

**light, dark,
and architecture**

Light, dark, and architecture.

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requirements for the degree of

Master of Architecture

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contrast, architecture, sky

abstract

The thesis explores the relationship of light, architecture, and humans focusing on both the mathematics of solar movement that informs the architecture and the experiential and spiritual response of human perception to it. The exploration uses the celestial realm as the inspiration and canvas that the design process was built on.

The light tunnels, the design concept explored in detail, investigate the consequences of architectural form and space in combination with volumetric, reflected, dispersed, or absorbed light. The design process transforms an instrument derived from the sun dial to a living piece of architecture that responds to human perception to variably objectify and reveal spiritual conditions of the celestial sky.

general audience abstract

The thesis explores the relationship of light, architecture and humans focusing on both the movement of the sun and the perceptive response to it. The Pilgrimage of the ‘*temples of inexplicable*’ is a complex with several pavilions that engage with light and dark to create a space that allows the coexistence of spirituality and science in harmony.

The thesis looks into one pavilion in detail – The light tunnels that investigate the movement of the light source, its nature as an object or revelation, and the human perception. The design process transforms an instrument to a living piece of architecture.

Acknowledgements

To Hilary,
for her relentless enthusiasm and encouragement.

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for their continuous support and guidance.

To Aai and Baba,
for their unwavering faith.

For Aaba,

the man who believed in me unconditionally
and taught me to never settle.

-Porya



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1.

prologue

1638, Florence.
The union of realms.

...his ponderous shield
Ethereal temper, massy, large, and round,
Behind him cast; the broad circumference
Hung on his shoulders like the Moon, whose orb
Through optic glass the Tuscan artist views.

- John Milton
Book 1, Paradise lost (1667)

Milton compares Satan’s shield to the Moon viewed
and measured by Galileo, the “Tuscan
artist”(Henderson, 2021)

John Milton, 30, was set on a journey to explore the
artistic and religious traditions of Roman Catholicism.
He paid a visit to the (in)famous Galileo Galilei in his
villa in Arcetri. The astronomer, then, was old, blind
and in house arrest, having faced the Roman
Inquisition for believing and advocating Copernicus’s
theory that the ‘Earth revolves around the sun’. An
idea that challenged the church’s doctrine that the Sun
orbits the Earth.

The encounter left such a lasting impression on Milton
that it made it’s way into one of his greatest literary
works ‘Paradise Lost’(1667). The epic, based on the
biblical tale of the fall of the mankind hints to his
Florentine travels by referring to Galileo. The ‘devils’
in his narrative represent failed revolutionaries, hence
establishing an undercurrent of mutiny. Milton, later,
was also imprisoned for his radical thoughts.

It is indeed incredible to imagine that these exemplary
personalities from two different worlds crossed paths
and shared history. Especially now when we tend to
separate science from creative expression so
dramatically (Moshenska, 2017). The episode is a sad
example of the harmony between technology and
poetics being replaced by barriers.

Relativity
for Stephen Hawking

When we wake up brushed by panic in the dark
our pupils grope for the shape of things we know.

Photons loosed from slits like greyhounds at the track
reveal light’s doubleness in their cast shadows

that stripe a dimmed lab’s wall—particles no more—
and with a wave bid all certainties goodbye.

For what’s sure in a universe that dopplers
away like a siren’s midnight cry? They say

a flash seen from on and off a hurtling train
will explain why time dilates like a perfect

afternoon; predicts black holes where parallel lines
will meet, whose stark horizon even starlight,

bent in its tracks, can’t resist. If we can think
this far, might not our eyes adjust to the dark?

- Sarah Howe (2015)

Chinese-British poet, Sarah Howe was commissioned to write a few verses on light for the National poetry day. Her first thought was to acknowledge light’s absence as back holes, a realm Stephan Hawking spent his life studying. ‘Relativity’ emanates from Howe’s admiration for Hawking’s research and interest in science fiction. Howe strongly believes that ‘scientists and poets should talk more’, a direct takeaway from Milton-Galilei chapter. Science relies on ‘Metaphors’ to communicate itself and ‘Metaphors’ are traditionally poet’s tools. Thus every scientific discovery has an experiential, almost spiritual aspect to it. The blurring of lines and the tension between reality and metaphor are often feared, but this tension tends to inspire exploration and subsequently discovery (Howe, 2015).

The world thrives on exploration, which today lies in scientific pursuit. But behind this heavy pursuit of reason lies a more effervescent, rebellious sense of imagination and creativity. Exploration demands the ability to imagine the unimaginable. To imagine the inexplicable. Yet society has evolved to build a tall partition between all things quantifiable and all things not. A partition so opaque and difficult to break through that it has crept it’s way into our culture and perception. It divides our community and confines ideas into rigid boxes in an unnecessary attempt to create inflexible definitions.

The dispersion of this partition is hence crucial to create a safe space where contrasting realms can coexist. Architecture can be an instrument that acts like a catalyst in this process of exploring and celebrating science and spirituality simultaneously.

Acknowledging binaries through the celestial realm:

Science and Spirituality.
Reason and Religion.

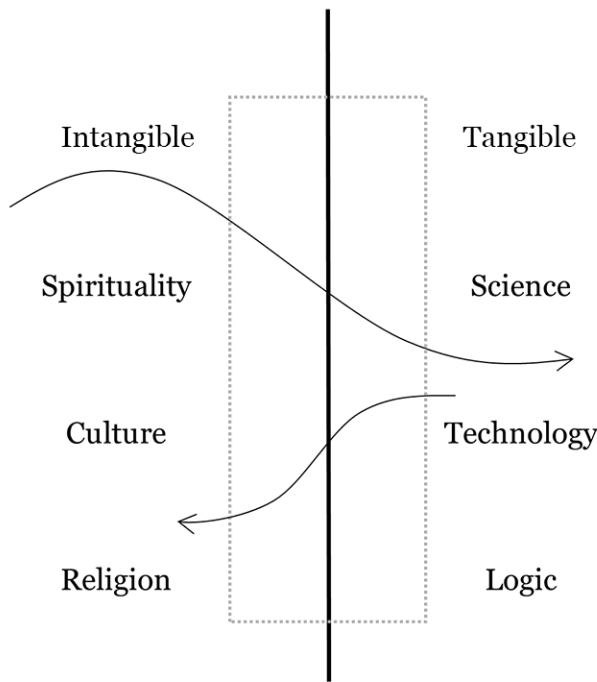
The idea of ‘exploration’ can be traced to the oldest of natural sciences, Astronomy, and its derived technology that symphonized art, architecture, and sociology. Observation of celestial bodies led to derivation of mechanisms to calculate time, a crucial contributor for the development of agriculture. Control over production of food allowed humans to shift to sedentary live and create community. Communities created culture. Culture codified hierarchy and the associated tussle for power. The entire evolution of societal systems can thus be tracked back to observing stars, planets and their movements- essentially the entities whose shear existence allows life to flourish on earth, not only metaphorically, but literally.

Religion was born out of the necessity of holding these growing communities together. ‘Humans who tended to survive were those driven by guilt rather than revenge, because the latter would fight and die’ (Vernon, 2019). The concept of divine deities as creators of law and issuers of punishment promotes pro-social behavior. Religion was hence a tool to ensure sustenance of mankind.

But ‘is the concept of Religion and God a delusion?’ can be a ferocious debate (Mckay and Ross, 2021). Considering the context at the time of its origin, it is not surprising that the Sun, Moon and other stars and planets took prominent positions in the realm of Gods. The Sky, a home to these mysterious entities that looked upon earthly lives, was associated to the highest power. But the reverence of these entities was a function of their inexplicable, mysterious nature. Knowledge and understanding of the existence of a Being liberates one from the associated imposed boundaries. The lack of knowledge about these celestial entities is what essentially led to them being worshipped. Mythology came in and humanized these entities to reduce the gap between earthly and godly lives, and creatively generated narratives served to justify the humanization.

What essentially questioned this framework of religion and reverence is visualization of celestial entities as objects of matter instead of mystical bodies. Emergence of astrophysics as a branch of astronomy played a crucial role in it. Involvement of physics and chemistry made the celestial realm quantifiable. Jumping back to modern Astronomy and space physics, mythological narratives began to be questioned through reason-based observations. The speed of technological advancements catapulted. We went from the first aircraft to the first space craft in about 50 years and hence objectified the very celestial entities that were perceived as godly personifications. The knowledge-based progression in the past centuries put science and technology at odds with culture and religion, and divided the world instead of unifying it.

The tangible battled against the intangible, quantifiable against the unquantifiable, revelation against a story. Where in fact stories inspire revelations. Darkness gives light its worth. Death makes life desirable. There is no denial of binaries, but the hierarchy within a binary isn’t truly of great significance in the longer run as power and hierarchy can be overthrown. The existence of the binary keeps the ball rolling and encourages more exploration.

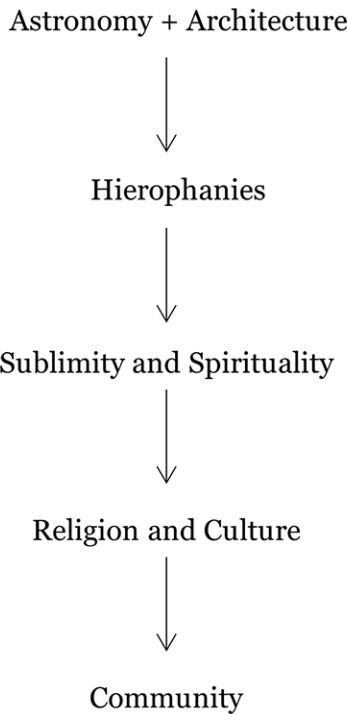


Architecture as an instrument for celestial revelations.

The ancient need of men to understand the fundamentals of time and space through cosmic observations found material presence in Architecture (Dolan, 2021). A medium that physically and symbolically expresses the culture and knowledge systems and one’s power through it. Architecture and its monumentality was thus a means to express ‘Heirophanies’ through architecture’s design as an astronomical tool. Hierophany, derived from the Greek words hiero-, "sacred," and phainein, "to show", means the manifestation of the sacred.

Power management of the ‘inexplicable’ or the ‘sacred’ emerged from the need for the expression of a world view, or a communal framework of notions, which was critical for the establishment of culture and religion. The use of architecture as astronomical instruments was one way to allow the ‘sacred celestial entities’ to reveal themselves and invoke a sublime experience. The ‘awe’ generated by the sublimity can have both positive and negetive consequences. It can be empowering or grotesque This duality in sublime allowed man to explore the relationship between his individual self with the world around him. And Spirituality was born.

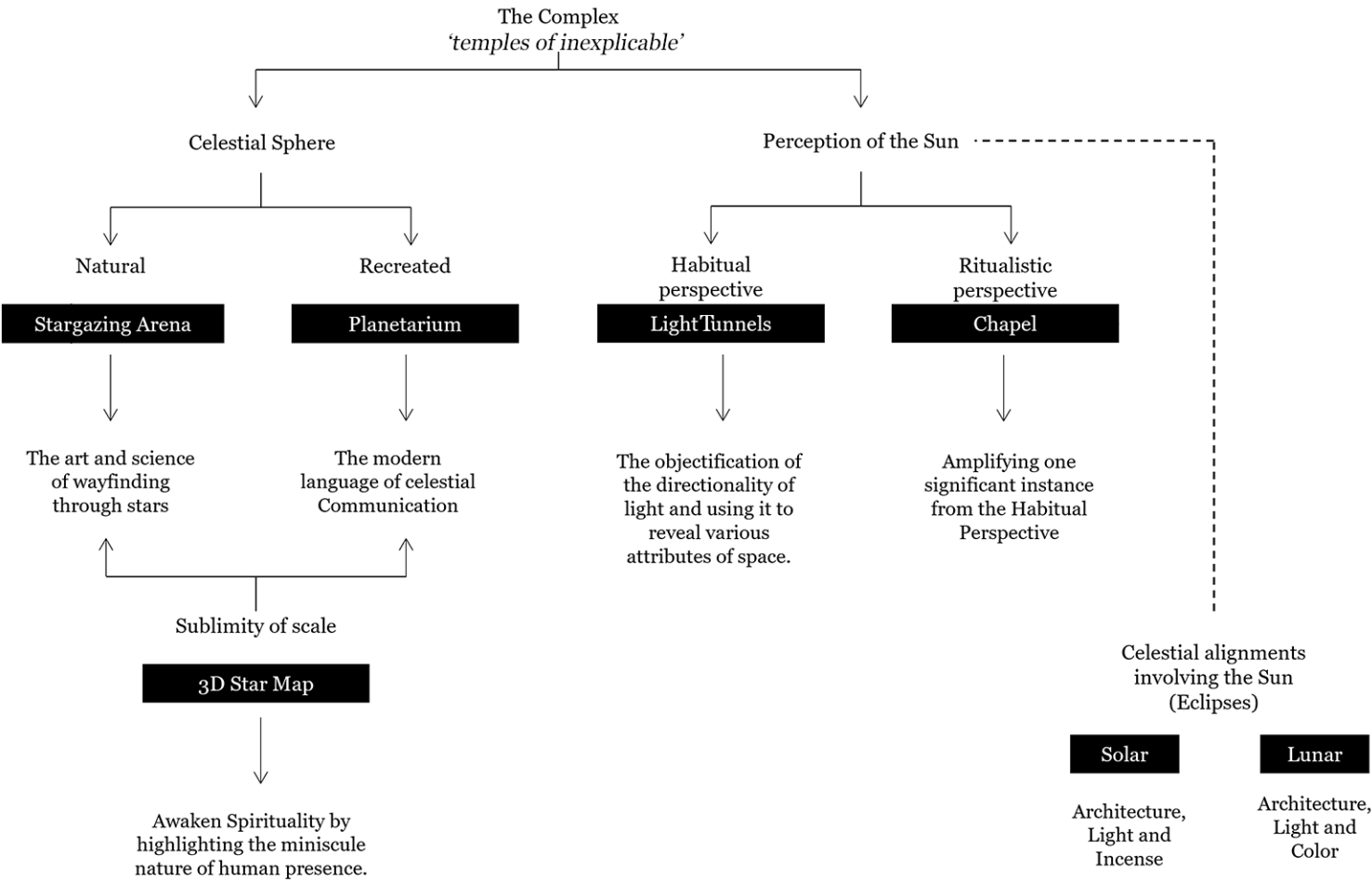
Spirituality predates religion and focuses on self-actuality and transcendence. Architecture gives an opportunity to choreograph this discovery, translating scientific phenomenons into sensory simulations. Architecture unifies the revelation with it’s story and celebrates the binary.



The ‘temples of inexplicable’, Chile

The ‘temples of inexplicable’ emerged from the idea of exploring architecture as a medium to celebrate the knowns and unknowns of the outer space paying an ode to its mathematical evolution and the reverence and spiritual awakening its vastness induces. The proposed temple complex is a part of a larger Pilgrimage that connects the earliest cradles of civilization in which astronomy developed as a science. Having multiple locations for the temple complex improves accessibility, relatability and covers multiple perspectives and cultural associations of astronomy and architecture.

Chile, an acknowledged capital of modern astronomy, is not only a home to the newest technological advancements, but also represents the under-represented southern hemisphere in the astronomic realm. Nestled in a valley in the hills of the Atacama, the chosen site is in close proximity to Vicuna, the home of Chilean wine. With the clear view of the Sunrise from over the higher peaks of Andes in the east and the El Tamba reservoir in the west, the vicinity boasts of some of the darkest accessible night skies in the world.



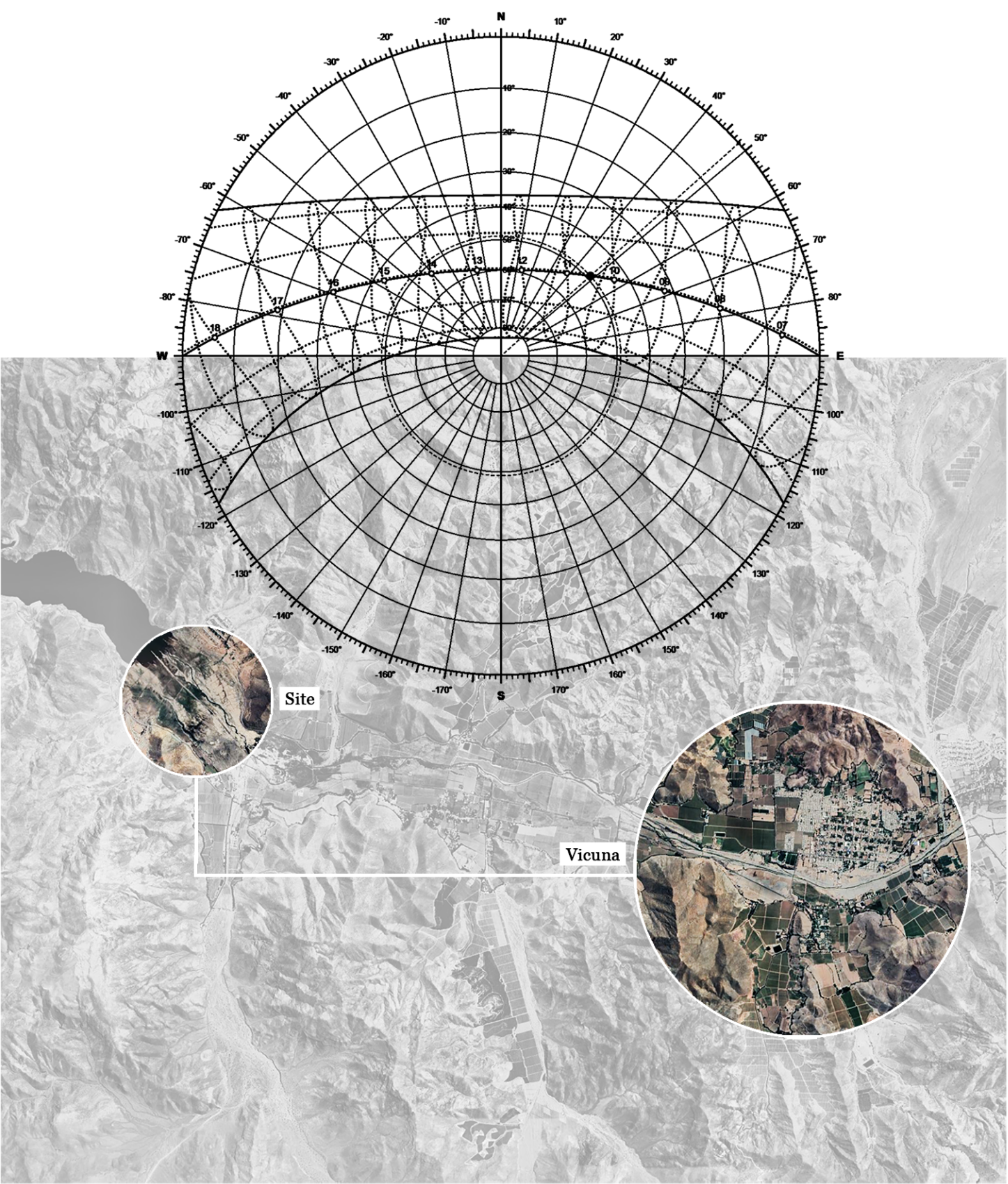
Refer to the Appendix of a detailed discussion of the Pilgrimage and specifics of the site in Chile.

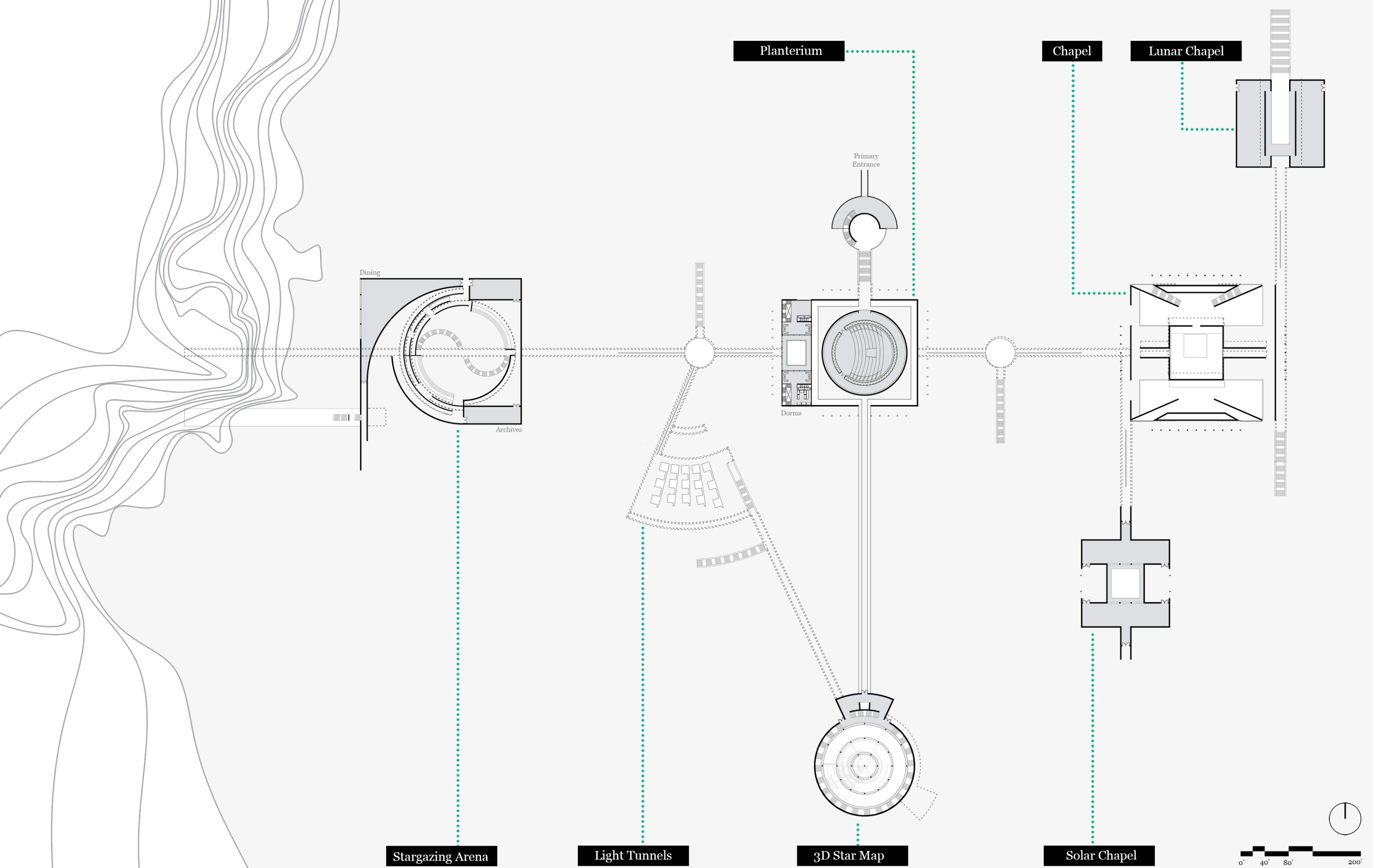
Site information-

- Coordinates - 30°00’ S 70°49’ W
- Nearest Airport - La Florida (70 mi approx)
- Climate - Dry / Arid
- Temperature - 44°F to 78°F
- Rainfall - 0.04 inches, 0-6% frequency
- Humidity - 0%

Summers near Vicuna are warm, arid, and clear, while winters are cold, dry, and partially overcast. The best time of year to visit for warm-weather activities is from late November to late March. The temperatures seldom fall below 37°F or rise over 82°F, making it comfortable all round the year with appropriate gear.

The skies above Chile's Atacama Desert are blessed with over 300 clear skies per year, perfect for stargazing. These clear skies mean that this part of the country has become one of the world's most important sites for observatories. Elqui has incredibel scenery and it is one of the principal producers of Chile’s national spirit *Pisco*, a grape brandy. The drastic temperature change through the day due to proximity to the mountains, contributes to the wines’ flavour profiles.

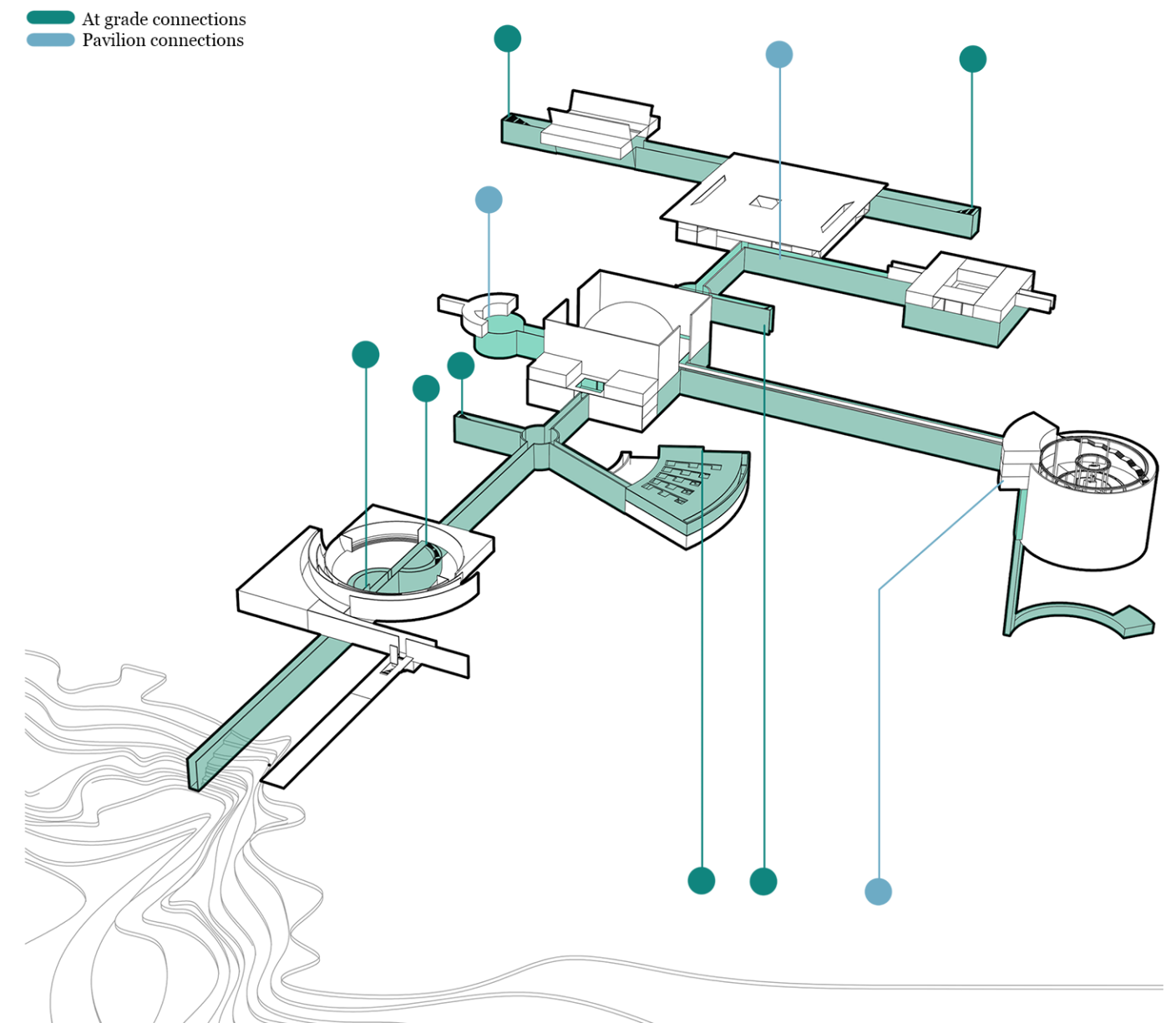
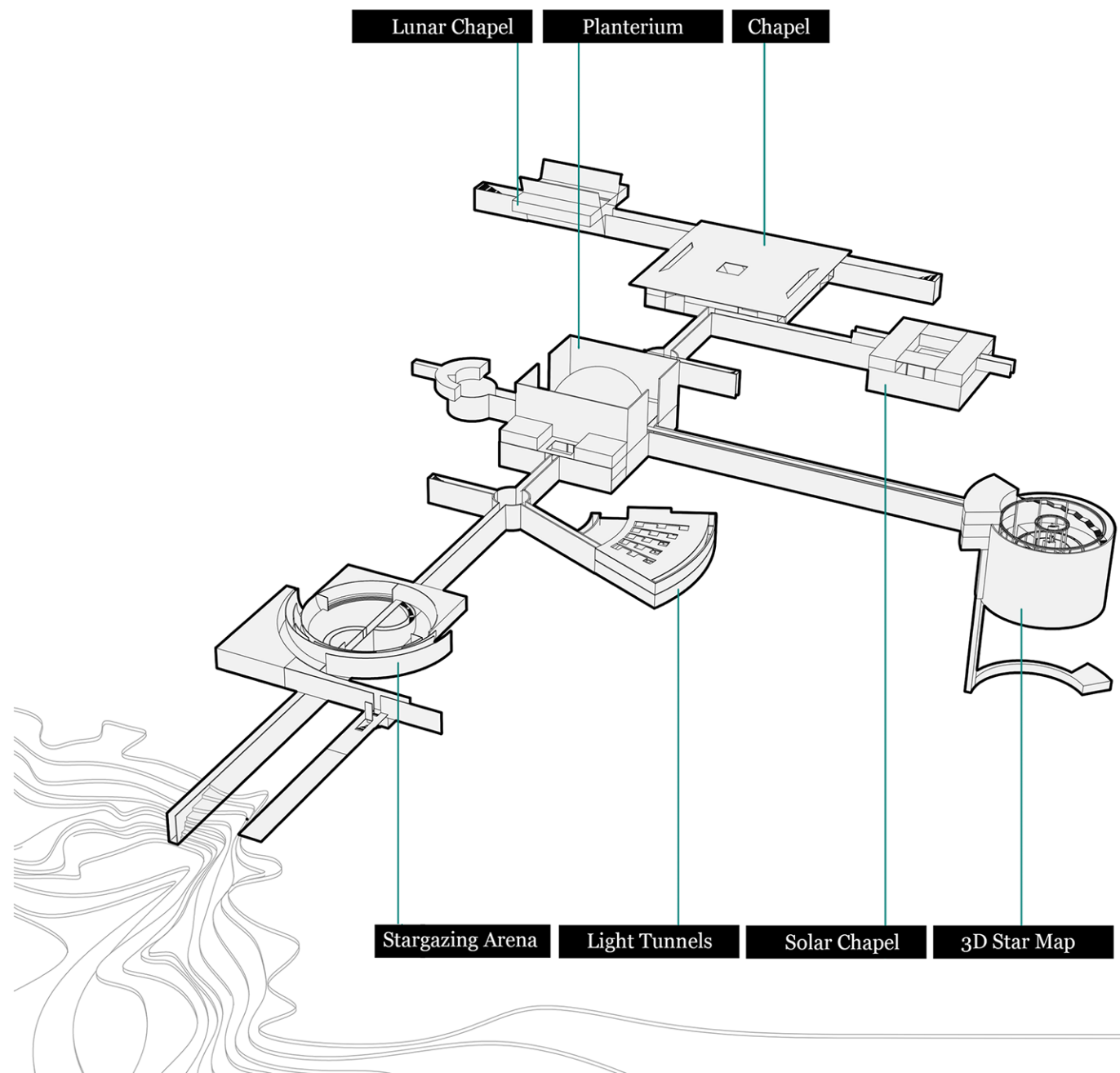




The dark trail.

To navigate through the *temple complex*, there is a possibility of movement at grade and then there is the dark trail, a secondary path of movement connecting individual pavilions. The purpose of having both is to bring out the binary of known and unknown in the circulation/ movement patterns as well. The dark trail creates an interesting parallel experience characterized by human movement, and the movement of the source of light (the sun) through the day.

The intertwined presence of both paths is a metaphoric representation of the earth and the outer space and how physical transcendence between these two entities involves breaking barriers - tangible and non tangible. The dark trail explores various levels and intensities of light revealing different elements of space. There are visual connections with other spaces but the threshold isn't always permiable. People are encouraged to meander and take different routes along the same pavilion in order to unfold the mystery.

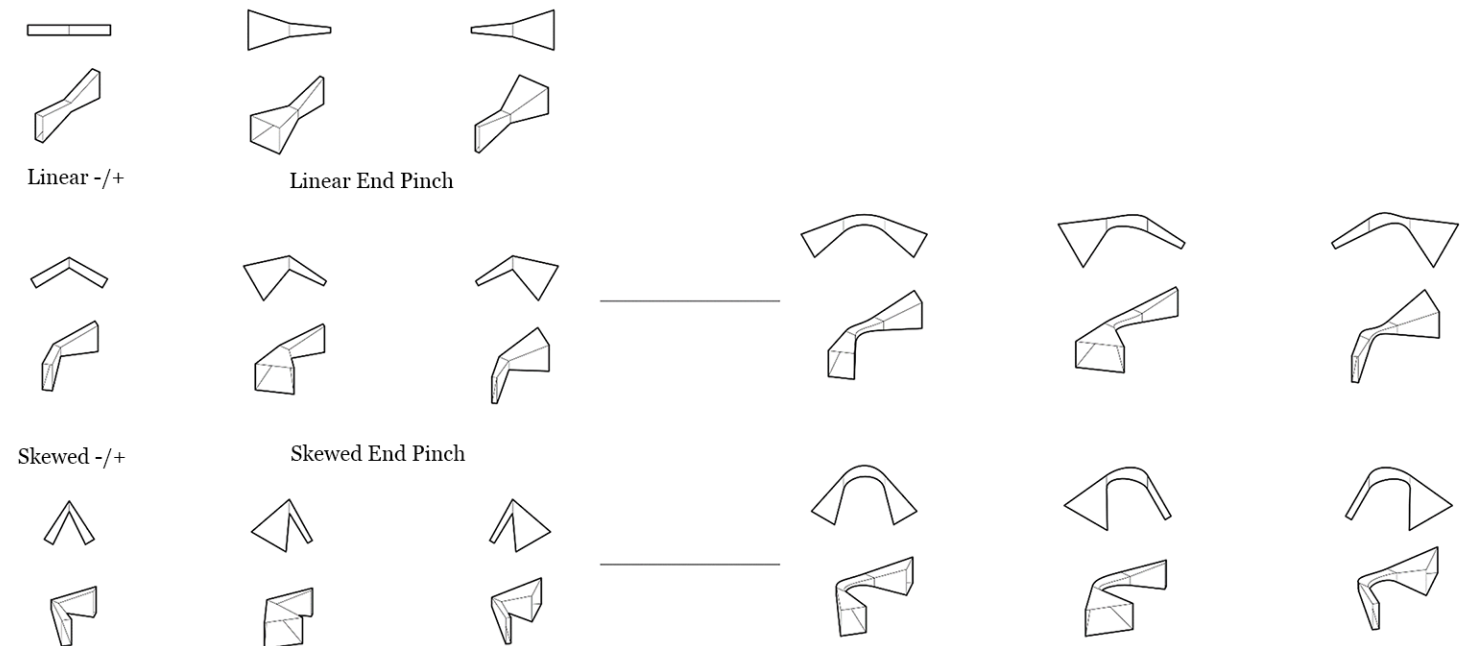
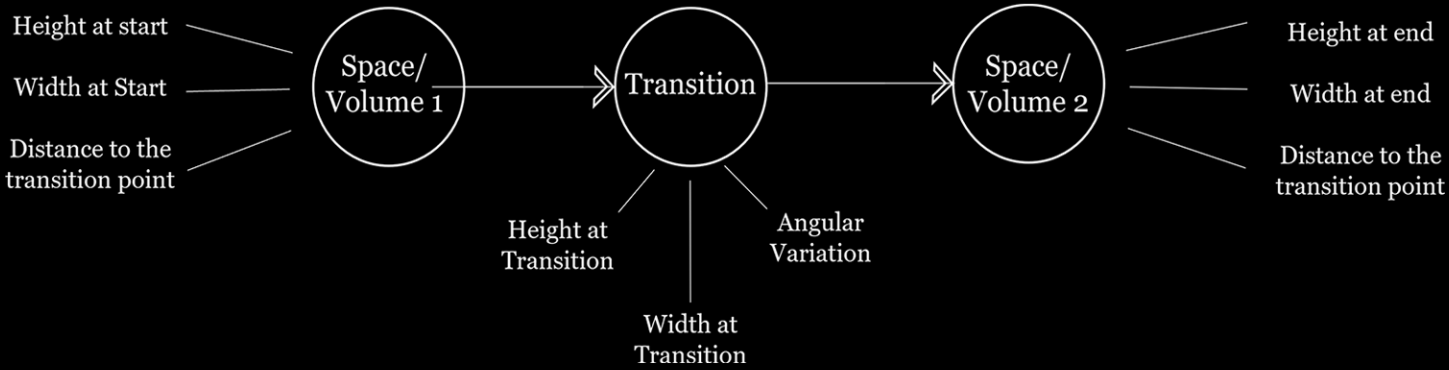


2.

exploration

Light, Contrast, and Spacial Proportions

When dealing with contrast entities, what makes polarity of these entities evident is the threshold between them. For this reason, the first exploration was aimed at understanding the impact of this threshold on the spatial transition from one space to another. The threshold was identified to be a range – from being a point of sharp change to being a third space sandwiched between the two that allows a more gradual change. The impact of this transition is a crucial factor, as a sudden change in light contrast and spatial proportions will create more intensive sensory simulations than the gradual one.



Case 1
Comparative
Analysis



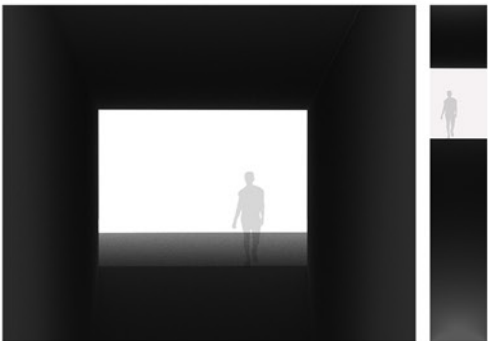
Linear +/-



Linear End Pinch



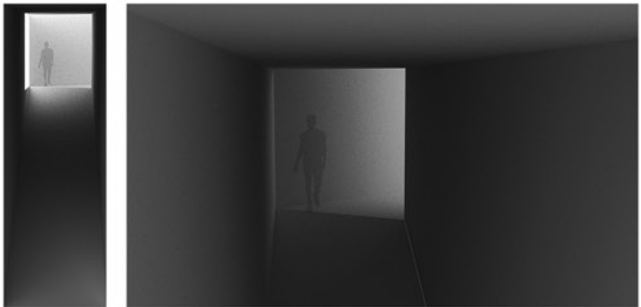
Linear End Pinch



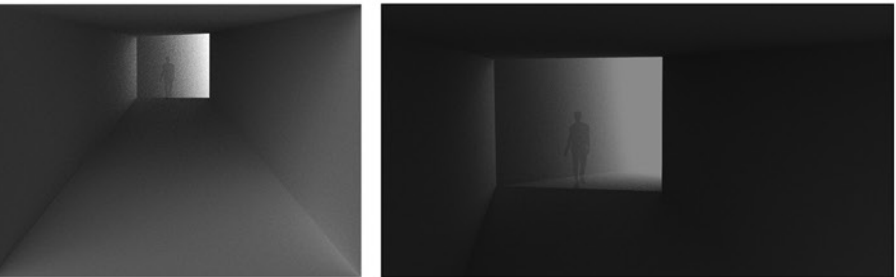
Case 2
Comparative
Analysis



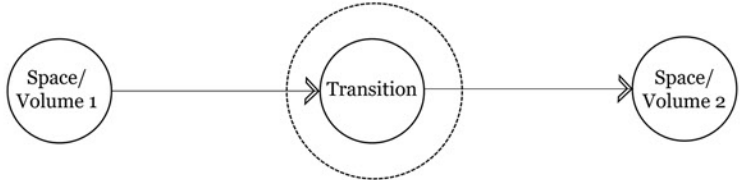
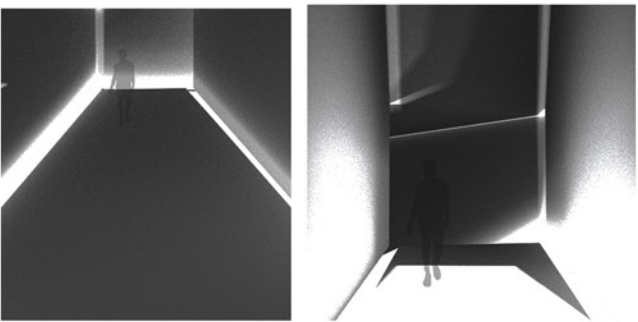
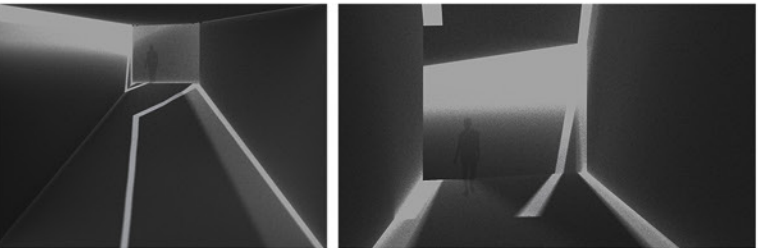
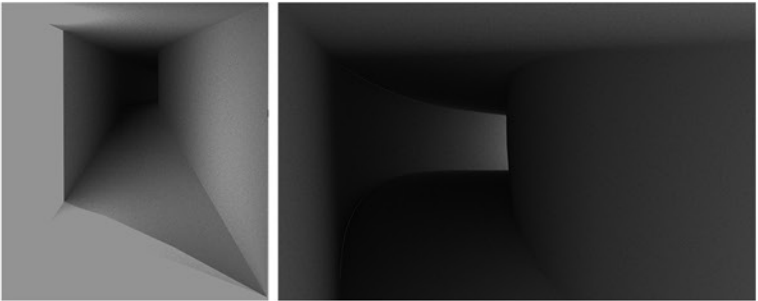
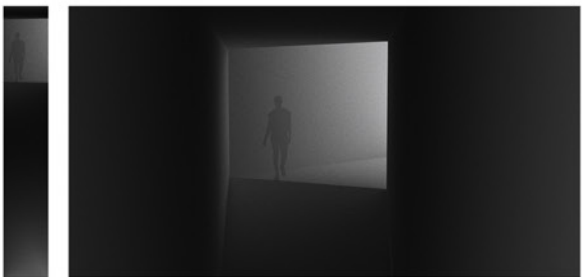
Skewed +/-



Skewed End Pinch



Skewed End Pinch



Constant
Impact ?

