

2013

Techstyle Haus

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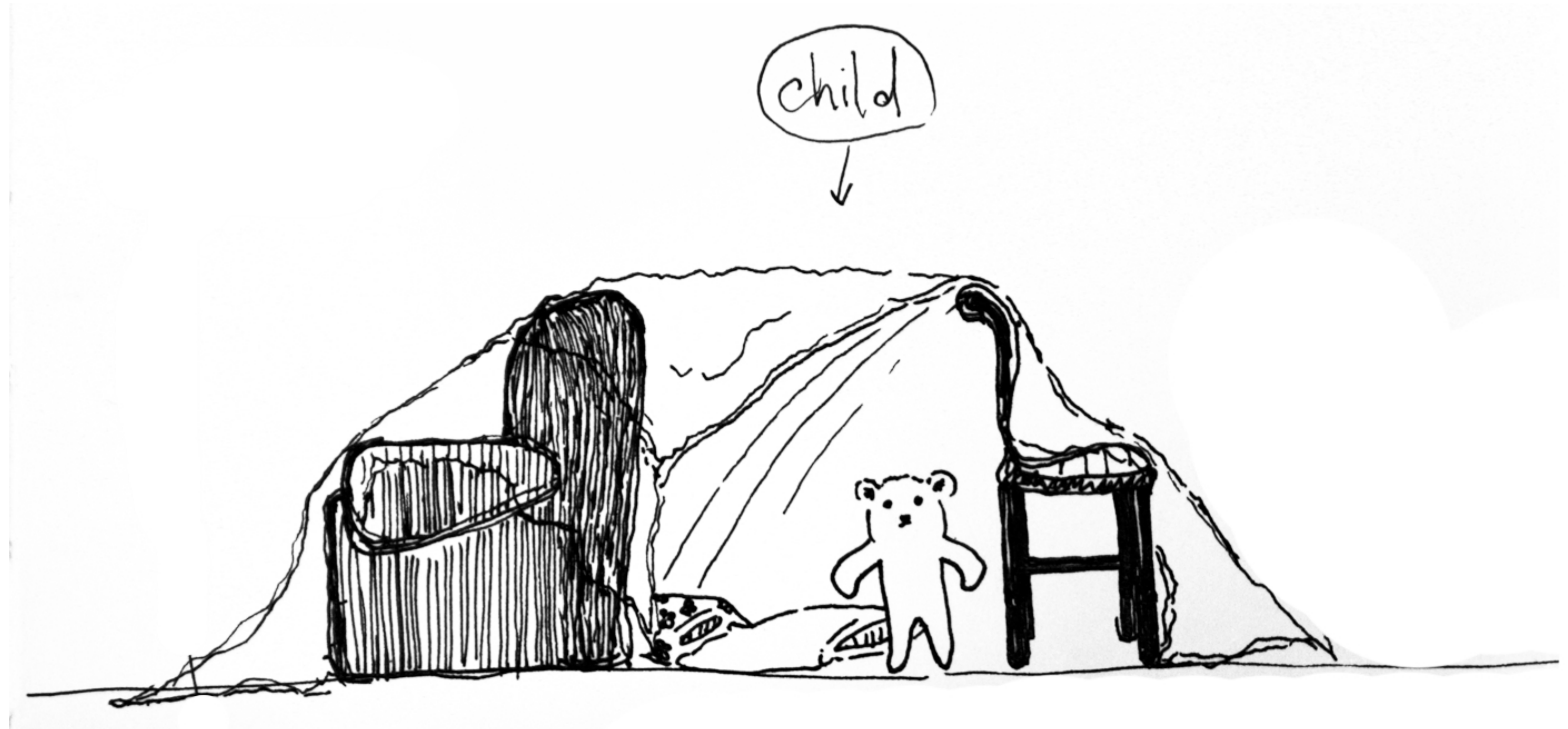
Authors

Architecture Department, Jonathan Knowles, Sina Almassi, Alexa K. Asakiewicz, Jason W. Askew, Caterina Belardetti, Guoyuan Chen, Kim E. Dupont-Madinier, Sara B. Fetterolf, Zachary P. Futterer, Atara H. Kelman, John A. Mars, Kevin T. McNulty, Saja Tourbah, Annabelle T. Tran, and Cong-Xin G. Wong





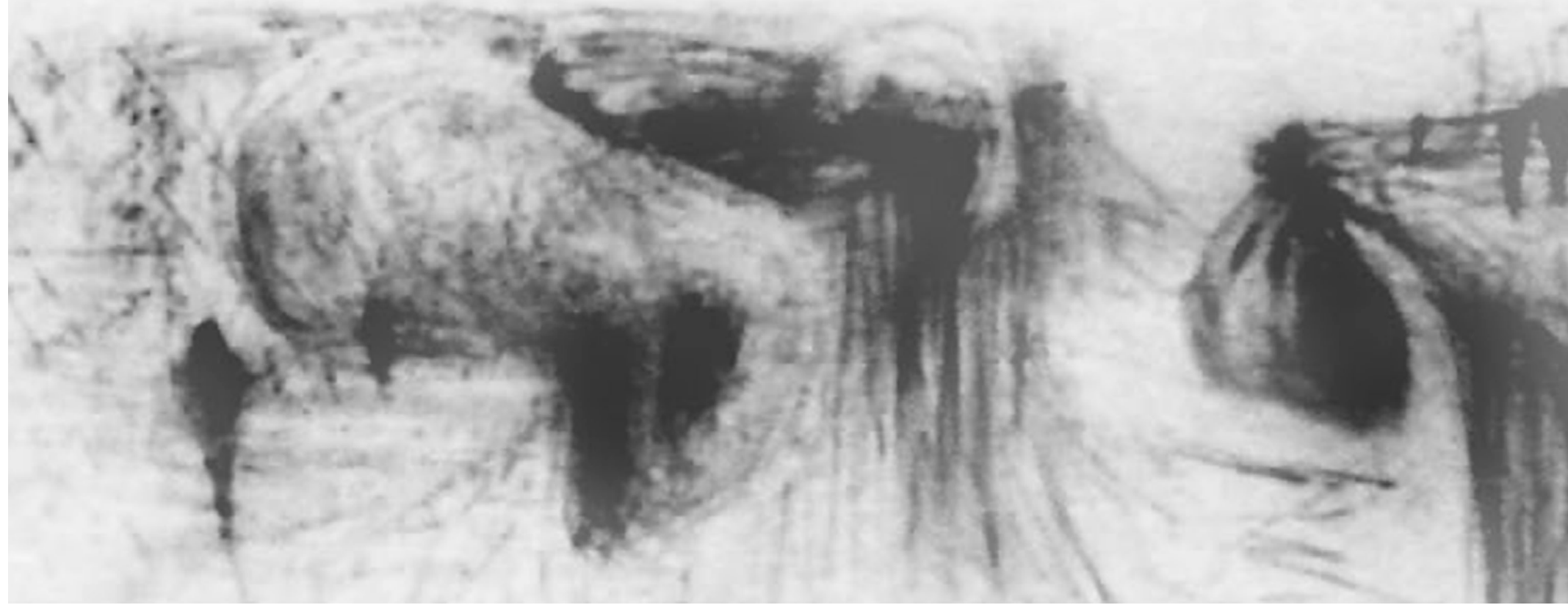
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



A house made of textiles can function in the same way a child conceives of a tent, in a spirit of play and dialogue between hard and soft surface.



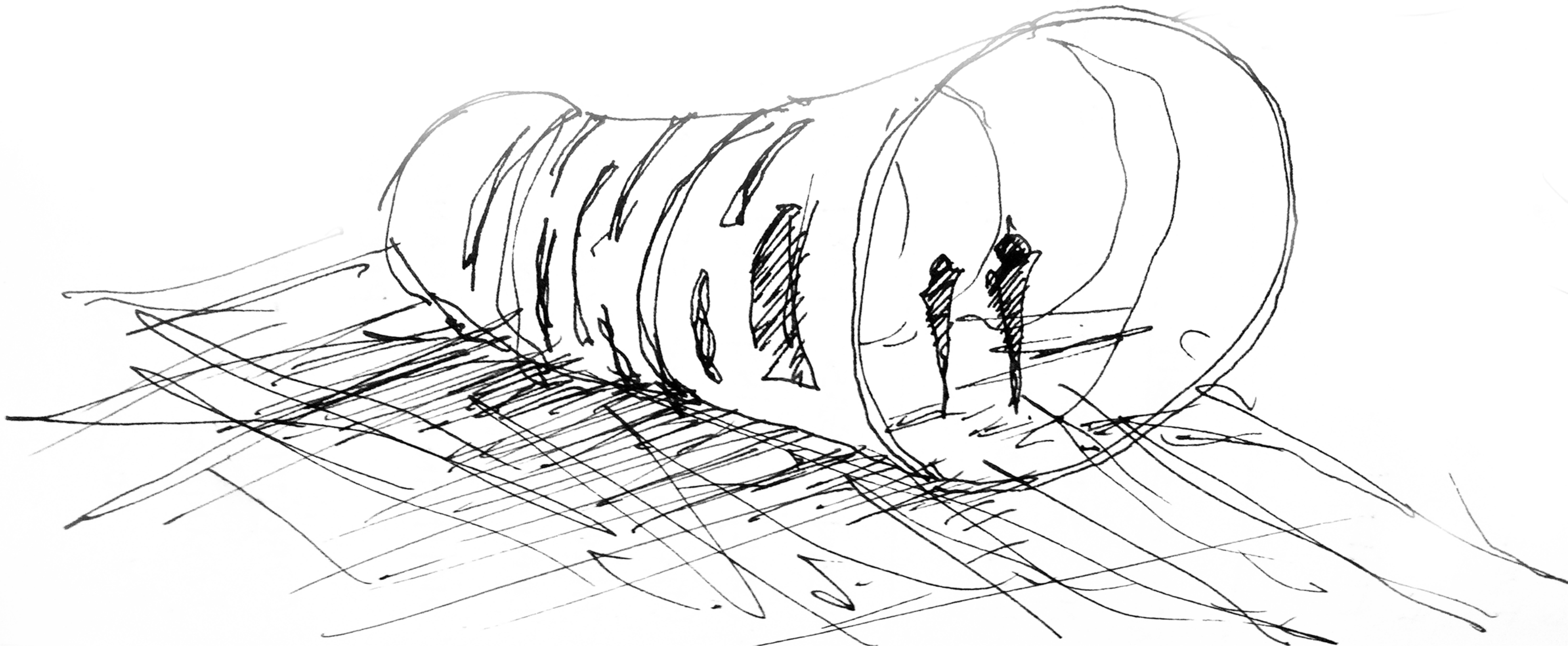
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Textiles can perform the role of a cocoon, whereby a soft material stretches and bends to embed itself in the environment.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Cradled by its sloping landscape, the house opens itself up to the south end to create points of entry, light and ventilation.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING

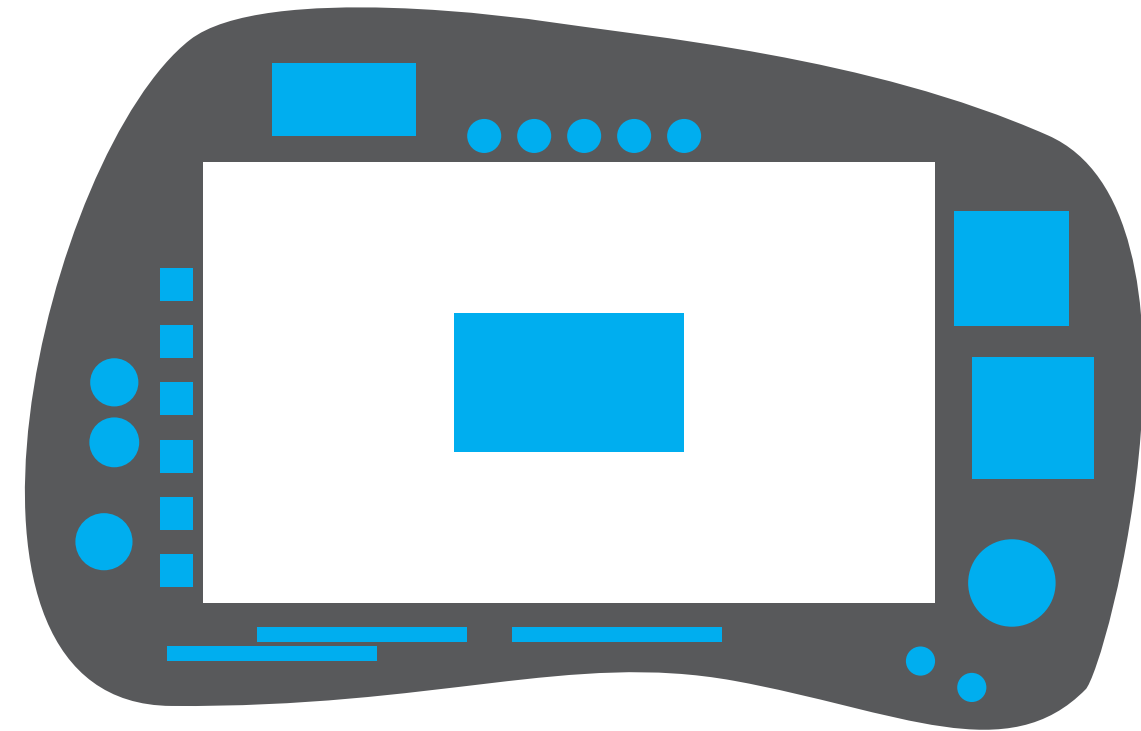


PLAY SHELL URBANISM PLANNING SKIN LIGHTING

(SYSTEMS INSIDE)



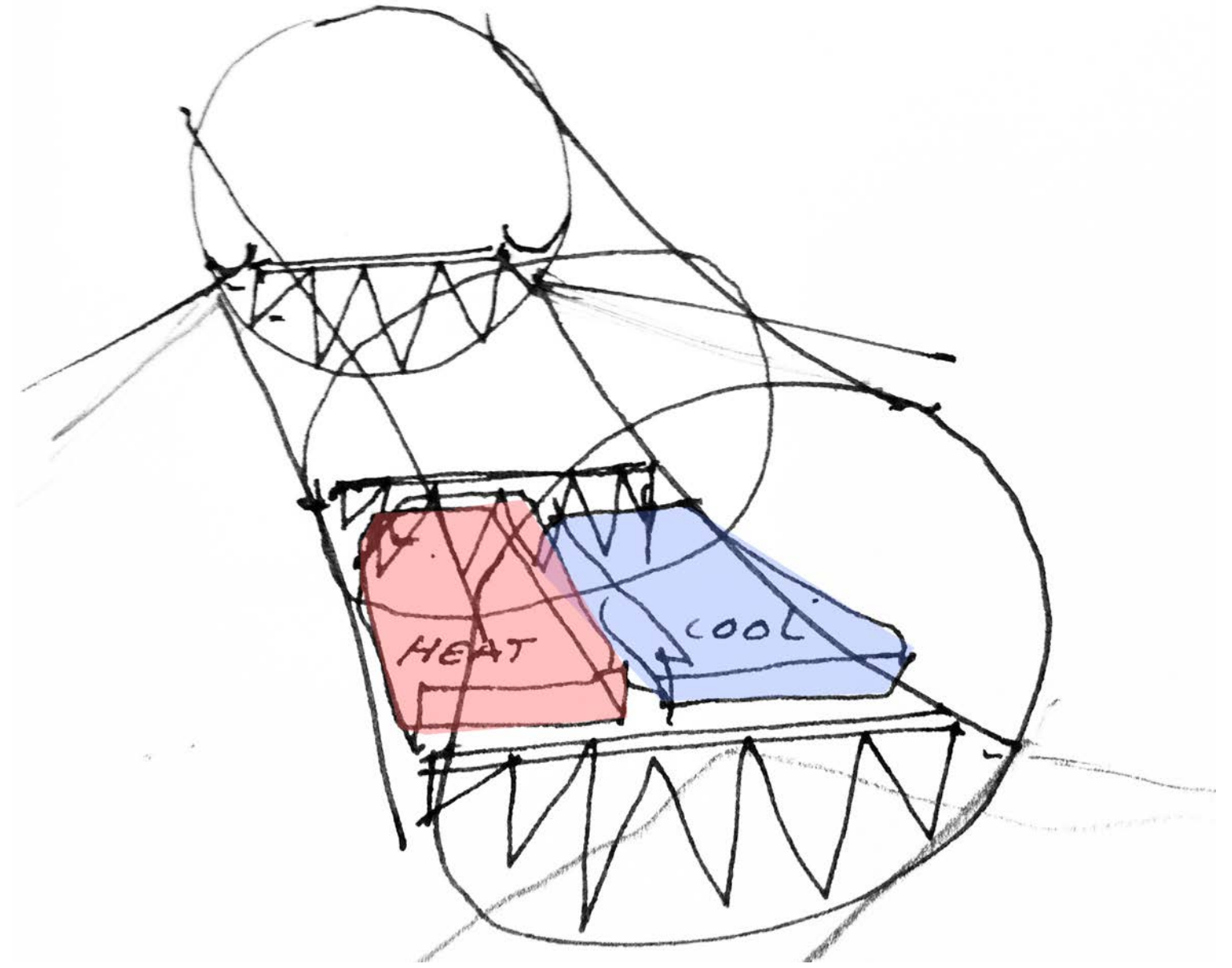
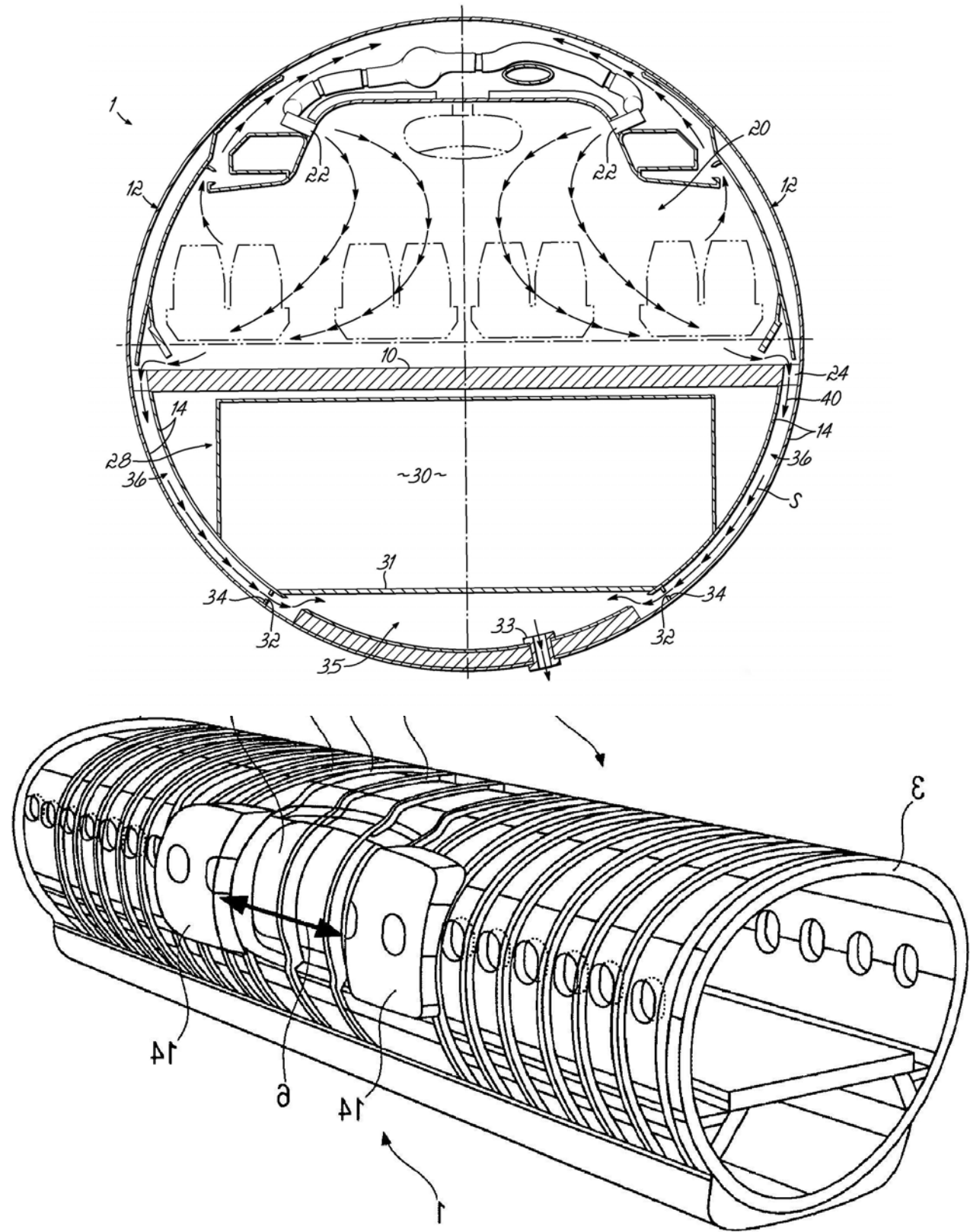
(SYSTEMS INSIDE OUT)



