

# WHEELLOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE



courtesy of william rawn associates

anne k cheney

lighting | electrical option

advisors: kevin houser, ted dannerth

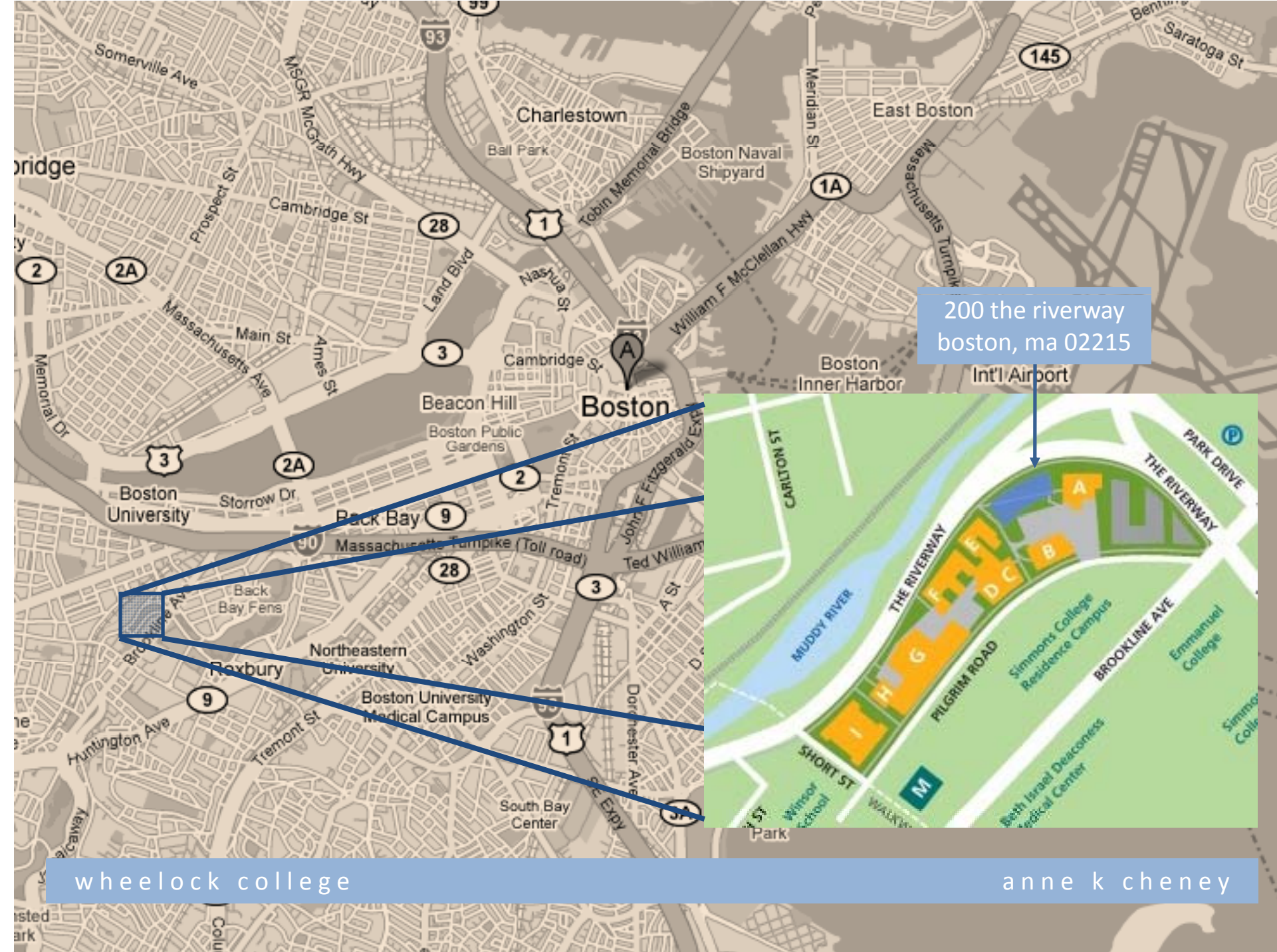


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200 the riverway  
boston, ma 02215



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## building statistics

size		60,000 sf
floors		7 floors
construction		09.27.07 – 12.31.08
delivery method		design-bid-build
cost		\$23 million

## project team

owner		wheelock college
architect		william rawn associates
lighting		hlb lighting design
structural		lemessurier consultants, inc
m/e/p		vanderweil engineering
general contractor		shawmut design and construction

# WHEELLOCK COLLEGE

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## project scope

lighting

conference room  
student lounge  
cafeteria  
roof deck  
dorm room

electrical

feeder redesign  
fault current analysis  
SKM analysis  
voltage change

acoustics

reverberation study

architecture

daylight control study





# WHEELLOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE



courtesy of william rawn associates

## presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

electrical

acoustics

architecture

final remarks

acknowledgments



functions

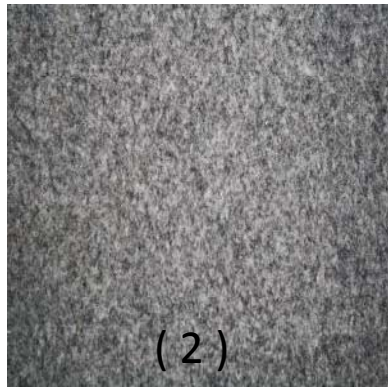
meeting space

classroom

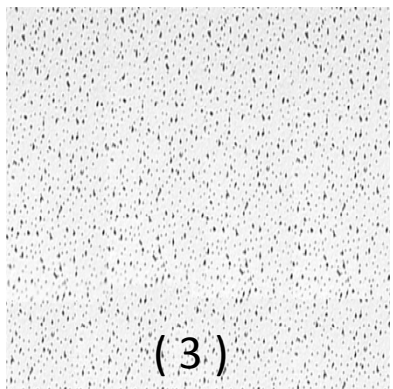
presentation space



(1)



(2)



(3)

spatial considerations

sleek impression

window walls

12 person table

wood panel wall (1)

gray carpet (2)

14' act ceilings (3)

presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

electrical

acoustics

architecture

final remarks

acknowledgments





# presentation outline

lighting

**conference room**

student lounge

cafeteria

roof deck

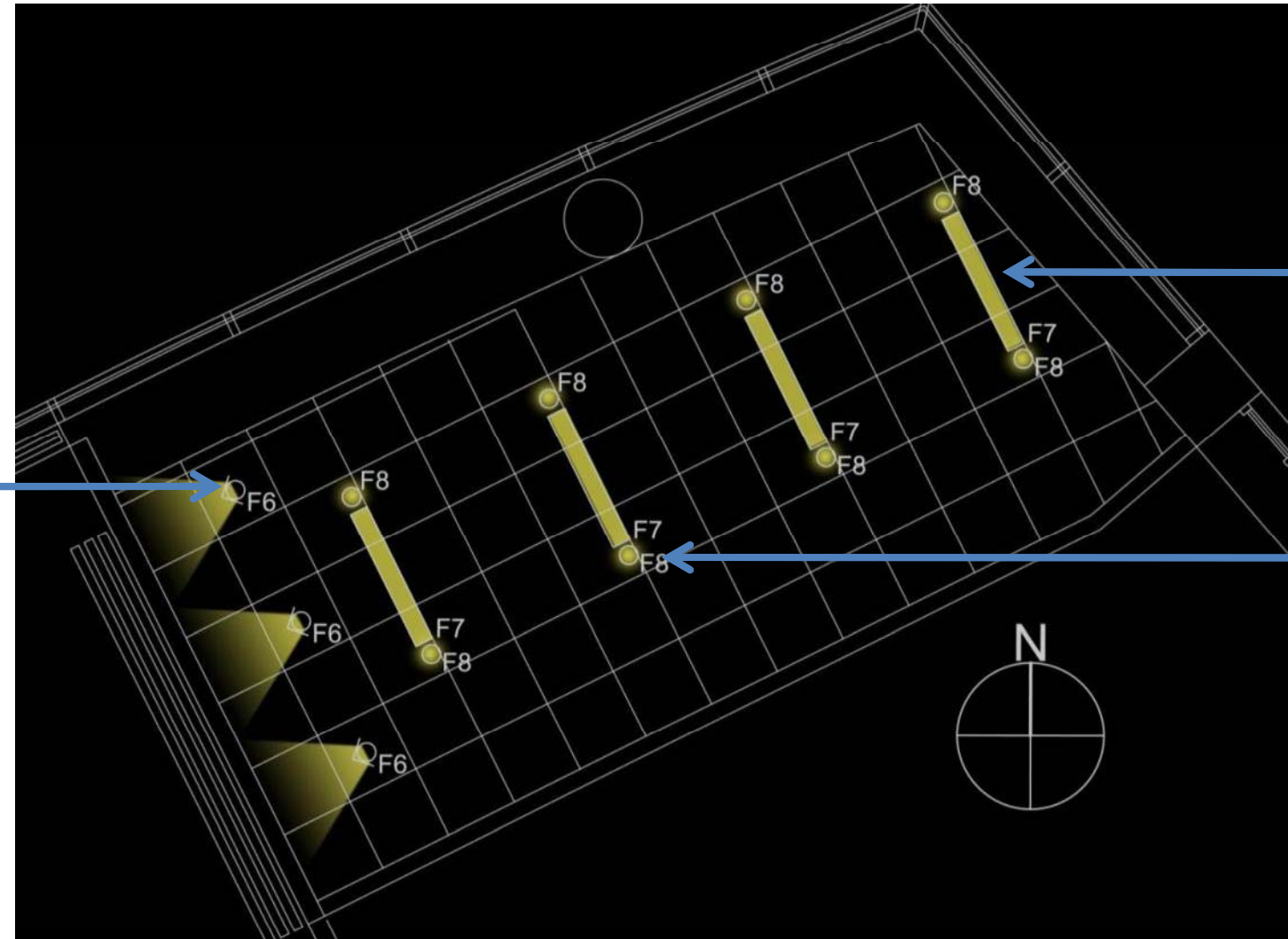
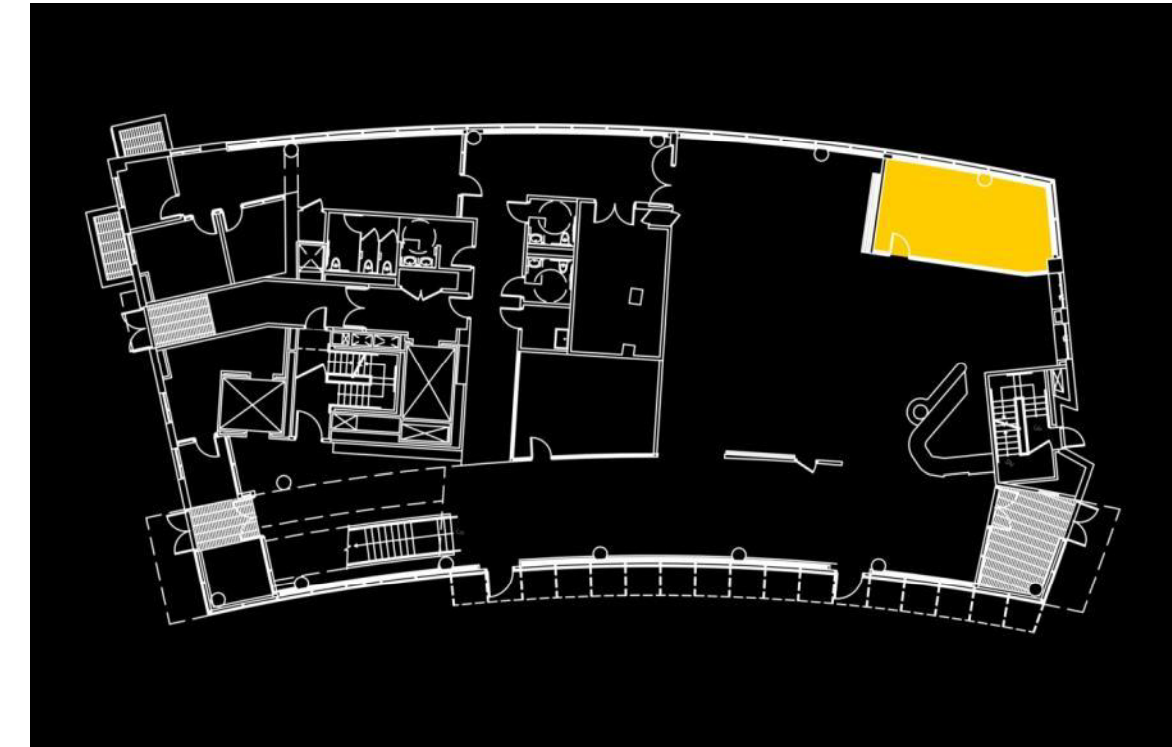
electrical

acoustics

architecture

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# presentation outline

lighting

**conference room**

student lounge

cafeteria

roof deck

electrical

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# presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

