



Devin Maurizio

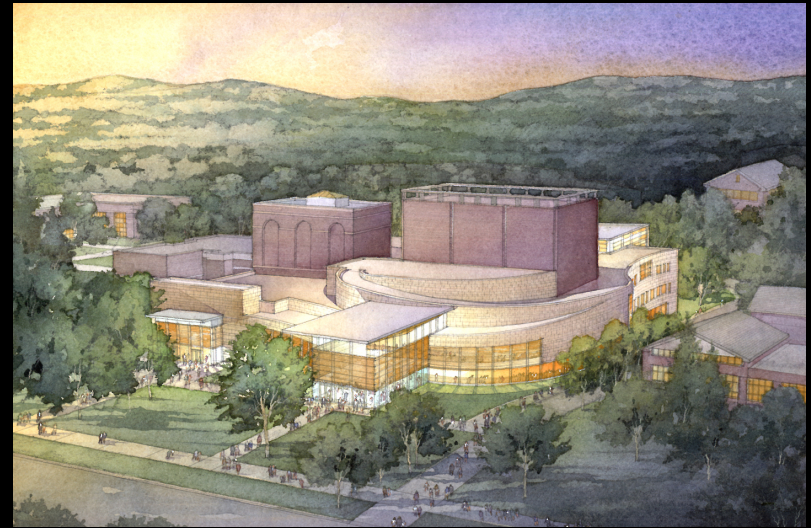
Spring 2007

Lighting/Electrical Option



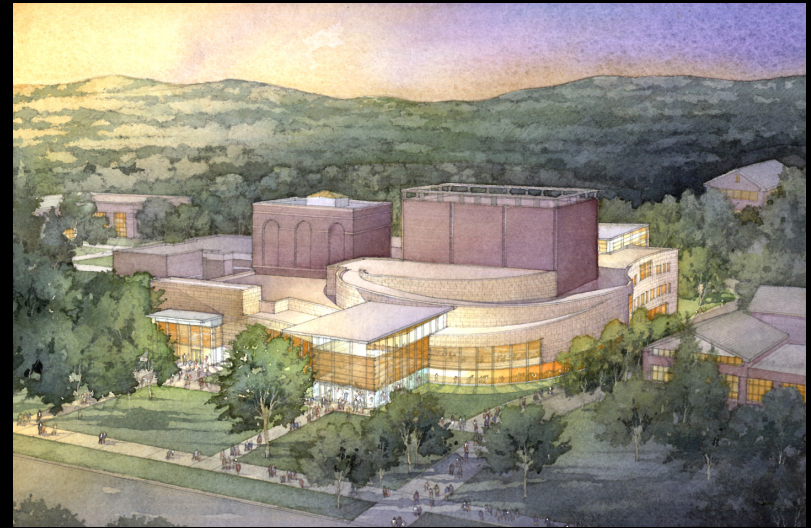
Presentation Outline:

- Building Overview
- Lighting Depth
 - Front Lobby
 - Dance Rehearsal Studio
 - Depth Summary
- Electrical Depth
 - Photovoltaics
 - Depth Summary
- Sustainability Breadth
- Conclusions
- Questions



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General Information

LOCATION: Williamstown, Massachusetts

SIZE: 126,000 sq. ft.

Floors: Maximum of 3

COST: \$54 million

COMPLETED: June 2005

FACILITIES: 550 Seat Main Theatre
220 Seat Renovated Theatre
Central Black Box Theatre
Dance Rehearsal Studio
Classrooms & Offices



Key Players:

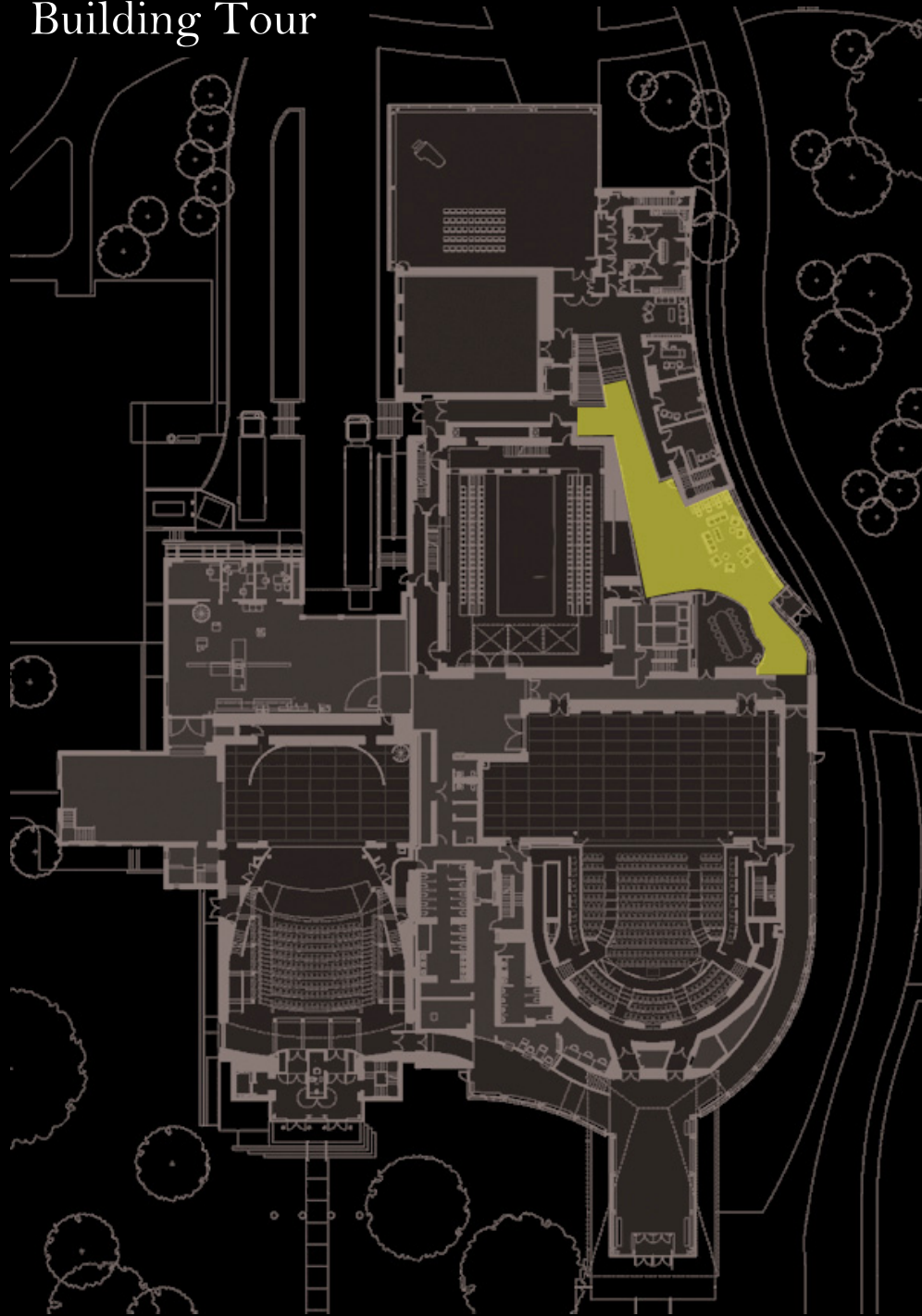
ARCHITECT: William Rawn Associates

LIGHTING CONSULTANT: Horton Lees Brogden

MEP CONSULTANT: TMP Consulting Engineers



Building Tour



Lobby



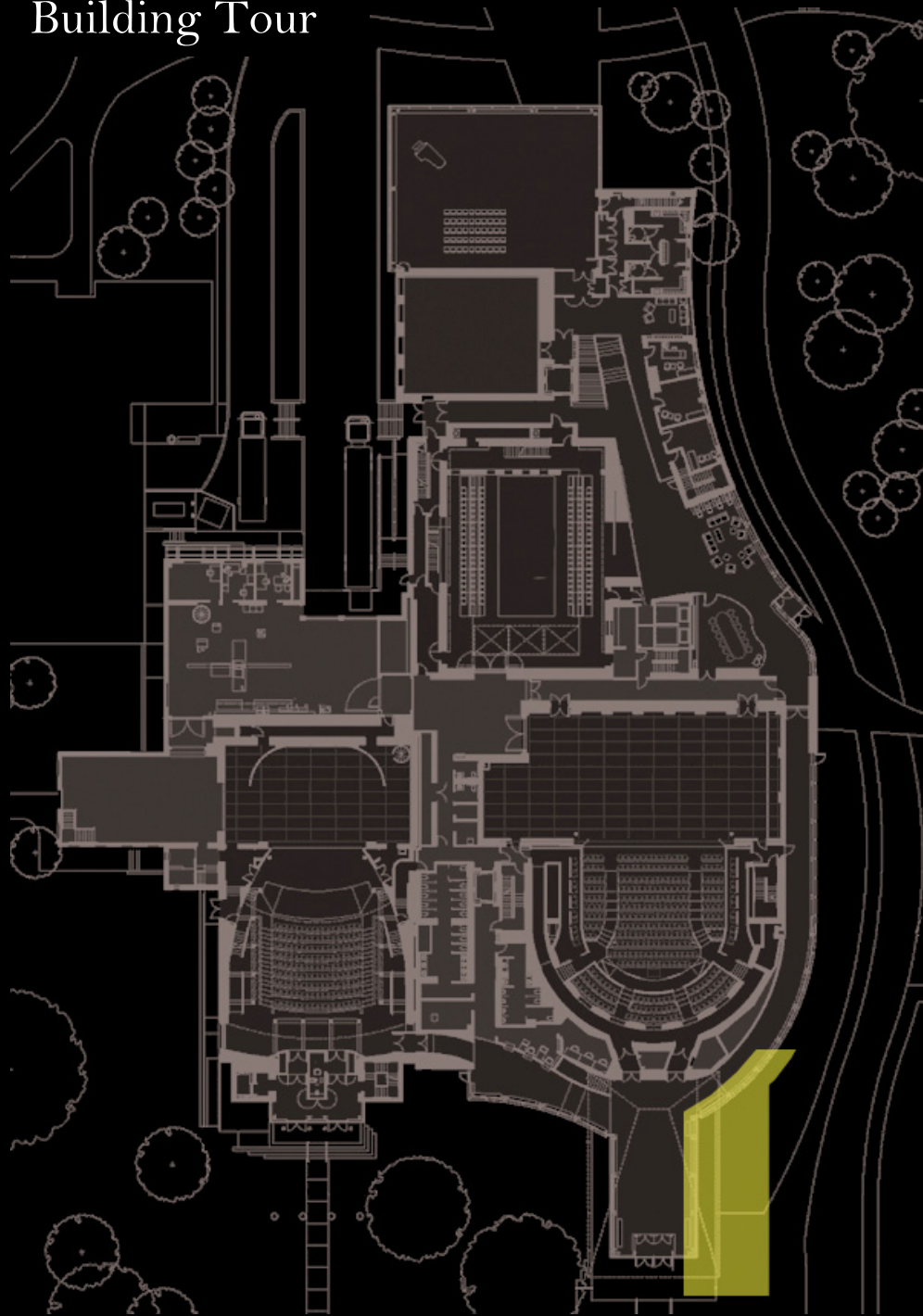
550 Seat Theatre



Center Stage Lobby



Building Tour



Black Box Theatre



Dance Studio

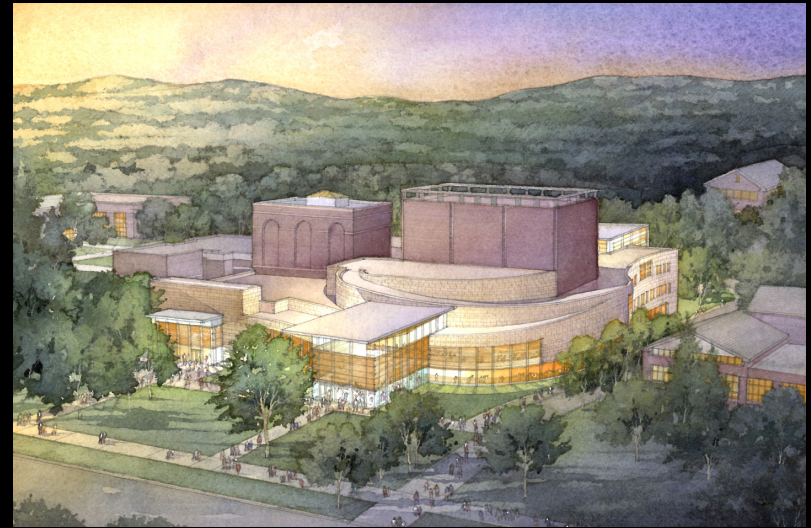


Exterior Patio

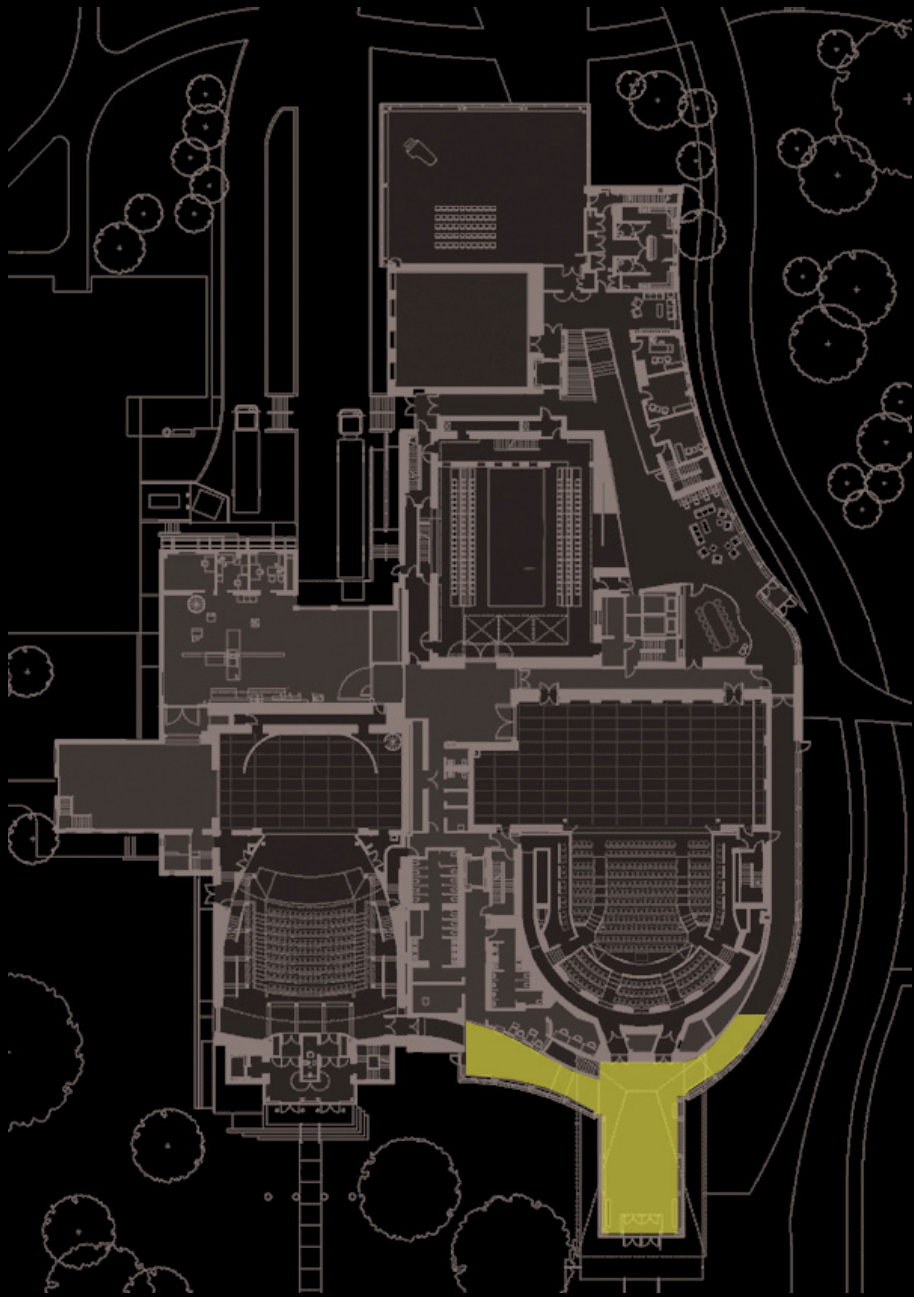


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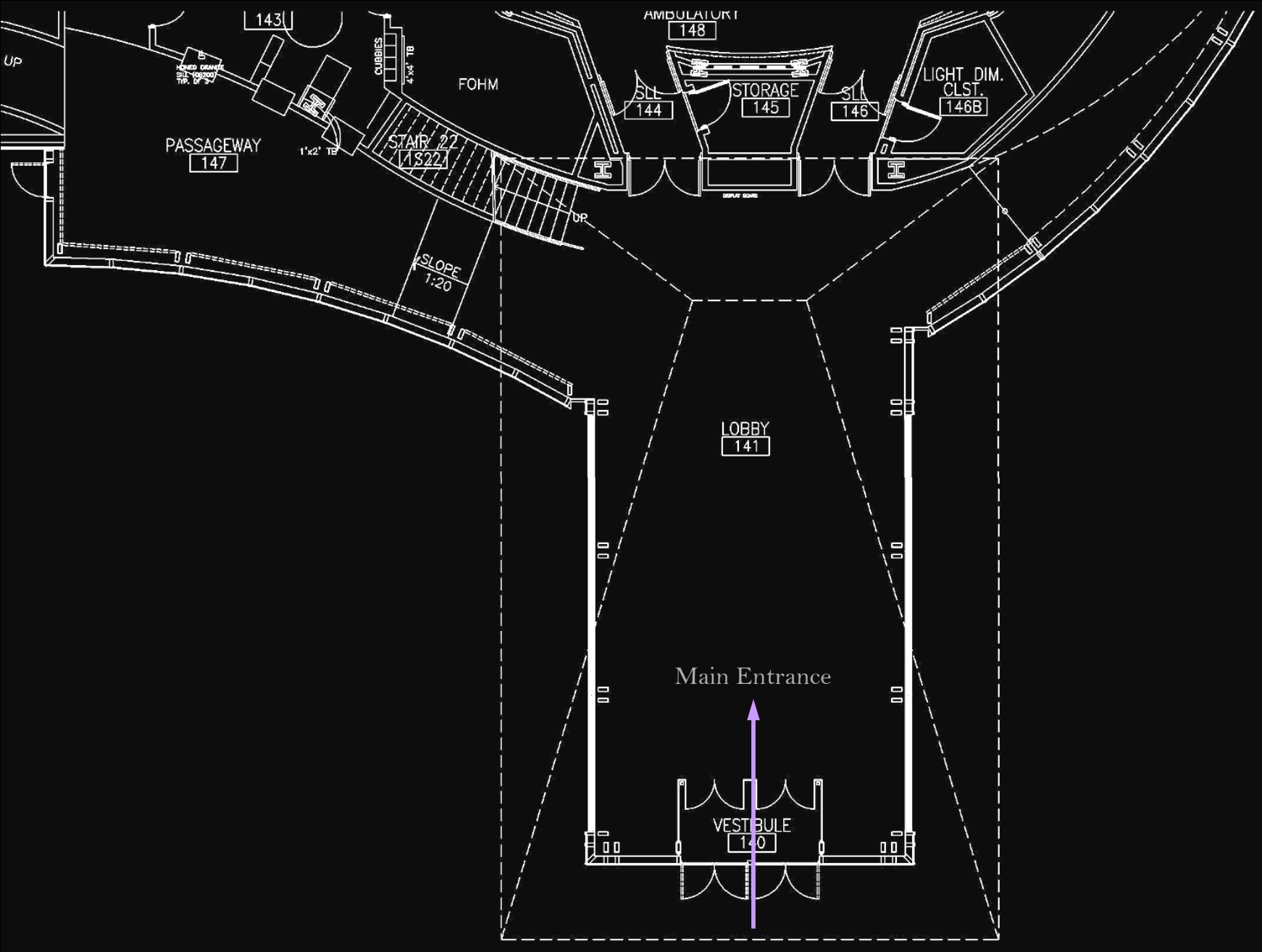