The layers of the house work much like human anatomy. Interior becomes organ tissue; structure becomes bone; enclosure becomes skin.



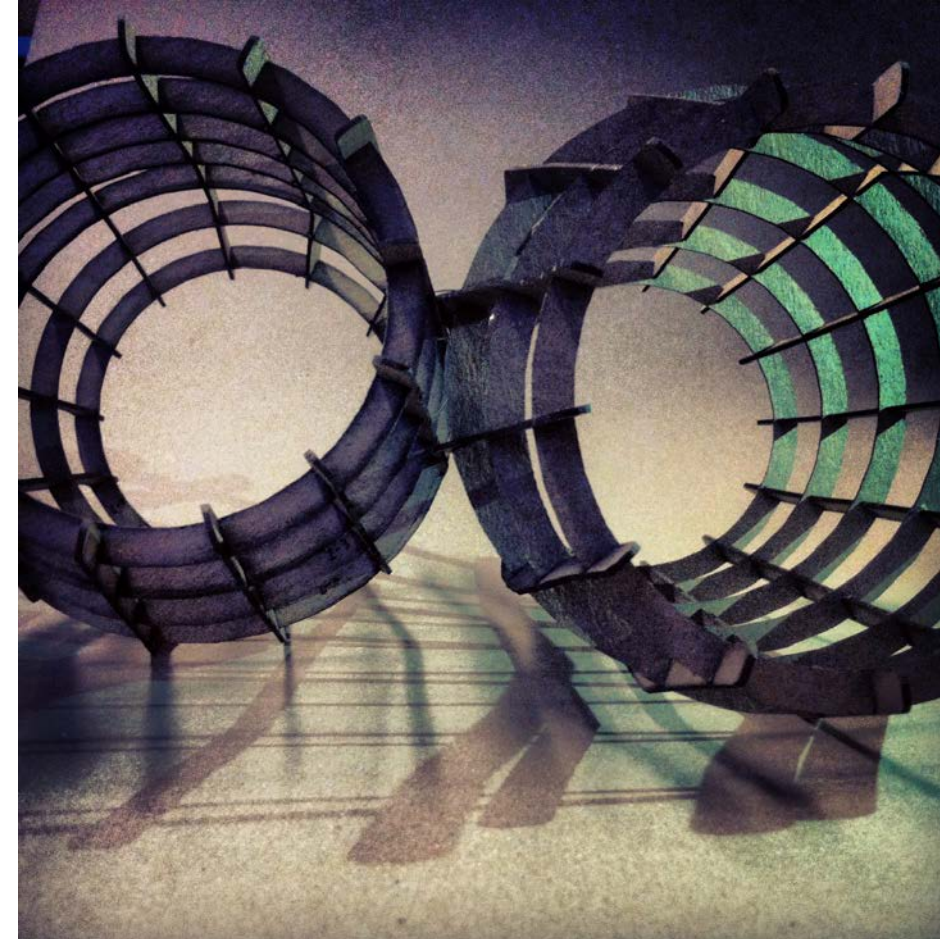
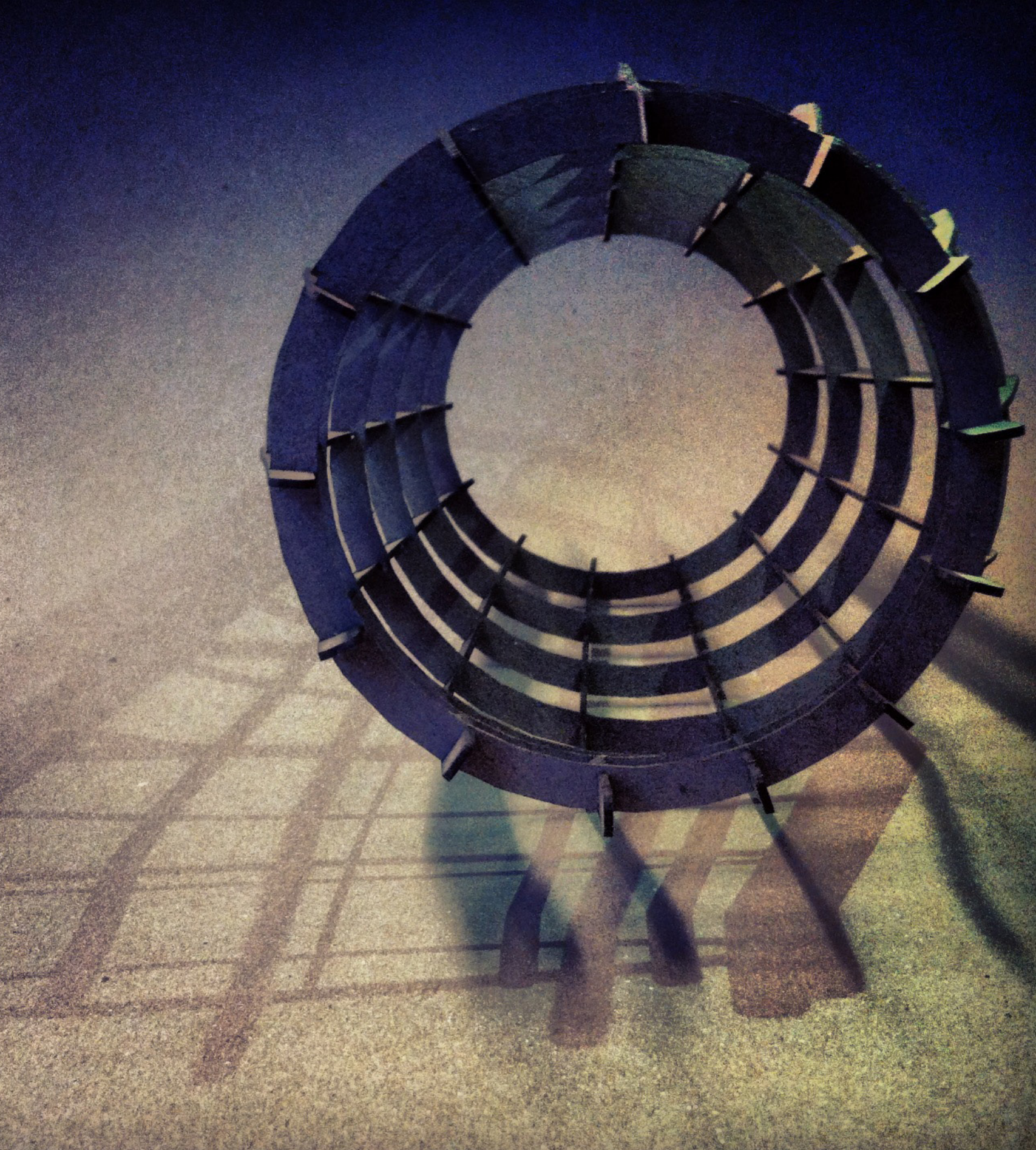
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



With a curved outer shell and a flat floor plate, the subfloor vacts much like an airplane fuselage to create space for mechanical systems.



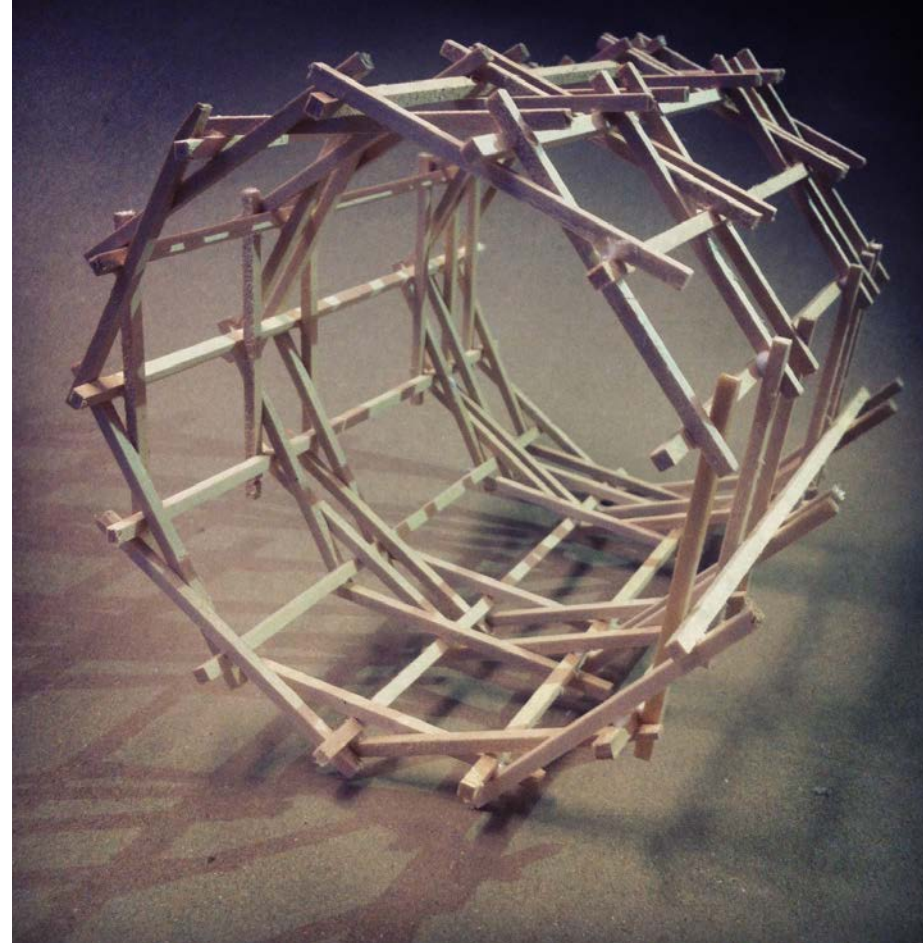
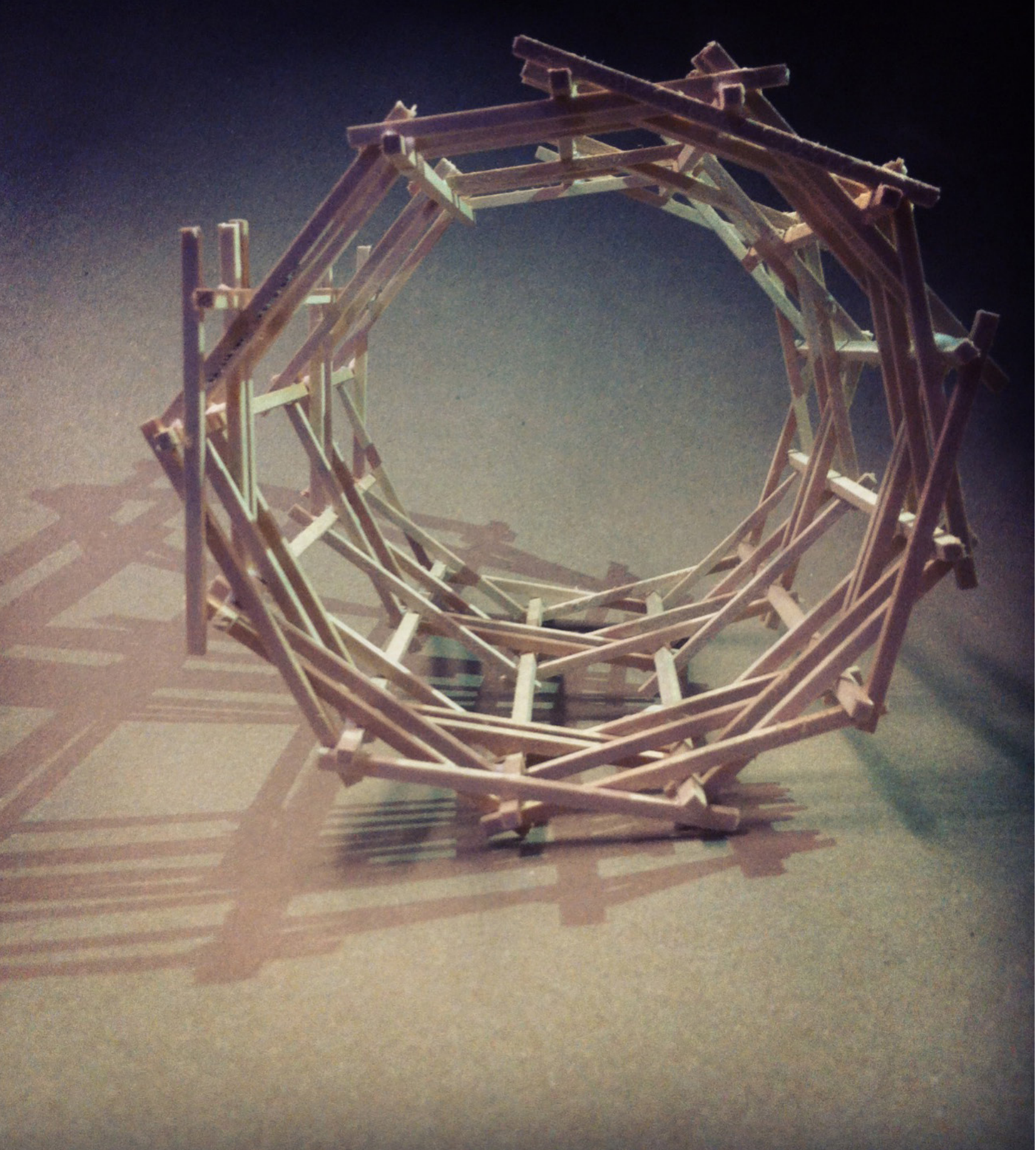
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Several structural systems have been considered for the house, including this application of a semi-monocoque strategy.



