

Daylighting and Electric Lighting Integration - Simulations in Practice

Alan DeMarche

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Daylighting and Electric Lighting Integration - Simulations in Practice

2017 INTERNATIONAL RADIANCE WORKSHOP

ALAN DE MARCHE

LOISOS + UBBELOHDE

ARCHITECTURE . ENERGY . LIGHT

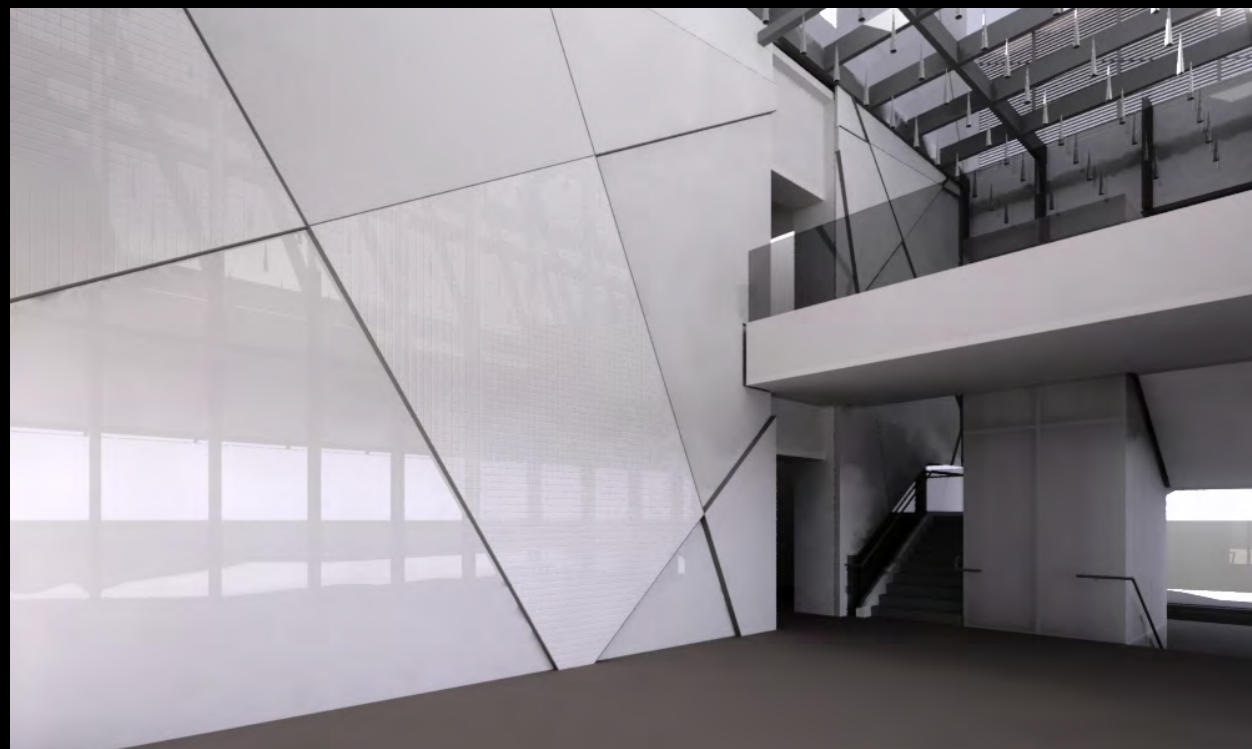
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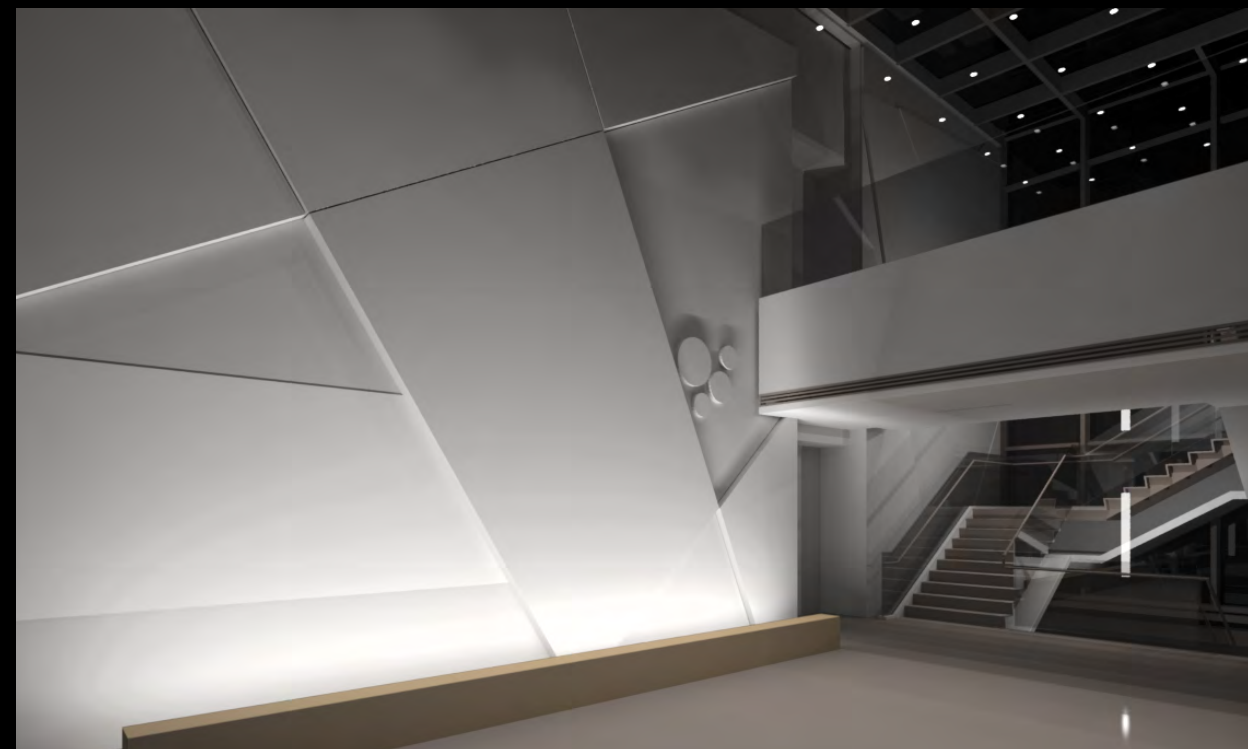
SIMULATIONS IN PRACTICE

DAYLIGHTING



Simulation by L + U

ELECTRIC LIGHTING



Simulation by L + U



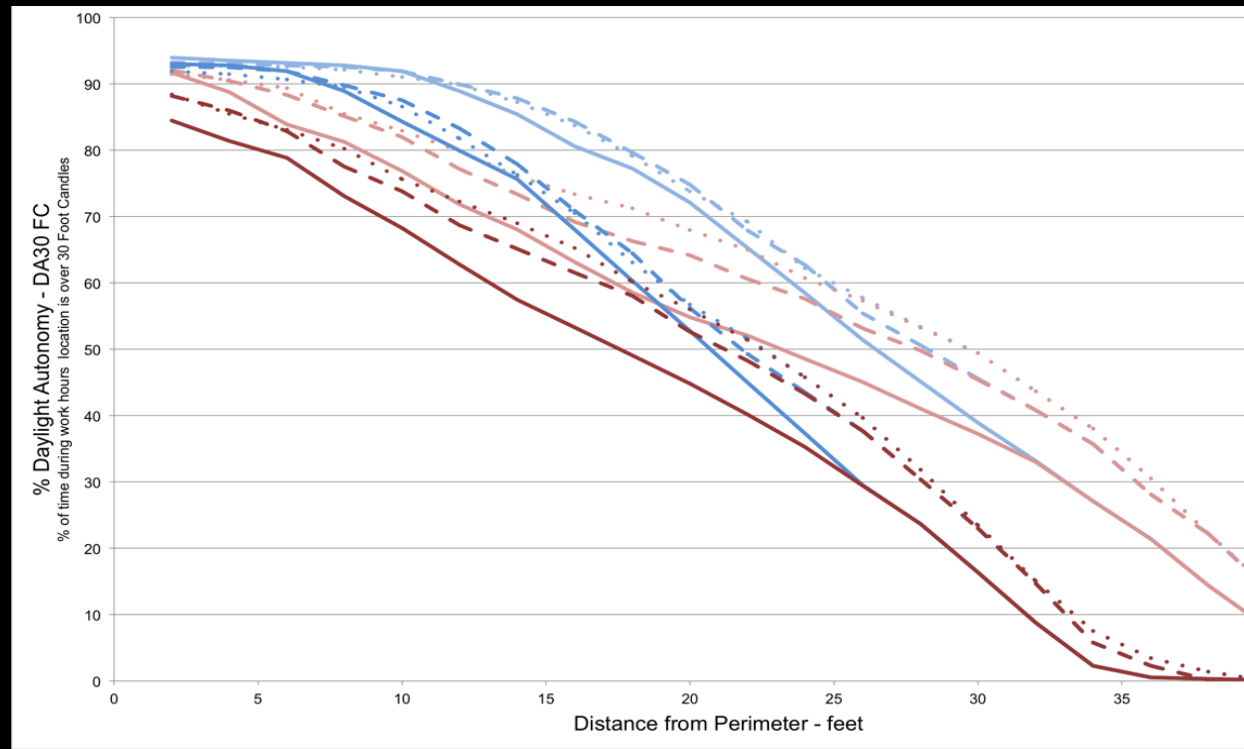
Photograph by Bruce Damonte



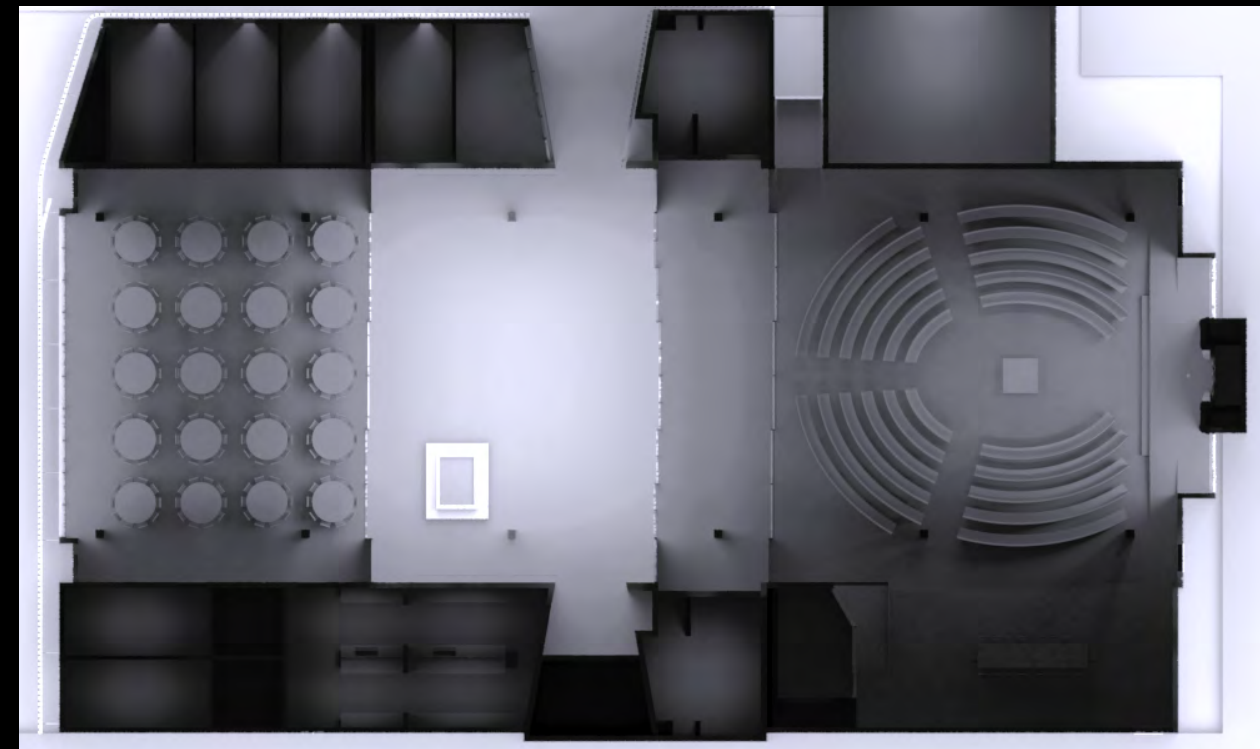
Photograph by Bruce Damonte
Chu Hall - Solar Energy Research Center | SmithGroupJJR - Architect

