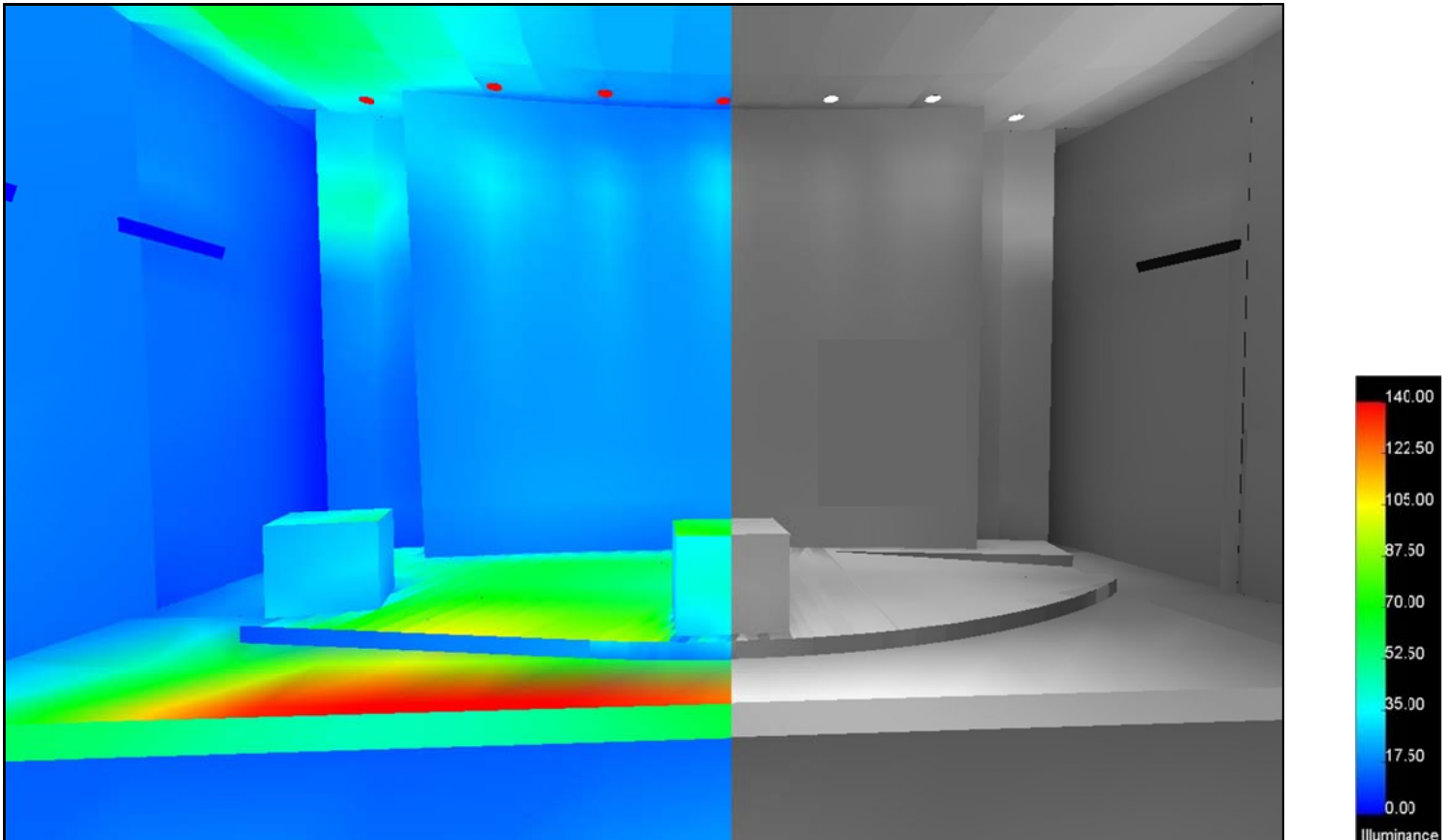
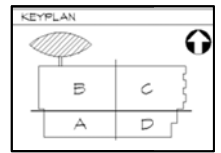


Figure 30: Auditorium | Front Row Seating Pseudo and RGB Rendering Combined



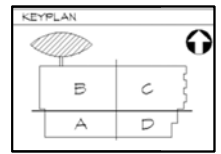
Figures 28-30 are rendered images of three important views in the space. Figure 28 and 29 depict the general illumination of the environment. The indirect illuminates the space well while not shining light directly on the audience seating. This design addresses glare issues and prevents light from distracting the audience. The main focus of all three images is easily recognizable as the stage and podium area. Figure 30 depicts the view of a front row audience member. It shows the large amount of light on the floor in front of the stage area which, earlier commented on, could perhaps cause the uniformity gradient to be so high. One flaw with the lighting design of the auditorium space, shown in Figure 30, is the scalloping on the projection screen. This could be a distraction to the viewer if the screen is not being used because there is no other rhythmic patten of light throughout the space. However, it does provide a patterned backdrop for a speaker that is not using the projection screen.