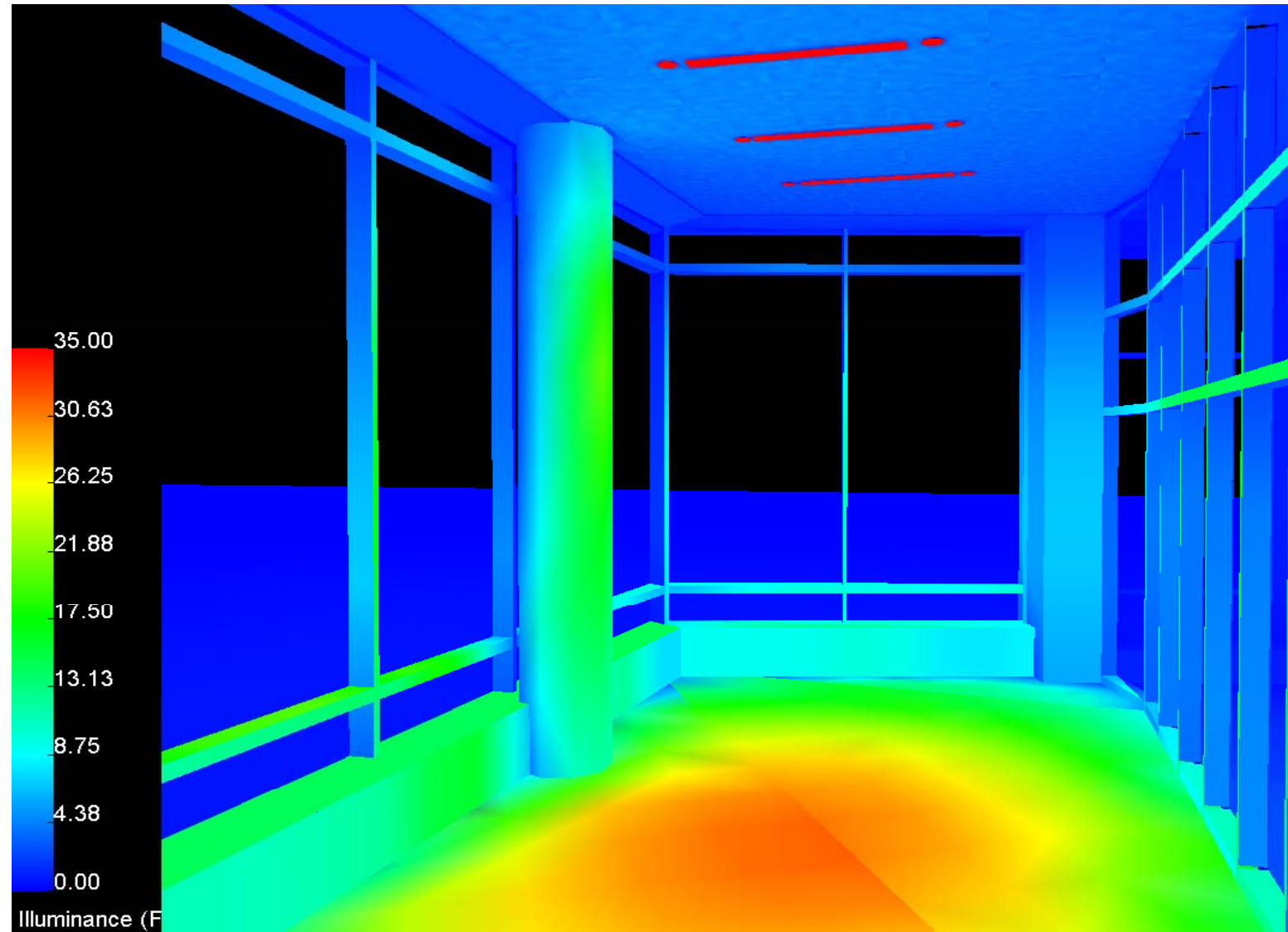
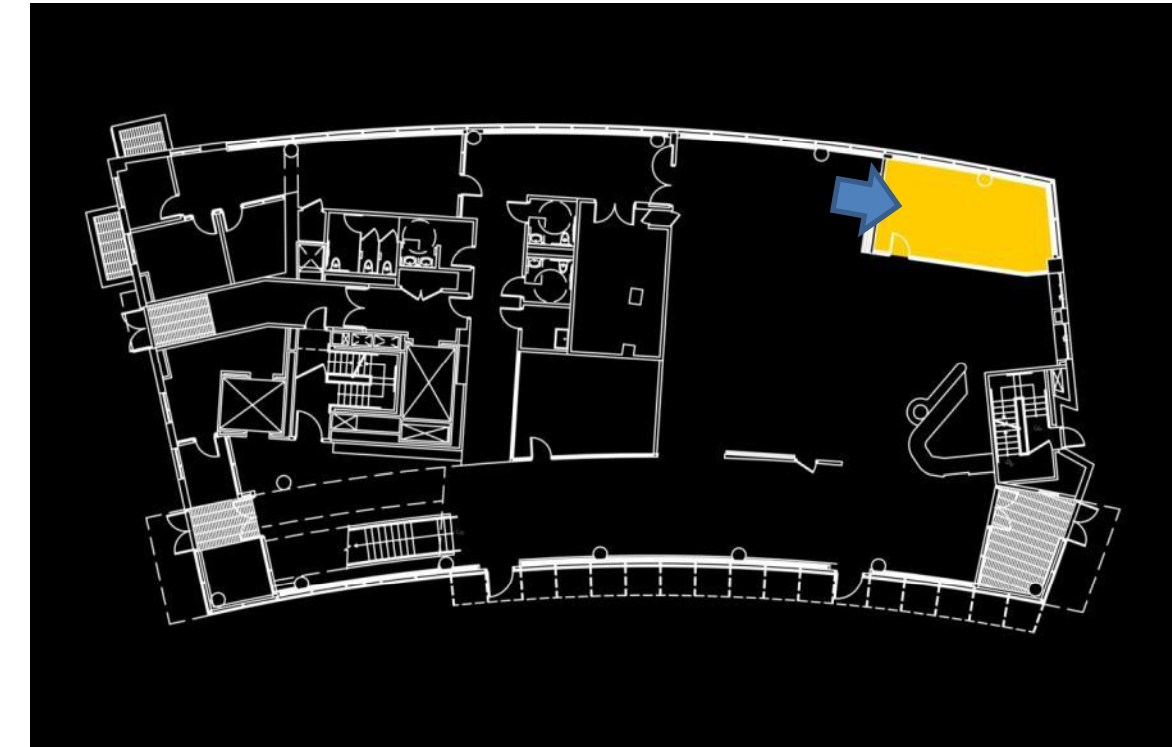
electrical

acoustics

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IESNA/ASHRAE 90.1

horizontal illuminance | target = 30 fc  
calculated = 26.5 fc

vertical illuminance | target = 5 fc  
calculated = 4.8 fc

energy code | target = 1.3 W/ft<sup>2</sup>  
calculated = 1.43 W/ft<sup>2</sup>

presentation outline

lighting

**conference room**

student lounge

cafeteria

roof deck

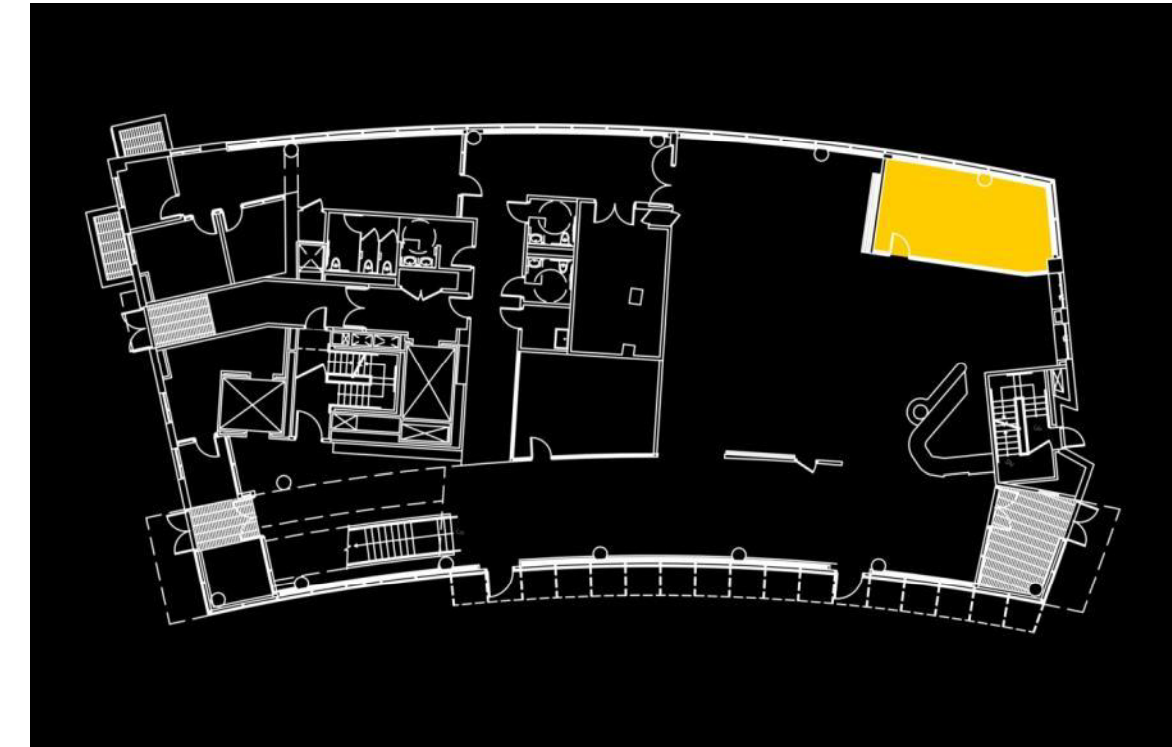
electrical

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functions

circulation space

student lounge

spatial considerations

façade wall

14' height

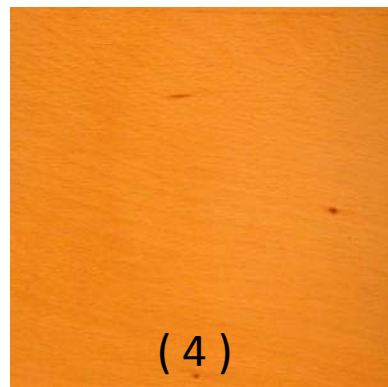
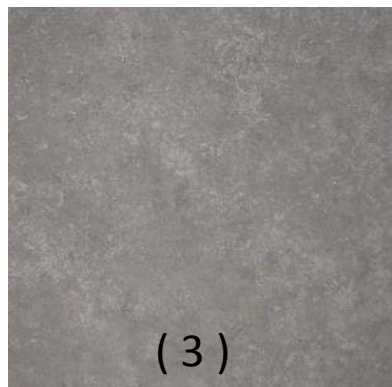
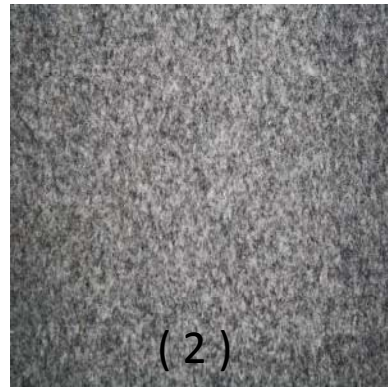
long narrow space

wood panel wall (1)

gray carpet (2)

stone tile (3)

wood ceiling tile (4)



