

Demands of the Radiance Power in a Non-Orthogonal World

Eduardo Pintos

18th International Radiance Workshop, New York, New York, August 22, 2019

2019 International Radiance Workshop // NYC August 21-23

DEMANDS OF THE RADIANCE POWER IN A NON-ORTHOGONAL WORLD

Eduardo Pintos

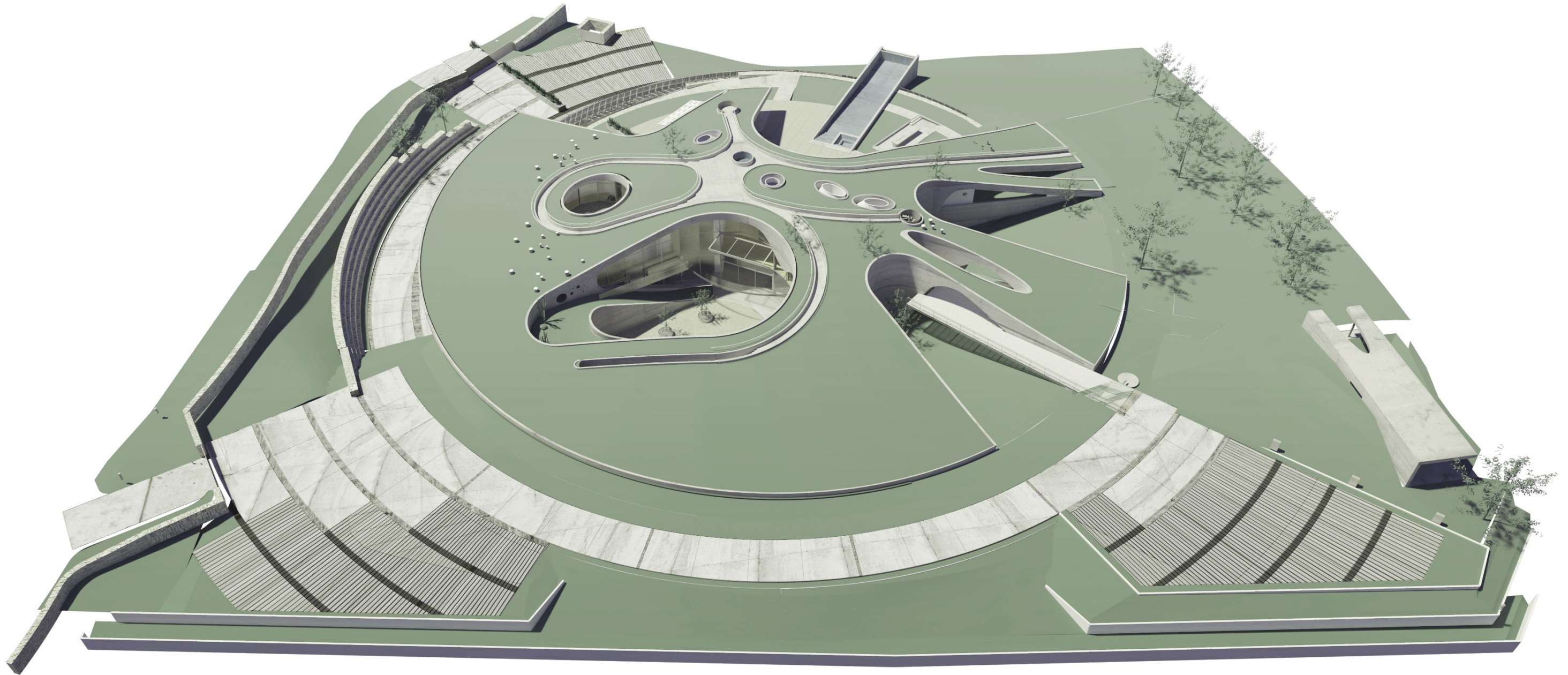
Project Team: George Loisos, Alan deMarche, Ibone Santiago, Abe Shameson

LOISOS + UBBELOHDE

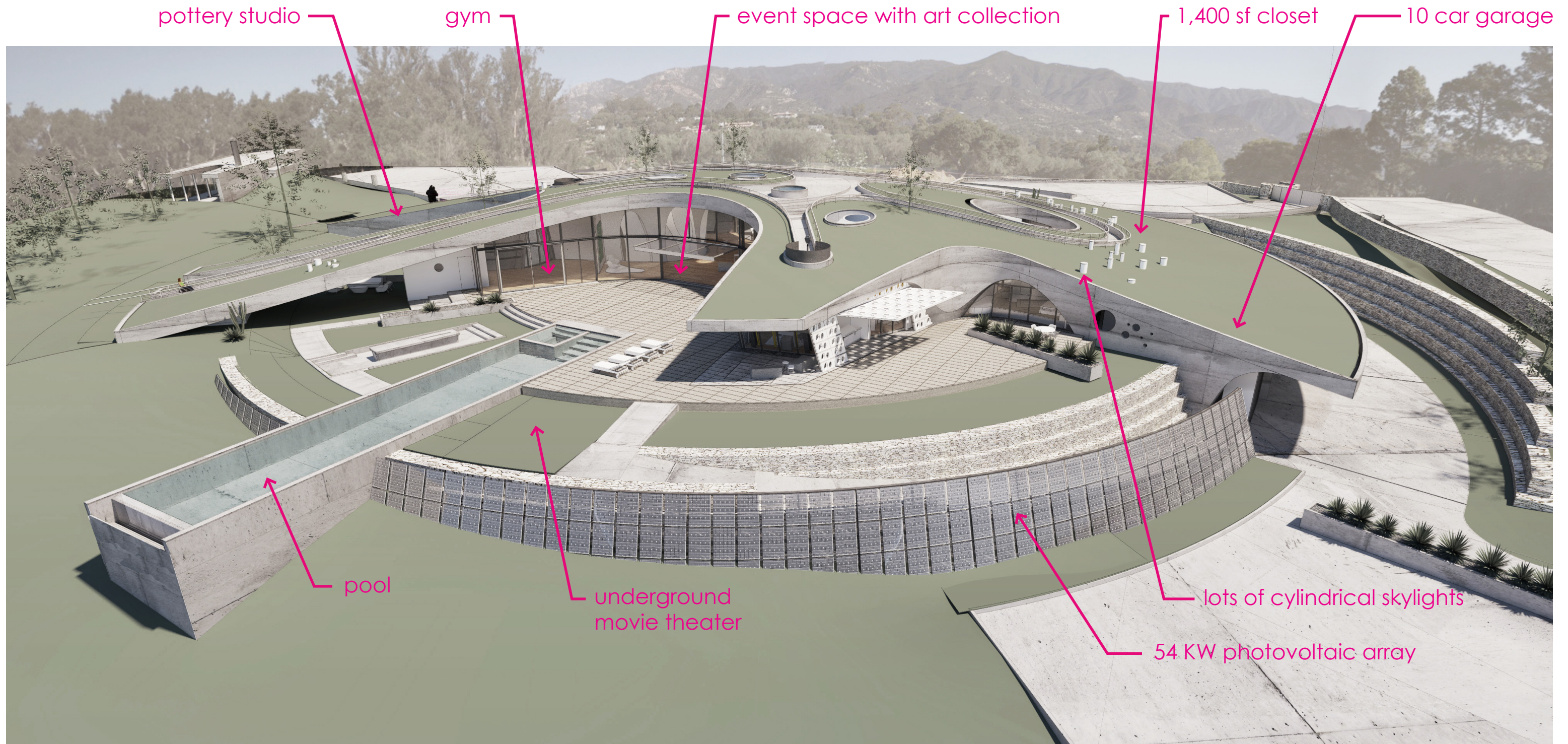
ARCHITECTURE . ENERGY . LIGHT

House Intro

.....yes, this is a house, not a flying saucer.



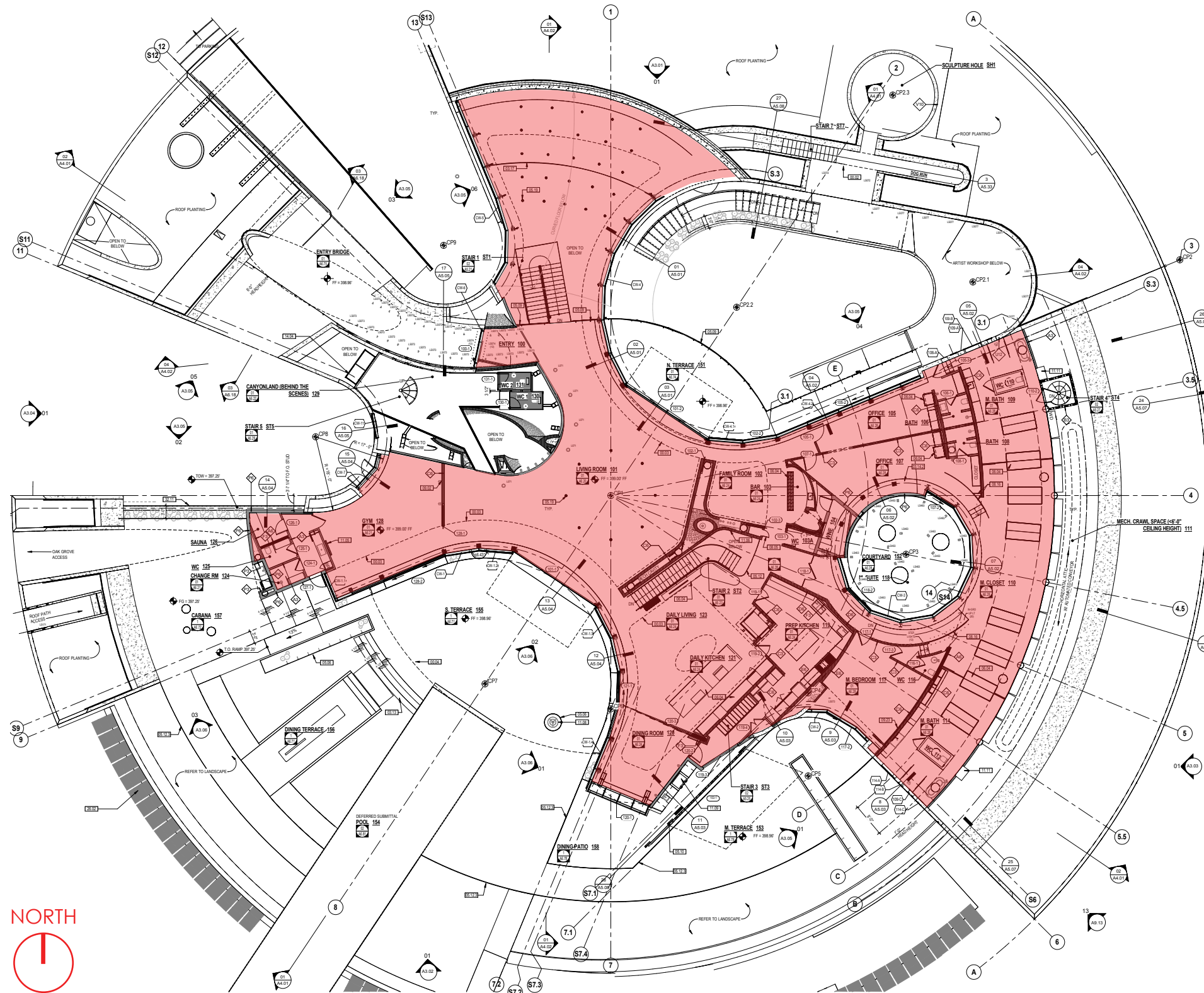
House Intro



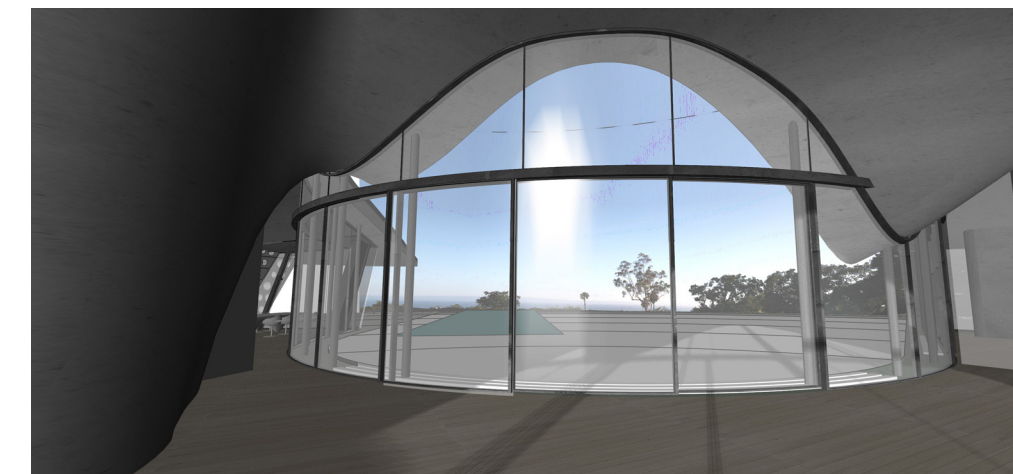
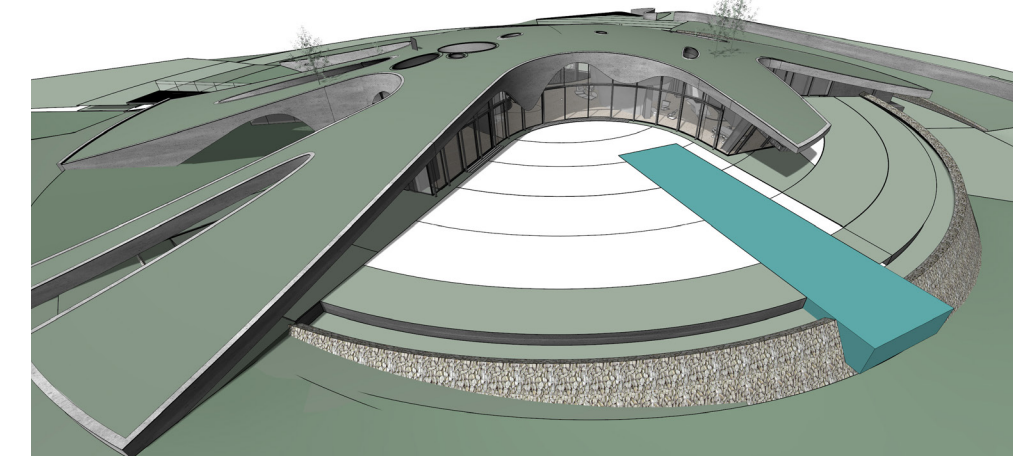
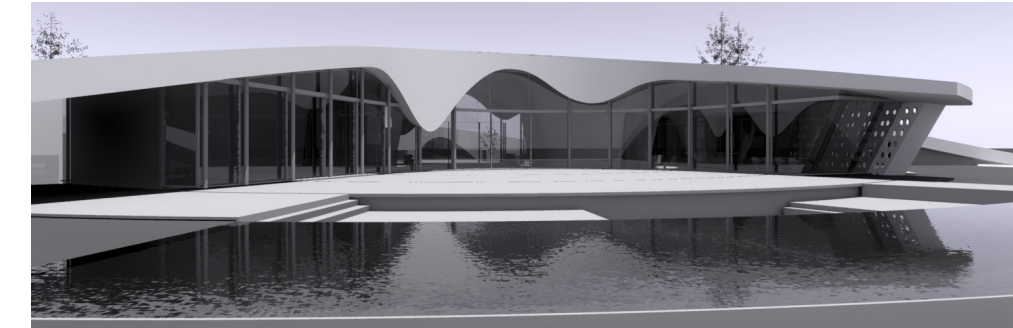
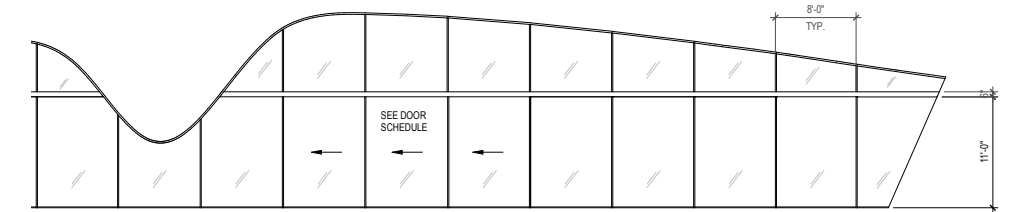
Aerial view rendering with site context

