2016

LIXIL INTERNATIONAL UNIVERSITY ARCHITECTURAL COMPETITION
"NEXT GENERATION SUSTAINABLE HOUSE IN TAIKI-CHO"
Comfort of Lightness

Chulalongkorn University • Thailand
AIR WEAVING HOUSE

Cornell University • United States of America
THICKET (原野の竹林)

HESAM University / École Nationale Supérieure d'Architecture de Paris-La Villette • France
LEVITATING ATMOSPHERES

Kyoto Institute of Technology • Japan
鉄の方丈庵 (STEEL HOJO-AN)

Parsons School of Design • United States of America
SIX HOUSE

Politecnico di Milano • Italy
NO|Body HOUSE

The Royal Danish Academy of Fine Arts, Schools of Architecture, Design and Conservation • Denmark
INFINITE FIELD

Swiss Federal Institute of Technology (ETH) Zurich • Switzerland
Floating Veil

Universidad Nacional Autónoma de México • Mexico
EVANESCENT ENVELOPES

University of Cape Town • South Africa
A WOVEN HUT

The University of Melbourne • Australia
ON THE VERANDA

Yokohama National University • Japan
Light Skin House

課題

ライトウェイトな快適さ

現代の快適さは，環境を遮断し，バリアをつくることによりもたらされてきました．しかし，現代に必要なものは，自然に近い暮らしなのかもしれません．そこで快適な生活を楽しむことのできる，組み立て，移動できる軽い住居を考えてください．移動できるということは，周囲の状況を読み取り，配慮し，関係を持つということです．また簡易な組み立て住居であることは，自然の環境や地面に近づき，その場所の豊かさをもたらすでしょう．組み立て，移動でき，大樹町の夏や冬など，環境を楽しめる住居を考えてください．ここで考える自然や周囲との関係は，都市に移動しても可能な周囲の読み取り方をもたらすかもしれません．

最優秀案は実施を前提とします．また，複数の棟をつくる場合や既存施設との関係も想定し，配置も考慮してください．大樹町でどのような作業をするのか，また組み立て方を含めたつくり方も提案してください．ただし，必要な設備は既存の施設を利用します．

設計対象

- 原始的な暮らしを楽しむ，自然に近い生活をもたらす．大樹町の夏，冬を楽しめること．
- 5 人くらいが泊まれるもの．1 棟の建設費は 600 万円．
- 5 人以内で解体，移動（基礎を必要とする場合、基礎も含む），組み立てが 1 日以内でできること．
- 最大 2 棟くらいつくる可能性も検討．その関係性も含めて提案してください．
- ただし最優秀案を 2 棟つくるとは限らず，2 棟の設計者を分けてつくる可能性もあります．
- つくり方も提案．現地作業も重要ですので，考慮にいれてください．
- 設備は不要です．必要であれば既存の棟のものを使います．
- 設計・作図・監理補助は学生主体で行い，教授や講師など，先生はアドバイザーとして関わることができます．

AIR WEAVING HOUSE

6th LIXIL INTERNATIONAL UNIVERSITY ARCHITECTURAL COMPETITION
NEXT GENERATION SUSTAINABLE HOUSE IN TAIKI-CHO
COMFORT AND LIGHTNESS

Lightness in architecture always draws a discussion, since architecture aims for firmness, as Vitruvius suggests . The alluring aspect of lightness is that it allows mobility, reduces environmental load, and gives an impression of freedom.

To achieve the ultimate lightness in our project, air - weightless, is obtained as the main structure that raises up the shelter, creating a sanctuary space inside. Such pneumatic structures answers the condition of fast assembly and dismantling precisely, as they are entirely transformable by simply inflating or deflating.

A small fabric tube which is easy to handle than a big sheet is our starting point. But a simple stand-alone air tube would be unstable, therefore, weaving is applied to strengthen up the whole plane consisted of light-weighted small linear members. The trihexagonal pattern of the weaving creates a strong-but-flexible bond. The light carbon fibre sticks work as a form giver to the whippy weaving plane.

These air structures are inflatable polyamide film tubes ending with aluminium caps. The caps are attachable to specific positions on the base elements with ball-socket joints - allowing them to adopt any happen angle. With the strength of weaving, the ends of some tubes are able to overhang independently and sealed by airtight clamps.

A challenging point of architecture's mobility is that it contradicts the core idea of architecture, the stability of foundation. Generally, a building would need a certain kind of structure that holds it onto the ground to attain stability, both in the literal and psychological sense. In our project, with a little help from nature, water is thought to become the shelter's portable foundation by easily filling it in when assembling and pouring it out when dismantling. The idea therefore leads to the base design, composing a series of hexagonal-tank units that perceive the shelter's load. The negative trigonal spacings formed between are where the structure above meets the base and is that what holds the tanks together. The base's organization likewise complements the weaving pattern of the pneumatic structure.

Usage of nature elements, in this case, does not only complete the architecture in the structural aspects, but also promotes comfort and allow the residents to enjoy a primitive upon different seasons. Apart from being used as the main structure, air is also filled into the weaving inflatable skin to act as heat insulation for the shelter during the harsh winter of Taiki-cho. The flexibility of the base structure allows planting possible during warmer seasons, creating greenery and lively atmospheres. Water-filled tanks can also be opened for foot bathing with the temperature responding to different seasons - cool water for summer then warm water for winter. In the center of the base, a large tank unit is placed to host a fireplace to be the central heat generator in winter - defining a cosy area where everyone gathers around altogether.

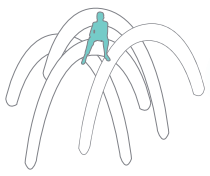
With our proposal, architecture and a given surrounding nature shall complement one another to best draw out the richness of the place.

IDEA & CONCEPT

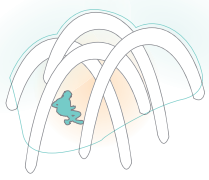
Air is weightless, immaterial and intangible. By inflating air into a plastic tube forms it a physical identity. A tube alone has no structural property but when setting it into an arch greatly improves stability. Thus, the method of weaving is used to increase the structure's strength. The series of arches creates a livable space below; yet to make it comfort, air is used again as a inflatable skin to act as a heat insulation.

Pneumatic tube with non structural property

Arch forms stability

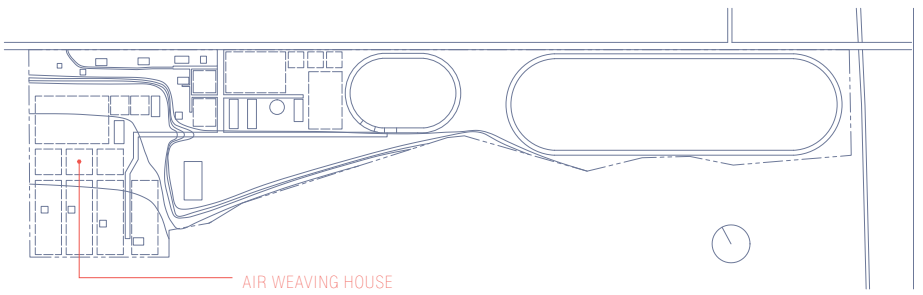


Weaving strengthens the structure



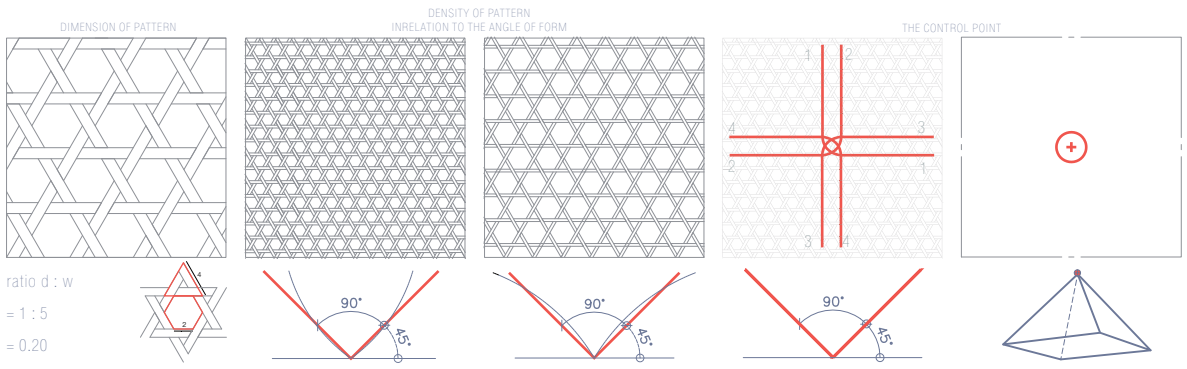
Pneumatic skin as heat insulation

SITE

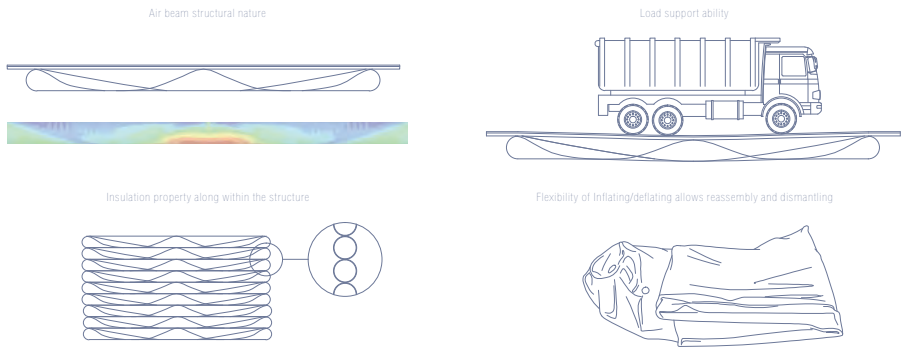


RESEARCH & EXPERIMENT

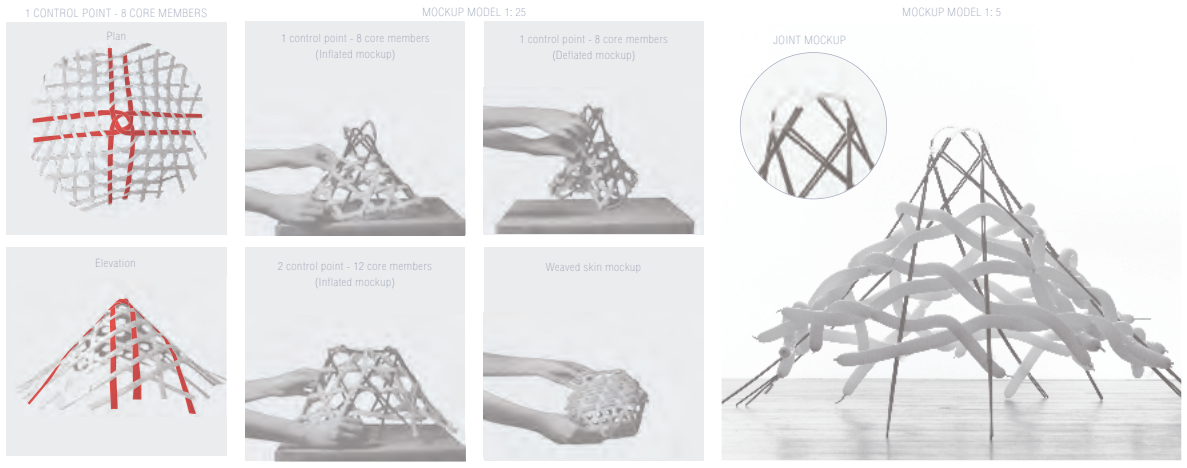
WEAVING PATTERN



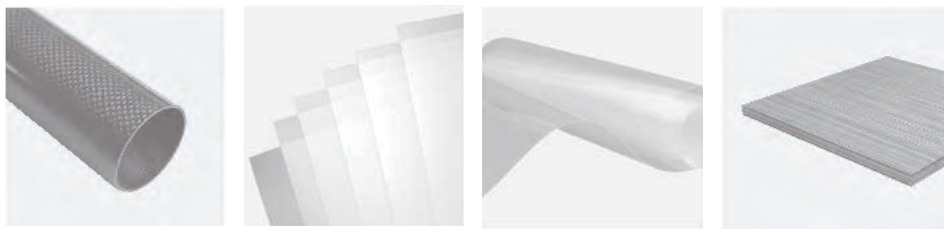
PNEUMATIC STRUCTURE RESEARCH



STUDY MODEL



MATERIAL



CARBON FIBER

A lightweight structure providing well flexibility and durability

POLYPROPYLENE

High thermal resistance with low glass transition temperature so it can be suite with both high and low temperature.

LAMINATED PNEUMATIC TUBE

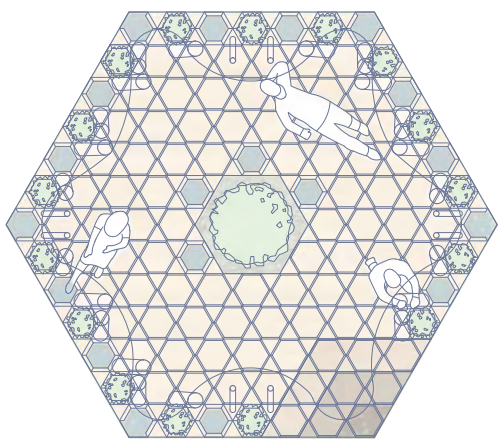
The composite mambrane of Polyamine (Nylon) and Fluorocarbon film (coating) in order to enhance the weather resistance ability of the membrane , morevoer , this Fluorocarbon coating film can be resist both low and high temperature from -200 to 260 °C.

PLYWOOD

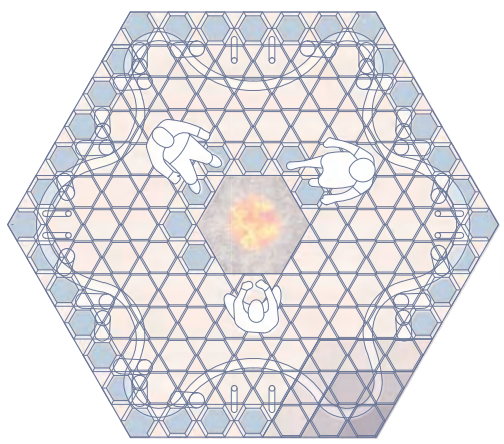
Plywood's strength is relatively high compared to its thin section and light-weightiness. Therefore, the material can be easily manufactured and allows convenient transportation.

FACULTY OF ARCHITECTURE
CHULALONGKORN UNIVERSITY, THAILAND

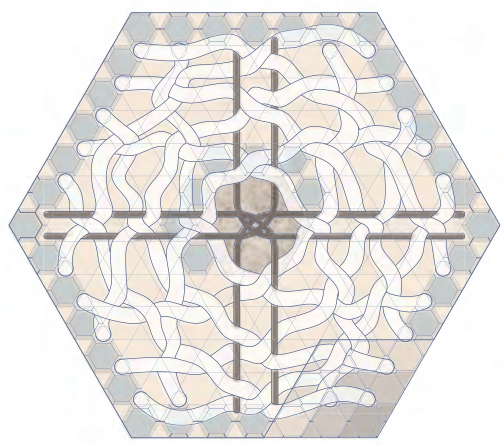
PLAN



SUMMER PLAN
DEFLATED SKIN



WINTER PLAN
INFLATED SKIN



ROOF PLAN

0 0.5 1.5 3.5

ELEVATION

SUMMER ELEVATION
DEFLATED SKIN

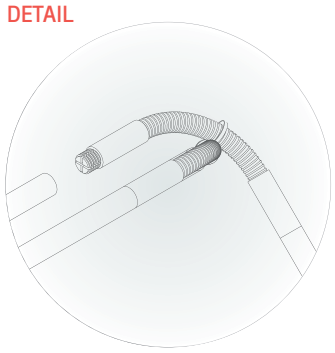
WINTER SECTION
INFLATED SKIN

SECTION

SUMMER SECTION
DEFLATED SKIN

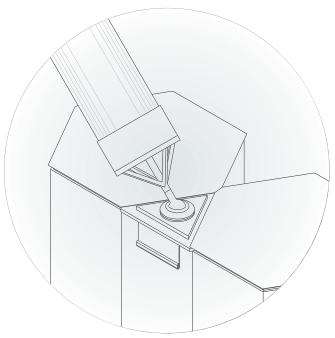
WINTER SECTION
INFLATED SKIN

DETAIL



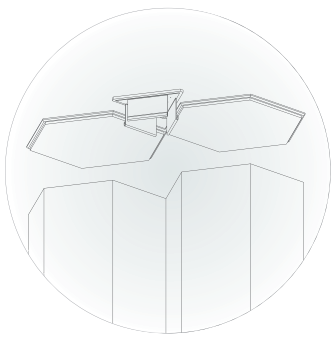
CONTROL POINT

7.5 cm Carbon fiber tube
Carbon Fiber Connector
Epoxy
Flexible joint
Hook and loop fastener



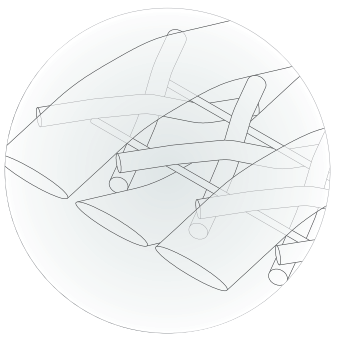
PNEUMATIC TUBE CONNECTION

Pneumatic tube (Polyamide film coated with Fluorocarbon)
Air-tight aluminium cap
Ball-socket joint
Plywood floor panel
3 mm. Steel plate



AIR STRUCTURE - BASE

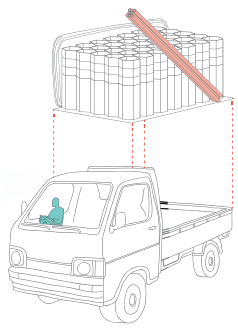
Plywood floor panel
Screw
3 mm. Steel plate
Hexagonal PP portable foundation



WEAVING PNEUMATIC TUBE

7.5 cm Carbon fiber tube
Pneumatic tube (Polyamide film coated with Fluorocarbon film)
Magnetic Button Snap
Inflatable skin

ASSEMBLY DIAGRAM



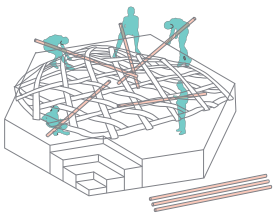
1
ALL IS READY!

Hexagonal PP portable Foundation x 121
Carbon Fiber poles x 8

Kei truck bed
3.7*2.4*2.5 m.

2
LAY OUT THE BASE

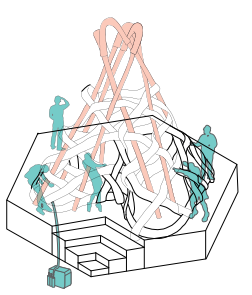
Place 121 Hexagonal Foundation on Ground.
Lock the tanks with trigonal floor units.
Place the floor panels.



Carbon Fiber poles x 8
4 m. long - Weigh 2 Kg. each

3
INSERT PLOES IN WEAVED PNEUMATIC TUBES

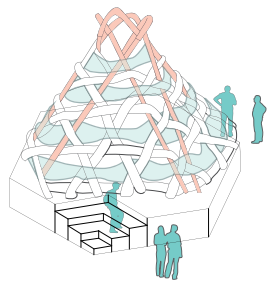
Insert the carbon fiber poles through the pneumatic tubes.



Air Blower
392*367*342 mm

4
SET UP CARBON FIBER POLES

Lock the poles at the control point joint.
Hold up the double poles of each corner.



5
INFLATE PNEUMATIC STRUCTURE

Connect the Aluminium cap of the structure with the base.
Inflate the pneumatic structures.
Weave the inflatable skin horizontally.

6
INFLATE THE SKIN

Inflate the inflatable skin in winter.

FACULTY OF ARCHITECTURE
CHULALONGKORN UNIVERSITY, THAILAND

THICKET 原野の竹林

A SENSE OF LIGHTNESS AND COMFORT

A Contextual Project
Instead of creating a singular work of architecture, THICKET proposes a strategy for construction, occupation and transformation. Mindful of the forests where the indigenous Ainu hunted, THICKET offers an alternative to 'house as object' and instead proposes domesticity as an open system that provides for evolving physical, spatial and performative scenarios. Not unlike the fishing structures and trellises that dot the adjacent coastal and agricultural regions, or the clusters of trees that crown the gently sloping landscape, THICKET is not a building per se but a field of bamboo poles that serves to structure a series of performative fabrics that provide energy, comfort, warmth, coolness and enclosure. Familiar references of Japanese domestic space, as structured layers of increasingly private spaces, are reimagined as layers of intelligent fabrics that create soft and flexible enclosures.

An Ecological Project
This project expands traditional construction materials and practices to include innovative design and fabric technologies. Specifically, the innovative fabrics introduced here are the result of collaborative workshops between the Cornell architecture students and renowned Professor Juan Hinestroza of Cornell's Department of Fabric Science and his Textiles Nanotechnology Laboratory. Here the interface between the established field of textile science and the emerging and revolutionary field of nanoscale science creates nanomaterials that modify the properties of existing textile products. The resulting nanofiber-based materials are capable of extreme, efficient and sustainable performances that replace traditional construction assemblies and energy sources. Through weaving intelligence into traditional fabrics and materials, THICKET proposes revolutionary fabric technologies that can:
— collect the sun's energy through a soft technology of embedded solar cells
— transform kinetic energy into electricity
— introduce stiffness to otherwise malleable textiles
— create thermal comfort through innovative fiber construction
— repel and collect water and melting snow through ecological applications

An Experiential Project
This project achieves a sense of comfort and lightness not only through a lightweight bamboo and fabric structure, but also through a physical experience of weightlessness. The bamboo structure lifts occupants into a constructed canopy overlooking the Taiki-cho landscape, protecting its timeless beauty while nourishing a lush and productive garden below, and from which flowering vines and fruit trees work their way up into the elevated structure. From afar, THICKET promises the comfort and warmth of shelter as the fabrics glow in the frozen landscape. From within, it provides a flowing space of shadows and silhouettes.

Mobility
THICKET is initially sited in the fields across from the Experimental House. Bamboo poles with pre-attached brackets are driven into the earth and a series of unfolding operations bring stability to the primary skeletal structure. A secondary framework is unfolded onto which fabrics and hammocks are stretched and hung. As a spring shower falls in the morning dew, a layer of water repellant fabric channels water to the garden below. As the warm sun rises on a summer afternoon, a light fabric screen is rotated into position offering cool shade. A thin skin of dense fabric is unrolled to deflect the cool autumn breezes. As the crisp winter night descends, a soft thermal layer warmed by the winter light is expanded into a cocoon. Thus, physical comfort begins as a layer of warmth close to the body expanding outward creating occupiable spaces.

THICKET transforms the spectacle of seasonal change into an evolving spatial landscape as its occupants finely tune its fabric enclosure. This 'Cycle of Life and Rebirth' is, according to the Jomon people, fundamental to a resilient seasonal lifestyle that is practiced generation to generation. Referencing the primordial forests that cover almost 70 percent of Hokkaido, THICKET might expand or fragment into five clusters—as seeds dispersed throughout the local and distant landscapes, both urban and rural. As in a forest of trees competing for sunlight, water and nutrients, THICKET is a constantly evolving field. As in the game of Go, with its simple rules and subtle relationships and strategies, each iteration is a careful response to the context that has been placed before it.