presentation outline

lighting

conference room

**student lounge**

cafeteria

roof deck

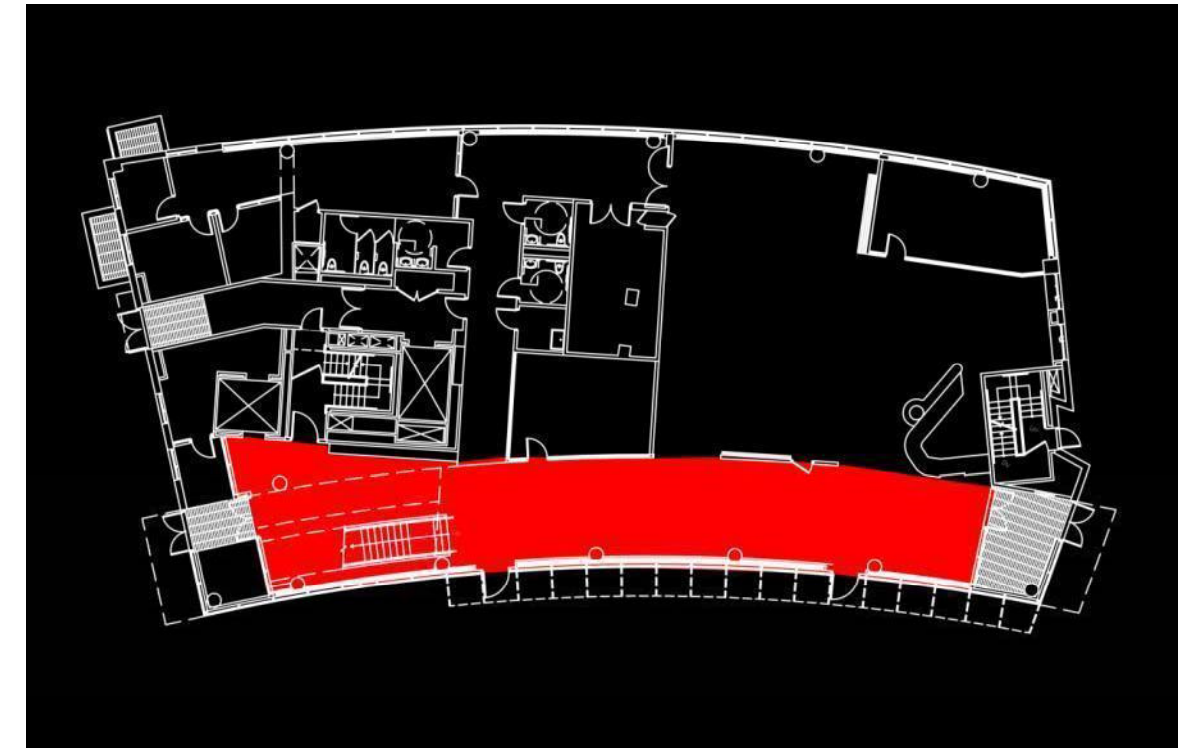
electrical

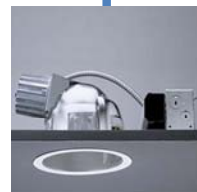
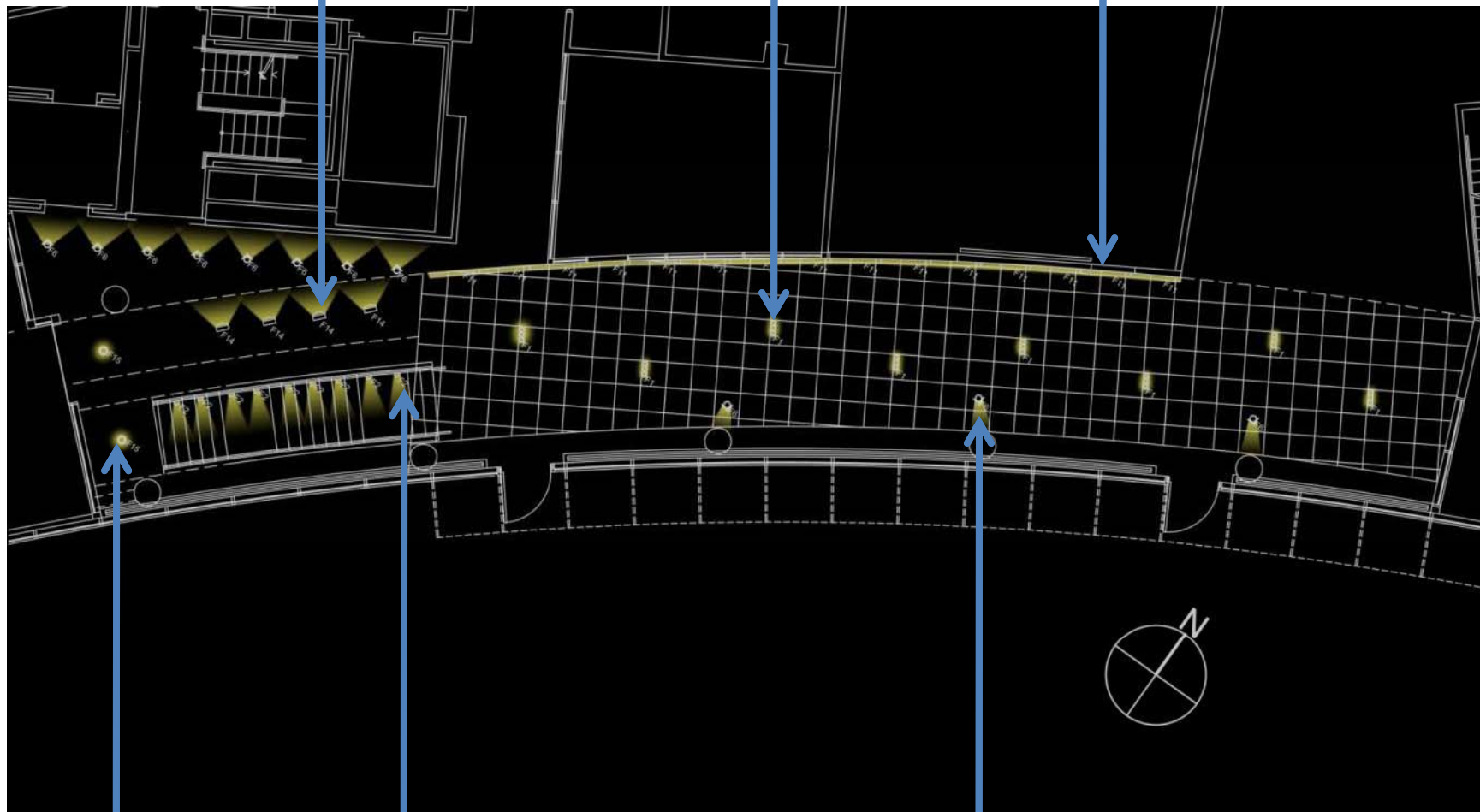
acoustics