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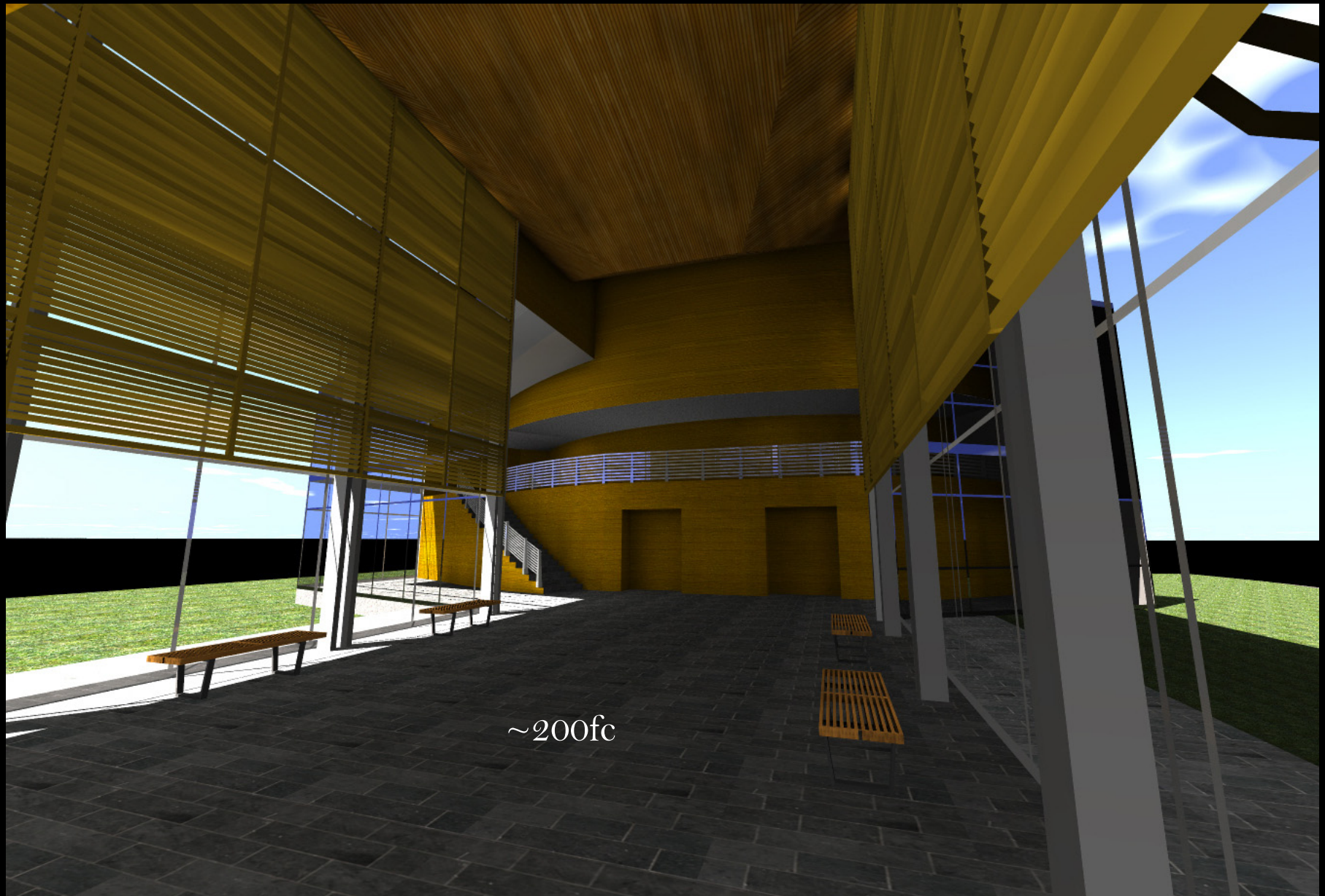
Space 1: Front Lobby



Space 1: Front Lobby



Space 1: Front Lobby



~200fc

Daytime Conditions – June 21st @ 1:00pm



Space 1: Front Lobby

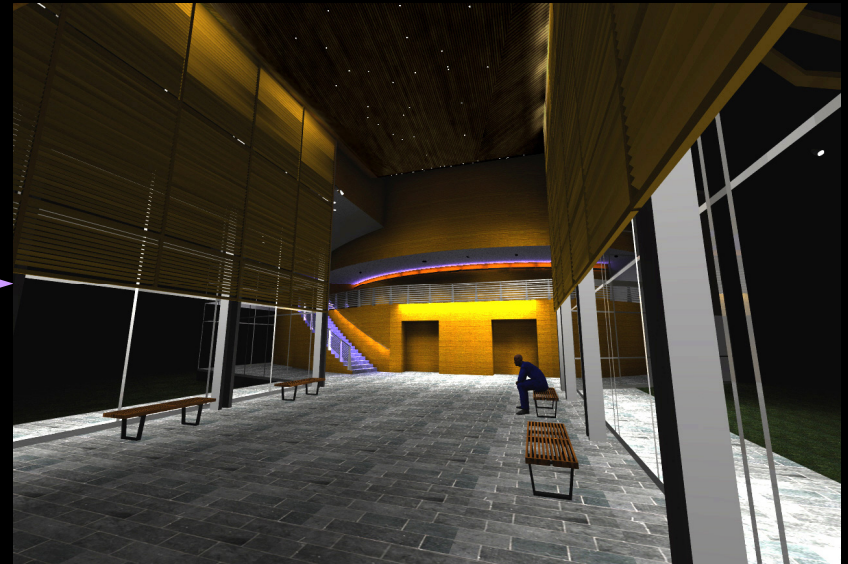
DANCE. *“an artistic form of non-verbal communication”*

Main Concept:

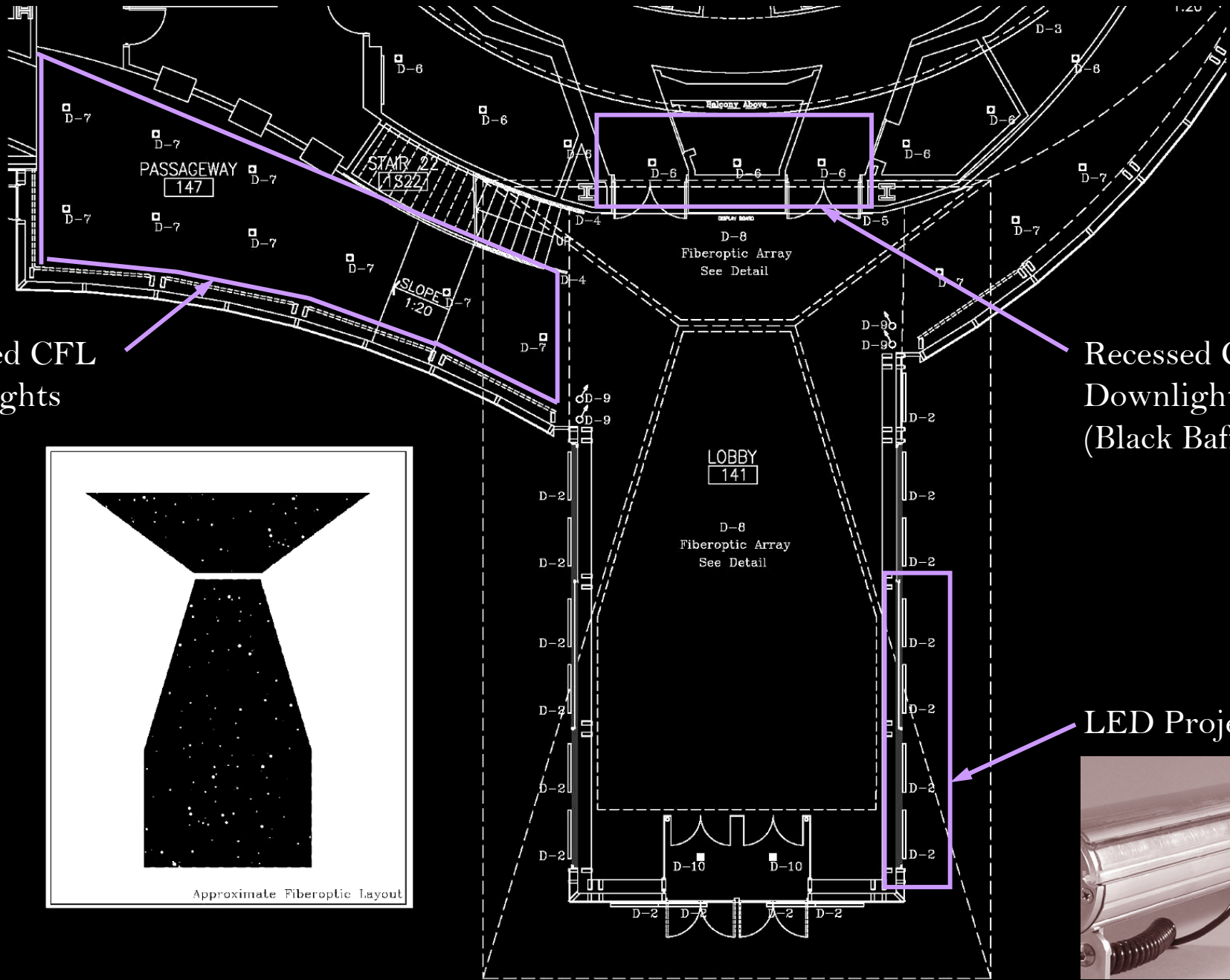
Combine the artistic, emotional expression of dance with the act of experiencing a building.