House Intro

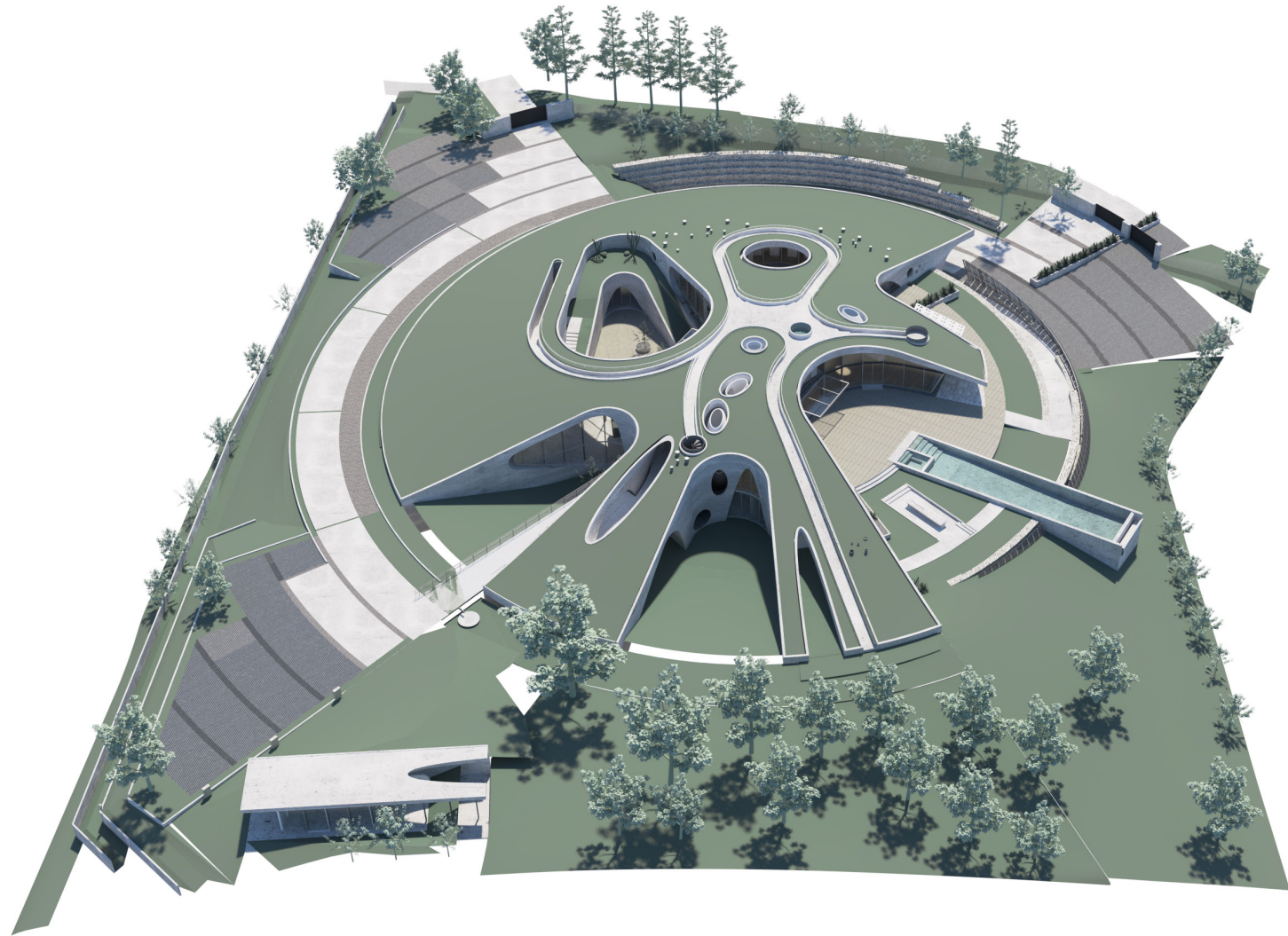
Main Level Plan



WWR: ~ 50%



This House vs. Other House Type We Normally Work On



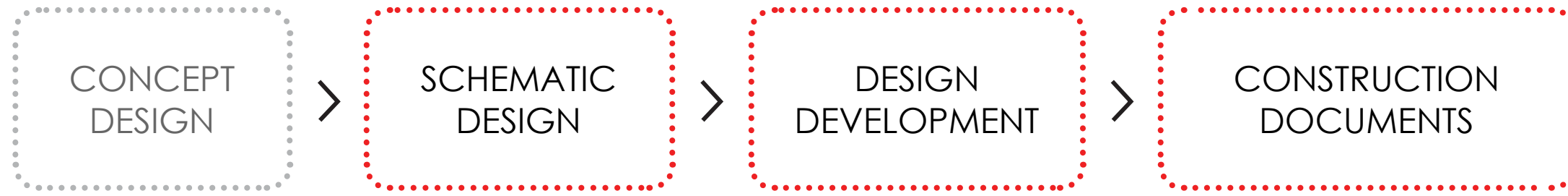
VS.



Just to name a few challenges:

- curved vertical glass facades facing southeast and southwest
- double curvature walls and ceilings
- daylight sensitive art collection
- large size round skylights with clear glass
- wide open site with no shading from context

Design Phases



SCHEMATIC DESIGN



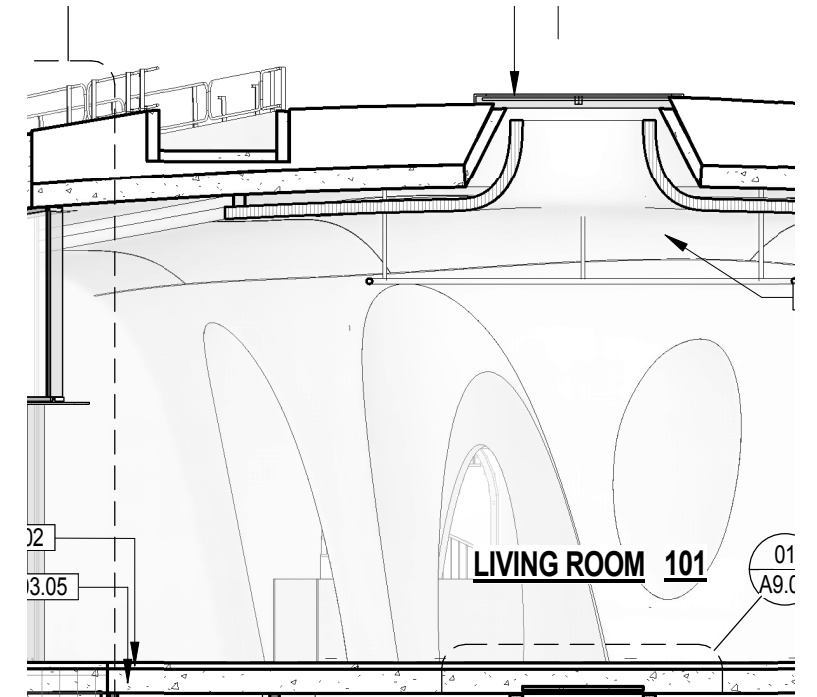
exterior rendering

DESIGN DEVELOPMENT



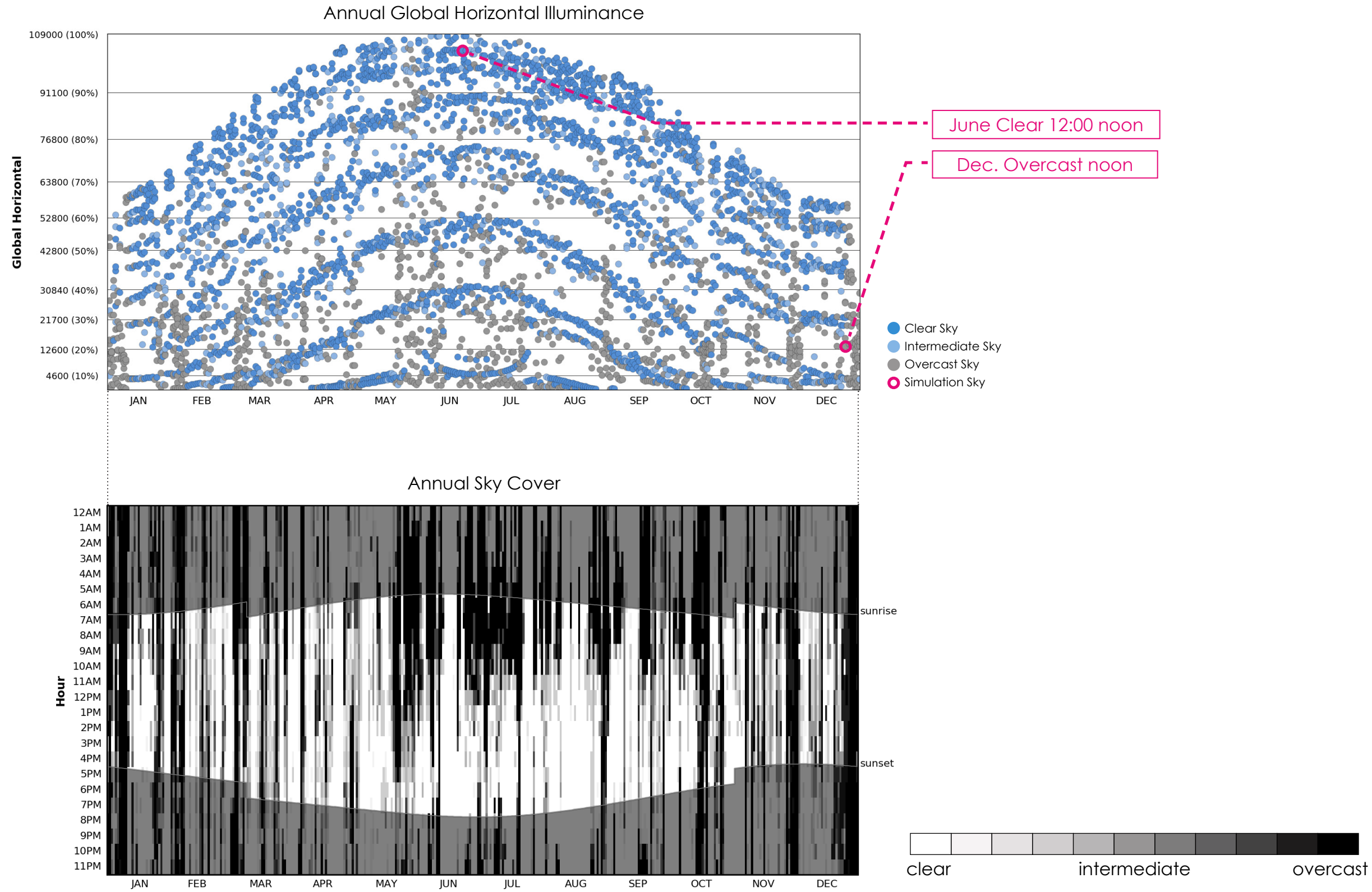
interior 180° rendering with finishes

CONSTRUCTION DOCUMENTS



section drawing

Weather Data // Sky Conditions



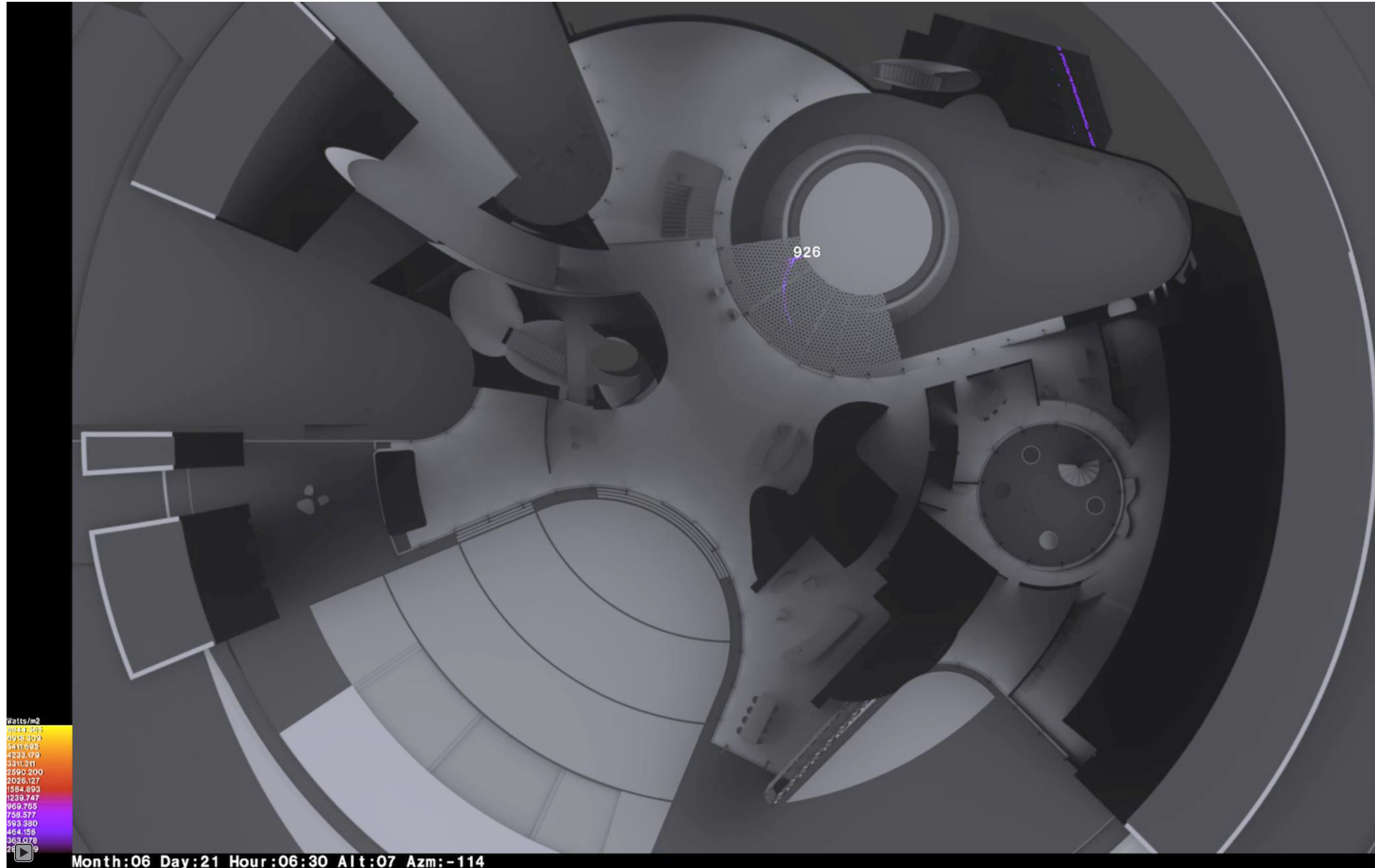
Schematic Design



Schematic Design



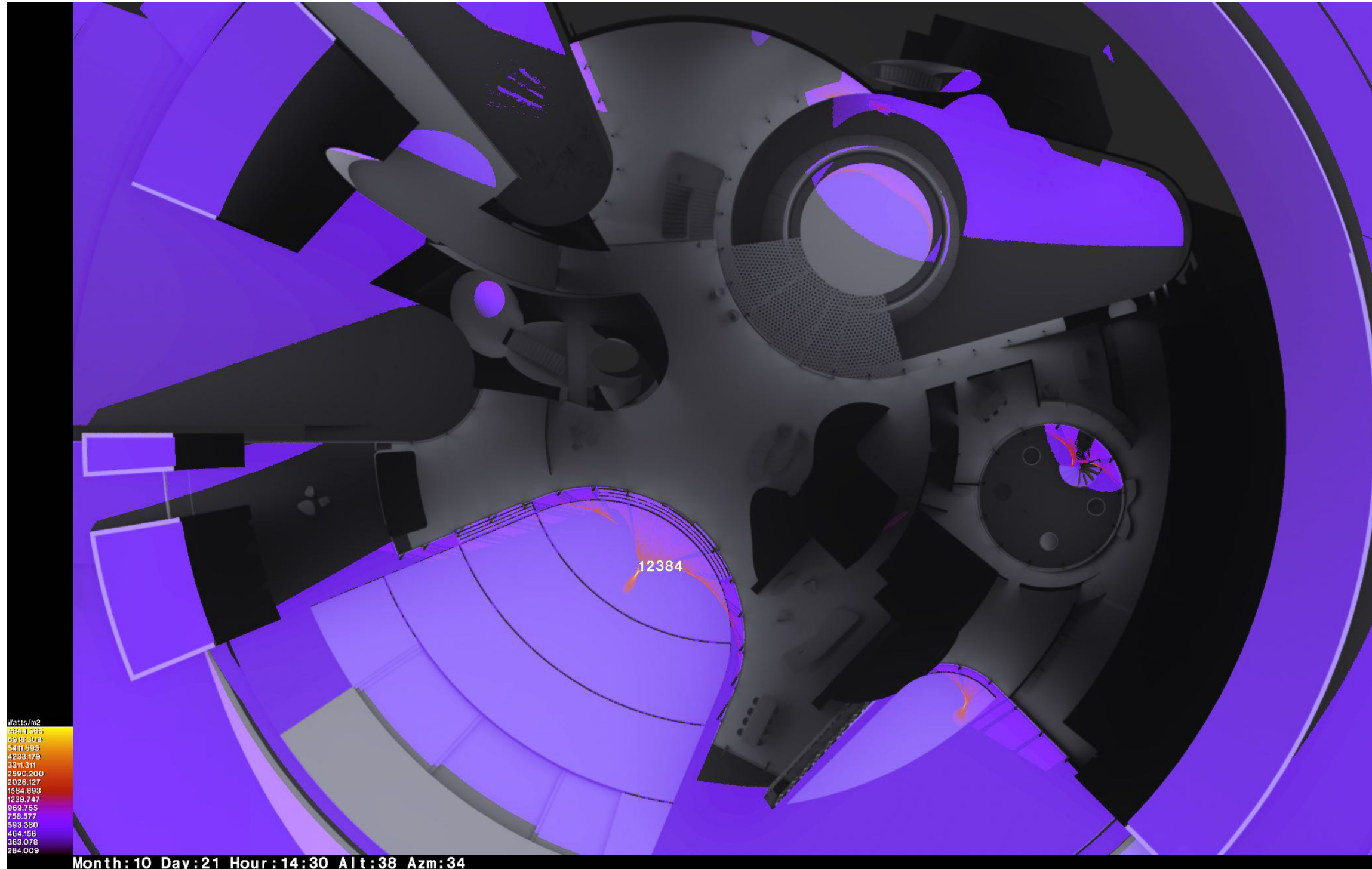
Solar Convergence Studies // animation



Schematic Design



Solar Convergence Studies



“**12,384 watts/m²**” in a given horizontal spot of the outdoor patio.