Concept


Light Touch


Irrigation


Water


Forest

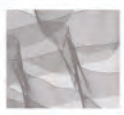

Ground Cover

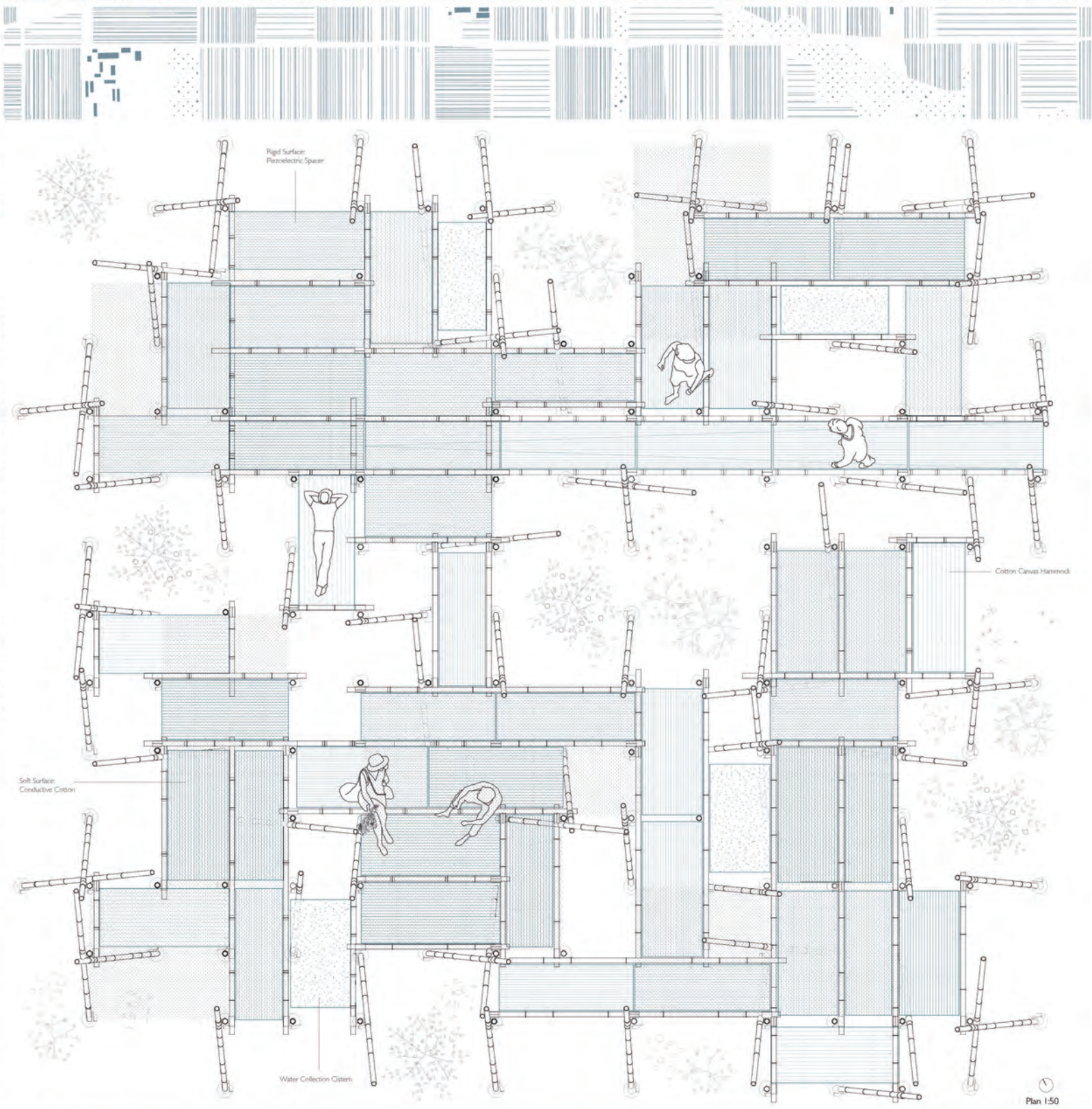

3D Spacer Fabric


Light

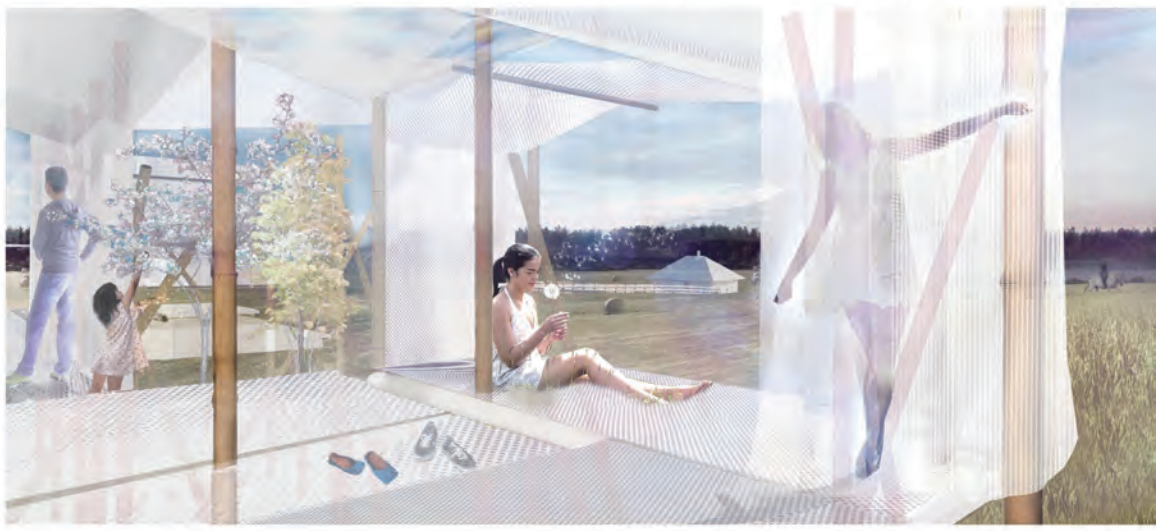

Agriculture Trellis

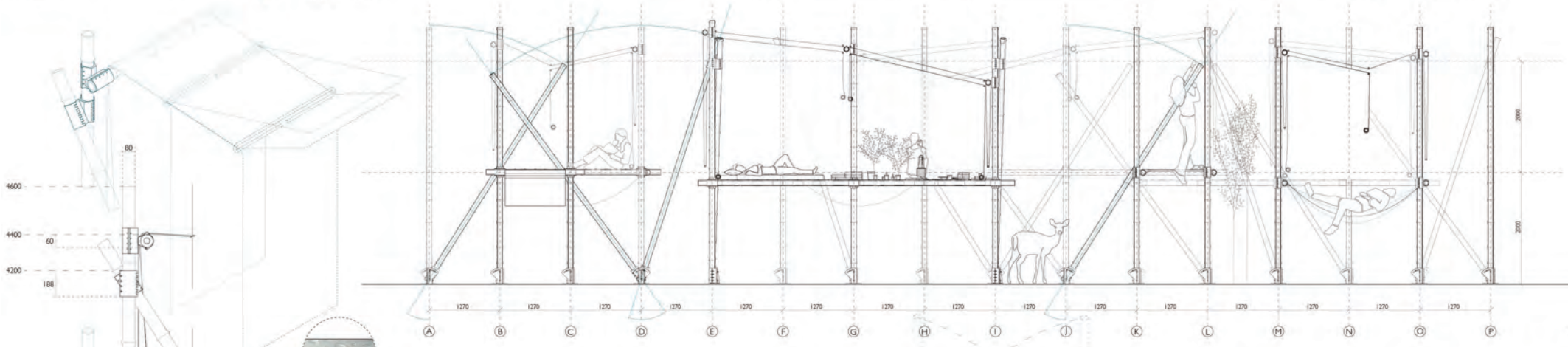

Shading + Shadows


Insulative Mesh

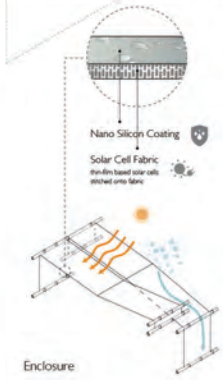


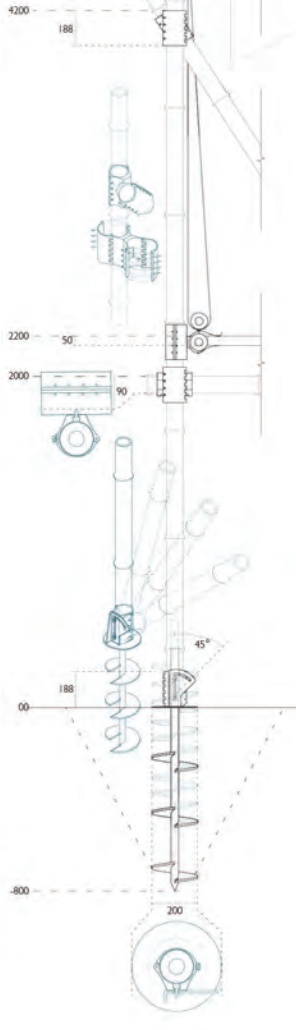
Plan 1:50





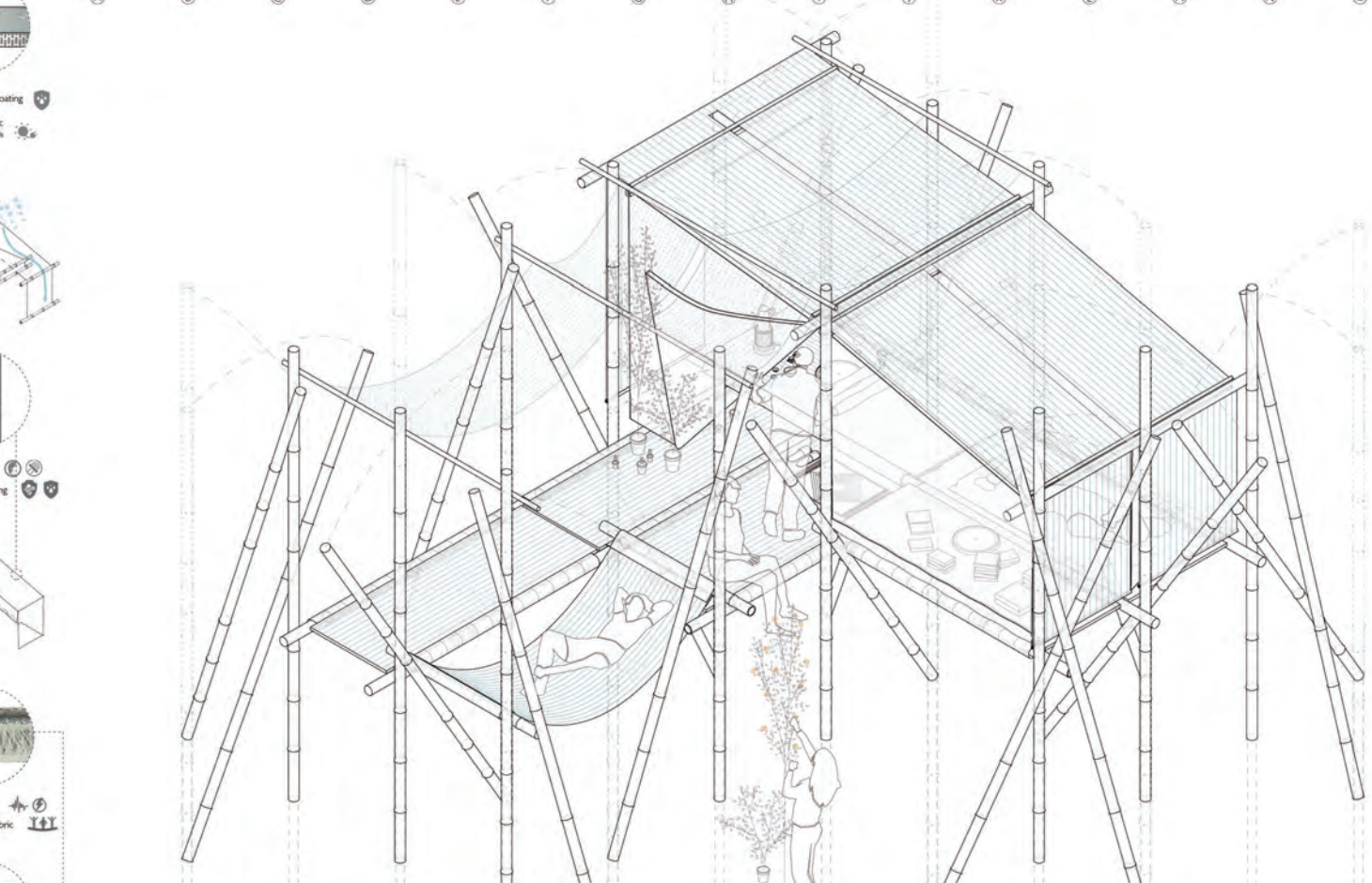
Section 1:50



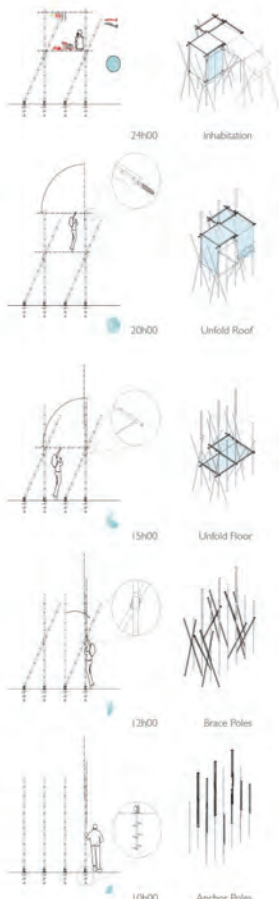


Technical Section 1:25

Fabric Inventory



Module Isometric 1:30



Construction Sequence

Summer Winter Elevation 1:50

LEVITATING ATMOSPHERES

COMFORT AND LIGHTNESS
Next Generation Sustainable House in Taiki-Cho - Lixil International University Architectural Competition

LEVITATING ATMOSPHERES is a light and versatile space system, a reflection of our fragile era. It offers a sensitive experience, a simple way to listen to the rustling of the earth and to feel the breath of a soft wind. Just like a musical instrument, our shelter catches infinitesimal vibrations and every detail of the surrounding landscapes. It links different types of comfort into an ambiguously balanced architecture.

Our project is based on a structural system stabilised by tension and compression forces: tensegrity. Lines allow poles to hang without touching above our heads, thus creating a sense of lightness. LEVITATING ATMOSPHERES transforms these structural elements into architectural ones: floating clouds, platforms made of fabric and a path. During tuning, lines compress the poles made of slats of bamboo fiber, and as some of them open up, cloud-like shapes slowly spring open inside a linen envelope.

By moving our light structure in order to select a place to grasp the landscape, our architecture revisits the concept of *shakkei*. Depending on the specificities of the site and the season, we can choose the opening size of the floating clouds and the position of the fabrics. The shelter will stand in harmony with the environment.

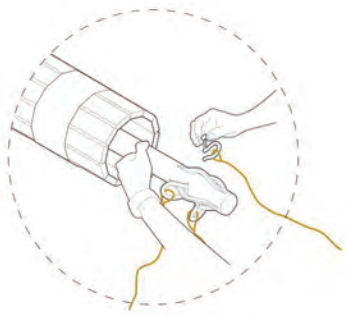
This shelter offers an experience of habitat facing changes in climate, between spatial and thermal layers connecting the near and the distant. Getting off the ground, the feeling of levitation makes us feel a part of the structure's equilibrium. We can use the meshed path to ascend or to rest in front of the view, as it participates to the creation of both individual and collective experiences. Inside a floating cloud, we cannot see the surroundings anymore, only light penetrates the translucent membrane. A feeling of calmness radiates as we open all our senses.

We perceive every sound even better, every gust of wind kindly shakes the cloud and is reverberated into our bones. We can enjoy the sound of the rain or the snow while keeping ourselves warm. In sunny days we stay cool between airstreams and shade. Reaching the upper platform, we can feel even better the fragility of this complex structure. We pay attention to our balance, as the clouds, the fabric and the lines gently adapt to our movements. We stay between the steadiness of the earth and the constant movement of the sky and the wind, enjoying the timeless atmosphere created in-between.

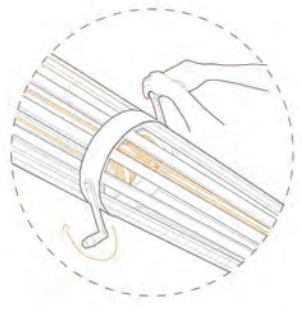
SITUATION PLAN
Installation into area 2

Choosing a location

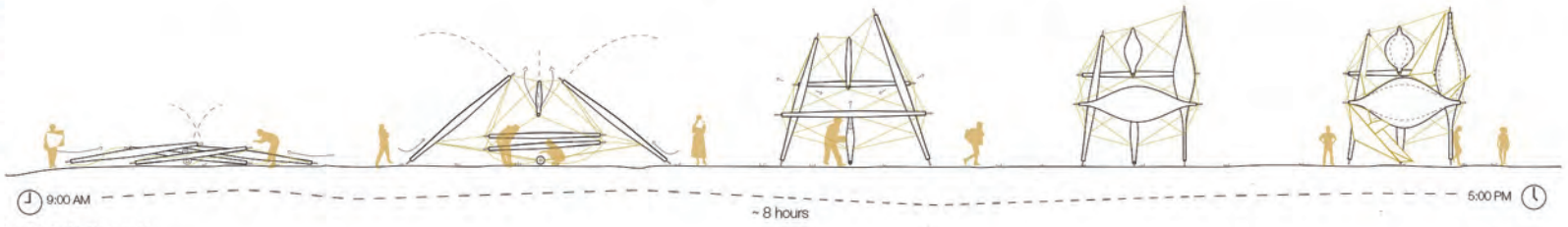
Following the plans to assemble the poles



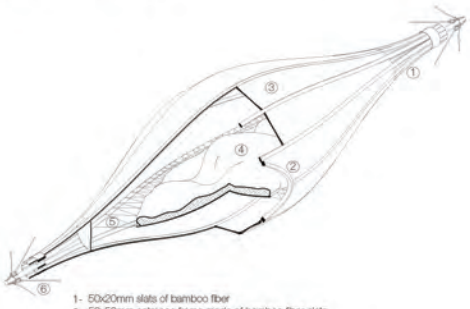
Hooking the lines



Tuning the lines with the winch to spring open the structure

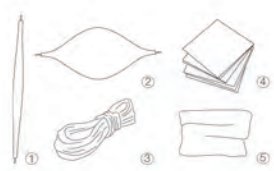


ASSEMBLY DIAGRAM



1- 50x20mm slats of bamboo fiber
2- 50x50mm entrance frame made of bamboo fiber slats
3- insulated tensioned membrane (PTFE fiberglass and aerogel)
4- linen *futon* with cotton fiber inside
5- soft fabric mesh
6- see pole / lines hooking detail

FLOATING CLOUD AXONOMETRY



MATERIALS LIST

1- 3 poles made of 50x20mm slats of bamboo fiber, with 100mm-wide stainless steel strapings

- 6m long
- 7,7m long
- 7,4m long, including a four-drums winch to build the tensegrity

2- 3 floating clouds made of 50x20mm slats of bamboo fiber, circled with insulated tensioned membrane (PTFE fiberglass and aerogel), with a soft fabric mesh included inside

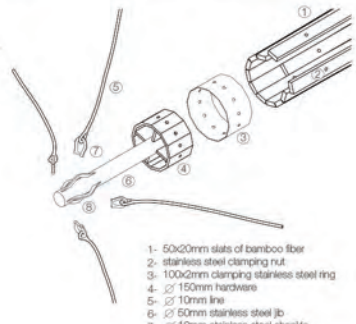
- 6,6m long / 6,1m compressed
- 7,6m long / 6,6m compressed
- 6,6m long / 6,1m compressed

3- 100 meters of 10mm-line, divided in six diamond-shaped parts, ending with shackles

4- 40m² of meshed path (including railings), forming the platforms

5- 3 linen *futon* to install inside the floating clouds after the mounting of the shelter

TOTAL WEIGHT OF THE STRUCTURE : 260 KG



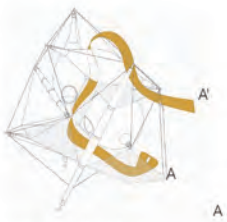
1- 50x20mm slats of bamboo fiber
2- stainless steel clamping nut
3- 100x2mm clamping stainless steel ring
4- ∅ 150mm hardware
5- ∅ 10mm line
6- ∅ 50mm stainless steel jib
7- ∅ 10mm stainless steel shackle
8- stainless steel loop

POLE / LINES HOOKING DETAIL

ENJOYING THE AUTUMN IN TAIKI-CHO

Sitting on the platform, the wind carries the smell of the soil and the flowers.

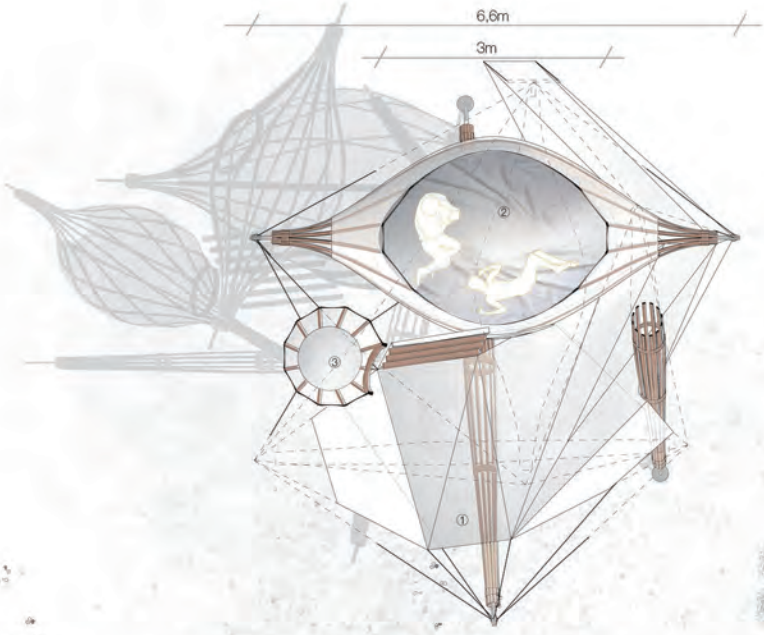
Hearing the sound of the heavy rain hitting the membrane enhances the feeling of comfort and protection inside the floating clouds.



Path of the section

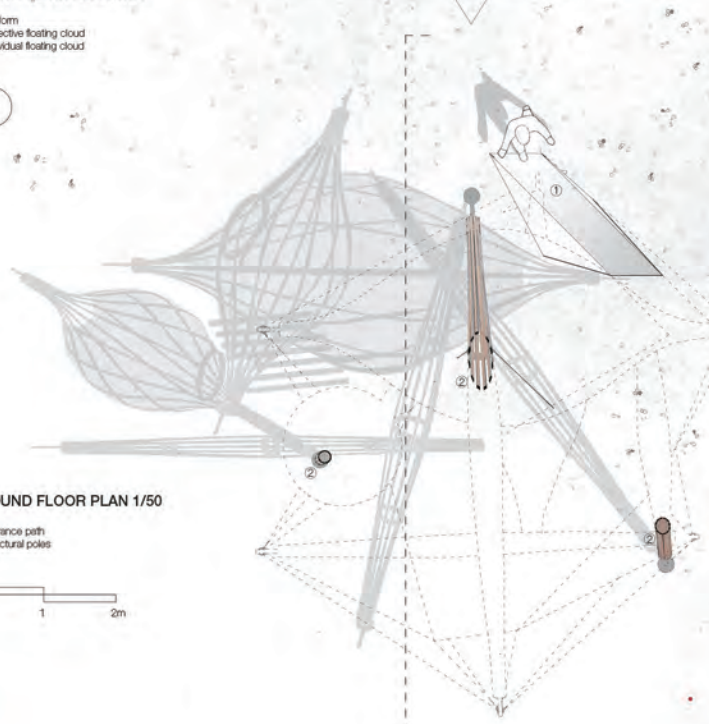
A

UNFOLDED ATMOSPHERES SECTION 1/50



LIVING FLOOR PLAN 1/50

1- platform
2- collective floating cloud
3- individual floating cloud

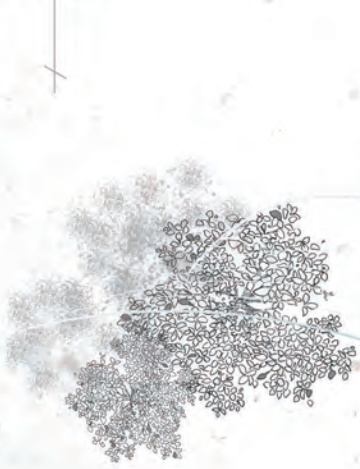


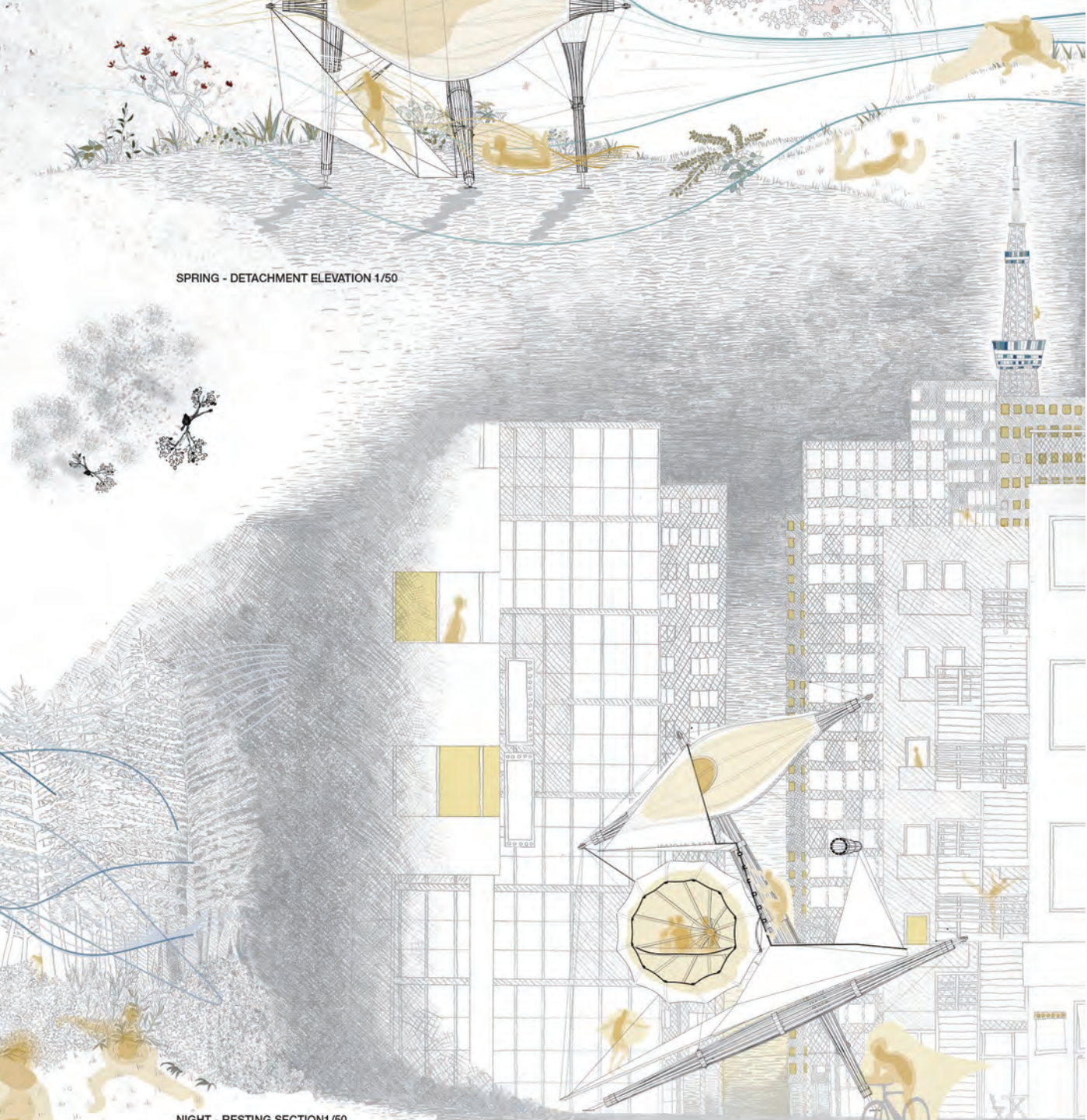
GROUND FLOOR PLAN 1/50

1- entrance path
2- structural poles

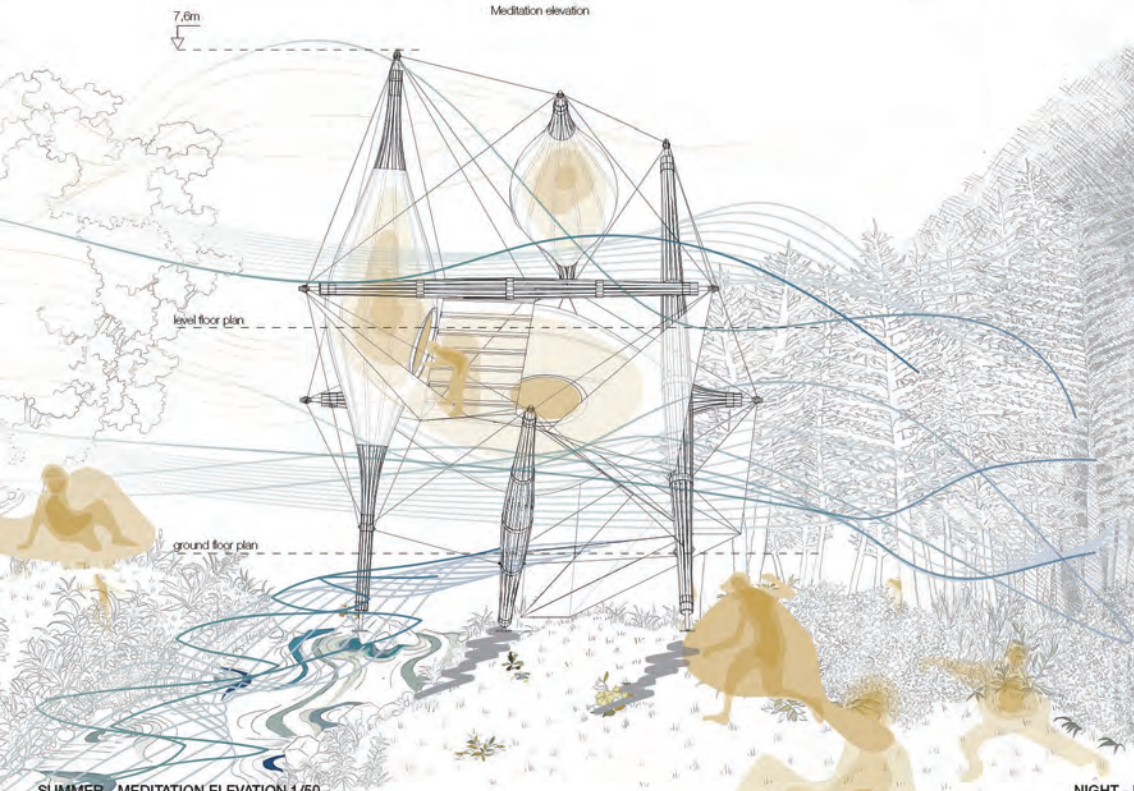
0 1 2m

Meditation elevation





SPRING - DETACHMENT ELEVATION 1/50

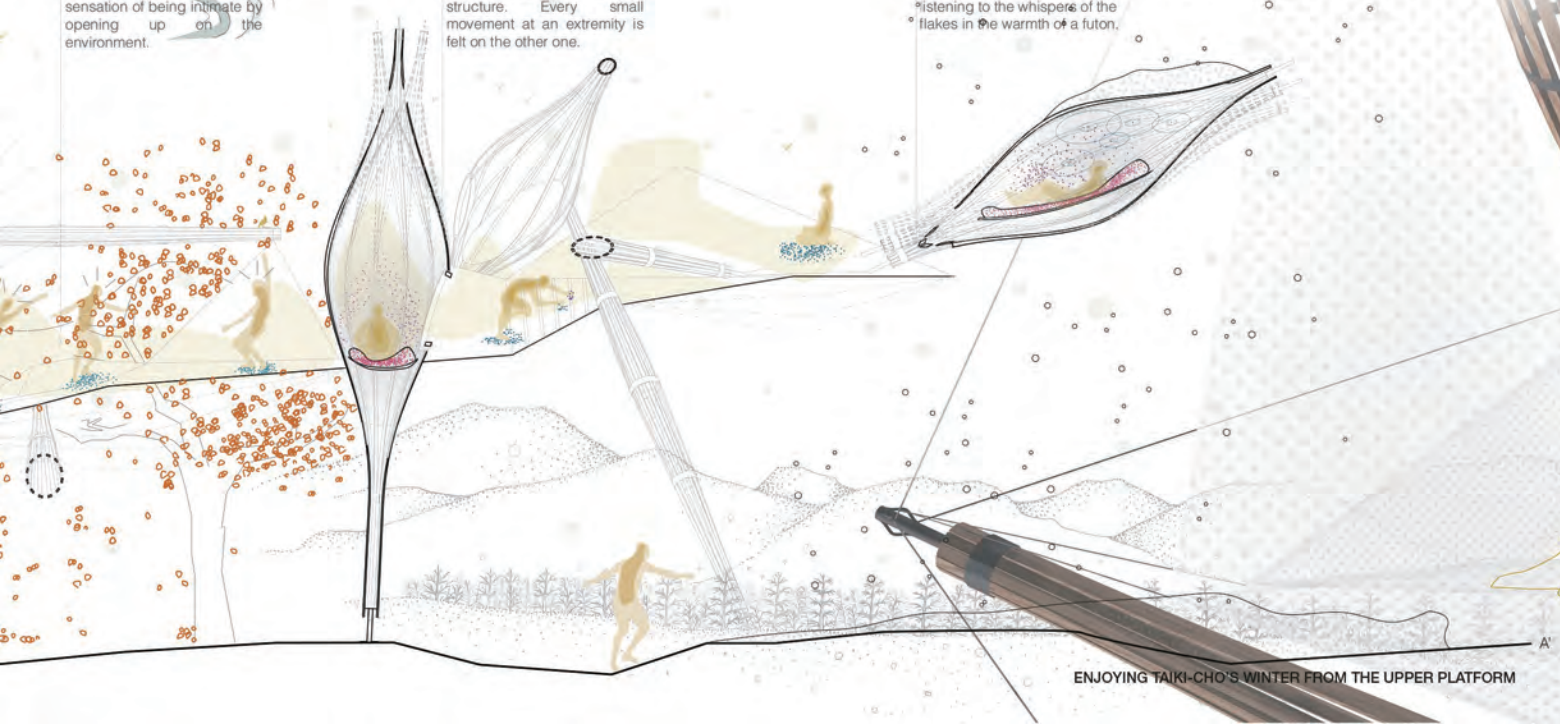


SUMMER - MEDITATION ELEVATION 1/50

The porosity of the structure creates an ambiguous sensation of being intimate by opening up on the environment.