Drastic difference between the expected and the actual

Colors are emotionally charged and provide a path to the theater

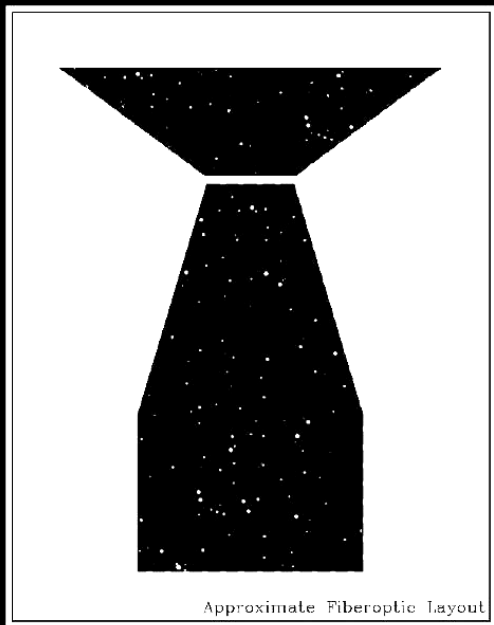


Space 1: Front Lobby



Recessed CFL
Downlights

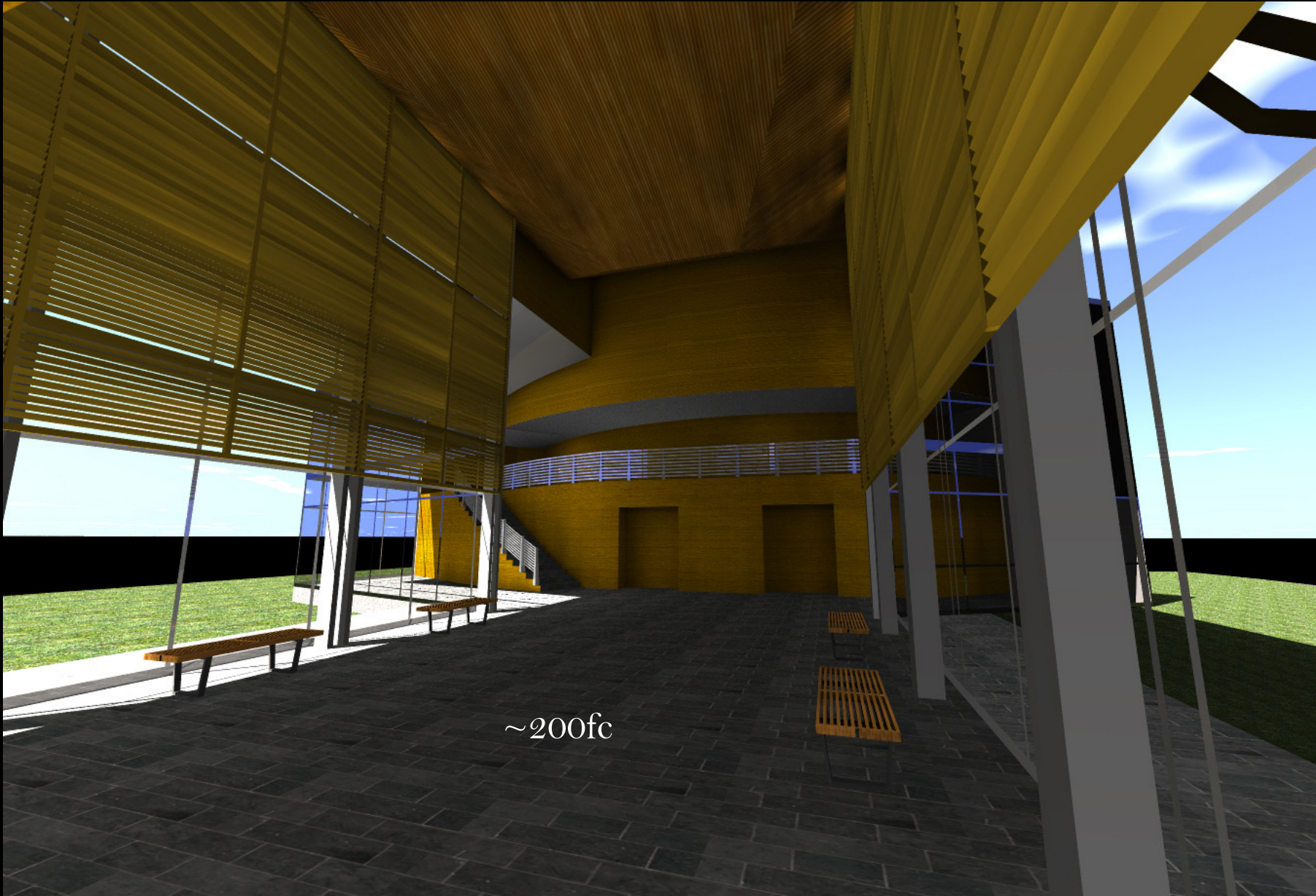
Recessed CFL
Downlights
(Black Baffle)



