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Kyle Jensen

University of Waterloo - Masters of Architecture, 2015

“The Barn” adaptive reuse project - 2011-Present

Furniture design - 2010-Present

Carlton University- 2010

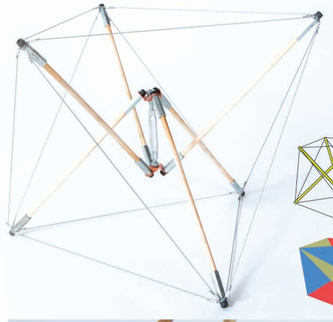
Optimizing Structure
Masters Thesis 2015

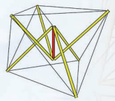
An investigation into Lightweight Structures

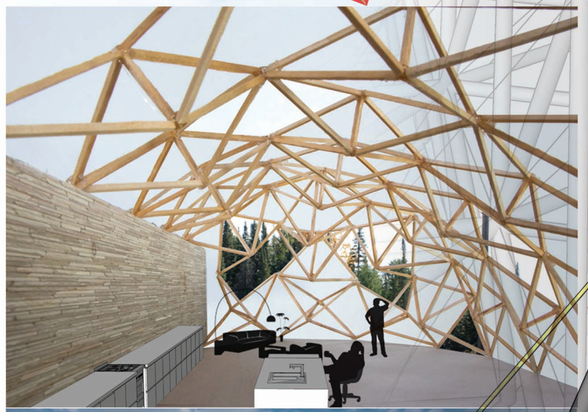
Abstract

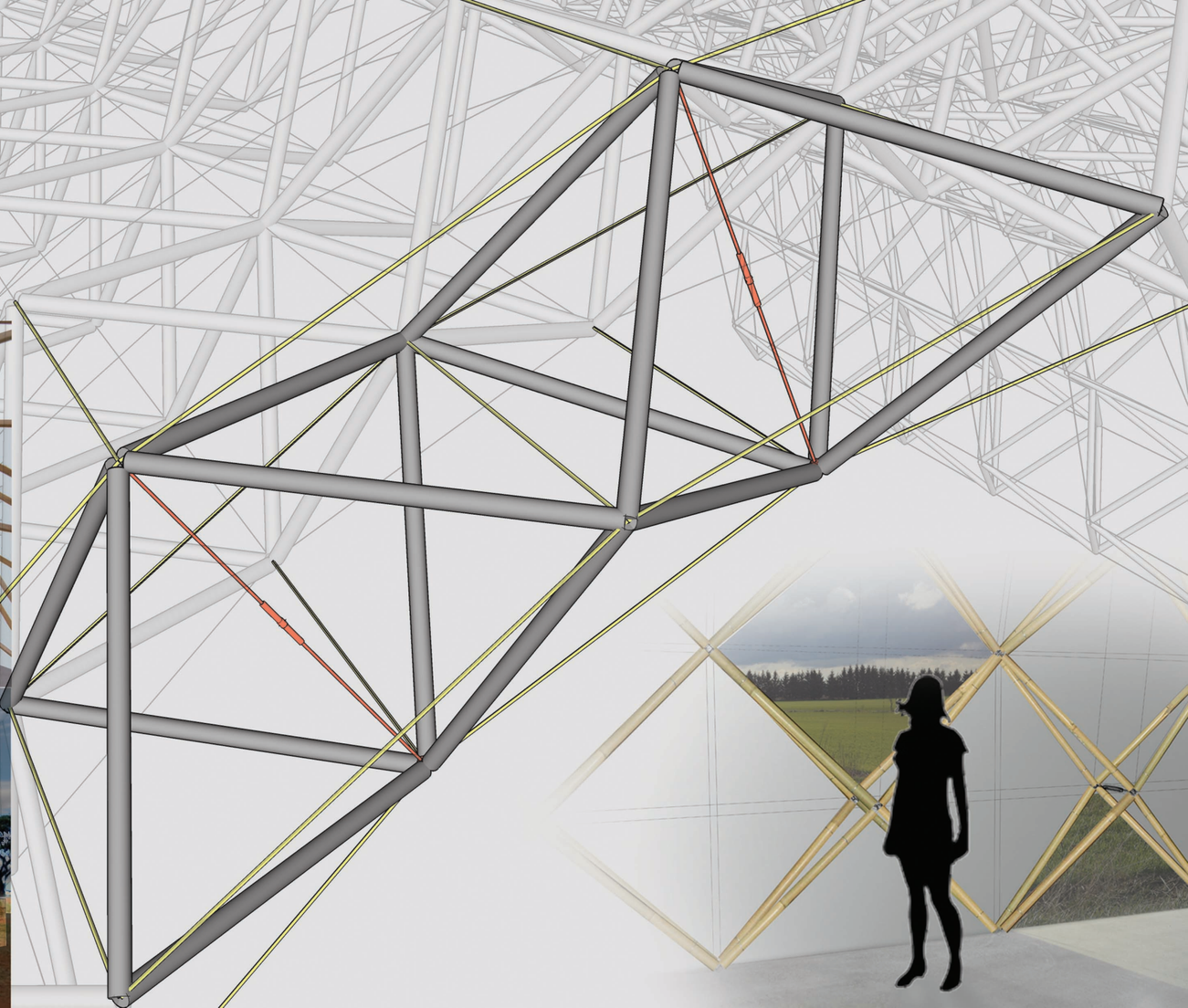
This thesis investigates how to reduce the raw materials invested in a building, specifically in the structural aspect of its construction, and in so doing decrease the embodied energy required to build a structure. Geometric structures that utilize tensile forces allow for the most efficient, lightweight and economical improvements in building design. This construction method will allow structures to be built in a way that incorporates rapid set up, decreased material transportation costs, and the substitution of local materials. Innovative truss technologies that have the potential to be applied to multiple scales and types of building structures will facilitate the optimization of enclosed spaces. Architecture typology today is still largely articulated on modernist practices developed nearly a century ago. This research proposes an alternative to the present and future of building technology. The focus is on creating small triangulated units that can be linked together in order to create a grid that makes a stable and supported structure. Unlike space frame construction, this approach reduces the size and volume of materials required by optimizing the use of tension components. Lightweight but strong tensile cable, in combination with small compression struts composed of wood or another renewable material, create a building unit that is extremely strong and utilizes resources to their maximum potential.