Every person is participating in the equilibrium of the structure. Every small movement at an extremity is felt on the other one.

During the winter, the feeling of comfort comes down to listening to the whispers of the flakes in the warmth of a futon.



NIGHT - RESTING SECTION1/50

ENJOYING TAIKI-CHO'S WINTER FROM THE UPPER PLATFORM

STEEL HOJO-AN:
鉄　の　方　丈　庵
WANDERING HUT

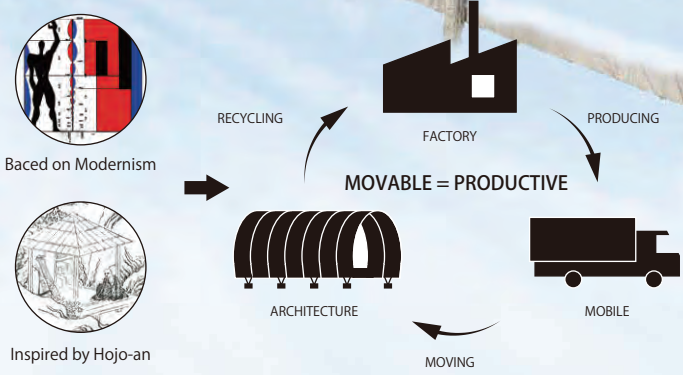
Sustainability in the movable architecture could be said “liberation from restriction of the ground” . In this case the architecture mainly focus on mobility and universal habitability so it is important that functionality of architecture as a independent units.

From modernism period, many of architects believed thinking simple idea from universal architecture system can make absolute confort to live and adaptation to world-wide environments.
But truethly we, human beings, are always moving to adapt environment from ancient time to nowadays and architecture which can not be moved sometime work as restriction for living. so we think that is one of reason why modernism architecture could not achieve the principle of the architecture.

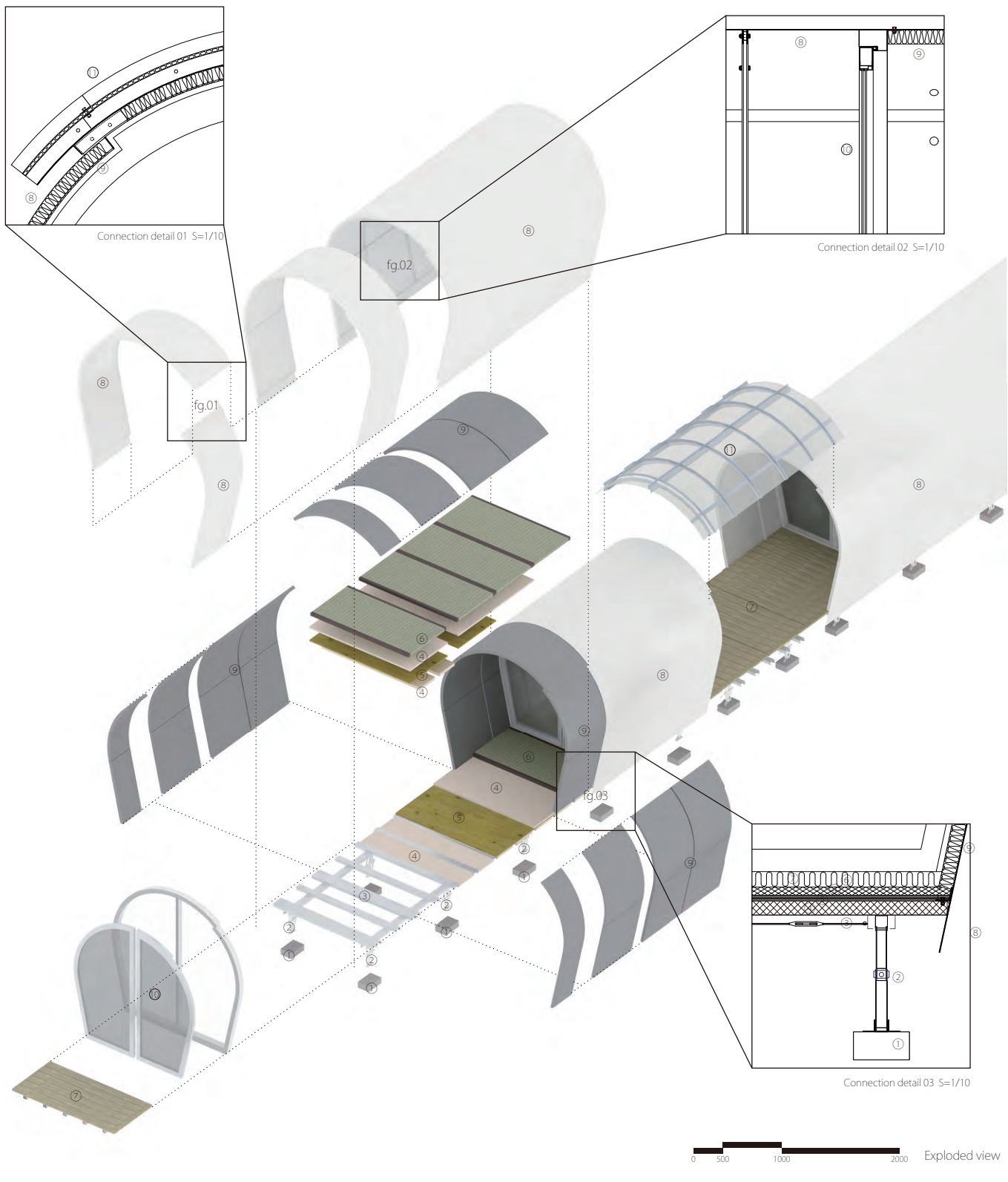
Hojo-an by Kamo no Chomei has similarity of ideas from modernism such like establishing same architecture system in anywhere and also independent from ground because of movable. We think that movable architecture is one of cource that modernism aimed.

Our concept is “Hojo-an to Modern” . Hojo-an was designed like a product which can separate each elements and combine to one architecture to move and construct easily.
We propose movable architecture produced by modern technology and circulate as a product.

The architecture always be flowing without staying one place.
The arechitecture always be with all of wanderers who live today.

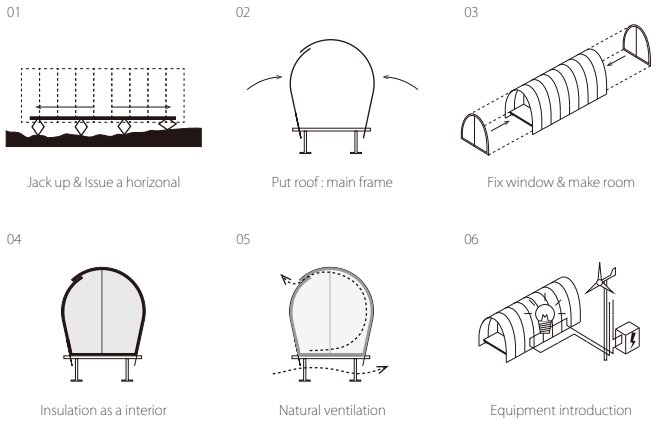


Production
The architecture is made by metal forming. All elements are produced same forms in the factory and connected correctly. The architecture can be taken apart to each element and these are fastened by bolts.



Exploded view

System
Constraction is systematic. The architecture can be completed very symply like assembly of furniture. Productive steel structure can make it possible.



Mobility
All elements can load on a truck, move anywhere, and can be carried by manpower.


Loading image

Elements	Scale[mm]	Weight (per unit)[kg]	Number	Summary[kg]
House part				
Bacement				
① Concrete blicks	390*190*100	10.3	10	103
② Pantograph jack		3.7	10	37
③ Lip channel steel	T2.3*100*50*1800	7.3	21	153.3
	T2.3*100*50*3808	15.45	4	61.8
Floor(indoor)				
④ Styrofoam	1800*357.5*50	0.96	10	9.6
	1826*894.5*30	0.48	5	2.4
⑤ Structural plywood	1828*894.5*20	11.9	5	59.5
⑥ Tatami mat	1777*894.5*50	30	4	120
Floor(outdoor)				
⑦ Resinous wood deck panel	1855*914.5*81	48	3	144
Roof				
⑧ Steel plate(bending)	T3*4834*914.5	130.4	9	1173.6
	T3*2264*914.5	68.9	9	620.1
⑨ Grass wool board	1820*910*50	2.65	15	39.75
Window				
○ Window panel	2370*2200*100	77.6	2	155.2

Elements	Scale[mm]	Weight (per unit)[kg]	Number	Summary[kg]
Terrace part				
Bacement				
① Concrete blicks	390*190*100	10.3	4	41.2
② Pantograph jack		3.7	4	14.8
③ Lip channel steel	T2.3*100*50*1929	7.8	2	15.6
	T2.3*100*50*2000	8.12	5	40.6
	T2.3*100*50*1497	6.08	2	12.16
Floor				
○ Resinous wood deck panel	1855*914.5*81	48	4	192
Roof				
○ Polycarbonate panel(bending)	3327*2264*15	44.8	1	44.8
○ L-shape angle	T2*50*50*2264	6.9	6	41.4
	T2*50*50*3327	10.2	2	20.4

2585.85kg<Loadable limit of track 3tons

Elements List

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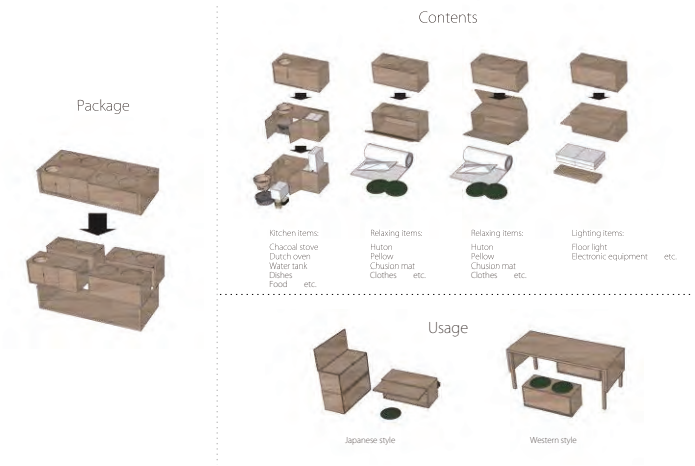
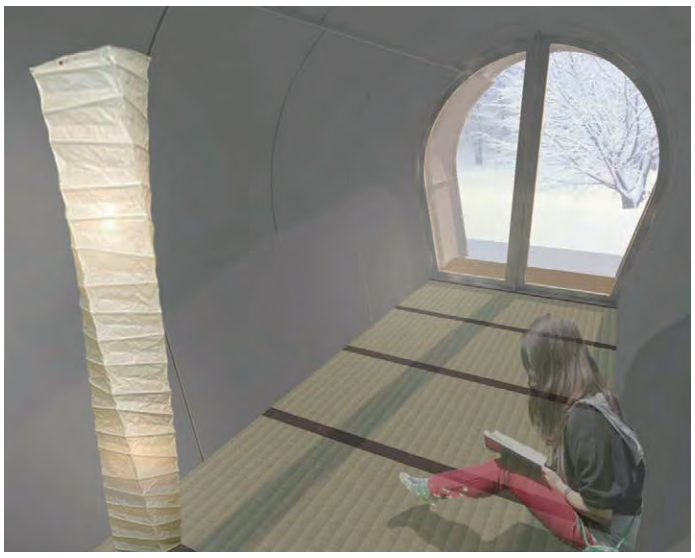
KYOTO INSTITUTE OF TECHNOLOGY

Furniture

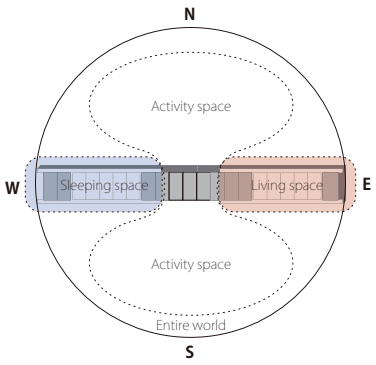
In the boxy design furnitures, all lifestyle items are included. Resident carry only one package when he moves and living.



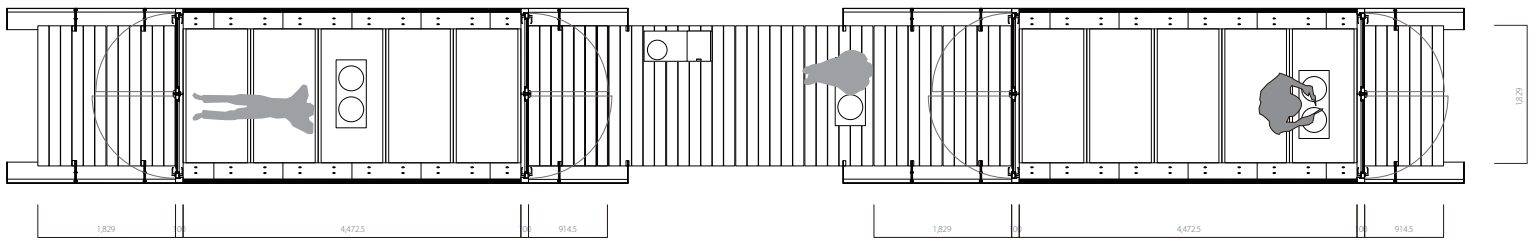


Plan

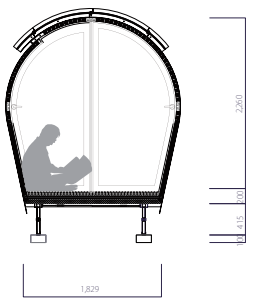
In the basicaly plan, the space seperated 2 minimum scale rooms living and sleeping. Room floor is filled by 5 tatami mat. And there' s semi-outside terrace in the center of the house and connect with outside environment. Both side of the terrace would be activity space.

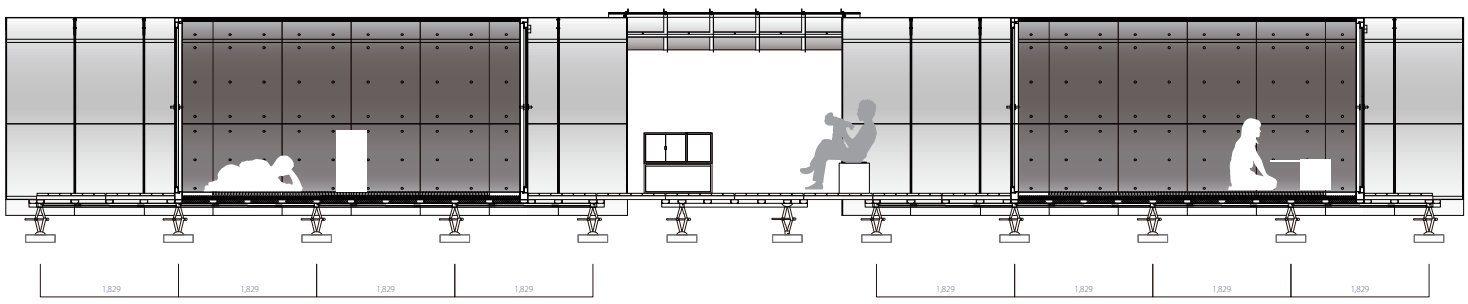


Basic arrangement plan S=1/250

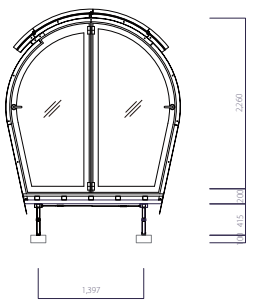


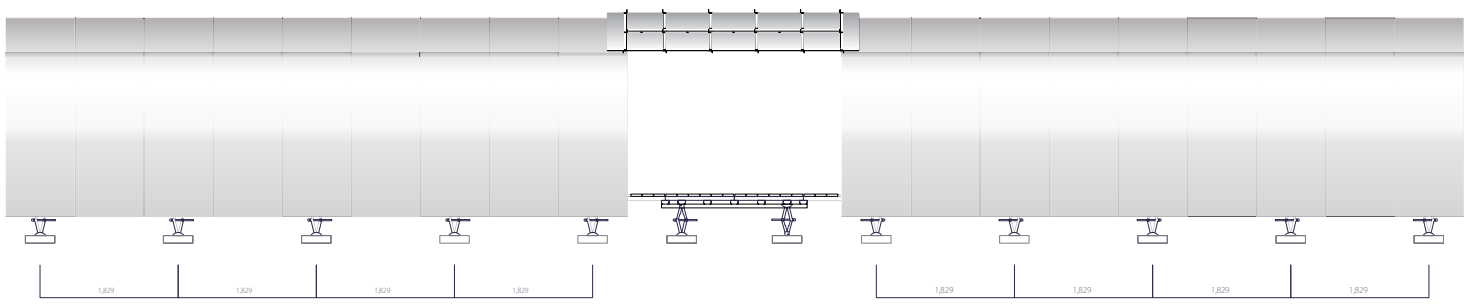
Floor Plan S=1/50





Section S=1/50

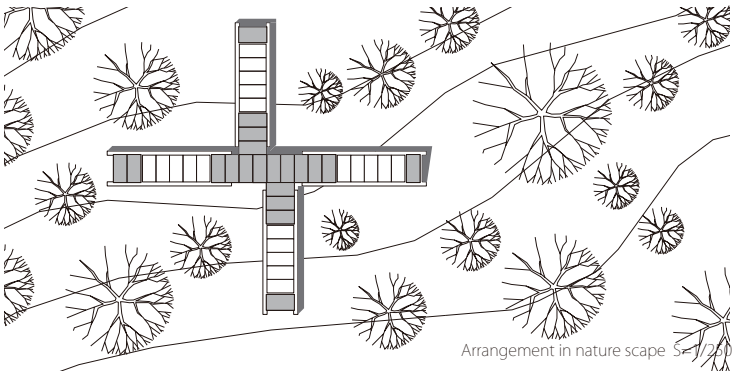




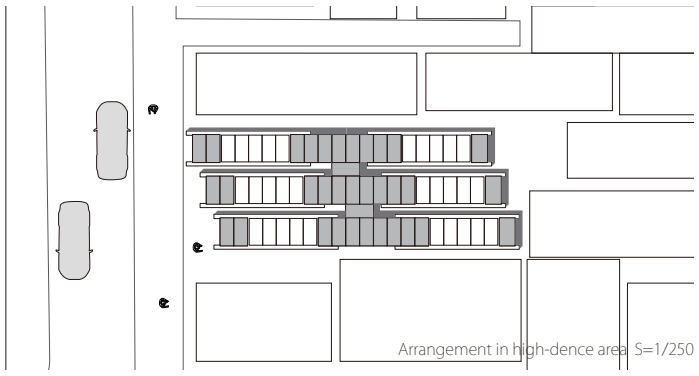
Elevation S=1/50

Variety

Each indepemdent units can combine together by terrace. Expanding units, architecture becomes community and make relation with evironment.



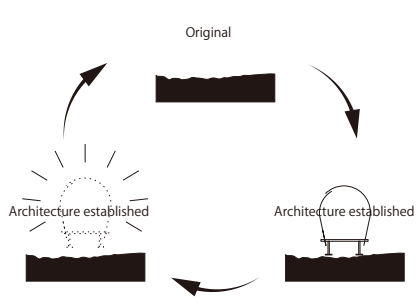
Arrangement in nature scape S=1/250



Arrangement in high-dence area S=1/250

Afterwards

After the architecture moved away, There is no remains that belong to the architecture but an original landscape.



Unsettlement = Never collapse original nature scape

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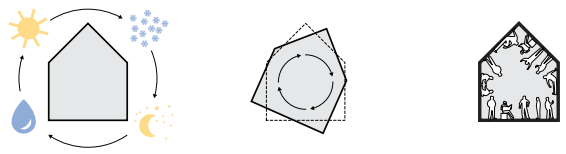
SIX HOUSE



The typical house is fixed to the earth; anchored and still, while the sun and the elements constantly change. But what if the house could move? What if we could do more with less? What if a single space could become Six?

Increasing environmental change, combined with evolving societal needs urge us to redefine the way shelter is understood, designed and inhabited within the 21st century.

SIX HOUSE proposes one room in support of six programs; empowering each surface to become wall, floor, ceiling and aperture. Meditating, Drawing, Gathering, Eating, Resting and Dreaming drive reconnection to the sky, ground and community of Taiki-cho.

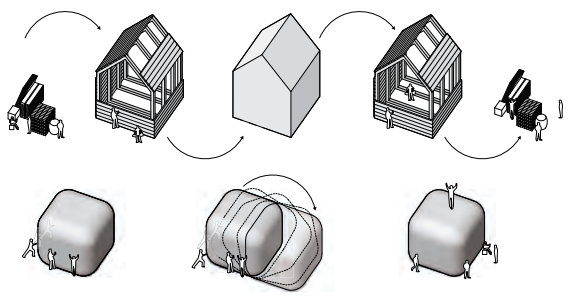
Five people assemble to rotate the space together, and together they occupy each of the unique and different surfaces.

Transition between programs occurs through the coordination of five bodies and ten hands engaging the exterior shell, in a communal rolling sequence. The six (five interior, one exterior) programs are accessed through operable apertures that serve as both doorway and window.

An economic, efficient and considered approach to space-making, in an over-crowded, over-utilized world, SIX HOUSE invites collaboration and community through the social "assembly" of five people to facilitate the reorientation of their day-to-day experience. The user-defined design responds to variable weather conditions in Taiki-cho; access to daylight, shade from the bright sun, as well as protection from the harsh cold. The occupation of all six surfaces guarantees mobility which in turn facilitates a light touch by preventing extended occupation of the same location. Allowing occupants to traverse the vast landscape of Memu Meadows, engaging with a multiplicity of environmental conditions and existing inhabited shelters.

Employing the Japanese tradition of Shou Sugi Ban, a charred cedar cladding, gives the shelter strength and resilience, while honouring the land from which it comes. A continuous channel carved into the exterior creates surfaces for the hand to engage with during reorientation. The interior is softened with lightly charred cedar, traditional Tatami, and pressed wool felt for the body to rest on. The structural system consists of a series of notched plywood ribs that are prefabricated into modules for easy installation on site.

SIX HOUSE creates a new housing typology touching the ground more lightly than traditional building techniques, while fostering active engagement with interior and exterior environments as well as those who inhabit them. Natural light, compact but comfortable living spaces and a social ritual of collaboration with friends, family and neighbours, reorient the living experience.

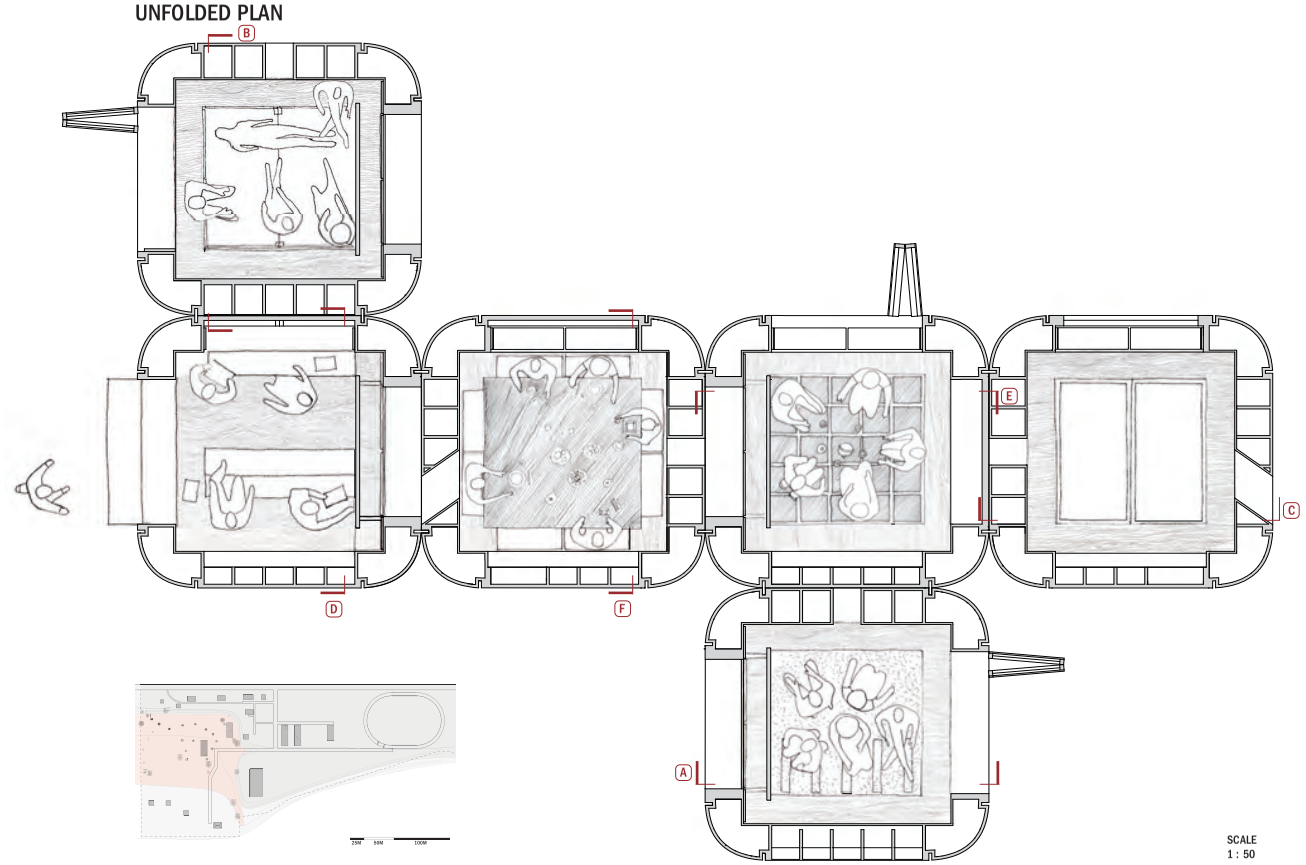


ASSEMBLY / DISASSEMBLY

SIX HOUSE takes a unique approach to the challenge of assembly, disassembly and relocation, re-envisioning the notion of mobility by directly integrating it into the design. This enables (structural) assembly + disassembly to be reframed as (social) assembly + reassembly, focusing on collaborative engagement with the project and site as the five occupants become collaborators in curating their lived experience in real time.

This rethinking is facilitated through the activation of all six surfaces of a small building allowing for reduced footprint and lighter overall weight. SIX HOUSE employs a fulcrum strategy enabling five people to distribute the building load and use the extruded exterior channels to leverage the house and roll it onto each of its six faces. Rounded corners soften the movement and facilitate a smooth roll.