This primarily would depend on the intensity of the light source producing the scalloping. If the contrast is low between the scalloped light and the background, it will not be a large distraction. These renderings and calculations were performed with all lights on. Section “Lighting Controls” explains in depth the system in this space. Therefore, the scalloping generally would not be a problem because the luminaires directly in front of the projection would be turned off for a presentation. Overall, the environment has uniformity throughout with the main focus on the presentation space.

Circulation Space | Lobby/Main Staircase | Existing Conditions

Description

The main lobby and staircase is located on the ground floor of the Office Tower. Because of such a high flood plain, reception, security, elevators, and main staircase are the only assets of this space. The lower portion of the Atrium is also a part of the main lobby, which extends through to the second floor. As noted before, the entire Office Tower façade is a curtain wall system. Influencing the connection between the



outside and inside, reflecting pools surround the two main entrances of the lobby space. These two elements are what produce a visitor's first impression. The curtain wall system defines the lobby from the exterior and produces curiosity to visitors while walking between pools of water. As you walk through the East main entrance, you are greeted by a grand reception desk as well as a grand porcelain staircase leading to a technology display on the second floor. The photo in Figure 42 illustrates this environment.

Existing Room Conditions

Area: Approximately 2981 SF

Dimensions: 59' x 51', ceiling height 13' 6"

Space Category: Circulation/Gathering Space

Materials: Refer to Figure 31: Circulation Space | Lobby/Main Stair | Finish Schedule and Figure 33: Lobby/Main Stair | Overall Finishes Floor Plan.








Material/Finish	Manufacturer	Location	Color	Reflectance
Porcelaine Stone/ PS1	Crossvile Porcelain Stone/USA	Floor Refer to Figure 22	 #VS85-PO - General's Grey Polished	0.85
Porcelaine Stone/ PS2	Crossvile Porcelain Stone/USA	Floor Refer to Figure 22	 #VS85-UP - General's Grey Unpolished	0.75
Porcelaine Stone/ PS3	Crossvile Porcelain Stone/USA	Floor Refer to Figure 22	 #VS86-PO	0.62
Vinyl Wall Cover/WC1	Knoll Textures	Atrium Space	 # WC454/4-Alloy	0.46
Glass Façade/ IG-2	Viracon	Wall System	 Transparent, Visible Transmittance: 70%	0.32
Paint/ PT7	Benjamin Moore	Underside of Main Stair	 Decorator's White	0.83
Acoustical Ceiling Tile/ ACT1	Armstrong World Industries	Ceiling	 White	0.86

Figure 31: Circulation Space | Lobby/ Main Stair | Finish Schedule

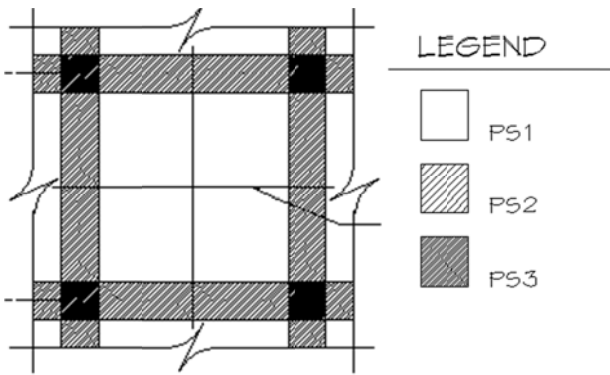
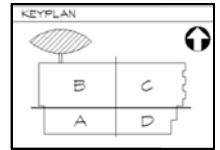