Preliminary investigations into tensile structures revealed that the failure in such a system would likely occur in the compression struts rather than in the tension segments themselves. Therefore, the research also focuses on the issue of compression members and how to improve their form. The goal is to achieve a tension structure that resists bending, yet can remain lightweight and can be assembled using humble materials. The research also addresses ecological and sociological concerns. Technological advancement in an age of consumption has resulted in the creation of extraordinary structures from an architectural standpoint; however, the increased use of materials and the expansion of the human world are taking their toll on the earth's natural systems. The construction method proposed still allows the standard of living that Western society has become accustomed to, but in a way that is much more environmentally responsible. Indeed because of its adaptability and portability, it may afford developing nations a viable building opportunity they could otherwise not have envisaged.







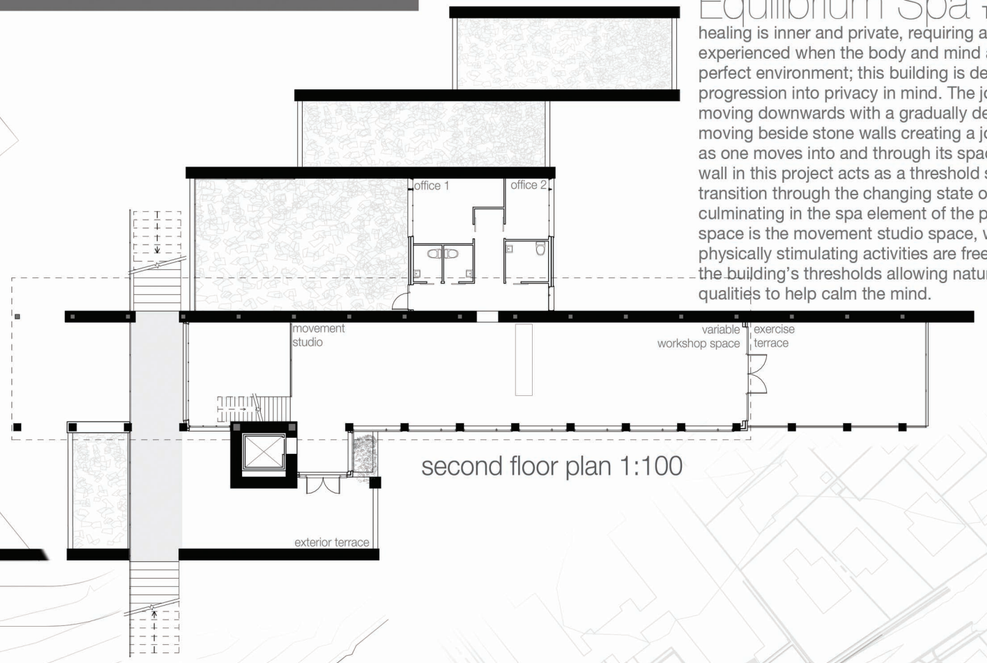


Equilibrium Spa

The experience of healing is inner and private, requiring a state of mind only experienced when the body and mind are held in an the perfect environment; this building is designed with a natural progression into privacy in mind. The journey begins by moving downwards with a gradually descending staircase moving beside stone walls creating a journey for the senses as one moves into and through its space. The linear stone wall in this project acts as a threshold space for the transition through the changing state of mind and body, culminating in the spa element of the project. Above the spa space is the movement studio space, where yoga and other physically stimulating activities are free to move in and out of the building's thresholds allowing nature and its healing qualities to help calm the mind.