architecture

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# presentation outline

lighting

conference room

**student lounge**

cafeteria

roof deck

electrical

acoustics

architecture

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## presentation outline

lighting

conference room

**student lounge**

cafeteria

roof deck

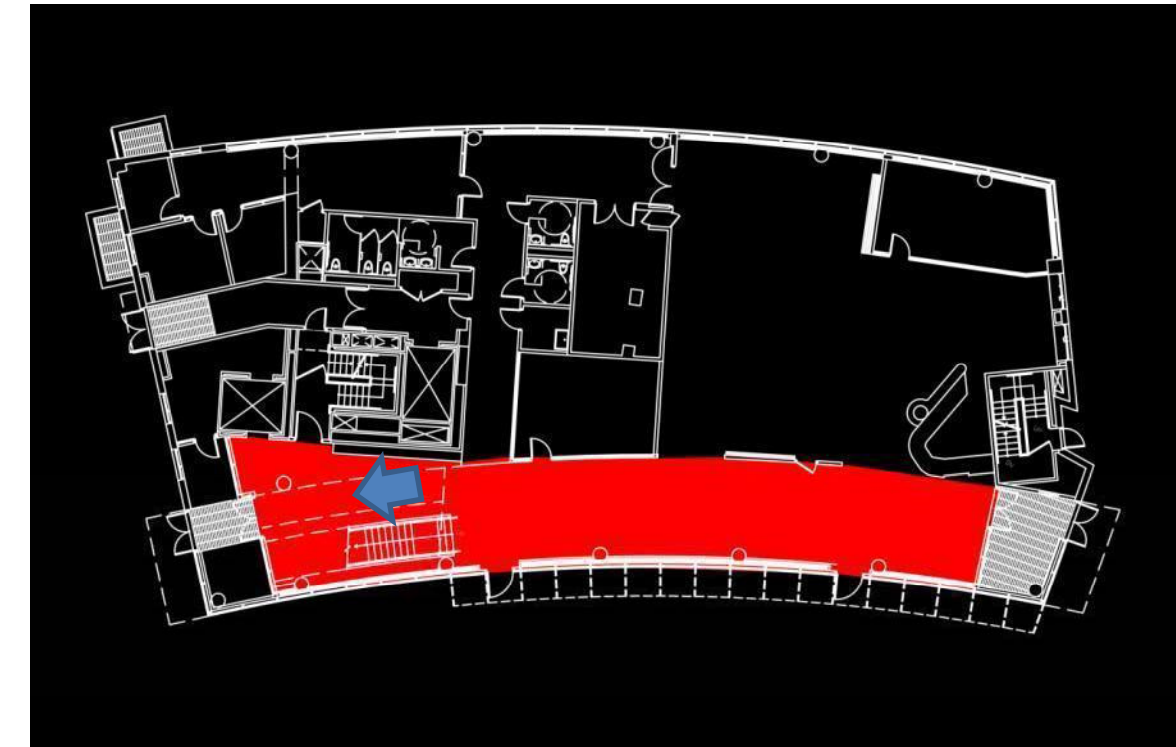
electrical

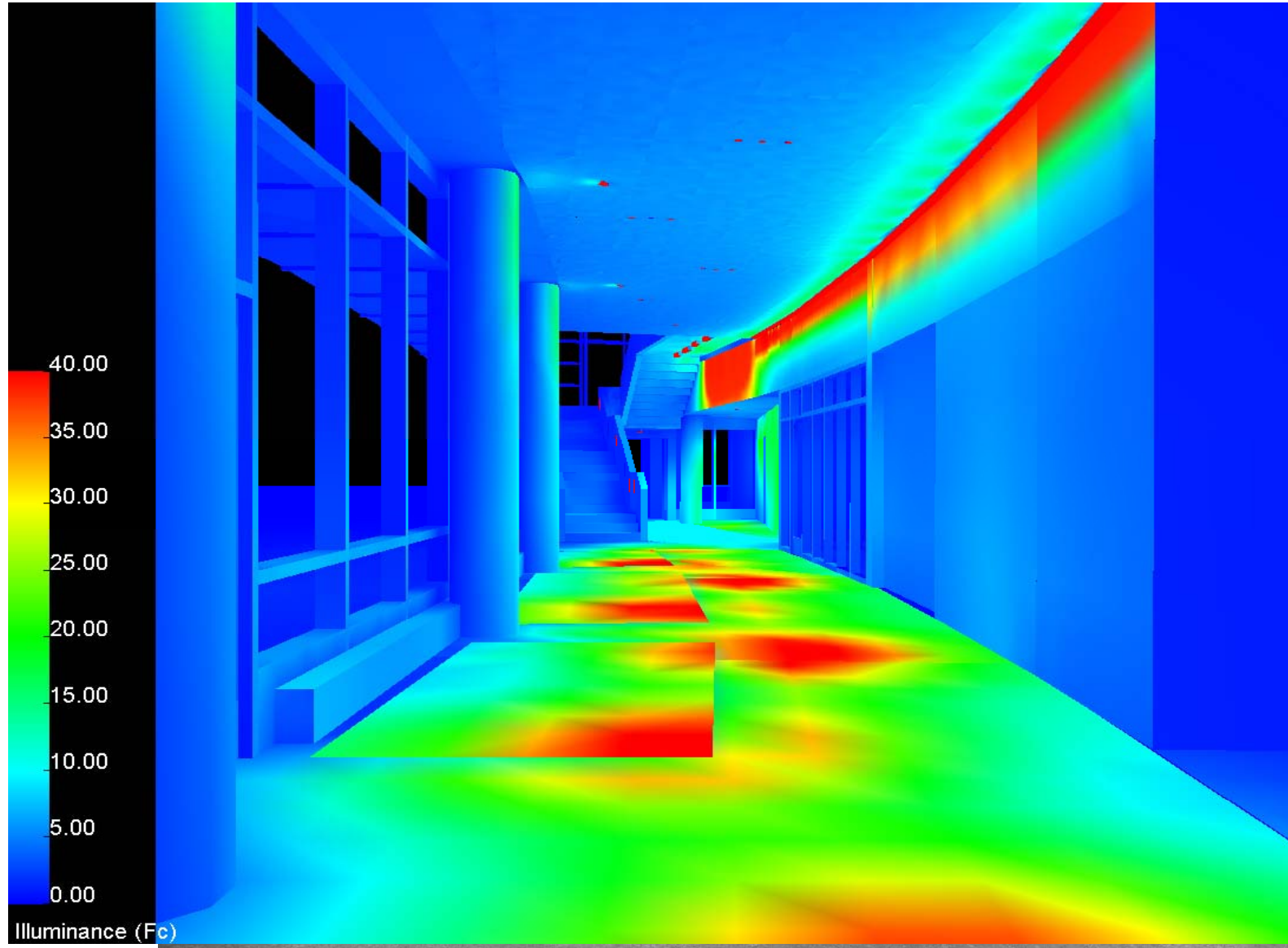
acoustics

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## presentation outline

lighting

conference room

**student lounge**

cafeteria

roof deck

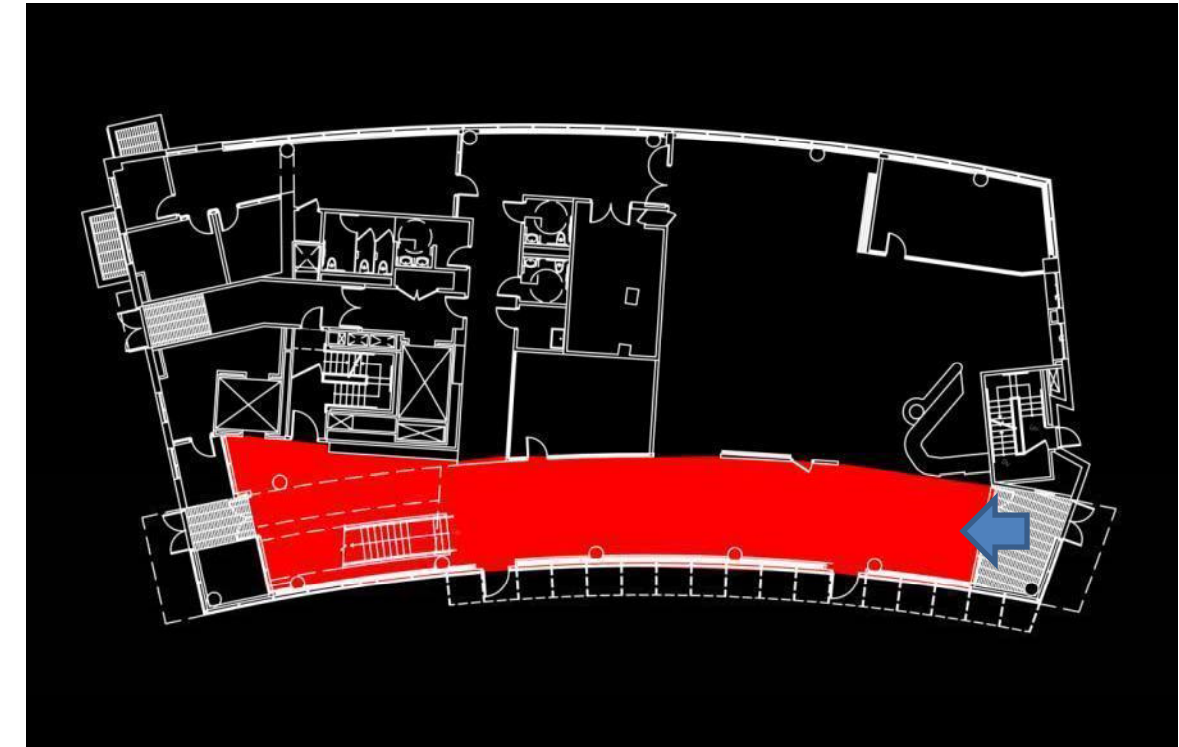
electrical

acoustics

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IESNA/ASHRAE 90.1

horizontal illuminance | target = 10-30 fc  
calculated = 25.57 fc

energy code | target = 1.2 W/ft<sup>2</sup>  
calculated = 0.89 W/ft<sup>2</sup>

## presentation outline

lighting

conference room

**student lounge**

cafeteria

roof deck

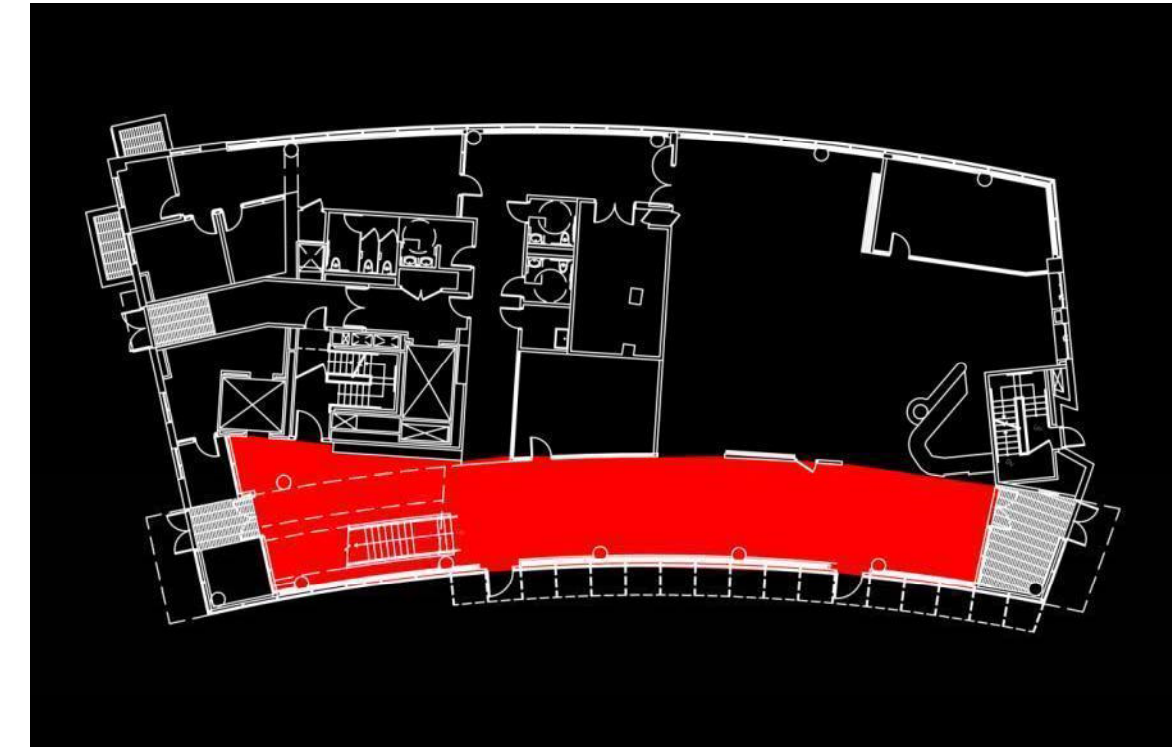
electrical

acoustics

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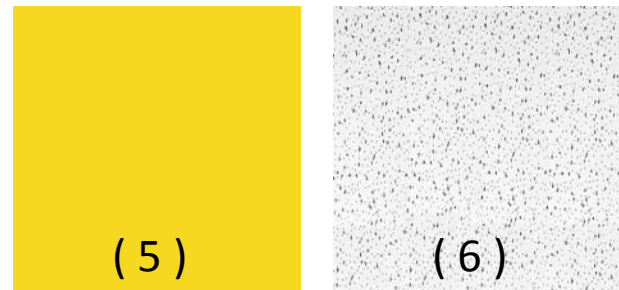
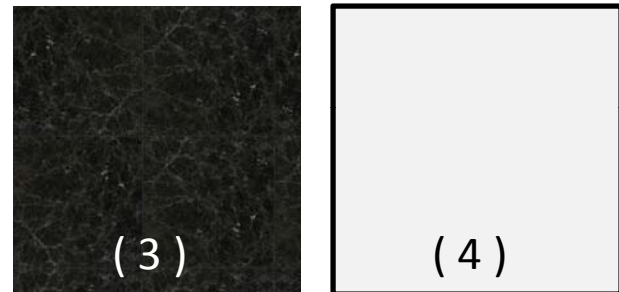
acknowledgments



functions

food preparation

food serving



spatial considerations

hardwood floor(1)

red counters(2)

marble countertop(3)

white wall(4)

accent wall (5)

8' act ceiling(6)

presentation outline

lighting

conference room

student lounge

**cafeteria**

roof deck

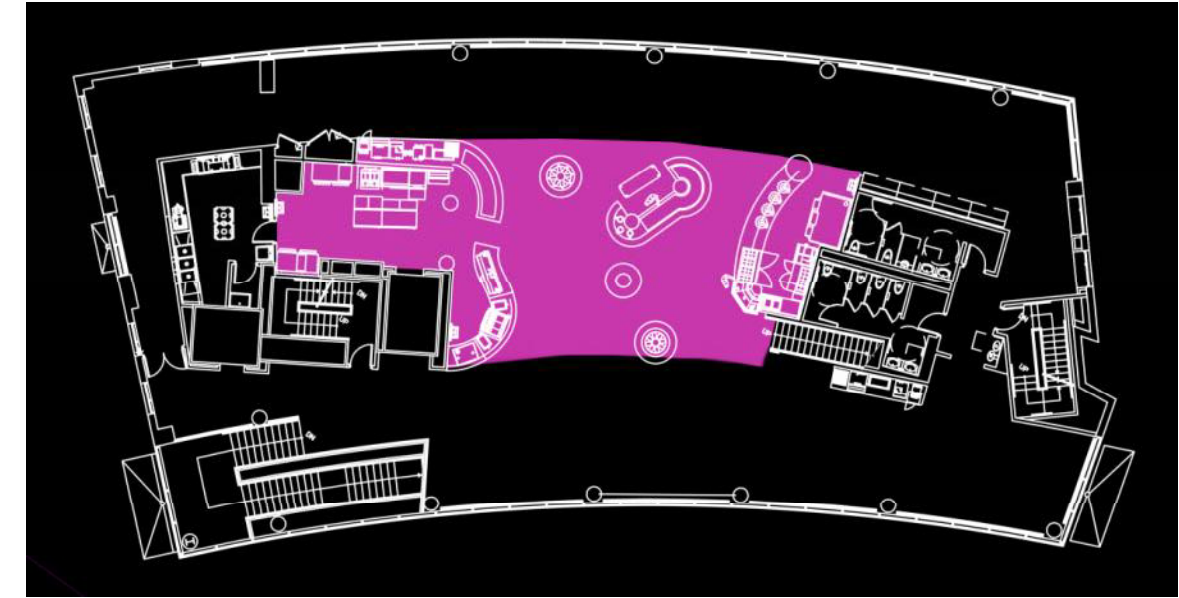
electrical

acoustics

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# presentation outline

lighting

conference room

student lounge

**cafeteria**

roof deck

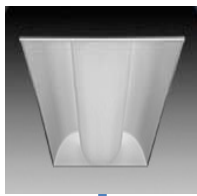
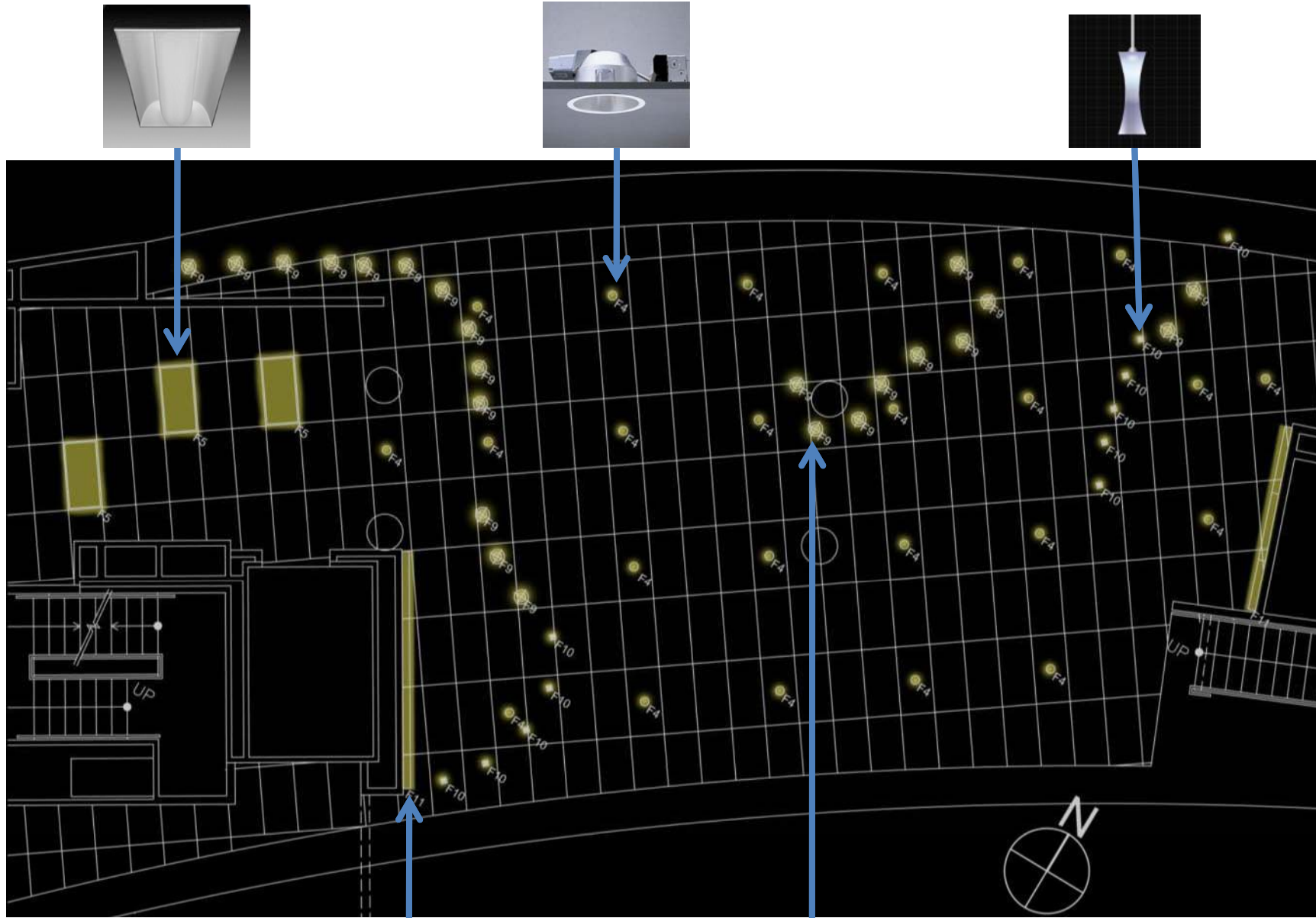
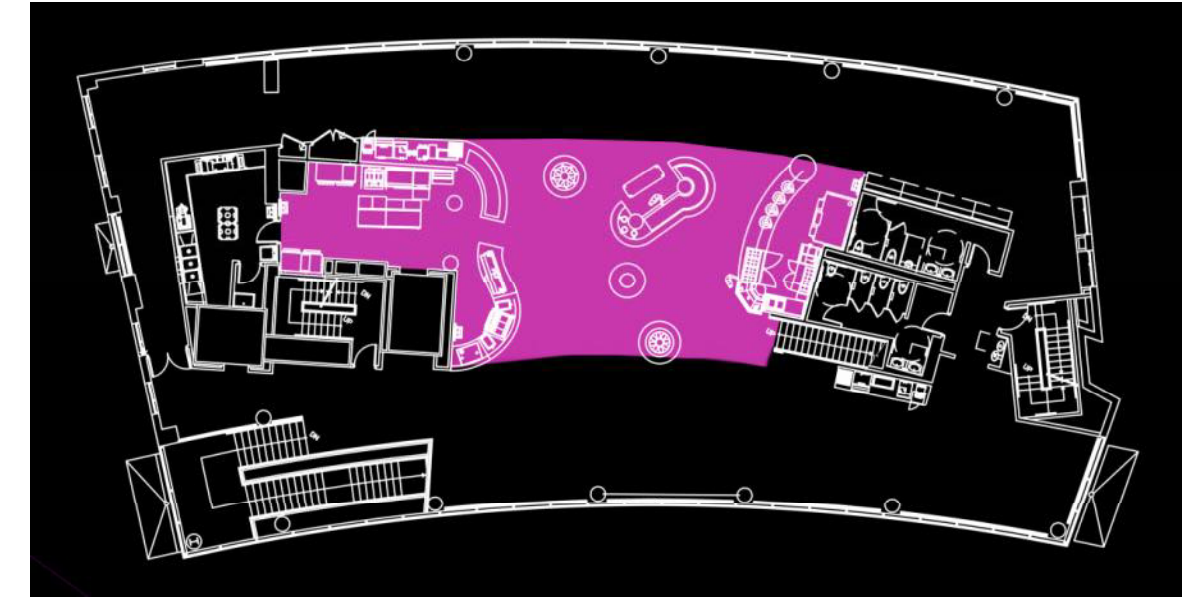
electrical

