2019 International Radiance Workshop // NYC August 21-23

DEMANDS OF THE RADIANCE POWER IN A NON-ORTHOGONAL WORLD

Eduardo Pintos

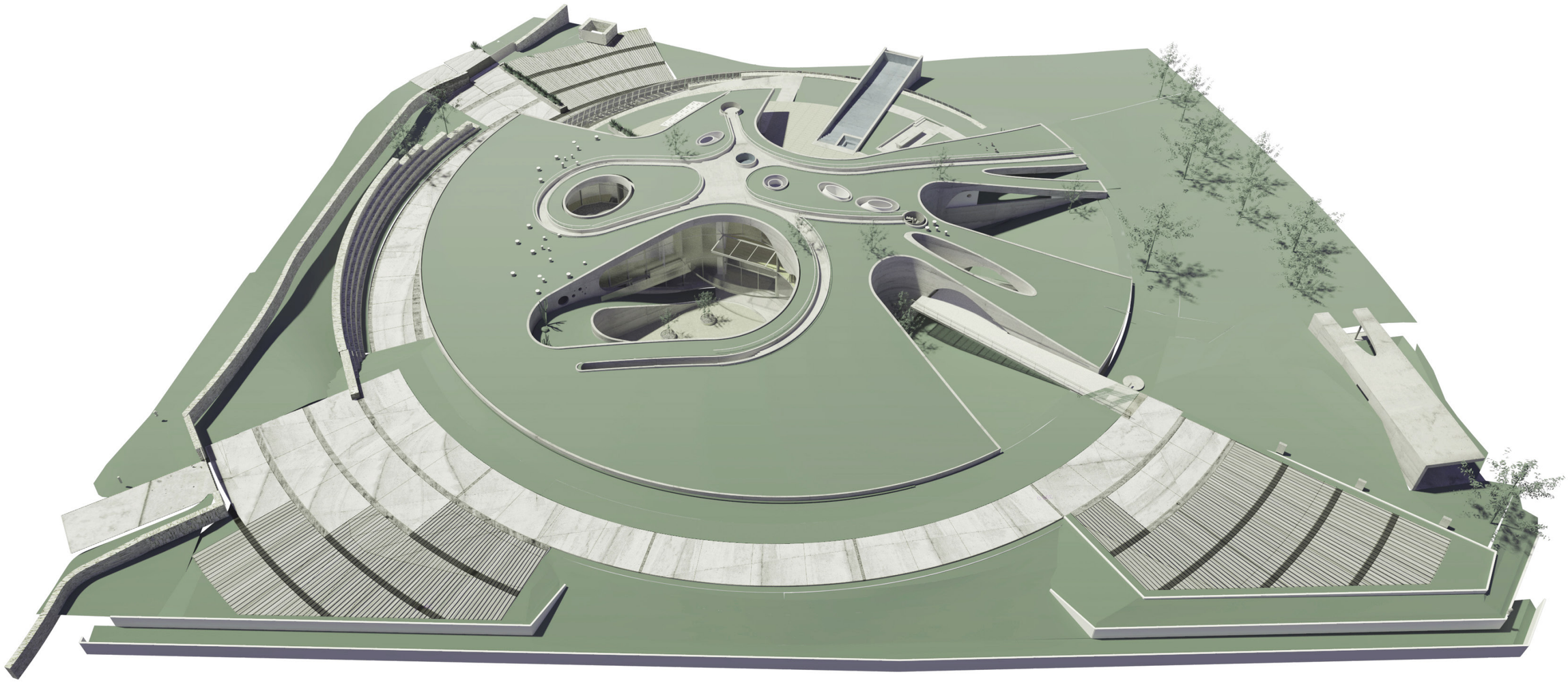
Project Team: George Loisos, Alan deMarche, Ibone Santiago, Abe Shameson

LOISOS + UBBELOHDE

ARCHITECTURE . ENERGY . LIGHT

House Intro

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



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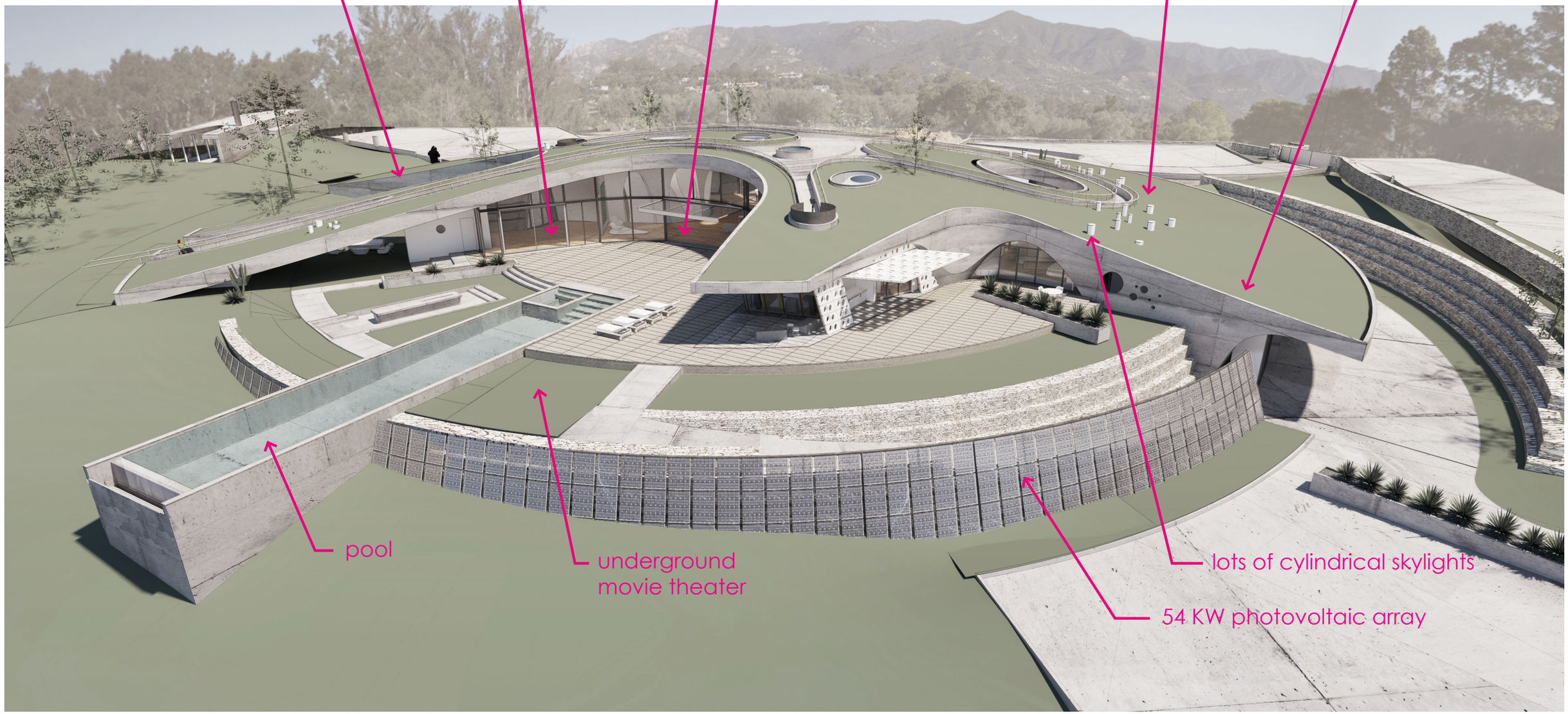
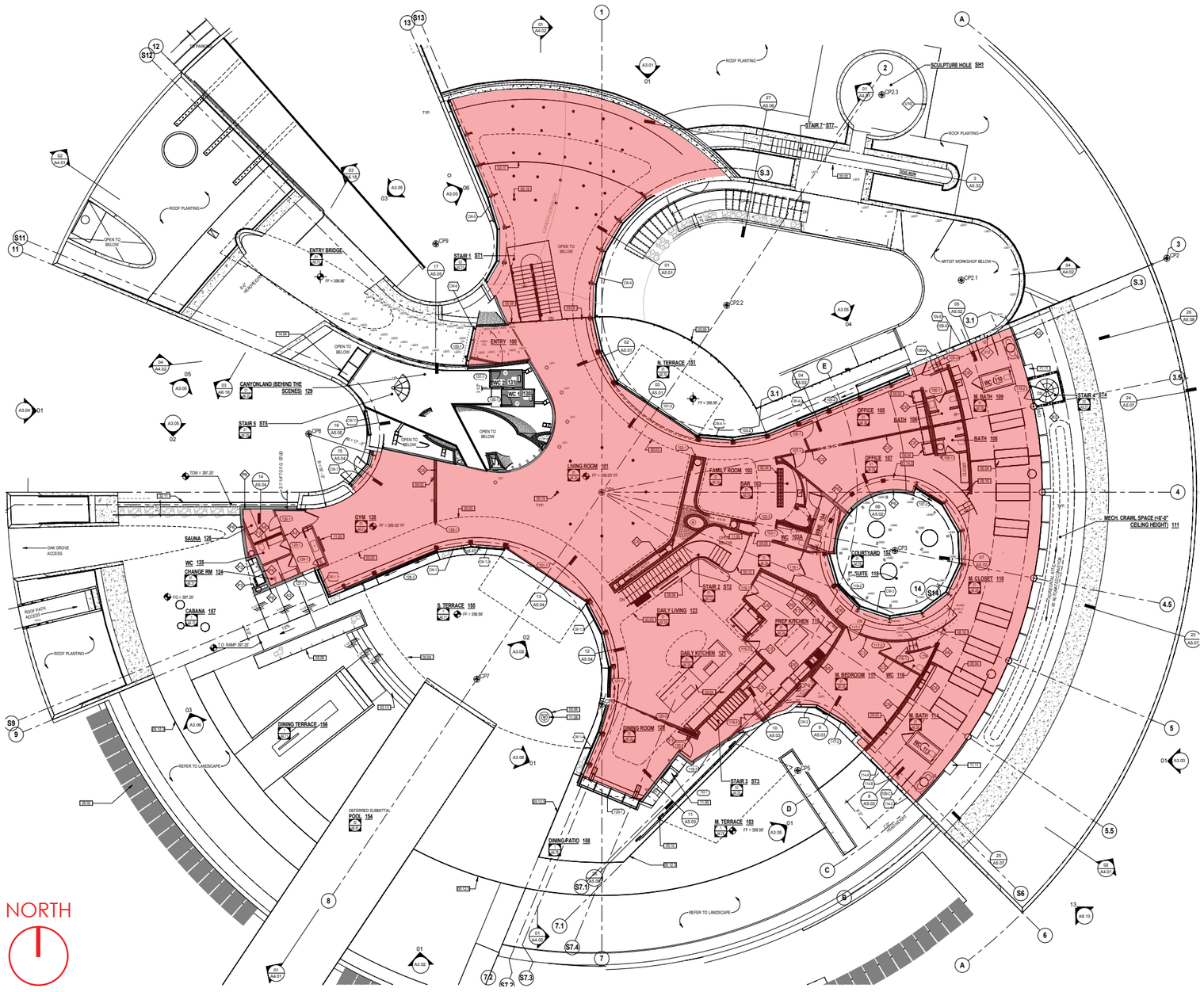
House Intro



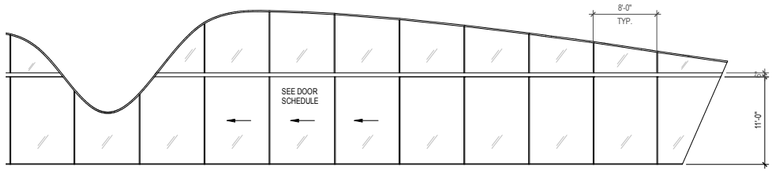
Aerial view rendering with site context

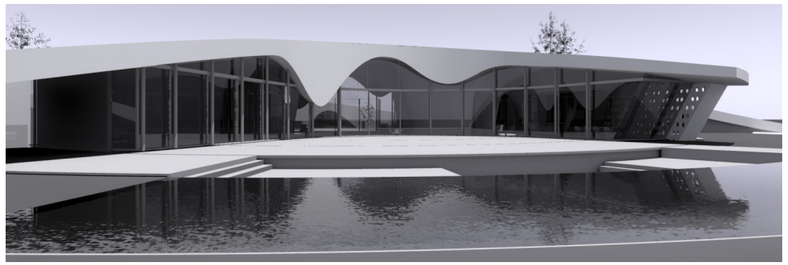
House Intro

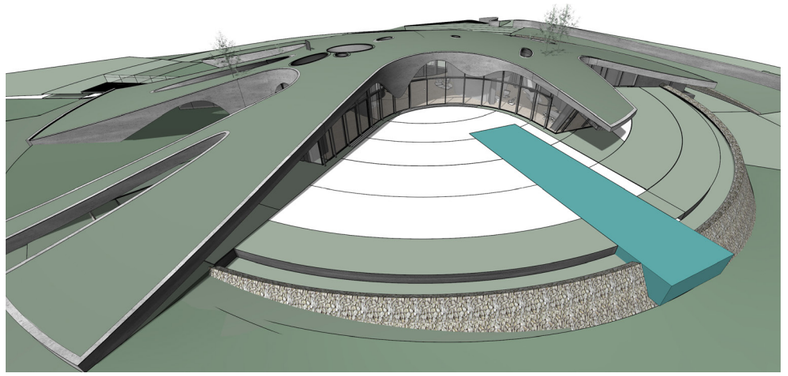
Main Level Plan

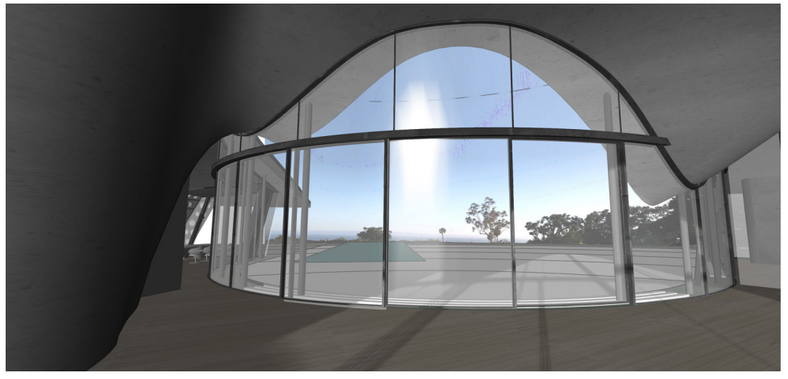


WWR: ~ 50%









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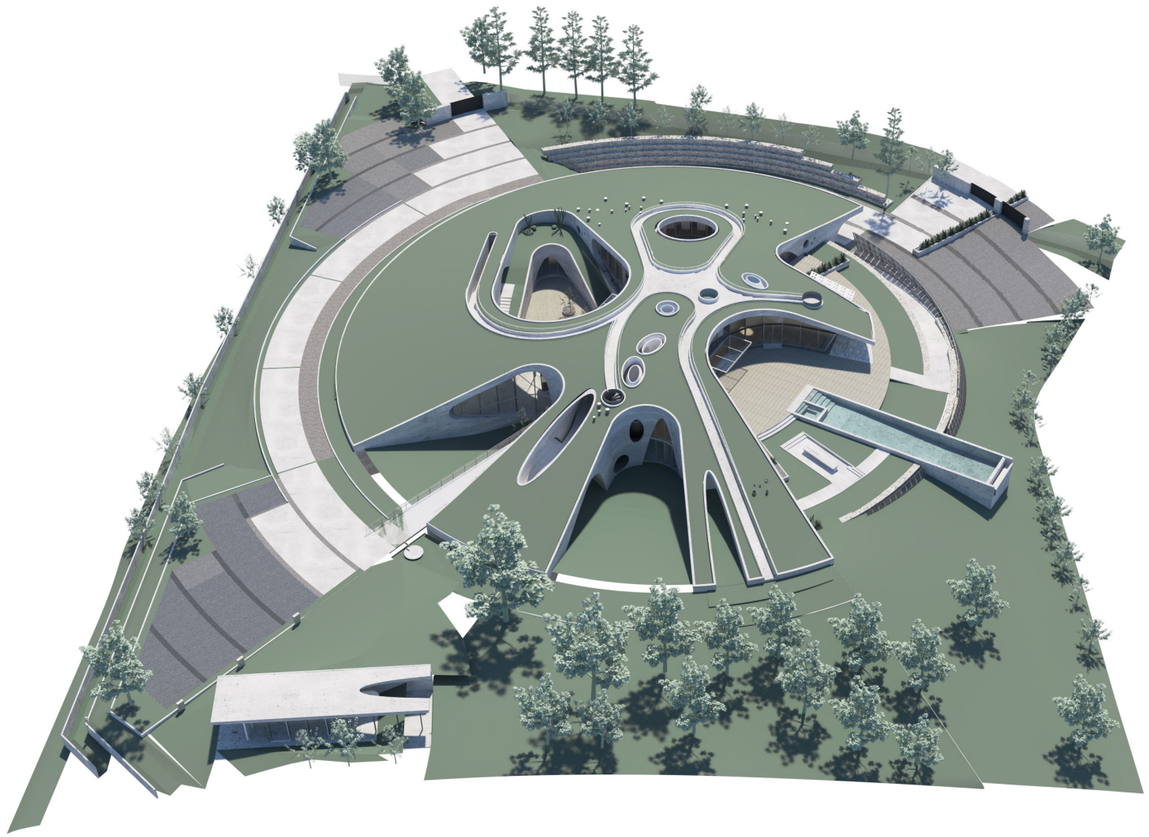
This House vs. Other House Type We Normally Work On



