O! Canada?

a pavilion for the 2010 World Exposition in Shanghai

by

Coryn Kempster

Honours B.A. Architectural Studies
University of Toronto, 2003

Submitted to the Department of Architecture on 17 January 2008
in partial fulfillment of the requirements for the degree of
Master of Architecture at the Massachusetts Institute of Technology

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ABSTRACT

While ninety percent of new buildings in Canada are built with light wood framing, the conventions of this construction method are seldom challenged, the economic systems behind their materials scarcely exposed, and the accumulative impact on our cities, while often questioned, is seldom answered. Through the design of a pavilion for Canada at the Shanghai World Exposition in 2010 this thesis aims to draw these elements together to stand as a critique of the single family home that is their apotheosis.

Also addressed are the ramification of large crowds on the display of objects, the potential for representing national identity without recourse to romanticism or nostalgia and economic and ecological responsibility in view of the ephemeral nature of expo pavilions.

Thesis Supervisor: Nader Tehrani
Title: Associate Professor of Architecture

Warmest thanks to my committee for their patient guidance

and to Julia for everything else

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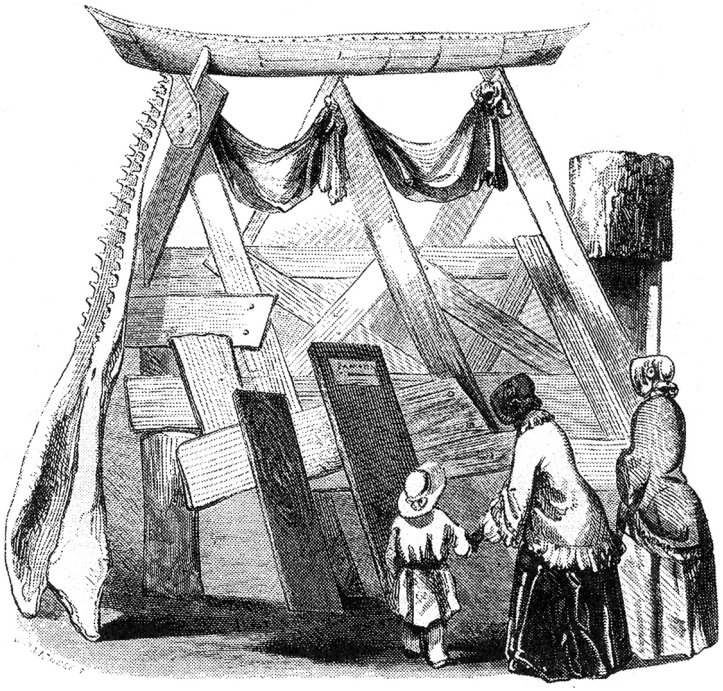
Pictured opposite is the ¨Canadian Timber Trophy surmounted by a Canoe of Bark¨ at the Crystal Palace in London by Gottfried Semper for the Great Exposition, 1851. Image Wesemael, 2001

O! Canada?



a pavilion for the 2010 World Exposition in Shanghai

Proposal

Haibao is the official mascot for Expo 2010
http://www.expo2010china.com/expo/expoenglish/mascot/pic/userobject1ai47907.html

Better City, Better Life

In 2010, Shanghai will host the next Great World Exposition with the theme, "Better Life, Better City". All participating countries have been asked to use their pavilions to address this theme.

Responding to this theme, as is the long tradition of World Expos, is an invitation to critique the present through projective speculation about the future.

Canada's model for urban growth is still the single family house

The continuing model of urban growth in Canada is predicated on the light wood framed single family house. This ubiquitous system for construction has remained largely unchanged in over a hundred years and is still aggregated into a model for urban development that has not been reconsidered in more than half a century.

"The Caspian" is one of thirteen models available in "Gates of Countryside"
A typical Canadian residential development, it is located in Brampton, a suburb of Toronto.
http://www.countrywidehomes.ca/dispatch.php?what=displayFramesetSearch
Aerial photo opposite by Pierre Metivier http://flickr.com/photo_zoom.gne?id=1483621313&size=o

Better City, Better Life

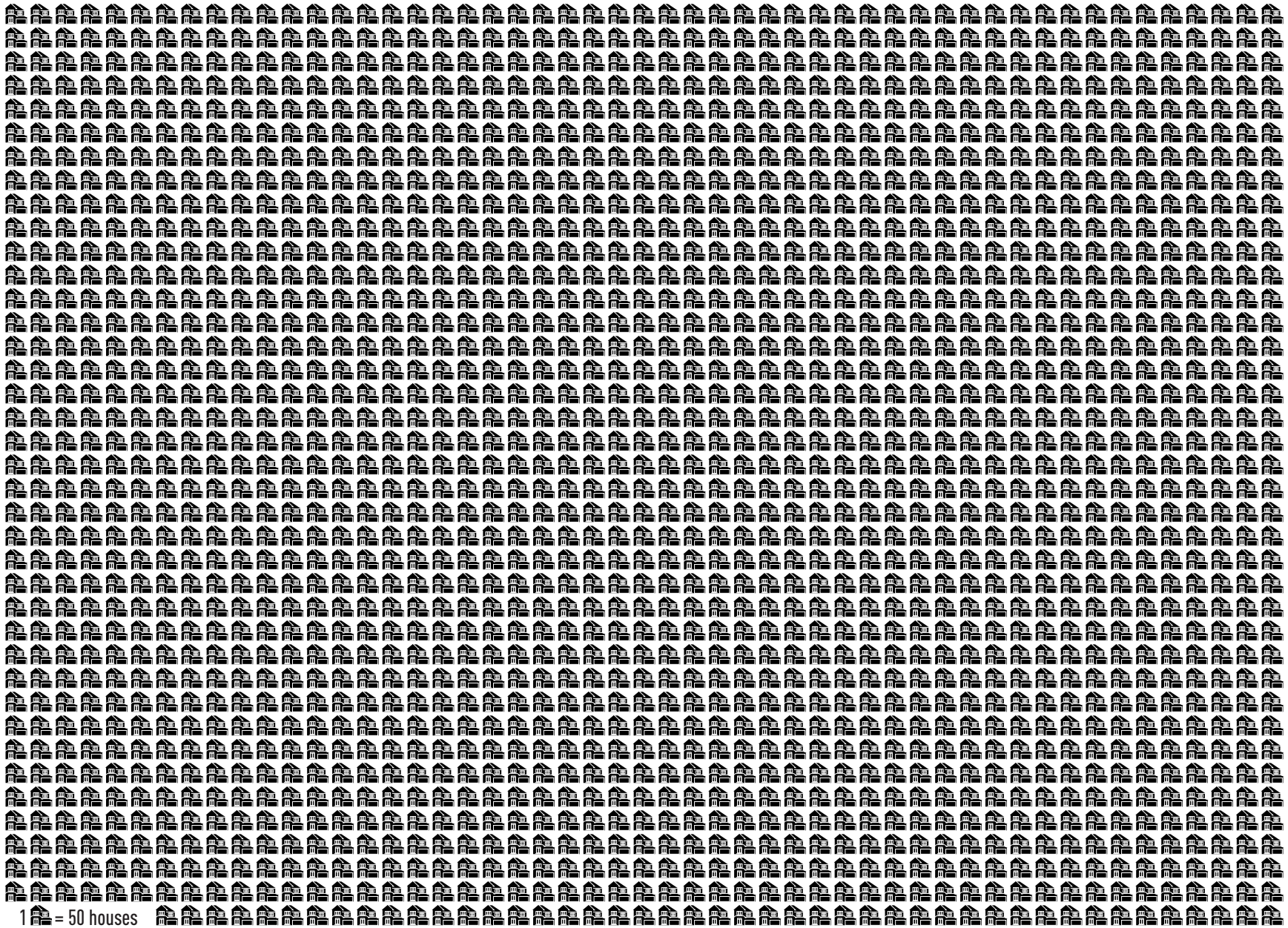
Model Home Display

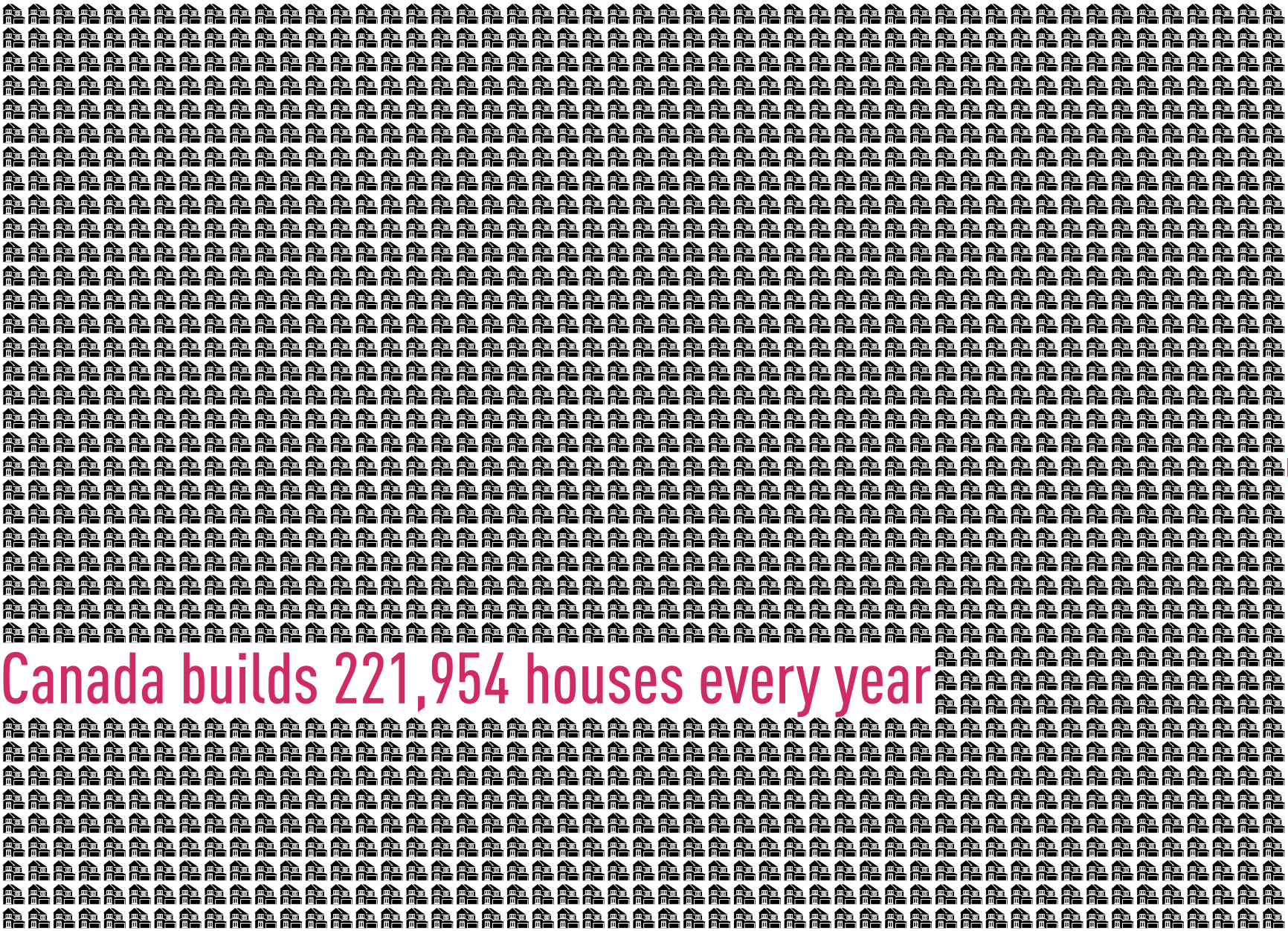
Display Model Home

The history of Expositions is one of spectacle on display. The most popular display at the 1855 World Exposition in Paris was an entire house that had been turned upside down. In response to the theme for 2010, it is appropriate that Canada also feature a full-scale reproduction of a typical house, complete with all furnishings.

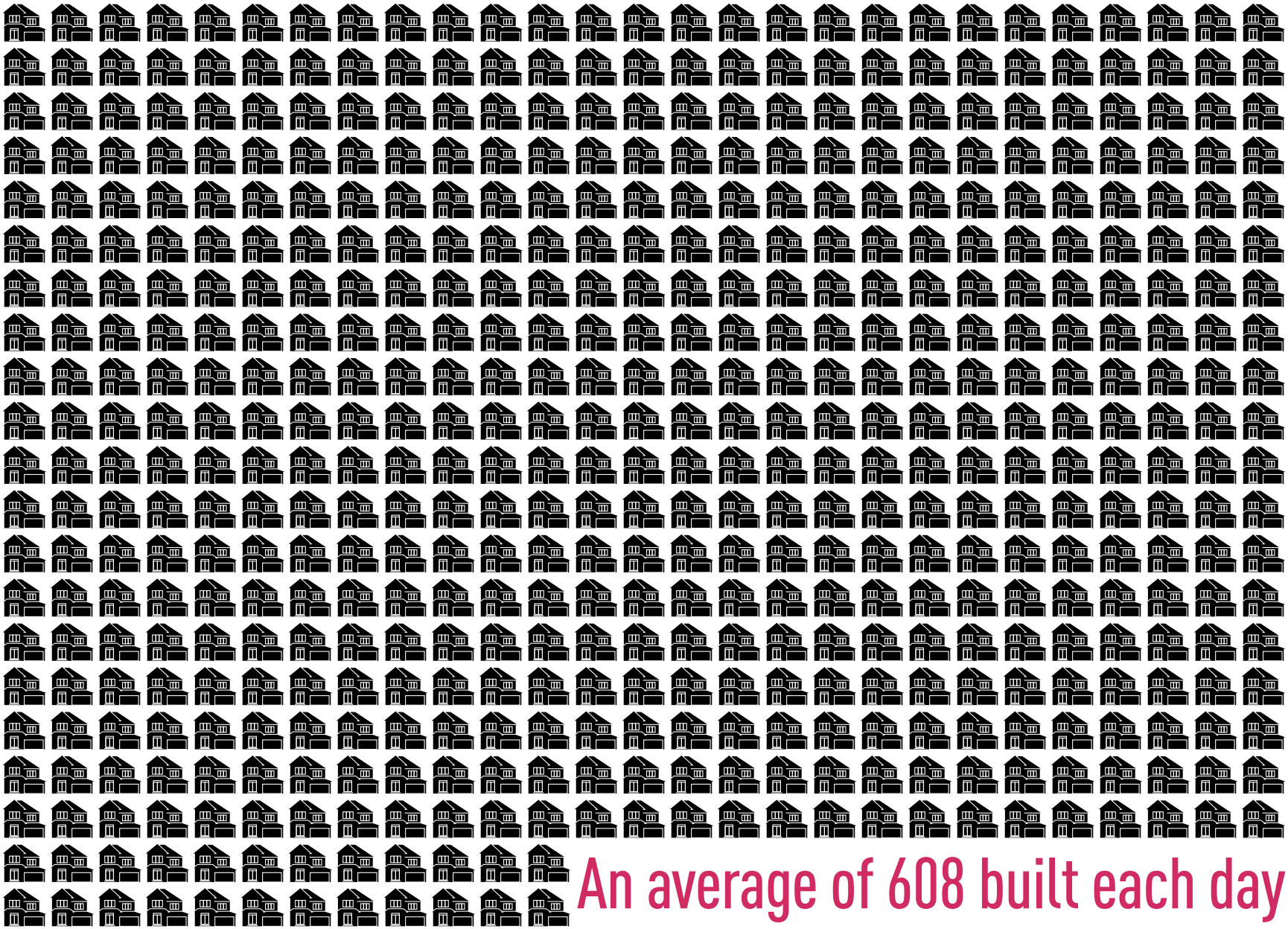
To facilitate the high volume of traffic the house must be laid on its side and split apart at the middle of each floor. This also works to signify a critical action taking place, the home appearing to be split open in a medical vivisection, its insides laid bare to the visiting public.

