Medical Education BuildingLandon RobertsJohns Hopkins University School of MedicineLighting/Electrical OptionLighting Existing Conditions and Design Criteria Report10/05/07Dr. Richard Mistrick10/05/07

The Anne and Michael Armstrong Medical Education Building



Johns Hopkins University School of Medicine Technical Assignment 1

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Each space is analyzed for the following:

- 1) Existing Conditions
 - a. plans and elevations lighting and furniture
 - b. lighting fixture schedule fixtures, ballasts and lamps
 - c. daylight elements materials and reflectances
- 2) Design Criteria
 - e. IESNA recommendations
 - f. AHSRAE/IESNA Standard 90.1
 - g. Light Loss Factors
- 3) Design Evaluation
 - h. general design critique
 - i. computer software calculations (2 spaces)

Executive Summary

The first technical report is to analyze the overall existing lighting conditions in the building and specifically how the design has met the design criteria pertinent to four specific spaces. The four spaces are the exterior façade, the central full height atrium, the first floor auditorium and the fourth floor anatomy lab.

The exterior façade and space is concerned especially with safety as it is a campus building. The design reaches this criteria in a creative way by uplighting trees and using the reflecting light to illuminate the area. White LED bollards are also used along the pavement to provide more interest to the exterior.

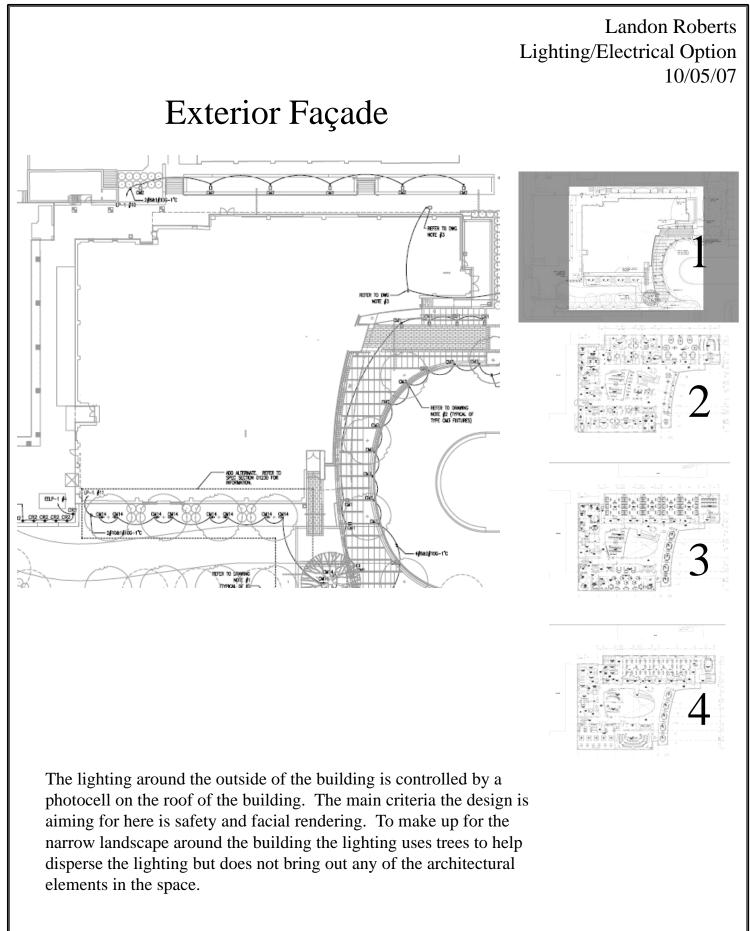
The auditorium has ten dimming zones controlled by a Lutron GRAFIK Eye to accommodate the various uses in the space. Recessed compact fluorescent and linear fluorescent downlights were designed in a fluid pattern to compliment the curved floating wood acoustical ceiling. The fixtures are zoned in bands horizontal to the front wall to accommodate the varying class or lecture attendance. Along the periphery are halogen wallwashers that are on their own zones to either create a sense of spaciousness especially during class time.

The atrium is a full height atrium in the center of the building. A large amount of natural daylight penetrates the space from the large skylight at the top of the atrium and an exterior curtain wall along the southwest façade. The daylight penetrates every floor, especially the meeting rooms along the northern glass curtain wall of the atrium. Compact fluorescent downlights surround the east south and

Executive Summary

West space edges of the atrium on the first and second floor. A combination of compact fluorescent and metal halide downlights are lined up along the perimeter of the third and fourth floor. Sensors are placed throughout the atrium to accurately measure the level of daylight. As one of the largest spaces in the building, there could have been more emphasis on the design and more integration of daylighting systems into the design.

The most important design criteria the lighting design should meet are daylight integration, direct glare, and illuminance levels.