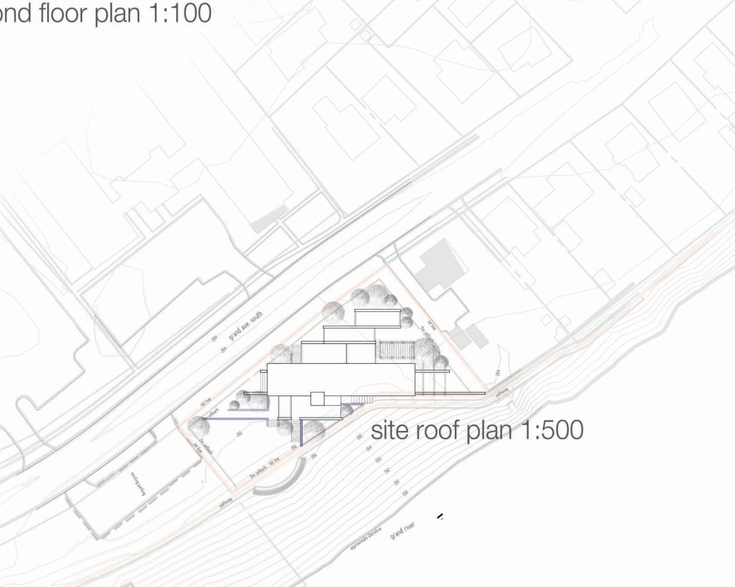
spa patio perspective

ground floor plan 1:100



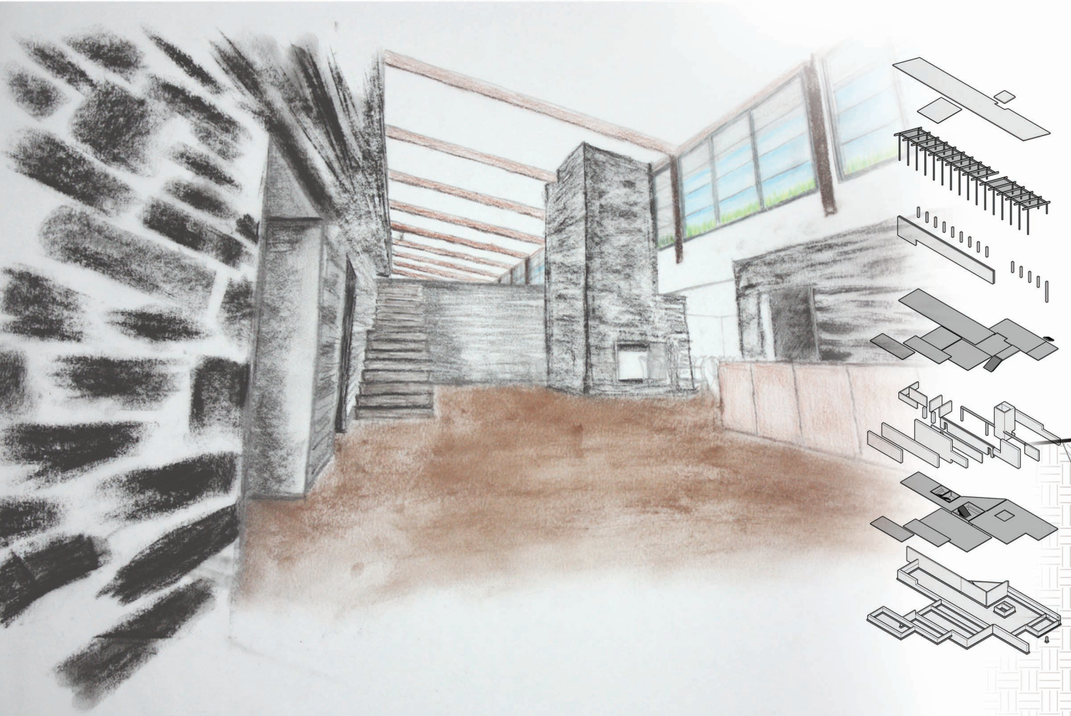
second floor plan 1:100

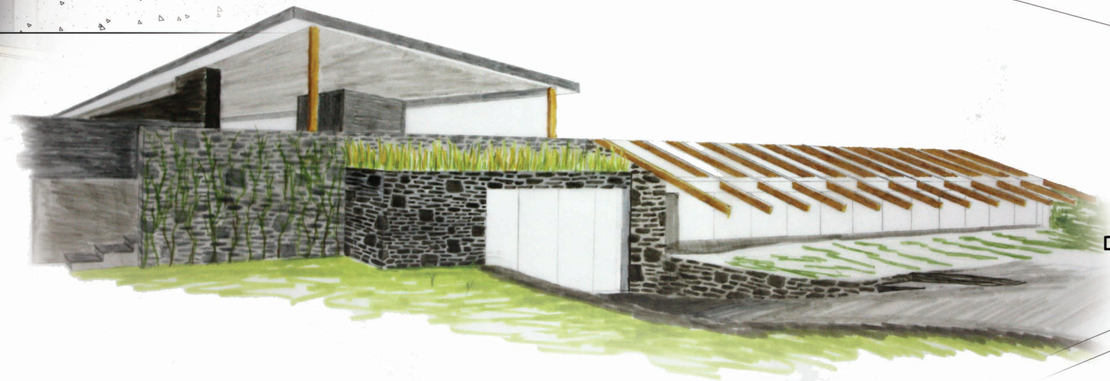
main entrance perspective

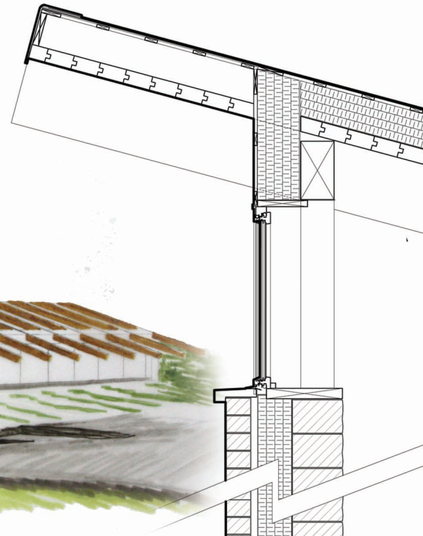


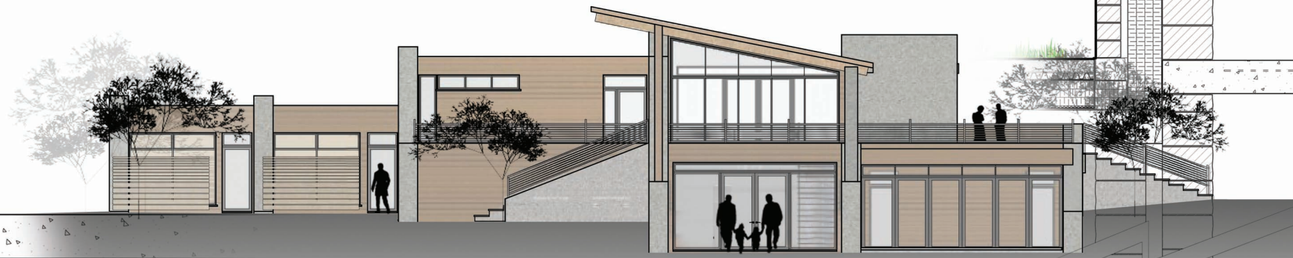
site roof plan 1:500

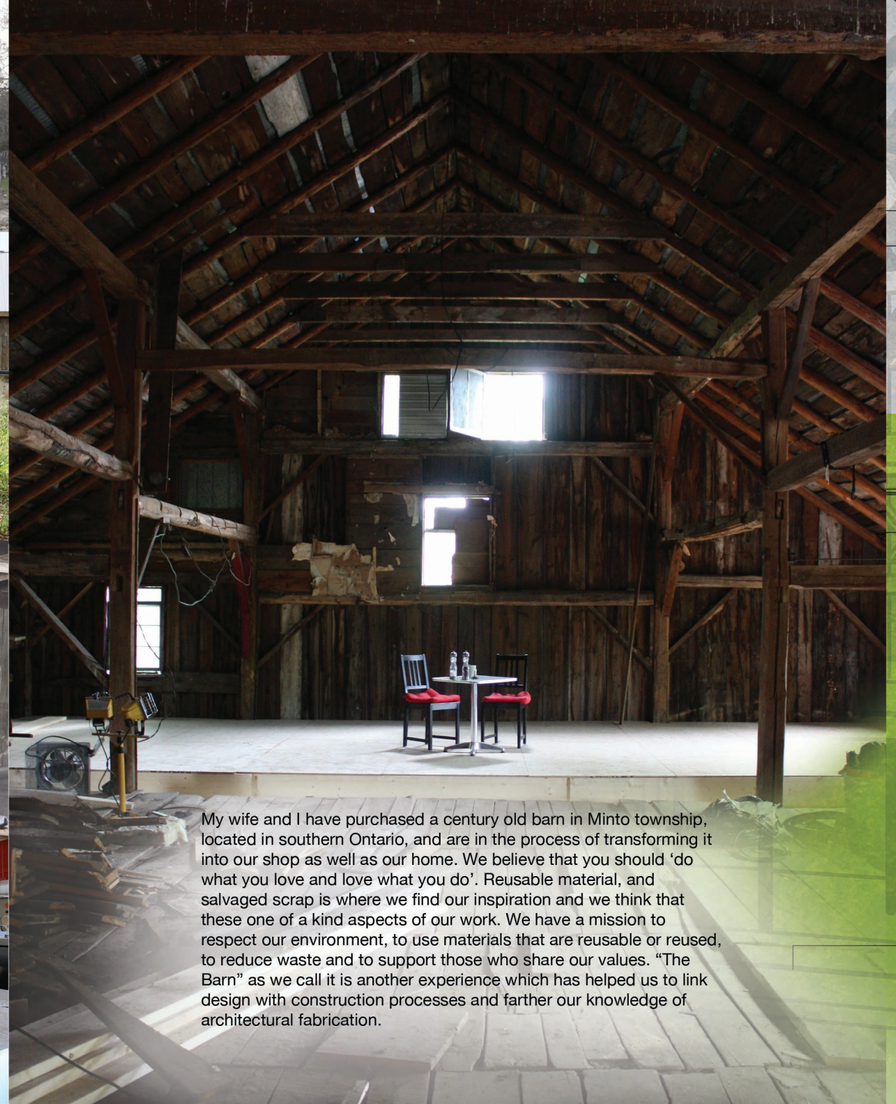
Design Progression - Equilibrium Spa



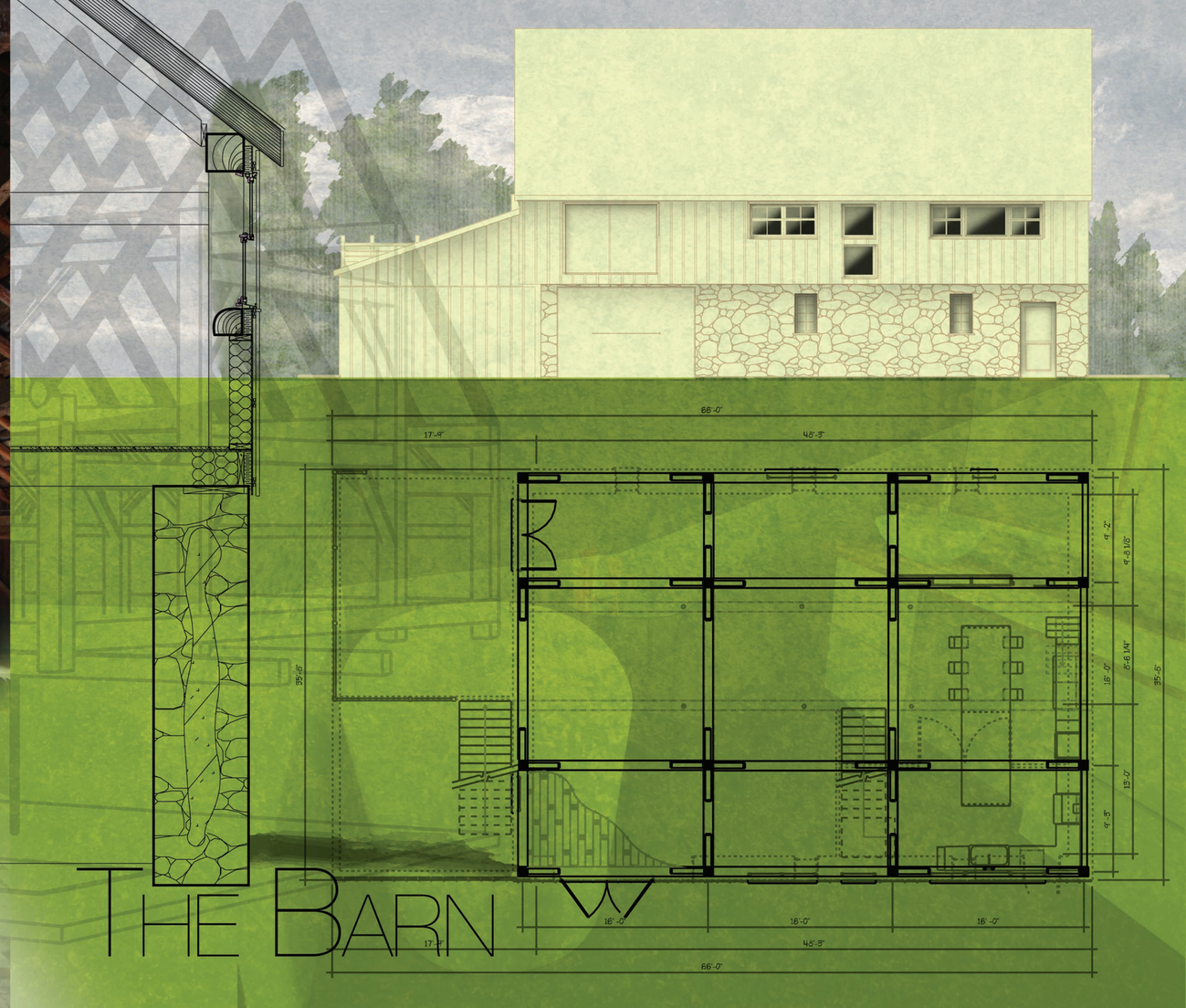








My wife and I have purchased a century old barn in Minto township, located in southern Ontario, and are in the process of transforming it into our shop as well as our home. We believe that you should ‘do what you love