The critical action is complimented by an exhibition surrounding the home. Urbanists, architects and designers are invited to project different futures for Canadian homes and cities based on rethinking the single family home and its attendant urbanism.


1 = 50 houses



Canada builds 221,954 houses every year

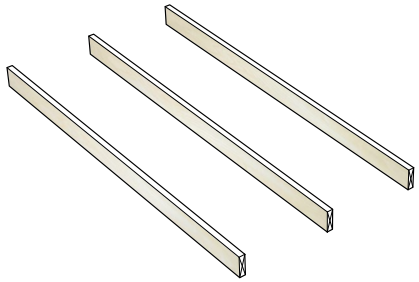

An average of 608 built each day

608
single family
homes

=

146,172
sheets of
plywood

+



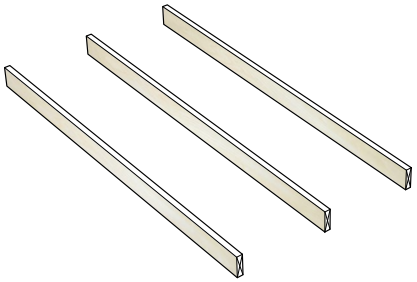
146,172
2x6 studs

221,953 (608 x 365) houses built per year based on the average of the five most recent years on record (2002-2006) from Statistics Canada

Material numbers are based on an average house size of 214m^2
CANSIM Table 027-0008 http://www40.statcan.ca/l01/cst01/manuf05.htm

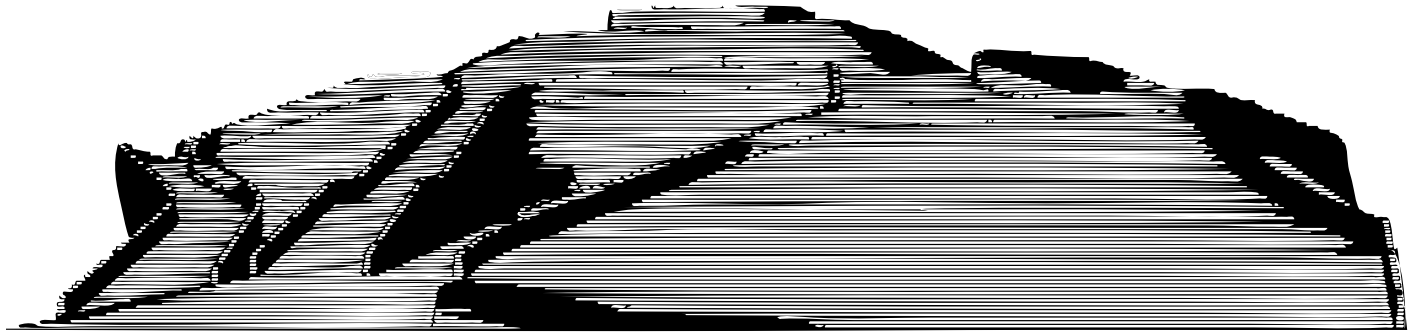
146,172
sheets of
plywood

+



146,172
2x6 studs

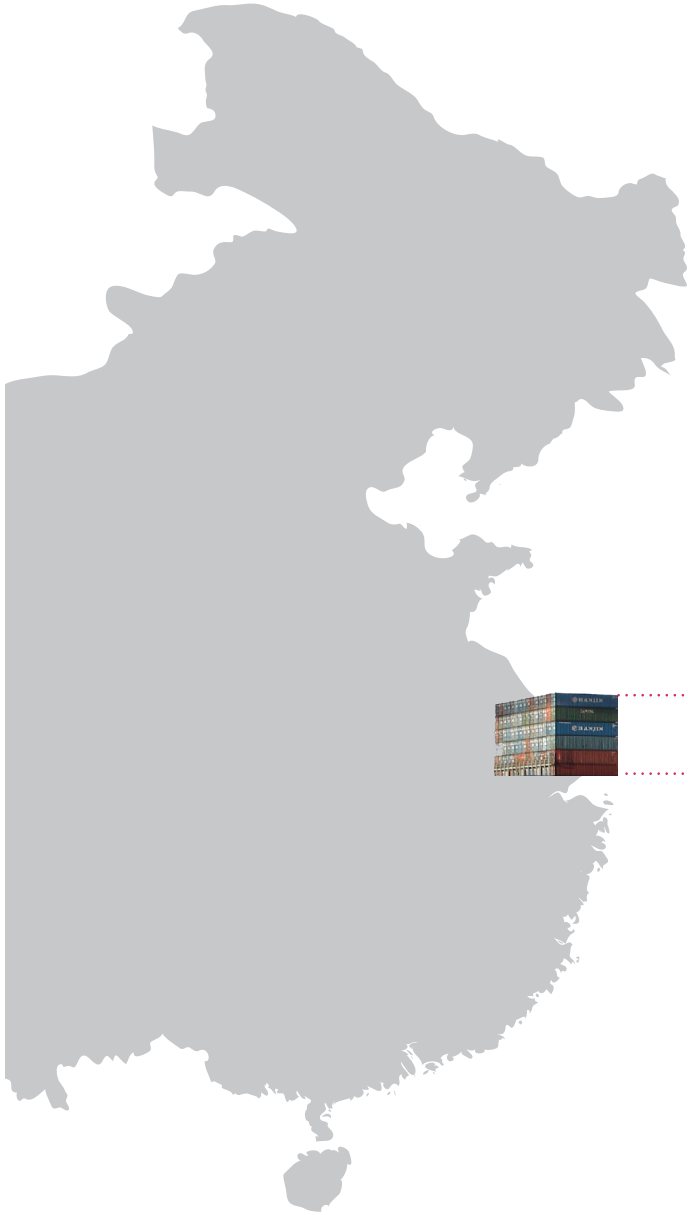
=

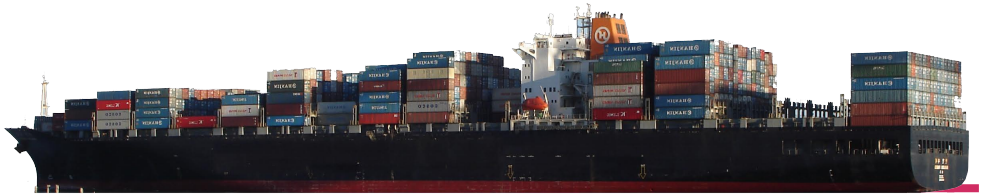


1 Pavilion

Can the materials used to build houses on any given day in Canada also be used to build Canada's pavilion in Shanghai?

The key is to use the same materials in a different manner, not to propose a replacement to light wood framing but rather a provocation: if the same materials, and nothing more, can be used to create an architecture that exceeds our formal expectations of them, then what else is possible?





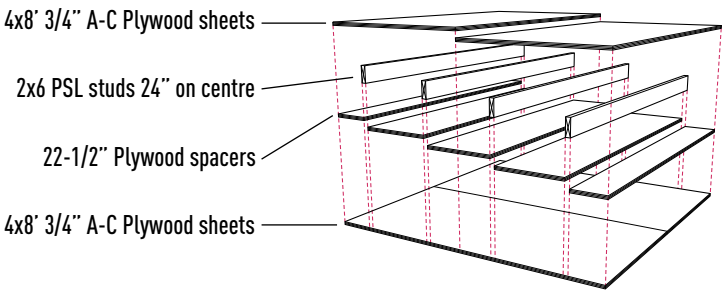
Canada exports wood veneer to China...

...where it is processed and sold back to Canada

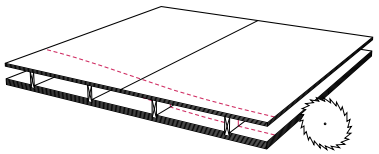
Every year Canada exports tonnes of wood veneer to China where it is used to sandwich inexpensive south mahogany and then sold back to Canada as plywood.

Borrowed for 6 months on its way back, Canada can build its pavilion from this wood

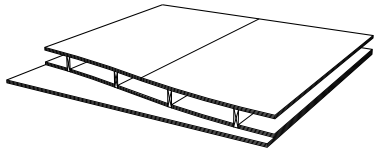
4% of one containership-load is borrowed on its way back for the 6 months of the World Expo to build the Canadian pavilion in Shanghai. The wood is returned to the economic flow at the end of the event.



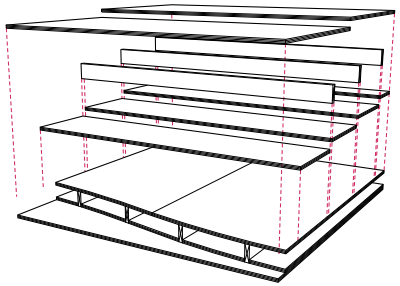
2x6s are sandwiched between two layers of plywood and held 24 inches apart by pre-ripped ply spacers



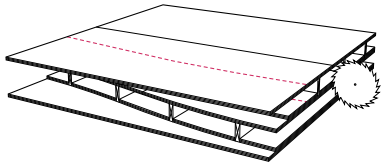
The edge of the resulting stack is then cut to the desired contour with a handheld circular saw



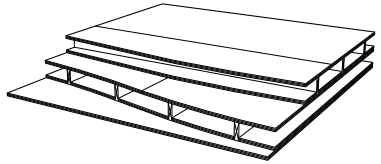
The saw is set to cut through the spacers, but not the bottom sheet of plywood



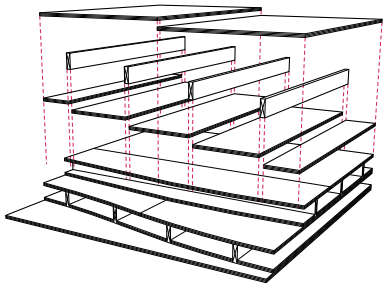
Another layer is added

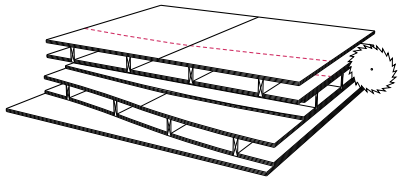


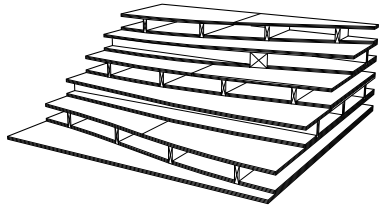
and the new layer cut



The process is repeated...

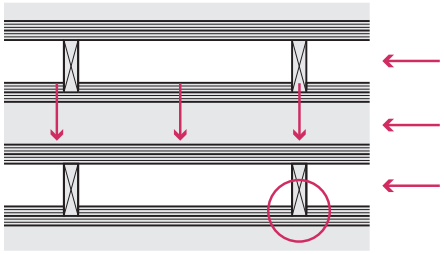




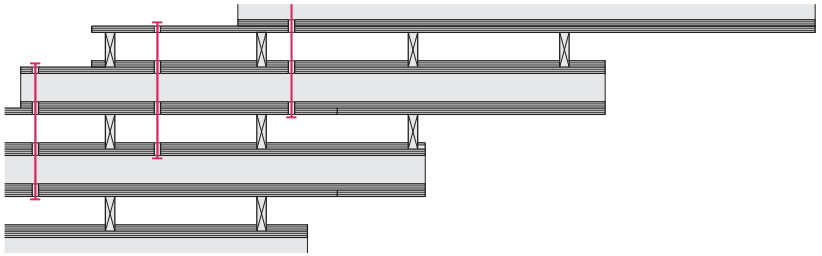


The pavilion is constructed from the same materials as a light wood framed house:

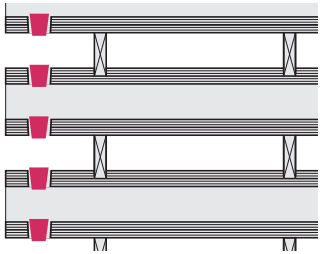
layers of 2x6s and plywood, but literally turned on end, the layering becomes a stacking



The plywood spacers grip the studs, making them cantilevered columns to resist lateral loads coupled with the dead load of the structure's own weight

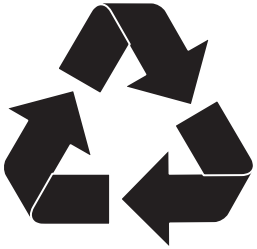


While some corbelling is possible, larger spans and vaulting are possible by pinning the layers together



Otherwise, no nails or fasteners are used in the system. The spacers at the edges are dowelled to the plywood below to lock all the spacers in between into place

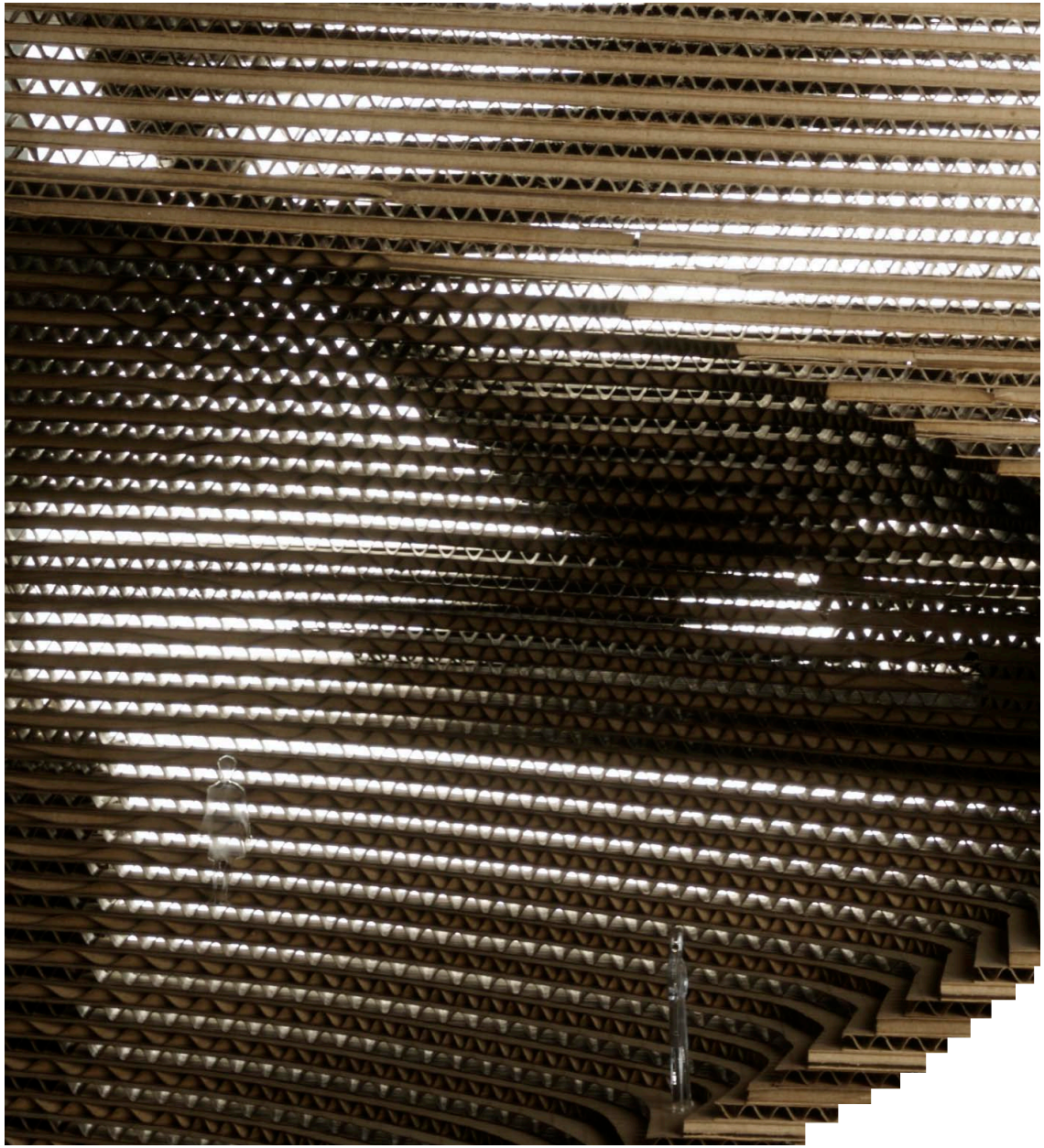
By constructing the pavilion without nails it can be easily disassembled and the wood re-used or recycled



Like light wood framing, the structural system relies on a high degree of redundancy. This leads to large masses of wood, 2x6s and sheets of plywood that are left whole.