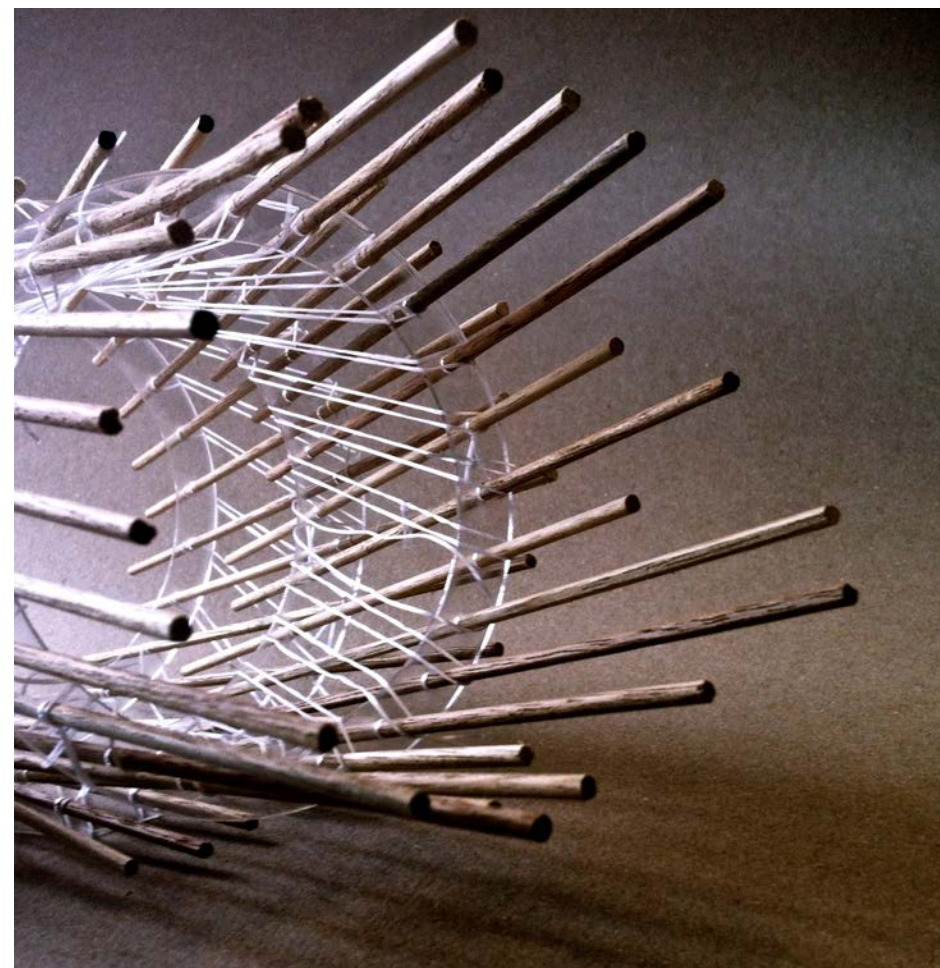
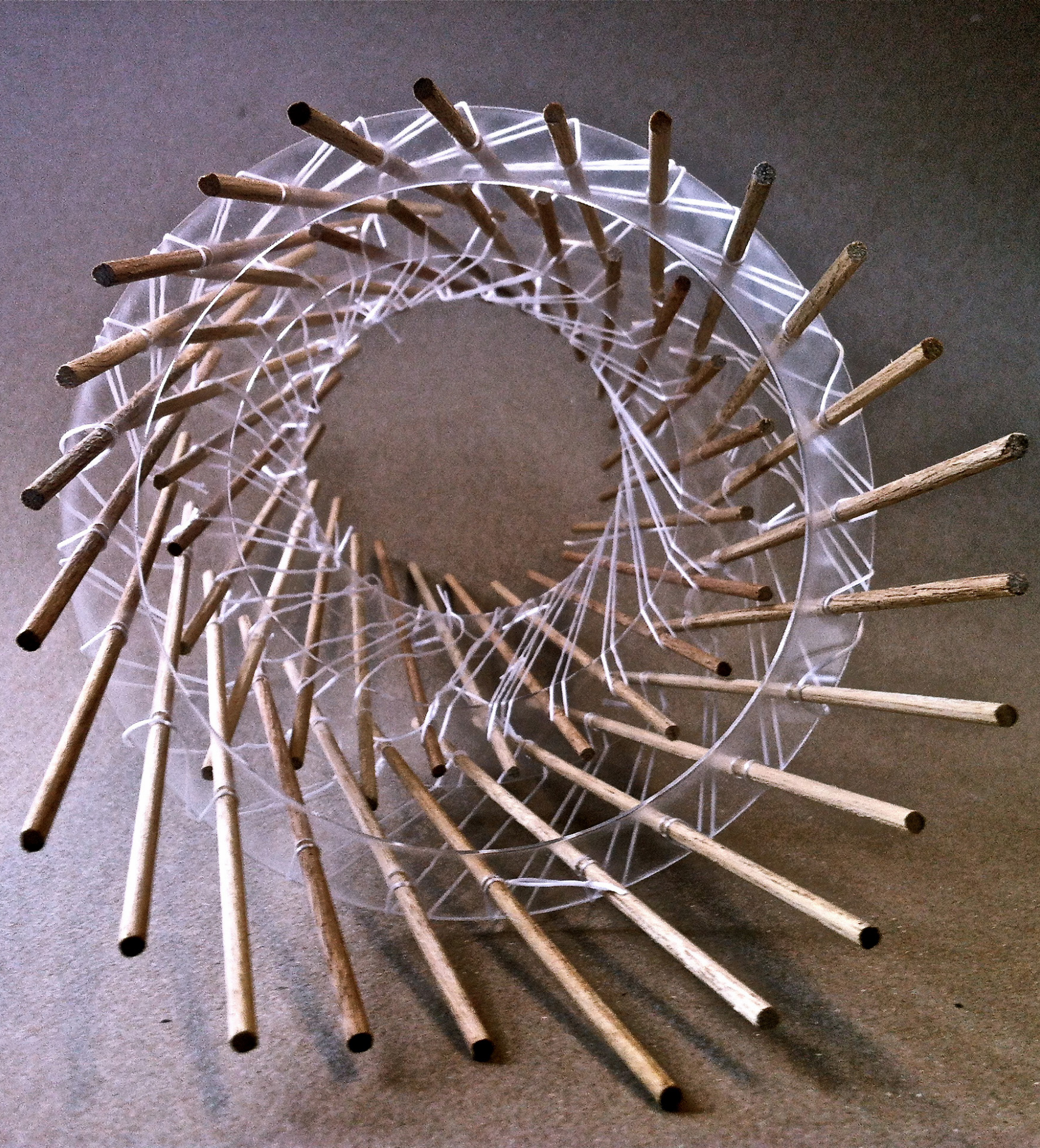
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



A reciprocal frame can also offer stability, but with little potential for curves, it limits its form to straight homogeneous tubes.



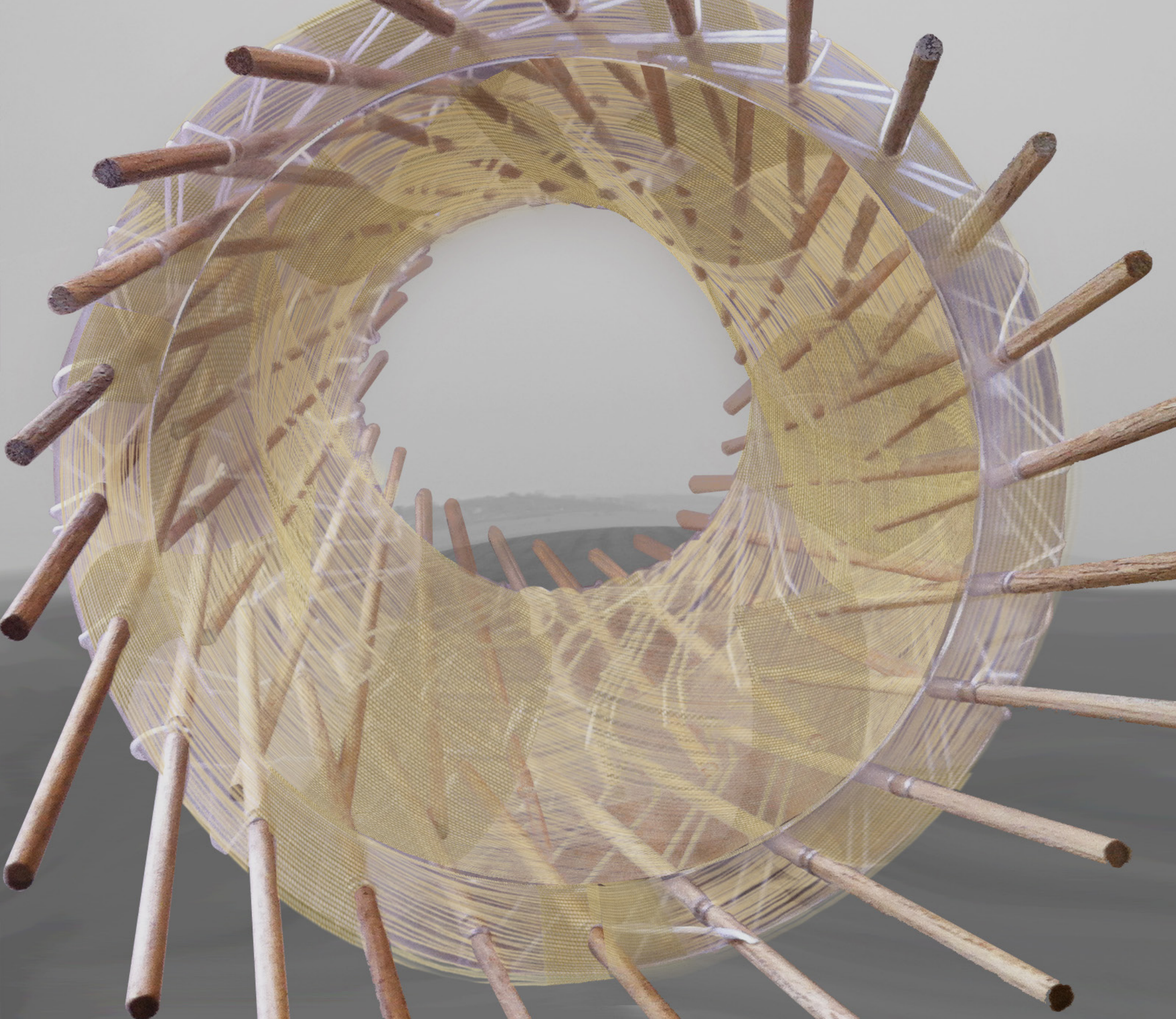
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Ring-assisted tensegrity permits greater variation in diameter and engenders a double skin condition.



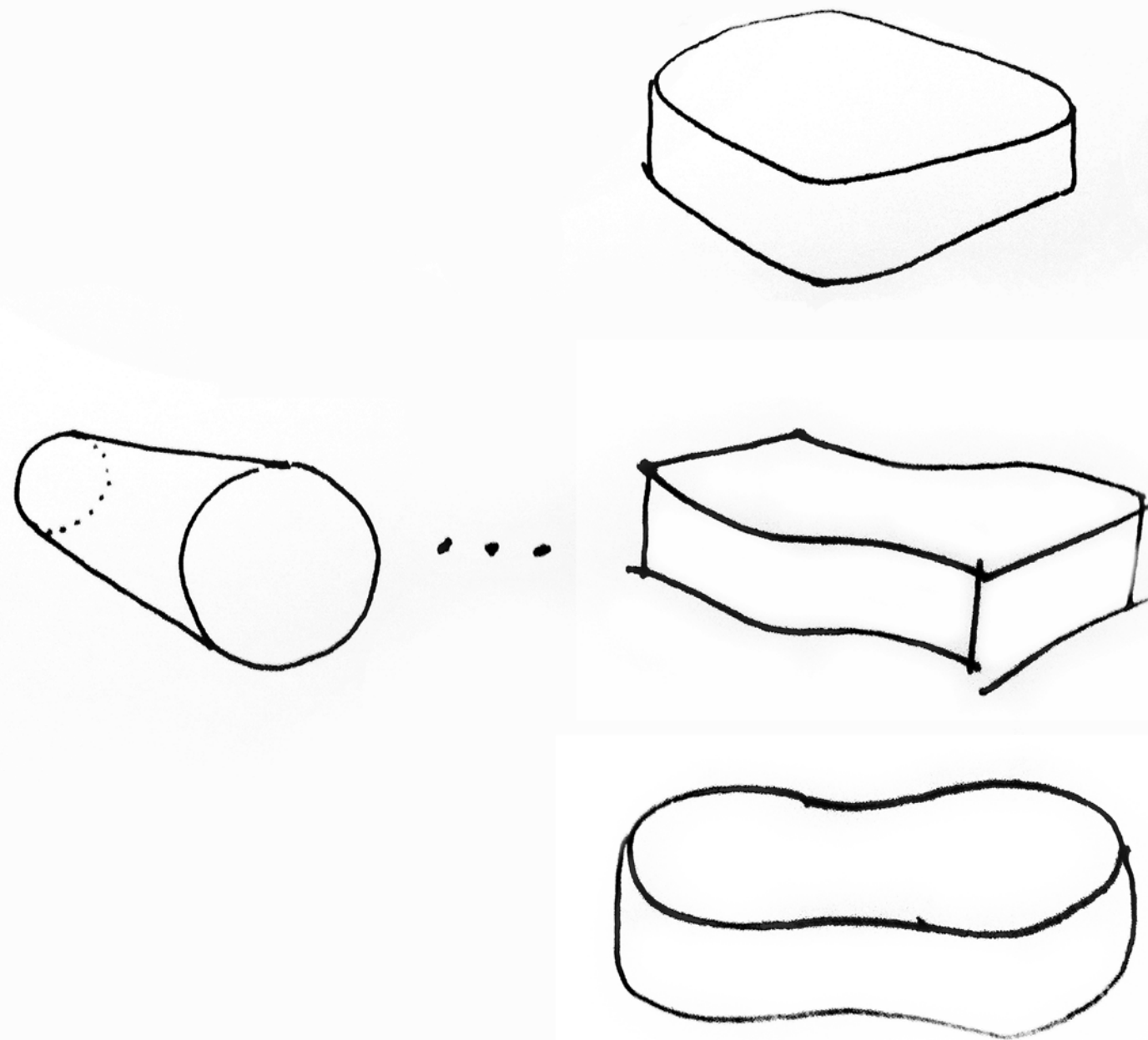
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Since the outer skin morphs in response to its structural frame and to inner protrusions from the floor or walls, one may imagine any number of resulting forms when considering the potential for aggregation in an urban context.

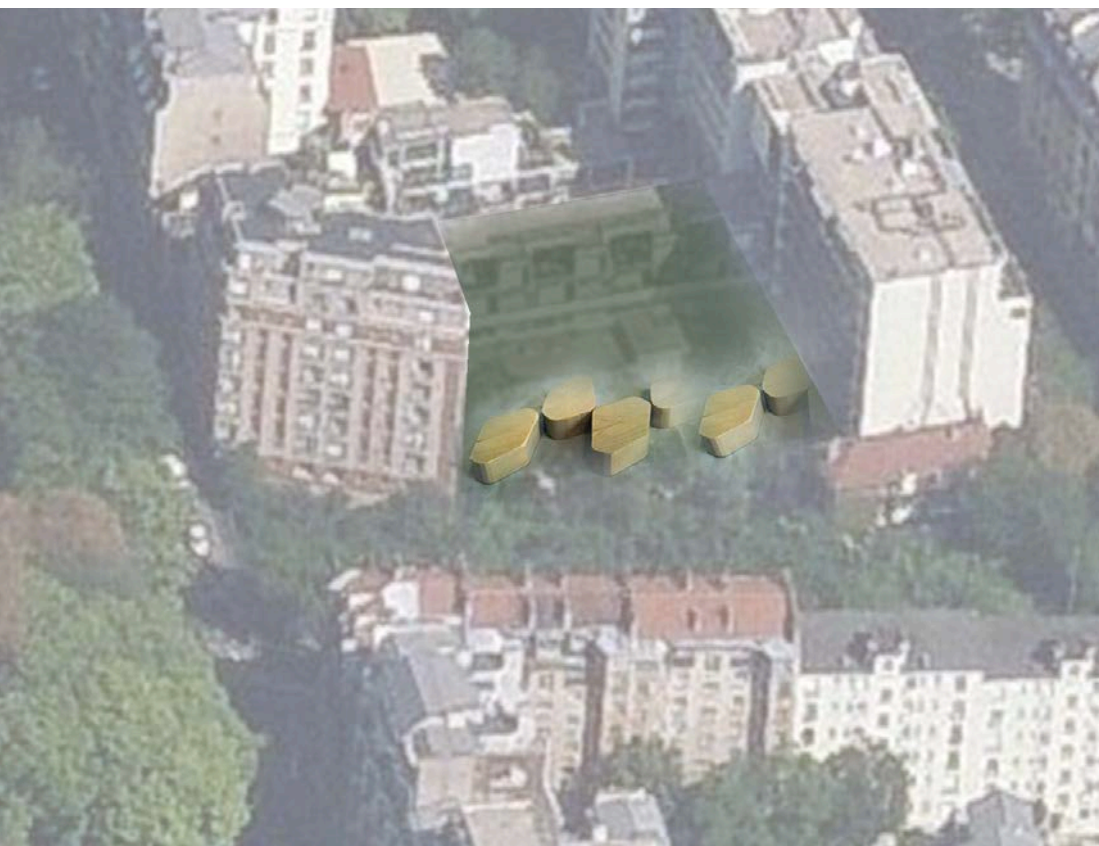




Multiple urban options are possible, including staggering and stacking for both single- and multi-level growth.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



