

New Jersey Center for Science,  
Technology, and Mathematics  
Education



Final Thesis Presentation

John P. Mulhern

April 15, 2008

# Presentation Outline

1. General Building Information
2. Lighting Design Theme
3. Lighting Depth – Lower Lobby
4. Electrical Depth
5. Mechanical & Structural Breadth
6. Final Conclusion

# General Information

- ✘ Owner: Kean University
- ✘ Architect: Cannon Design, Inc.  
+ MEP
- ✘ Structural: Schoor Depalma Engineers  
& Consultants
- ✘ Civil Eng: K.S. Engineers, P.C.
- ✘ CM: Provided by University
- ✘ GC: Terminal Construction  
Corporation
- ✘ Location: Union, NJ
- ✘ Size: 6 stories; 117,000 SF
- ✘ Construction: September 2008  
Start
- ✘ Overall Cost: \$45,000,000

**General Info**

**Lighting**

**Electrical**

**Breadths**

# Uses



[http://www.aviationtechcenter.com/images2/Computer\\_lab.jpg](http://www.aviationtechcenter.com/images2/Computer_lab.jpg)



[http://www.engin.umich.edu/caen/campcaen/photos/cave\\_princecar.jpg](http://www.engin.umich.edu/caen/campcaen/photos/cave_princecar.jpg)



<http://www.allegany.edu/bedford/Images/BCCFacCWsmall.jpg>



[http://constructlab.com/images/College%20University%20\(23\)%20cropped%20small.JPG](http://constructlab.com/images/College%20University%20(23)%20cropped%20small.JPG)



[http://paulstamatiou.com/wp-content/uploads/2007/10/mizzou\\_macs.jpg](http://paulstamatiou.com/wp-content/uploads/2007/10/mizzou_macs.jpg)



[http://photos.igougo.com/images/p9423-College\\_Station-My\\_22nd\\_Birthday\\_at\\_Garcias.jpg](http://photos.igougo.com/images/p9423-College_Station-My_22nd_Birthday_at_Garcias.jpg)

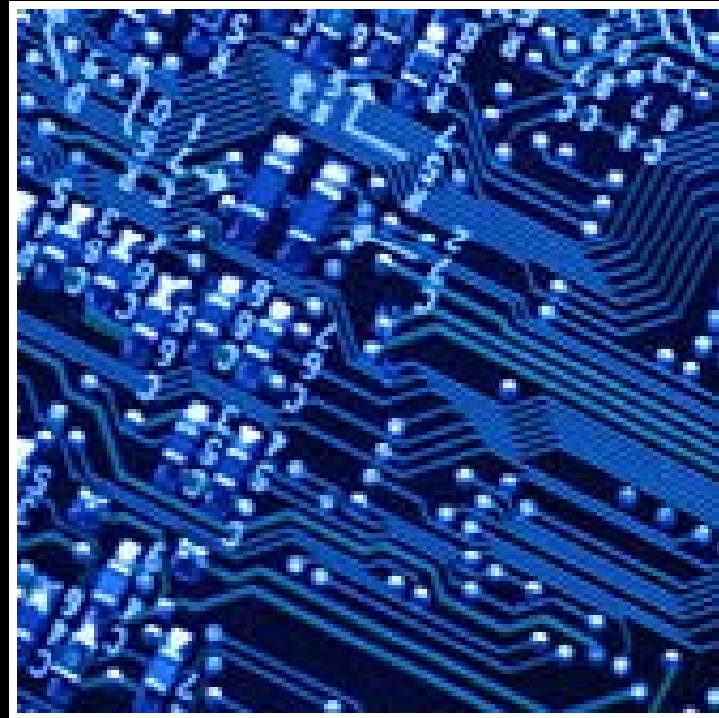
**General Info**

**Lighting**

**Electrical**

**Breadths**

# Lighting Design Theme



**General Info**

**Lighting**

**Electrical**

**Breadths**

# Overall Design Goals

Guide visitors through the irregularly shaped building with light

Provide recessed lighting wherever possible to keep ceilings clean

Incorporate luminaires which complement the modern architecture

Provide sufficient light levels for students

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# Lobby Information

Double height ceiling 21'6"