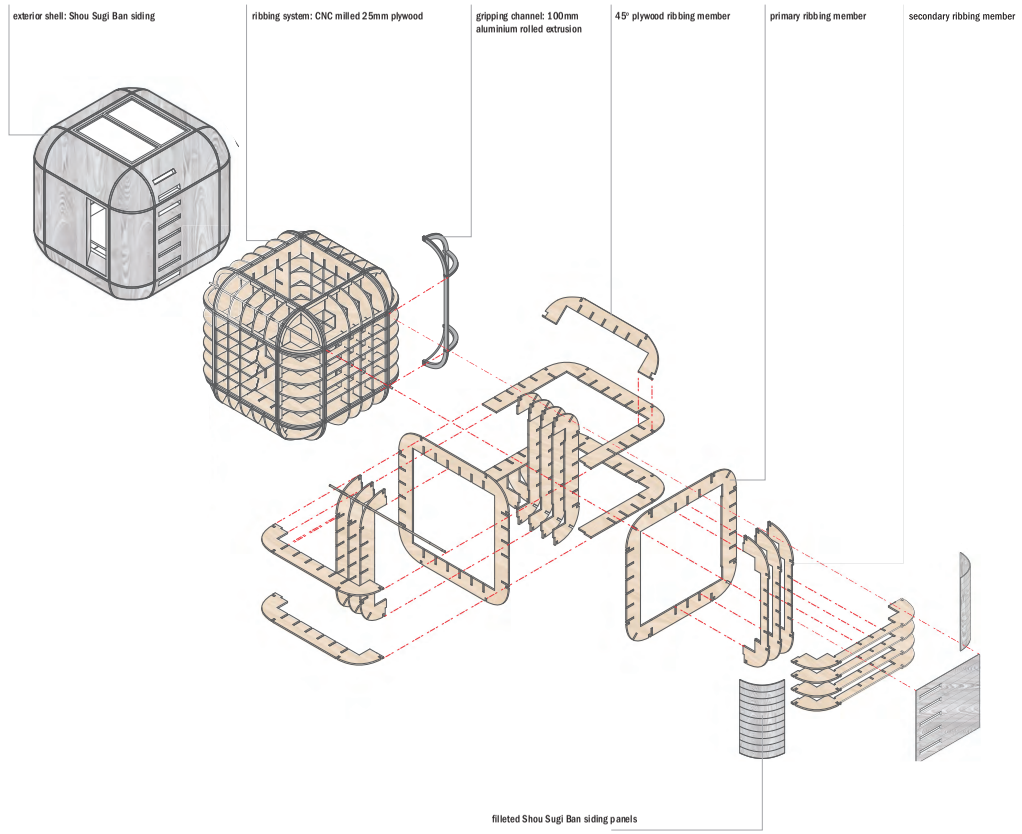
UNFOLDED PLAN



SCALE
1 : 50

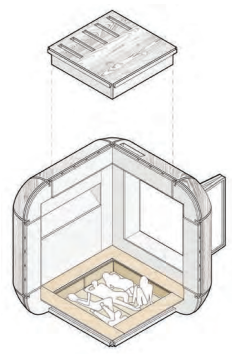
NOTCHED RIBBING

The structural system prioritises a notched connection detail in honour of traditional Japanese joinery techniques. CNC milled wood pieces assemble into predetermined modules off-site, connector plates with screw fasteners are employed at all corner seams.



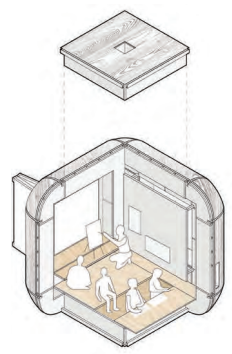
LEXICON OF LIGHT

Lightness is not only about how the building lands (touches the ground), or about the embodied energy inherent in the material processes of production, fabrication and transportation, but Lightness is about an experiential quality. In SIX HOUSE, each programmed surface is related to a unique daylighting condition.



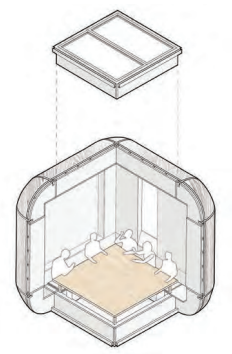
RESTING

The physical engagement required to reorient the house is supported by the Resting surface. Padded linen supports the body, the adjacent Tatami surface becomes stacked storage space where cushions and blankets for warmth and rest reside. View from the tea ceremony aperture remind us of our scale in relation to the expansive surrounding environment.



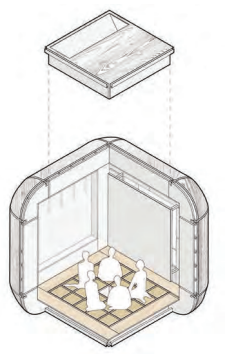
DRAWING

Notating our surrounds through sketch is a creative act which encourages a heightened understanding and appreciation of our surroundings. Hinged interior surfaces fold down to support drawing in a variety of positions while engaging the hand and eye in creative notation. The cork table, oriented as wall, facilitates the appreciation of drawings pinned to its surface for display.



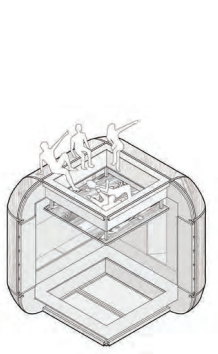
EATING

A communal table creates space to enjoy the harvested food of Memu Meadows. The use of cork as table surface engages environmentally responsible materials free of harmful toxins and resistant to repeated use. When the house is flipped to Drawing surface, the table top becomes pin-up space and the underside becomes a light shelf, creating a dynamic atmosphere within the interior.



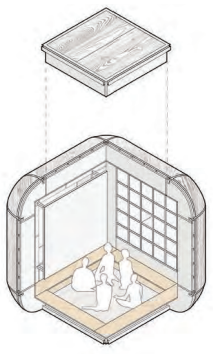
GATHERING

Ceremony and gathering facilitate shared experience between members of a community. When the traditional Tatami mats are oriented as floor, five bodies gather around an aperture containing a recessed vestibule for tea or candle light. When the Tatami is reoriented, the aperture serves as a light portal and pinhole to the environment. Integrated storage concealed beneath the Tatami mats, houses objects for ceremony.



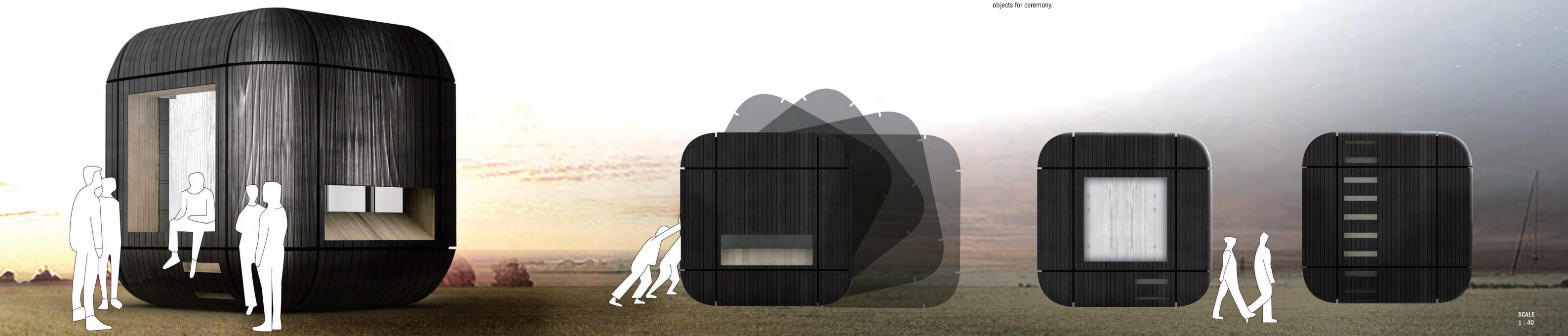
DREAMING

Looking toward the expansive sky, we are struck by the beauty and power of the universe and inspired to dream. Ceiling becomes ground as the shelter flips to re-orient the table surface. A sunken Dreaming Deck elevates the body toward the sky. The deck is accessed from the exterior through a notched ladder surface.



MEDITATING

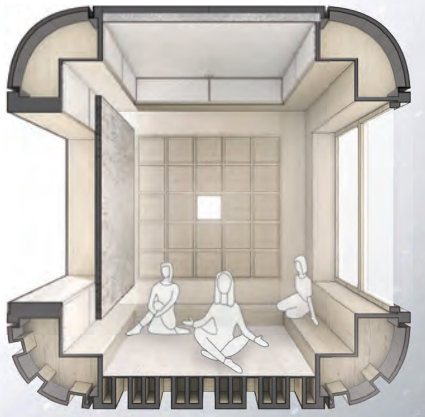
Adjusting to the natural from the fast-paced interactions of the urban environment requires a need for pause and reflection. When oriented as ground, the Meditation surface engages a full and focused floor area for re-calibrating mind and body. With the table surface oriented as wall, diffuse light is reflected into the interior creating a soft, uniform, interior illumination.



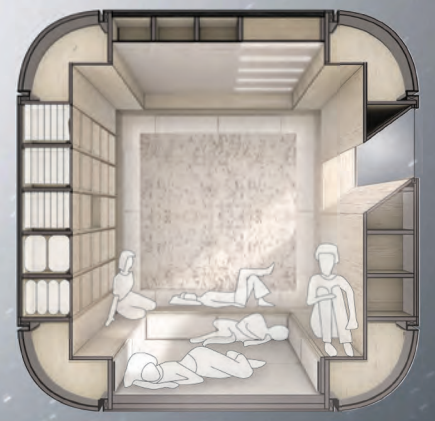
SCALE
1 : 40

20mm filleted Shou Sugi Ban siding
clipping mechanism for siding
25mm marine grade plywood filleted rib
5mm translucent matte acrylic sheet
19mm baltic birch plywood
6mm rolled aluminium gripping channel
mini european hinge for storage surface
Tatami mat
drainage plane material
structural sheathing board
siding vent
6mm rolled aluminium gripping channel
20mm filleted Shou Sugi Ban siding
clipping mechanism for siding
6mm rolled aluminium gripping channel
blocking for gripping channel
padded pressed wool upholstery

SIX HOUSE

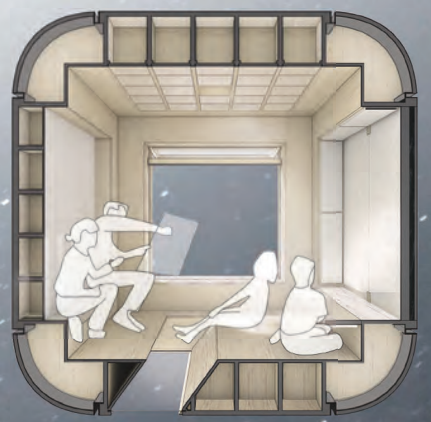


A
MEDITATING

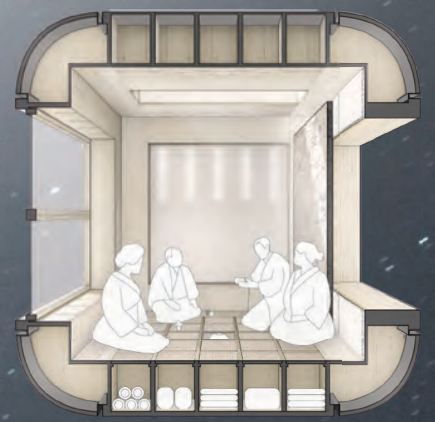


B
RESTING

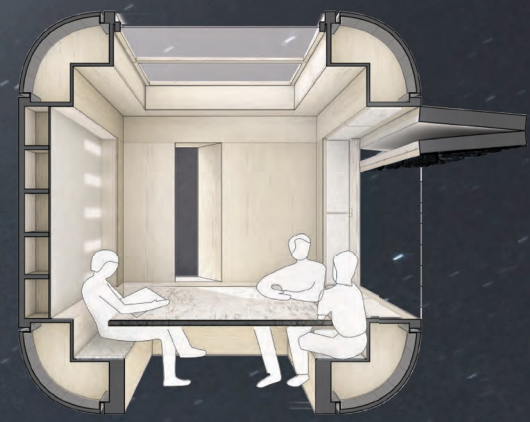
C
DREAMING



D
DRAWING



E
GATHERING



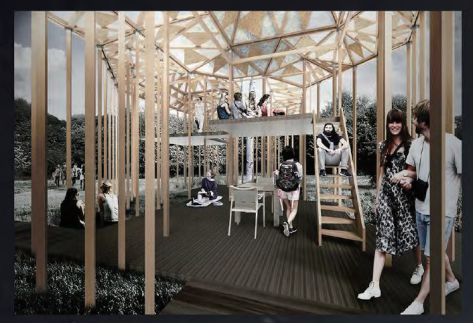
F
EATING

20mm filleted Shou Sugi Ban siding (charred)

STARGAZING

The night sky in Taiki-cho affords a rare experience of the stars, a view unobscured by urban light pollution or overshadowing. SIX HOUSE prioritises access to this expansive sky through the Dreaming surface and encourages visitors to contemplate the possibility of doing something extraordinary.

NO | Body HOUSE

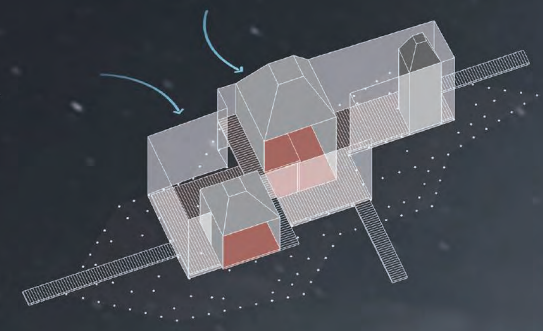


is an ephemeral house, a forest of thin pillars covered by a light roof: that`s enough to be potentially a house. Its spaces are defined according to people`s interaction with the surroundings. The livable spaces depend on the dialectic between inclusion and exclusion of the areas between the pillars. People can easily define their own comfortable space hanging membranes, and curtains to the roof`s structure.
NO | Body House is a kit of simple and basic elements that can be assembled by few people: foundations are steel plates that can be easily fixed to the ground and jointed among them. Wooden pillars are slender and lightweight and provided with a metal joint for triangular preassembled modules of the roof. NO | Body House is a house without its own body because it lives in symbiosis with the bodies of the users.

Three screens against the harsh cold guarantee thermal comfort of a cozy, intimate space.

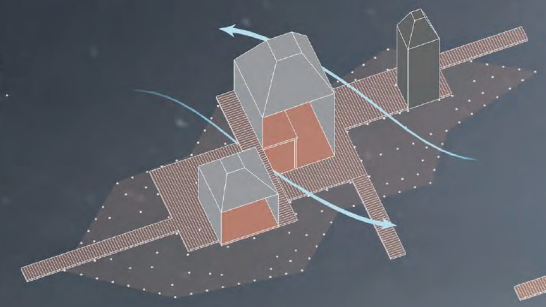
WINTER CONFIGURATION

Users remove the external skin defining their own comfort in a balance with the surroundings.



FALL CONFIGURATION

Users extend the livable space to the external platforms getting closer and closer to nature.



SPRING CONFIGURATION

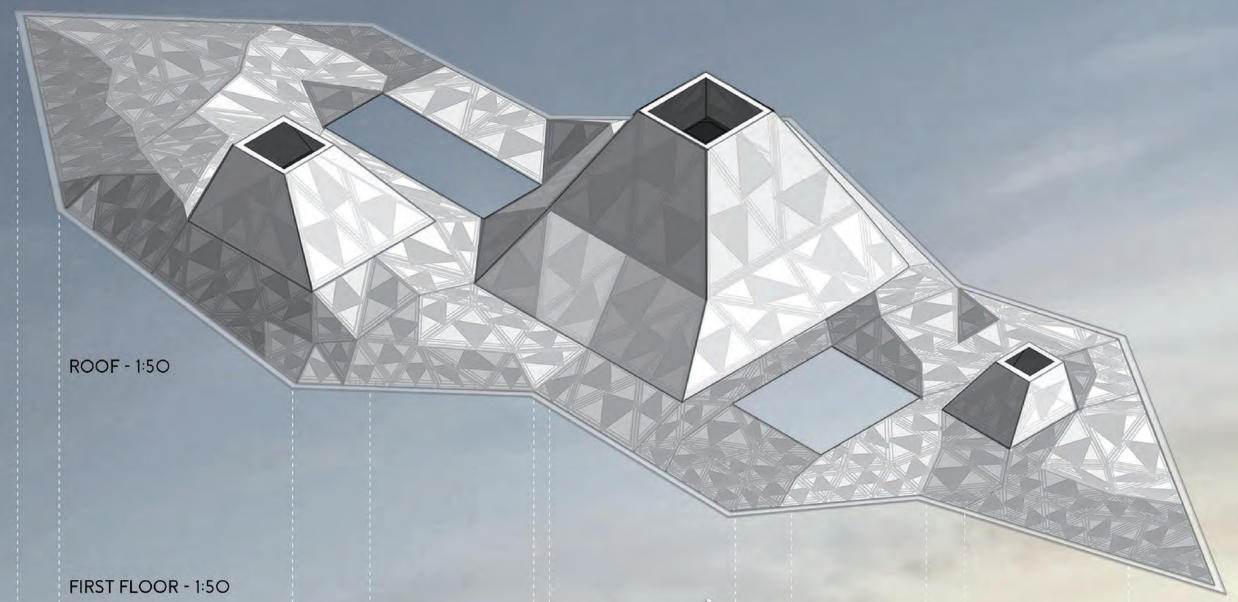
Removing the last filter between indoor and outdoor all the space is enjoyable under the roof shadow.

SUMMER CONFIGURATION

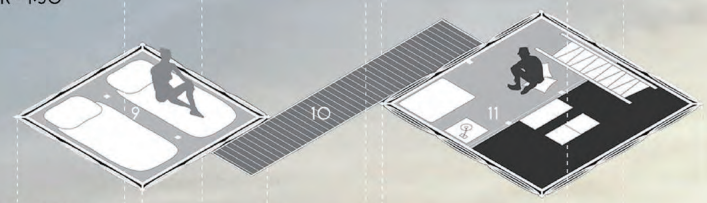
SITE PLAN

winter configuration | WEST ELEVATION - 1:50

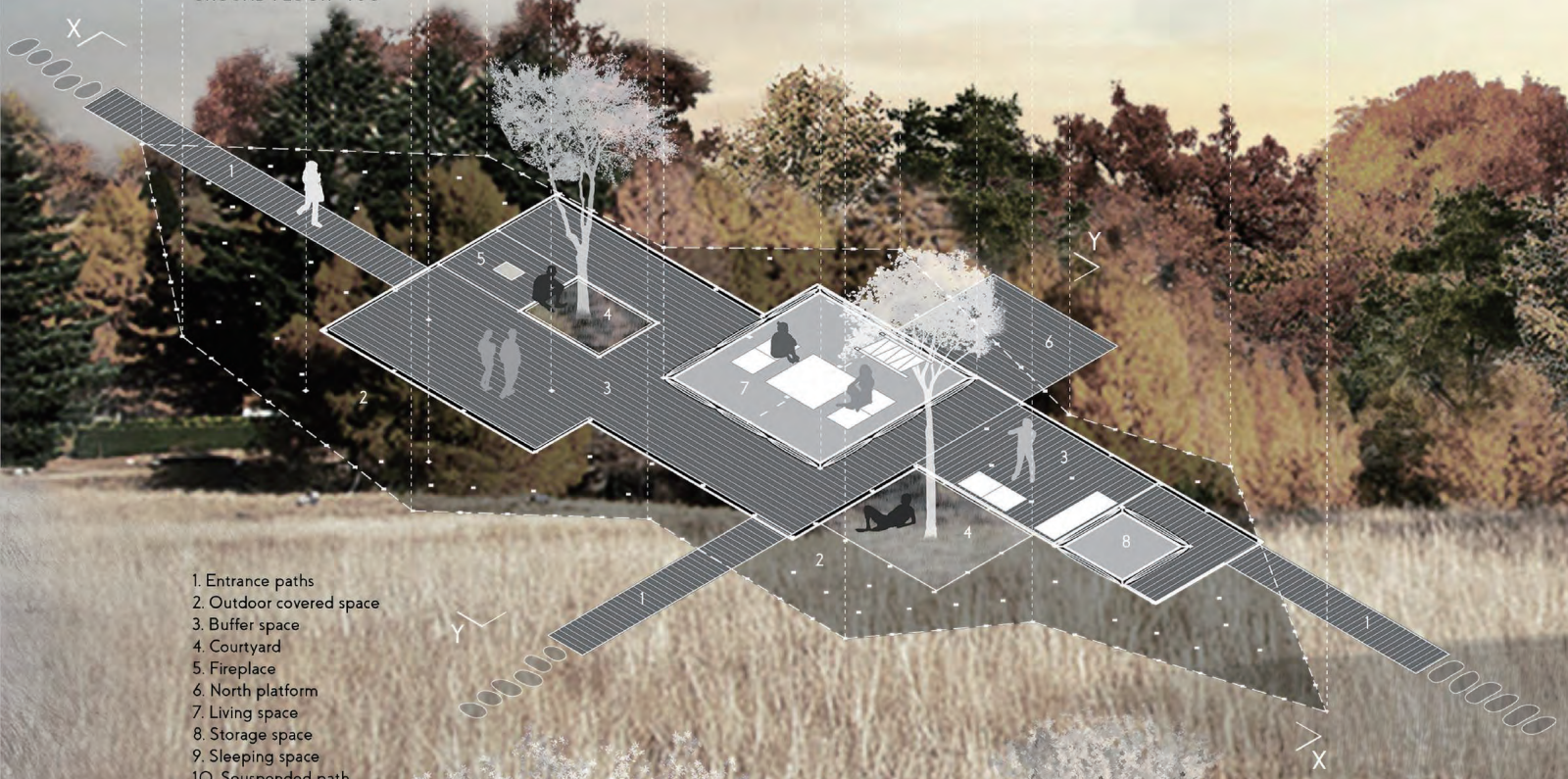
fall configuration | SECTION XX - 1:50



ROOF - 1:50

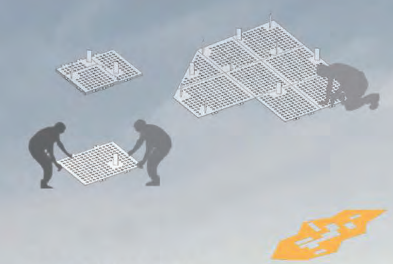


FIRST FLOOR - 1:50

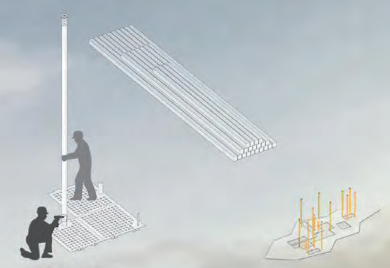


GROUND FLOOR - 1:50

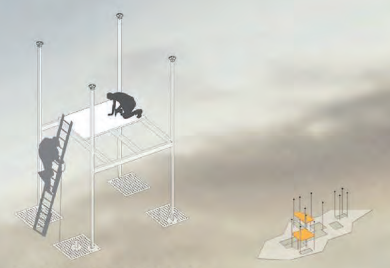
1. Entrance paths
2. Outdoor covered space
3. Buffer space
4. Courtyard
5. Fireplace
6. North platform
7. Living space
8. Storage space
9. Sleeping space
10. Souspended path
11. Loft



1. BASEMENT PLATES



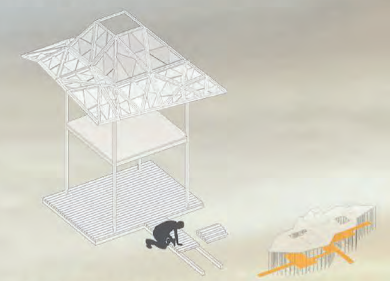
2. PILLARS



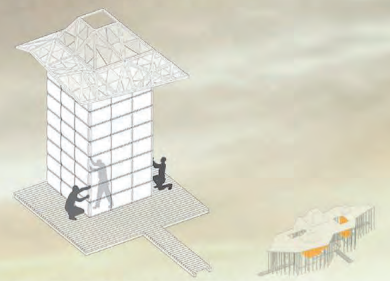
3. FIRST FLOOR SLABS

4. ROOF STRUCTURE

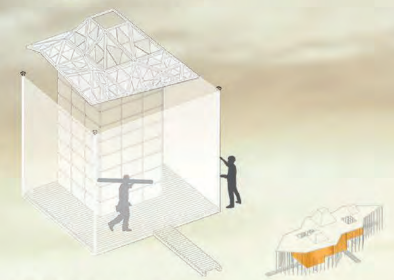
5. ROOF PLASTIC MEMBRANE



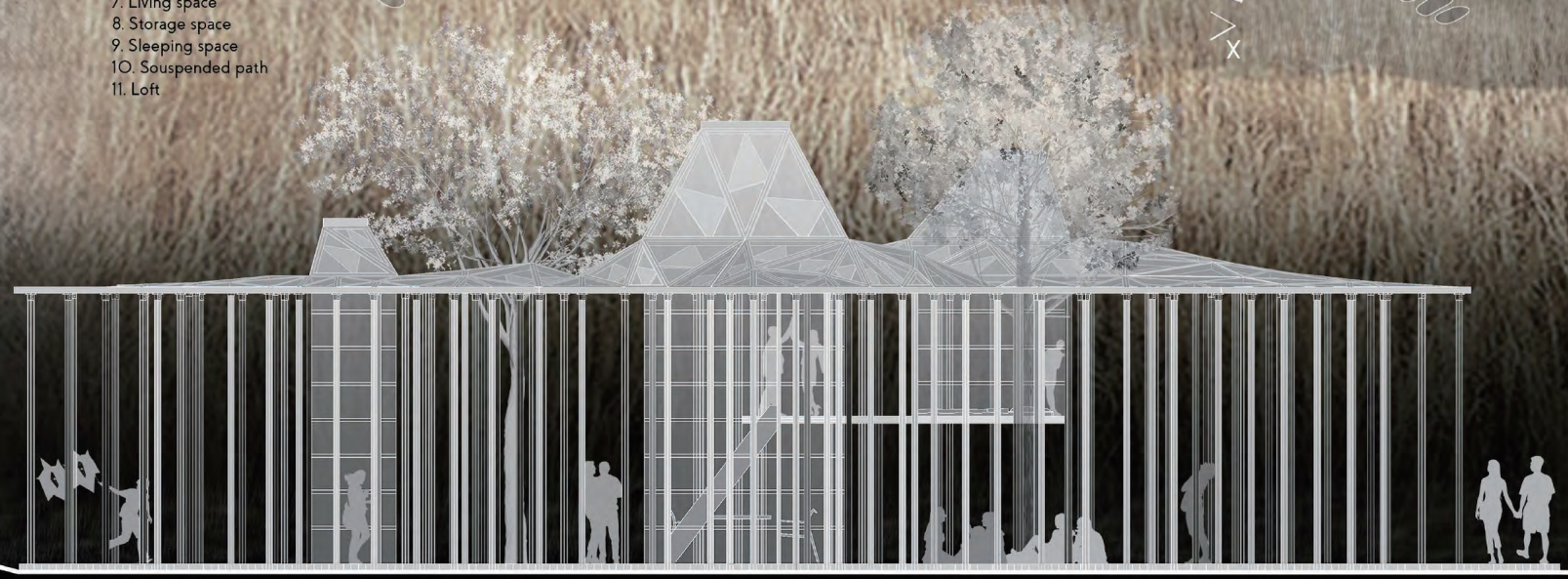
6. WOODEN PLATFORM AND PATHS



7. INFLATABLE INSULATION CUSHION



8. SEASONAL SCREENS



spring configuration | NORTH ELEVATION - 1:50

summer configuration | SECTION YY - 1:50

INFINITE FIELD

Setting the scene
green crops of summer or winter's abundant snow-fall, the structure offers a space to dwell, and a sense of unity and belonging to the landscape beyond.

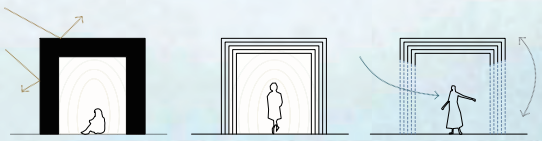
Inviting nature in
Embracing the temporal aspect of the seasons, the dweller is invited to handle a set of soft, permeable membranes which dress the structure. These moveable layers of fabric negotiate the changing seasons. In harsher weather conditions the textile skin remains lowerewd, ensuring a comfortable living environment within. On warmer days a pulley mechanism can hoist up the lower part of the skin, revealing a panoramic view of the surrounding landscape. Even when closed, the softly graduated transparency towards the lower part of the skin allows natural light to pass through, maintaining visual contact with the outside world.

