

University of California, San Diego

CAL IT²



Brian Smith

Senior Thesis 2006

Pennsylvania State University

Architectural Engineering

Lighting/Electrical Option

10 April 2006

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Building Overview

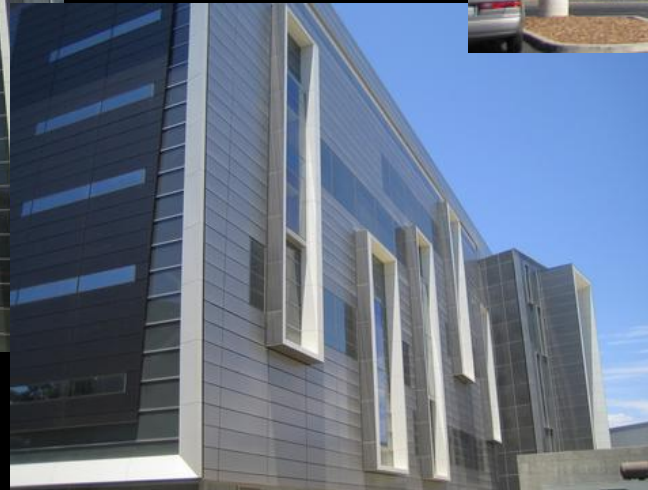
California Institute for Telecommunications and Information Technology

Location - San Diego, CA

Architect - NBBJ (San Francisco, CA)

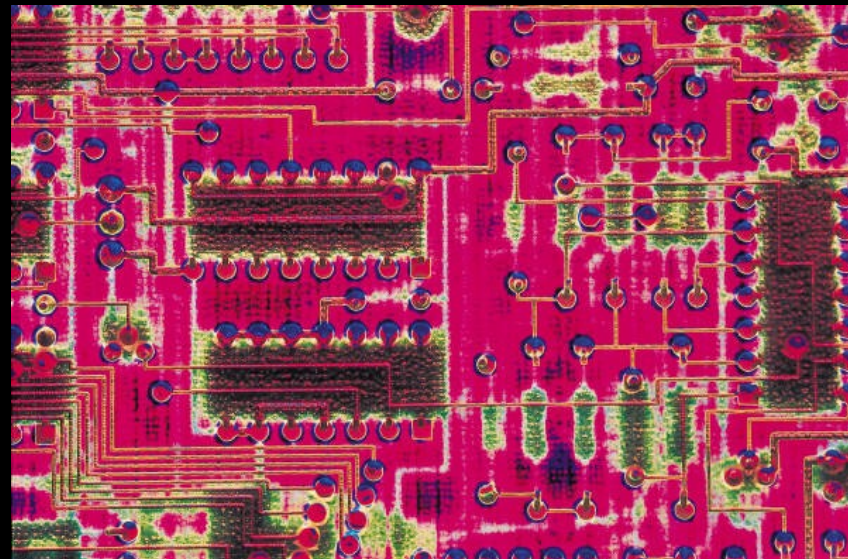
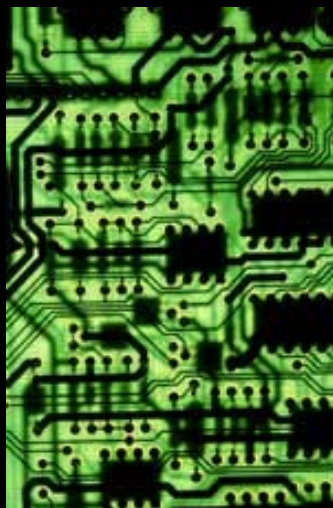
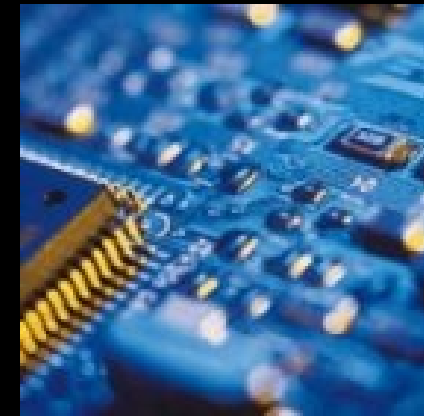
Size - 220,000 sf

Final Cost - \$62,000,000



Building Uses

- Research Laboratories
- Seminar Rooms
- Black-box Theater Space
- Private Offices
- Multipurpose Room
- Computer Laboratories



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Presentation Outline

Lighting Depth

- 3100 Research Cluster
- Black Box Theater
- Main Lobby/Gallery
- Academic Courtyard
- Underground Tunnel

Electrical Depth

Construction Management Breadth

Acoustical Breadth

Summary

Acknowledgements

Questions?



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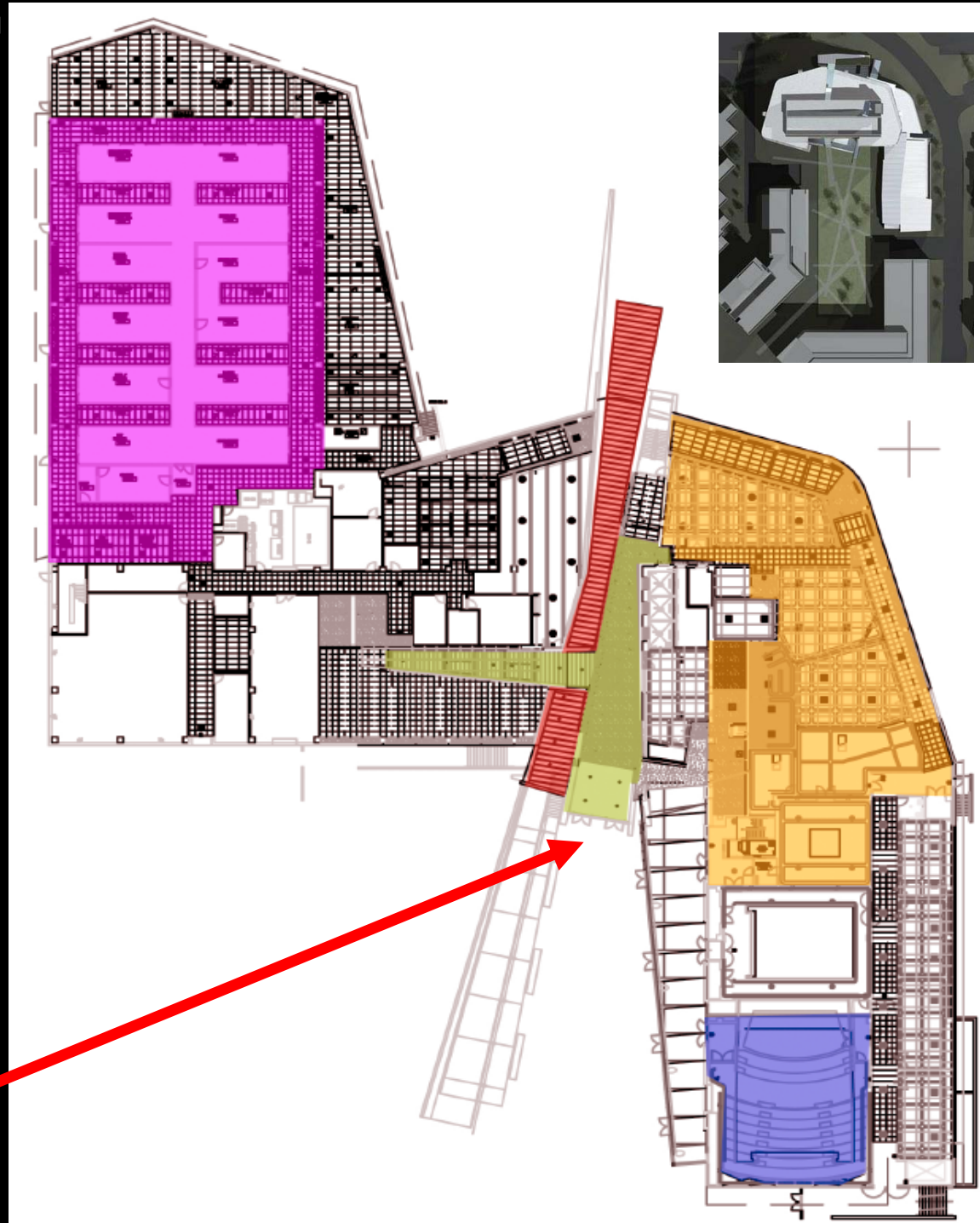


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Entire 1st Floor Plan Showing:

-  Lobby & Gallery Space
-  Black Box Theater
-  Underground Tunnel
-  Laboratories
-  Offices and research room