Because it is a friction-fit system, nails and other fasteners are avoided as much as possible or altogether. The result is a pavilion that can be disassembled efficiently.

Pieces that have been cut or exposed to traffic or weather are pulped to make new engineered lumber, everything else is sent back on its way to Canada to build houses (608 to be exact).



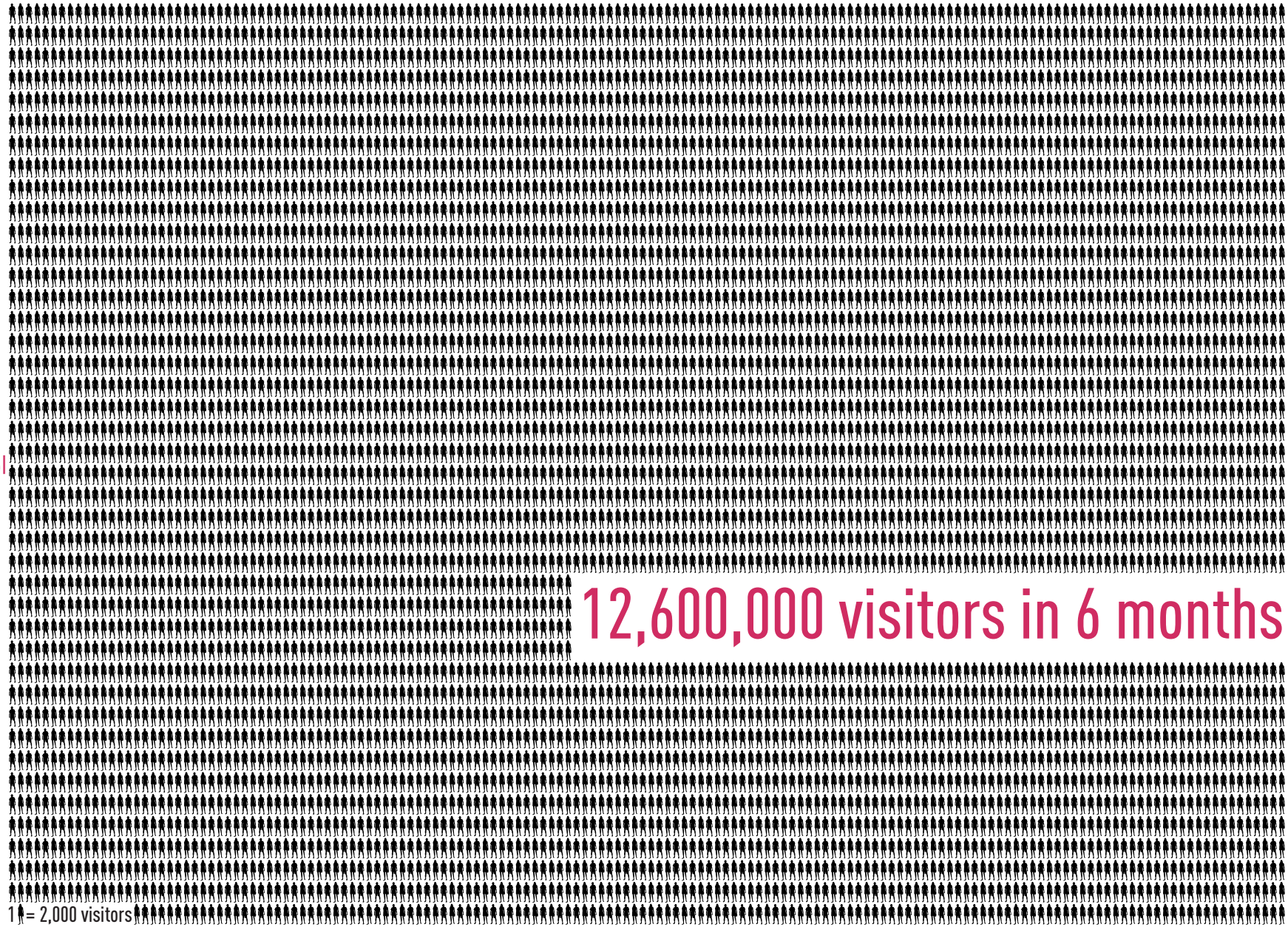
Transparency, Form and Furniture

The system enjoys three haptic benefits:

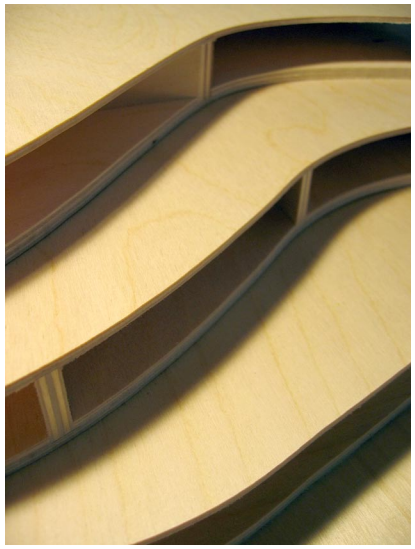
The two orthogonal directions of the stacking lends the system a transparency that betrays its mass;

Any complex curved form can be easily achieved as the system simply breaks down into layers in the z-axis and then contours it easily in the xy-axes; and

At 6-1/4 inches each layer is a potential step, every two a seat.

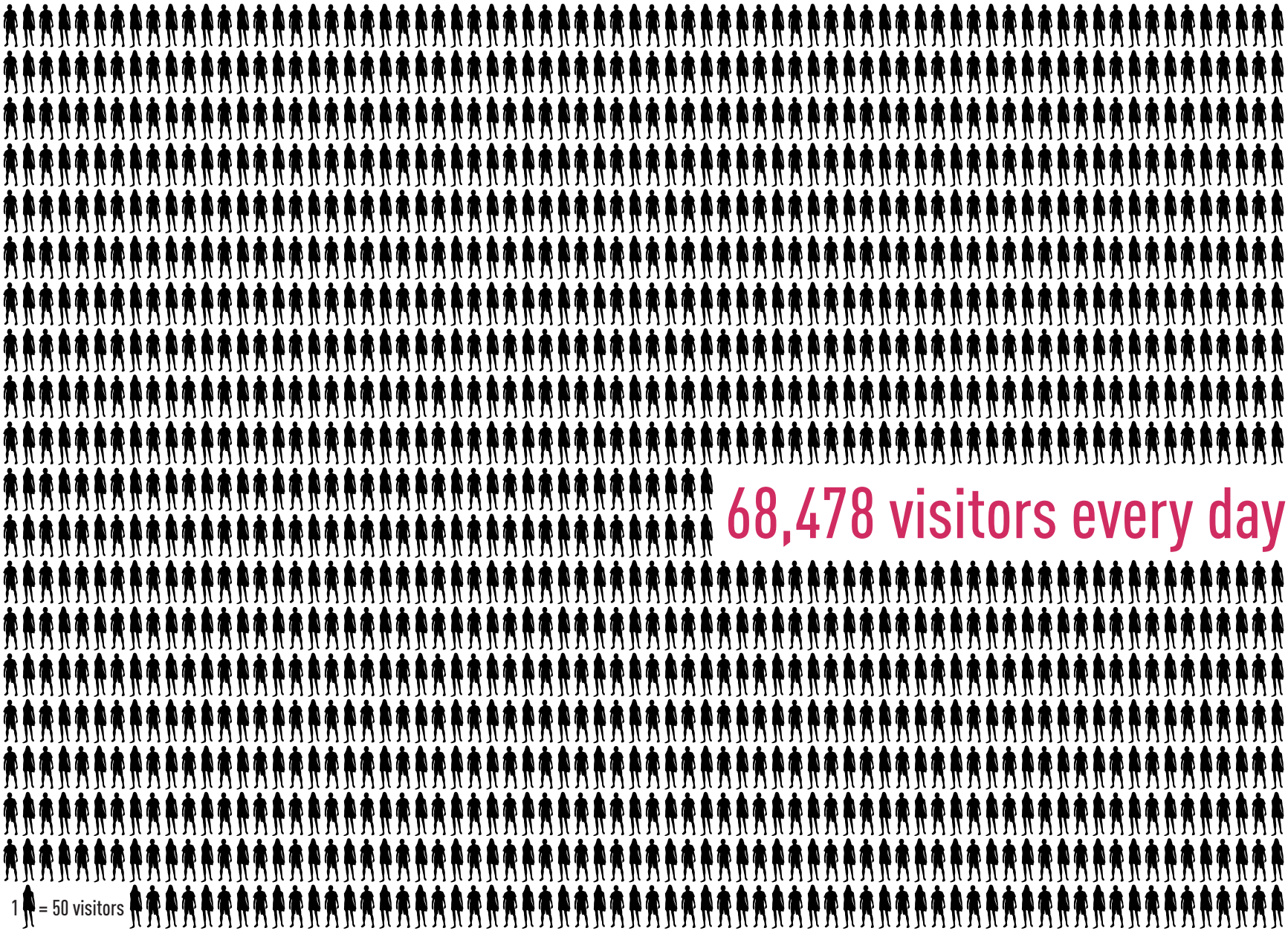

12,600,000 visitors in 6 months
1 = 2,000 visitors

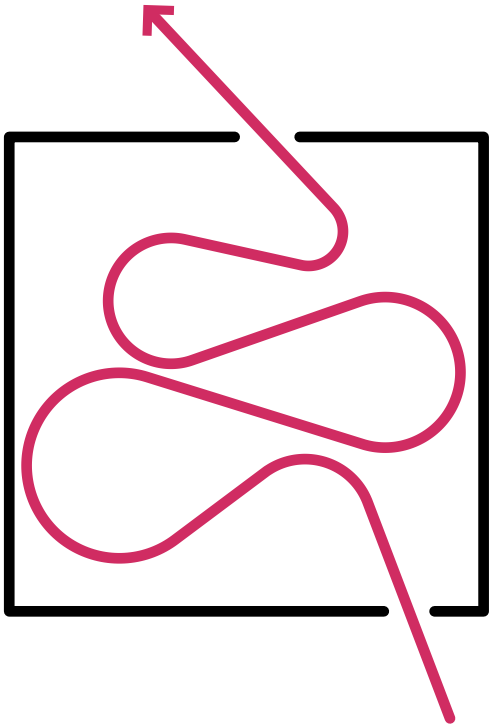
Shanghai is anticipating the greatest attendance of any Expo in history with an estimated 70 million spectators expected to visit during the 6 month event. At the Aichi Expo in 1995, the Canadian pavilion attracted 2.7 million people; 18 percent of the 15 million visitors to the expo grounds. If Canada repeats this success at Shanghai, then the pavilion will have to play host to 12.6 million in the same amount of time.

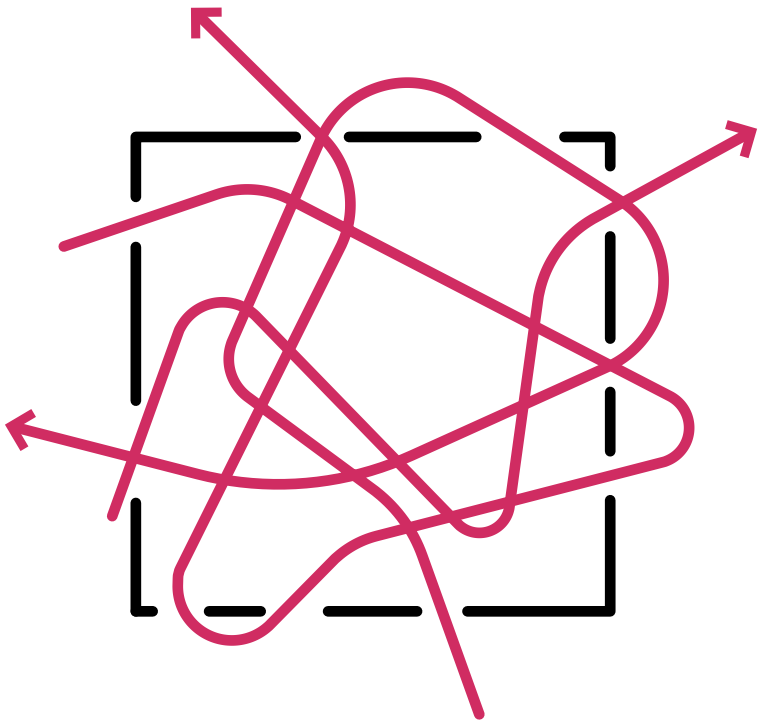



Like dog years, the pavilion will age half a century in half a year

Left unfinished the layers of ply will wear away underfoot, allowing the pavilion to register its intense inhabitation. Like desirelines crossing a snowy park, the visitors will leave a trace behind, their movements revealed in the lines of wear that will crisscross the pavilion.


