

- Polycarbonate roof**

Translucent polycarbonate allows diffused daylight to enter the space whilst reducing glare. The draping cocoa PLA creates warm tones. The introduction of both transforms the roof into a protective envelope and as a sensory device.
- Queen post truss**

Its form efficiently distributes load whilst creating open interior spaces. The exposed timber framework creates a sense of openness. It extends traditional Japanese construction principles.
- Sujikai (Diagonal brace)**

Stabilises the timber frame against lateral forces, e.g. wind loads.
- Interlocking timber**

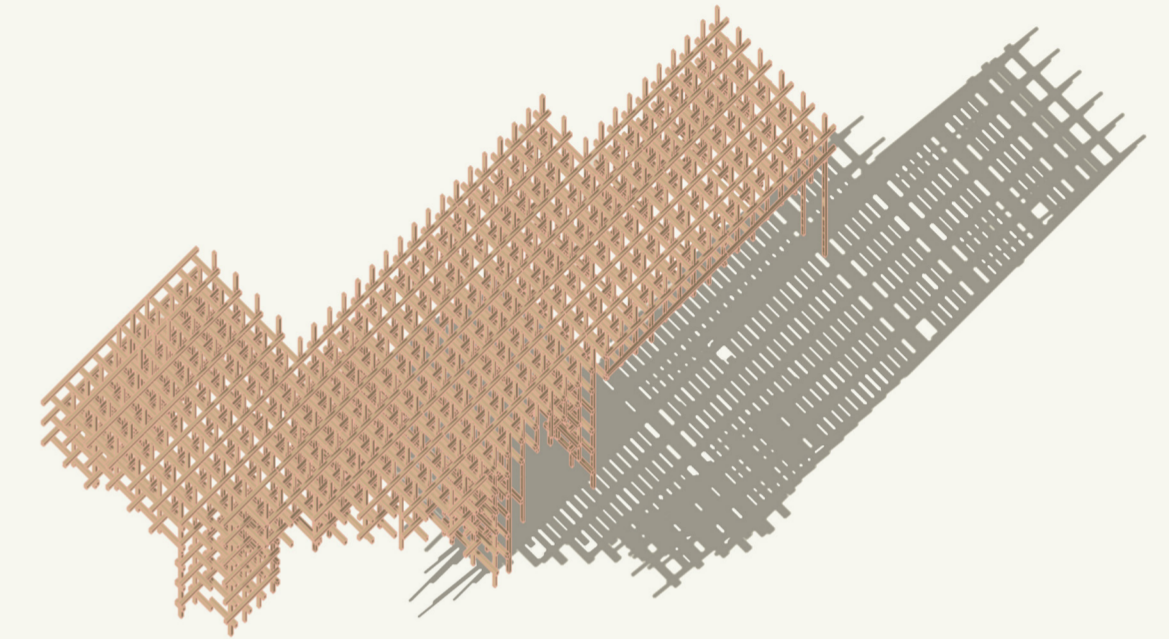
Interlocking timber joints reduces reliance on mechanical fixings.
- Windows**

Created using a layered sandwich system that combines cast glass with cocoa-infused PLA.
- Hashira (Vertical post)**

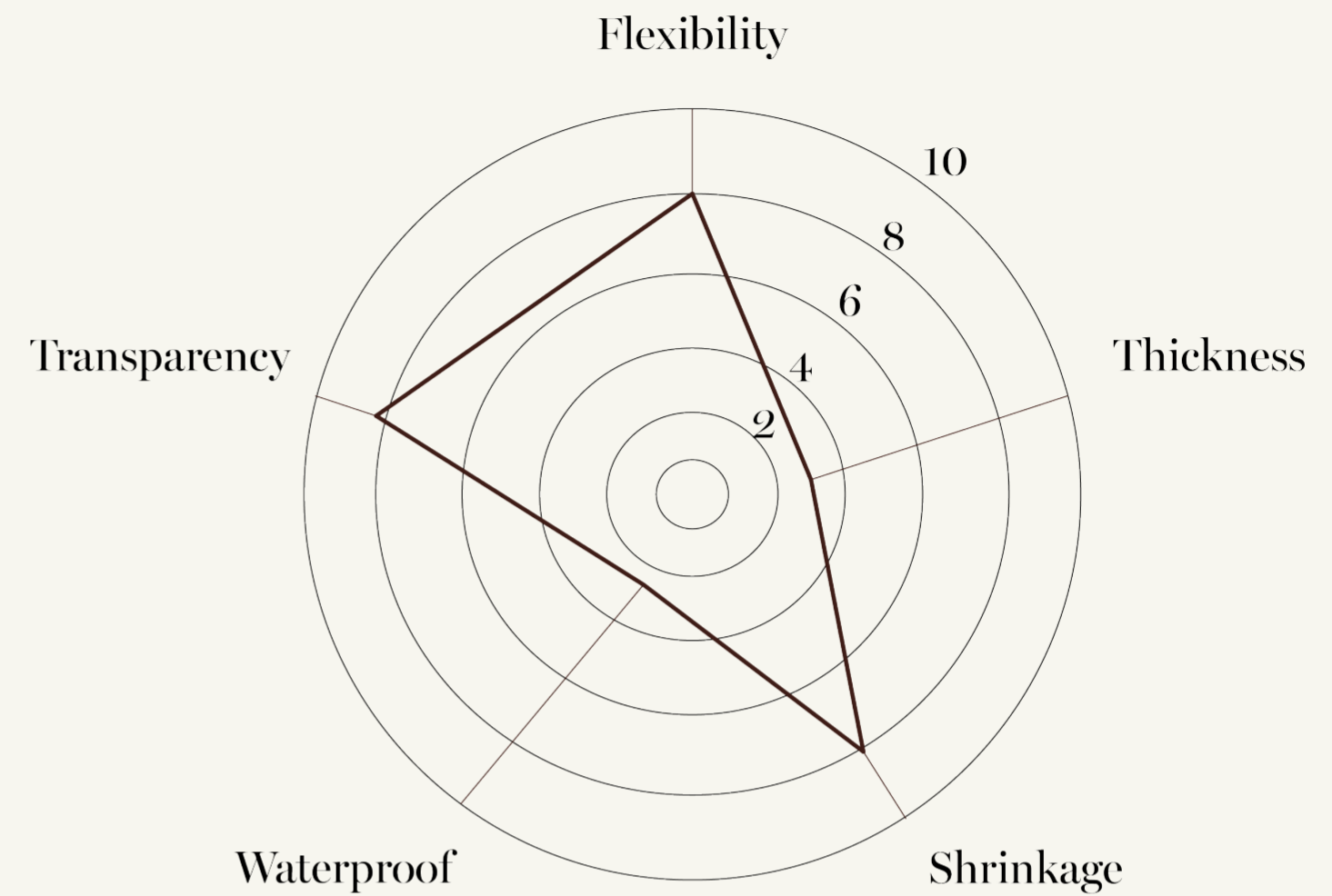
Forms the primary vertical structure, drawing from traditional Japanese timber construction.
- Wall**