DAYLIGHT SIMULATIONS

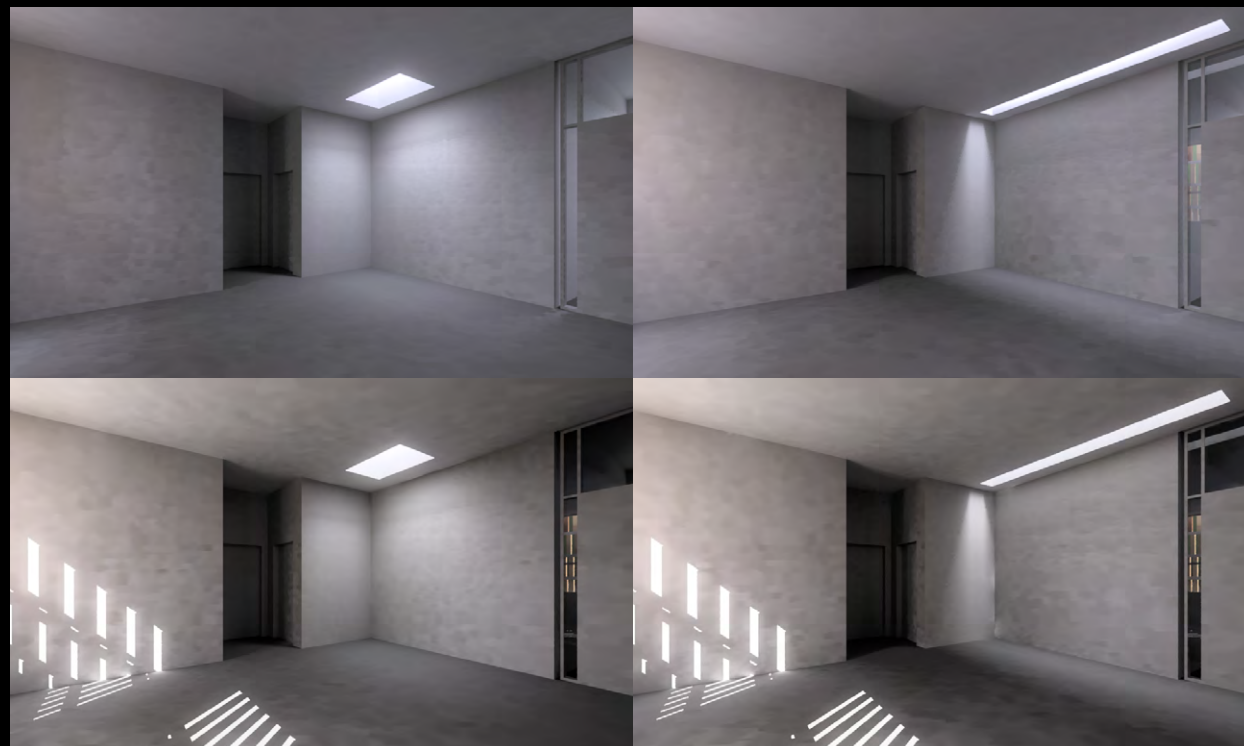
POINT BASED - GREY SCALE MODELS - OPTION STUDIES - VLT TUNING - ARCHITECTURAL DETAIL



Perimeter Daylight Autonomy Study - Bay Area Office BLDG.



VLT Tuning - Kol Emeth*



Skylight Studies - Kol Emeth*

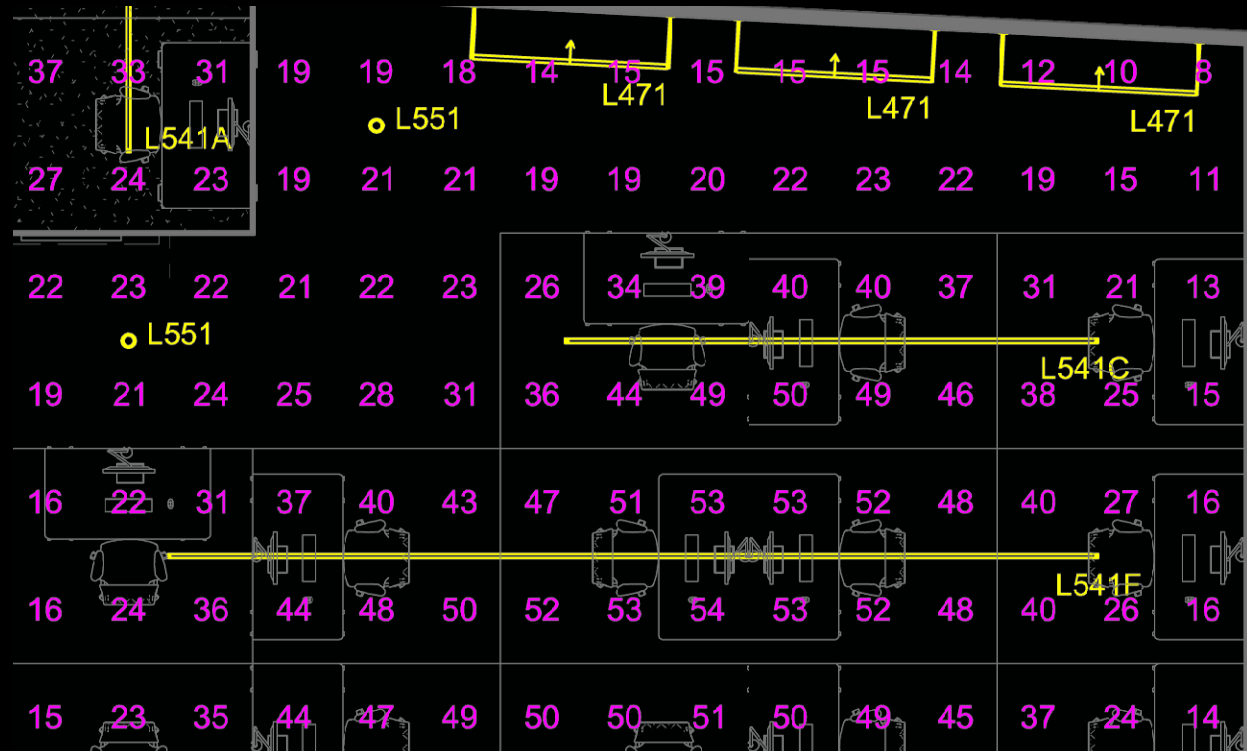


Daylight Performance - Kol Emeth*

*Congregation Kol Emeth - Field Architecture - H.P.S. - Loisos + Ubbelohde (Daylighting and Electric Lighting)

ELECTRIC LIGHT SIMULATIONS

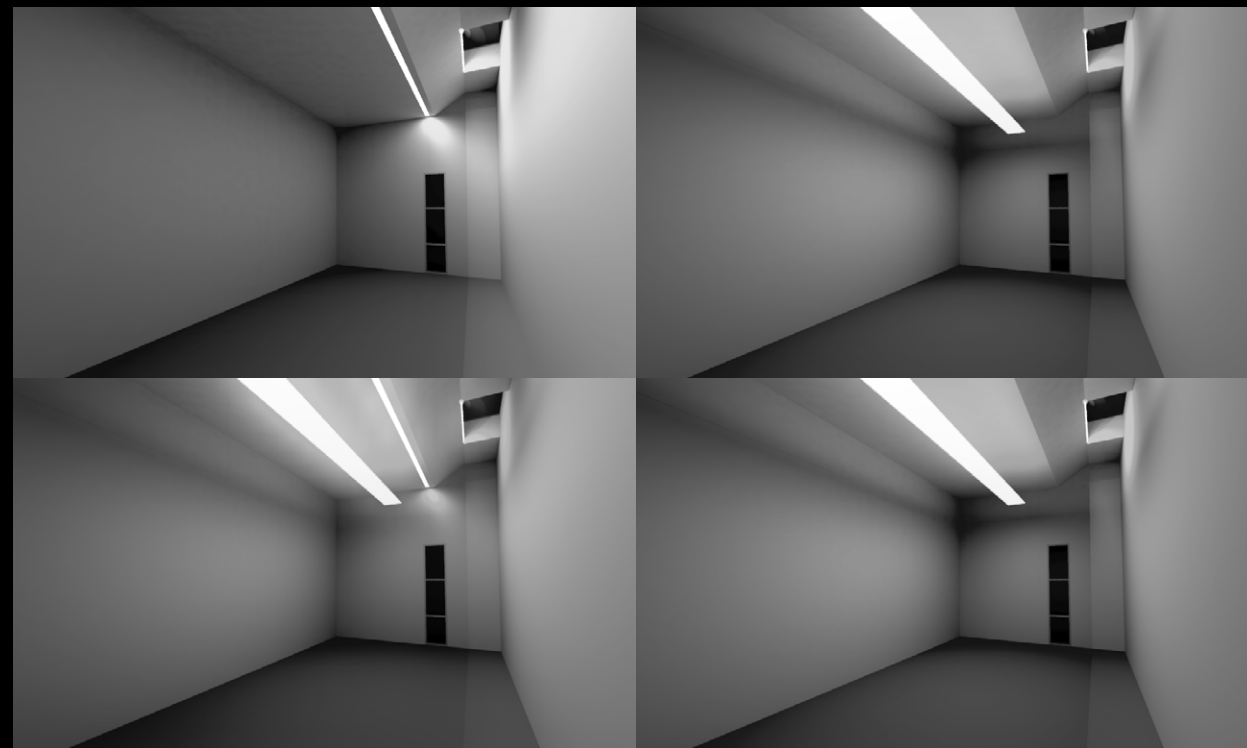
POINT BASED - GREY SCALE MODELS - OPTION STUDIES - SCENE TUNING - ARCHITECTURAL DETAIL



Open Office Electric Lighting - Bay Area Office BLDG.



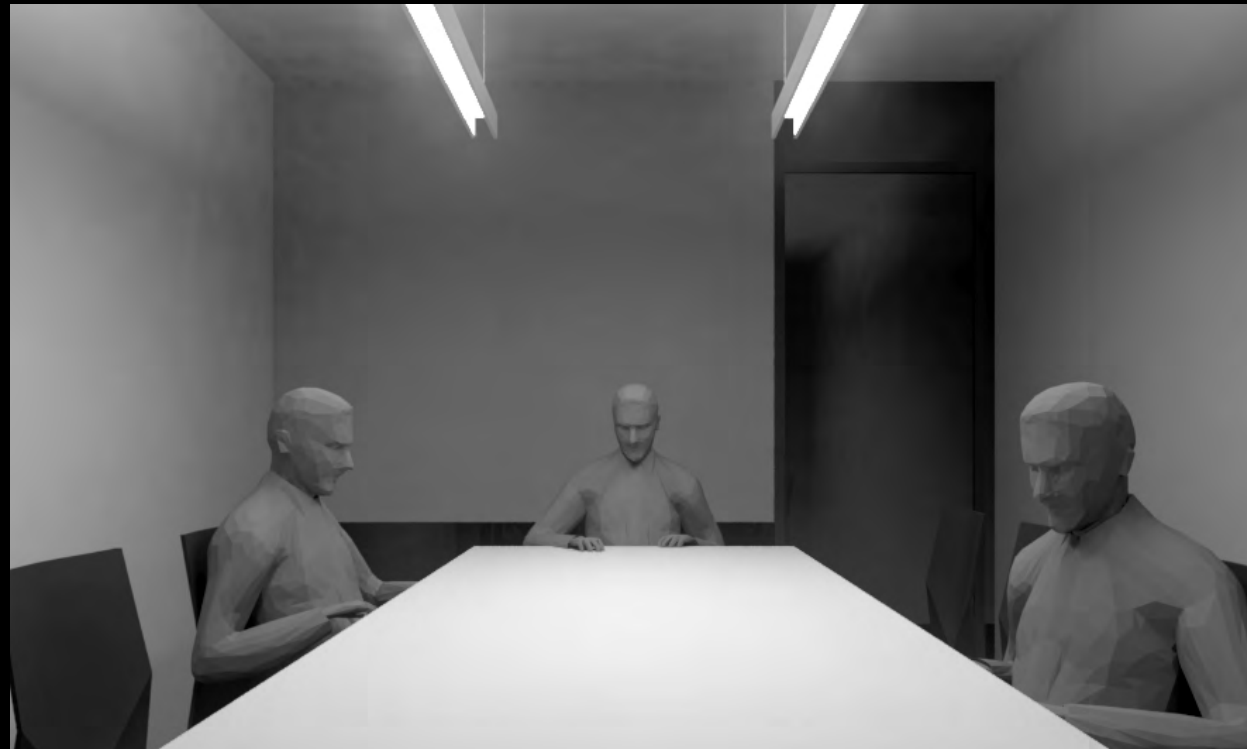
Scene Tuning - Bay Area Office BLDG.