68,478 visitors every day
1 = 50 visitors

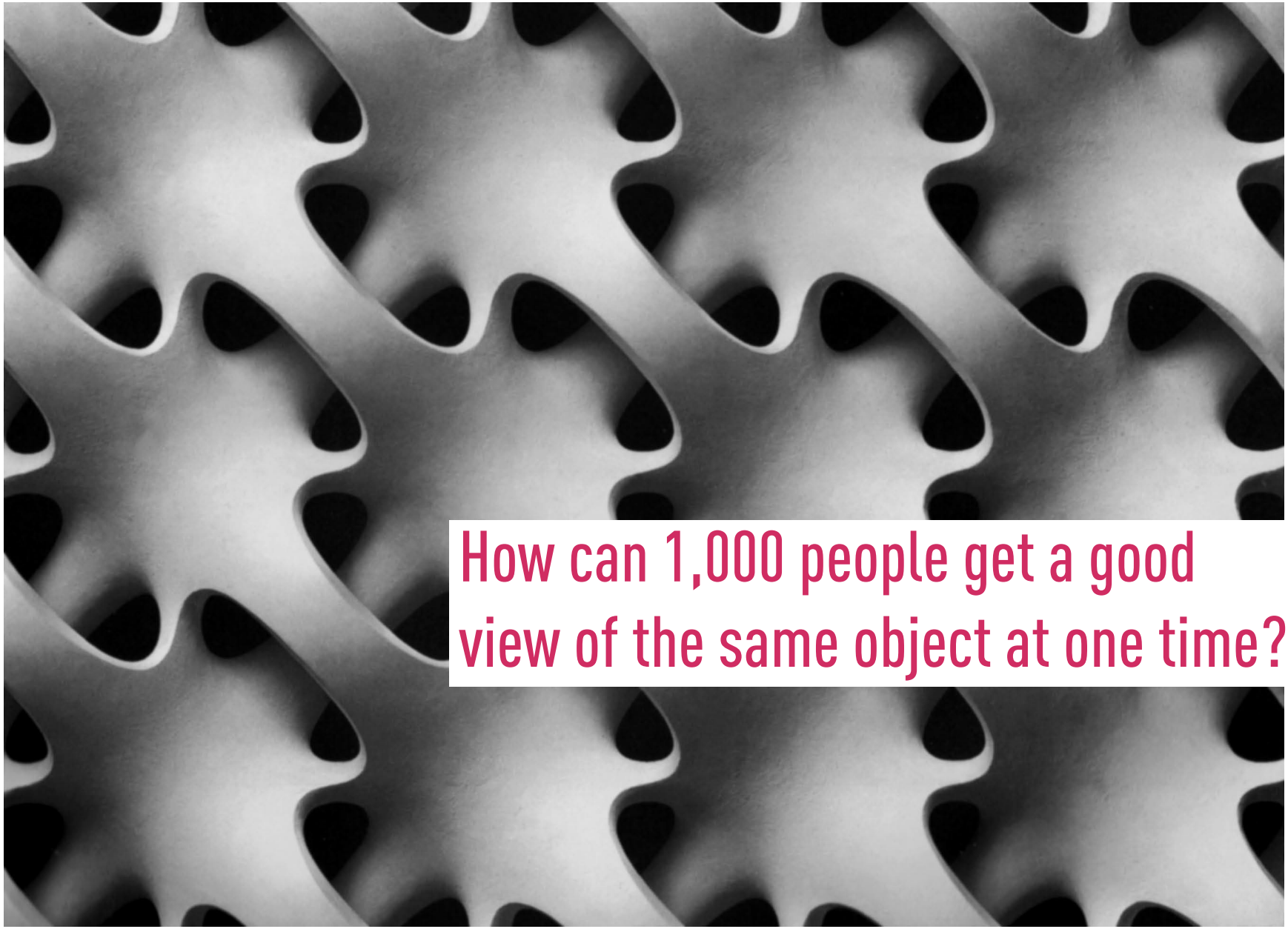




12.6 million visitors in 6 months means the Canadian pavilion will have to accommodate an average of nearly 70 thousand every day. Based on an average visit of 8 minutes to Canada's pavilion at Aichi in 2005, one thousand people can be expected inside the pavilion at Shanghai at any given moment. On the busiest days this number is anticipated to double.

Traditionally, circulation through expo pavilions is highly choreographed. Visitors are typically streamlined into a single, linear trajectory that carries them from the entrance through the displays and out the exit. The system appears to promise maximum efficiency but closer examination reveals that it promotes queues and compromises the visitor's experience by establishing a single speed through the exhibit, forcing visitors to "keep-up" and often leave feeling rushed.

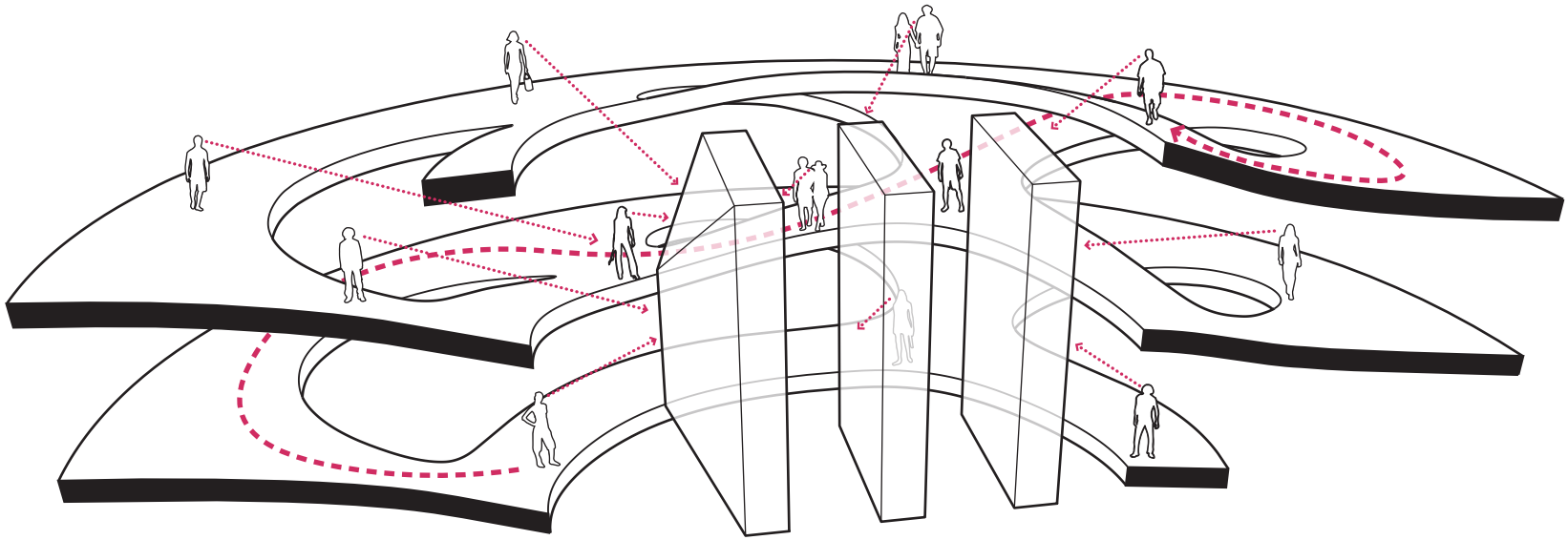
Traditional models will not be able to cope with the dramatic increase of visitors to Shanghai. Circulation must be maximized, the single route must become many and a multiplicity of choices must be offered. This will not only accommodate the unprecedented volume of traffic through the pavilion, but also eliminate queues and empower visitors to find their own way in their own time, seeing as much or as little of the pavilion as they choose.


How can 1,000 people get a good
view of the same object at one time?

Mathematical models of single-surface geometries provides the inspiration for a building where all surfaces are inhabitable; a building of total circulation, a network of generous paths to accommodate large crowds

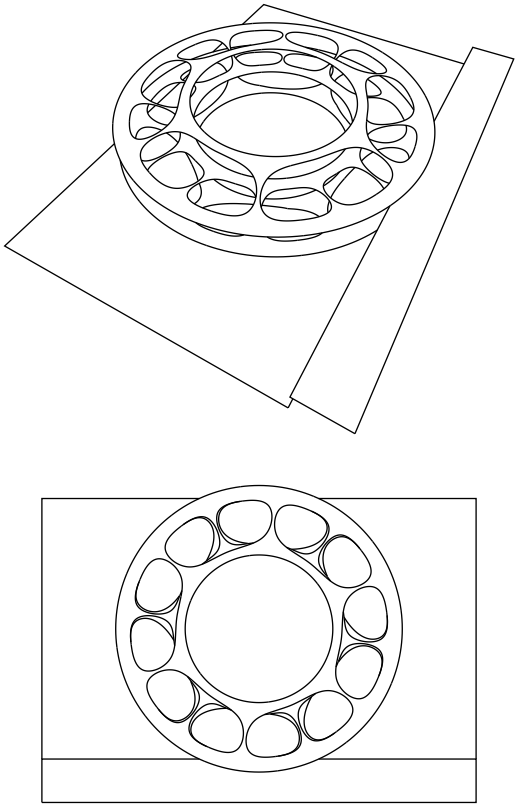
The single-surface is folded up to form another level, making the building a multi-storeyed one to accommodate even more people

The surface is split open at its centre to place the Model Home Vivisection at the heart of the pavilion.

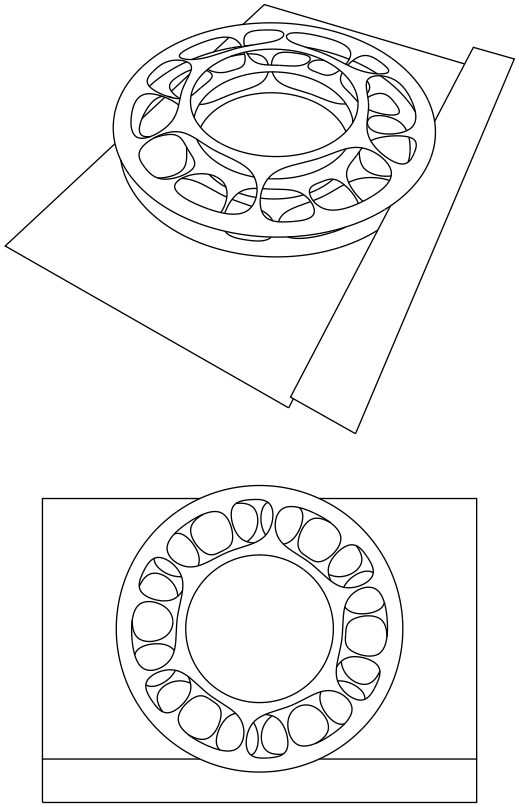


An architectural screen inspired by single-surface geometries by Erwin Hauer in 1950 is pictured opposite. Hauer (2004)

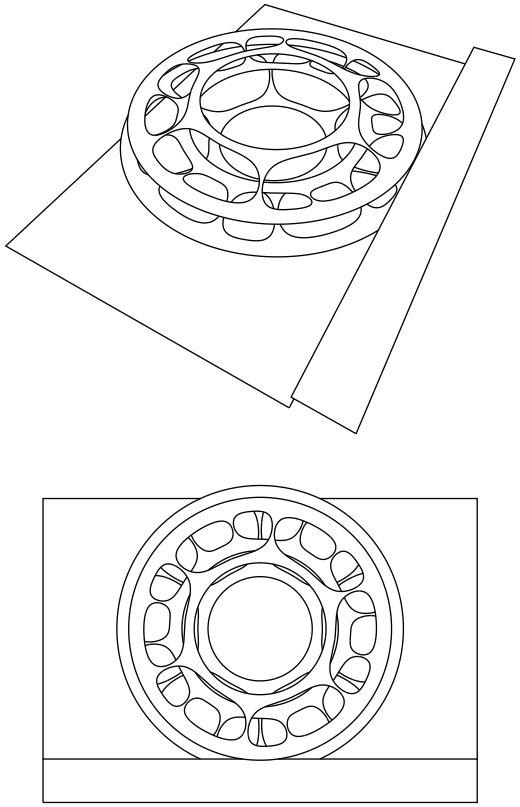
The network of circulation offers maximum choice to the visitor. As they navigate up and down they continually enter and exit the interior of the pavilion without a discernible transition between storeys. The resulting pavilion provides a maximum number of vantage points from which to study the Model Home Vivisection



The single-surface diagram is placed on the 60x100m site with an adjacent elevated pedestrian walkway 5m above the ground

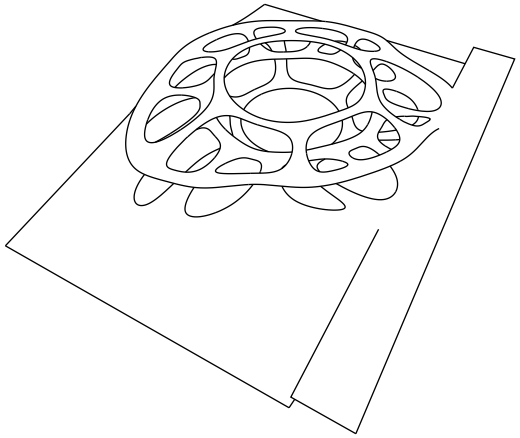


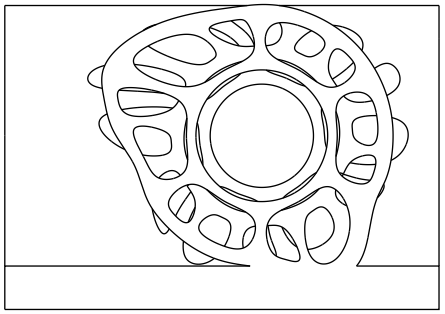
Vertical circulation elements are staggered to avoid coincident bearings in anticipation of the structure that will be need to carry their loads to the earth



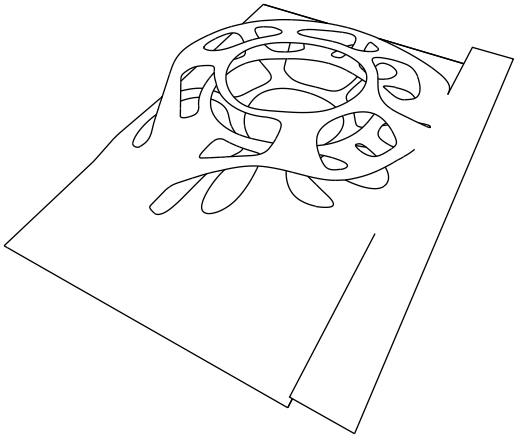
Horizontal circulation is similarly pushed and pulled to avoid the structure from those above bearing down directly on top of those below

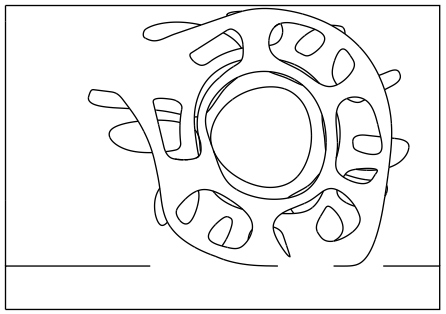
The pavilion's circulation emerges from the single-surface diagram



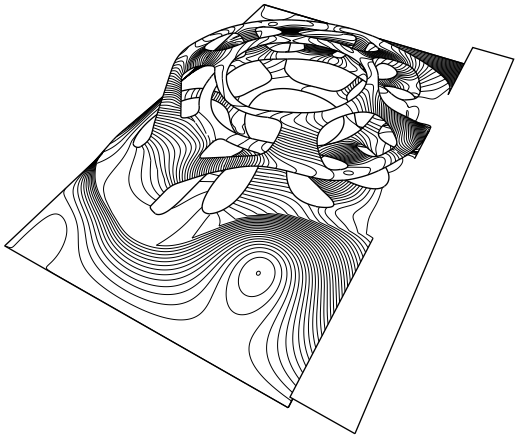


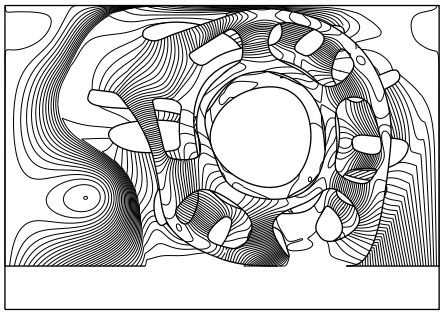
The diagram is deformed to the site conditions. Three entrances emerge - at the front, the back and from the elevated pedestrian walkway





The pathways of the diagram are cut, pulled and rejoined as necessary to create an even greater amount of choices for navigating the pavilion