The walls act as both as an enclosure and a filter, defining internal spaces.
- Foundation**

The concrete footings stabilise the timber framework whilst also creating a durable base.



The project explores materiality as both an environmental strategy and as a method of shaping the sensory experience. Timber, coffee dyeing (from using cacao husks), and the greenhouse planting system creates a relational interior that also supports wellbeing through biophilic design. Material choices are informed by sustainability, low-impact construction, and the ability to adapt and reuse. The timber lattice frames form the primary construction strategy that integrates coffee growing and programmes. The coffee-dyed bioplastics respond to the needs of those with chronic illnesses, through the use of diffusion and introducing a connection to texture. Through material experimentation, adaptability, and future reuse, the project shapes how interiors are perceived, inhabited, and experienced.



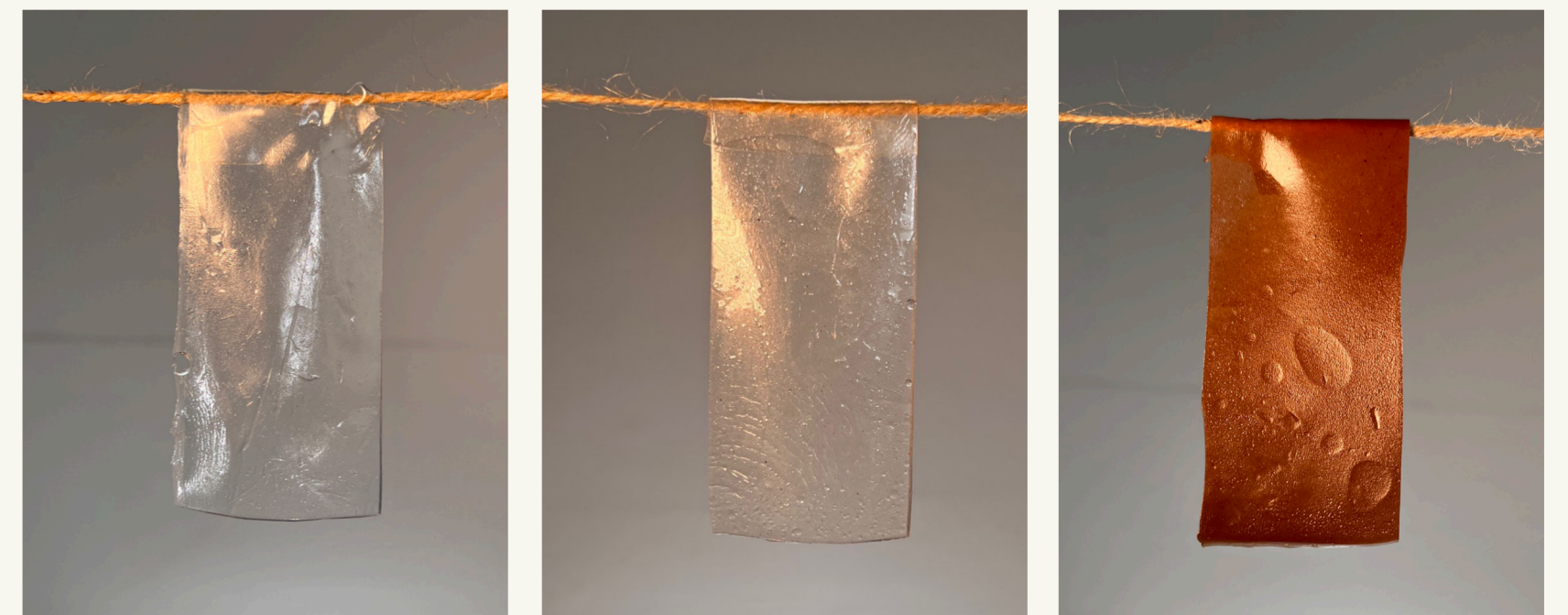
Glycerine	0g	1.4g	2.7g	5.4g
Water	40ml	40ml	40ml	40ml
Agar	1.6g	1.6g	1.6g	1.6g
Vinegar	5ml	5ml	5ml	5ml
Essential oil	5ml	5ml	5ml	5ml