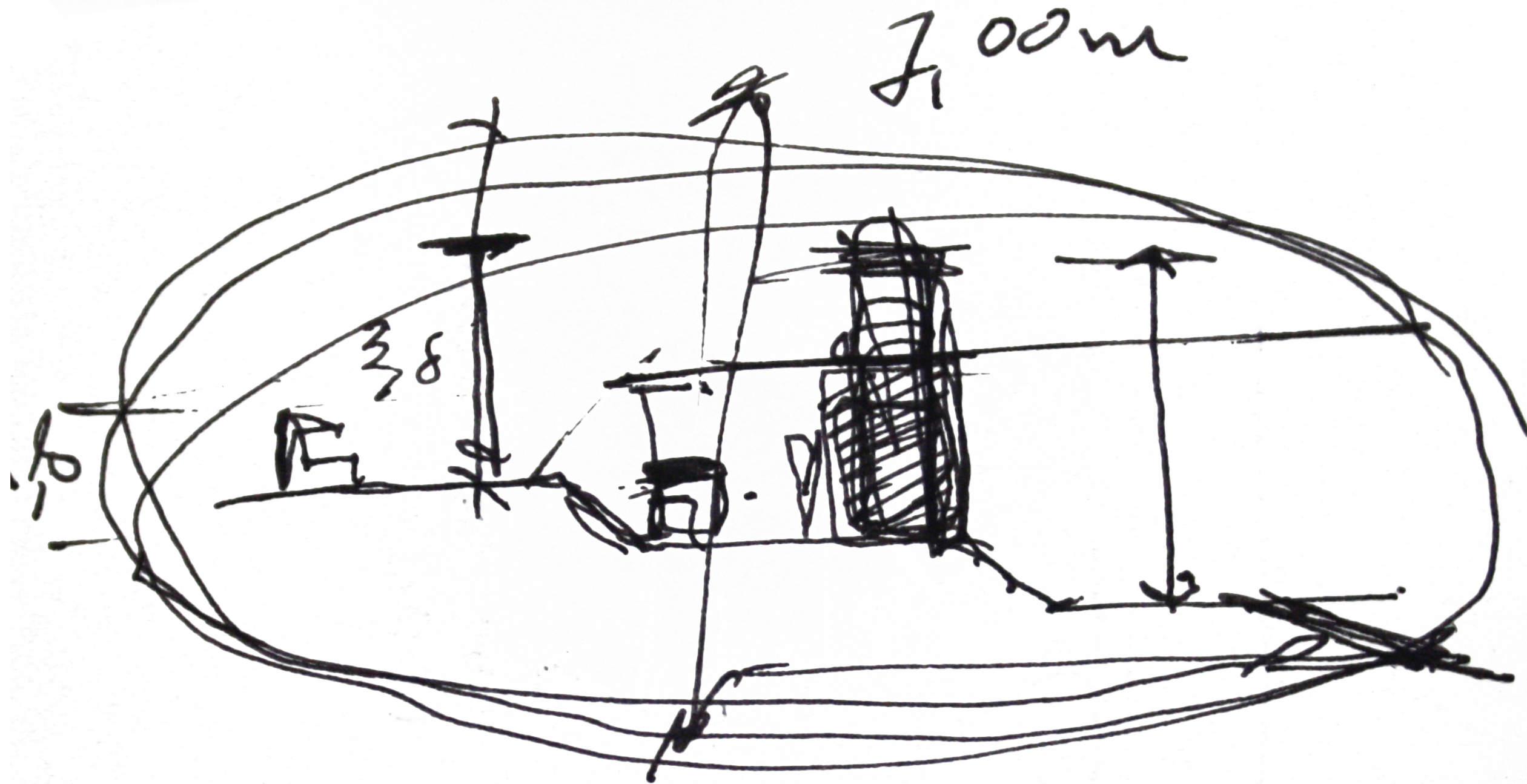
These strategies are meant to address the relationship of this housing with street, courtyard and adjacent buildings.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



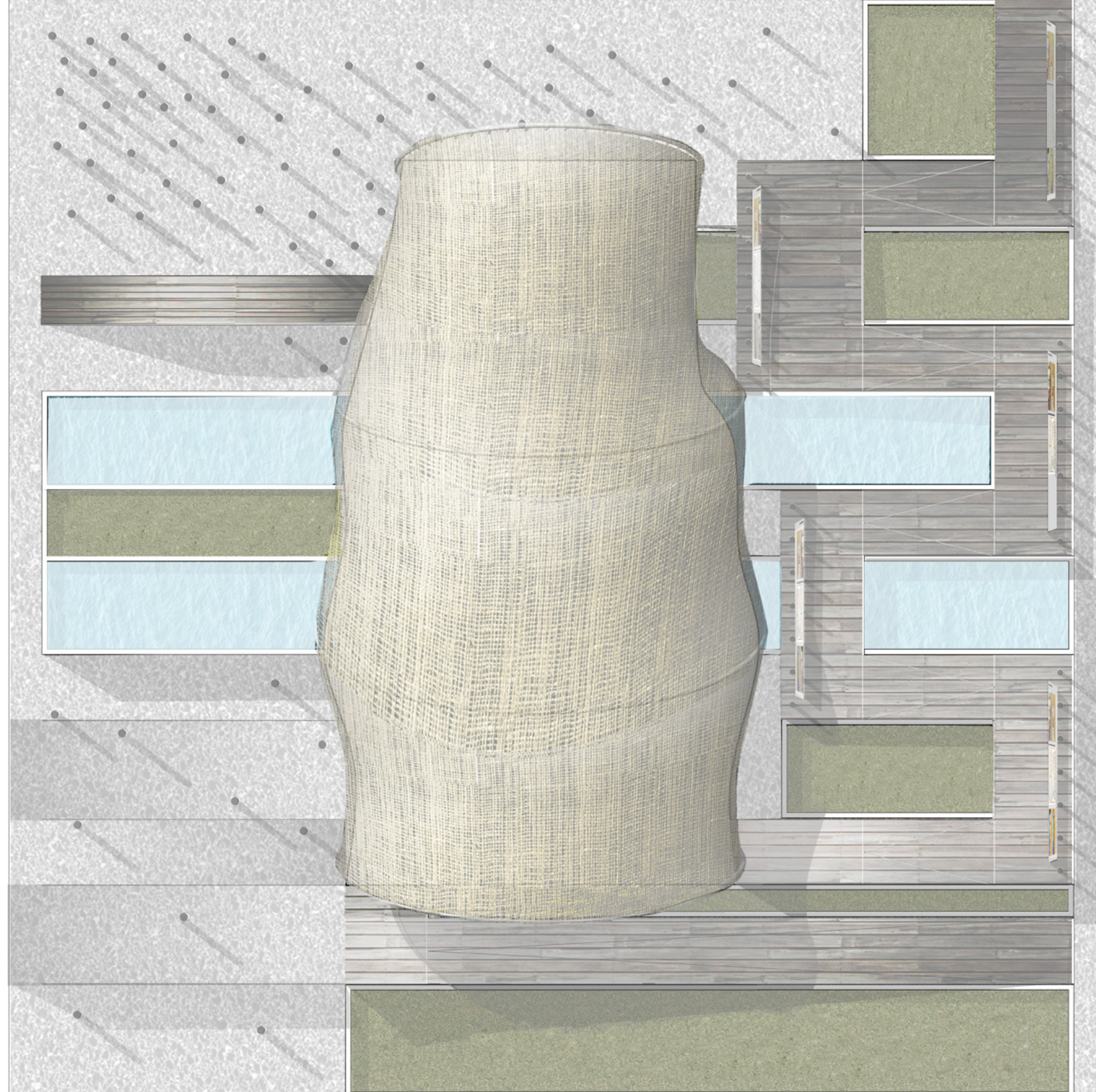
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



The concept of fuselage also aids in planning, with the potential for level changes and the separation of mechanical and habitable spaces.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



A grain forms across the site with the orientation of water beds, planters, sloped terrain, ramps and play areas.



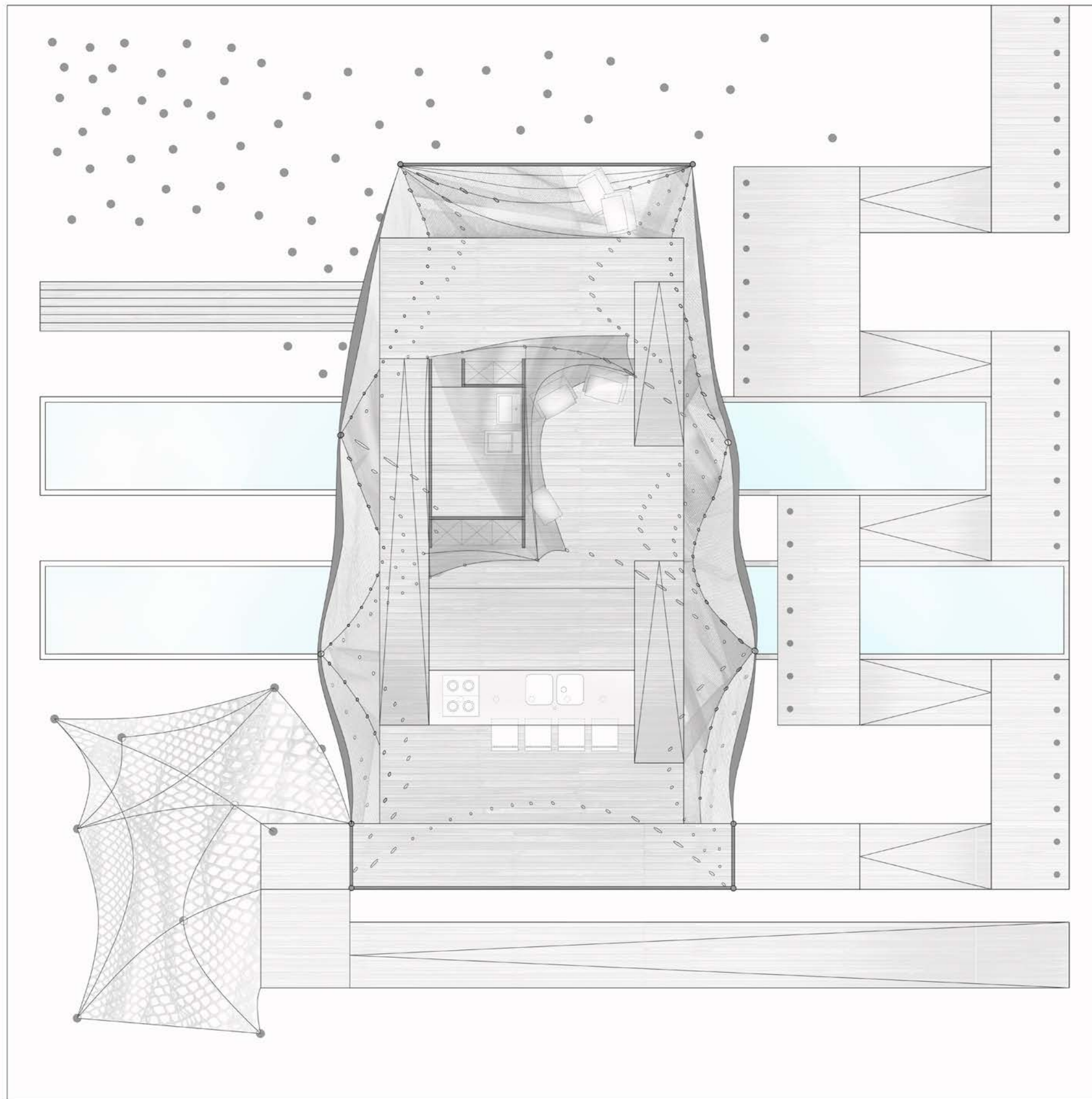
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



The landscape might benefit from a strategy of sloped terrain which not only reinforces the grain across the site but also delineates planted and walkable space.

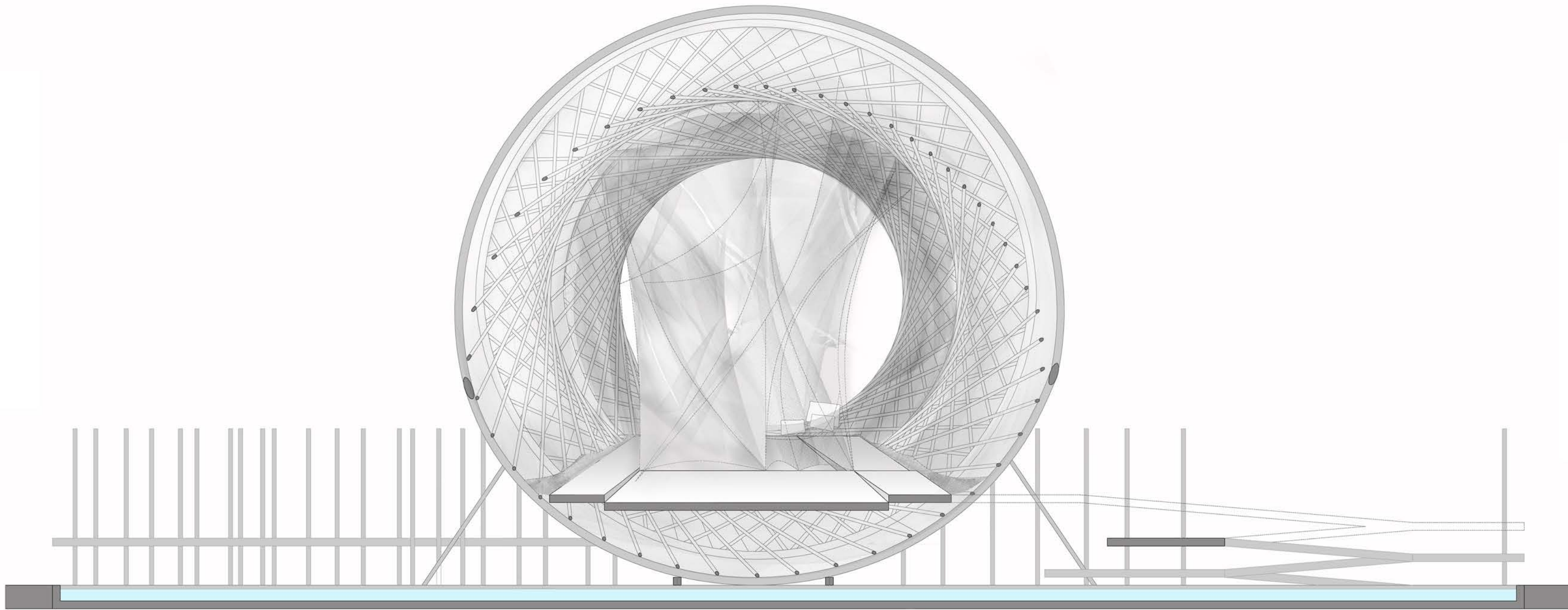


PLAY SHELL URBANISM PLANNING SKIN LIGHTING



The interior consists of an open plan with a floating core to contain the bathroom, mechanical closet and storage. The house divides into three levels separated by ramps along the perimeter: the first a more social space for cooking and entertaining; the second a more relaxed space for living; and the third a more private space for sleeping and working.

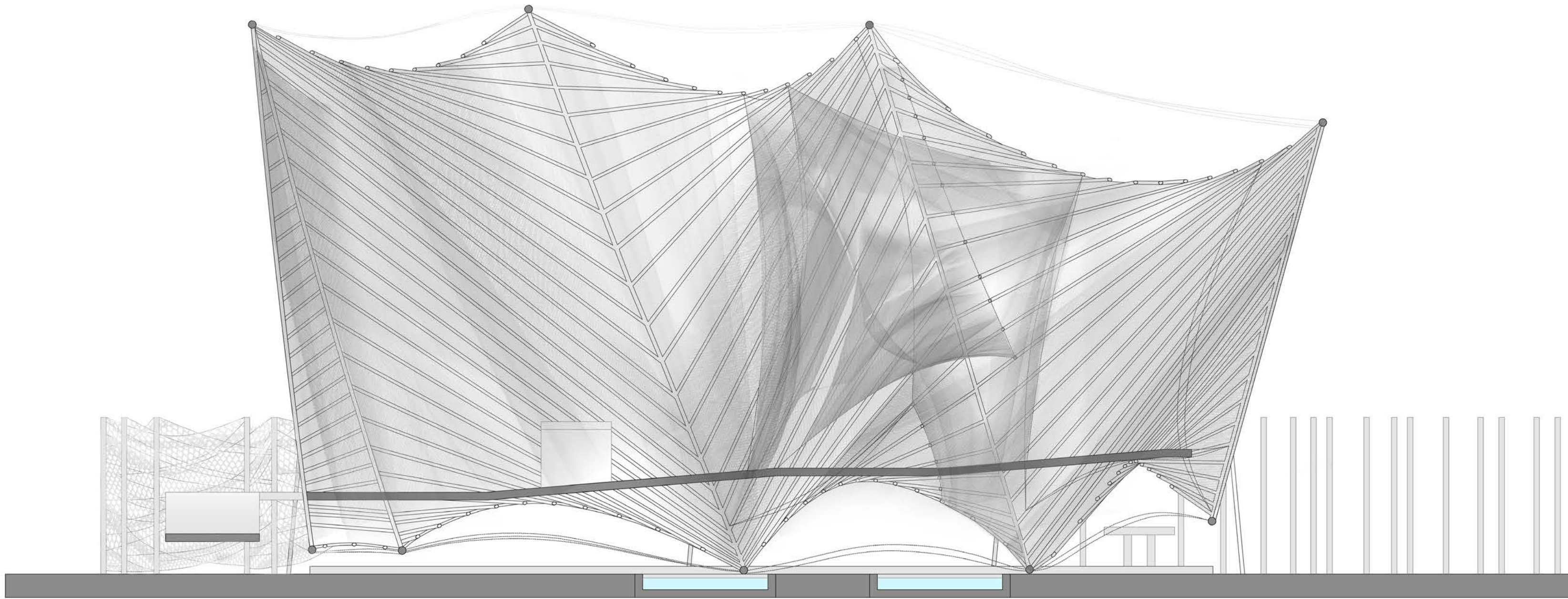




The cross-section denotes the fuselage-like arrangement of space, a clear impression of the rigid outer frame and a generous ceiling height.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Level changes happen subtly but serve to divide space, as do the four outer rings which pinch the fabric membranes into pockets.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



PLAY SHELL URBANISM PLANNING SKIN LIGHTING

PERMEABLE

TRANSLUCENT

OPAQUE

EMBEDDED



The layers of the outer fabric wall may vary in permeability and opacity as needed to provide better lighting and ventilation.