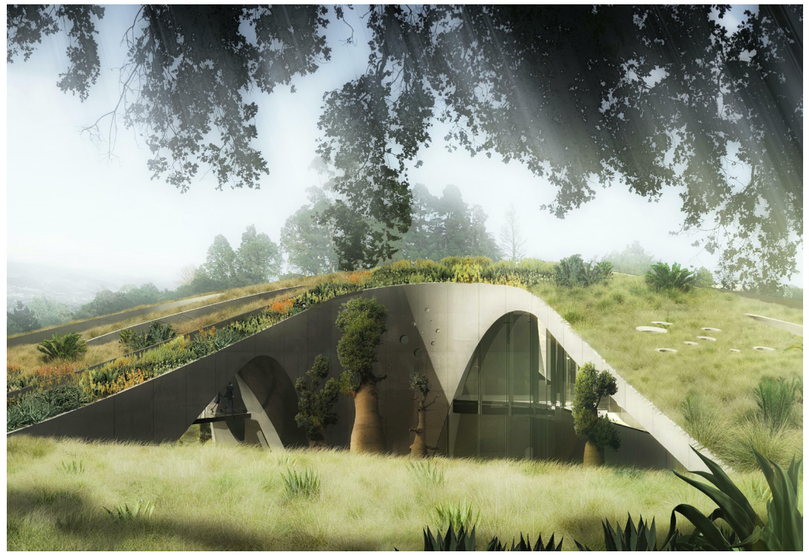
VS.

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

CONCEPT DESIGN › SCHEMATIC DESIGN › DESIGN DEVELOPMENT › CONSTRUCTION DOCUMENTS

SCHEMATIC DESIGN

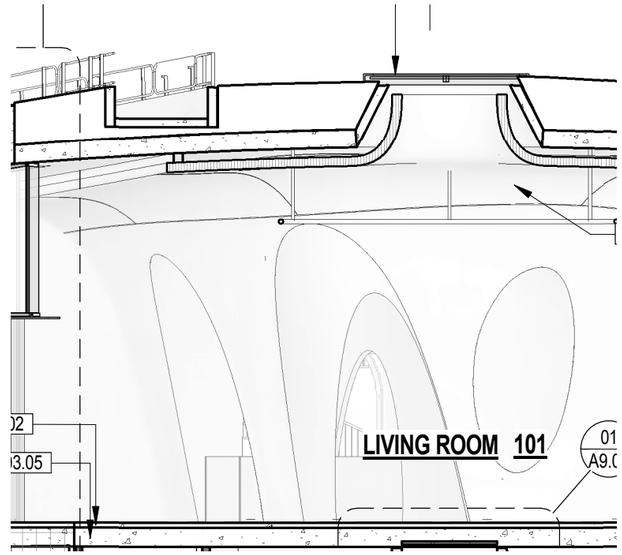


exterior rendering

DESIGN DEVELOPMENT

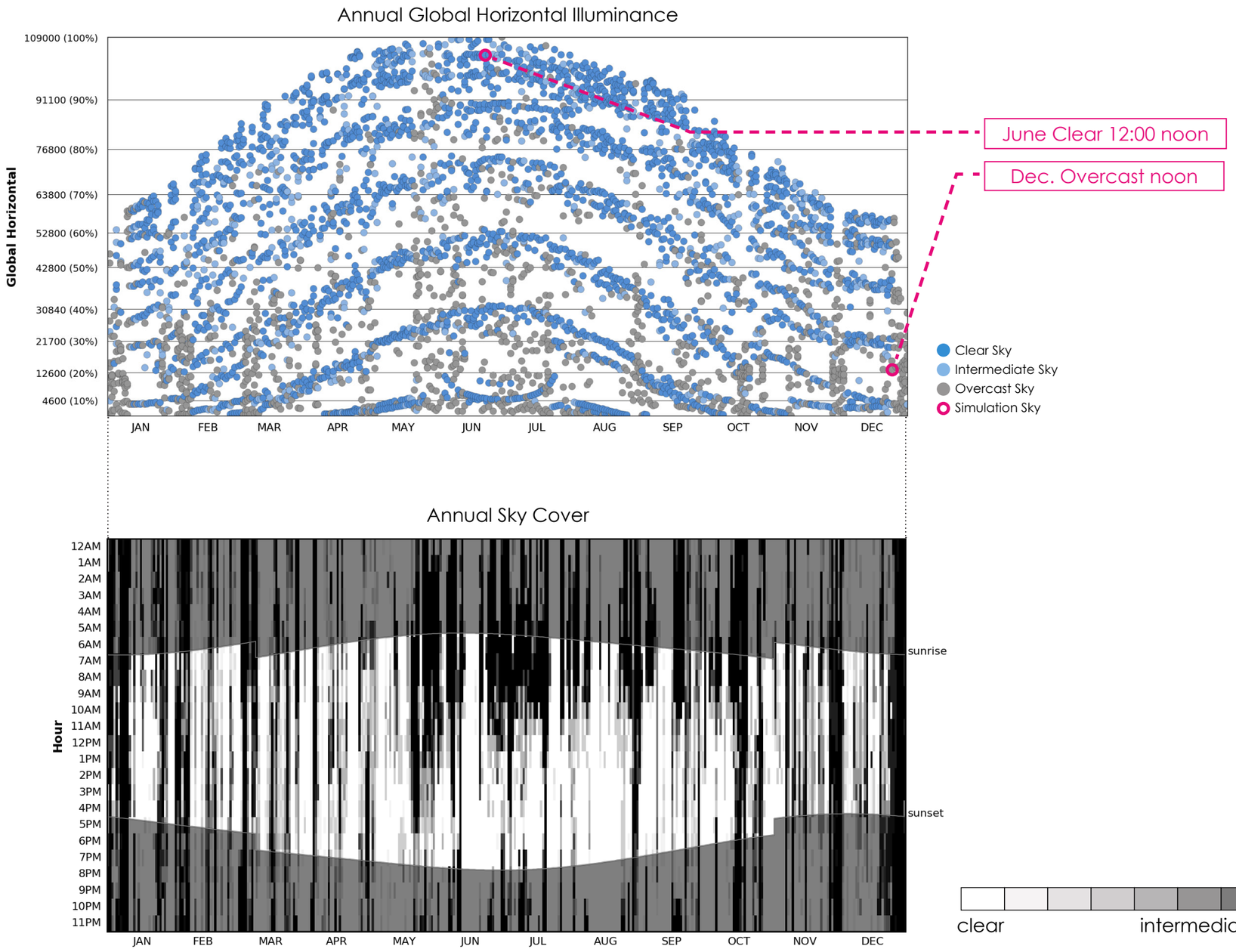
interior 180° rendering with finishes

CONSTRUCTION DOCUMENTS

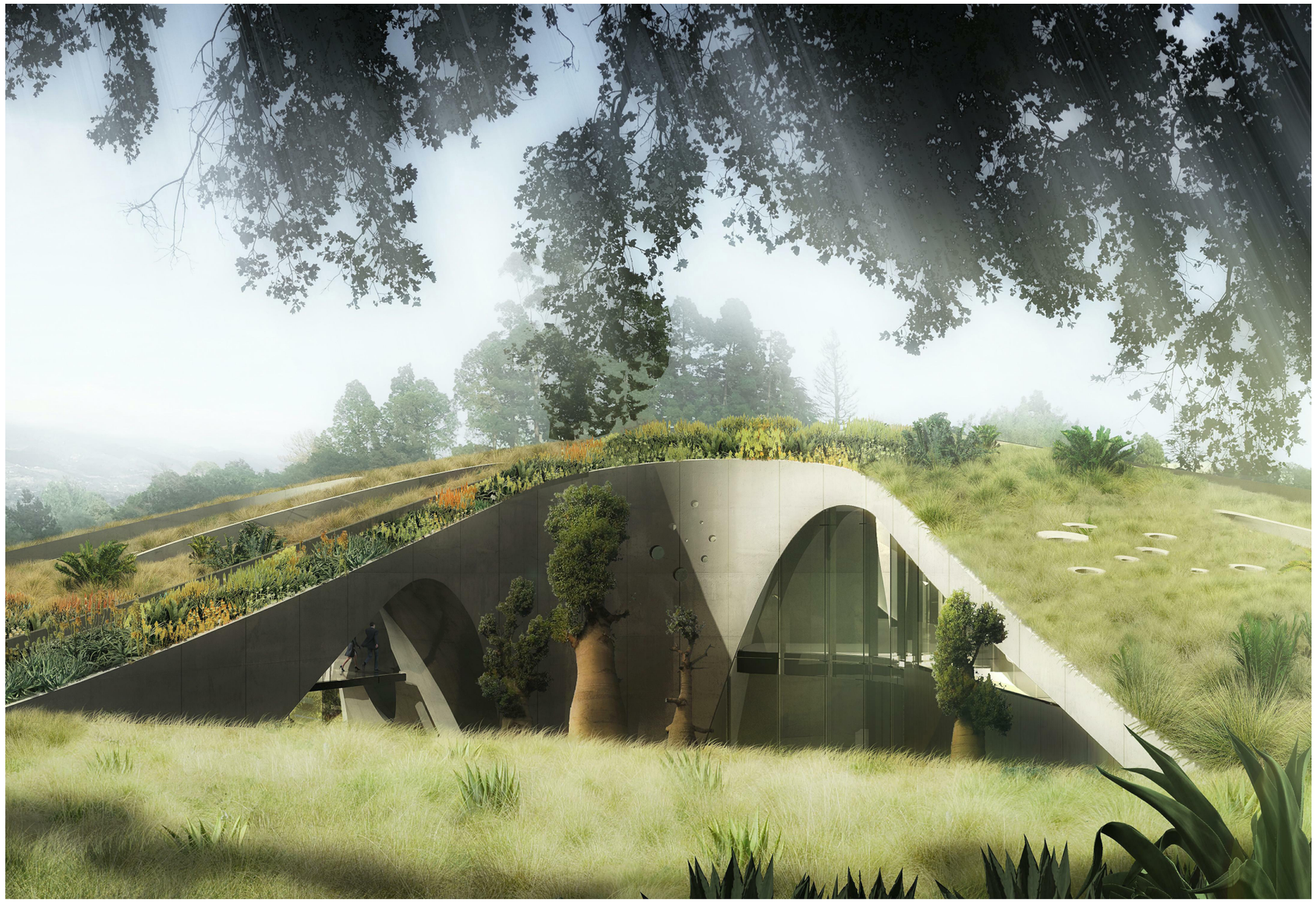


section drawing

Weather Data // Sky Conditions



Schematic Design



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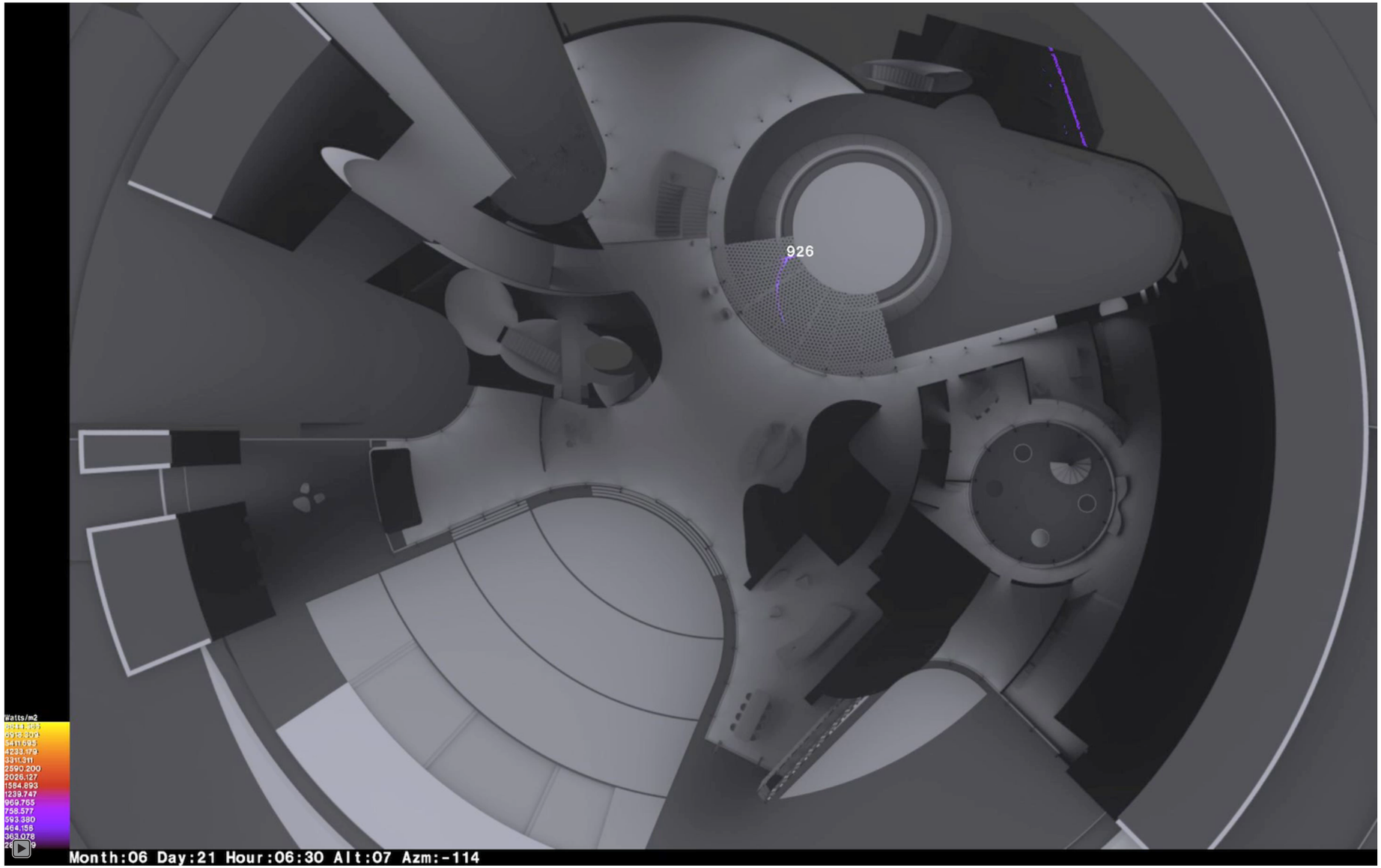
Schematic Design