and love what you do’. Reusable material, and salvaged scrap is where we find our inspiration and we think that these one of a kind aspects of our work. We have a mission to respect our environment, to use materials that are reusable or reused, to reduce waste and to support those who share our values. “The Barn” as we call it is another experience which has helped us to link design with construction processes and farther our knowledge of architectural fabrication.

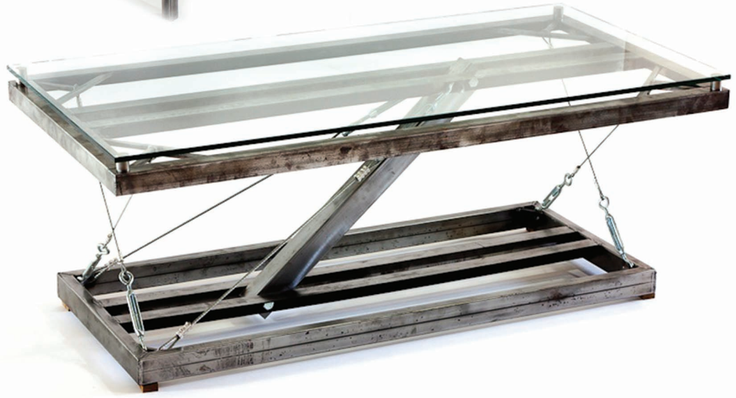


THE BARN

Composite Angle Design Inc.

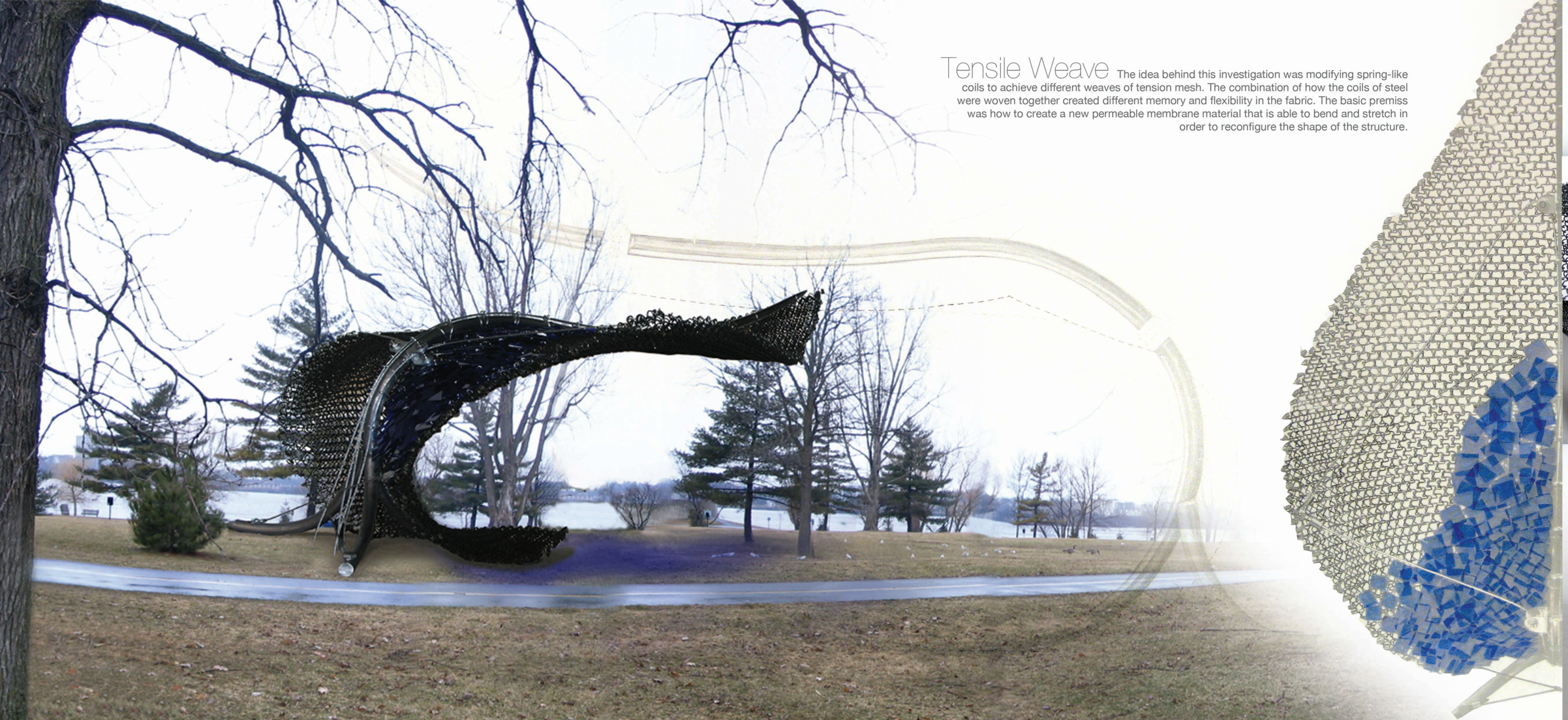
Founded in 2010 by two architecture graduates, Kyle Jensen and Natalie Dube, who enlightened by our studies and inspired by the greats, have set out on a path to create unique furniture pieces from initial concept to finished product. Our studies in architecture have lead us to the realization that the hands on process of design is key to creating truly unique and one of a kind pieces of furniture. There is a special satisfaction that comes from transforming easily accessible stock materials into furnishings that are not only functional, but beautiful. There are no large production lines here, no large staff, and no limits; we enjoy working on a case by case basis as well as custom orders. Our shop may be small, but our ideas and determination are limitless.