Exterior Façade Lighting Fixture Schedule

EXTERIOR DESCRIPTION COMPACT FLUORESCENT DOWNLIGHT, VERTICAL LAMP, VOMINAL 6 INCH DIAMETER PRETURE X 11 INCH MAXIMUM RECESS DEPTH, SATIN CLEAR ALZAK .OW IRIDESCENT CONE AND FLANGE, THEGRAL ELECTRONIC BALLAST WITH LAMP FAILURE PROTECTION. COMPACT FLUORESCENT WALLWASHER. NOMINAL 6 INCH DIAMETER APERTURE X 11-1/4 INCH MAXIMUM RECESS DEPTH, SATIN CLEAR ALZAK LOW IRIDESCENT CONE CALLAST. METAL HALIDE DOWNLIGHT, VOMINAL 6 INCH DIAMETER APERTURE X 10 INCH MAXIMUM RECESS DEPTH, SEMI-SPECULAR CLEAR ALZAK LOW IRIDESCENT REFLECTOR WITH FLAT FLANGE, HIGH YOWER FACTOR, ELECTRONIC SALLAST. METAL HALIDE WALL MOUNTED JUMINAIRE, NOMINAL 5 INCH WIDE X	GOTHAM GOTHAM	DESCRIPTION AFV-32TRT-6AR- LD-277-GEB10 AFVW-32TRT- 6AR-LD-277- GEB10 APRH-		HEDUL MPS TYPE CF32DT/E/IN/8 35 CF32DT/E/IN/8 35	INPUT WATTAGE 36	277 277	MOUNTIN G RECESSE D RECESSE D
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SINGLE CUT-OFF TYPE LUMINAIRE, NOMINAL 13 INCH WIDE X 22 INCH JONG X 5 INCH DEEP CAST ALUMINUM ROUNDED HOUSING WITH HEAT SINK FINS, GASKETED CLEAR TEMPERED FLAT GLASS LENS AND SASKETED DOOR, UL WET LOCATION ABEL, MOUNT ON 5 INCH X 18 FOOT HIGH SQUARE ALUMINUM POLE, ABLE FO WITHSTAND 80 MPH WIND WITH 14 JUST FACTOR, DARK GRAY PAINT FINISH ON LUMINAIRE AND POLE.	LITHONIA	ASI150M-SR3- 277-SPA-DSPD- POLE:SSA-18-5G- DM19AS-DSPD	I	MCP150/U/ME D/830	185	277	POLE
JED BOLLARD. NOMINAL 8 INCH JIAMETER X 36 INCH TALL, SYRTUDED ALUMINUM BOLLARD COLUMN, DIE-CAST ALUMINUM JUMINAIRE HOUSING WITH NTEGRATED HEAT SINKS, ONE-PIECE, JV STABILIZED TRANSLUCENT VOLYCARBONATE LENS, CONTINUOUS SILCONE GASKET, 12 HIGH OUTPUT WHITE LEDS WITH EXTRUDED ALUMINUM OPTIC, INTEGRAL DRIVER, PROVIDE ALL HARDWARE AND ACCESSORIES FOR COMPLETE NSTALLATION AND FULLY FUNCTIONING SYSTEM. SILVER TINSH.	SELUX	NT-3-L012-SV- 277	1	HIGH OUTPUT WHITE LED BY MANUFACTU RER	33	277	BOLLARD
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METAL HALIDE ADJUSTABLE ACCENT IGHT, NOMINAL 3 INCH DIAMETER X INCH CYLINDRICAL MACHINED LUMINUK AND RABLE, ACCENT IGHT, OKABLE, AIMING KNUCKLE IECESSED IN GRADE ELECTRONIC ALLAST HOUSING, WET LOCATION ISTED. OVERALL PAINT FINISH OF INTURE AND CANOPY TO BE	ND PIECE, HAND BLOWN, THREE-PLY RIANGULAR SHAPED GLASS UFUSER, HIGH POWER FACTOR, LECTRONIC BALLAST. UL WET ISTED. FINISH TO BE SELECTED BY ESIGN PROFESSIONAL.BEGA4482PVECORATIVE LINEAR POLE TOP UMINAIRE, NOMINAL 6 INCH MAMETER X 3 FOOT HIGH DIFFUSER X 2 FOOT OVERALL HEIGHT, STAINLESS TEEL TUBULAR HOUSING WITH UV TABILIZED WHTE POLYCARBONATE UFFUSER, HIGH POWER FACTOR, WITE ROLYCARBONATE UFFUSER, HIGH POWER FACTOR, WITEGRAL ELECTRONIC BALLAST. RUSHED STAINLESS STEEL FINISH.FORMS AND SURFACESLIGHT COLUMN SERIES 600- MOD-3- DIFFUSER-12' OVERALL HEIGHT, STAINLESS TEEL TUBULAR HOUSING WITH UV TABILIZED WHTE POLYCARBONATE UFFUSER, HIGH POWER FACTOR, NOT AS INCH WITE VARBONATE INGLE CUT-OFF TYPE LUMINAIRE, IOMINAL 13 INCH WIDE X 22 INCH ONG X 5 INCH DEEP CAST LUMINUM ROUNDED HOUSING WITH ELST SINK FINS, GASKETED CLEAR EMPERED FLAT GLASS LENS AND ASKETED DOOR, UL WET LOCATION ABEL, MOUNT ON 5 INCH X 18 FOOT IIGH SQUARE ALUMINUM POLE, ABLE O WITHSTAND 80 MPH WIND WITH 14 JUST FACTOR, DARK GRAY PAINT INISH ON LUMINAIRE AND POLE.LITHONIA POLE:SSA-18-5G- DM19A3-DSPD OLE:SSA-18-5G- DM19A3-DSPD OLE:SSA-18-5G- DM19A3-DSPD OLE:SSA-18-5G- DM19A3-DSPD OLE:SSA-18-5G- DM19A3-DSPD OLE:SSA-18-12 HIGH OUTPUT WHTE LEDS WITH ATALL, XTRUDED ALUMINUM BOLLARD OLLYCARBONATE LENS, CONTINUOUS LICONE GASKET, 12 HIGH OUTPUT WHTE LEDS WITH EXTRUDED LUMINVARE HOUSING WITH HETCAL HALDE ADIUSTABLE ACCENT IGHT, NOMINAL 3 INCH DIAMETER X INCH CYLLARDWARE AND CCESSORIES FOR COMPLETE STALLATION AND FULLY UNCTIONING SYSTEM. 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NOMINAL 8 INCH HAMETER X 36 INCH TALL, XITRUEDE ALUMINUM BOLLARD OUUMN, DIE-CAST LALWINNUM HUNARE HOUSING WITH TTEGRAFT, 12 HIGH OUTPUT WHITE LEDS WITH EXTRUDED LUMINAR AND FULLY UNCTIONING SYSTEM. SILVER INSH. BK LIGHTING BY MANUFACTU RER MCP39PAR20/ U830/FL IETAL HALIDE ADJUSTABLE ACCENT IGHT, NOMINAL 3 INCH DIAMETER X INCH CYLDNEASS LENS, 9D DEGREE PAP.LOCKABLE, AIMING KNU</td> <td>ND PIECE, HAND BLOWN, THREE-PLY RINANGULAR SHAPED GLASSBEGA4482P1PSMAJRASU RS44RINANGULAR SHAPED GLASSLICTRONIC BAHAPED GLASSLICTRONIC BAHAPED GLASS44ILCCTRONIC BALLAST. UL WET ISTED. 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BALE O WITHATAD 80 MEH WIND WITH 14 LUST FACTOR, DAKK GASKETED COLLEAR EMPERED FLAT GLASS LENS AND ASKETED DOLARD NORMINA IS NOCH INSIG OUTPUT TINISH ON LUMINARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MANUFACTU RES RER185277 277VICH ADDIVASING WITH HAMELTER X 50 INCH TALL, STRUED AND LUMINUM BOLLARD OULMARARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MANUFACTU RES RER33277 277VICH CONSING WITH EXTRUDED LUMINUM MUNUMARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MA</td>	ND PIECE, HAND BLOWN, THREE-PLY RANGULAR SHAPED GLASS INFUSER, HIGH POWER FACTOR, LECTRONIC BALLAST. UL WET ISTED, FINISH TO BE SELECTED BY ESIGN PROFESSIONAL. BEGA 4482P 1 PS/MAYASJO RS DECORATIVE LIMEAR POLE TOP UMINARE, NOMINAL 6 INCH MAMETER X 3 FOOT HIGH DIFFUSER X 2007 OVERALL HEIGHT, STAINLESS TEEL TUBULAR HOUSING WITH UV FORMS AND SURFACES IGHT COLUMN SERIES 600- MOD.3 ⁻¹ . 1 F025/835/XP/E CO INFLEX, HIGH POWER FACTOR, IFECTUBULAR HOUSING WITH UV FORMS AND ESTELE FINISH. FORMS AND SURFACES IGHT COLUMN SERIES 600- MOD.3 ⁻¹ . 1 INGLE CUT-OFF TYPE LUMINARE, IOMINAL 13 INCH WIDE X 22 INCH ONG X 5 INCH ZS IESS AND ASKETED DOOR, UL WET LOCATION ABEL, MOUNT ON 5INCH X 18 FOOT IGH SULARE ALUMINUM POLE, ABLE O WITHSTAND 80 MPH WIND WITH 1.4 UIST FACTOR, DARK RAY PAINT INSH ON LUMINARIE AND POLE. IITHONIA ASII 500 N.S. 277.5PA-DSPD- DMI9AS-DSPD 1 MCP150/U/ME D/830 IEB BOLLARD, NOMINAL 8 INCH HAMETER X 36 INCH TALL, XITRUEDE ALUMINUM BOLLARD OUUMN, DIE-CAST ALUMINUM UNTRARE AND POLE. SELUX NT-3-L012-SV- 277 1 HIGH OUTPUT WHITE LED BY MANUFACTU RER ILCONE GASKET, 12 HIGH OUTPUT WHITE LEDS WITH EXTRUDED LUMINAME AND POLEAR ED BOLLARD. NOMINAL 8 INCH HAMETER X 36 INCH TALL, XITRUEDE ALUMINUM BOLLARD OUUMN, DIE-CAST LALWINNUM HUNARE HOUSING WITH TTEGRAFT, 12 HIGH OUTPUT WHITE LEDS WITH EXTRUDED LUMINAR AND FULLY UNCTIONING SYSTEM. SILVER INSH. BK LIGHTING BY MANUFACTU RER MCP39PAR20/ U830/FL IETAL HALIDE ADJUSTABLE ACCENT IGHT, NOMINAL 3 INCH DIAMETER X INCH CYLDNEASS LENS, 9D DEGREE PAP.LOCKABLE, AIMING KNU	ND PIECE, HAND BLOWN, THREE-PLY RINANGULAR SHAPED GLASSBEGA4482P1PSMAJRASU RS44RINANGULAR SHAPED GLASSLICTRONIC BAHAPED GLASSLICTRONIC BAHAPED GLASS44ILCCTRONIC BALLAST. UL WET ISTED. FINISH TO BE SELECTED BYFORMS AND SUBFICIES RADIAL1PSMAJRASU44RECORATIVE LINEAR POLE TOP UMINARE, NOMINAL 6 INCH IMAETTER X 50 FOOT HIGH DIFFUSER X 2 POOT OVERALL HEIGHT, STAINLESSFORMS AND SURFACESLIGHT COLUMN SERIES 600- MOD.3: DIFFUSER.12 OVERALL HEIGHT1FO25/835/XP/E CO28INGLE CUT-OFF TYPE LUMINARE, RUSHED STAINLESS STEEL FINISH.FORMS AND SURFACESLIGHT COLUMN SERIES 600- MOD.3: DIFFUSER.12 OVERALL HEIGHT1FO25/835/XP/E CO28INGLE CUT-OFF TYPE LUMINARE, RUSHED STAINLESS STEEL FINISH.FORMS AND SURFACESASTISOM-SR3- DIFFUSER.12 OVERALL HEIGHT1MCP150/UME B/27/SPA-DSPD- POLESSA-18-SG DM19AS-DSPD1MCP150/UME B/830185INGLE CUT-OFF TYPE LUMINARE, RUSHING NUTH HEAT SINK FINIS GASKETED CLEAR REAT SINK FINIS GASKETED CLEAR LOWINAL IS INCH MALLS INCH MARETER X 36 INCH TALL XITED CAST ALUMINUM MOLE, ABLE O WITHATAL S0 MITH VIEGATED PARTS AND SO MITH VIEGATED HARTSINKS, ONE-PIECE, RUSH AND FULLYSELUXNT-3-L012-SV- 2771HIGH OUTPUT WHITE HED MANUFACTU RER33MICH OUSING WITH VIEGATED TRANSLUCENT OULMAN, DIE-CAST ALUMINUM UNITAL SINCH MADWERE AND CCESSORIES FOR COMPLETE WSTALLARD NAD FULLY VIEGATED FULSAL AND FULLY NISH.BK LIGHTINGEV-59-FINISH-9- B-HP2-H35E:2771MCP39PAR20/	ND PIECE, HAND BLOWN, THREE-PLY RENAULAST, UL WET BEGABEGA4482P1PSMDASKA3044277RENAUGLAR STARPED GLASS IFFUSER, HIGH POWER FACTOR, LECTRONIC BALLAST, UL WET STED. INNISH TO BE SELECTED BYBEGA4482P1PSMDASKA3044277LICTRONIC BALLAST, UL WET STED. INNISH TO BE SELECTED BYPORMS AND SURFACESIGHT COLUMN SEREIS 600- MOD-3- DOT HIGH DUFFUSER X 2 POOT OVERALL HEIGHT, STAINLESS TEEL TUBULARD HOWER FACTOR, RUSHED STAINLESS STEEL FINISH.PORMS AND SURFACESIGHT COLUMN SEREIS 600- MOD-3- OVERALL HEIGHT1PO25635/XPFE CO28277INGLE CUT-OFF TYPE LUMINAIRE, COMINAL 13 INCH WIDE X 21 INCH ONG X 5 INCH POWER FACTOR, RASKETED DOLARD, SASKETED DOLARD ASEL TONINAL IS STEEL FINISH.LITHONIAASII50M-SR3- 277-SPA-0SPD- OUESALL SES TOLE INFO DIAGK SASKETED COLLEAR EMPERED FLAT GLASS LENS AND ASKETED DOLARD NORMINA IS NOCH ASKETED DOLARD NORMINA IS NOCH INSIG S INCH TALL, XITRIDED ALLIMINUM POLE. BALE O WITHATAD 80 MEH WIND WITH 14 LUST FACTOR, DAKK GASKETED COLLEAR EMPERED FLAT GLASS LENS AND ASKETED DOLARD NORMINA IS NOCH INSIG OUTPUT TINISH ON LUMINARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MANUFACTU RES RER185277 277VICH ADDIVASING WITH HAMELTER X 50 INCH TALL, STRUED AND LUMINUM BOLLARD OULMARARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MANUFACTU RES RER33277 277VICH CONSING WITH EXTRUDED LUMINUM MUNUMARE AND POLE.SELUXNT-3-L012.SV- 2771HIGH OUTPUT WHITE LED MA