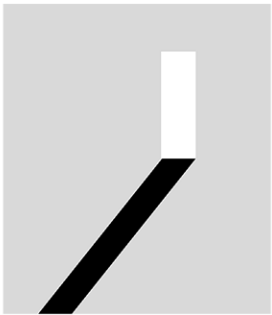
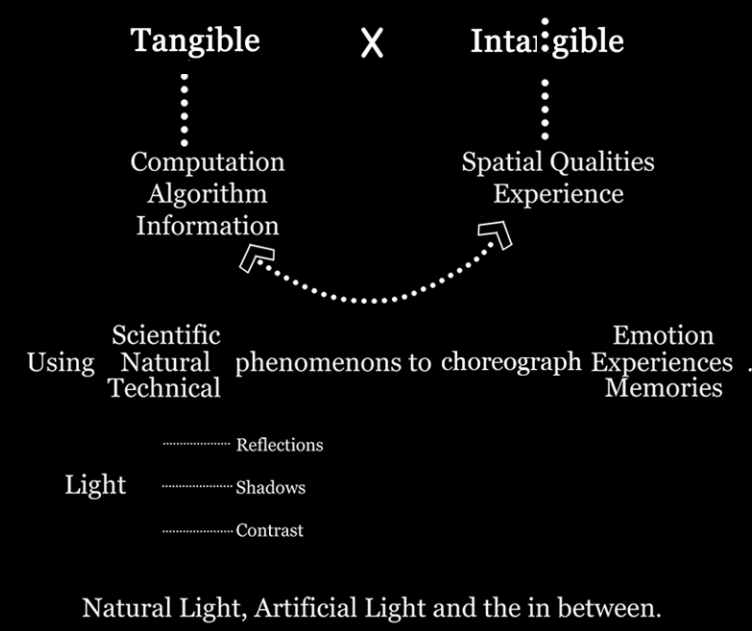
Amplification of contrast Situation 1

X

Mitigation of contrast Situation 2

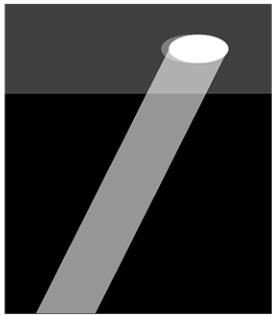
Transition point v/s Transition Space

Inverse Ideation of a Sundial.



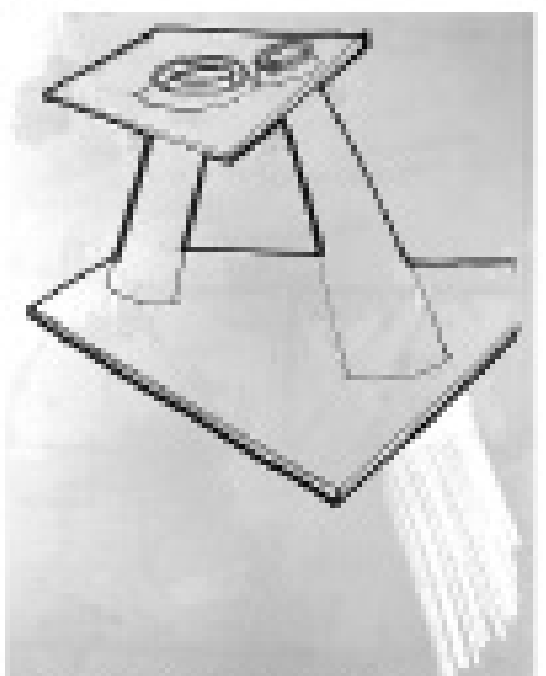
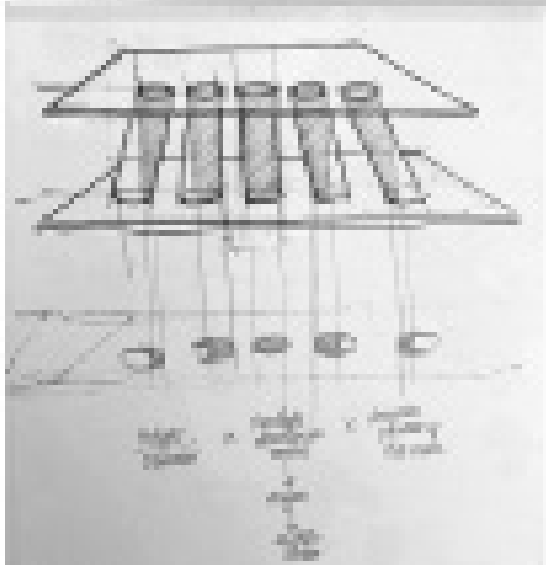
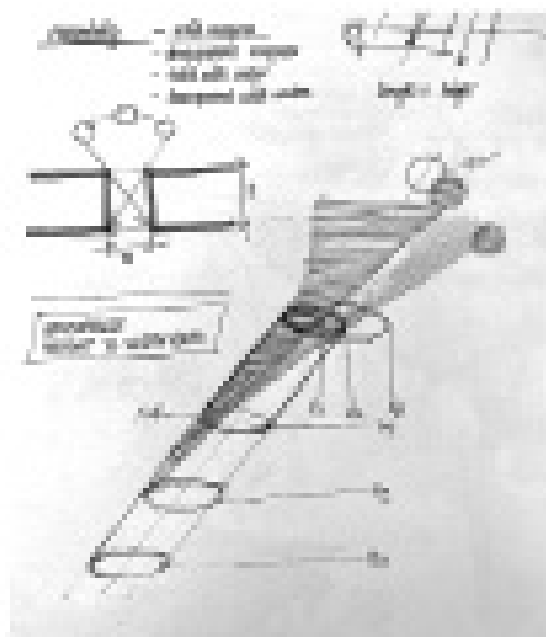
Traditional Ideation:

Use of Shadow to represent the progression of time.



Inverse Ideation:

Using streaks of sunlight to represent the fundamentals of life.

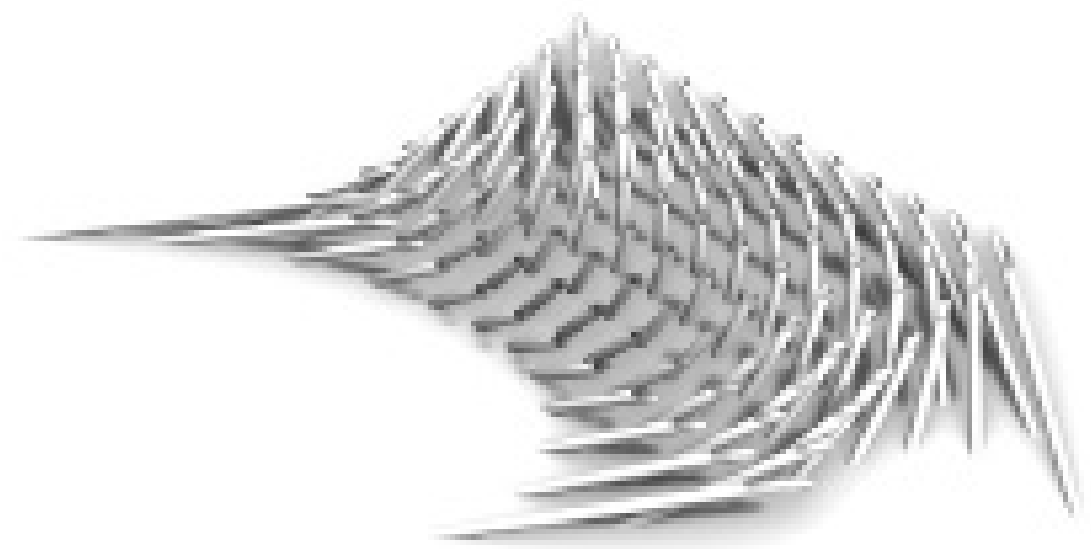
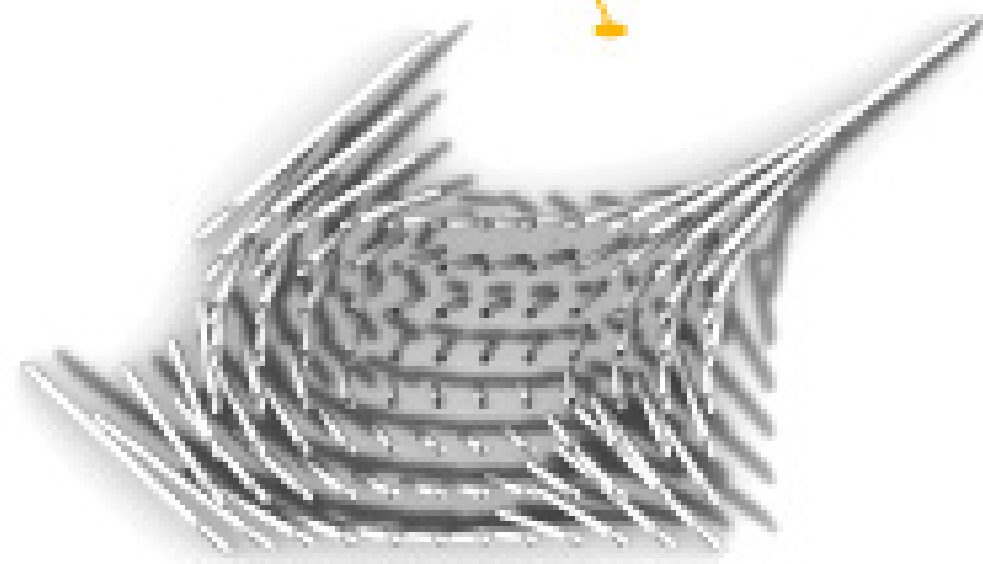
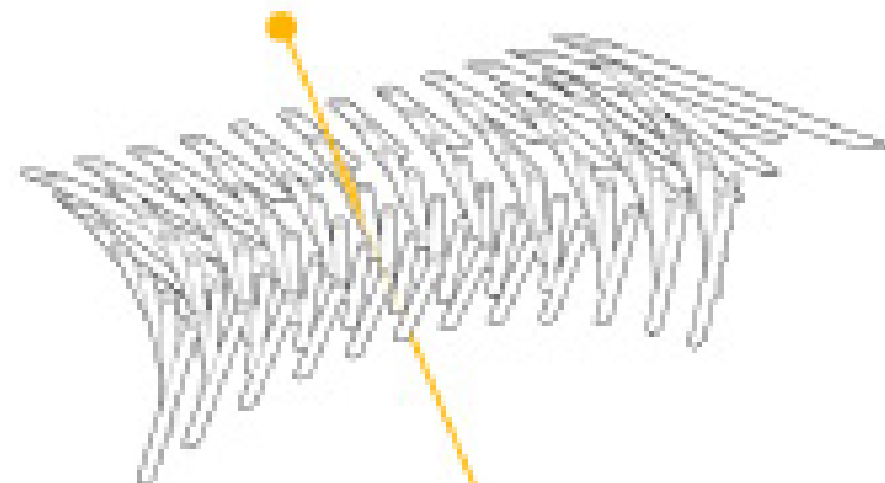


Development of the instrument :

One of the earliest instruments developed to quantify and measure time was the Sun-dial, which transformed the intangible vectors of the directional sunlight into readable/tangible shadows. This exploration is an attempt to objectify the vector itself into fatherable geometries by using the sun to create spotlights that have unique positions depending on the position of their source (the sun).

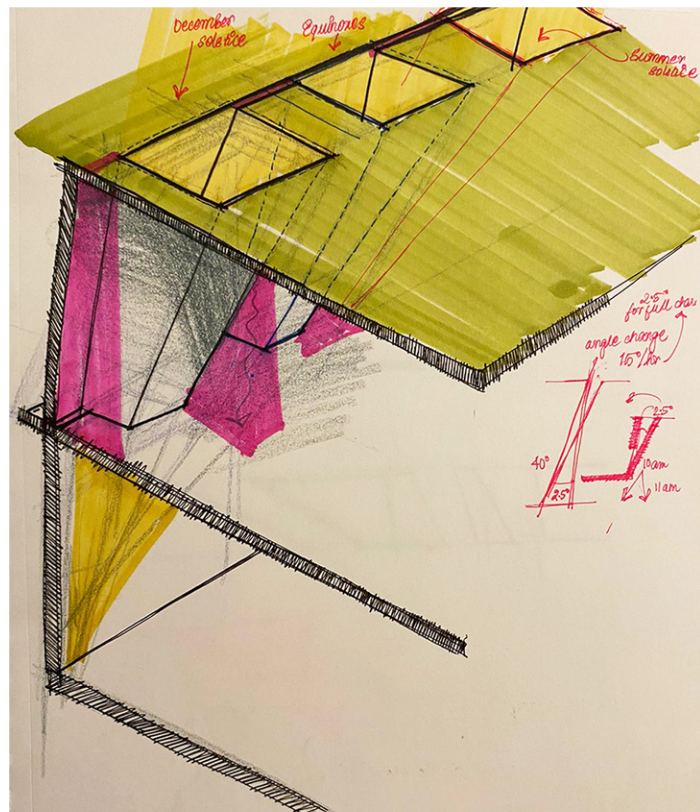
Critical aspects of consideration :

- Dimensional relationships
(length/width/height of the tunnel)
- Transmitting and receiving surfaces
- Choice of time and relationship to cultural significance
- Range of phenomenon versus visual range.
- Communication of duality
(light-driven / shadow-driven)
- Spatial qualities and geographical implications.



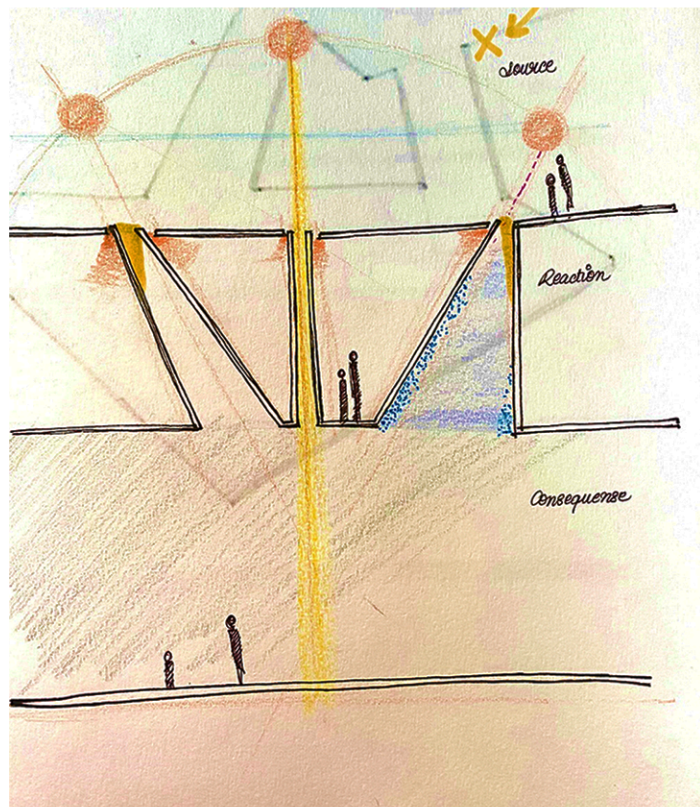
Analysing the workings of the tunnels

Analyzing the working of the instrument

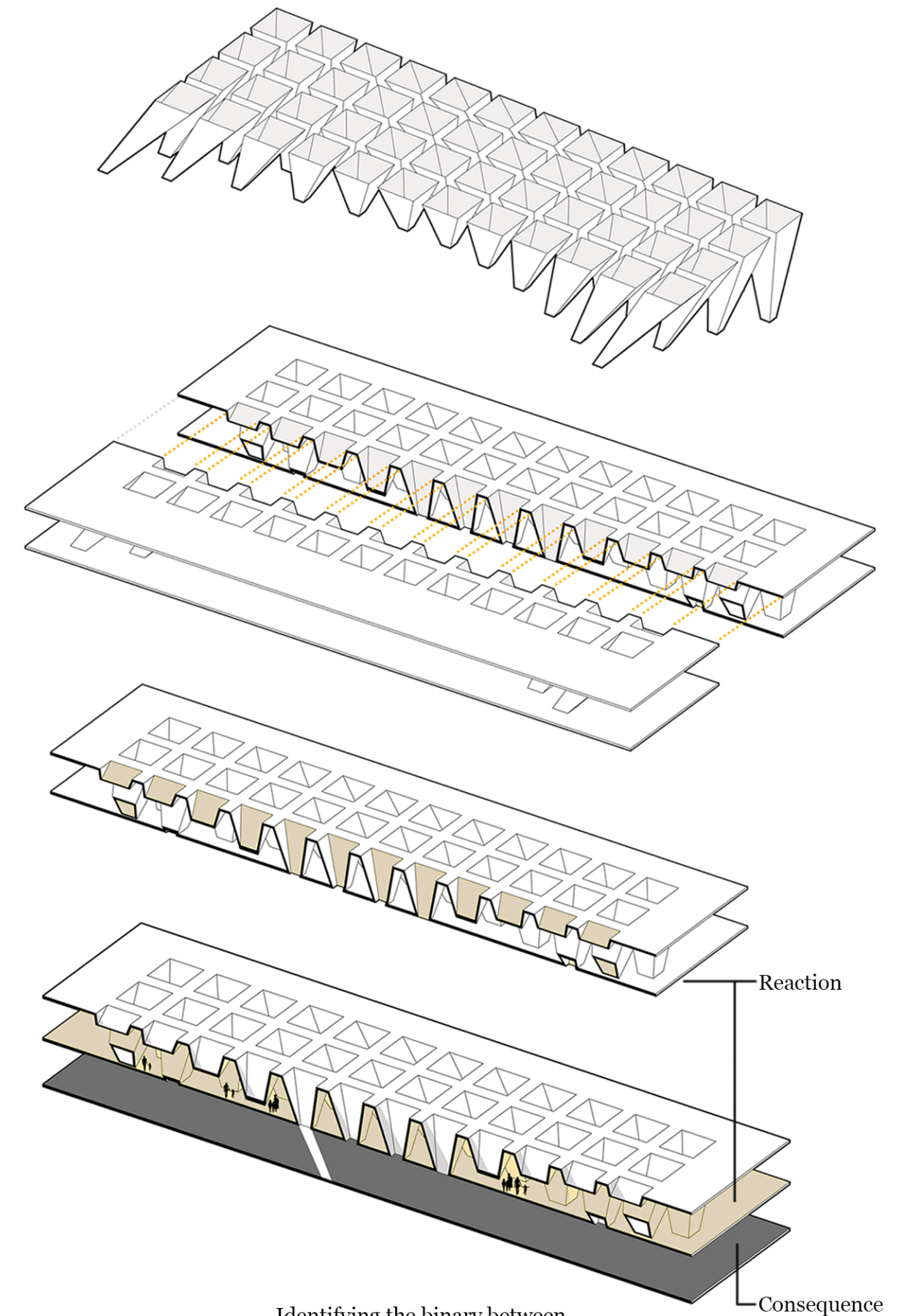


Source, Reaction , and Consequence :

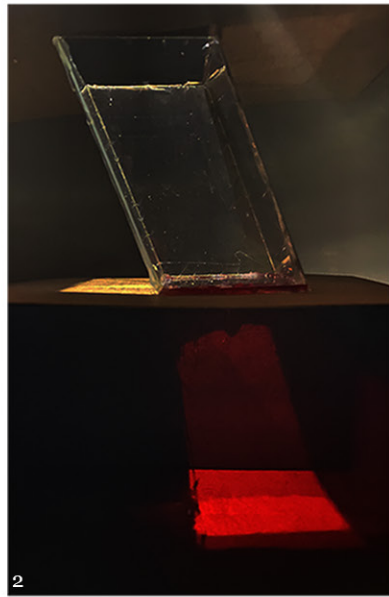
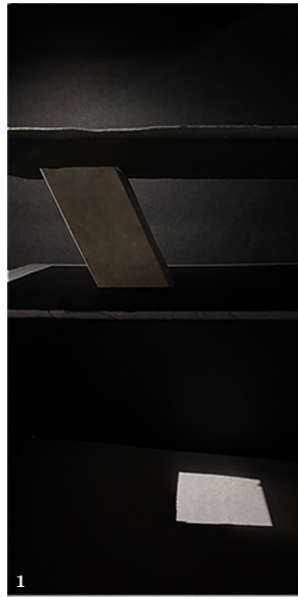
The instrument can be thought of as 3 interactive layers. The source, the reaction and the consequence. The 'reaction' is the set of intentionally inclined light tunnels that facilitate the interaction between the 'source' and the 'consequence' which are two contrastingly lit spaces. The source is flooded with natural light from the sun which then filters through the tunnels in the 'reaction' space bringing in a beam of light into the 'dark' spaces of the 'consequence'. The stark binary between the 'reaction' and the 'consequence' highlights the power and impact of the sun. The tunnels objectify the light but the 'consequence' allows it reveal the time and space.



Identifying the interactive layers

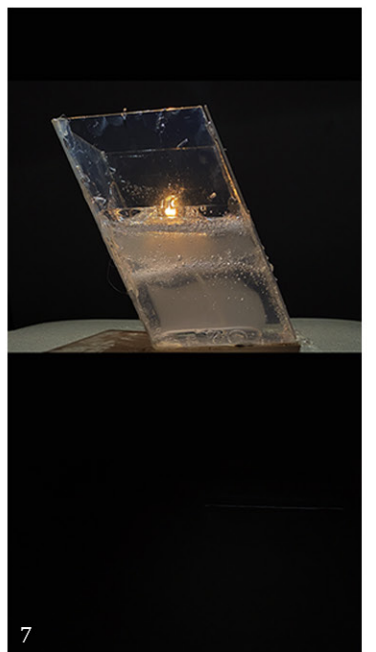
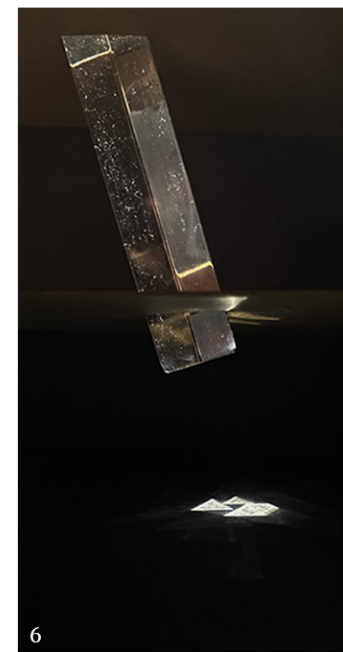
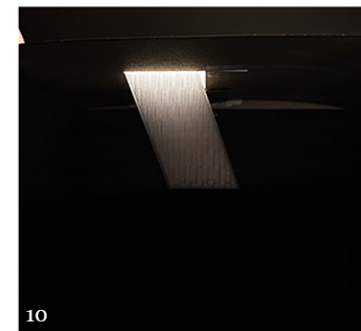
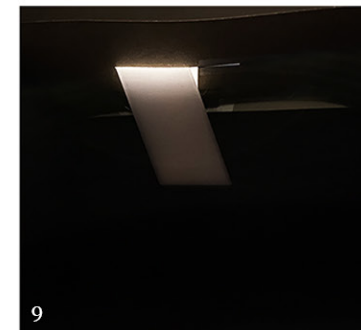
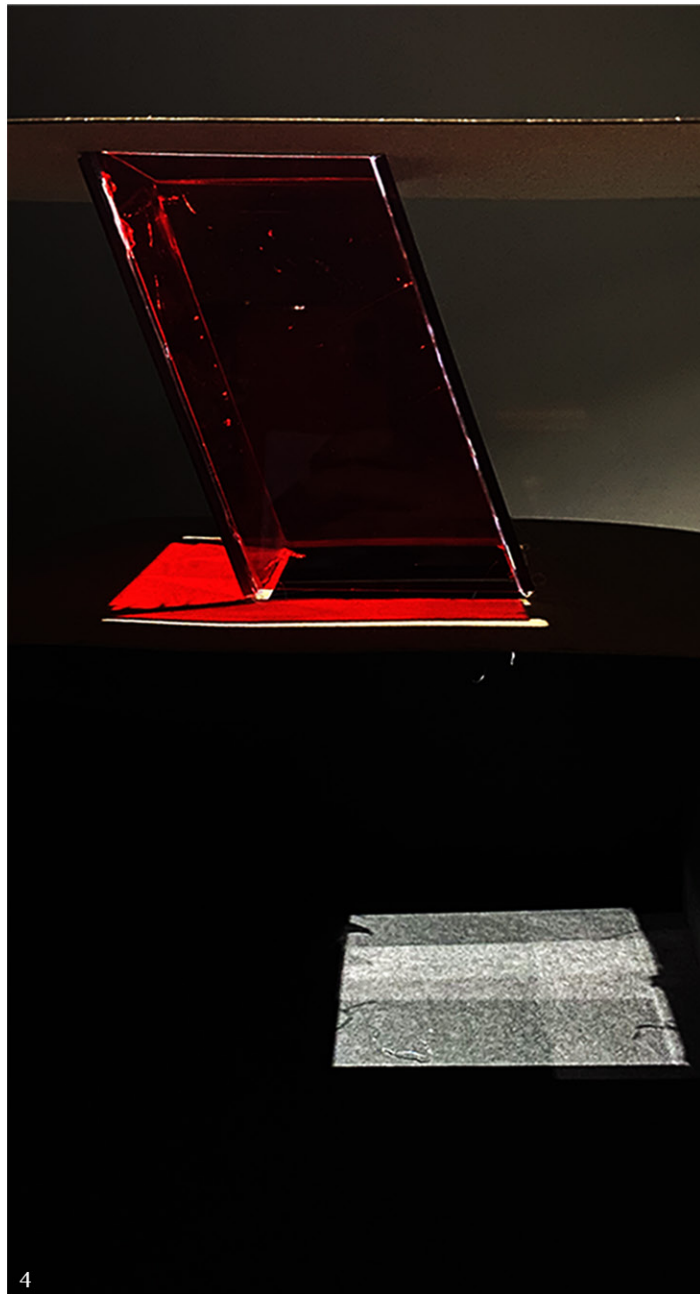


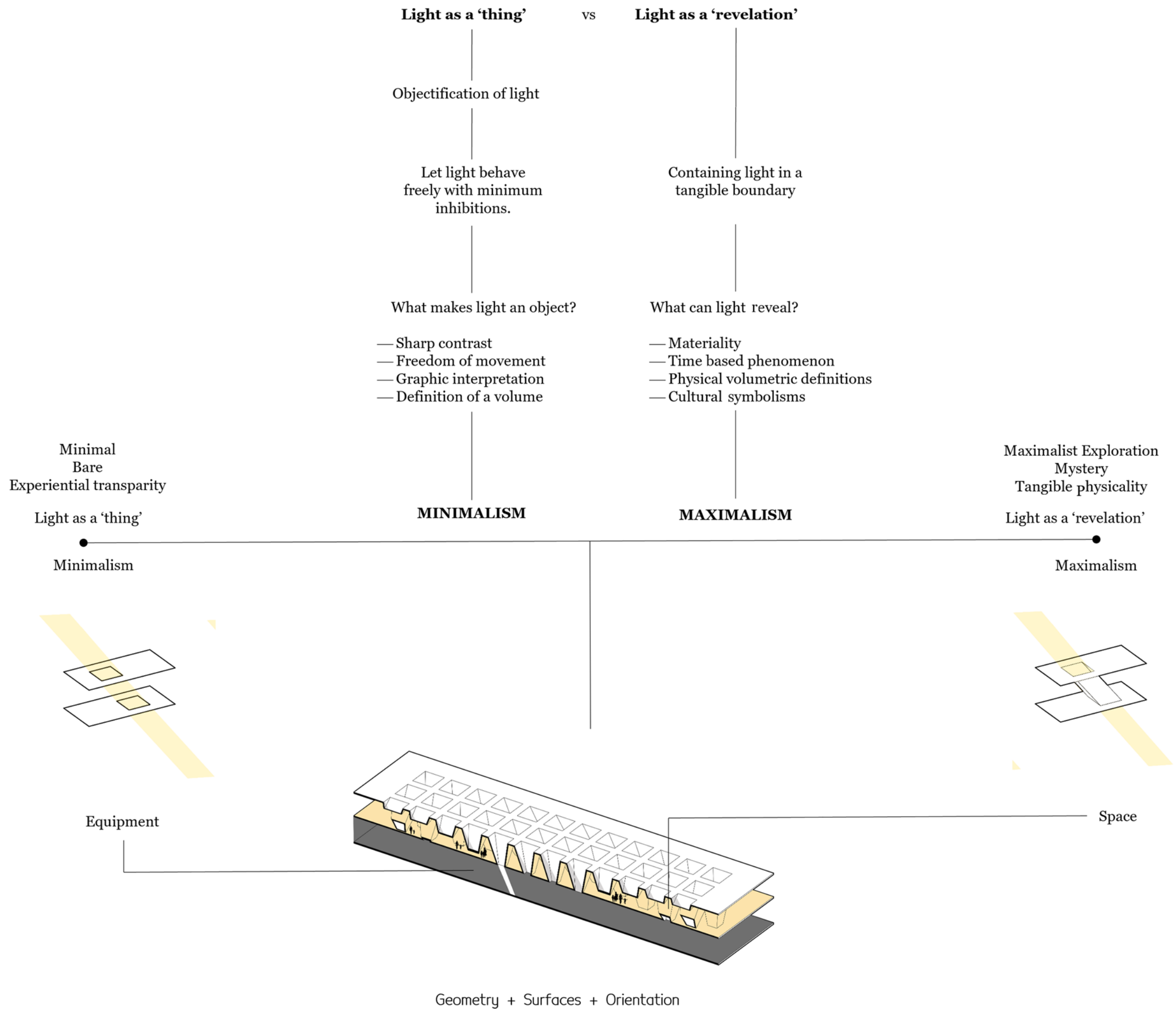
Identifying the binary between Reaction and Consequence



Material Exploration

- 1-4 - Opacity, transparency, color and water
- 5 - Incense
- 6,7 - Glass prism and wax
- 8,9,10 - 3D printed PETG (90%, 50%, 15% infill)

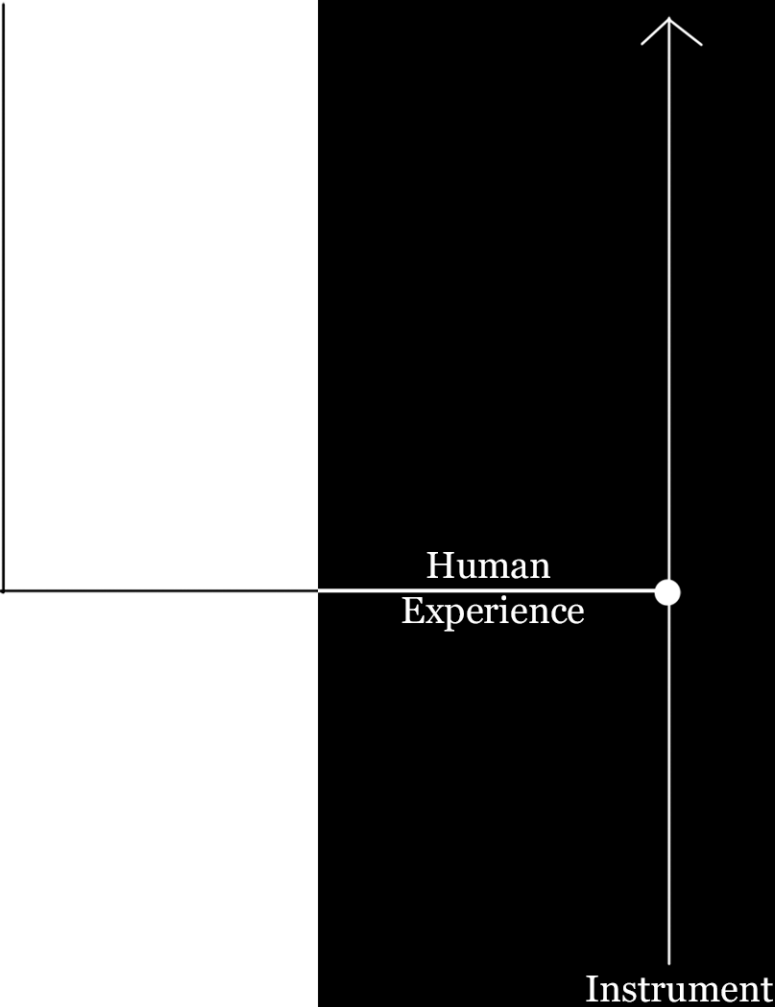




3.

narrative

Light and Architecture



Architecture is the stage for light to perform and it is this performance that transforms architecture from being an object to a live experience. Light hence allows perceptions to be formed, memories to be created and sentiments to be touched. Light permits recognition of physical boundaries while generating intangible boundaries of its own. This coexistence of physical and derived thresholds encourages movement.

The design studies investigate the relation that sunlight has with an architectural space and its inhabitants. It intends to manipulate perceptions and engage universal ideas to reveal its local and cultural significance. This is a journey of an ‘instrument’ brought alive by inhabitation of light and humans.

Light and Darkness

Theological reference
to the divine presence

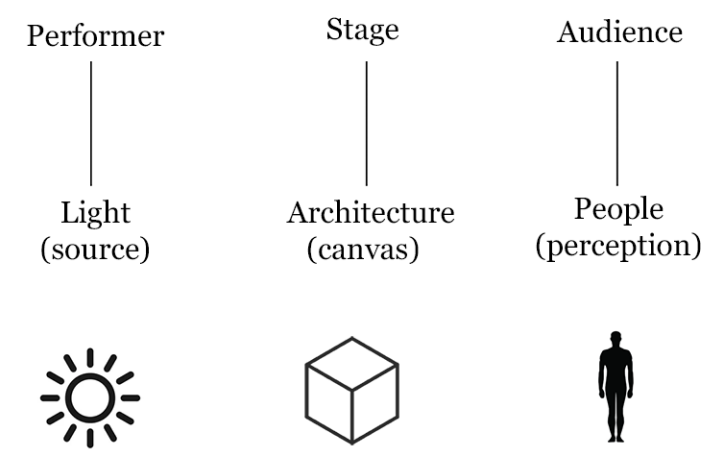
Hightlight impact and
importance through absence

More than 56% of the world population today lives in cities (*World bank statistics*). Which means that more than half of the human population on earth is so exposed to light population that it doesn't know what darkness is. According to a study by *Science Advances* more than 80% of the world and 99% of the United States live under light polluted skies and this is creating an everlasting impact on ecology, healthcare, and astronomy (see appendix).

Broadening on the theory that absence of something emphasizes its worth, the lack of natural light at night should help highlight the importance of the sun for the existence of our planet and develop a spiritual reverence for its powerful presence. But our dark nights are not dark enough and we take 'light' for granted. The strategy is thus to accentuate the impact of light through its depredation, forcing a human presence in a space into submission and getting it to surrender. The submission builds that reverence bit by bit through the sublimity of the dark.

This journey is also an experience of the shift in the binaries where the darkness has a stronger initial impact in comparison to the sparse effervescent light. But though effervescent, the light has just enough might to break through the heavy presence of the darkness in all its glory. It creates focus, hiding all distractions in the dark and emphasizing on one feature. The idea is not to create a grotesque sublime with the dark but one that is awe-inspiring, engaging, almost romanticized in the way that allows light to emerge as a beacon of hope.

Romanticizing Darkness through light

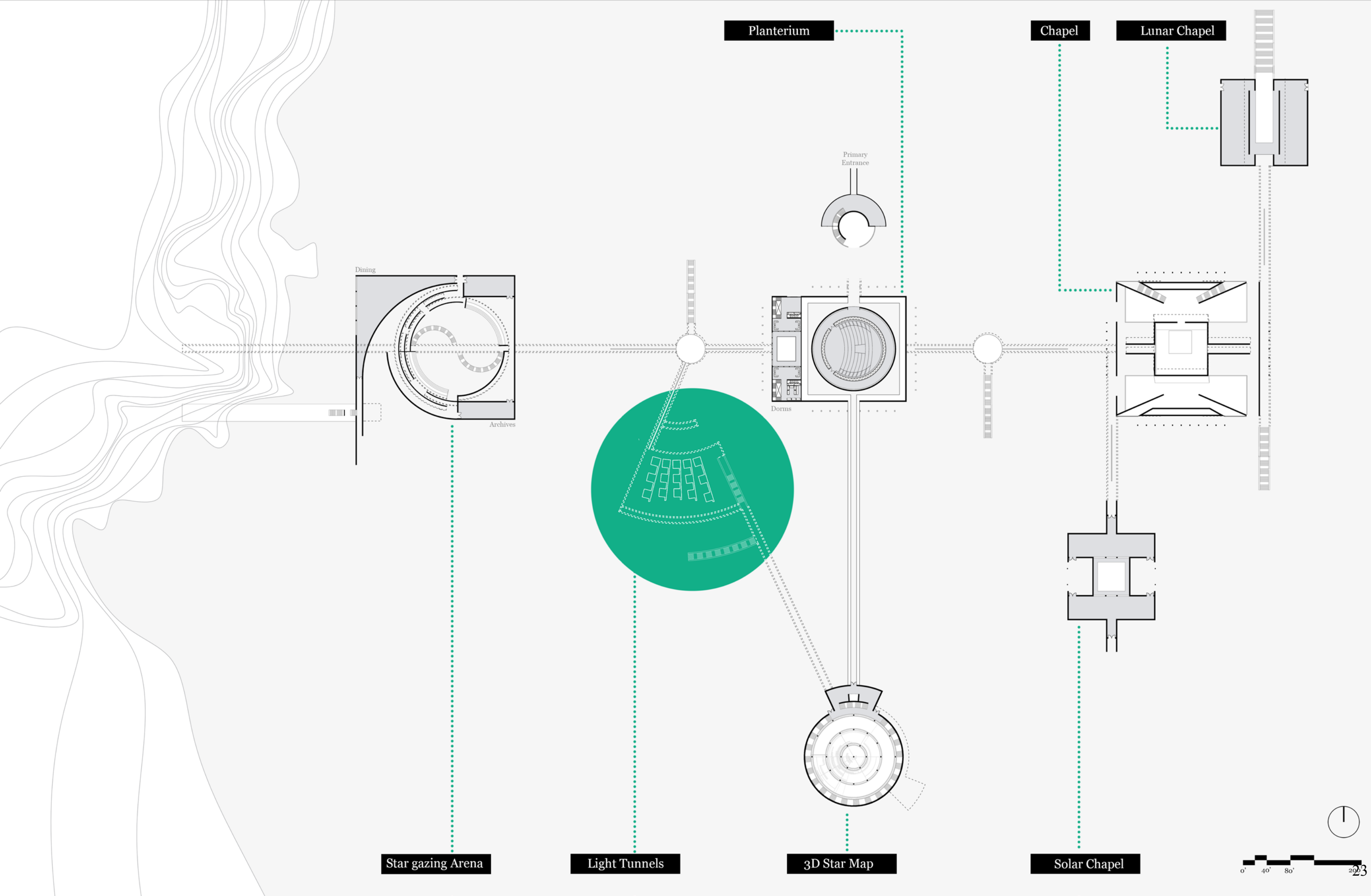


What does Light reveal in Darkness ?

- 1. Direction of Human movement
- 2. Direction of Light itself
- 3. Geometry of the space

4.