SD > DD > CD

Solar Convergence Studies // animation



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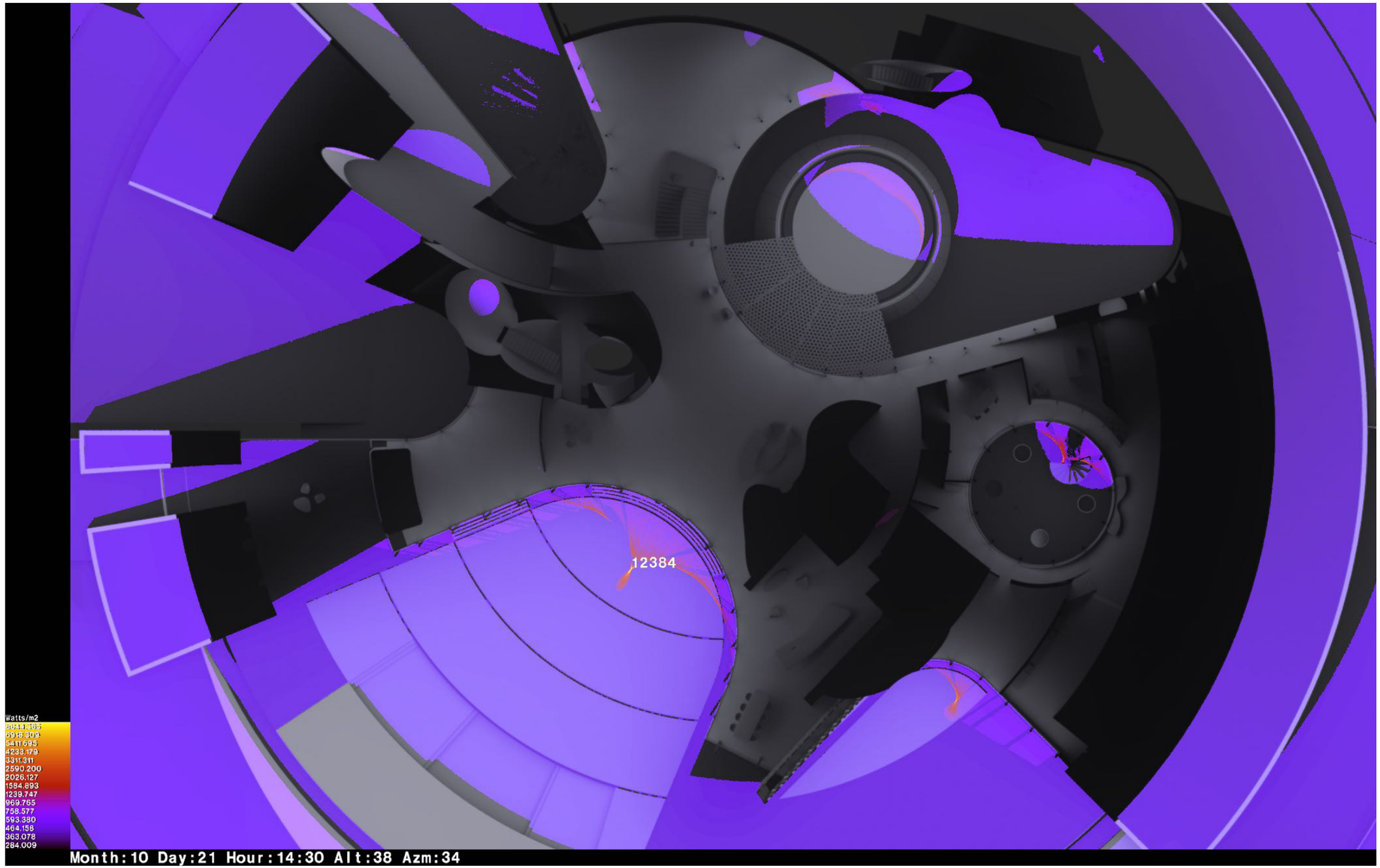
Schematic Design

SD > DD > CD

Solar Convergence Studies



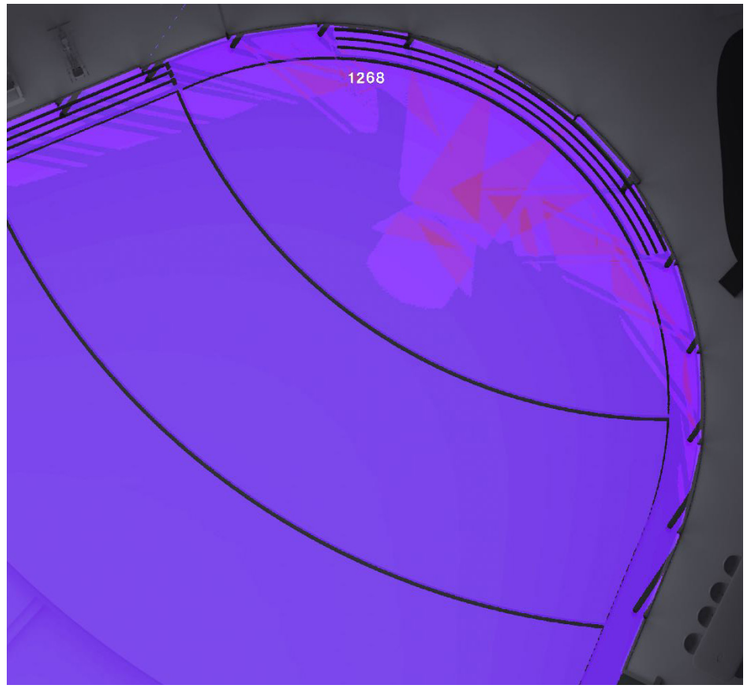
"**12,384 watts/m2**" in a given horizontal spot of the outdoor patio.

Some references:
11,000w/m2: burst into flames
1,000 w/m2: clear sky_desert
750 w/m2: clear sky_urban

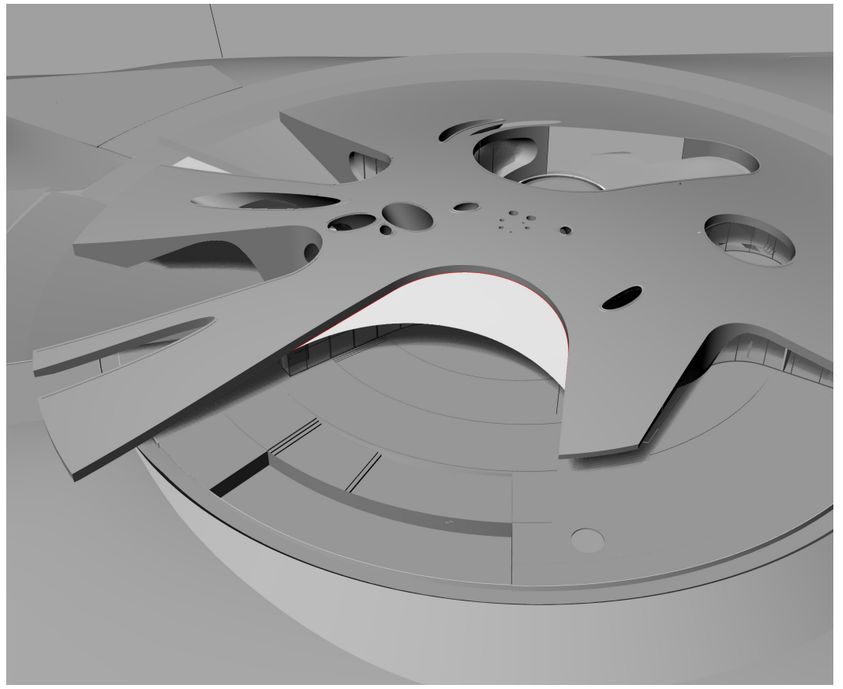
Schematic Design

SD > DD > CD

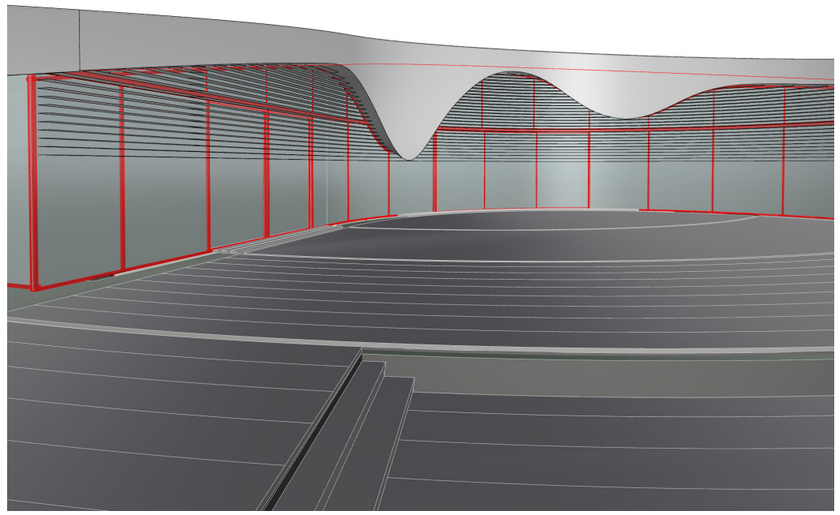
Proposed Solutions



Flat glass in segmented curve



Glass shading alternative 1

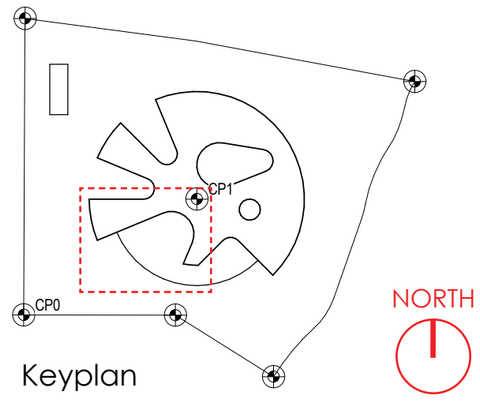


Glass shading alternative 2

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

Glass Specifications: SunGuard SNX 60/28

Visible light				Solar energy			Solar factor (g)	U-value (EN 673)	
Trans-mission [%]	Reflection outside [%]	Reflection inside [%]	Colour rendering index	Direct trans-mission [%]	Reflection outside [%]	Absorp. [%]	EN 410 [%]	Air* Krypton 90%** [W/m²K]	Argon 90% [W/m²K]
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