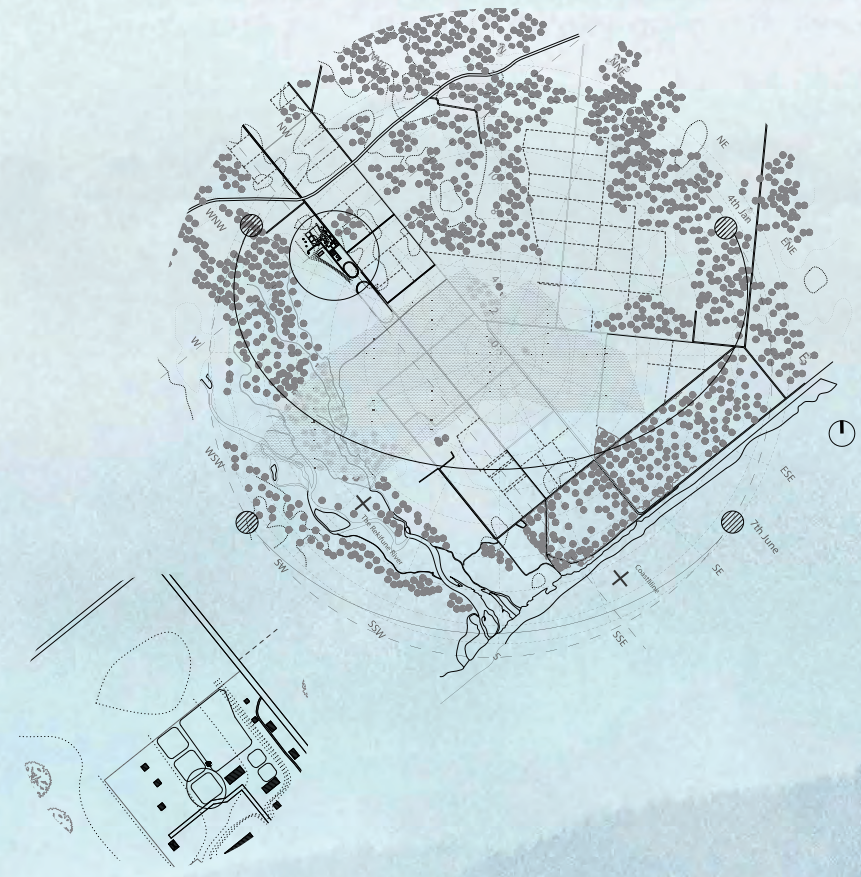
Engaging the senses
Rem Koolhaas once said 'Transparency only reveals everything in which you cannot partake,' since the material offers only a visual experience and not a phenomenological one. Rejecting glass altogether, a breathing structure is proposed; one which responds to both wind and light, and engages all of the senses too, from sound and sight to smell and more.

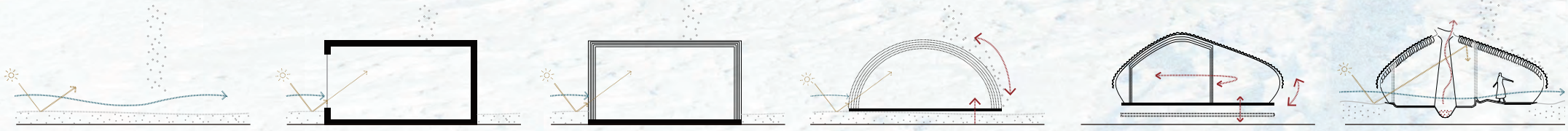
The thermal potentials of fabric
The dwelling space seeks to avoid complete thermal insulation which blocks out natural phenomena. Instead, the dweller is invited to wear layers of the building; a means of thermal dressing. As one moves from the outdoors towards the interior, one passes through an envelope of graduated layers which enclose the central heat source of the hibachi inside.

A responsive environment
The platform is designed to host various simple human activities such as sleeping, sitting, observing and communicating around the hibachi. The platform's design responds to the ergonomic requirements of these human activities. Pieces of voile suspended from the ceiling sway gently with the summer breeze, making the invisible perceptible and illustrating the micro-climate within.

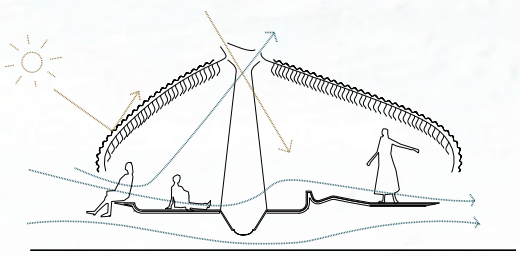
A kit of parts
The structure should be taken apart to create a flat pack which fits into one or two Kei-trucks. This flat pack can be assembled in a sequence by a group of five or so people using only minimal tools. The total weight of the structure is estimated to be as low as 760kg, allowing the major parts to be carried by just one or two people.



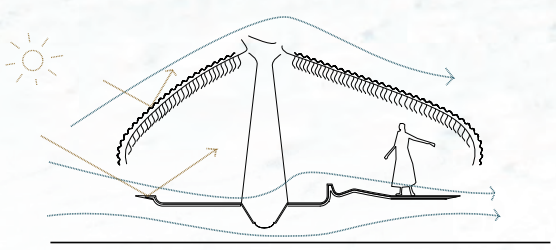




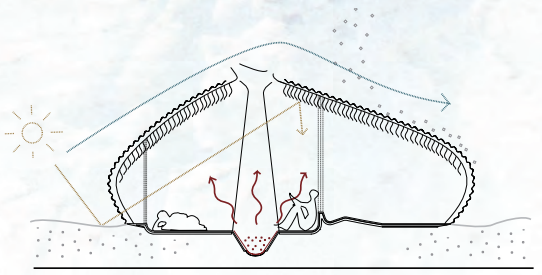
environmental site analysis | minimum comfortable space for five people | graduating layering- negotiating changing seasons | considering contextual environment | adaptable layering | proposed experience with nature



summer

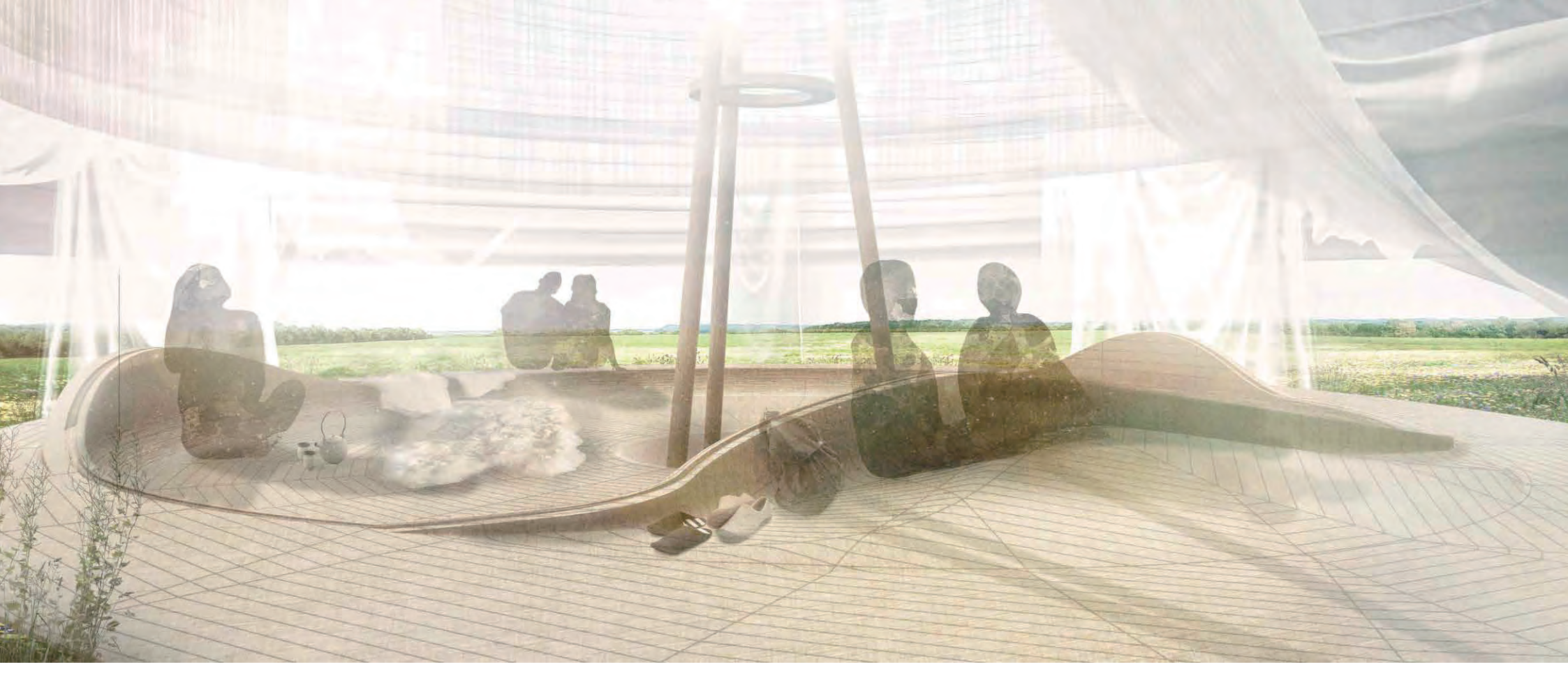


mid season

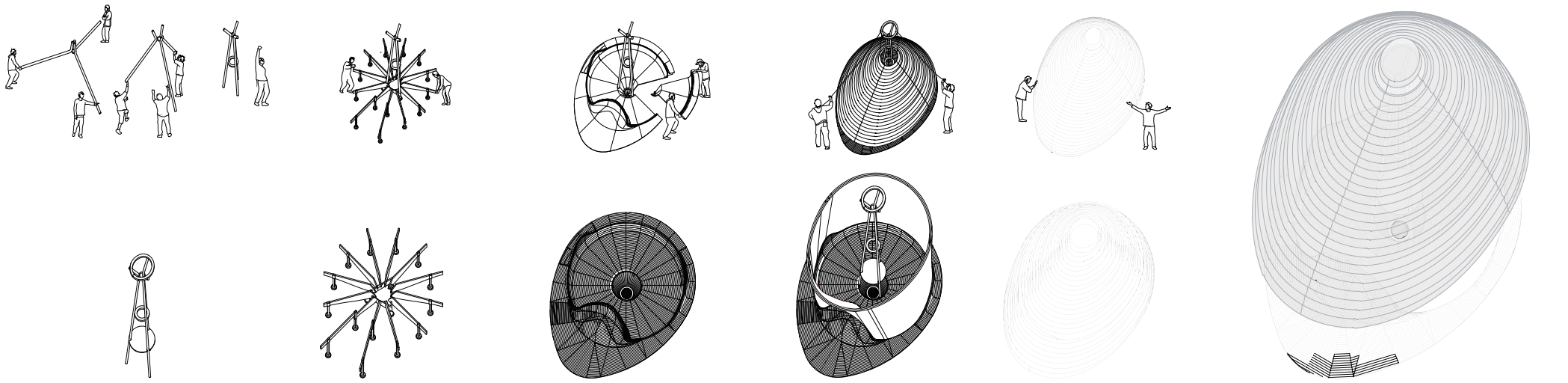


winter

Elevation 1:50



Assembly Timeline



Measure out and drill foundation piles.

Layout top ring and connect central columns.

Raise central column structure and secure to foundation.

Base beams fastened to central column structure.

Concentric substructure laid out and leveled.

Platform modules laid out and secured to substructure.

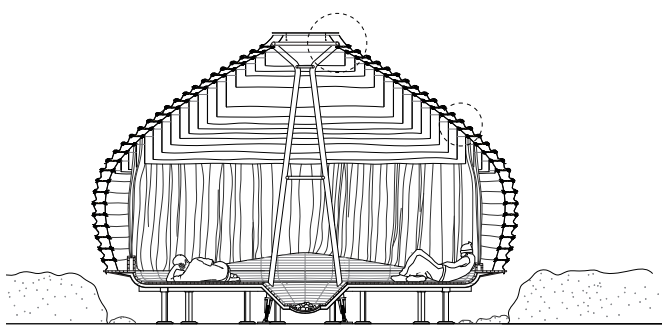
Fabric roof shell assembled on platform.

Roof shell hoisted up from the central column structure.

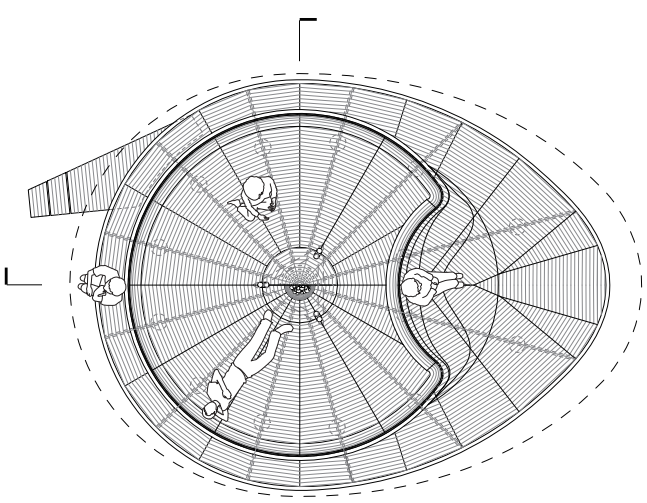
Interior fabric fastened to interior shell.

Once completed, panoramic roof can be operated by a central pulley system.

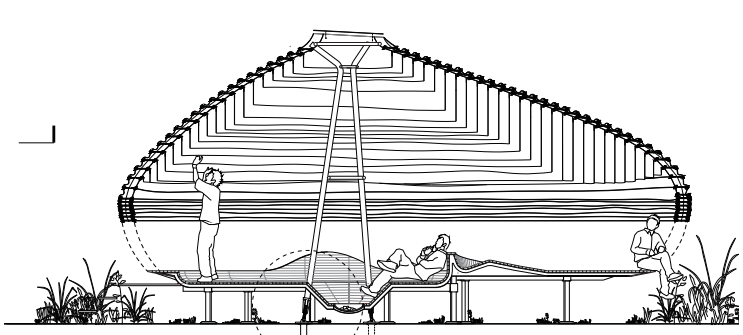
Fully assembled structure



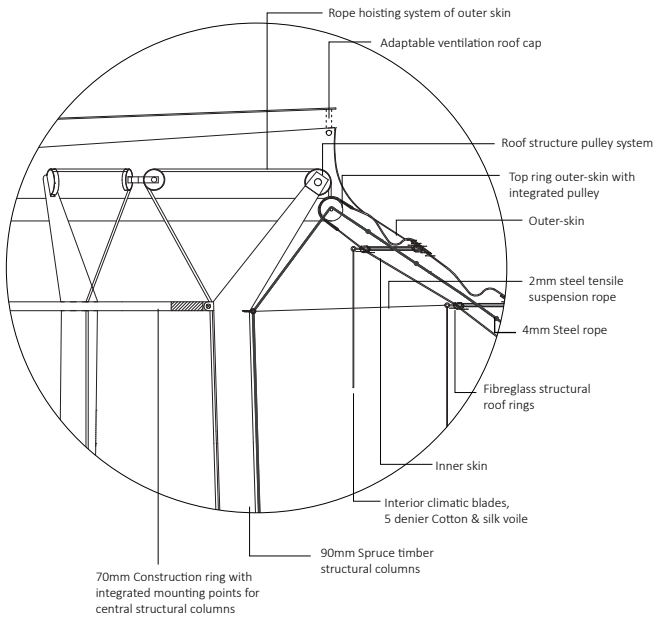
Short Section 1:50
Winter



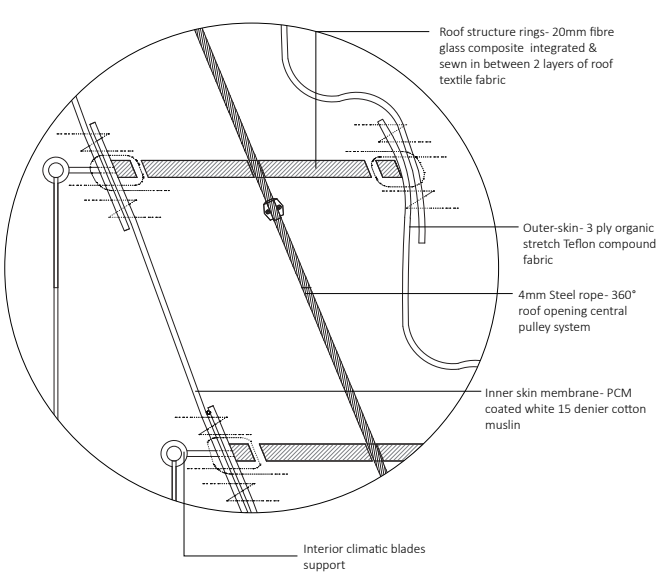
Plan 1:50



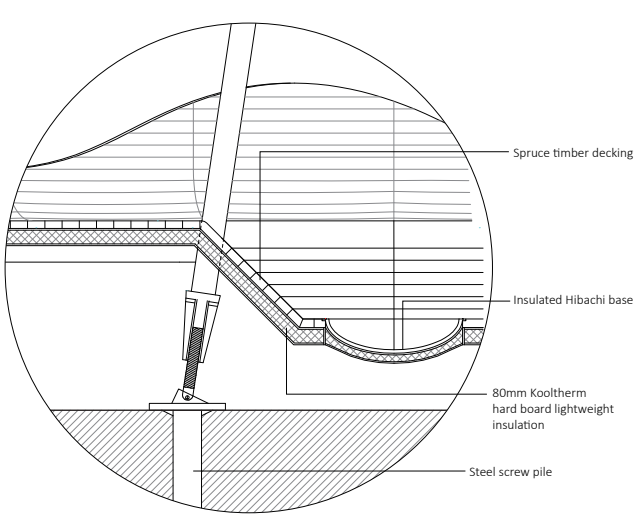
Long Section 1:50
Summer



1:10 Roof Detail



1:2 Facade Detail



1:10 Base Detail

Floating Veil

How can a shelter provide both protection and livability? How can we define an equilibrium between necessity and comfort?

Trying to confront these questions, our definition of the shelter lies between the primitive sense of survival and the desire for an open connection to the environment. In a way, it is intended to represent a symbolical retreat of “habitation” as a reconceptualization of protection and lightness.

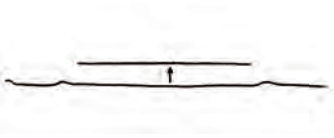
On an abstract level, our proposal consists of two major gestures:
On the one hand, the “elevation” of the shelter from the ground, which is intended to differentiate zones of controllable accessibility, as well as zones of thermal variance.
On the other hand, the use of a “soft skin” for the overall enveloping of the volume which serves as the space where the relationship between the “inside” and the “outside” is articulated.

The architectural rendering of our intentions consists of an elevated rectangular volume with a pit in the middle, covered by different types of fabrics. The elevated part, forming a “ring” above the ground can be used to accommodate the more private moments of shelter life, whereas the pit can be used as the common space. The shelter doesn’t provide an open entrance, but instead a small portable staircase, so as to control the access depending on occasion.

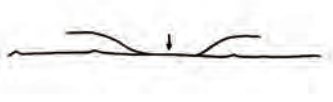
More concretely, in order to simplify the construction-assemblage procedure of the shelter we tried to reduce the design / structural elements of the project to three.
The textiles:
Composed of two different fabrics, one for colder and one for warmer conditions, they form the skin of the shelter and give the possibility for a variety of arrangements.
The frames:
Nine aluminium frames that give shape and structural support to the elevated volume, and can be assembled by hand.
The blanket:
The flooring of the shelter, which is composed of four layers (structural, solid, heating, cover).

The construction process consists of three phases:
First: Assemble the frames that form the pit and touch the ground. After putting those together, the rest of the frames can be assembled on place.
Second: Adjust the four floor layers to the structure.
Third: Adjust the summer textile to the structure. Then, cover with the winter one.

During time, the inhabitants can perform variations to the shelter that correspond to alternating climatic conditions or usage intentions.



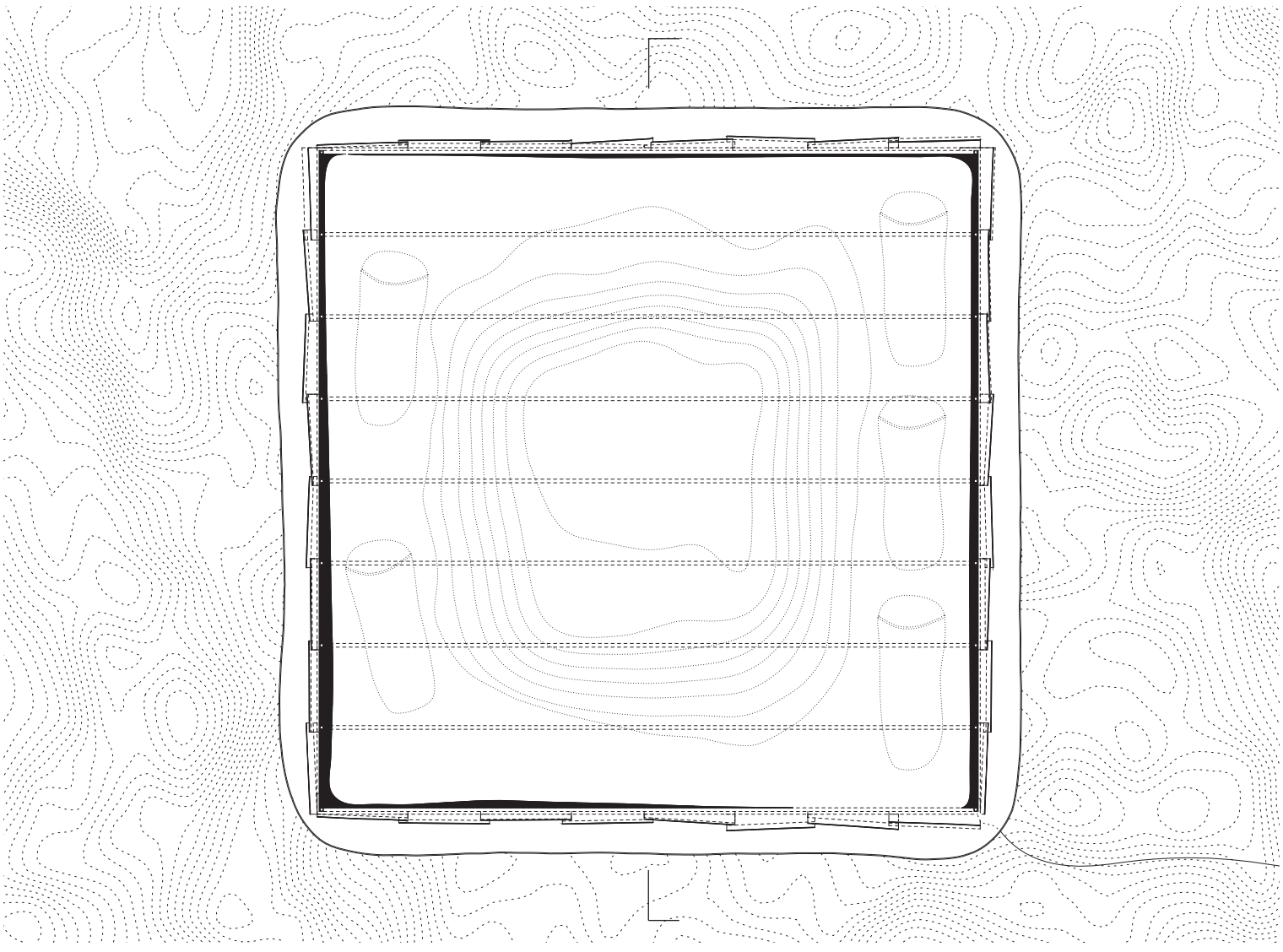
1. Platform elevation



2. Formation of the pit

3. Skin cover

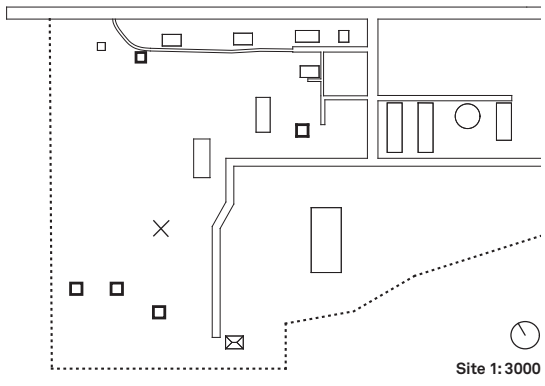
Exterior winter view



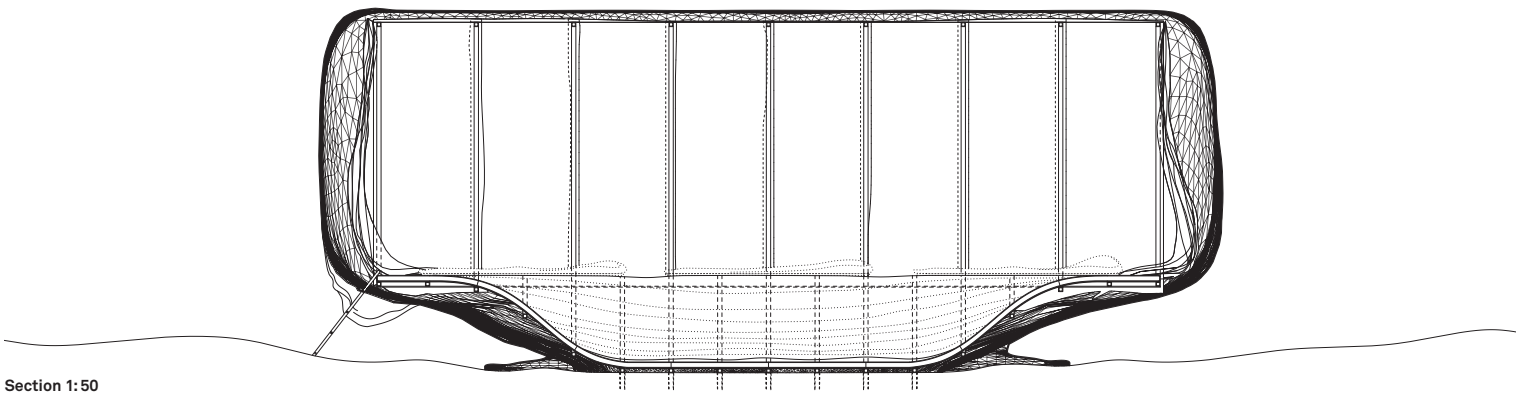
Floor Plan 1: 50

Hanging fishing nets. Technique employed by Ainu to sun dry the fabrics.