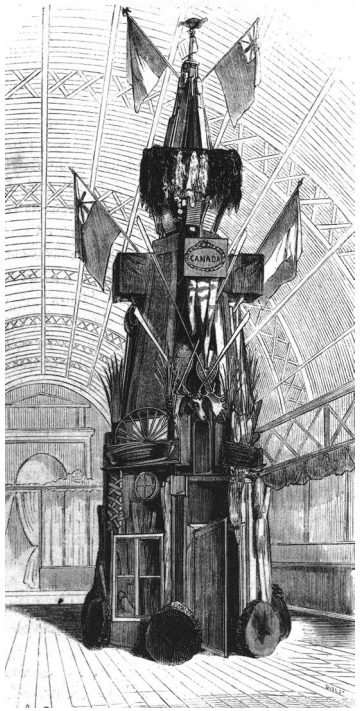




Finally, the surface of the diagram is striated into stairs. The rise of each stair is 6-1/4 inches while the run varies down to a minimum of 11 inches. All major vantage points are accessible with more than half the pavilion featuring slopes suitable for adaptation to wheelchair ramps

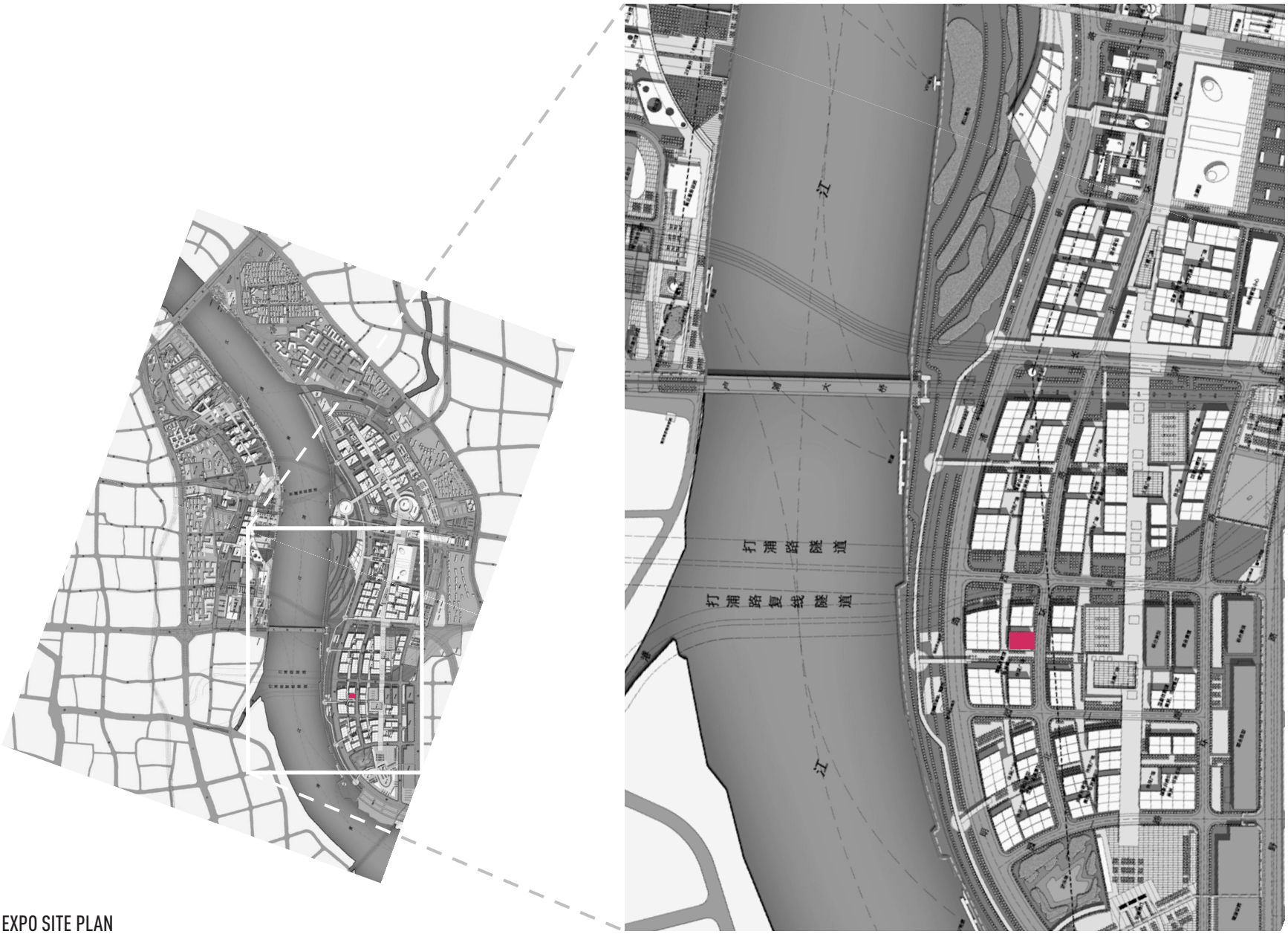
Pictured opposite is the "Canadian Timber Trophy composed of every type of wood and finish commercially available in Canada" by Gottfried Semper for the World Exposition in Paris, 1855. Image Wesemael, 2001

O! Canada?