MATERIAL EXPERIMENTATION

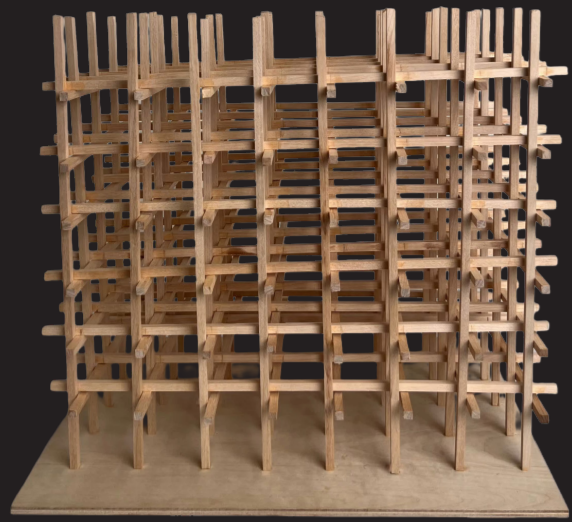
Bioplastics are materials that have an organic composition, the main polymers that characterise them being both starch and cellulose (Riera A., & Palma R., 2018). They exist as polyhydroxybutyrate (PHB), polypropylene (PP), polyhydroxyalkanoate (PHA), polyglycolic acid (PGA), and polylactic acid (PLA). Cocoa PP is what the project utilises. Bioplastics make up 1.5% of the over 489 million tons of plastic globally produced.

Material experimentation of bioplastics formed the key part of the projects development, exploring how variation in bioplastic composition can produce different spatial and sensory qualities. Through testing different ratios of the glycerine ingredient, the bioplastic demonstrated varying levels of flexibility, thickness, transparency, waterproofing, and shrinkage. Increasing the amount of glycerine resulted in a softer and more flexible material, whilst decreasing it produced a stiffer and more rigid material. The incorporation of cocoa powder affected the translucency of the bioplastics, with higher concentrations created a more opaque appearance. These tests informed the composition of the final design, with lower concentrations allowing light to permeate the plastic, and higher concentrations diffusing daylight, which directly influences the human experience of space.

Bioplastics naturally are unpigmented, leaving an almost clear surface



The various pigments are made from cocoa powder, diluting each container with different amounts of powder, creating an ombre effect.



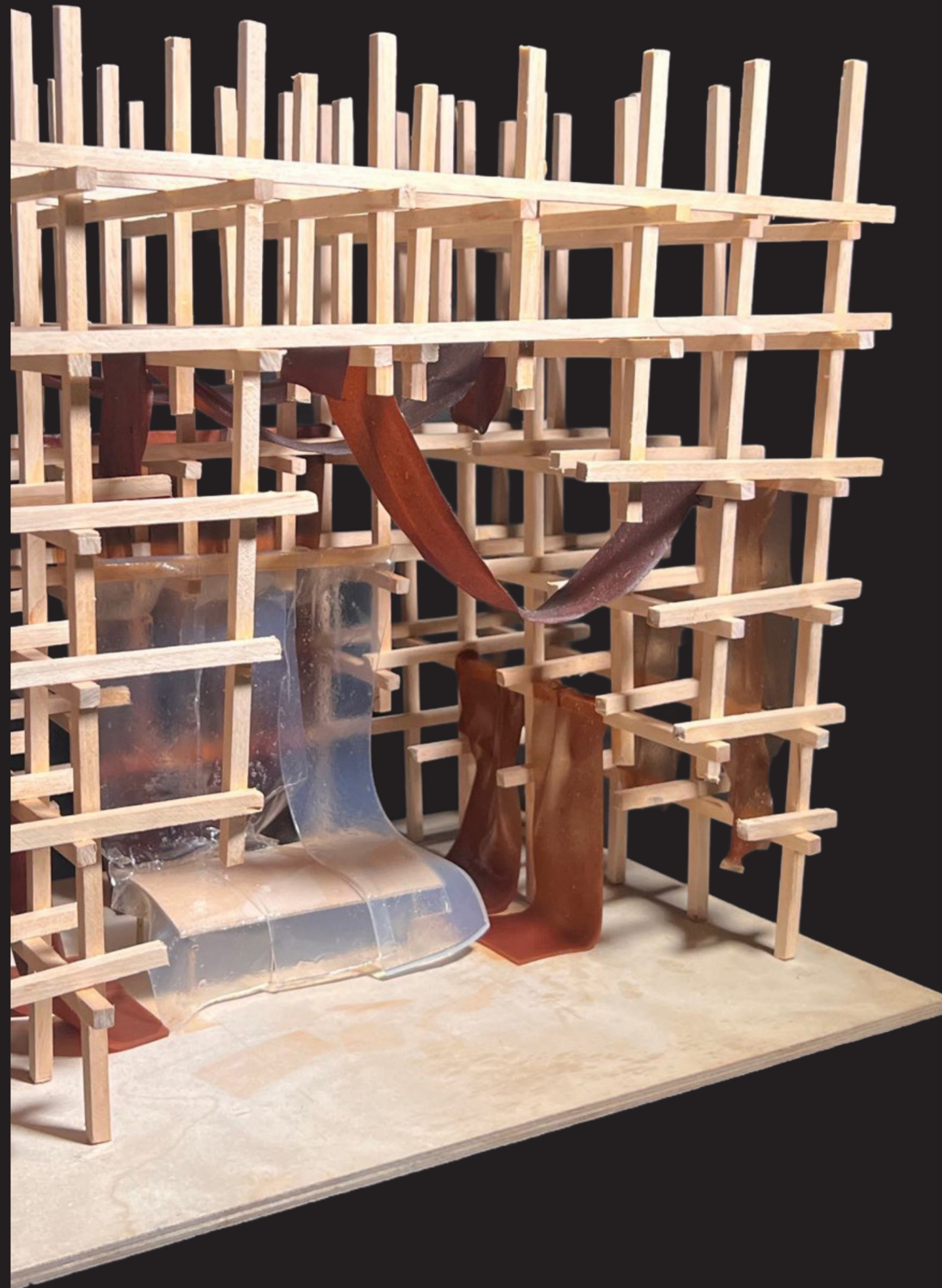
STRUCTURAL SKIN

The timber interlocking frame defines the primary structure of the space. The frame acts as a lightweight but rigid grid, using joinery to create stability. It establishes the boundaries of a small interior room centred on a tea table arrangement.