Some references:

11,000w/m²: burst into flames

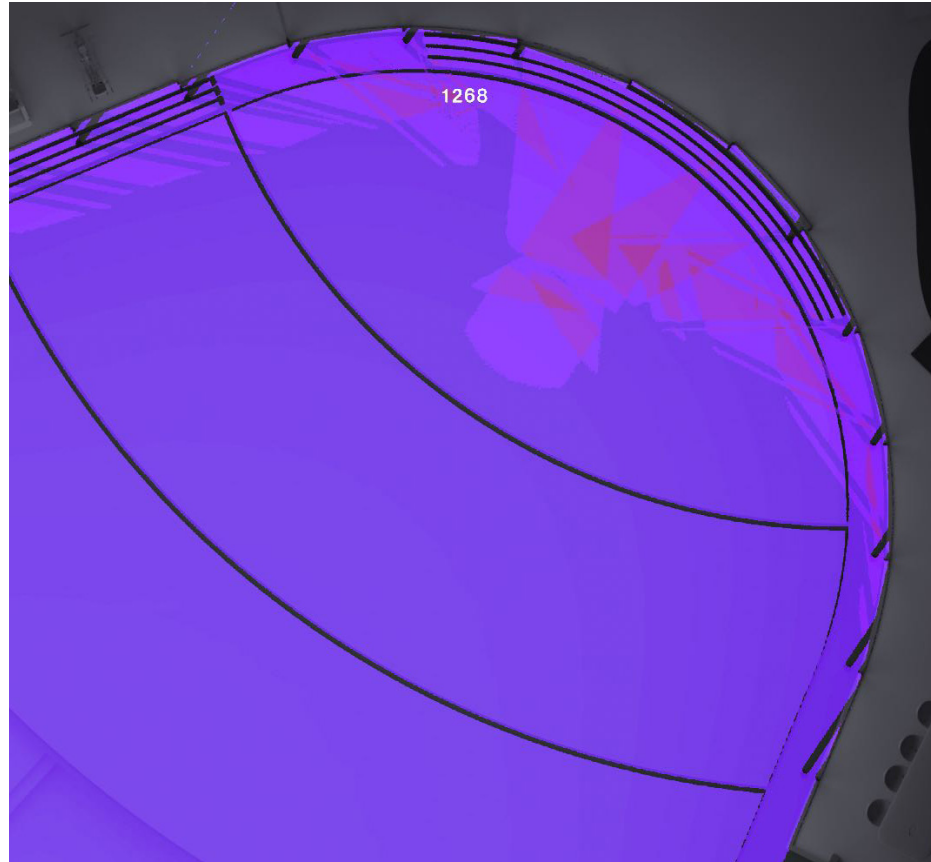
1,000 w/m²: clear sky_desert

750 w/m²: clear sky_urban

Schematic Design

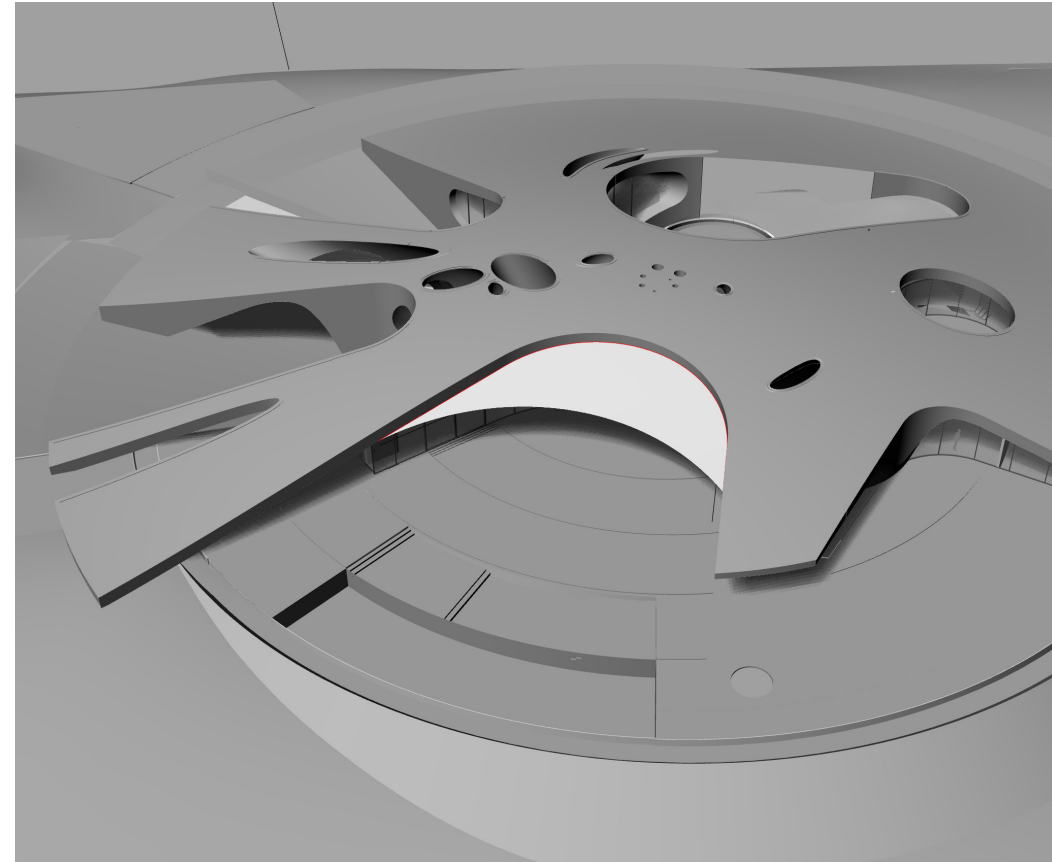


Proposed Solutions

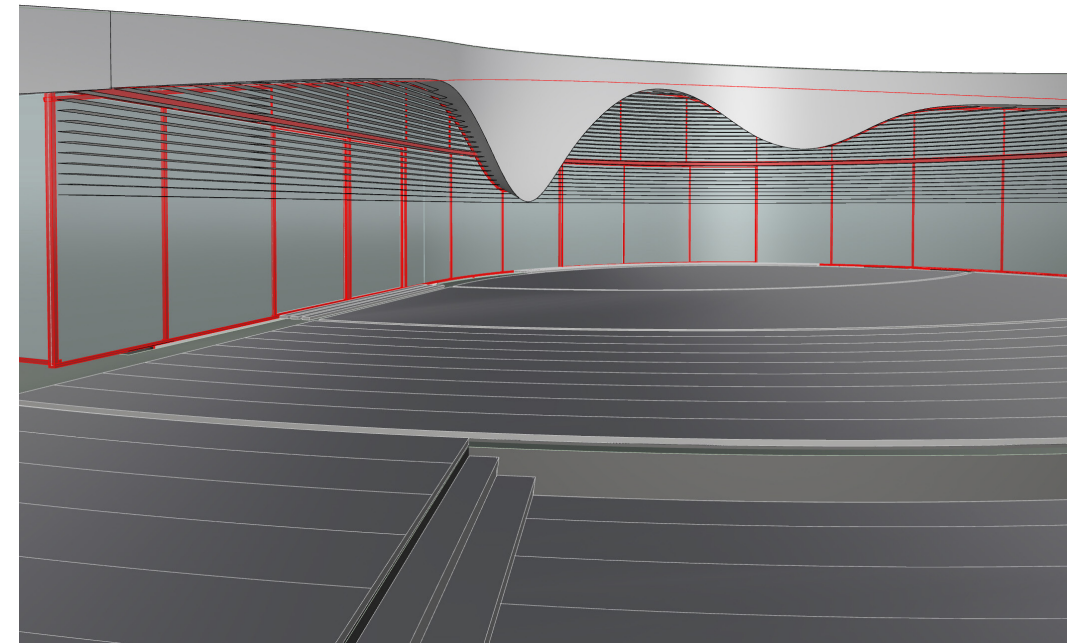


Flat glass in segmented curve

Peak reduction:
From 12,384 to 1,268 watts/m²



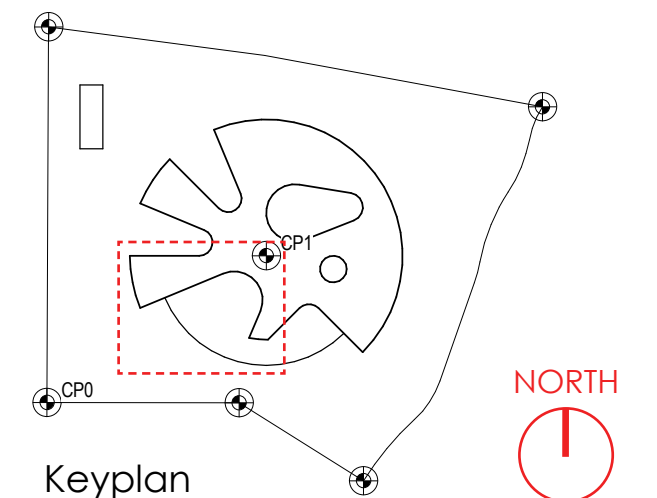
Glass shading alternative 1



Glass shading alternative 2

Glass Specifications: SunGuard SNX 60/28

Visible light				Solar energy			Solar factor (g) EN 410 [%]	U-value (EN 673)	
Transmission [%]	Reflection outside [%]	Reflection inside [%]	Colour rendering index	Direct transmission [%]	Reflection outside [%]	Absorp. [%]		Air* Krypton 90%** [W/m ² K]	Argon 90% [W/m ² K]
Double Glazing: 6-16-4, SunGuard® High Selective on #2									
60	12	14	93	26	40	34	28	1.3*	1.0
Triple Glazing: 6-12-4-12-4, SunGuard® High Selective on #2 + ClimaGuard® Premium on #5									
53	14	17	92	22	41	37	26	0.5**	0.7

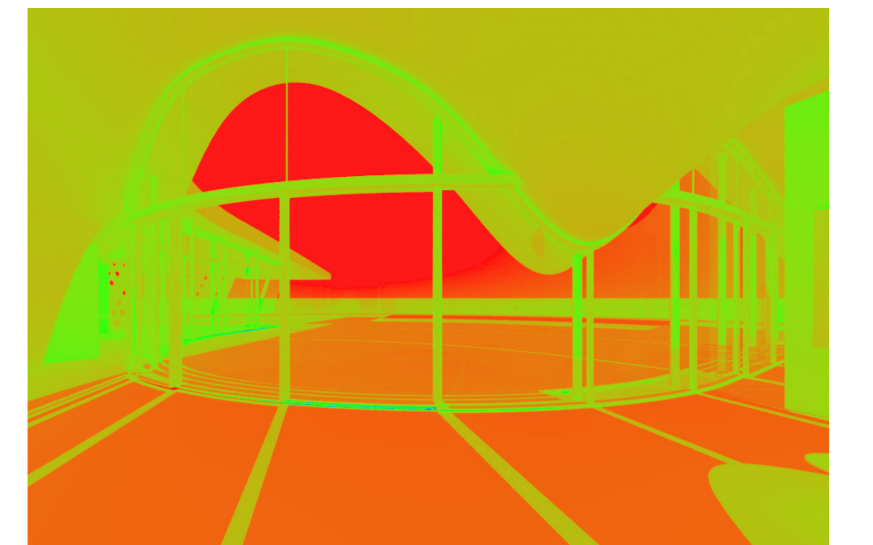
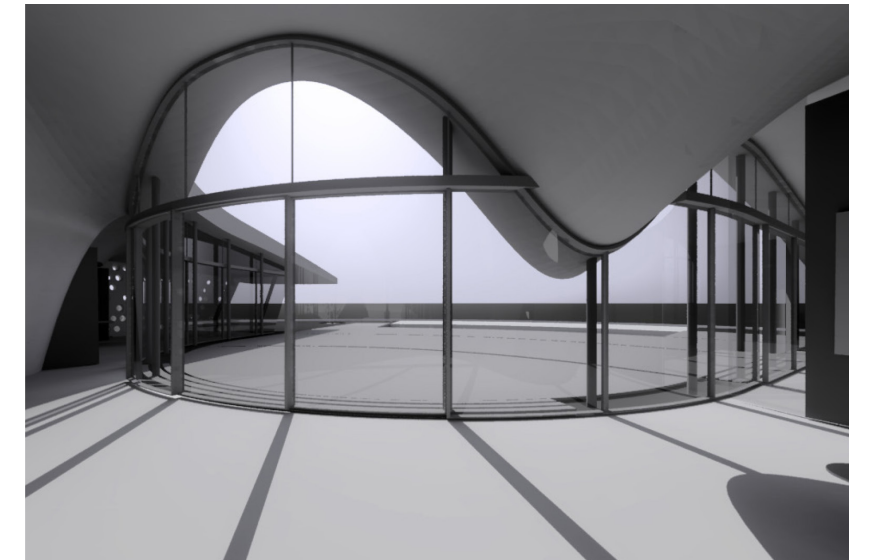