acoustics

architecture

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## presentation outline

lighting

conference room

student lounge

**cafeteria**

roof deck

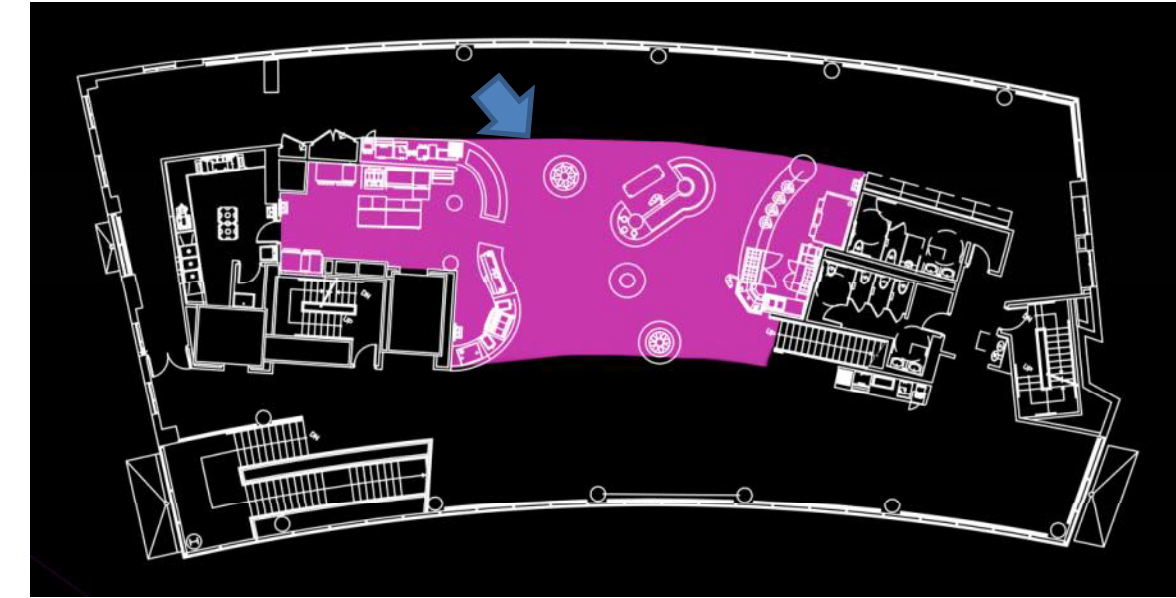
electrical

acoustics

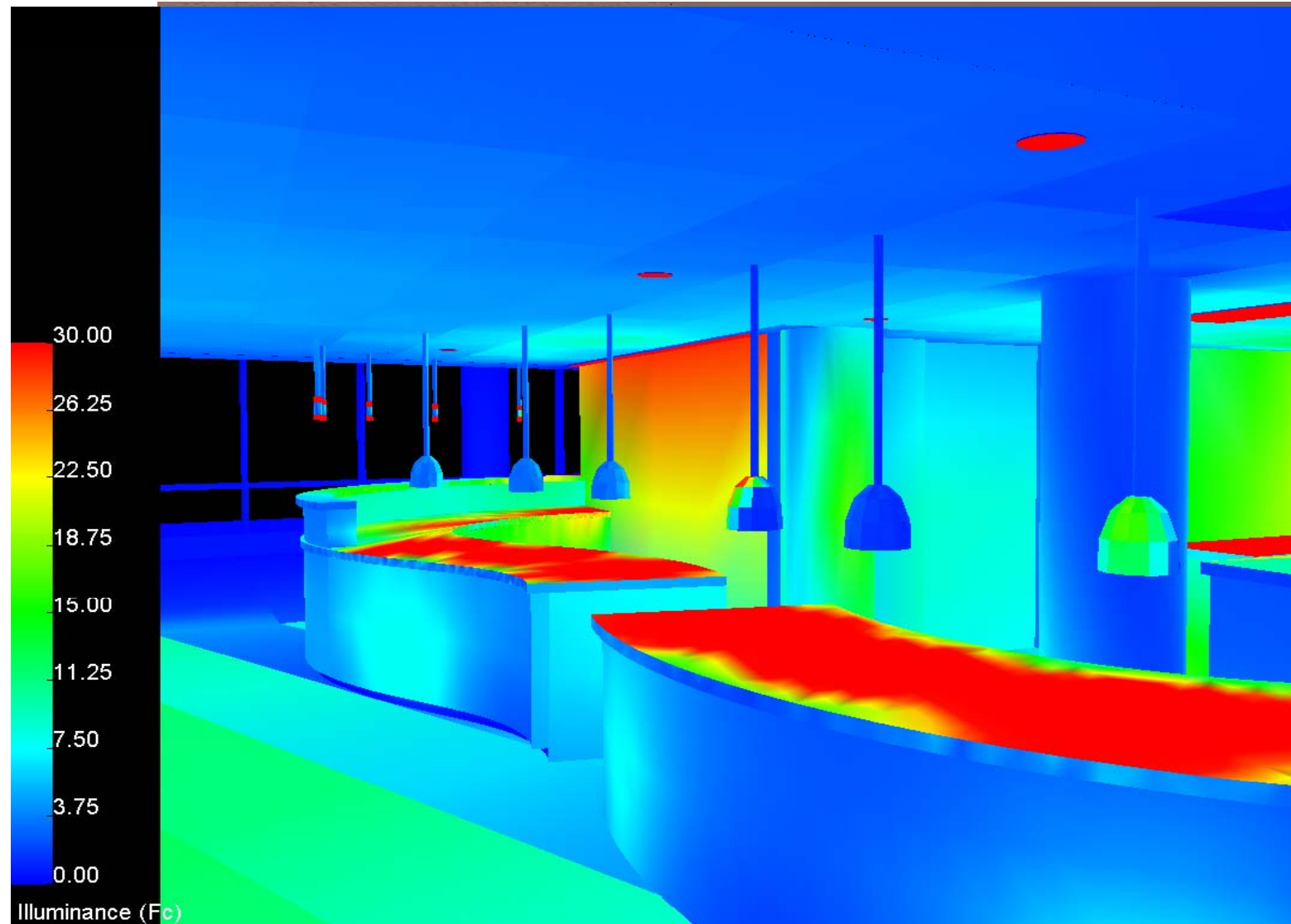
architecture

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## presentation outline

lighting

conference room

student lounge

**cafeteria**

roof deck

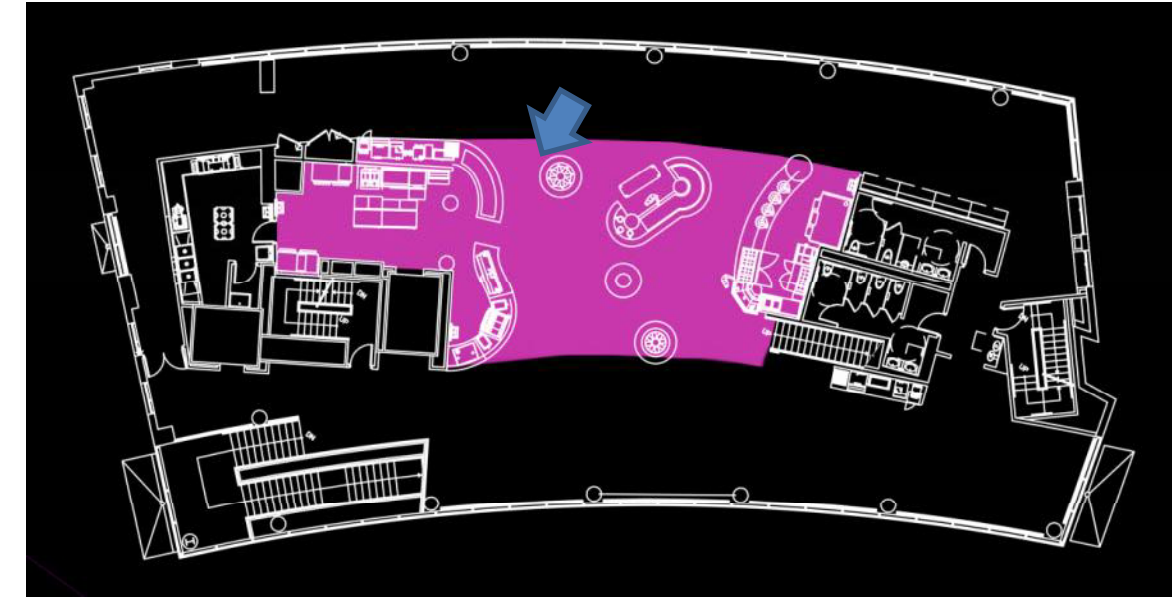
electrical

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## IESNA/ASHRAE 90.1

horizontal illuminance

food preparation | target = 30 fc  
calculated = 28.6 fc

food serving | target = 10 fc  
calculated = 11.68 fc

vertical illuminance | target = 3-5 fc  
calculated = 3.38 fc

energy code | target = 1.4 W/ft<sup>2</sup>  
calculated = 0.74 W/ft<sup>2</sup>

## presentation outline

lighting

conference room

student lounge

**cafeteria**

roof deck

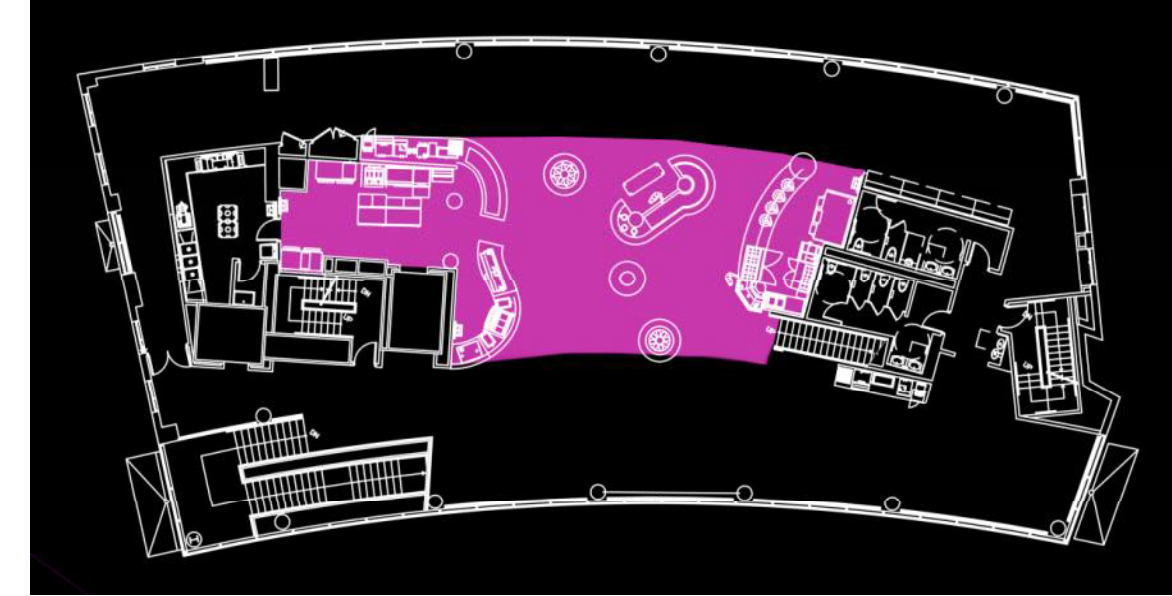
electrical

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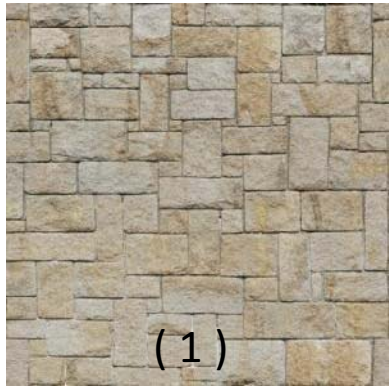




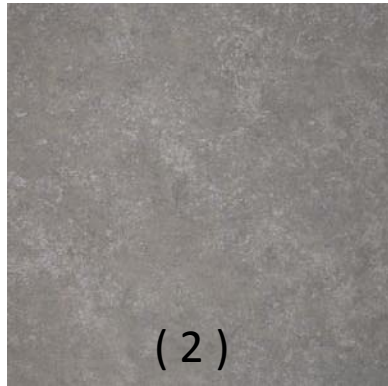
functions

social space

relaxation space



(1)