LED Projector



Space 1: Front Lobby

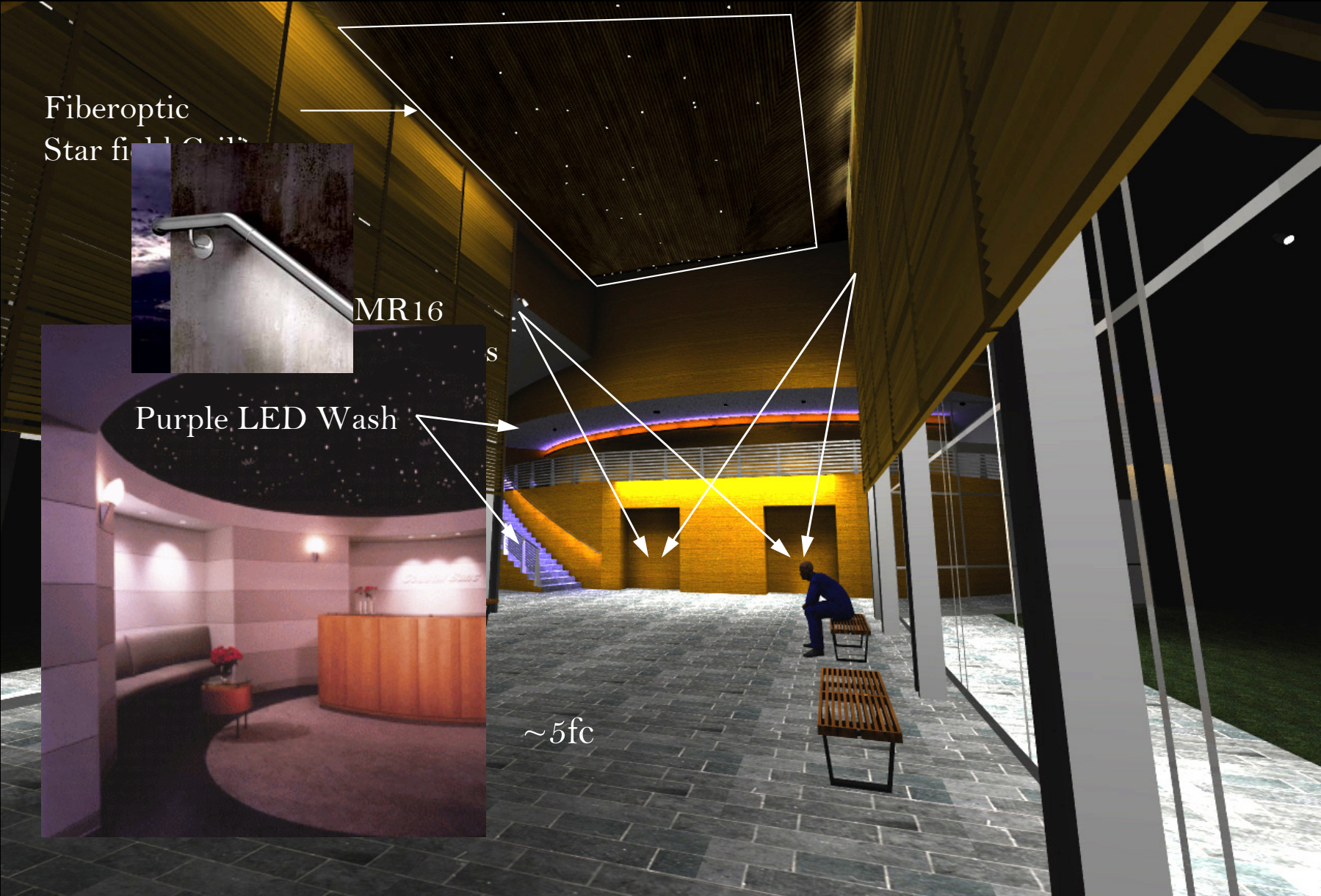


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Daytime Conditions



Space 1: Front Lobby

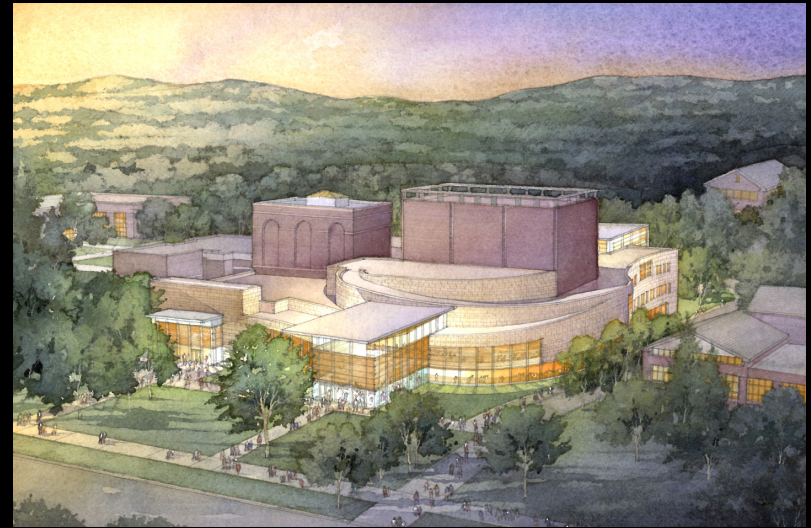


Conceptual Rendering

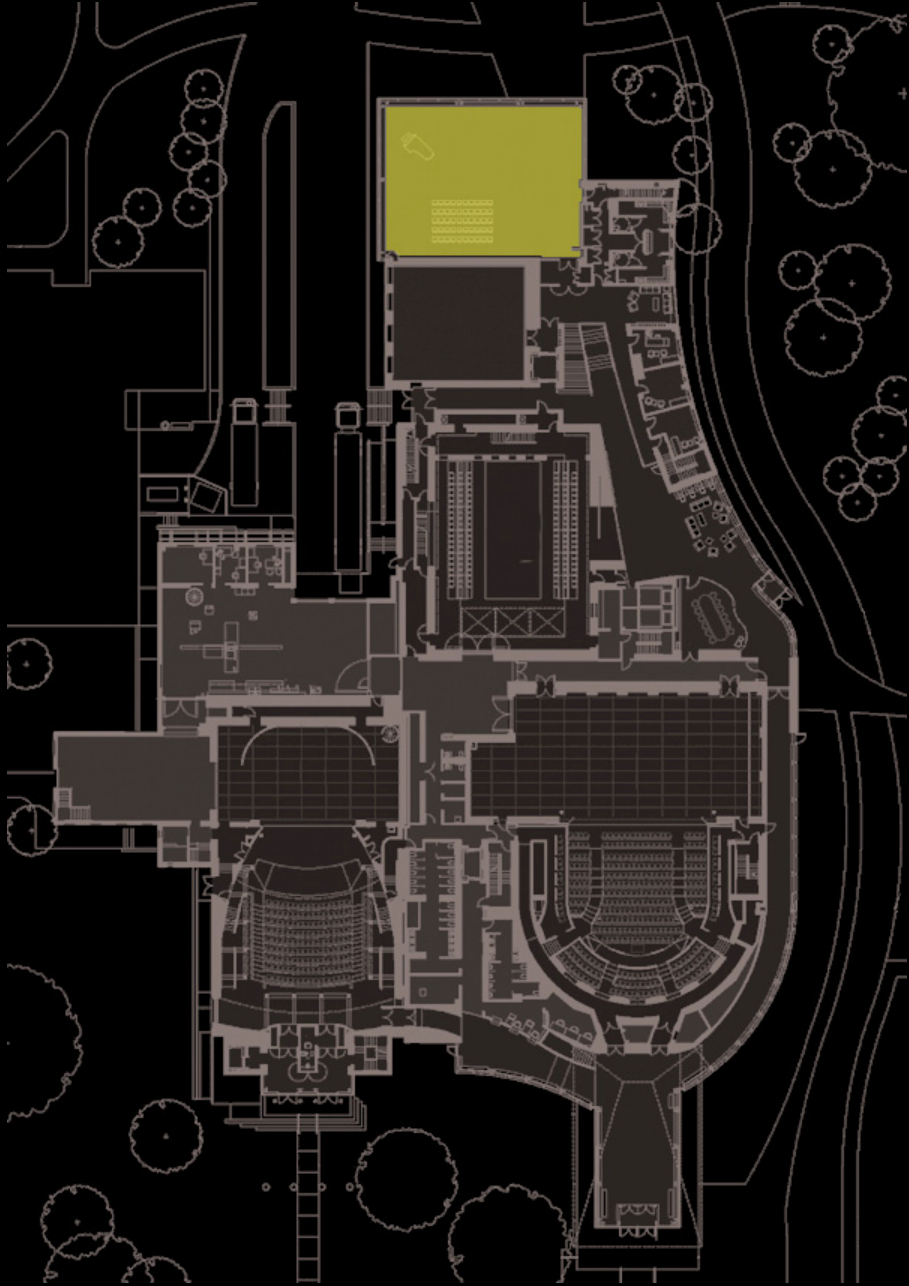


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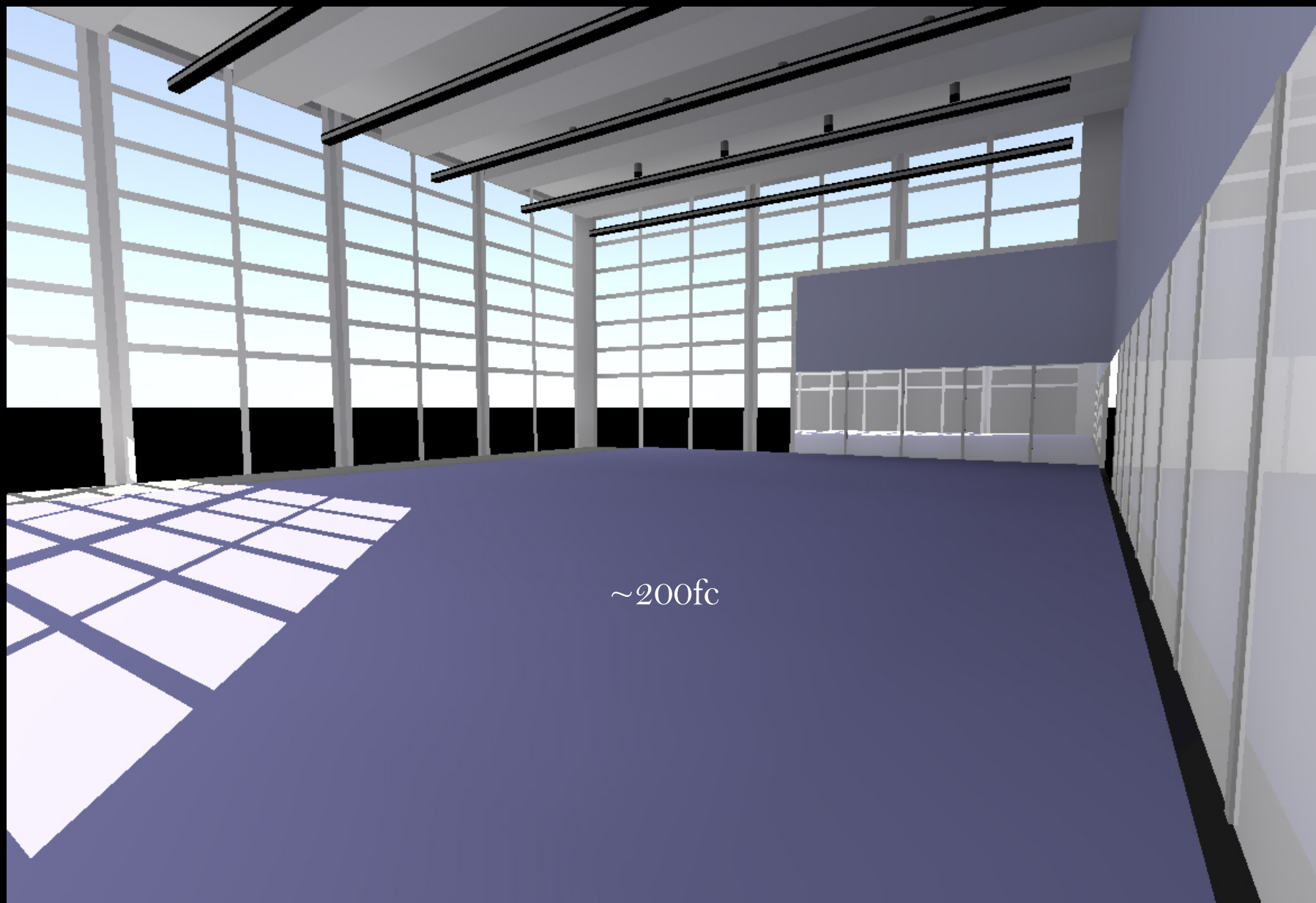
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Space 2: Dance Rehearsal Studio



Space 2: Dance Rehearsal Studio



Daytime Conditions – June 21st @ 1:00pm



Space 2: Dance Rehearsal Studio

Main Concept:

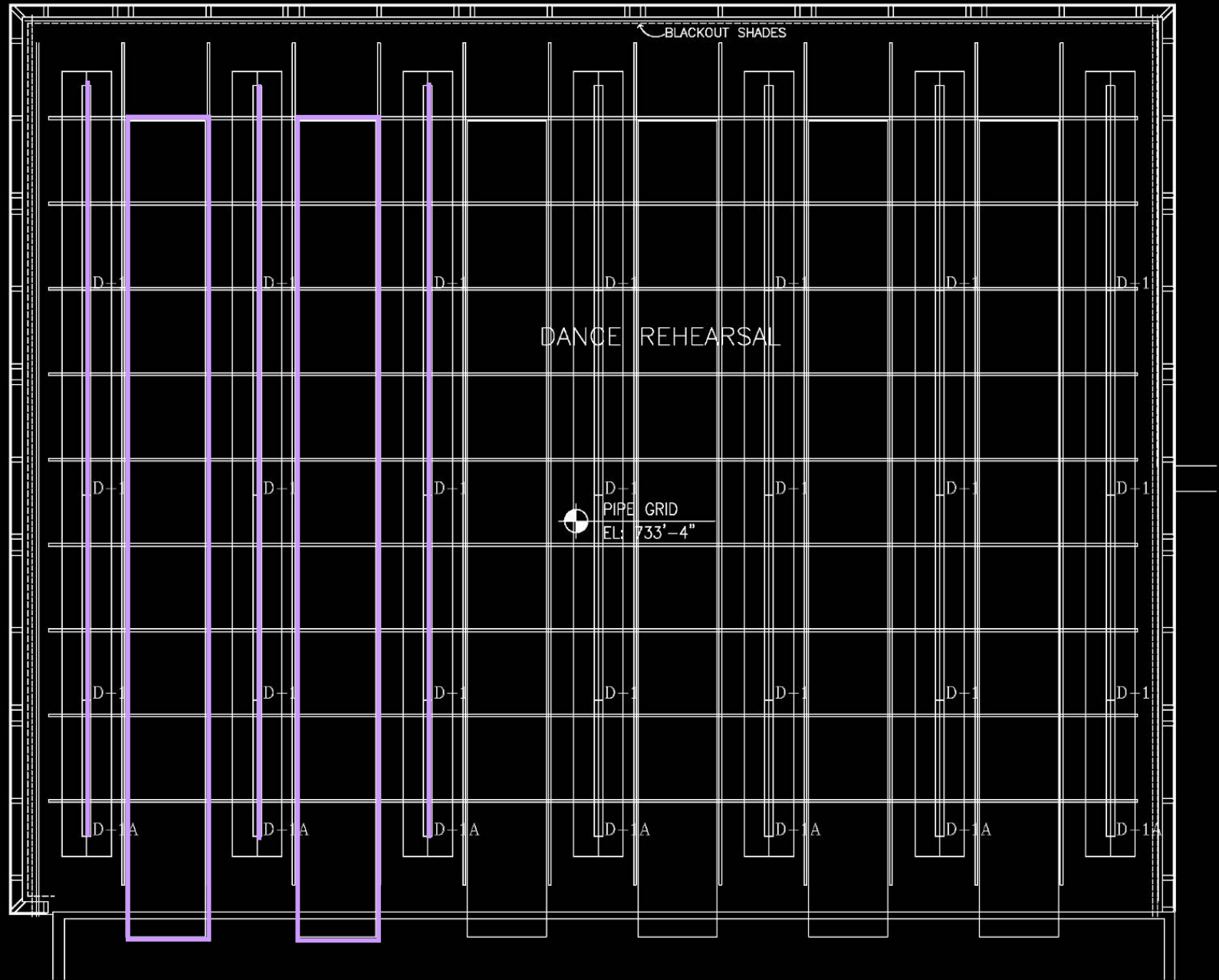
Provide high-efficiency diffuse up-lighting to minimize shadows