Café Area at south east corner

Color patterned and curved ceramic tile wall and grand stair case are focal points

Curtain wall on three sides with surrounding portico

**General Info**

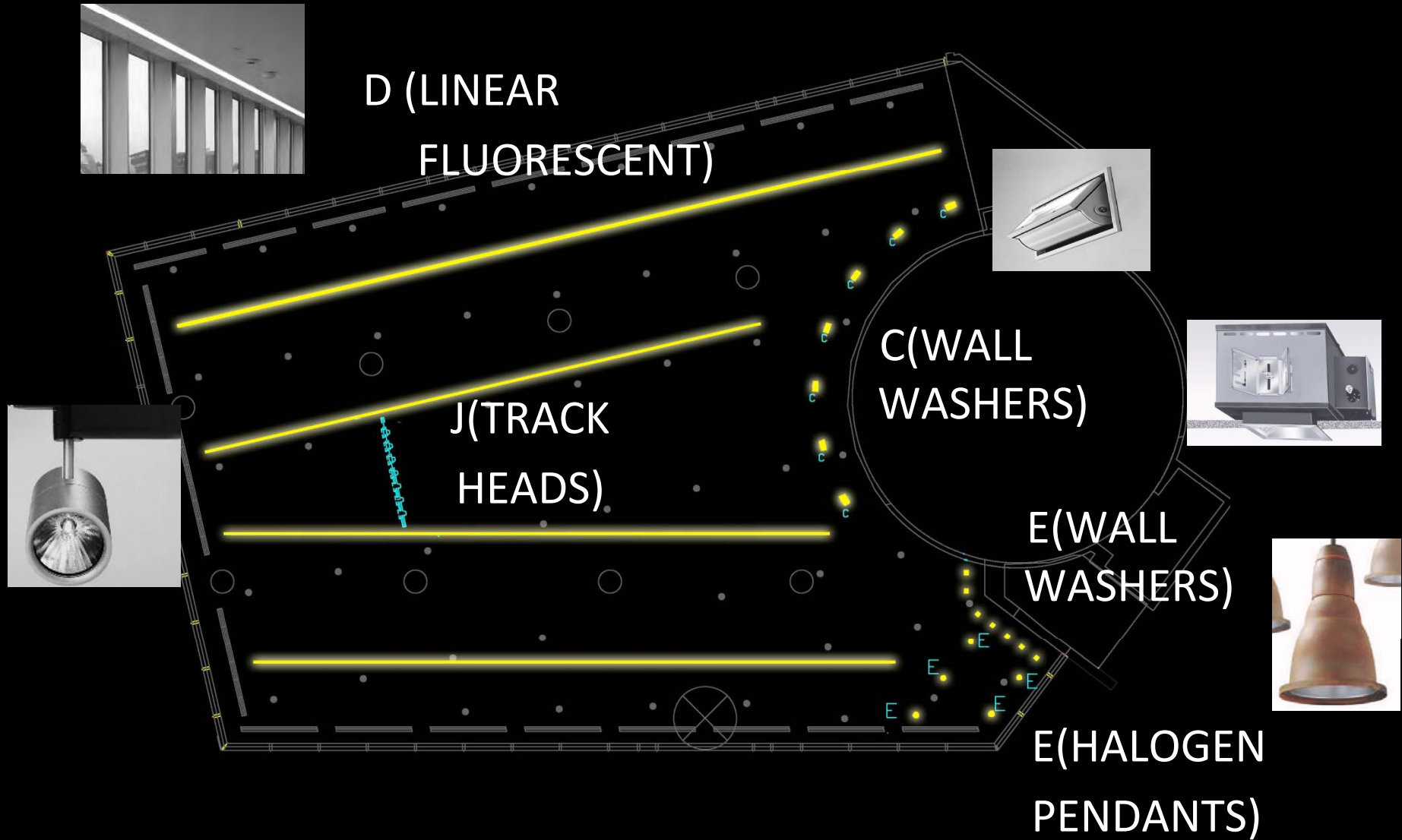
**Lighting**

**Electrical**

**Breadths**



# Lighting RCP



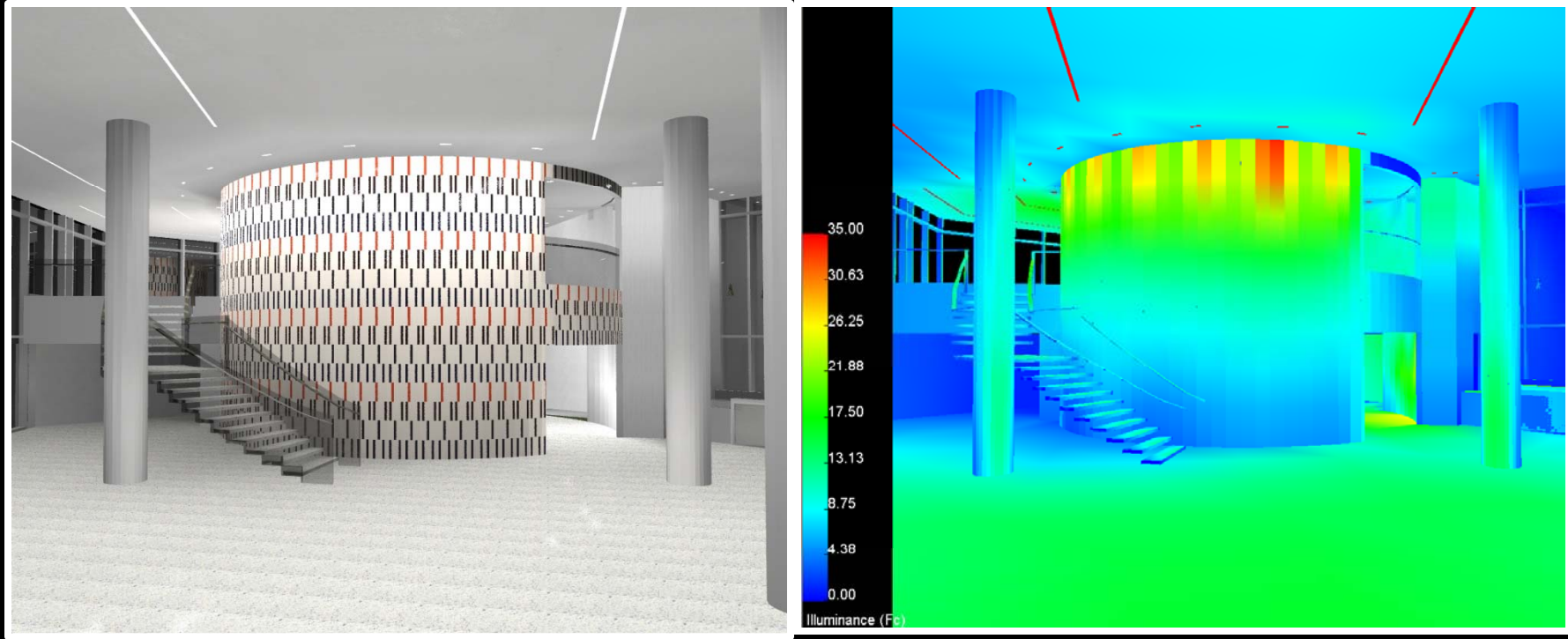
General Info

Lighting

Electrical

Breadths

# East Perspective (Lobby Mode)



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
zCeramicBig_9_Wallwash	Illuminance	Fc	15.34	36.9	8.1	1.89	4.56
CalcPts	Illuminance	Fc	12.23	16.5	6.0	2.04	2.75
zSTONE_2_Lower	Illuminance	Fc	15.69	19.5	8.3	1.89	2.35
Back Counter_Back Counter	Illuminance	Fc	13.92	18.3	6.1	2.28	3.00