Figure 32: Lobby/ Main Stair | Floor Finishing Detail

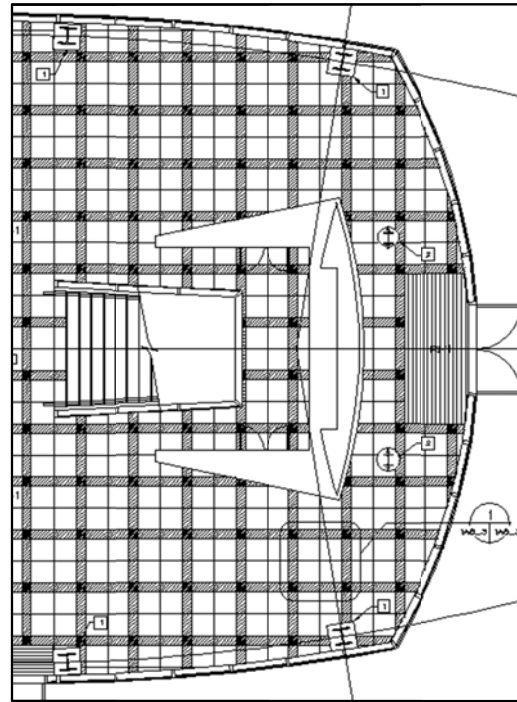


Figure 33: Lobby/ Main Stair | Overall Finishes

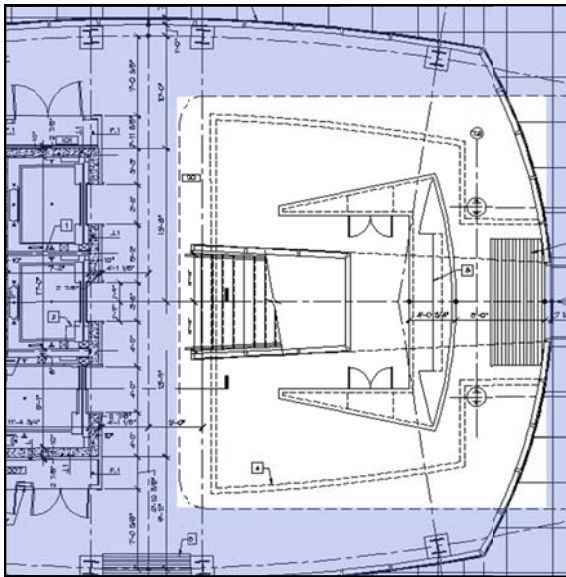


Figure 34: Lobby/ Main Stair | First Floor | Floor Plan

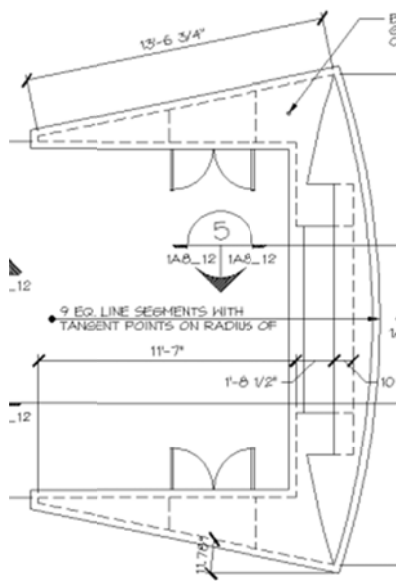


Figure 35: Lobby/ Main Stair | Reception Desk Detail

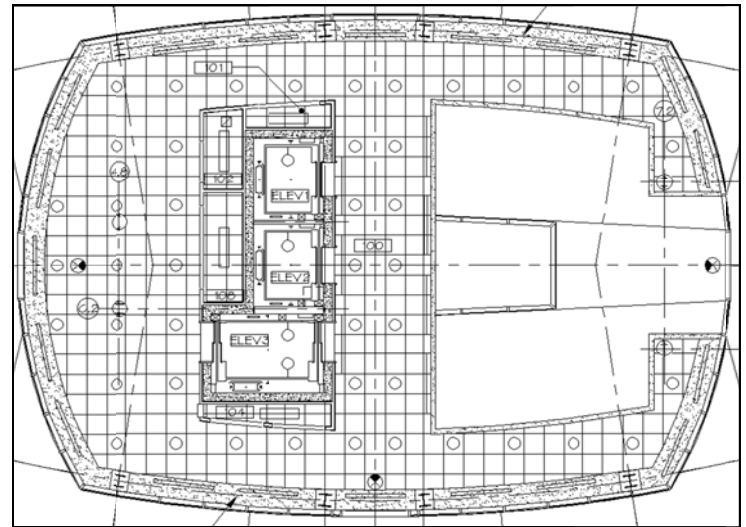


Figure 36: Lobby/ Main Stair | First Floor | Reflected Ceiling Plan

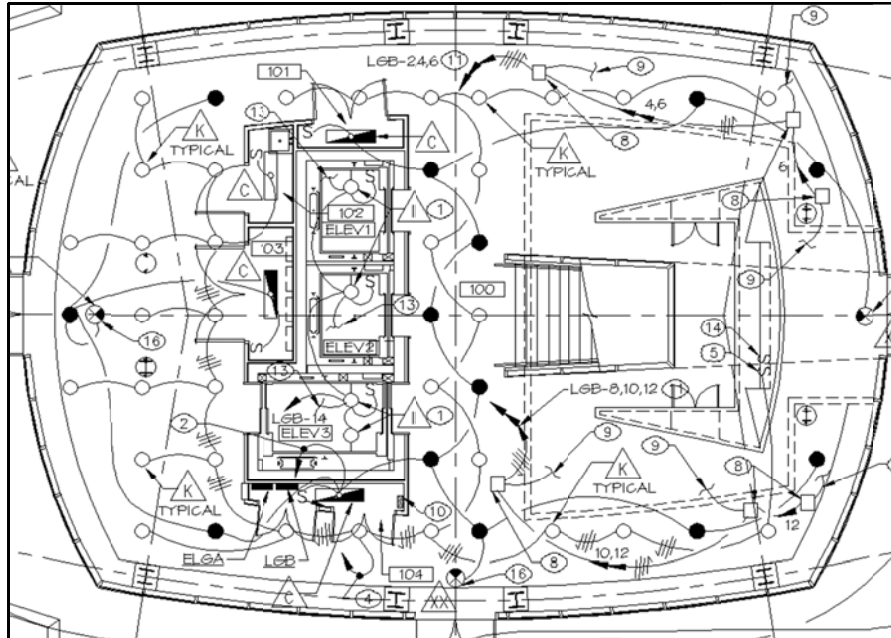
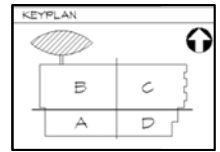