Courtyard Entrance



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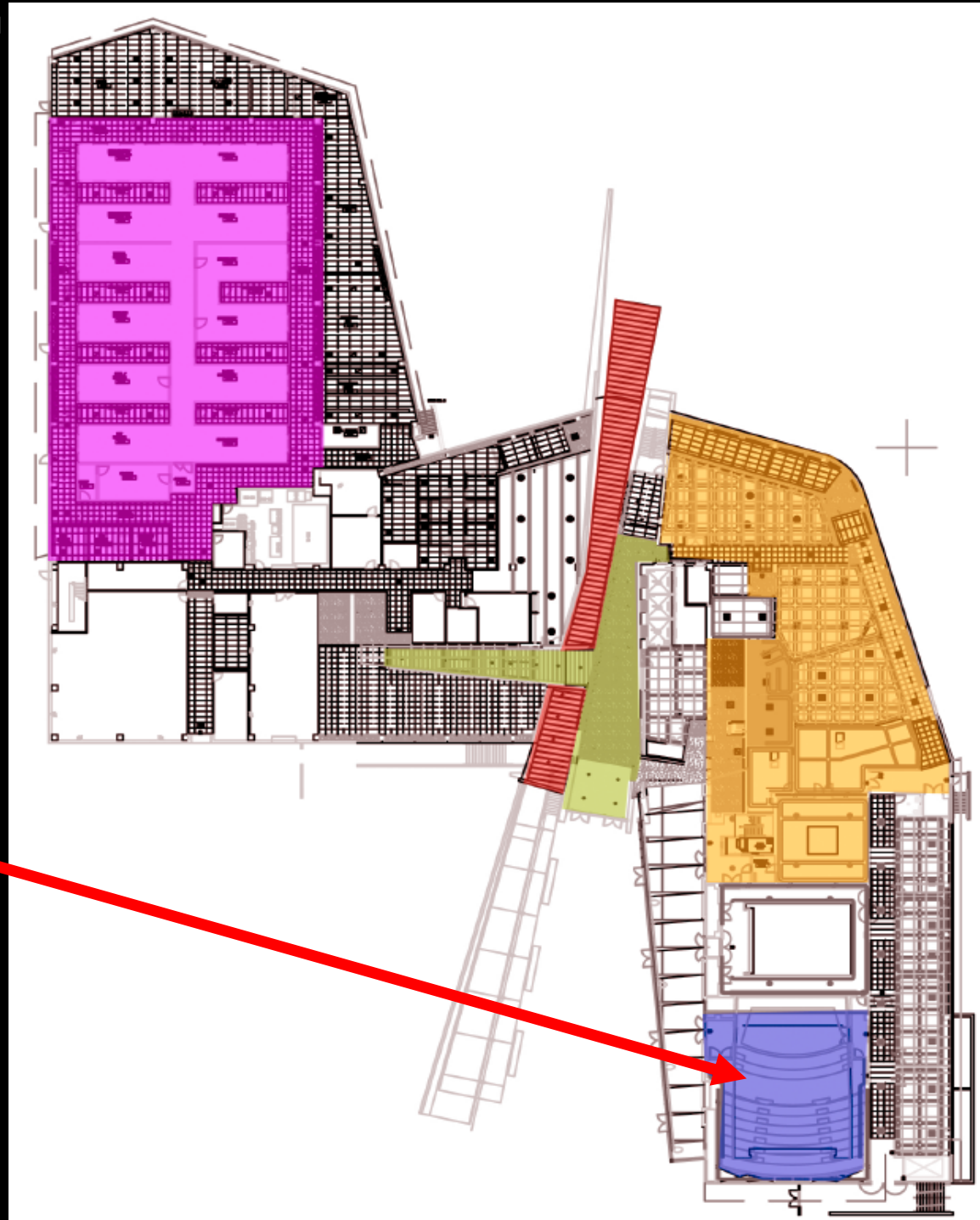
Black-Box Theater



Black-Box Theater

Black-Box Theater

Black-Box Theater



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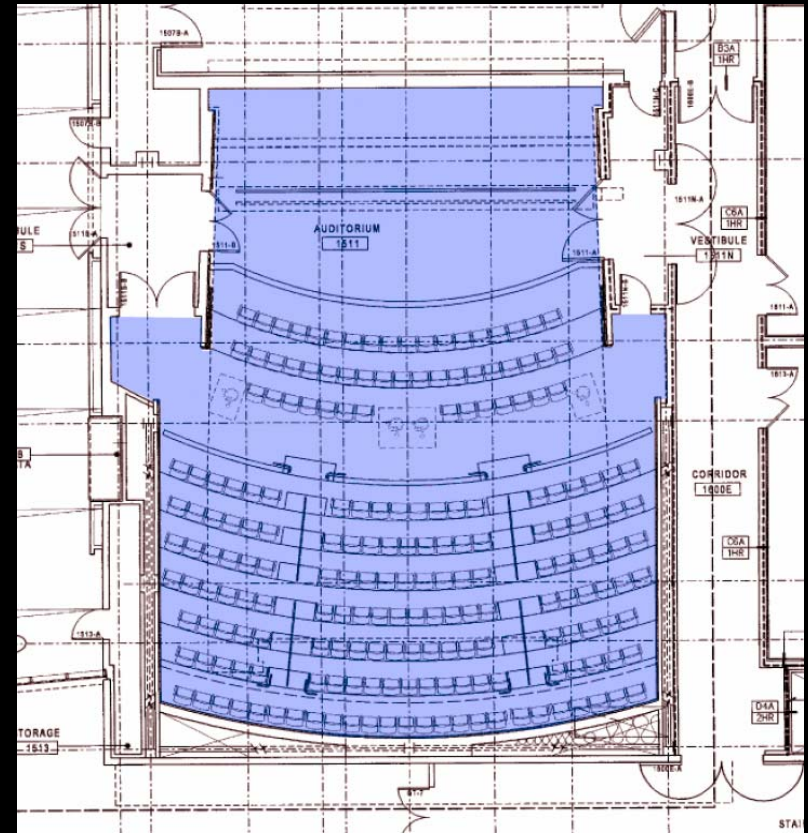
Black-Box Theater

Uses:

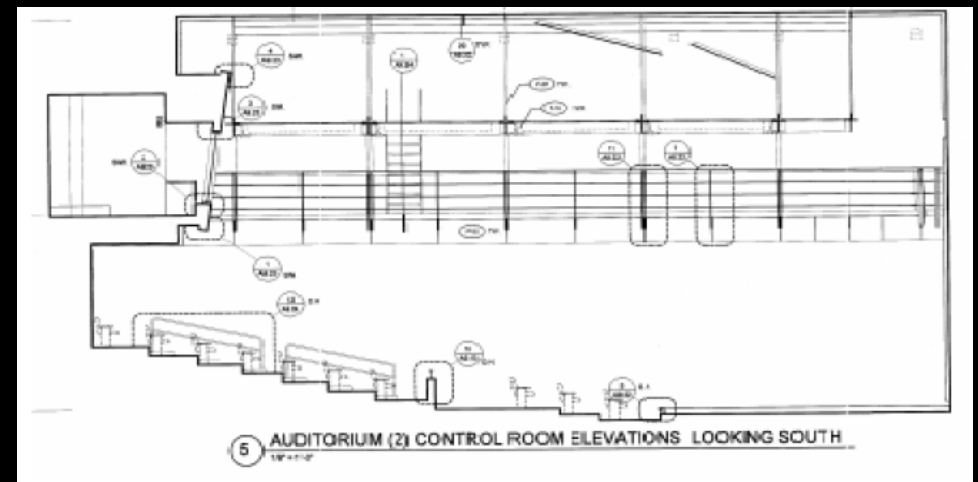
- Educational sessions
- Small student theater performances
- Guest lecturers and speakers
- Theatrical practices

Architectural Elements:

- Black mesh ceiling
- Black fabric sectioned walls
- Dark gray carpeting
- Black fabric stationary chairs
- Black stage curtain
- Catwalk surrounding theater



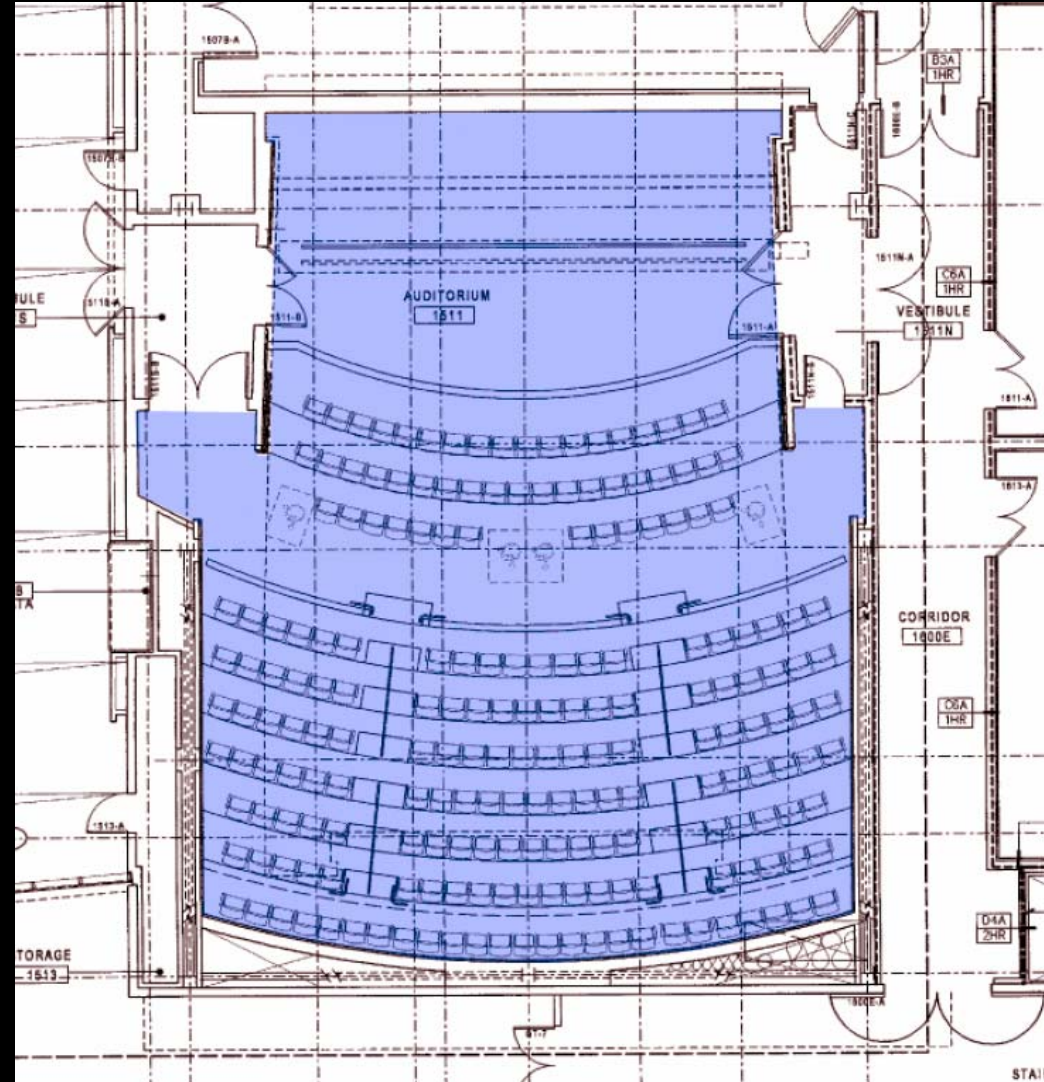
200 Seat Capacity



Black-Box Theater

Design Goals:

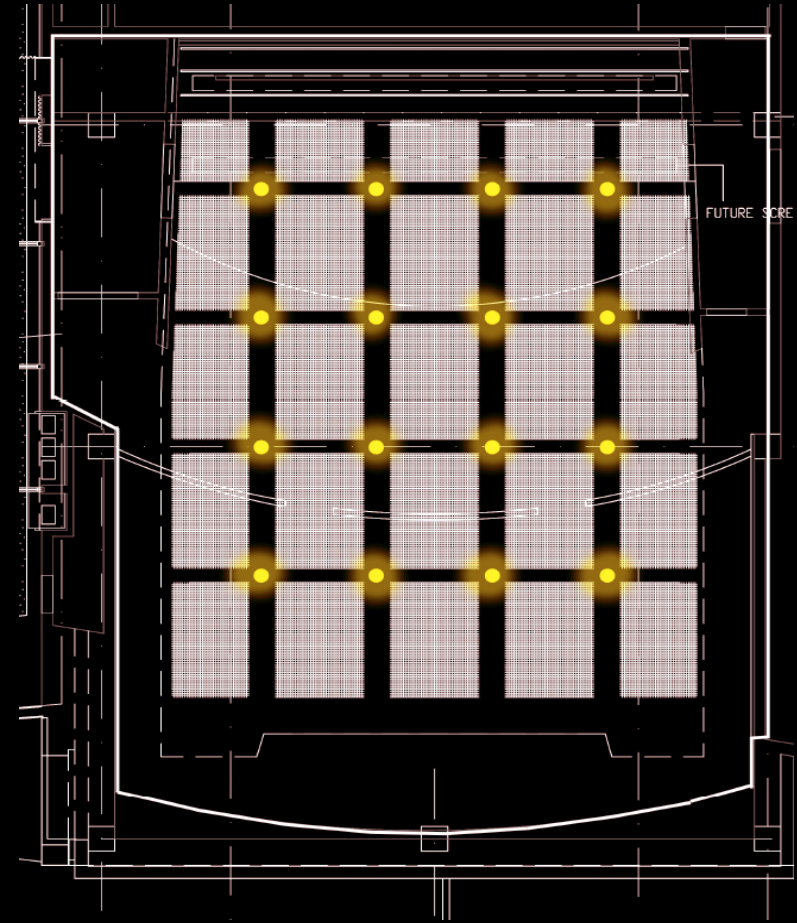
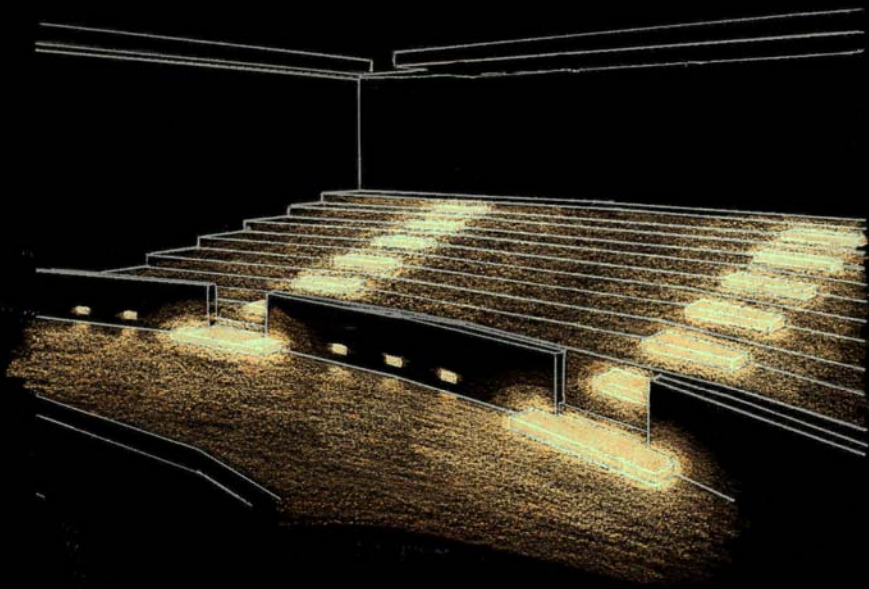
- Provide various lighting schemes
- Enough light for reading and writing during educational sessions
- Apply dimming system to adjust lighting levels during performances
- Use different colored light to create technological feel
- Very small light sources in ceiling to create night feel



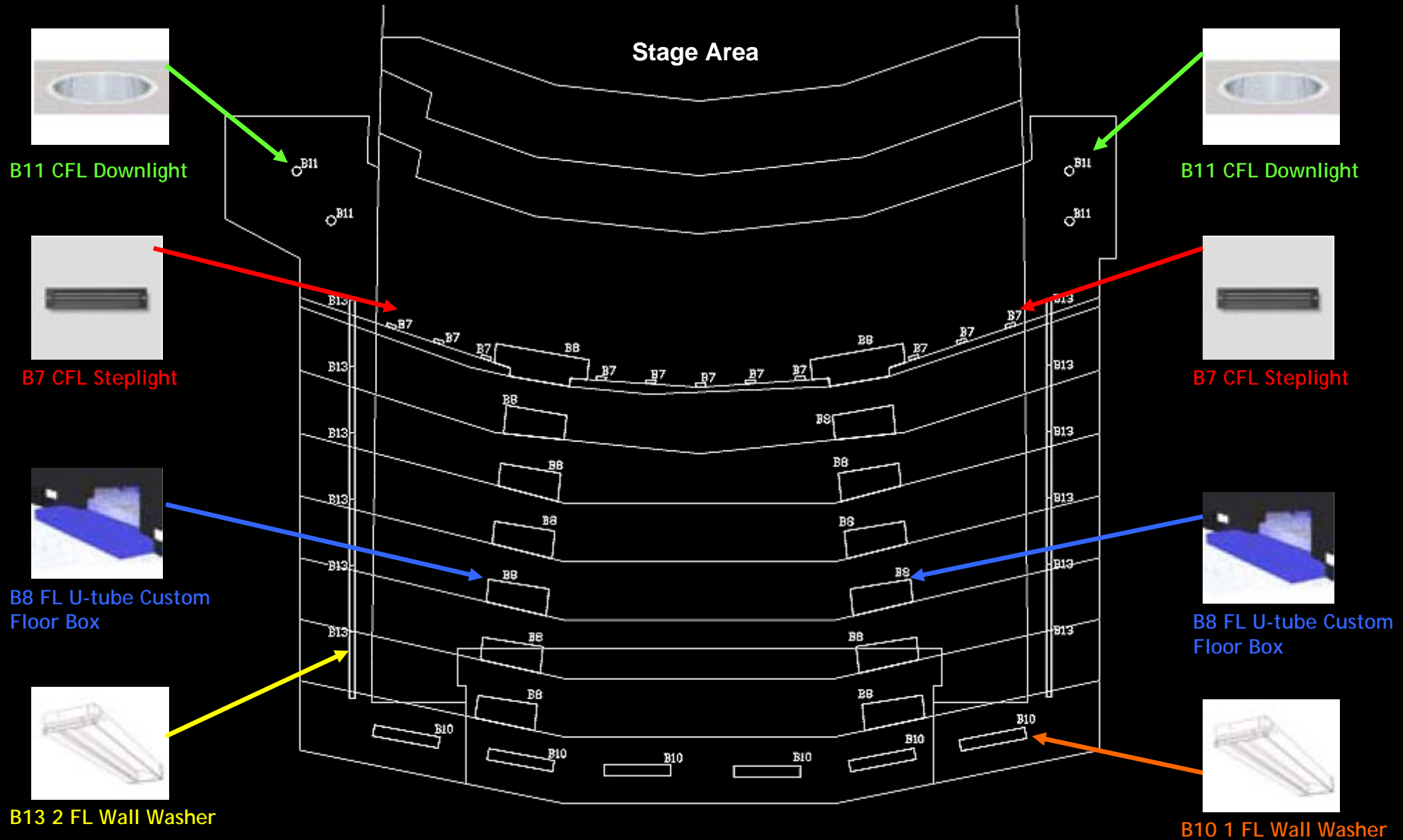
Black-Box Theater

Schematic Design Intent:

- Illuminated floor boxes to provide guidance
- Small light sources in between mesh to provide adequate light levels