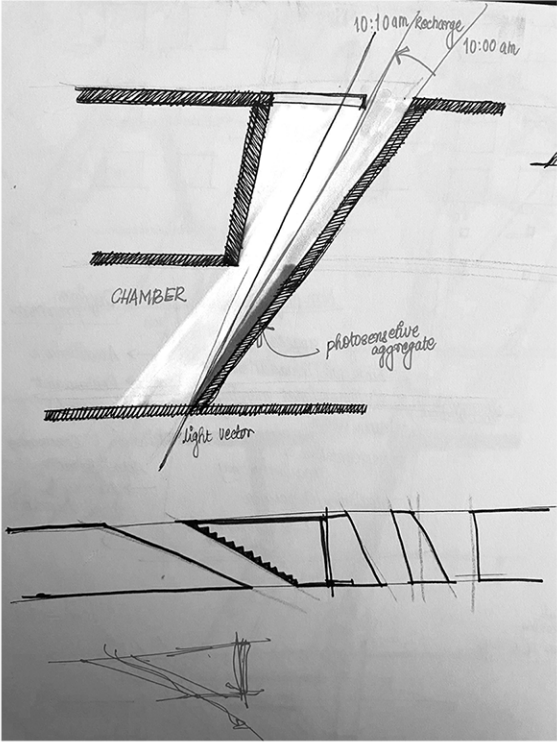
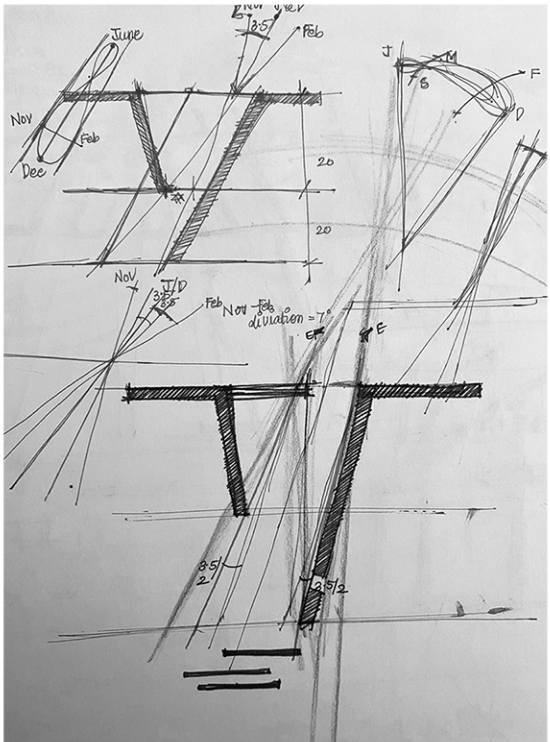
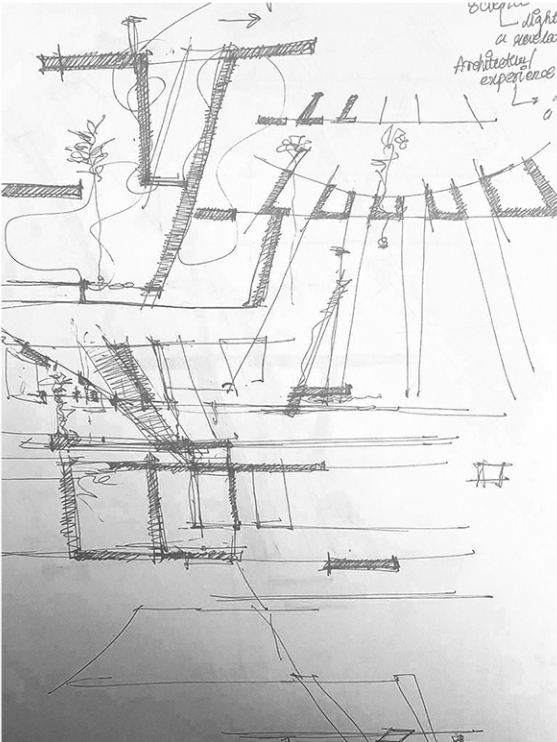
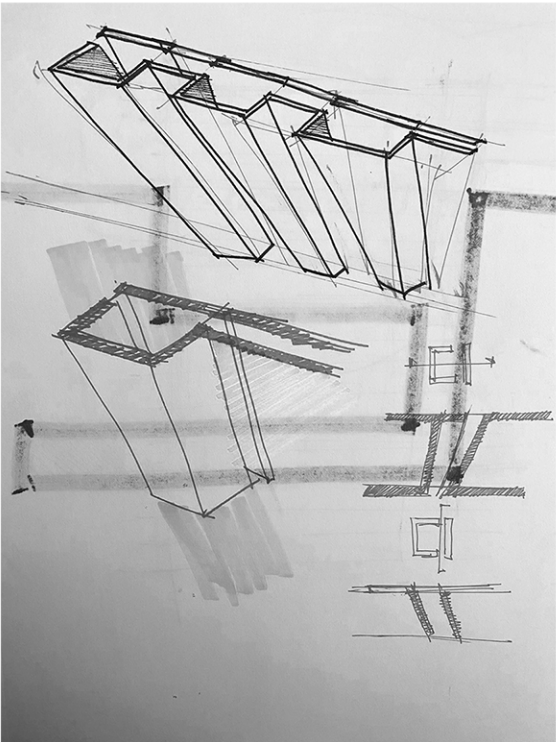
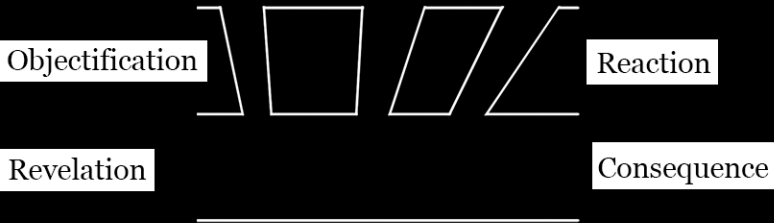
design process

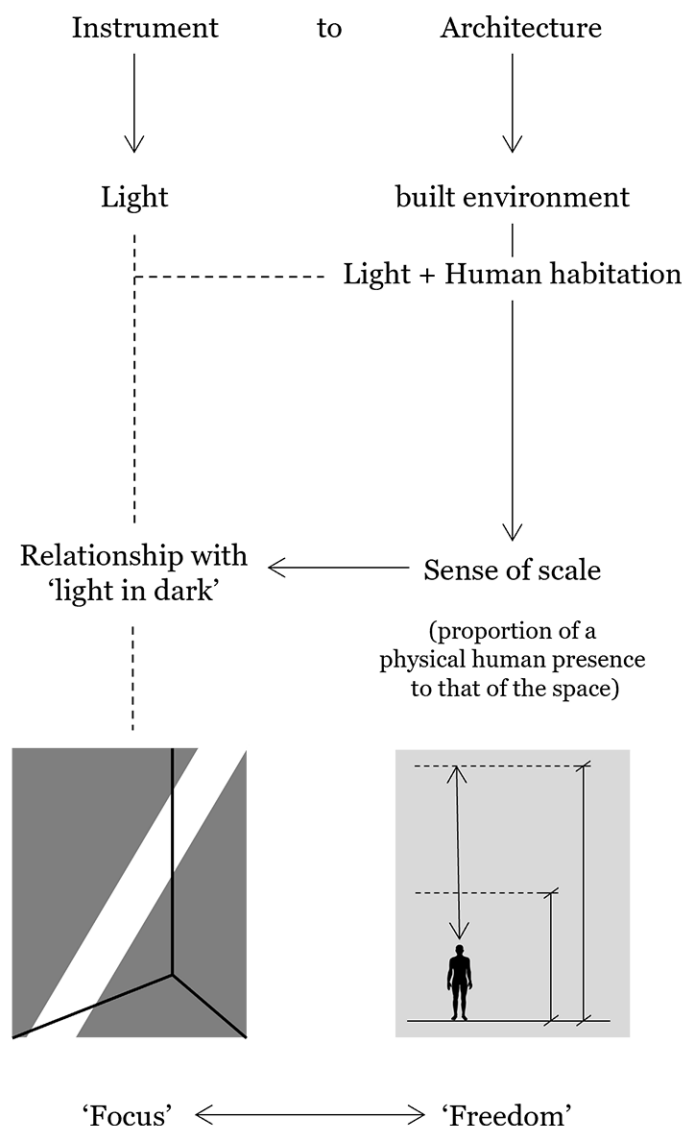


Light tunnels

The design process that follows further scrutinizes and develops the ‘reaction’ and ‘consequence’ derived from the explorations. The ‘reaction’ space is a node on the ‘Dark trail’ showcasing ways a meagre source of light can reveal various characteristics of the physical space and perception. It is a silent catalyst in developing the experience in the space under without intruding it. It reveals glimpses of this catalytic reaction but there is no physical pathway/connection that directly connects these 2 levels. Thus, there is this sense of mystery and motivation to meander/explore.

The ‘consequence’ space or the level under the ‘reaction’ is where light transforms from an entity

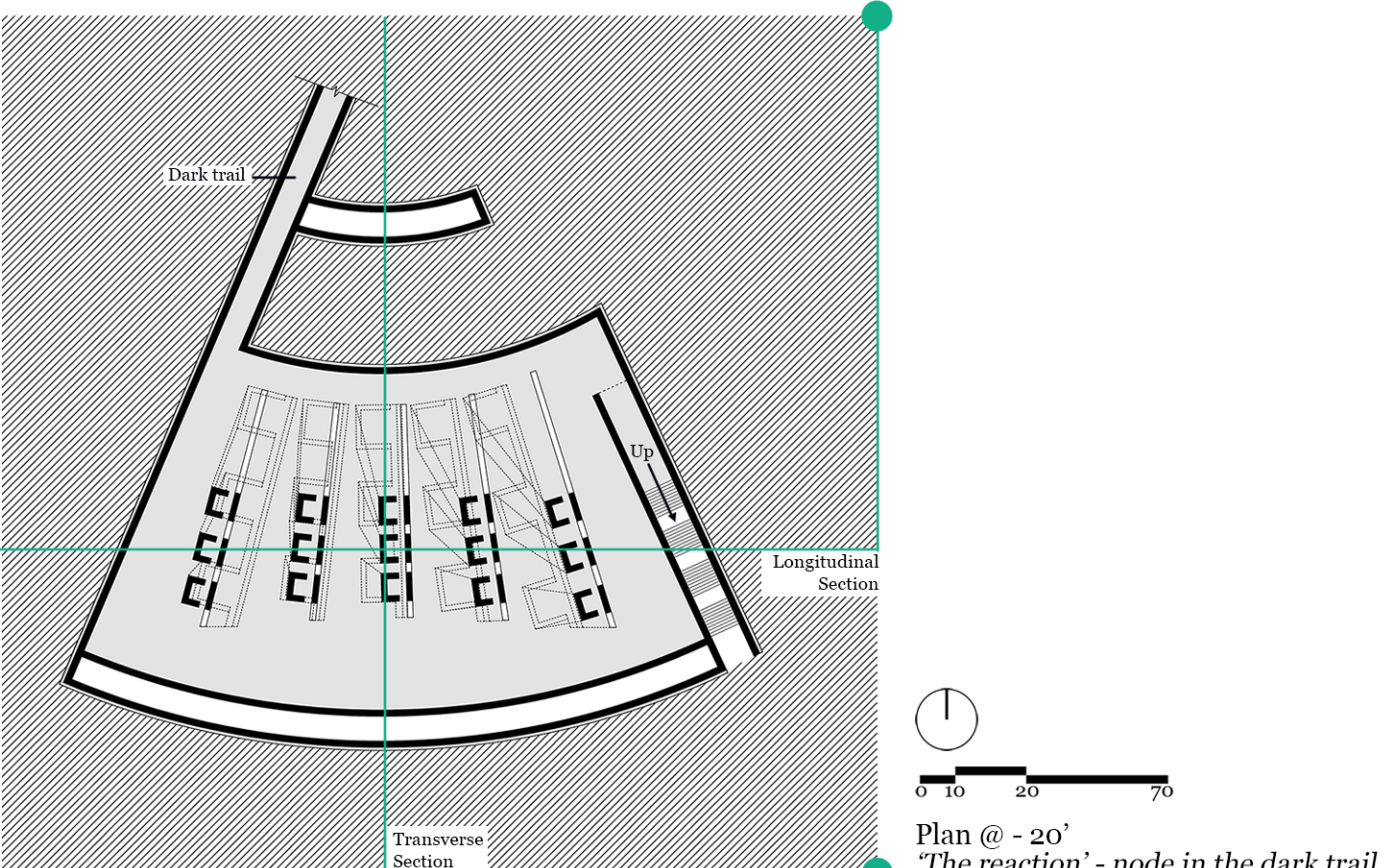
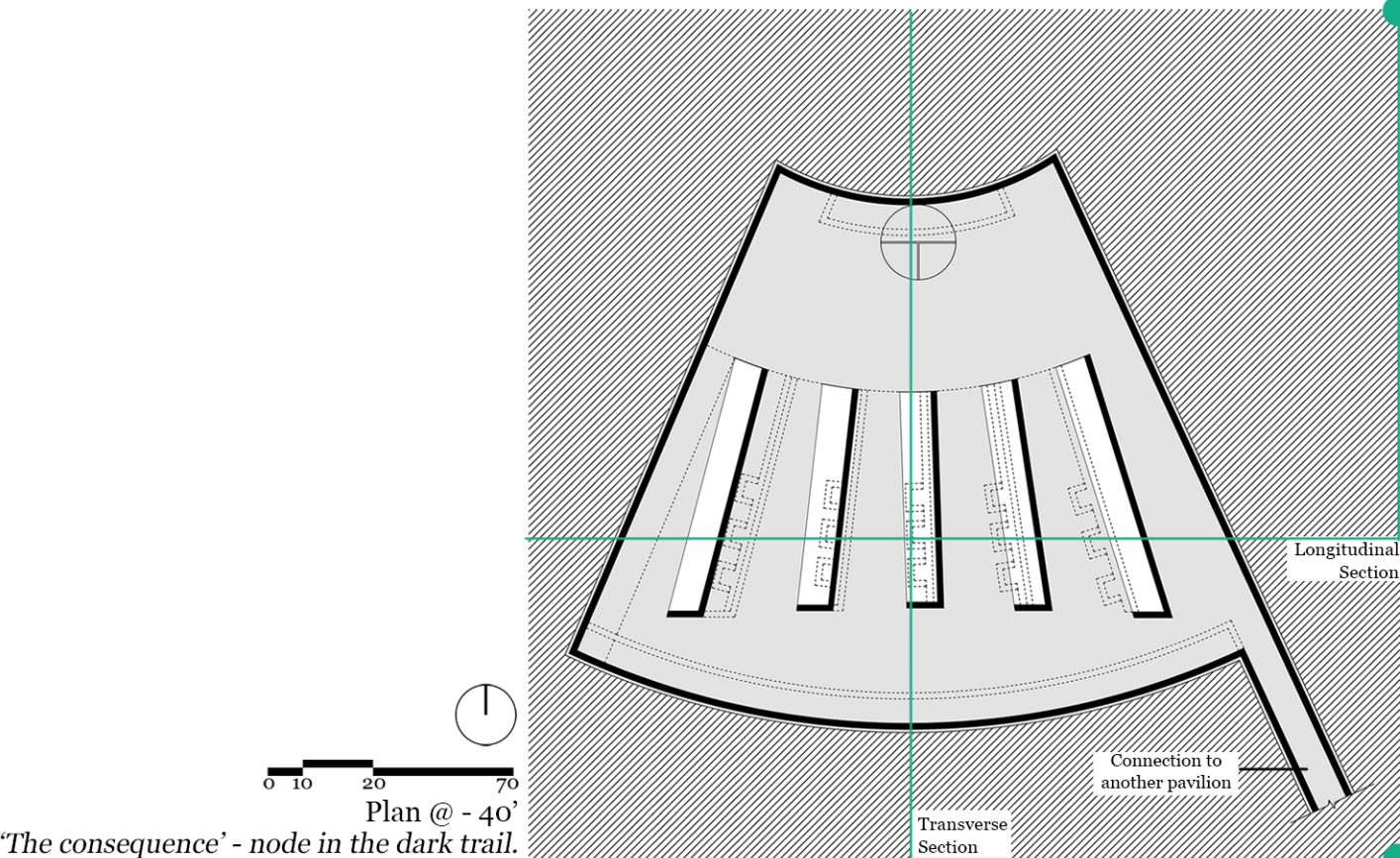
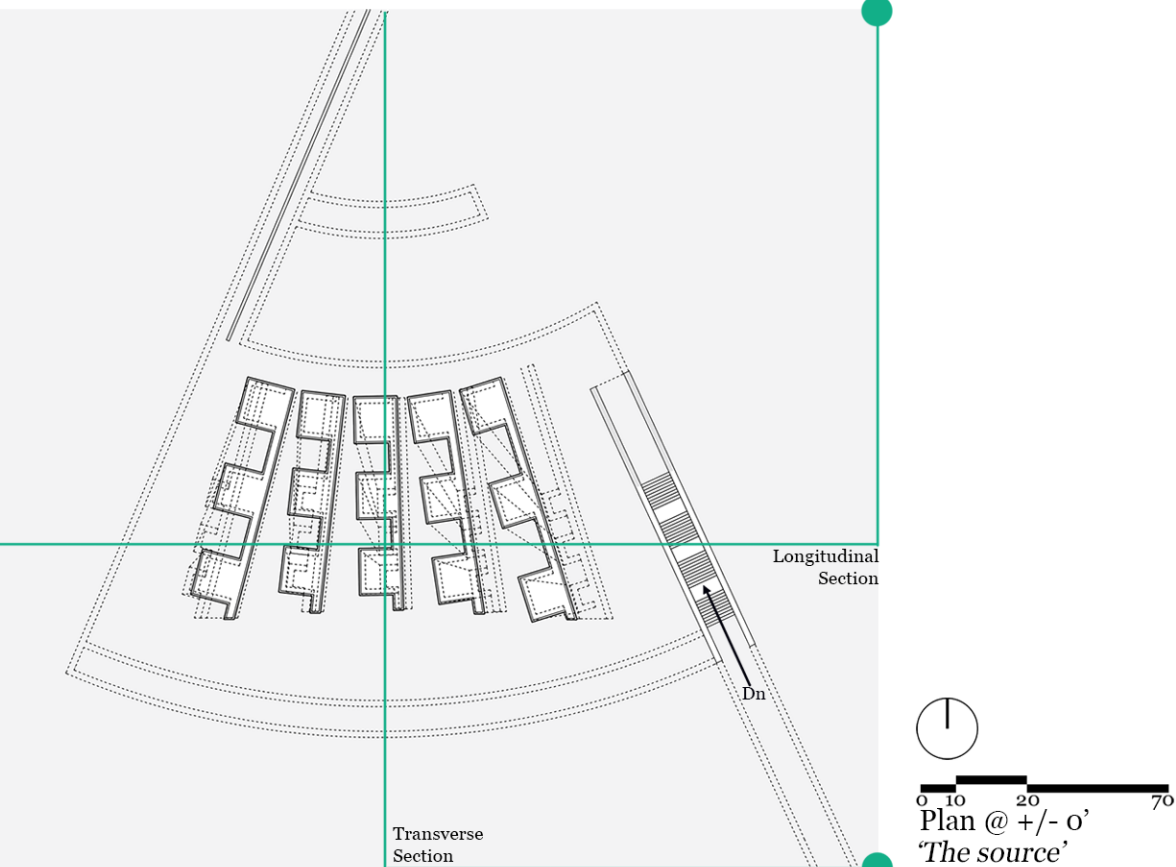




The object/ instrument has one variable, sunlight, yet Architecture has multiple and goes beyond its technical constructs being an environment which gets its value from human inhabitation. Thus, designing a piece of architecture involves establishing a relationship between the scale of the physical environment with that of the human presence. This relationship of scales is perceived through the presence of light or even its absence (darkness).

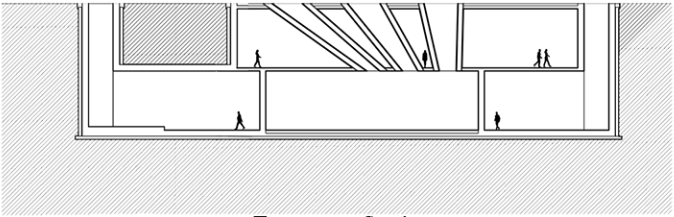
Introducing a minimal quantity of light in darkness reduces the human capacity to perceive the entire space and instead creates focus on the lit areas. The proportions are thus not of great consequence, but they begin to matter as the light starts overpowering and the entire volume of the space may gradually be perceived. Dimensional characteristics like 'height' then start affecting the way someone thinks, feels, and acts (Levey and Zhu, 2007). Vertical spaces encourage more free and abstract thought process as compared to the confined nature of smaller spaces.

The combination of a 'focus-driven' perception in a 'light in dark' situation with the exaggeration of scales (with respect to typical room sizes) creates an interesting and impactful contrast.

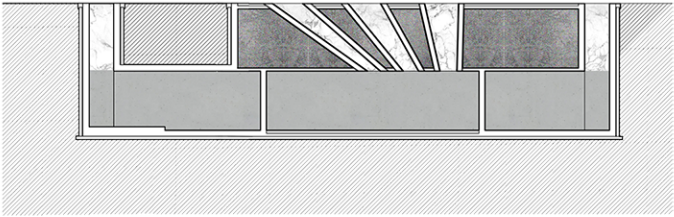


The instrument aspect of the design is an array of 15 light tunnels (constituting the 'reaction') and forming a radial grid whose geometry aligns with the movement of the sun. On the longitudinal axis is the hour-based solar movement and on the transverse is the day-based. The 5 tunnels on the longitudinal axis get activated every hour, one-by-one between 10:00 am and 2:00 pm. The 3 tunnels on the transverse axis mark the extreme positions of the sun on the summer and winter solstice, and its (closest proximity to the) perpendicular position on the equinoxes. The tunnels are wider at the top to gather maximum amount of light and narrow at the bottom to intensify the spotlights formed in the 'consequence' space.

What transforms this instrument into architecture are narrow openings in the ground plane and the tunnels themselves that allow the geometry of the different space to be realized. The two floors, the 'reaction' (at -20') and the 'consequence' (at -40') are two very individual spatial experiences bound together by the force that is creating them: the sunlight. The impact of light in the space is an unified investigation for both the floors, but that of human experience is independent.



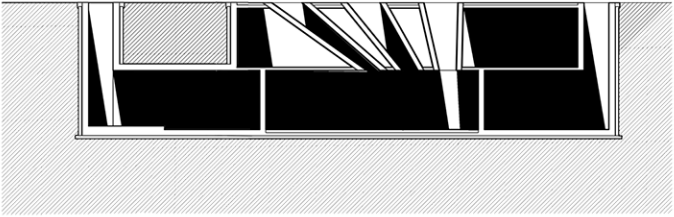
Transverse Section



Material palate



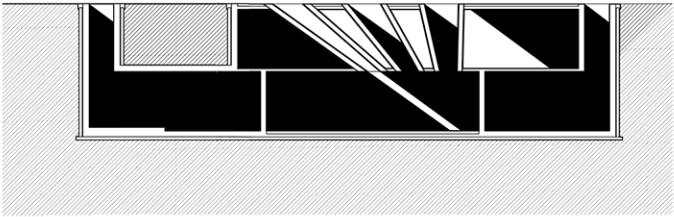
Spring Equinox



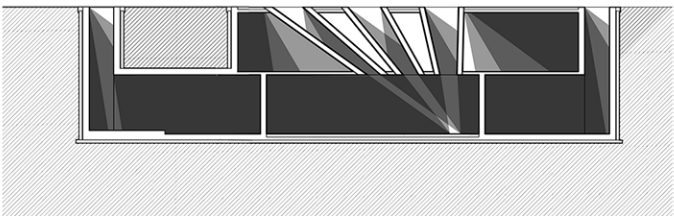
Summer Solstice



Fall Equinox



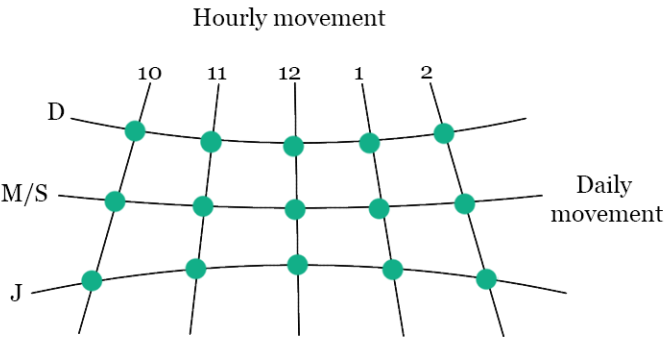
Winter Solstice



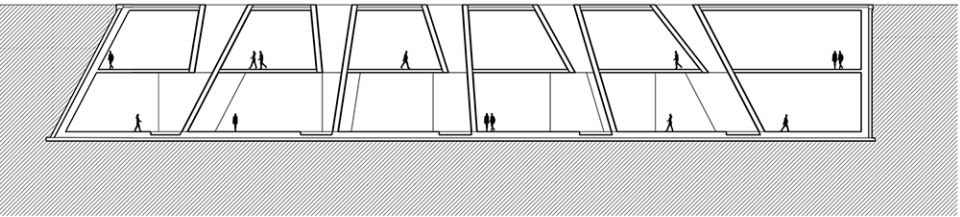
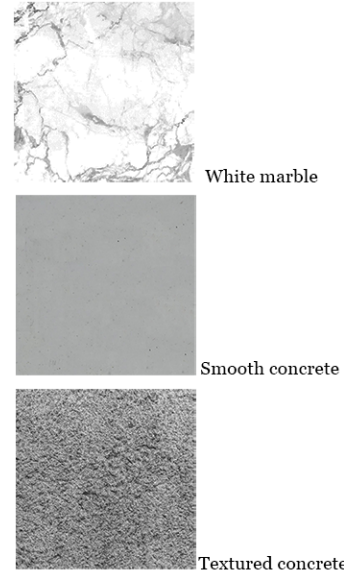
Overlaped visualization

Transverse Section : Day-based Sun movement

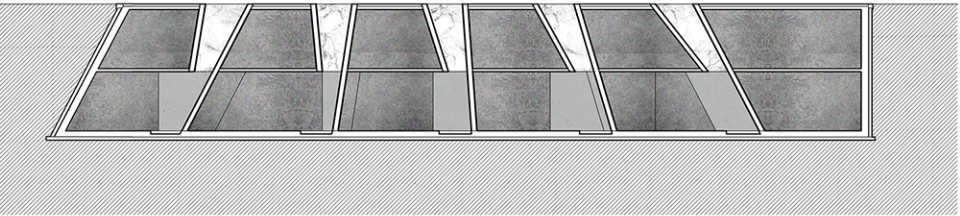
Temporal investigation.



Material palate.



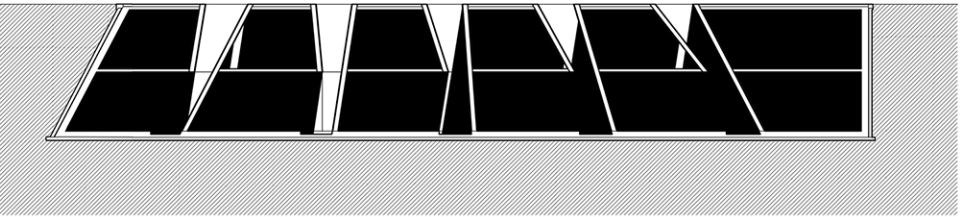
Longitudinal Section



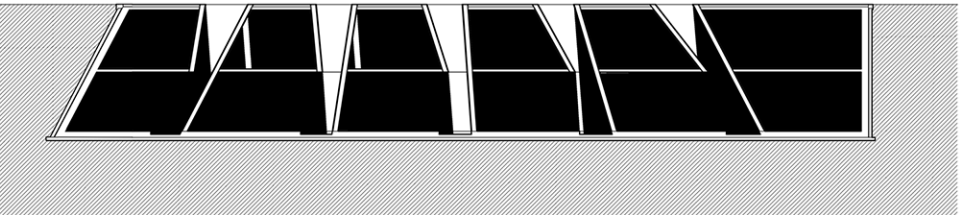
Material palate



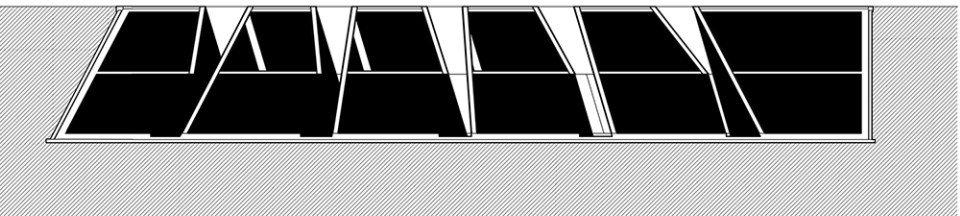
10:00 am



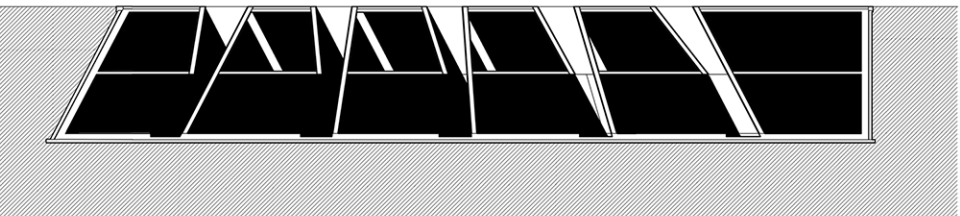
11:00 am



12:00 noon



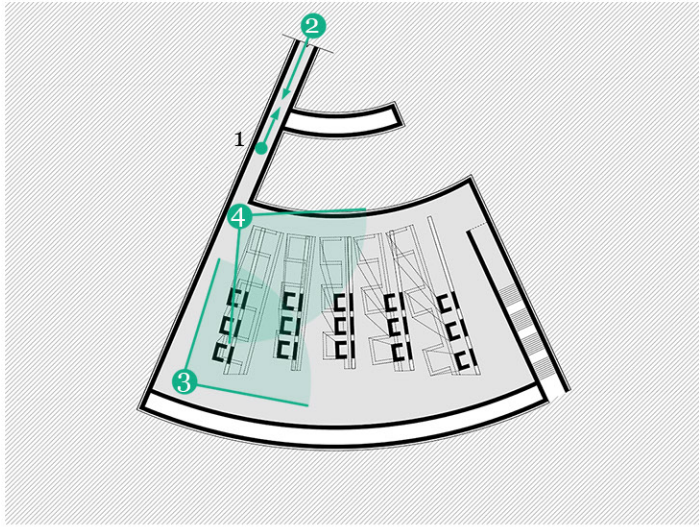
01:00 pm



02:00 pm

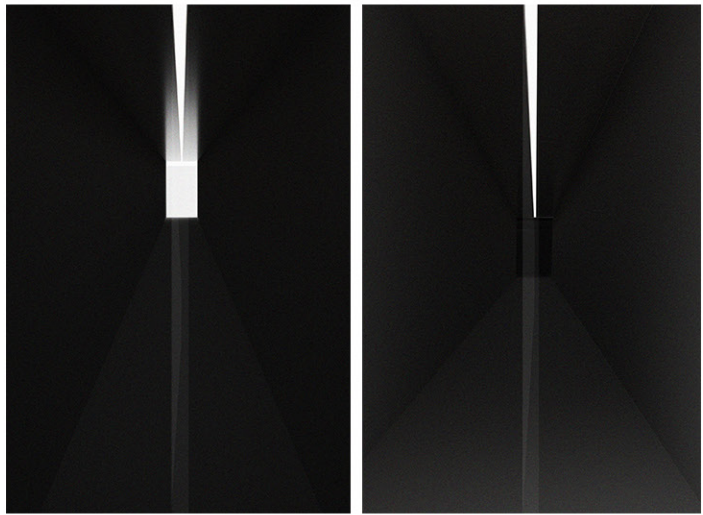
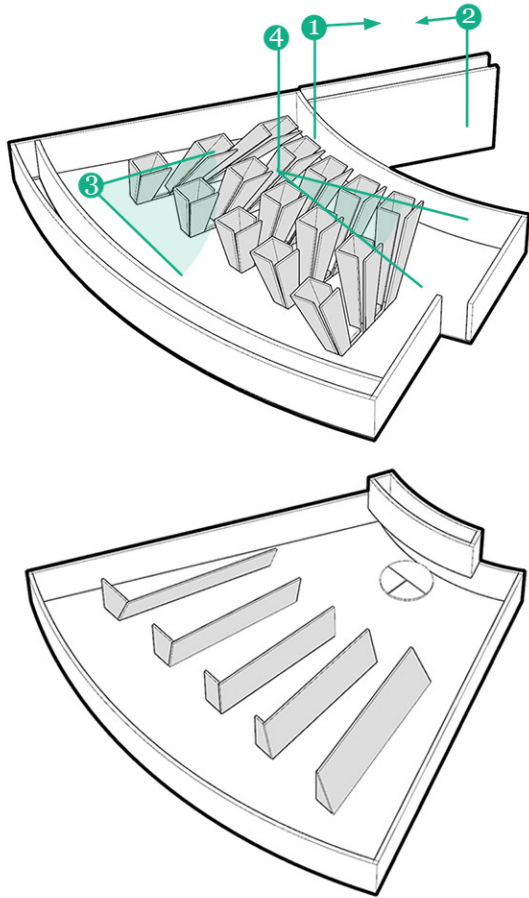
Longitudinal Section : Hour-based Sun movement

Experiential Investigation:
The 'reaction'



The entry to the 'reaction' space (at -20') is through the dark trail. The role of sunlight in the space changes from being the indicator of the direction of human movement to revealing the geometry of space. The light no more indicates the meanderers where to go, but rather introduces them to the labyrinth of tunnels. The slight curvature in the orientation of these tunnels gives an effect of infinity, increasing the impact of repetitive monotony. The space is an interesting combination of permeable and impermeable thresholds. With the curtains of light being formed as porous and the concrete walls of the tunnels as dense and impenetrable.

The termination point in the space is the staircase that takes one back to ground level which is almost frustrating as a wanderer. Having had a glimpse of the space/floor underneath through the slits, one would expect the path to lead to it. But the movement is choreographed to be a tease. The circulation motivates to explore, meander, and in a way even design one's own experience based on the path they took to and away from the space.



1,2 - The dark trail

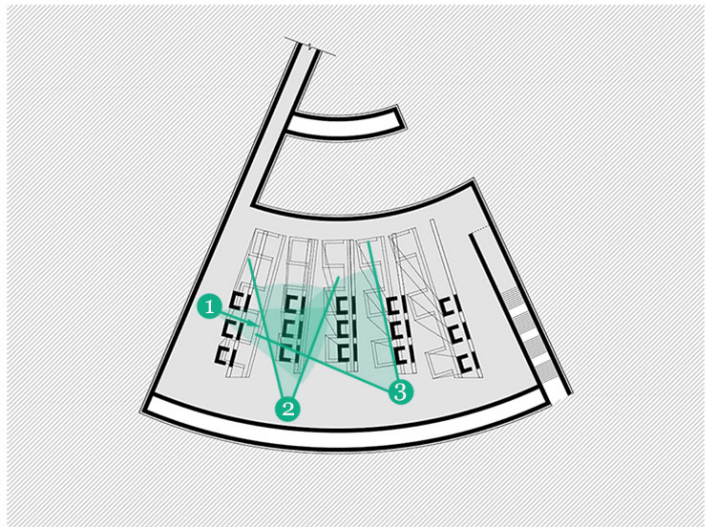


▲ 'The reaction' - Grid Edge

'The reaction' - Edge infinity ▼

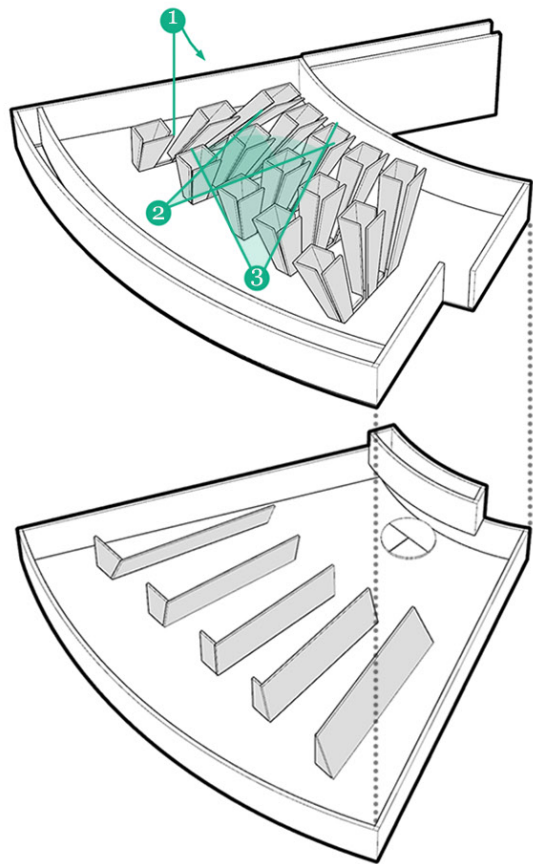


Experiential Investigation: The 'reaction'

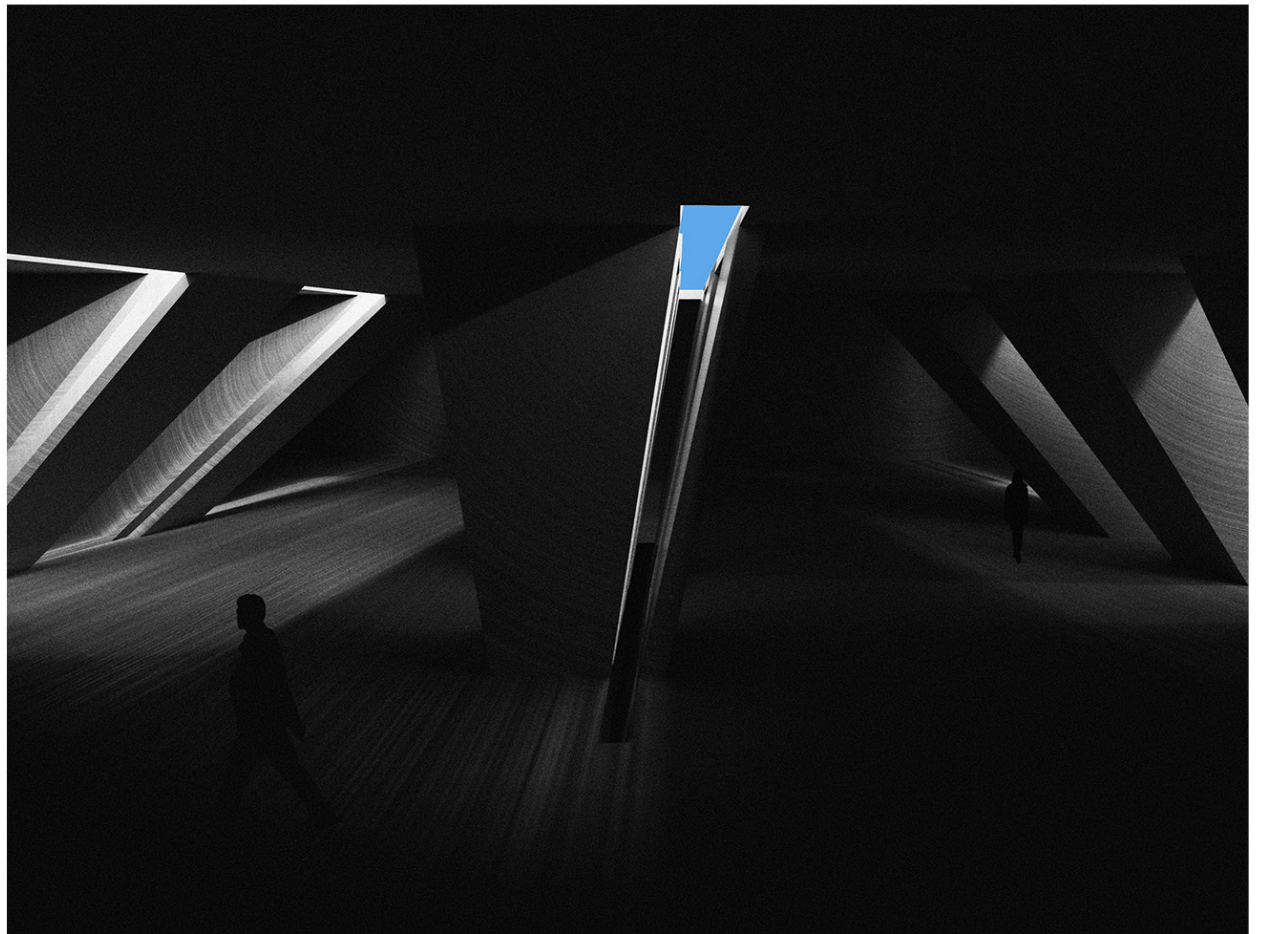


The 'reactive' space is monochromatic as a response to its monolithic materiality. What breaks this dark uniformity is the glimpse of the sky through the slits in the tunnels. The temporal changes not only present themselves as light curtains and shadows, but also the change in the color of the sky. This controlled visual of color is critical to the human experience. It is a gentle reminder of the outside world that prevents the sublimity from slipping into something that is scary and grotesque. Color is a symbol of hope on a dark canvas, which is the intent of the design process.

From the perspective of Tschumi's idea of 'violence in architecture' (1981), the light tunnels create multiple enclosed non-violent spaces in the chaos of human movement around it. This non-violent, bright and reflective space indicates purity but one can only imagine what it would feel like being within it. The space creates ambition to escape from the darkness into the illuminated marble-lined insides of the tunnel. As the light bounces and reflects from the internal surfaces, it gets objectified, giving it a physical identity. Historically, humans have always humanized or objectified the forces they idealize. Reverence or worship is made indulgent, sensual and easy. Hence, an attempt at 'containing' and observing it from a distance is a gesture of paying respect.



2 - 'The reaction' - Connection to outside

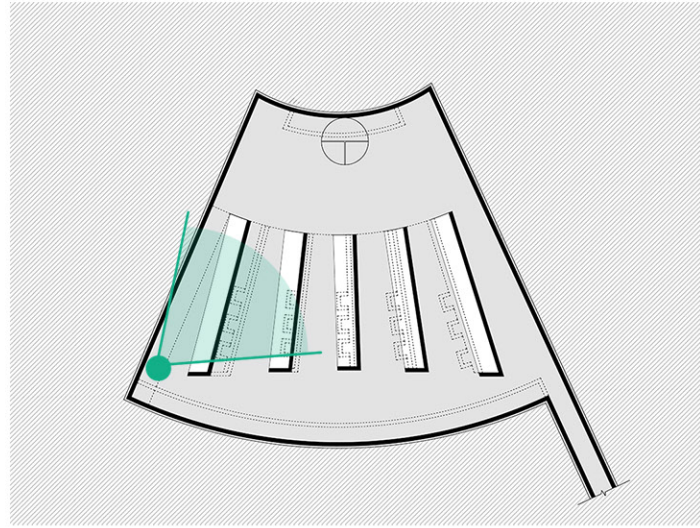


▲ 3 - 'The reaction' - Connection to outside

1 - 'The reaction' - Infinity frames ▼



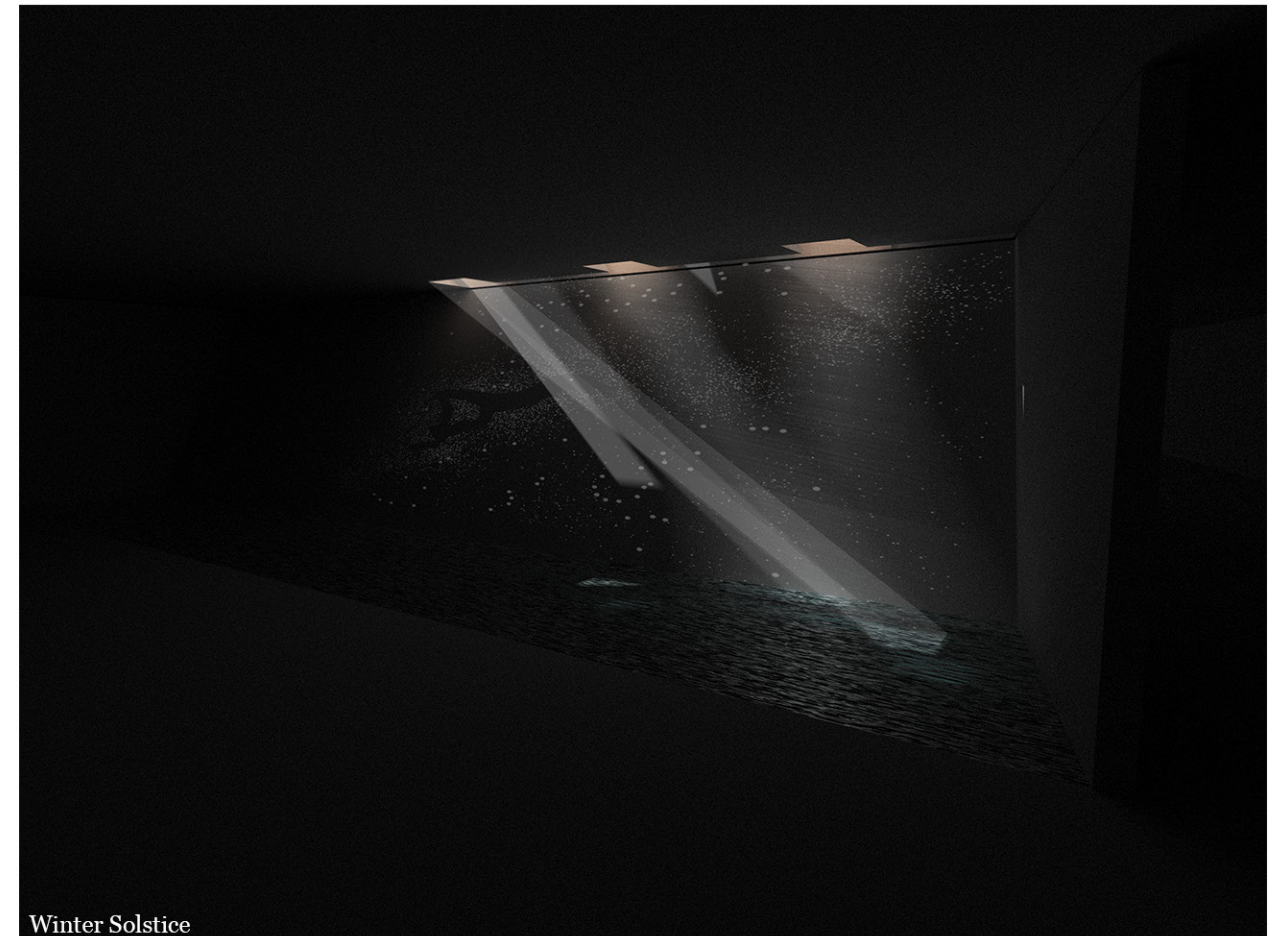
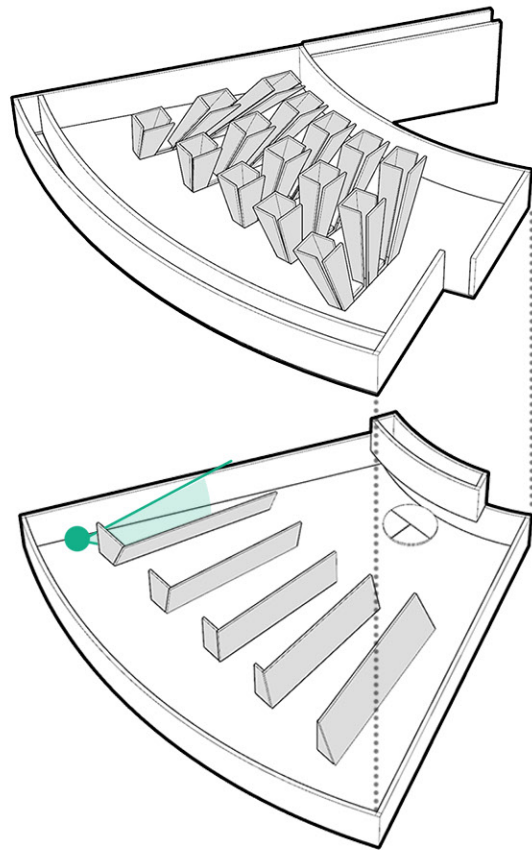
Temporal & Experiential Investigation: The 'consequence'



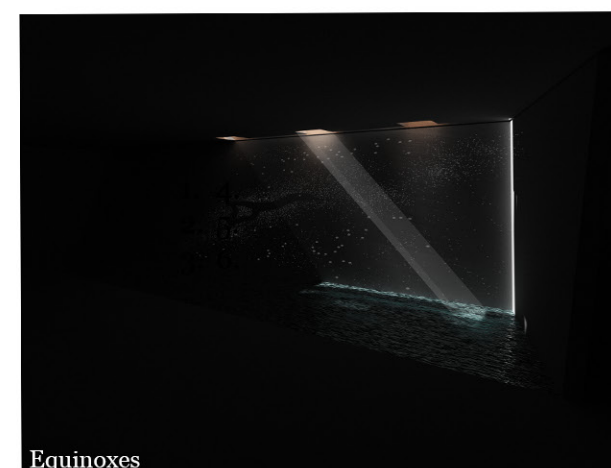
The 'consequence' is where the light returns from being objectified back to being a revelation. Light meets its purpose of producing a result of having a consequence. The intent of designing this space was to create a unique way to measure or quantify time, or its passage, and to etch a memory in its wake.