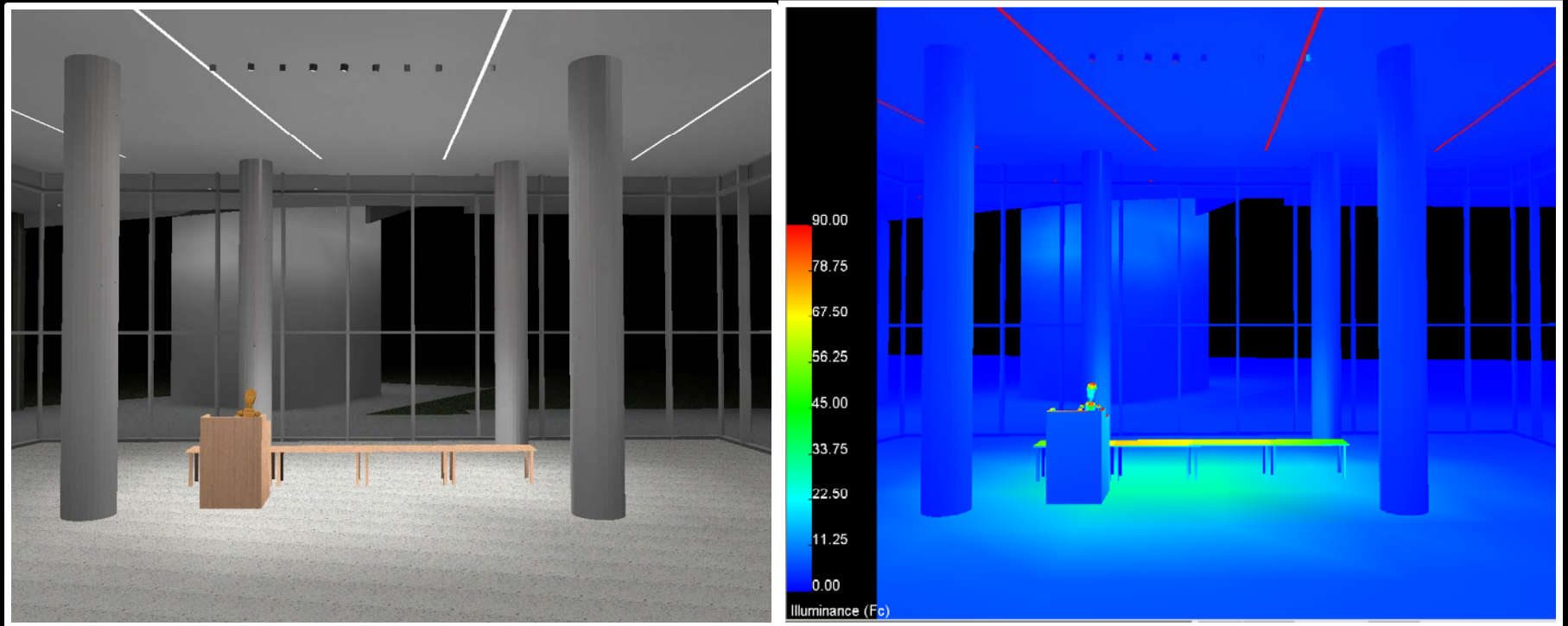
**General Info**

**Lighting**

**Electrical**

**Breadths**

# West Perspective



Gala Mode

General Info

Lighting

Electrical

Breadths

# Auditorium Information

Staggered ceiling with coves at junctures

311 seats in auditorium

Staggered walls with vertical coves

**General Info**

**Lighting**

**Electrical**

**Breadths**

# Auditorium Information

Staggered ceiling with coves at junctures