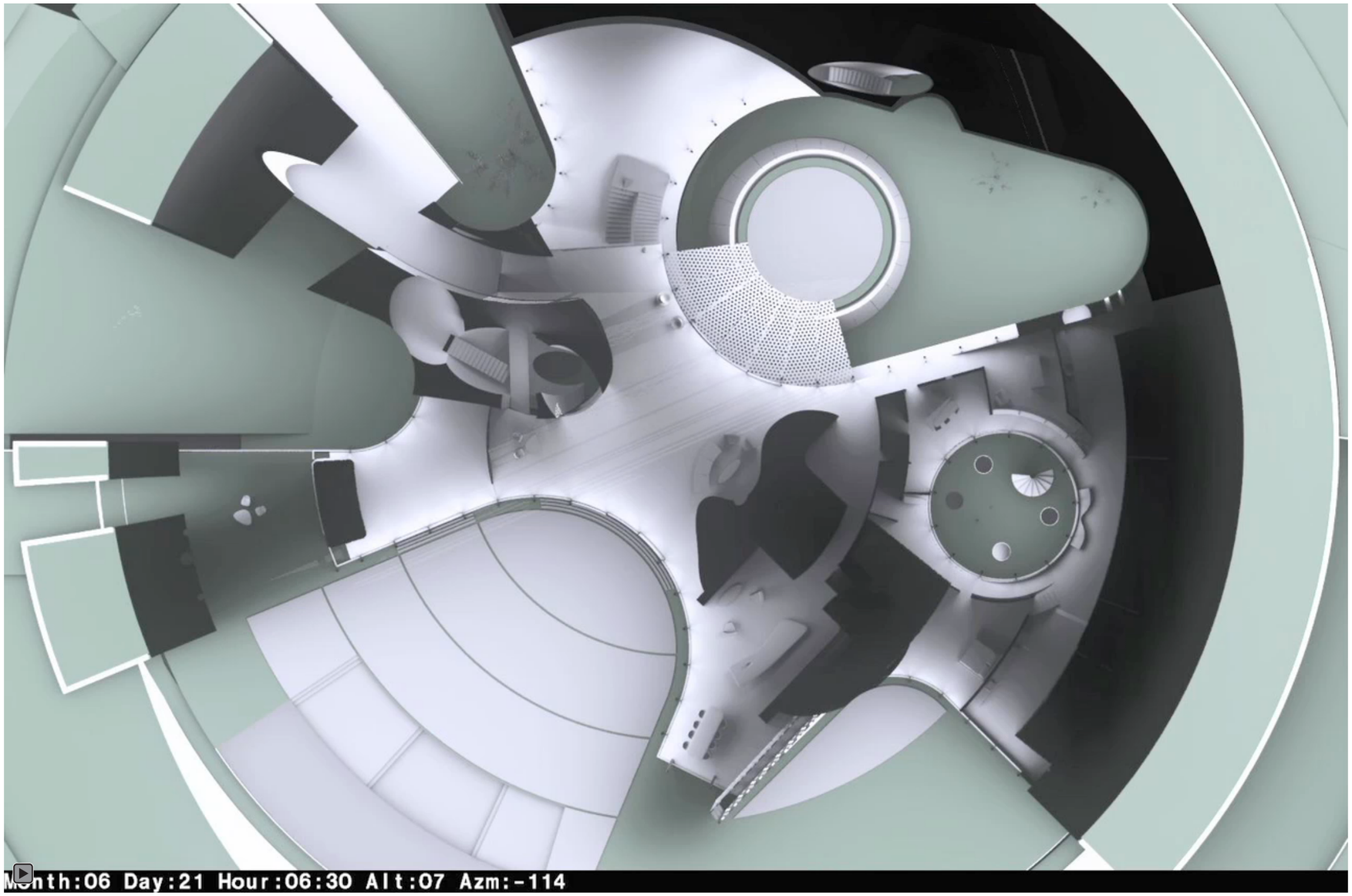


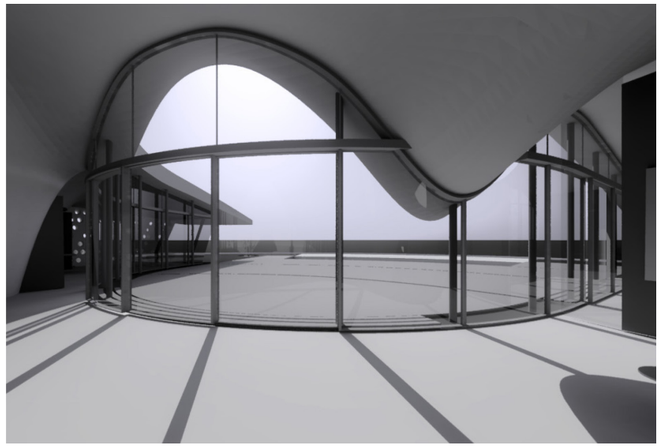
Keyplan

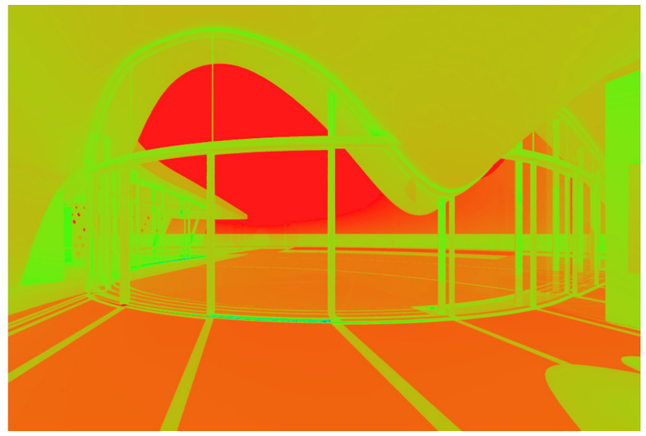
Schematic Design

SD > DD > CD

Direct Sun Penetration Animation





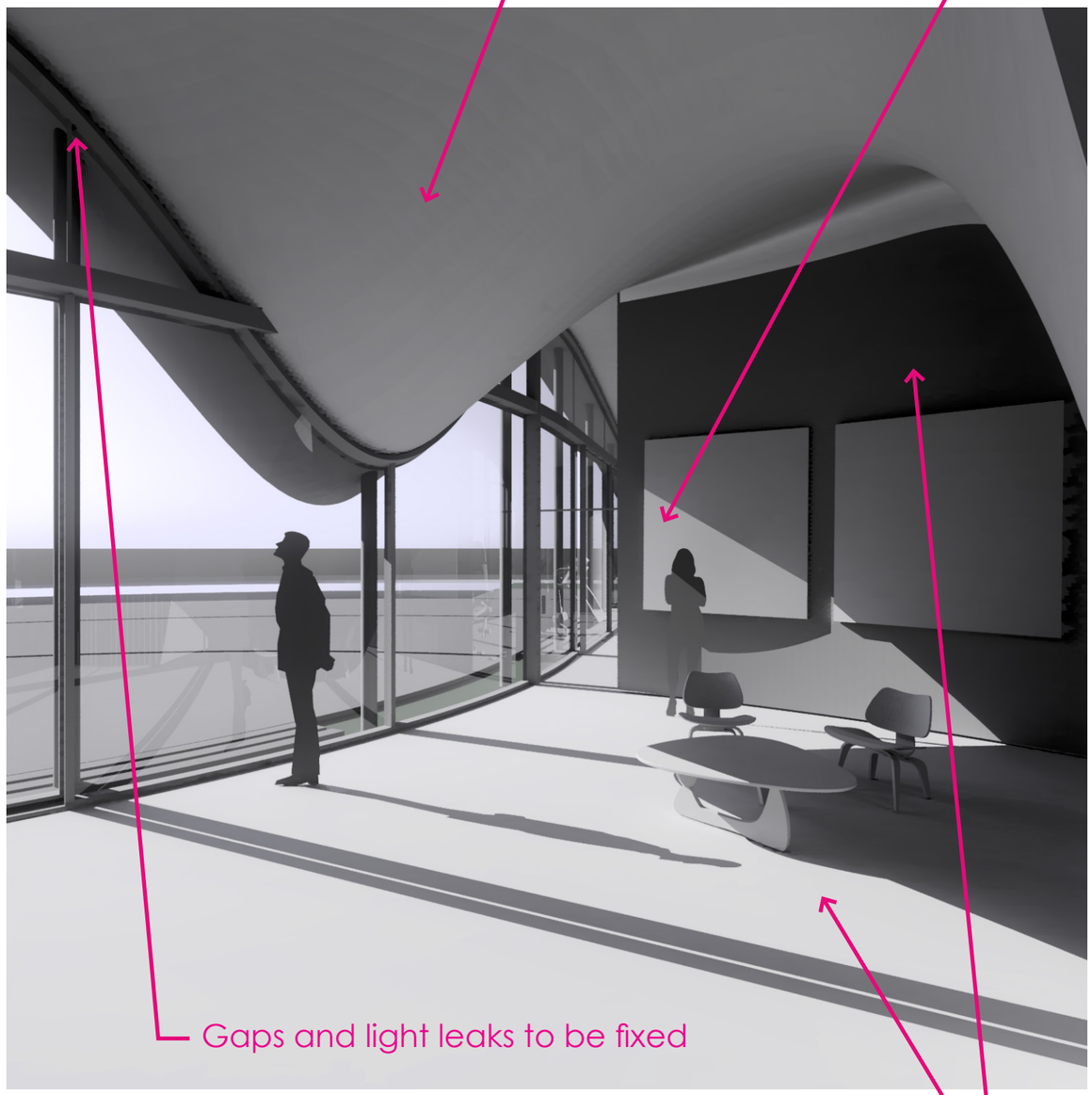


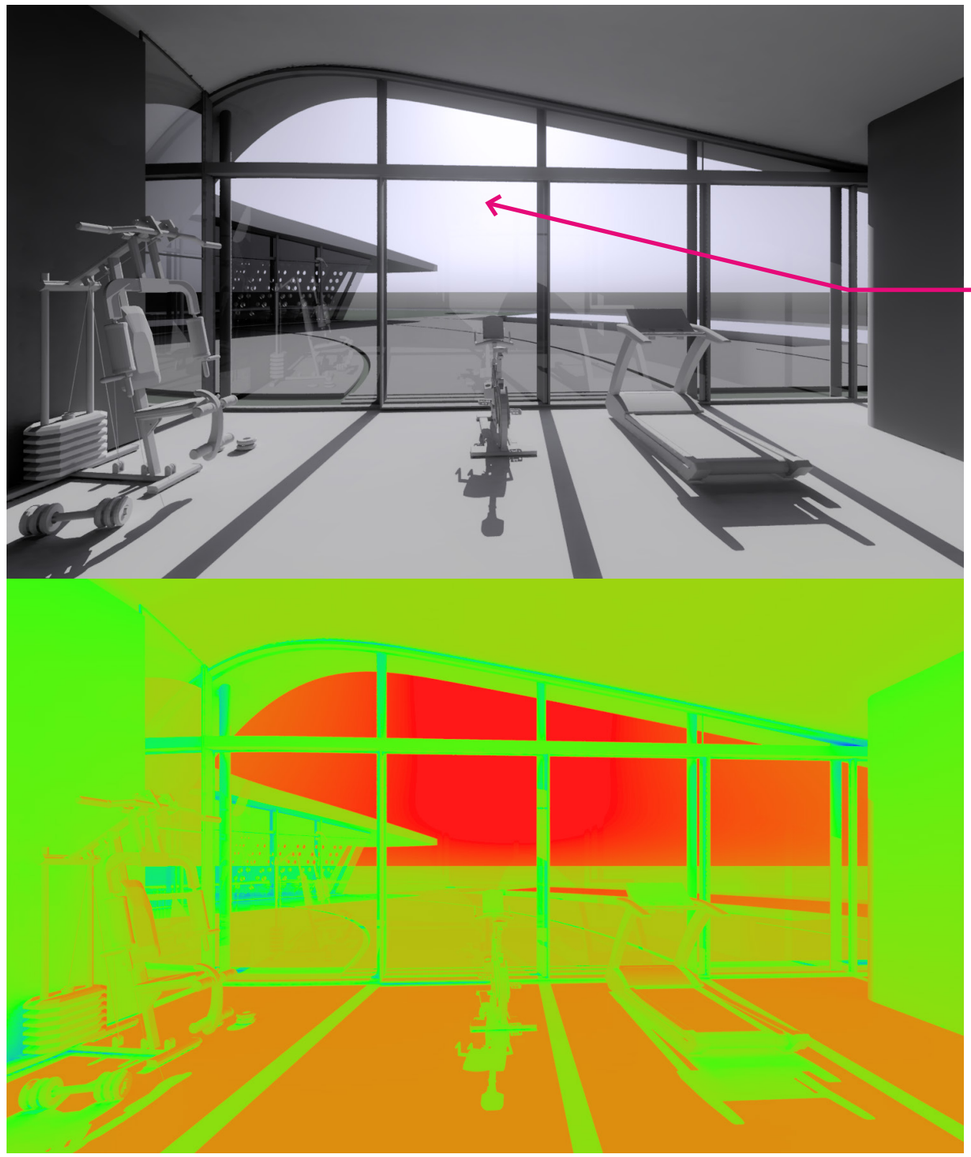
December 22nd, clear skies, 11:30am

Schematic Design

SD > DD > CD

Direct Sun Penetration



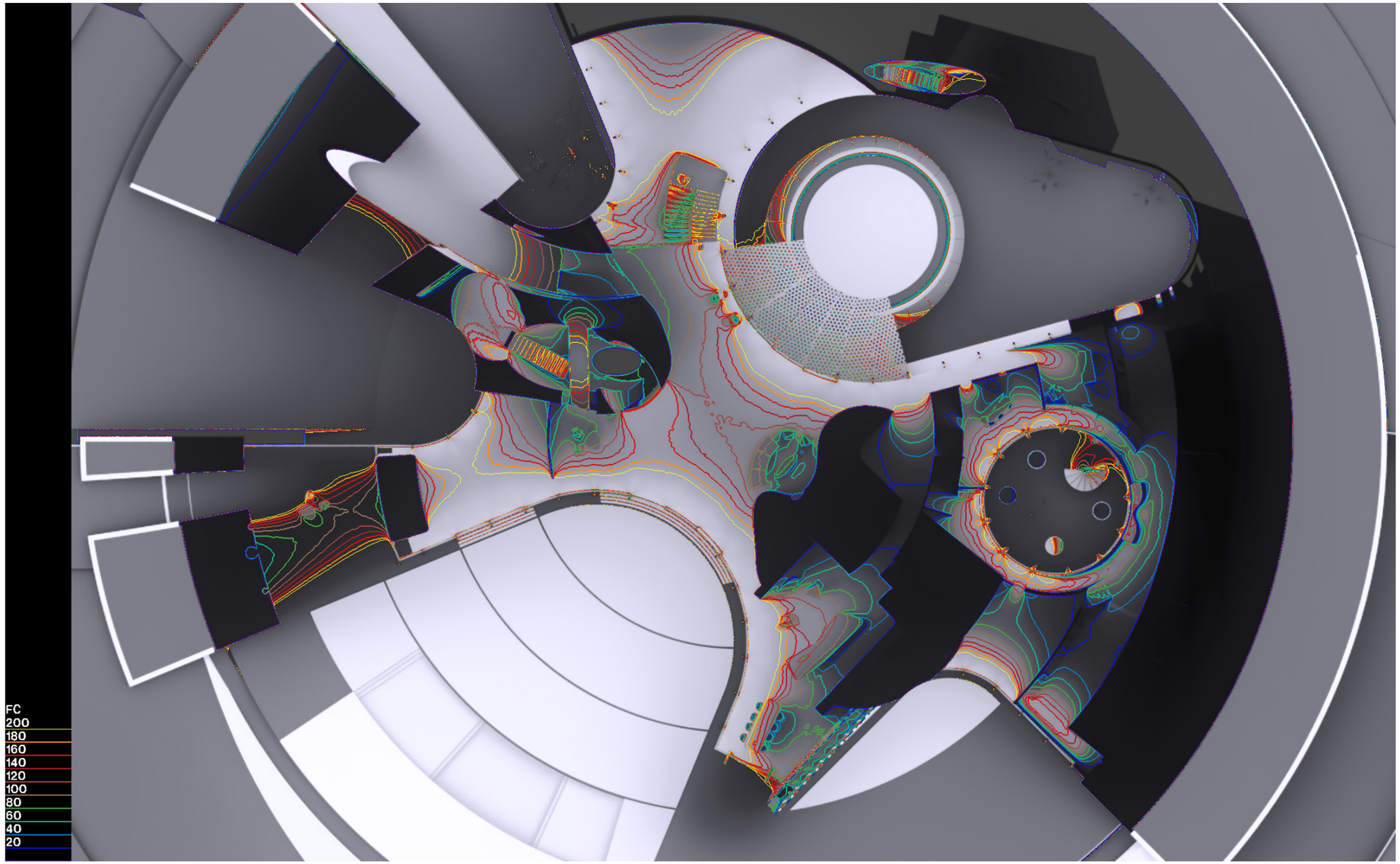


December
Clear skies
12:00 noon

Schematic Design

SD > DD > CD

Daylight Availability



Design Development

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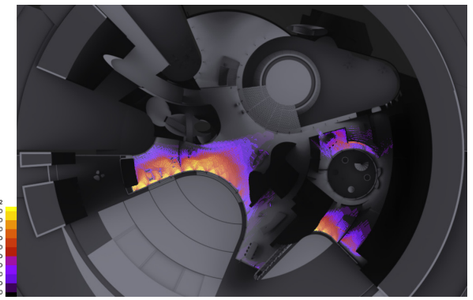
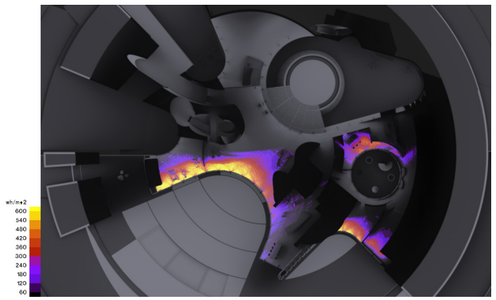
Design Development

SD > DD > CD

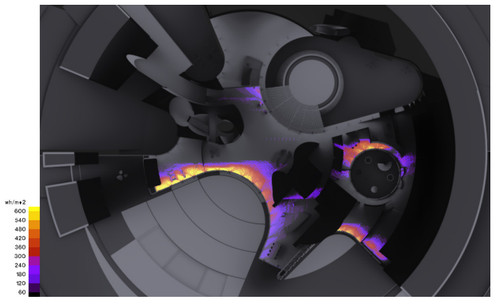
Monthly Summary // Cumulative Solar Radiation (over one day)



