



MUSCULAR ARCHITECTURE: AN INTERACTIVE BENDING-ACTIVE SYSTEM

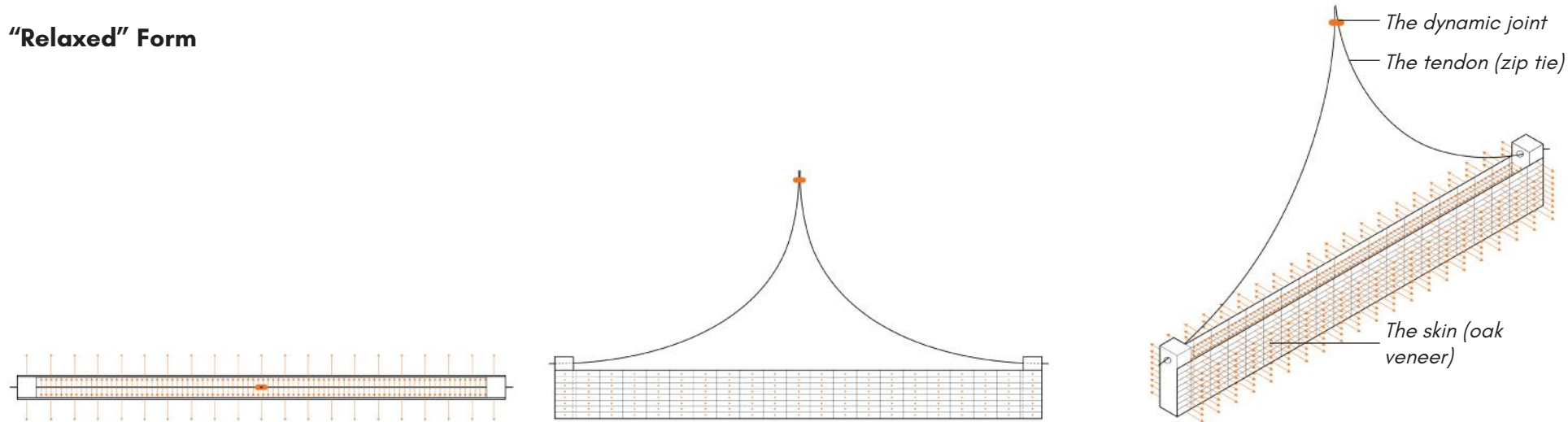
ALINA TUREAN

This project aims to investigate the possibilities of a bending-active system based on interactive joints.

The intention behind the prototypes was to use the bending properties of flexible materials to develop a modular system that would induce stresses into the veneer strips. As seen in the modules, the bending and torsion forces in the "skin", oak veneer, are induced through the pulling forces caused as a result of the bending forces applied on the "tendon", zip tie, by the dynamic joint.

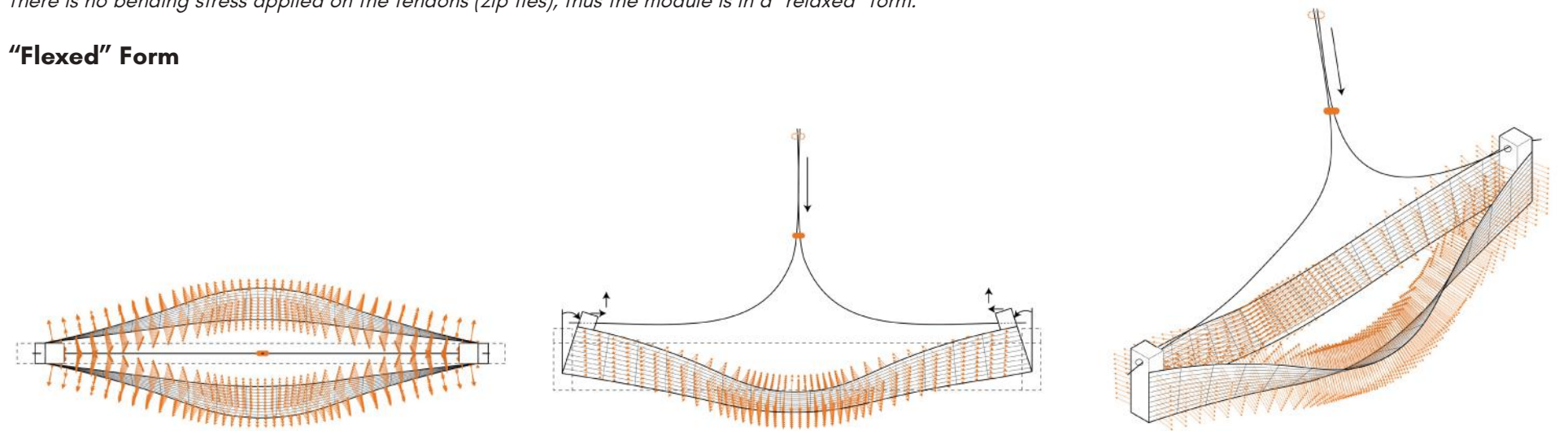
The 20 meter-long interactive wood skinned pavilion is made from thin plywood custom sheets encased within a steel frame. The visitors are encouraged to interact with the pavillion by applying weight on the wooden base which causes the dynamic wood "walls" to flex and bend in response to the movement of people.