The quantification of time is achieved through marking the equinoxes and solstices to the tunnels. On the mentioned four days, the beams of light converge at a common point on the floor creating a spotlight that the entire development of the experiment began with which is the inverse ideation of a sun dial. The 15 spotlights created by the 15 tunnels mark 5 hours on the 4 most crucial, cultural and celebrated days of the celestial realm. This, however is an occurrence happens only 15 times in the entire year.

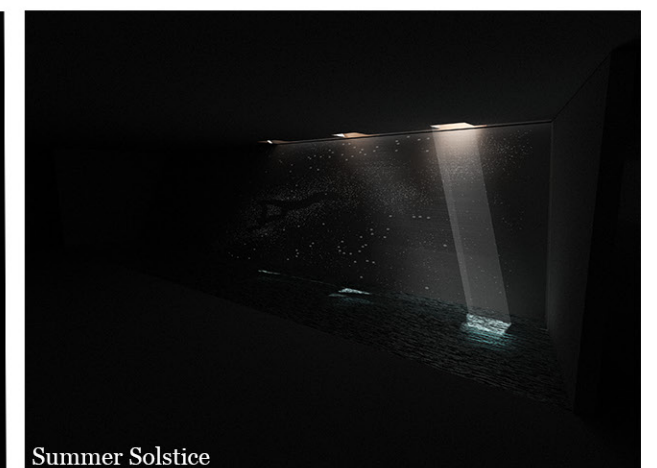
What makes the experience relevant everyday is the reaction of light with the walls and the photosensitive aggregate that glows way after the light has moved from its place. The impact of the light hitting its last surface hence triggers the epilogue of the entire reaction which lasts longer and beyond the unique position of the sun that initiated it.



Winter Solstice

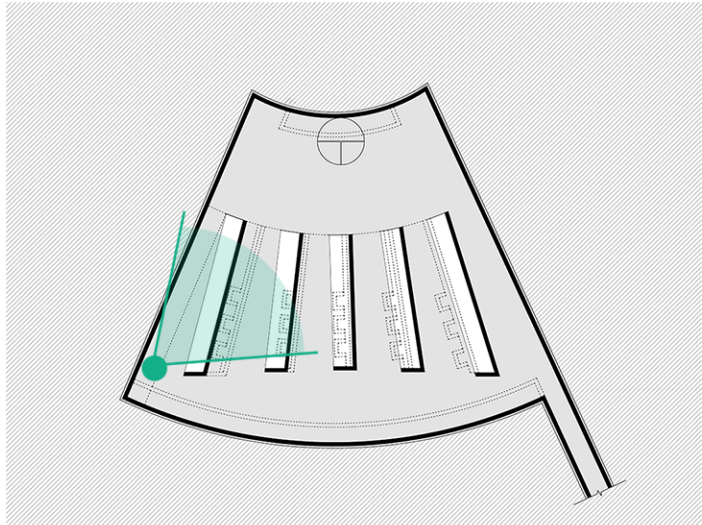


Equinoxes



Summer Solstice

Temporal & Experiential Investigation:
The 'consequence'



When the sunlight hits the wall the photo-luminescent aggregate on the surface absorbs the UV light and stores it untill the position of the sun changes and the source of light has shifted. In darkness, the stones begin to give away their energy in the form of ambient light. The aggregate takes about 10 mins to charge under direct or indirect light and then tends to glow for about 10 to 12 hours in the dark. The slit along the walls is designed to create a 2.5 degree angle with the inclined wall which is the distance the sun travels in the celestial sphere in 10 mins. Thus the walls along the tunnel take 10 mins to store energy starting every hour from 10:00 am along the longitudinal axis and then reveal an image created by the aggregate that lasts throughout the day.

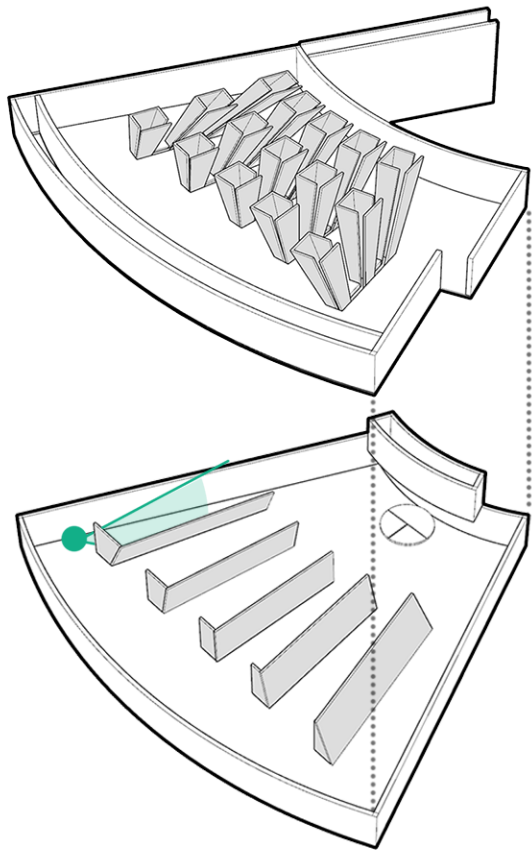
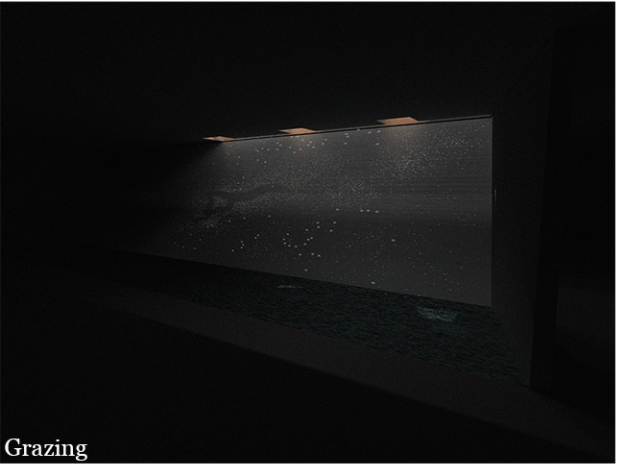
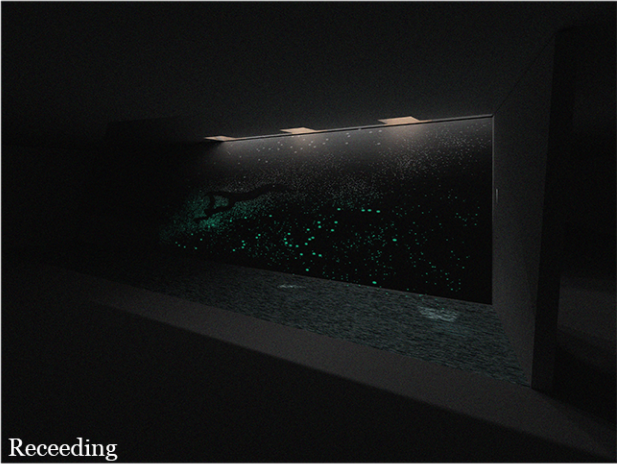


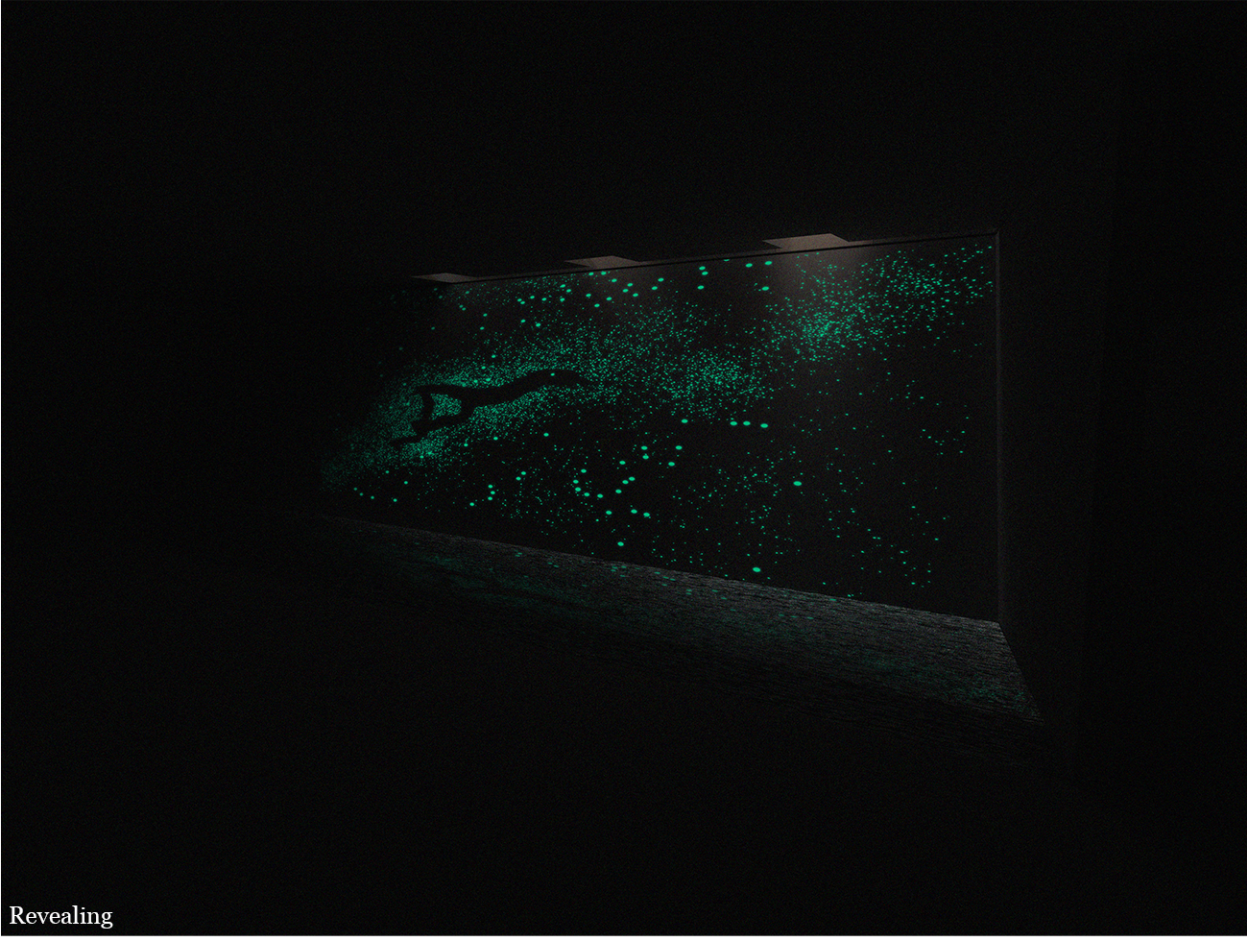
Fig 9 : Glowing trails (Ambient glow technology)



Grazing



Receding



Revealing

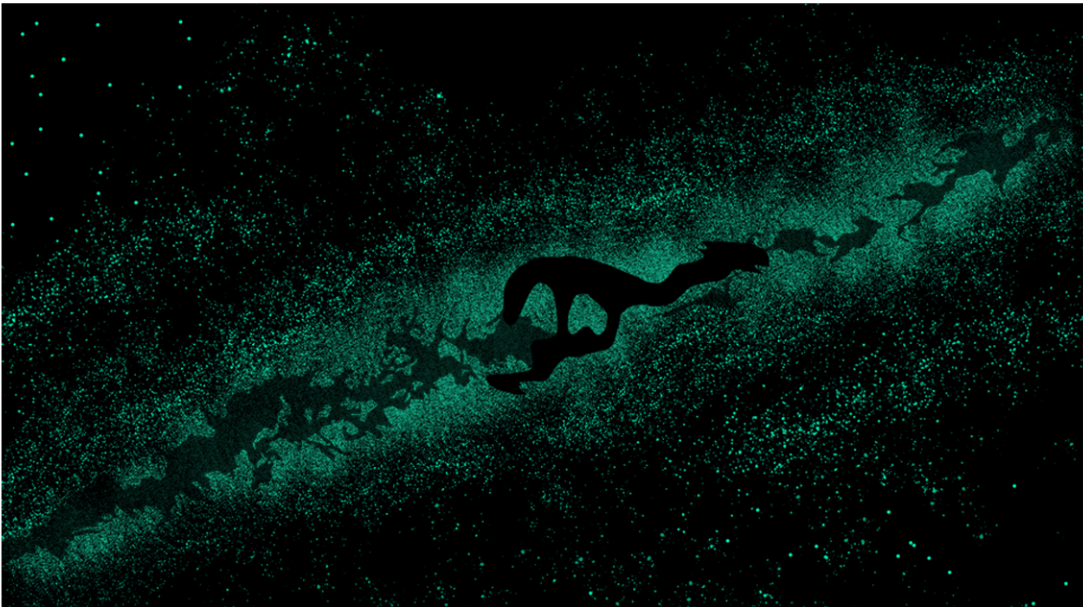


Cultural Imagery

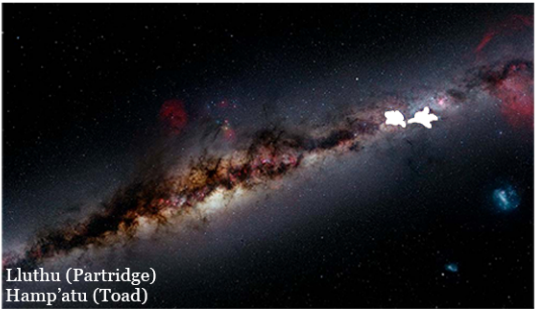
The complex is in Chile, the home to the Inca civilization. The Incas were the only culture in the world to identify constellations in the light and dark. Not only did they connect the stars in the dark sky to create graphic imageries like the rest of the world did, but they also identified dark areas in the Milky way as a secondary set of entities or the ‘dark constellations’. Both the moon and the sun were worshiped as gods, and elaborate pillars and temples were built with great precision so that these "heavenly bodies," such as the sun, would pass over the structures or through windows on specific days. The rising and setting of the sun, moon, and stars were the most important events for the Incas. The choice of equinoxes and solstices to form the transverse axis of the tunnel aligns with this world view.

Because of their connection to nature, The Incan had a perfect understanding of the sky in order to understand agricultural cycles. Through the dark constellations, they identified several animal imageries in the Milky Way. The main function of their system of identification was to signal different stages of agriculture via the animals that are active in that particular growing season.

The 5 walls in the ‘consequence’ space use the photo luminescent aggregate to reveal a depiction of the dark constellations. One depiction figure is revealed every hour. This is an attempt at discovering engaging ways of designing exhibition spaces. Architecture must not be a box that contains exhibits but become a didactic space of experience itself.



Yana llama (Black Llama)



Lluthu (Partridge)
Hamp'atu (Toad)



Mach'away (Serpent)

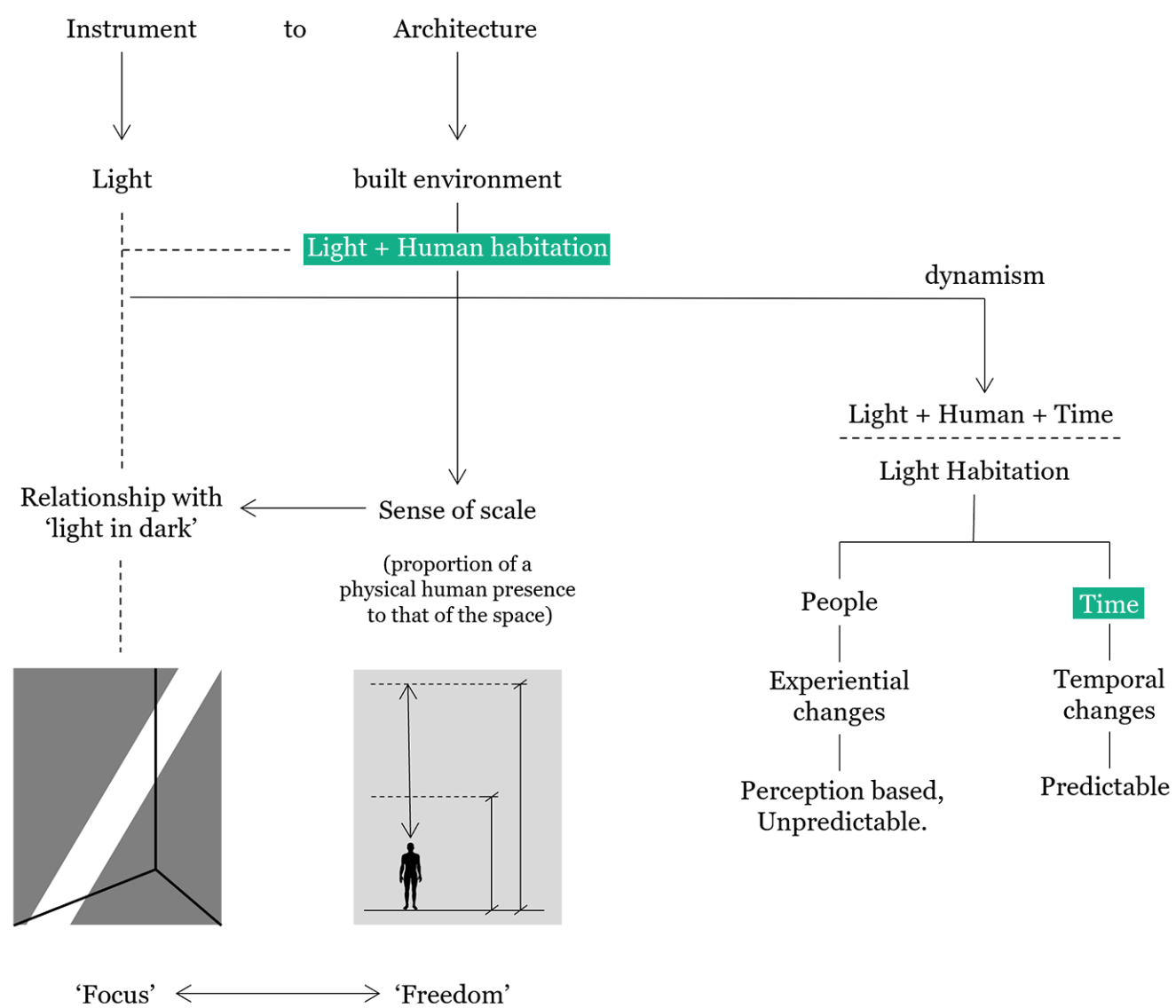


Atoq (Fox)



Michiq (Shepherd)

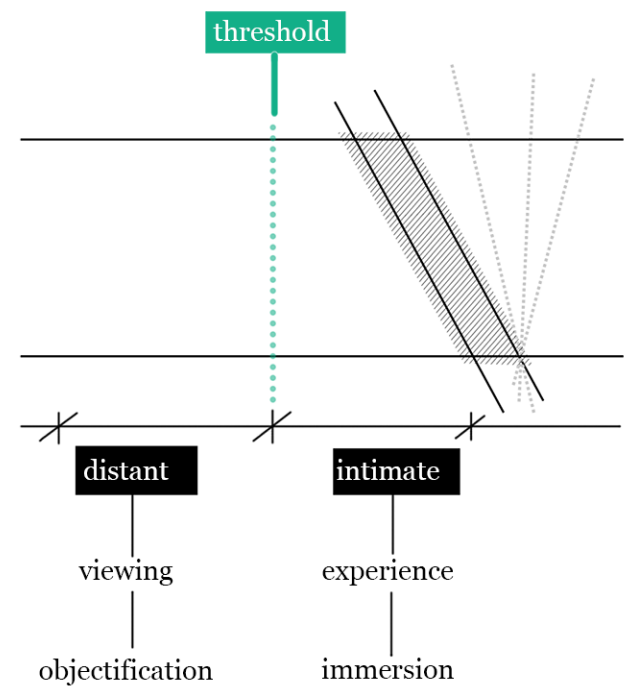
Fig 2 : Dark constellations (Salkantay specialists)



The relationship between light and human perception is dynamic, and thus time plays an important role in connecting the two together. The physical impact of light in space is defined by the temporal change in the position of its source and its experiential qualities by the human perception. The movement of the sun is predictable but not that of humans. Hence the interdependencies are complex.

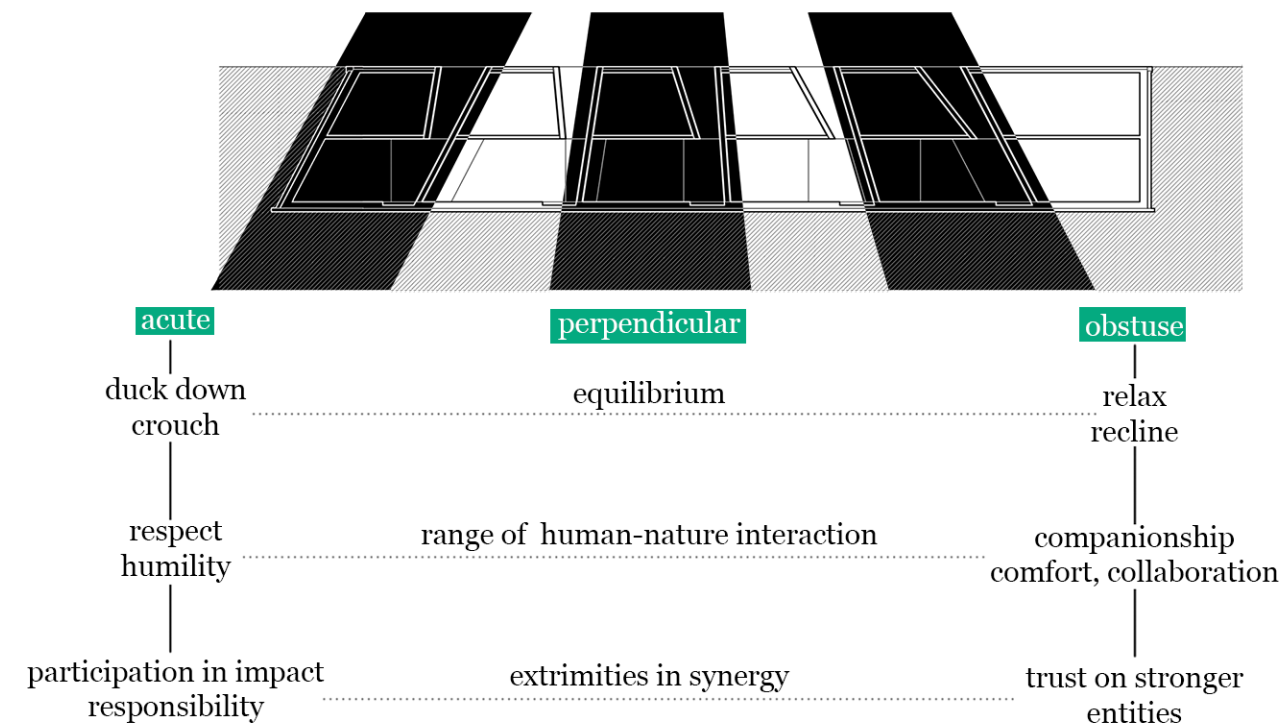
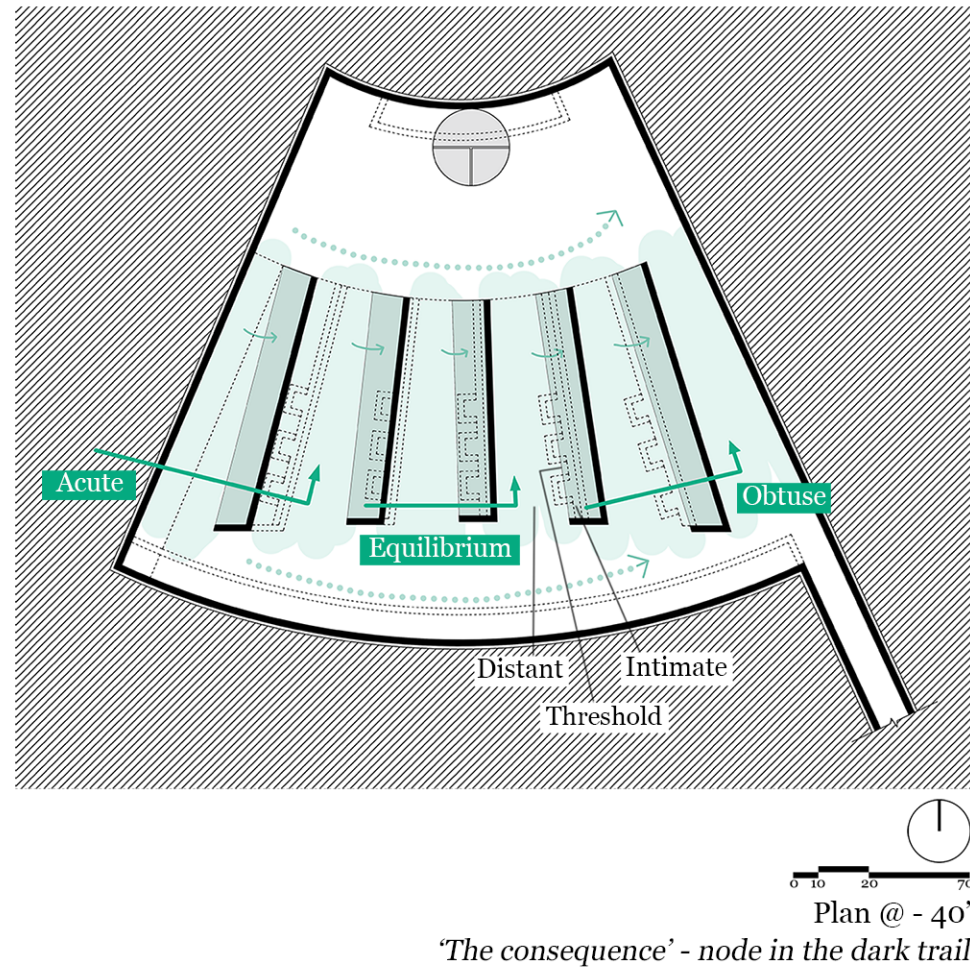
In a dark space, eyes have a tendency to follow light. Thus movement patterns can be predicted but not be generalized. Movement is almost always inspired by the surrounding environment or other people around. The design and geometry of the physical environment and its interaction with sunlight gives cues to encourage directionality and speed of movement.

ii : choreographing human experience.



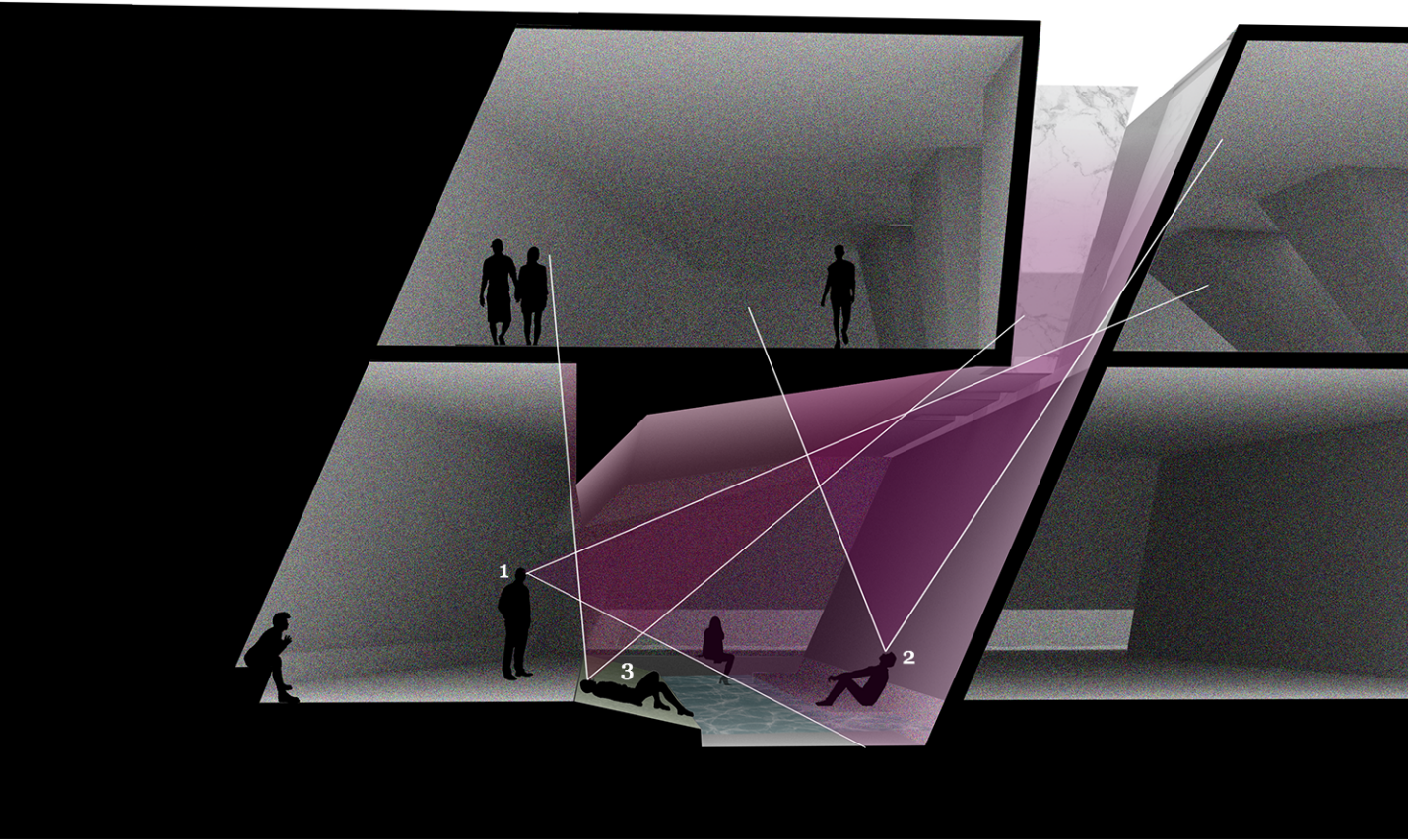
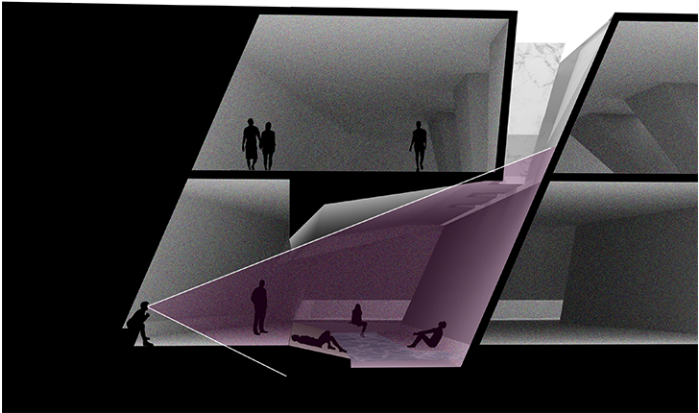
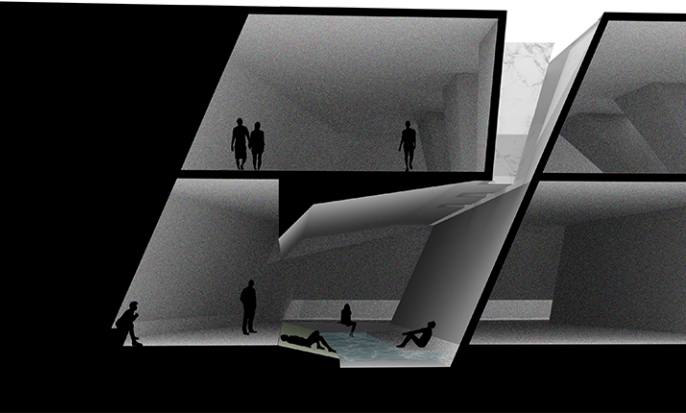
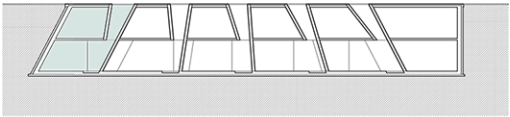
The 'consequence' space is structured by the 5 linear walls inclined at different angles. There are two ways in which people can engage with these- the distant and the intimate. In the distant viewing, the wall gets objectified as the photo sensitive aggregate reveals the graphic. As people meander through the space their experience of objectifying the walls transforms depending on the inclination of the volumes they are in. But in this larger scheme of movement, there are opportunities to shift from a distant to intimate form of engagement where the people and the wall immerse in an experience formulated by the sunlight and materiality.

As the sun moves, the light starts riding up the walls. It is a natural tendency to want to escape darkness and follow the source of light. The movement of the sun brings people closer to the wall causing them to cross the threshold between the distant and the intimate. The intimate zone allows the walls to be perceived as an element in the three dimensional space rather than as a planar motif. As the light rides up the wall completely, the wall next in line is already activated, thus continuing a sequence that lasts through the day.



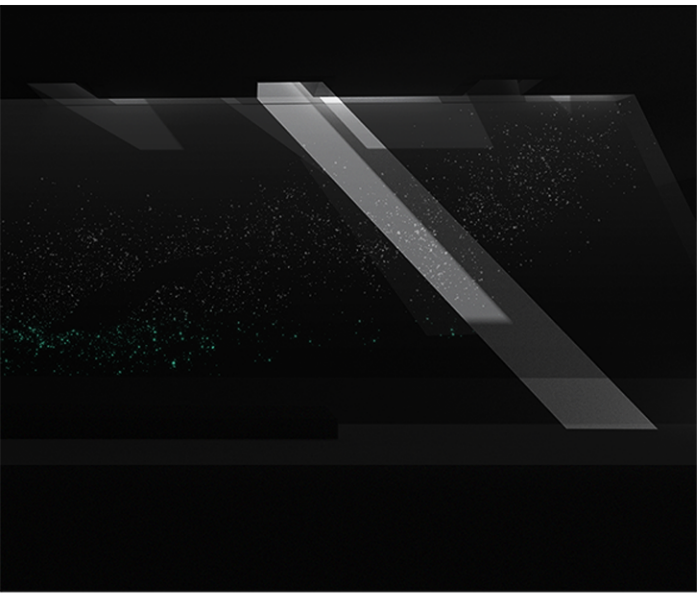
Acute space:
respect, humility

The intimate spaces provide varied opportunities to engage in a 3 – dimensional manner as compared to the distant viewing. It is designed in a way that the threshold needs to be crossed to engage. People here have the choice to sit, stand, or even lie down and each of these physical positions reveal a different kind of light.



1. Volumetric and Absorbed Light

A closer variation of the distant viewing. The tunnels shaped the light creating depth. As the light back, the aggregate emits the absorbed energy in the form of photons and glow in the dark.



2. Dispersed or natural - chromatic light

This position allows a direct visual of the sky through the tunnels. The chromatic nature of the sky intensifies the perception of depth and elongates the tunnels.