Within this timber structure, bioplastics are introduced as non load bearing elements that modify how the space is used and experienced. The material is formed into a chair, allowing seating to remain soft. It also extends across the table and ceiling with varying levels of translucency. The hanging and folding exhibits how these elements are not rigid like the timber frame, but rather softening the geometry.

Light filters through the draped surfaces, reducing intensity and creating muted atmosphere.

The programme of this space is centred around a tea table, positioned as a quiet point of gathering and enjoying tea. This also becomes a space for receiving diagnoses or holding conversations connected to chronic illness, but also functions as a setting for withdrawal and rest. Exploring architecture as a place of encounter and solitude.

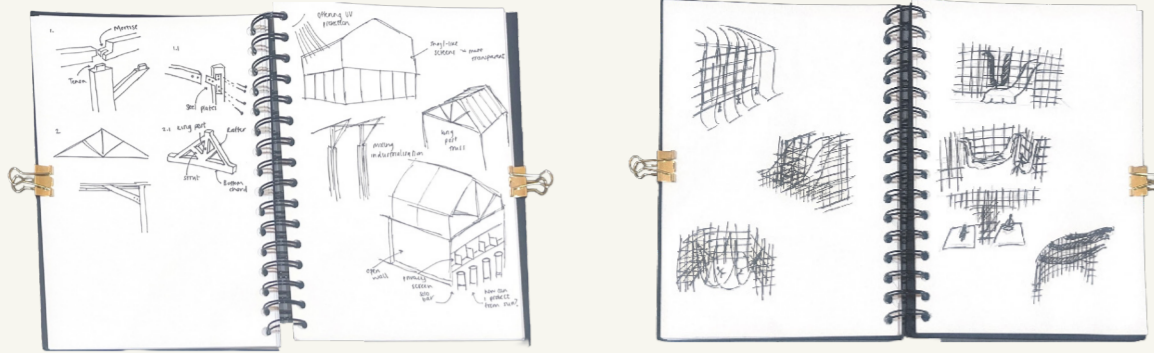


SECOND SKIN

The design uses bioplastics as a semi-permeable membrane that filters and diffuses natural light. Rather than allowing direct sun exposure, which can be overwhelming or harmful for people living with chronic illnesses that are affected by photosensitivity, the material breaks light into a softer gradient whilst still preserving daylight and spatial warmth. In this way, the bioplastic operates as a second skin, it sits between the building and the body, regulating exposure in a gentle, adaptive way. The architecture does not isolate from light entirely but translates it into something that is more inhabitable. Light becomes atmospheric rather than direct and invasive.

Protection is not expressed through enclosure or withdrawal, but calibration. The different levels of translucency depending on the level of direct sunlight which allows the building to be more attentive to different thresholds of comfort.