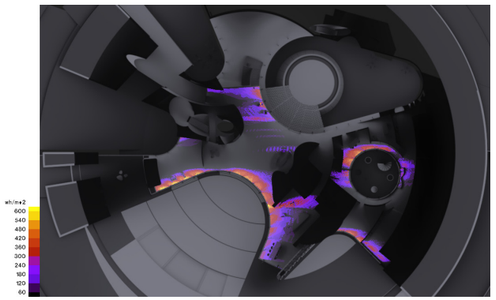
January 21st



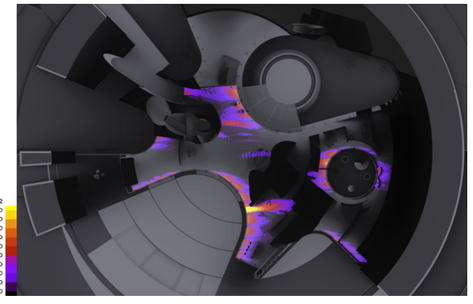
February 21st



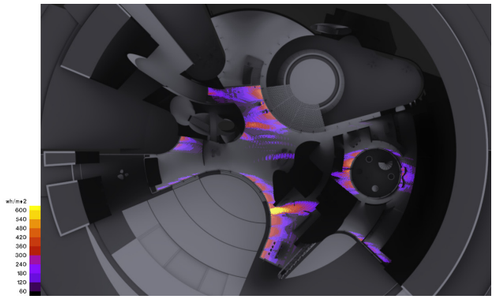
March 21st



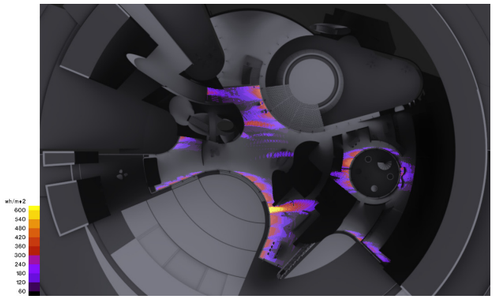
April 21st



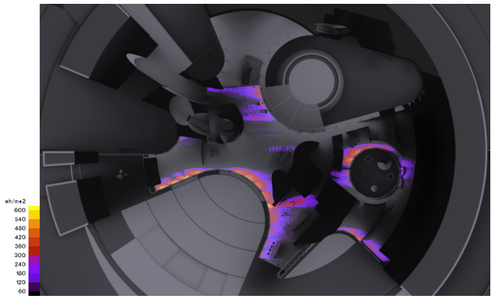
May 21st



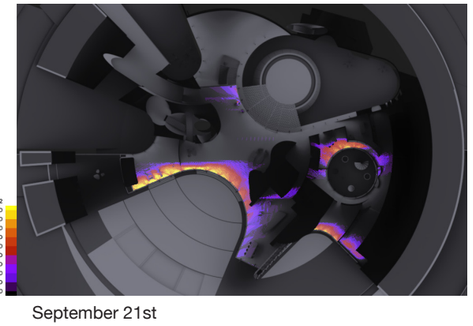
June 21st



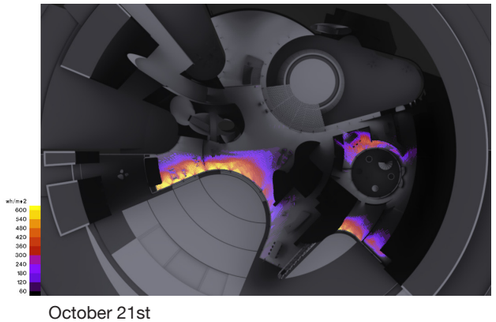
July 21st



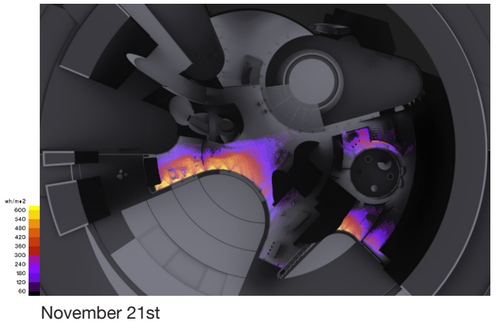
August 21st



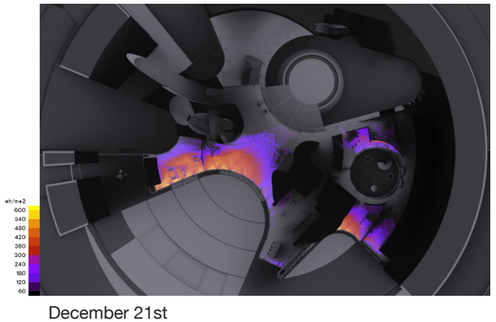
September 21st



October 21st



November 21st

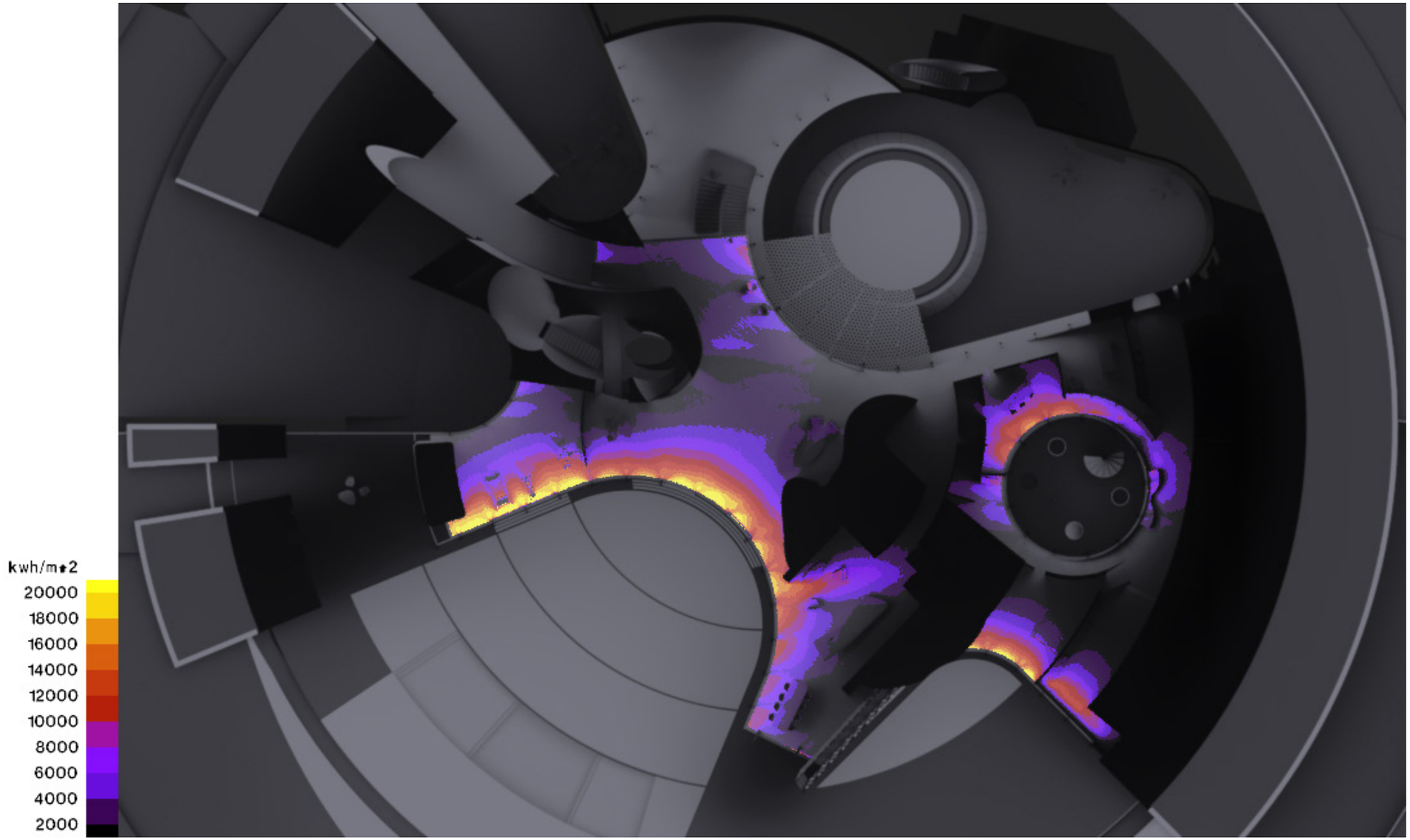


December 21st

Design Development

SD > DD > CD

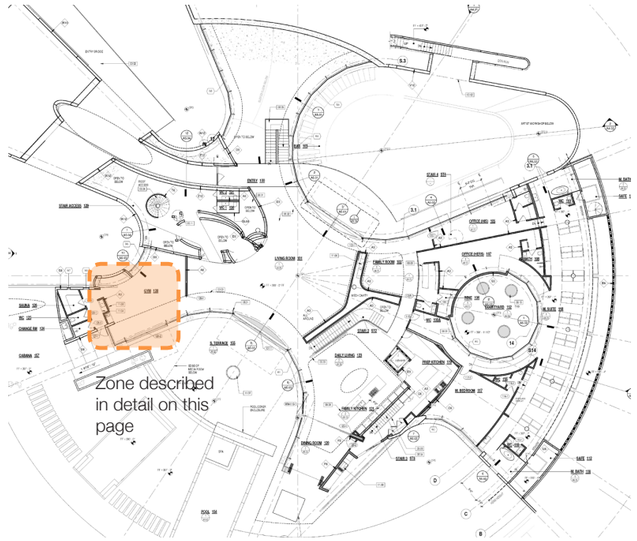
Cumulative Energy



Design Development

SD > DD > CD

Radiant System Zoning



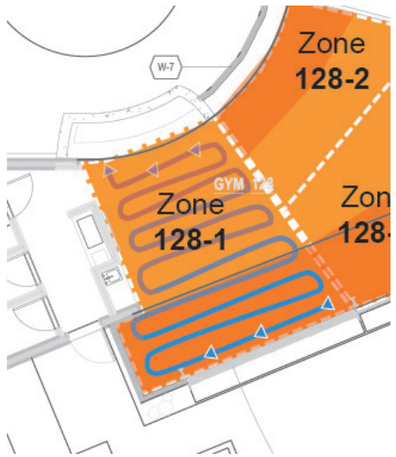


Diagram showing piping sequence through a typical zone (in this case, the gym) where the perimeter area, most likely to be affected by solar heat gain and heat loss, receives chilled water first.

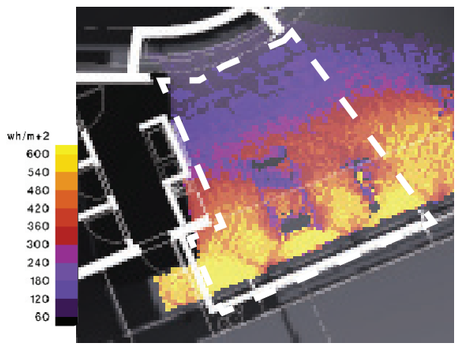


Image showing cumulative solar radiation (kWh/m2) in the zone shown above over a typical year.

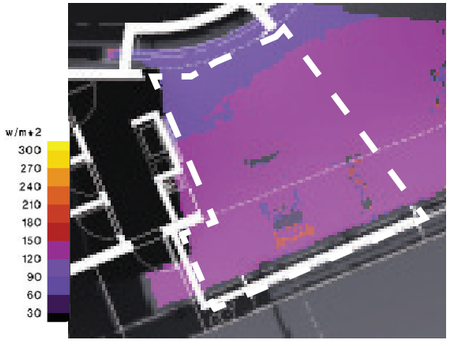
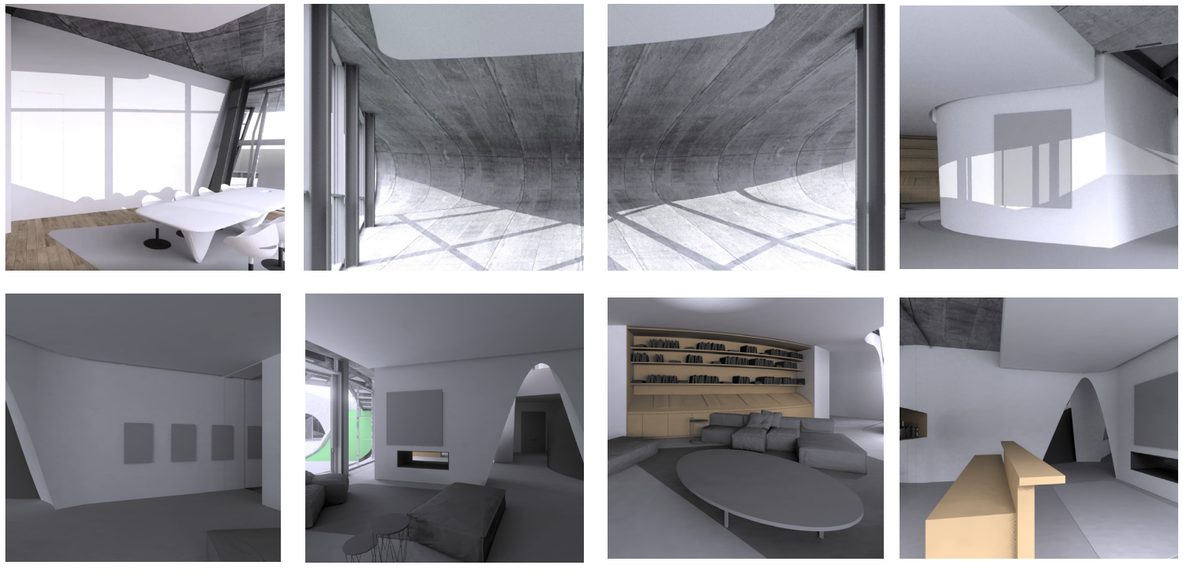


Image showing peak instantaneous solar radiation (W/m2) in the same zone on October 21st

Design Development

SD > DD > CD

Curatorial Analysis



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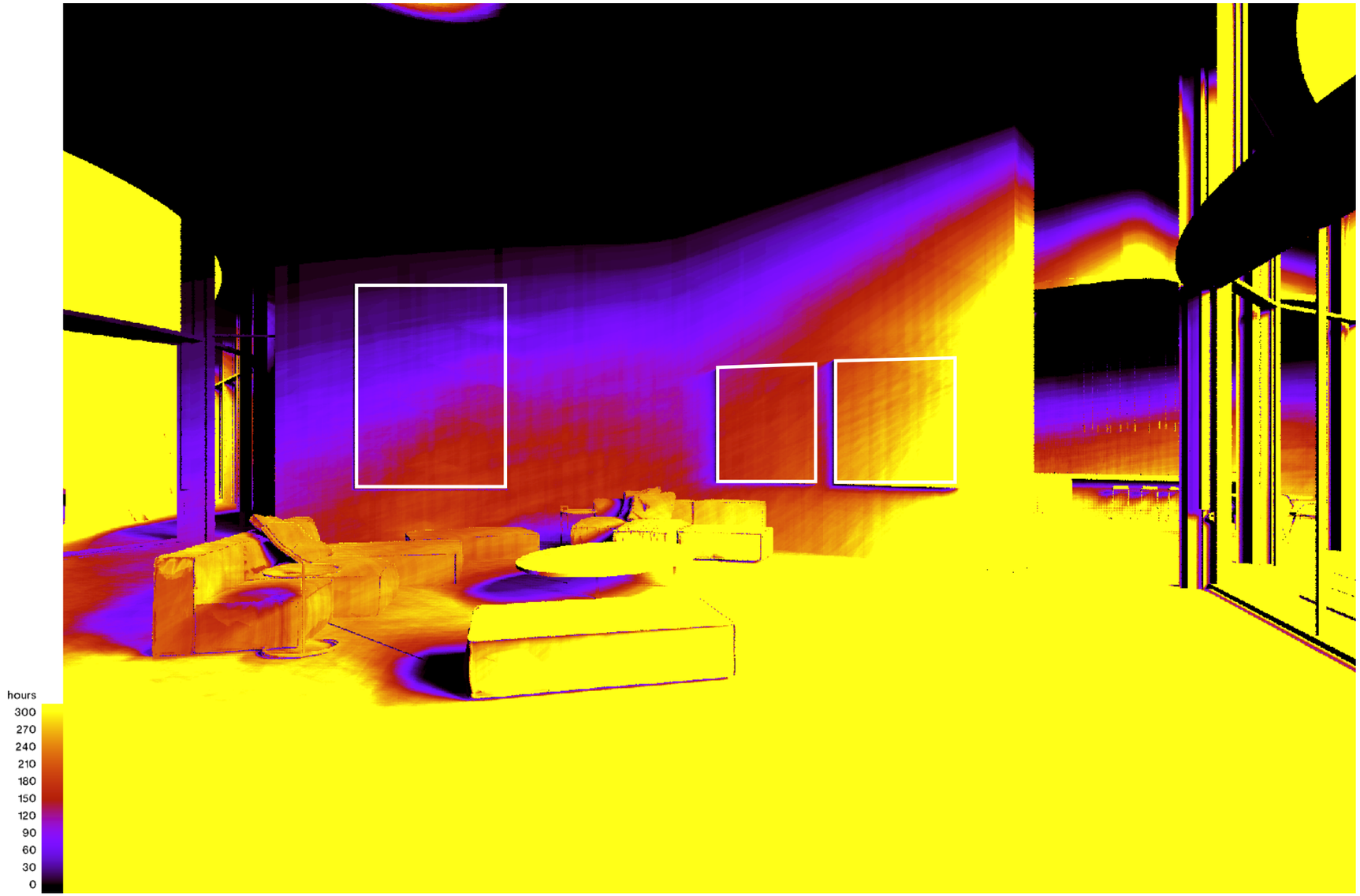
Design Development

SD > DD > CD

Annual Cumulative Hours of Direct Sun



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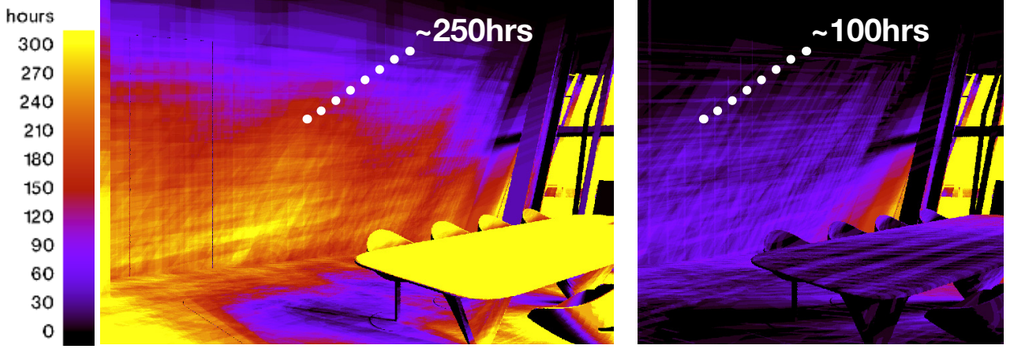
Design Development

SD > DD > CD

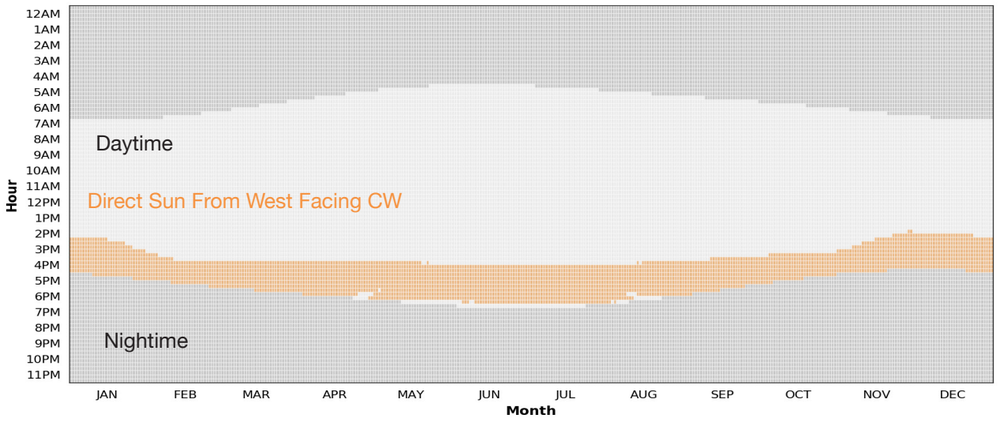
Curatorial Analysis

Hours of Direct Solar Radiation



Cumulative With No Shades

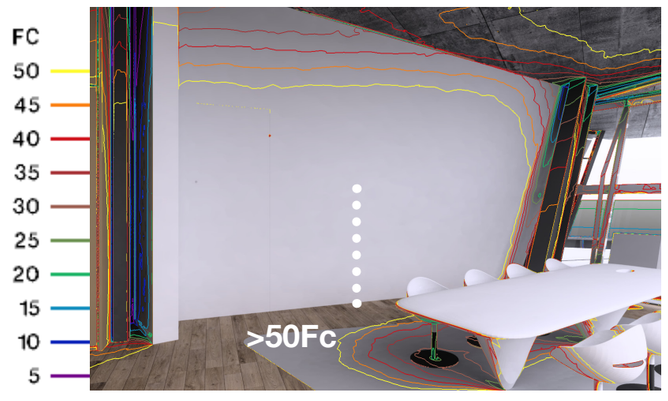
With Shades (Blackout) only on West CW



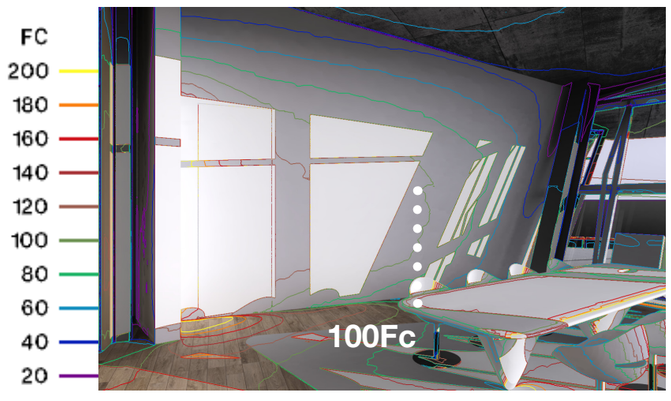
Observations:

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.