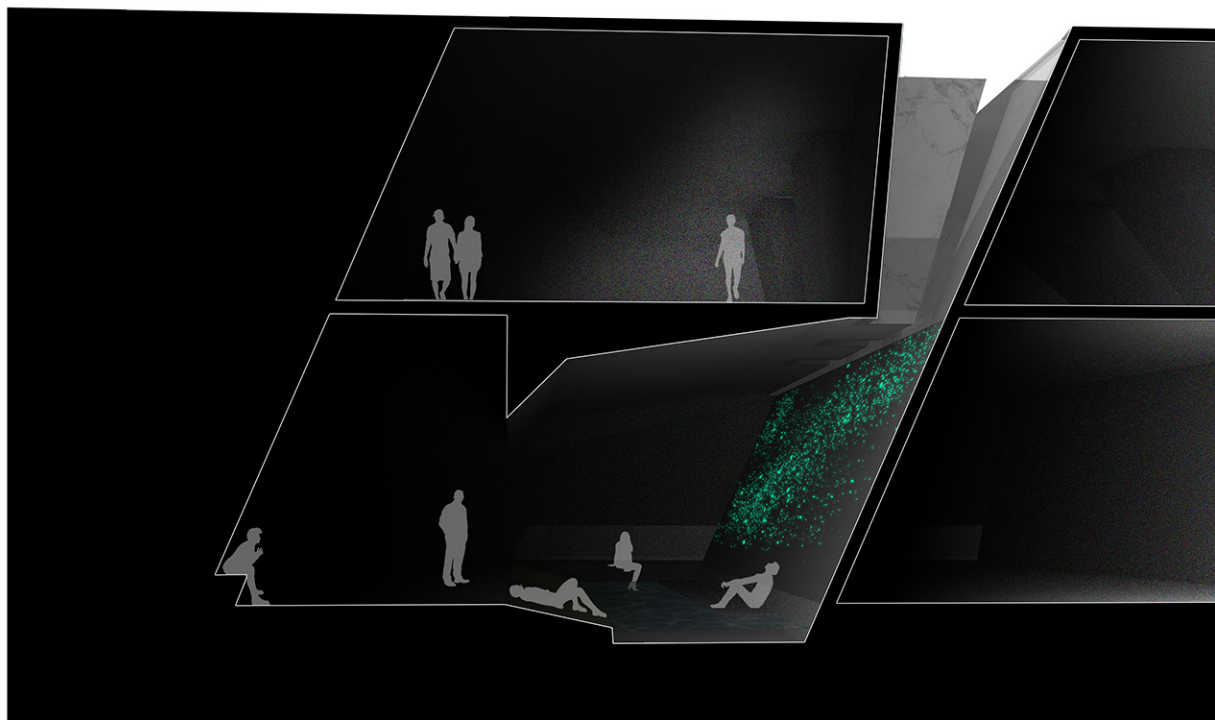
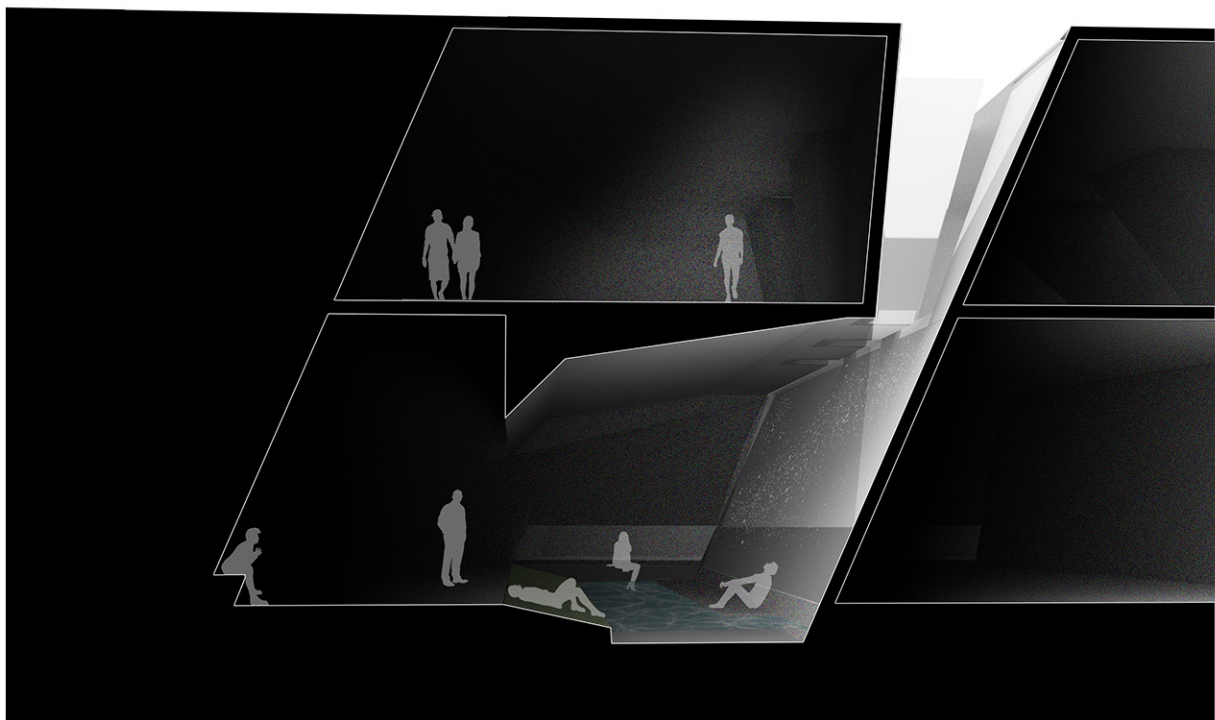
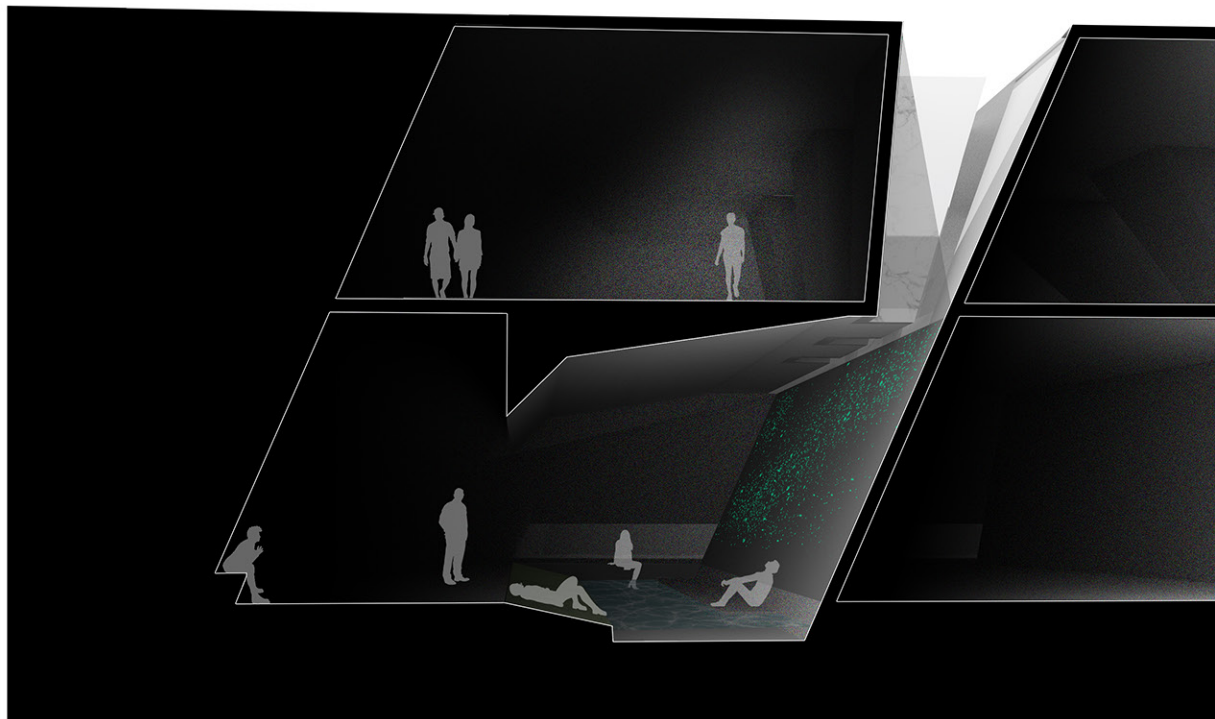
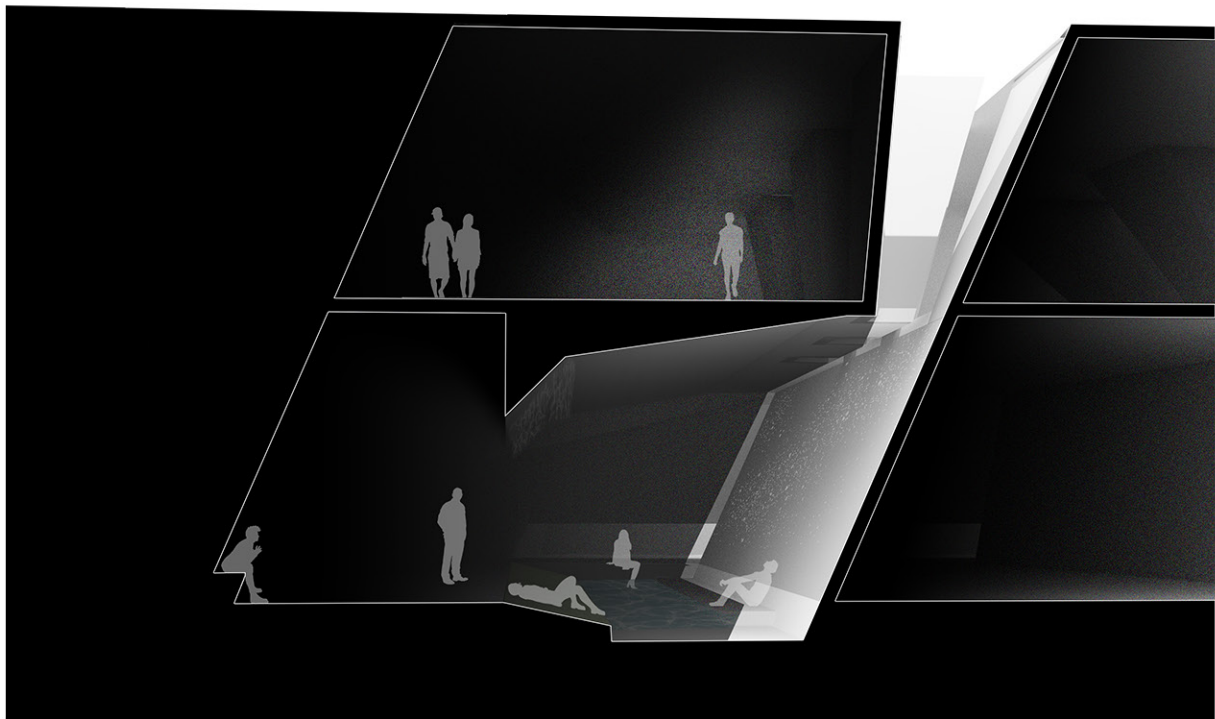
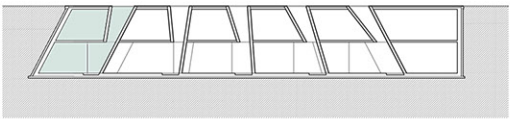


3. Reflected Light

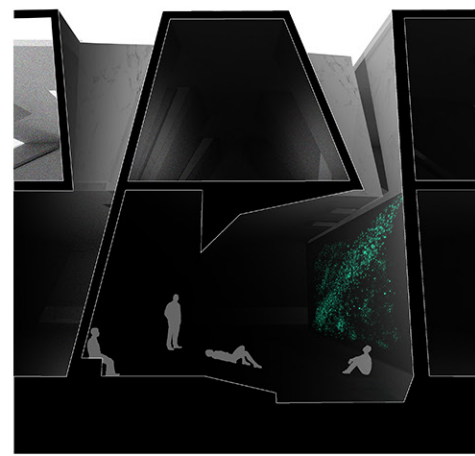
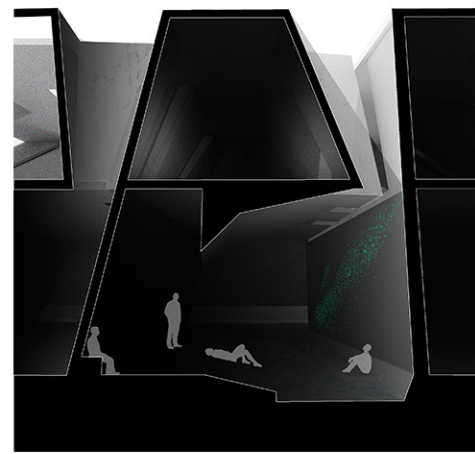
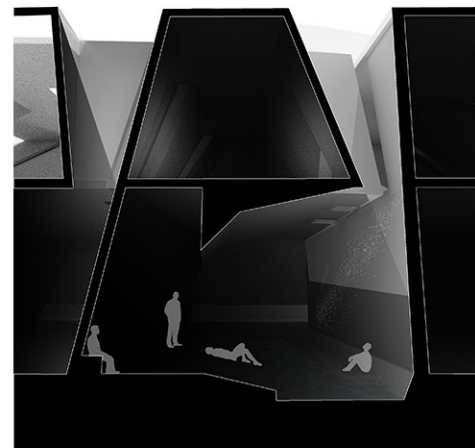
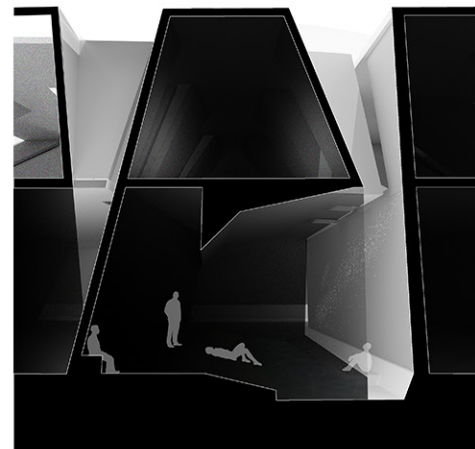
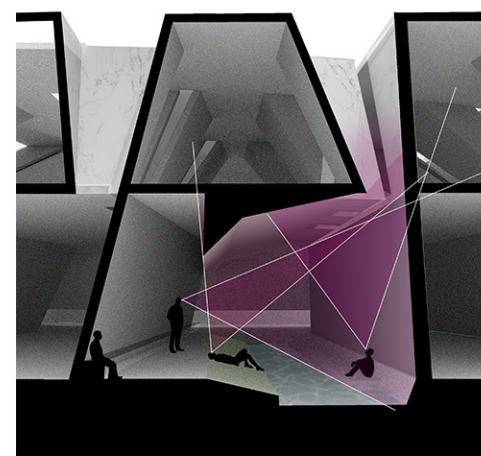
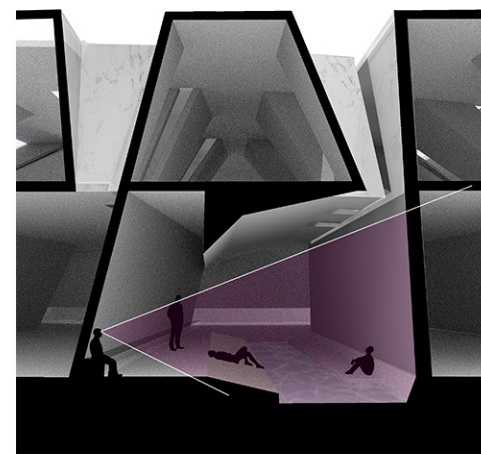
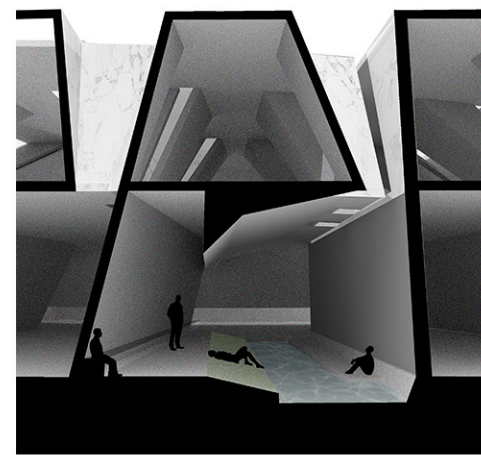
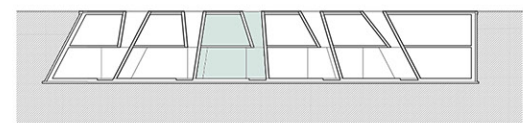
The light bounces off the water to create reflections on the ceilings visible only within the intimate threshold.



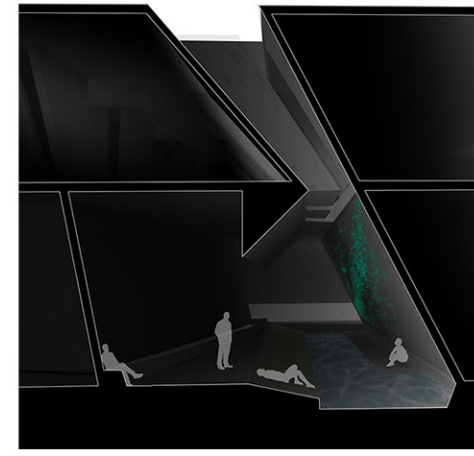
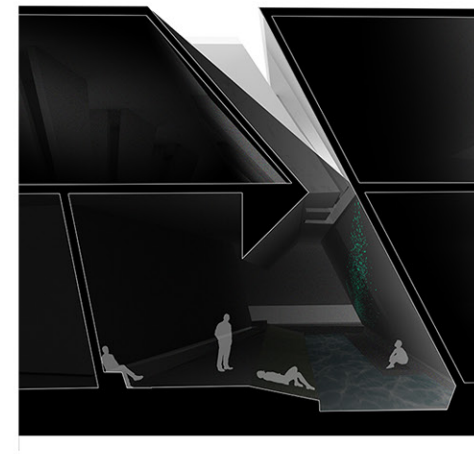
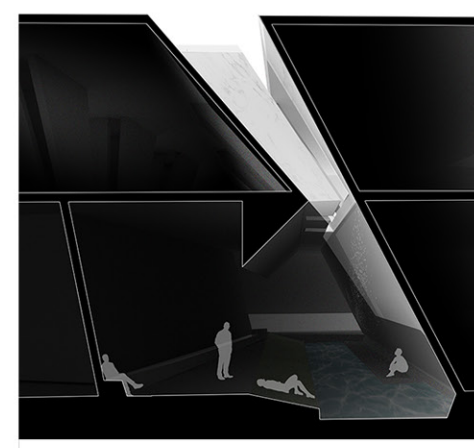
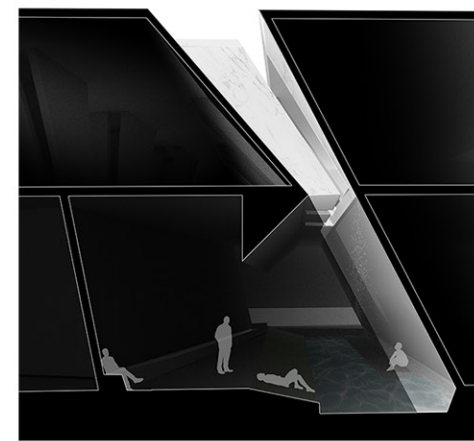
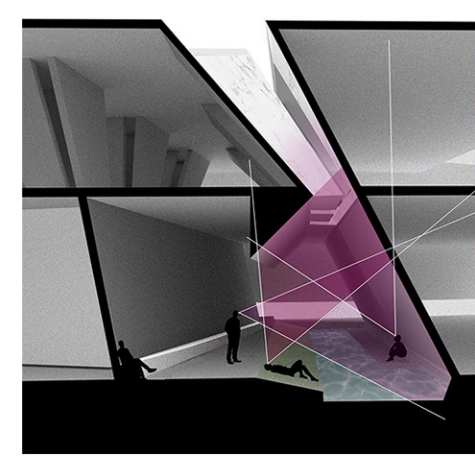
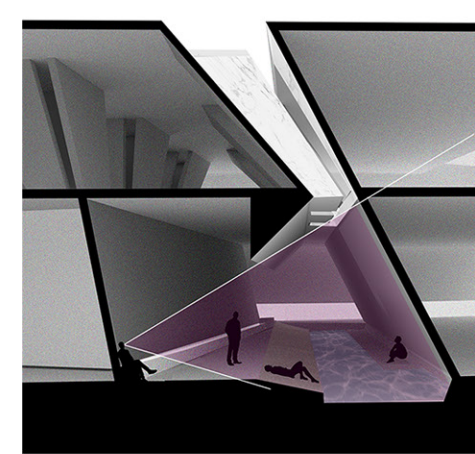
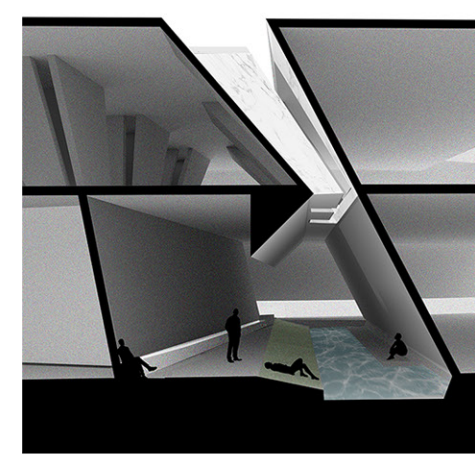
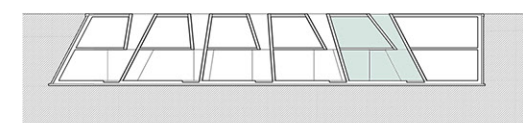
Acute space :
respect, humility

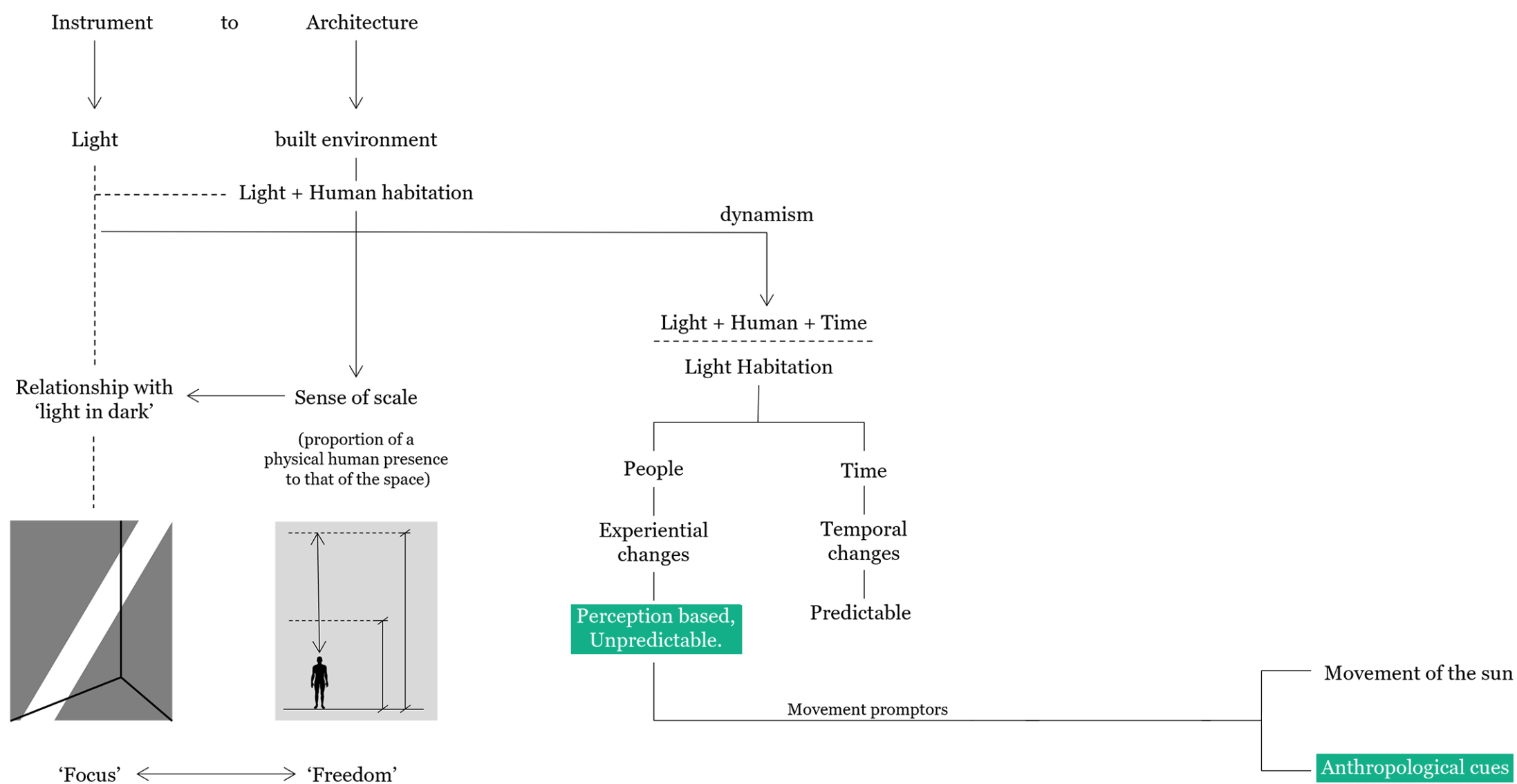


Equilibrium space :
balance



Obtuse space :
companionship, collaboration



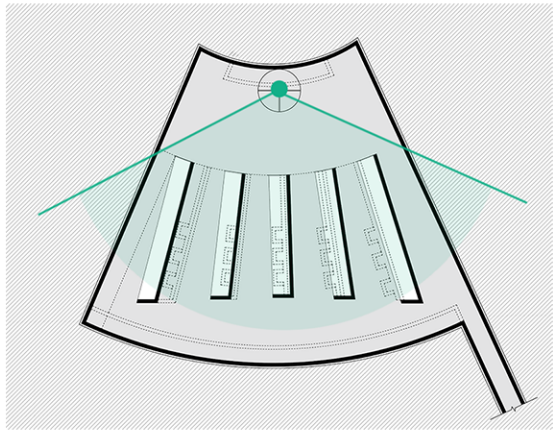


The movement of the sun is the primary prompt for determining how people navigate through the space, from crossing the threshold between the distant and intimate to moving on to the next wall. But what is equally important is determining where to stop, stand, or sit and where to move. Habituated to the standard dimensions to rooms and furniture, the human body now subconsciously remembers and responds to them. Hence, incorporating these ingrained body movement instigators is an effective strategy to choreograph human movement without introducing patterns that seem forced.

iii : connecting architecture and anthropology

A pedestal on the north end of the room is a marker for the position that brings all the individual elements of space into one experience, to create a snapshot of time. The position allows one to perceive all the 5 chambers together and visualize how the light interacts with the varying geometries of solid physical boundaries.

The location is placed accurately to allow the clear 60 degree visual cone to cover 3 walls and the 135 degree peripheral vision cone to cover all the 5 walls. The spot vision provides a nice contrast to the possible 'walk along the edge' movement parallel to the walls on both sides.

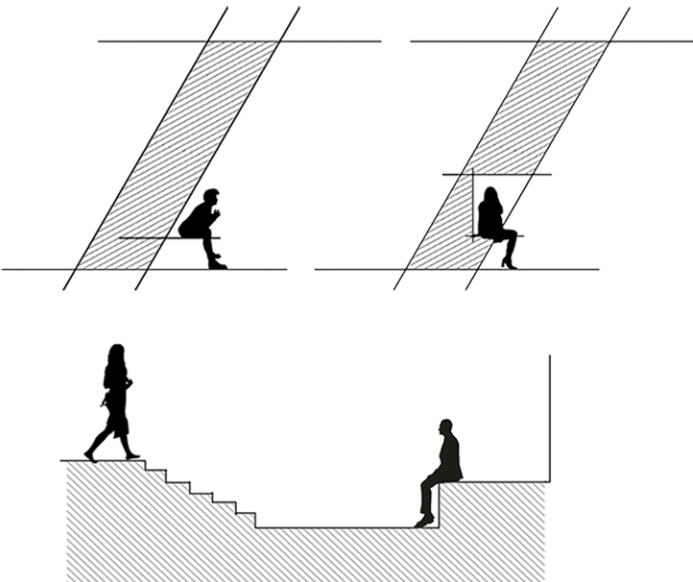


View from the location that snapshots temporal changes

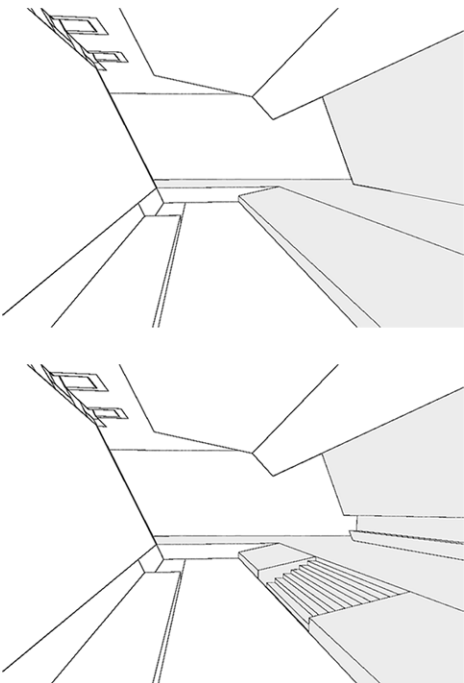
The intended human choreography is based on the position of a viewer and their movement with respect to the light entering the space. It is important that design is suggestive of how people are supposed to inhabit the spaces. This is achieved by making the seatings /viewing points as a part of the structure or by providing other elements that suggest certain physical movements or orientations.

The seating for distant viewing is imbedded in the wall located so it's at a comfortable angle but the impact of the inclination isn't diminished. Considering that is not a well-lit space, this makes the design more accessible by respecting human proportions.

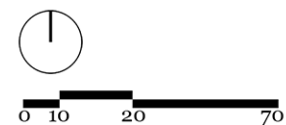
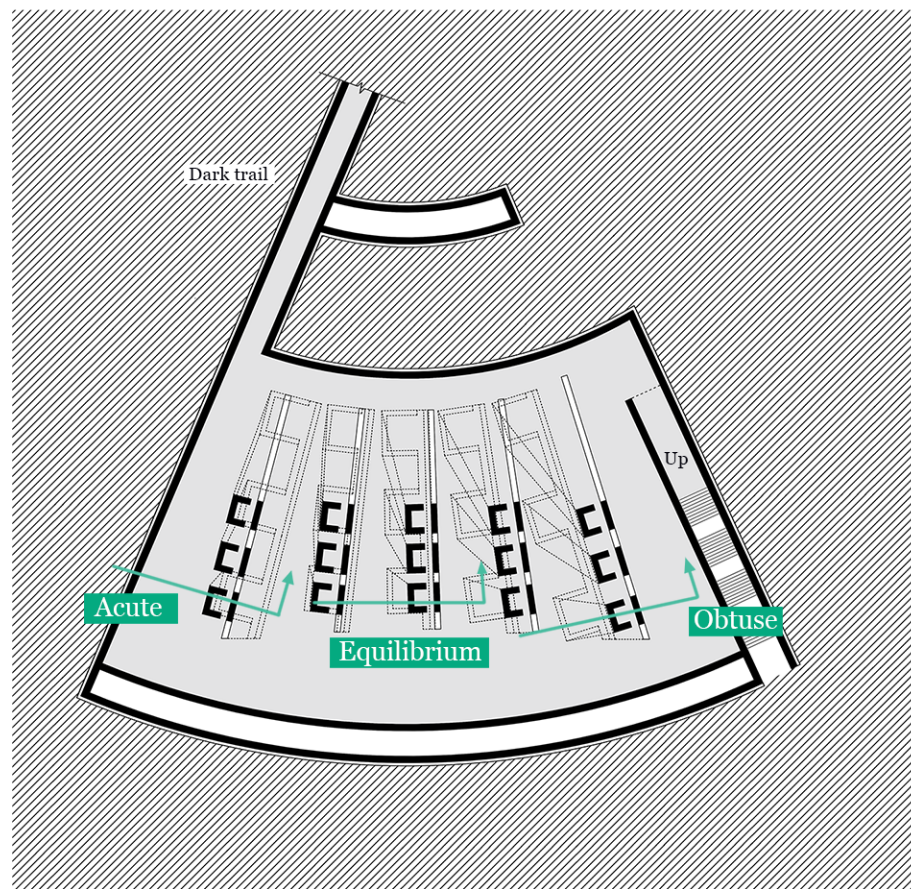
The seating ledges closer to the wall with an 'aggregate graphic' is an intimate space and follows a different strategy, a series of steps. In a typical environment the human body is accustomed to the universal building/furniture dimensions as they have been derived from the comfortable range of limb movement. When a pedestal's height is about 3 step risers, psychologically it triggers the gesture to sit more than a free-standing pedestal of the same dimensions would.



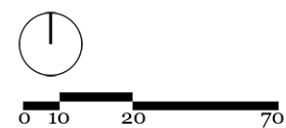
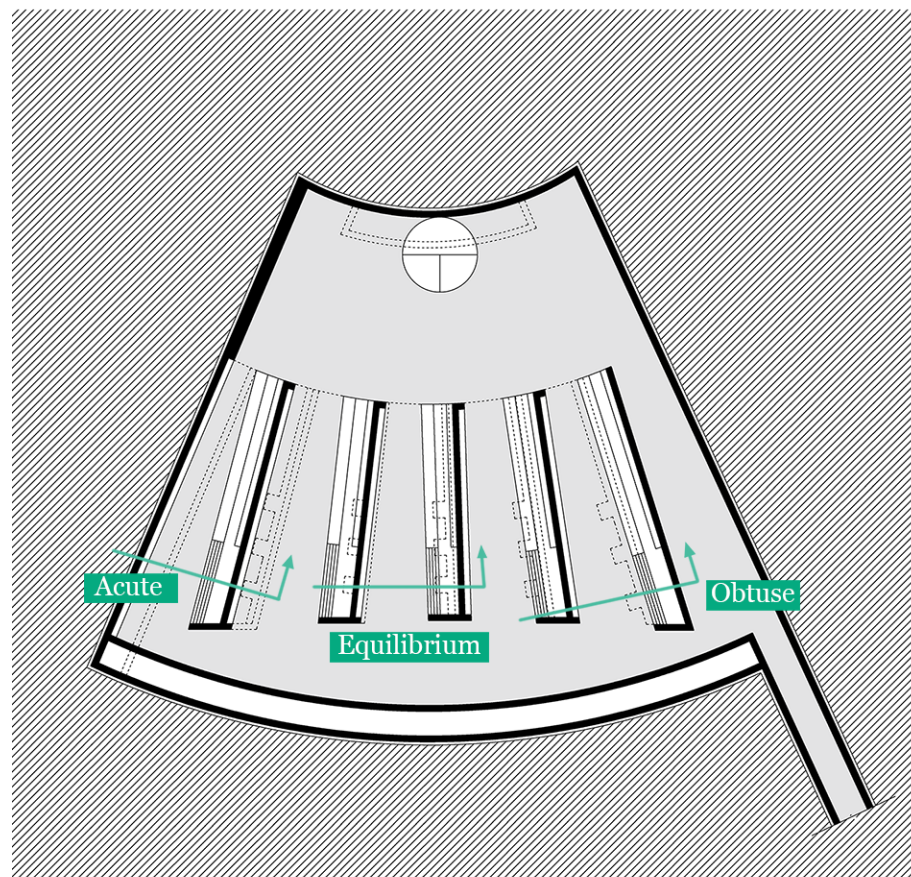
Distant viewing



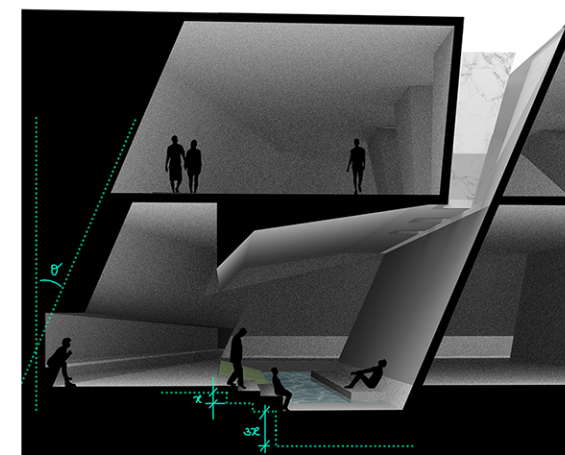
Intimate ledges



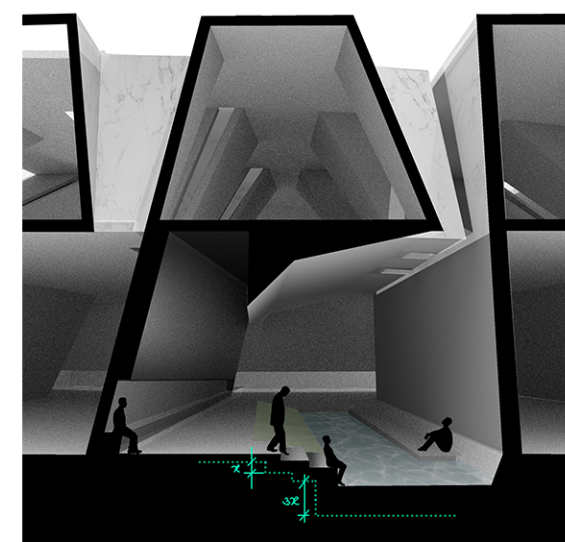
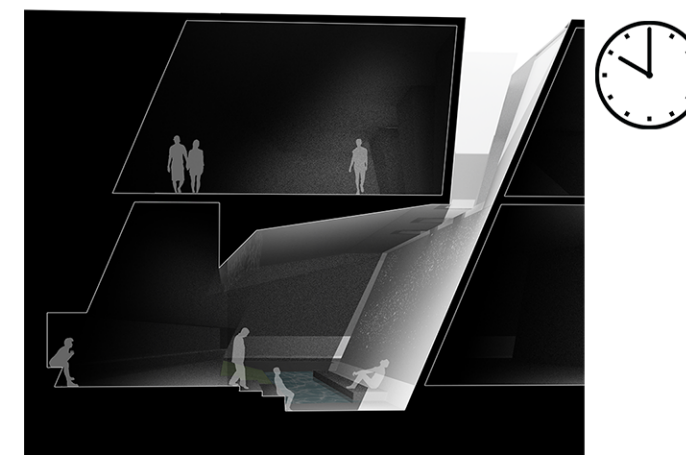
Plan @ - 20'
'The reaction' - node in the dark trail.



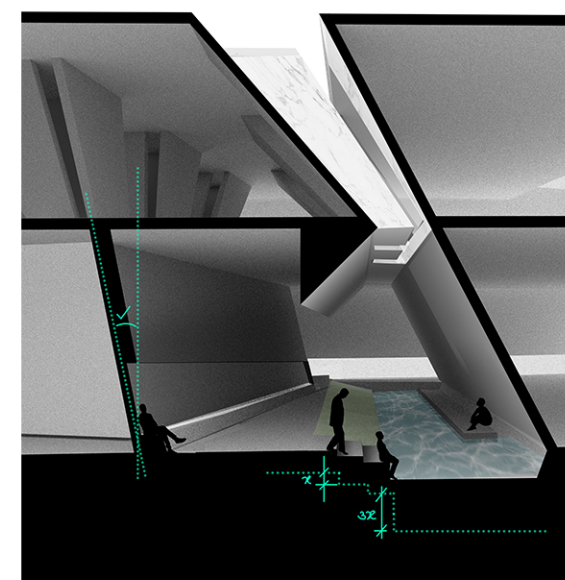
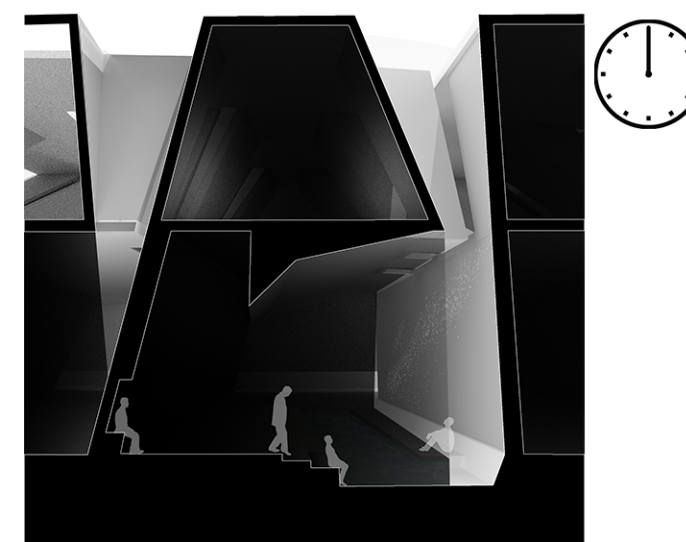
Plan @ - 40'
'The consequence'



Acute



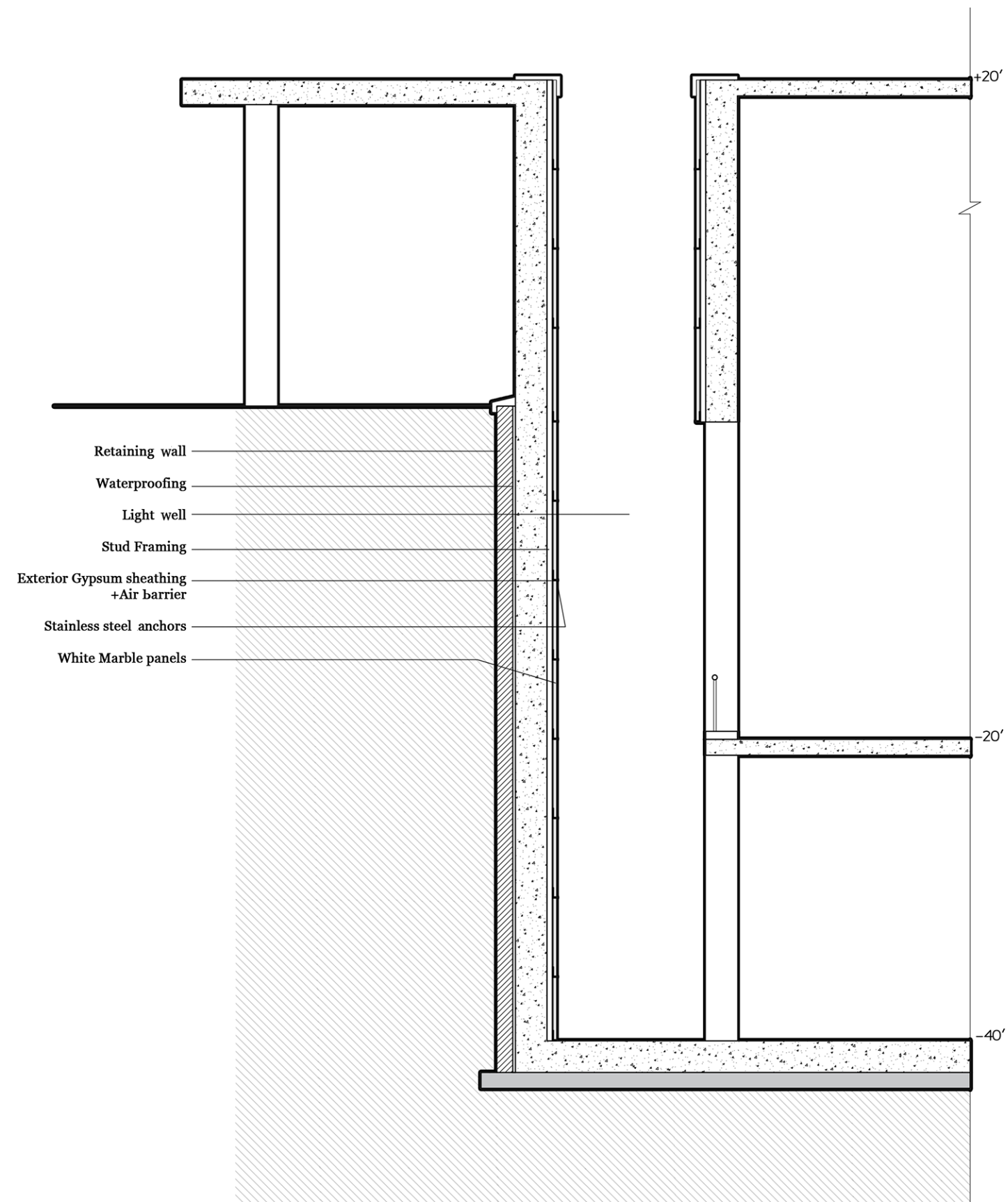
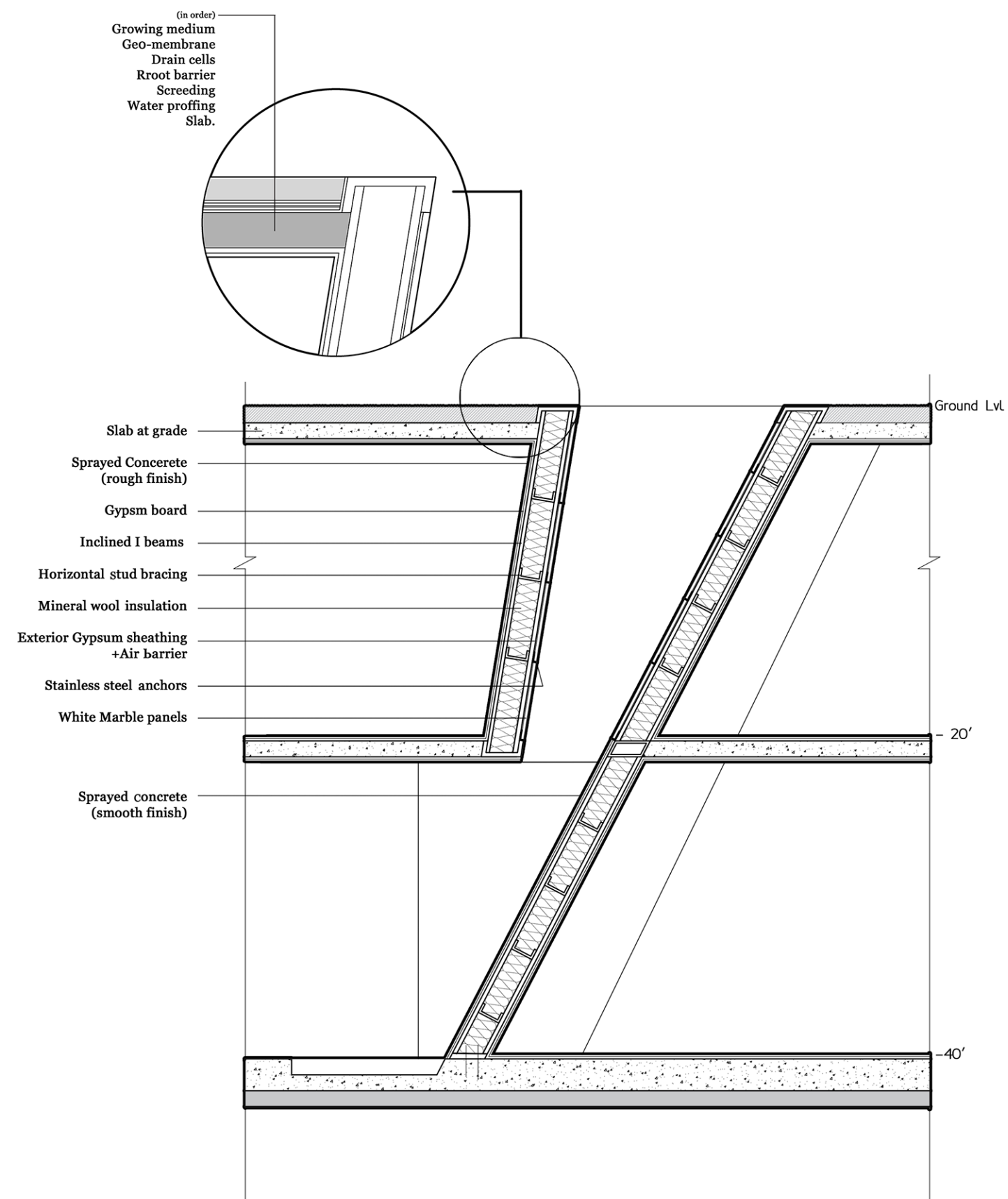
Equilibrium