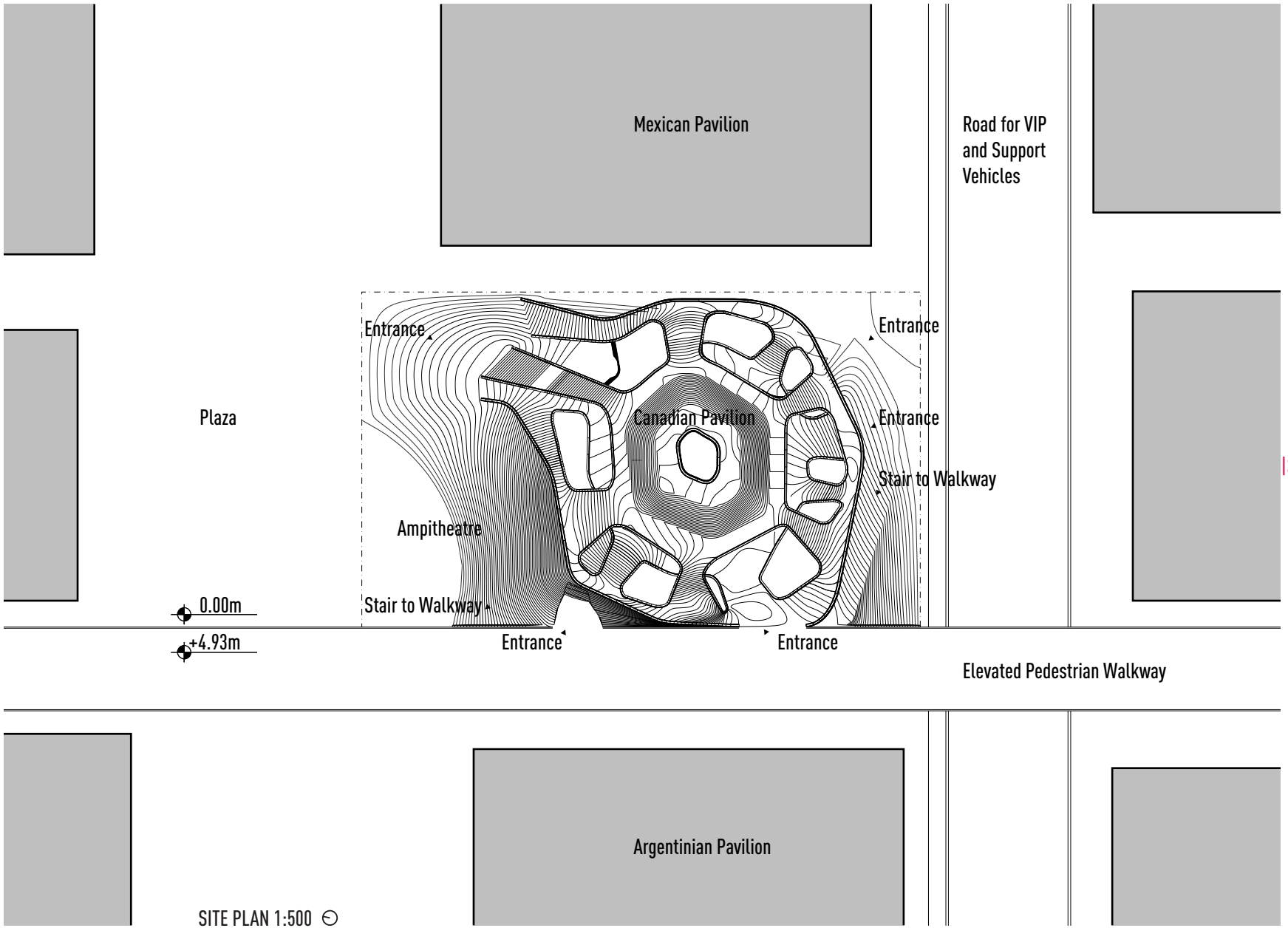


a pavilion for the 2010 World Exposition in Shanghai

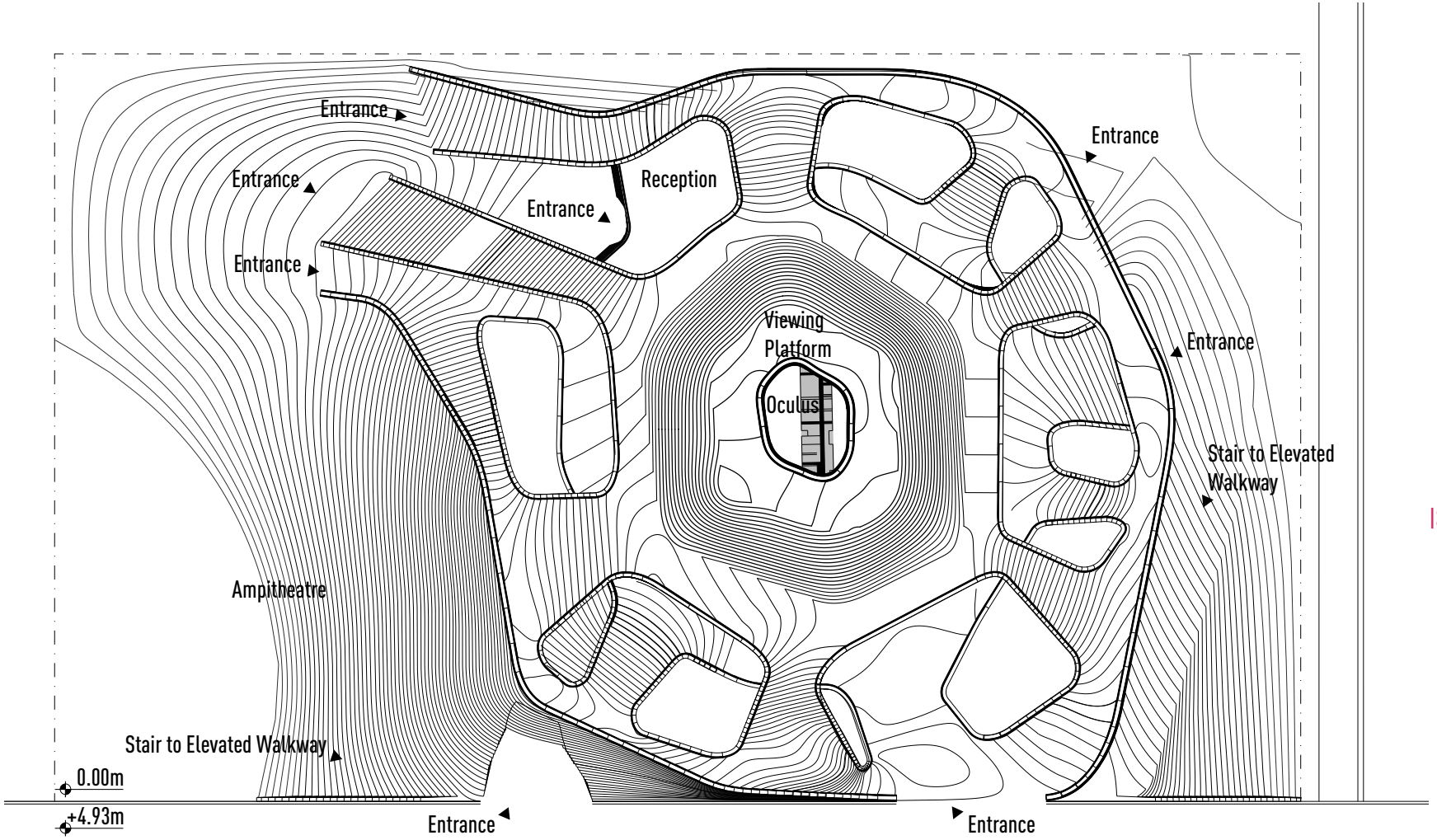
Project



EXPO SITE PLAN

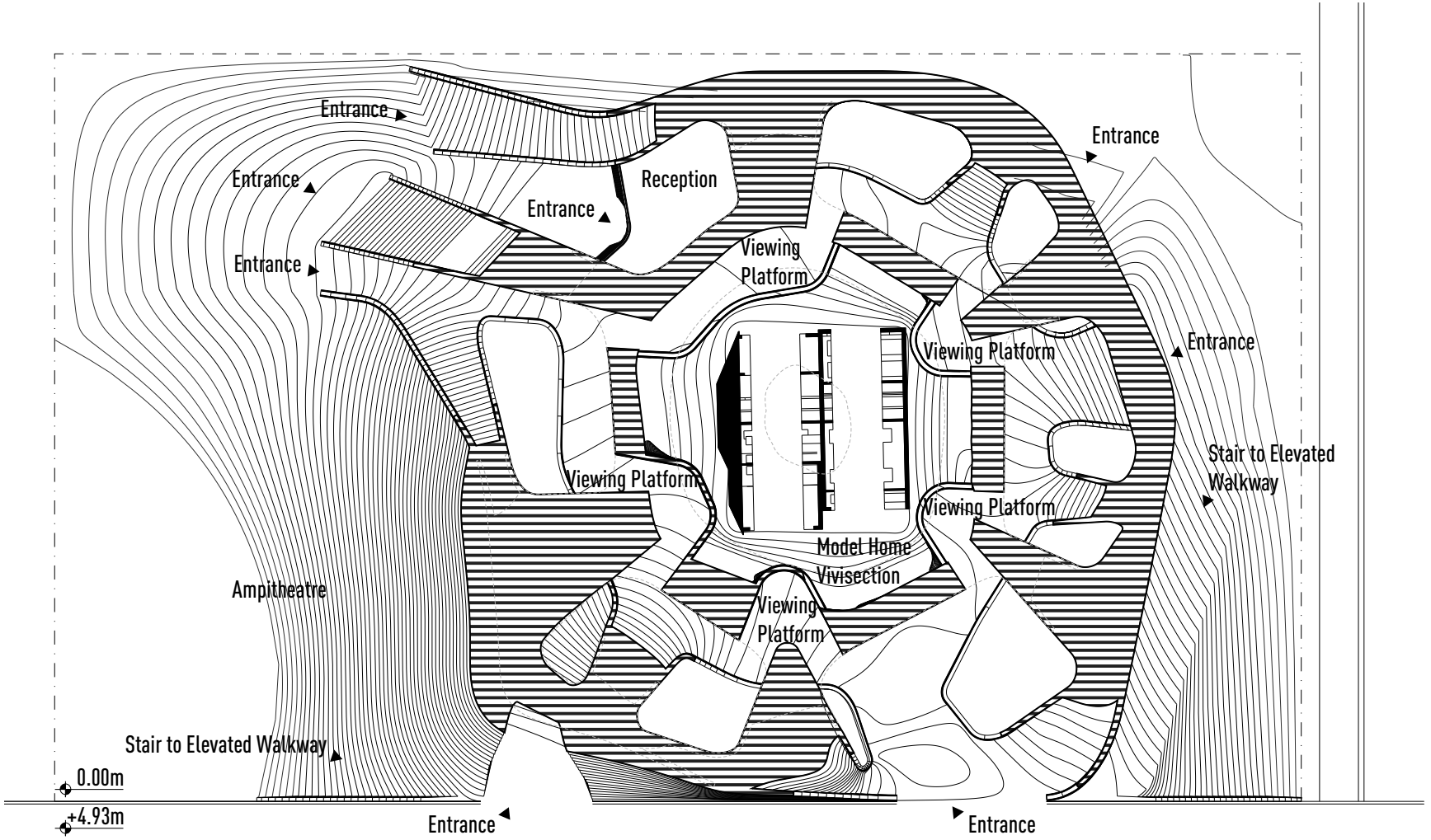


SITE PLAN 1:500



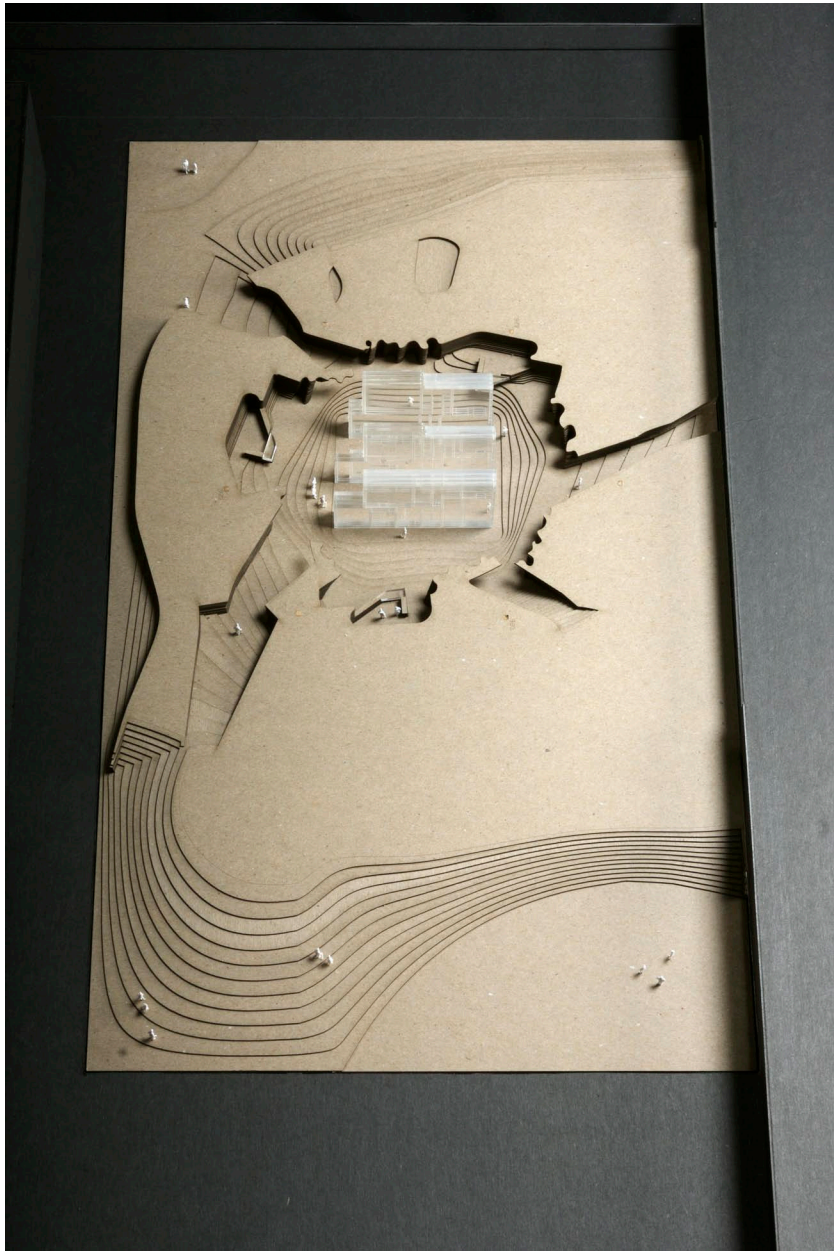
Elevated Pedestrian Walkway

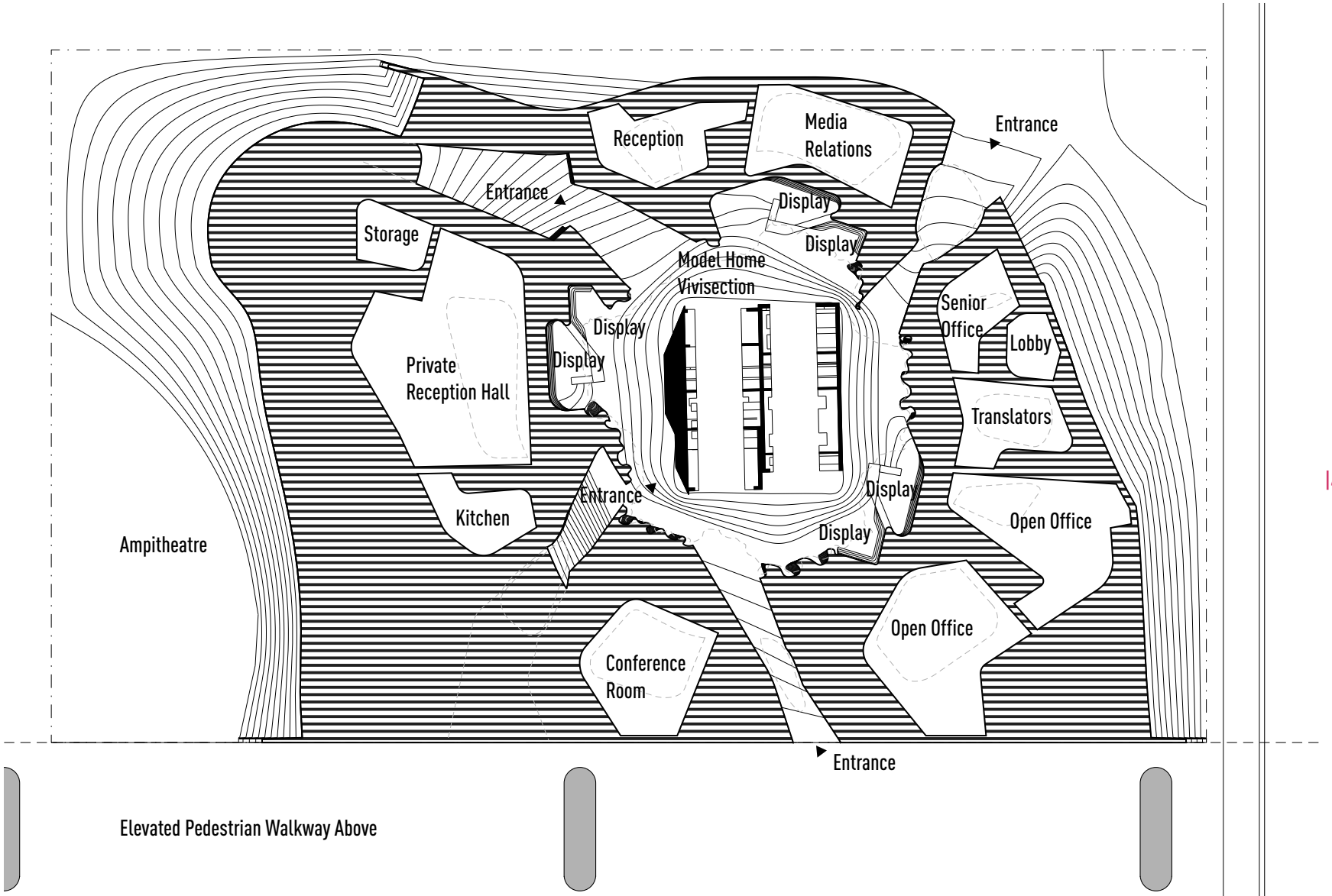
ROOF PLAN 1:500



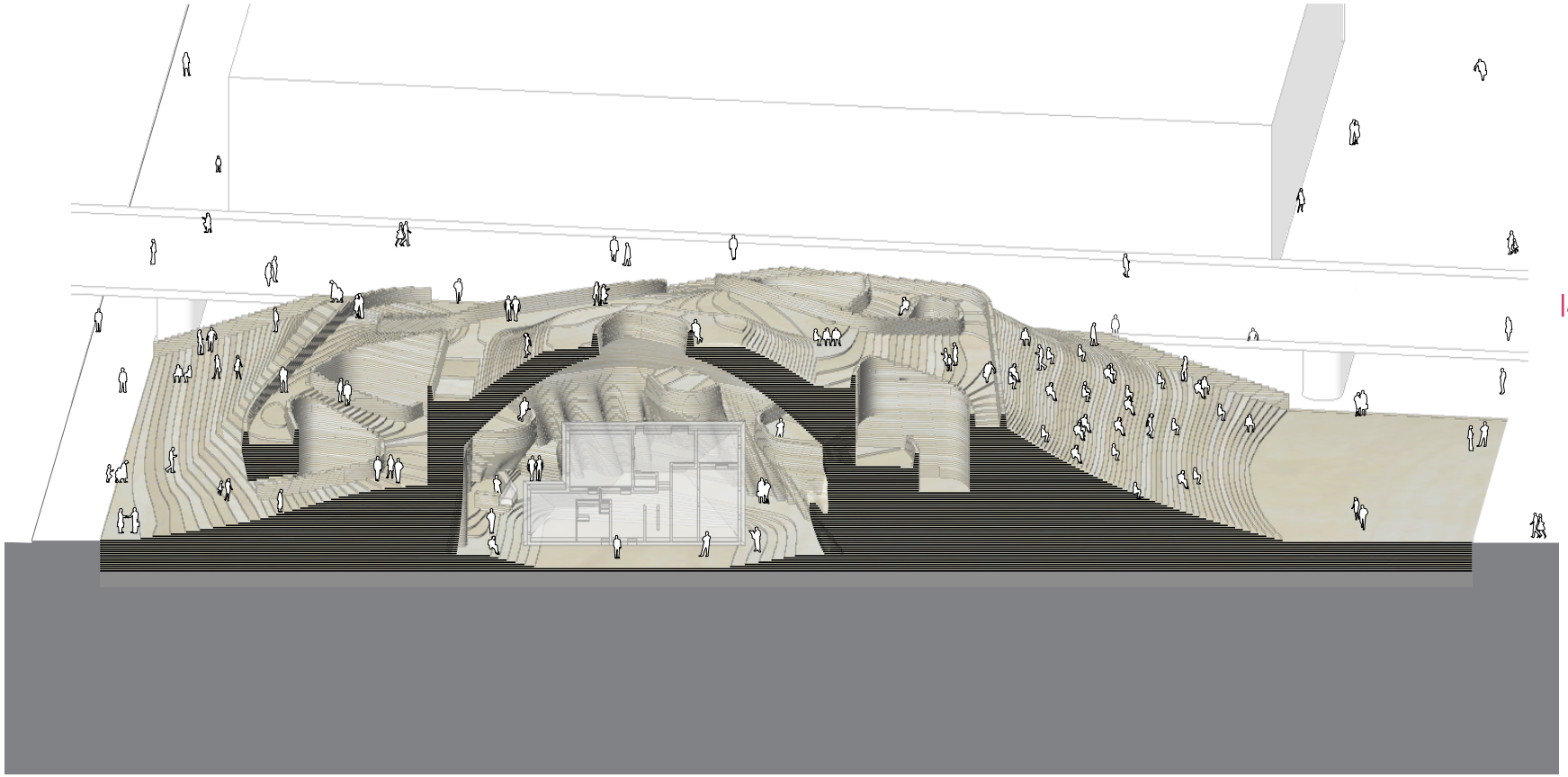