Fixture Options Studies - Kol Emeth



Electric Lighting Performance - Kol Emeth



Geometric Detail - Bay Area Office Bldg.



Visible Sources - Bay Area Office Bldg.



Material Specificity - Bay Area Office Bldg.



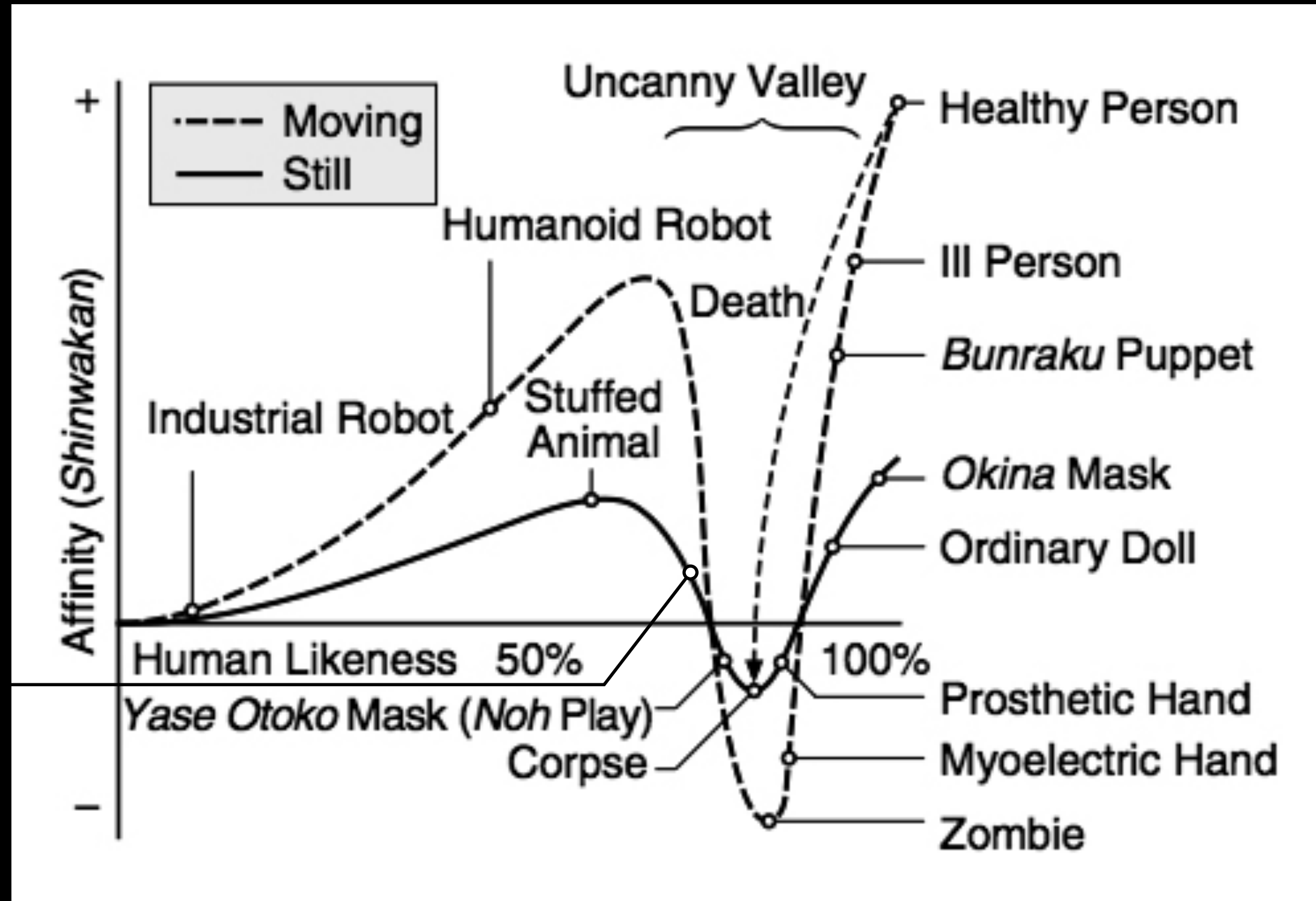
White Balance - Bay Area Office Bldg.

THE UNCANNY VALLEY

HUMAN LIKENESS AND AFFINITY



RESUSCI ANNIE



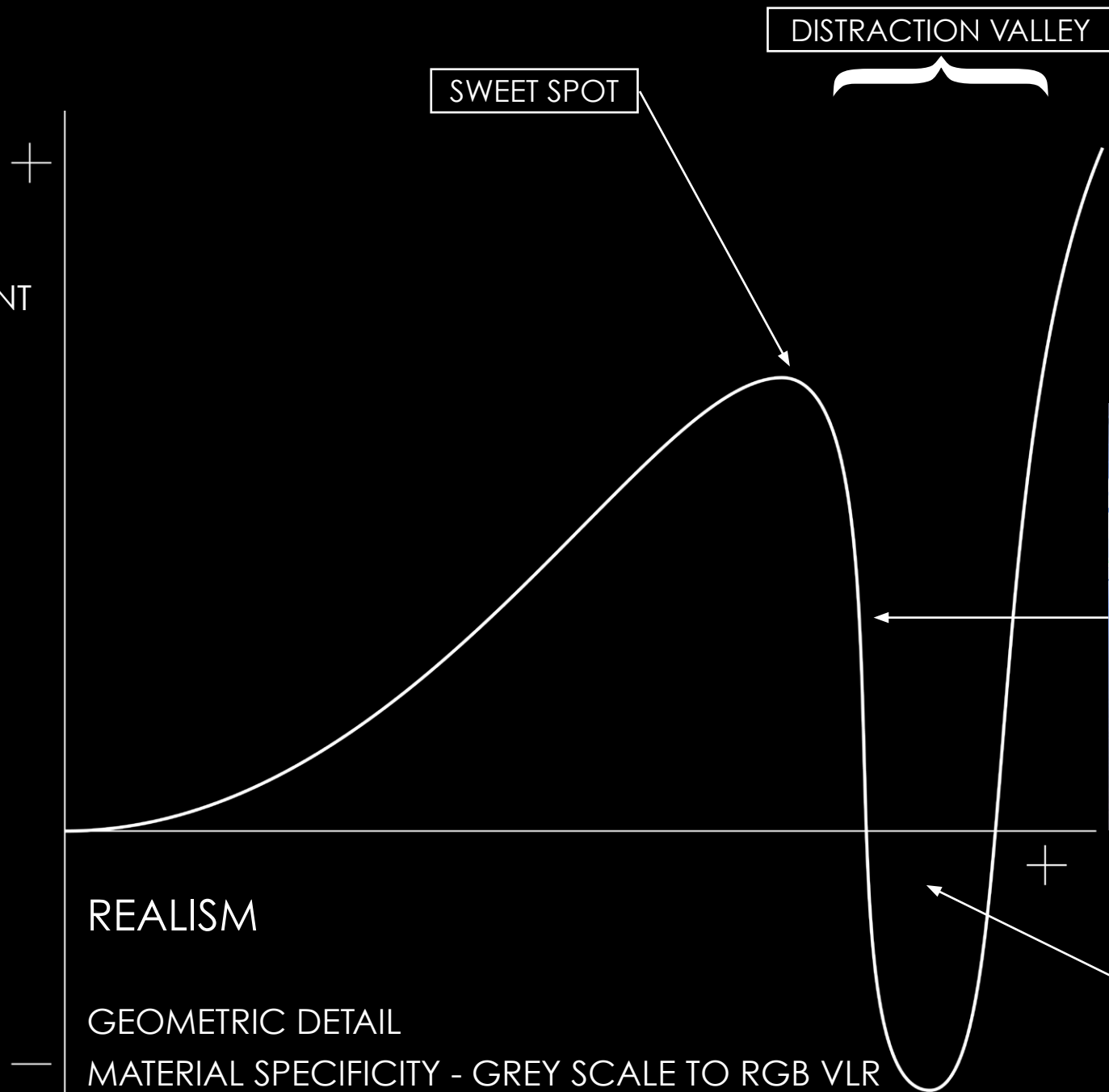
M. Mori, "The Uncanny Valley," Energy, vol. 7, no. 4

THE "DISTRACTION" VALLEY

REALISM AND THE EFFICACY OF IMAGES AS ANALYTICAL TOOLS

EFFICACY

FOCUS ON TOPIC OF ANALYSIS
COMMUNICATION OF DESIGN INTENT
EMPATHIC RESPONSE



REALISM

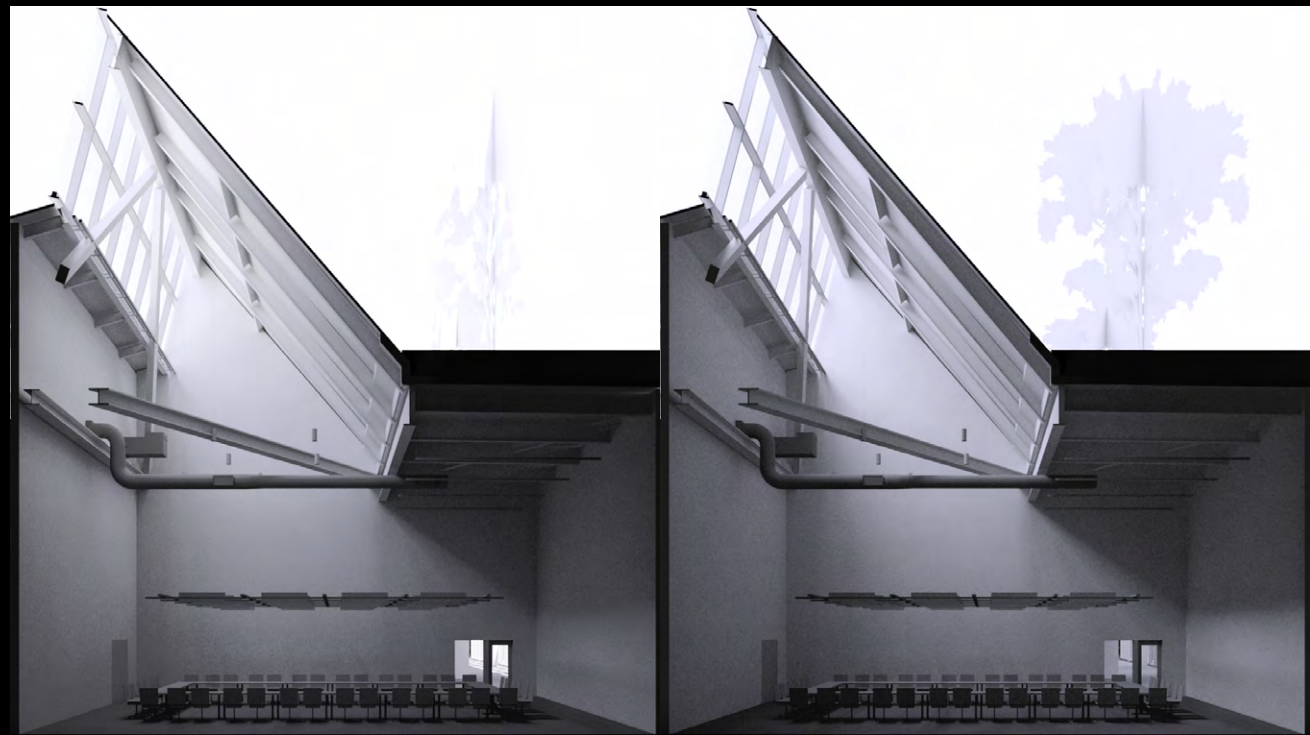
GEOMETRIC DETAIL
MATERIAL SPECIFICITY - GREY SCALE TO RGB VLR
SOURCE CCT
IMAGE WHITE BALANCE
and MODELING + SIMULATION TIME
and INCREASES IN POTENTIAL DISTRACTIONS

Separate Simulations for:

Typical Sky Conditions - Design Criteria - Overcast - Clear - Time of Day - etc...