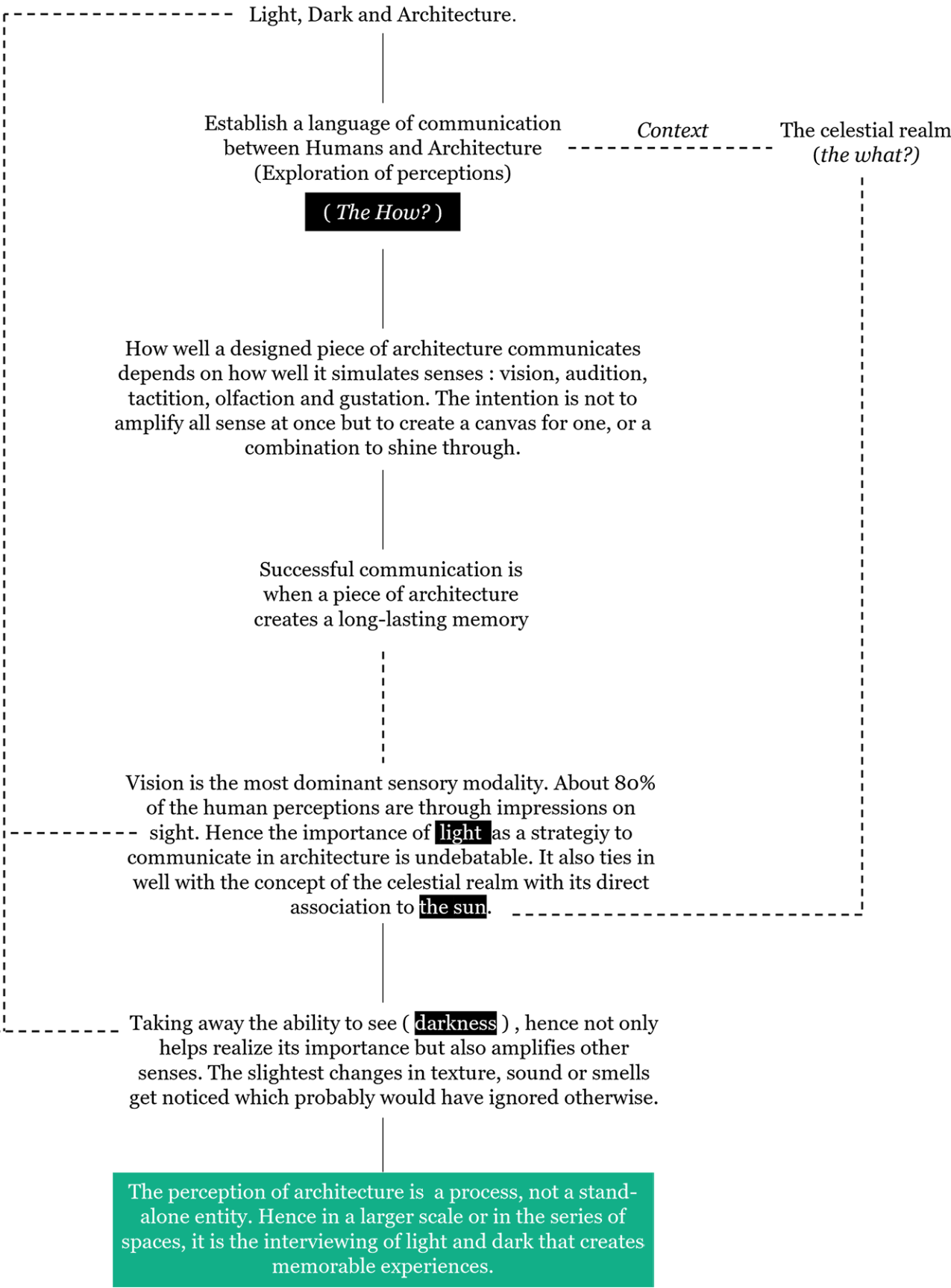
Obtuse



iv : typical details



v : the complex : a reflection

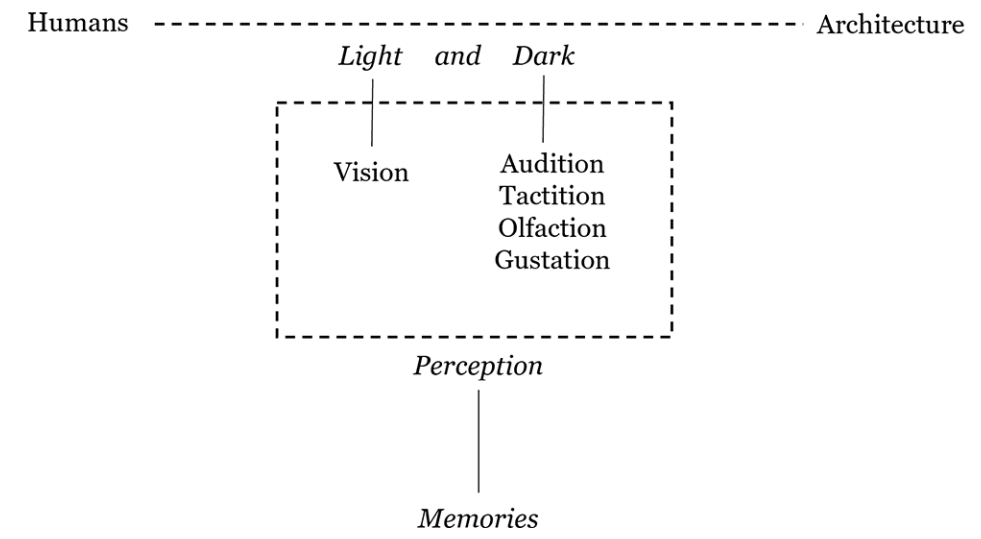
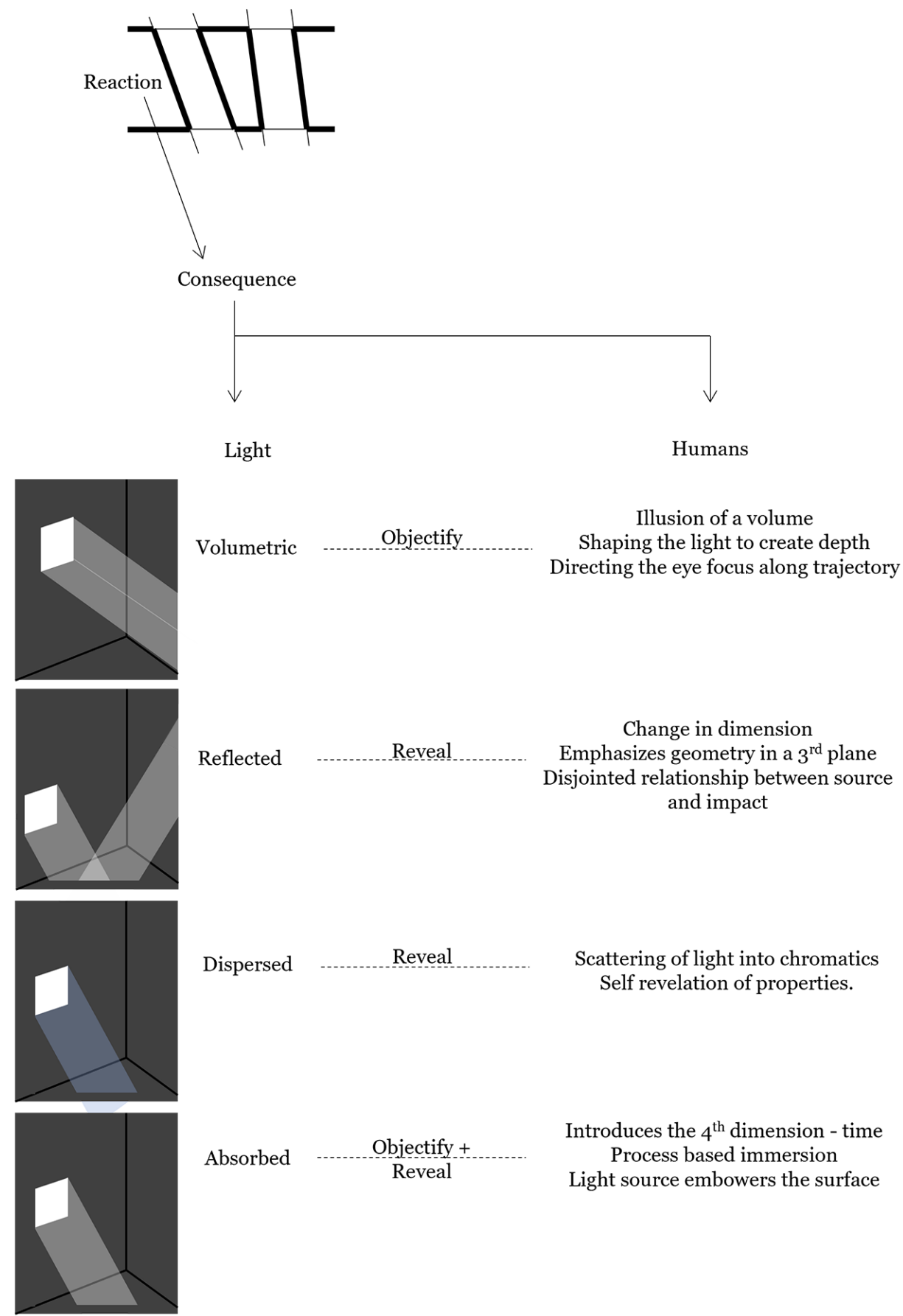


Specifically with respect to the light tunnels, the eyes constantly seek the light and in the process start noticing all the different attributes the light reveals – the texture of the rough concrete against the smooth, the reflectivity of the marble, the inclinations in geometry. All other characteristics of the space that could distract attention from these attributes are blocked.

In the ‘consequence’ space, when the light rides up the walls and the chamber is dark, subtle movements like the rustling of the grass blades and the sound of water and someone walks through it will be noticed in the backdrop of glowing photoluminescent aggregate. The darkness allows the subtle simulations to create lasting impressions.

This idea of interweaving simulations is also what brings the entire complex together. Different pavilions aim to heighten different senses. This develops their potential to work as a stand alone experience and also remain a part of the larger story.

vi : conclusion



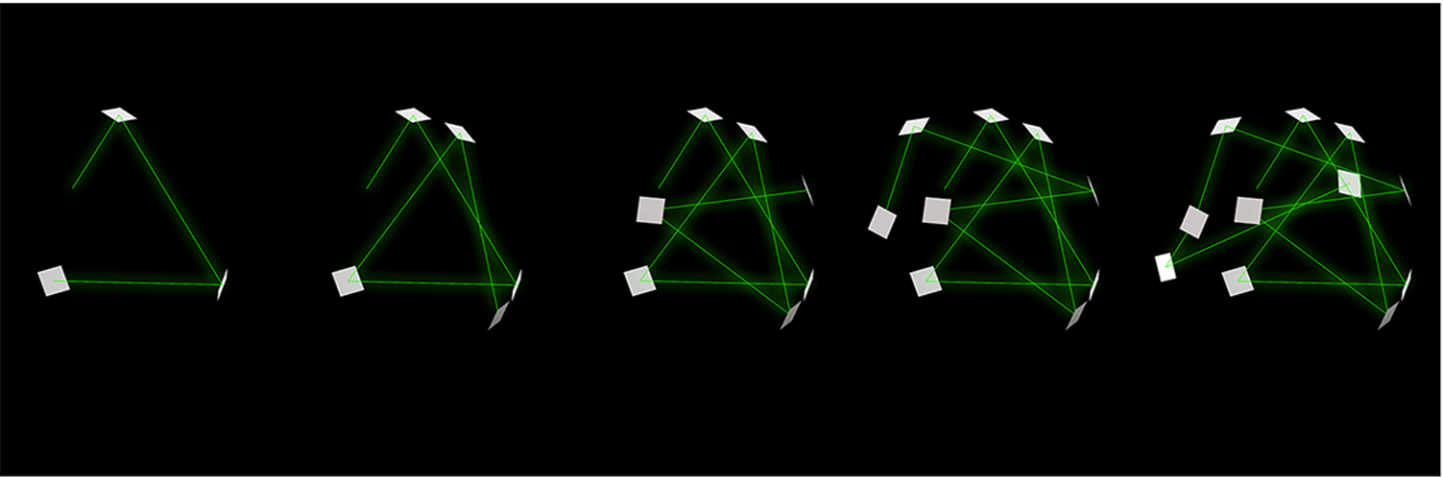
“Architecture is bound to situation. And I feel like the site is a metaphysical link, a poetic link, to what a building can be.”
- Steven Holl

5.

appendix

i : additional explorations

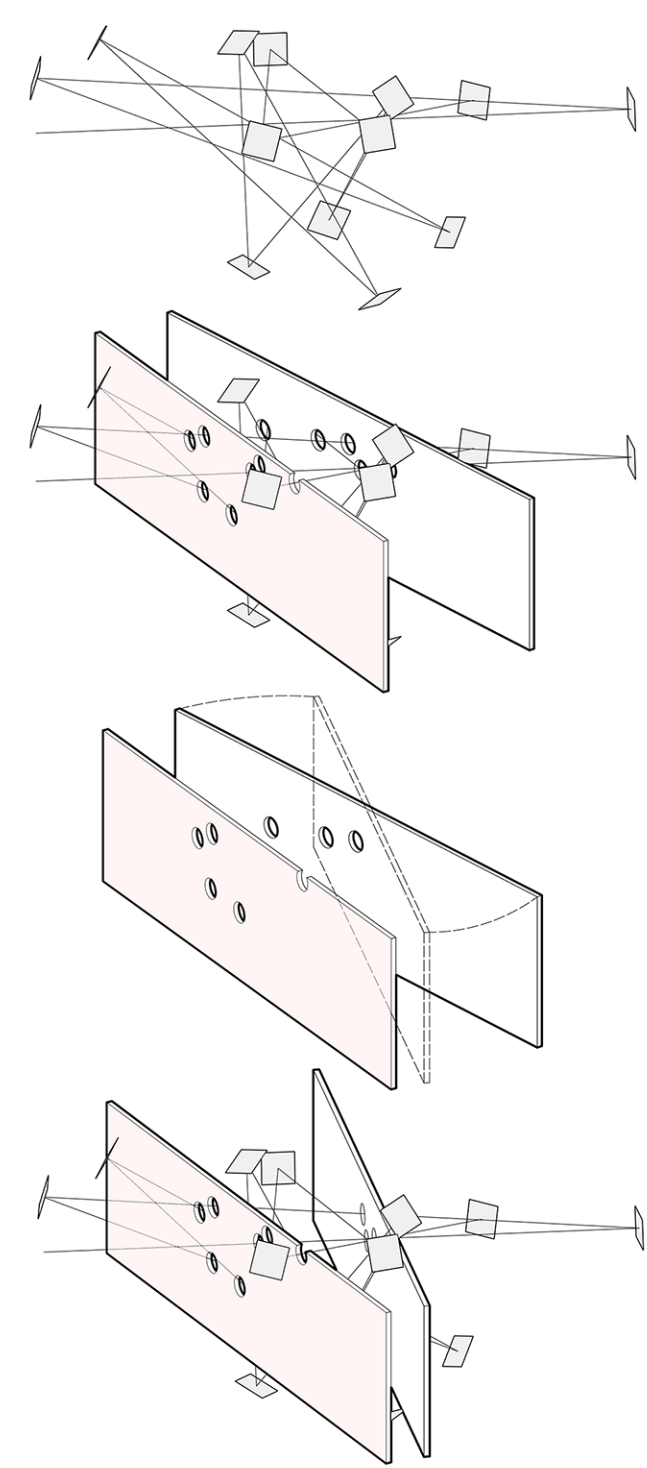
Architecture as a gathering :



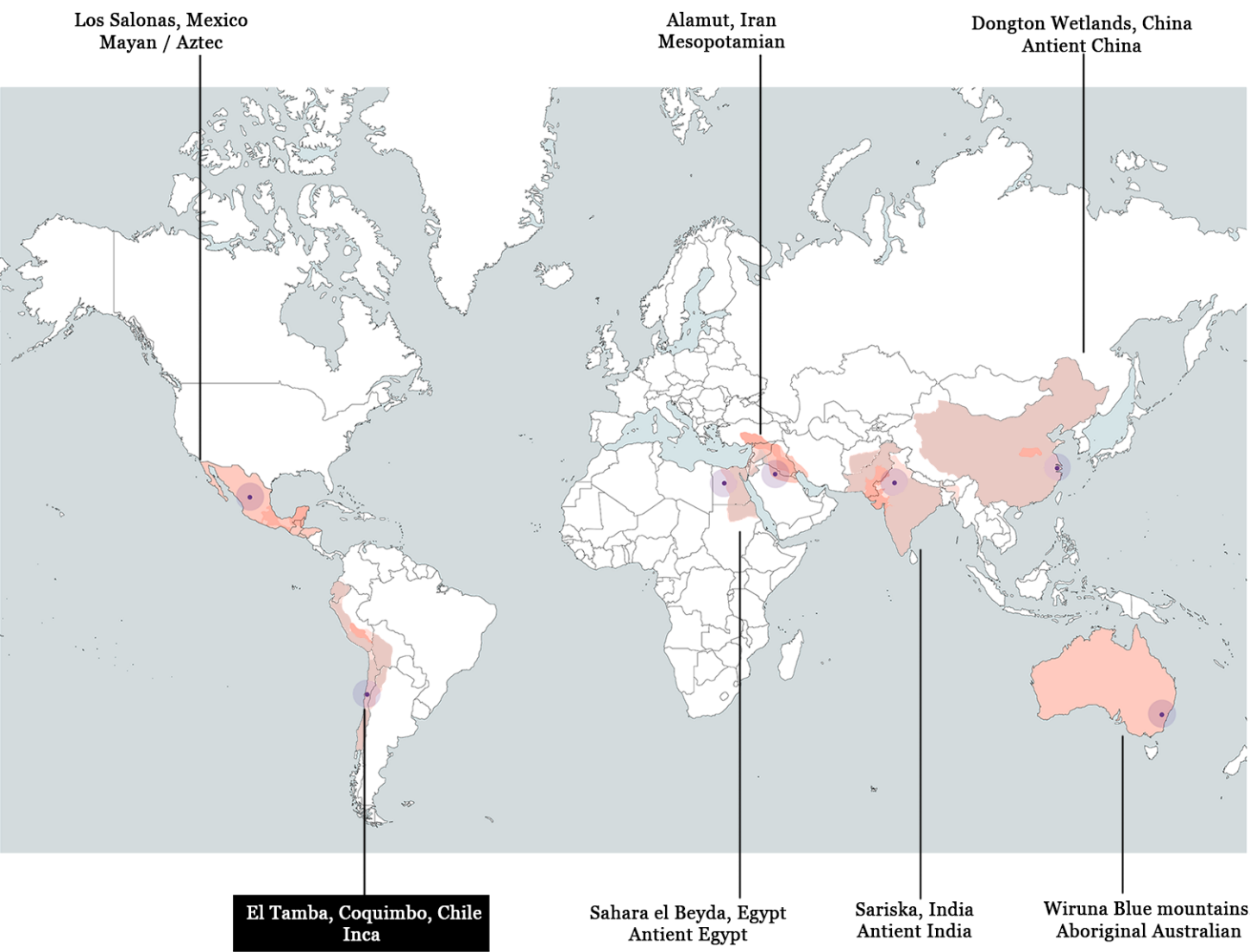
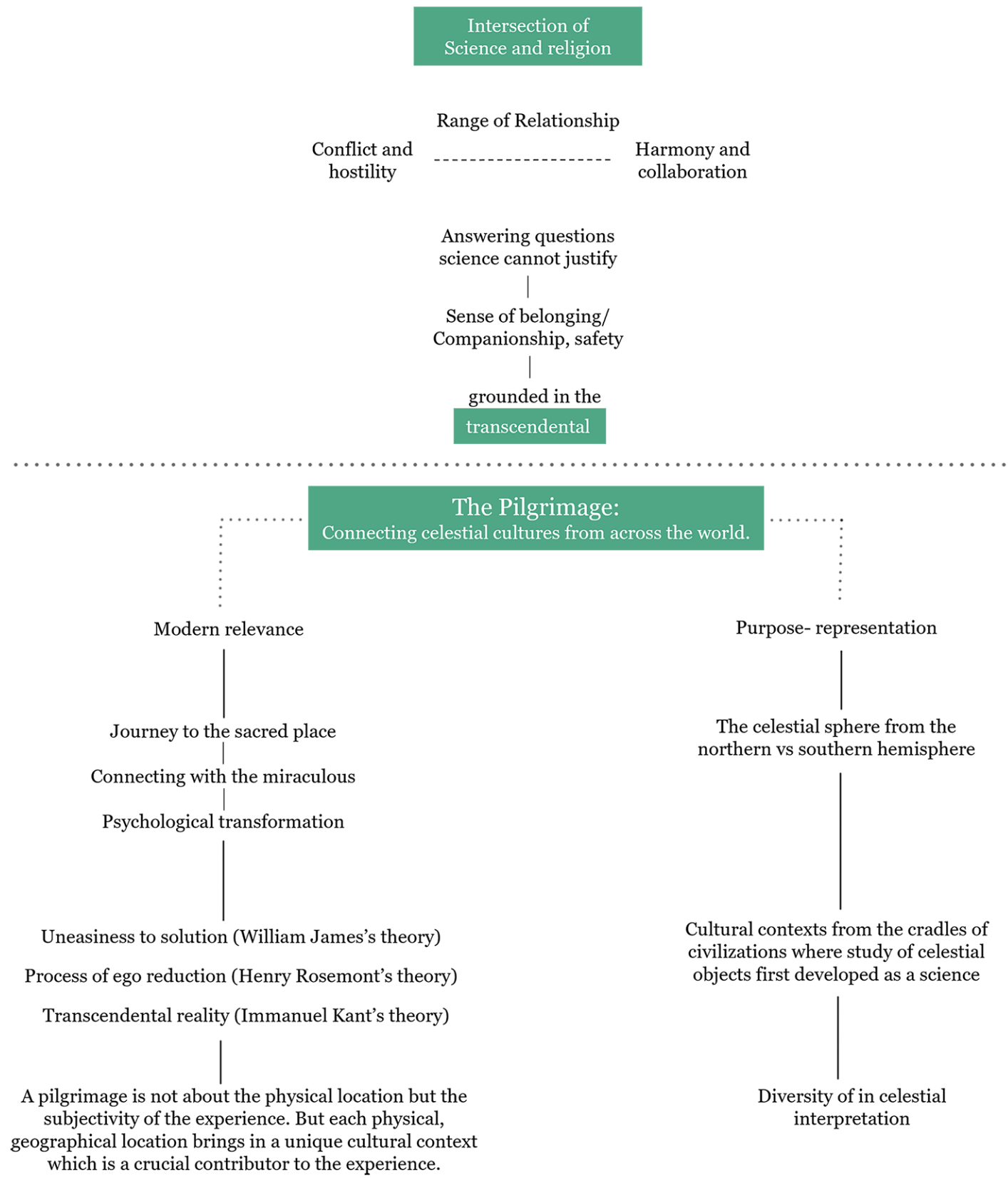
The connection to the celestial elements came from the study of the Church at Firminy by Le Corbusier, especially the chapel with a ceiling of openings that seems to form a constellation peircing through the roof. This precedent brought up the question - Can celestial elements can geometries be representated through architecture by specific and articulated way by using natural light and artificial light?

The experiments to symbolize architecture as a gathering were inspired by the works for artist- Carlo Bernandini who designs pure light artworks that use fiber optics, prisms, and sculptural elements to create laser-like geometric schematics that span galleries and other areas.

Tangible and intangible boundaries :



ii : the pilgrimage and choice of location



The pilgrimage of the Temple of Inexplicable

A geographical pattern that connects areas and cultures that were the origins of astronomy and hence subsequently civilizations. These temples are a canvas for the exhibits of scientic discoveries and the ethnic developments to collaborate to form an immersive experience.

Locations	Alamut	Sahara el Beyda	Sariska, Alwar	Dongton Wetlands	Los Salonas Park, Durango	El Tamba, Coquimbo	Kanangra, Wiruna Blue mountains
Country	Iran	Egypt	India	China	Mexico	Chile	Australia
Continent	Asia	Africa	Asia	Asia	North America	South America	Australia
Hemisphere	Northern	Northern	Northern	Northern	Northern	Southern	Southern
Cultural Association/ Civilizations	Mesopotamian	Ancient Egypt	Ancient India	Antient China	Mayan/Aztec Antient Mexico	Inca Civilization	Aboriginals - Australia
Climate	Hot-summer Mediterranean	Hot white sand desert	Steppe (or semi-arid)	Humid Subtropical, Wetlands	Cold steppe (or semi-arid) climate	Dry	Temperate oceanic
Night sky darkness SQM (o-22)	21.8	21.99	21.7	21.5	21.95	21.9	21.95
Bortle Scale	Class 3 - Rural Sky	Class 1 - Excellent dark sky site	Class 3 - Rural Sky	Class 4- Rural Suburban transition	Class 2 - Typical truly dark site.	Class 2 - Typical truly dark site.	Class 2 - Typical truly dark site.
Nearest town/City	Qazvin	El Farafra	Jaipur	Shanghai	Durango	La serena	Sydney
Distance from the town/city	43.6 mi	141.5 mi	76.4 miles	43.7 mi	74.5 mi	68.4 mi	110 mi

Another crucial side consideration is the preservation of the night sky, which also helped shape a narrative around romanticizing darkness. Beyond just the purpose of star gazing, persevering the dark sky is important for wildlife conservation and controlling energy usage especially in an urban context. The International dark sky association (IDSA) recognizes places and communities as leaders in this mission. The chosen sites are either already or are in the process of getting an IDSA recognition. Having an immersive experience designed around the concept of darkness is hence an attempt at spreading more awareness about the importance of keeping the night skys dark through generating genuine respect for the celestial elements and appreciating the beauty of star gazing.

Why Chile as the chosen site to design ? (and selection criteria within Chile)

- Modern world’s astronomy capital
- Proximity to several other astronomical sites
- Upcoming pop-culture of Astro-tourism.
- Preserved dark skies.
- Unique folk culture from the Inca civilization.
- Representation of the under-represented southern hemisphere (in the realm of astronomy).

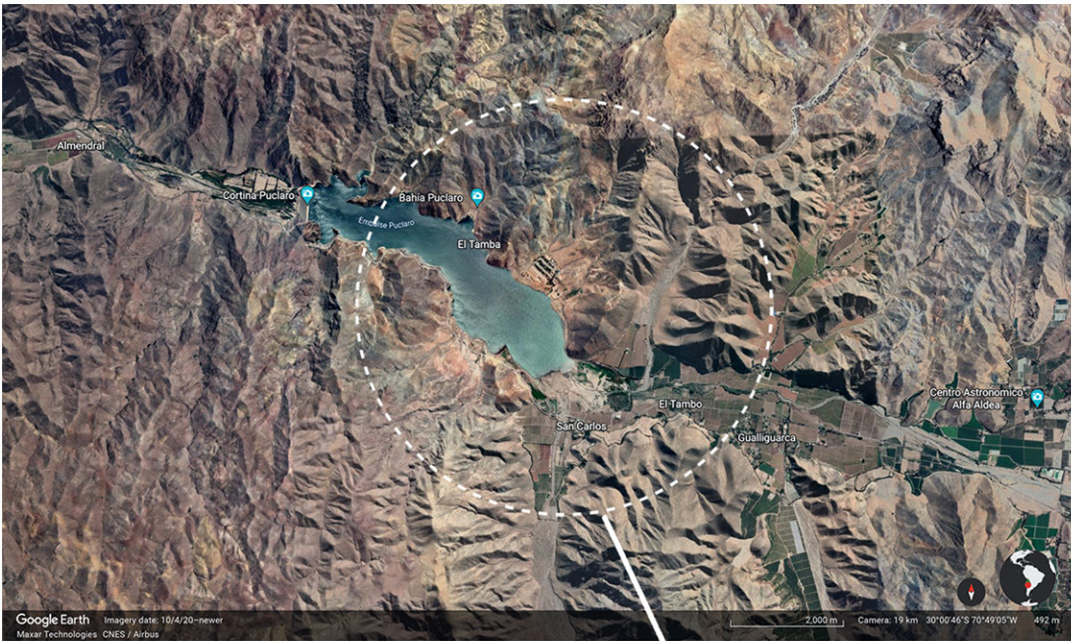


Fig 3 : Site Location, El Tamba (Google Earth)

Fig 4 : Other sites to visit in close proximity (Google Earth)



Fig 5 : View from the site in the East
Sunrise viewing opportunity
(Google Earth)



Fig 6 : View from the site in the West
Sunset viewing opportunity
(Google Earth)

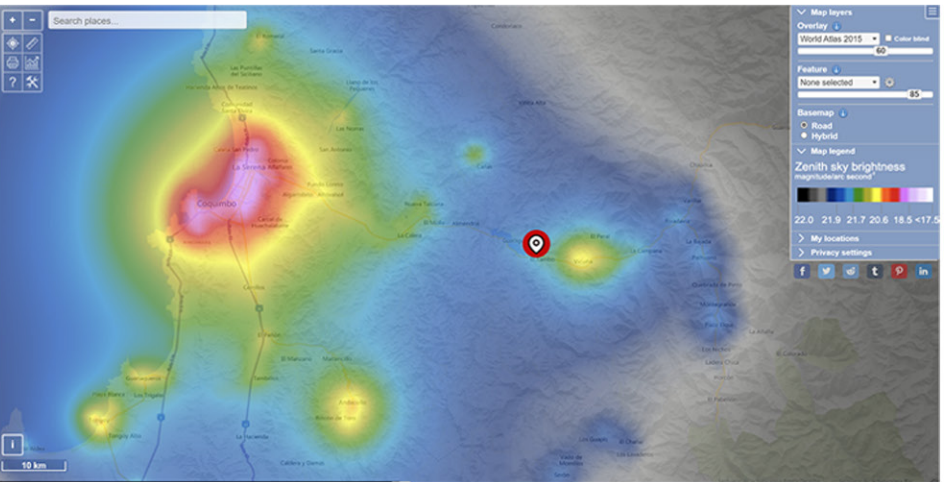
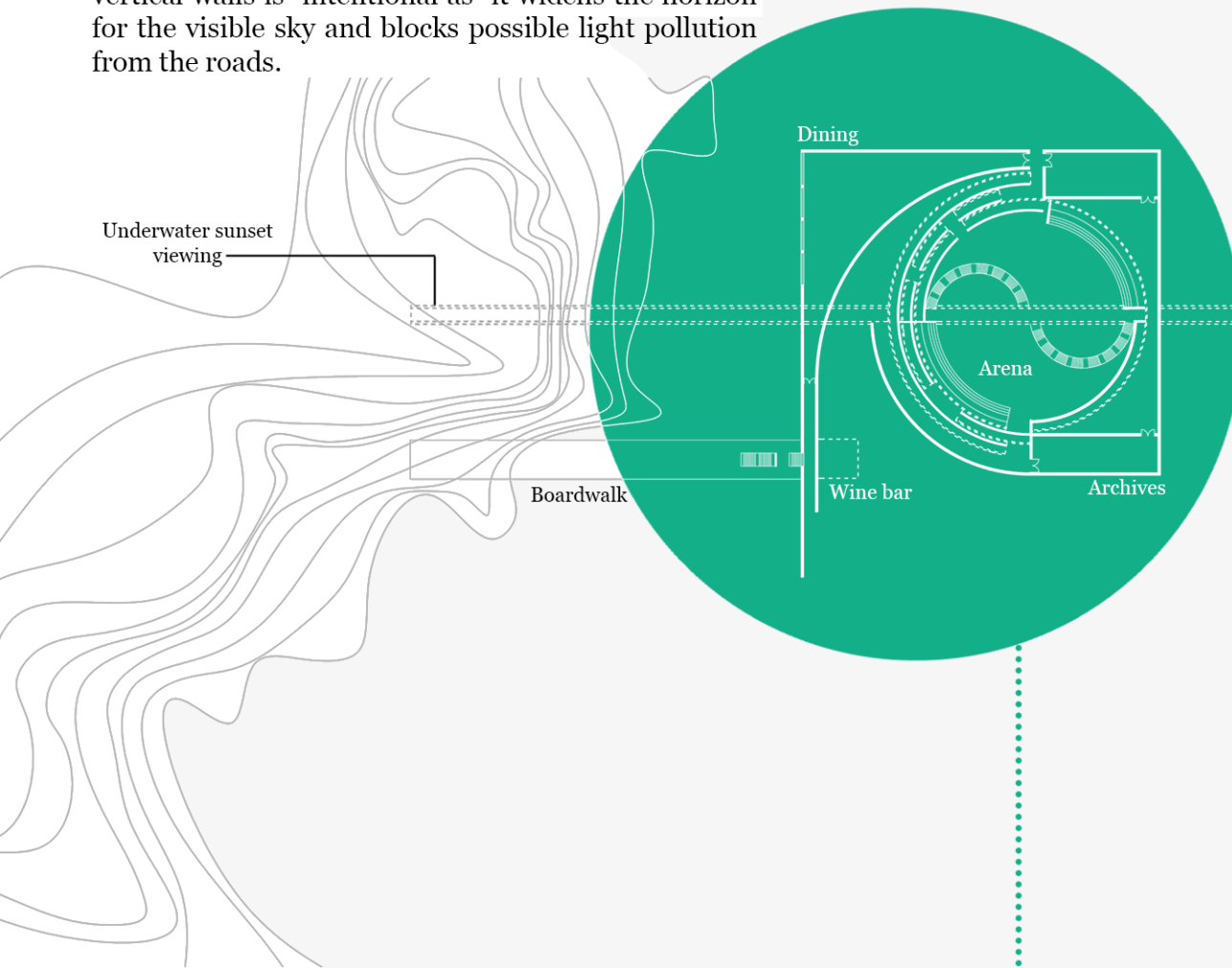


Fig 7: Night sky darkness map
(lightpollutionmap.info)

The stargazing arena

The purpose of the complex is to provide multiple ways/opportunities to appreciate the celestial realm, naturally and through scaled representations. The star gazing area is an ode to the traditional art of observing the sky. The entrance is through a narrow labyrinth which forces a crisscross non-linear movement. It makes the 'gazer' lose his/her sense of direction by the time they enter the arena and then rely on the stars to re-orient themselves. The concave nature of the vertical walls is intentional as it widens the horizon for the visible sky and blocks possible light pollution from the roads.



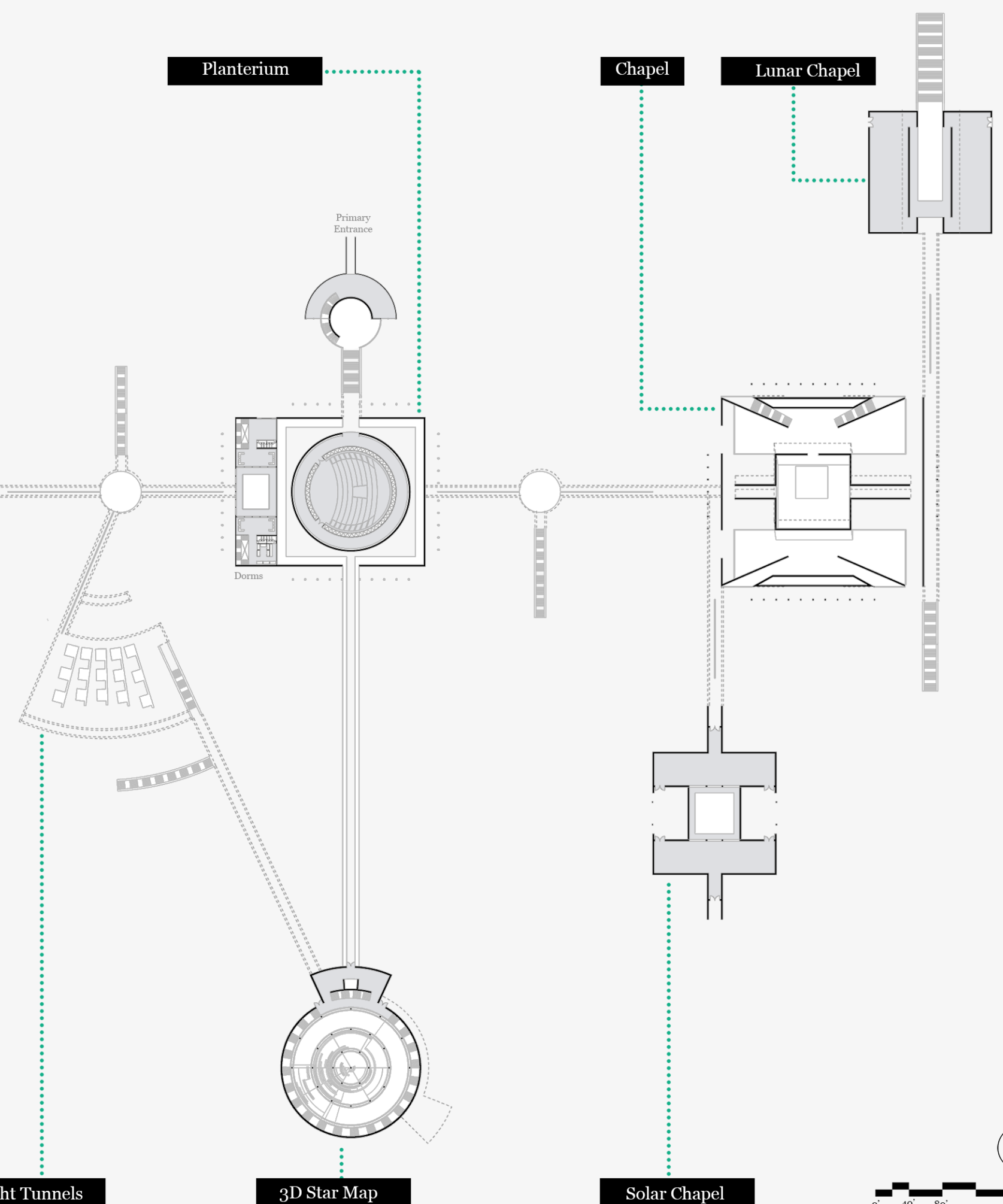
The arena is flanked by archives and a public library on the east and a dining restaurant and wine bar on the west. The visitors are expected to make their way towards the arena in the evening right in time for dinner. As stargazing parties, conventions, and concerts are becoming more popular, the arena also provides a platform to host various public events. Being the western most point in the complex, the 'branches' of the arena explore the possibilities of sunset viewing over the El Tamba reservoir. The small underground wine bar has a connected boardwalk that extends over the shoreline. Parallely the dark trail culminates in the reservoir body where the visitors can experience the sunset from under the water.