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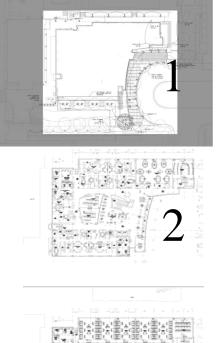
Medical Education Building

Johns Hopkins University School of Medicine Lighting Existing Conditions and Design Criteria Report

Exterior Façade

IESNA Handbook Light Loss Factors

Exterior Light Loss Factors						
Туре	LLD	LDD	RSDD	BF*	TOTAL LLF	
CA17	0.85	0.88	1	0.87	0.65076	
CA18	0.85	0.88	1	0.87	0.65076	
CB14A	0.95	0.86	1	0.87	0.71079	
CK1	0.61	0.88	1	0.87	0.467016	
CL1	0.85	0.82	1	0.87	0.60639	
CM2	0.8	0.82	1	0.87	0.57072	
CM3	1	0.82	1	0.87	0.7134	
CM14	0.6	0.82	1	0.87	0.42804	



ASHRAE 90.1 Power density requirements

Exterior Power Density Calculation						
W/SF Allowance	W/SF Existing					
0.2	18400	3900	0.21			



Exterior Façade Design Criteria

Appearance of Space and Luminaires. [IMPORTANT]

The luminaires should provide directional cues to the building entrances and distribute light downward and evenly on the walking paths.

Color Appearance & Color Contrast. [IMPORTANT]

The color rendering is important to create the appropriate mood in the outdoor space.

Daylighting Integration and Control. [VERY IMPORTANT]

Daylighting controls are very important for fixtures outside to minimize energy use during the day.

Direct Glare. [VERY IMPORTANT]

Direct glare should be strictly avoided to maintain safety in the area at night. The contrast between the dark surroundings and a very bright source are very uncomfortable and can hinder visibility in the area.

Illuminance (Horizontal). [VERY IMPORTANT]

The illuminance on the ground is very important for people to be able to find their way around the building and to the building entrance.

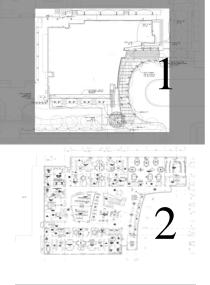
Illuminance (Vertical). [IMPORTANT]

Vertical illuminance is important in this space for good facial modeling and safety around the perimeter of the building.

Intrinsic Material Characteristics. [SOMEWHAT IMPORTANT]

The exterior materials of the building façade as well as walkway materials can be used to highlight the building and create points of interest along the façade.

Light Distribution on Task Plan (Uniformly). [VERY IMPORTANT] Uniform lighting along walkways and surroundings should be addressed to improve security in the vicinity of the building. Shadows should be avoided as much as possible around the walkways.







Exterior Façade Design Criteria

Light Pollution/Trespass. [VERY IMPORTANT]

Avoid luminaires with light directed above 90 degrees to keep direct light from entering into the atmosphere.

Modeling of Faces or Objects. [VERY IMPORTANT]

Lighting levels on faces and objects is very important for safety around the building.

Peripheral Detection. [IMPORTANT]

Lighting levels along the periphery of the walkways are important to safety.

Points of Interest. [IMPORTANT]

Architectural elements of the building such as the entrance and the glass façade are important for aesthetics and for directing pedestrians.

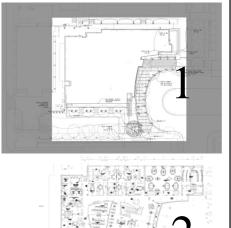
Reflected Glare. [IMPORTANT]

Reflections in the glass along the first floor should be avoided to prevent discomfort.

Shadows. [VERY IMPORTANT] Shadows should be prevented to allow for pedestrian comfort and safety around the exterior of the building.

Sparkle/Desirable Reflected Highlights. [IMPORTANT]

Surrounding trees can be used to help distribute a diffuse indirect light to the surrounding area.

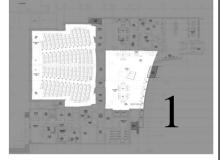














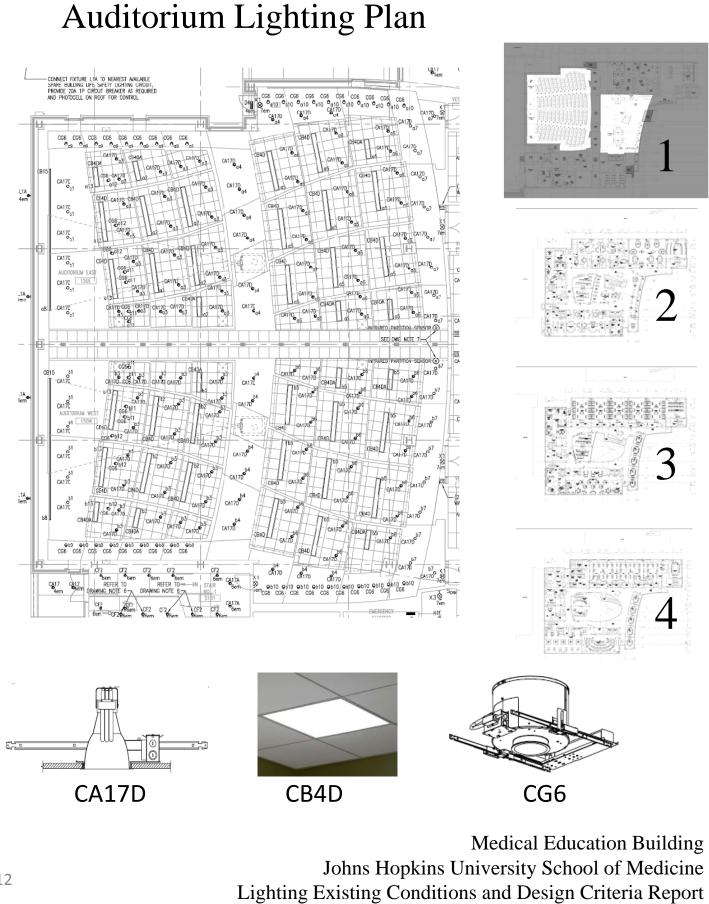




The Auditorium seats 350 people and has stadium seating lowering four feet below the first floor elevation. Although this space does not have any daylight, it has a Lutron GRX-4116 controls system to serve its multiple functions. Compact fluorescent and linear fluorescent downlighting is recessed in the floating wood ceiling above the seating areas. The side walls are washed with metal halide downlights to provide a more spacious feeling in the space. The lighting in both sides are controlled from the podium and entrance to the room.