Fixture Type - scale by output option - Light Loss Factor

Break out fixtures by Zone - for daylight dimming - scene tuning - direct / indirect



Clear Sky

Overcast Sky



Overhead Direct



Primary Direct



Primary Indirect



Secondary Direct

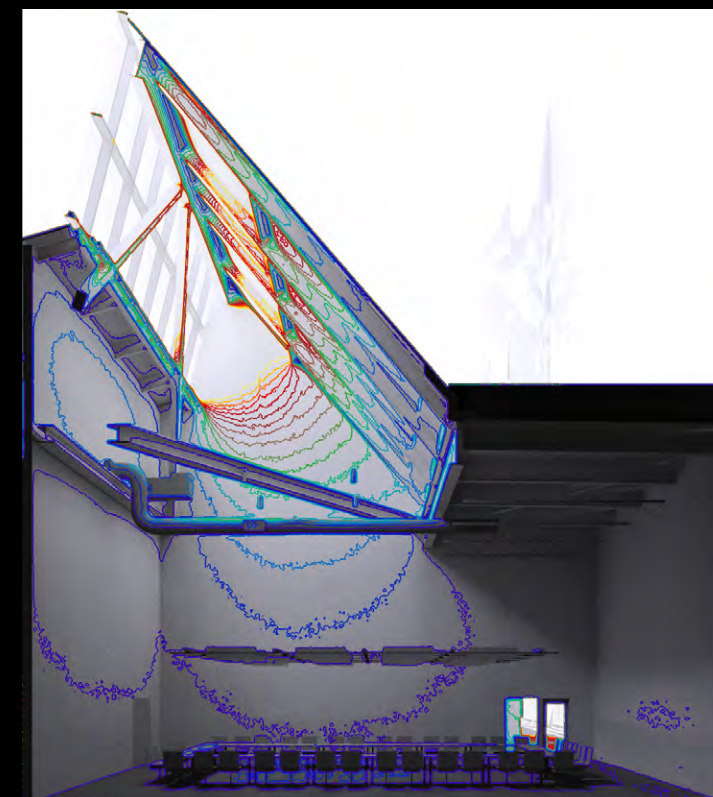
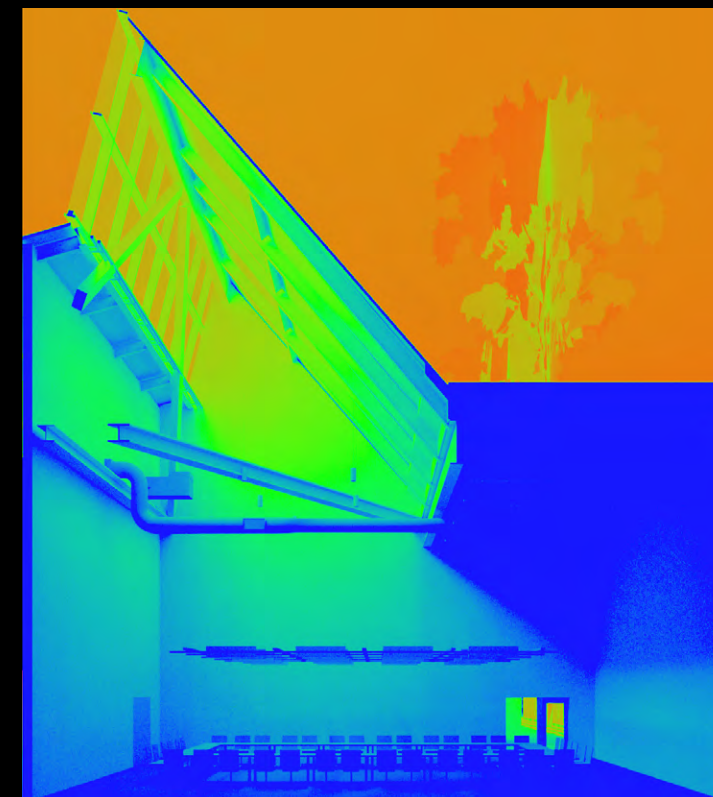


Secondary Indirect

Loisos + Ubbelohde (Daylighting) - Electric Lighting Design by others

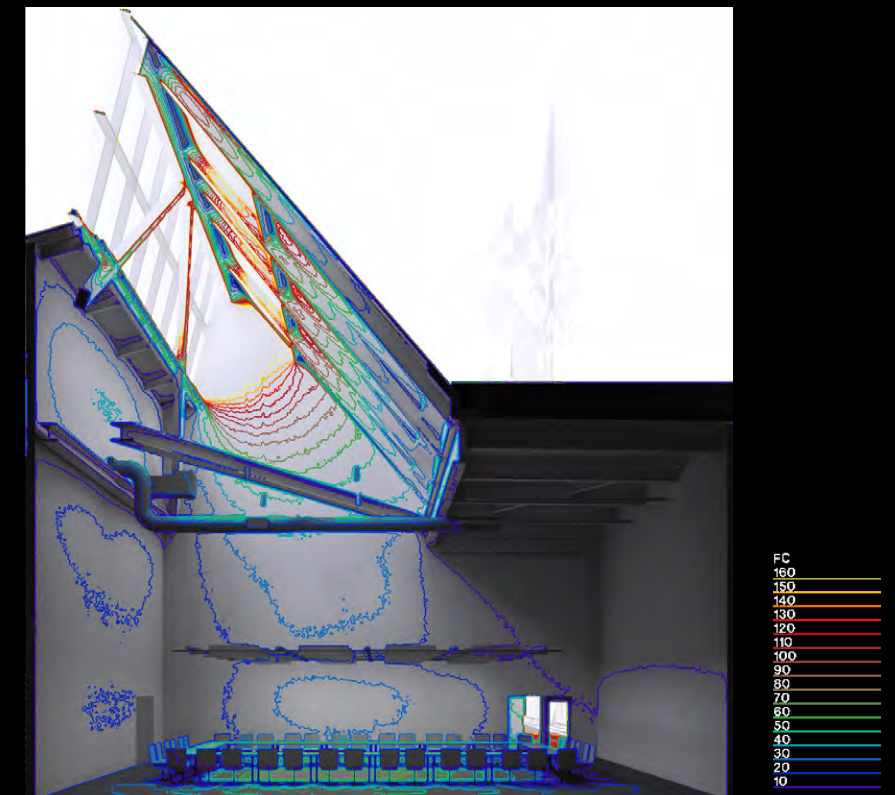
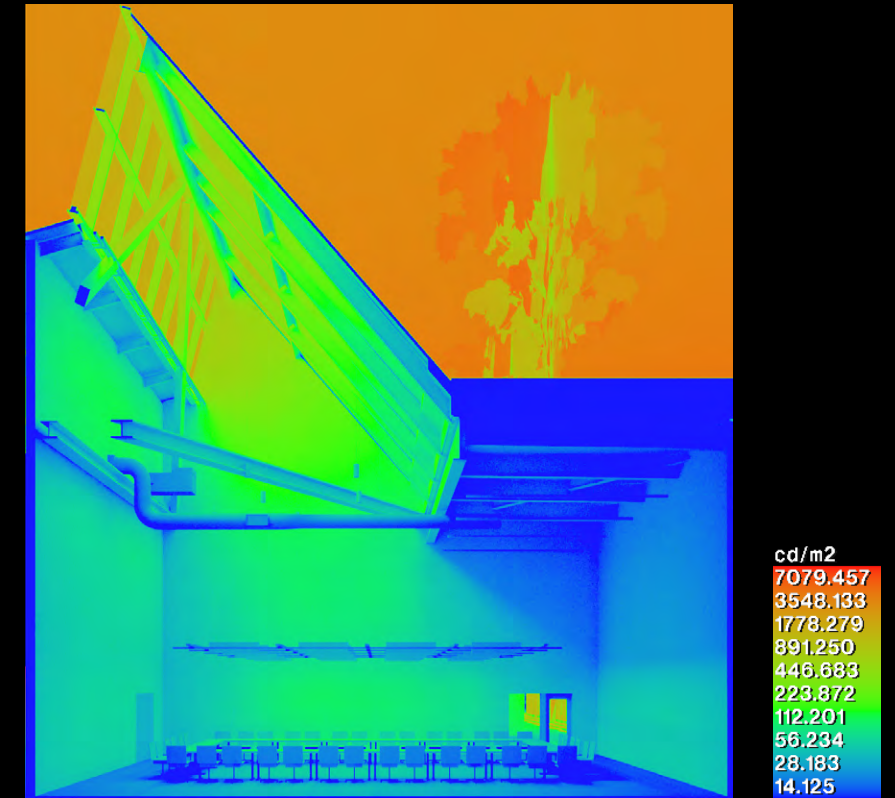
SCENE TUNING

CLEAR SKY - DAYLIGHT ONLY



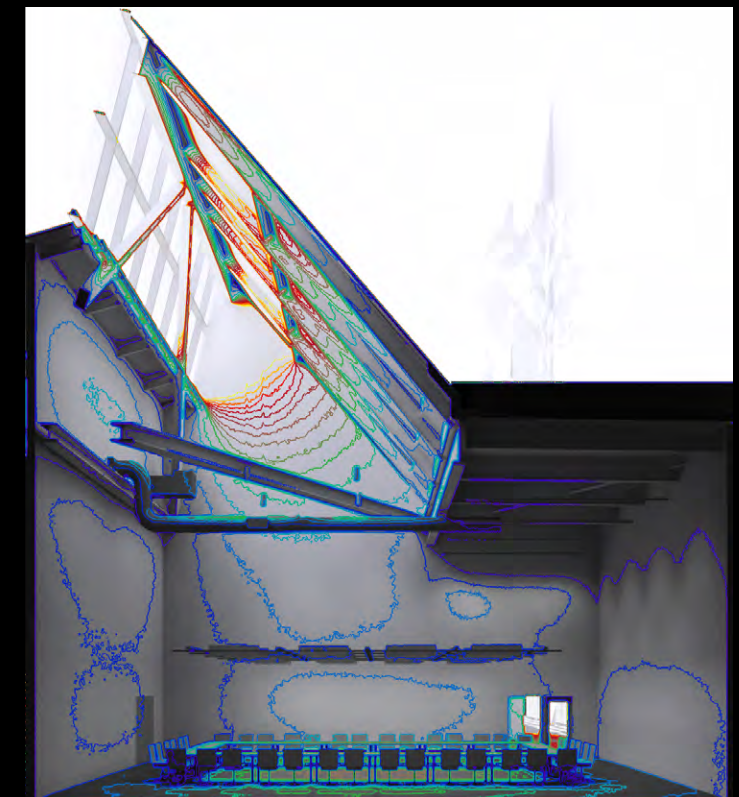
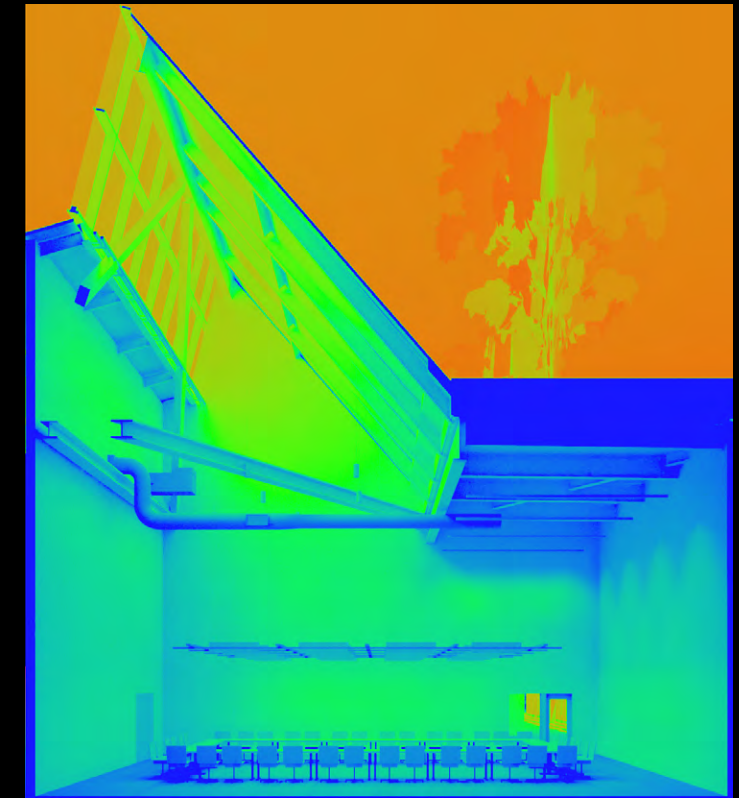
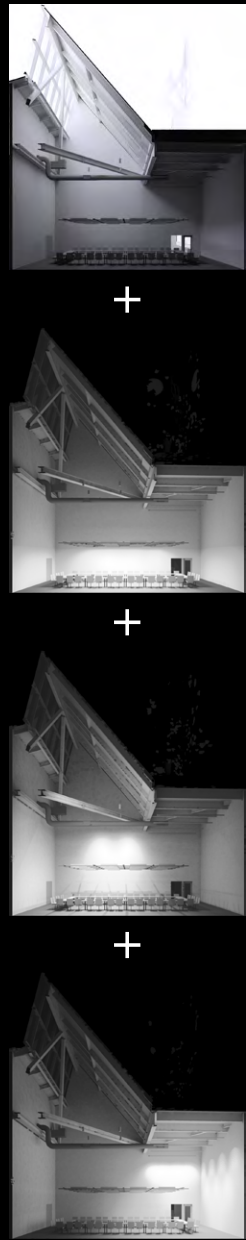
SCENE TUNING