(2)



(3)

spatial considerations

glass façade wall

unusual shape

stone walls(1)

stone tile(2)

landscape (3)

presentation outline

lighting

conference room

student lounge

cafeteria

**roof deck**

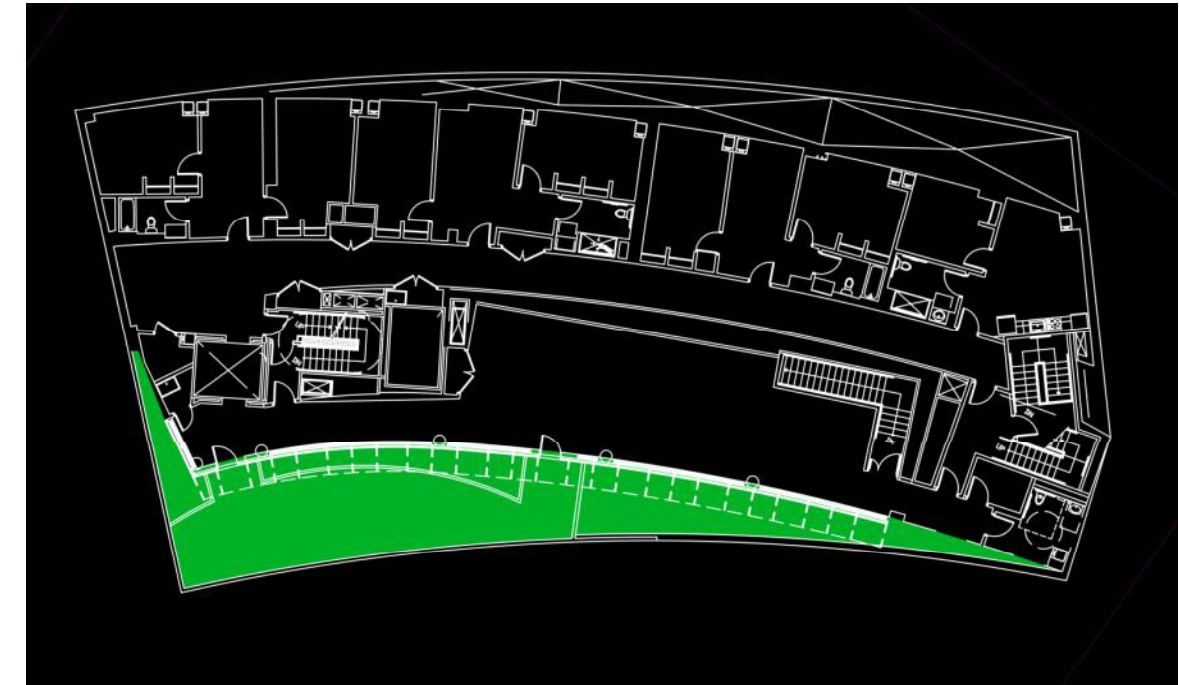
electrical

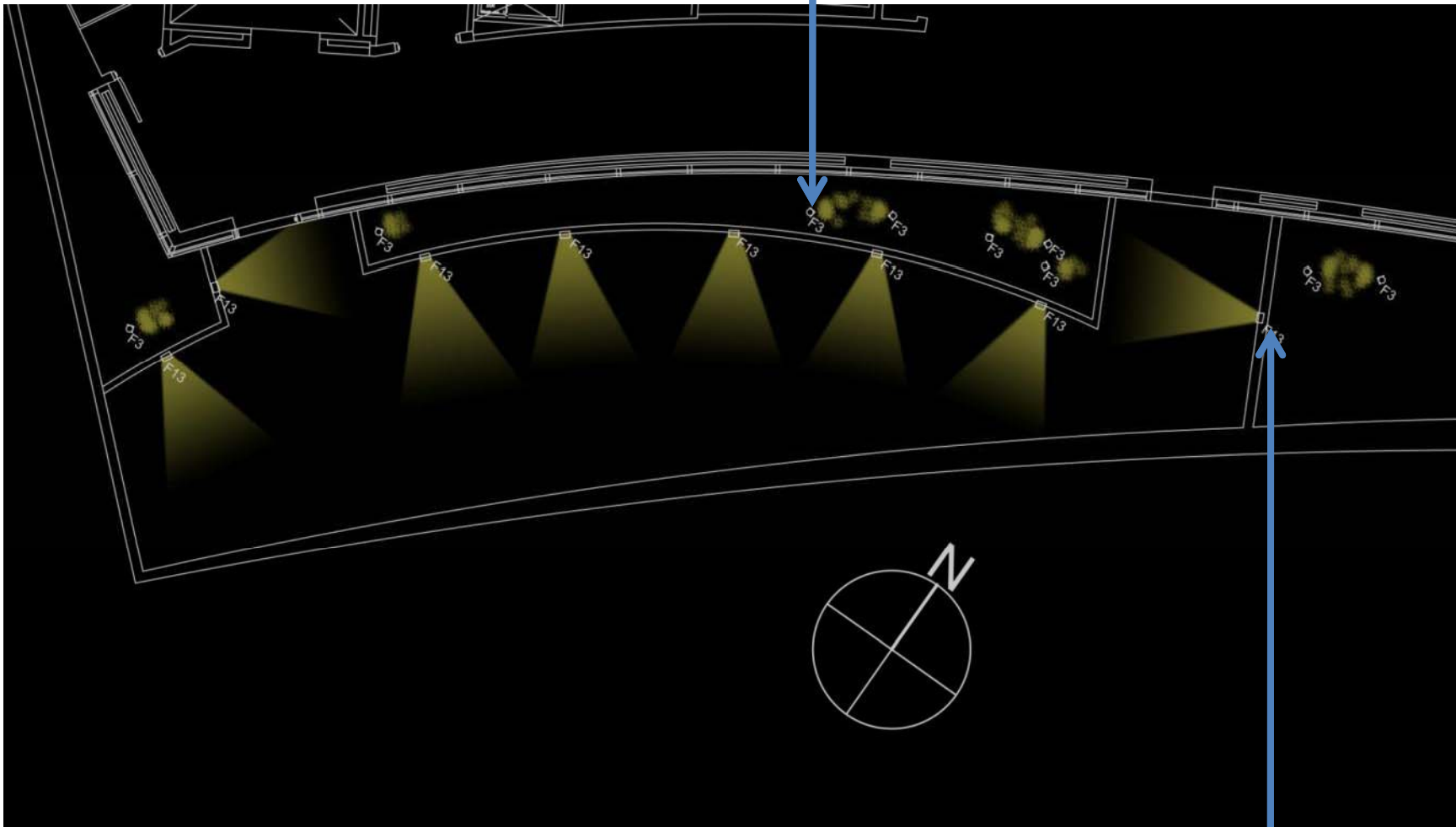
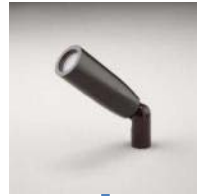
acoustics

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## presentation outline

lighting

conference room

student lounge

cafeteria

**roof deck**

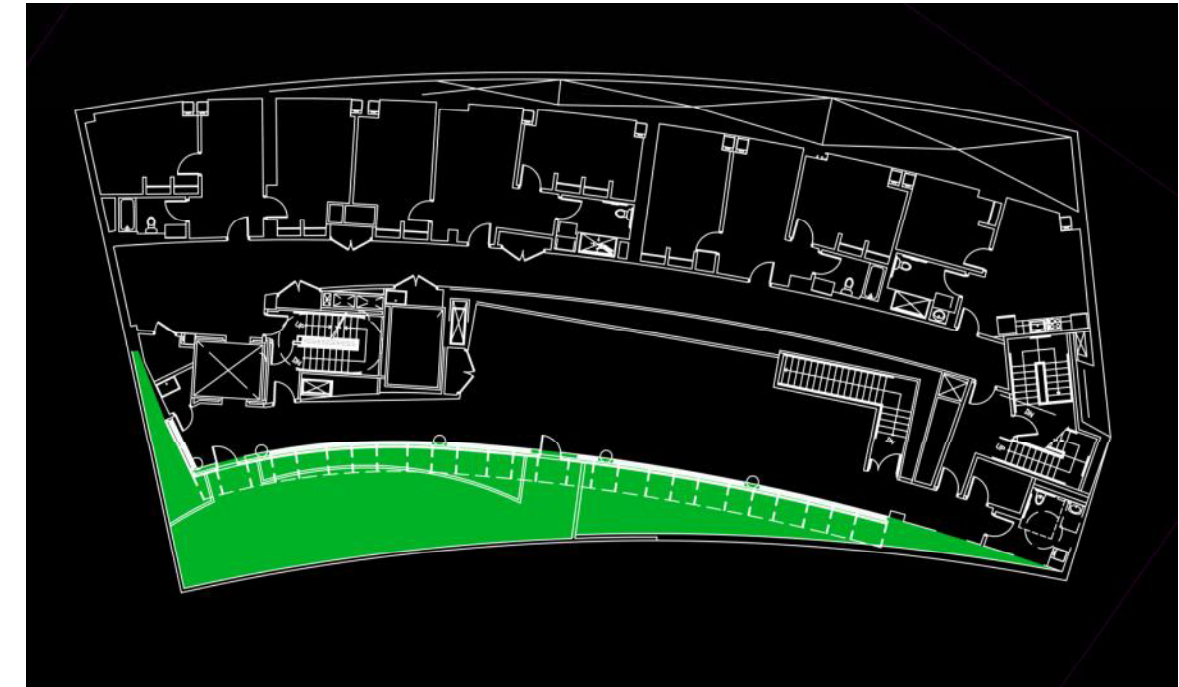
electrical

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## presentation outline

lighting

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student lounge

cafeteria

**roof deck**

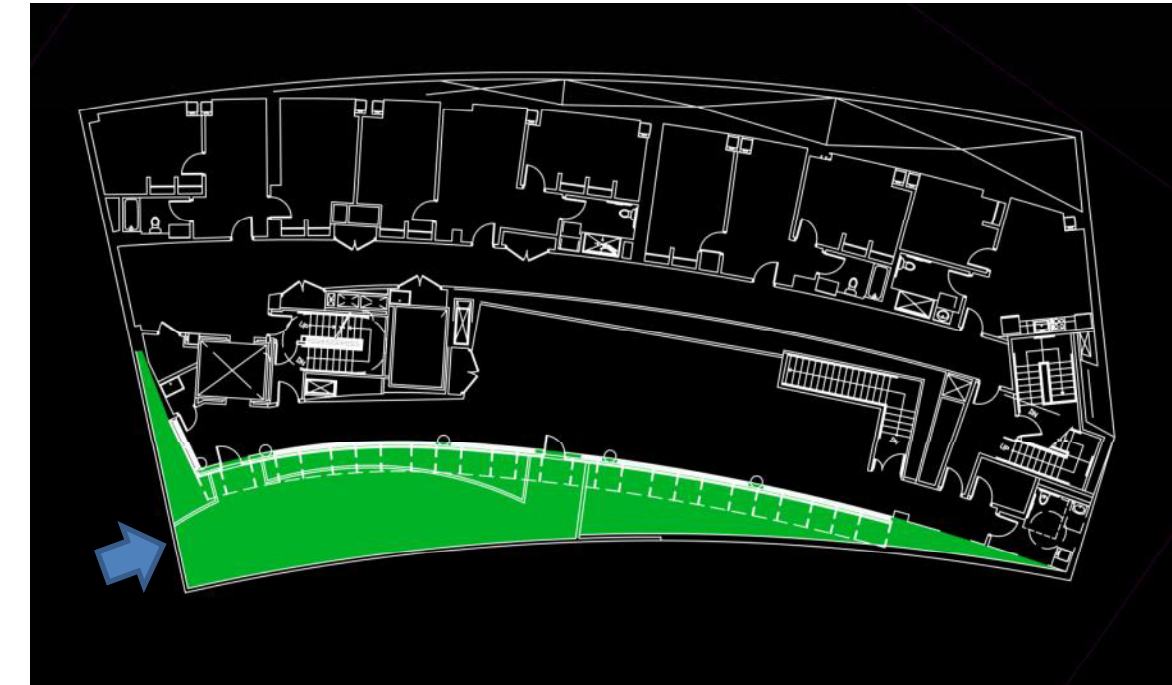
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# presentation outline