Landon Roberts Lighting/Electrical Option 10/05/07 **Auditorium Sections** EXTERIOR STOREFRONT WINDOW SYSTEM SEE EXTERIOR DETAILS EXTERIOR STOREFRONT WINDOW SYSTEM SEE EXTERIOR DETAILS Exterior Cur System FINISHED CEILING 201 2 P-1 FRONT ST 4'-0". DP FINSHED CELLIN P-1 -P-S FWP-1 FWP-P-1 -----FWP-1 P-1 P-1 P-1 P-1 INTERNEDIATE 2'-0" PTD. GWR W/ 1/4" REVEALS 1 1/4" O.D. BRUSHED STAINLESS STEEL HANDRAIL AND WALL MOUN DETAILS OF DOOR AND FRAME Medical Education Building Johns Hopkins University School of Medicine

Lighting Existing Conditions and Design Criteria Report

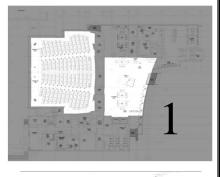


Auditorium Lighting Fixture Schedule AUDITORIUM LIGHTING FIXTURE SCHEDULE INPUT MANUFACTU VOLTA MOUNTI TYPE DESCRIPTION DESCRIPTION REMARKS WATTA RER DUANT GE NG GE TYPE COMPACT FLUORESCENT OWNLIGHT, NOMINAL 6 INCH DIAMETER APERTURE X 11-1/4 PROVIDE LUTRON NCH MAXIMUM RECESS DEPTH, DB SERIES DIMMIN F32DT/E ATIN CLEAR ALZAK LOW AFV-32TRT-6AR-LD-277 RECESSI BALLAST, CUSTOM CA17D RIDESCENT CONE AND FLANGE, GOTHAM 1 38 277 AINT SAMPLE TO BE DMHL TFCTBD MP7061 IN/835 D VITH 5% ARCHITECTURAL SUBMITTED WITH DIMMING BALLAST AND TRIM HOP DRAWINGS INISH PAINTED TO MATCH AMPLE PROVIDED BY ARCHITECT RECESSED FLUORESCENT TROFFER, NOMINAL 12 INCH WIDE 96 FOOT LONG BY 10 INCH DEEP ð 0 LAMP PER CROSS SECTION, STEEL HOUSING, HIGH REFLECTANCE WHITE REFLECTOR, FLEXIBLE VL-18-(MOD)-277-ROVIDE LUTRON RECESSE FOR DIMMING MARK 54WT5HO-EDB-(HI-P54/835/H CB4D 2 126 277 TRANSLUCENT WHITE PVC DIFFUSER WITH CLEAR OVERLAY LIGHTING LUME)-CUSTOM TRIM O/ ECO BALLAST COLOR DIMMING BALLASTS. PROVIDE CUSTOM TRIM COLOR TO MATCH PAINT SAMPLE PROVIDED BY 17, 5857, 57, 20, RCHITECT. 國家保護部制 VL-14-(MOD)-277-PROVIDELUTRON AME AS TYPE CB4D EXCEPT 4 MARK 54WT5HO-EDB-(HI-P54/835/ RECESS 277 FOR DIMMING CB4DA 63 LUME)-CUSTOM TRIM OOT LONG LIGHTING O/ ECO D BALLAST COLOR INEAR FLUORESCENT WALL OUNTED DOWNLIGHT. NOMINAL 3 INCH WIDE X 4-1/2 INCH TALL X ENGTH AS SHOWN ON DRAWINGS, EXTRUDED ALUMINUM HOUSING, REFER TO P54/835/H CORRUGATED REGRESSED TRIP FAVDS-CR-1T5HO-1C-277-S-SM-TS-LENGTH ARCHITECTURAL SECTION FOR FOCAL POINT 1/4FT SURFAC CB15 60 277 VITH FLUSH SATIN LENS, STEEL 0/ ECO MOUNTING DETAIL EFLECTOR, CLEAR ACRYLIC DUST OVER, INTEGRAL HIGH POWER ACTOR, ELECTRONIC BALLASTS REFER TO ARCHITECTURE DRAWINGS FOR MOUNTING EIGHT. ALOGEN DOWNLIGHT. NOMINAL INCH APERTURE X 9 INCH AXIMUM RECESS DEPTH. SATIN 5PAR30S/ RECESS GOTHAM APR-PAR30-4AR-LD 75 277 CG6 1 CLEAR ALZAK REFLECTOR CONE HAL/FL25 D ND RETURN FLANGE, 277/120V NTEGRAL AUTOTRANSFORMER METAL HALIDE ADJUSTABLE ACCENT, NOMINAL 4-1/2 INCH DIAMETER APERTURE X 6-1/2 INCH MAXIMUM RECESS DEPTH, DIE CAST CONSTRUCTION WITH MCP70P/ RECESS RSA LIGHTING CDMC-P3-S-70-277-NC R30LN/U/ CK3 82 277 1 D NDUSTRIAL SILVER POWDER 30FL COAT FINISH, 30 DEGREE TILT, 359 DEGREE ROTATION, HIGH POWER ACTOR, ELECTRONIC BALLAST.

Auditorium

IESNA Handbook Light Loss Factors

Auditorium Light Loss Factors						
Туре	LLD	LDD	RSDD	BF*	TOTAL LLF	
CA17D	0.85	0.88	0.98	0.87	0.6377448	
CB4D	0.95	0.86	0.98	0.87	0.6965742	
CB4DA	0.95	0.86	0.98	0.87	0.6965742	
CB15	0.95	0.88	0.98	0.87	0.7127736	
CG6	0.95	0.88	0.98	0.87	0.7127736	





ASHRAE 90.1 Power density requirements

Auditorium Power Density Calculation					
W/SFArea of space(SF)Total Lamp WattageW/SF Existing					
1.4	7680	19600	2.55		

Medical Education Building Johns Hopkins University School of Medicine Lighting Existing Conditions and Design Criteria Report

Auditorium Design Criteria

Appearance of Space and Luminaires. [IMPORTANT]

The arrangement and relationship of the luminaires to the layout of the auditorium is important in order to create a uniform level of light on the seating. It will also be important to give an overhead guide to flow throughout the space above the aisles.

Color Appearance and Color Contrast. [IMPORTANT]

The importance of color along the ceiling and perimeter walls is important to enhance the wood finishes. It is also important for performing educational tasks.

Direct Glare. [VERY IMPORTANT]

This is very important in order for people to pay attention and see the front of the auditorium. Discomfort glare, overhead glare, reflected glare and disability glare are very important to address in the space to avoid visual issues in the space.

Illuminance (Horizontal). [VERY IMPORTANT]

The illuminance levels are very important on the horizontal task plane in the space to adequately supply the appropriate levels for tasks to be performed. The task plane in the space will be at 30 inches. A minimum of 10 footcandles is recommended by IESNA standards.

Illuminance (Vertical). [IMPORTANT]

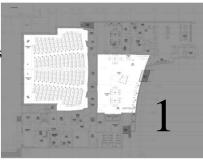
The illuminance levels are very important on the vertical task plane in the space to adequately supply the appropriate levels along the front wall for chalkboard/whiteboards. It should also be uniform in order to avoid distractions. A minimum of 3 footcandles is recommended by The IESNA standards.

Light Distribution on Surfaces. [IMPORTANT]

The luminance ratios in the space should be uniform to avoid distractions and to open the space. Ceiling and wall luminance ratios should not exceed a 3:1 ratio but should be visibly different to avoid monotonousness in the space.

Light Distribution on Task Plane (Uniformly). [VERY IMPORTANT]

Non-uniform levels will be distracting and uncomfortable and will hinder the occupant from performing tasks well. Task illuminance levels should be 1.5 to 3 times higher than the immediate surroundings (aisles and walkways) to direct the attention of the occupant to the task plane.



Lighting/Electrical Option

Landon Roberts

10/05/07







Auditorium Design Criteria

Luminaire Noise. [IMPORTANT]

Noise from the luminaires (and HVAC equipment) is very distracting especially in a quiet space. It can be very distracting during presentations and lectures and in extreme cases.

Luminances of Room Surfaces. [VERY IMPORTANT]

The space should include direct and diffuse light to the occupants to increase comfort and satisfaction to avoid shadows and dark spots.

Modeling of Faces or Objects. [IMPORTANT]

The space is designed to focus the attention to the front of the room. Most uses of the space will involve a speaker at the front of the room where the attention will be on so shadows especially on the face should be avoided.

Points of Interest. [IMPORTANT]

The front of the room is the most important part of the room and the illuminance levels should be higher here. There should also be a focus on the sides where a podium would stand in case the luminaires are switched off and the speaker uses the projector.

Reflected Glare. [VERY IMPORTANT]

Glare in this space should be avoided to ensure optimal task performance and comfort and clarity for the occupants. It is important to provide illuminance from the sides of the tasks to avoid glare.

Source/Task/Eye Geometry. [VERY IMPORTANT]

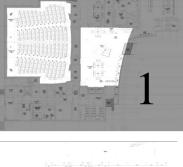
The angles between the light source, the task plane and the occupant are very important in this space. Improper placement of luminaires can cause discomfort and distractions to the occupant.

Surface Characteristics. [IMPORTANT]

Surface materials and reflectances are important to increase ambient light in the room and decrease contrast from the fixtures and their backgrounds. The surfaces should be mainly a matte or satin finish to avoid glare. There is also wood finishes along the side walls to help decrease reverberations in the space.