CLEAR SKY + DIRECT ELECTRIC LIGHTING



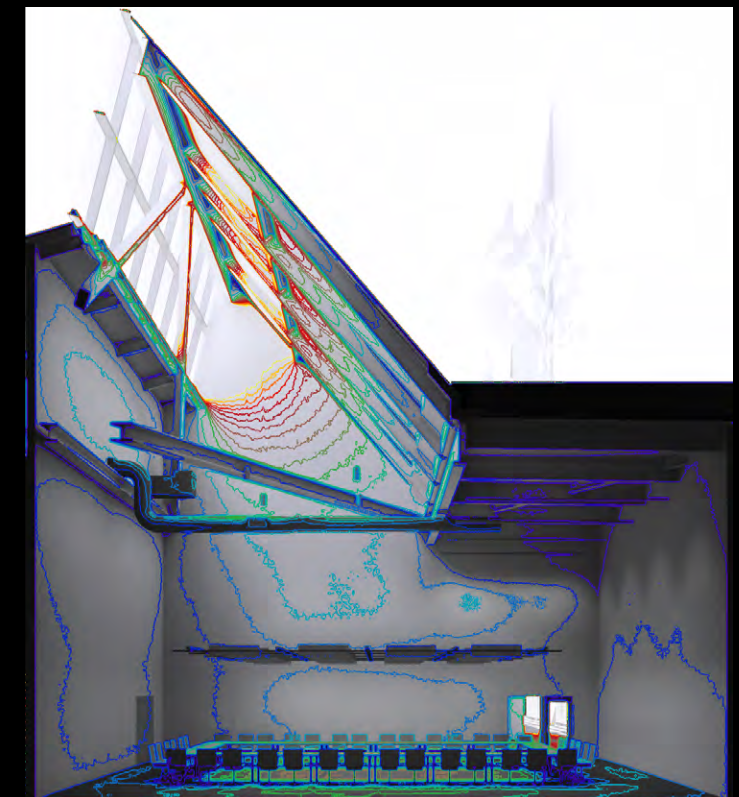
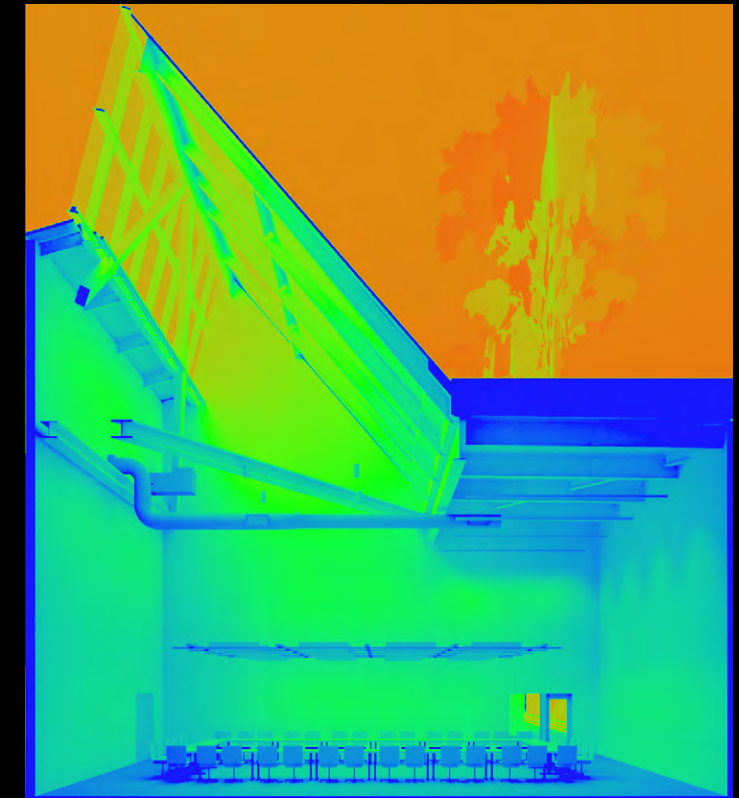
SCENE TUNING

CLEAR SKY + DIRECT ELECTRIC LIGHTING



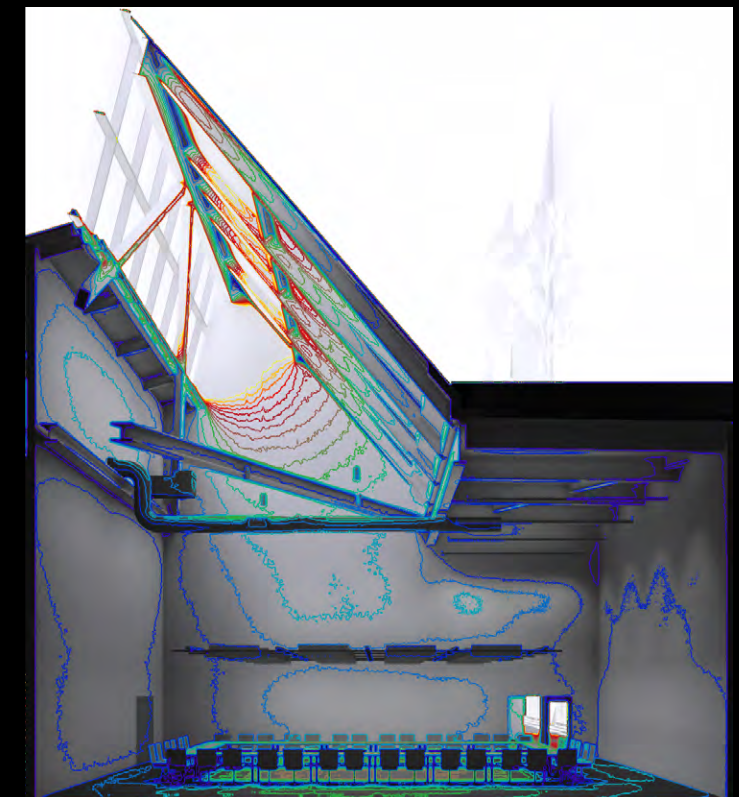
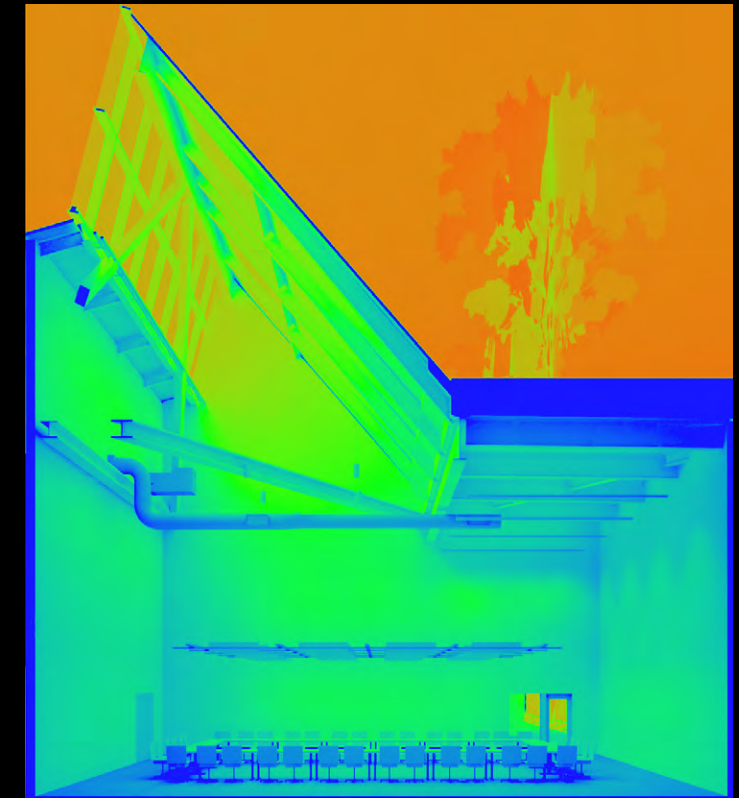
SCENE TUNING