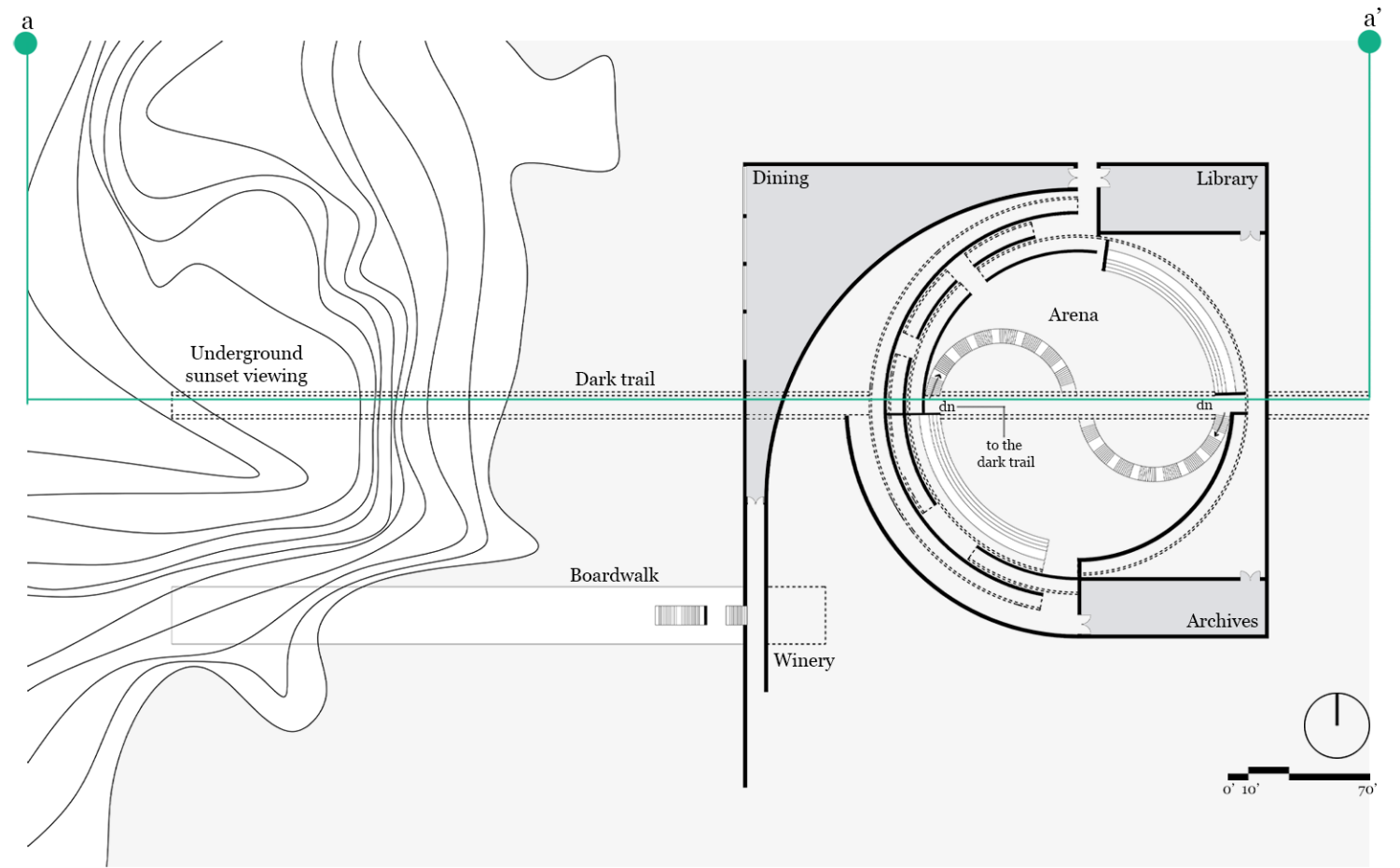
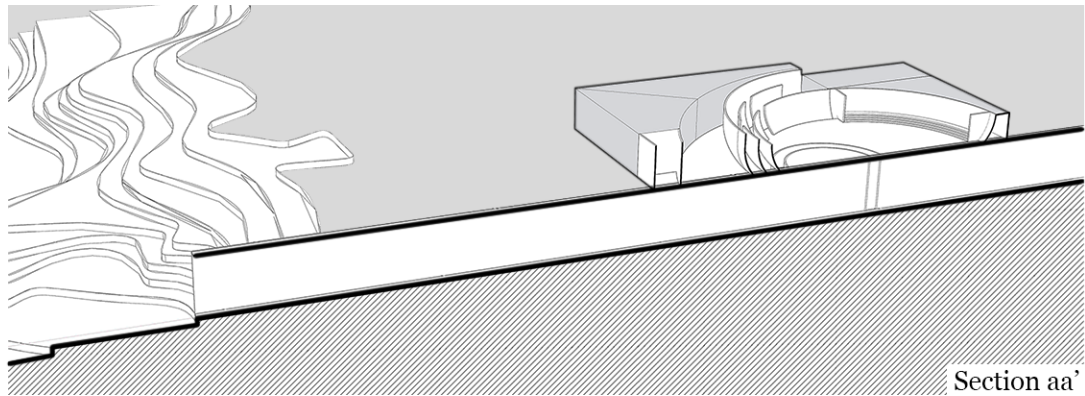
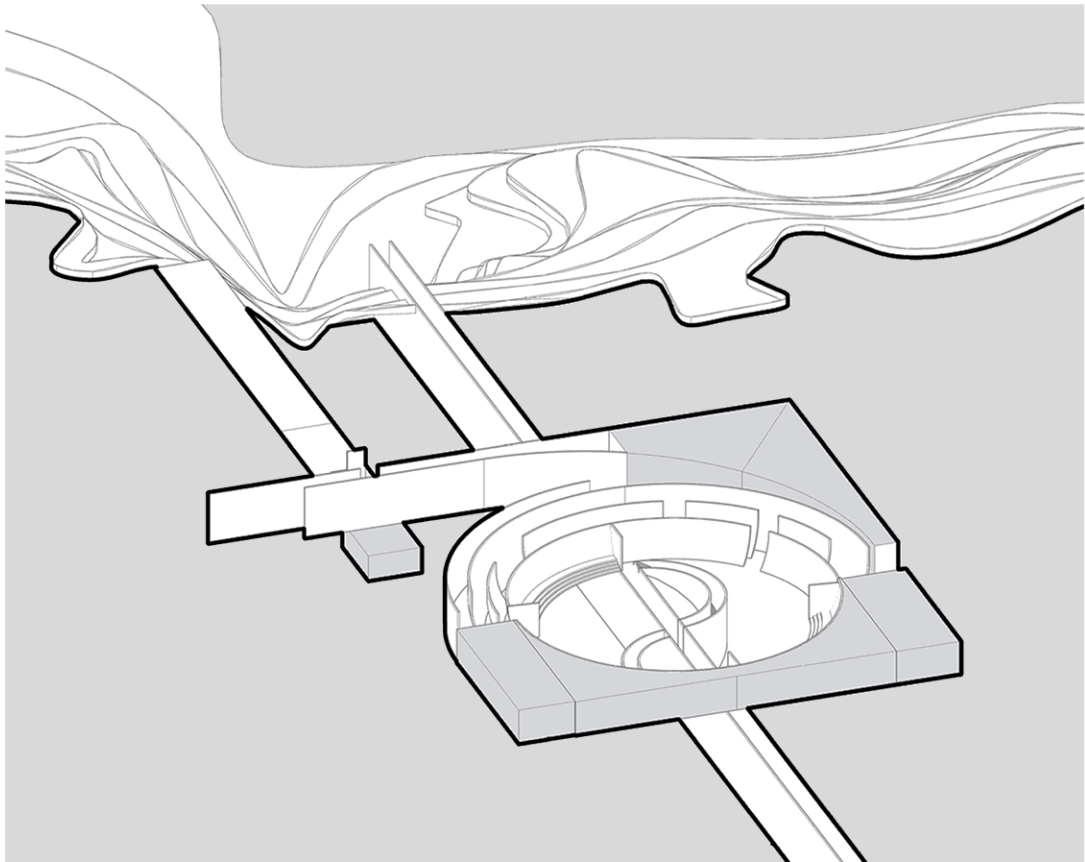
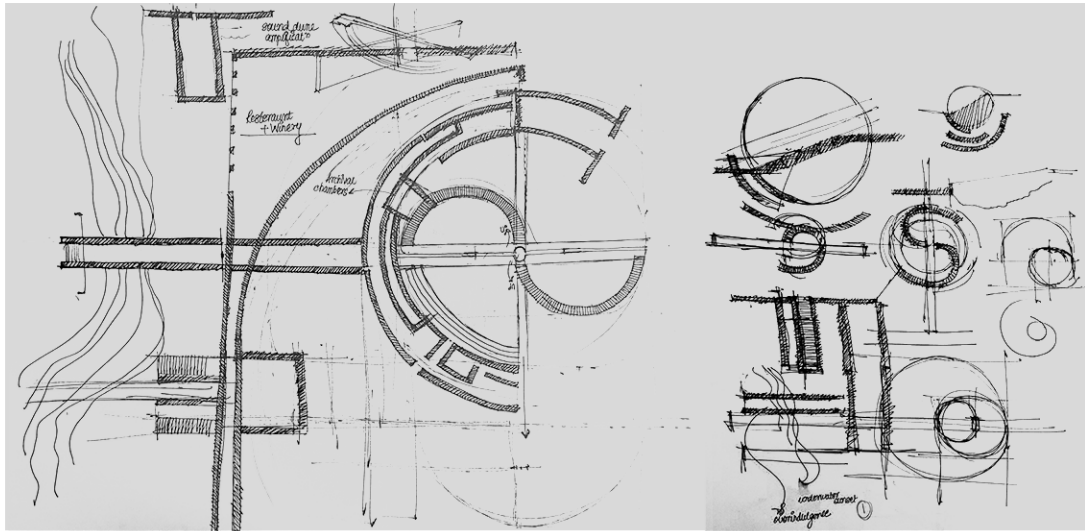
Star gazing Arena

Light Tunnels

3D Star Map

Solar Chapel

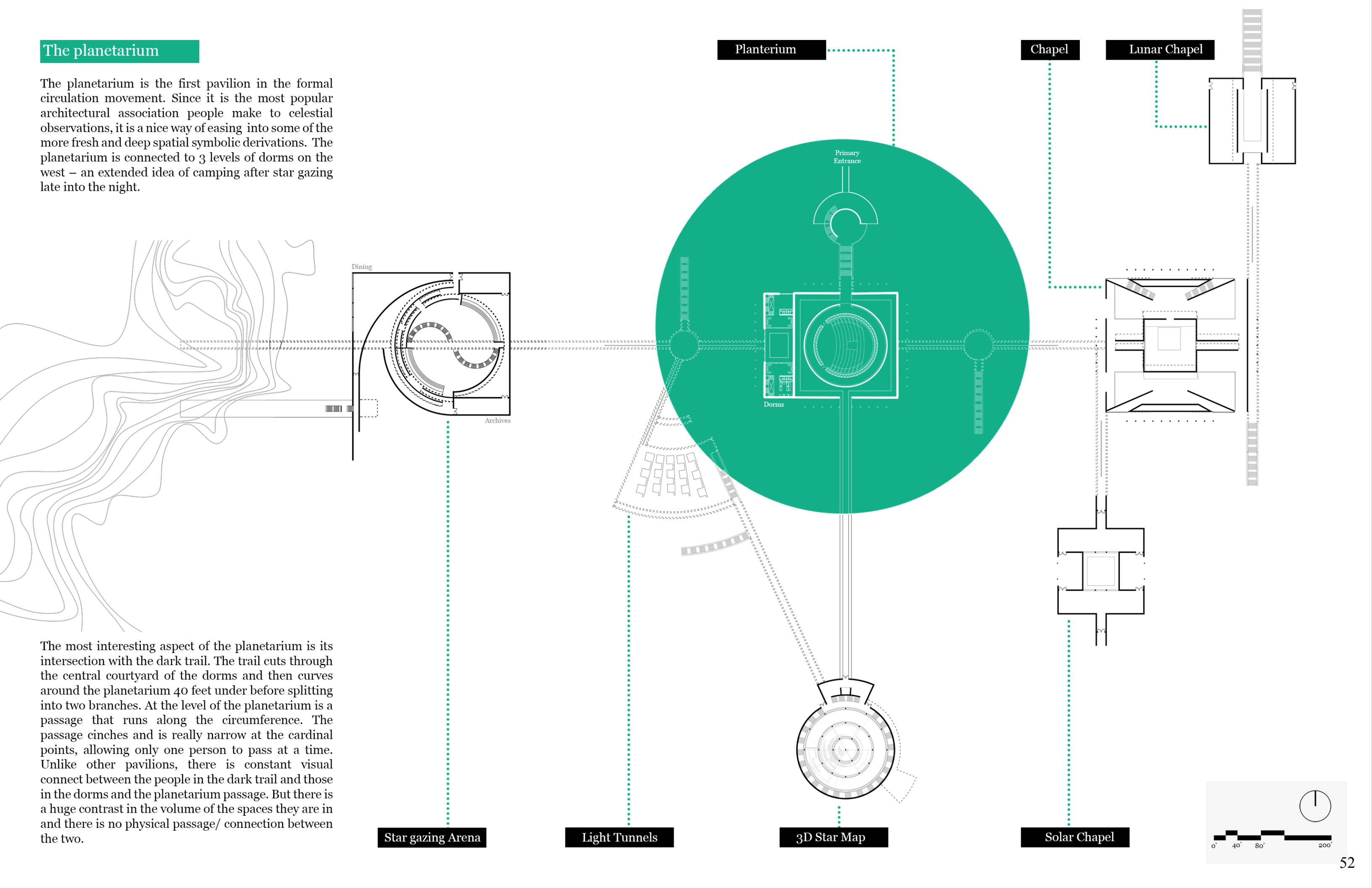


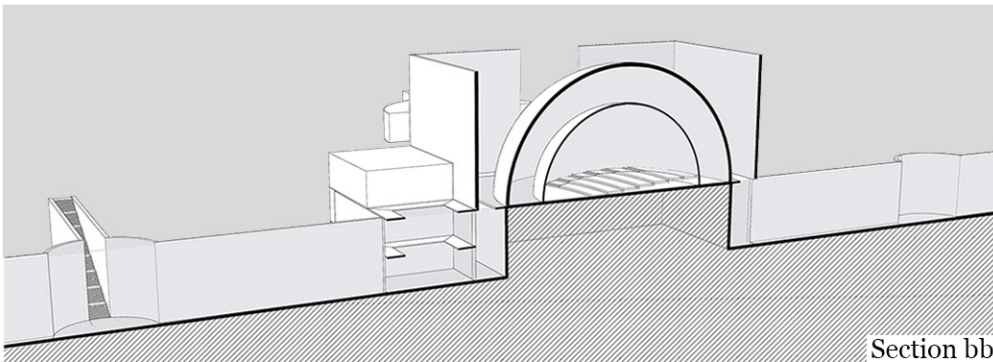
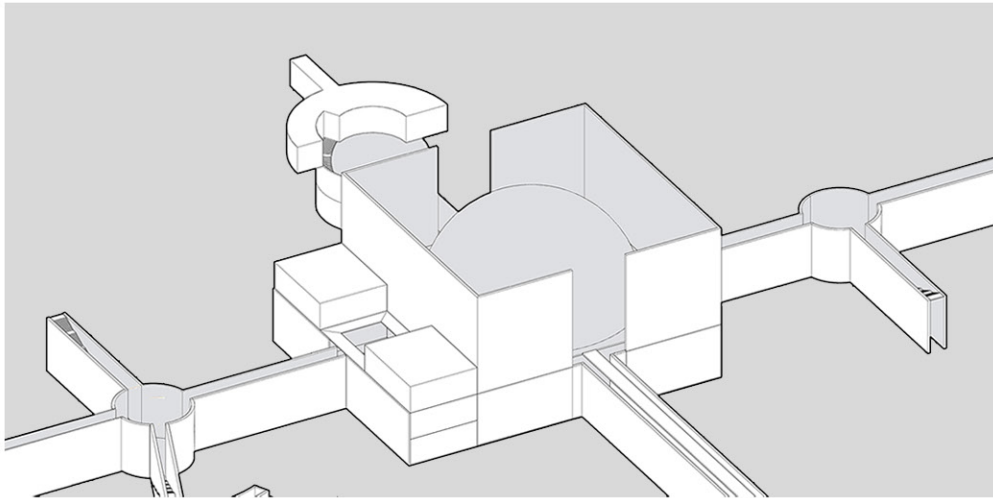
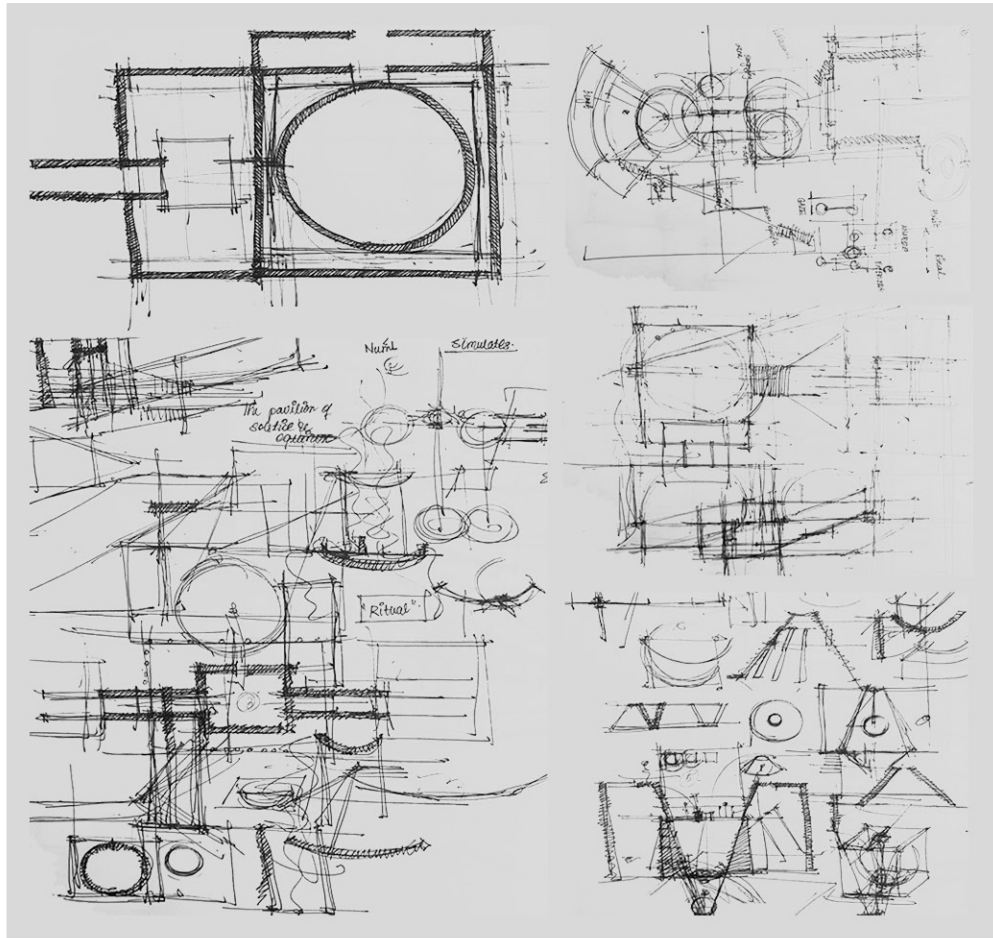


The planetarium

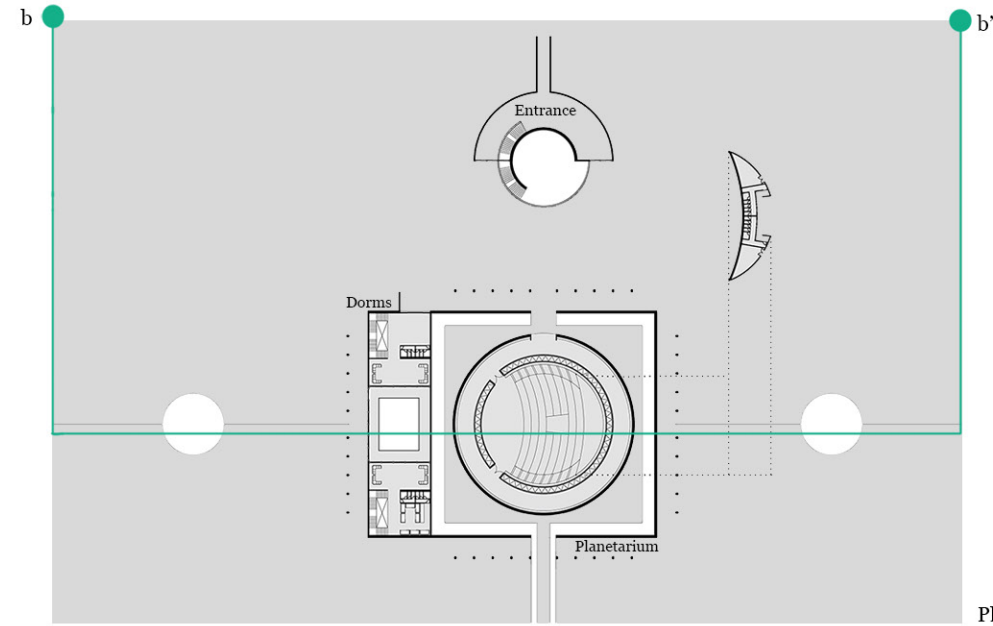
The planetarium is the first pavilion in the formal circulation movement. Since it is the most popular architectural association people make to celestial observations, it is a nice way of easing into some of the more fresh and deep spatial symbolic derivations. The planetarium is connected to 3 levels of dorms on the west – an extended idea of camping after star gazing late into the night.

The most interesting aspect of the planetarium is its intersection with the dark trail. The trail cuts through the central courtyard of the dorms and then curves around the planetarium 40 feet under before splitting into two branches. At the level of the planetarium is a passage that runs along the circumference. The passage cinches and is really narrow at the cardinal points, allowing only one person to pass at a time. Unlike other pavilions, there is constant visual connect between the people in the dark trail and those in the dorms and the planetarium passage. But there is a huge contrast in the volume of the spaces they are in and there is no physical passage/ connection between the two.

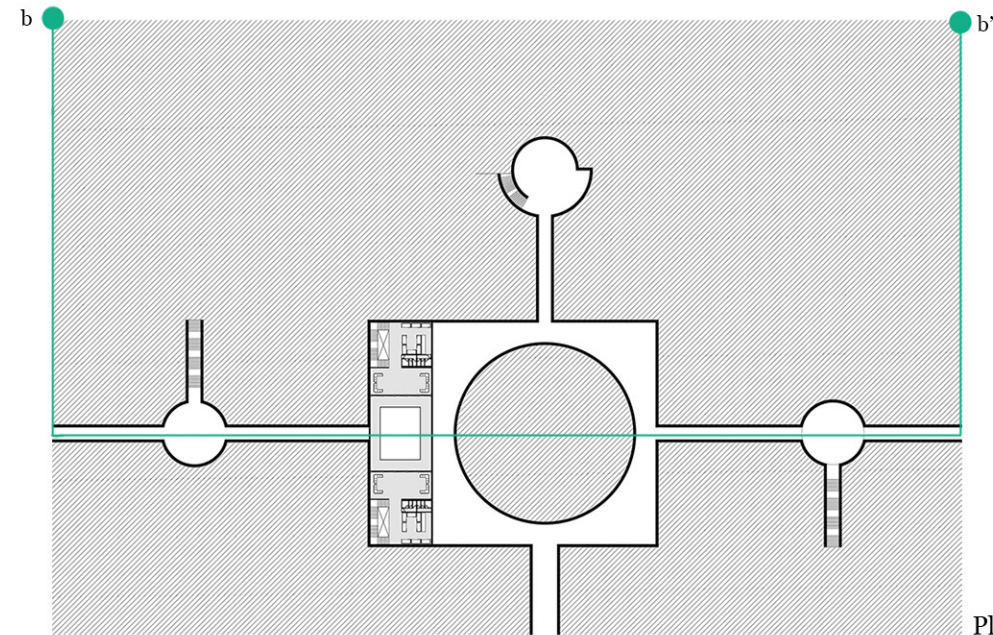




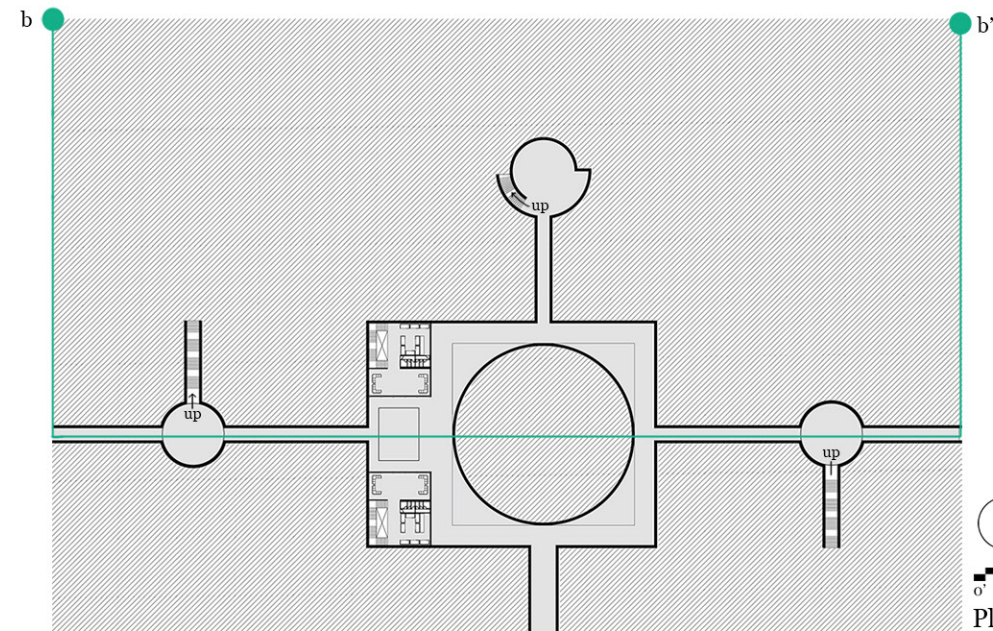
Section bb'



Plan @ +/-0'



Plan @ -20'



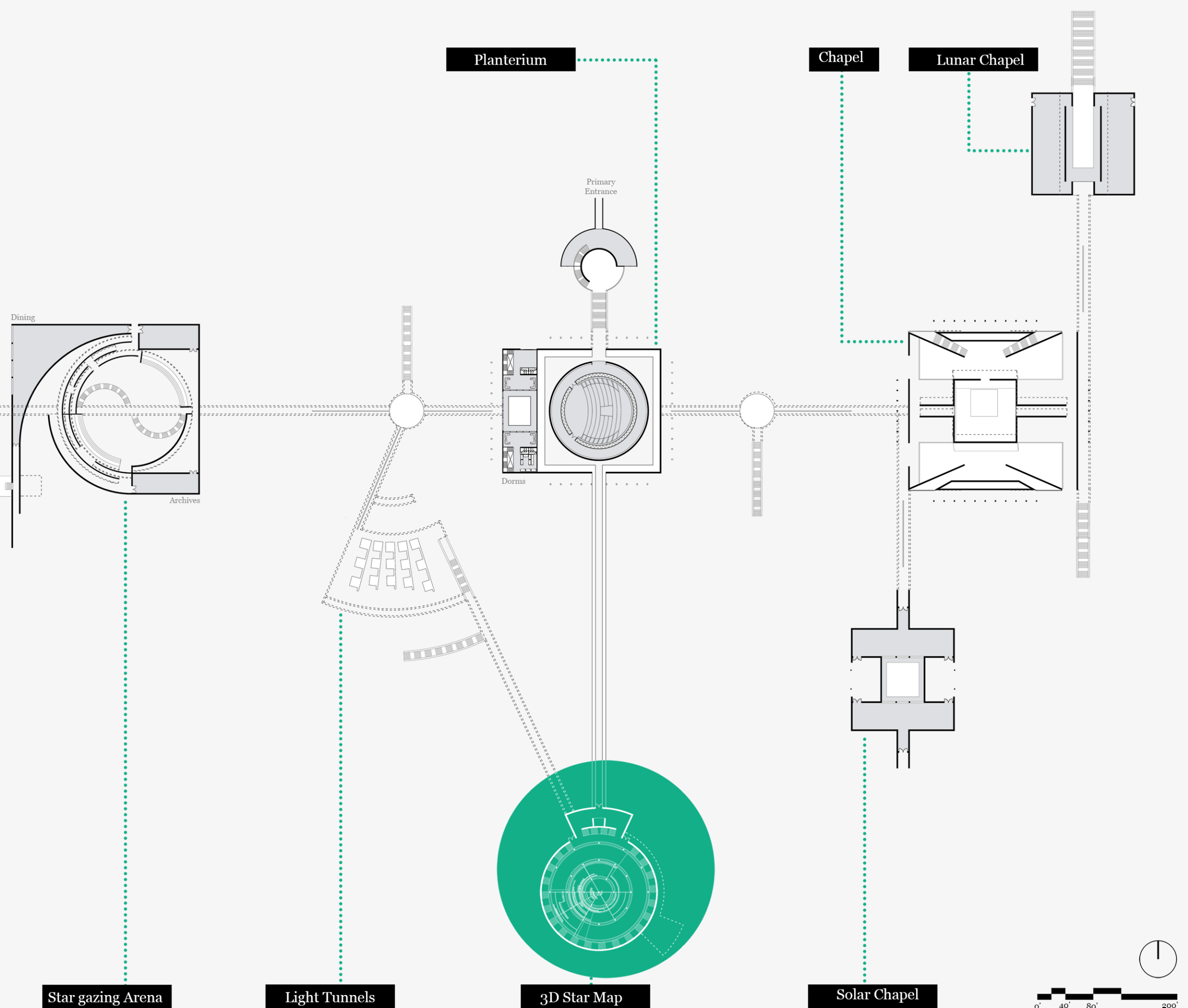
Plan @ -40'

The 3-d star map

The 3D star map is the physical scaling down of the stars and the constellations to dimensions and distances humans can relate. Experientially it is inspired by the ancient step wells dug deep inside the ground that are practically invisible from a distance but reveal its monumental volume when one walks closer. A crucial perspective that was considered is the design methodology of museums as warehouses, storage units that contain the exhibit rather than integrate with it. The primary objective of the majority of pavilions was to design spaces that are exhibits in themselves but are also a home to more formal, conventional exhibition materials. The 3D star map in particular focused on the movement between exhibition spaces and how that journey could also mean something in the larger context in terms of experience, spirituality, and science.

The driving force behind this pavilion is the implication of 'scale' on the astronomical viewing from the earth. We perceive most of the stars and constellations as 2 dimensional or planar entities, but that is not how they exist in space. The distance of the nearest star to the view point on earth in itself is so huge that the 3 dimensional relationship that one star has with the other becomes irrelevant. The design exercise was an attempt at bringing this forgotten three-dimensionality into light.

The 3 circumpolar constellations of the southern hemisphere were chosen as they are visible year round. Thus it is easier to relate to star formations that you have seen in the star gazing arena and then understanding their positions in a zoomed-in context. A constellation consists of several stars, humans only see those that cross the threshold of visible brightness. The design process involved choosing these specific stars and converting their positions from a celestial measurement system (right ascension and declination) to one that could be implemented in architecture and construction by developing a computational code. The scale used is 5 light years equivalent to 1 foot. To give some context on understanding the magnitude of a light year – the circumference of the earth's orbit around the sun is less than 9-10 times of 1 light year.



Srno	Constellation	Star	Right Acessions			Declination (negetive)			Distance (in LY)	V.M. (log)	V.M. (linear)
			Hours	Minutes	Seconds	Degrees	Minutes	Seconds			
1	Southern Cross	α	12	26	34.45	63	5.67	45.2	321	1.4	27.54
		β	12	47	43.32	59	41	19.4	352	1.25	31.62
		γ	12	31	13.315	57	5	48.6	88	1.6	22.91
		Δ	12	15	8.76	58	44	56	364	2.79	7.66
2	Carina	Alpha - Canopus	6	23	57.09	52	41	44.6	313	-0.72	194.09
		x	7	56	46.74	52	58	56.6	387	3.46	4.13
		Epsilon	8	22	30.86	59	30	34.3	632	1.86	18.03
		l-Apsidiske	9	17	5.43	59	16	30.9	692	2.23	12.82
		Phi	10	32	1.48	61	41	7.3	497	3.3	4.79
		Theta	10	42	57.43	64	23	40.1	439	2.74	8.02
		Omega	10	13	44.28	70	2	16.5	370	2.92	6.79
		Beta – Miaplacidus	9	13	12.24	69	43	2.9	111	1.67	21.48
3	Centaurus	U	9	47	6.14	65	4	19.3	1622	2.92	6.79
		Alpha	14	39	40.9	60	50	6.5	4.36	-0.01	100.93
		Beta	14	3	49.44	60	22	22.7	525	0.61	57.01
		Epsilon	13	39	53.27	53	27	58.9	376	2.29	12.13
		Gamma	12	41	31.2	48	57	35.6	130	2.2	13.18
		Zeta	13	55	32.43	47	17	17.8	284	2.55	9.55
		v1	13	49	30.3	41	41	15.6	475	3.41	4.32
		Phi	13	58	16.28	42	6	2.5	465	3.83	2.94
		n	14	35	30.45	42	9	27.9	308	2.33	11.69
		k	14	59	9.7	42	6	14.9	539	3.13	5.60
		Micron	13	49	37.01	42	28	25.3	527	3.47	4.09
		L	13	20	36.07	36	42	43.5	59	2.75	7.94
		psi	14	20	33.48	37	53	7	247	4.05	2.40
		Theta	14	6	41.32	36	22	7.3	61	2.06	15.00
		sigma	12	28	2.41	50	13	50.2	443	3.91	2.73
		Delta	12	8	21.54	50	43	20.7	395	2.58	9.29
		Pi	11	21	0.44	54	29	27.7	321	3.9	2.75
		Rho	12	11	39.15	52	22	6.3	342	3.97	2.58

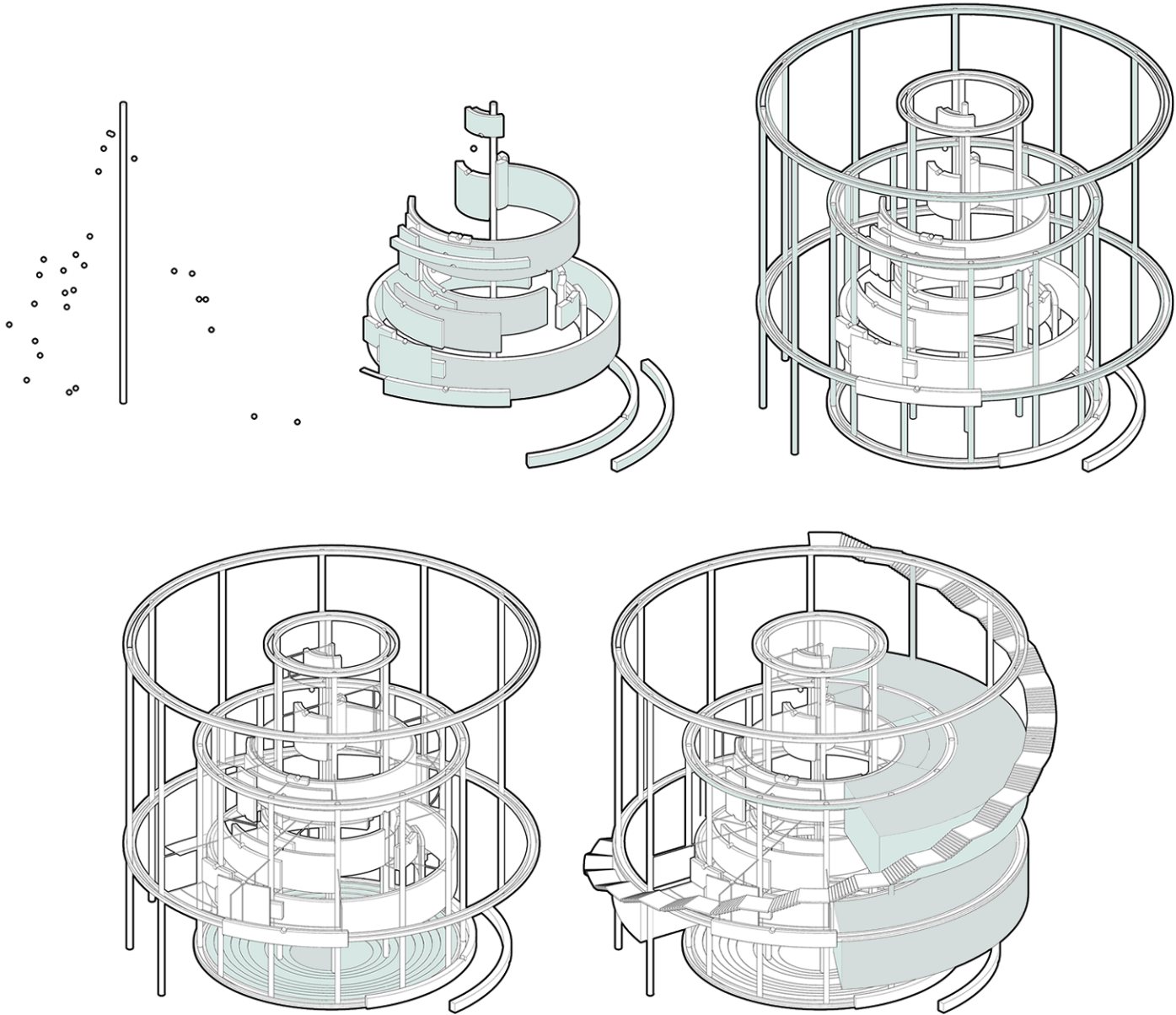
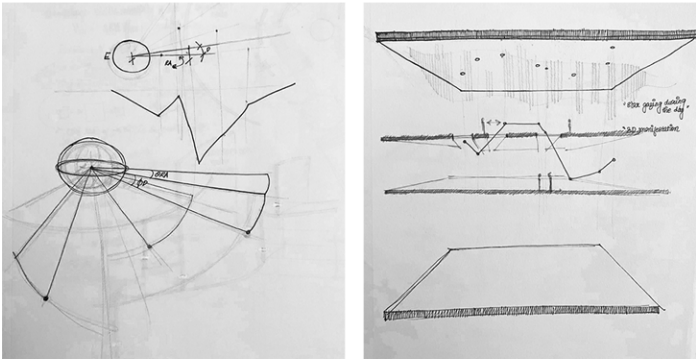
The process -

1. Plotting the central axis and the stars around it.
2. Developing circular partitions around the plotted stars.

The length of the partition is directly proportional to the visual brightness magnitude of th star as seen from the earth. The longer the partition, the brighter the associated star. With respect to the height the curves of the partitions are extruded to the nearest plane of multitudes of 40’ (ground level, 40’, 80’ and 120’)

3. Development of a structure system that supports the partitions yet makes them appear as floating entities in the space.
4. The congregation space 120 feet under the ground
5. Development of enclosed spatial volumes and movement

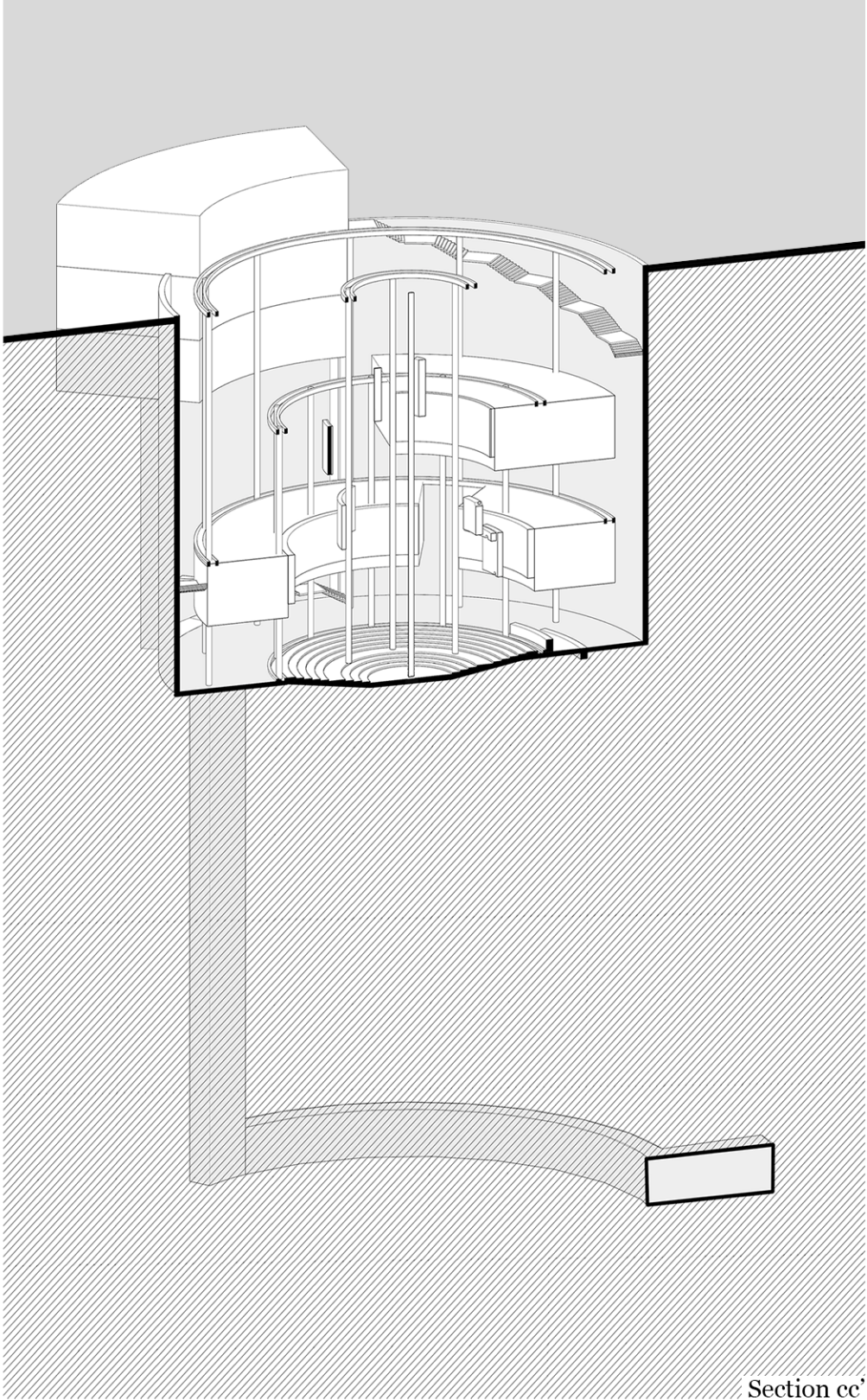
Creation of volumes of space between partitions that can act as small exhibition spaces and a staircase along the circumference that connects everything.



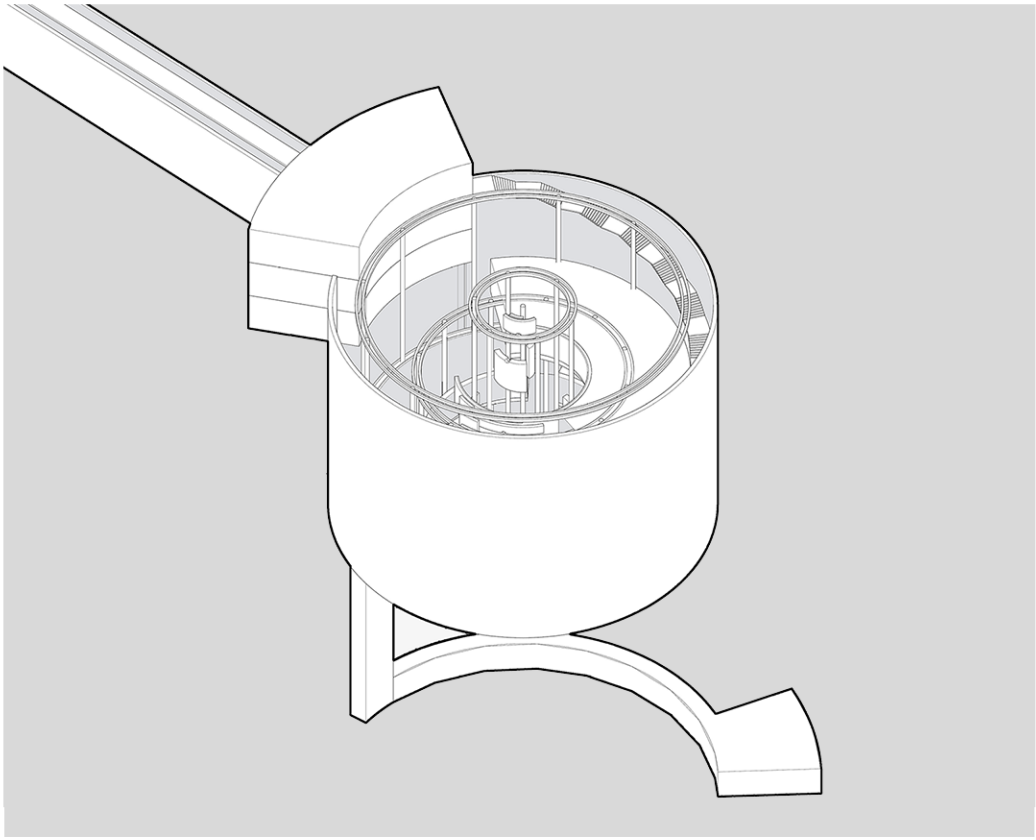
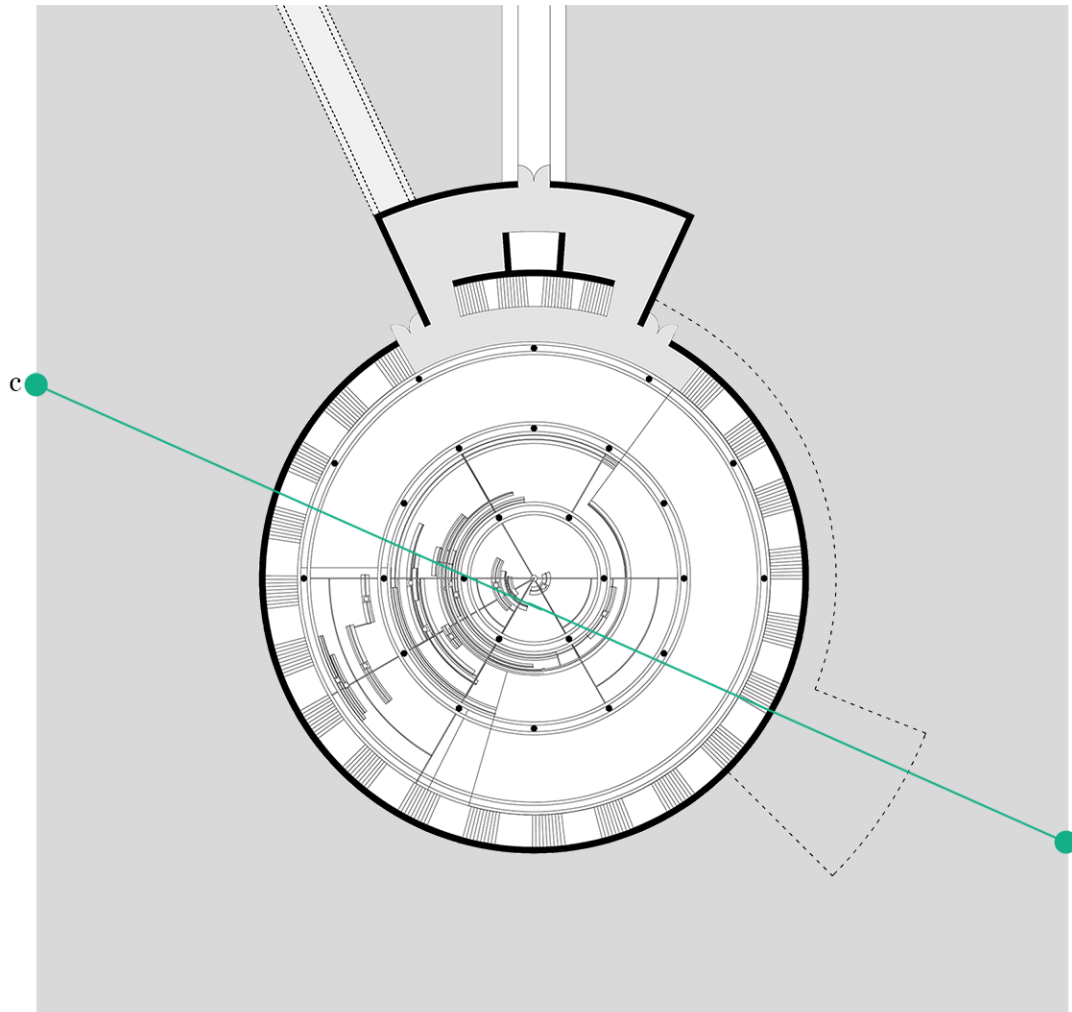
The sequential process

The 3-d star map is an experiential journey, understanding the magnitude of the volume of outerspace and gradually making their way to the congregational space from where you look up and see these massive floating partitions that make one feel really small in comparison to the architectural volume and in that process develop a sense of humility.