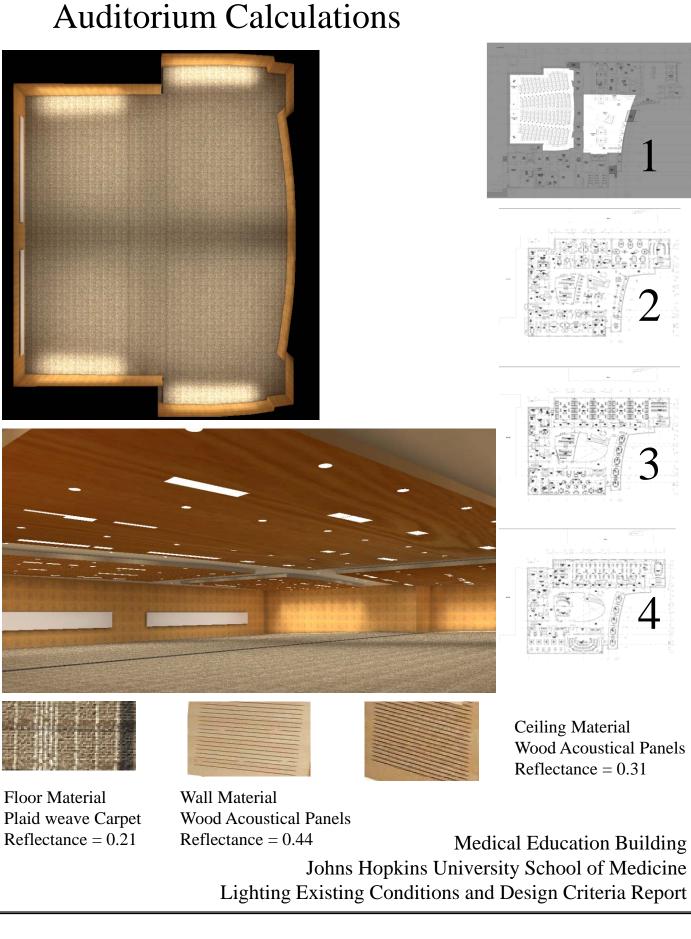
System Control and Flexibility. [VERY IMPORTANT]

The multi-functionality of the space requires various light levels to accommodate the occupants. Lower light levels will be needed for projector-screen use and high levels will be needed for presentations and lectures using the front chalkboard/whiteboard. Dimming might also be used to lower the light levels in the space for projector-use or digital presentations.



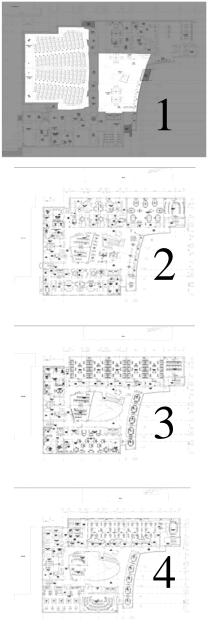






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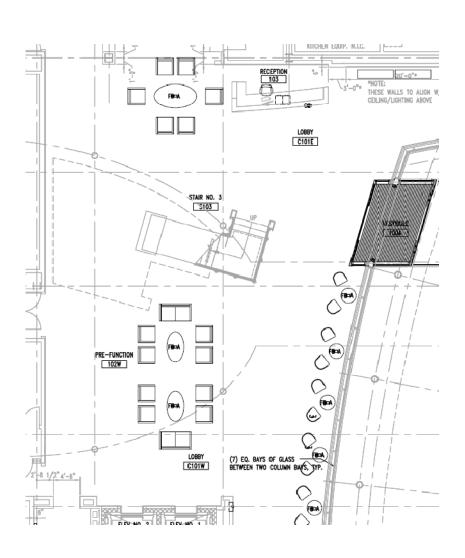




After analyzing the lighting conditions in the main auditorium space, the calculations met the design criteria for the space. An average of 30 footcandles was calculated on the task plane.

The lighting along the wall helps to present a more spacious feeling to the room and also helps to illuminate the walkways along the walls. The lighting compliments the wood acoustical ceilings that float above the four main seating areas in the space. Both systems work together to create a natural flow towards the center of the room, giving the space more interest and a more impressive look.

First Floor Atrium

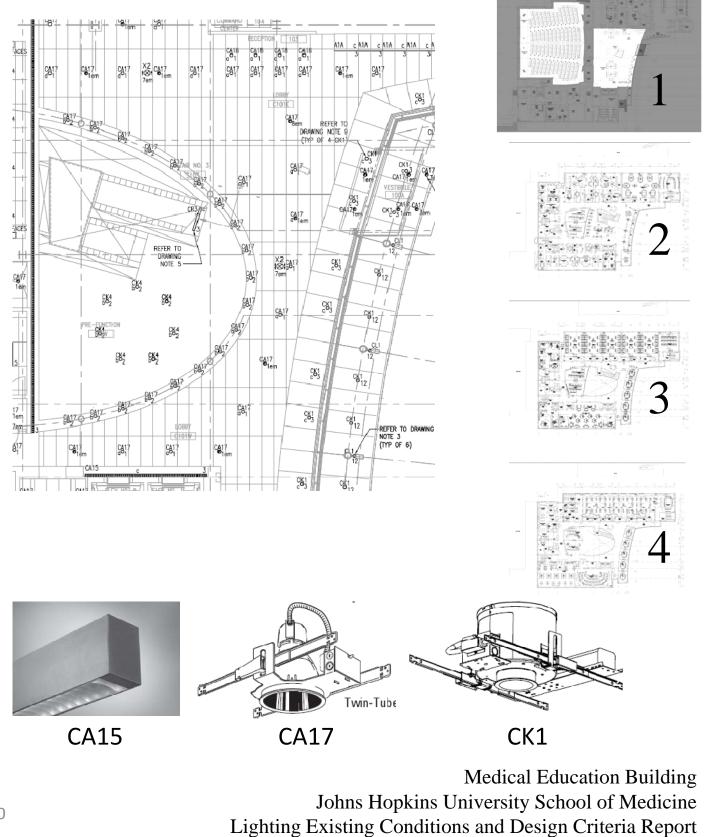


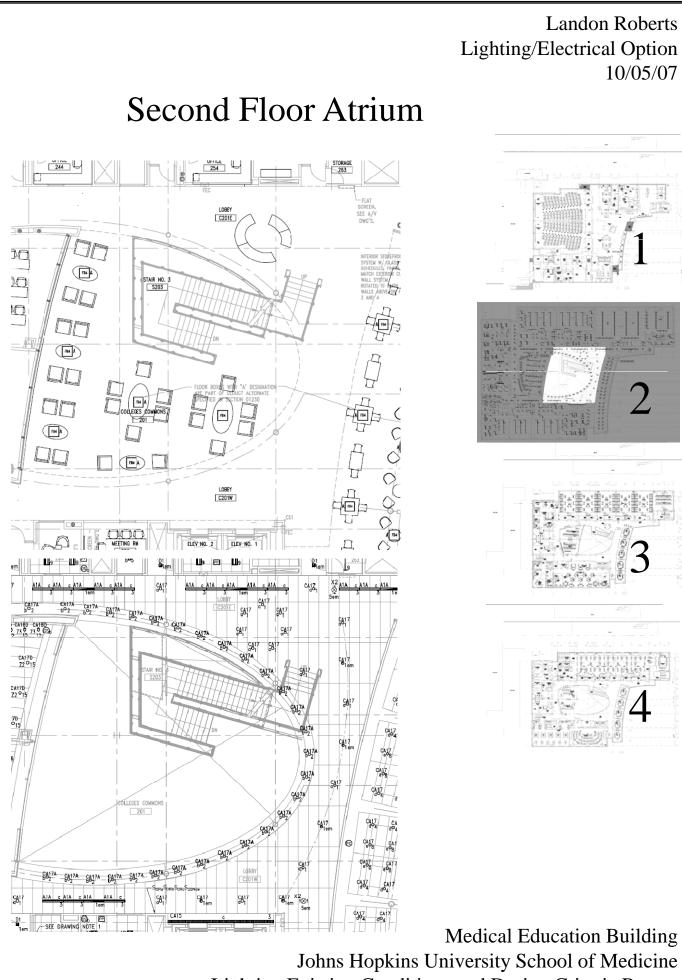




The first floor of the atrium is the main space people enter into when entering this building. Compact fluorescent downlights are recessed in the ceiling along with wallwashers along the walls. Metal halide downlights are located above the furniture in the center of the atrium and along the glass curtain wall. There is also a cove system along the north wall in the lobby .