Keyplan

Schematic Design



Direct Sun Penetration Animation



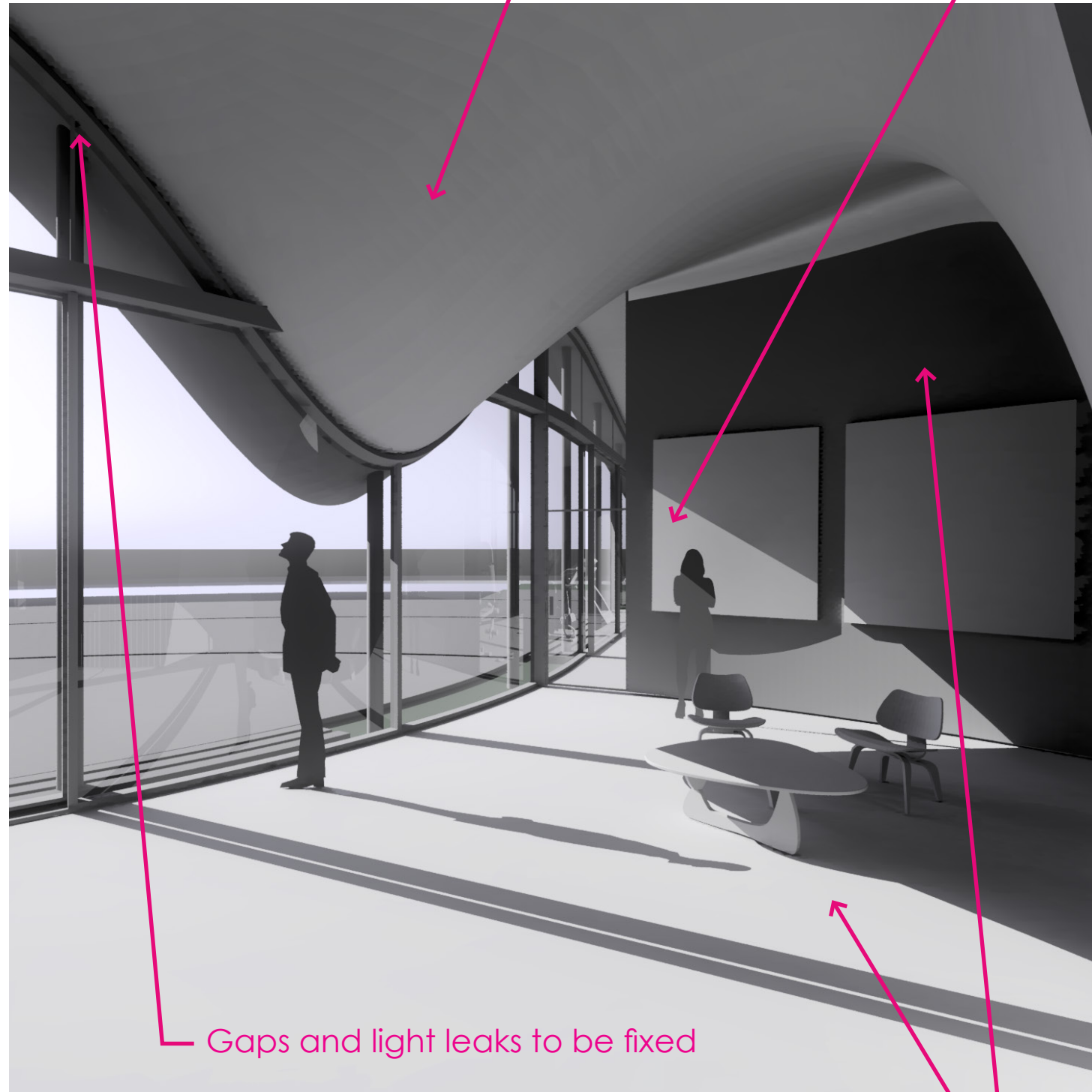
December 22nd, clear skies, 11:30am

Month:06 Day:21 Hour:06:30 Alt:07 Azm:-114

Schematic Design



Direct Sun Penetration

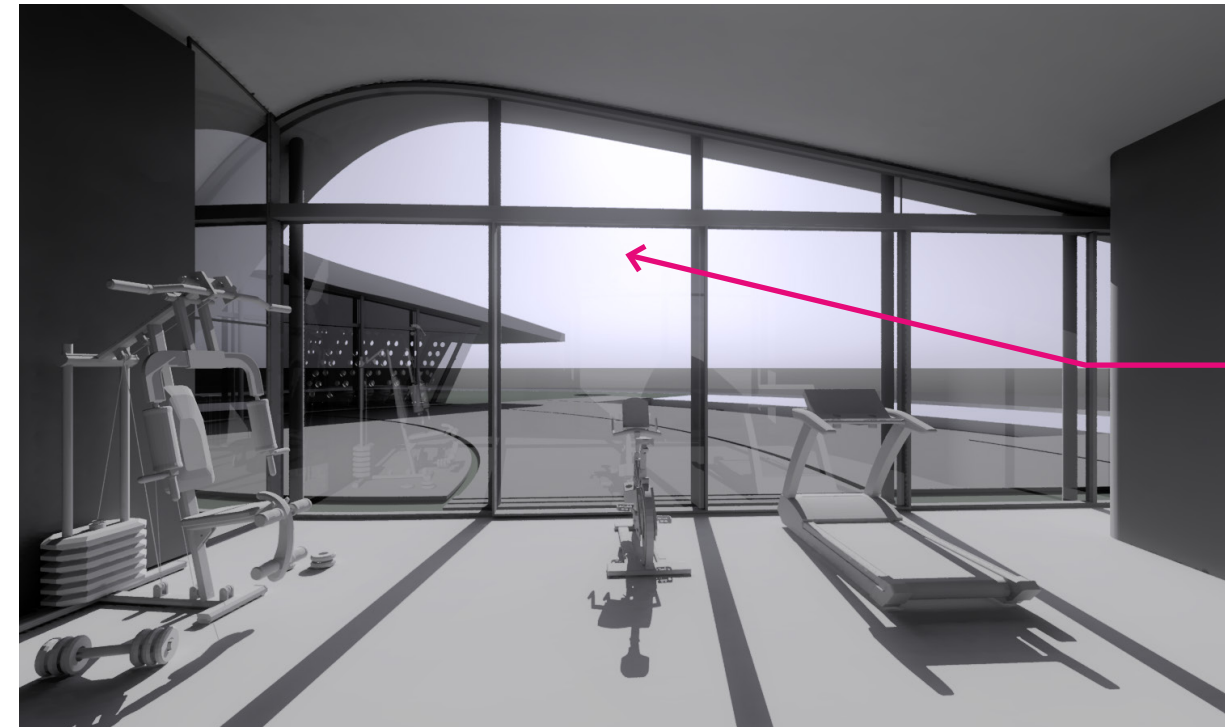


3D model meshing
not quite refined yet

PROBLEM!
Direct sun on painting

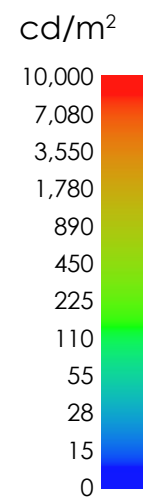
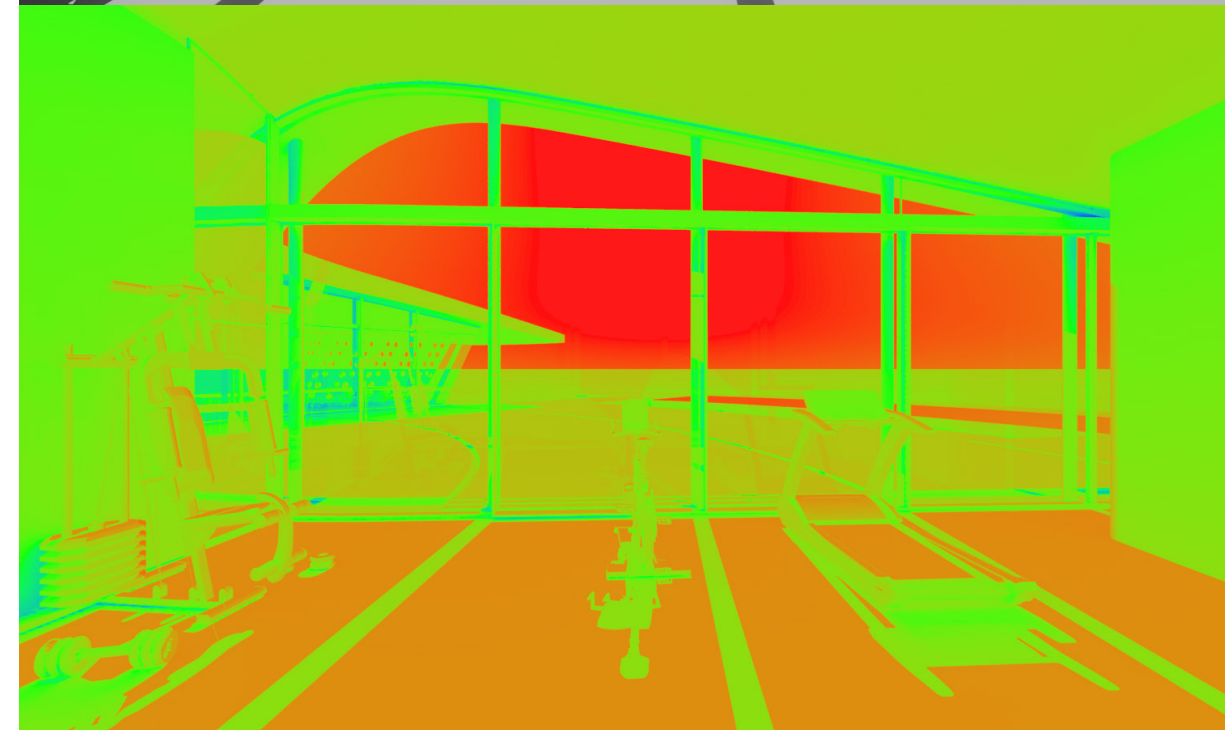
Gaps and light leaks to be fixed

Basic materials for early studies (final finishes still TBD)



December
Clear skies
12:00 noon

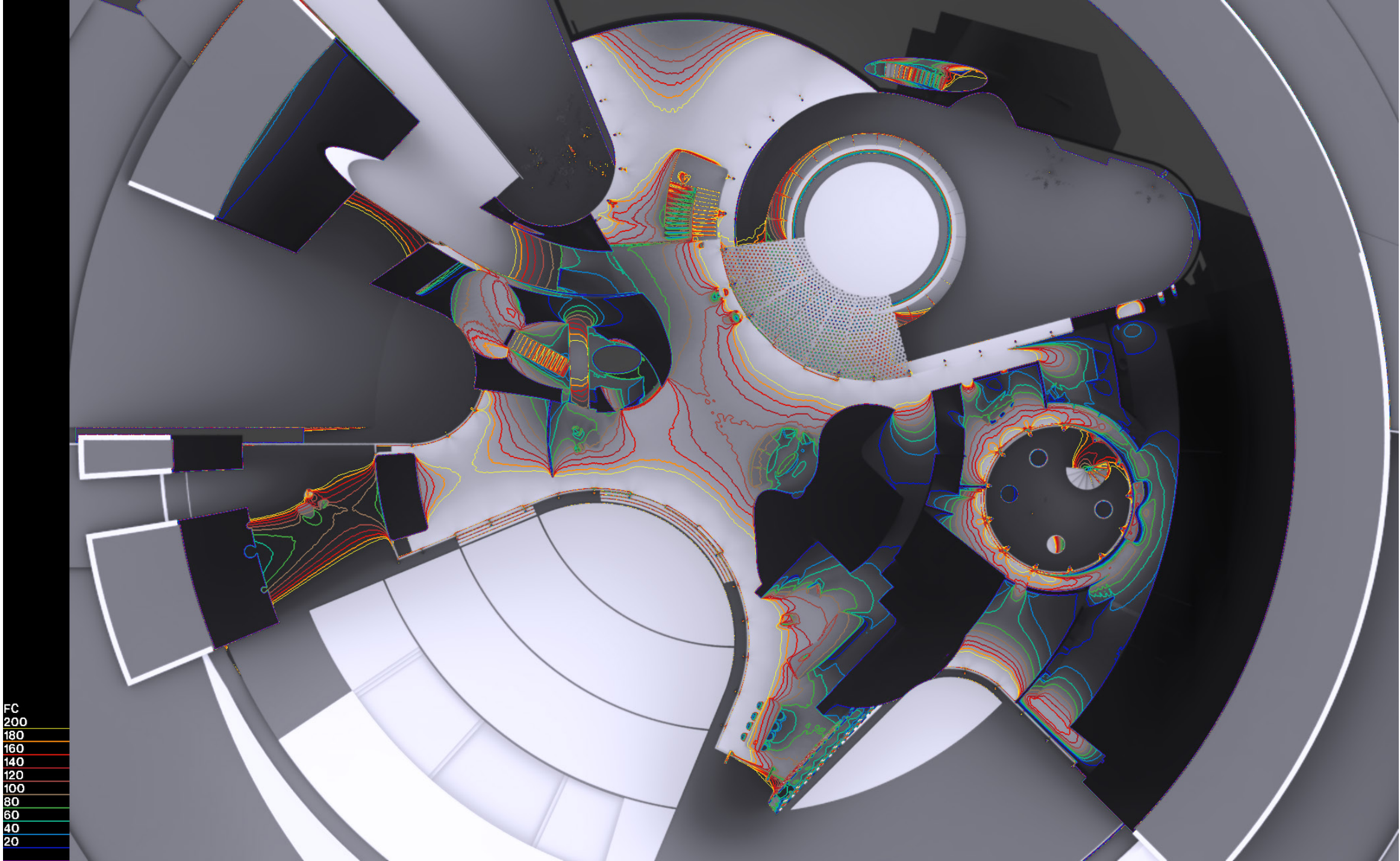
PROBLEM!
Getting blind
while using the
treadmill



Schematic Design



Daylight Availability



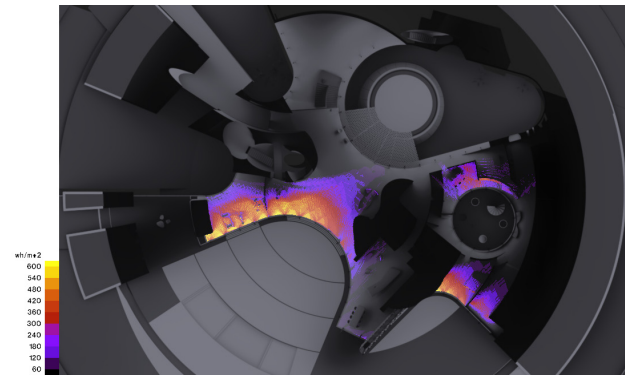
Design Development



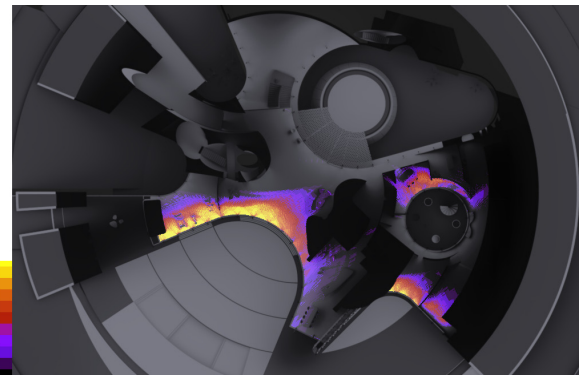
Design Development



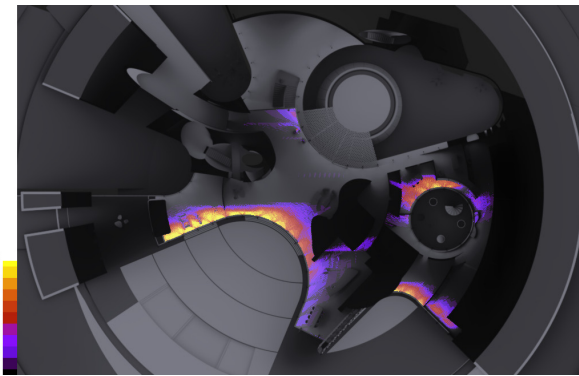
Monthly Summary // Cumulative Solar Radiation (over one day)