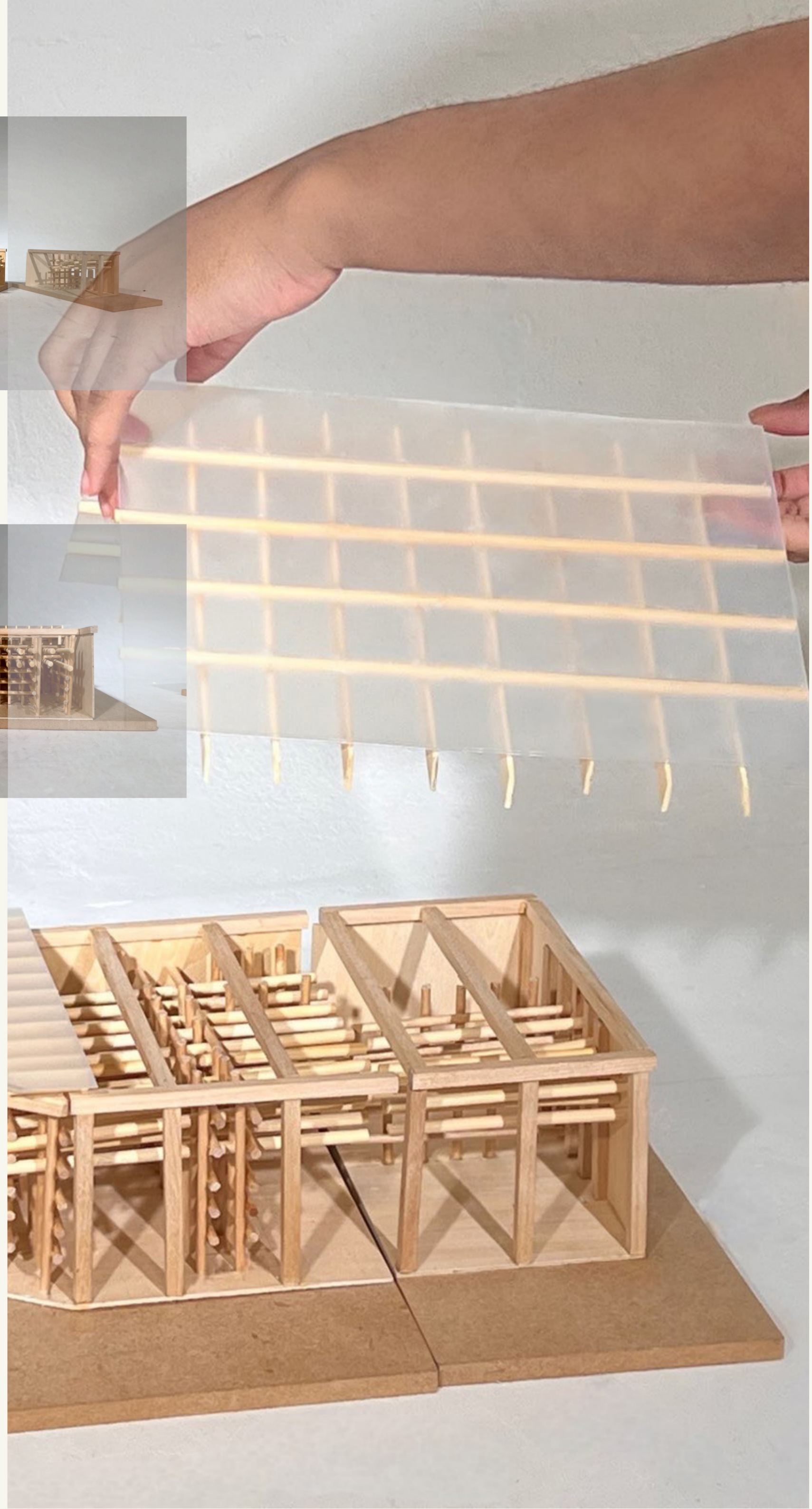
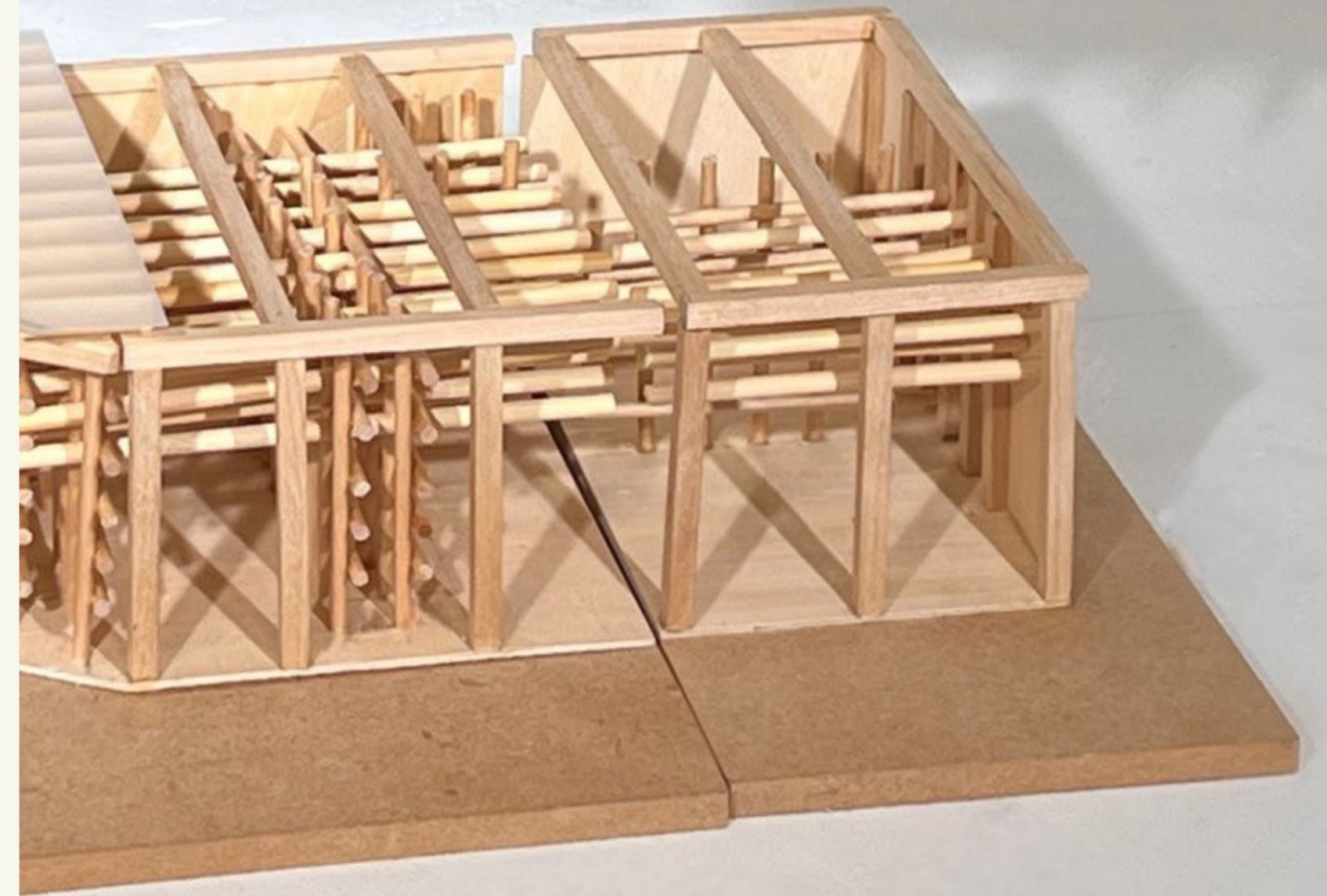