"Relaxed" Form



There is no bending stress applied on the tendons (zip ties), thus the module is in a "relaxed" form.

"Flexed" Form

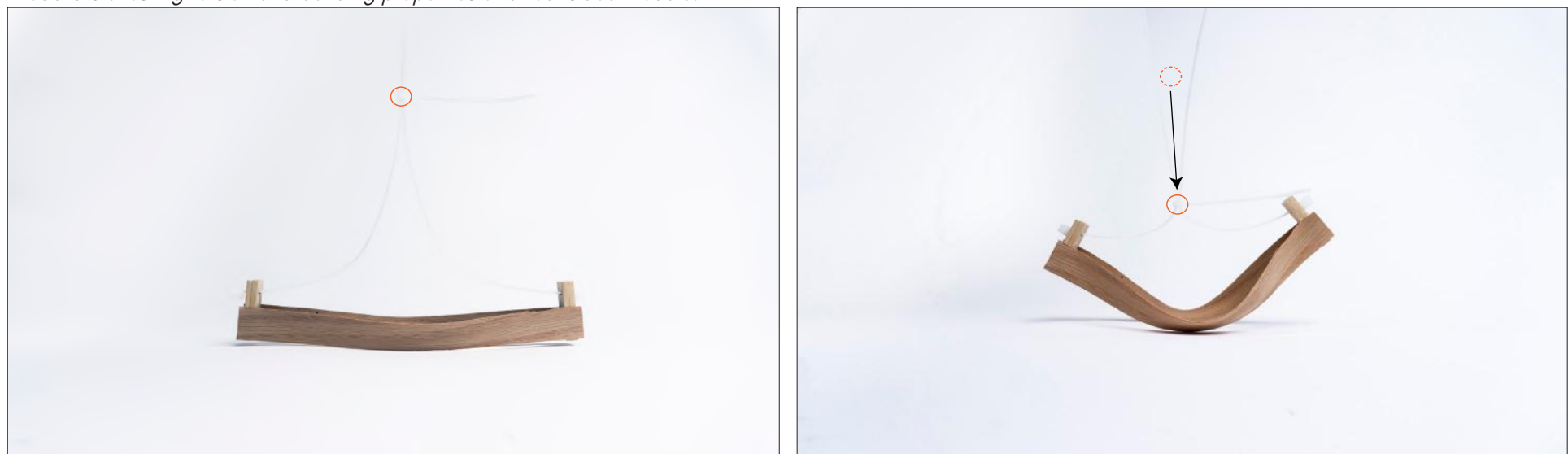


Bending and torsion is induced on the veneer through applying bending stresses on the tendons (zip ties) by moving the joint location.