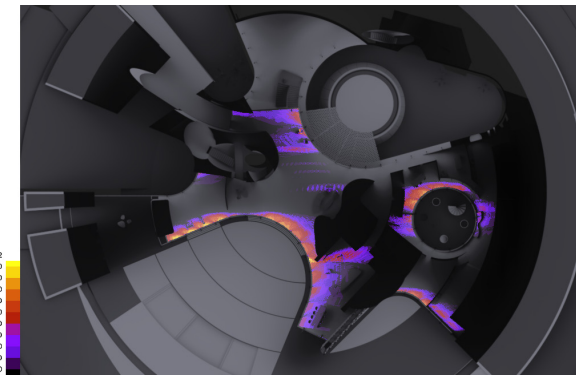
January 21st



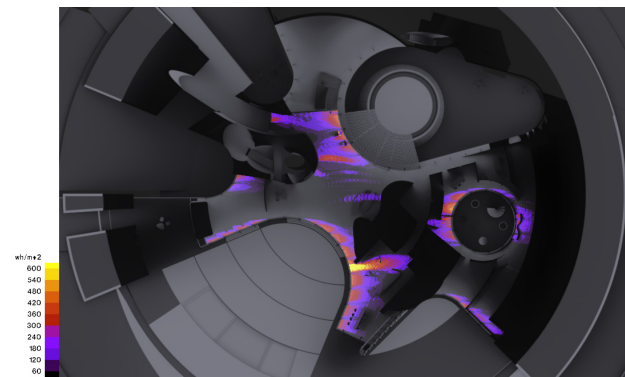
February 21st



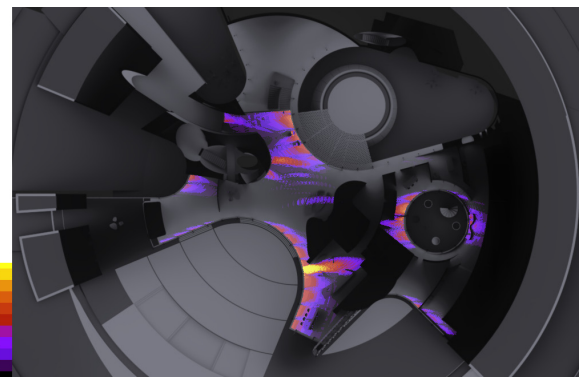
March 21st



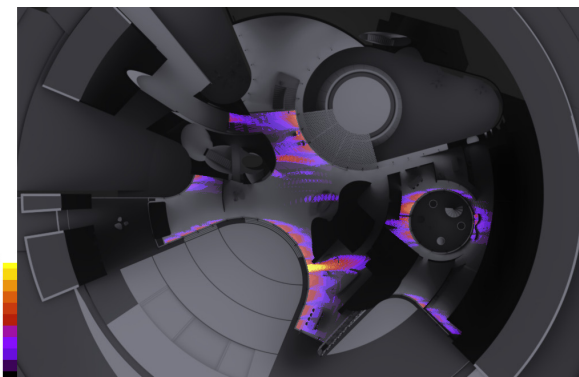
April 21st



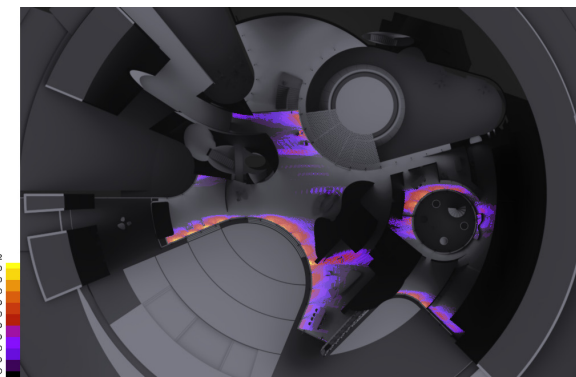
May 21st



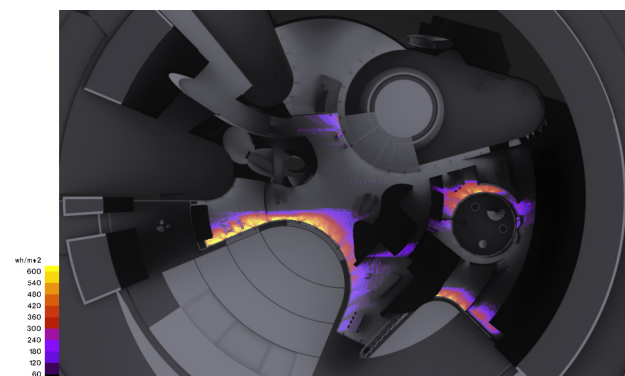
June 21st



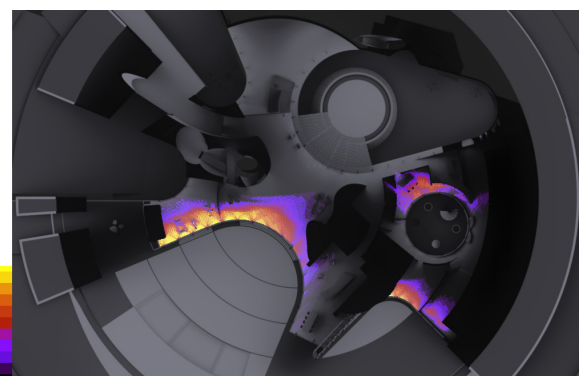
July 21st



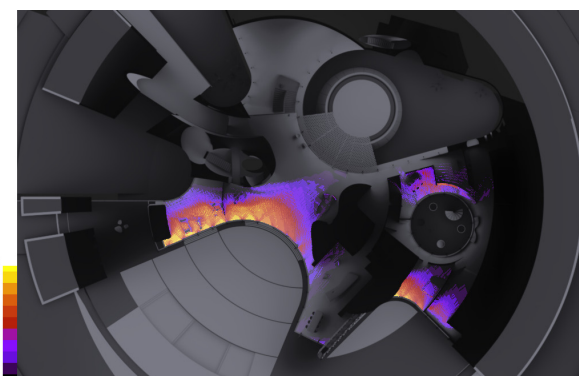
August 21st



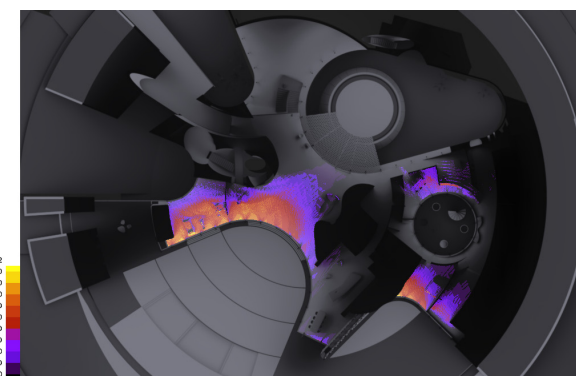
September 21st



October 21st



November 21st

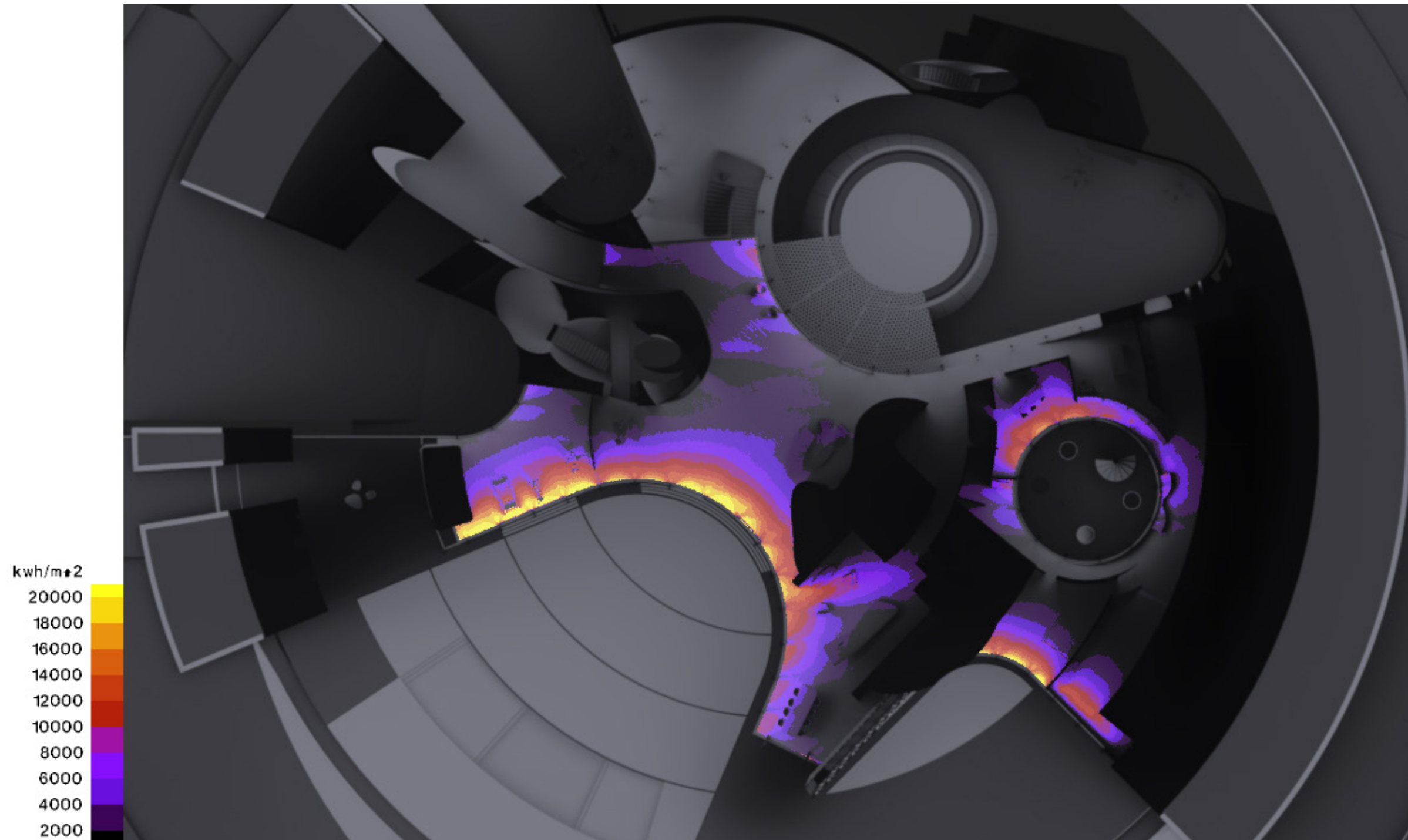


December 21st

Design Development



Cumulative Energy



Design Development



Radiant System Zoning

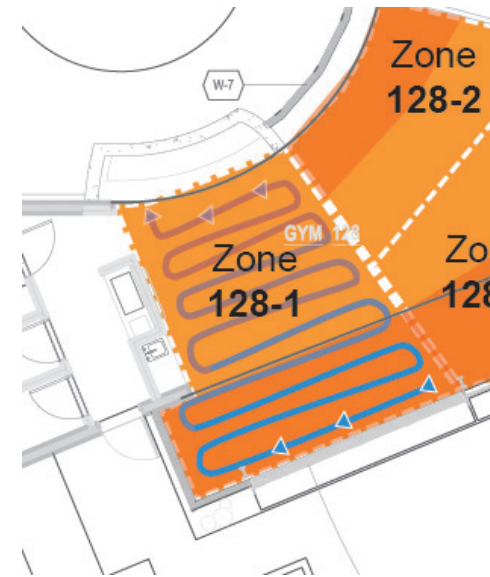
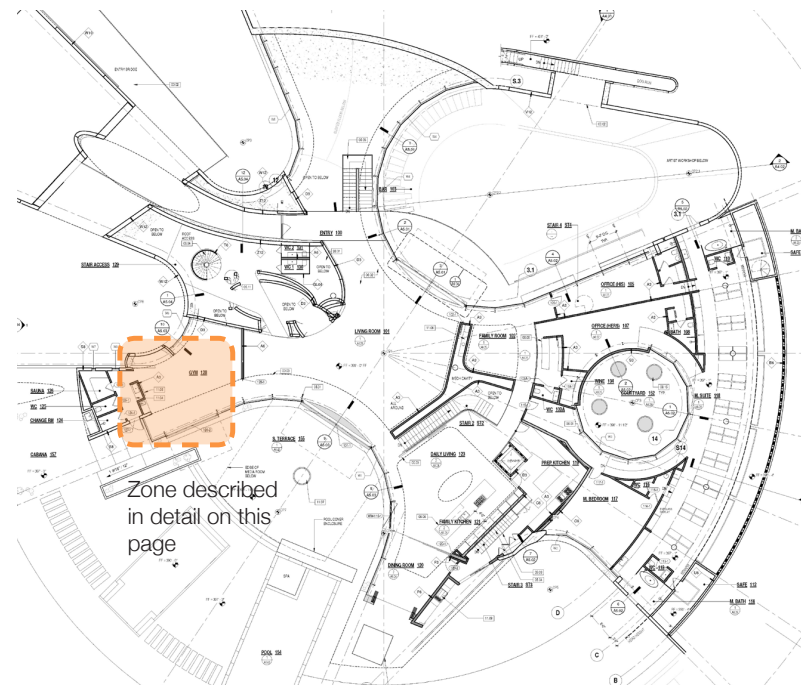


Diagram showing piping sequence through a typical zone (in this case, the gym) where the perimeter area, most likely to be affected by solar heat gain and heat loss, receives chilled water first.

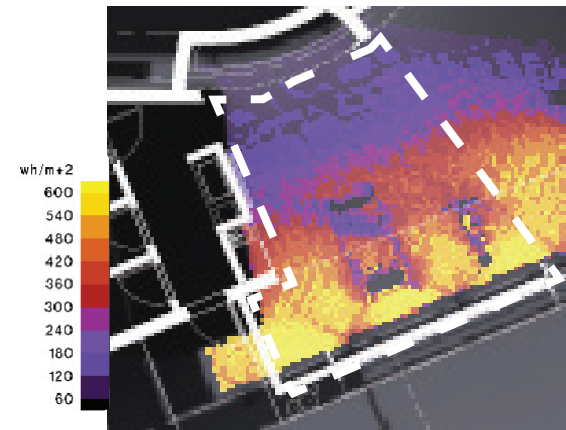


Image showing cumulative solar radiation (kWh/m²) in the zone shown above over a typical year.

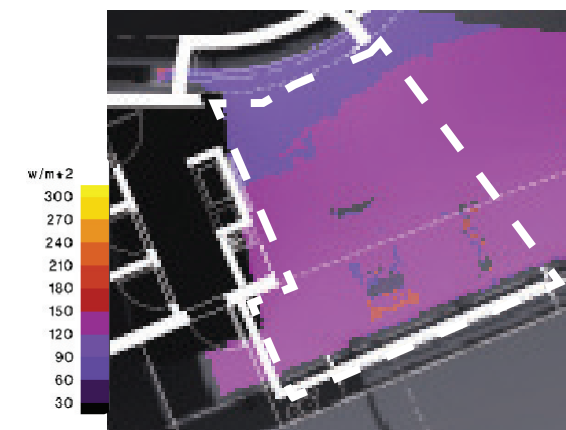


Image showing peak instantaneous solar radiation (W/m²) in the same zone on October 21st

Design Development



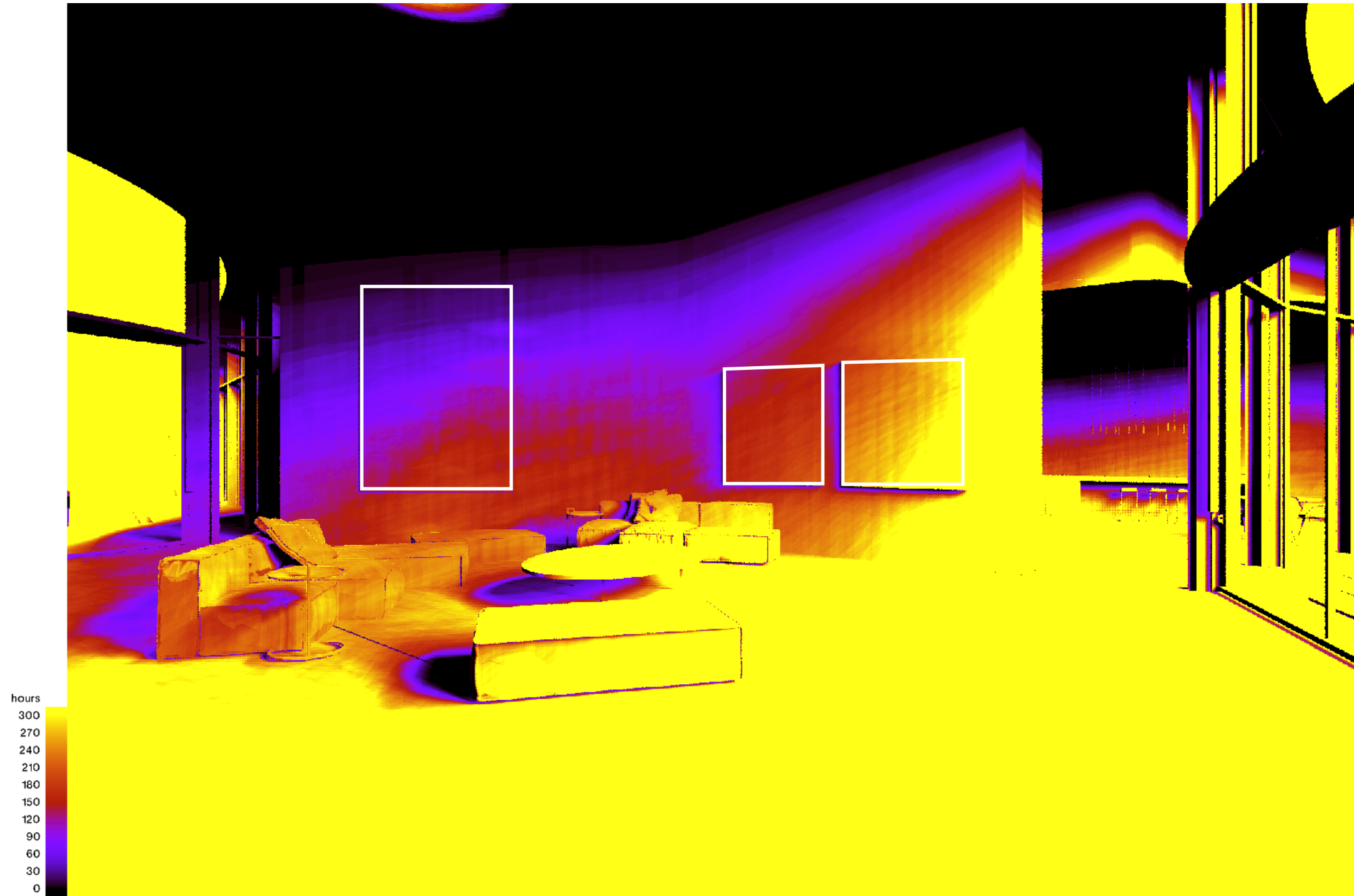
Curatorial Analysis



Design Development



Annual Cumulative Hours of Direct Sun

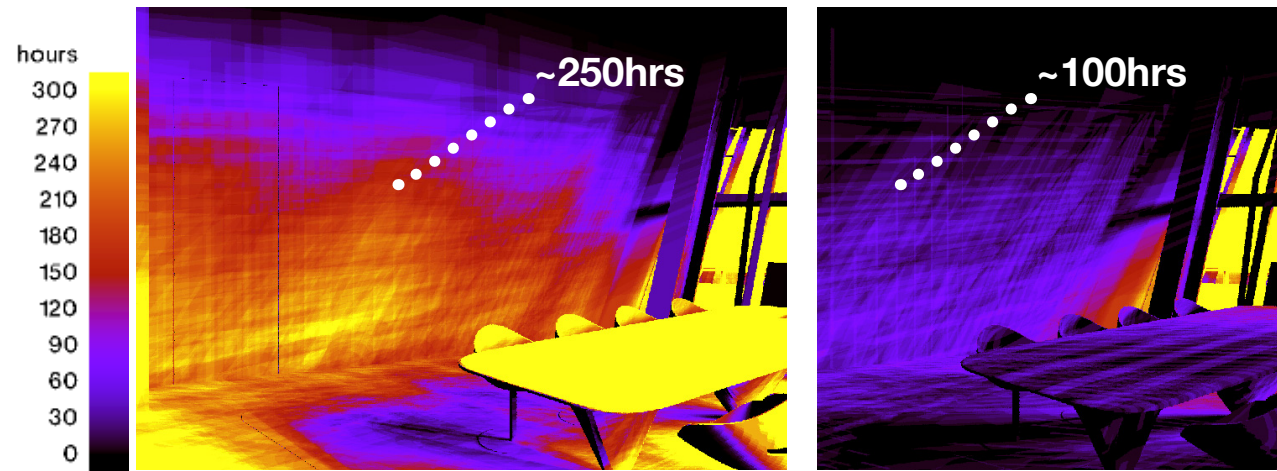


Design Development



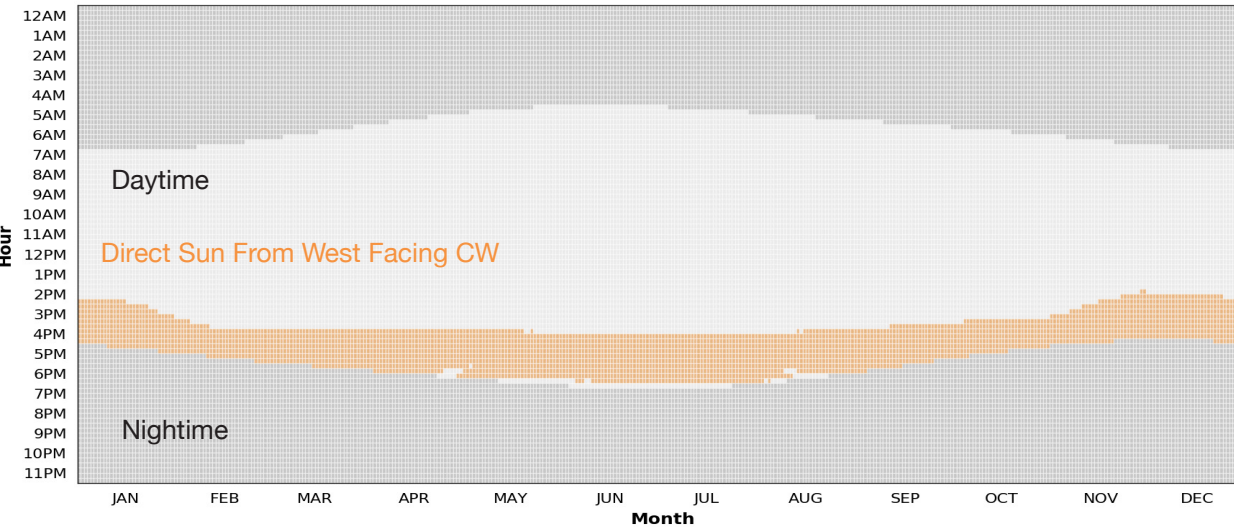
Curatorial Analysis

Hours of Direct Solar Radiation



Cumulative With No Shades

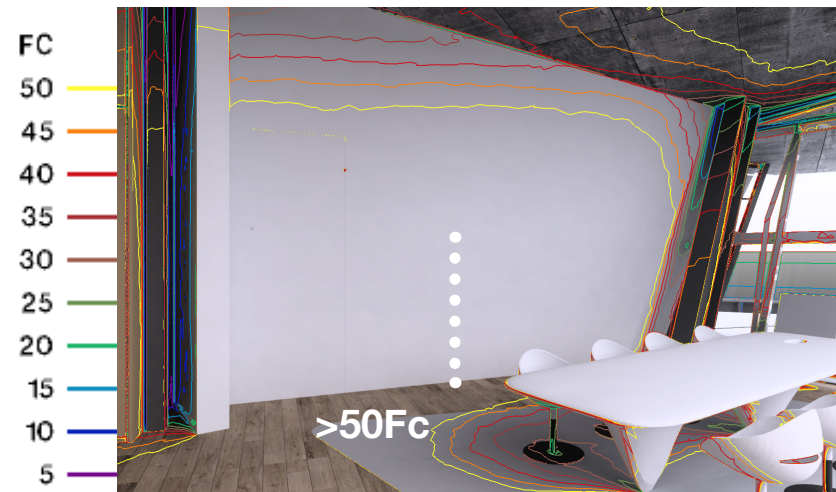
With Shades (Blackout) only on West CW



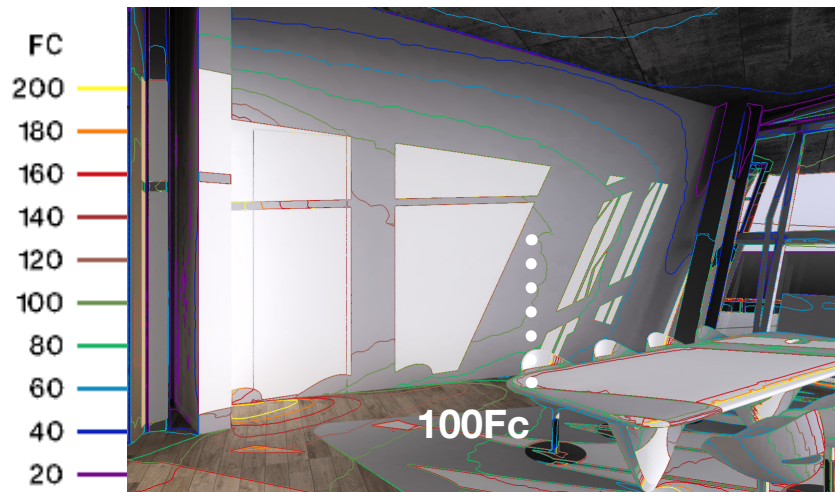
Observations:

Total of 250 hours per year of direct sun (over 400Fc), maximum of 775 hrs on the whole wall. Sun comes from west facing curtain wall. Direct sun from west facing curtain wall happens in the afternoon from 2pm to 4pm until sunset, during the whole year.