311 seats in auditorium

Staggered walls with vertical coves

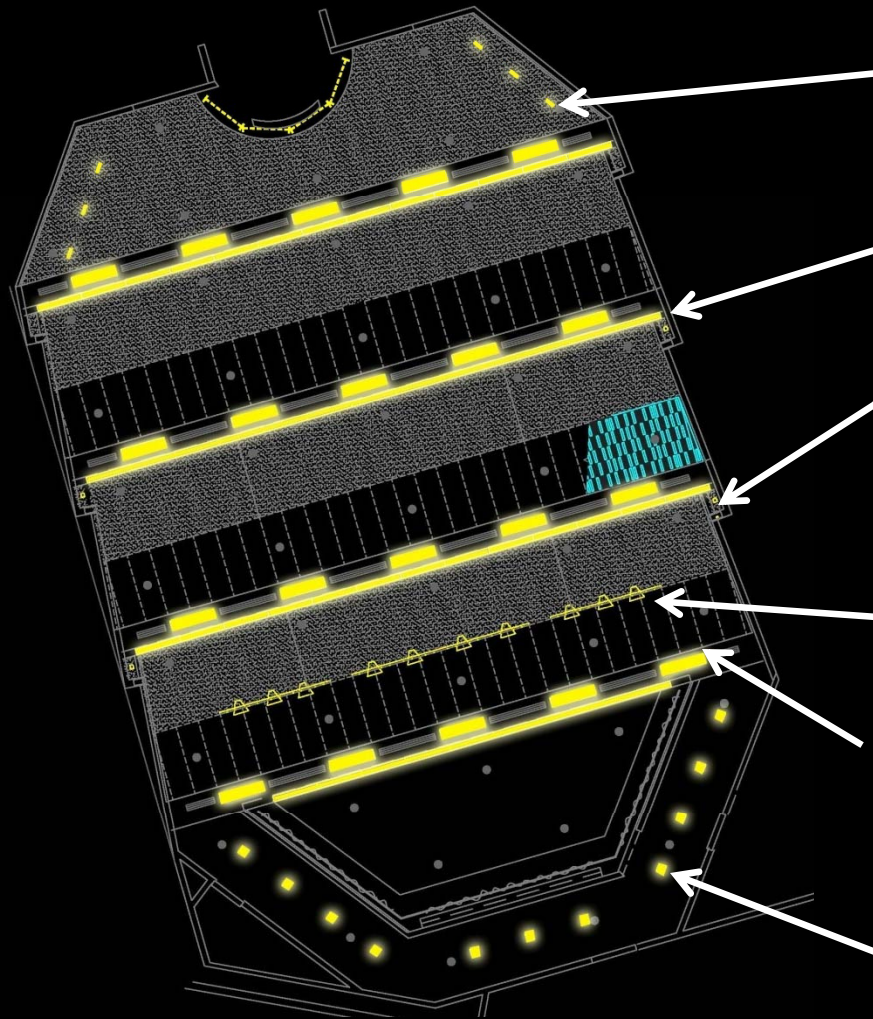
**General Info**

**Lighting**

**Electrical**

**Breadths**

# Auditorium RCP



O (WALL WASHER)



M (COVE FIXTURE)



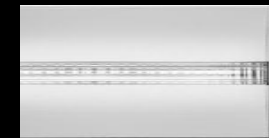
N (VERTICAL  
COVE FIXTURE)



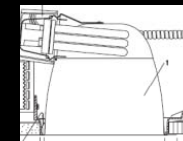
J&K (TRACK FIXTURES)



L (RECESSED LINEAR  
FLUORESCENT)



P (RECESSED CFL  
DOWNLIGHT)