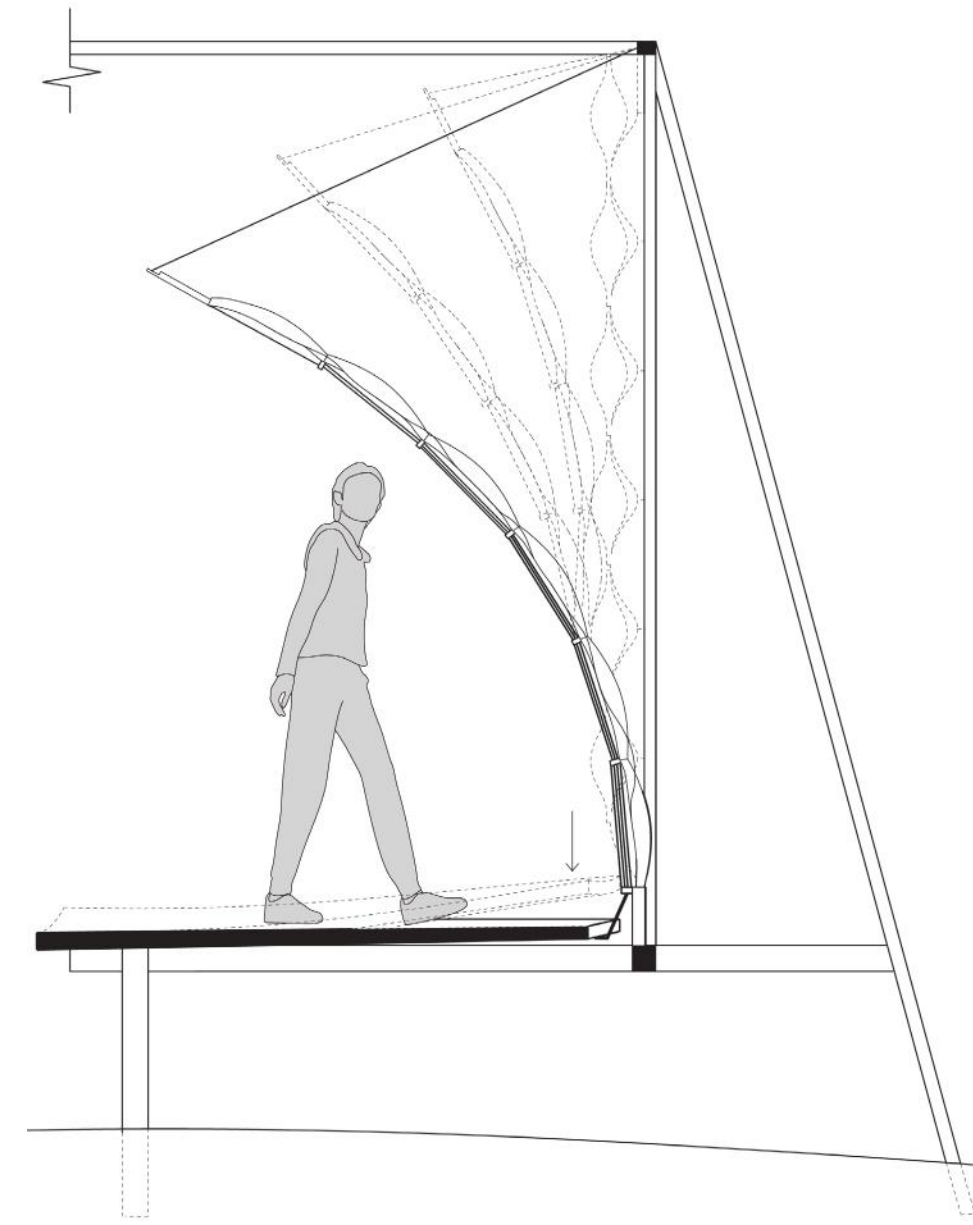
Modular System Prototypes



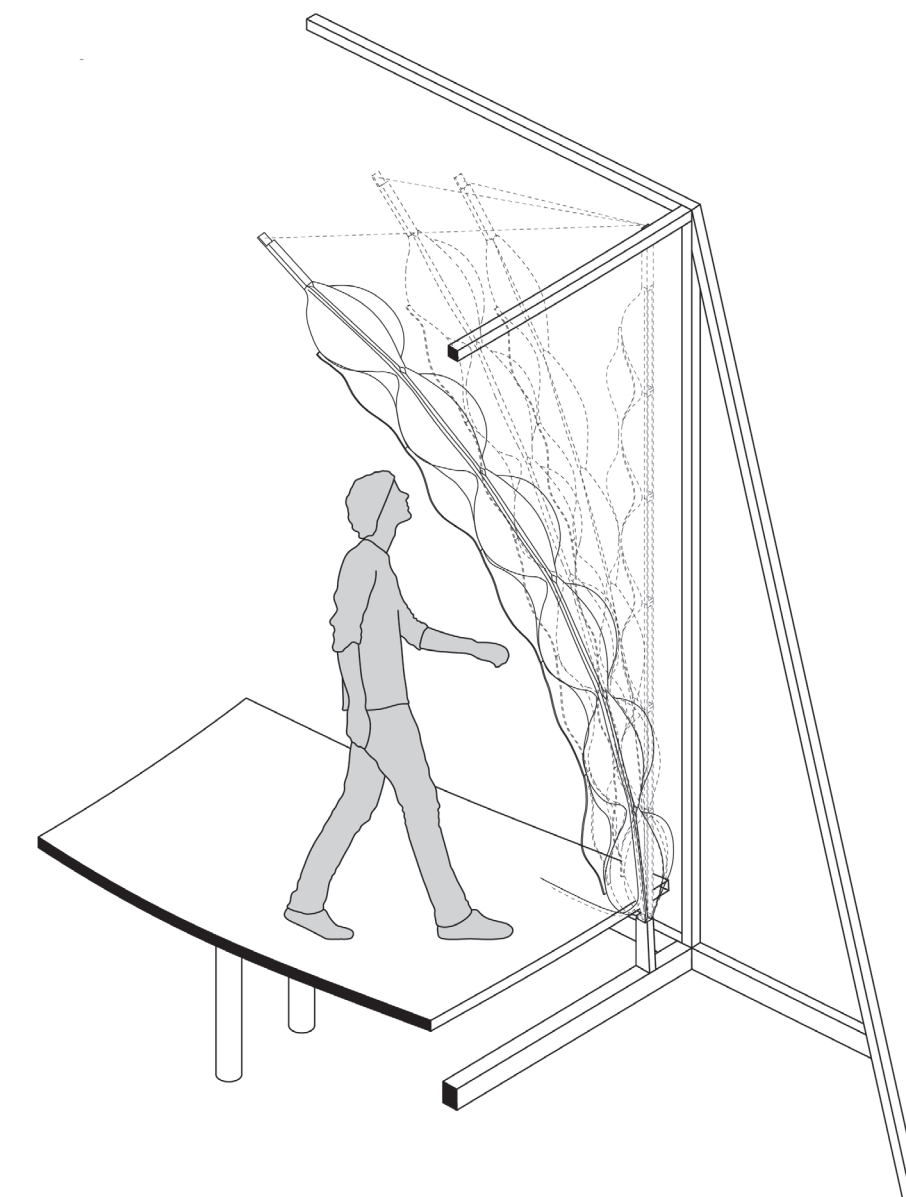
Module 01: Testing torsion and bending properties of a four sided module.



Module 02: Testing an alternative connection method between skin (veneer) and tendon (zip tie).