Black-Box Theater



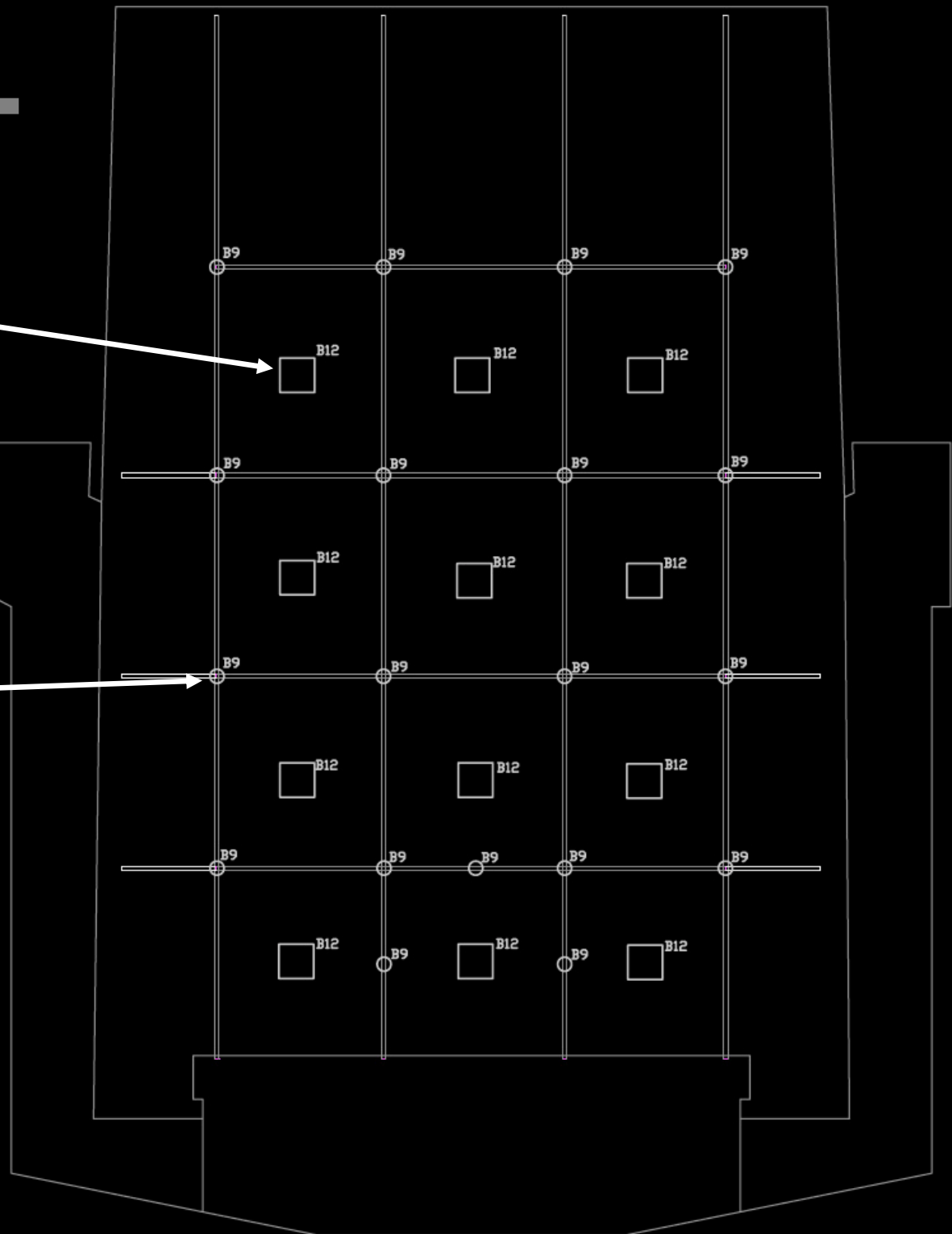
Black-Box Theater



B12 FL Square
Pendant Downlight



B9 CFL Surface
Mounted Downlight

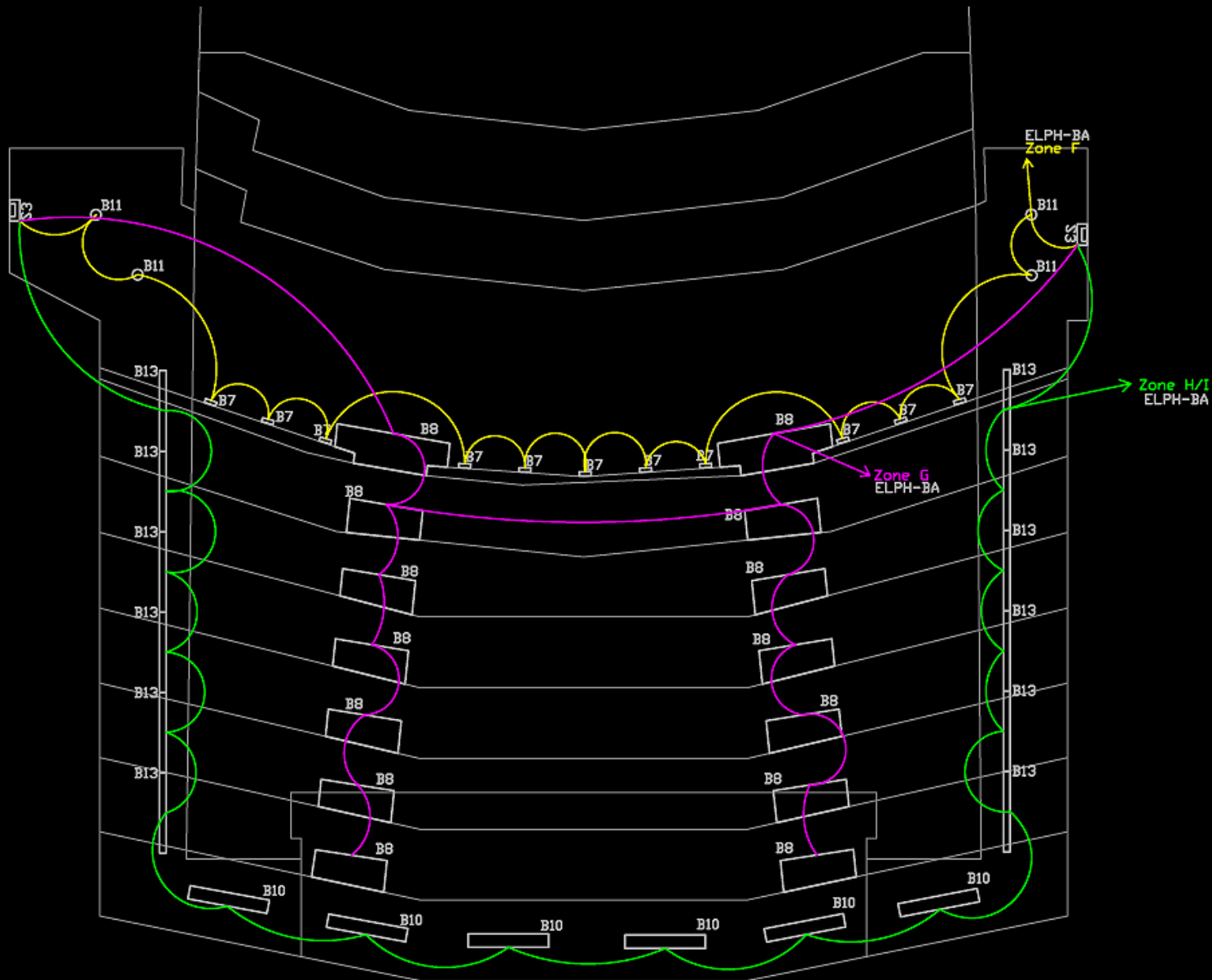


Black-Box Theater

Control and Circuit Diagrams

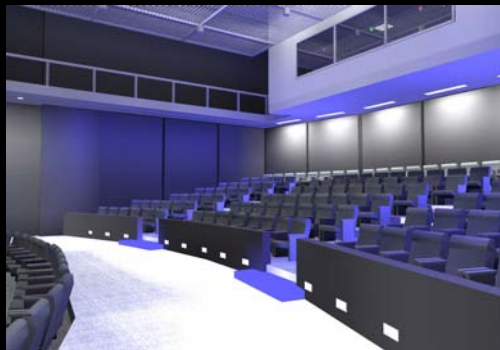


Control Panel - S3



Black-Box Theater

Theater Scenes				
Scene	Name	Zones	Fixtures	Dimming
Scene 1	Performance Entrance	D, F, G, I	B7, B8, B10, B11, B12, B13	D(10%)
Scene 2	Educational	D, E, F, H	B7, B9, B10, B11, B12, B13	
Scene 3	Performance	G, F	B7, B8, B11	G(1%), F(1%)
Scene 4	Educational 2	D, E, H	B9, B10, B12, B13	
Scene 5	Performance Entrance 2	D, H, F	B7, B10, B11, B12, B13	D(10%), H(10%)



Average Illuminance Values:

Educational Scenes - 29.56 fc

Pre-performance Scene 1 - 4.06 fc

Pre-performance Scene 5 - 7.42 fc

Performance Scene - 0.33 fc

Power Density					
Fixtures	Fixture Count	Watts	Total watts	SF	W/SF
B7	11	13	143		
B8	14	17	238		
B9	19	80	1520		
B10	6	36	216		
B11	4	18	72		
B12	12	65	780		
B13	12	35	420		
			3389	2845	1.19