Figure 37: Lobby/ Main Stair | First Floor | Lighting Plan

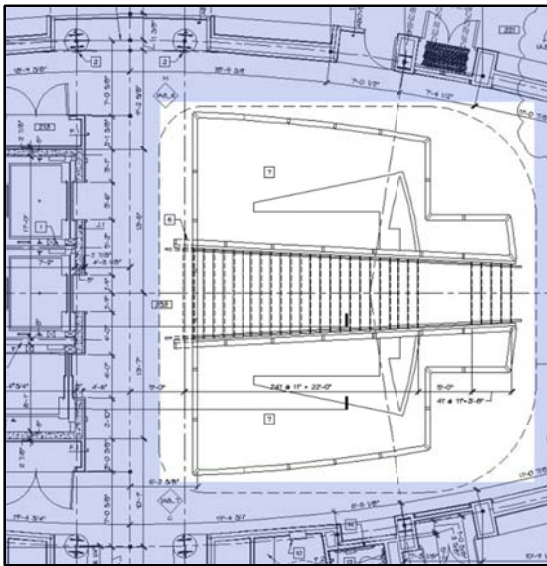


Figure 38: Lobby/ Main Stair | Second Floor

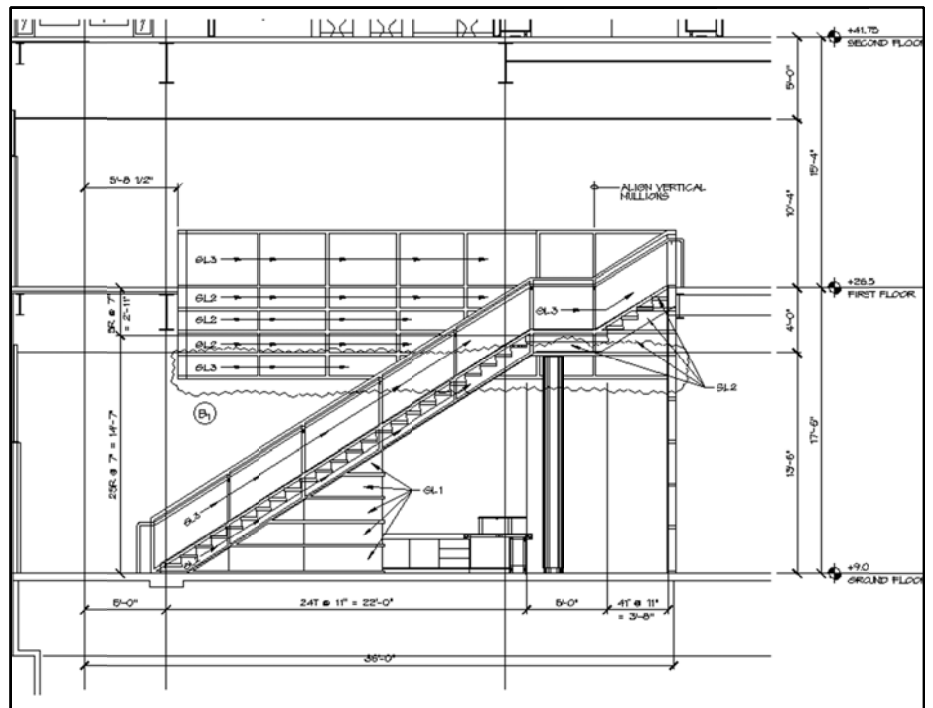


Figure 39: Lobby/ Main Stair | Main Stair Section

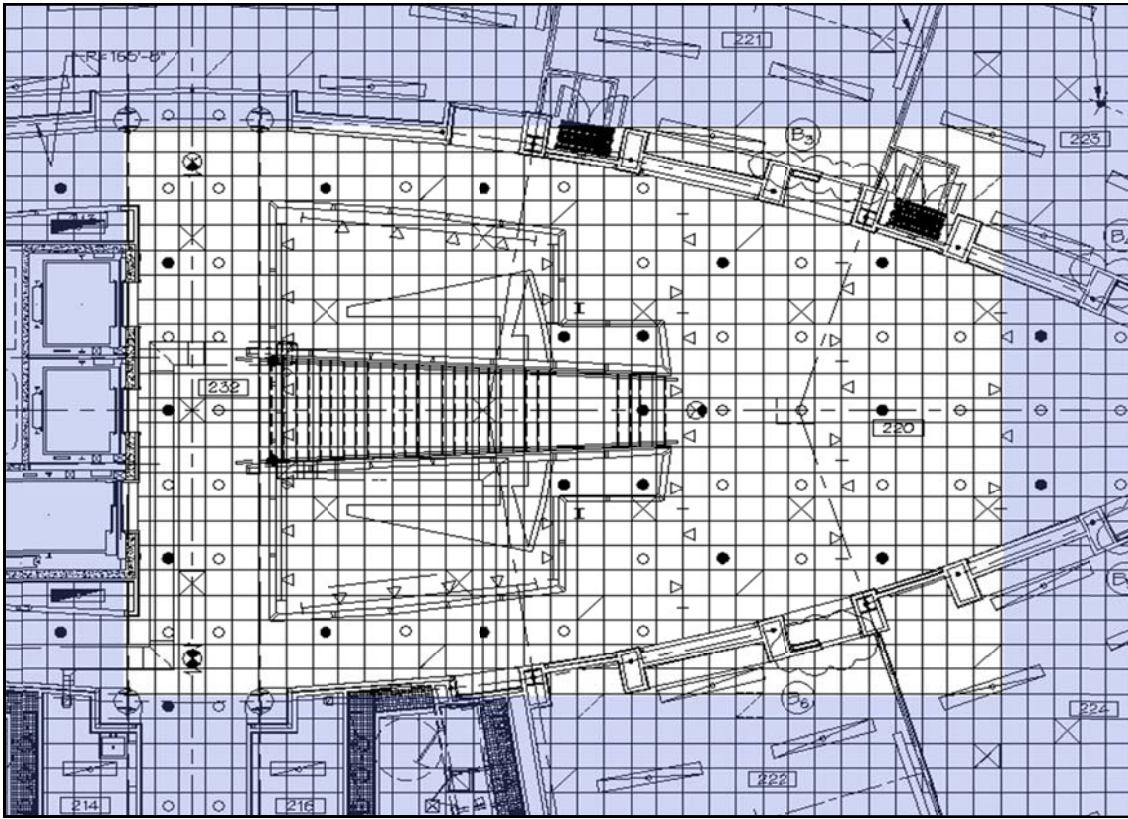
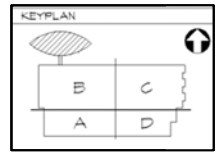


Figure 40: Lobby/ Main Stair | Second Floor | Reflected Ceiling Plan

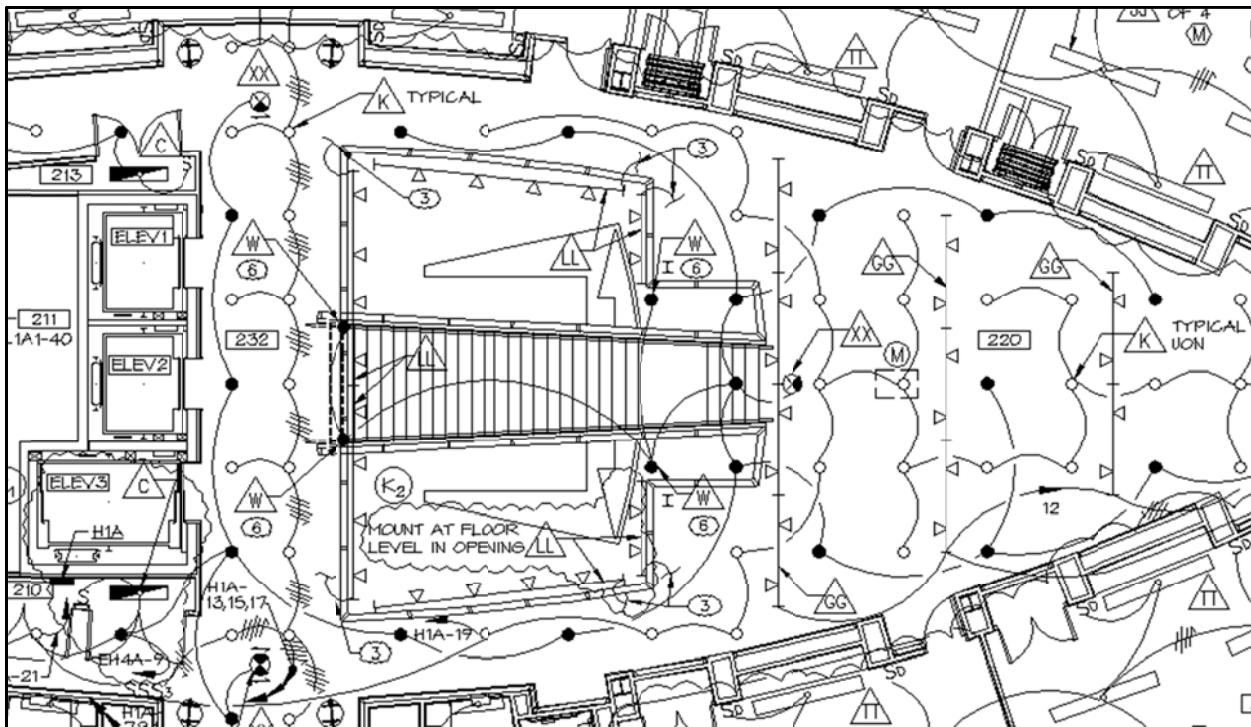
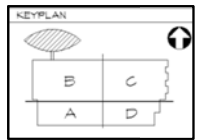


Figure 41: Lobby/ Main Stair | Second Floor | Lighting Plan



Existing Lighting Equipment

Producing the visitor's first impression, this space is designed to have a public and spacious feeling. The high ceiling height of the lobby contributes to this impression as well as the glass façade allowing natural daylight and outdoor views to infiltrate the space. As you enter the space, track lighting surface mounted around the open atrium are positioned to highlight the central core of the space and provide easy navigation. General illumination of the lobby is provided by recessed downlights

Figure 42: First Floor Lobby | Photograph

also highlighting the elevator lobby area. Refer to Figure 43 and Figure 44 for fixture information. Figure 27 and 31 provide fixture locations of the first and second floor. Figure 32: First Floor Lobby | Photograph provides an actual view of the space.