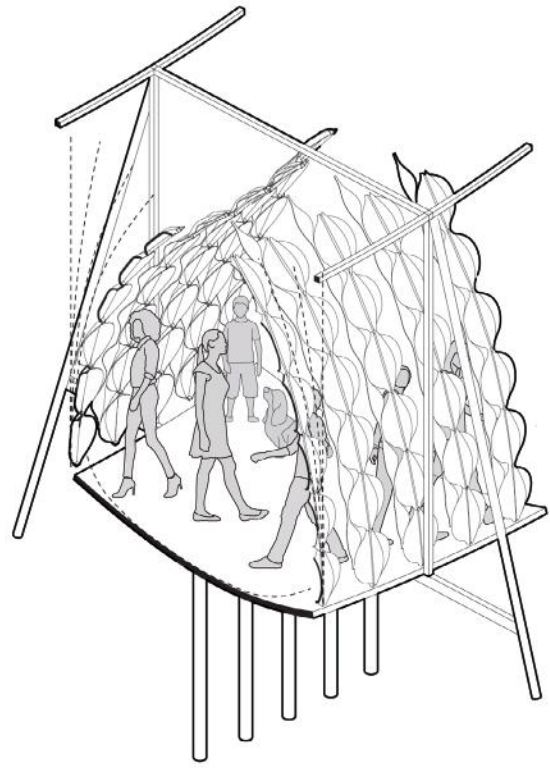


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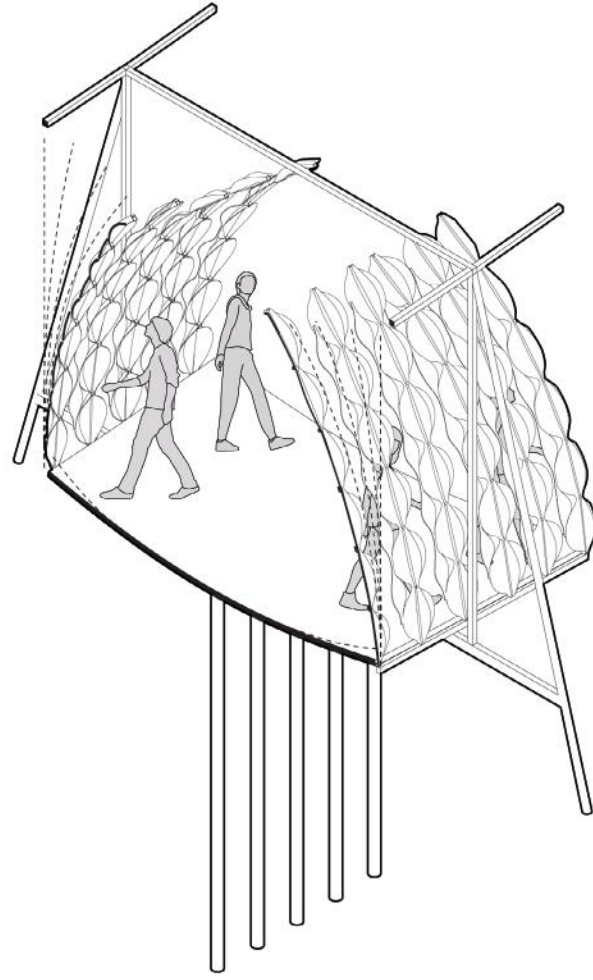


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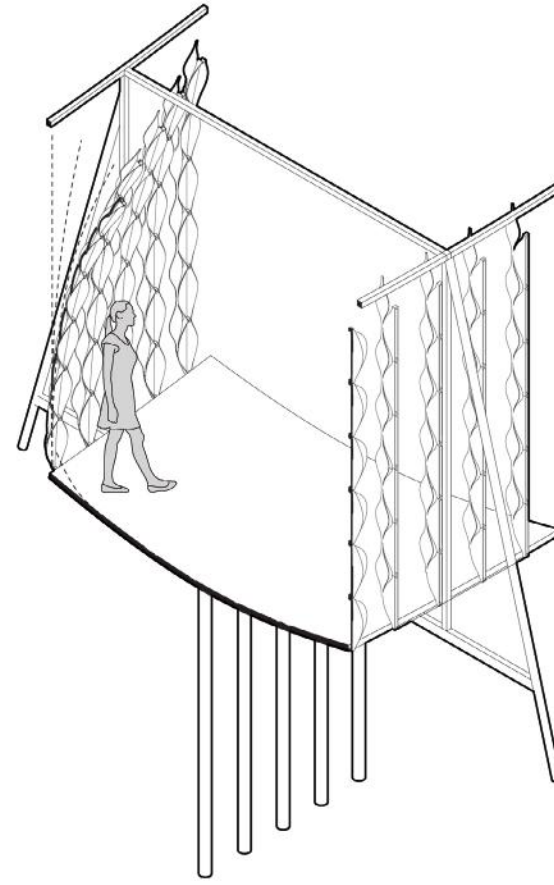
1 "Flexed" Form
Occupancy: High