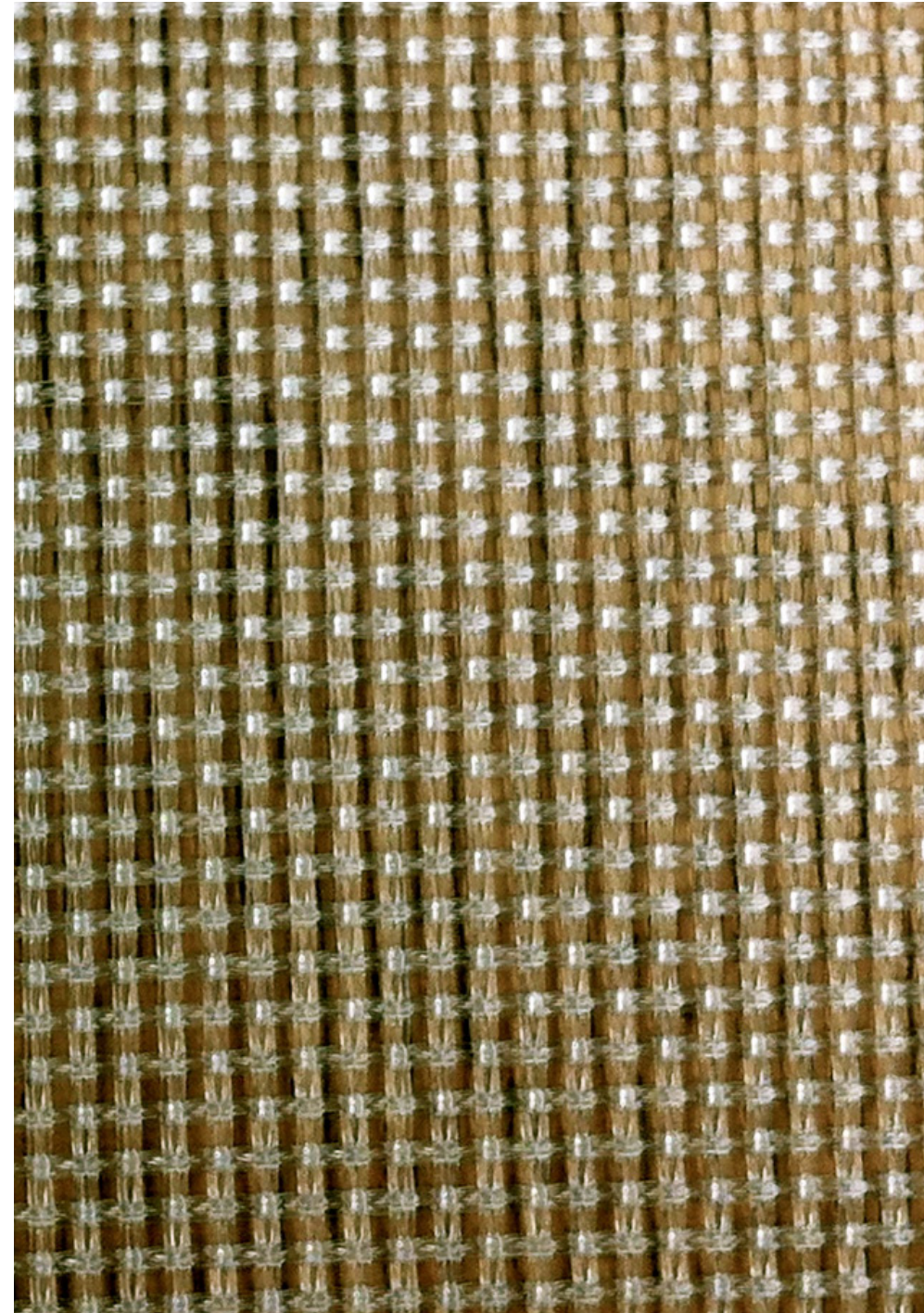


Research in the material collections at RISD have yielded multiple possibilities for skin. Samples include such beneficial properties as waterproofness, superinsulation, light diffusion, light embedding, compact solar collection, evaporative cooling, thinness and durability.

POLYPROPYLENE SRP COMPOSITES



WEATHERPROOF PVDF MESH



WOVEN NATURAL FIBERS



PLAY SHELL URBANISM PLANNING SKIN LIGHTING

3D WOVEN TEXTILES



TEXTILE TILES



3D WOVEN FIBERS



EVAPORATIVE COOLING FABRICS



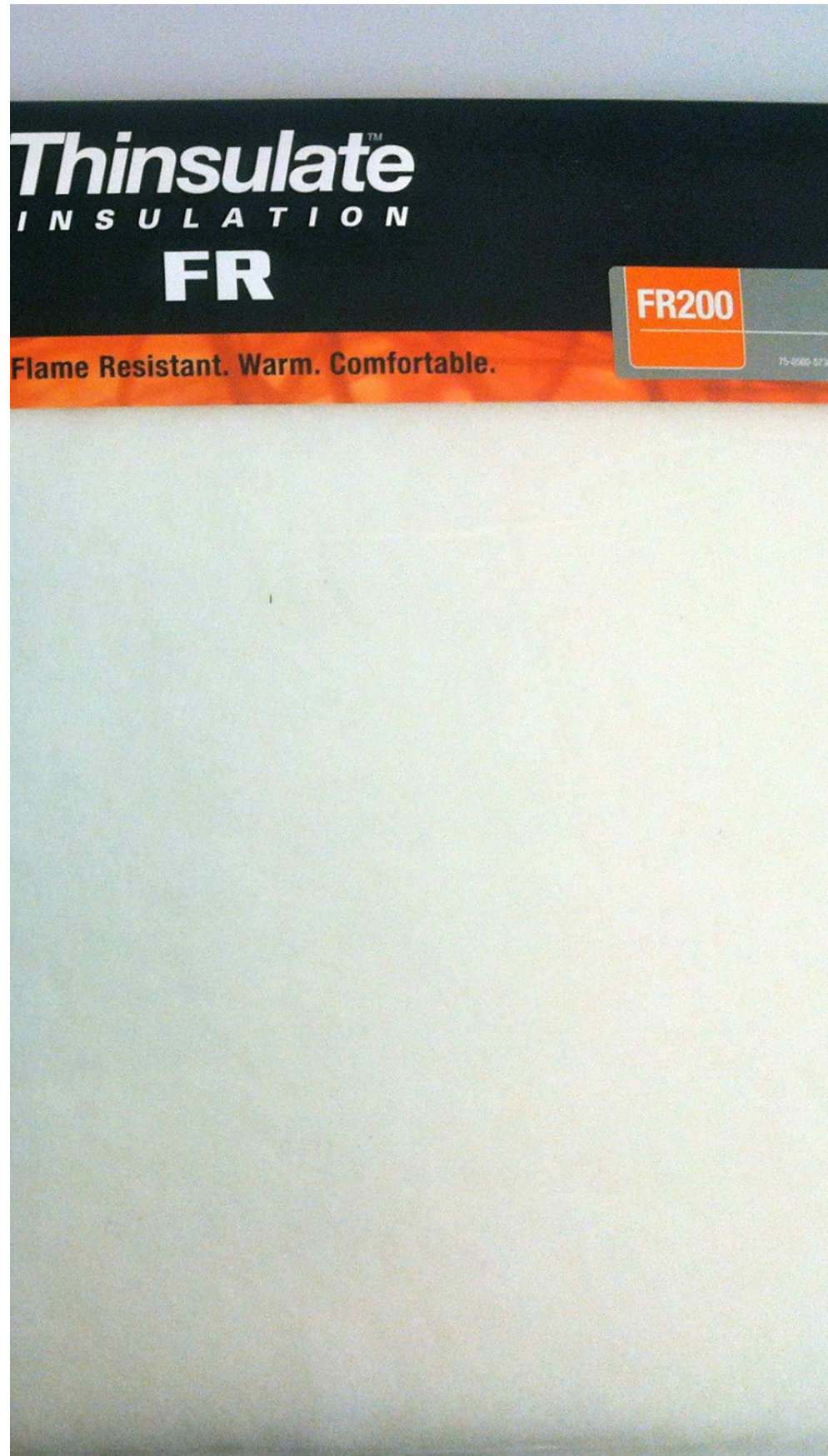
CARBON FIBER & FIBERGLASS



PHASE CHANGE MATERIALS



THINSULATE INSULATION



CUSHIONING GEL

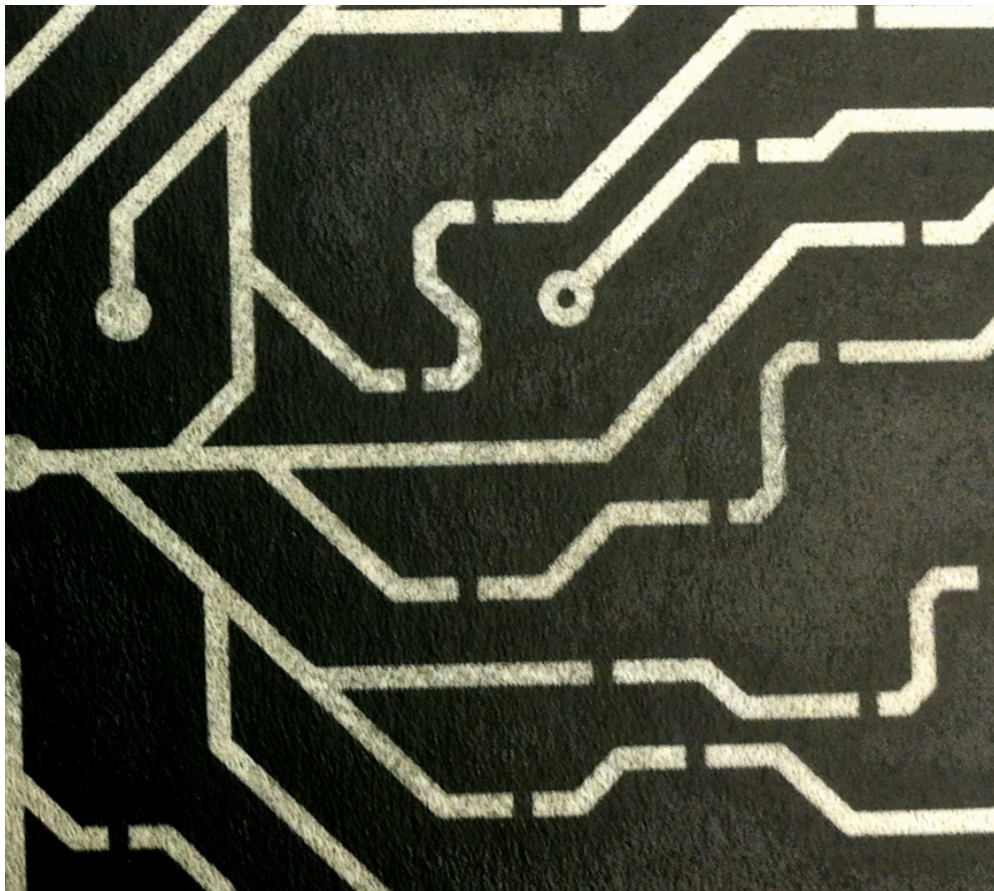
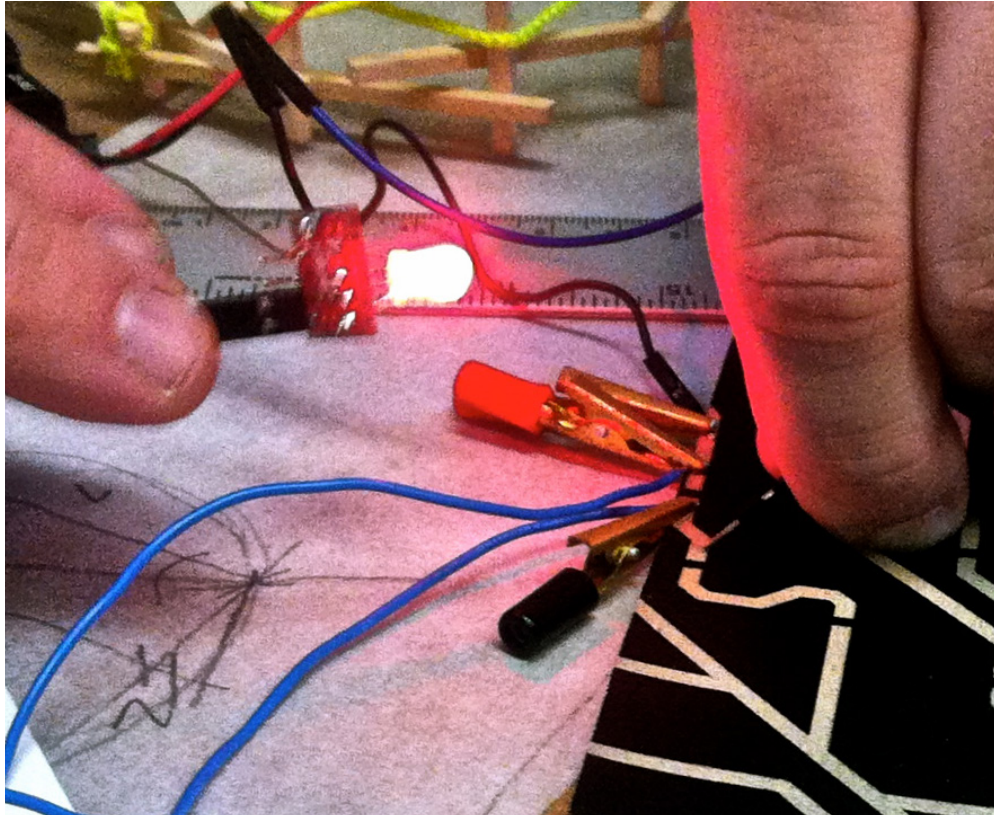