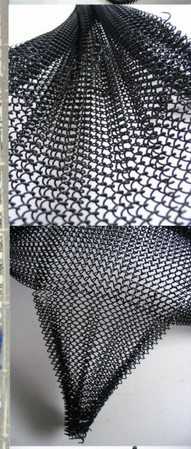
Our furniture, especially our tension line, has a very strong influence steaming from industry and engineering components and strategies. The use of tension cables has always fascinated us simply because of the amount of raw strength in every cable. This fascination along with an understanding of structural assemblies along with respect for tensagraty and other such construction methods is what gave us the initial concept of the design. So even thou our designs are somewhat unconventional it is there truly unique and one of a kind designs that make the furniture we make stand out from the rest. Whether it be the innovative pieces of our Tension Group line, or our one of a kind Industrial Junkyard Gems, each piece is a reflection of our passion for and commitment to transforming the ordinary into the extraordinary.



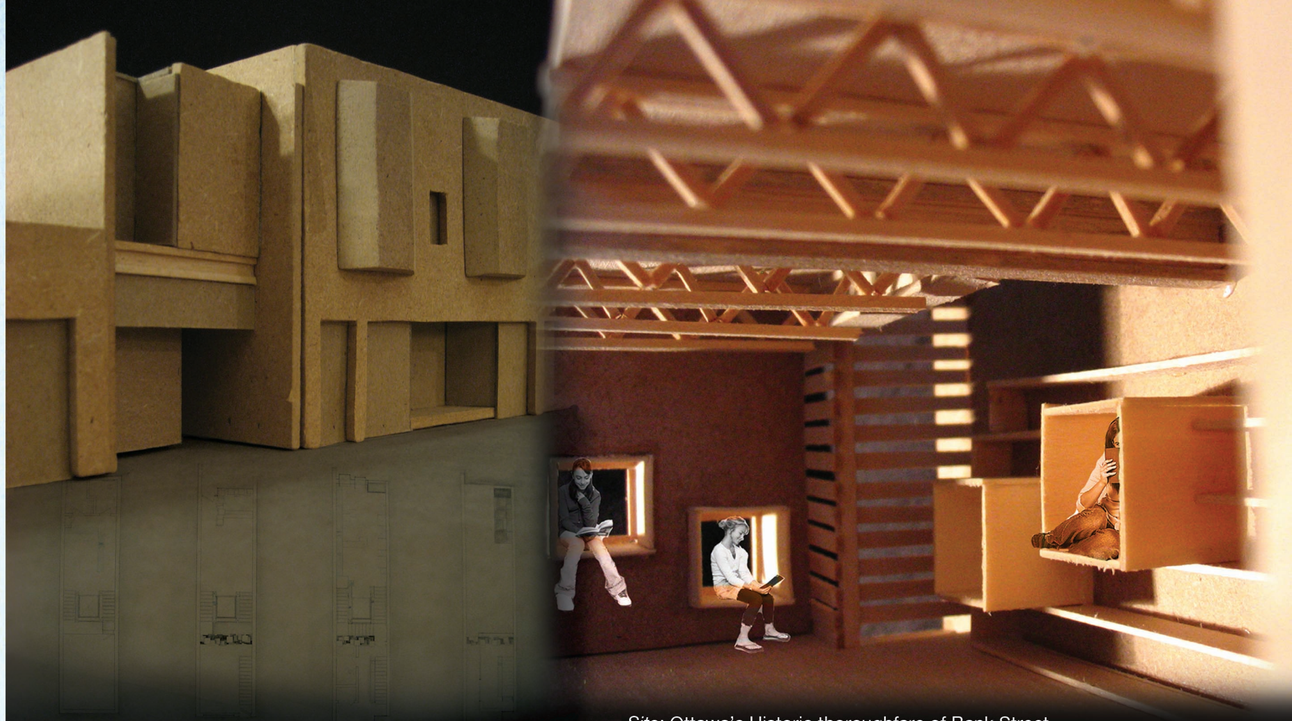
Tensile Weave

The idea behind this investigation was modifying spring-like coils to achieve different weaves of tension mesh. The combination of how the coils of steel were woven together created different memory and flexibility in the fabric. The basic premiss was how to create a new permeable membrane material that is able to bend and stretch in order to reconfigure the shape of the structure.