Power Density < 1.4 W/SF

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Black-Box Theater



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Black-Box Theater



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Main Lobby/Gallery

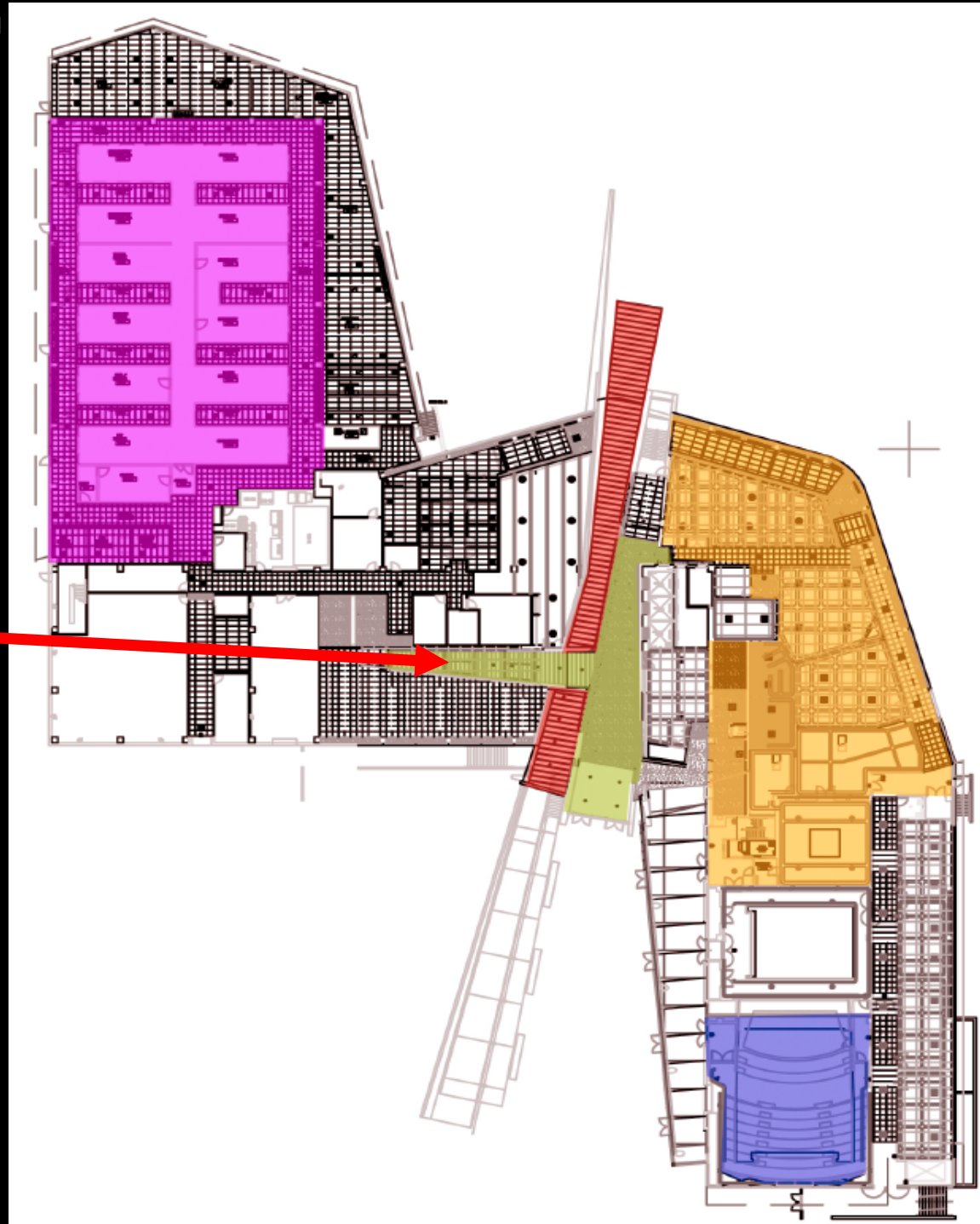


Main Lobby/Gallery Space

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Main Lobby/Gallery

Lobby & Gallery
Space



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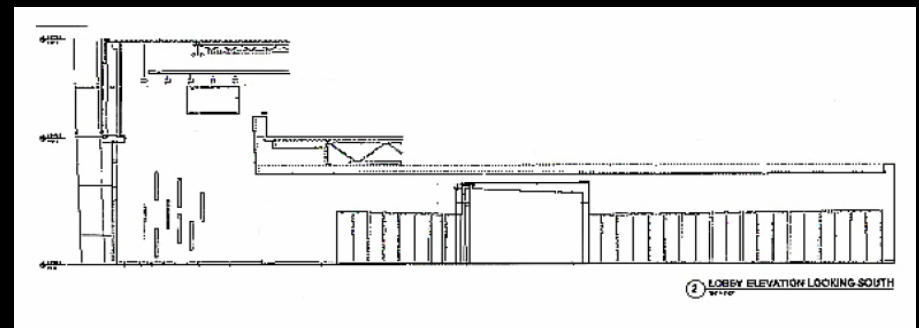
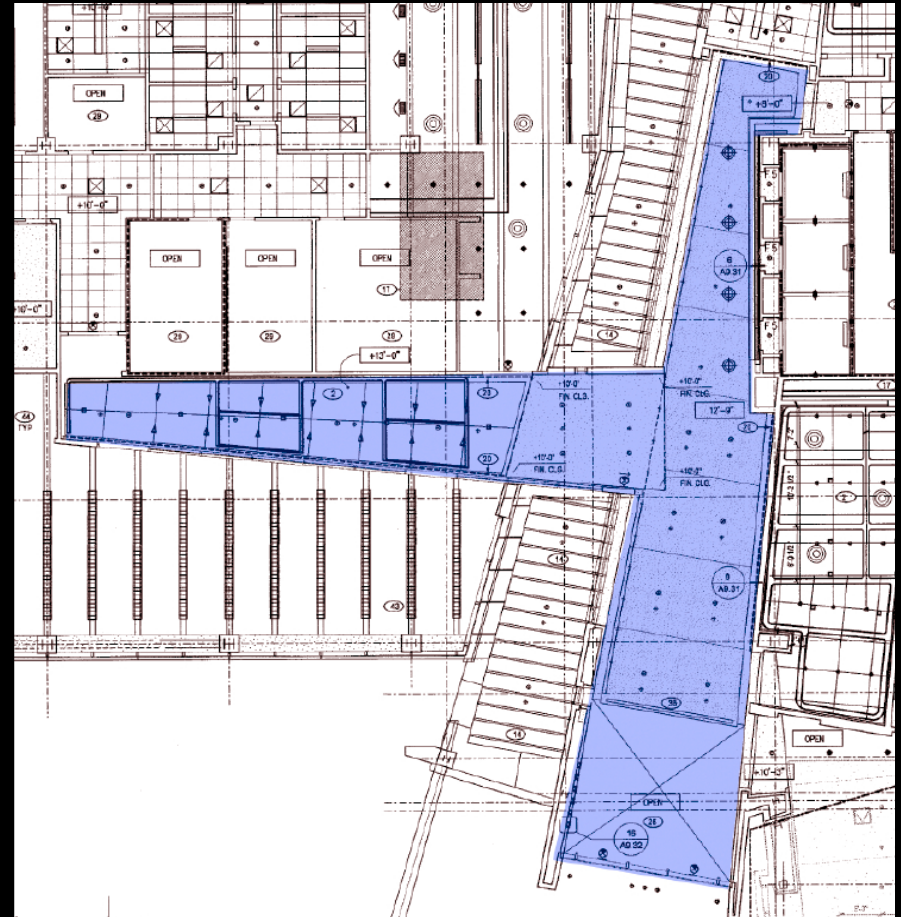
Main Lobby/Gallery

Uses:

- Introduces Building to people
- Guides people to their destinations
- Showcase works and art

Architectural Elements:

- 3/4 height windows showing underground tunnel
- Tinted glazing on front wall
- Different ceiling heights
- White and Light Green painted walls
- Views into server room and courtyard

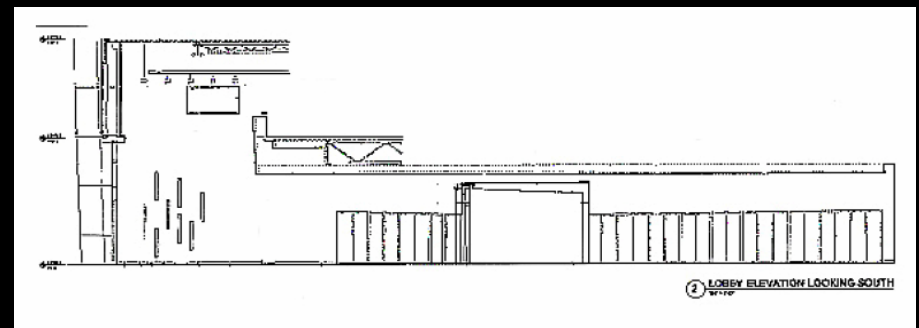
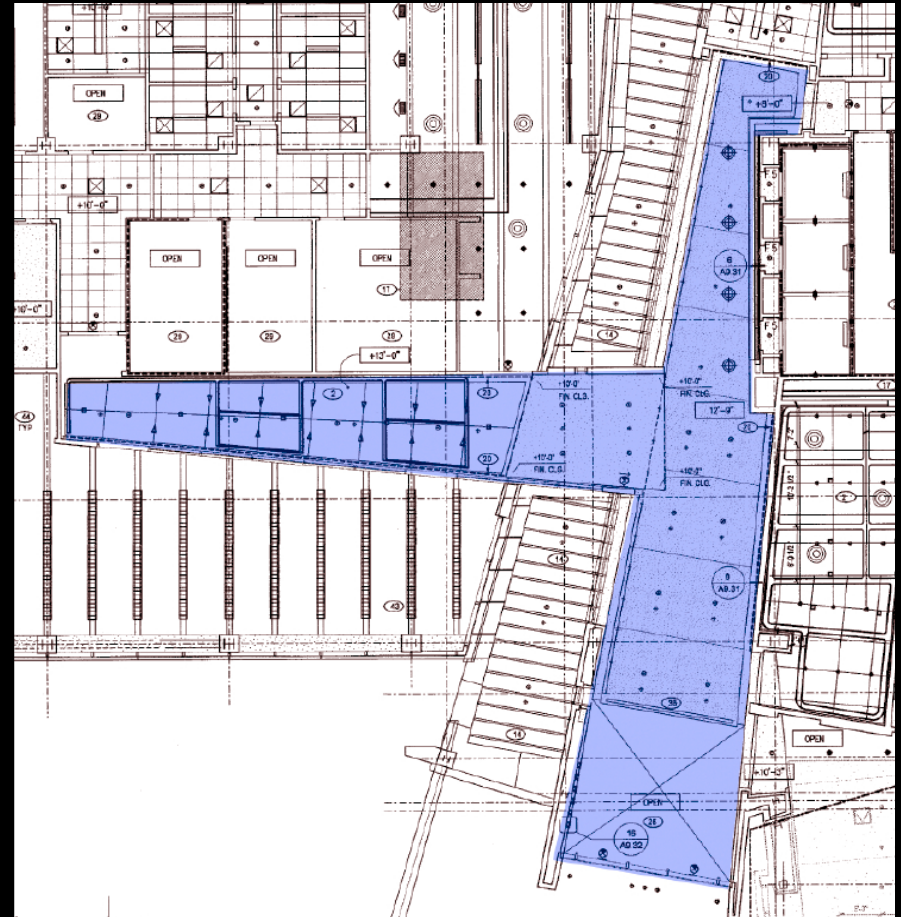