lighting

conference room

student lounge

cafeteria

**roof deck**

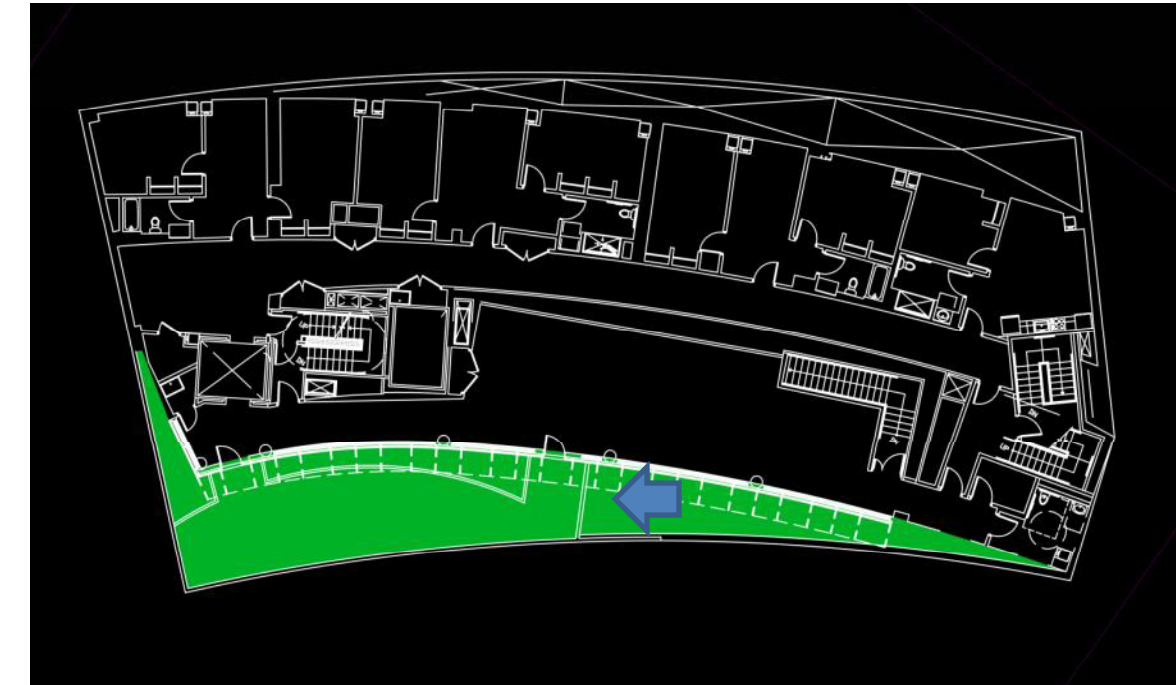
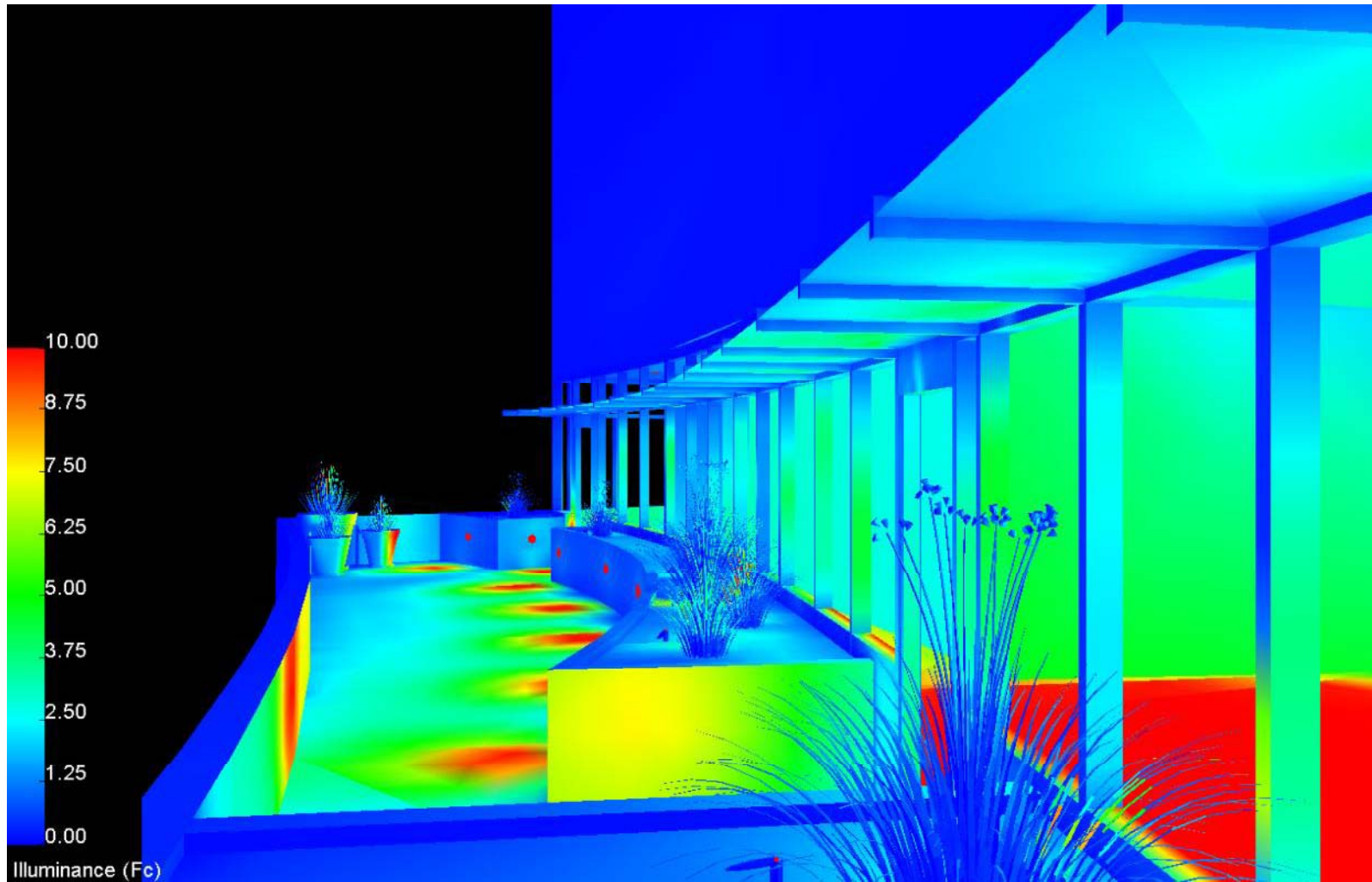
electrical

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IESNA/ASHRAE 90.1

horizontal illuminance | target = 3-5 fc  
calculated = 4.13 fc

vertical illuminance | target = 1-3 fc  
calculated = 4.52 fc

energy code | target = 0.2 W/ft<sup>2</sup>  
calculated = 0.22 W/ft<sup>2</sup>

presentation outline

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**roof deck**

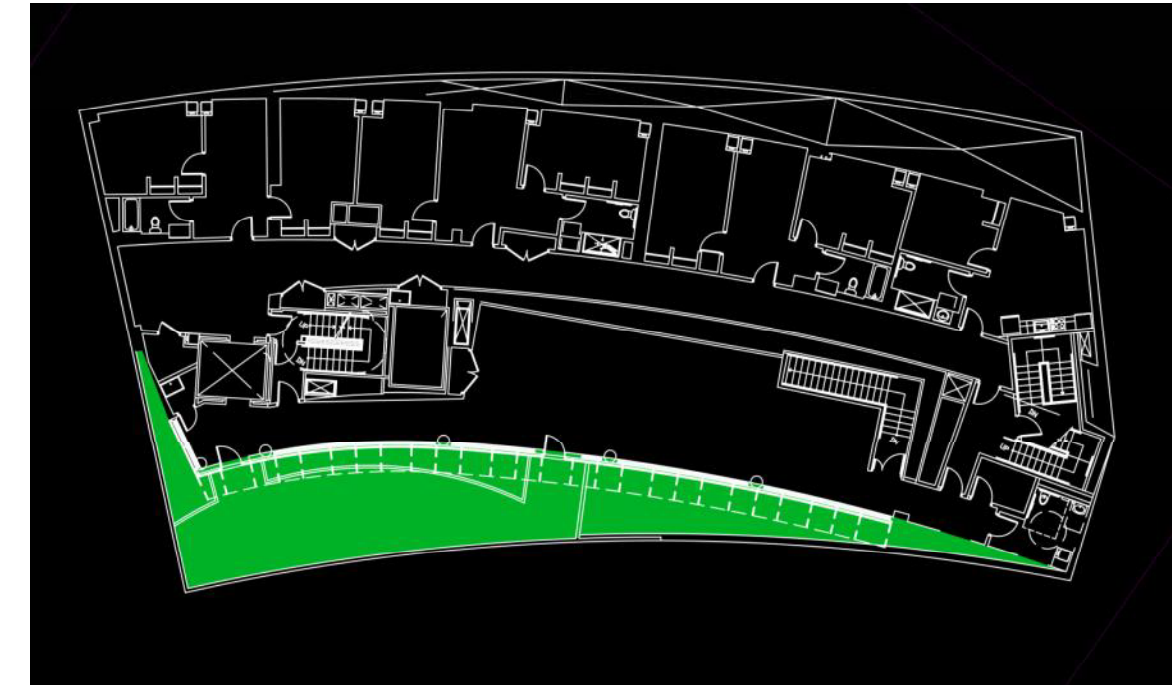
electrical

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panelboard feeder resizing LP4B

presentation outline

lighting

conference room

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**electrical**

acoustics

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existing panelboard LP4B

LOAD DESCRIPTION	LOCATION	LOAD WATTS	C/B SIZE	POS NO	A PH	B PH	C PH
Lighting	Basement	1596.0	20A/1P	1	*		
Lighting	Basement	482.0	20A/1P	3		*	
Lighting	Basement	1194.0	20A/1P	5			*
Lighting	Lounge	1100.0	20A/1P	7	*		
Lighting	Lounge, Serving Area	2265.0	20A/1P	9		*	
Lighting	Serving Area	1500.0	20A/1P	11			*
Lighting	Serving Area	1765.0	20A/1P	13	*		
Lighting	Conf Room	1529.0	20A/1P	15		*	
Spare		0.0	20A/1P	17			*
Spare		0.0	20A/1P	19	*		
Spare		0.0	20A/1P	21		*	
Spare		0.0	20A/1P	23			*
Spare		0.0	20A/1P	25	*		
Spare		0.0	20A/1P	27		*	
Spare		0.0	20A/1P	29			*
Spare		0.0	20A/1P	31	*		
Spare		0.0	20A/1P	33		*	
Spare		0.0	20A/1P	35			*
Spare		0.0	20A/1P	37	*		
Spare		0.0	20A/1P	39		*	
Spare		0.0	20A/1P	41			*

presentation outline

- lighting
- conference room
- student lounge
- cafeteria
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redesigned panelboard LP4B

LOAD DESCRIPTION	LOCATION	LOAD WATTS	C/B SIZE	POS NO	A PH	B PH	C PH
Lighting	Basement	1596.0	20A/1P	1	*		
Lighting	Basement	482.0	20A/1P	3		*	
Lighting	Basement	1194.0	20A/1P	5			*
Lighting	Lounge	1420.0	20A/1P	7	*		
Lighting	Lounge, Serving Area	1781.0	20A/1P	9		*	
Lighting	Serving Area	1668.0	20A/1P	11			*
Lighting	Serving Area	1765.0	20A/1P	13	*		
Lighting	Conf Room	1312.0	20A/1P	15		*	
Spare		0.0	20A/1P	17			*
Spare		0.0	20A/1P	19	*		
Spare		0.0	20A/1P	21		*	
Spare		0.0	20A/1P	23			*
Spare		0.0	20A/1P	25	*		
Spare		0.0	20A/1P	27		*	
Spare		0.0	20A/1P	29			*
Spare		0.0	20A/1P	31	*		
Spare		0.0	20A/1P	33		*	
Spare		0.0	20A/1P	35			*
Spare		0.0	20A/1P	37	*		
Spare		0.0	20A/1P	39		*	
Spare		0.0	20A/1P	41			*

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LP4B feeder redesign				
demand load	10096.2 W			
voltage	480/277V			
design load	36.4 A	+25% space capacity	45.6 A	
circuit breaker	conductors	neutral	ground	conduit
50 A	(3) #8 Cu THHN	(1) #8 Cu THHN	(1) #10 Cu	½"