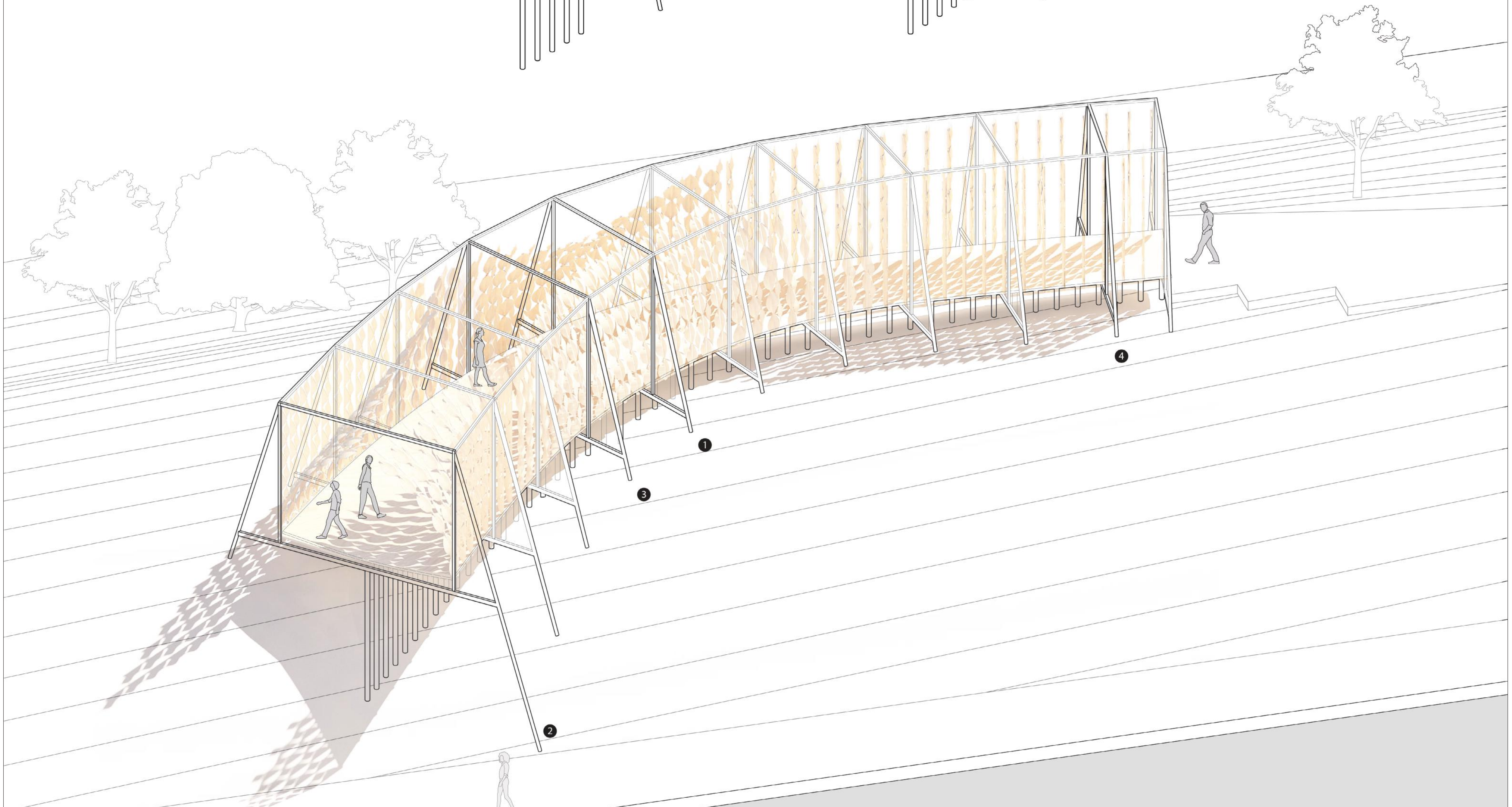
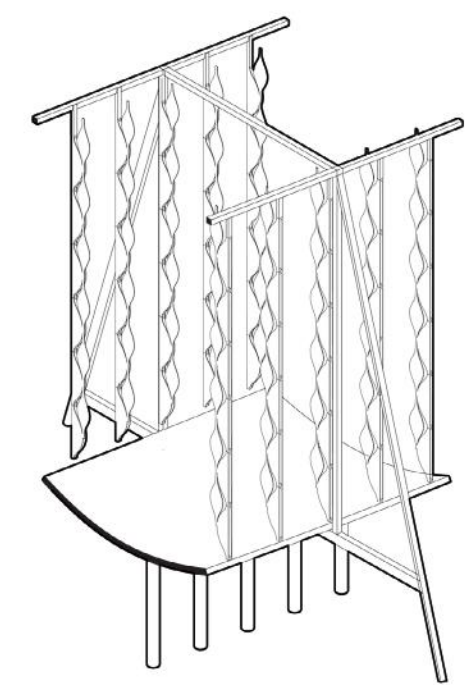
2 "Flexed" Form
Occupancy: Medium