STRUCTURAL PET PANELS

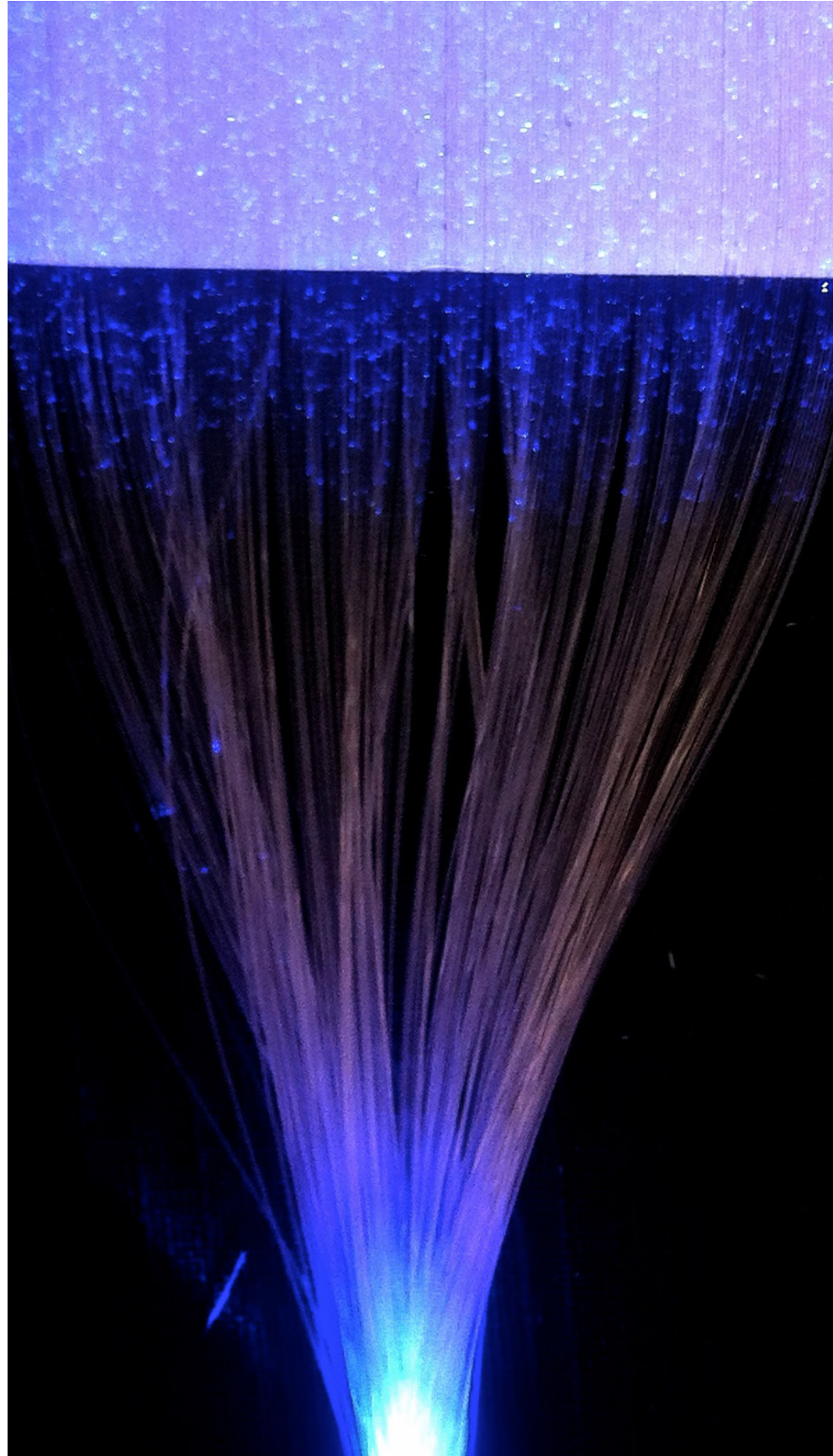


PLAY SHELL URBANISM PLANNING SKIN LIGHTING

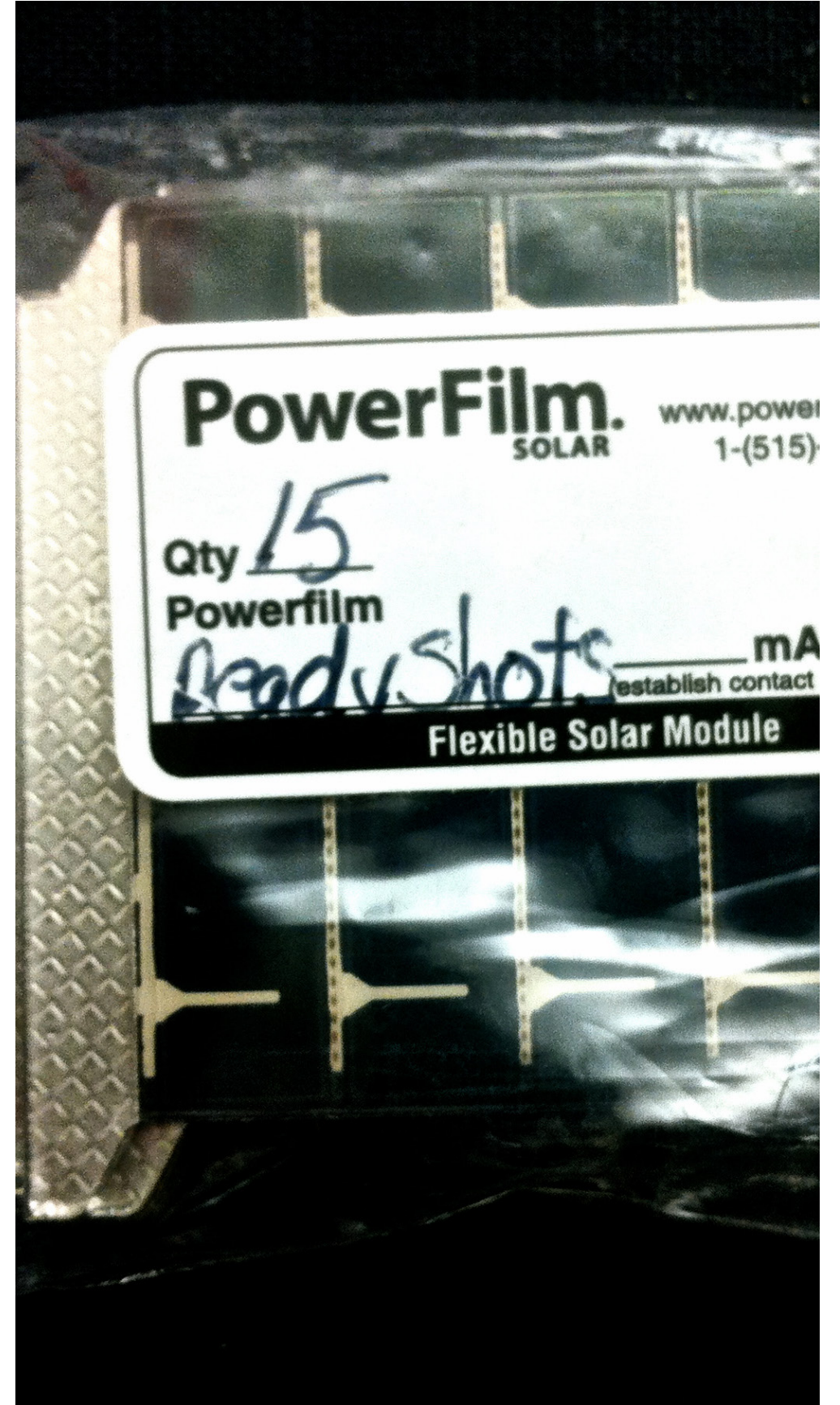
EMBEDDED CIRCUIT WALLPAPER



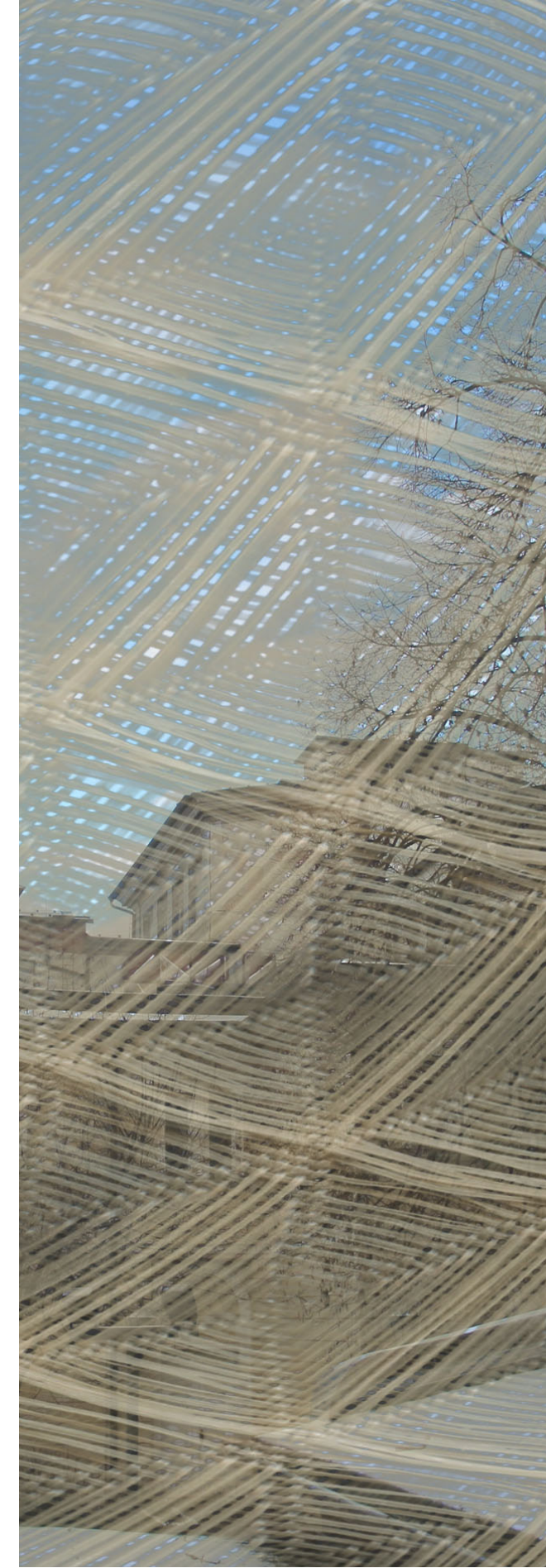
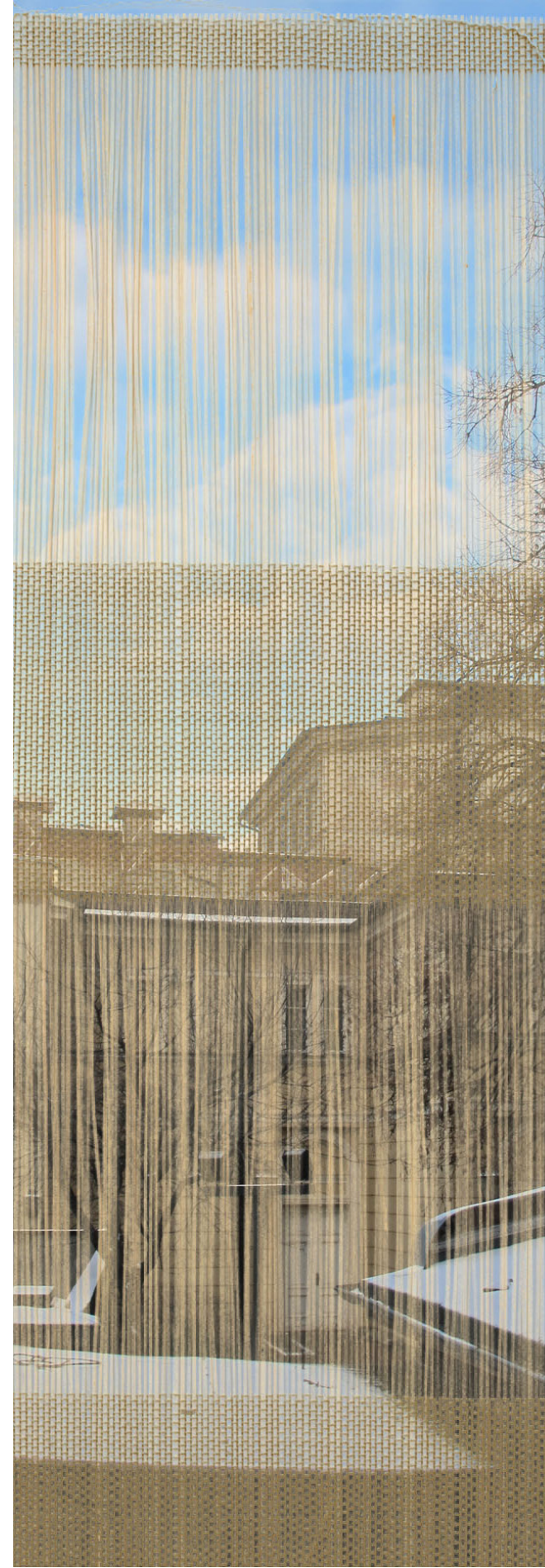
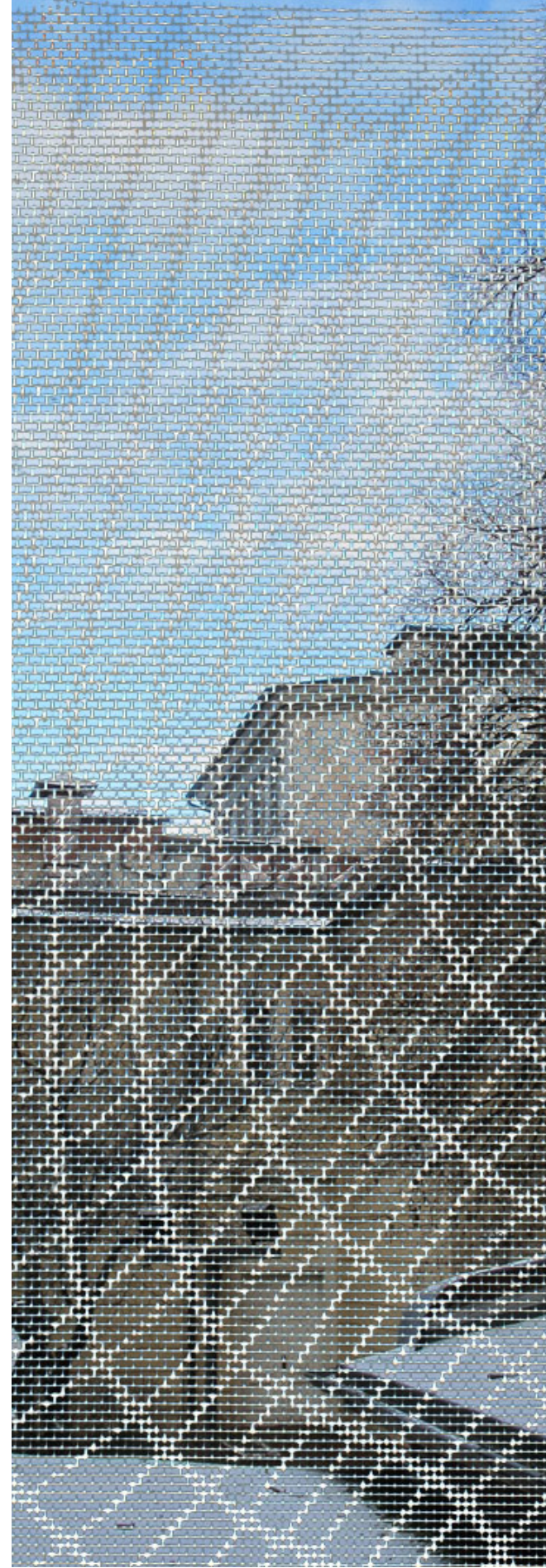
FIBER OPTICS