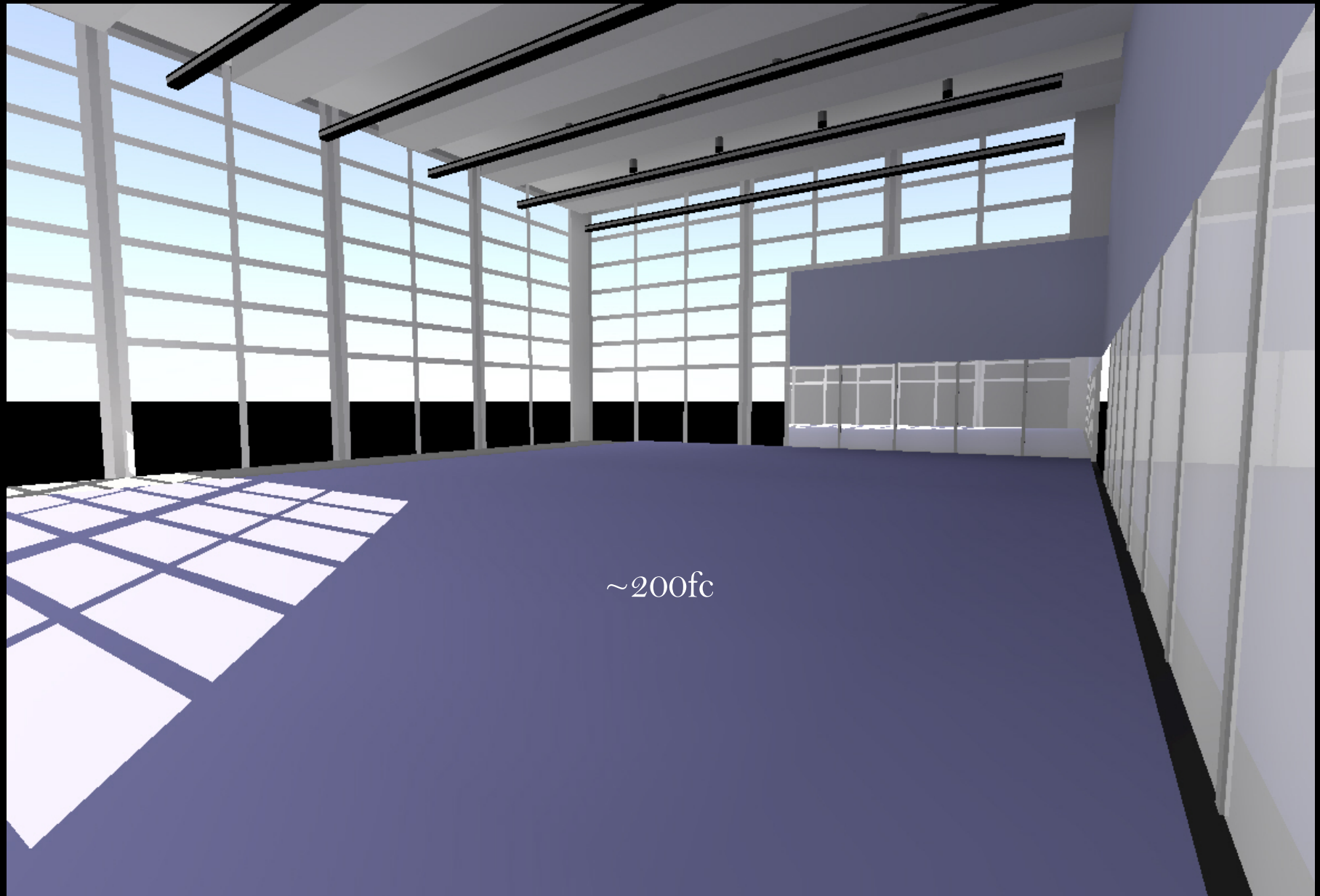
Space 2: Dance Rehearsal Studio

Mechanical
System

Lighting
System



Space 2: Dance Rehearsal Studio

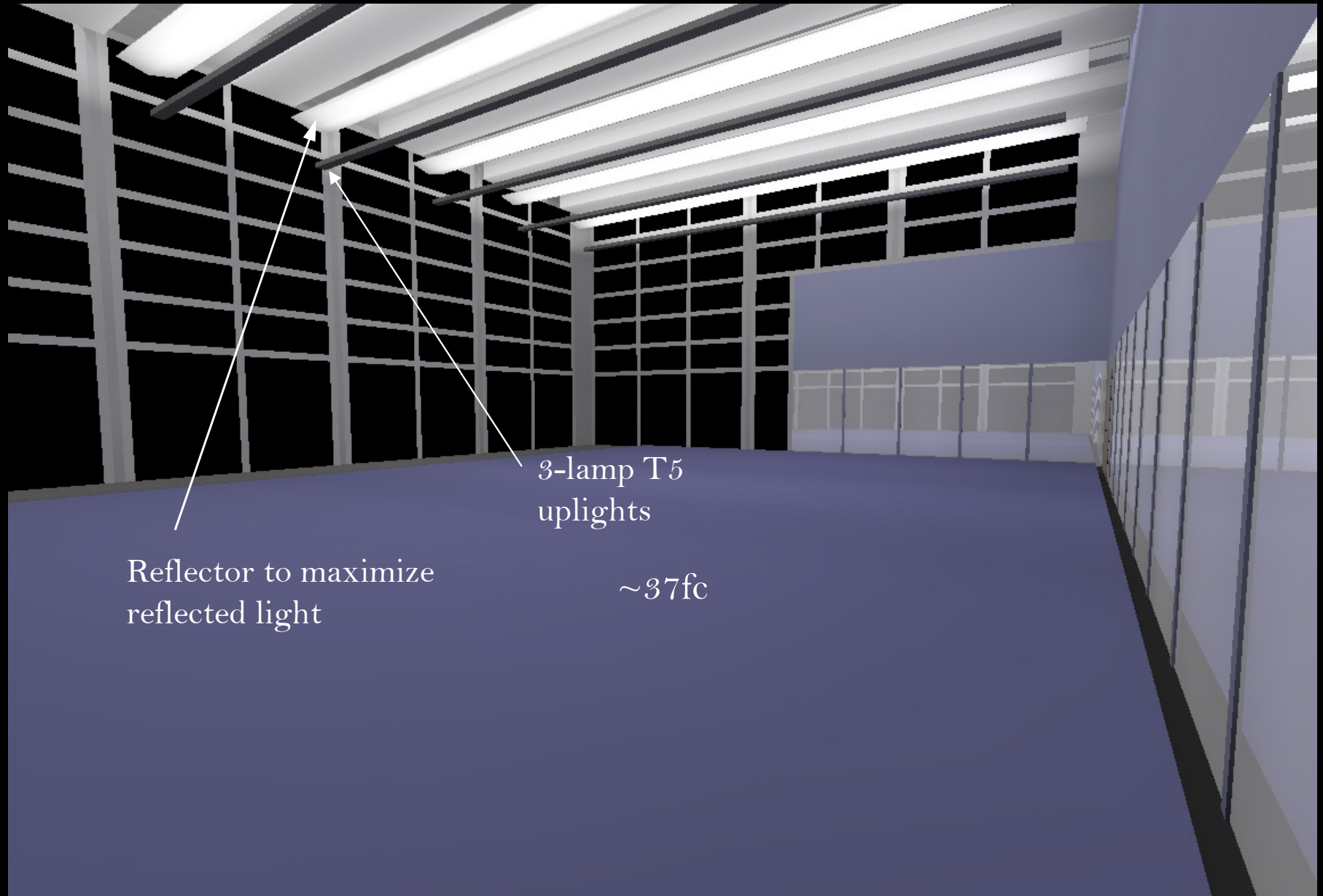


~200fc

Daytime Conditions



Space 2: Dance Rehearsal Studio



Conceptual Rendering



Space 2: Dance Rehearsal Studio

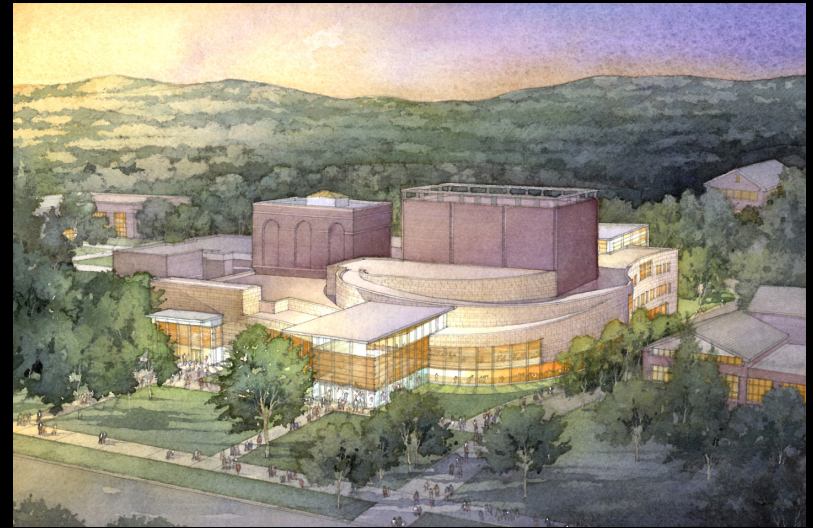
System Comparison:

What are the differences between using uplights vs. downlights??

	Uplighting	Downlighting
Positives	Shadow reduction	More efficient, cleaner
Negatives	Low efficiency	Distracting shadows
Power Density	2.1	1.5
Choice	<input checked="" type="checkbox"/>	

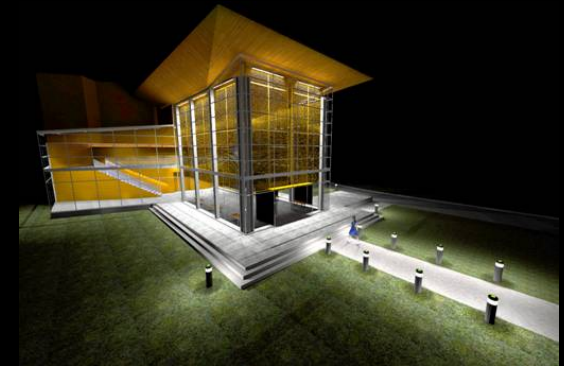
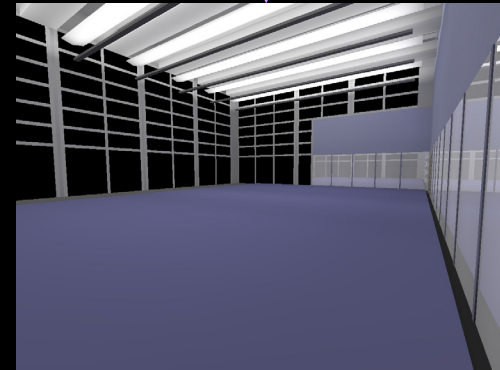
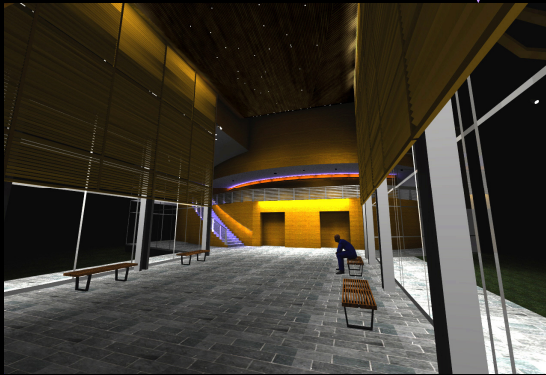
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Lighting Depth Summary

	Front Lobby	Breakout Space	Dance Studio	Exterior Patio
Allowable LPD	1.8	1.8	1.6	-----
Existing LPD	3.5	1.1	3.0	1752w
New LPD	0.6	0.7	2.1	1450w
% Reduction	83%	36%	30%	17%

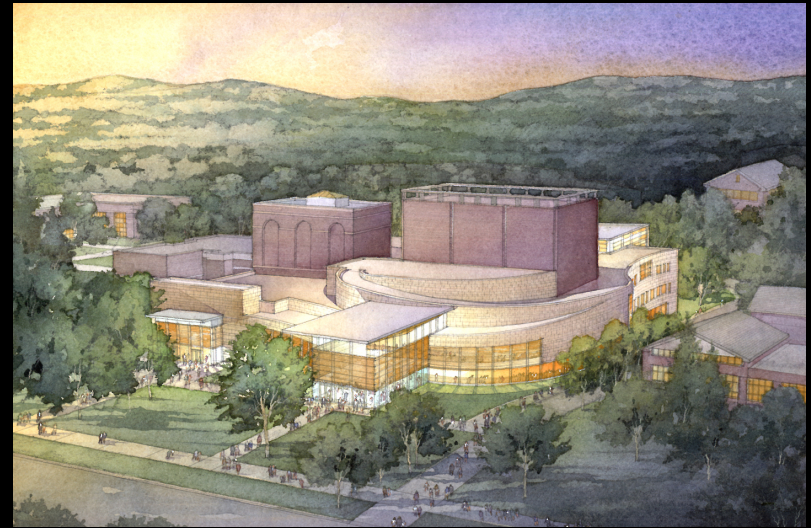


Reductions by:

- Using LED's
- CFL Downlights
- Reduced illuminance levels

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Photovoltaic Study

Is it beneficial to supply the building with solar energy?

Adjacent Parking Structure Roof has large area of unobstructed surface

Available area for pv array: 23,000 sq.ft.

Cost/Payback Analysis:

- Installed: 17,000 sq.ft. @ \$530,000
- Net Energy (kwh): 257,000 / 1,219,000 (21%)
- Savings: \$21,000
- Payback: 19 years



Aerial During Construction

Photovoltaic Study

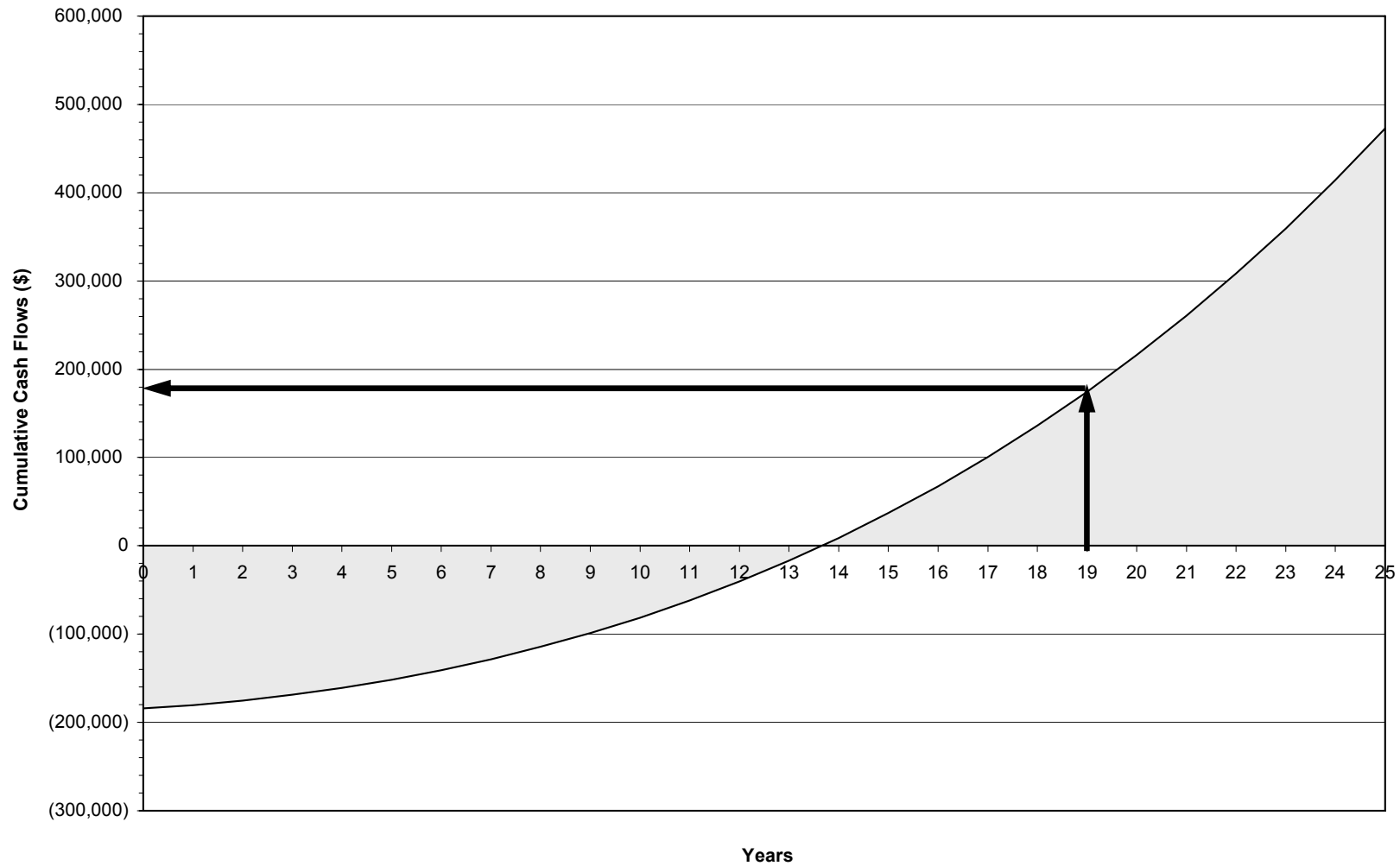
Cumulative Cash Flows Graph

Photovoltaic Project Cumulative Cash Flows Center for Theatre & Dance, Williamstown, MA