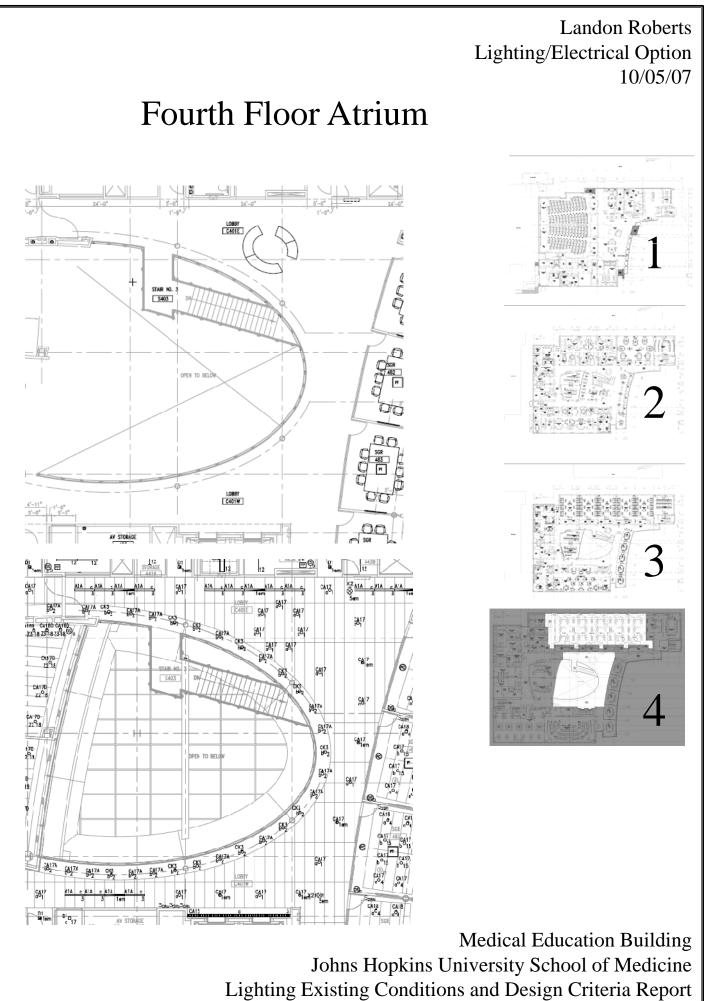
First Floor Atrium





Landon Roberts Lighting/Electrical Option 10/05/07 Third Floor Atrium 343A EE A/V LOBBY C301 E 0 10 STOREFRONT / 1/4" GLASS TO MATCH CW Don 0 STAIR NO. 3 \$303 0 0 <u>SGR</u> 382 ГТ OPEN TO BELOW DO Dr SGR 383 PT LOBBY C301W 00 ELEV NO. 2 ELEV NO. 1 01 Elem υ U1 ■1em İZ 1/2 Ŧ 343A CA1Z CA17 SA17A СК3 ЬФ2 <u>C</u><u>A</u> CK3 CA17 D CA18D CA18D 013 013 23 3 30 CK3 GA174 CK3 CALZA CALZA CA C CA17D Z2 013 Ca17 1er STAIR NO S303 CA17D Z2 °13 9A1 CA17 170 013 70 14 6817/ CA18 C&17 CA17 5G CK3 0 CA17 6010 6817A CAI 6617A CK3 CA18 CA18 C&17 1en CK3 6417 6⁰10 6417A CA17 CK3 b02 ® GATTA CA17 CA17 6°10 68^{17A} 68^{17A} 68^{17A} 68^{17A} 68^{17A} 68^{17A} 68^{17A} 68² CA1 CA17 a⁰9 CA 17 6 CA17 X2 1em 1⊗15e CA17 C&17 1em CA17 CA18 09 CA18 Medical Education Building

Johns Hopkins University School of Medicine Lighting Existing Conditions and Design Criteria Report



Atrium Lighting Fixture Schedule ATRIUM LIGHTING FIXTURE SCHEDULE INPUT MANUFACTURER TYPE DESCRIPTION DESCRIPTION /OLTAGE MOUNTING QUANTITY TYPE WATTAG RECESSED 4 FOOT LONG WALLWASHER WITH NOMINAL 2 LWAR9-G-1-FP54/835/HO INCH WIDE APERTURE, EXTRUDED PEERLESS 4T5HO-HOL-U4 60 277 RECESSED A1A 1 ECO ALUMINUM REFLECTOR WITH BLACK GEB10 MATTE PERFORATED DIFFUSER. INEAR FLUORESCENT RECESSED UMINAIRE, NOMINAL 11 INCH WIDE X MAXIMUM 8-3/8 INCH RECESS DEPTH X LENGTH AS SHOWN ON P54/835/HO DRAWINGS, STEEL HOUSING. PPL-WH-ECO CONTINUOUS WHITE REFLECTOR UP LENGTH-277-AND CA15 MARK LIGHTING 2/4 FT 120/4 FT 277 RECESSED TO 40 FEET LONG. HIGH POWER 000 2T5HO-EB FP39/835/HO ACTOR, ELECTRONIC BALLASTS ECO PROVIDE SLIDING SLEEVE AS REQUIRED. REFER TO ARCHITECTURAL DRAWINGS FOR ENGTH. 에게 2017 2014 프로 1 원구 이것 바람이다. COMPACT FLUORESCENT DOWNLIGHT, VERTICAL LAMP, NOMINAL 6 INCH DIAMETER APERTURE X 11 INCH MAXIMUM AFV-32TRT-6AR-CF32DT/E/IN RECESSED CA17 GOTHAM 1 36 277 RECESS DEPTH. SATIN CLEAR ALZAK LD-277-GEB10 835 OW IRIDESCENT CONE AND FLANGE INTEGRAL ELECTRONIC BALLAST VITH LAMP FAILURE PROTECTION METAL HALIDE DOWNLIGHT, NOMINAL 6 INCH DIAMETER APERTURE X 10 INCH MAXIMUM PRH-P3070MHC RECESS DEPTH, SEMI-SPECULAR CDM70/PAR CK1 GOTHAM 6-AC-T30-LD-1 82 277 RECESSED CLEAR ALZAK LOW IRIDESCENT 0L/M/FL VOLT-HEB REFLECTOR WITH FLAT FLANGE HIGH POWER FACTOR, ELECTRONIC ALLAST METAL HALIDE ADJUSTABLE ACCENT, NOMINAL 4-1/2 INCH DIAMETER APERTURE X 6-1/2 INCH AXIMUM RECESS DEPTH. DIE CAST CDMC-P3-S-70-MCP70PAR30 СК3 CONSTRUCTION WITH INDUSTRIAL RSA LIGHTING 1 82 277 RECESSED 277-NC LN/U/830FL SILVER POWDER COAT FINISH 30 DEGREE TILT, 359 DEGREE ROTATION HIGH POWER FACTOR, ELECTRONIC ALLAST METAL HALIDE ADJUSTABLE ACCENT, NOMINAL 4 INCH DIAMETER APERTURE X 9-1/2 INCH MAXIMUM RECESS DEPTH, SEMI-SPECULAR DPH-P2039MHC-CDM35/PAR2 CK4 CLEAR ALZAK LOW IRIDESCENCE REFLECTOR WITH FLAT FLANGE, 40 GOTHAM -AC-T20-LD-277 1 45 277 RECESSED 0/M/FL HEB DEGREE TILT, 360 DEGREE ROTATION HIGH POWER FACTOR, ELECTRONIC BALLAST. FLUORESCENT RECESSED IN-FLOOR JPLIGHT, NOMINAL 4-1/2 INCH WIDE 48-1/2 INCH LONG X 5 INCH IAXIMUM RECESSED DEPTH, DIE AST ALUMINUM ALLOY HOUSING VITH EXTRDUD ALUMINUM INNER RECESSED FP54/835/HO/ CR3 BEGA 8643P 277 HOUSING. STAINLESS STEEL 1 60 IN ECO ACEPLATE, TEMPERED GLASS LENS MILLWORK ANODIZED ALUMINUM SYMMETRICAL REFLECTOR WITH OUVER, HIGH POWER FACTOR. LECTRONIC BALLAST. UL WET ISTED

Atrium

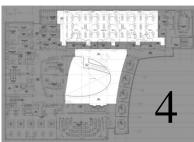
IESNA Handbook Light Loss Factors

Atrium Light Loss Factors						
Туре	LLD	LDD	RSDD	BF	TOTAL LLF	
A1A	0.95	0.86	0.98	0.87	0.6965742	
CA15	0.95	0.86	0.98	0.87	0.6965742	
CA17	0.85	0.88	0.98	0.87	0.6377448	
CA18	0.85	0.88	0.98	0.87	0.6377448	
CK1	0.61	0.88	0.98	1	0.526064	
CK3	0.61	0.88	0.98	1	0.526064	
CK4	0.61	0.88	0.98	1	0.526064	
CR3	0.95	0.88	0.98	0.87	0.7127736	



ASHRAE 90.1 Power density requirements

Atrium Power Density Calculation					
Area ofTotal LampW/SF Allowancespace(SF)WattageW/SF Existing					
1.1	6430	4851	0.76		



Atrium Design Criteria

Daylighting Integration and Control. [VERY IMPORTANT]

Daylight directly penetrates the space from the roof glass ceiling and through the glass curtain wall on the first and second floor. It also can come through the student group rooms lining the glass curtain wall on the third and fourth floor. With the amount of daylight penetrating the space, it will be important to have daylight control in order to keep a comfortable level constant throughout the day.

Direct Glare. [IMPORTANT]

It is important to minimize glare because of the importance of circulation and heavy meeting use of the space.