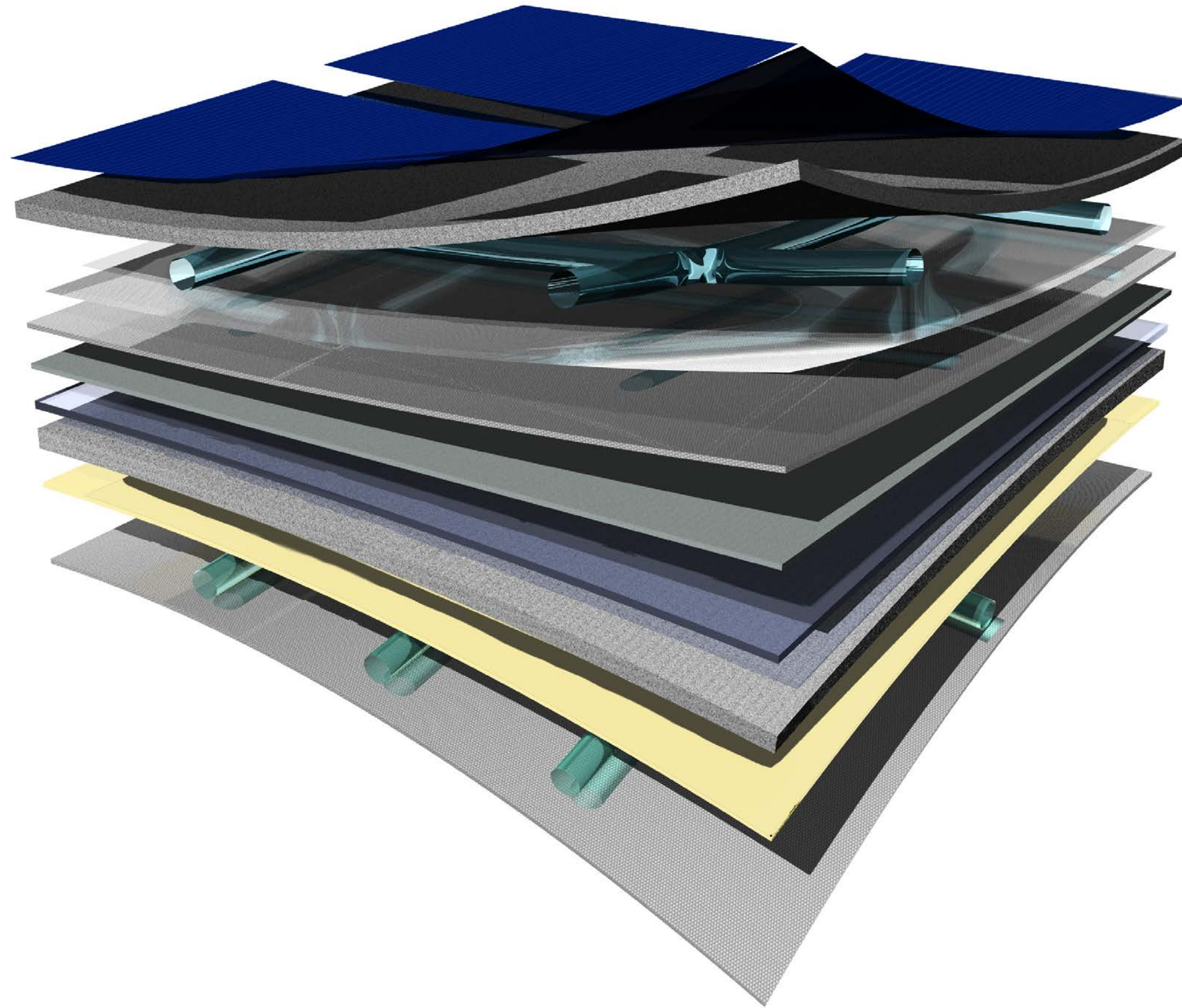
FLEXIBLE SOLAR MODULES



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



PLAY SHELL URBANISM PLANNING SKIN LIGHTING



DEPOSITED THIN-FILM
PHOTOVOLTAIC CELLS

WATER ABSORPTION
SUBSTRATE

COLLECTED WATER
& HEATED WATER
TRANSPORT TUBES

GORE-TEX
KEVLAR
NOMEX

DEPOSITED
ELECTROCHROMIC
POLYMER

THINSULATE

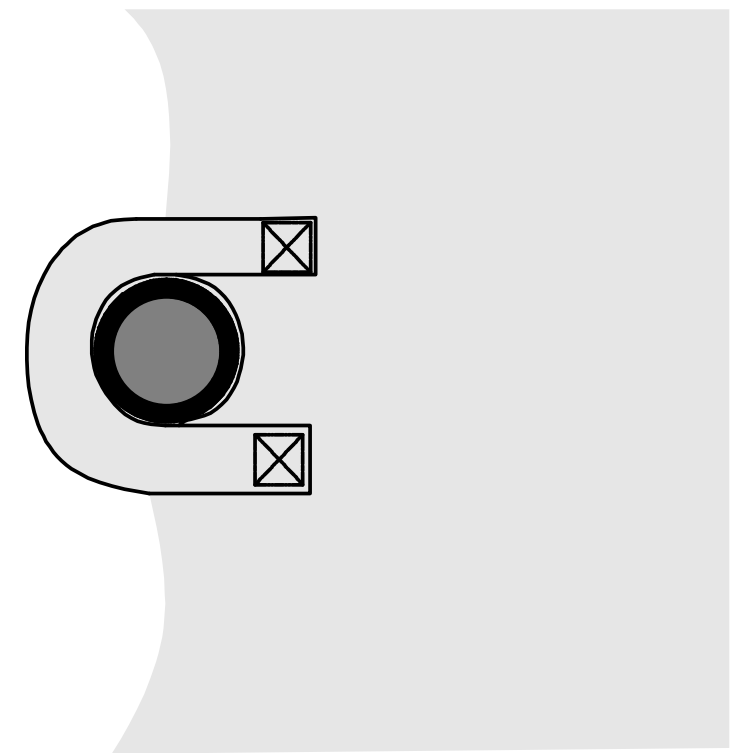
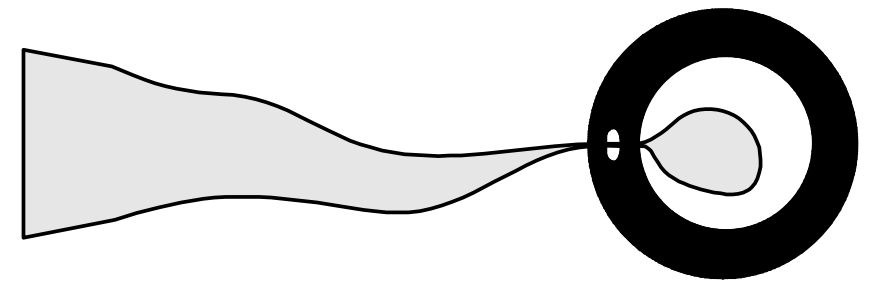
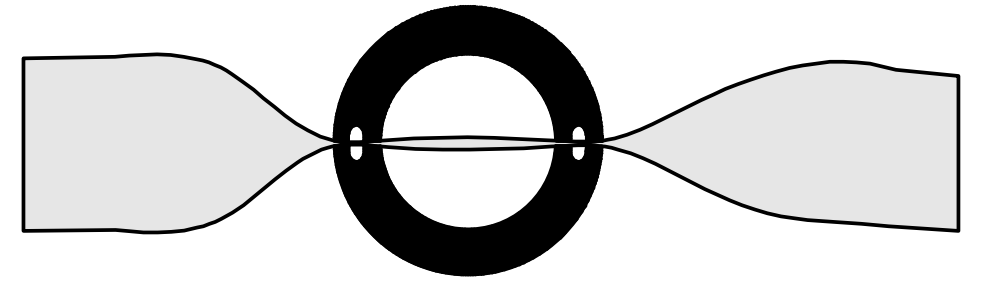
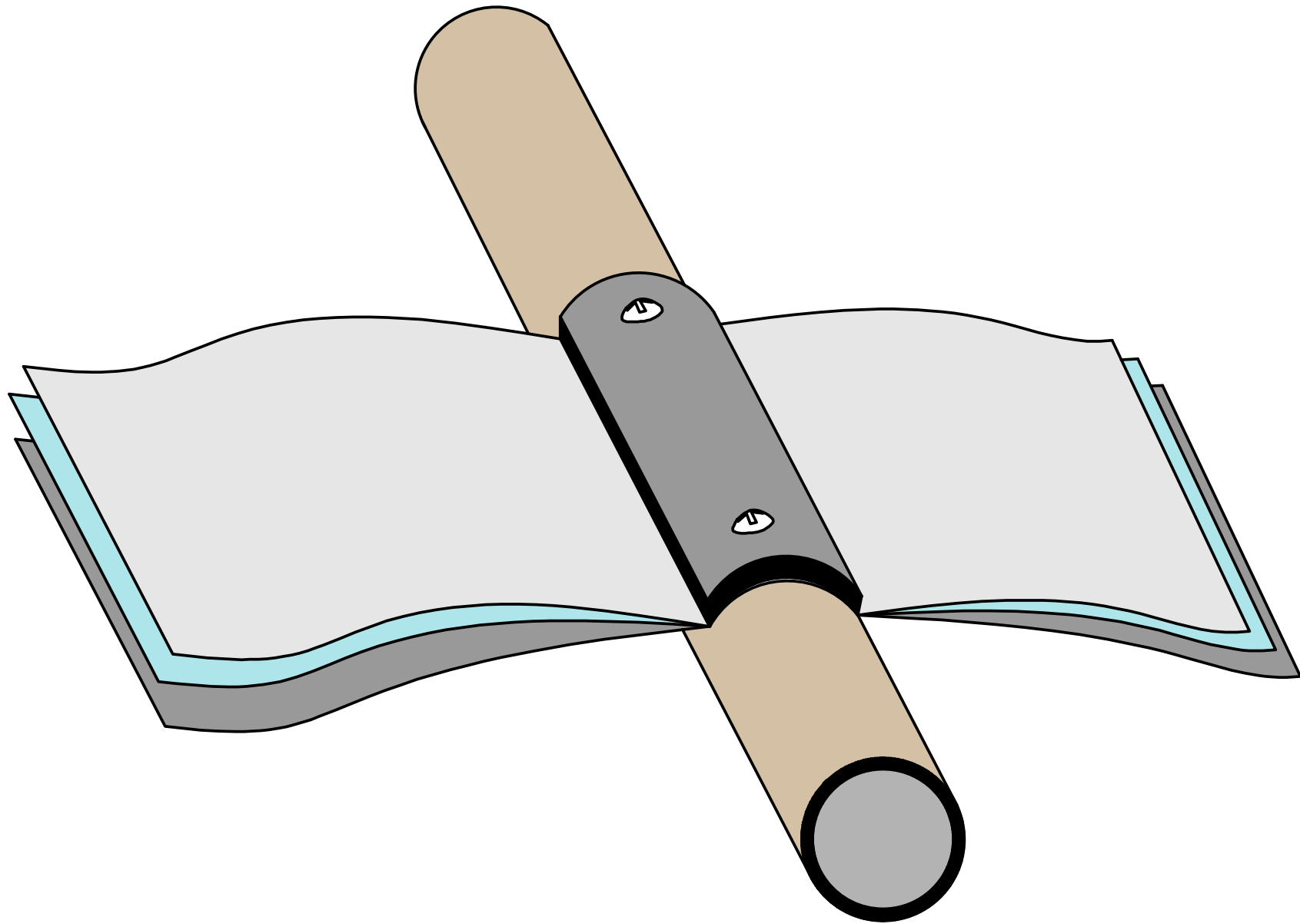
SILVERED MYLAR

RADIANT HEATING &
COOLING WATER TUBES

INNER SKIN



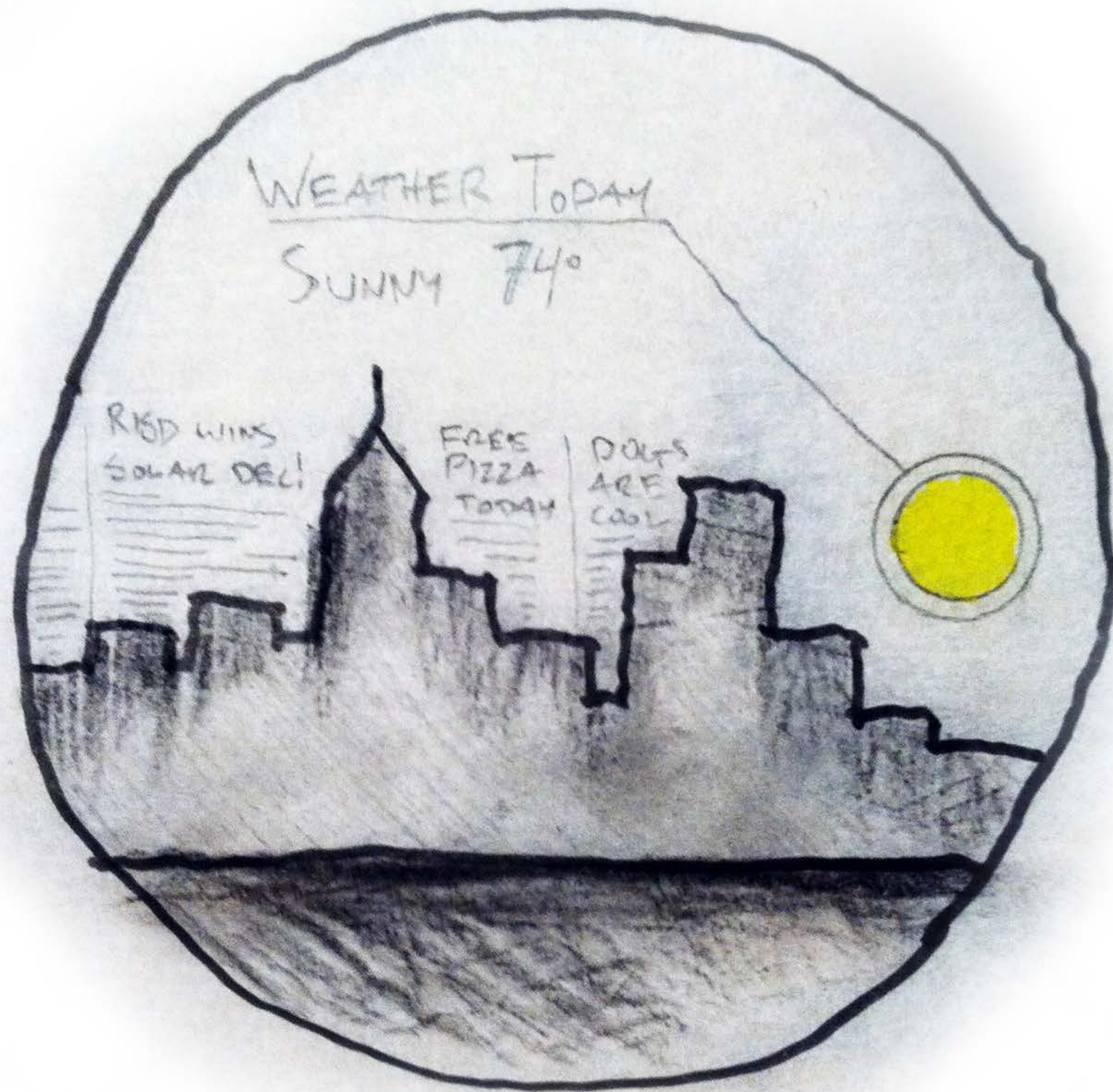
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



The fabric skin may attach to the rigid structural frame through a system of clamping, bunching or wrapping.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING

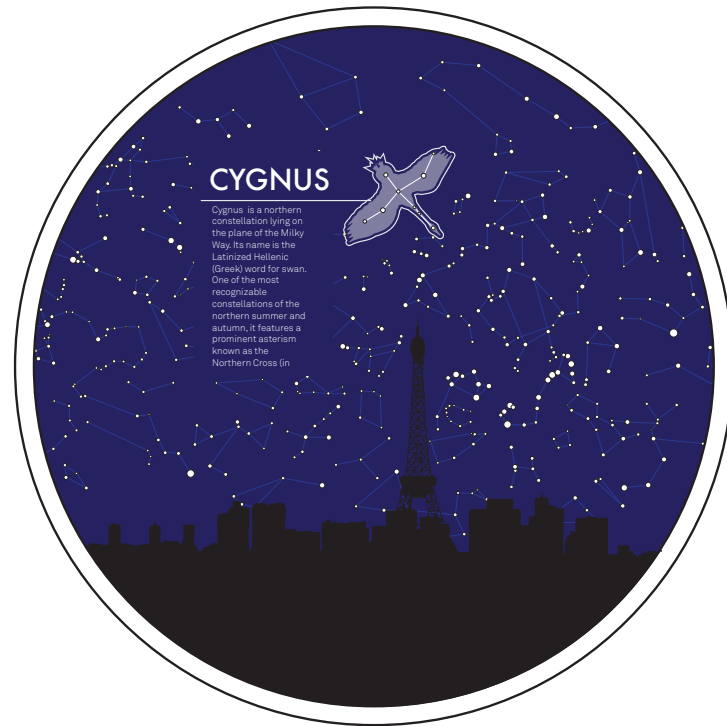


Augmented-reality windows will be installed in the house to provide the user with practical information about the outside surroundings.