General Info

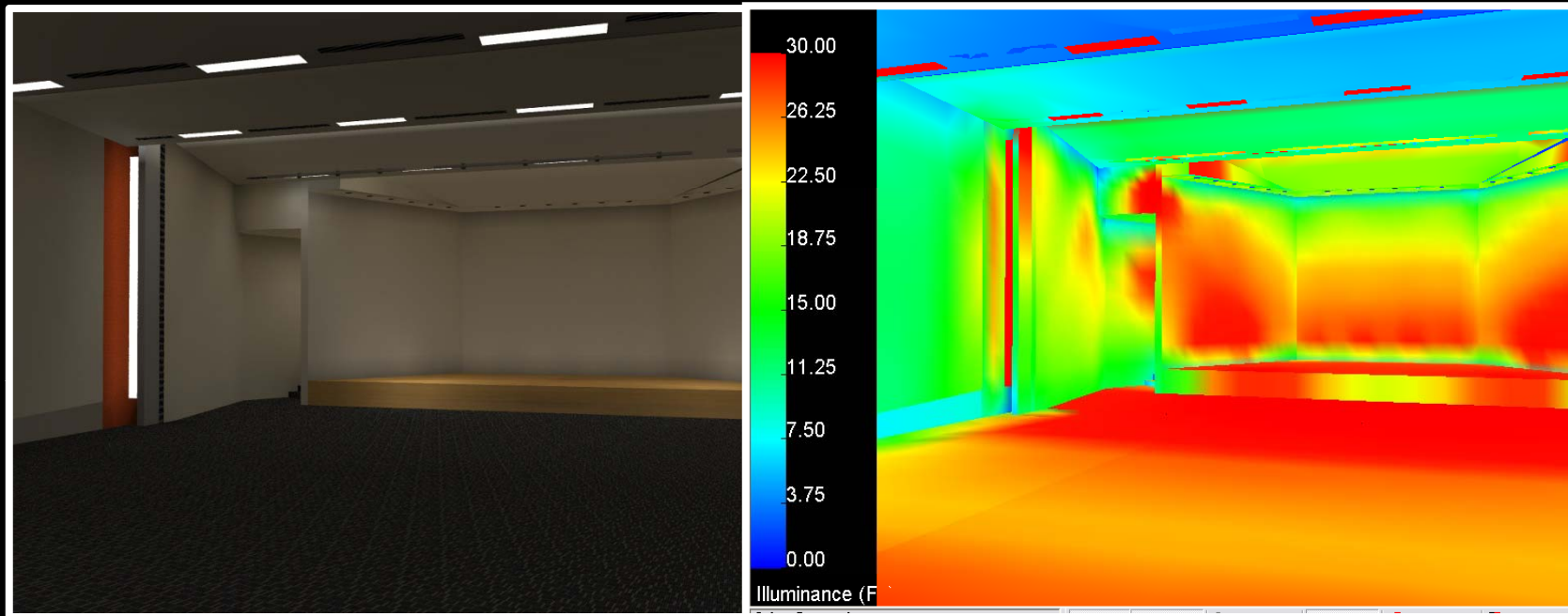
Lighting

Electrical

Breadths



# South Perspective



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Task_2	Illuminance	Fc	0.00	0.0	0.0	N.A.	N.A.
Task Plane	Illuminance	Fc	28.94	37.6	21.5	1.35	1.75
Carpet_1 Back Vestibule	Illuminance	Fc	15.19	24.4	5.6	2.71	4.36
Task Plane Left	Illuminance	Fc	25.07	34.6	15.4	1.63	2.25
Task Plane Right	Illuminance	Fc	26.50	34.5	18.0	1.47	1.92
Floor in front of stage No chair	Illuminance	Fc	31.07	84.4	20.4	1.52	4.14
Carpet1_Carpet1	Illuminance	Fc	31.41	34.9	27.7	1.13	1.26