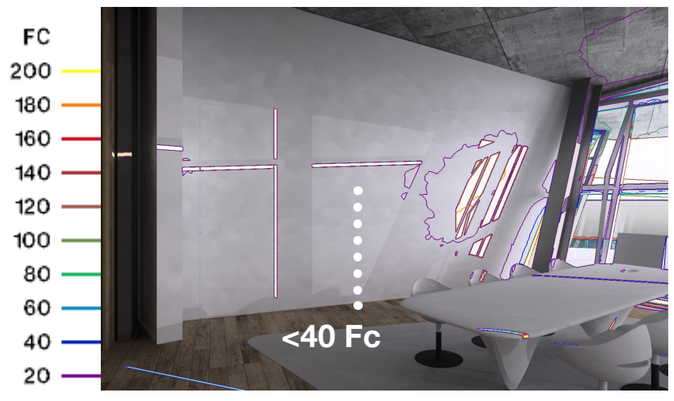
Instantaneous Light Levels



Overcast - No Shades



Clear Sky - No Shades

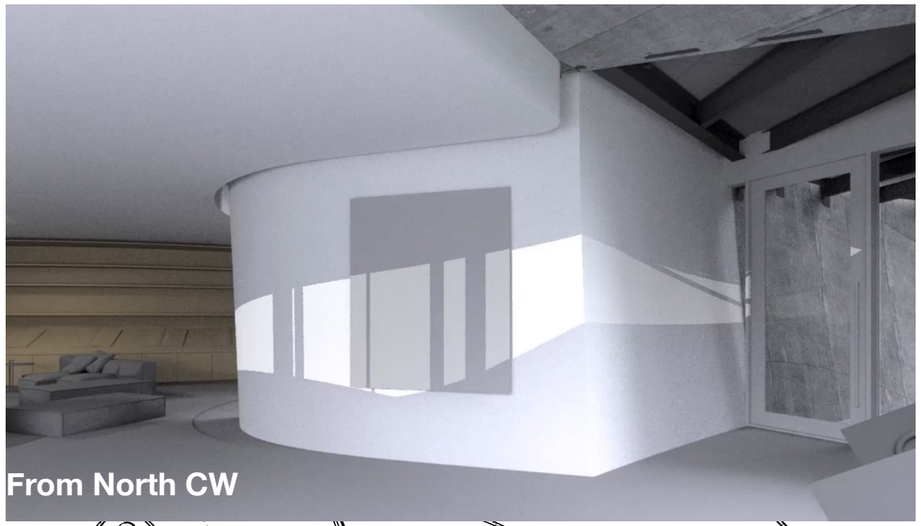


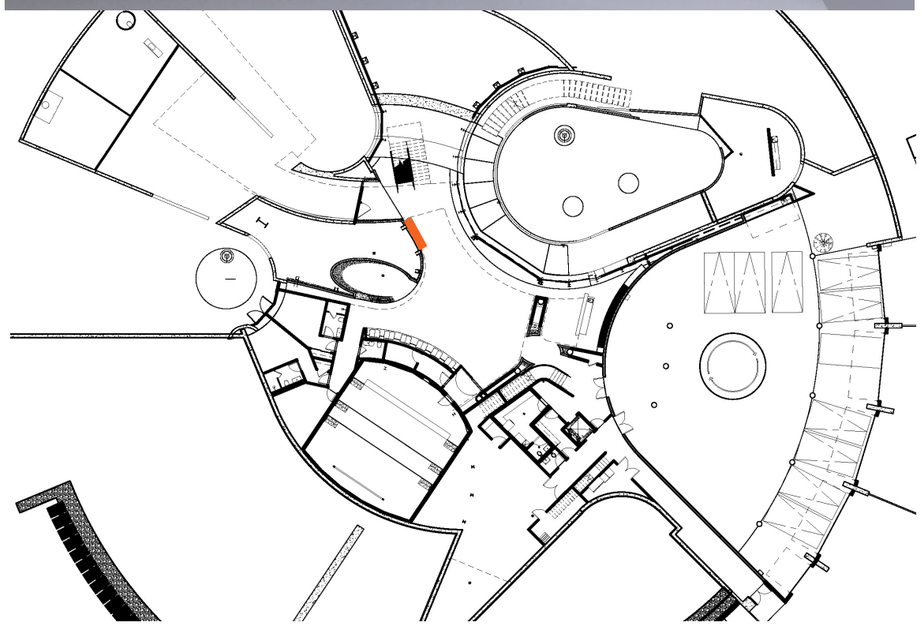
Clear Sky - Shades
(4% Openess on West CW)

Design Development

SD > DD > CD

Curatorial Analysis





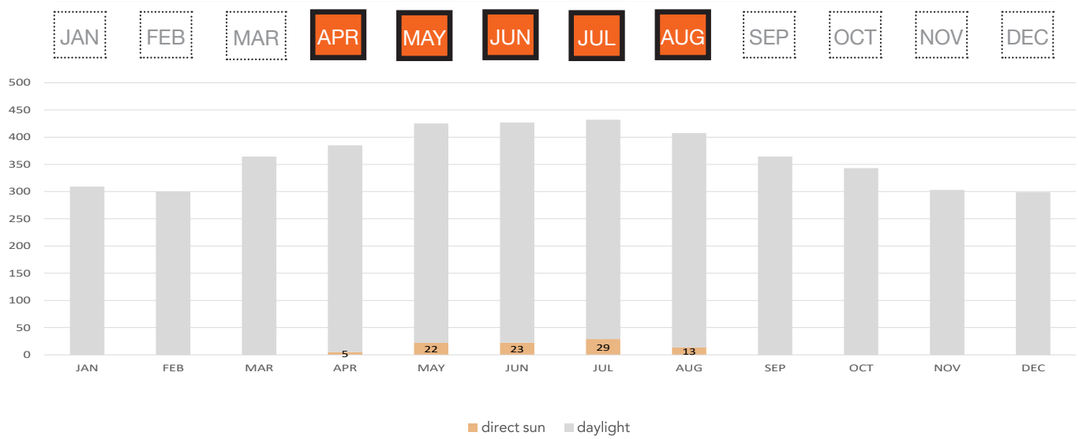
Recommendation:

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

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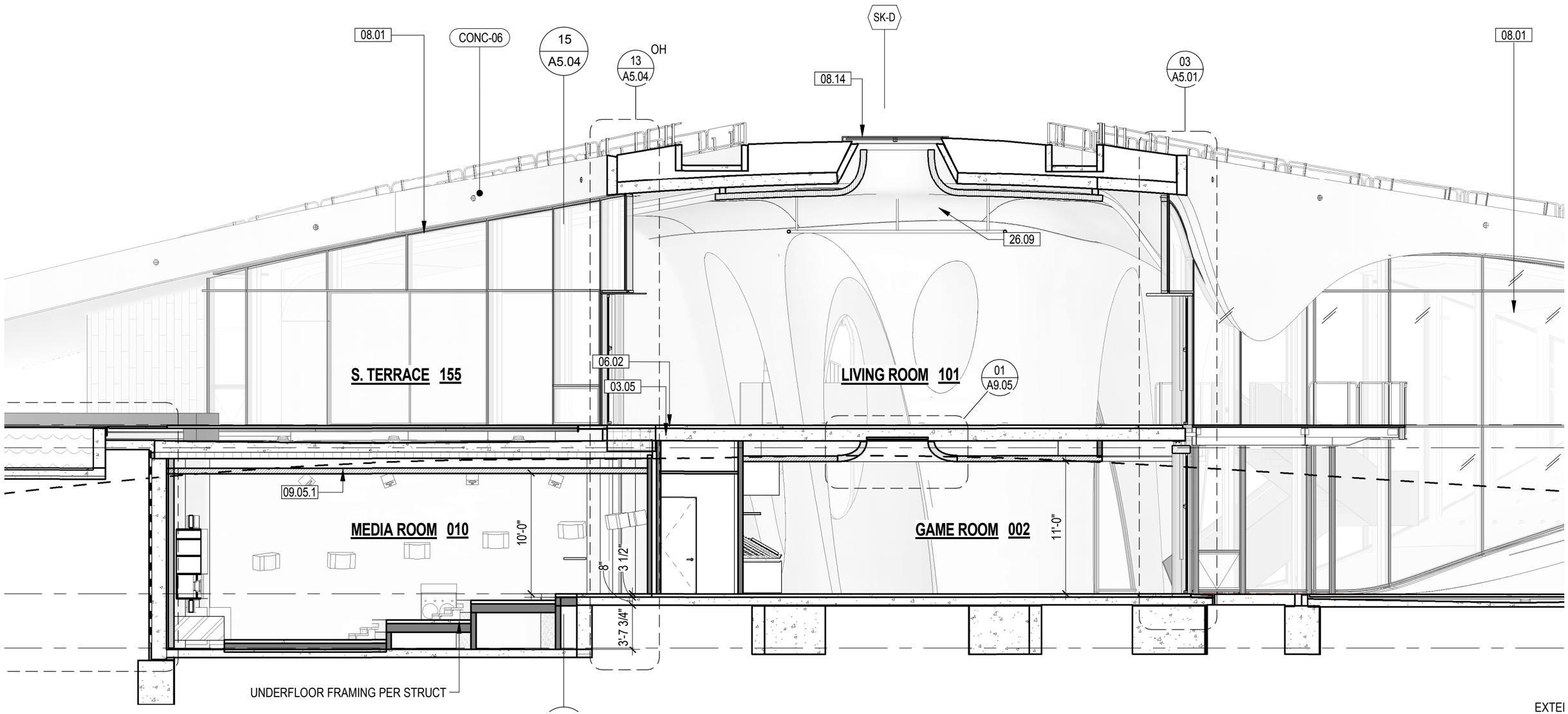

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Refinement of daylighting and electric lighting design

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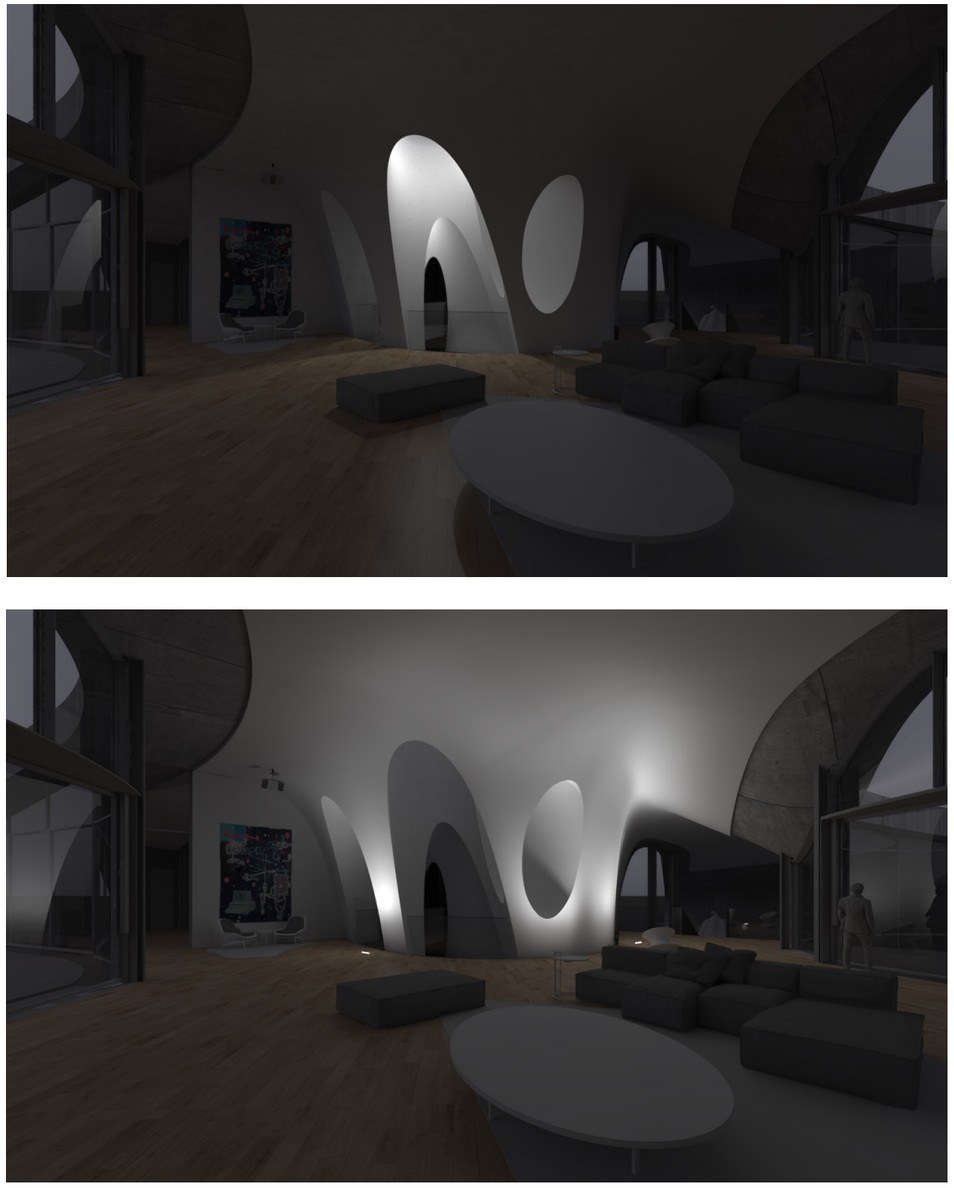
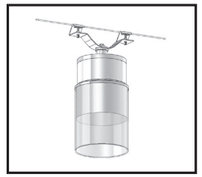
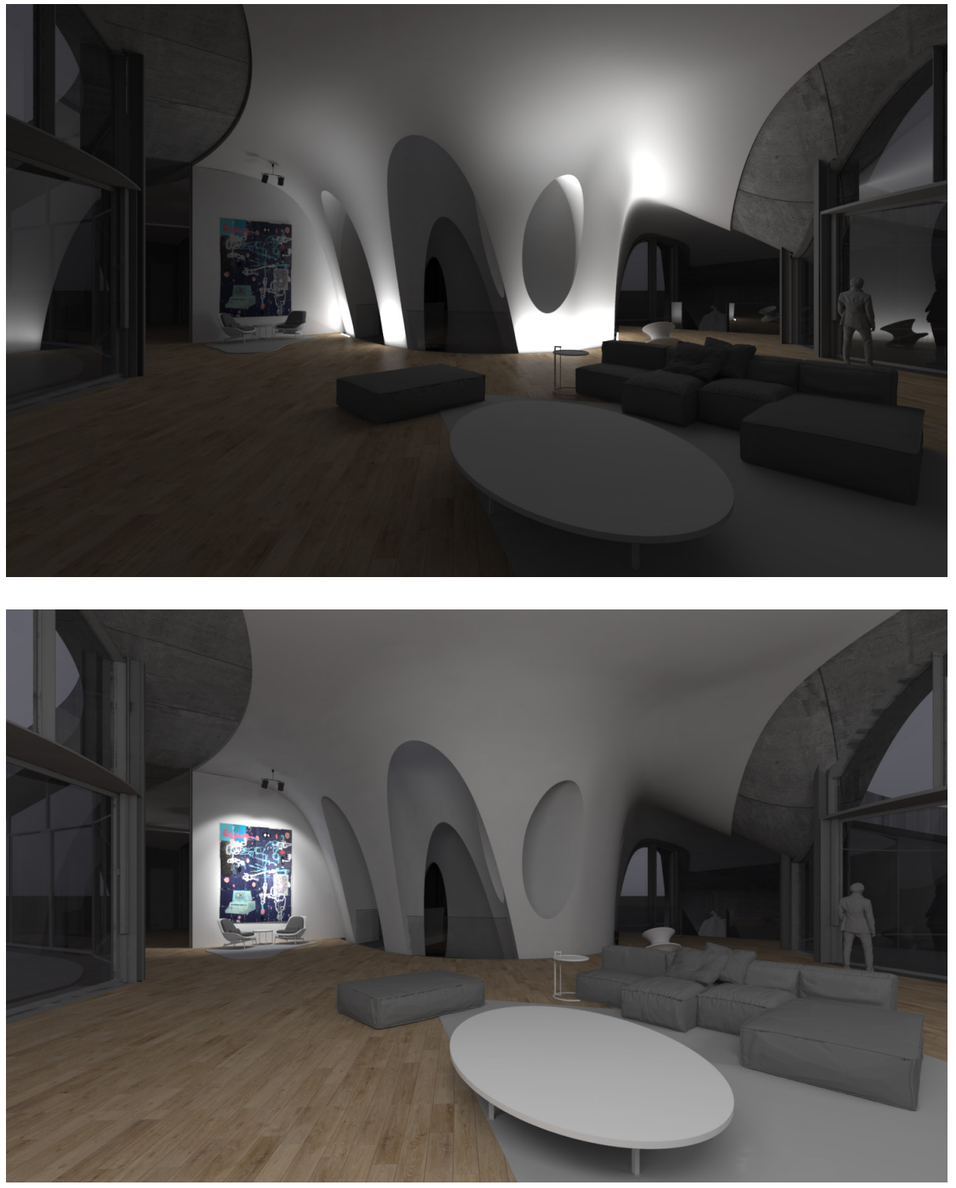
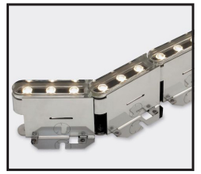
Layers Of Light