CLEAR SKY + DIRECT + DIMMED INDIRECT ELECTRIC LIGHTING



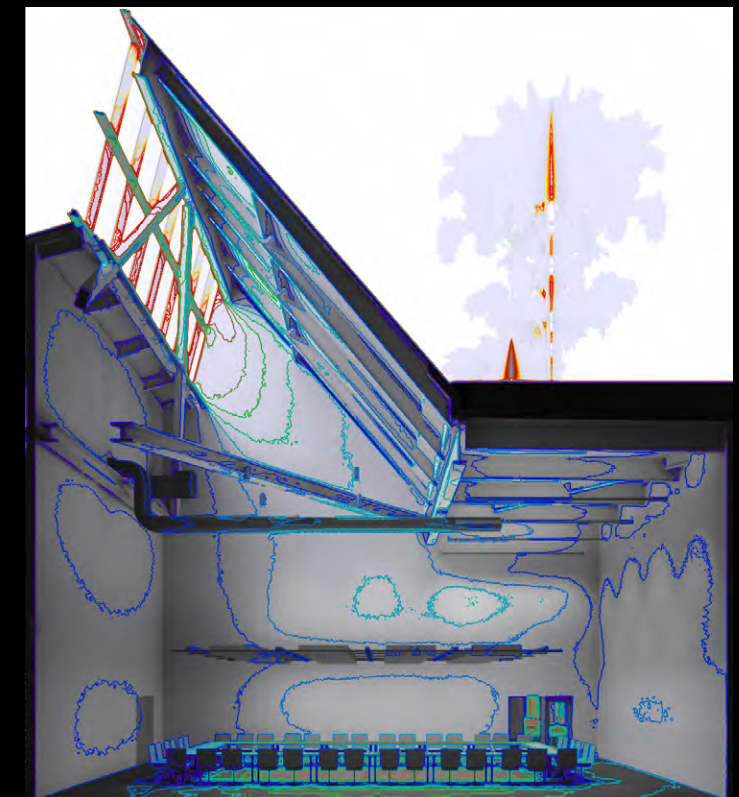
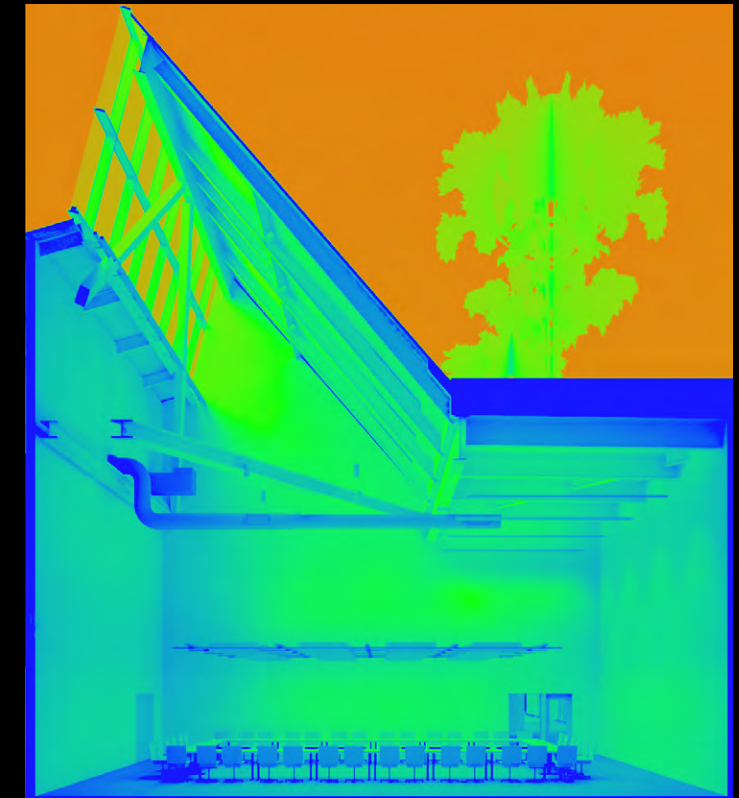
SCENE TUNING

CLEAR SKY + DIRECT + DIMMED INDIRECT ELECTRIC LIGHTING



SCENE TUNING

OVERCAST SKY + DIRECT + INDIRECT ELECTRIC LIGHTING



Include:

Geometry at daylight apertures that might reduce or alter transmission

Fixture geometry where visible

Surfaces / objects to be illuminated - work surfaces, architectural details, etc...

Geometry for scale - especially in large spaces

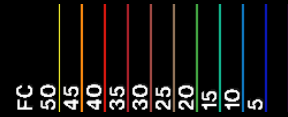
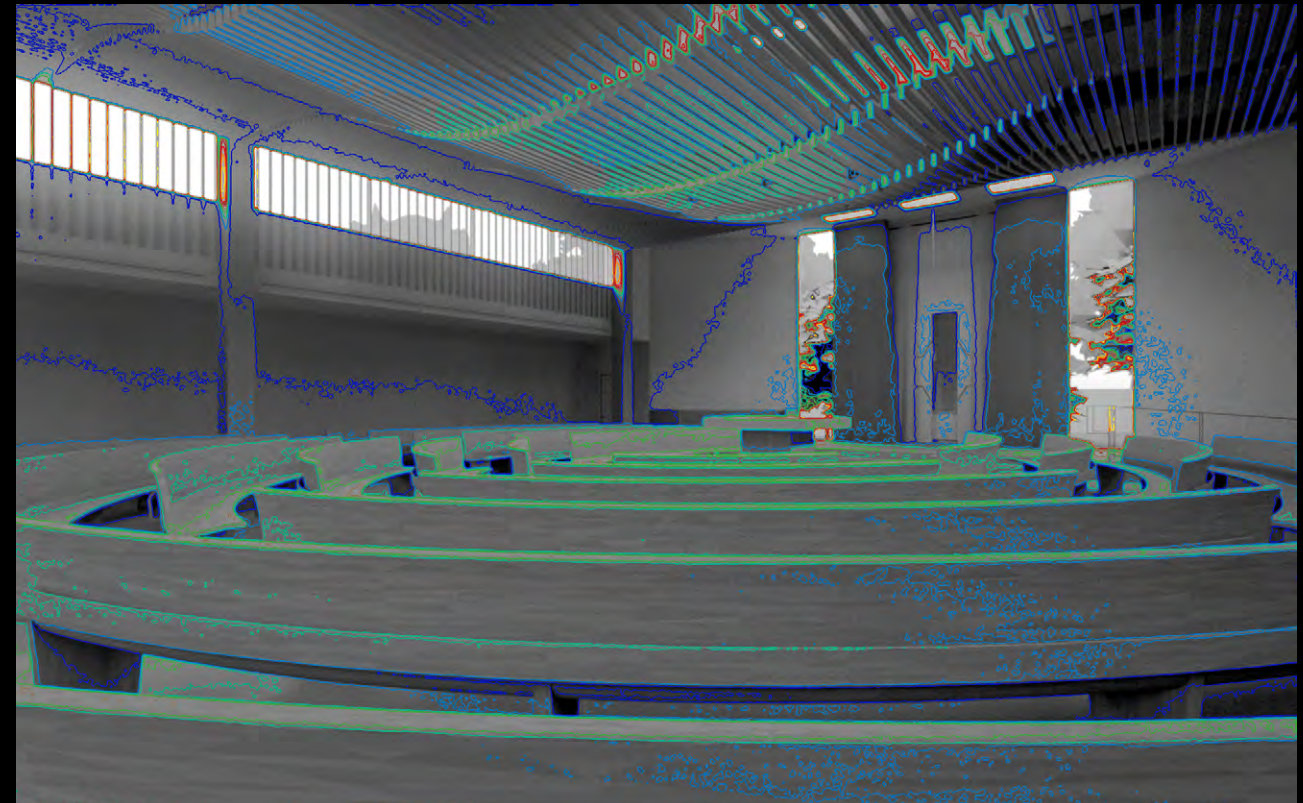
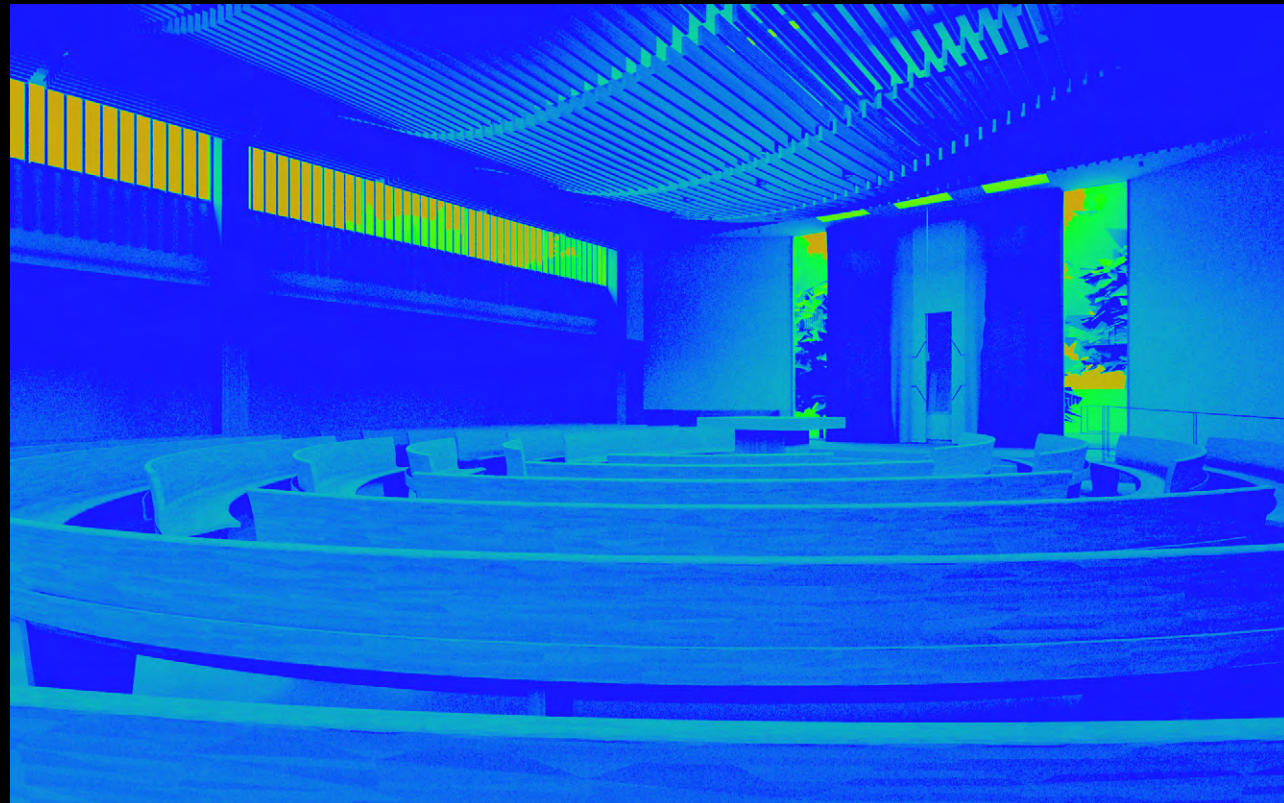
Geometry that might cast shadows with interior sources

Exterior - trees, site elements



Congregation Kol Emeth - Field Architecture - H.P.S. - Loisos + Ubbelohde (Daylighting and Electric Lighting)

