

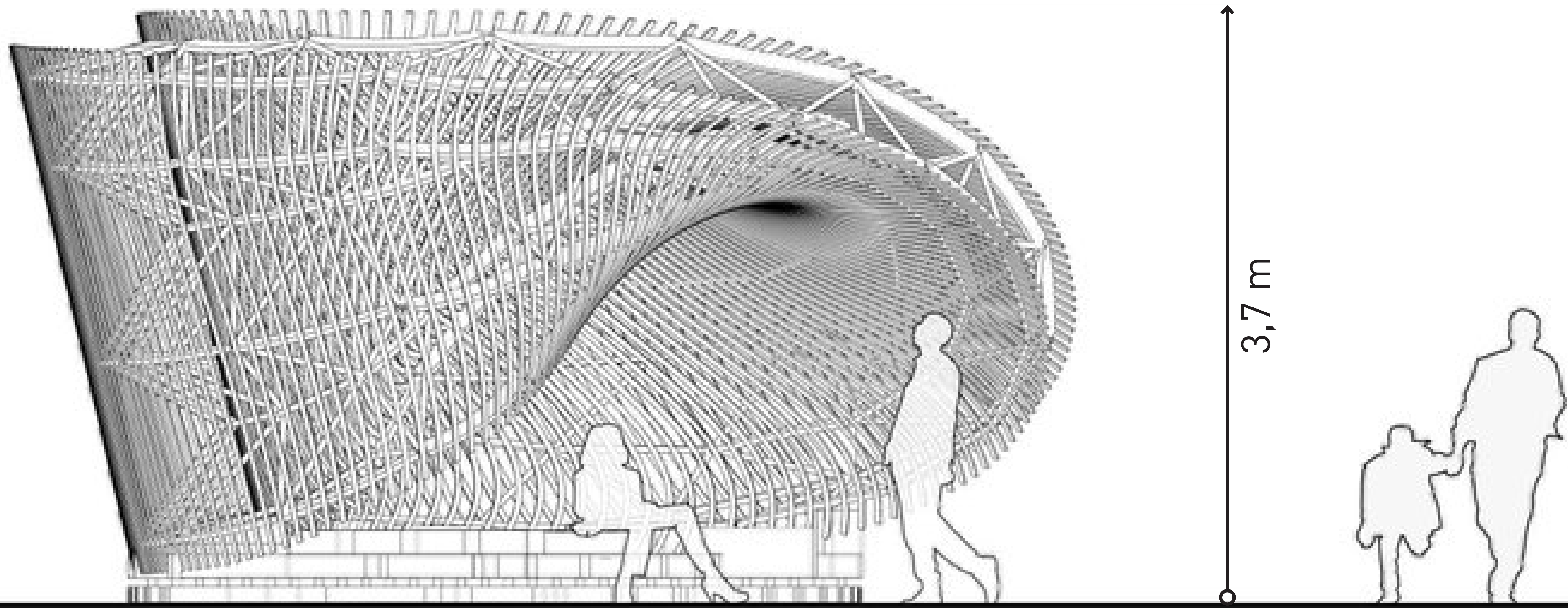
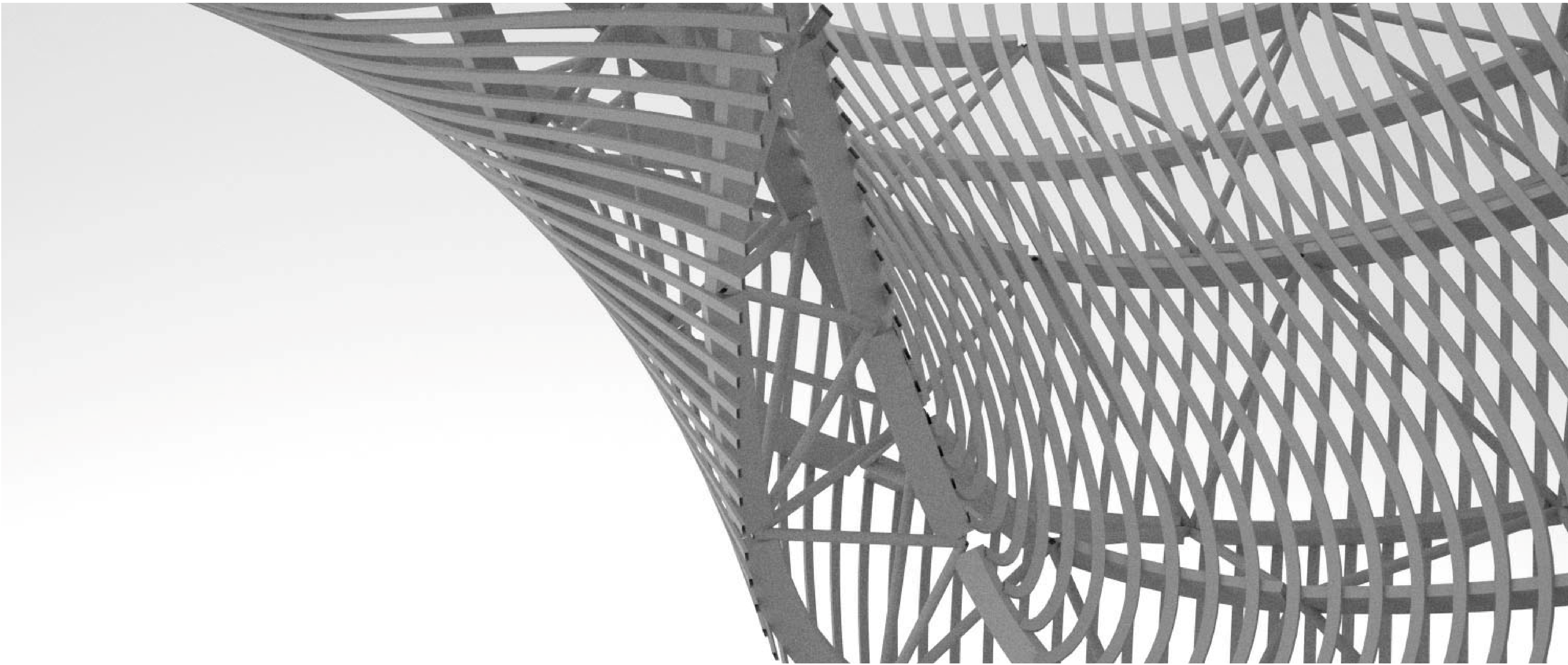