Illuminance (Horizontal). [VERY IMPORTANT]

Horizontal Illuminance levels are important for safety along the stairwell and atrium edge as well as clearly light the circulation areas of the occupants. The recommended illuminance level should be 10 footcandles.

Light Distribution on Surfaces. [IMPORTANT]

It is important to differentiate the illuminance levels of the different surfaces in the space to keep a visual interest. The recommended ratio between the ceiling and floor is a 3:1 ratio.

Light Distribution on Task Plan (Uniformly). [IMPORTANT]

It is important to have a uniform level of light along the staircase and floor throughout the space to keep it safe.

Light Pollution/Trespass. [VERY IMPORTANT]

It is important not to waste energy by directing light outside of the building through the large glass ceiling or full height glass façade. Reflected lighting should also be minimized to reduce light escaping from the glass.

Modeling of Faces or Objects. [IMPORTANT]

The atrium and lobby spaces will be the main circulation spaces in the building where people will meet and relax. It will be important to use multi-directional lighting to improve facial modeling and reflected lighting from the walls helps to fill in facial shadows.

Points of Interest. [IMPORTANT]

The grandoise atrium architecture and surrounding lobby spaces will be main points of interest because they are located in the middle of the building and span the whole height of the building.

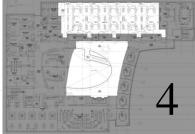
Reflected Glare. [IMPORTANT]

It is important to avoid reflections from the glass ceiling and glass wall along the north wall of the atrium.







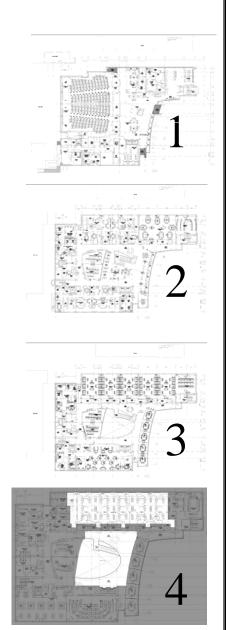


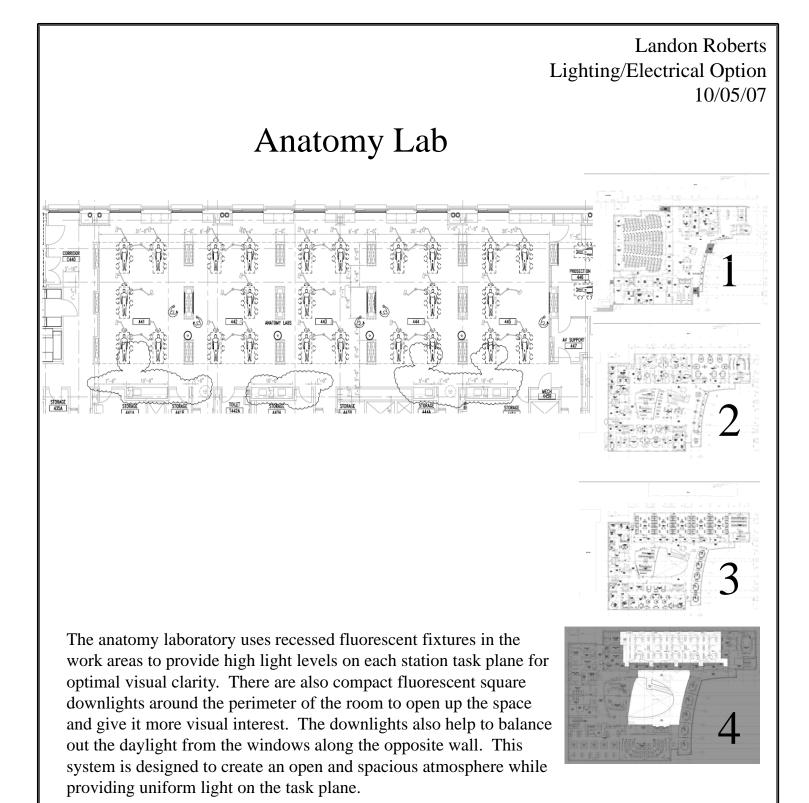
Atrium Design Evaluation

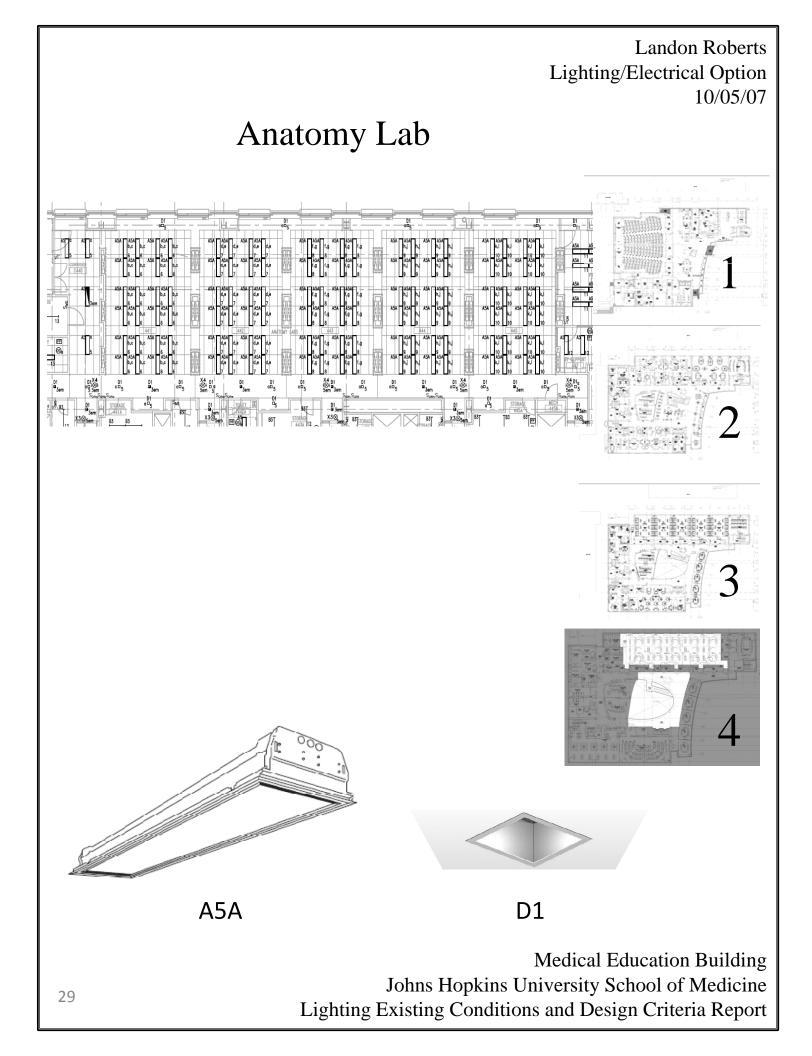
The lighting design of the atrium creates a very open space by the compact fluorescent and metal halide downlights along the perimeter of each floor. However, as the central and largest space in the building, the atrium is naturally the most commonly visited space in the building. The lighting should emphasize the powerful architectural statement it creates in the building.

Most of the first floor is separated from the atrium and creates more of a basement feeling to the first floor. The lighting design should emphasize the full height atrium and open up the first floor to open up the space. The stairwell also could be emphasized with its central location within the atrium. Giving this a vertical element could also connect the full height of the atrium.

The glass curtain wall also creates an illusion of a larger atrium space. The meeting rooms next to the atrium add to the lighting into the space from the skylight and southwest exterior glass curtain wall.







Anatomy Lab Lighting Fixture Schedule ANATOMY LABORATORY LIGHTING FIXTURE SCHEDULE LAMPS INPUT DESCRIPTION MANUFACTURER TYPE DESCRIPTION VOLTAGE MOUNTING WATTAGE QUANTITY TYPE RECESSED 1 FOOT X 4 FOOT FLUORESCENT FIXTURE WITH 0.125" #12 PRISMATIC ACRYLIC SP-G-232-A12125-277 GEB10RS 032/835/E LITHONIA 2 54 277 RECESSED A5 CO LENS AND FLUSH WHITE STEEL DOOR. RAPID START BALLAST. ě SAME AS TYPE "A5" EXCEPT WITH 3 SP-G-332-A12125-277 032/835/E A5A LITHONIA 3 85 277 RECESSED AMPS GEB10RS(2) CO ·蜀•毛 RECESSED COMPACT FLUORESCENT DOWNLIGHT WITH ϵ NCH SOUARE APERTURE. SOF-1/32TRT-6AR-F32DT/E HORIZONTAL LAMP, AND MATTE-GOTHAM 277 RECESSED D1 36 1 LD-MVOLT IN/835 DIFFUSED CLEAR ALZAK REFLECTOR WITH WRAPAROUND ONE-PIECE TRIM. Medical Education Building

Johns Hopkins University School of Medicine Lighting Existing Conditions and Design Criteria Report

Anatomy Lab

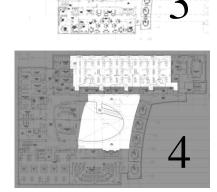
IESNA Handbook Light Loss Factors

ANATOMY LAB LIGHT LOSS FACTORS						
Туре	LLD	LDD	RSDD	BF*	TOTAL LLF	
A5	0.95	0.88	0.98	0.87	0.7127736	
A5A	0.95	0.88	0.98	0.87	0.7127736	
D1	0.85	0.88	0.98	0.87	0.6377448	



ASHRAE 90.1 Power density requirements

Anatomy Lab Power Density Calculation					
Area of Total Lamp W/SF Allowance space(SF) Wattage W/SF Existing					
1.4	4480	11532	2.57		



Anatomy Lab Design Criteria

Appearance of Space and Luminaires. [IMPORTANT]

The layout of the space with the different examination tables and flat screen TVs need higher light levels then the walkways between the different stations.