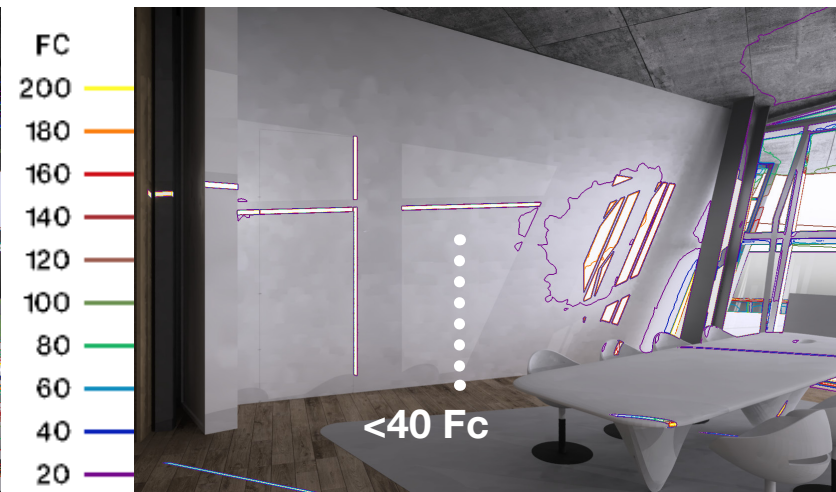
Instantaneous Light Levels



Overcast - No Shades



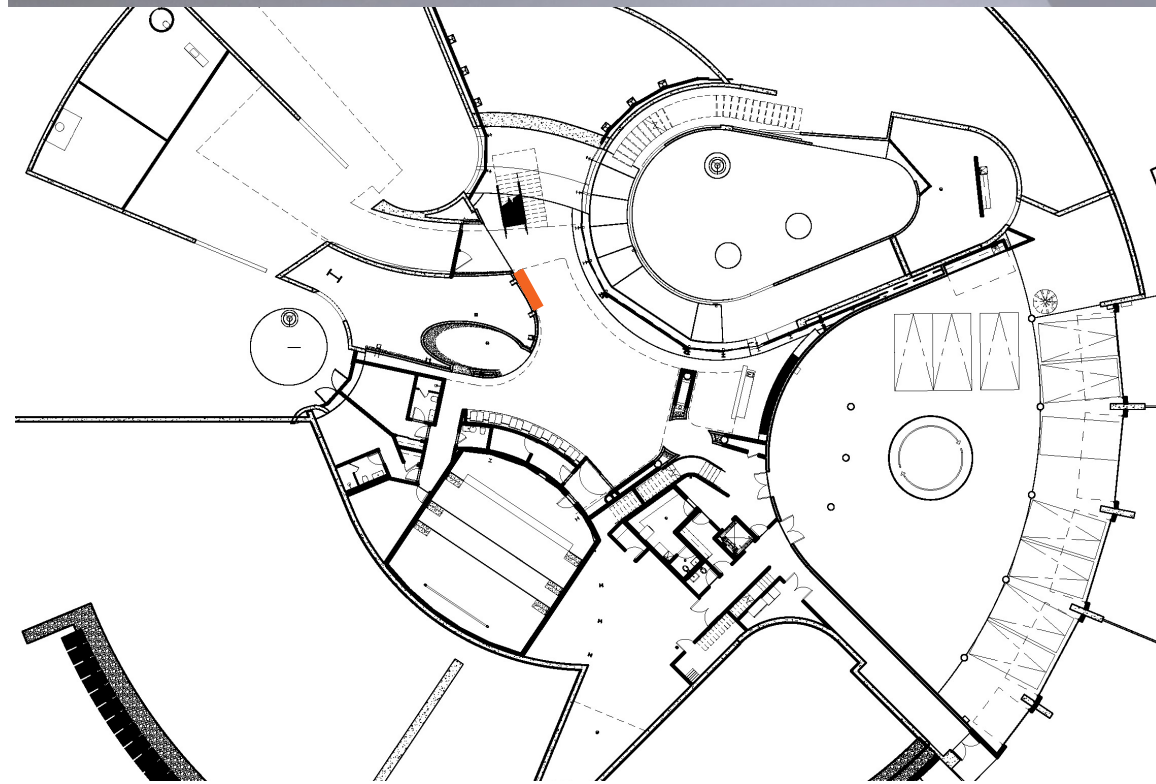
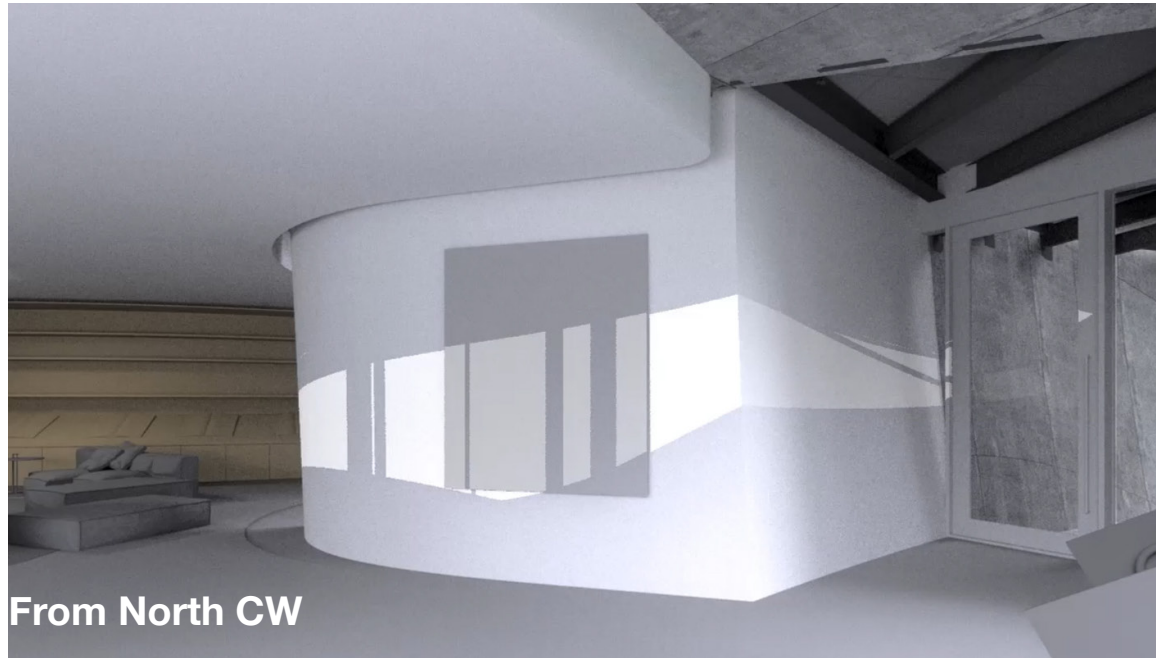
Clear Sky - No Shades



Clear Sky - Shades
(4% Openness on West CW)



Curatorial Analysis



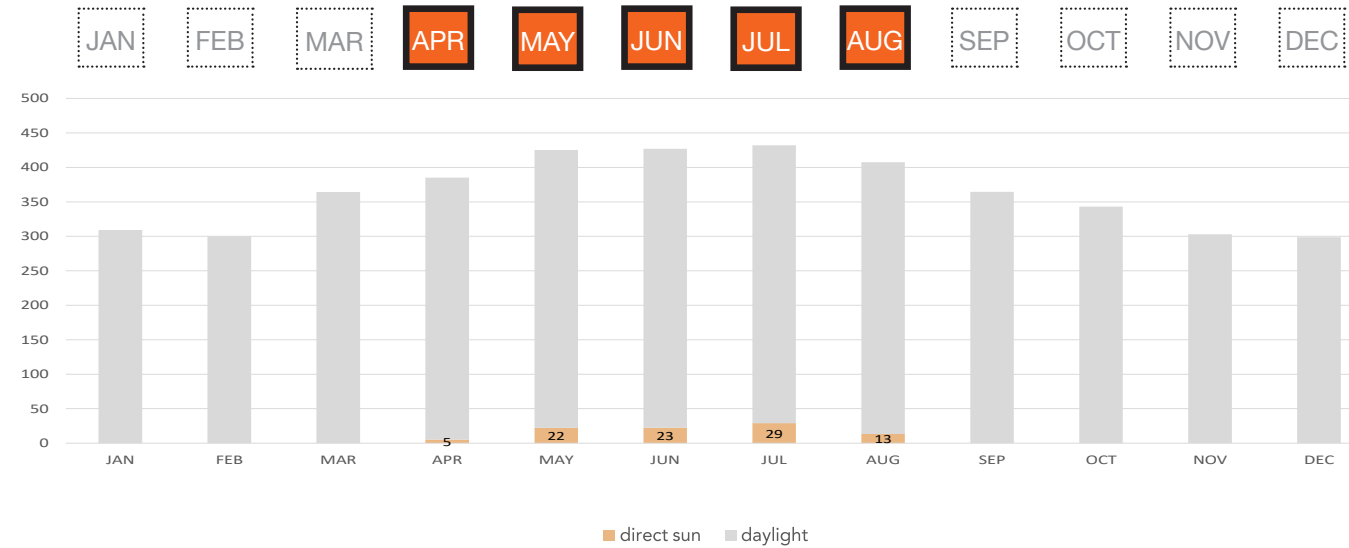
Recommendation:

It is possible to display the following colored materials:

ONLY if automated shades on north

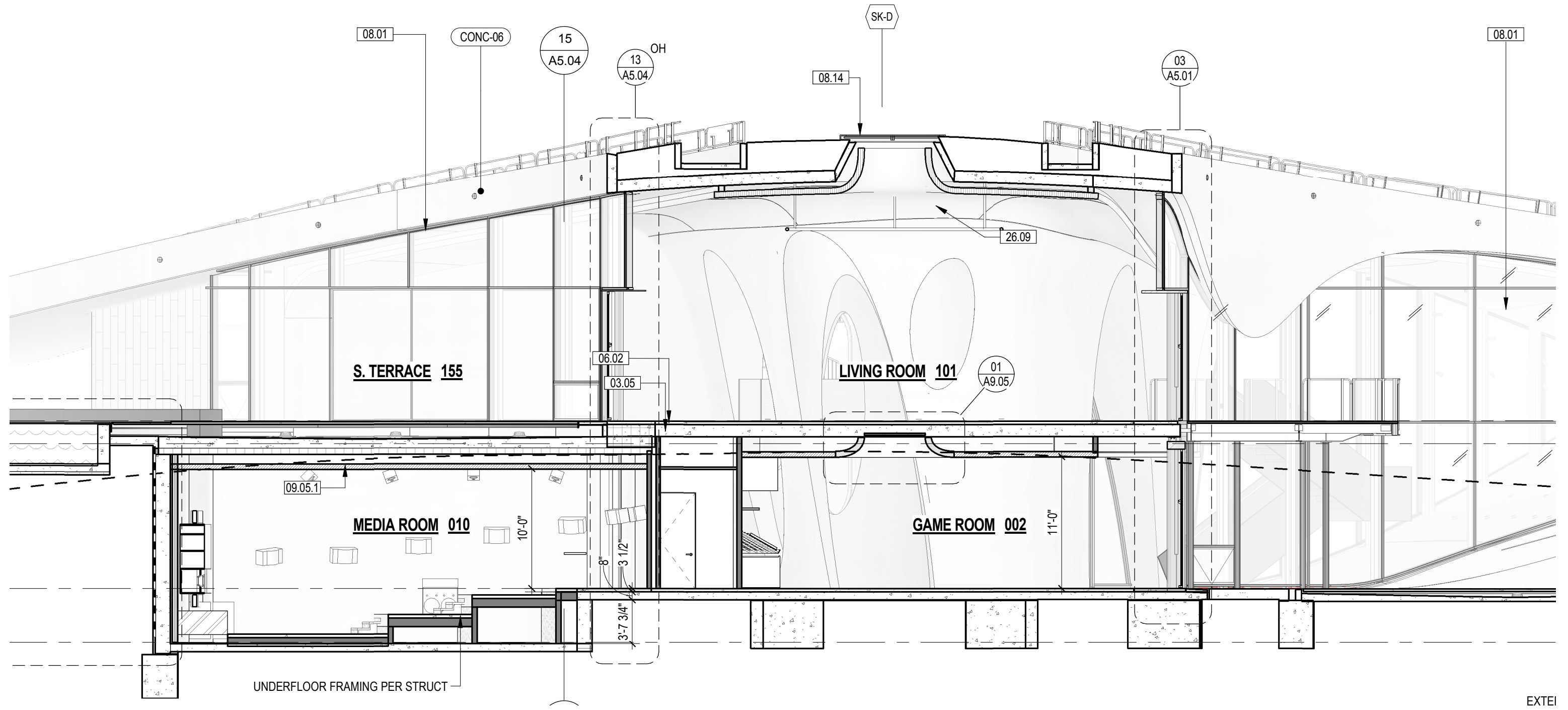
NO SENSITIVITY	* LOW SENSITIVITY	MEDIUM SENSITIVITY	HIGH SENSITIVITY
NO LIMIT	LIMIT: 60,000 Fc/hr (20Fc)	LIMIT: 5,000 Fc/hr (20Fc)	LIMIT: 1,500 Fc/hr (5Fc)
Metals, stone, glass, most ceramics, enamel, most minerals.	Oil and tempera fresco, undid leather and wood, horn, lacquer, some plastics	Costumes, watercolors, pastels, prints, manuscripts, paintings in distemper media, wall paper gauche, wood, fur, leathers	Silk, newspaper, felt tip pen, fugitive dyes, pristine art never exposed to light.