PLAY SHELL URBANISM PLANNING SKIN LIGHTING

CONSTELLATION



MOON PHASE



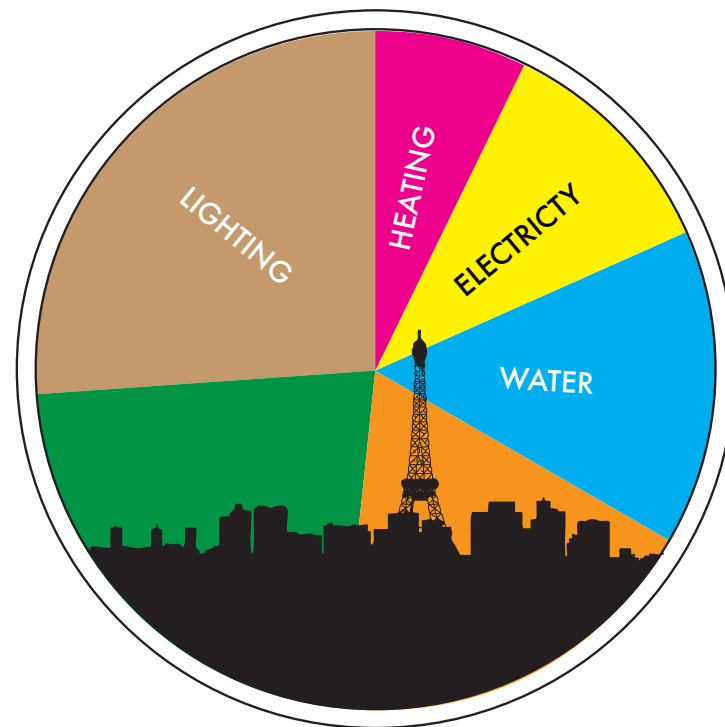
WEATHER



FIREWORKS



GREEN INFORMATION

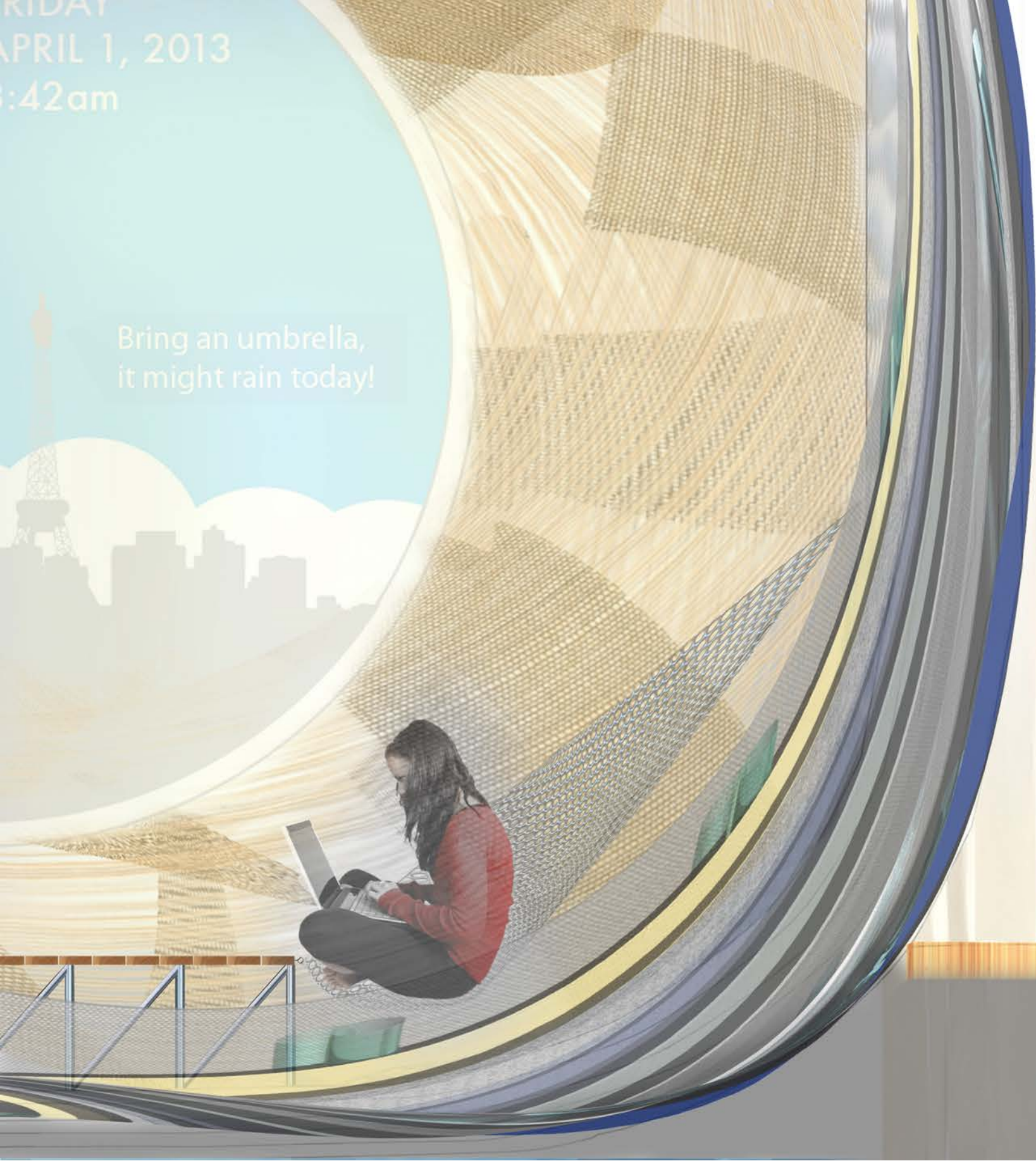


MOVIE



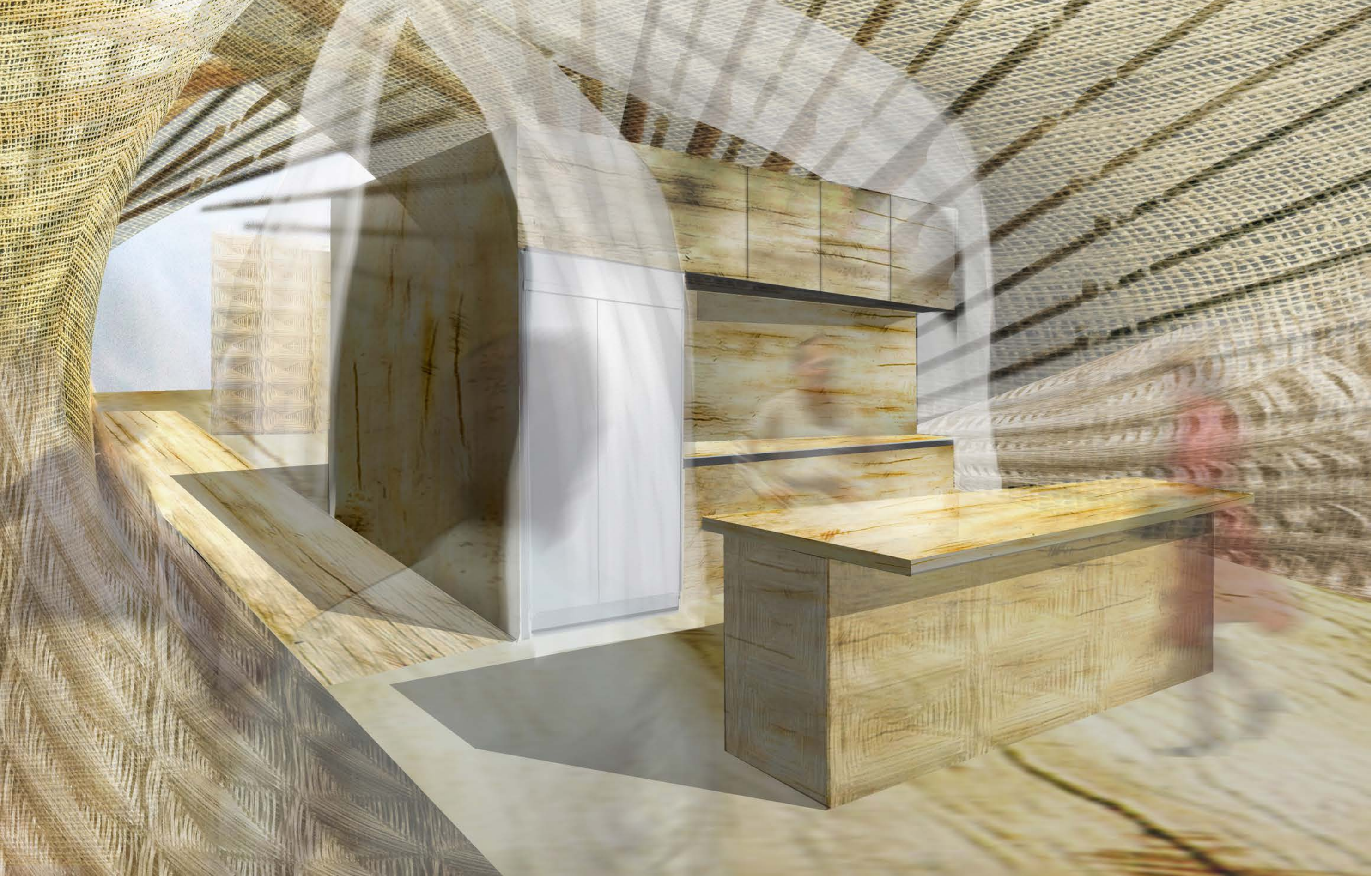
FRIDAY
APRIL 1, 2013
10:42am

Bring an umbrella,
it might rain today!

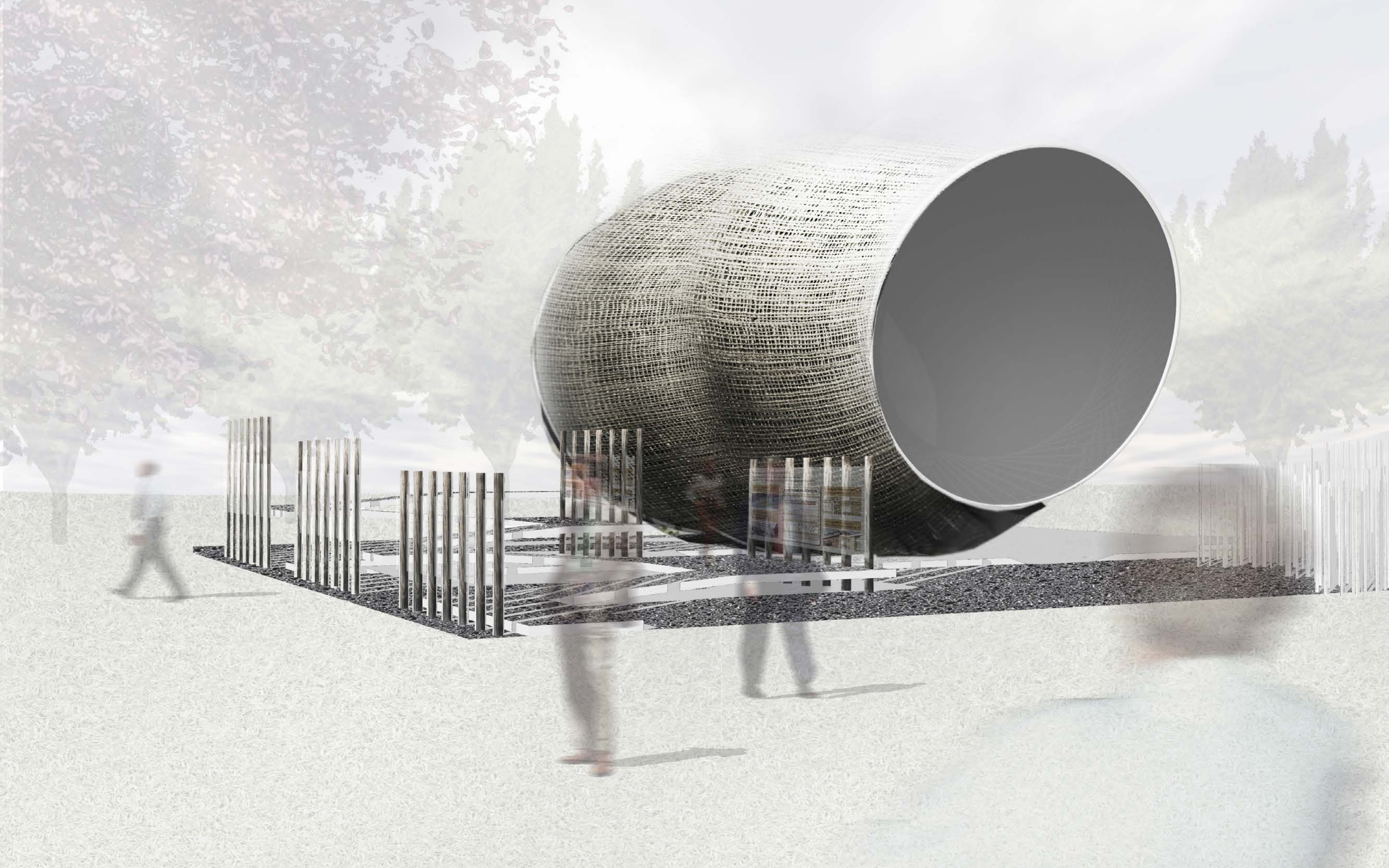


These strategies create both soft and interactive spaces within the house that encourage play.



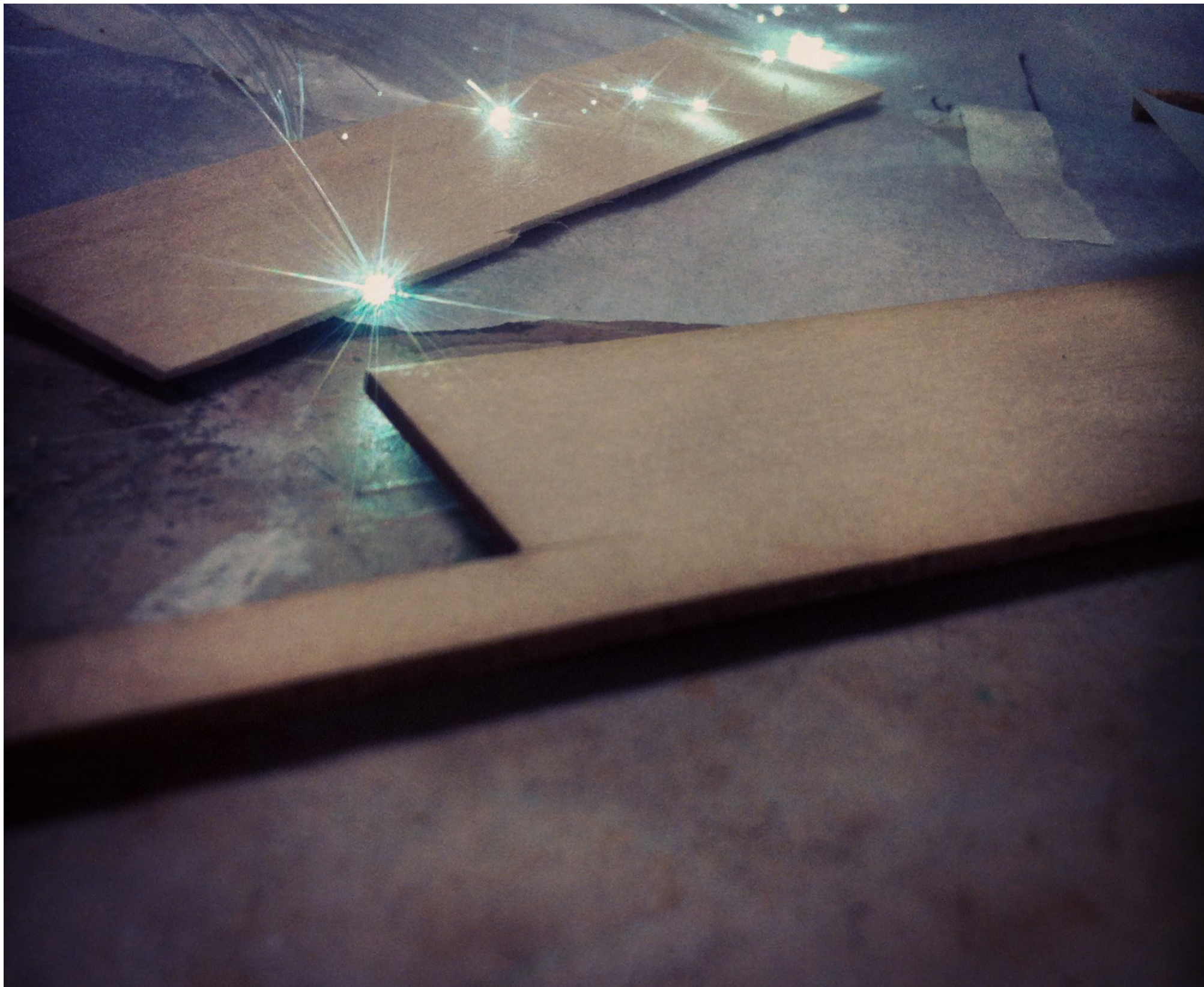


PLAY SHELL URBANISM PLANNING SKIN LIGHTING





PLAY SHELL URBANISM PLANNING SKIN LIGHTING



Fiber optics and LED lights are embedded in both the landscape and skin to emphasize the relationship of the ground to the sky.



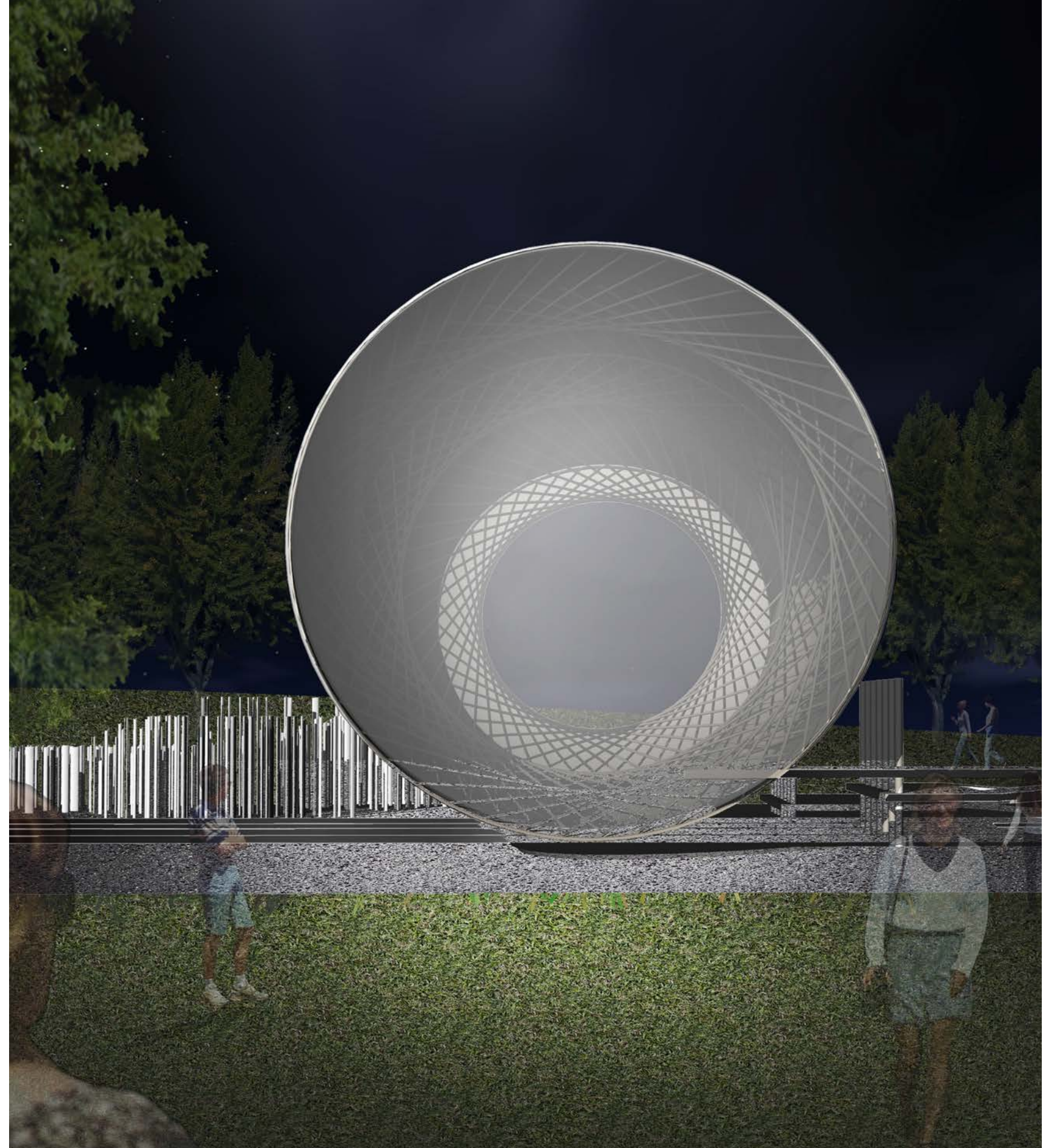
PLAY SHELL URBANISM PLANNING SKIN LIGHTING



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