Color Appearance and Color Contrast. [VERY IMPORTANT]

Luminaires with higher CRI values should be used to see color better and distinguish between color while occupants are using anatomy stations.

Daylighting Integration and Control. [IMPORTANT]

The space is located on the eastside of the building so there will be a large amount of light entering in the morning hours. Daylighting controls should be used to compliment the daylight with electric lighting to ensure optimal light levels throughout the day and to minimize energy use.

Direct Glare. [VERY IMPORTANT]

It is very important not to have direct glare during anatomy labs. Visual clarity is very important in this space and direct glare will be very uncomfortable and distracting.

Illuminance (Horizontal). [VERY IMPORTANT]

It is very important to have appropriate light levels along the task plane. A minimum of 50 footcandles is recommended in this space.

Illuminance (Vertical). [VERY IMPORTANT]

It is very important to have appropriate vertical light levels for facial recognition. A minimum of 30 footcandles is recommended in this space.

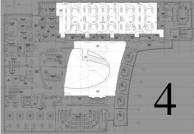
Light Distribution on Surfaces. [IMPORTANT]

Light levels at stations should be higher than the light levels along the periphery and in the walkways between stations to direct attention to the stations.

Light Distribution on Task Plan (Uniformly). [VERY IMPORTANT] Uniform lighting along task plane is essential for performing critical tasks along stations that require visual datail. There should not be any shedow

along stations that require visual detail. There should not be any shadow around work station.





Anatomy Lab Design Criteria

Luminances of Room Surfaces. [IMPORTANT]

An average of 30-100 candela per square meter are recommended for wall luminance levels in a workspace to increase brightness along the periphery of the room.

Modeling of Faces or Objects. [VERY IMPORTANT]

The depth and shape of objects are important in this space to see and be able to perform necessary tasks at stations throughout the space in order to see the small details.

Points of Interest. [VERY IMPORTANT]

The stations and TVs are the points of interest in the space and should have higher illuminance levels than the walkways between the stations.

Reflected Glare. [VERY IMPORTANT]

Glare should be avoided to minimize distraction and discomfort in the space. The daylight and electric lighting both could hinder the tasks being performed. Reflected glare from the TV screens also needs to be avoided in order that the students can easily see the screen.

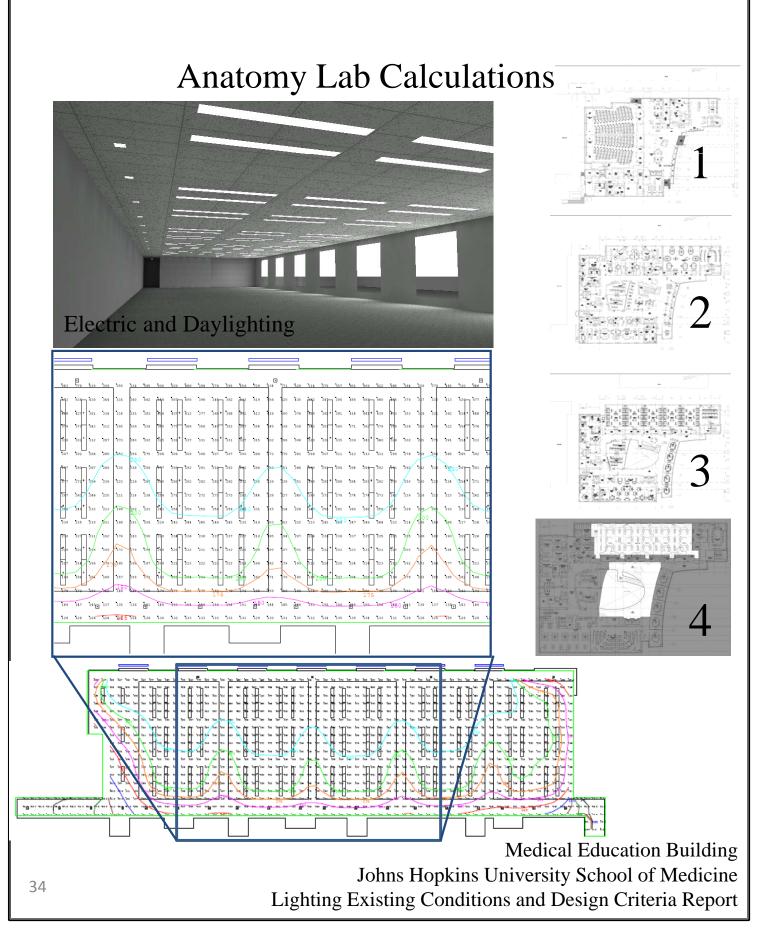
Shadows. [IMPORTANT]

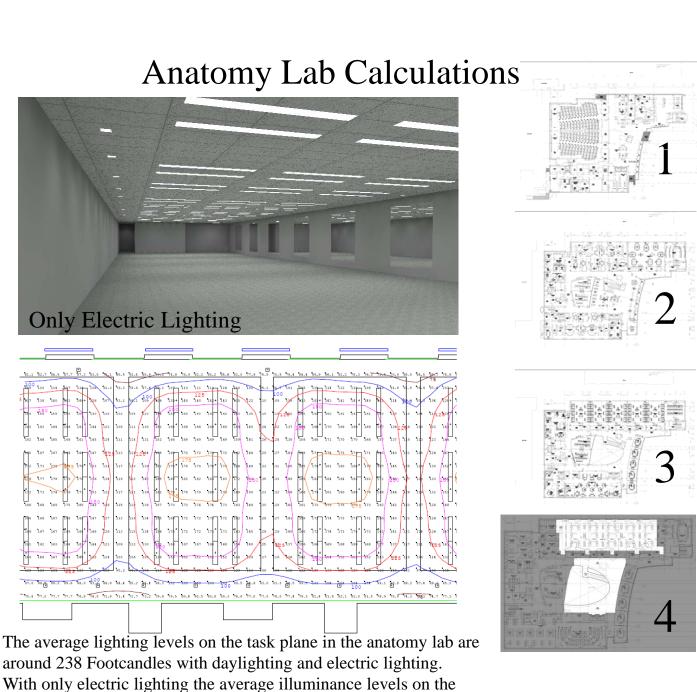
Shadows should be avoided in this space due to the important visual tasks being performed at the stations throughout the room.

Source/Task/Eye Geometry. [VERY IMPORTANT]

Due to the importance of the visibility of the tasks being performed, the sources should not interfere with the vision of the occupants.

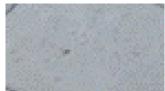






task plane is 124 Footcandles. The high levels are needed on the task plane in order for occupants to see minute details while they

perform the common tasks of the space.

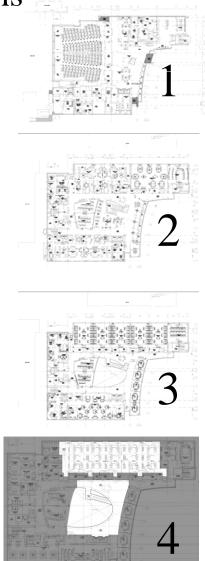


Floor Material Epoxy Painted Concrete Reflectance = 0.35 Ceiling Material Acoustical ceiling tile Reflectance = 0.85

Anatomy Lab Calculations

After calculating the lighting levels on the task plane in the anatomy lab, the results showed high values. The average lighting levels on the task plane in the anatomy lab are around 238 Footcandles with daylighting and electric lighting. With only electric lighting the average illuminance levels on the task plane is 124 Footcandles. However, most of the tasks performed will require high levels in the space in order for occupants to see minute details while conducting anatomy labs.

The space is very open and long. The lab is 112 feet long and 40 feet wide. Each work station is sits next to a flat screen TV for occupants to receive instructions for lab assignments. The openness of the space allows occupants to move around easily especially when various equipment will be needed for the assigned tasks.





Floor Material Epoxy Painted Concrete Reflectance = 0.35 Ceiling Material Acoustical ceiling tile Reflectance = 0.85

Appendix

All relevant computer files can be found on the Penn State Architectural Engineering computer server.

- IES Files for existing fixtures
- AGI 32 Files Auditorium.a32; Anatomy Lab.a32
- Excel Files LLF.xls; Power Density Calcs.xls; Existing LFS.xls
- Word documents lighting design criteria for each space