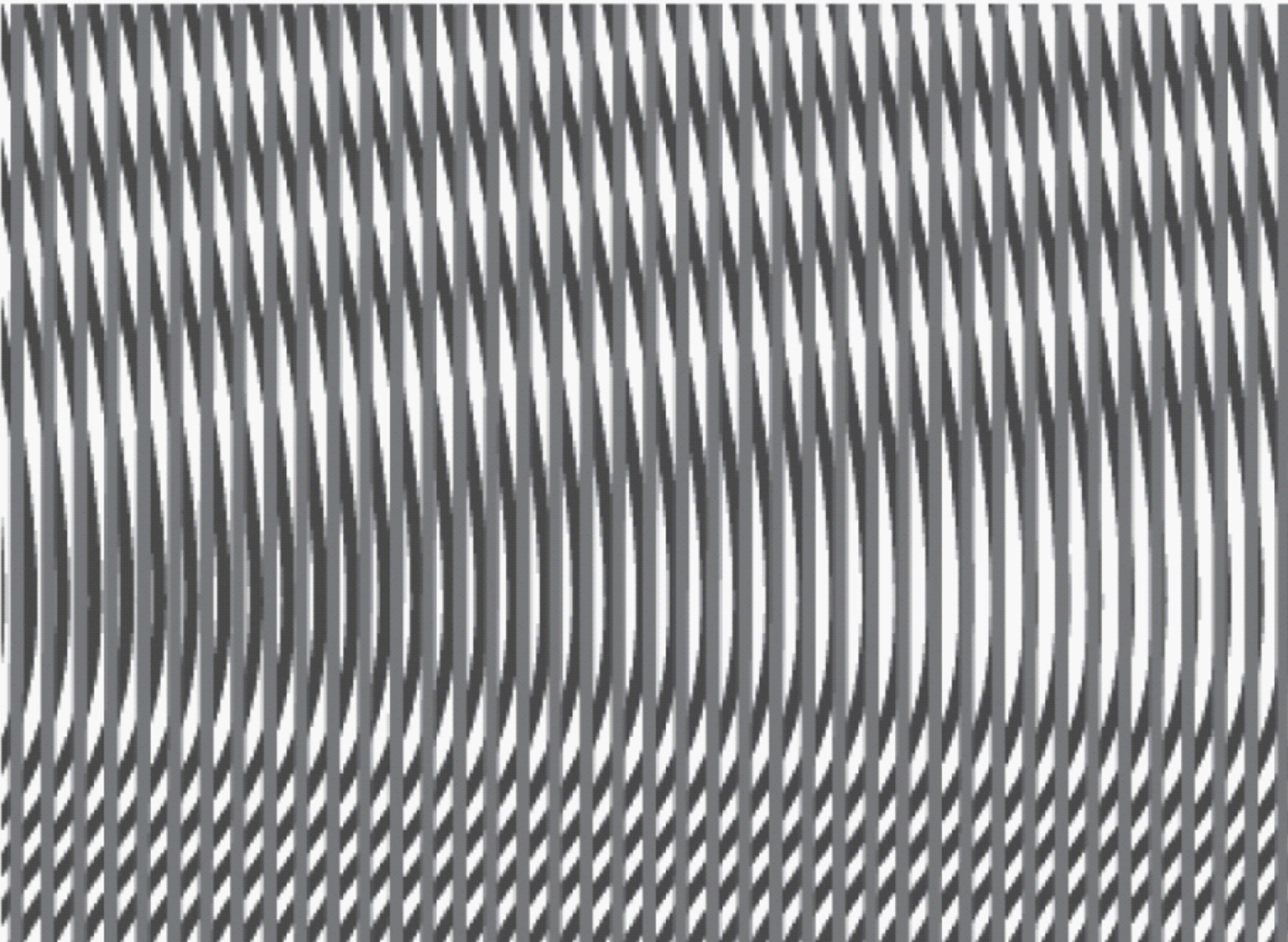
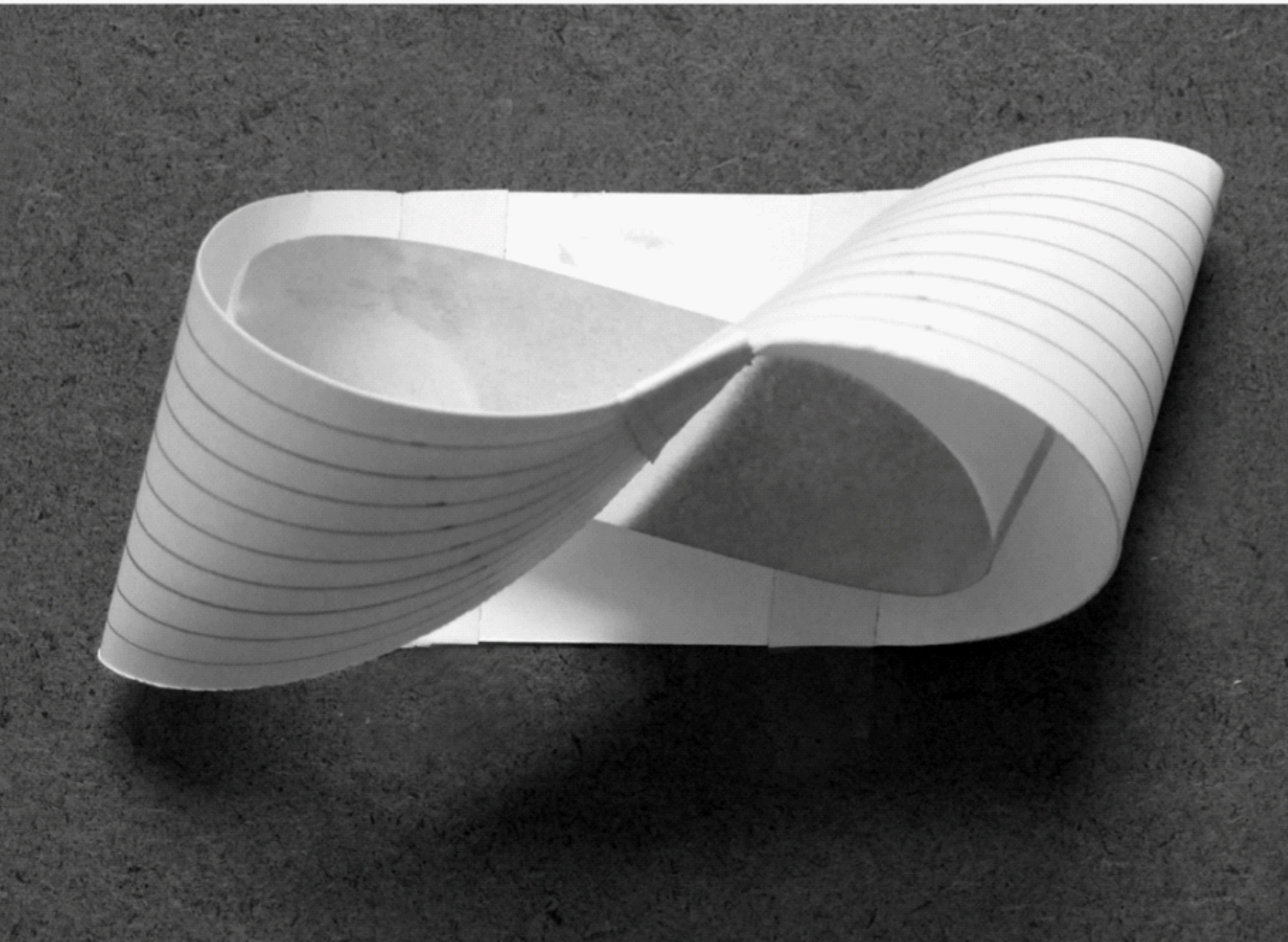