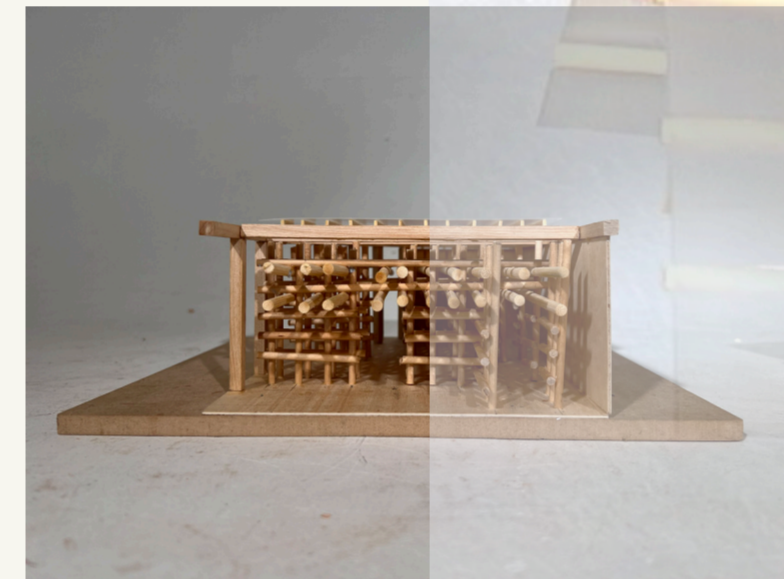