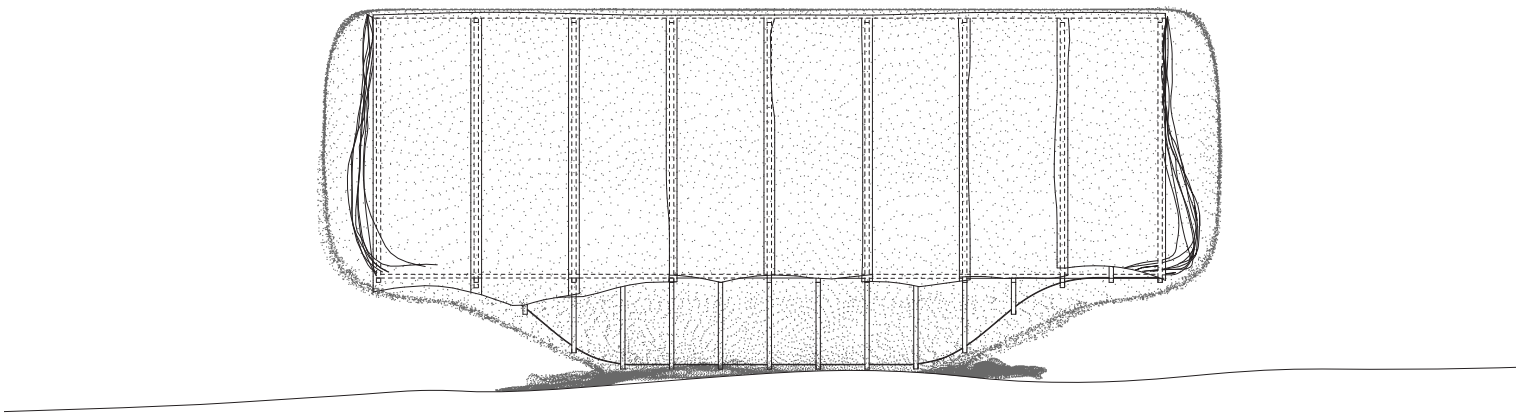
Throwing fishing nets



Site 1: 3000

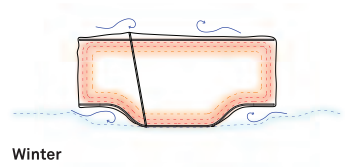


Section 1: 50

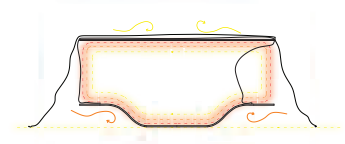


Elevation 1: 50

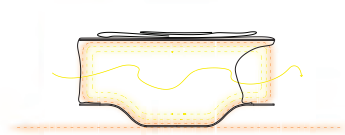
Interior summer view



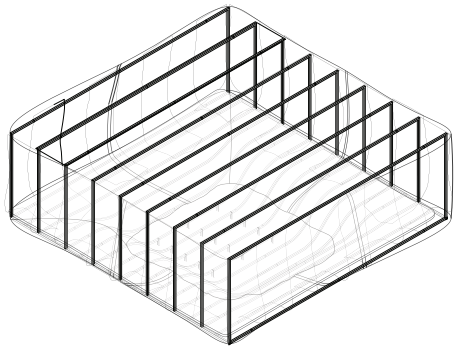
Winter



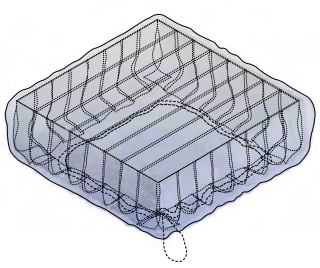
Fall- Spring



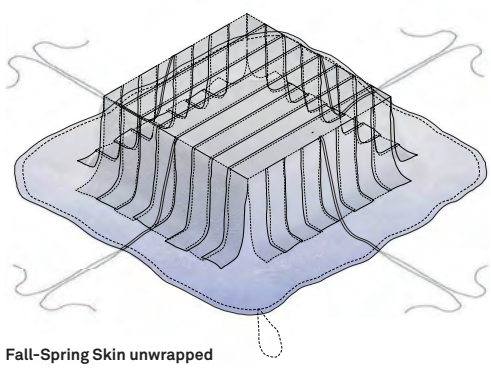
Summer



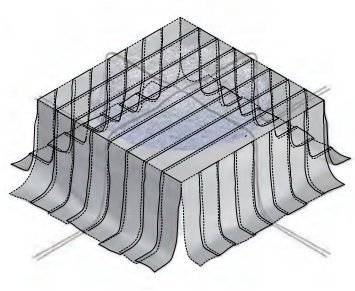
Shelter assembled



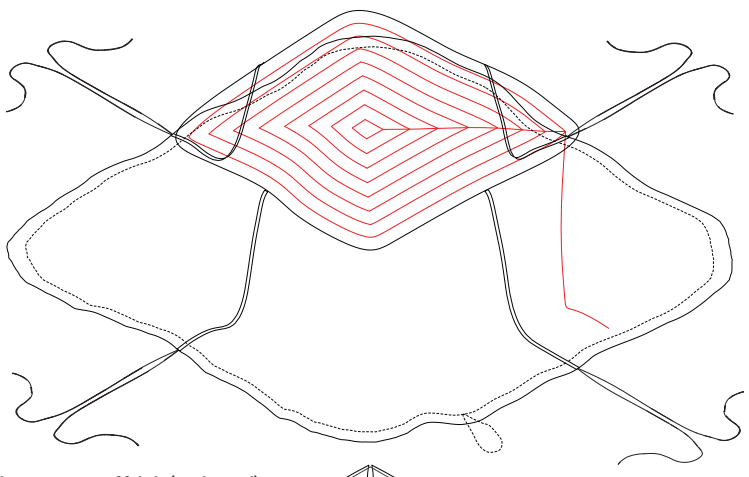
Winter Skin tightened



Fall-Spring Skin unwrapped

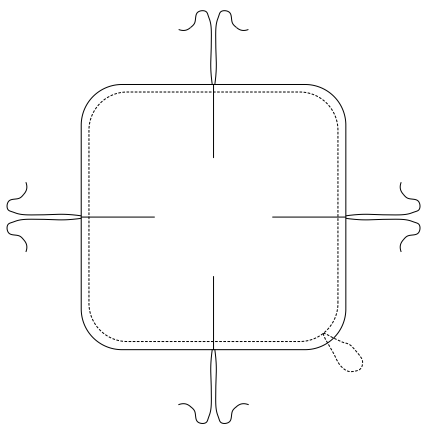


Summer Skin and wrapped winter skin on top

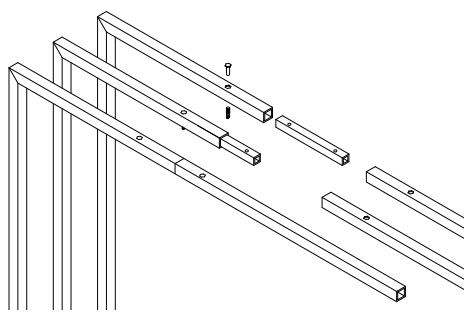


Winter waterproof fabric (top heated)

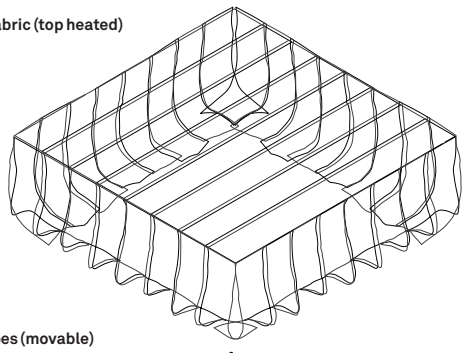
Winter waterproof cotton skin



Winter waterproof cotton skin unfolded

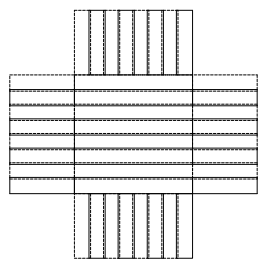


Detail with the assemblage of the aluminium frames

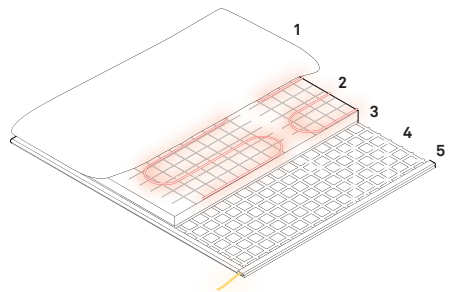


Summer cotton stripes (movable)

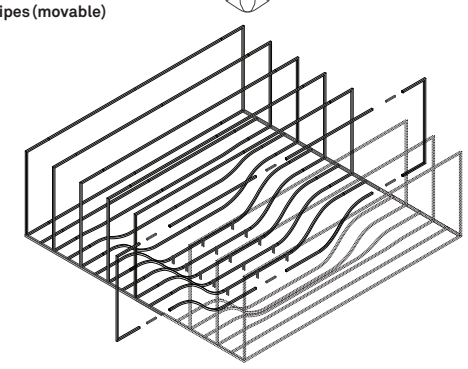
Summer cotton skin



Summer cotton skin unfolded

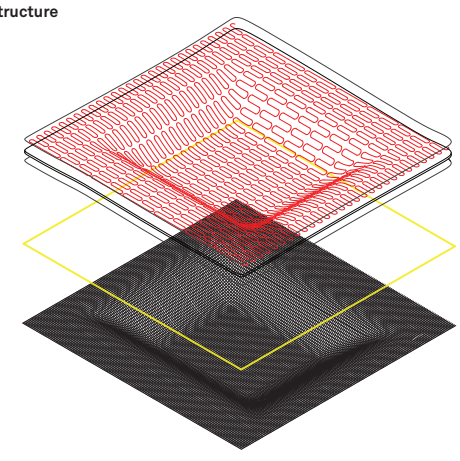


Detail Floor layers composition:
1. Blanket wrapping sack
2. Heating system
3. Rubber floor pieces
4. Net wire mesh
5. Led light stripe



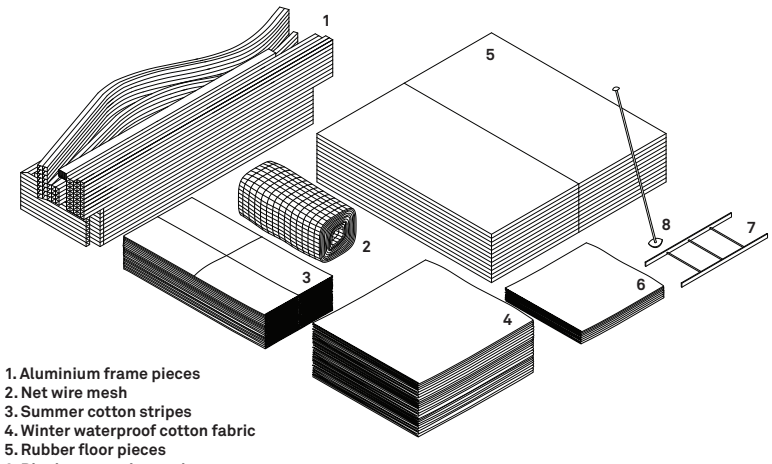
Aluminium frame structure

Aluminium profile

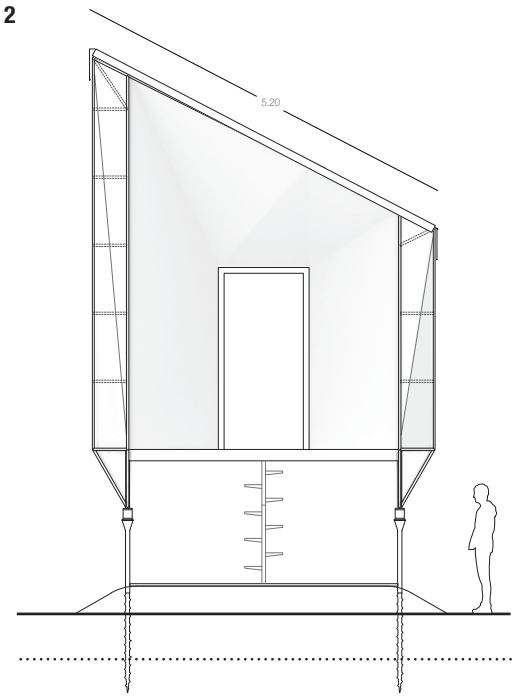


Floor components

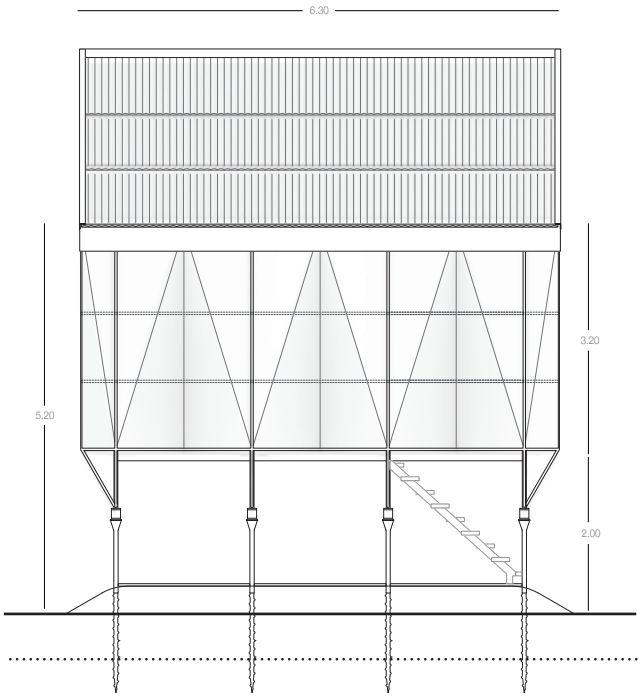
Heating system



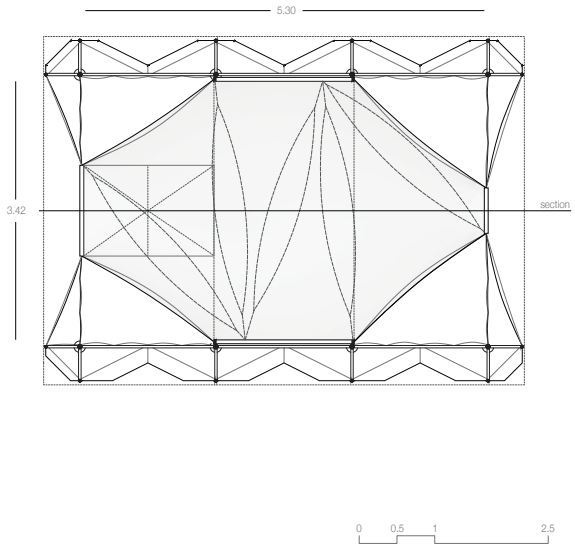
1. Aluminium frame pieces
2. Net wire mesh
3. Summer cotton stripes
4. Winter waterproof cotton fabric
5. Rubber floor pieces
6. Blanket wrapping sack
7. Stairs
8. Telescopic pole for the adjustment of the winter skin



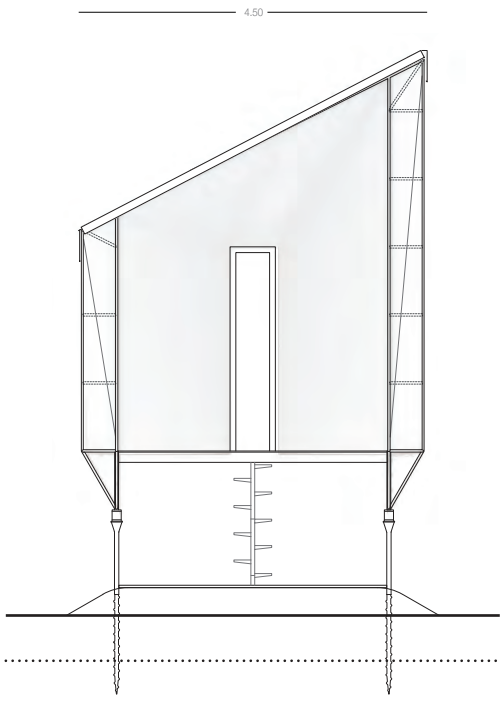
NE Elevation 1:50



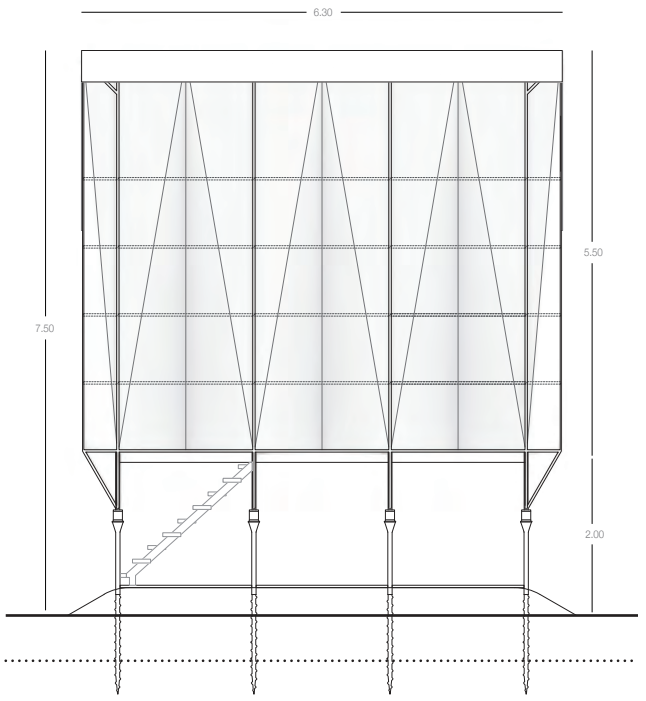
NW Elevation 1:50



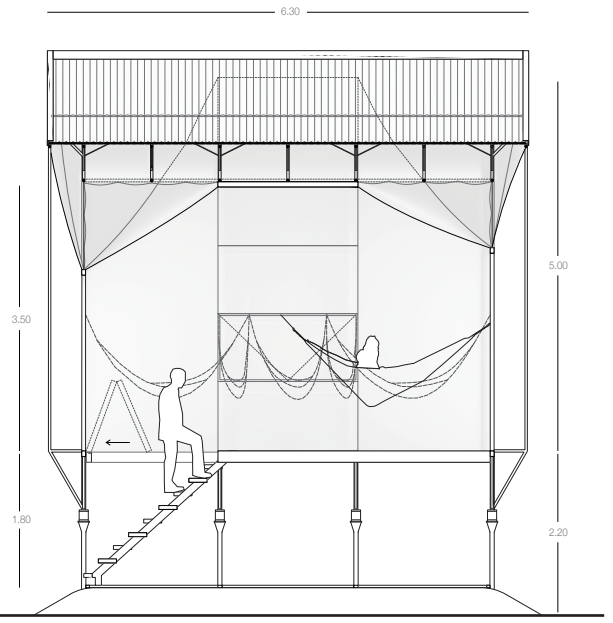
Plan 1:50 **N**



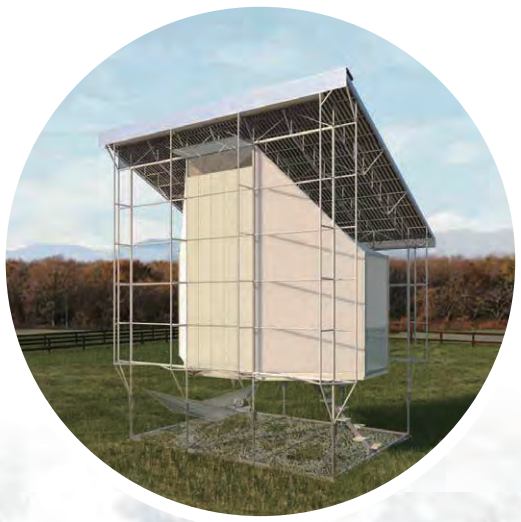
SW Elevation 1:50



SE Elevation 1:50



Long Section 1:50



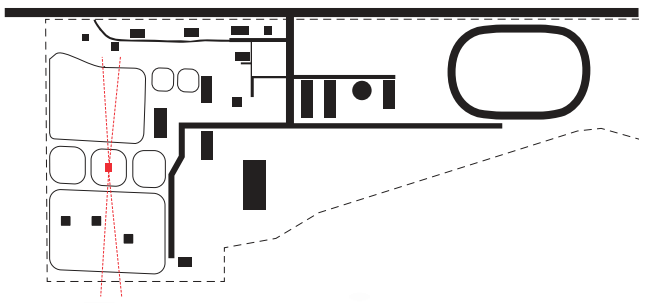
COMFORT AND LIGHTNESS Next Generation Sustainable House

Evanescent Envelopes

Change is the nature of the environment. Our proposal hinges on the notion of change and material flexibility, as principles for adaptation and mitigation in the face of dynamic conditions by embedding the minimum mechanics and thermodynamics necessary to activate the agile potential of change into architecture in a wide array of cycles and timeframes. We propose a lightweight, easily transportable and rapidly deployable shelter that can reconfigure its materiality to adapt to the climate and topographic conditions of the site, as well as the sociocultural agenda, both private or public, of the inhabitants.

Our proposal represents a platform technology that can be used to produce several different versions of a lightweight shelter with the potential to be reconfigured by it´s inhabitants, in order to establish a dynamic, ever-changing relationship with the environment. To achieve this, we propose an architecture that refuses a single, resistive thermal boundary. Our approach includes a series of layered envelopes, each designed to contribute in a specific way to the thermodynamics of the structure, capturing heat from the environment and storing it (latent heat through PCM technology) or reflecting it back to the inhabitants (radiation heat).

Raised off the ground, the minimum indoor space is a neutral canvas where private and public activities can take place. Timber flooring provides a pleasant indoor surface while sleeping or resting is carried out in hammocks. When the weather allows it, the hammocks can the fixed outside under the structure to relax and enjoy the surrounding nature. Transparent glazing frame the views of the surrounding landscape while translucent panels bring daylight in to create a warm and comfortable atmosphere. The roof integrates photovoltaic membranes to power basic artificial lighting and outlets. In the coldest conditions, the exterior mesh harvest the fog or captures the snow to produce a protective barrier against the wind, reducing heat losses and reconfiguring once more the exterior of the structure.



Site Plan 1:3000 **N**

Closed in winter and Open in Summer

The ability of the house to reconfigure the envelopes allows for maximum flexibility and adaptation to the environment´s weather patterns and seasons.

Cold weather performance

The house´s geometry takes into account the prevailing NW winds to shed snow into it´s aerodynamic shade, in order to reduce snow loads. Although a lightweight structure lacking thermal mass, the performance of the layered configuration is optimized to capture the radiant and convective heat loss of the inhabitants to passively maintain indoor conditions.

EVANESCENT ENVELOPES

Flexible Photovoltaic Membrane
Lightweight high-performance photovoltaic membrane, with integrated double-junction amorphous silicium cells that provide flexibility and higher efficiency in low light conditions or under snow cover, providing 1.5 KwH installed power capacity, completely attached to roofing system.

Rolled Roof System
Flexible roofing system composed of a battery of aluminum profiles running transverse to the primary structural members, within a vulcanized rubber layer with fabric reinforcement, providing an impermeable high-durability roofing system whch can be easily transported and installed.

Anodized Aluminum Structure
Modular and redundant structural solution, engineered for disassembly and transportation, composed of anodized aluminum trusses with bolted + insert connections. Structure is able to withstand snow and wind loads, as well as regional seismic factors. Overall weight of primary structure is 675 kgs.

Translucent Frame
Lightweight solution that distributes diffused daylight, even in cloudy conditions, to the interior space, while serving as a rigid base for the transparent operable windows. Composed of shatterproof, non-conductive structural thermal break composite sandwich panels (U-Value .08).

Plexiglass Glazing
Framing views to the natural environment of Taiki-Cho, transparent windows utilize double-pane Plexiglas inside an engineered frame that allow interface and support for the multiple layers of textiles in an integrated thermally-broken solution which is 50% lighter than the standard glazing.

Interior Textile
Directional breathable textile with two types of microencapsulated PCMs (Phase Change Material) which passively regulate indoor temperature within the range confort while removing excess humidity and avoiding condensation.

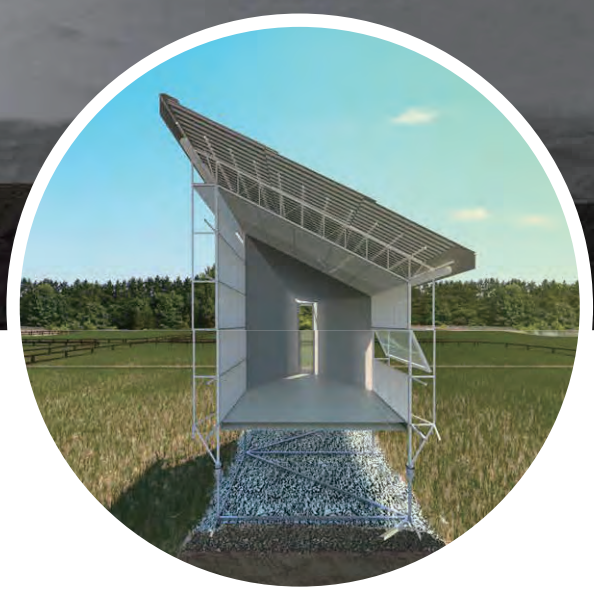
Intermediate Membrane
Double-layered removable membrane for winter use, breathable and waterproof to the outside. On the inside face, a simple natural wool insulation is coupled with reflecting aluminum foil patterns to reduce radiative heat loss from users.

External Mesh
Deployable HDPE mesh serving, in summer, as an adaptative shading device that protects the indoor spaces from solar gains. In the winter, the mesh acts as an additional layer when cold conditions appear, as supporting frame for frost that reduces heat loss by convection from interior envelopes.

CLT Flooring
Engineered modular flooring system using Cross-Laminated Timber components, carefully milled for ease of transport and assembly. CLT flooring panels provide excellent thermal insulation and low center of gravity, performing as a base for indoor activities with a kind floor finish materiality.

Seismic Damper
Serving as the connection between the foundations and the lightweight building, seismic dampers allow the supestructure to excell in wind load and seismic load conditions.

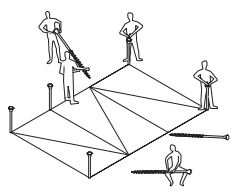
Ground Screws
Rapidly deployable foundation solution which requires no excavations or preparations and reduced post-ocupancy negative impact on the site. By fixing the lightweight superstructure to the ground, this system provides excellent lateral pressure loads mitigation, as well as 100% recuperation of foundation.



House Section in Summer
The house is well protected from solar gains, while the windows provide a natural passive ventilation and bring daylight in. The fixed windows frame the views and emphasize features that the site can provide, establishing an intimate visual relation between inhabitant and nature.

Assembly Process
(16 hours total with 5 persons)

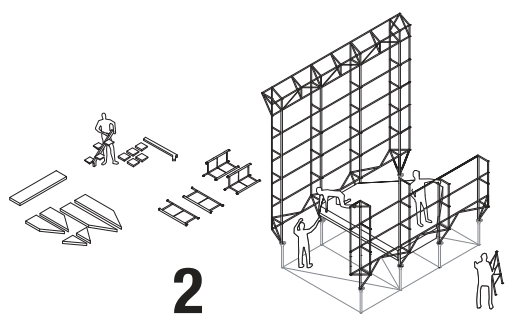
Assembly of this house does not require specialized skills or technical knowledge of construction. Each of the house component´s is designed not to exceed the lifting weight limits of a normal human.



1

Foundations (2 hrs.)

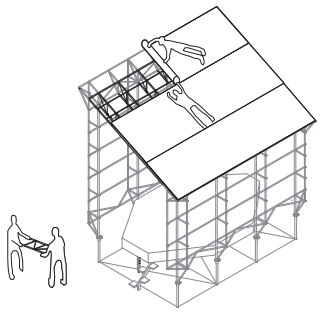
The assembly process starts with the overall cleaning of the site. After joining and resting the horizontal steel braces, which will serve as the dimensional guide for the foundations, the team proceeds to bury the eight (8) ground screws and attach the damper heads. Leveling of the top plates is the final milestone of this stage.



2

Structure and Flooring (6 hrs.)

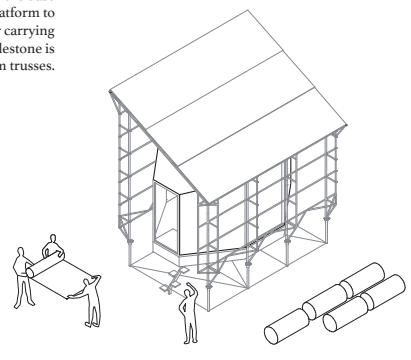
After securing the connection to the foundation, the team starts assembly of the structure by first consolidating the CLT flooring panels to the base structure to provide bracing and a raised platform to work in. The stairs are implemented for carrying components to the top levels. The key milestone is erecting all vertical aluminum trusses.



3

Roofing (2 hrs.)

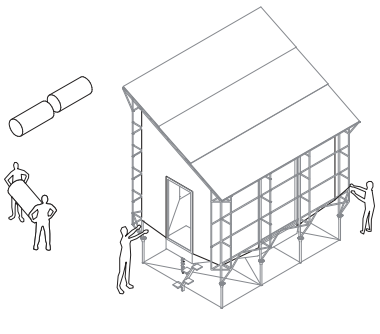
Once the structure has reached it´s maximum height, truss beams are assembled on the ground and raised to final location. Bracing elements are bolted and the primary structure is finished. Rolled roof elements are raised by hand and placed into position, while heavy-duty zippers consolidate the roof for future work under the protection from the rain and sun.



4

Glazing and Textile (4 hrs.)

Modular glazing panels and translucent panels are fixed to the primary structure, while sealing joints for optimum thermal performance. After rigid panels are finished, the interior textile is implemented, slowly applying traction and joining them together. The objective of this stage is to consolidate the inner-most layer of the thermal envelope.

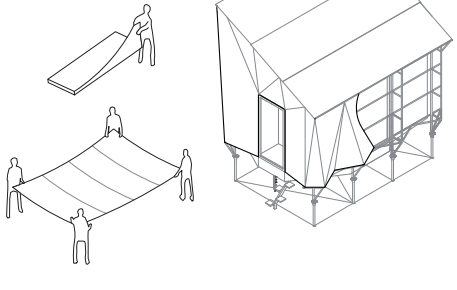


5

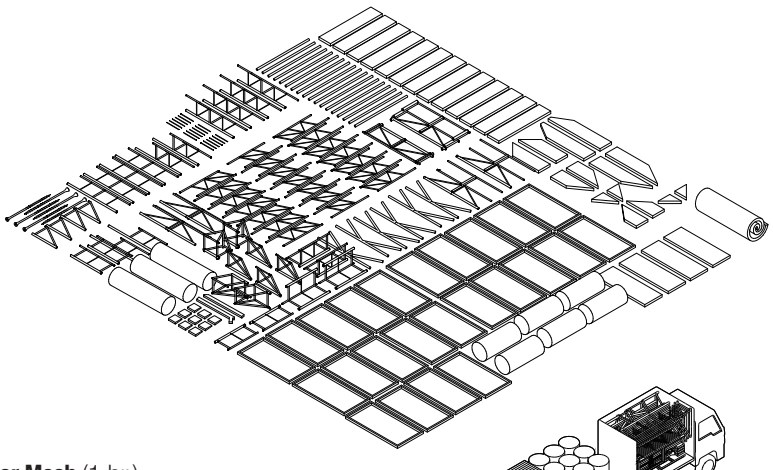
Intermediate Membrane * (1 hr.)