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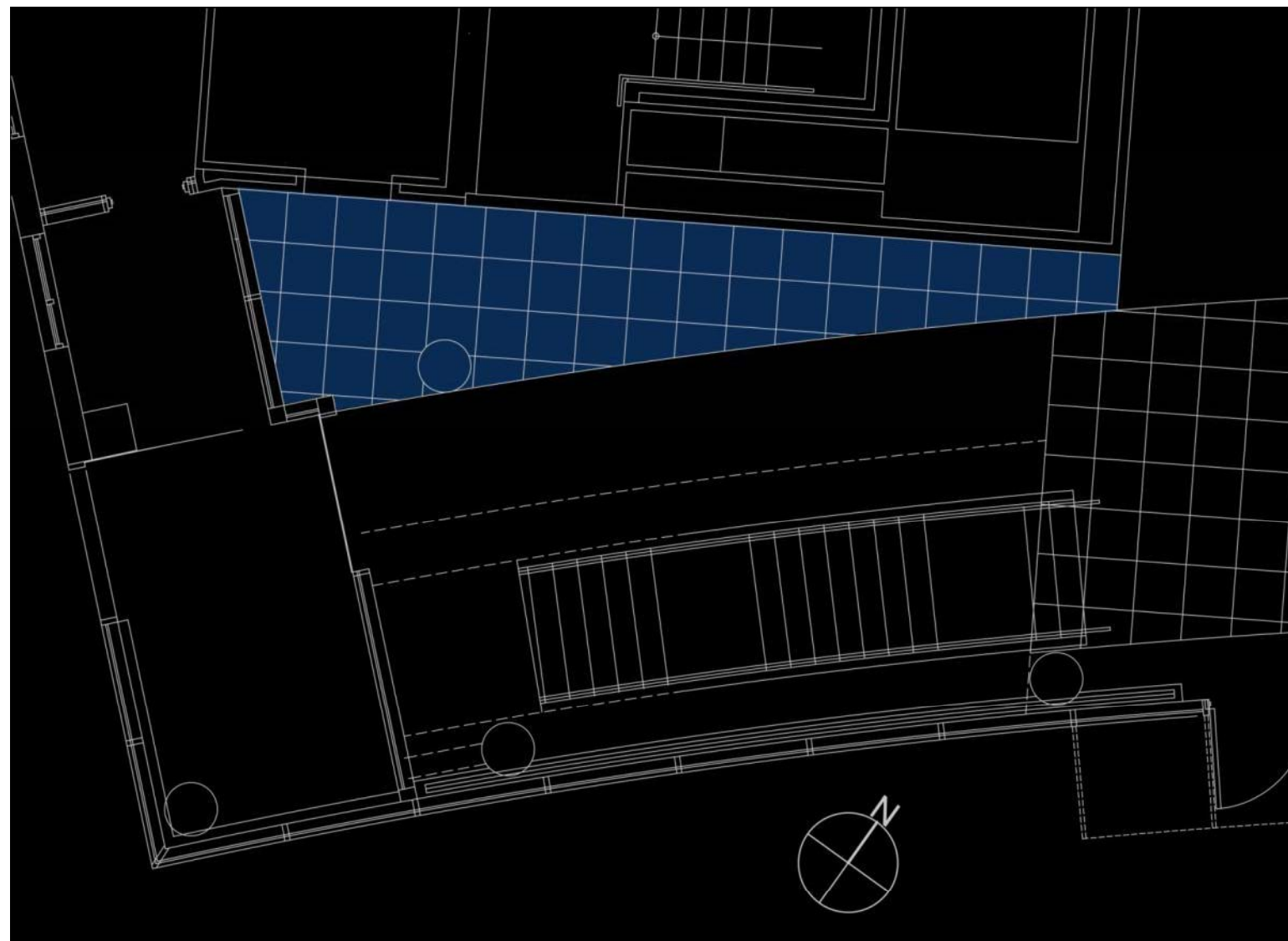
# student lounge reverberation time study

reverberation time (seconds)						
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
target	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1
existing design	0.82	1.33	1.58	1.42	1.47	1.50

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## presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

electrical

**acoustics**

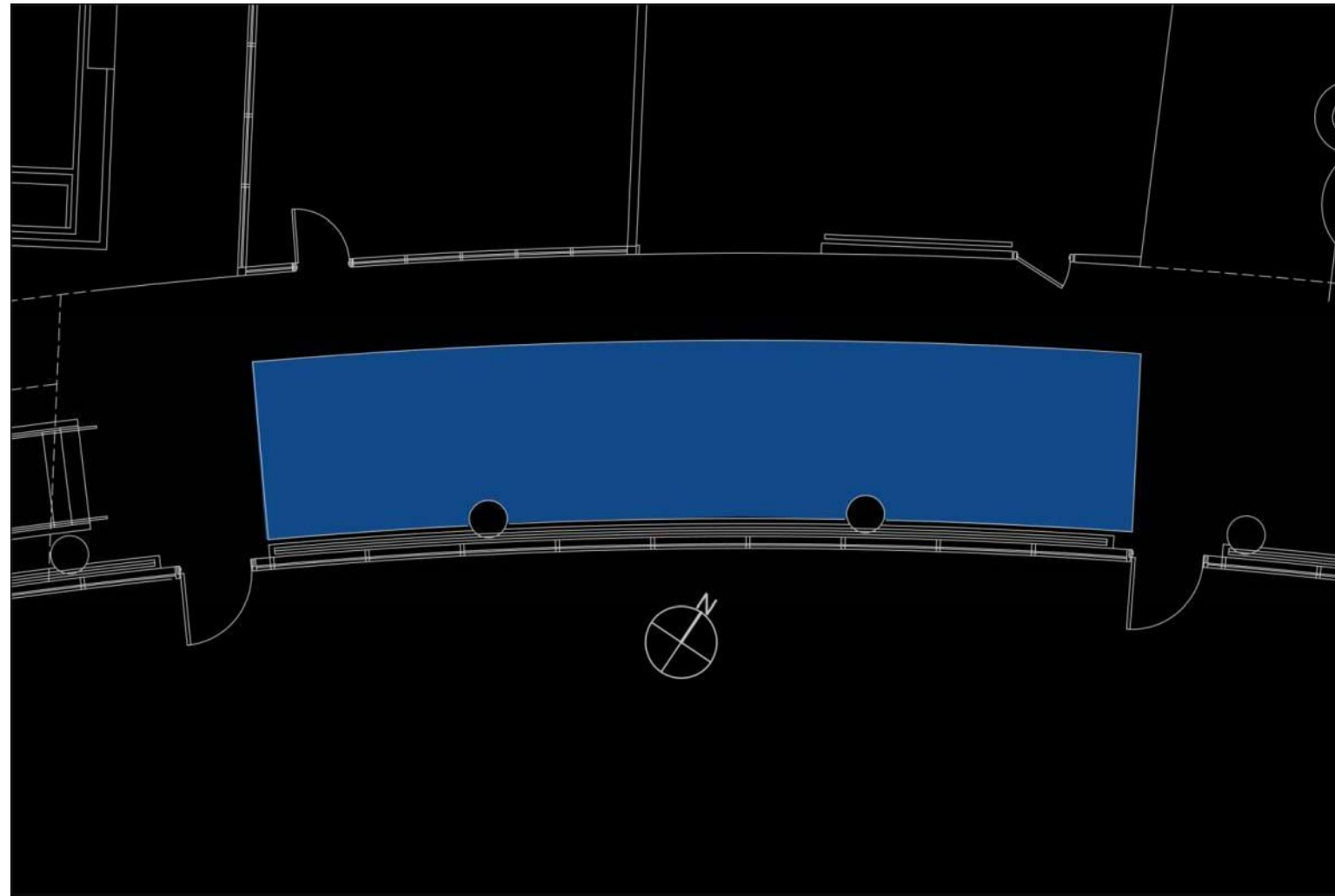
architecture

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## presentation outline

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reverberation time (seconds)						
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
target	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1
existing design	0.82	1.33	1.58	1.42	1.47	1.50
redesign	0.76	1.07	1.17	0.90	0.80	0.79

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# presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

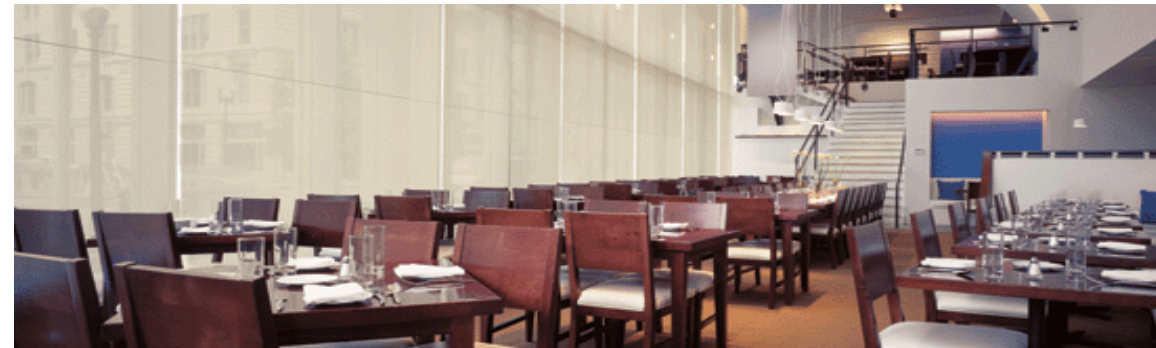
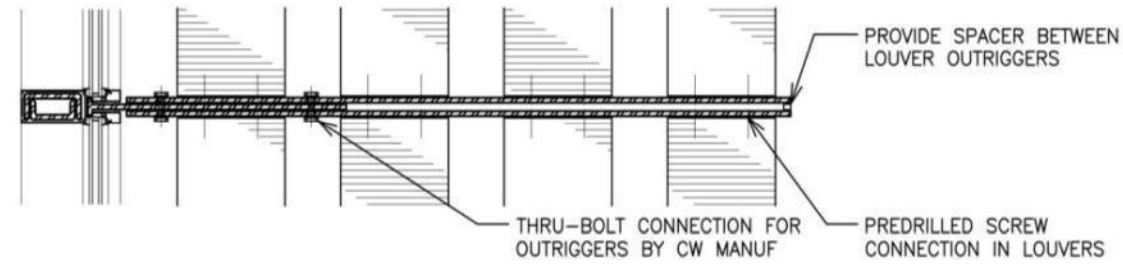
electrical

acoustics

**architecture**

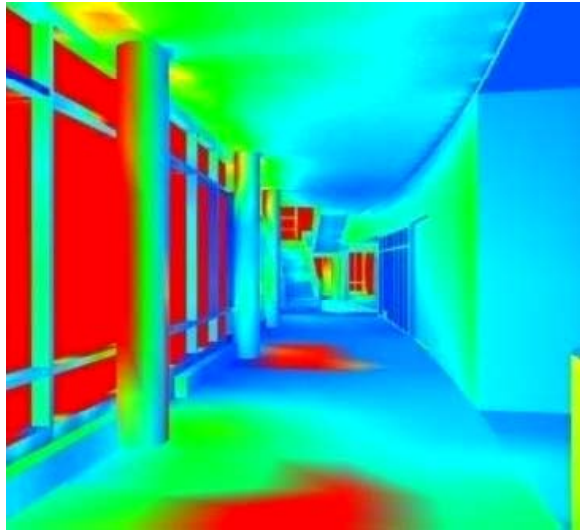
final remarks

acknowledgments

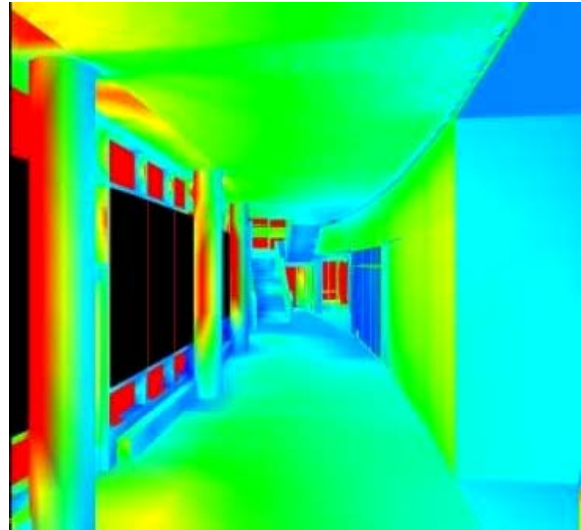




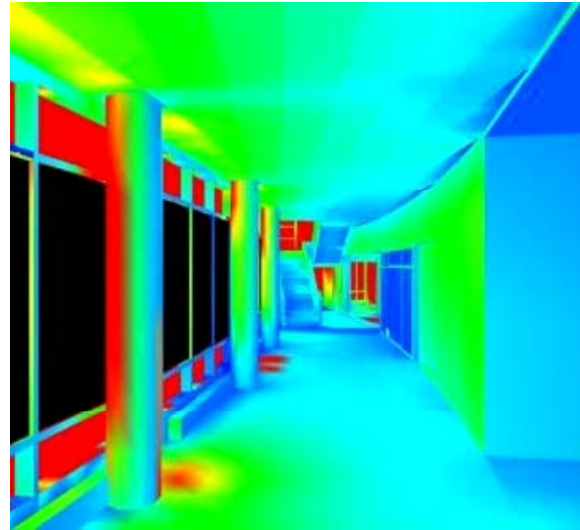
10:00 pm December 21, 2009



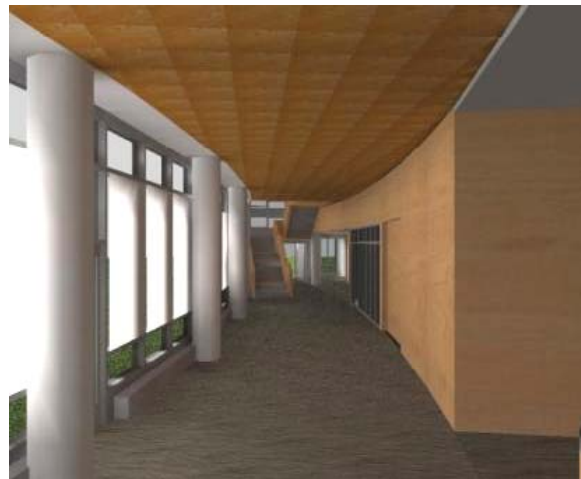
louvered  
exterior shade



lutron  
sheer shade



kalwall



## presentation outline

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# final remarks

lighting | *consistent themes* throughout building reinforce lighting design  
utilized *simple designs* to emphasis the architecture

electrical | redesigned spaces save *1914 Watts* compared to the ASHRAE 90.1 allowance  
total loads for the redesigned panelboards were *lower than the originals*, due to the decrease in wattage

acoustics | current reverberation times in the student lounge are *above what is recommended*  
the redesigned space *changes very little*  
new reverberation times are *better suited* for the needs of the space

architecture | analyzed *three daylight control solutions* for the student lounge  
found the best daylight control comes from *kalwall*

# presentation outline

lighting

conference room

student lounge

cafeteria

roof deck

electrical

acoustics

architecture

**final remarks**

acknowledgments



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friends, family and ae peers

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QUESTIONS?