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Main Lobby/Gallery

Design Goals:

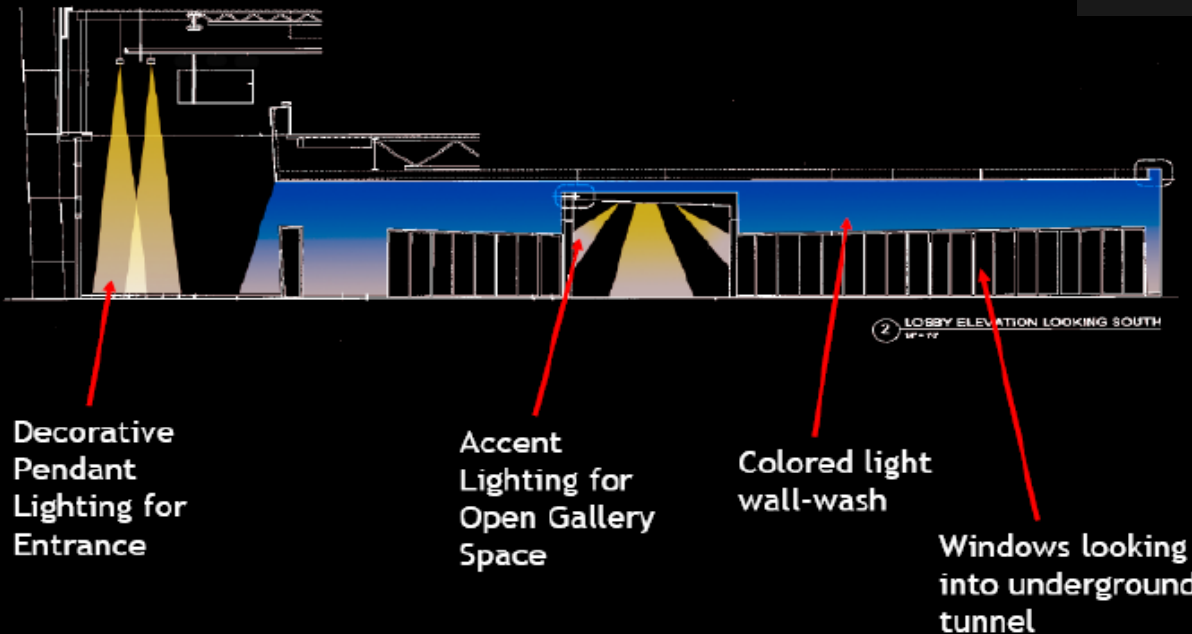
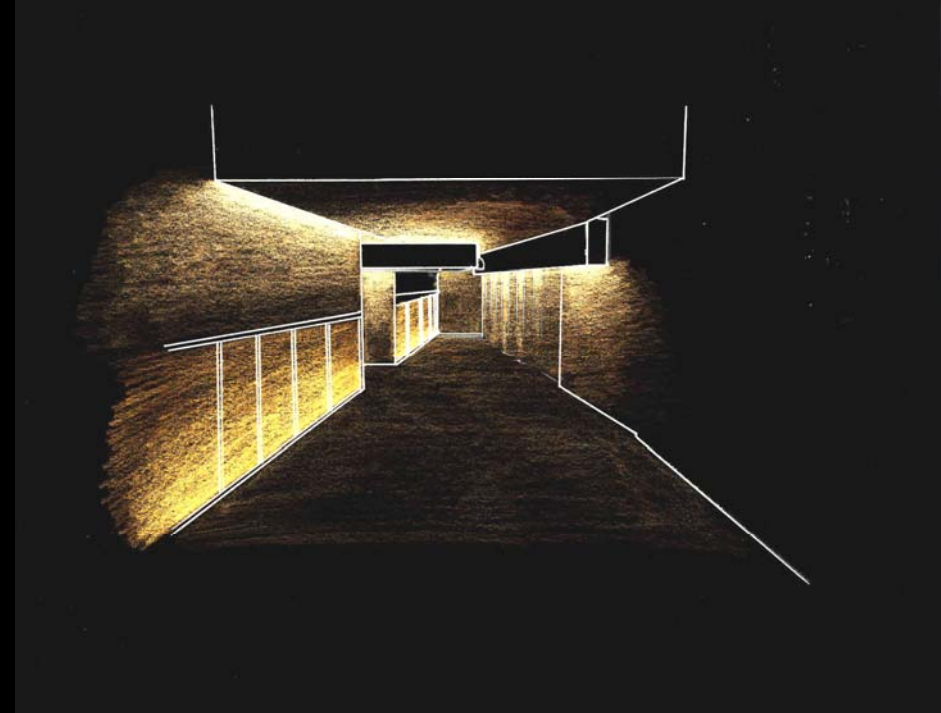
- Provide an innovative space that shows the technological advancement of the building
- Use lines of light to guide people through the space fast and efficiently
- Cooler Color Temperatures
- Impact of tunnel through lobby windows
- Emphasize the different ceiling coves and heights
- Highlight photography and works of art on the walls in gallery