After the interior textile and glazing are in place, the intermediate membrane is implemented. Although heavier than the other textiles, the modularity allows for rapid fixation to the glazing and primary structure.

***** this step will be carried out according to the seasons and climate.



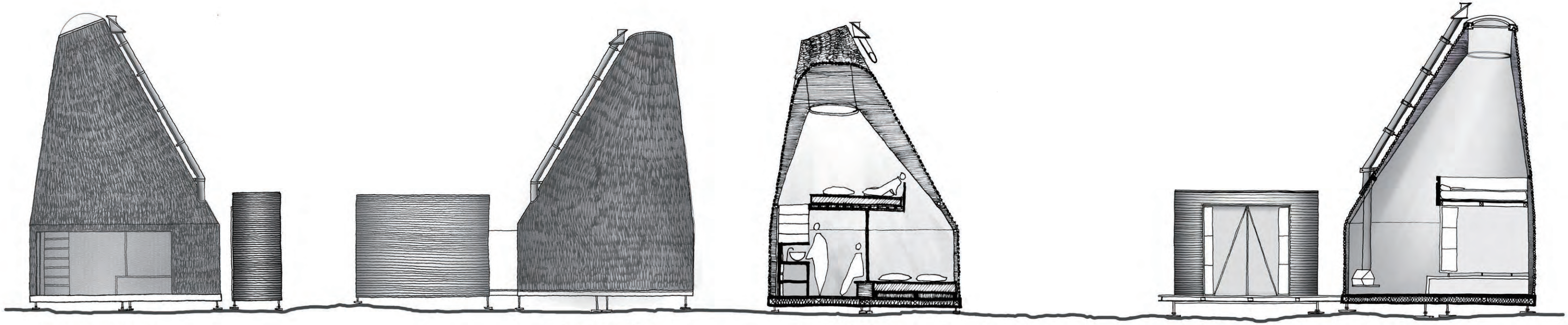
Transportation
All of the components and dead weight of the house is designed, dimensionally and geometrically, to fit into the standard Kei Truck payload and towing capacity. Longer journeys can be carried out in two (2) crates, for ease of logistical concerns.



6

Exterior Mesh (1 hr.)

The final stage is integrating the heavy-duty exterior blinds into the upper components of the structure and rolling the mesh into position. The primary structure is design to serve as ladder for this type of operations, which can be carried out in a small amount of time.



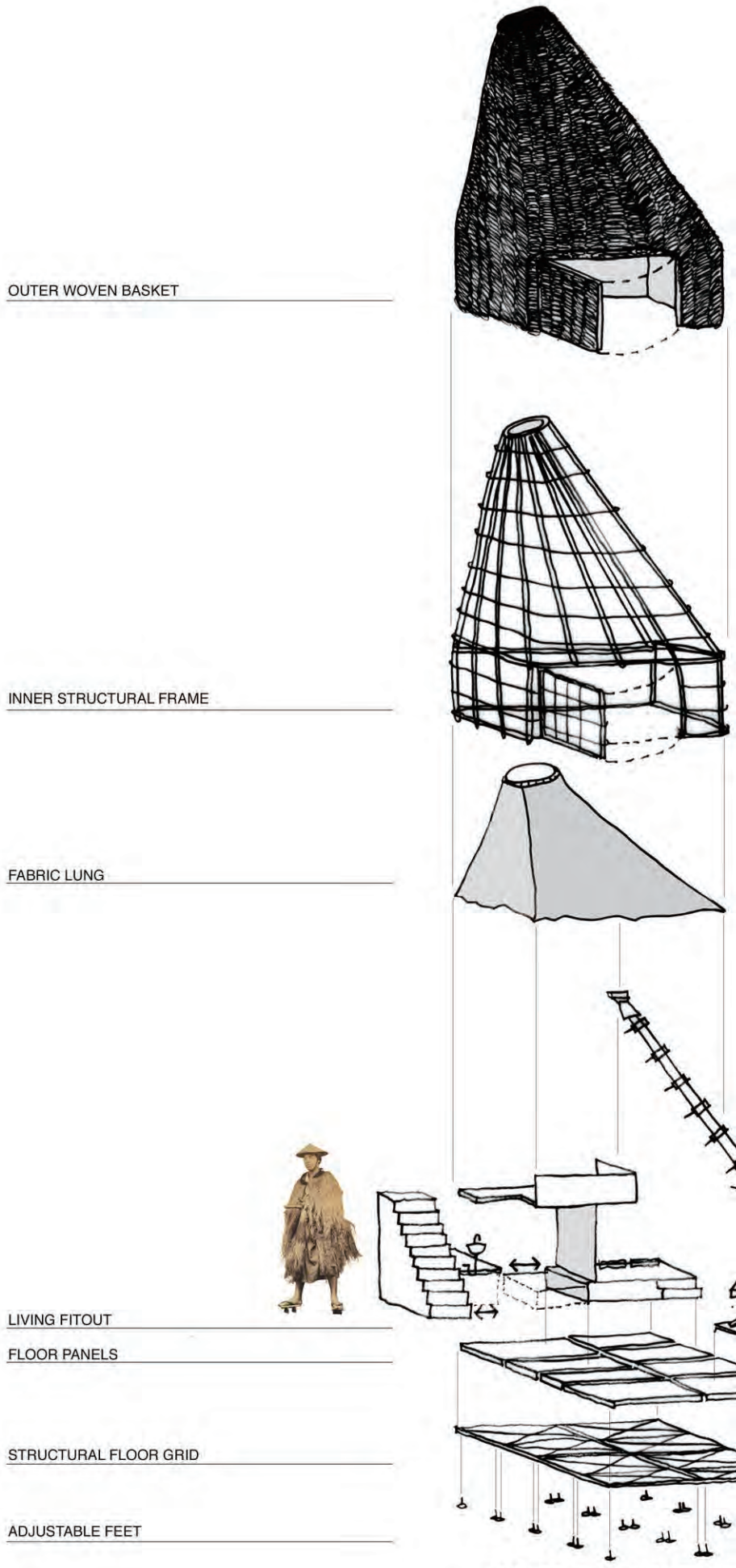
FRONT ELEVATION

0 1.5 4m

SIDE ELEVATION

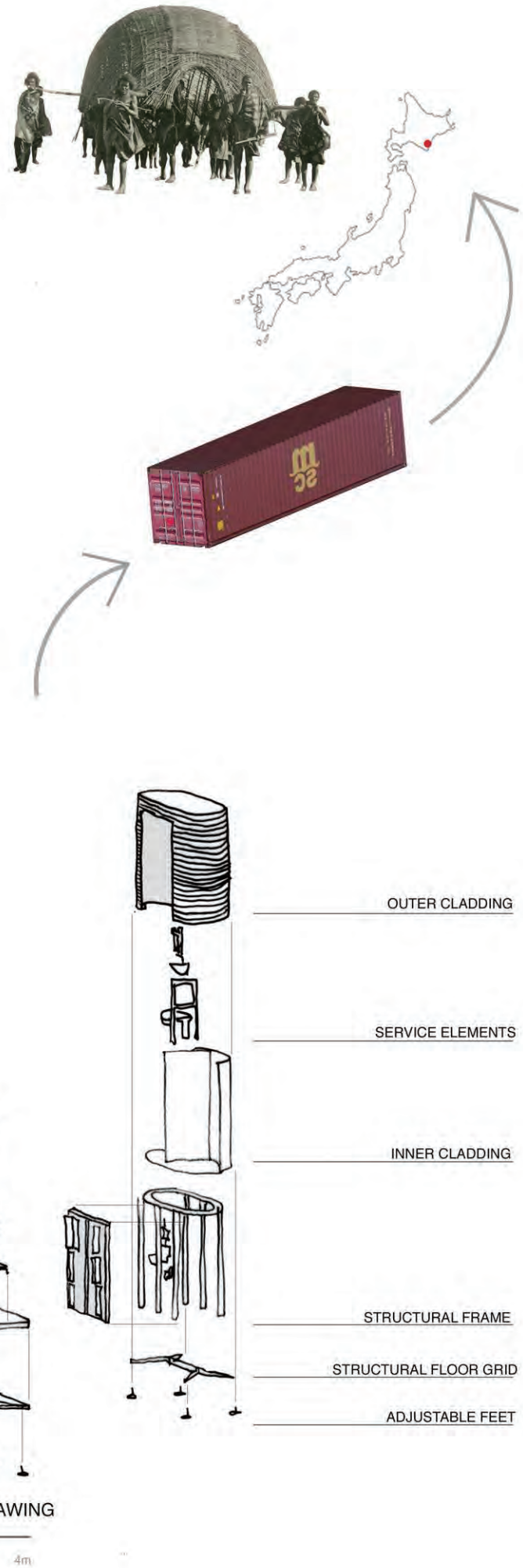
SECTION AA

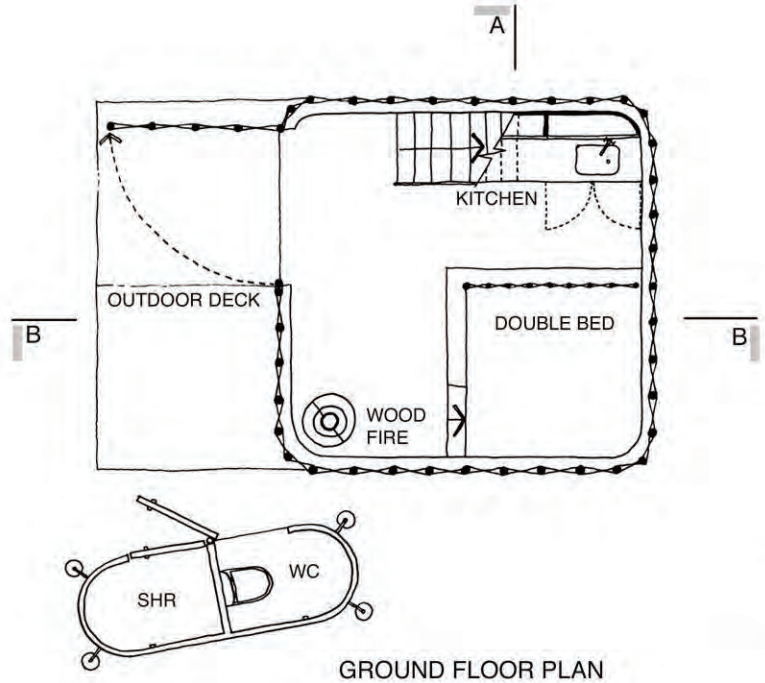
SECTION BB



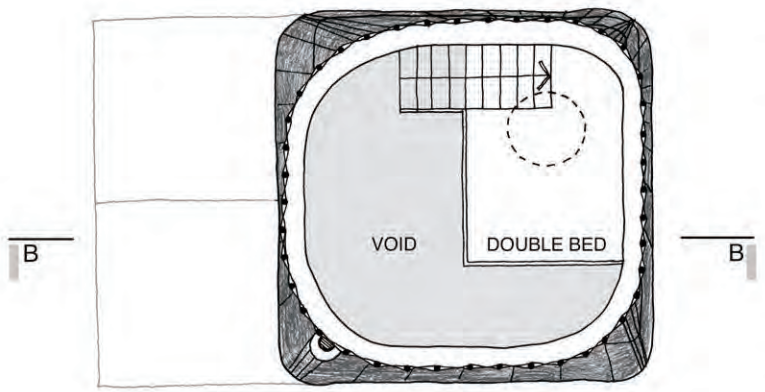
EXPLODED AXONOMETRIC DRAWING

0 1.5 4m

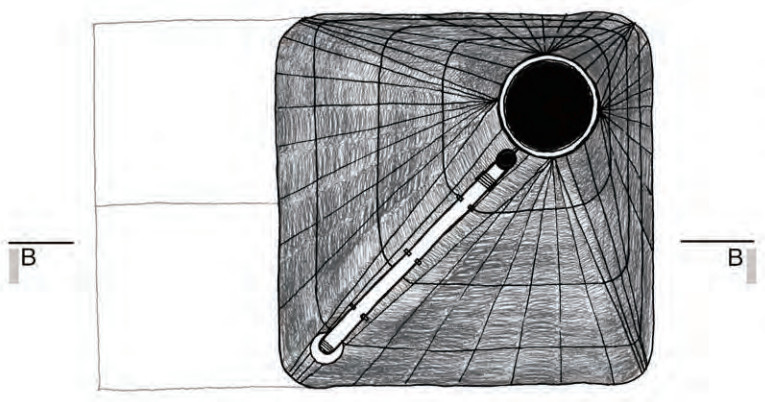




GROUND FLOOR PLAN



MEZZANINE PLAN



ROOF PLAN

0 1.5 4m

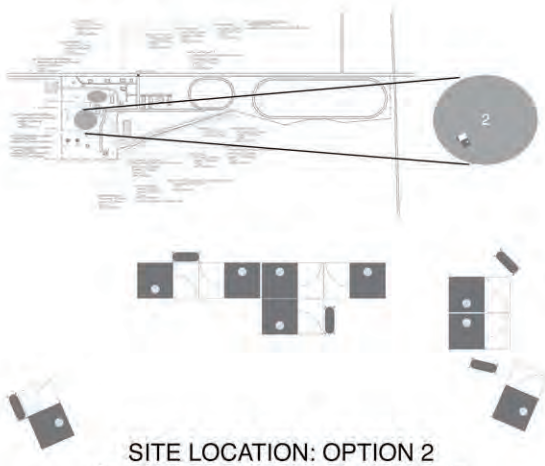
THE MOST ADVANCED

A WOVEN HUT

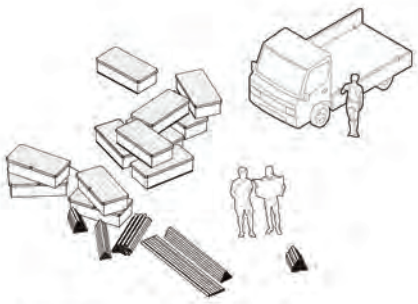
Fully modern humans have lived in the Western Cape for longer than anywhere else on earth, for 150 000 years. Their descendants still form part of the community. In the most distant past , the Khoi lived so close to the land that they didn't need to build, they used nature as a home.
When their society was changed by the arrival of cattle and sheep, it became necessary for them to follow the seasonal migration of their livestock as they followed the seasonal movement of the rains. In response they developed a way of making buildings which could be moved on the backs of their cattle - it was the most advanced use of the technology available.

Some of the descendants of the Khoi still live in those ancient houses, in isolated areas where there is no work and they no longer are able to roam unimpeded by fences. We would like to learn from them how to make these buildings without embodied energy, without money because it seems that natural materials are now the most modern materials.
It doesn't snow in Namaqualand, and rains very little, so the grass dome which works so well here wont work in Japan. Instead we have made a tall form, with a fireplace and an inner lining which can be adjusted to keep the warmth down low where its needed, whilst at the top, a plexiglass lens can catch the lower light of Hokkaido, and solve the problem with thatch roofs everywhere - water getting in where the slope isn't steep enough.

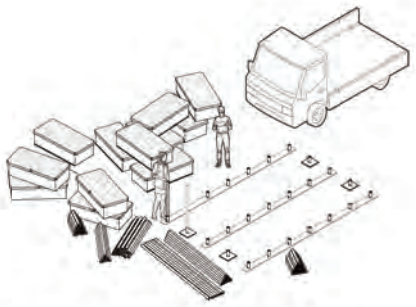
We propose having the building made not in Japan, but in South Africa, by the people whose ancestors built this way. They still have the knowledge and the skills, but those are dying out with the older people. We believe that the money would go a lot further, and do a lot more good in that community. The buildings are made from thin sticks and grass mats, a structural grid with a textile skin. The parts can be pre formed, packed in a shipping container and sent as an export product, reversing, just a little, the flow of global capital. We believe that would be the most advanced use of technology available.



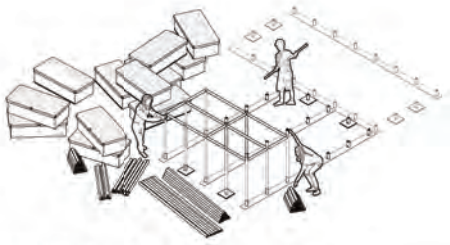
SITE LOCATION: OPTION 2
As a single unit, or arranged as a community.



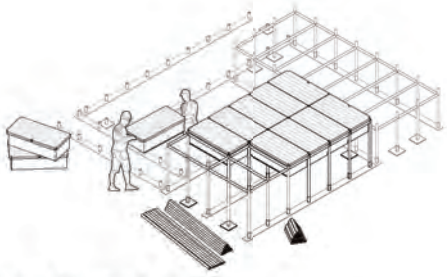
MEMU MEADOWS 8:00
The Kei Truck arrives with the first 'kit of parts' and instructions.



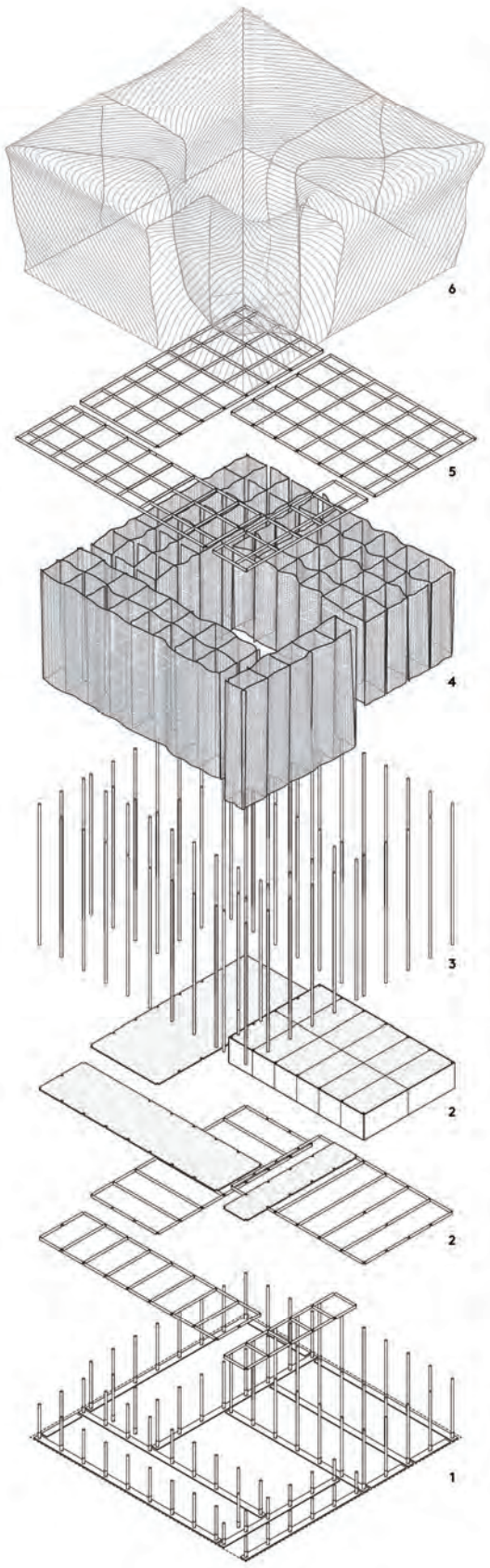
MEMU MEADOWS 9:00
150mm wide foot plates are laid out and connected to form the footings.



MEMU MEADOWS 10:00
1200mm high extrusions are added to the foot plates to begin the platform.



MEMU MEADOWS 12:00
The 600mm x 1200mm floor panels are inserted between the metal poles.



6. THE OVERCOAT
An outer layer providing waterproof protection and warmth when required. This outer layer can be adjusted to cloth different segments of the structure in different conditions. Custom sewn from hi-tech 40D nylon the fabric repels water and provides shelter from the weather. The overcoat can be pegged firmly to the ground in harsh conditions.

5. THE ROOFGRID
The roofgrid expresses the module of the structure. It is a 600mm module constructed from recycled materials gathered from decommissioned children's schools. Custom designed curtain systems are integrated into the prefabrication of these elements. Drawing on the techniques of scaffold construction, the 48.3mm diameter extrusions are fixed together using a unique timber click-and-lock joint system.

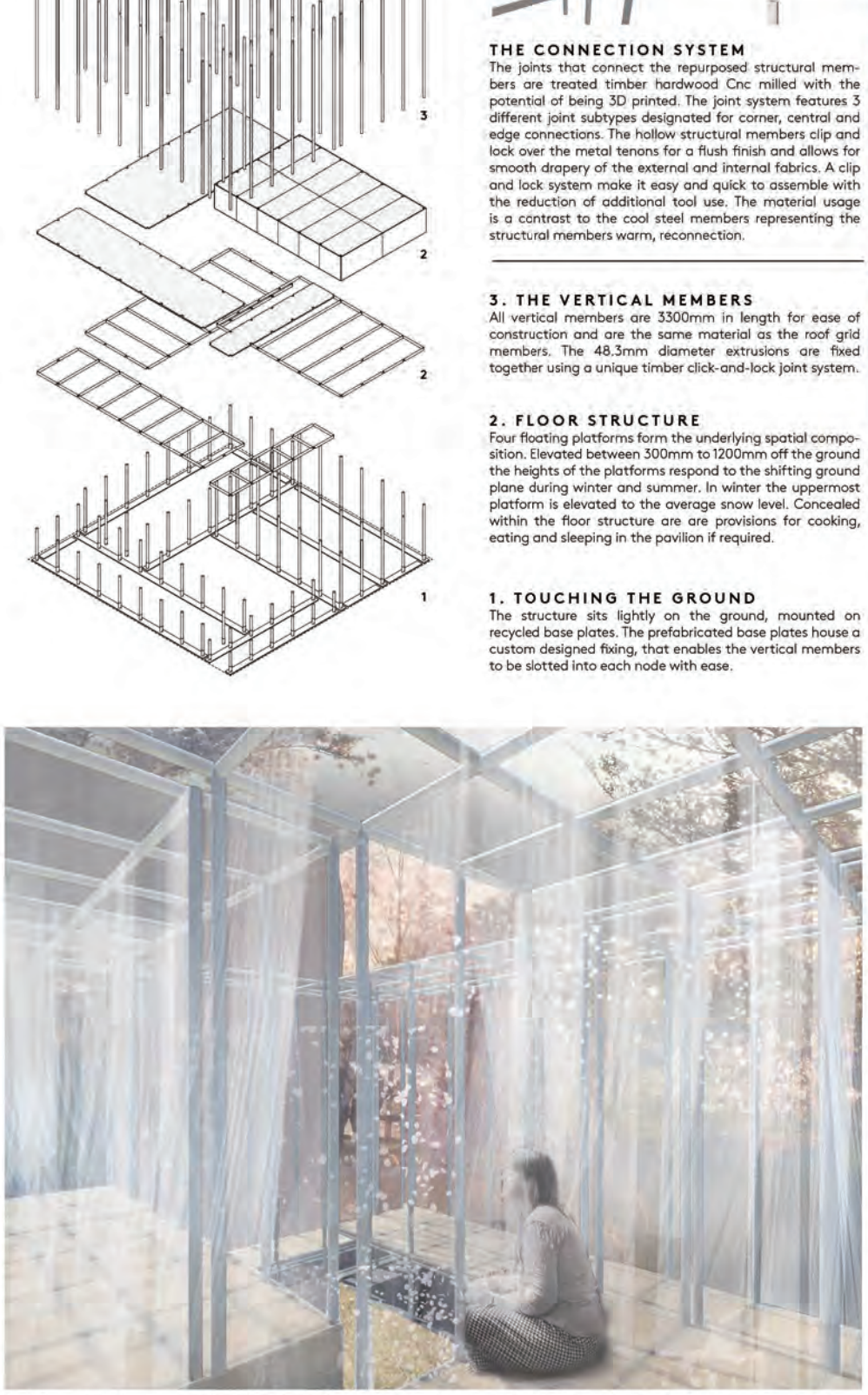
4. THE CURTAINS
600mm wide lightweight mesh curtains hang from the roof grid and form a diaphanous maze of flowing fabric. 20D nylon creates permeable layers of visibility. The fabric allows people to dissolve into the building.

THE CONNECTION SYSTEM
The joints that connect the repurposed structural members are treated timber hardwood Cnc milled with the potential of being 3D printed. The joint system features 3 different joint subtypes designated for corner, central and edge connections. The hollow structural members clip and lock over the metal tenons for a flush finish and allows for smooth drapery of the external and internal fabrics. A clip and lock system make it easy and quick to assemble with the reduction of additional tool use. The material usage is a contrast to the cool steel members representing the structural members warm, reconnection.

3. THE VERTICAL MEMBERS
All vertical members are 3300mm in length for ease of construction and are the same material as the roof grid members. The 48.3mm diameter extrusions are fixed together using a unique timber click-and-lock joint system.

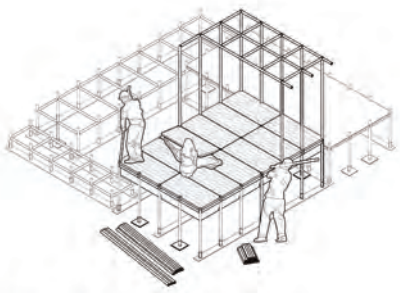
2. FLOOR STRUCTURE
Four floating platforms form the underlying spatial composition. Elevated between 300mm to 1200mm off the ground the heights of the platforms respond to the shifting ground plane during winter and summer. In winter the uppermost platform is elevated to the average snow level. Concealed within the floor structure are are provisions for cooking, eating and sleeping in the pavilion if required.

1. TOUCHING THE GROUND
The structure sits lightly on the ground, mounted on recycled base plates. The prefabricated base plates house a custom designed fixing, that enables the vertical members to be slotted into each node with ease.

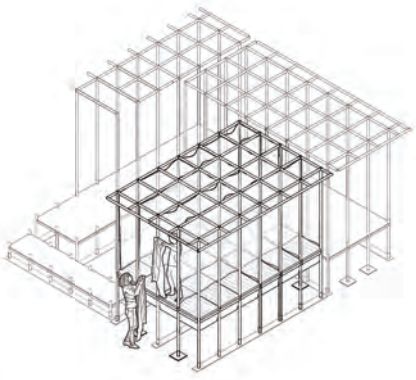


Sunlight streams down warm and gentle. Curtains billow, moving in the breeze. Blossom falls - a gentle rain of sweet smelling perfume. The threshold between inside and outside is blurred.

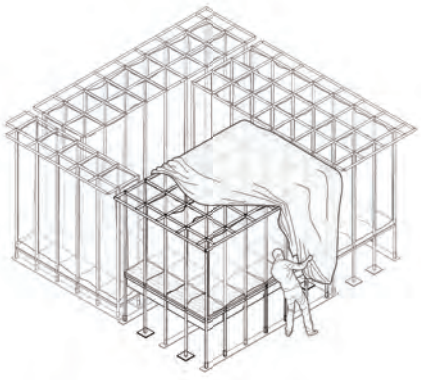
Cold winter, harsh wind blows but it is warm inside, soft and close. Pools of fabric gather within whilst the overcoat forms a strong, tight protective shelter.



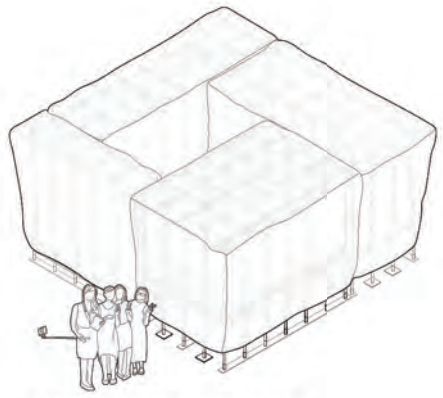
MEMU MEADOWS 13:00
3300mm extrusions rise up from the floor to begin the roof. The fabric is removed from inside the 'smart floor'.



MEMU MEADOWS 15:00
Pieces of thermal fabric are threaded through the grid roof structure.



MEMU MEADOWS 17:00
The final layer of waterproof fabric is pulled over each part of the structure.



MEMU MEADOWS 18:00
On the Veranda is complete.