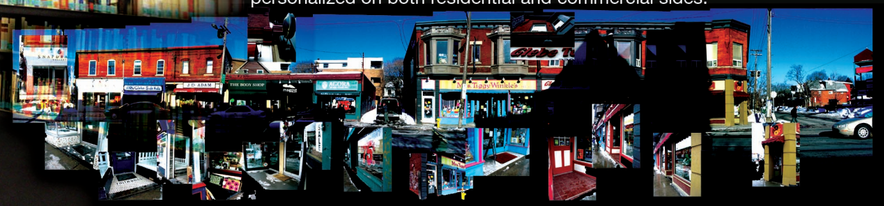


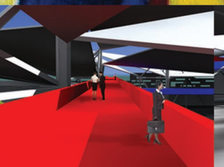


Children's Book Store

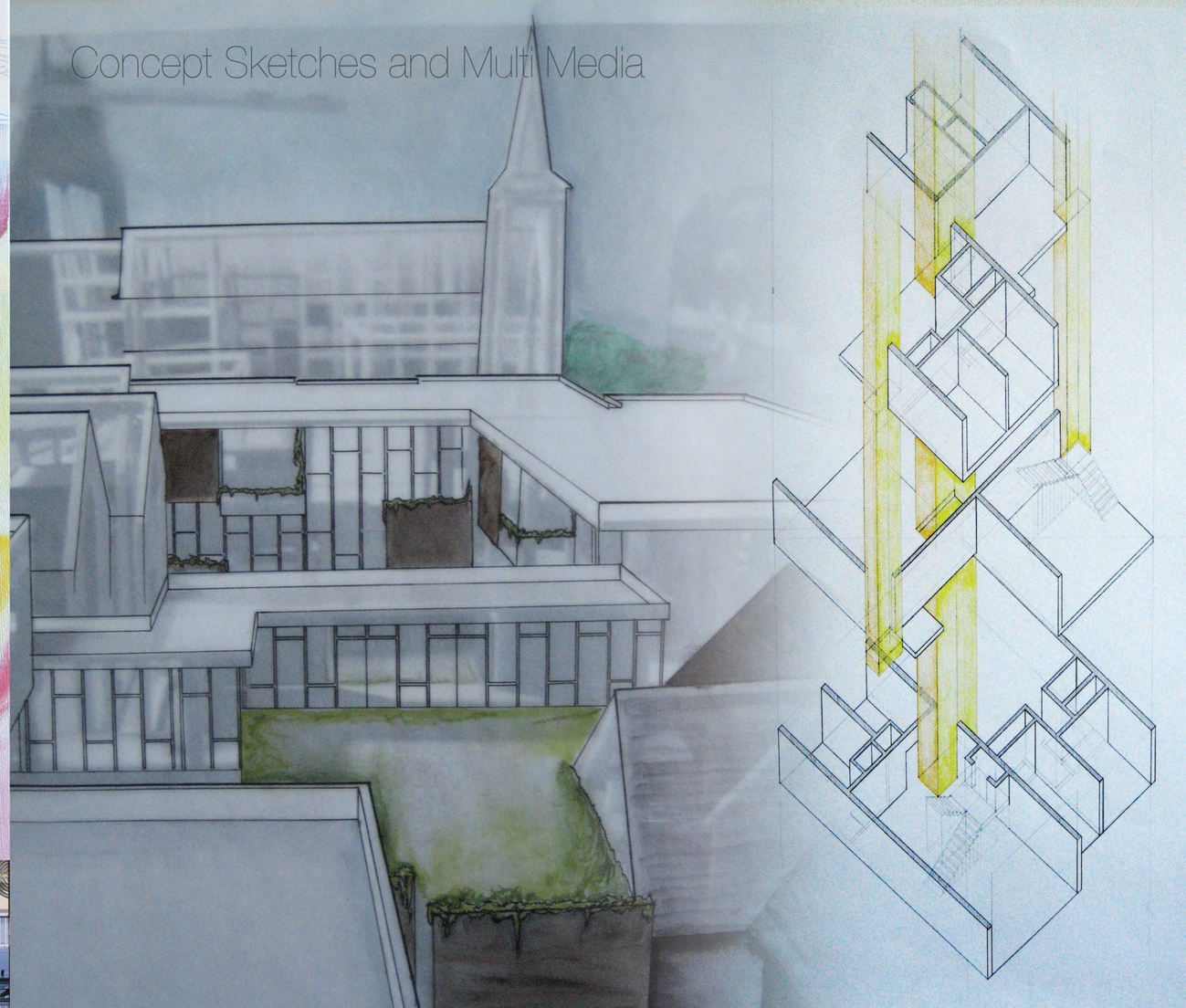


Site: Ottawa's Historic thoroughfare of Bank Street
Design Parameters: Propose a new book store to occupy an existing alley space amongst historical shops
Proposal: The design included a story time area with reconfigurable storage solutions and a reading room, complete with private reading pods. A large multi-storied modulated bookshelf separates the store from a residence at the back and acts as a playful element that can be personalized on both residential and commercial sides.