Main Lobby/Gallery

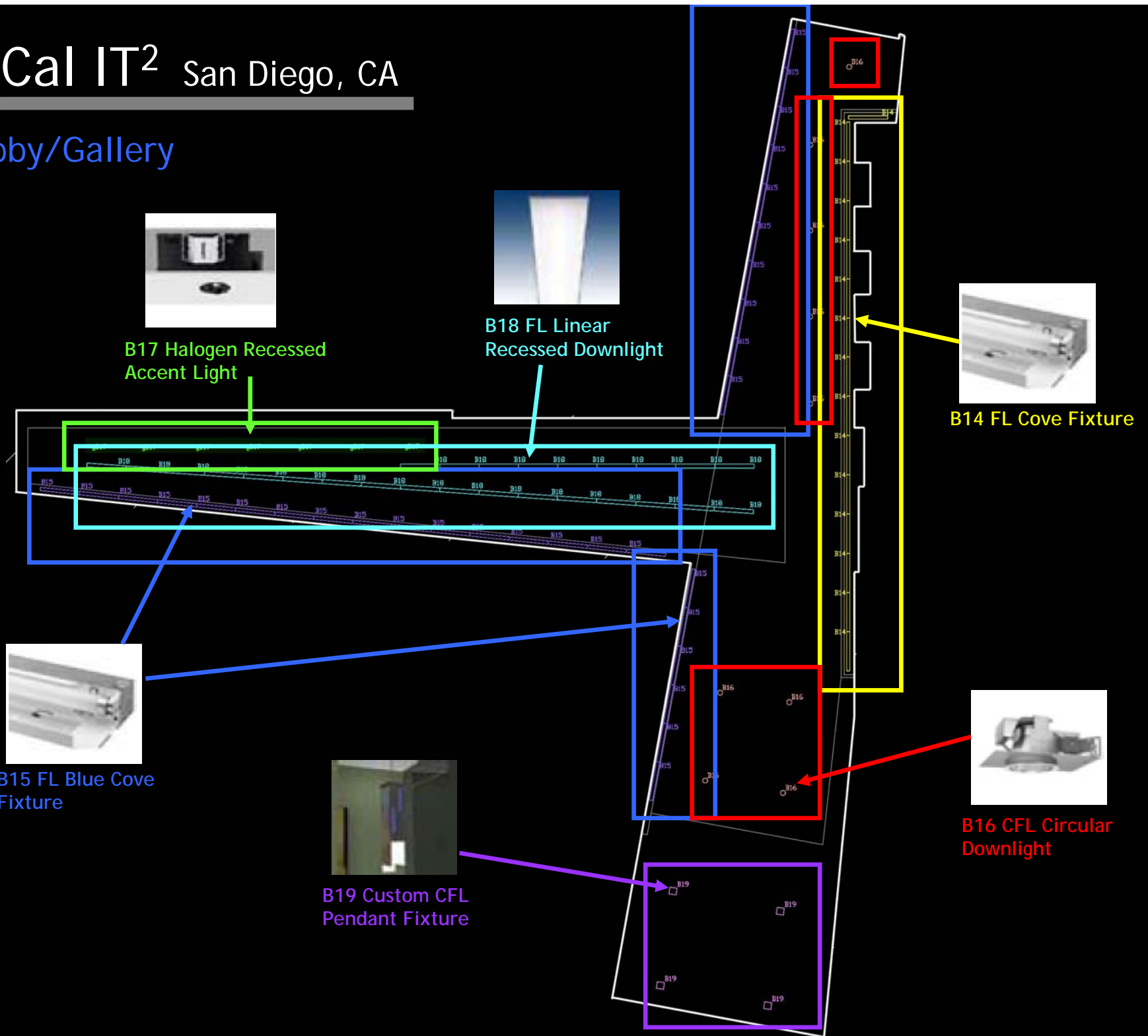
Schematic Design Intent

- Use lines of light to guide people
- Emphasize technology and sophistication



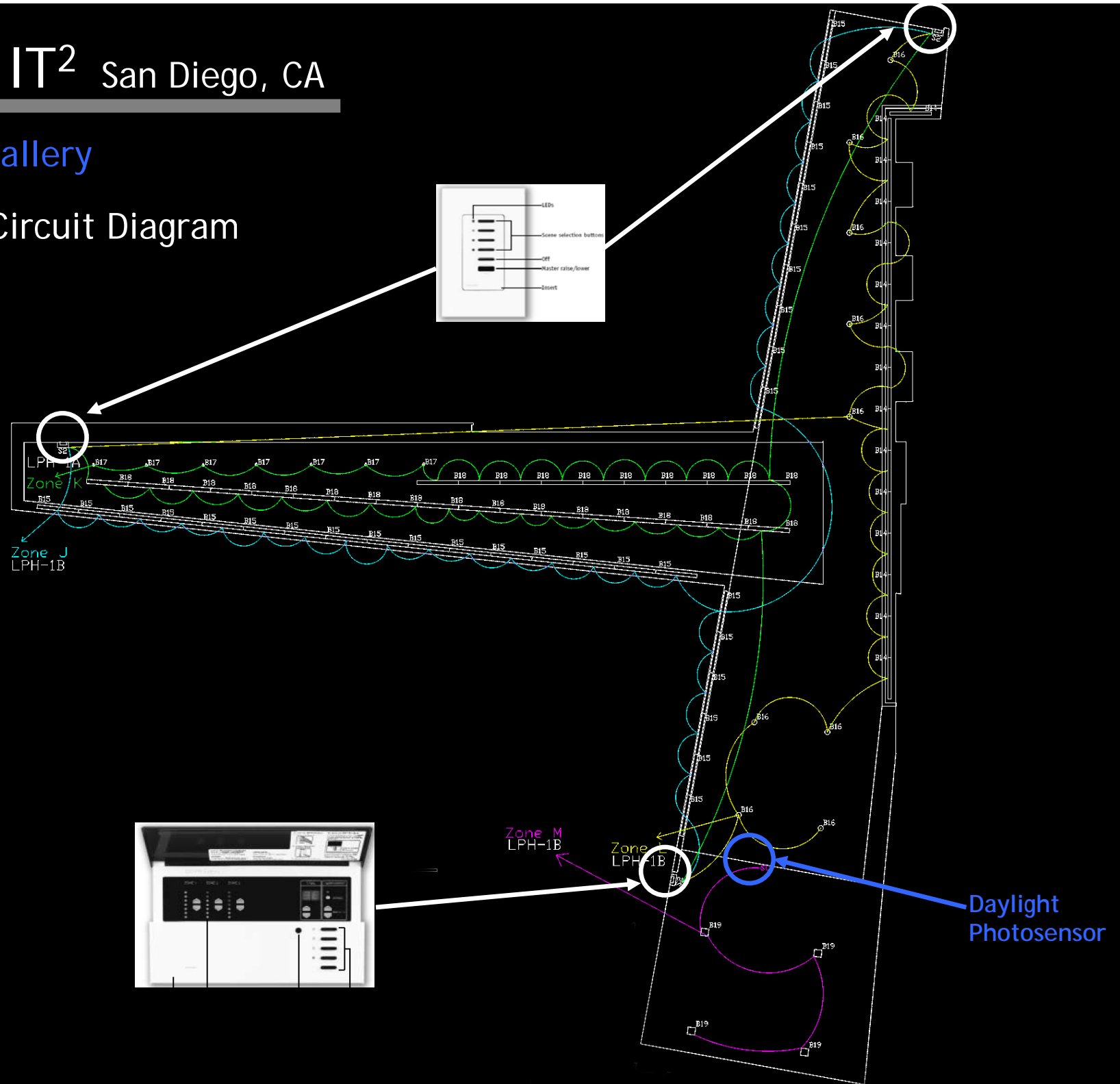
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Main Lobby/Gallery



Main Lobby/Gallery

Control and Circuit Diagram



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Main Lobby/Gallery



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Main Lobby/Gallery



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Main Lobby/Gallery



Gallery Space - All Lights On



Gallery Space - Night Lighting

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Main Lobby/Gallery

Conclusions

Average Illuminance Value - 20.75 fc

Power Density					
Fixtures	Fixture Count	Watts	Total watts	SF	W/SF
B14	16	29.5	472		
B15	36	29.5	1062		
B16	9	36	324		
B17	7	50	350		
B18	26	30	780		
B19	4	72	288		
			3276	2410	1.36

Power Density < 1.5 W/SF



-Lines of light were effective in leading people to the elevators or gallery space.

-A technological feel was given to introduce the high-tech building

-Power density is below the allowance

-Various switching can be done to produce the wanted lighting scene

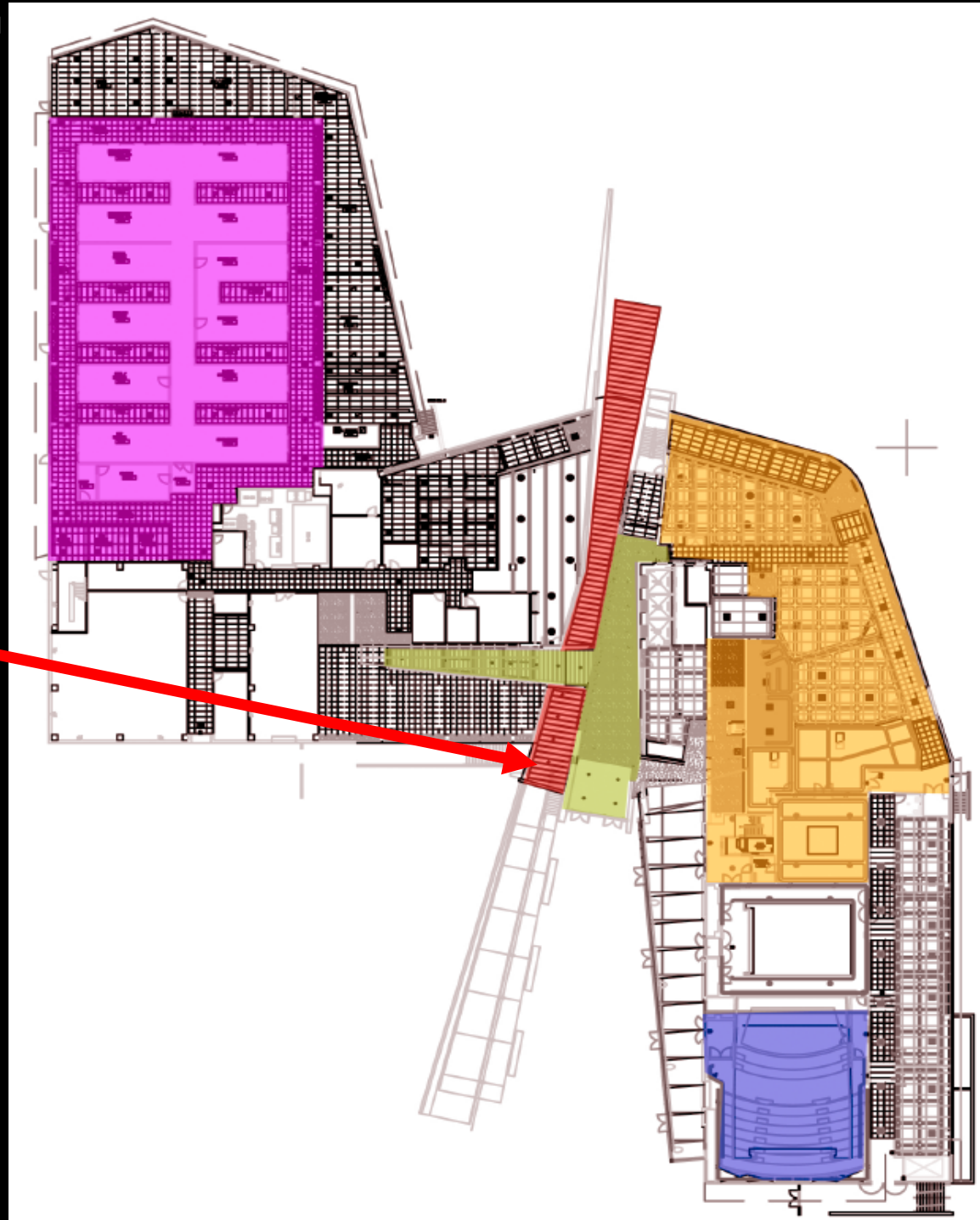
Underground Tunnel



Underground Tunnel

Underground Tunnel

Underground Tunnel



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Underground Tunnel

Uses:

- Passageway from courtyard to road and parking lot
- An introduction to the building without being inside

Architectural Elements:

- 3/4 height windows showing main lobby
- Concrete walls and floor
- Viewed as a "worm-hole" to the other side



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Underground Tunnel

Design Goals:

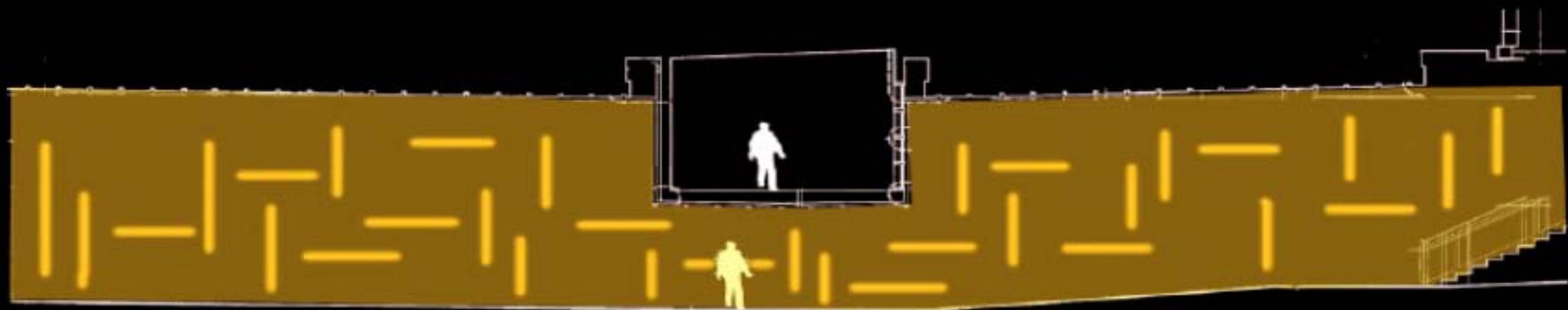
- Provide an innovative space that shows the technological advancement of the building
- Use dimming and oscillations to guide people through the tunnel
- Impact of building through tunnel windows
- Emphasize the tunnel as a “worm-hole” and attract visitors to it



Underground Tunnel

Schematic Design Intent

A slow movement of light will lead people through the tunnel. The randomly placed fluorescent tubes will illuminate the tunnel while creating a moving information highway.



Oscillating Movement



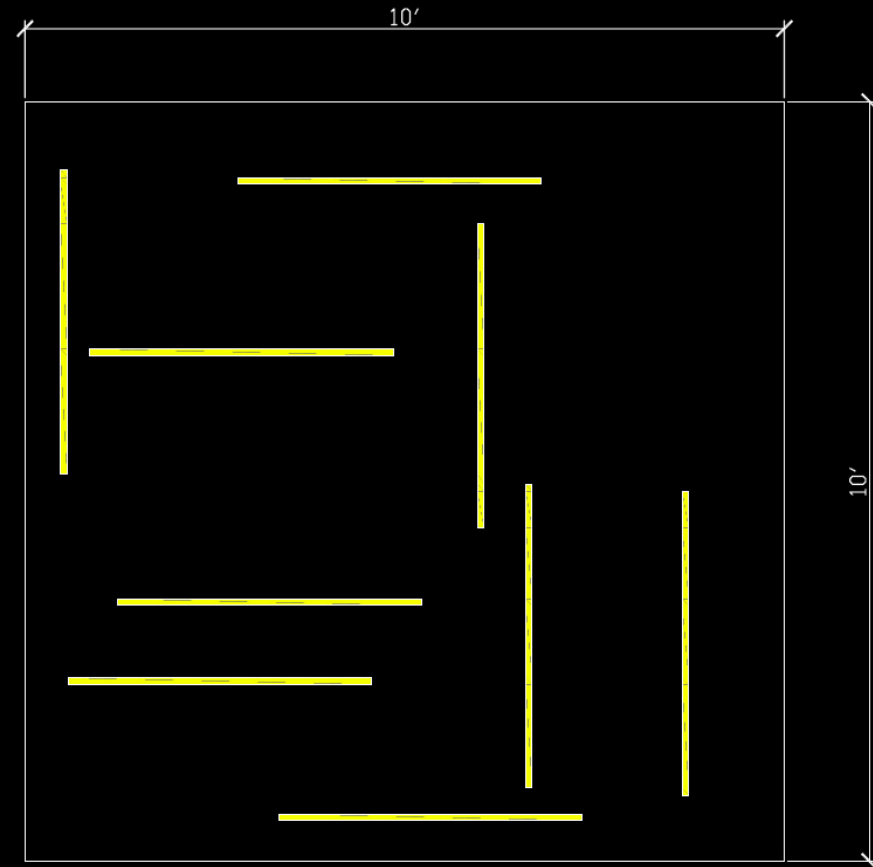
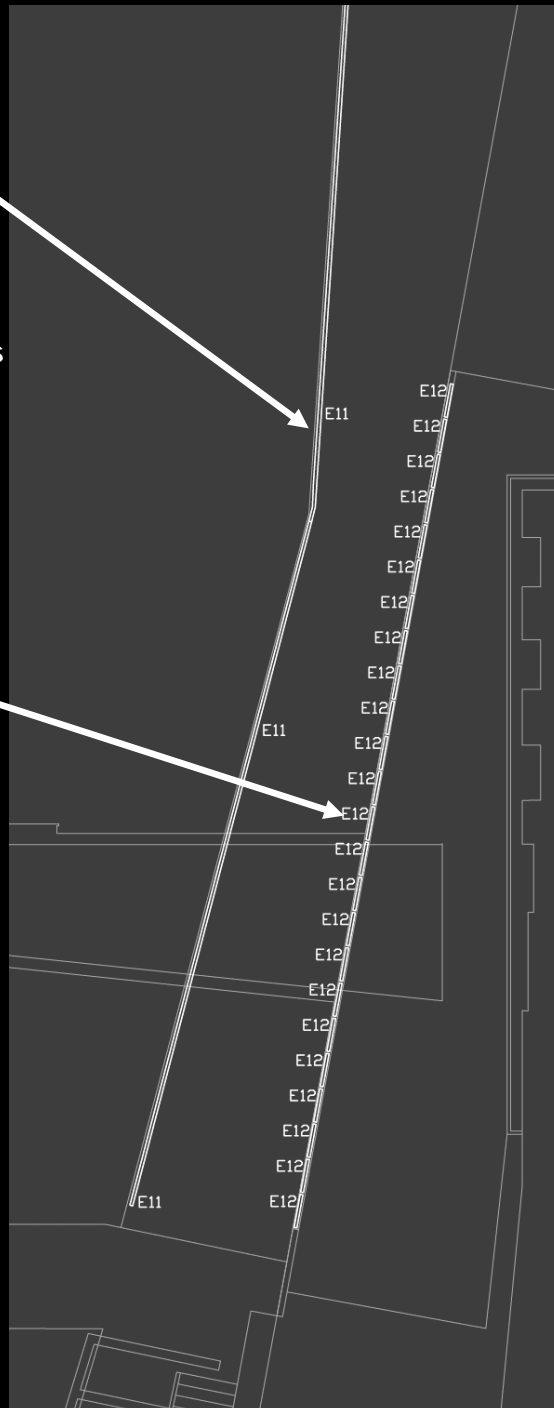
Underground Tunnel



E11 Custom FL Luminous Boxes

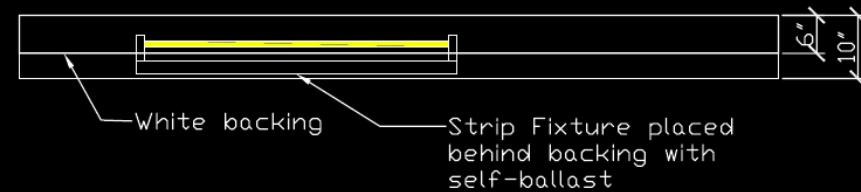


E12 Blue FL Strip Up-lights enclosed in windows



Tunnel Wall Fixture E11

Randomly placed 32W T8 lamps
Fixture comes in custom sizes to fit tunnel walls
Suggested size is 10' x 10'
Ballasts placed in cavity behind fixture and tandem wired
 $\frac{3}{4}$ " diffuse temperature treated acrylic with 60% transmittance
Panels can be re-lamped by taking front panel off with latch



Underground Tunnel



Underground Tunnel



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Underground Tunnel



Underground Tunnel

Conclusions

Power Density					
Fixtures	Fixture Count	Watts	Total watts	SF	W/SF
E11	X	X	X		
E12	24	29.5	708		
			708	1925	0.37

Power Density < 0.5 W/SF Allowed

Average Illuminance Value - 16.5 fc

- Created a technological tunnel through the core of the building to emphasize the movement of information going on inside
- Created a highlight for the building to attract visitors
- Encourages the use of the tunnel rather than walking around or through the building

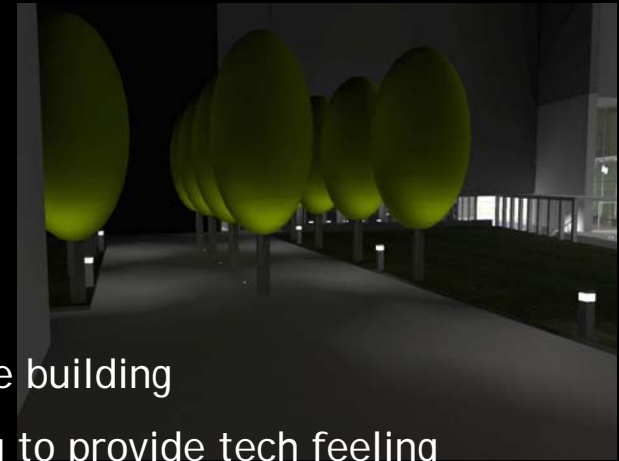


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Summary

Conclusions

- Provided a lighting design that incorporated the form and function of the building
- Used cooler color temperature fluorescent bulbs throughout the building to provide tech feeling
- Provided flexibility in the controls to integrate the spaces' use and people
- Added a decorative light art wall as a reminder of the fun in the creativity and innovation for the information technology field



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Acknowledgements

I would like to thank...

The entire AE faculty for their guidance

My fellow classmates for their support and distractions

My parents for their support throughout my Penn State experience

HLB Lighting Design for providing me with my project and their answers to my million and one questions

McLanahans for their \$2.59 special subs

Friends for their understanding and support





Thank You!

Have a Great Day



Questions and Comments are Welcome