Renewable energy delivered (MWh/yr): 250.568

Total Initial Costs: \$ 530,806

Net average GHG reduction (t_{CO2}/yr): 257.02



IRR and ROI: 8.4%

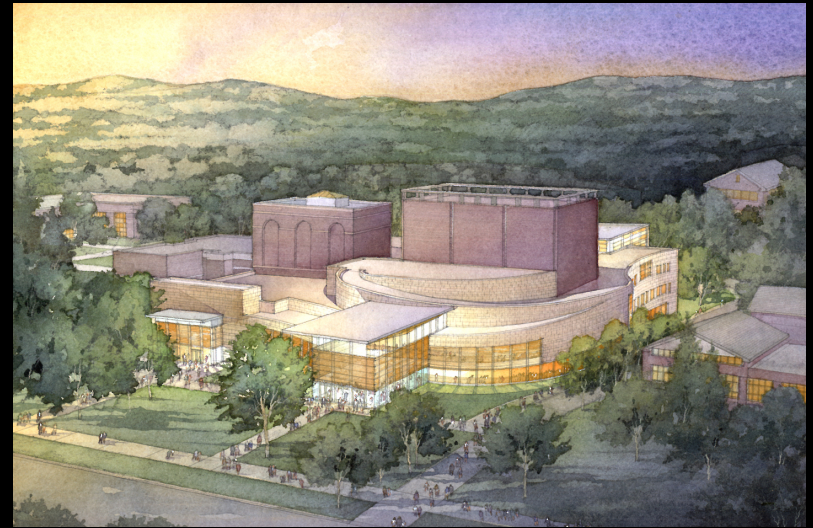
Year-to-positive cash flow: 13.7 yr

Net Present Value: \$ -13,680



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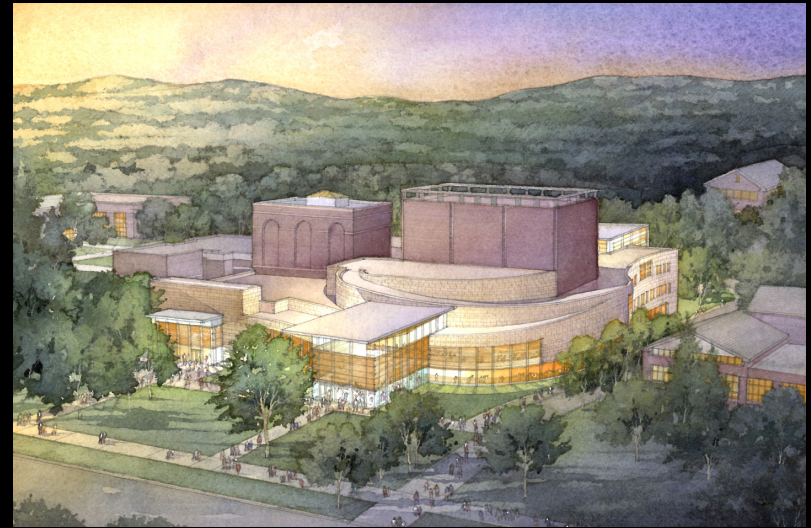


Electrical Depth Summary

- Most lighting controlled by dimmer panels in studied spaces
- Changes in lighting loads did not significantly change feeder sizes
- But, enhancing the buildings control systems with photosensors will save money
- Adding energy efficient transformers saves \$9,500 but requires 14 year payback

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Green Roof Feasibility Review



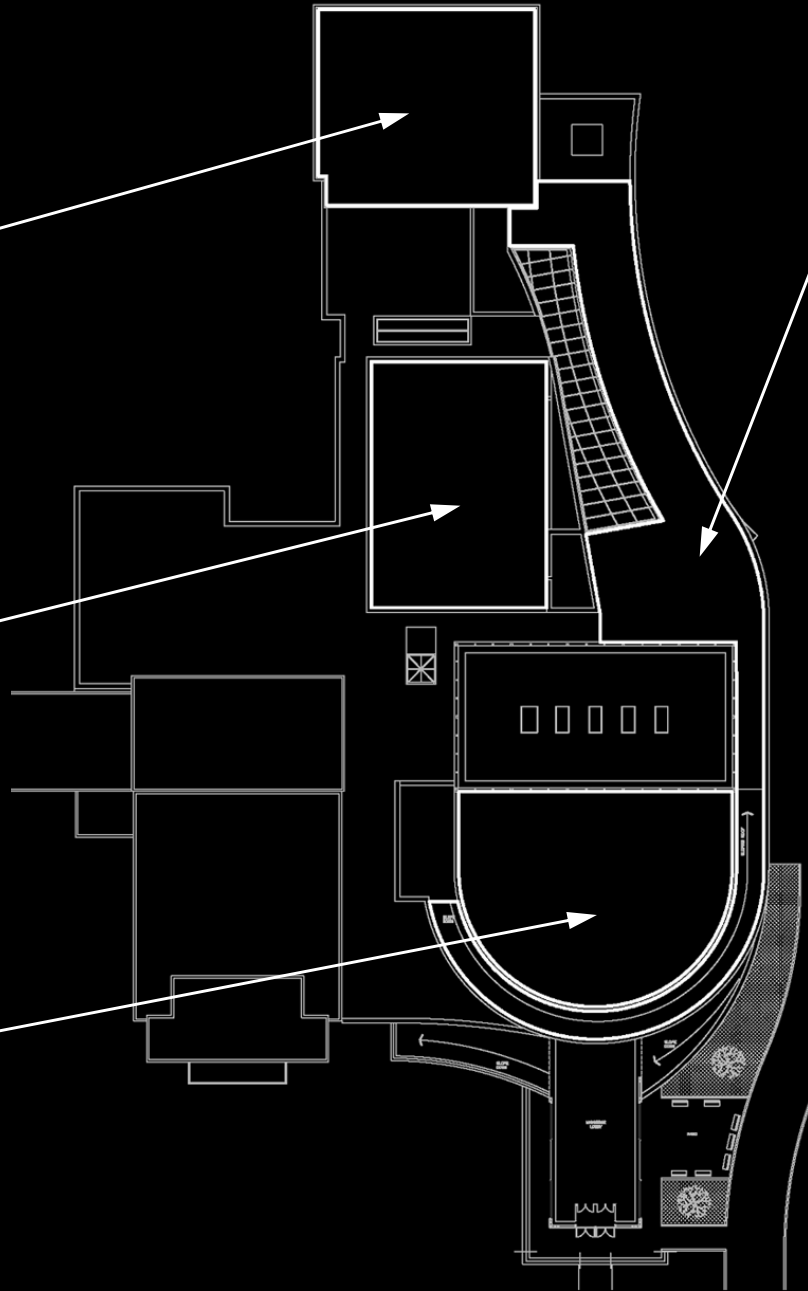
Dance Rehearsal Studio



Black Box Theater



550 Seat Theater



Main Corridor

- 4 locations
- 17,700 sq.ft. of green roof

Location Map for Green Roof Additions



Green Roof Feasibility Review

Is it beneficial to install a green roof on the building?

Products:



Extensive

or



Intensive

Economic Analysis:

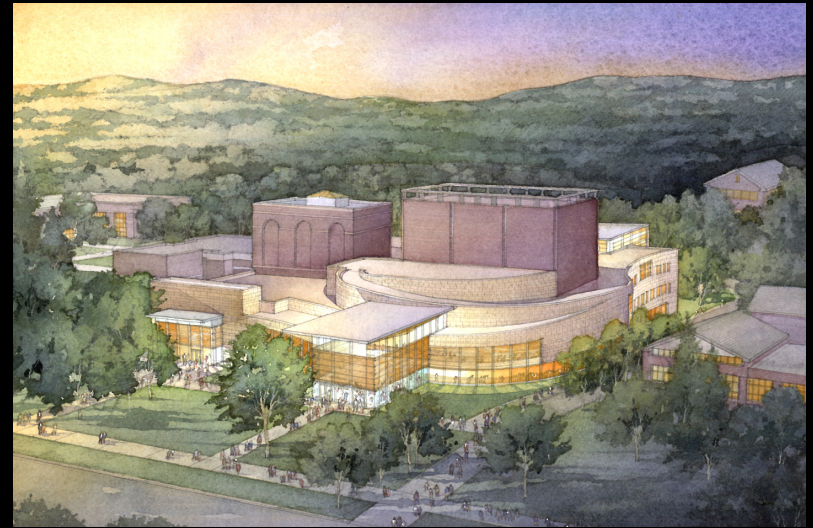
	Green Roof	Traditional Roof
Initial Cost	\$194,500	\$88,400
Energy Savings	\$26,067	0
Replacement	0	\$265,200
System Lifecycle Cost	(-\$848,200)	\$353,600
Simple Payback	7 years	-----

Total Savings:
\$1.2 Million

Calculations are over a 40 year period

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Conclusions

- **CFL's and LED's can produce lighting concepts at a fraction of the energy of halogens, even with very warm materials.**
- **In the theatre, emotion is the key to success, even in the architecture**
- **Photovoltaics can be beneficial if the money is available up-front**
- **Adding a green roof has a huge impact on the lifecycle cost of the building and only requires seven years to pay off**



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- Thank You -