GEOMETRIC DETAIL OVERCAST SKY - DAYLIGHT ONLY



GEOMETRIC DETAIL
ELECTRIC LIGHTING AT SKYLIGHTS



GEOMETRIC DETAIL
ELECTRIC LIGHTING WASHING SURFACES



HIGHLIGHTING ARCHITECTURAL DETAILS WITH ELECTRIC LIGHTING



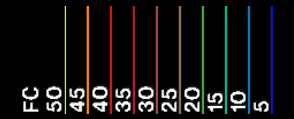
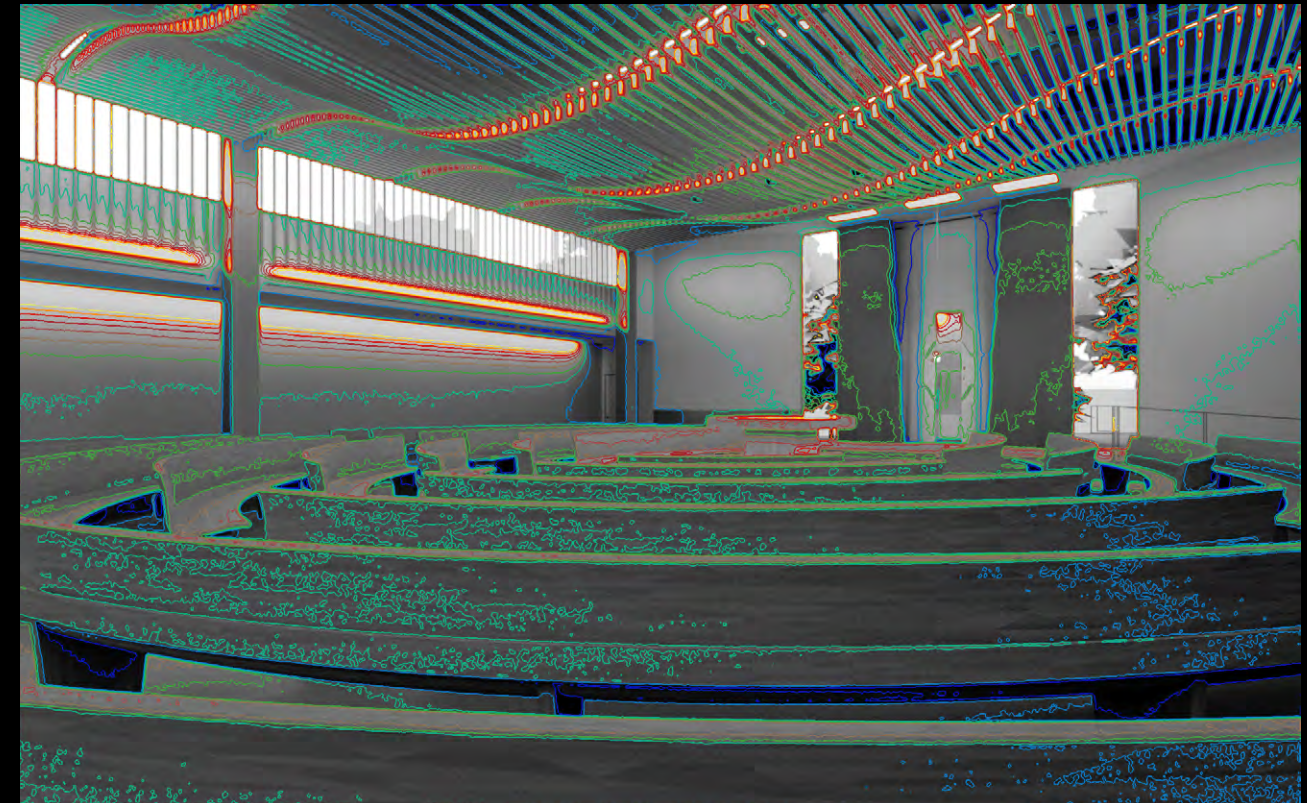
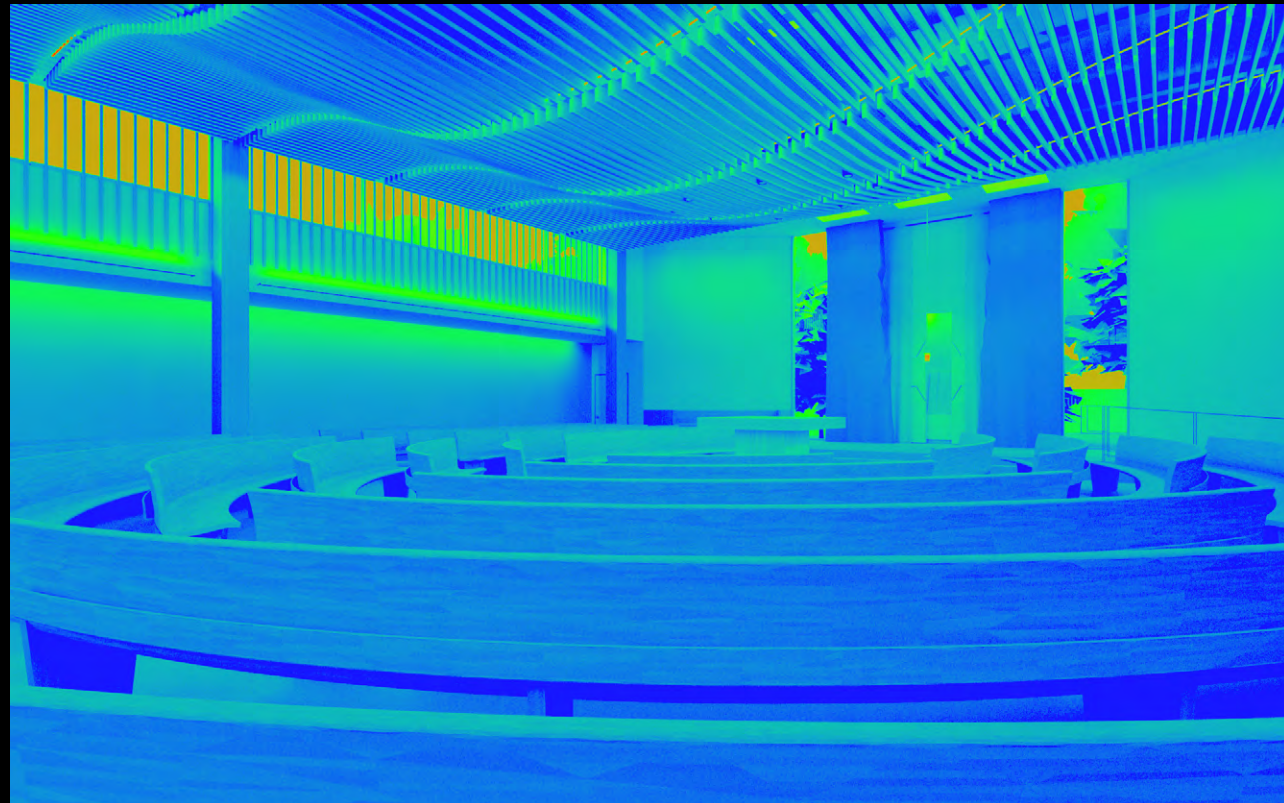
GEOMETRIC DETAIL
COMPLETE ELECTRIC LIGHTING



GEOMETRIC DETAIL
OVERCAST SKY + ELECTRIC LIGHTING



GEOMETRIC DETAIL OVERCAST SKY + ELECTRIC LIGHTING



Include:

Specular materials - i.e. polished floors, gloss paint, monitors, white boards
where reflections are relevant

RGB reflectances - for color casting, when a prominent part of design
retain grey scale when possible to best register source CCT, color casting

Fixture finishes - to show intent

Functional Textures! - brightfunc







MATERIAL SPECIFICITY
OVERCAST SKY + ELECTRIC LIGHTS





Model fixtures when visible - with details as required by view

Model source surfaces as separate materials - i.e. reflectors, lens, etc...

NOTE:

*These images are to capture design intent and the perception of the fixture in space.
This does not replace physical mock-ups or focused studies on fixtures as glare sources.*



Congregation Kol Emeth - Field Architecture - H.P.S. - Loisos + Ubbelohde (Daylighting and Electric Lighting)