Although the main lobby is on the first floor, the main staircase is part of the second floor with a large technology display at the top of the staircase. The second floor portion of the staircase is illuminated by recessed lighting fixtures similar to those of the first floor. The technology display utilizes track lighting which is individually adjustable in order to be display specific. Refer to Figure 35 for fixture information and Figure 31 for fixture locations.


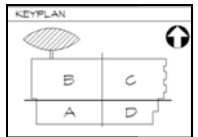
Symbol	Location	Mounting	Manufacturer/ Catalog #	#/Lamp Type/ Wattage	Notes
	Lobby First Floor Ceiling	Recessed	Prescolite/ CFT632EB-STF602	1-32W CFL	

Figure 43: First Floor Lobby | Luminaire Schedule







Symbol	Location	Mounting	Manufacturer/ Catalog #	#/Lamp Type/ Wattage	Notes
	Lobby Second Floor Ceiling	Recessed	Prescolite/ CFT632EB-STF602	1-32W CFL	
	Second Floor Ceiling over staircase	Recessed	Prescolite/ RHD601-100MH FE-5TH602WW	1-100W MH	
	Second Floor Technology Display	Track Lighting	litelab/ Busrun Series	Incandescent	
	Perimeter of Atrium Opening	Surface or Wall Mounted Track Lighting	Tech Monorail	50W MR-16	

Figure 44: Second Floor Lobby | Luminaire Fixture Schedule

Circulation Space | Lobby/ Stairs | Design Considerations and Criteria

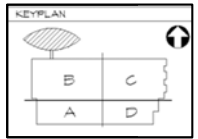
(IESNA Lighting Design Guide)

- **Psychological Impression**

Impression is everything in the lobby. If the visitor is not enjoying their first moments of the building, they are not going to be fully interested in what the rest of the facility has to offer. Therefore, the emotional response desired is most certainly a public and open space. The lobby is not exactly task oriented per se. Its task is to invite visitors and evoke curiosity with ease of navigation throughout the space.

- **Color Quality**

Infiltrating daylighting takes a strong role in color temperature and rendering choices for this space. Focusing on this factor must be considered important because rendering of faces and other objects (technology display) will generate the welcoming and comfortable atmosphere in order to produce curiosity in the



visitor. Sources' correlated color temperature should be a warm color to coincide with the color appearance of natural daylight.

▪ Lighting Controls

Because the lobby is constructed of a glass curtain wall system, lighting controls are necessary for the occupant to easily adapt to the lighting from exterior to interior. With glass exterior walls, there must be a higher brightness during the day in order to be seen from the outside against the intense brightness of daylight. At night, a lower brightness is required. Therefore, lobby lighting control should incorporate dimming or multiple switching.

▪ Quantitative Visual Performance (IESNA Lighting Design Guide)

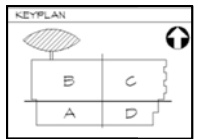
- Horizontal- 10 FC
- Vertical- 5 FC

▪ Design Issues

- Generating an interesting and curious space with light
- Light should guide the visitor through the space
- Light reflections off glass façade
- Adequate illuminance required on stairs
- Adequate illuminance for security reasons
- Safe transition from exterior to interior space

▪ Power Density Allowance

- ASHRAE 90.1-2007 Section 9.6: Space-By-Space Method
 - Lobby - 1.3 W/FT²
 - Atrium - 0.6 W/ FT² for first three floors, 0.2 W/FT² for every additional floor.
 - Refer to Figure 45 for a breakdown of the calculation factors.



Lighting Power Density Calculation							
Space	Ballast	Input Watts	Lamps/Luminaire	# of Luminaires	Total Area	Allowable W/FT ²	Calculated W/FT ²
Lobby	GE CFL Multi-Volt ProLine Electronic Program/Rapid Start	36 W	1	45	2981 FT ²	1.3 W/FT ²	0.54 W/FT ²
Atrium	N/A (MR16)	50W	1	20	701.25 FT ²	0.6 W/FT ²	1.78 W/FT ²
	N/A (MR16)	50W	1	5			

Figure 45: Second Floor Lobby | Luminaire Fixture Schedule

Circulation Space | Lobby/Main Staircase | Evaluation and Critique

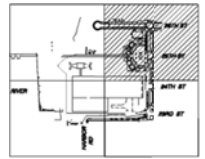
The Virginia Advanced Shipbuilding Carrier and Integration Center has a unique and interesting appearance that provokes people's interest. Once this is achieved, it is important to satisfy their curiosity craving. The lighting design choices that were made for this space enhances the architecture while fulfilling its goal of leading occupants through the building easily. Sections and photos provided (Figure 39 and Figure 42) prove the space provides an inviting atmosphere for those who may be visiting.