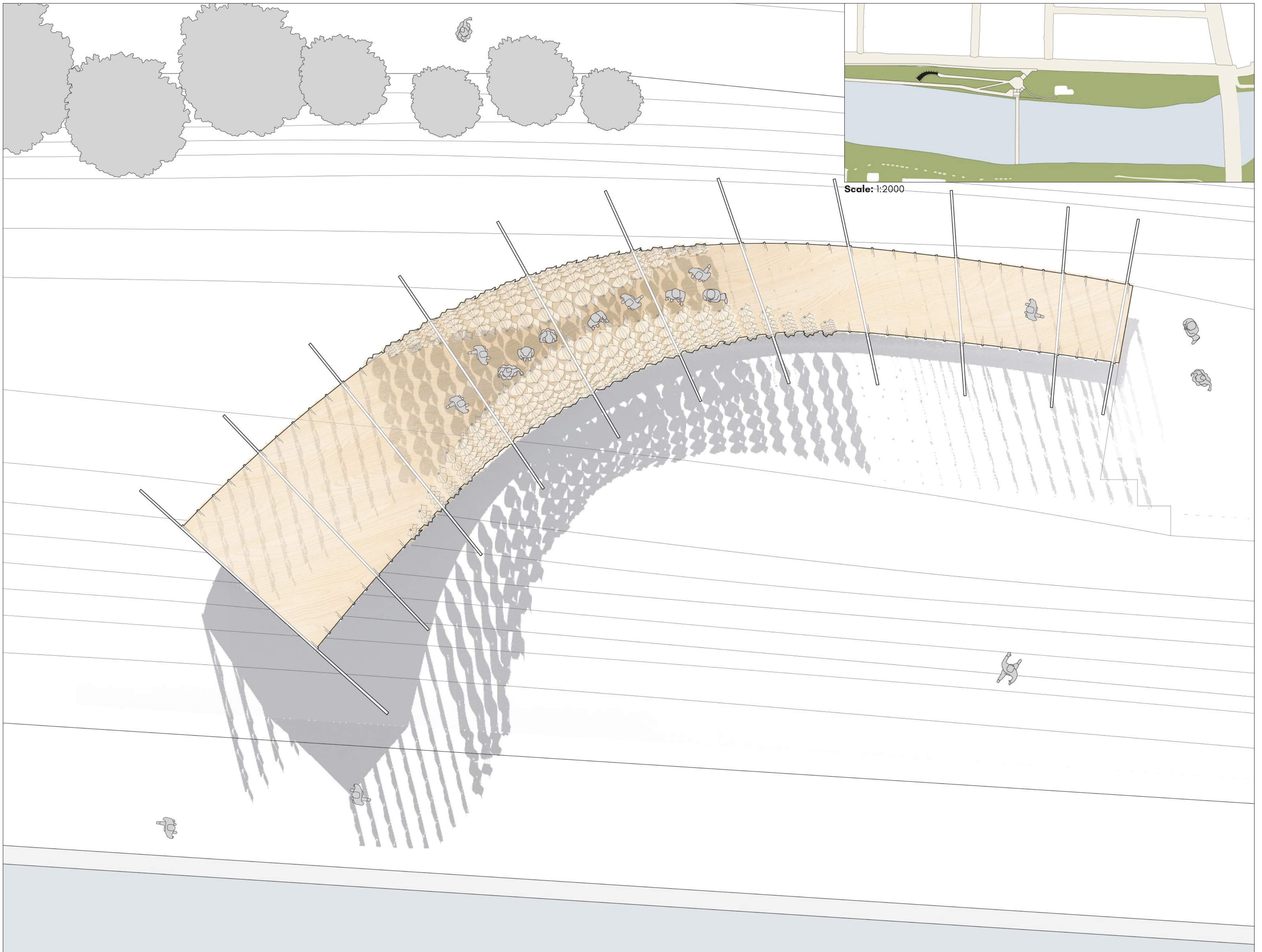


3 "Flexed" Form
Occupancy: Low



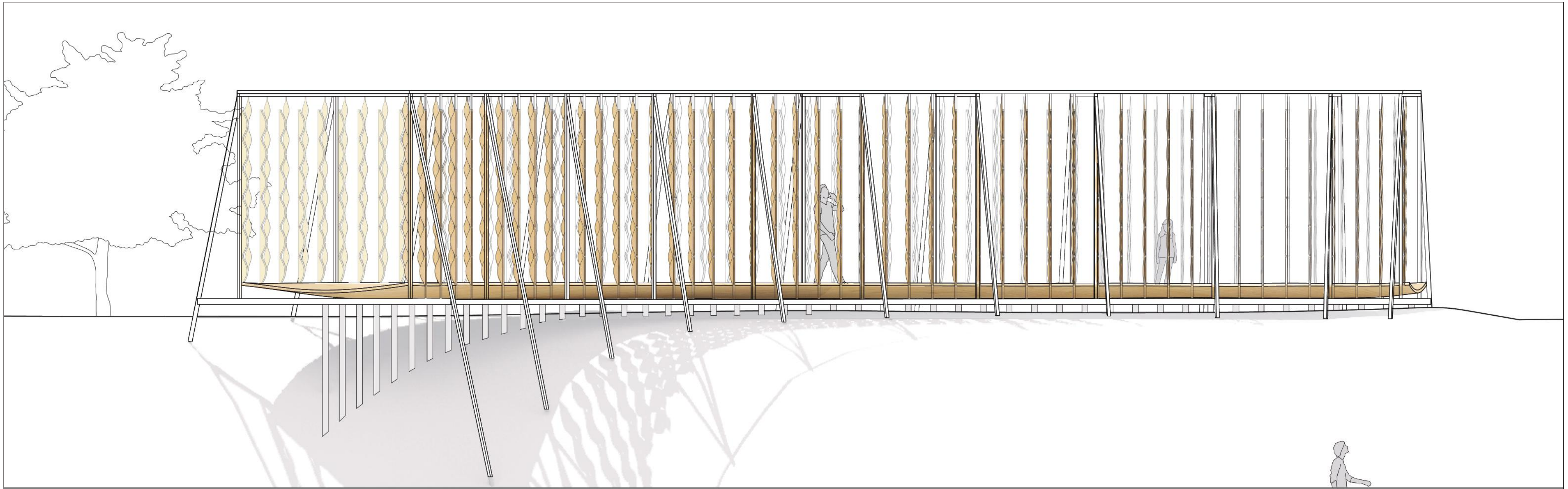
4 "Relaxed" Form
Occupancy: None



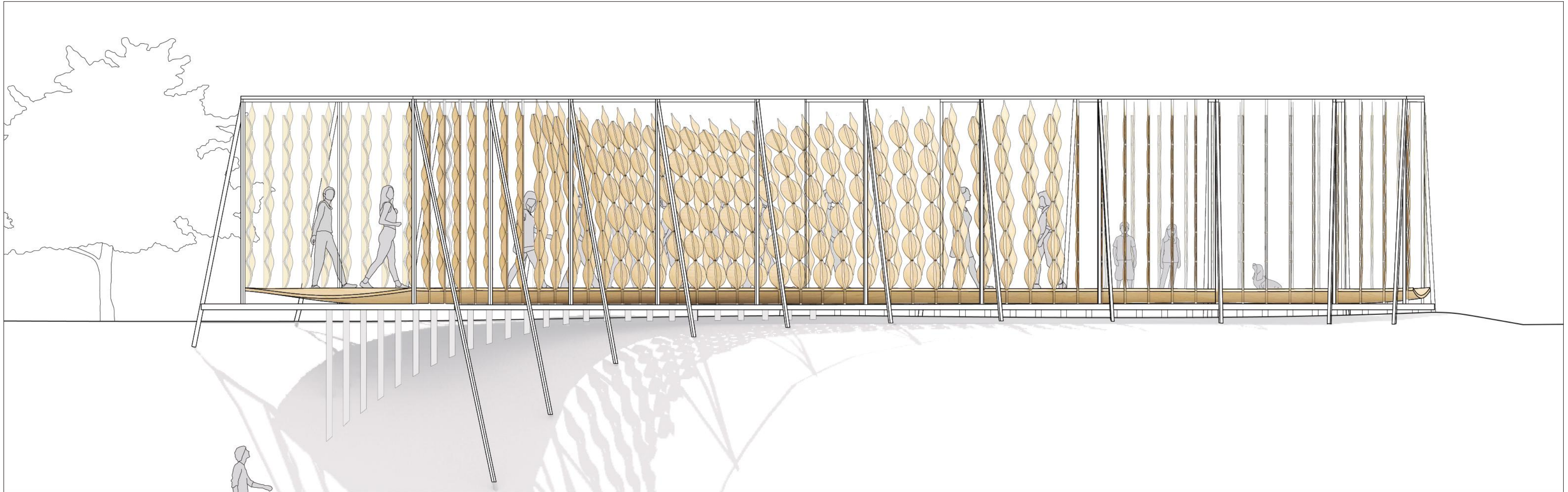


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PHYSICAL PROTOTYPES

EGG PROTOTYPES

The **FIRST** Egg aims to investigate the structural stiffness of the active-bending system of Module 01.

By creating an open network using Module 01, I was able to bend the members to form the oval shape of an egg. The limitation of this egg was that bending occurred in only one direction.

The **SECOND** Egg aims to investigate the structural outcome of linking the tendons and the veneer strips to create a closed network.

Through building a completely closed network, using the improved joinery of Module 02, I was able to achieve a free-form structure that bent in multiple directions. This Egg allowed for more freedom, but it did not yet have the ability to pre-program a final form.

The **THIRD** Egg aims to investigate a method to pre-program a shape into the bending-active network.

By attaching veneer strips between the two main bending strips, I was able to direct the bending of the structure to have an egg form.