ON THE VERANDA

IN BETWEEN COMFORT + LIGHTNESS

NARRATIVES IN TRANSIENCE

Temporary structures reflect a state of transience: of being and non-being, place and non-place. Similarly, patterns of human occupation can be traced as global narratives that tell of the transient values of our species. One current global narrative reveals a story of mass urban migration and an ever-widening gap in our connection to nature. Reflecting a state of perpetual change, *On the Veranda* endeavours to generate discussion and reflect on the process of urban migration.

LIGHTNESS IN SUSTAINABILITY

Constructed using recycled materials from decommissioned schools, the pavilion evokes the form of a children's playground. The lightweight structure and custom-designed joints evoke the rapid assembly methods of scaffolding. An easily demountable structure, the pavilion relocates to different places in order to experience each place in the optimum season – enjoying winter in Hokkaido before moving to different cities across Japan. Through its journey it both embodies and communicates a narrative of urban migration: raising awareness about sustainability, repurposed materials and a reconnection with nature.

NATURE IN VERANDA

Spatially, the pavilion takes the form of the Australian veranda, a concept that epitomises a spatial non-condition of both presence and absence. As an interstitial space, the veranda is a moment of informal exchange: a living space, shelter, refuge, and place to pause in the process of acclimatization. In Japan, the Engawa similarly acts as a bridging device between house and garden. As a series of floating platforms around a central courtyard *On the Veranda* reasserts the importance of the environment, conceptually replacing the 'house' with 'nature'. The varying heights of the platforms enable the veranda to be enjoyed in all seasons, and conceal provisions for cooking, seeping and additional warmth within the floor depth.

COMFORT IN CLOTHING

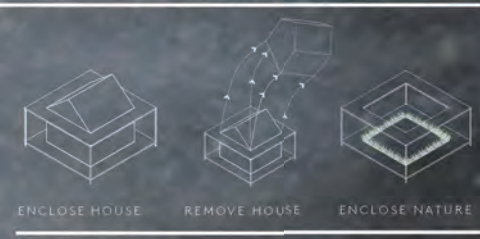
As an interstitial space, On the Veranda questions the nature of enclosure, challenging the requirements of walls, roof and floor. Instead, comfort is achieved by the ability to, 'clothe' and 'unclothe' the playful skeleton structure with a durable, protective, nylon 'overcoat', depending on the climatic conditions. Within the structure, diaphanous mesh curtains provide layers of permeable enclosure, and visualise a state of perpetual movement in response to changes in the wind.

CONCLUSION

On the Veranda embodies the transience of human migration and communicates the need for sustainable and renewable construction. Utilizing decommissioned school building materials and journeying around Japan, it raises awareness of sustainable construction and simultaneously disseminates the narrative of urban migration embedded within those materials. As both architectural experience and exhibition piece, the form, structure and materiality of *On the Veranda* reflect a state of movement and transience in between comfort and lightness.

VERANDA

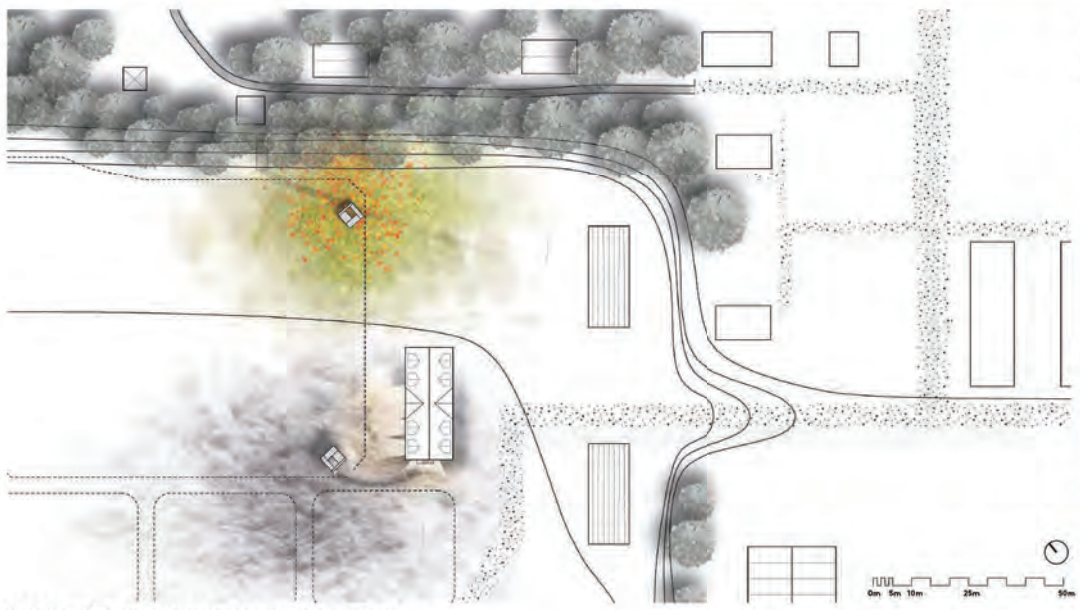
ENGAWA



CONCEPT

AUTUMN: 1400 MEMU MEADOWS

WINTER: 1000 MEMU MEADOWS



MEMU MEADOWS SITE PLAN - 1:1000
As part of the narrative of temporality, *On The Veranda* has the ability to 'dance' around the site, choosing the best locations for the season and function of the building at the time. This site plan proposes that *On The Veranda* could aid the conference centre during the autumn season, catering to the influx of sudden occupation and cling to the accommodation building during the colder months for easy access to amenities.

SUMMER: 2100 TOKYO ROOFTOP
Transported to a rooftop in Tokyo at Tokiwa Elementary School. *On the Veranda* lives here for three months teaching city dwellers about transience and urban migration.

SPRING: 0630 SENZOKUIKE PARK IN TOKYO
On the Veranda migrates to an urban park for cherry blossom season. The overcoat is packed underneath, the diaphanous curtains are allowed to shift with the winds. Cherry blossoms collect in the inner courtyard.

Light Skin House

ライトウェイトな快適さとは、外部と内部を完全に遮断することで快適な生活環境を獲得するやり方ではなく、より自然に近い状態で成立させることだと考えました。

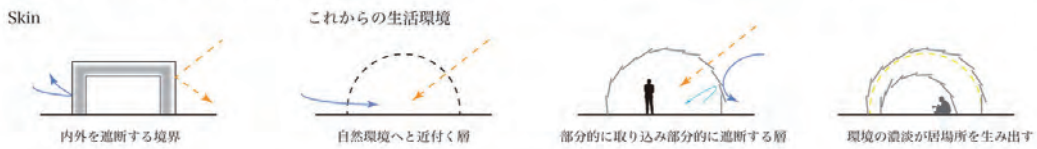
Light skin house は衣服のように季節や外部環境に合わせてフレキシブルに形状やレイヤーを調整し、内部環境をつくり出します。快適な環境を作り出します。建築の外皮によって温熱や光環境を遮断するものではなく、必要なものは外部から取り入れ、不要なものは吐き出し、呼吸をする組み立て可能な家です。

波板という軽い素材を直行方向に２枚重ね合わせ、強度のあるパネルユニット=Light skin をボールジョイントにより形成します。Light skin には、「光を取り込む透明なユニット」、「断熱材を挟んだ白いユニット」、「白いユニットの片面にアルミを溶着したシルバーのユニット」があります。シルバーユニットは人間から発せられる熱を反射し、輻射熱を与える外皮となります。また、夏には太陽光を反射する外皮となります。
これら３種類の Light skin を季節や場所、環境に合わせてフレキシブルに組み合わせることで、呼吸する軽い皮膚を持った家が自由に形成できます。

雄大なランドスケープにとけ込む大きな家や、３つの層を重ね厚い空気層を含んだ家、いくつかに分節された家など、大樹町から都市への広がりを見せる家を目指します。

00. 軽い層で生まれる呼吸する建築

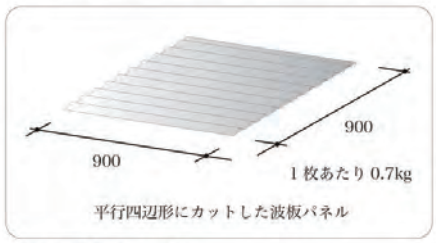
Light skin を介して外部から太陽熱源を取り入れ、内部の熱は逃さず、冷気を遮断します。



Light　大樹町の風景に変わる建築

小さな単位で構成することで、季節・場所・時間・人数に合わせてフレキシブルに環境に対応できる建築を作る。熱源を集め複層した暖かい小さな小屋、あるいは雄大なランドスケープとなる。

01. 建築を小さな単位で構成する

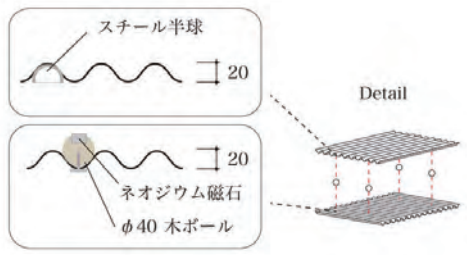


移動可能な建築をつくる材料に、どこでも手に入れる事ができるポリカーボネート波板パネルを使用します。耐水性にもすぐれ、簡単に組み立て解体が可能な規格したユニットをつくることで、集合体をつくります。

加工が容易な素材を使用する

ボールジョイントによる接合

波板を直交方向に２枚を重ね合わせることで、中空層が生まれ、構造強度を担保するユニットを形成します。球状のジョイントでつなぐことで、様々な向きに変えながらパネルを組み立てることができます。

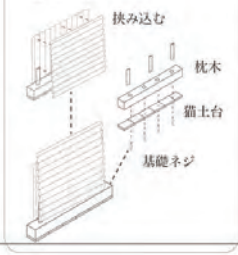


波を直交させることで強度が増す

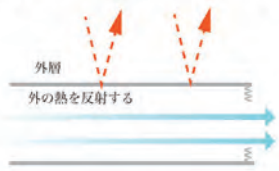
1. ボールジョイントをユニットで挟む　2. 角度をつけながら固定する　3. 立体的に重ね合わせる

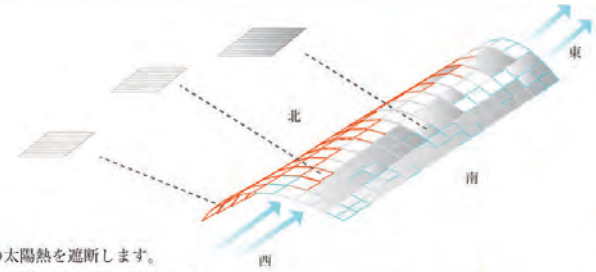
環境を操作するパネル

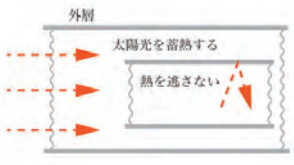
基礎詳細図



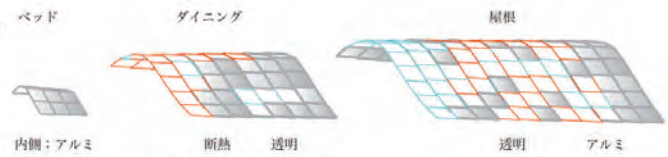
02. 季節に合わせて重ね着する



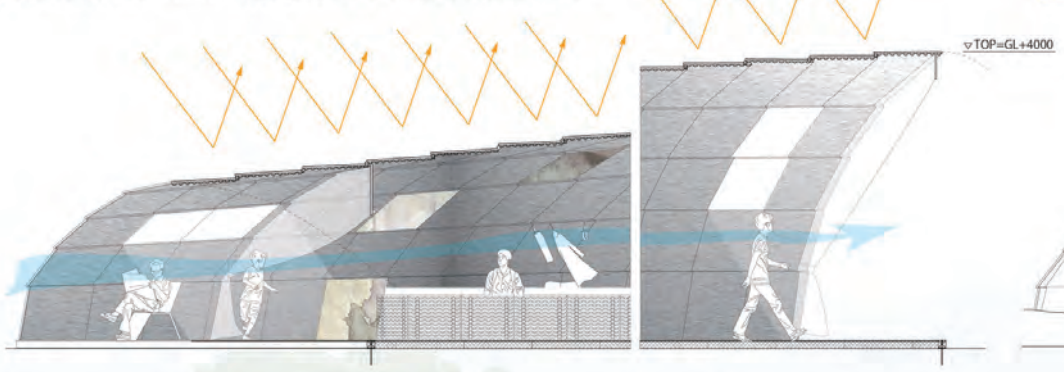




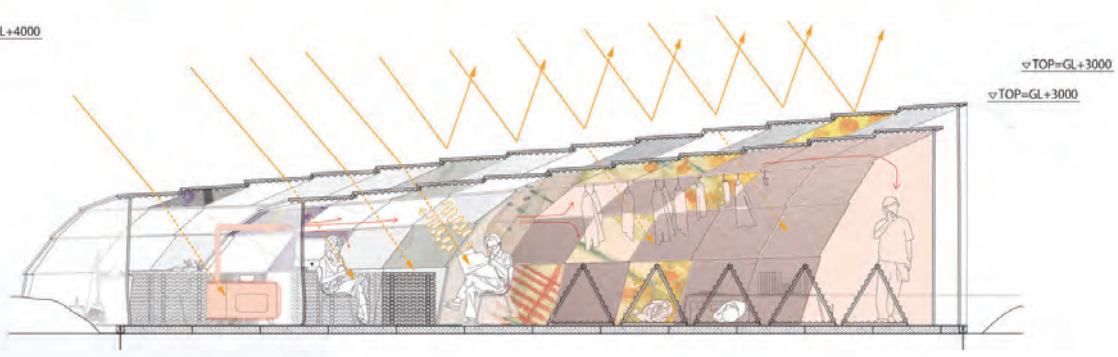
フィルムカーテン

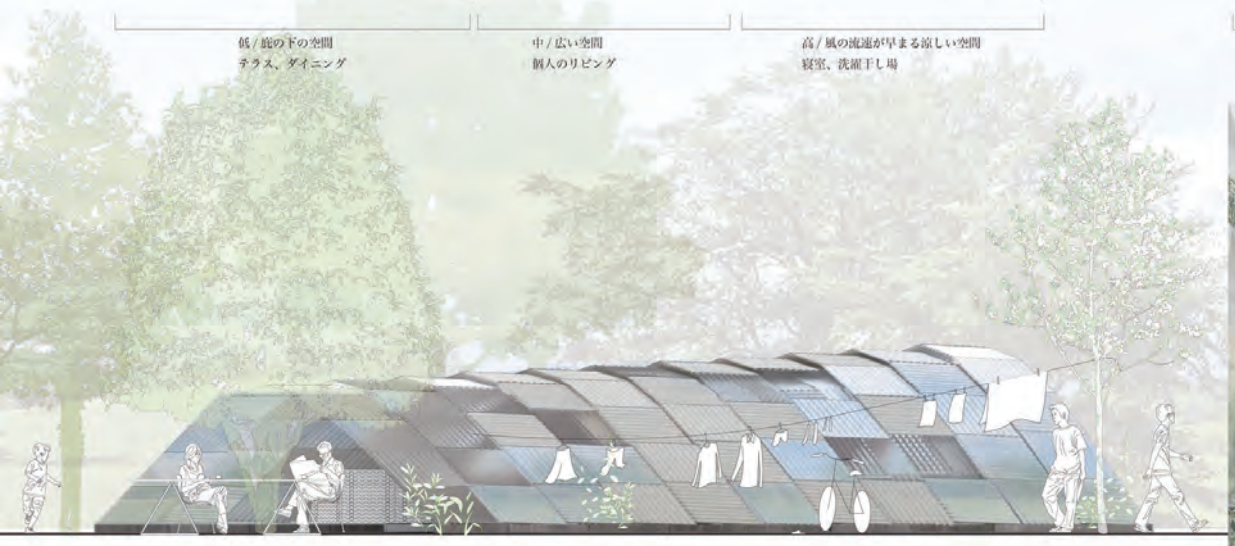


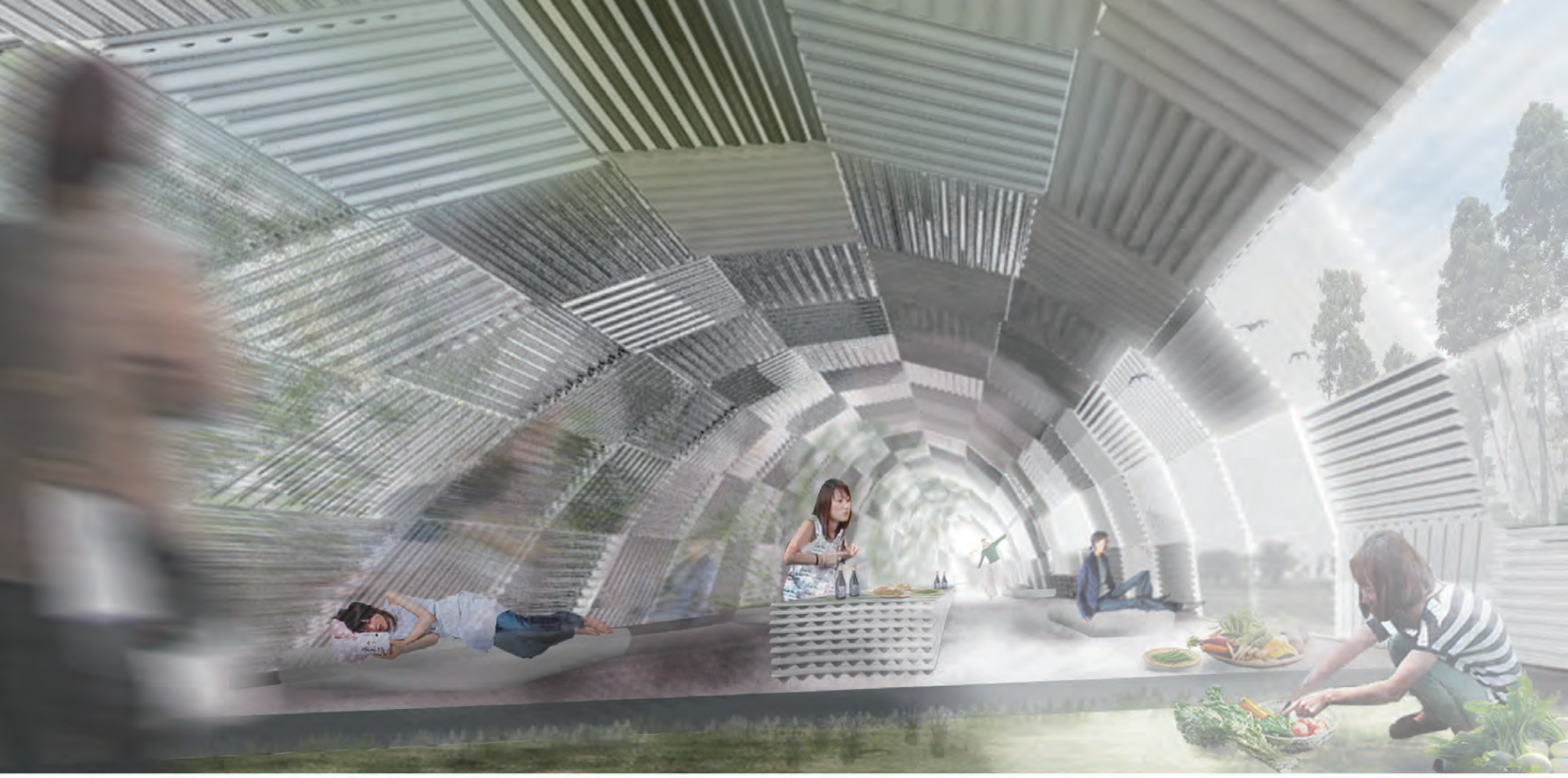
夏　夏は１枚の大きな外皮をまとい、熱を遮断し、南からの太陽熱を遮断します。
また西と東のフィルムカーテンを開け放し、西から吹く大樹町の風を取り込みます。



冬　冬は衣服に近い外皮、空間を囲い取る外皮、外部環境との境界となる外皮、それらの間に生まれる空気層を重ね着し、暖かい装いとなる。





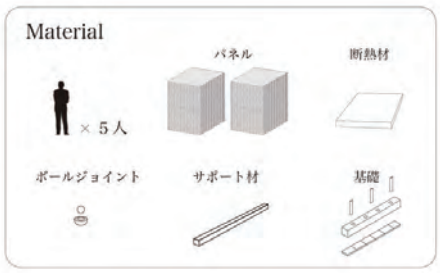


建築の組み方

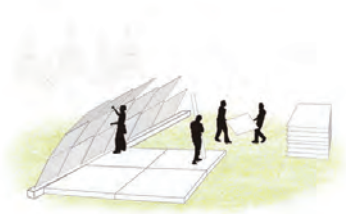
3種類のパネルをマグネット付きのボールジョイントで重ねながら接合していくだけの簡易な工法。
パネルの割合によってグラデーショナルな領域をつくり、その中を遊牧するように自分の居場所を見つけていく。

8:00 整地 / 8:30 角材に基礎を打つ / 10:00 断熱材を敷く / 11:00 サポート材を組む / 13:00 パネルを運ぶ / 14:00 パネルを組み建てる / 16:00 建て具を取り付ける / 解体

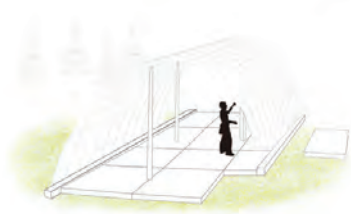
Material



1. 床の設置
105 角の製材で枠をつくり、スタイロフォームを敷き込む



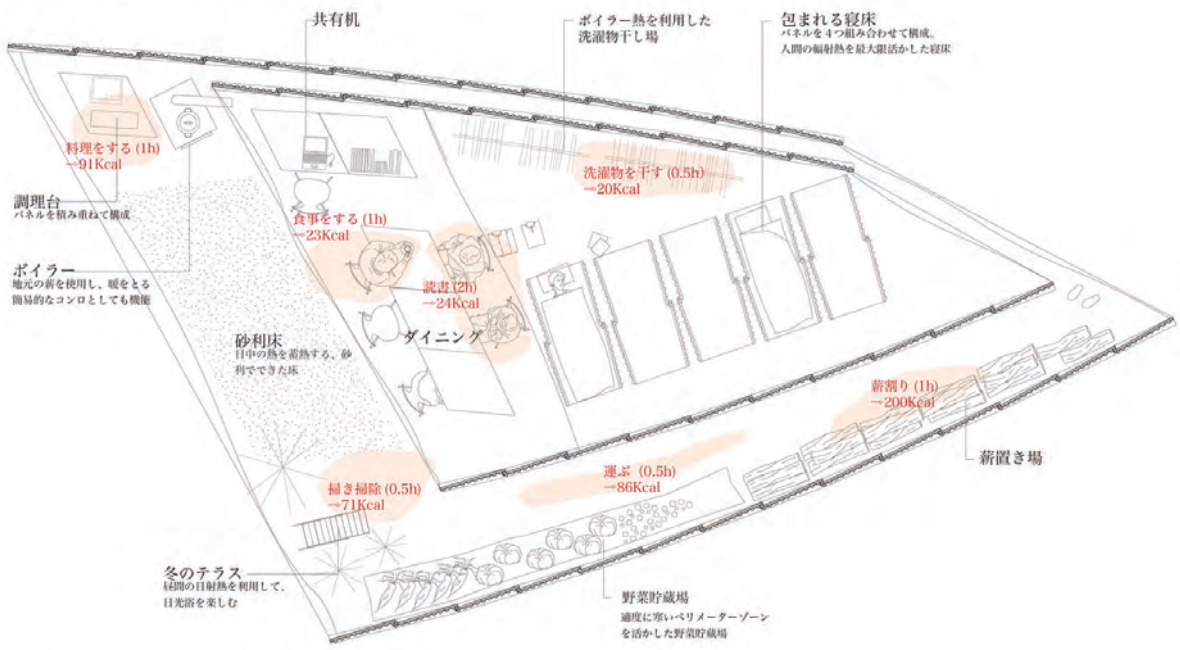
2. 仮設サポート材の設置
パネルを組むための最低限の仮設材を設置する



3. パネルの組み立て
3種類のパネルをジョイントさせていく

4. 出入り口の設置
遮熱効果のあるビニールカーテンを設置する

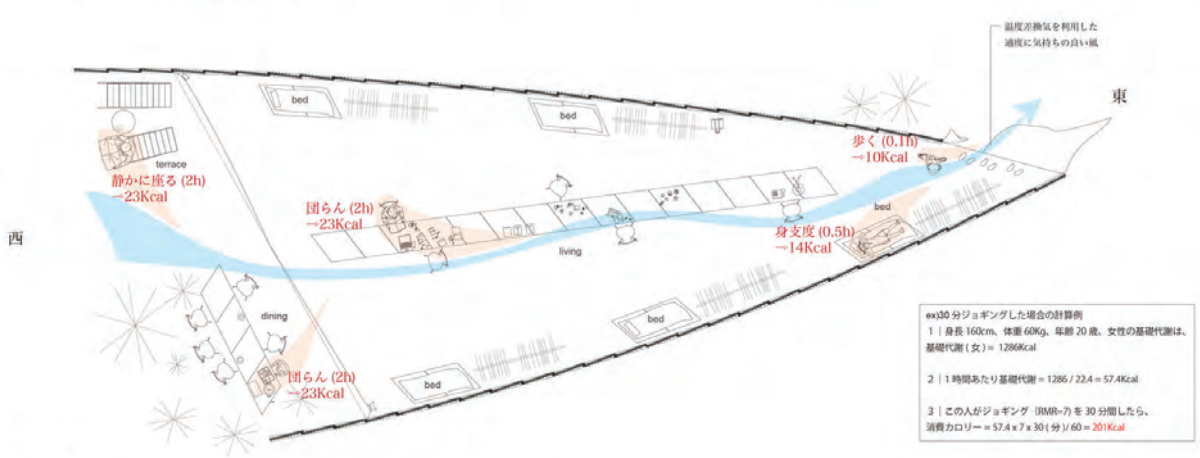
活動によるエネルギーを蓄える



Winter

冬はお互いが近い距離で過ごし、各々が発する熱が集まり、反射することで家全体が温まる。

S=1/50 N 0 20m



ex)30 分ジョギングした場合の計算例
1｜身長 160cm、体重 60Kg、年齢 20 歳、女性の基礎代謝は、
基礎代謝 (女) = 1286Kcal

2｜1 時間あたり基礎代謝 = 1286 / 22.4 = 57.4Kcal

3｜この人がジョギング（RMR=7）を 30 分間したら、
消費カロリー = 57.4 x 7 x 30 (分)/ 60 = 201Kcal

Summer

夏はお互いが距離をとって暮らし、温度差換気によって得られる涼しい風を最大限取り込みながら生活する。

S=1/100 N 0 20m

人間の日常時のエネルギー代謝率 RMR

昼寝	0
身支度	0.5
食事	0.4
昼休み	0.4
静かに座っている	0.2
読書	0.2
団らん	0.2
入浴	2.3
炊事	1.6
洗濯	1.7
洗面	0.7
洗濯物干し	1.6
アイロンかけ	0.7
拭き掃除	3.8
掃き掃除	1.7
掃き掃除	2.5
庭掃き	1.8
裁縫	0.5
机上事務	0.4
子供をだく	0.4
子供をだいて歩く	3.1
看病	1.6
園芸	2
階段上る	6.5
階段下る	2.6
自転車	2.9
ラジオ体操	1.6
徒歩通勤	4
乗物通勤	1
自動車運転	1
運転	1.5
電話交換	0.5
一般事務	1.5
郵便配達	3
軽い農作業	3.5
土建労働	5
歩く (50m/ 分)	1.6
歩く (60m/ 分)	1.8
歩く (70m/ 分)	2.2
歩く (80m/ 分)	2.8
歩く (90m/ 分)	3.7
歩く (100m/ 分)	4.7
かけ足 120	7
準備体操	4
足ふみ	3.8
なわとび	8.2
ジョギング	7
マラソン	14.5
サイクリング	3.4
卓球	4
遠泳	7
自由形	20
背泳ぎ	45
バレーボール	2.1
野球	2.7
サッカー	6.7
スキー歩行	3.3
スキー	10
スケート	6.3
ゴルフ	3.6
プロスポーツ	7
相撲けいこ	33
食事	0.4
身支度	0.5
洗面	0.5
自動車運転	0.5
そろばん	0.6
OA 機器	0.6
靴磨き	1.1
ゆっくり歩行	1.5
手洗い洗濯	2.2
電気掃除機	1.7
入浴	2.3
ゲートボール	2.0
雑巾がけ	3.5
急ぎ足	3.5
布団上げ	3.5
キャッチボール	3.0
ラジオ体操	3.5
階段を上る	6.0
テニス	6.5
クロスカントリー	9
クロール	20