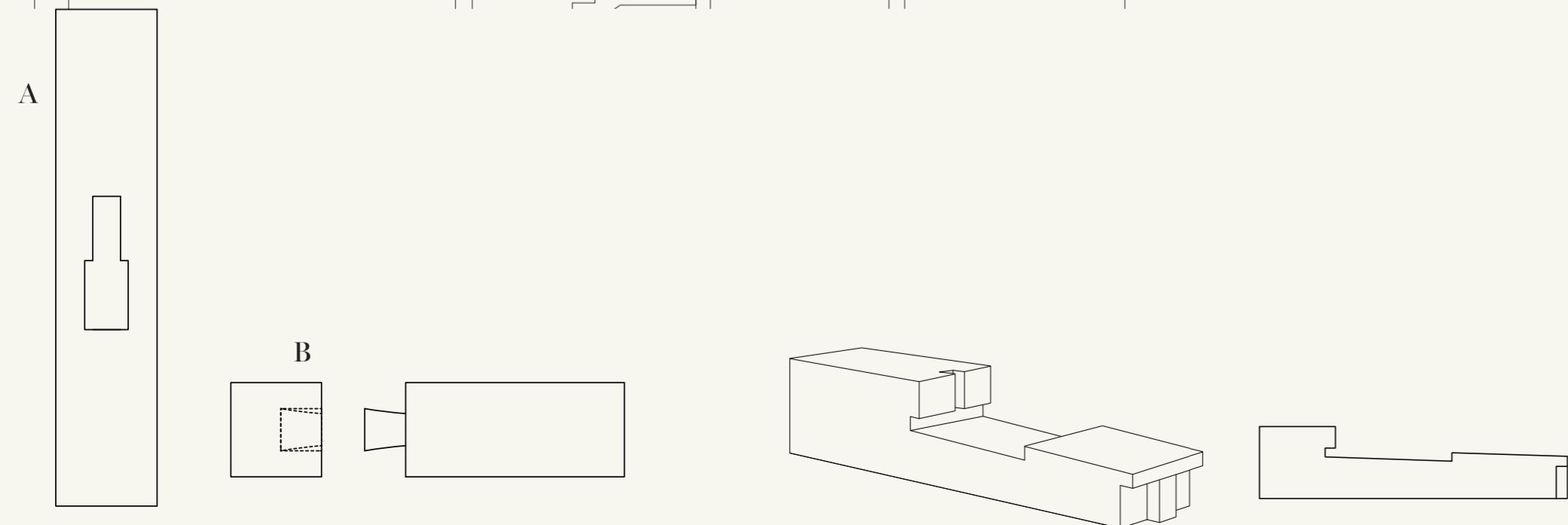
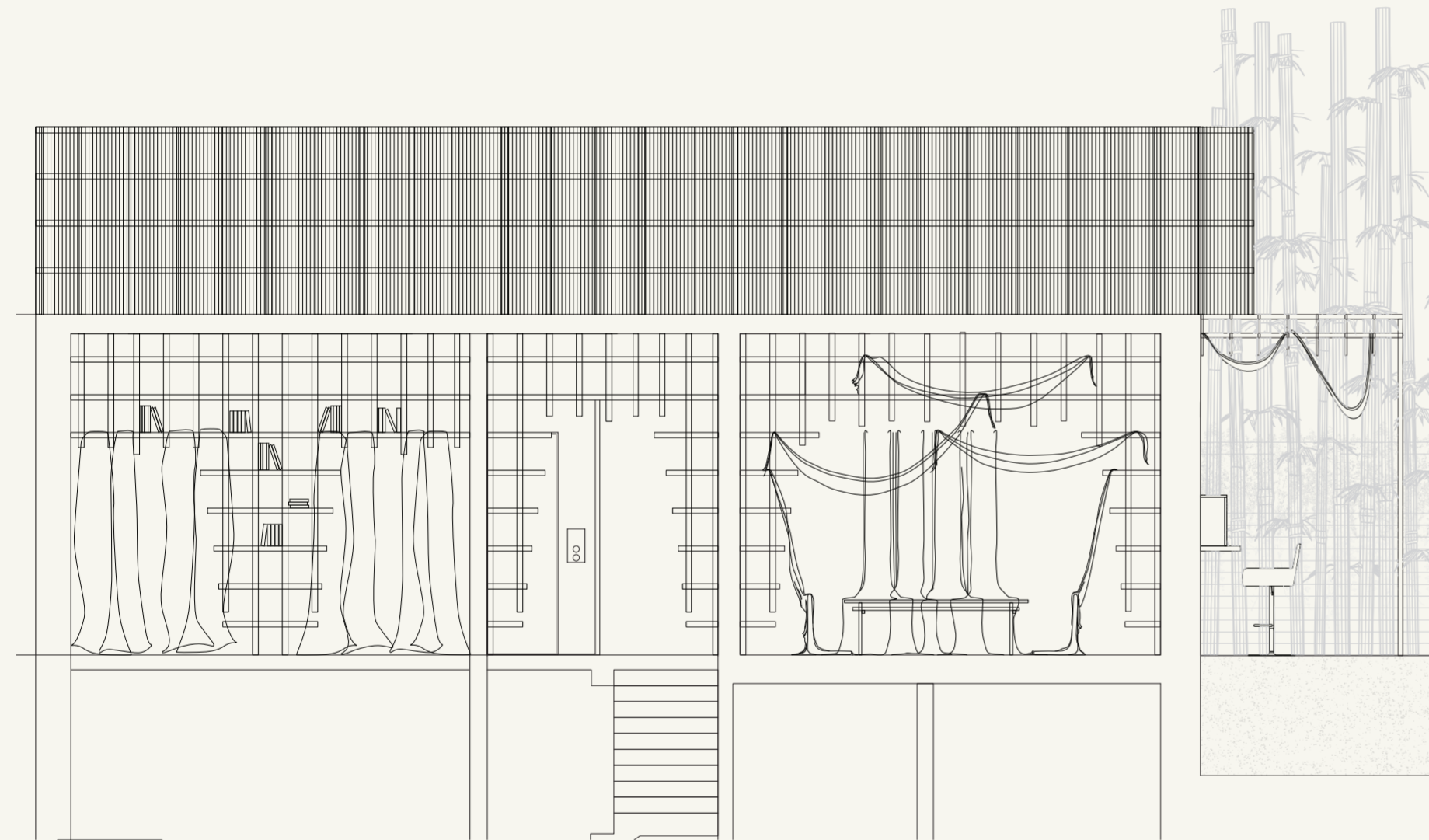