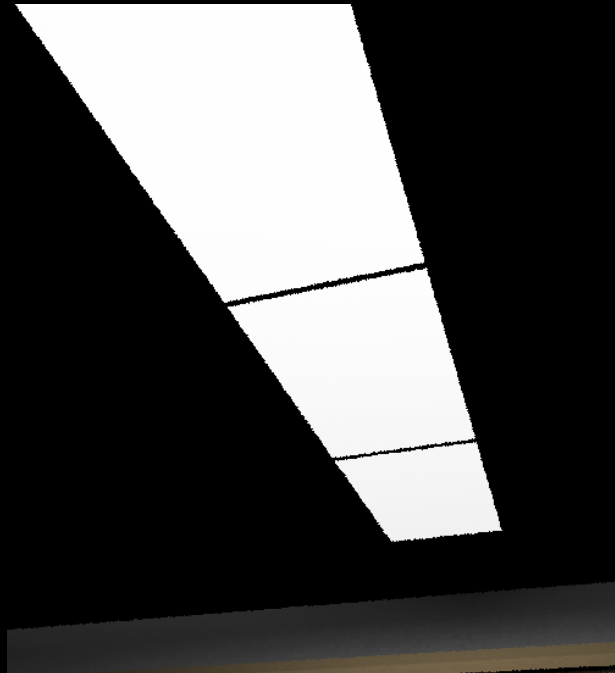
VISIBLE SOURCES

OVERCAST SKY + PENDANT + SKYLIGHT FIXTURE

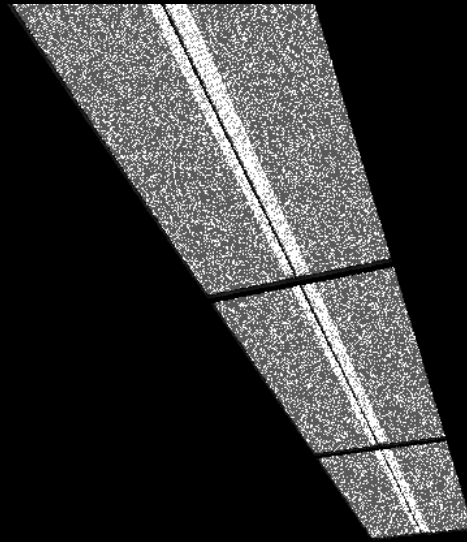




ies2rad as illum



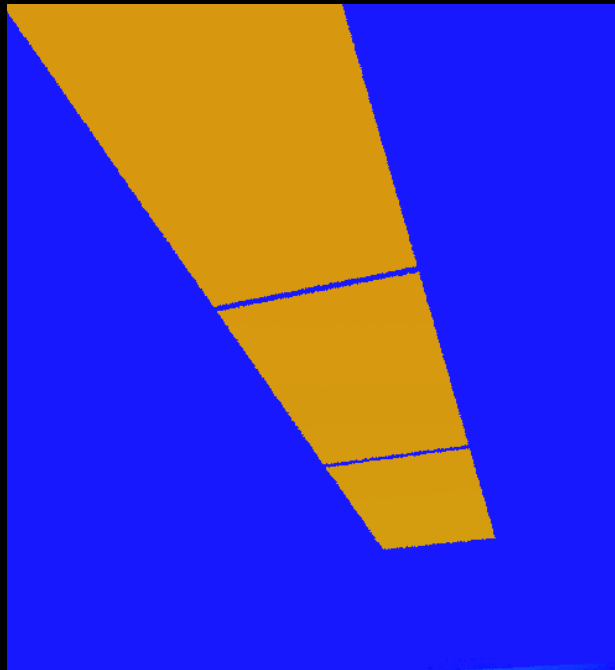
rvu - ies2rad as light



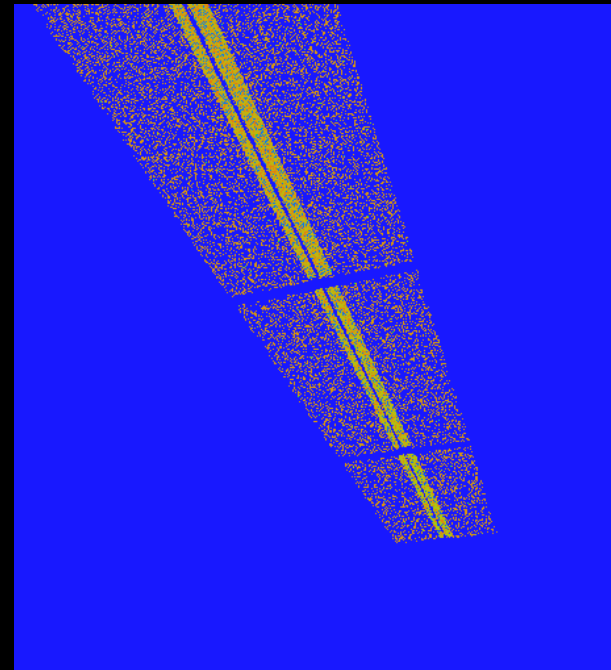
rvu - glow materials



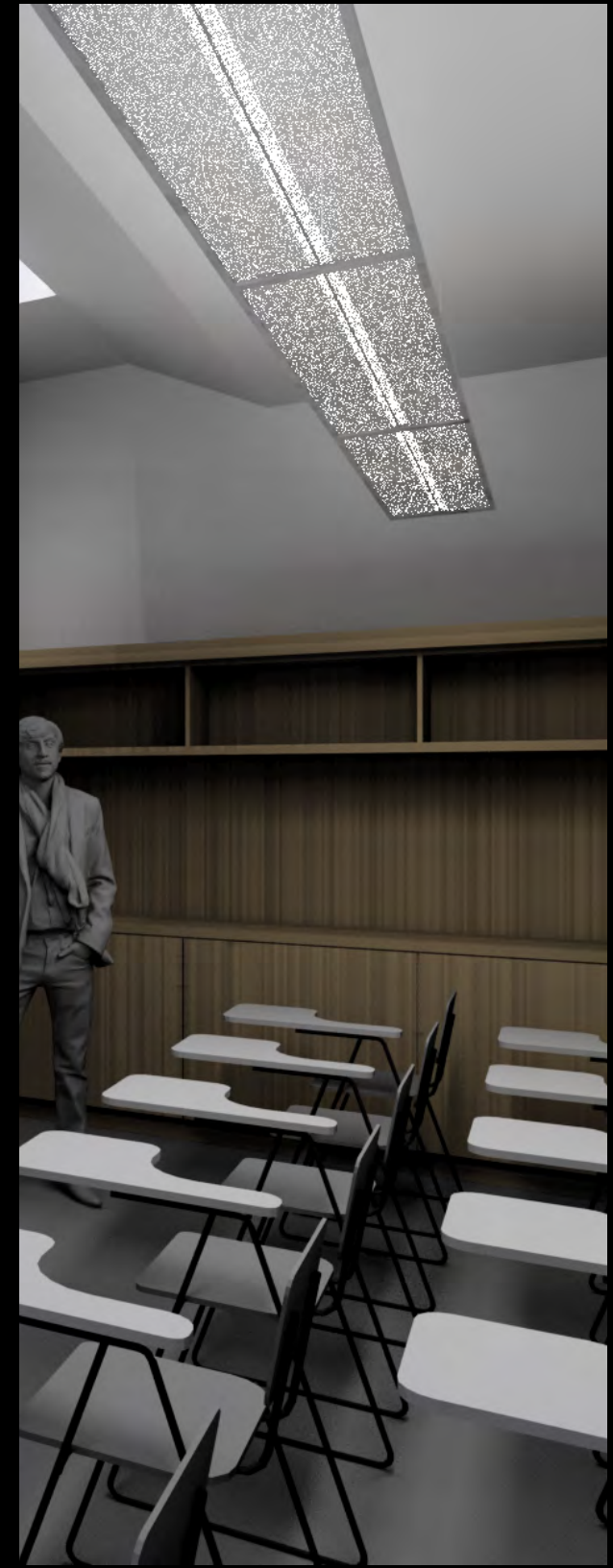
manufacturers brochure



luminance - ies2rad as light



luminance - glow materials



VISIBLE SOURCES

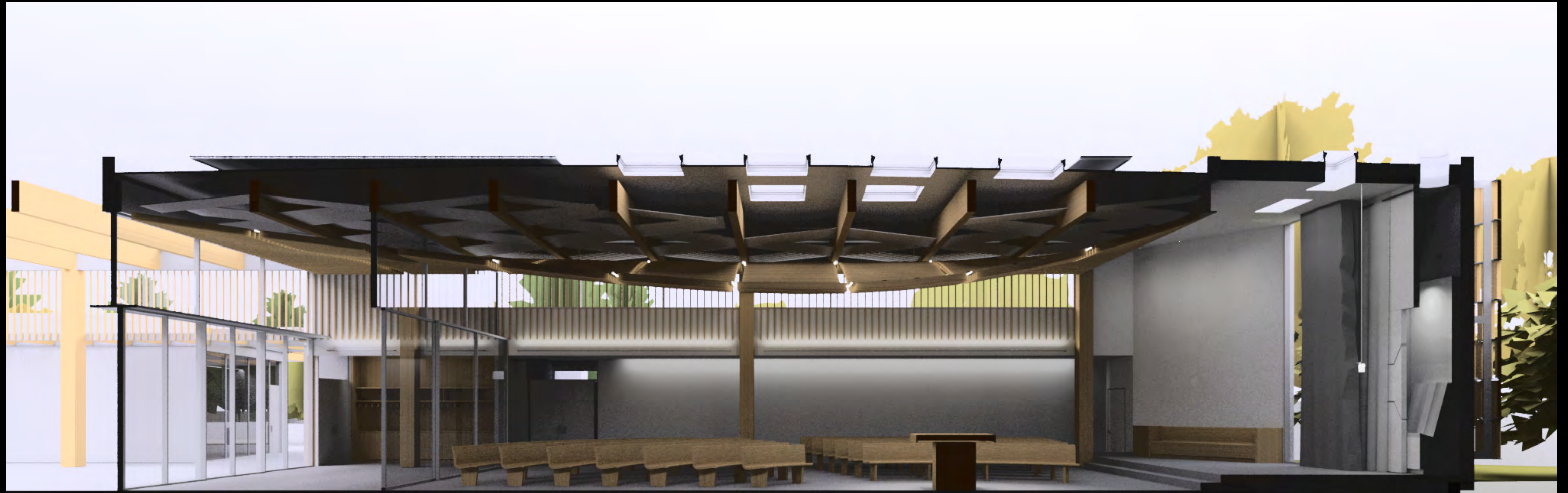
OVERCAST SKY + PENDANT + SKYLIGHT FIXTURE

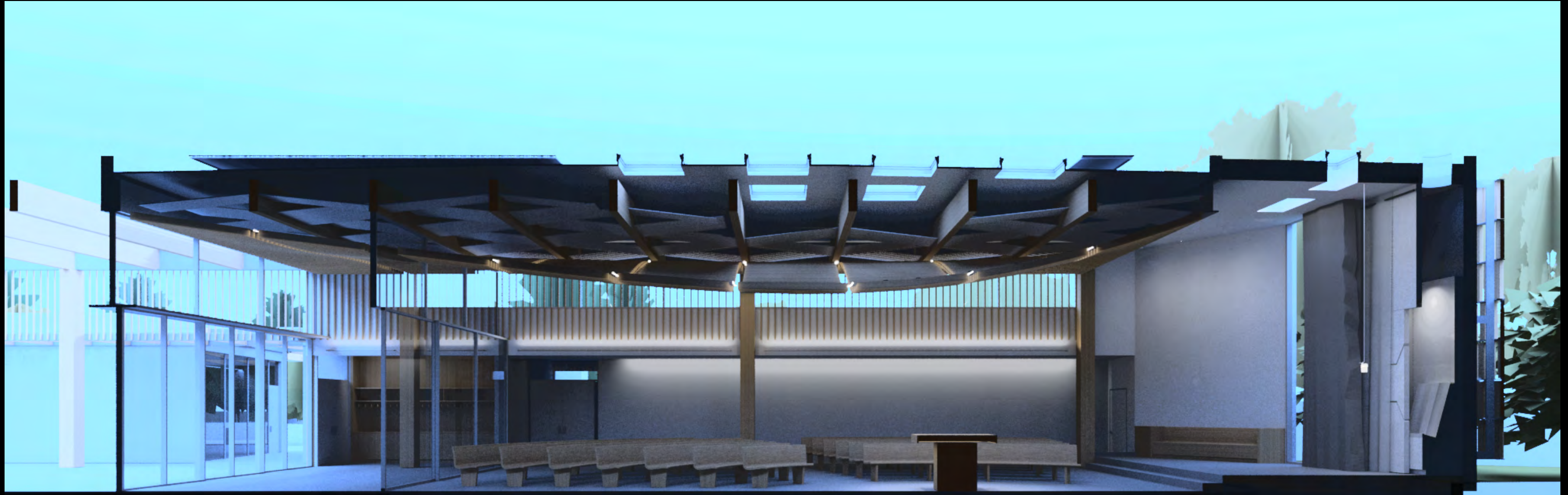


To communicate design intent and fixture specifications - source CCT

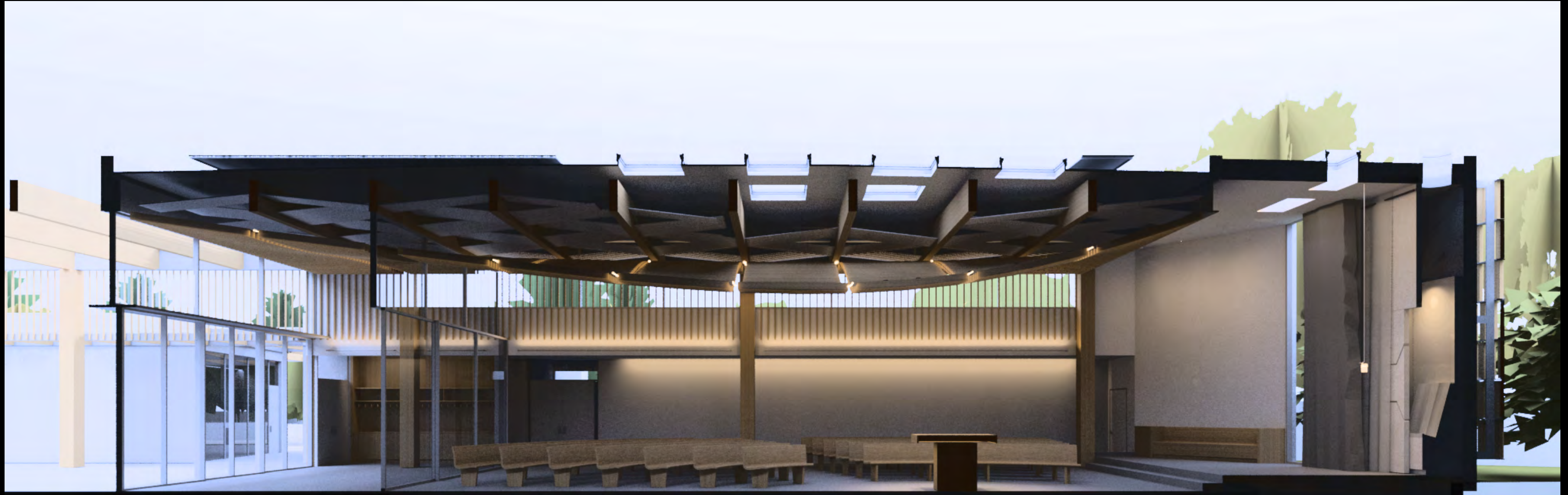
Perception of daylight and electric light contribution - pools of light, accents

Perception of space under various sky conditions



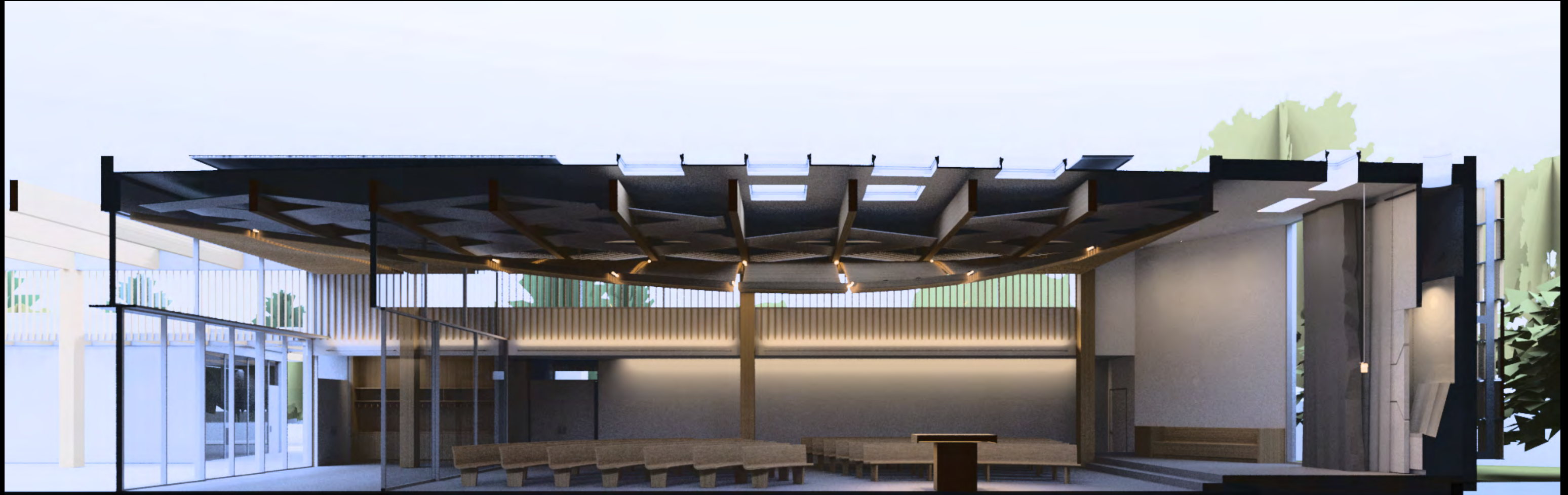


WHITE BALANCE 4000K
OVERCAST SKY 5500K + ELECTRIC LIGHTS 3000K



WHITE BALANCE 3750K

OVERCAST SKY 5500K + ELECTRIC LIGHTING 3000K, 2700K, & 2500K





WHITE BALANCE 3700K

OVERCAST SKY 5500K + ELECTRIC LIGHTING 3000K, 2700K, & 2500K



THANK YOU