Direct Solar Radiation



Anticipated Electric Lighting Effect

Wall wash, ceiling recessed



Construction Documents



Refinement of daylighting and electric lighting design



Construction Documents

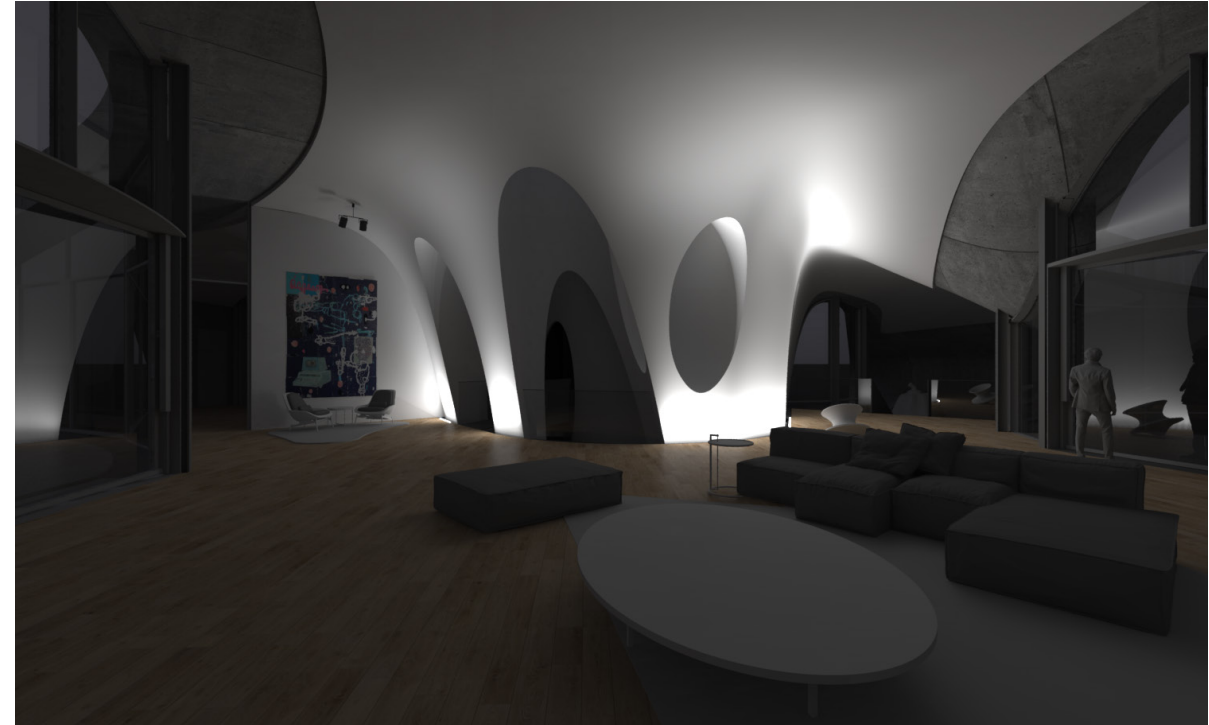
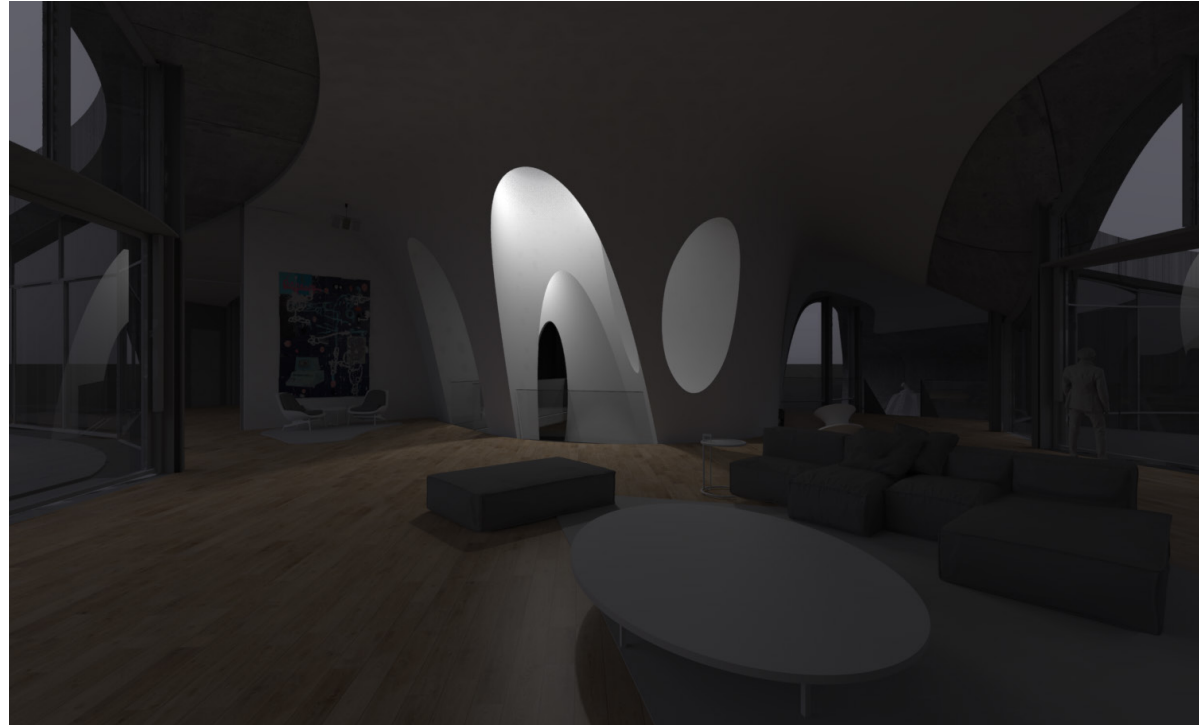
Lighting Design

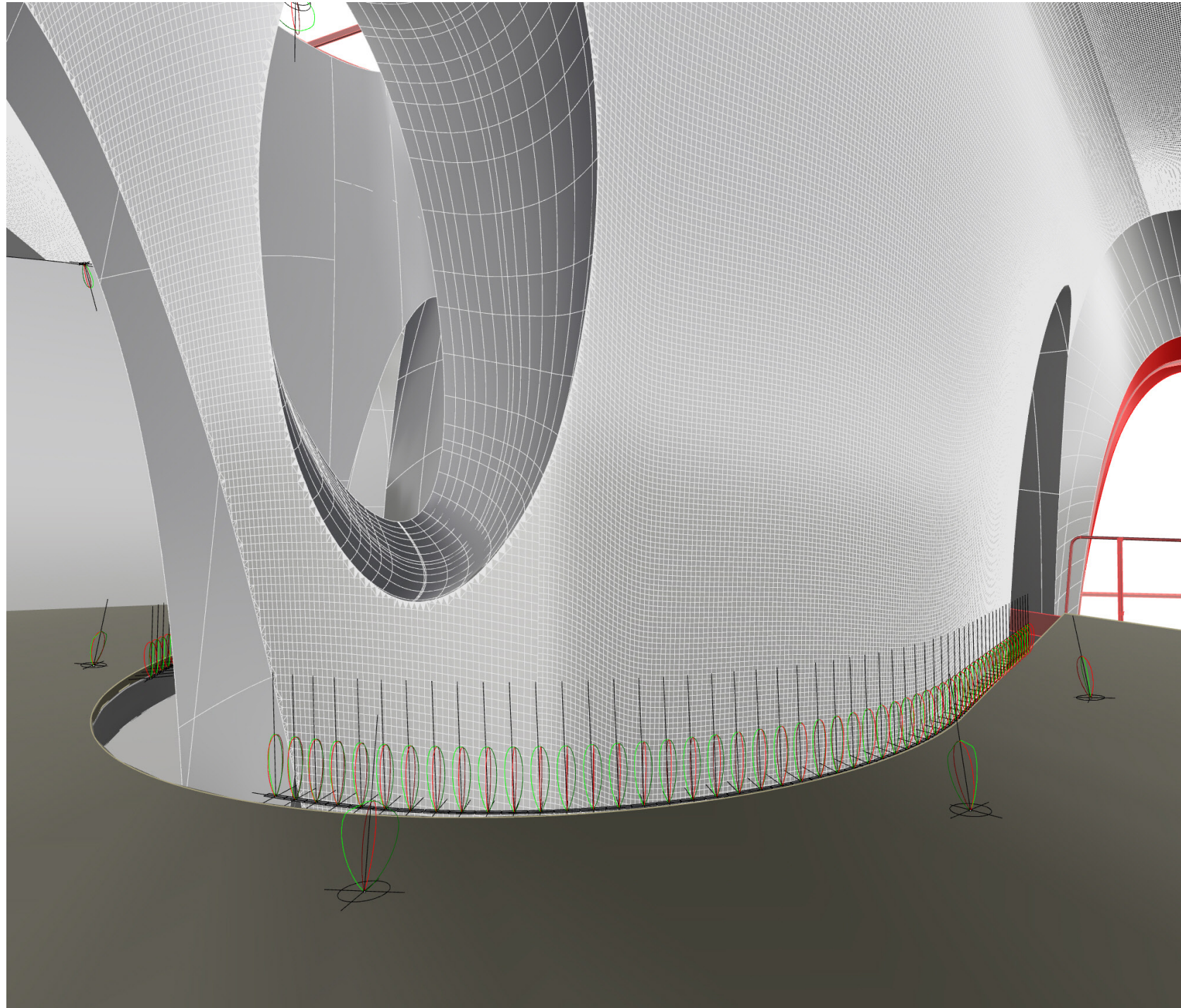


Construction Documents



Layers Of Light





Snake Deco Specifications



Ordering Information ¹ (Minimum order quantity 9pcs)							
Model	Length	Power	Color	Optics	Voltage	Options	Housing
F SND	5	H	30	FL	24	C1	SNC
F SND	5	H	30 35 40	SP FL	24	C1 C2 C3 CX	SNC

¹Specify remote power supply separately below. **Max run from single feed 23 elements**

Luminaire

- Sustainable design
- Radius, minimum 12.36" (314mm)
- Diffused line of light
- IP67, UL STD 1598, wet location, walkover rated 1000 lb
- Clear borosilicate glass 1.2" (30mm) thick
- Anti glare system
- Aluminum construction, with diffused tempered glass
- ABS Installation housing, direct concrete pour
- Snap in installation with no exposed hardware
- 3.3' (1m) feed cable standard

Size

- 5 = 5" (124mm) x 3.5" H (90mm)

Power

- H = 2.5W, 3000K, 225 lm

Color Temperature

- 30 = 3000K
- 35 = 3500K
- 40 = 4000K
- 2 Step MacAdam
- CRI: > 85

Optics

- SP = spot - 17°
- FL = flood - 31°

Voltage

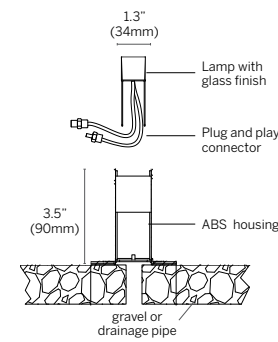
- 24 = 24VDC fixture voltage

Options

- C1 = 10' (3m) feed cable
- C2 = 20' (6m) feed cable
- C3 = 30' (9m) feed cable
- CX = specify length

Housing

- SNC = concrete



Power Supply² (Remote)

- | | |
|--|---|
| <p>Non-Dim</p> <ul style="list-style-type: none"> <input type="checkbox"/> D-520-24007: Osram 96W, 24VDC, 120-277VAC <p>Dim</p> <ul style="list-style-type: none"> <input type="checkbox"/> D-520-24006: Osram 10% 0-10V dimming, 96W, 24VDC, 120-277VAC <input type="checkbox"/> IL-JB-LED-24003-120V-DFPN: Lutron LTE 1% Forward Phase (with neutral) dimming, 5-40W, 24VDC, 120VAC, Case K, dry location enclosure | <ul style="list-style-type: none"> <input type="checkbox"/> IL-JB-LED-24010-UNV-D3W: Lutron L3D 1% 3-wire dimming, 5-40W, 24VDC, 120-277VAC, Case K, dry location enclosure <input type="checkbox"/> IL-JB-LED-24010-UNV-DES: Lutron L3D 1% EcoSystem dimming, 5-40W, 24VDC, 120-277VAC, Case K, supplied in a dry location enclosure |
|--|---|

²See power supply pages for details. No enclosure, unless stated. Im80 values shown.

FILIX

410 381 1497 inter-lux.com answers@inter-lux.com
Inter-lux reserves the right to make technical changes without notice.

ETL CE IP67
(rev2) 1

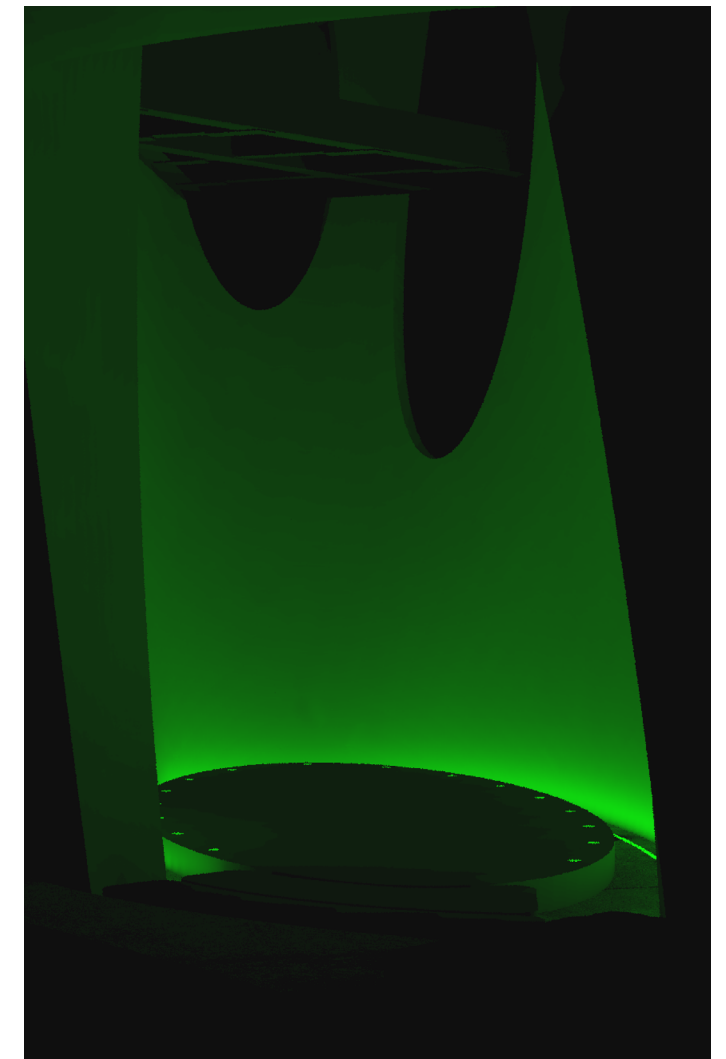
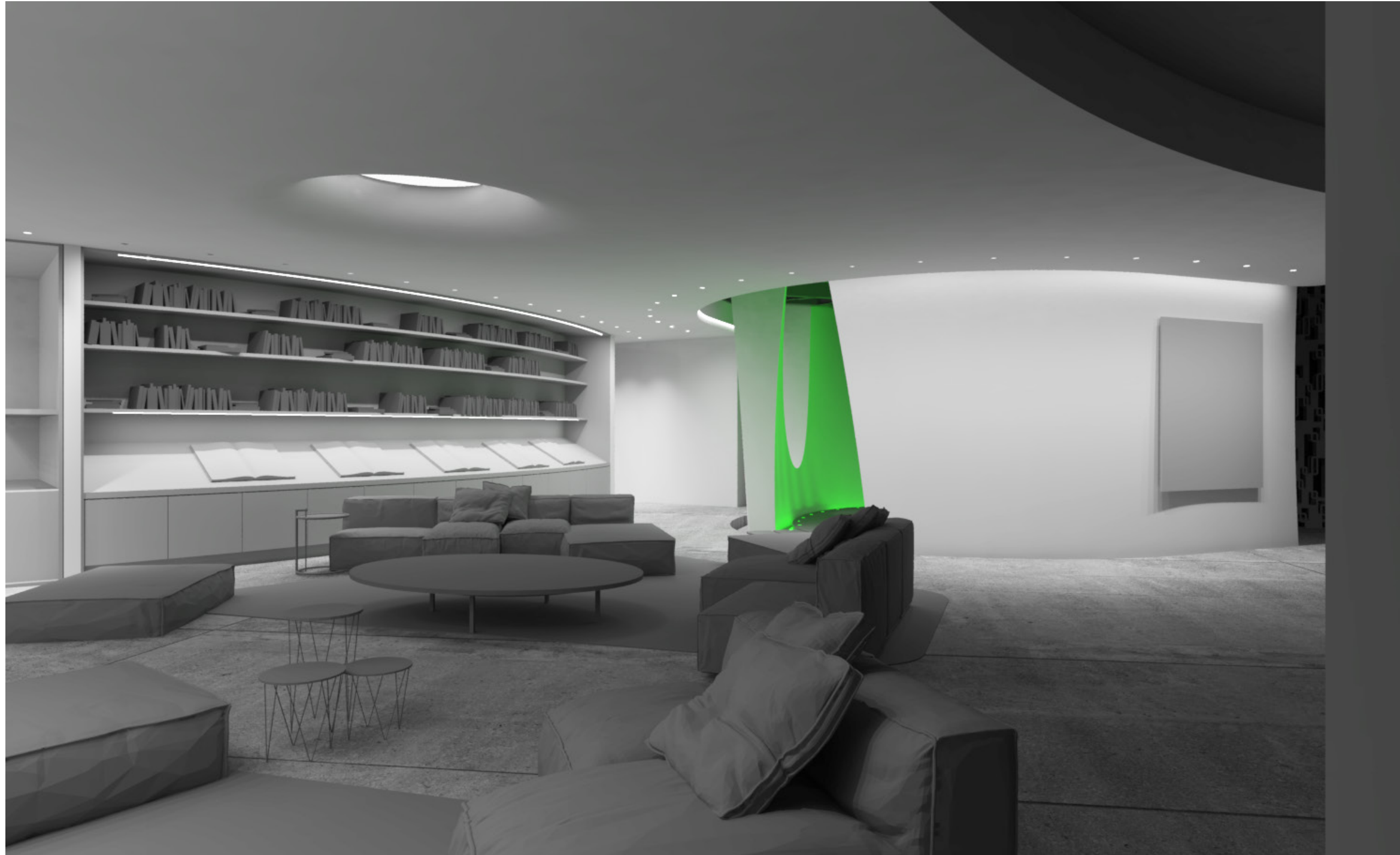