# Community Design Workshop

engaging the city through **contemPLAY**

möbius

moire



8.8m x 6.7m footprint

## Team

Dieter Toews, Evguenia Chevtchenko, Olga Karpova, Dina Safonova, SophieWilkin,HamzaAlhbian,SimonBastien,JustinBoulanger,ElisaCosta,JasonCrow,NicolasDemers-Stoddart,AndrewHruby,ShelleyLudman,DiandraMaselli,MariaMingallon,CourtneyPosel.

## Website

<http://web.farmmresearch.com/pavilion/>

## Directed Research Studio M.Arch. 2009-2011

The ContemPLAY pavilion project is a student-led initiative investigating new methods of practice. The project presented a unique opportunity for the students of the Directed Research Studio (DRS) of the McGill School of Architecture to learn through hands-on experience in an academic context. DRS masters students in coordination with the Facility for Architectural Research in Media and Mediation (FARMM) are responsible for the design, fabrication and assembly of the parametric pavilion.

The pavilion project is an excellent demonstration of the latest developments in the DRS program, exposing advanced construction techniques, digital processes and theoretical approaches to architecture in the public realm. Furthermore, the project highlights the student potential as well as the capacity for trans-disciplinary team work on a high level project. The project benefits from the use of novel design and fabrication techniques, utilizing algorithms for digital modelling and thus, facilitating fabrication of complex geometries and assemblies.

The project is a unique opportunity to allow students and the McGill School of Architecture to present an unprecedented graduate studies project in North-America, setting the standard for new architectural programs. It creates an opportunity for debate and discussion as to what public space can be, and how its structures can be conceived. The pavilion is donated to the public and open to all as a means of making architecture relevant and important in the community.

## Project Description

The pavilion is meant as a multi-generational artefact that gathers the ideas of contemplation and playing in a single clear gesture. As a socially sustainable public infrastructure that plays with the visual field through form and cladding, it questions the current trend in public space furniture and encroaches in the realm of the abstract sculpture or artefact.

## Concept

The gesture itself is a three dimensional Möbius strip supported by a triangular truss. The cladding is a visual pattern generated to create a simultaneous Moiré and parallax effect. As the public approaches and engages with the pavilion, the visual field is modified and interrupted by the interference created by motion and the two layers of cladding. The eye continuously covers the never ending surface of the Möbius inviting dynamic motion from the user. A base platform serves both as foundation and bench, providing a central area for seating within a never ending structure. The light filters through the cladding generating an ambiguous relationship between the notions of the inside and outside as well as furniture and shelter.

As you move around the pavilion, new interference patterns are continuously created and destroyed due to the Moiré mechanism, creating a responsive, interactive experience. The simplicity of a half-twist in a ribbon was rendered extremely complex through the doubling and offsetting of the Möbius strip: the creation of two surfaces activated the Moiré but required strong yet minimal structural solution. The solution to this complexity was a space frame. To resolve all these design criteria, the Moiré pattern and an optimized space frame are generated via customized digital parametric modelling.

The project enhances the potential for utilizing latest developments in digital design and manufacturing, exposing advanced construction techniques, digital processes and theoretical approaches to architecture in the public realm.

## Sponsors

360 VOX, Acier Altitude Inc., Corbec, DCYSC architects, Groupe Canam, CISC-ICCA Jodoin Lamarre Pratte architects, McGill University, MSDL architects, Natali film, Parametric Structures + Design, PGSS (Post-Graduate Students' Society of McGill University), Proto Plus Precision, Rubiks, Saia Barbarese Toupanov Architects and Simpson Strong-Tie.

## Private donors

Ronald Bastien, Lian Chang, Clément Demers, Mike Golden & Ashley Csenar, Dominique Jérôme, Irwin Posel & Lucia Fabijan, Dino & Mary Maselli, Maria Mingallon, Éric Pépin, David Posel, Jennifer Stoddart, Vincente Valencia and André & Sylvie Wilkin.