The one star that in humanized scale is about 250' under the ground level is the darkest point in the dark trail. Inspired from the dark cave experiences, this space is where the visitors would be subjected to extreme and absolute darkness for about a minute. The experience for fighting with the darkness until it gets so heavy on the eyes that one surrenders.



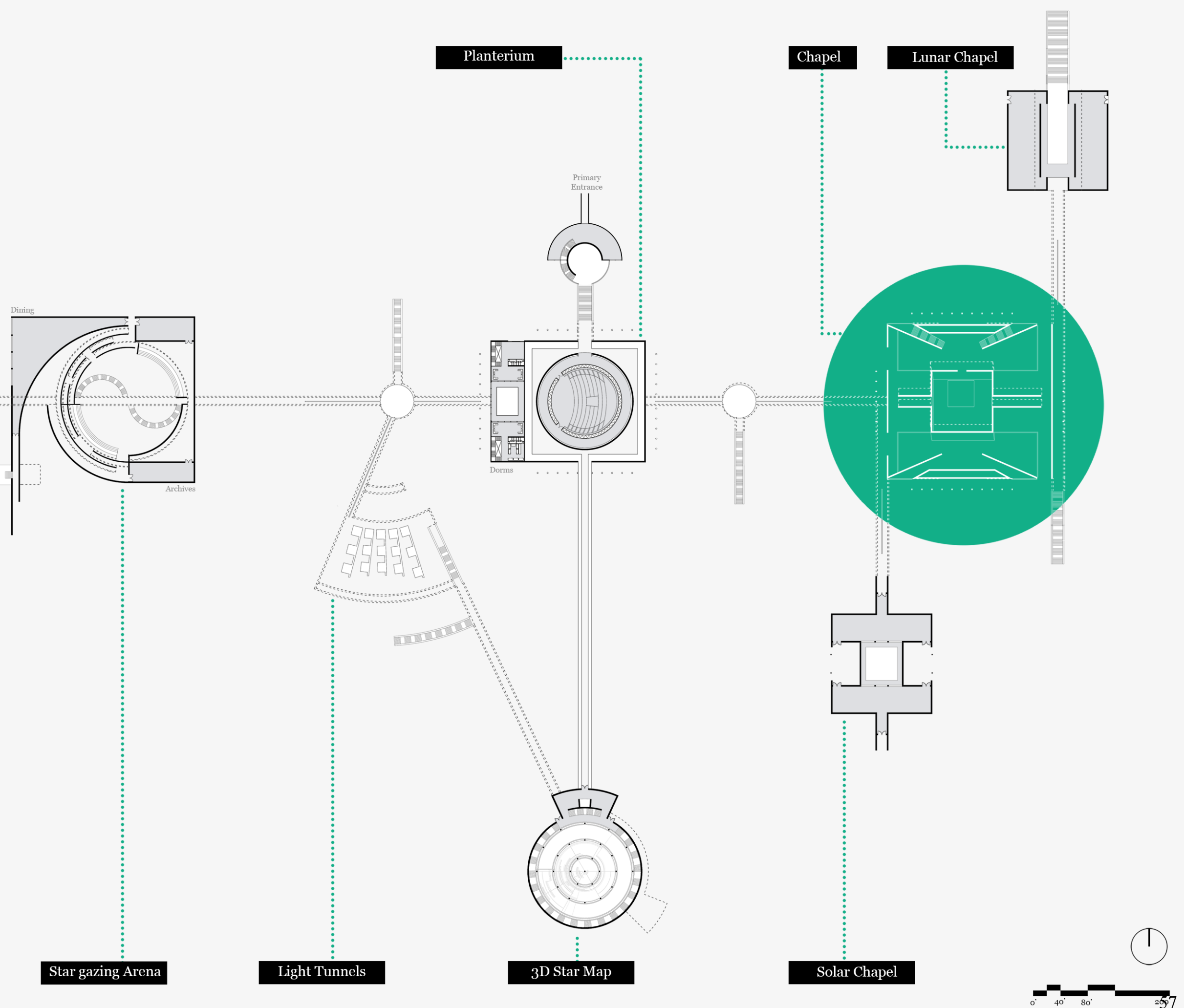
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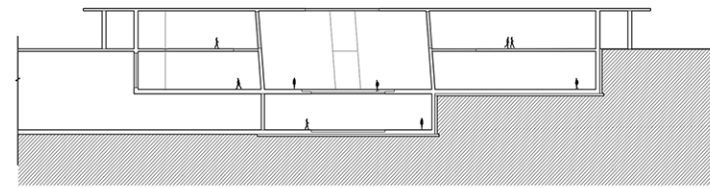


The chapel

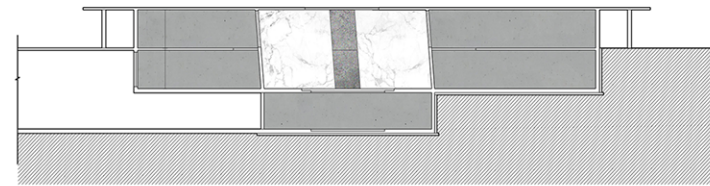
The chapel is the primary ritualistic pavilion in the complex. It can be looked at as an extension of the light tunnels. In the light tunnels design process, the multitude of tunnels were explored along the idea of creating violence free spaces (Tschumi). In the Chapel, the design exaggerates and analyzes the workings on one tunnel by introducing violence in it. The chosen time is that of the noon on the equinoxes when the sun is as perpendicular to the ground plane as possible and the night and the day are equal.

With respect to the cultural association, the cycles of equinoxes and solstices were celebrated by the Incans as the key components of the annual crop management activities. In a more practical sense, these were the days when the astronomy revered – the sunrise and sunset at the horizon. The Andean cultures link equinoxes with fertility. The spring equinox in September was when the soil was prepared for planting and the Fall equinox in March was when the crop was harvested. Thus the equinox is a symbol of both hope and prosperity.

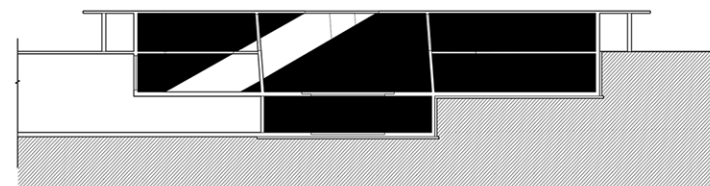




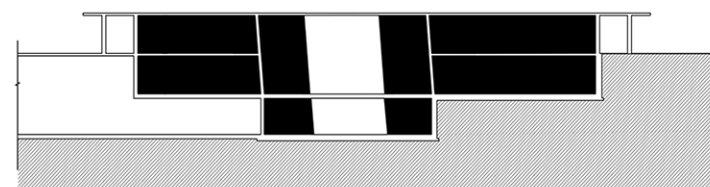
Section ee'



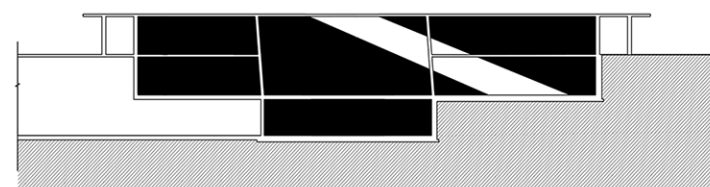
Material palate



Sunrise at equinoxes

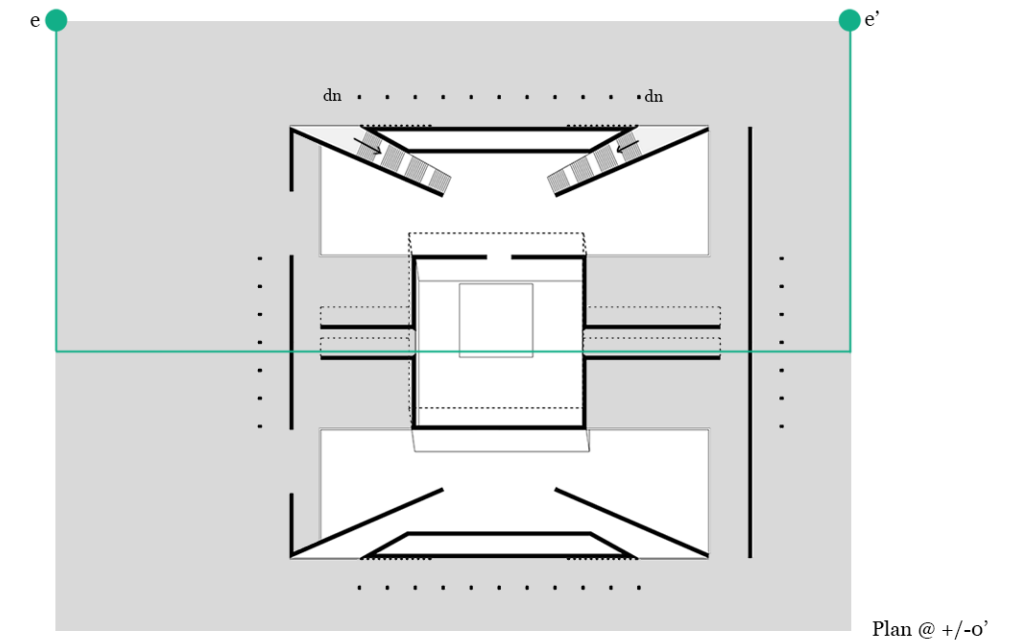


Noon at equinoxes

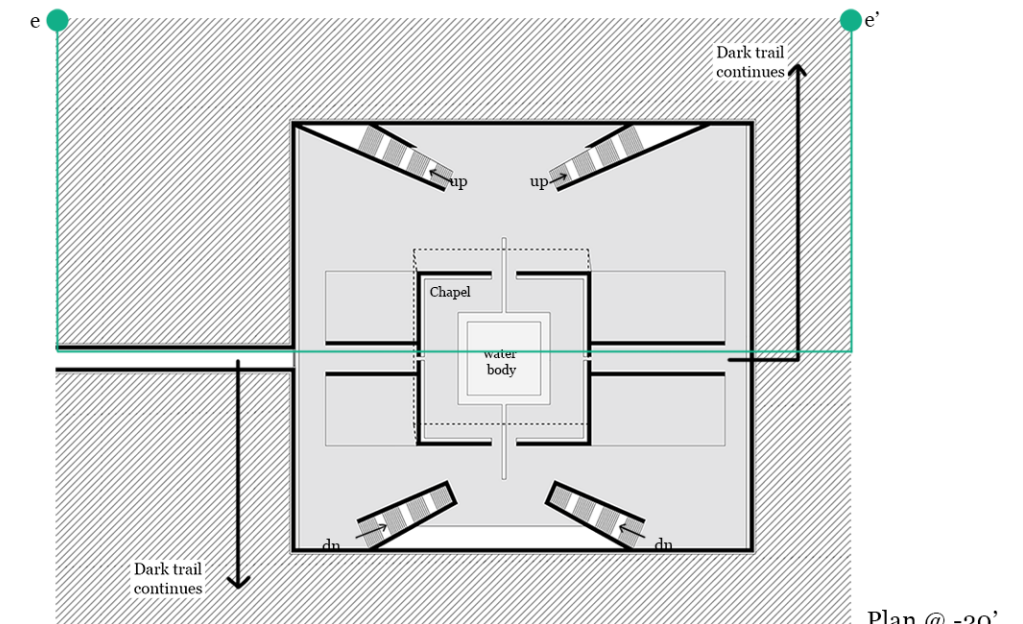


Sunset at equinoxes

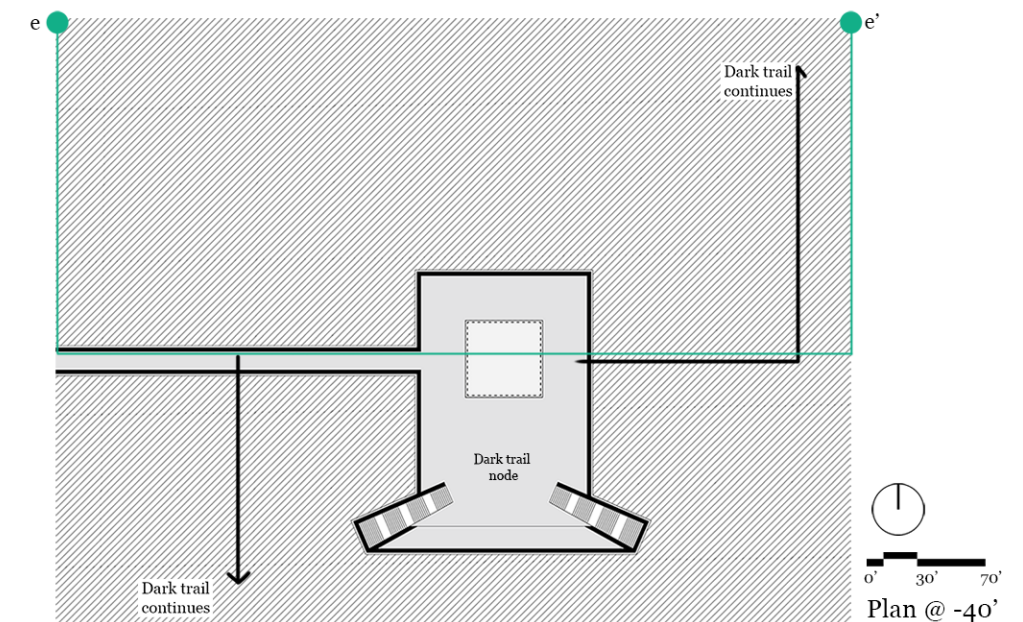
There are 3 key highlight times that make up the ritual – the sunrise, noon and sunset of the equinox. As the sun moves from east to west, its impression as spotlights on the ground move from west to east. This also generates a clockwise circumambulation movement pattern. The clockwise movement pattern is said to generate a vortex of energies. The transaction with this energy is considered as a close encounter with divinity as possible.



Plan @ +/-0'



Plan @ -20'



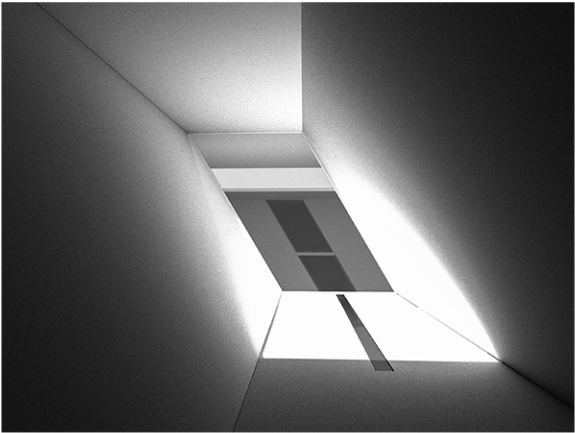
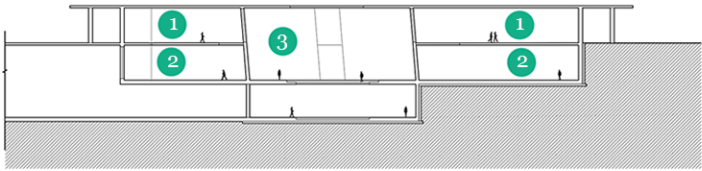
Plan @ -40'

The 'reaction' part of the chapel can be thought of 3 spaces :

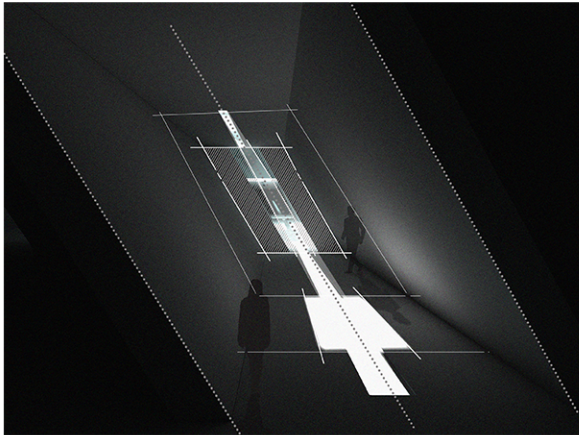
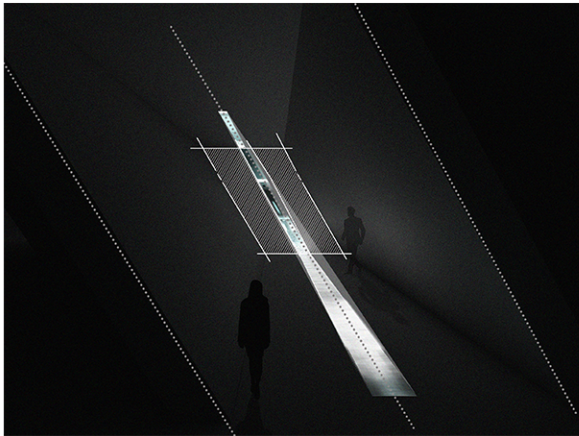
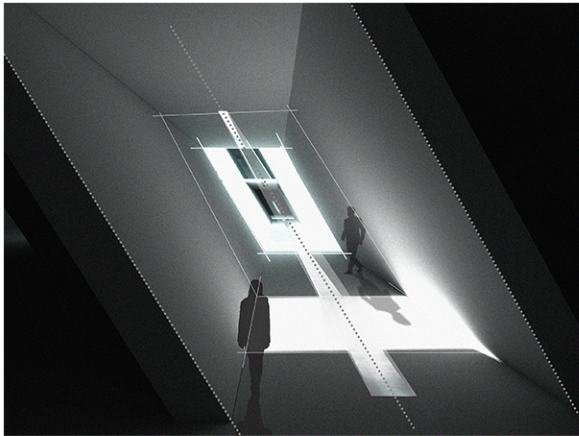
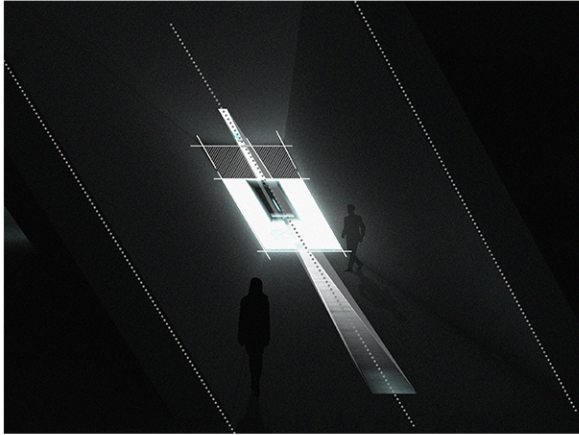
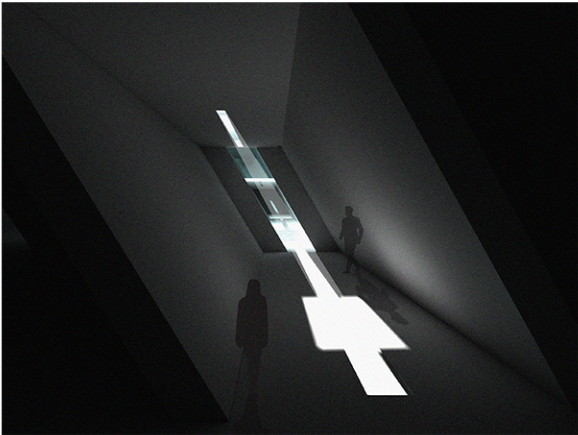
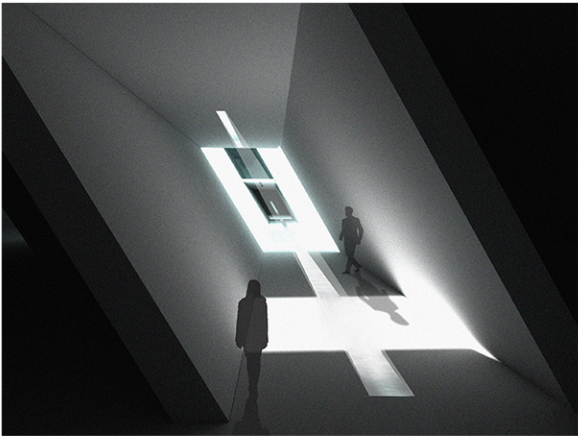
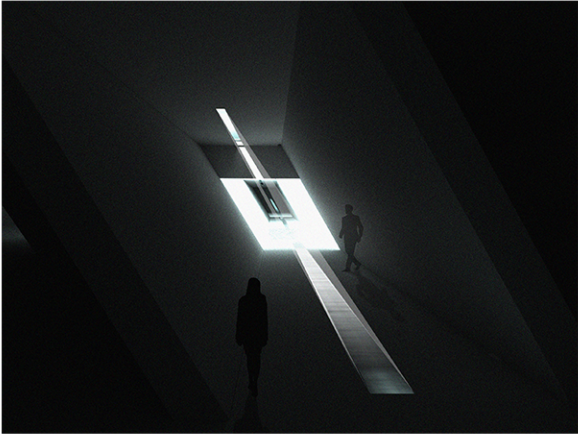
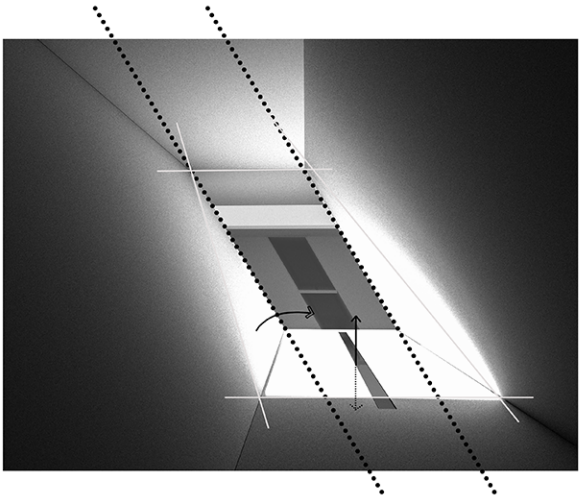
- 1. The observation
(only visual connection to the inside of the chapel)
- 2. The transition
(visual and physical connection to the inside of the chapel)
- 3. The inside of the chapel

The observation and the transition spaces also interact with each other. A considerable amount of light that enters the 'transition' is filtered through the 'observation' space. So even if this interaction is not directly perceived by the pilgrims, their experience of the space is determined by it.

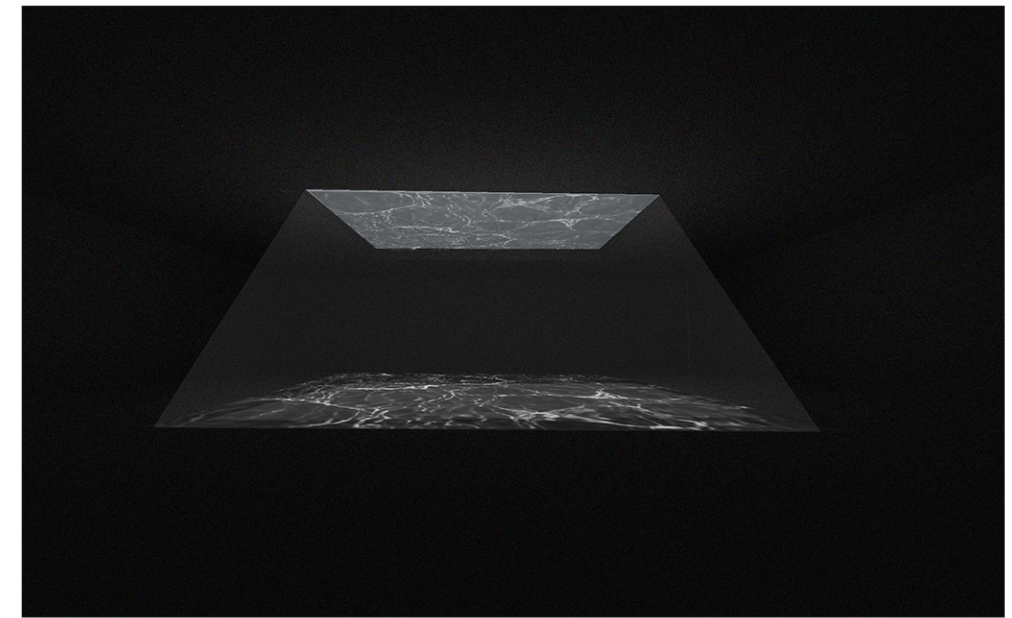
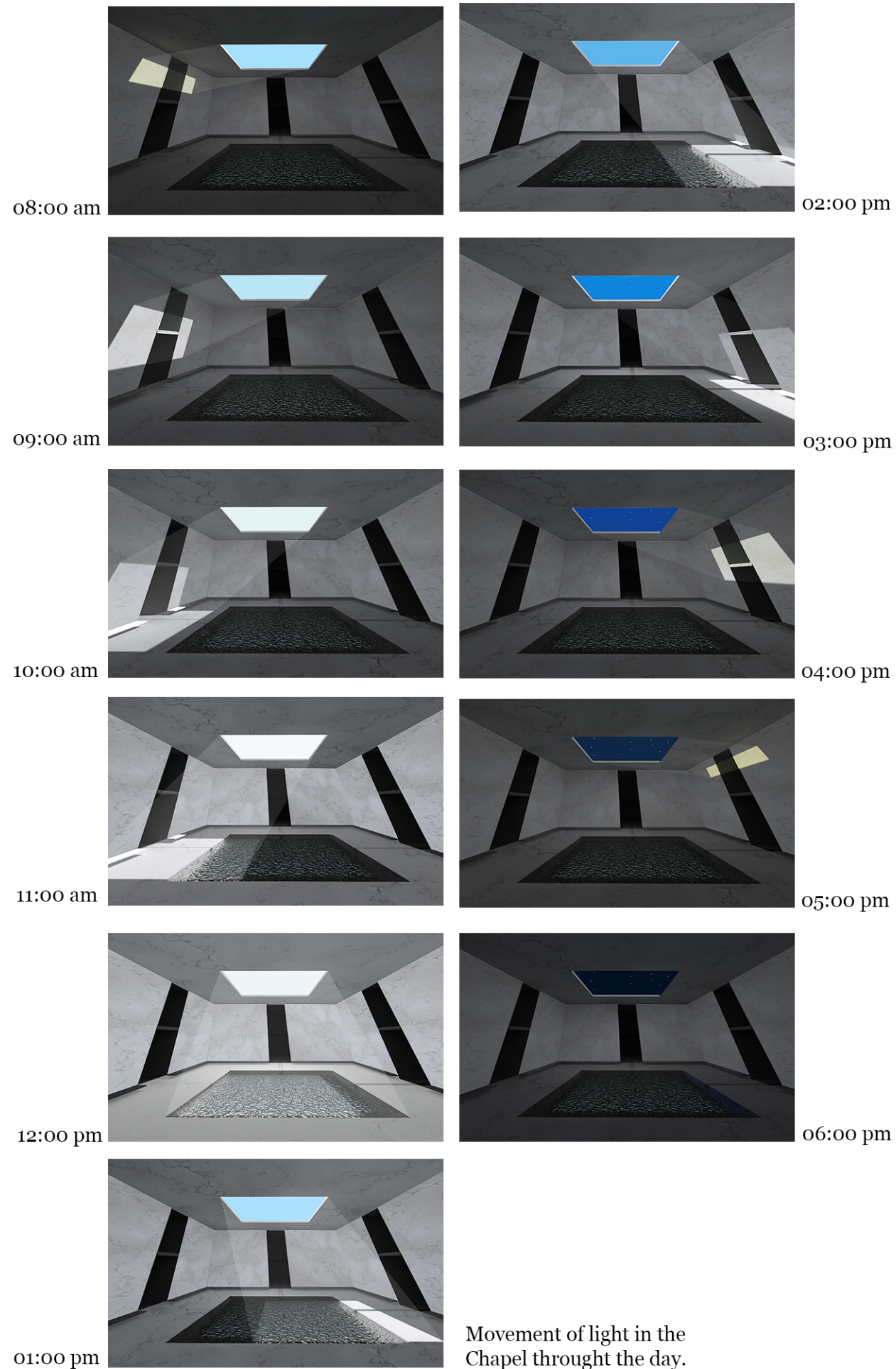
The transition space aligns with the dark trail. The linearity in the experience of the transition is just not important to highlight the dark trail but also intensify the experience of entering the larger and brighter volume of the chapel. The key factors that help amplify the linearity are not just the length and width of the space itself but also the way the light from the opening in the chapel ceiling create a bright (square shaped) spotlight imagery on the floor. Several possibilities of dimensions, volumes and openings were considered to explore this relationship of the humans with the light coming from a source that is not directly visible.



The observation



The transition - explorations



The dark trail node



Fig 18: Footsteps on glass (Benari and Mark)

The 'consequence' portion of the chapel is another node on the dark trail . The main chapel floor has a water body in the center with a glass floor. The night entering the node is thus filtered by water and glass to create dynamic and moving images of water reflection on the floors of the dark trail. The weightless movement of the light hence provides a starking contrast against the heavy darkness.

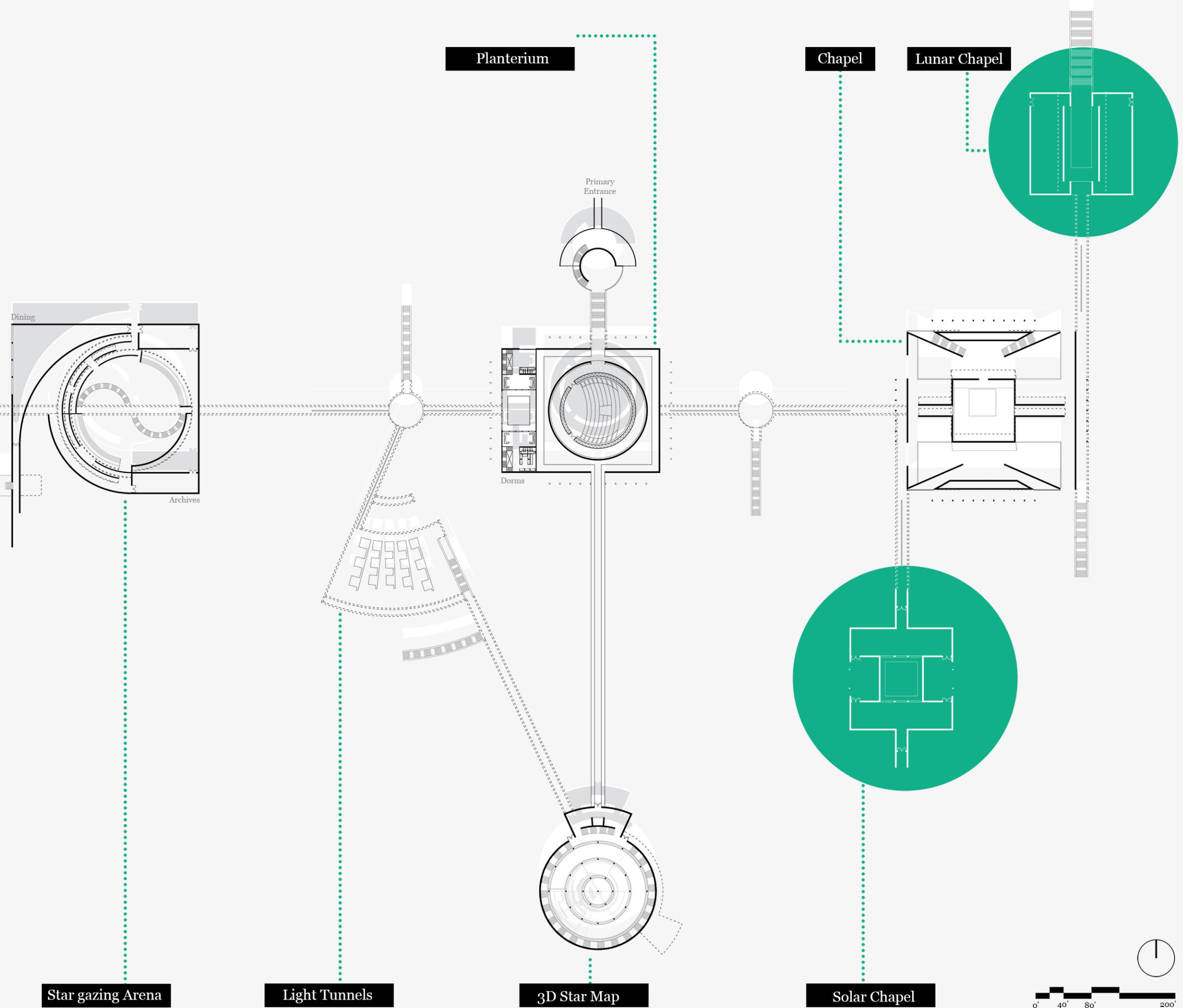
As people walk on the water surface above, it creates interesting ceiling patterns for the dark trail and adds ripples to the water that modify the reflections.

The violence introduced in the chapel ('reaction' space) through human movement thus has the power to manipulate experiences of the people in the dark trail ('consequence') underneath. Comparing it to the interactions in the light tunnels, the humans were just observers in the interaction between light and architecture. Here the humans are catalysts. They are a part of the reaction. They interact with the light to generate that 'consequence' – or in a more symbolic understanding – unite with the divine powers to make a difference.

The sub-chapels

While the main chapels celebrate the Sun in particular and its relative movement with respect to the earth over time, the sub-chapels celebrate specific orientations of the sun , earth and the moon (the eclipses). The solar eclipse pavilion engages the ritual where the the sun , moon and earth form a straight line with the moon in the between, while the lunar eclipse pavilion holds the ritual where the earth takes the middle spot in the linear formation.

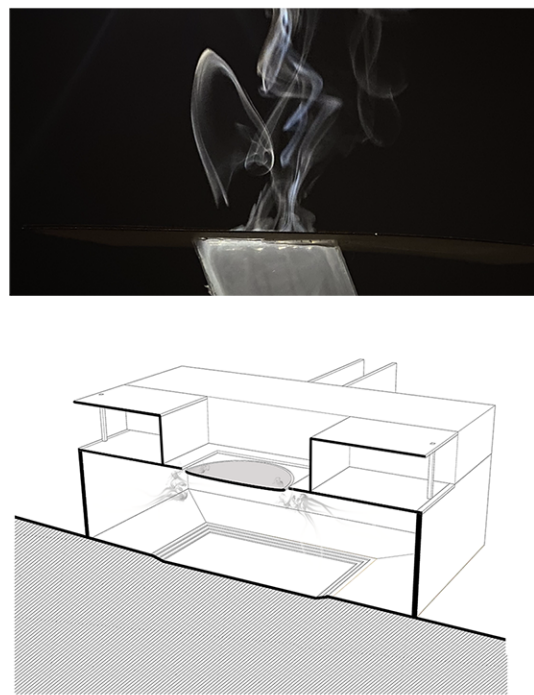
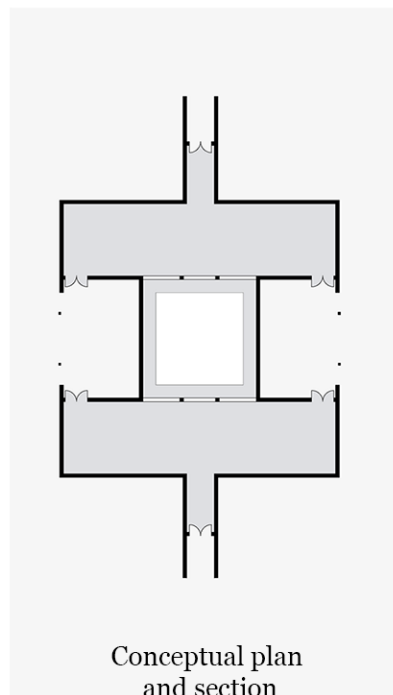
The impact of the ritual is the most effective in the dark trails in both cases. The ground level of each pavilion are simple exhibition spaces that tend to have mundane functioning on most days except on the day of the eclipses, at which time human intervention with the space transforms into a site of communal celebration. These are also the smallest of the designed pavilions in the complex.



The solar chapel

Beyond aesthetic appeal and artistic inspiration, the solar eclipses are crucial for scientific discoveries as well. Solar eclipses have helped scientists explain the Sun's structure and explosive events, uncover proof for the theory of general relativity, and identify a new element, among other things, for over a century. NASA scientists continue to investigate eclipses in order to learn more about the Sun, Earth, and our space environment. Total solar eclipses are especially significant because they allow scientists to glimpse a section of the Sun's atmosphere known as the corona, which is too faint to observe until the Sun's brilliant light is blocked.

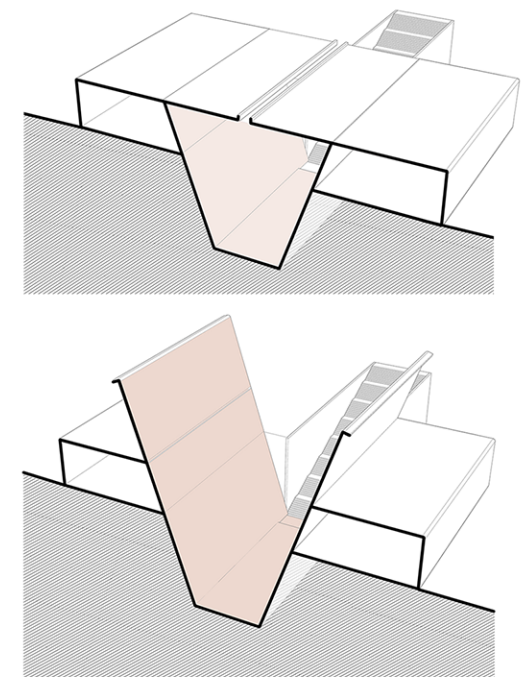
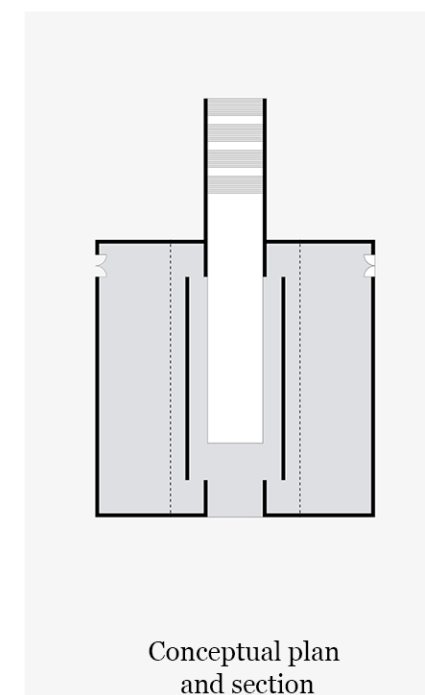
The primary purpose of this pavilion was to make the presence of atmosphere, or air, be felt. The central courtyard plate behaves like an incense holder which can be lit on the days of the solar eclipses. The smoke from the incense escapes through the gaps into the dark trail. These gaps are also the only source of light in the dark trail. In contrast to other dark trail nodes where light is perceived as spotlights, it is now seen as wisps for fragrant aura. In most world cultures, lighting incense is a ritualistic practice. It's a symbol of faithful rising to the heaven. In this case it is not over a medium that helps discover newer forms of light but also a act of gratitude for the scientists who make the discoveries happen.



The lunar chapel

During a complete lunar eclipse, the entire Moon is engulfed in the deepest region of Earth's shadow, known as the umbra. When the Moon is in the umbra, it turns a reddish color. Because of this, lunar eclipses are frequently referred to as "Blood Moons." The poetics in the visual scene that almost seems like the sunset is being reflected on the moon and being etched as a memory is beautiful. If one were on the Moon during a complete lunar eclipse, they would observe an orange or crimson ring around the Earth as the atmosphere reaches into space surrounding it. In essence, you would be witnessing all of Earth's sunrises and sunsets at the same time.

The design of the lunar eclipse was based on the colours of the sunset – the hues of oranges and reds. A portion of the insides of the dark trail are painted in these shades. This would not be of great consequence on any other regular days as the tunnel is intended to be dark and the color would not be perceived. But on the days of the lunar eclipse, the ceiling of the tunnel would be opened up to form a funnel shape. The light then bounces off the red surfaces multiple times to intensify the hue.



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Figure 1 – Glowing trail, Ambient glow technology
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Figure 2 – Dark constellations, Salkantay specialists
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Fig 3 : Site Location, El Tamba (Google Earth)

Fig 4 : Other sites to visit in close proximity (Google Earth)

Fig 5 : View from the site in the East - Sunrise viewing opportunity (Google Earth)

Fig 6 : View from the site in the West - Sunset viewing opportunity (Google Earth)

Fig 7: Night sky darkness map
Retrieved from – www.lightpollutionmap.info

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