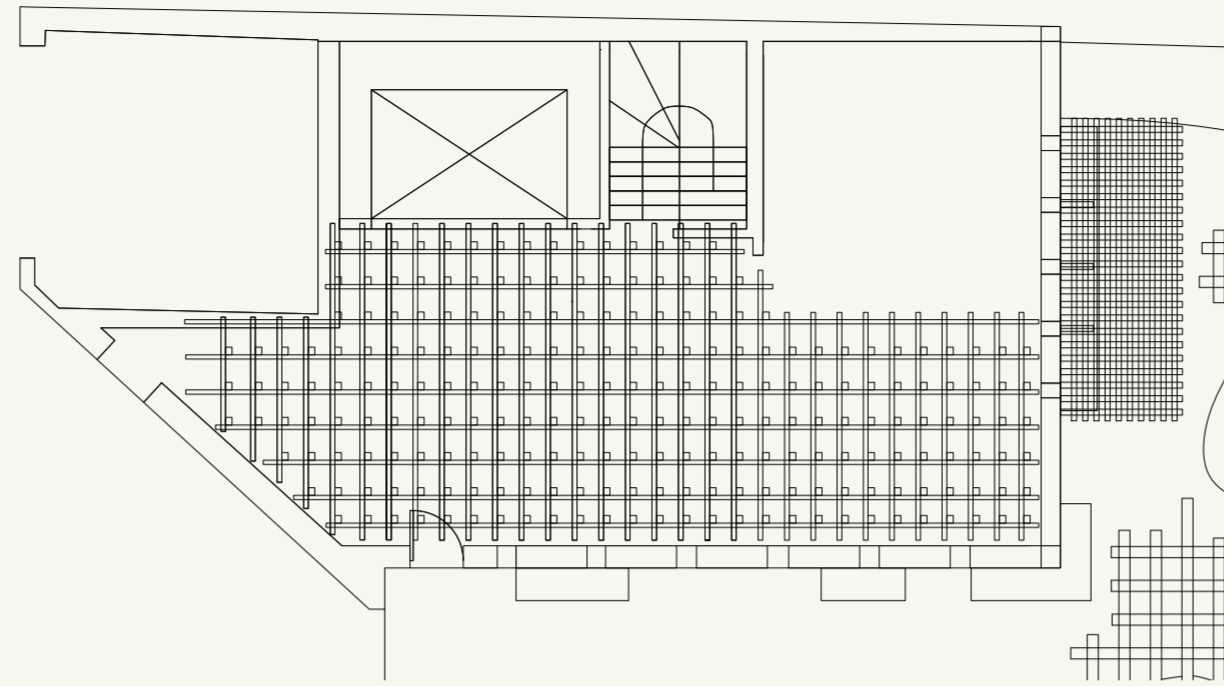
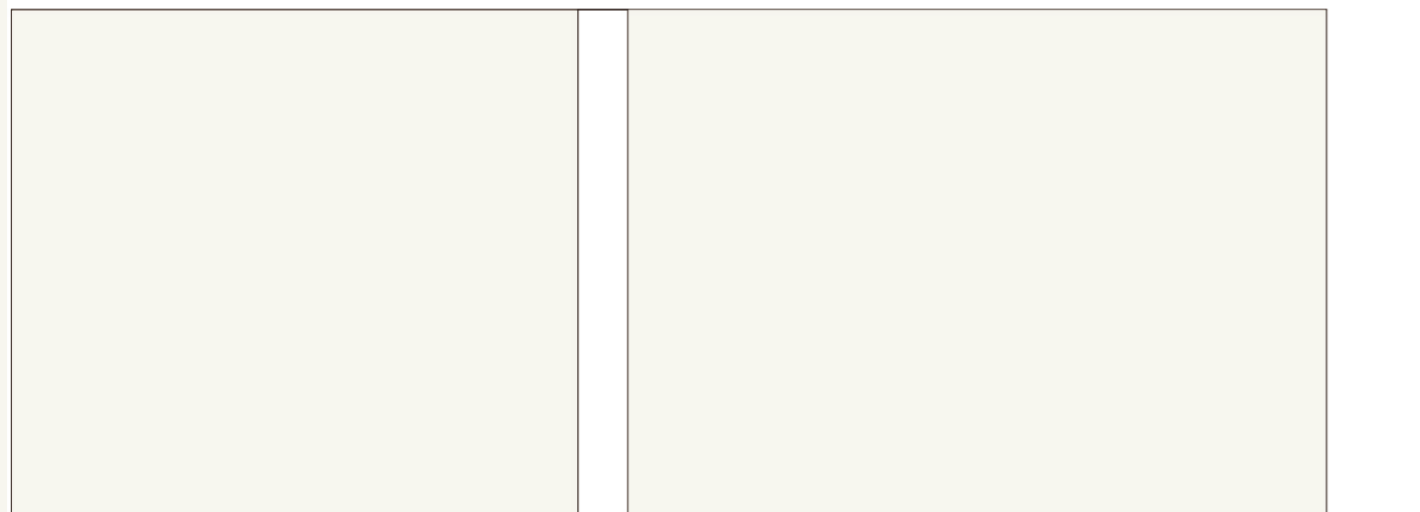
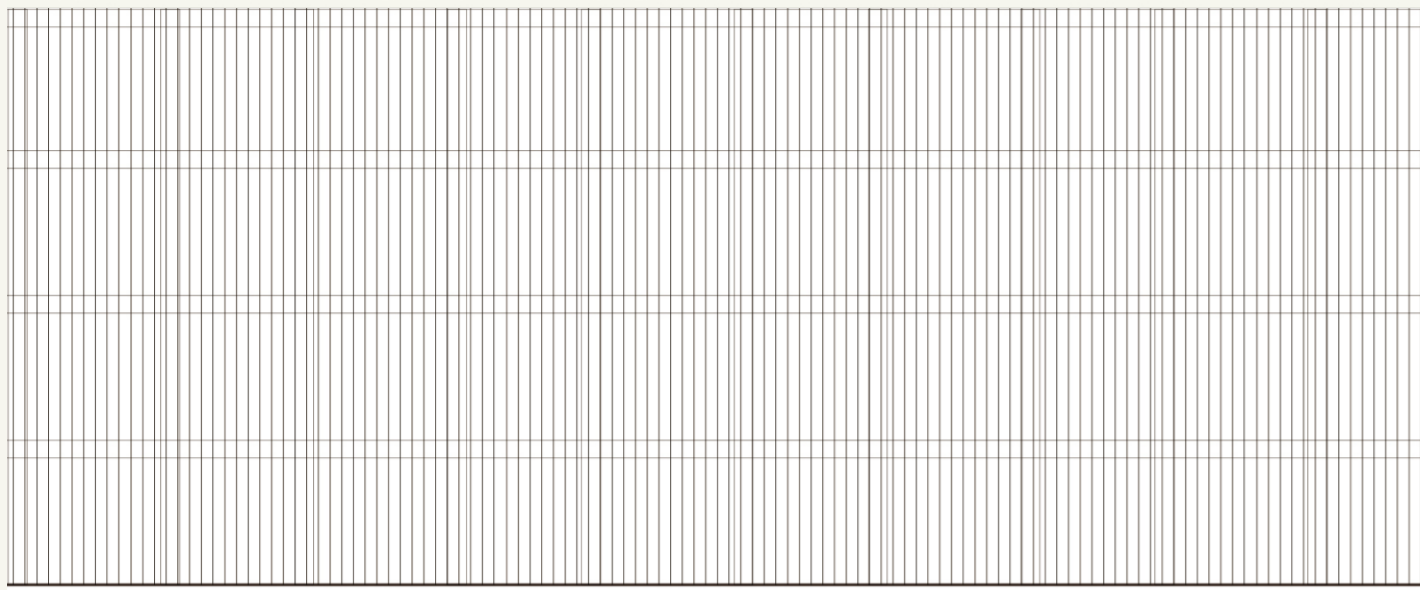
SOLTREE

The Soltree utilises Japanese joinery which introduces framework that is structural and conceptual. Using housed dovetail joint (connecting joint) and mortised rabbeted oblique splices.

Housed dovetail joints are frequently used on hanging posts (tsurizuka). At first the dovetail is inserted in the larger opening of the mortise (area A) and then shifted sideways into the narrower slot (area B) which has the exact inverted shape.

Mortised Rabbeted Oblique Splice - Splice Joint, is assembled by sliding over each other the internal faces of the upper wood and lower wood. Finally a wooden plug is inserted into the centre to ensure the joint will not easily come apart. The use of traditional Japanese joinery reinforces themes of ritual, care, and slowness which act as an extension of the project's narrative.





LIVING MATERIAL LANGUAGE

The Soltree; along Rootes Drive and situated within the courtyard, consists of a interconnected timber lattice structure infilled with translucent bioplastics. Each glass panel is preserved within cast glass. The roof, made from polycarbonate panels help to maintain a protective enclosure for the users. This system filters and softens daylight, creating a low-stimulation environments for individuals with photosensitivity, whilst also expressing fragility and care.