# Fabrication & detailing

over 1400 bolts



140 ribs



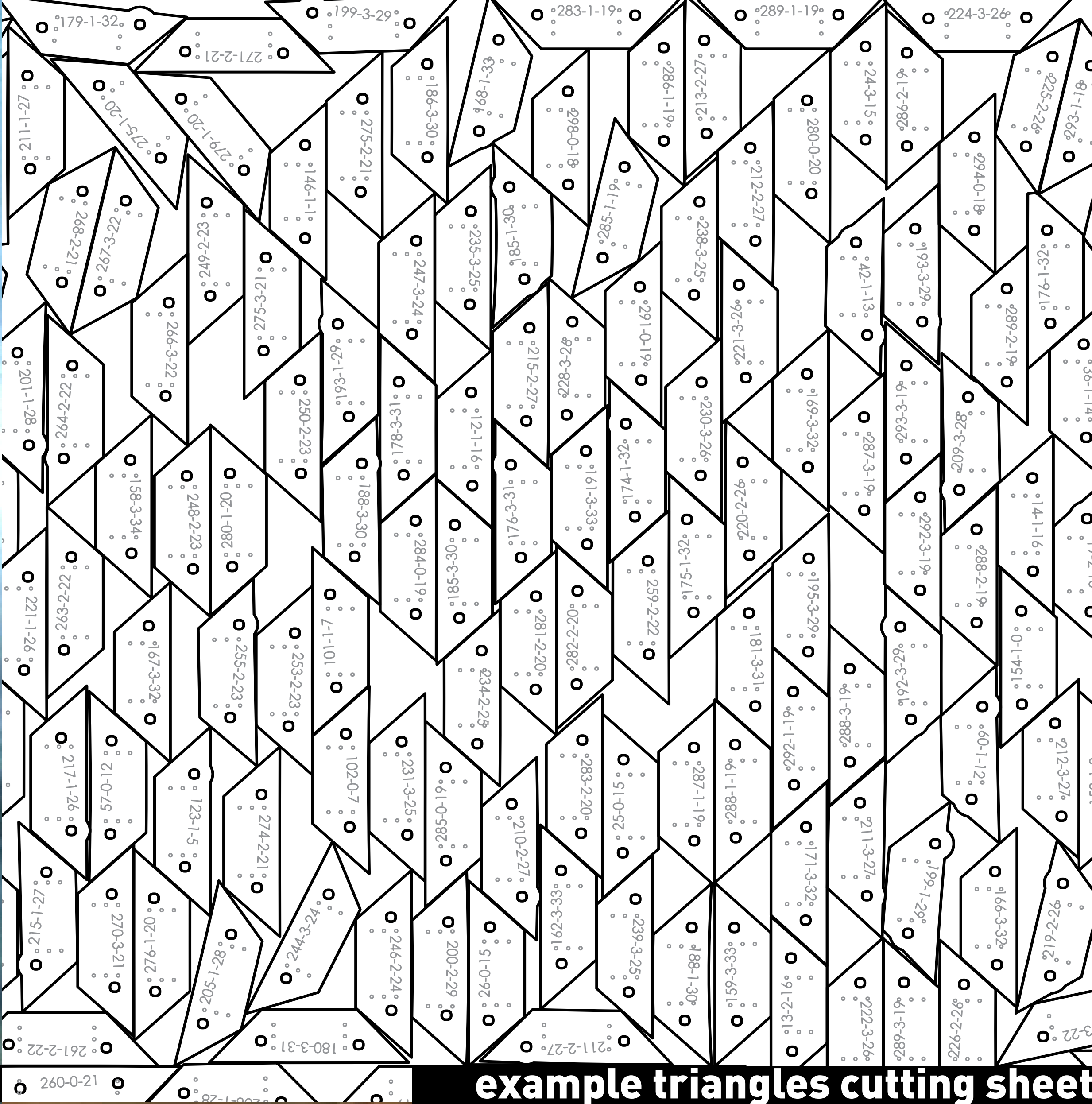
280 steel joints



270 tubes



labelling



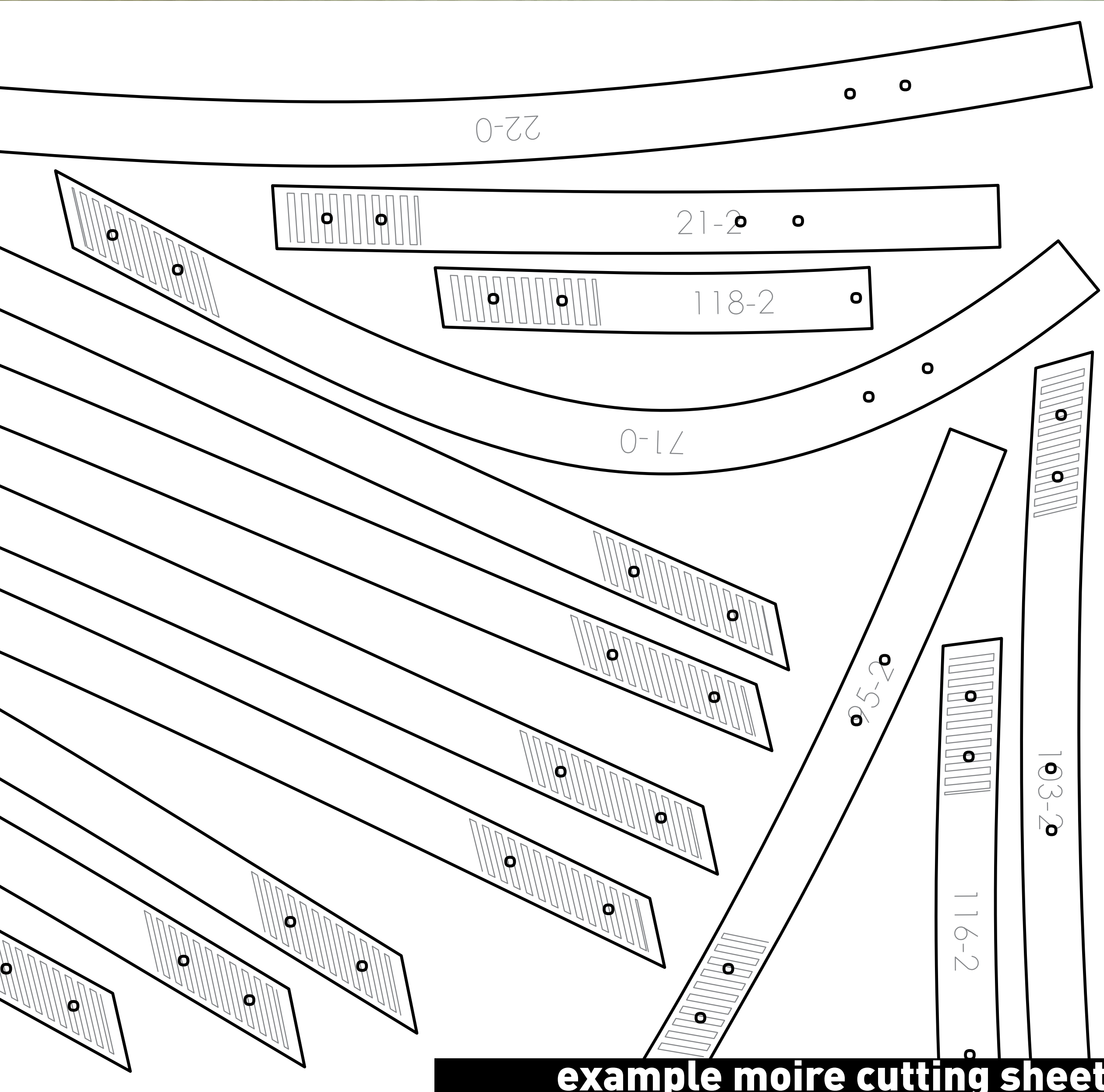
example triangles cutting sheet



cnc



302 moire



example moire cutting sheet



labelling