The staircase acts as the main exhibit of an art museum. Since the staircase is the focal point of the space, the choice of lighting was also appropriate in such a way to not mislead the visitor in the wrong direction. It does not produce any unwanted glare on the glass wall surfaces, which is an important factor to consider, while illuminating the space to adequate light levels for the function of the space.

Exterior Space | Gathering Space | Existing Conditions

Description

Currently there is no existing space for the location being considered. However, there is an existing porte cochere area located at the east entrance. In this space there is a victory arch located at the center of the drop off area which is then surrounded by concrete planters for aesthetic appeal. This space is designed with walkways and



seating enhanced with pleasant landscaping. There is a walkway that leads directly from the victory arch to the water behind the building. Refer to Figure 35 and Figure 36 for details.

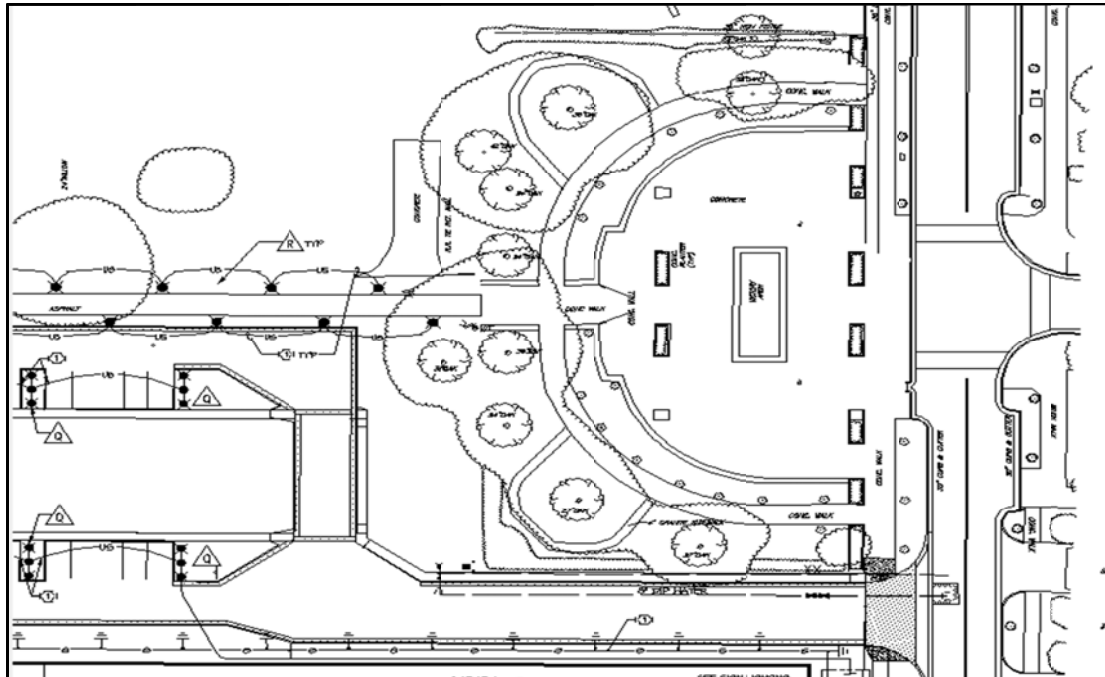
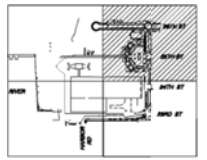


Figure 46: Exterior Space | East Entrance Prote Cochere



Figure 47: Existing Exterior Space | Areal View



The area in question is on the exact opposite side of the building. Because the building is located on the water and is the most influential, it is necessary to connect these two together. On the ground floor of the Office Tower, there exists reflecting pools of water that surround the main entrances. However, that is only one of the few connections between the building and water. Visually, you see the shape of the building and its materials imitate that of a ship. In order to connect the two separate entities together, a gathering space incorporating both the water and the different materials would be ideal. For the proposed location, refer to Figure 48. The reflecting pools (Figure 49) on the ground floor will be the main influential aspect for the new gathering space.