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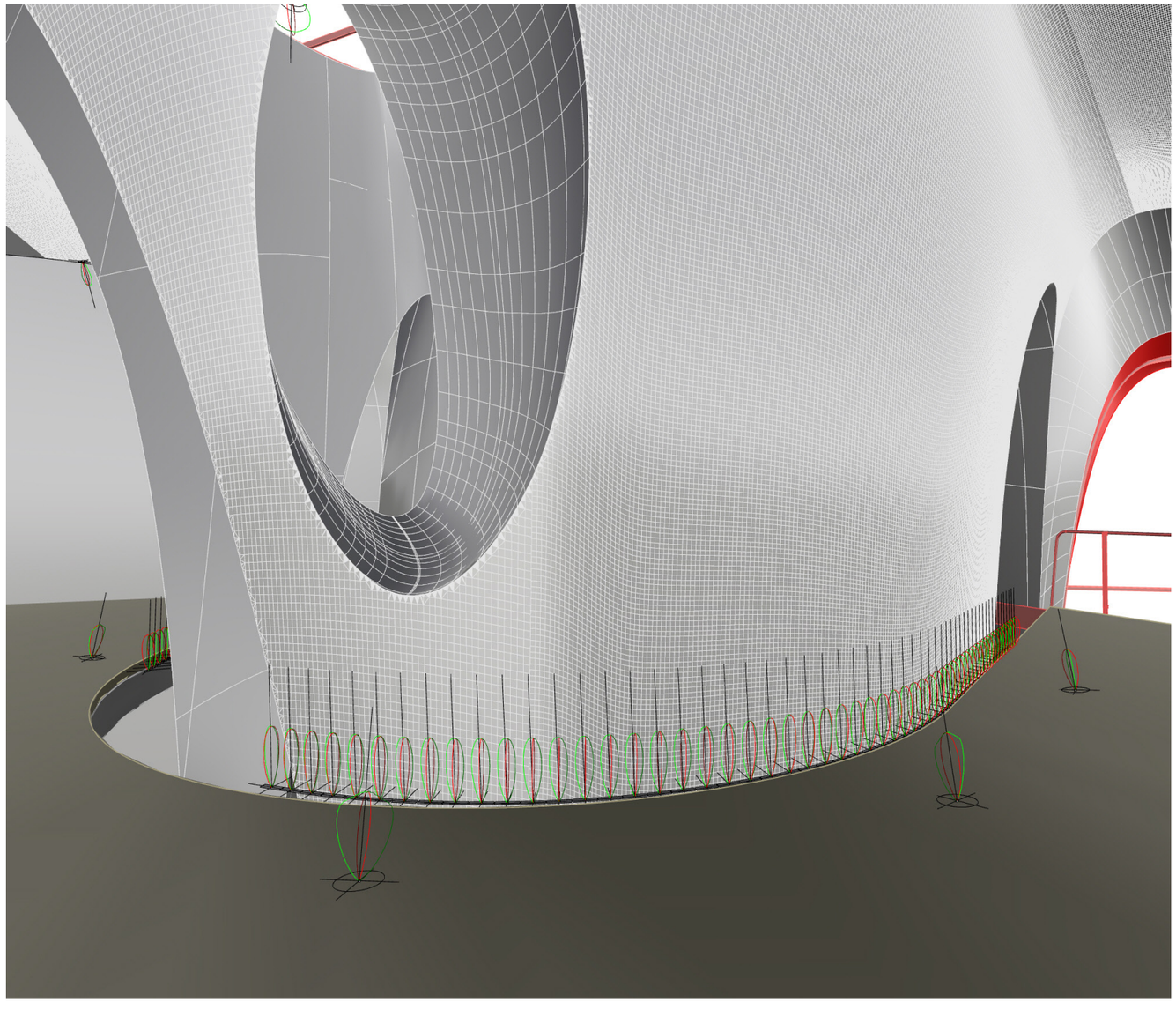
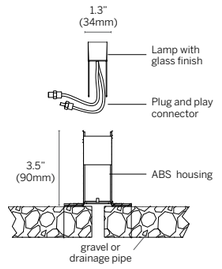


Snake Deco Specifications

Send **inter•lux**



Ordering Information[1] (Minimum order quantity 9pcs)

F SND	5	H	30	FL	24	C1	SNC
Model	**Length**	**Power**	**Color**	**Optics**	**Voltage**	**Options**	**Housing**
F SND	5	H	30 35 40	SP FL	24	C1 C2 C3 CX	SNC

[1]*Specify 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 Supply[2] (Remote)

Non-Dim
- ☐ D-520-24007: Osram 96W, 24VDC, 120-277VAC

Dim
- ☐ D-520-24006: Osram 10% 0-10V dimming, 96W, 24VDC, 120-277VAC
- ☐ IL-JB-LED-24003-120V-DFPN: Lutron LTE 1% Forward Phase (with neutral) dimming, 5-40W, 24VDC, 120VAC, Case K, dry location enclosure
- ☐ IL-JB-LED-24010-UNV-D3W: Lutron L3D 1% 3-wire dimming, 5-40W, 24VDC, 120-277VAC, Case K, dry location enclosure
- ☐ IL-JB-LED-24010-UNV-DES: Lutron L3D 1% EcoSystem dimming, 5-40W, 24VDC, 120-277VAC, Case K, supplied in a dry location enclosure

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

FILIX

410 381 1497 inter-lux.com answers@inter-lux.com

IP67

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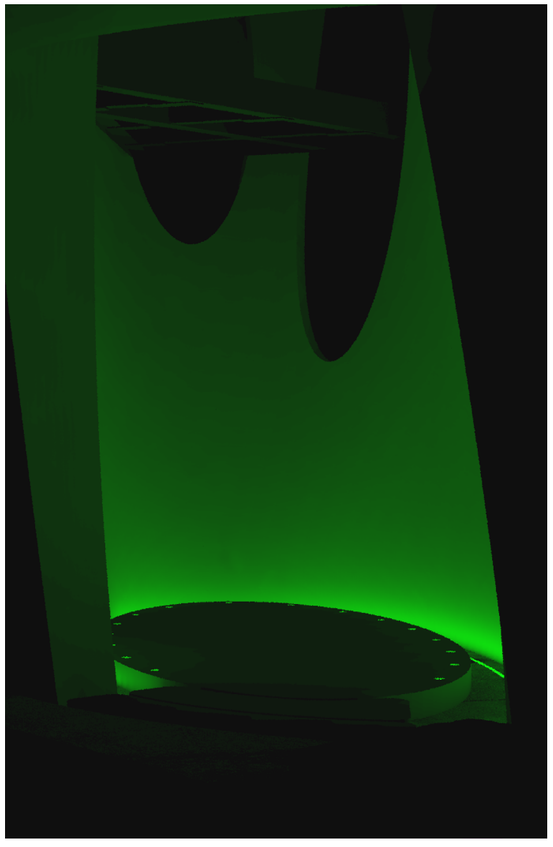

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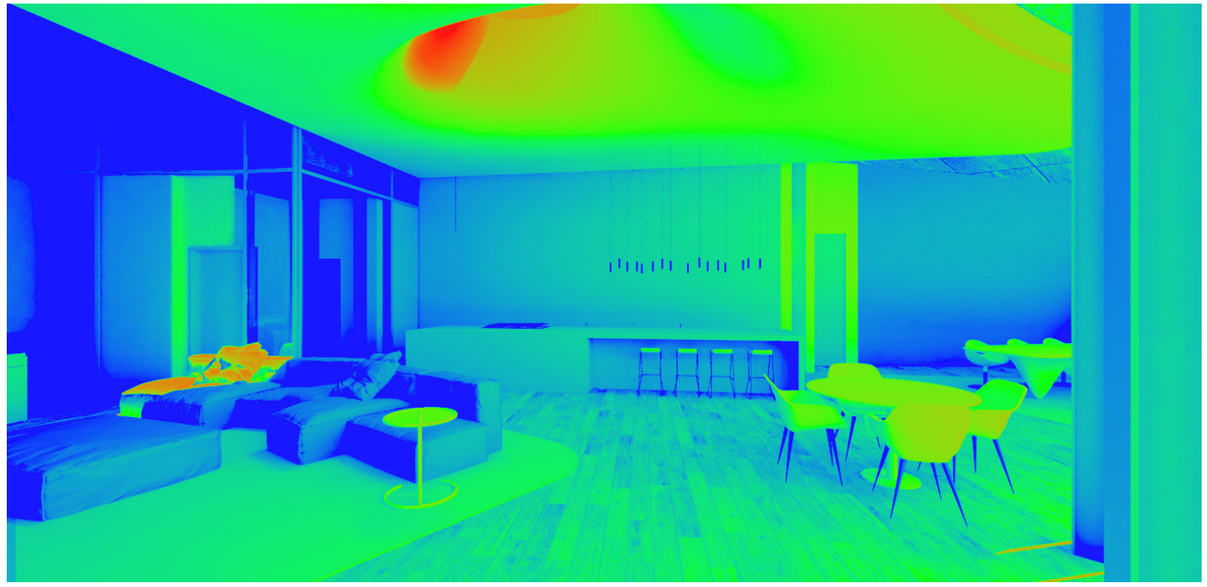
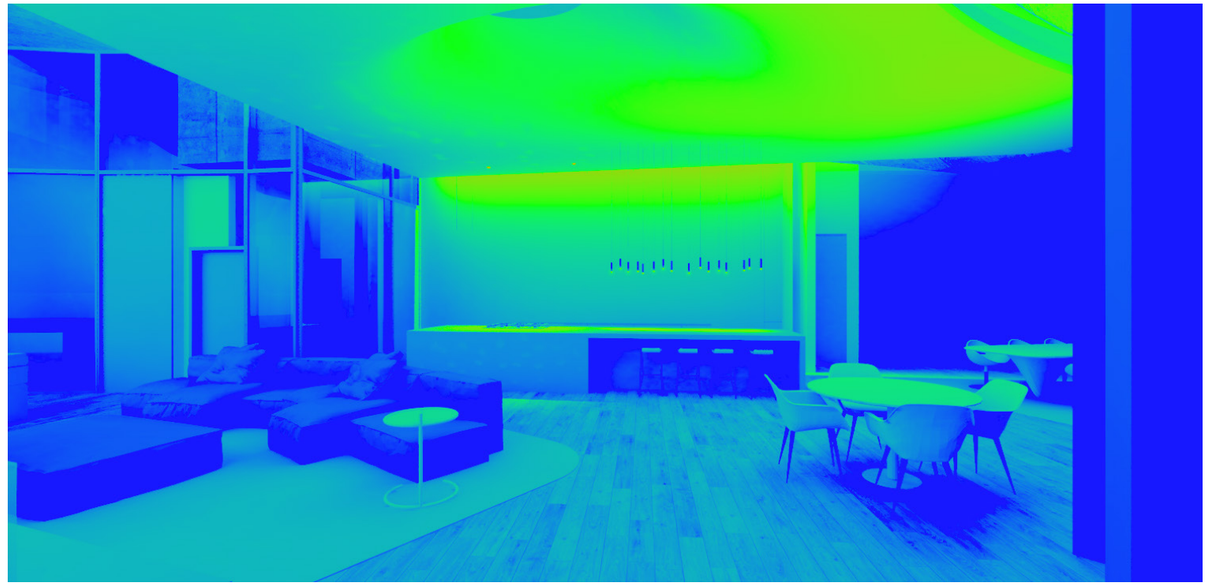
Day-Night Transition