## Parametric model

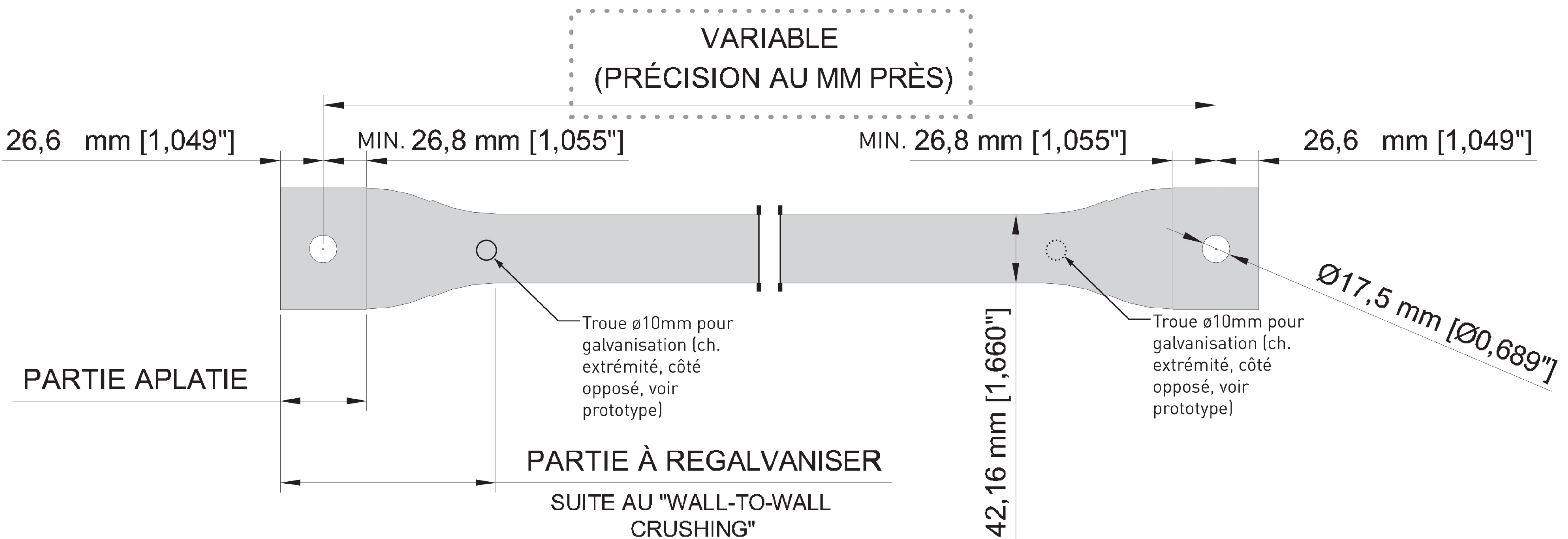
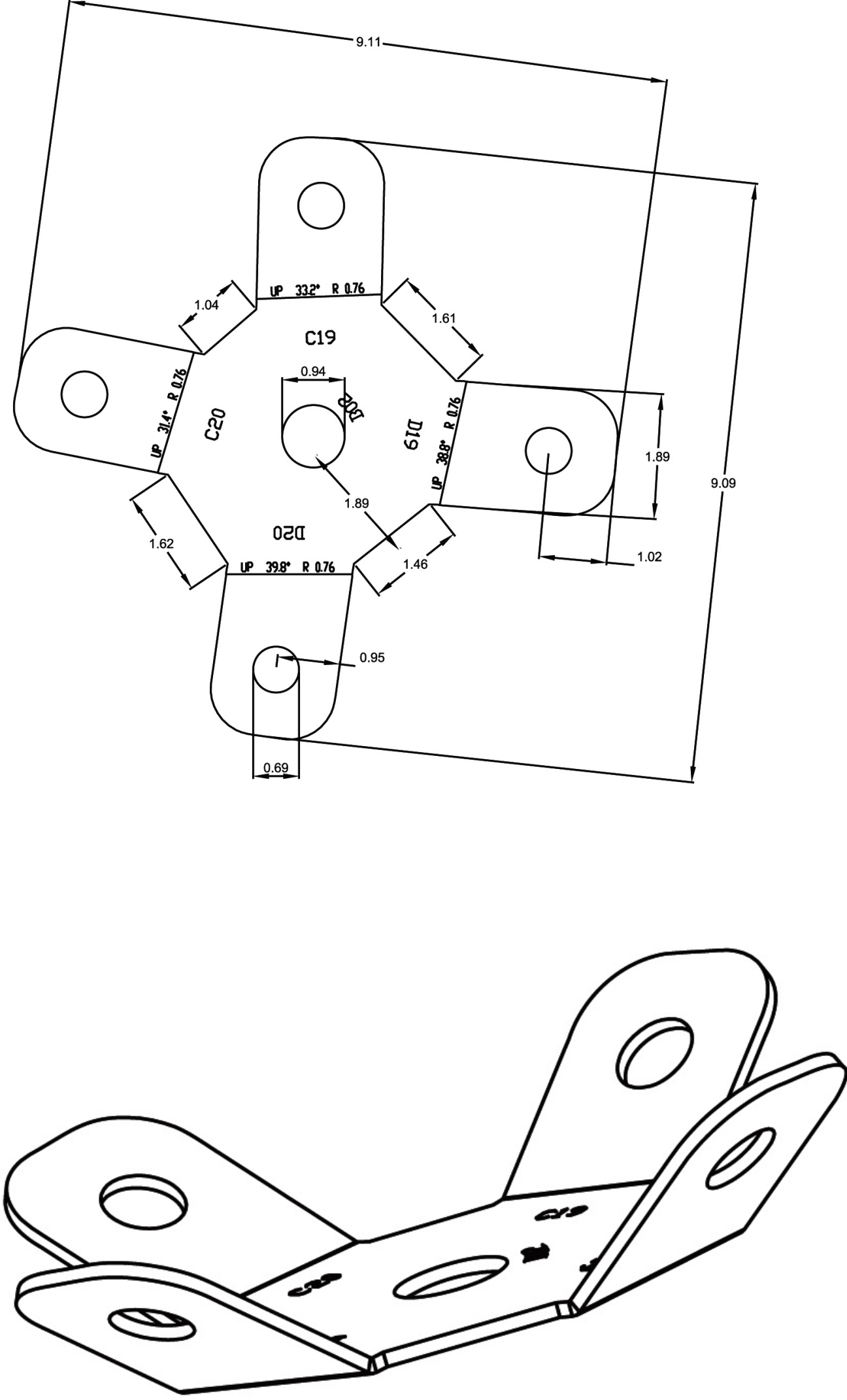
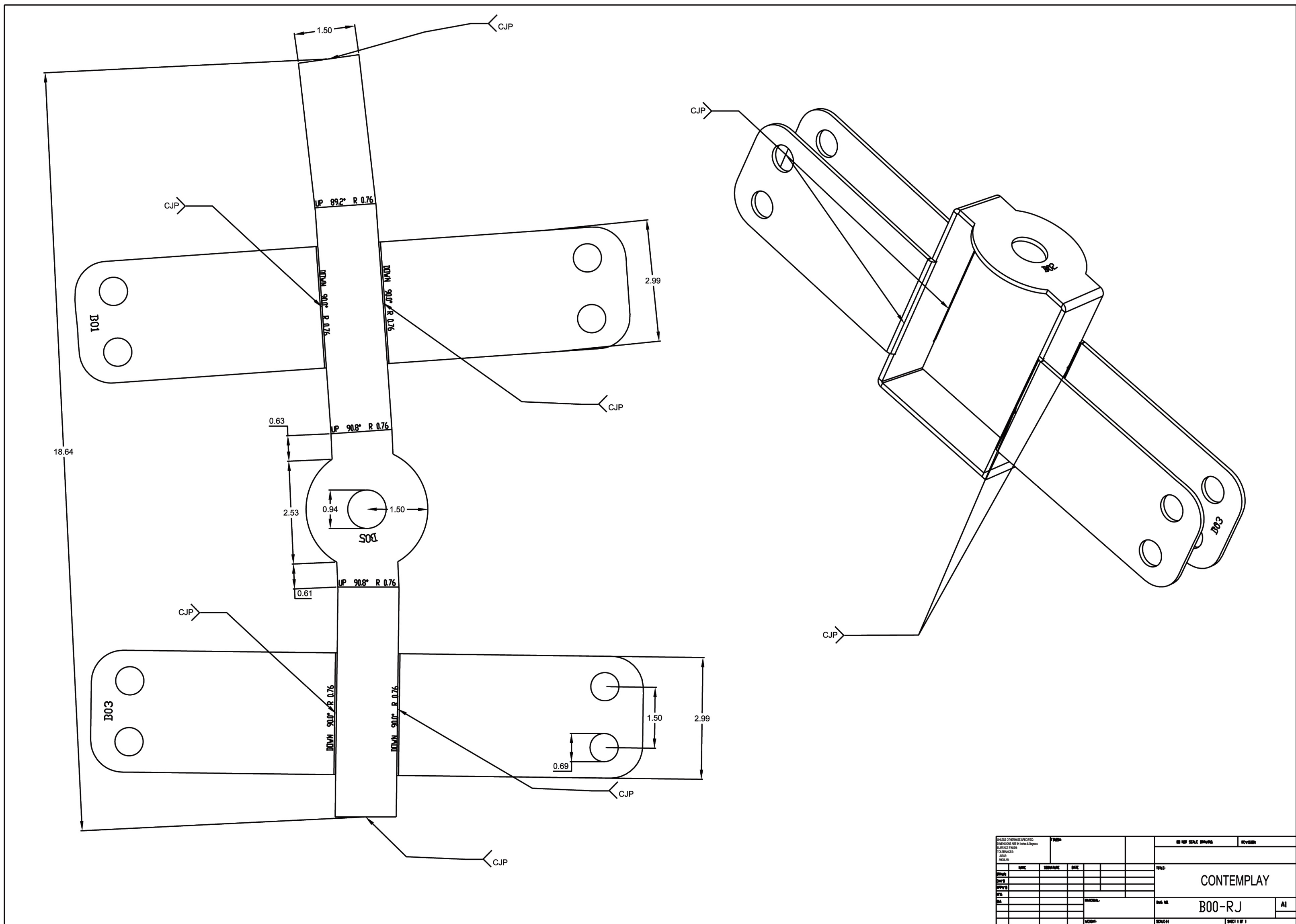
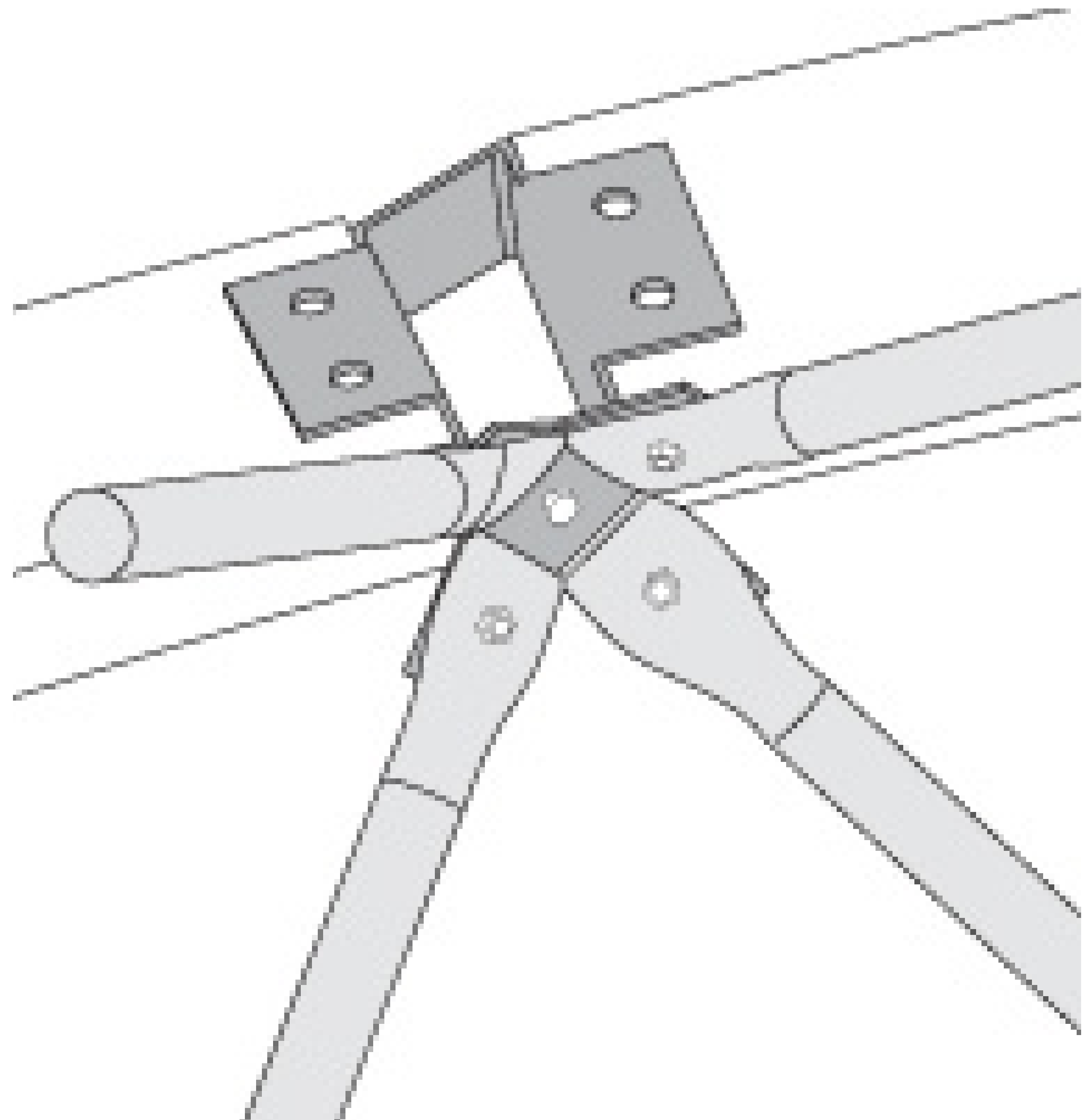
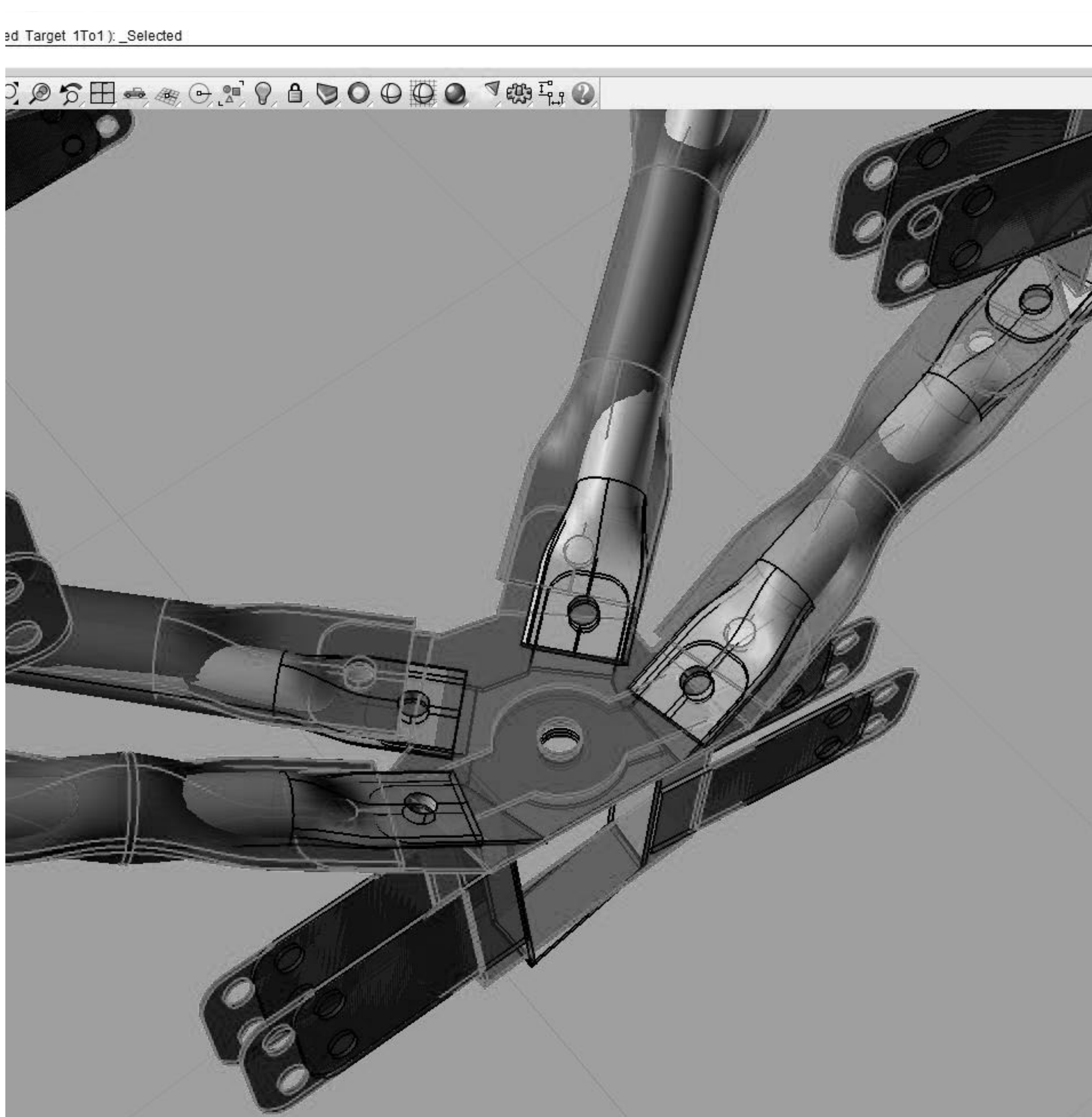
The transfer of the design information from the parametric model to the fabricators was facilitated by programs such as Rhinoceros 3D, RhinoNest, RhinoCAM, and Solidworks. The variability in length of the steel bars, the size and shape of the moiré strips and other wooden elements of the structure, and the specific bending angles in the steel joints are all factors requiring the use of automated processes and computational fabrication. The adaptability of the model and the digital fabrication tools employed permitted the fine-tuning of all architectural details, bringing the virtual model closer to the final built artifact, despite its geometrical complexity.