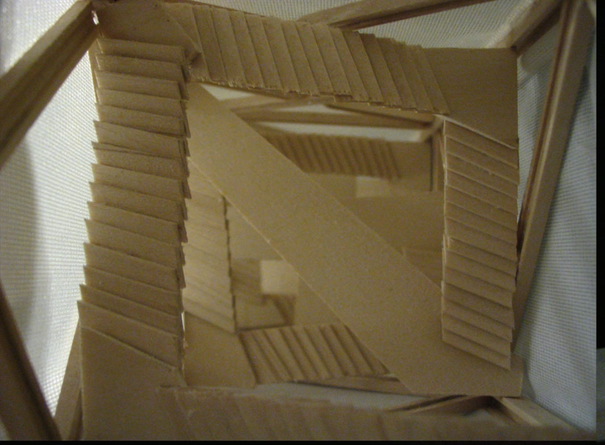


Concept Sketches and Multi Media

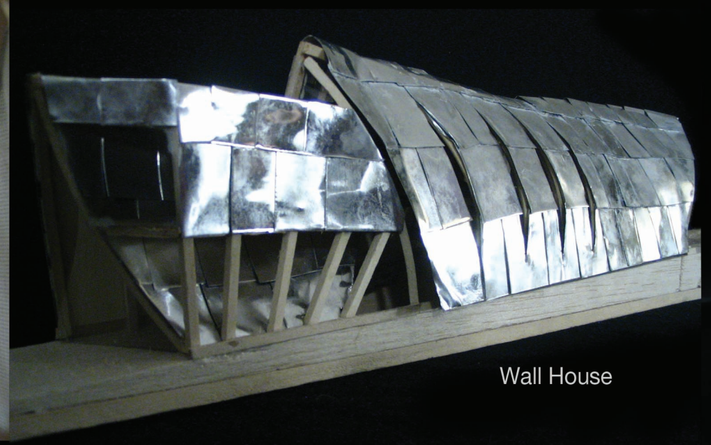


Physical Models

All physical models here were completed during my Bachelor of Architecture at Carlton University



Tower Lookout

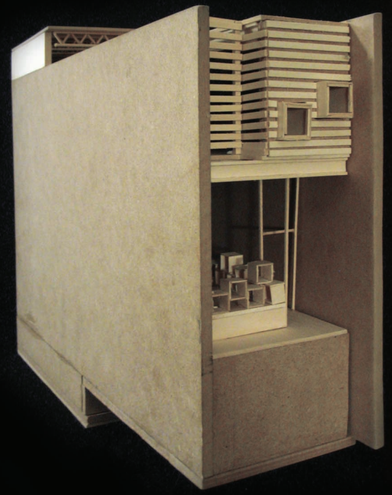


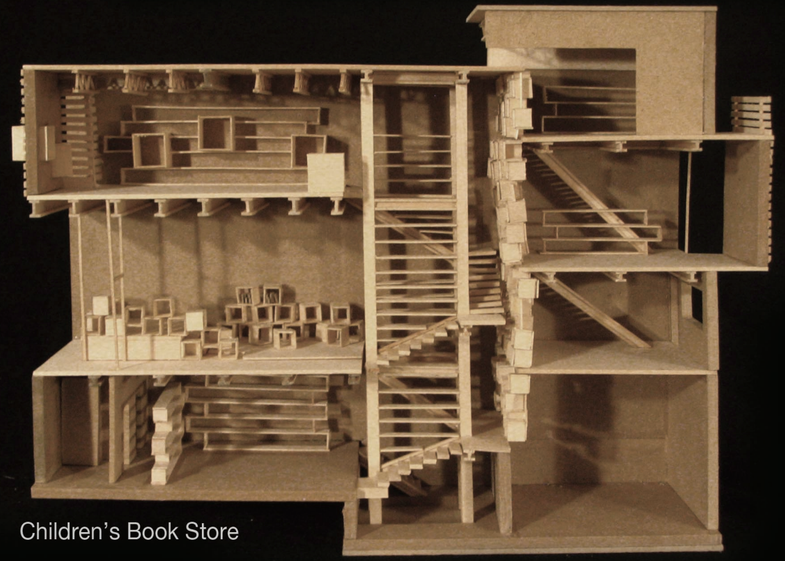
Wall House

Culinary School

Prefabrication Joint Assembly

Inspired by Konrad Wachsmann





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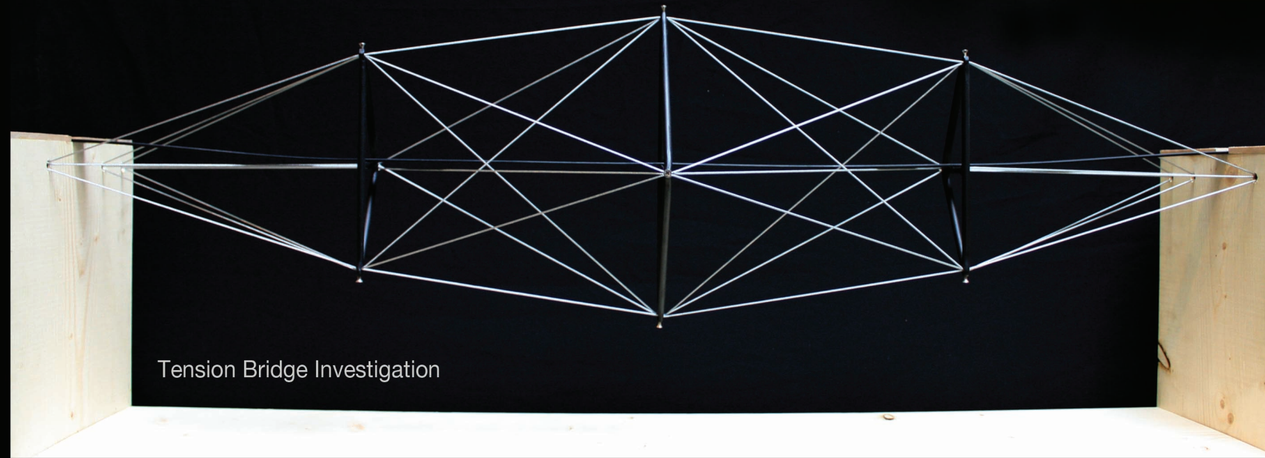

Tension Bridge Investigation