Elevated Pedestrian Walkway

MID-LEVEL FLOOR PLAN 1:500

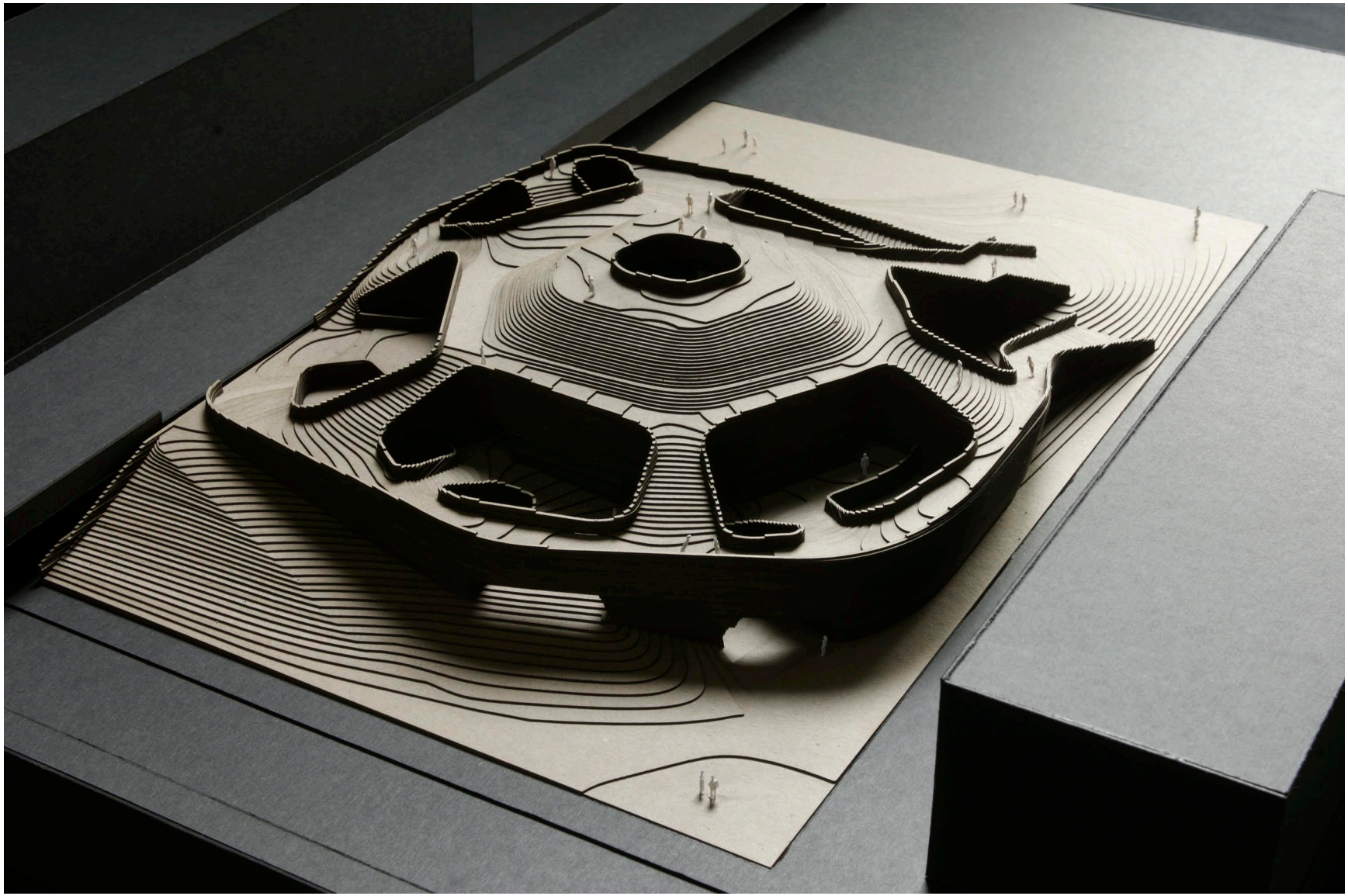


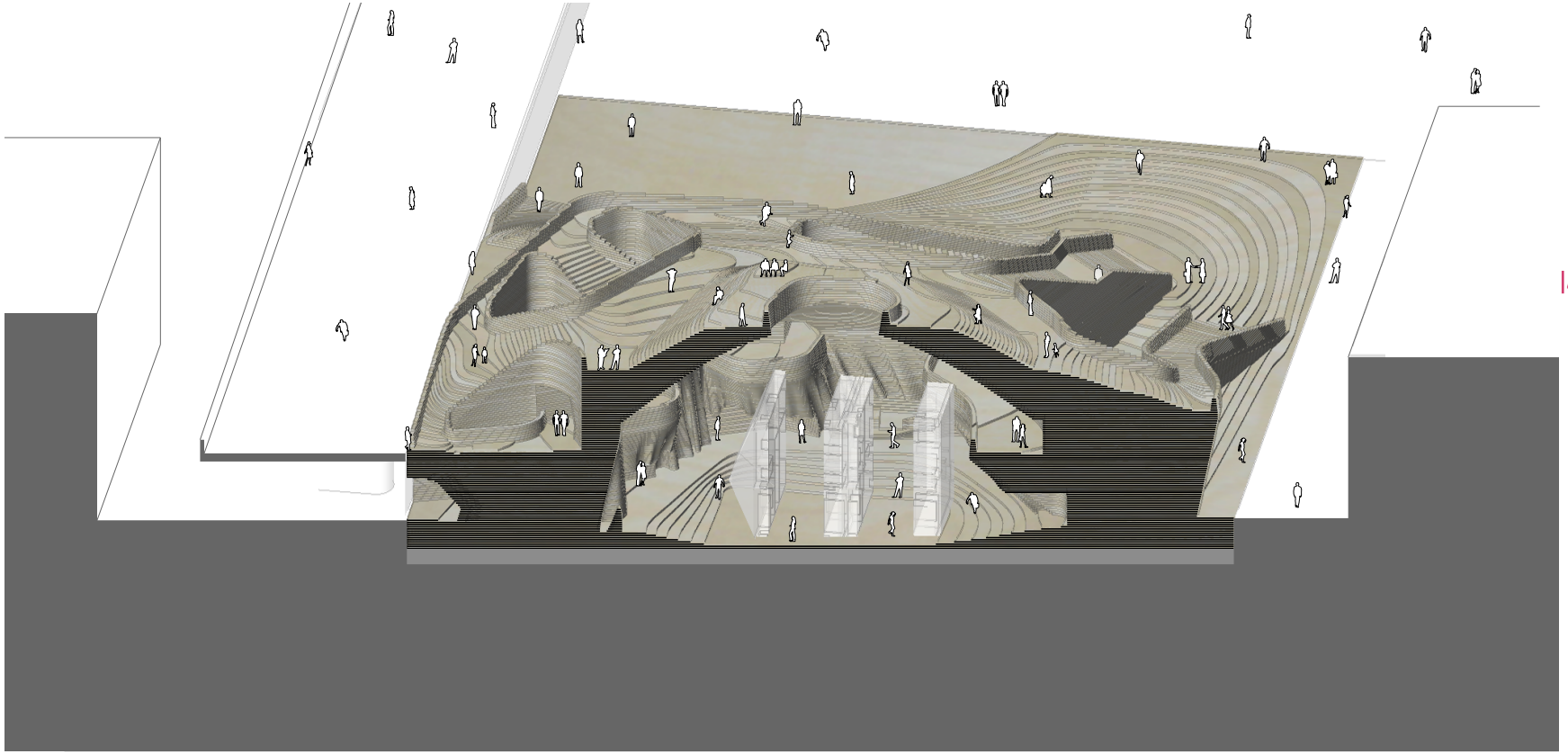


GROUND FLOOR PLAN 1:500

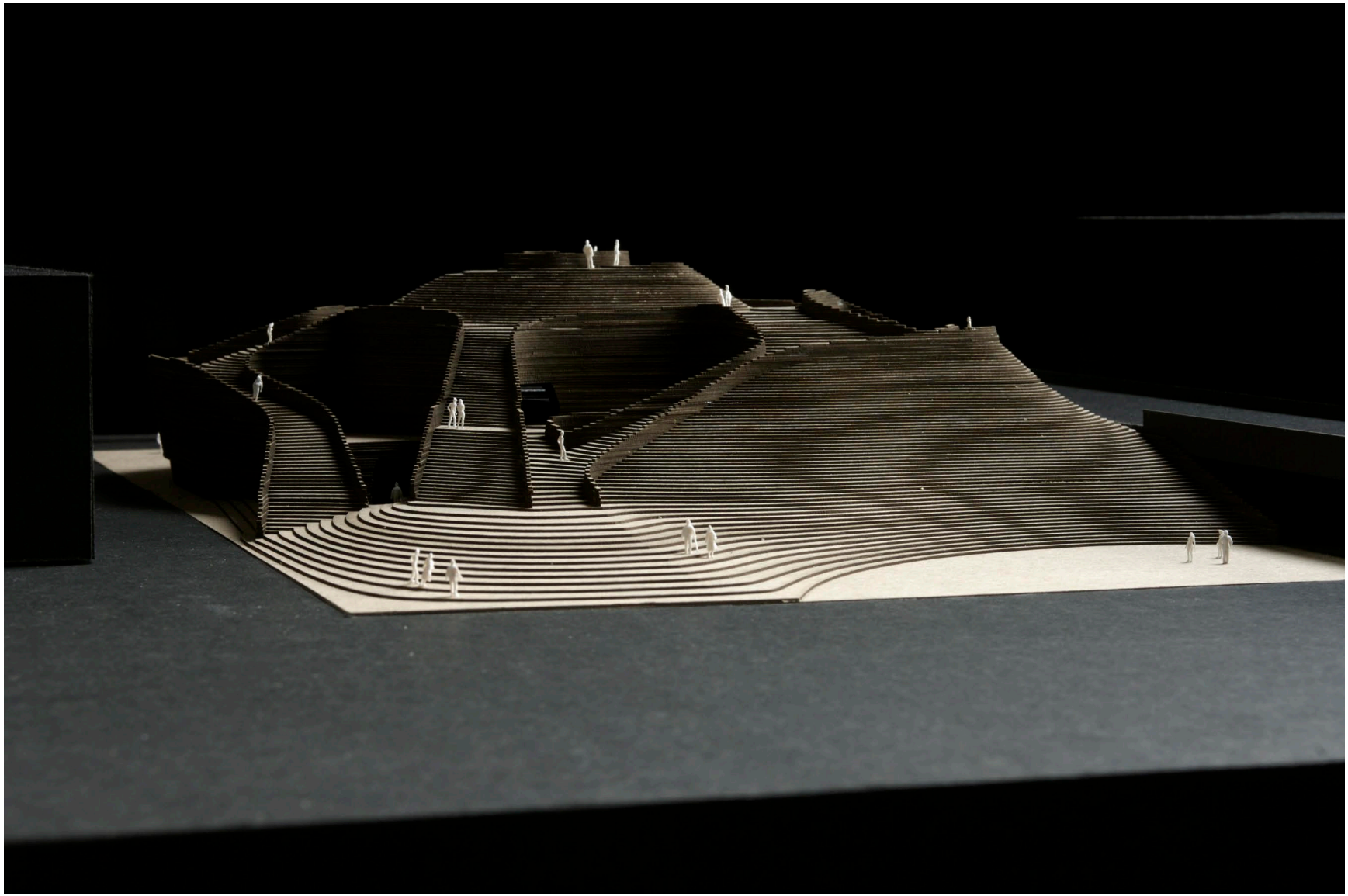


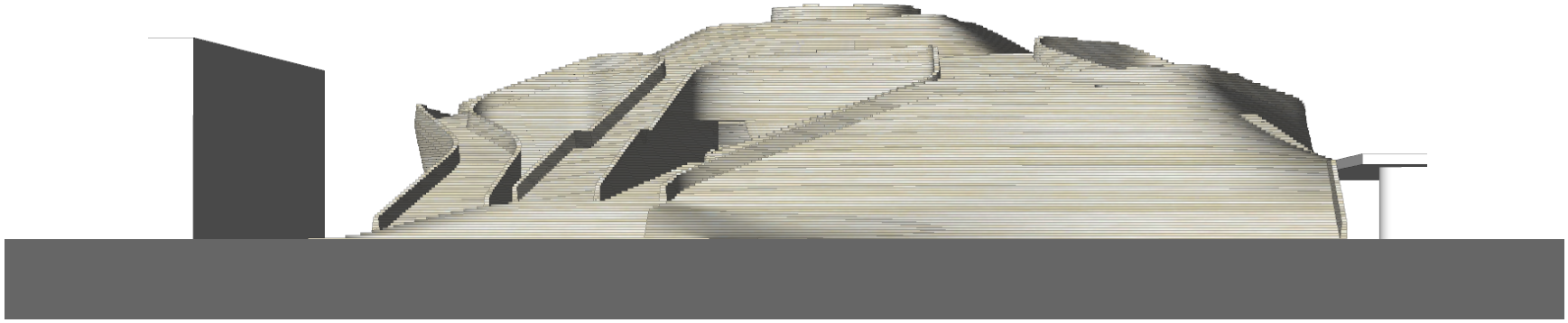
AXONOMETRIC LONGITUDINAL SECTION TO WEST 1:500





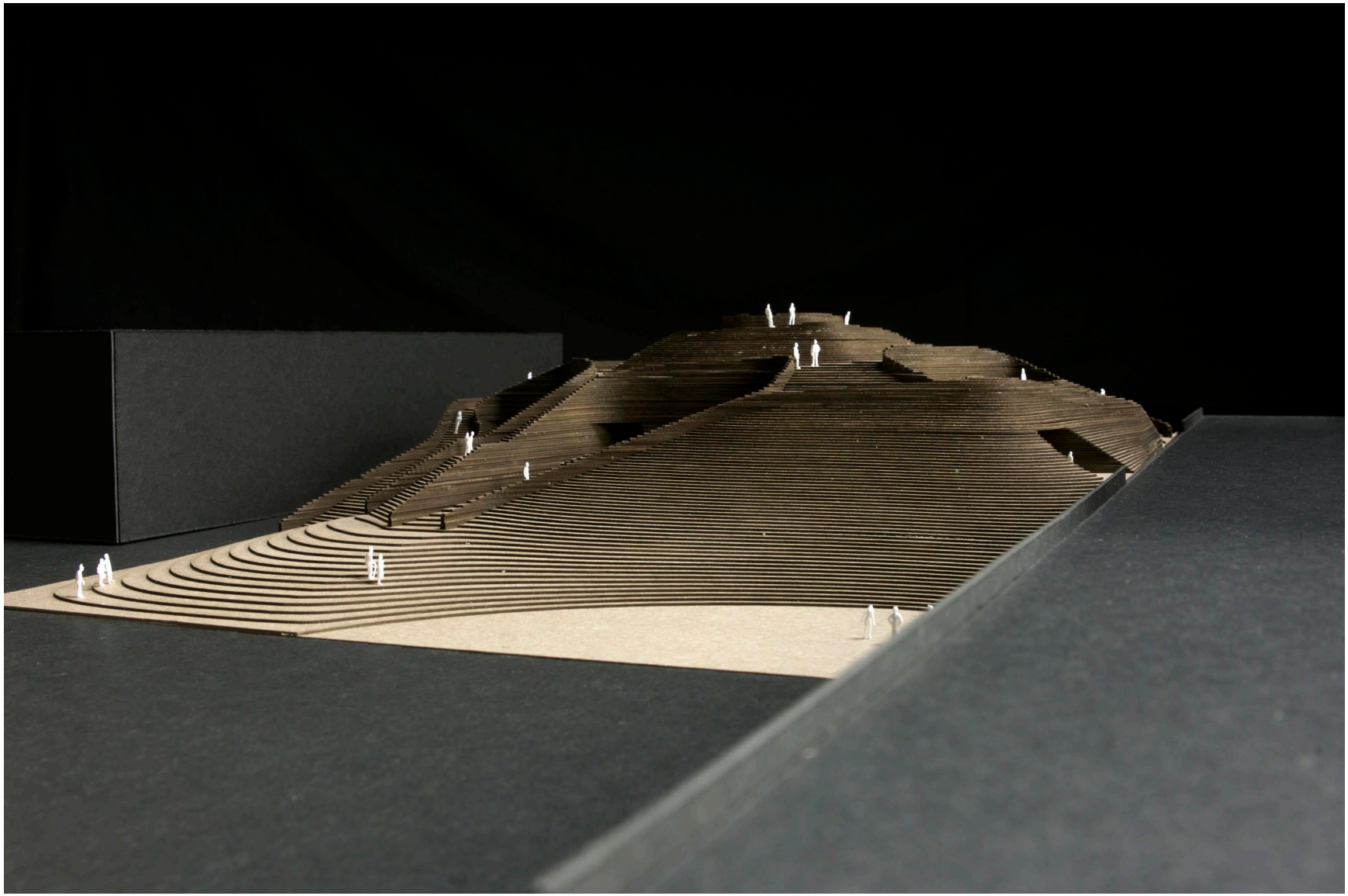
AXONOMETRIC CROSS SECTION TO NORTH 1:500