## CNC

The plywood ribs and moiré strips were cut using a 3-axis CNC router, shared by School of Architecture and Faculty of Engineering. Nearly one hundred sheets of plywood were consumed to produce all of the components fabricated in-house. Most of the wood components were designed as planar pieces, thus their perimeters served as tool paths in

the cutting process. However, the curving moiré strips required a final operation within the program before their 2D tool paths could be determined. Since the moiré surfaces were roughly aligned with the transverse isocurves of the möbius strip, they were extremely close to being singly-curved, “developable” surfaces. A fairly simple flattening algorithm was used that gave flattened outlines with minimal distortion.

The code generates a set of line drawings that mapped the path the CNC router would take to both cut the contour of the piece, engrave labels, drill registration holes and mill joinery for assembly. The steel joints were manufactured by a local prototype fabricator with CNC bending capabilities. The precision of this process was necessary to bridge between the continuous doubly-curved geometry of the overall möbius shape and the planar components. One of the major difficulties arising as result, were the numerous compound angles that the joints had to accommodate. Digital fabrication of the ribs, moiré and the steel joints permitted the assembly of an irregular space frame that could adapt to the variable curvature of the surface.





## Assembling

As a result of the pavilion's need to move around the city, the construction process had to be fully reversible. All joints and connections are bolted and do not require adhesives, meaning that the pavilion can be fully disassembled and recycled. Furthermore, the individual parts are light enough for people to carry, removing the need for machinery during construction, making for a quieter and safer building process.

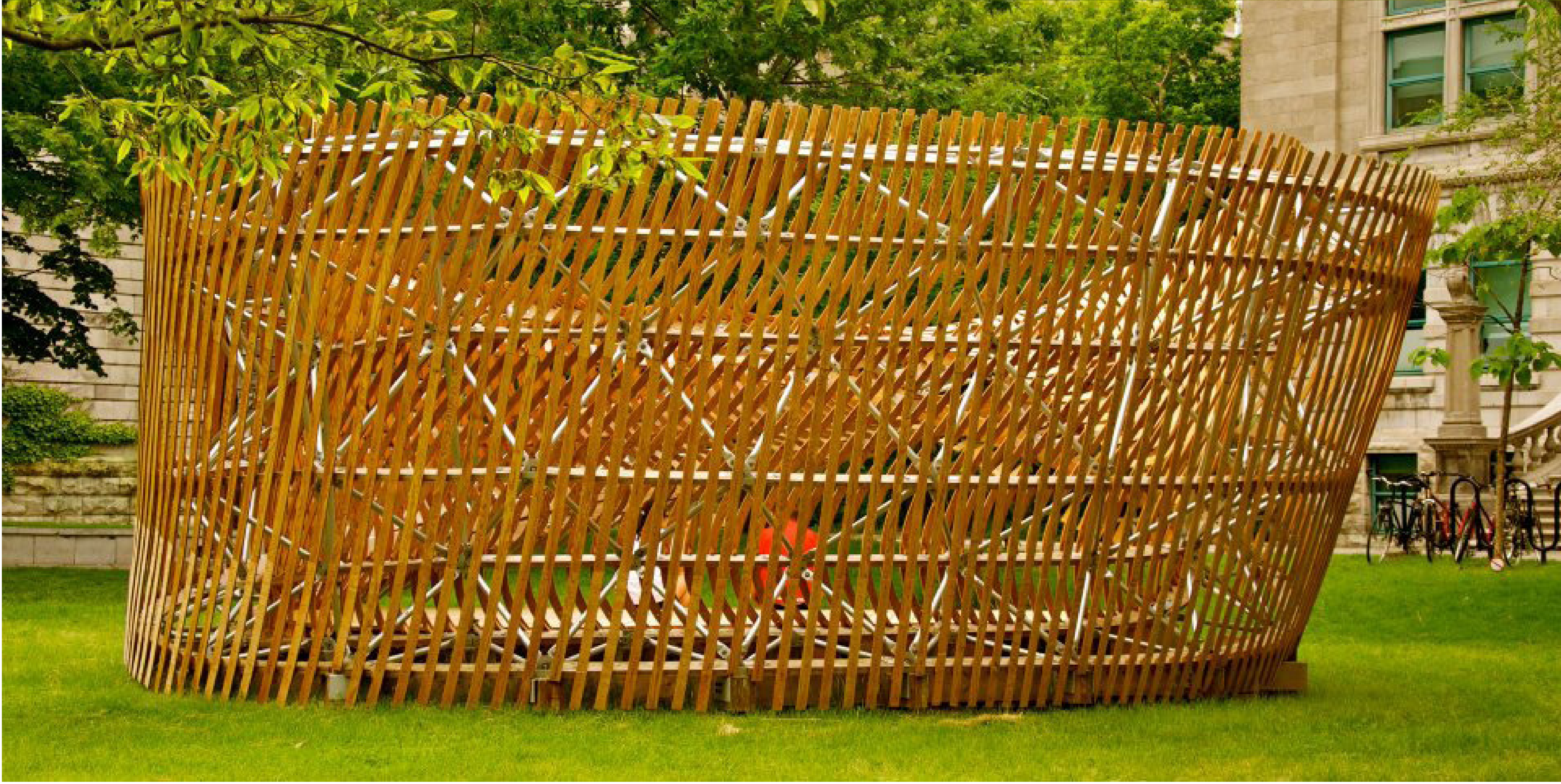
The pavilion was conceived over a period of 21 months (October 2010 to June 2012).

## Special thanks to our many volunteers

Jessica Dan, Éole Hupé, Shanie Jalbert, Vuk Krcmar-Grkavac, Philippe Larocque, Dan Oyama, Gabrielle Poirier and Ann Rodgers.



# Modeling & Built artifact



## From modeling to building

A revolution in digital modeling tools has enabled a new generation of designers to model anything that they are capable of imagining. A typical problem with many of the resulting designs is that it is very difficult to move past the formal superficiality of the digital model into confronting the physical limitations and complications of construction. The production of the ContemPLAY pavilion engaged the question of learning not through the representation of potential project but in questioning through making. In this way, formal possibility and technical complexity were interrogated by fabrication. As a design-

build effort, the project team confronted research into cutting-edge processes within the many challenges of bringing any design to reality.

The ContemPLAY pavilion project began as an exercise in parametric design and digital fabrication, and the built form now exists as an architectural statement about resolving complexity. The pavilion is a device for provoking inquiry, thoughtfulness, and even wonder about spaces and objects in one's environment. It manipulates viewers' perceptions through its overall form and carefully arrayed details, inviting the user to discern the boundaries between public furniture, shelter, and art.