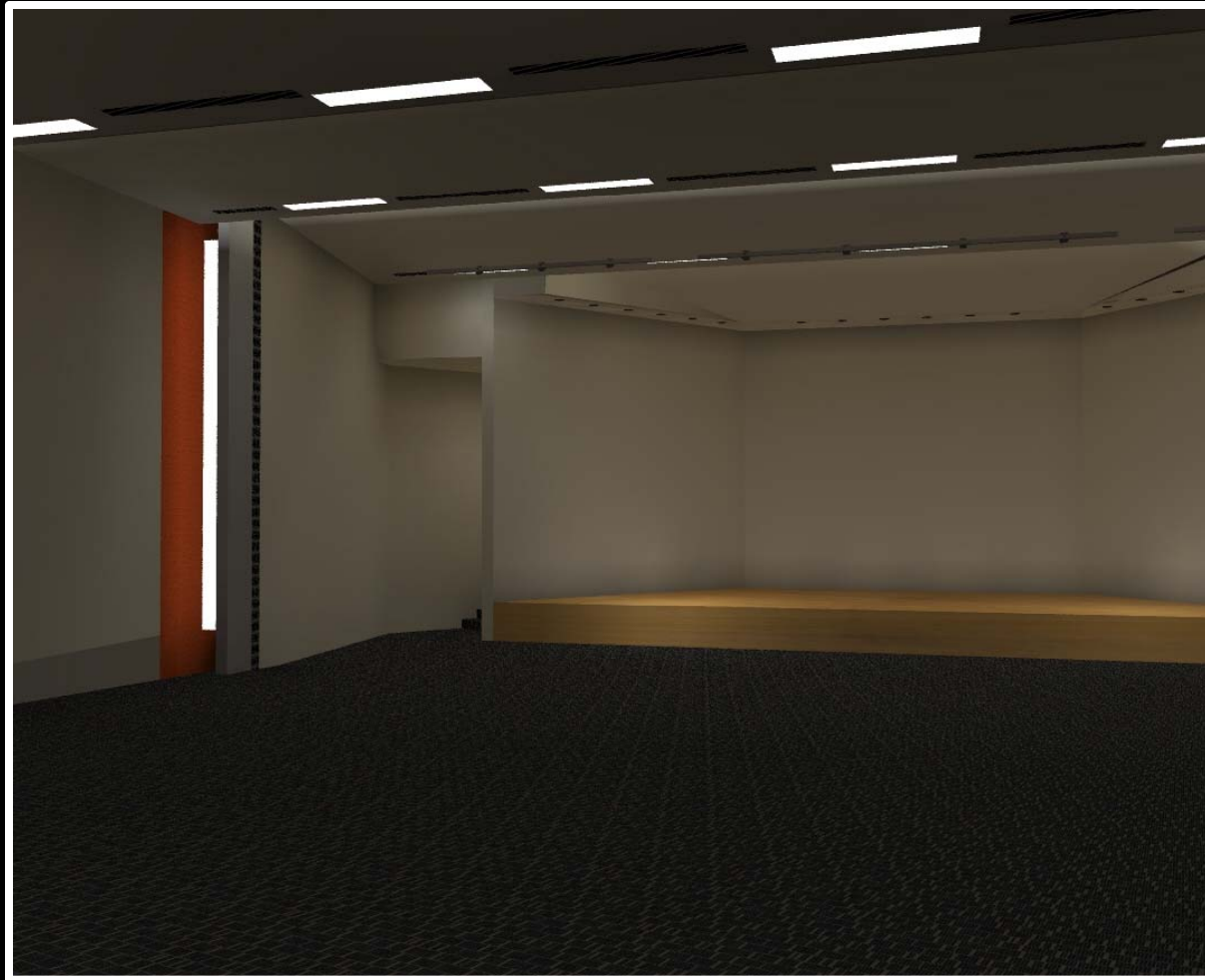
General Info

**Lighting**

Electrical

Breadths

# South Perspective



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**General Info**

**Lighting**

**Electrical**

**Breadths**



# Aluminum Feeder Estimate

74 branch and distribution panels throughout building

117 major feeders with step down transformers

Assumed EMT conduit and runs in the ceiling on upper floors

Aluminum Feeders

**NOT RECOMMENDED**

General Info

Lighting

Electrical

Breadths

# Introduction

Empirical Study of the mental effects of ceiling height at Univ. of Minnesota

Conducted tests on human information processing and cognitive skills

Result: Higher ceiling height increases cognitive skill strength

**General Info**

**Lighting**

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**Breadths**

# Redesign

Raise Ceiling height of auditorium by 4 feet

Causes higher thermal load with more exterior wall area

More load from brick on CMU wall resting on strip foundation

**General Info**

**Lighting**

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**Breadths**

# Methods

Binmaker program was used to organize TMY2 data

Solar air temperature calculation for loads

Fans in AHU-2 did not have to be resized

**General Info**

**Lighting**

**Electrical**

**Breadths**

# Acknowledgements

Dr. Houser

Dr. Mistrick

Professor Dannerth

Professor Davidson & Scott McCall

Dr. Srebric

Professor Holland

Professor Parfitt

**General Info**

**Lighting**

**Electrical**

**Breadths**