Lighting Design





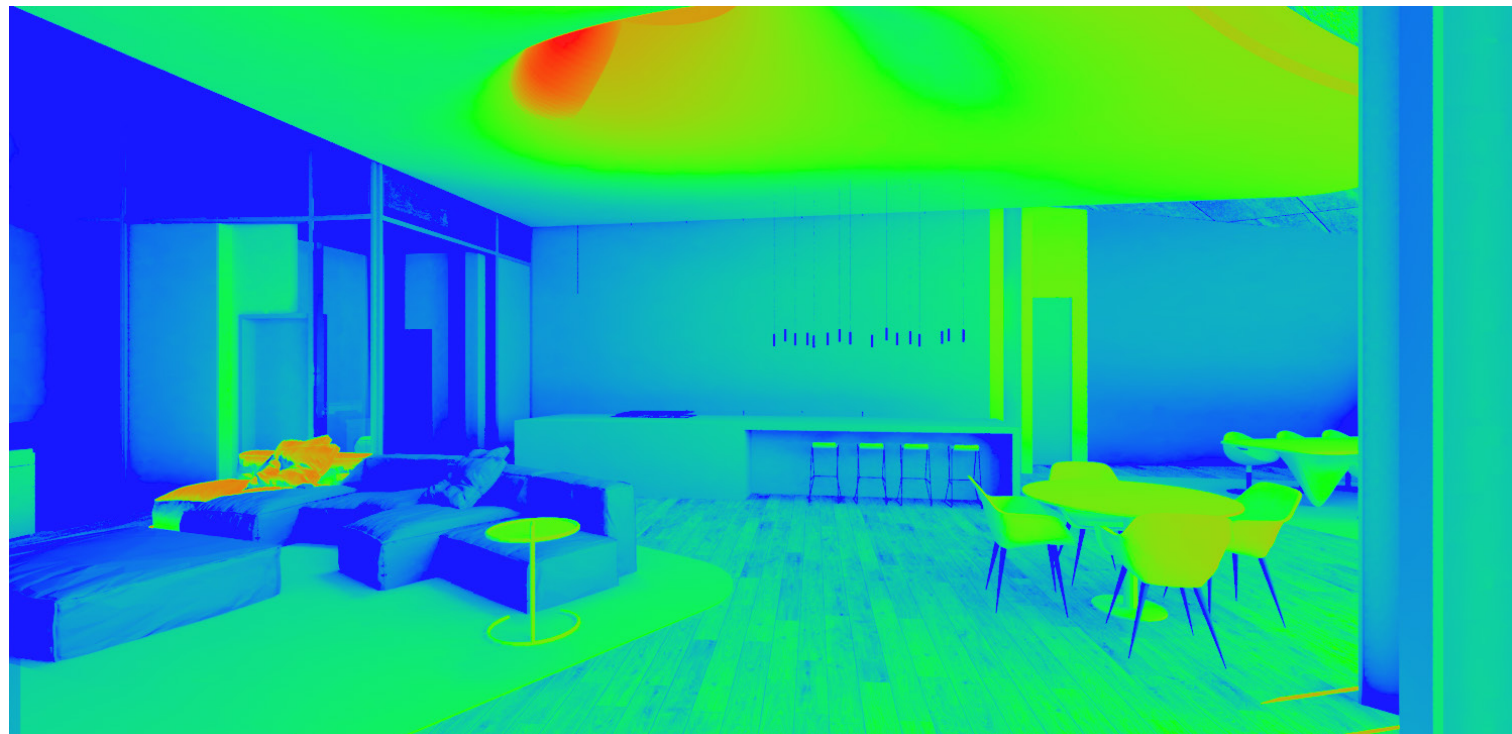
Lighting Design



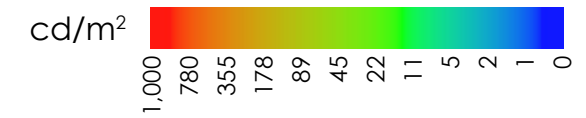
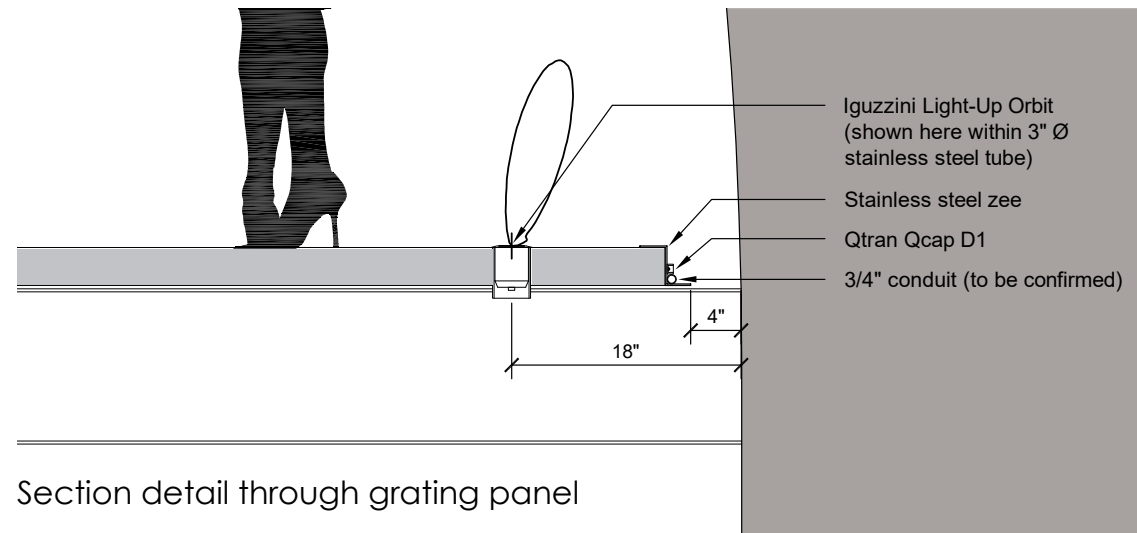
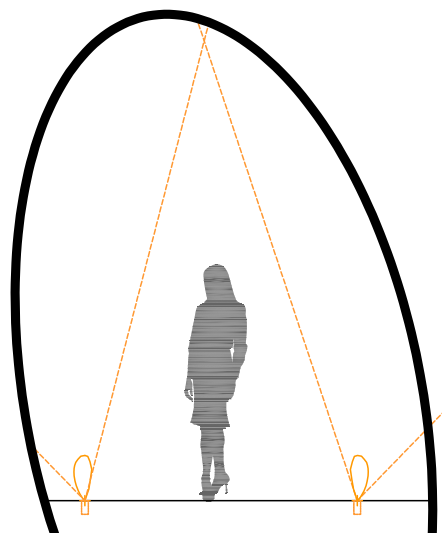
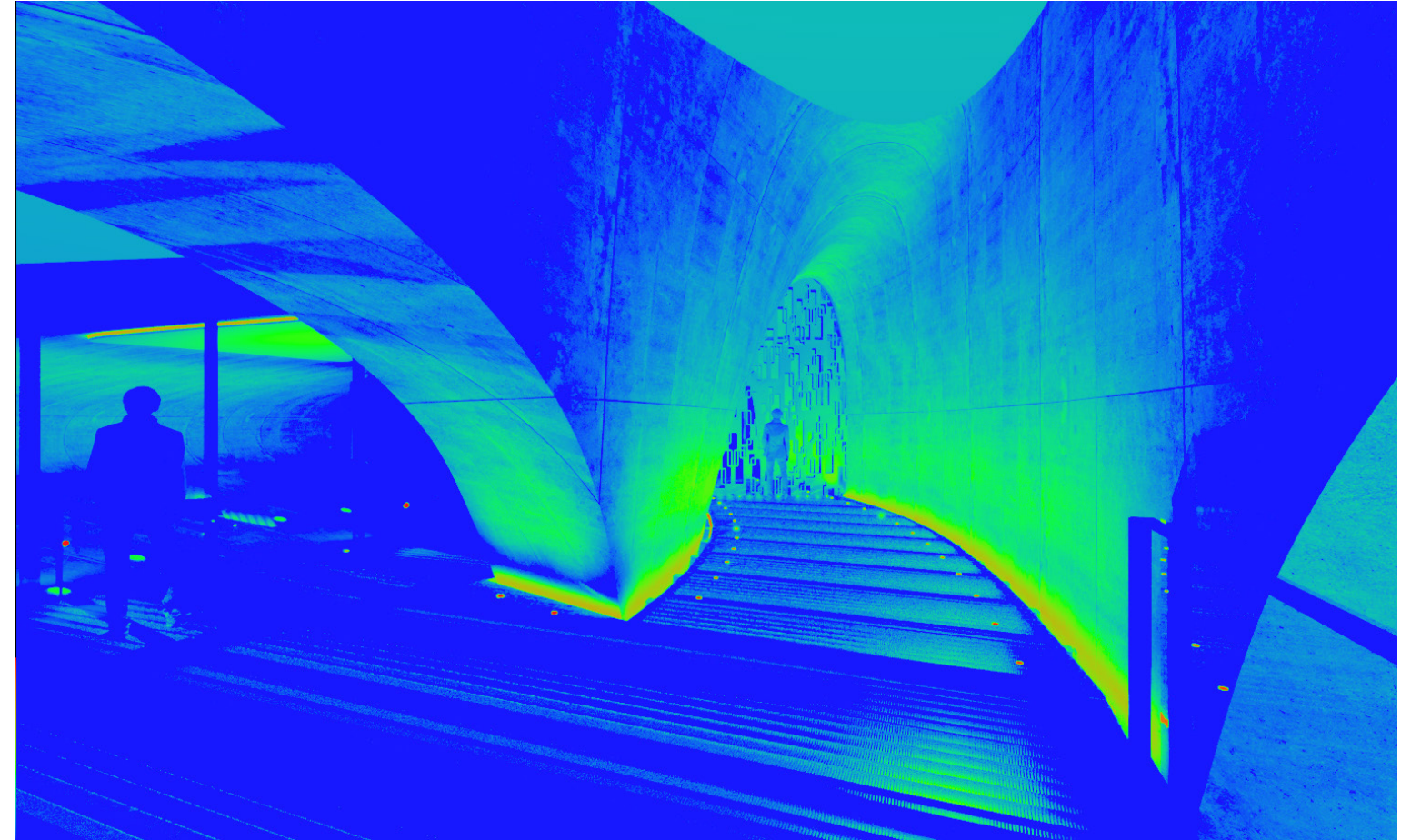
Construction Documents



Day-Night Transition



Lighting Design



Construction Documents

Lighting Design





Lighting Design

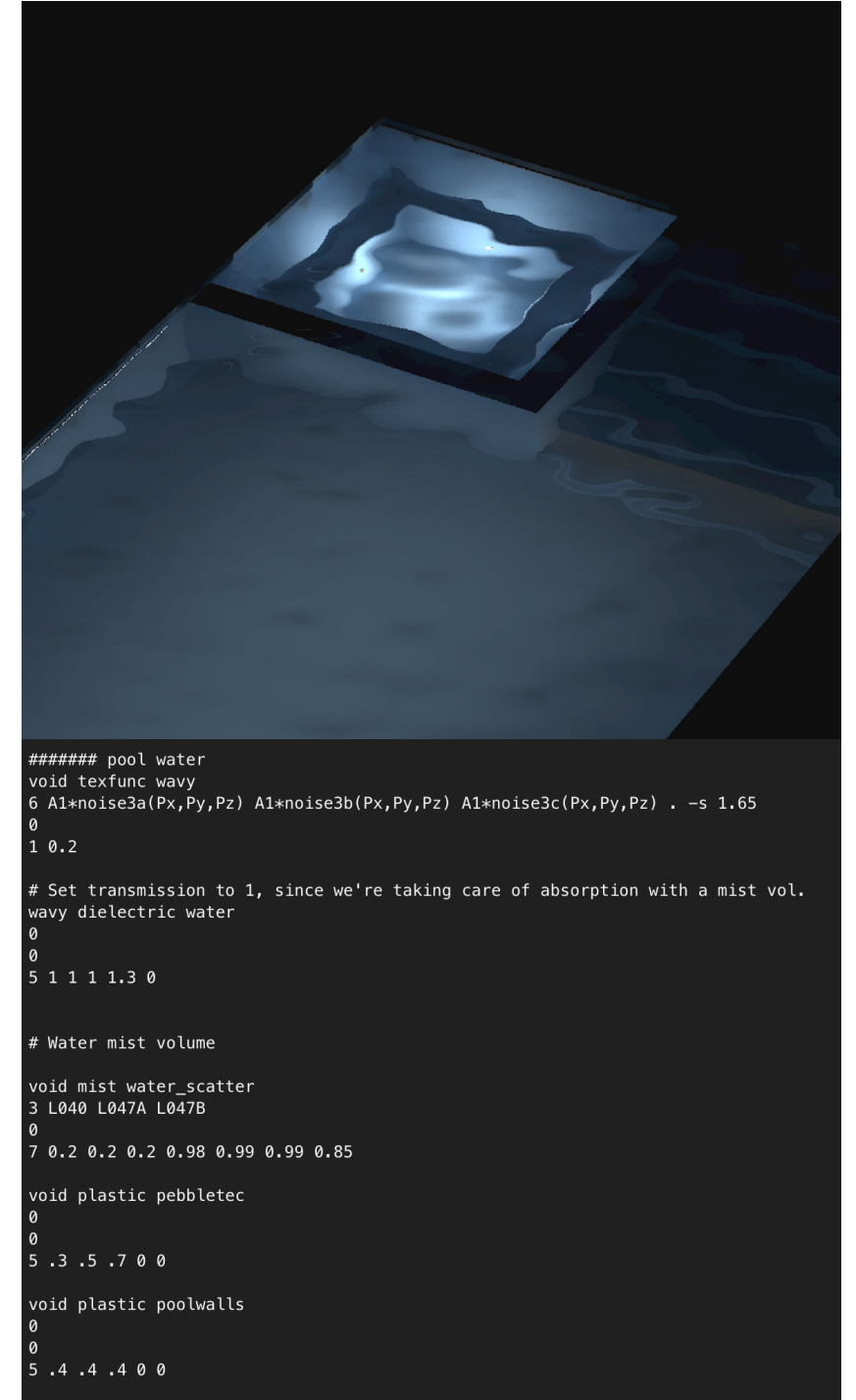
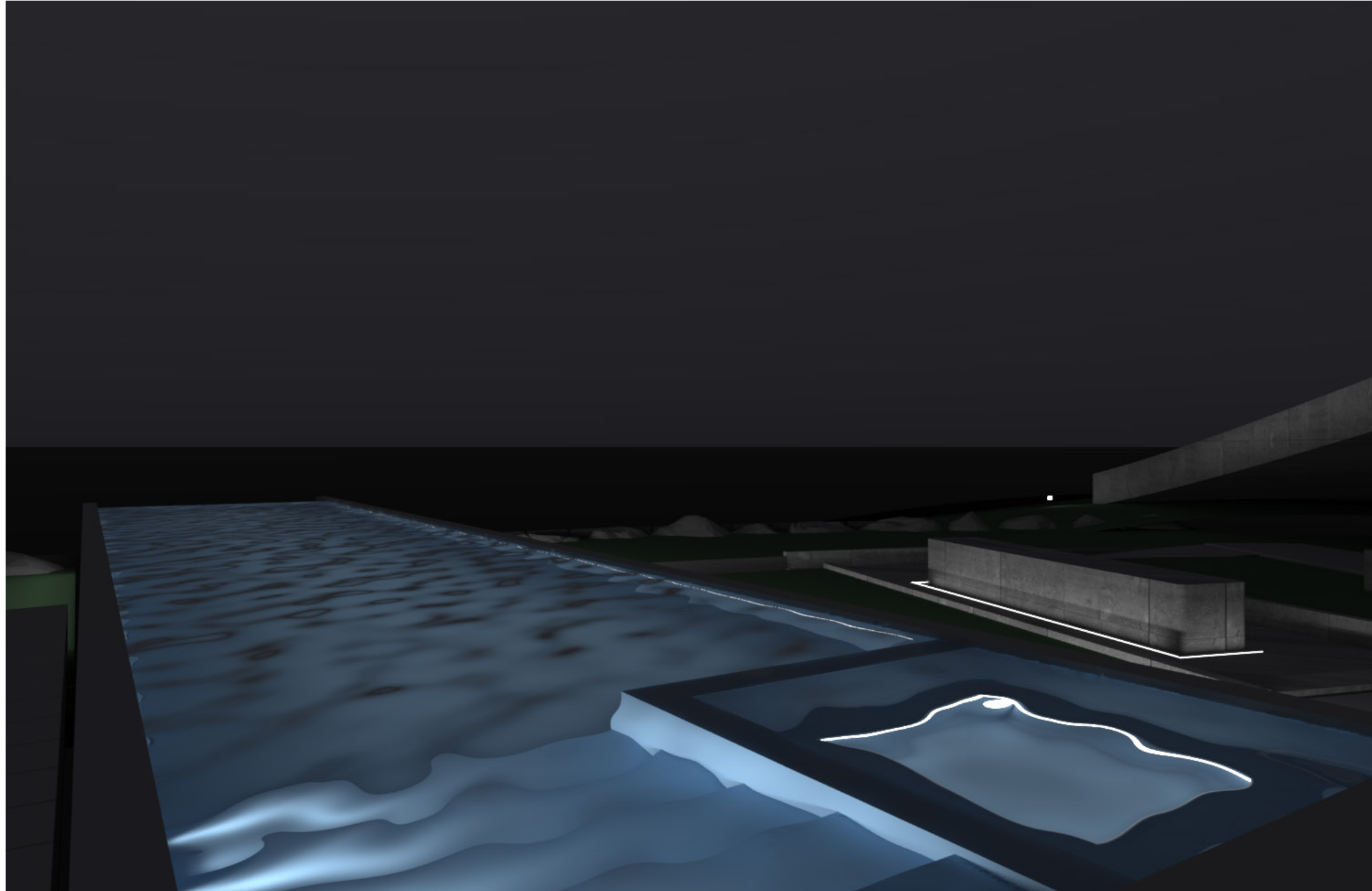




Lighting Design



Lighting Design



thanks Greg!

Under construction



Thank you