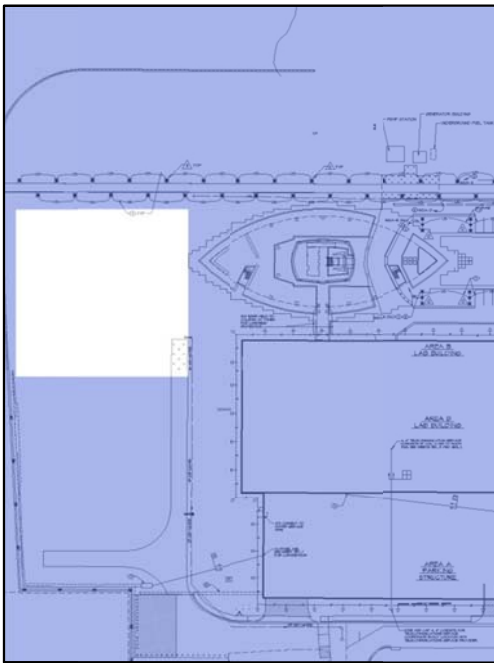
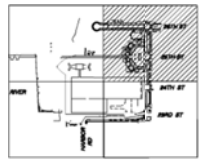


Figure 48: Proposed Exterior Space | Plan View Figure 49: Ground Floor | Reflecting Plan Photograph



Exterior Space | Gathering Space | Design Considerations and Criteria

(IESNA Lighting Design Guide- Chapter 21, pg. 21-5 to 21-6, 21-12 to 21-17)

- **Psychological Impression**

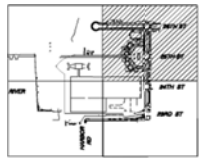
The impression that is desired from this space is somber/festive. This space is planned to be designed for a get-away, quiet place where visitors or workers can go and enjoy the outdoors and the views of the water. Various seating areas secluded and publicly will be available to meet the needs of the user.

- **Architectural Influence**

- Water- make a connection between the water surrounding the building to the natural water beyond the building
- Incorporate a water feature or sculpture to tie in the existing site features
- Incorporate the existing path way from the east entrance to gain interest in visitors
- Public and Private seating areas to influence a somber or festive experience

- **Quantitative Visual Performance (IESNA Lighting Design Handbook)**

- Fountain:
 - Horizontal- 5 FC
 - Vertical- 20 FC
- Decorative Pool:
 - Horizontal- 10 FC
 - Vertical- 5 FC



- **Design Considerations**

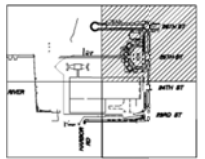
- Determine intended use of space and nature of audience
- Differentiate between significant areas in daylight verses significant areas in nighttime- controls may be necessary to achieve this
- Locate main point of interest in area- determine how to enhance this with light during day and night
- Safety and security lighting
- Light trespass and light pollution- environmental considerations

Although the exterior lighting design may not contribute greatly to light pollution, it is still an environmental consideration. Methods for controlling light pollution are:

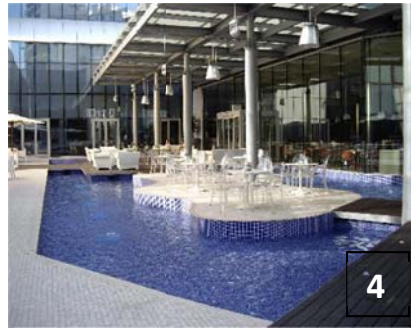
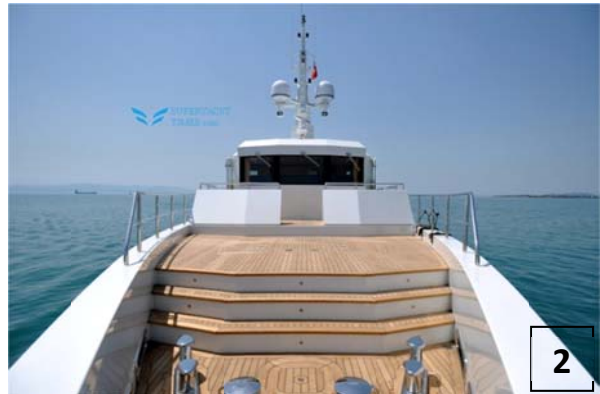
- Limit amount of light above horizontal, primarily will apply to pole lighting
- Minimize non-target illumination
- Control outdoor lighting during low usage times

- **Landscape Lighting Techniques**

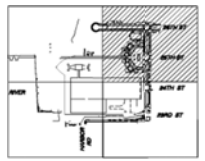
- Uplighting- Used to create drama on landscaping or architectural objects.
- Downlights- Used to illuminate textures or walkways. Facilitates pedestrian traffic and reduces safety and security concerns.
- Areal- General illumination and establishes borders or space.



Exterior Space | Gathering Space | Gathering Space Inspiration



The photos shown above demonstrate a few architectural ideas to design the exterior seating and gathering space. The main influence of this design is based on the ship figure and water. Looking at the building, it is evident they are important to the facility. The main idea in this design is to not only provide an exterior space for



visitors and occupants, but to tie together the front porte cochere, the reflecting pools of the ground floor, and the open sea behind the building.

Photos 2 and 8 primarily were chosen for materials to imitate. Photos 1, 3, and 6 are inspiration to incorporate water into the design. Photo 6 also is used for water inspiration, but more importantly how the walkway is outlined with water illuminated by colored light. This idea could be utilized for the pathway between the front porte cochere and this new exterior space behind the building in order to create interest and curiosity to the viewer. Achieving a somber and festive psychological impression, using rhythmic and flowing shapes would be ideal. Photo 7 illustrates a type of seating that could be used which could be surrounded by water as in Photo 4.