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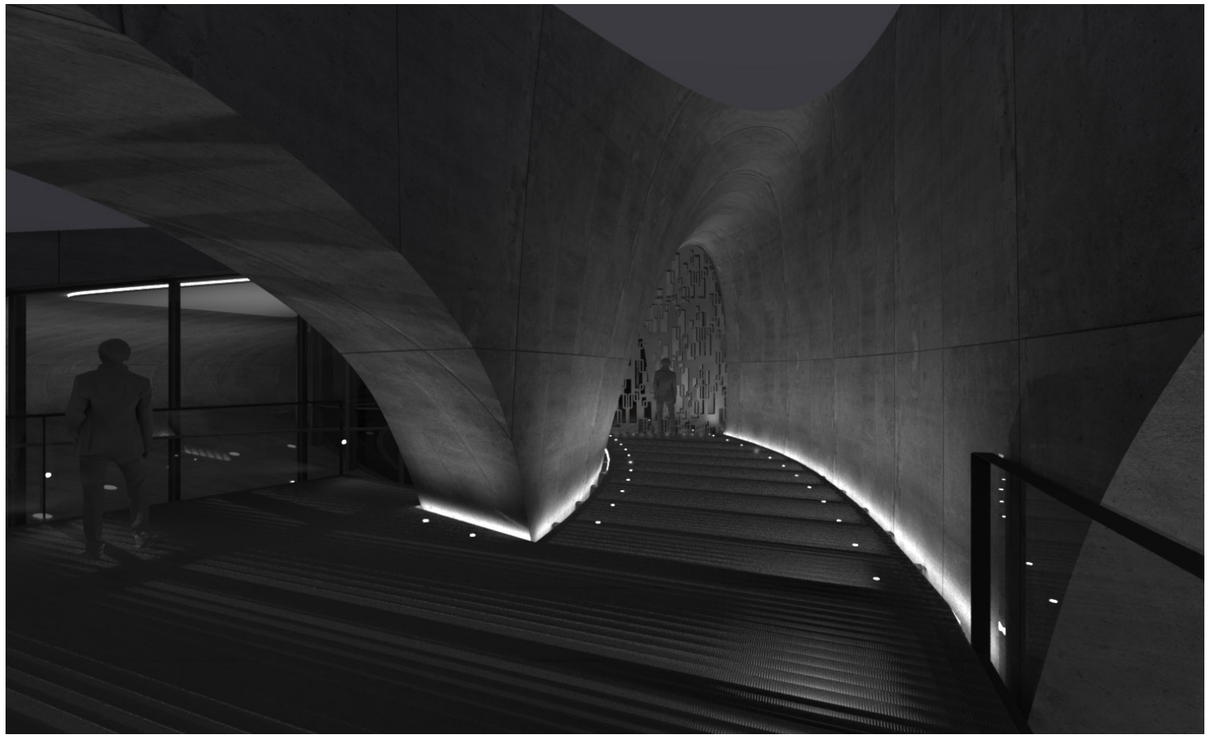
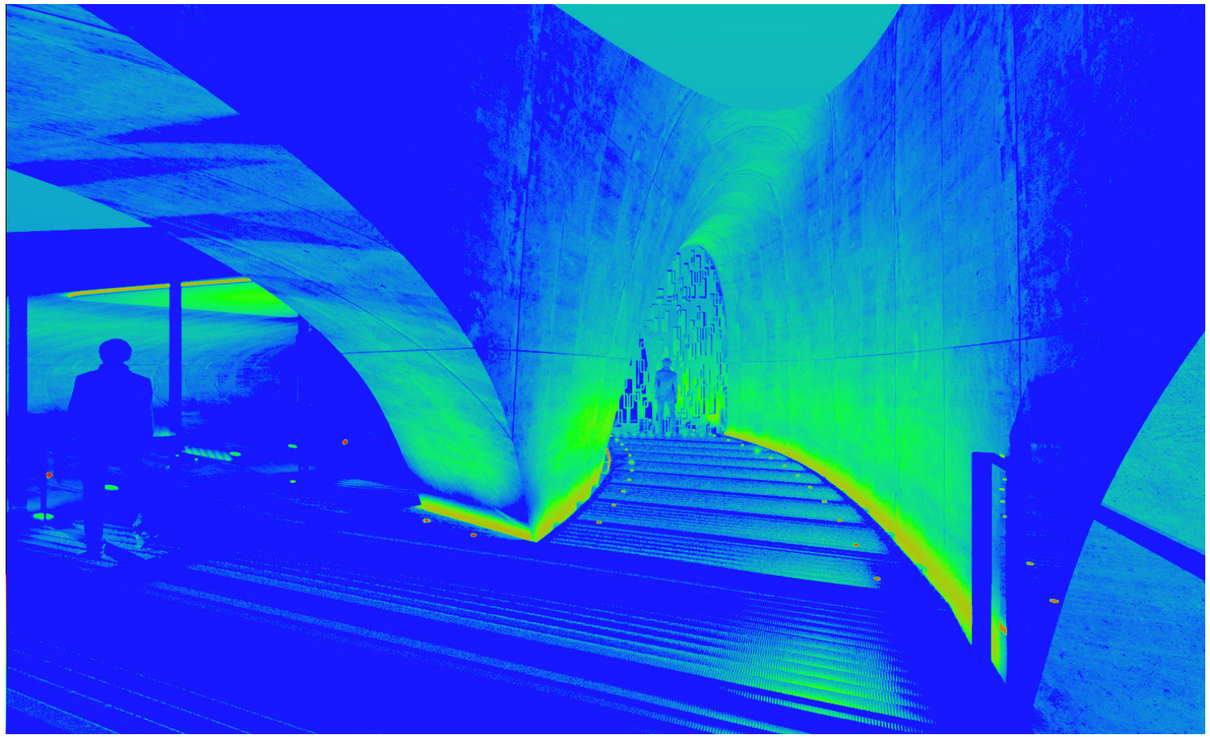
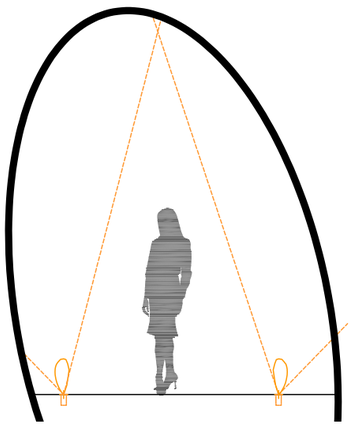
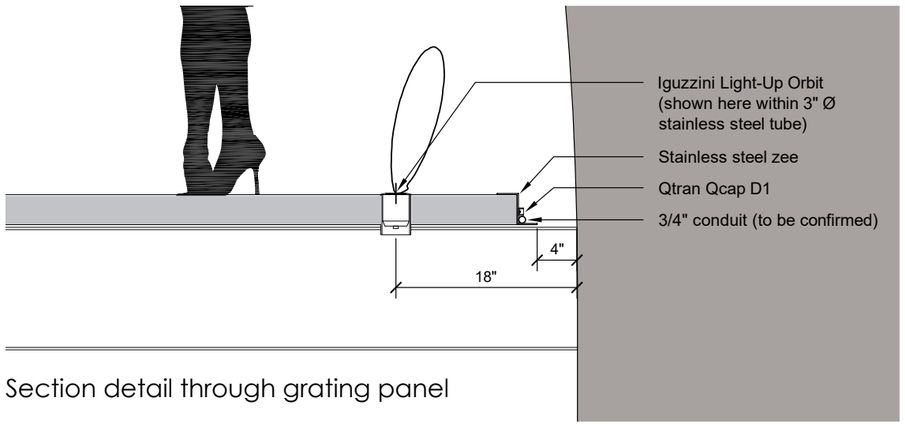
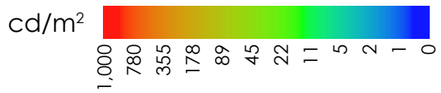








Section detail through grating panel



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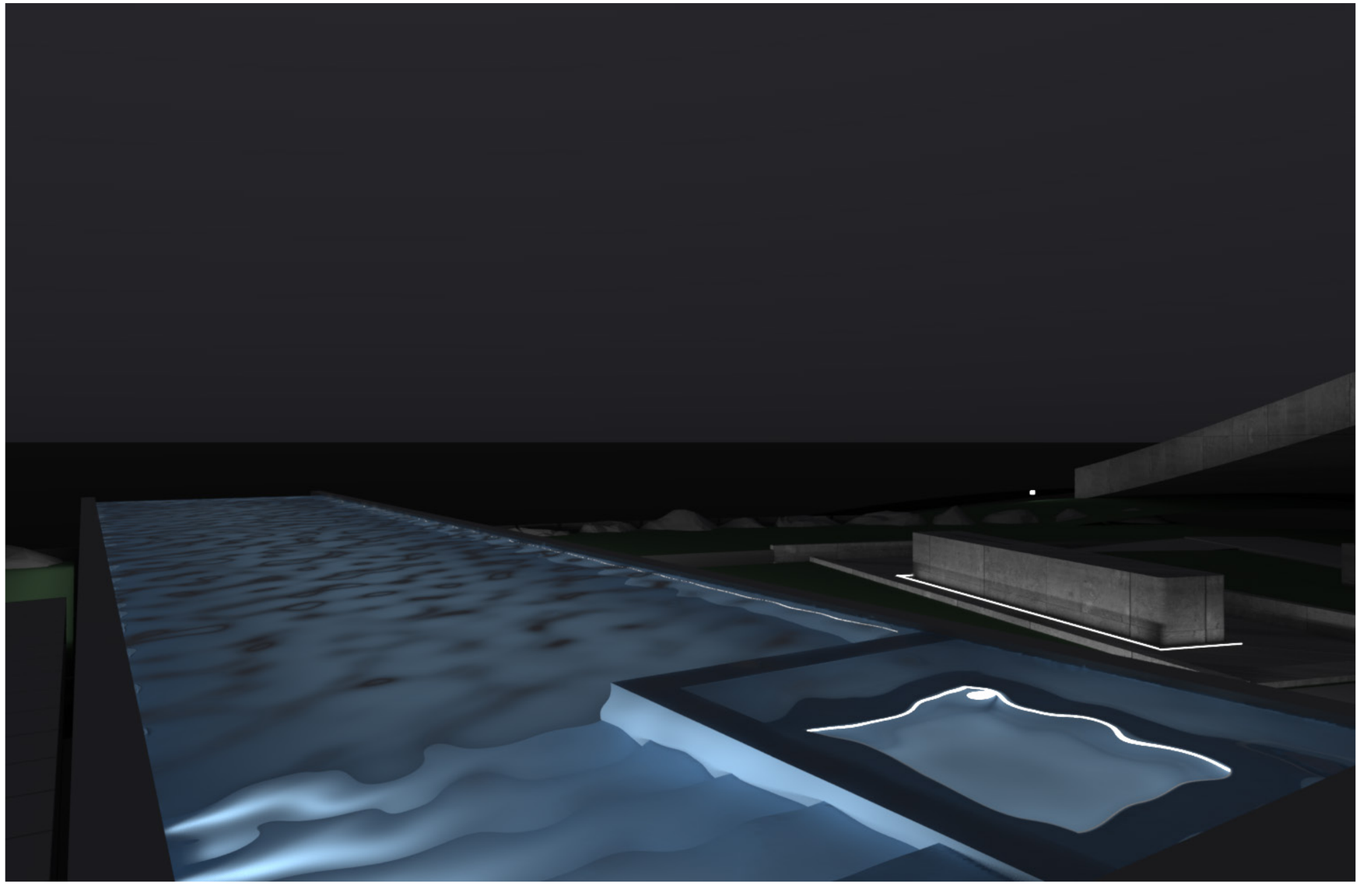
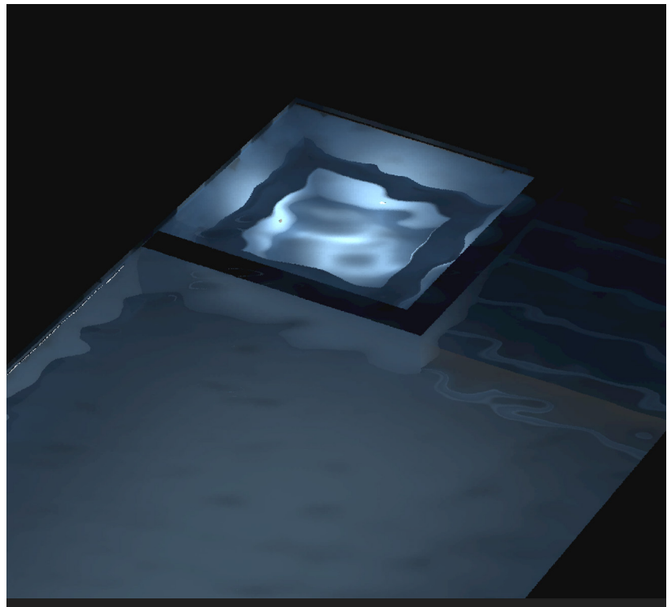


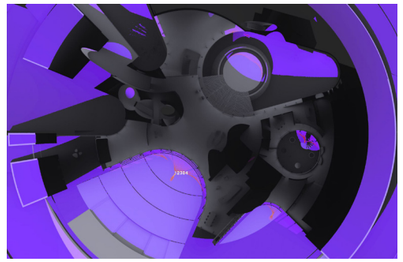


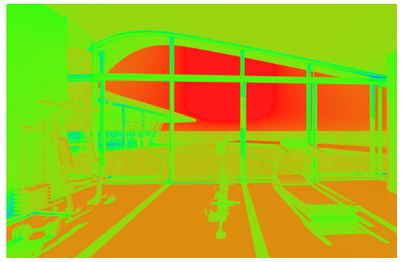
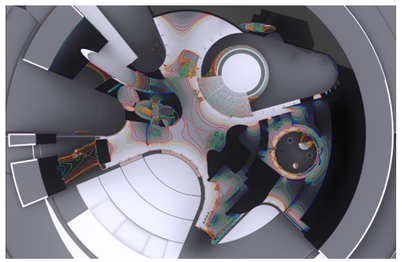
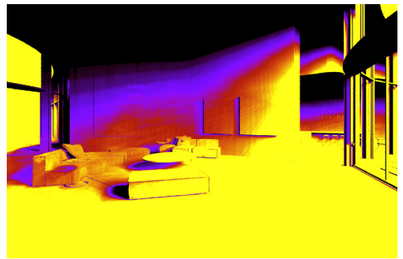
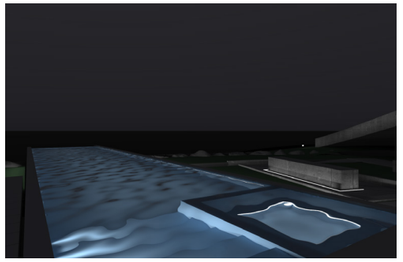
```
####### pool water
void texfunc wavy
6 A1*noise3a(Px,Py,Pz) A1*noise3b(Px,Py,Pz) A1*noise3c(Px,Py,Pz) . -s 1.65
0
1 0.2

# Set transmission to 1, since we're taking care of absorption with a mist vol.
wavy dielectric water
0
0
5 1 1 1 1.3 0


# Water mist volume

void mist water_scatter
3 L040 L047A L047B
0
7 0.2 0.2 0.2 0.98 0.99 0.99 0.85

void plastic pebbletec
0
0
5 .3 .5 .7 0 0

void plastic poolwalls
0
0
5 .4 .4 .4 0 0
```

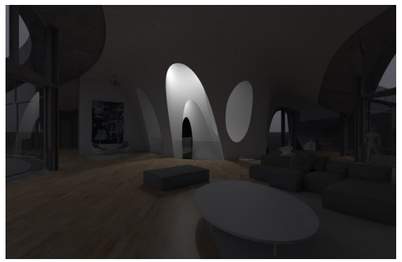
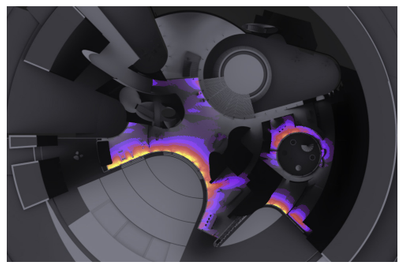
thanks Greg!

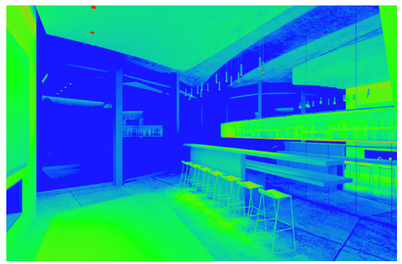
Under construction

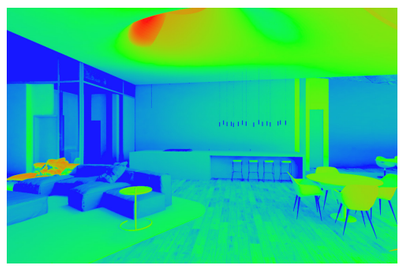
Thank you

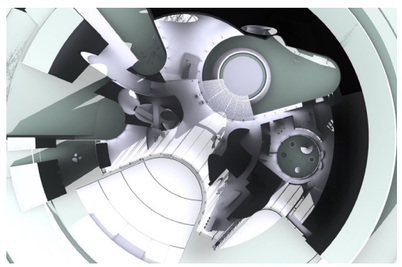
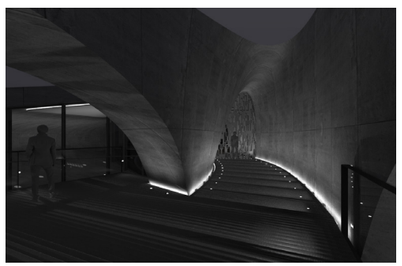






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