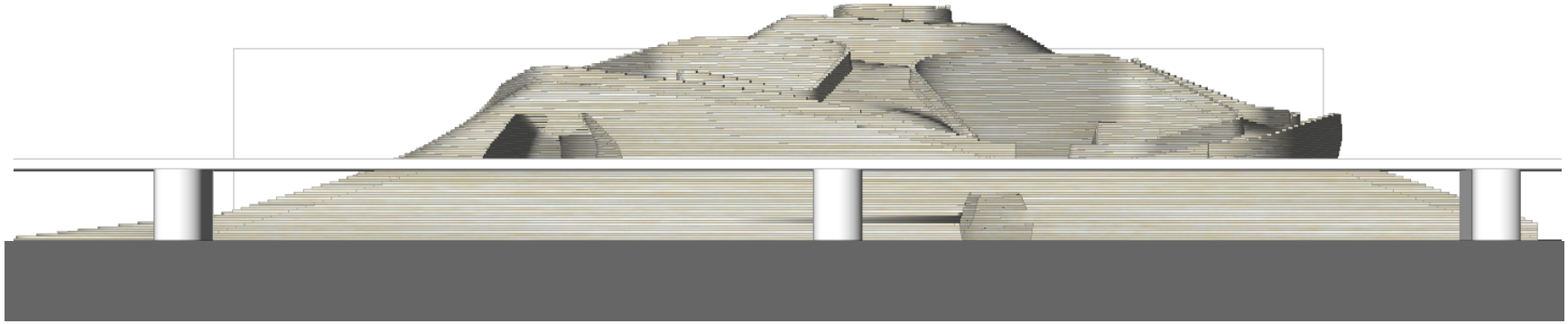




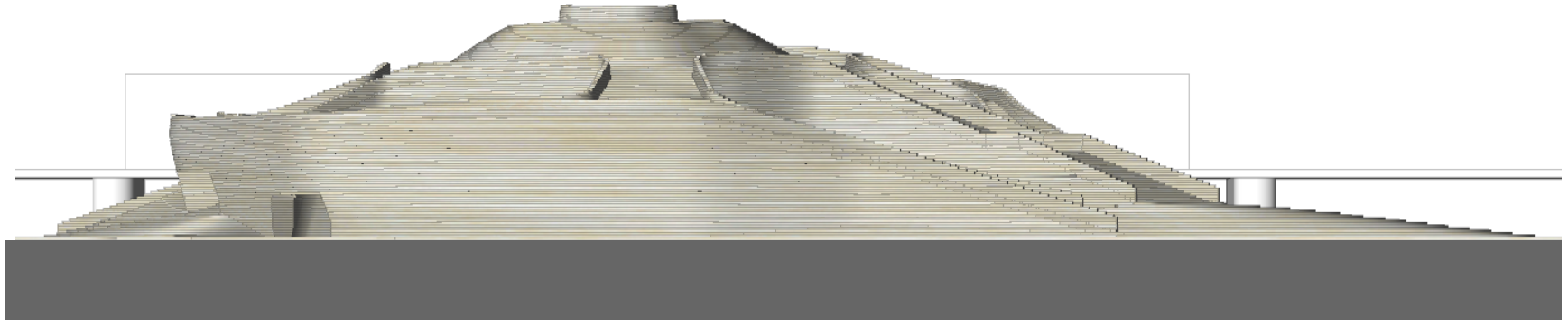
NORTH ELEVATION 1:500

SOUTH ELEVATION 1:500

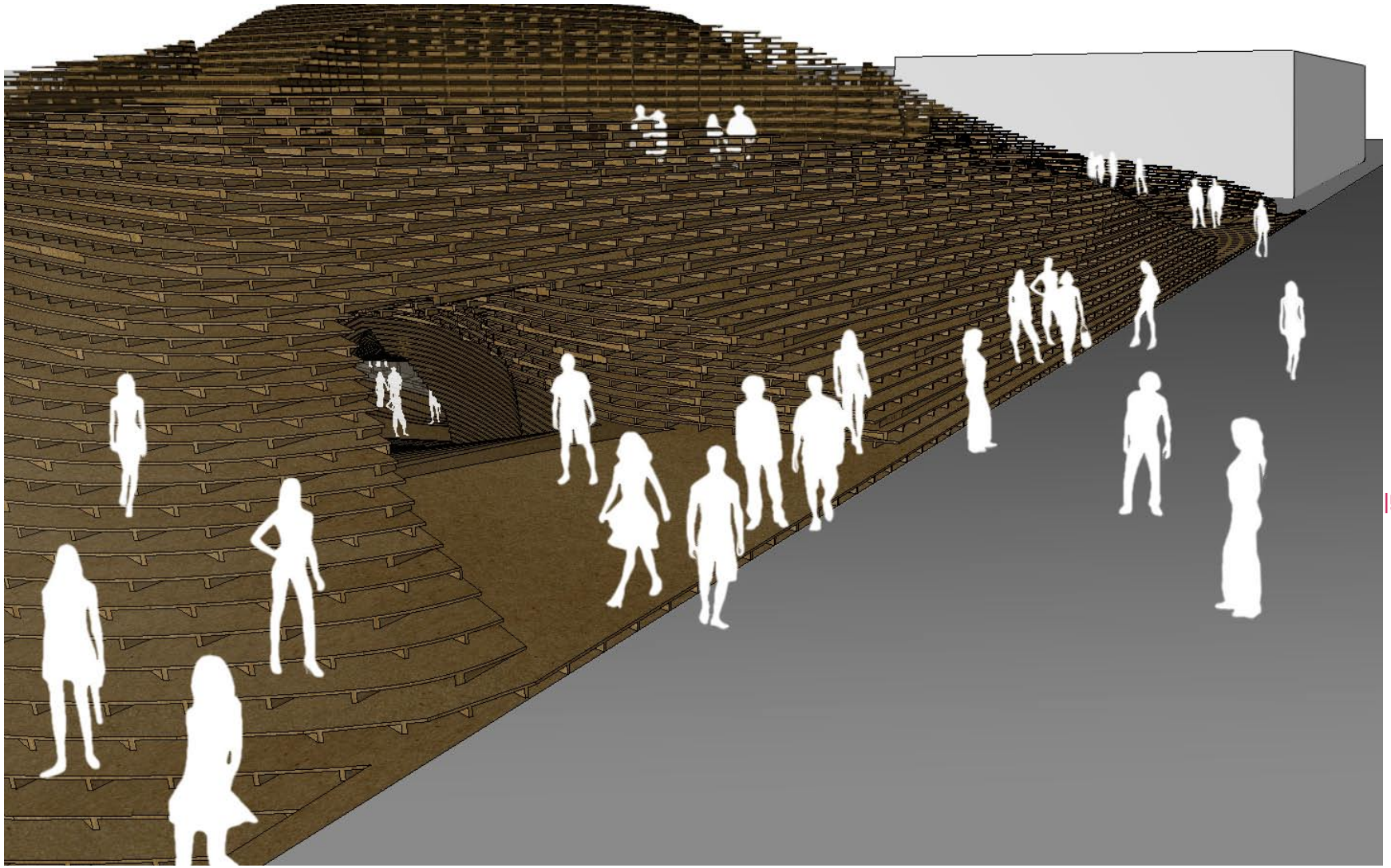




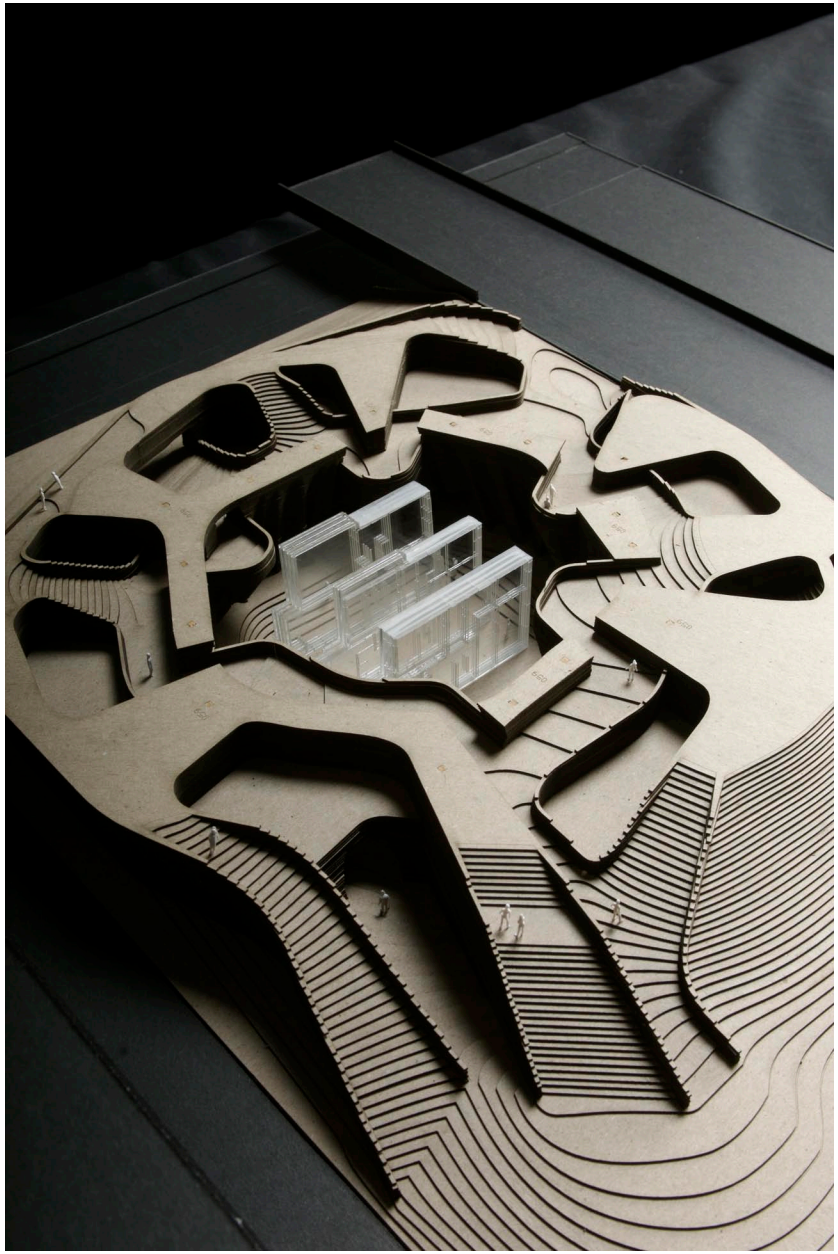
WEST ELEVATION 1:500

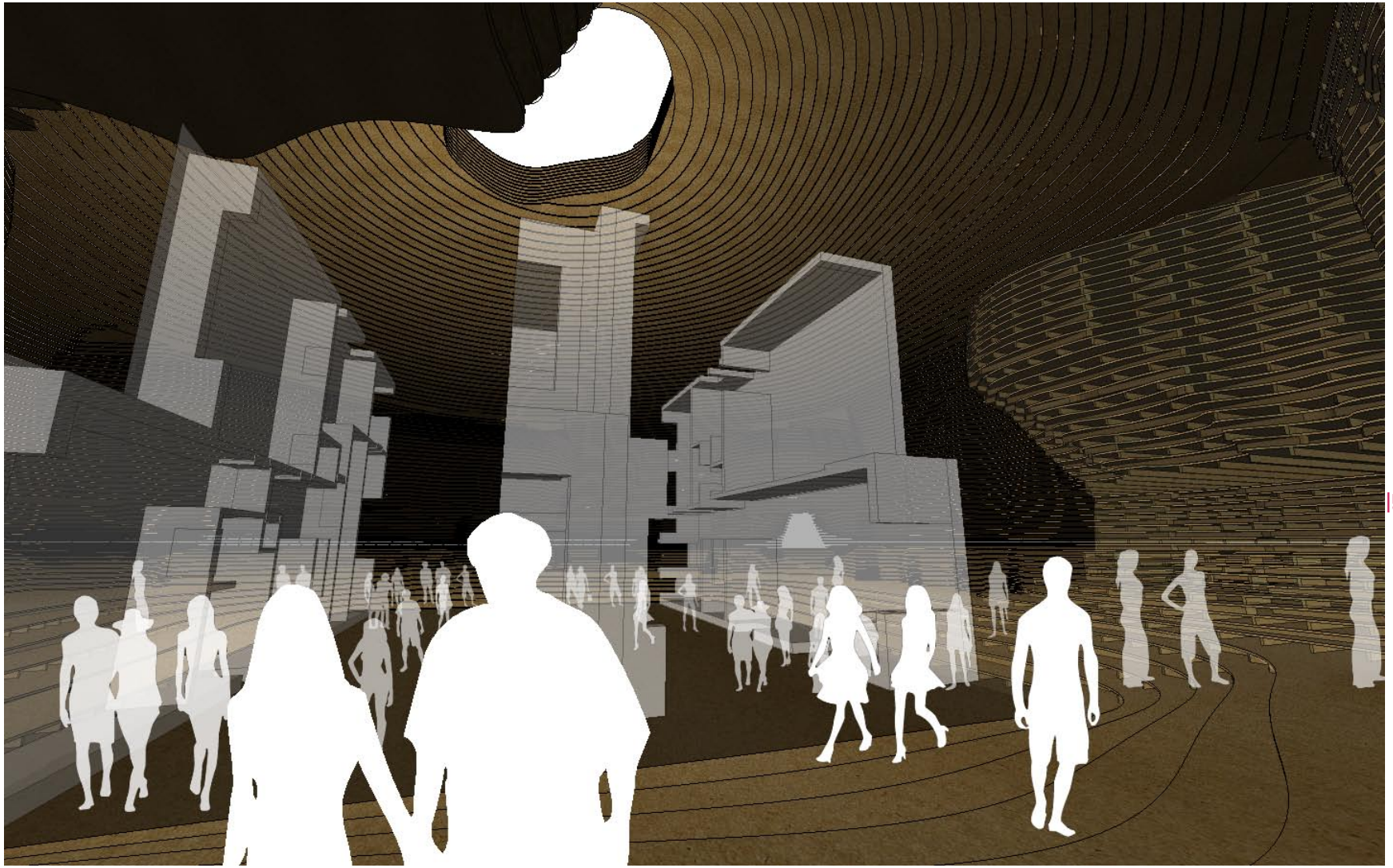


EAST ELEVATION 1:500



VIEW FROM ELEVATED PEDESTRIAN WALKWAY

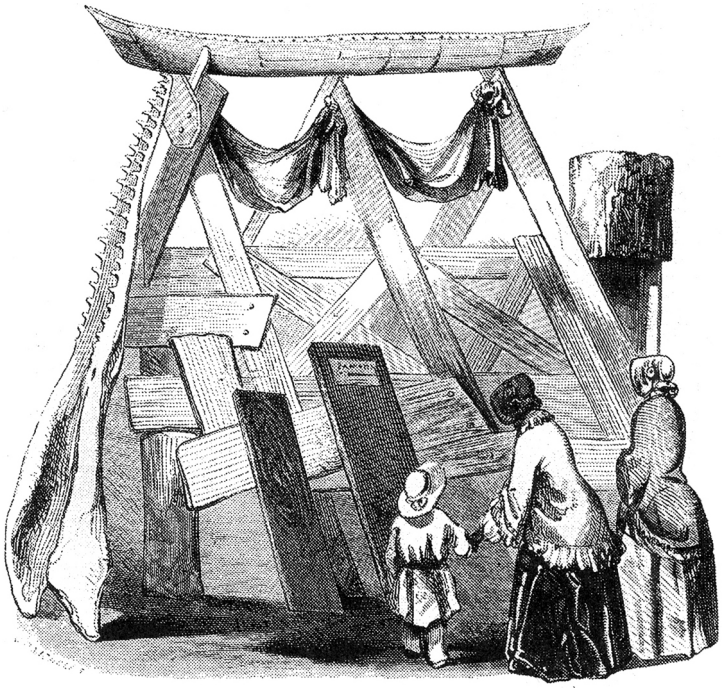




INTERIOR VIEW WITH MODEL HOME VIVISECTION

Pictured opposite is the ¨Canadian Timber Trophy surmounted by a Canoe of Bark¨ at the Crystal Palace in London by Gottfried Semper for the Great Exposition, 1851. Image Wesemael, 2001

O! Canada?



a pavilion for the 2010 World Exposition in Shanghai

Process

Thesis Prep

21 May 2007

O! Canada?

a pavilion for the 2010 World Exposition in Shanghai

My thesis will focus on the design of a pavilion for Canada at the 2010 World Exposition in Shanghai. This thesis will explore how Canada can be represented without recourse to nostalgia and romanticism; how CNC fabrication can be coupled with rethinking the standards of engineered lumber production to defamiliarize and exceed our formal expectations of wood; and, how structural ornament might resolve on the one hand the Modernist call for the "integrity" of a bride stripped bare and on the other, our undeniable visceral response to her in full regalia.

World Expositions

The history of World Fairs runs directly parallel with the rise of globalism and national identity. As Sigfried Giedion has noted, the first World Exposition (London, 1851) was the first confirmation of thoroughly global commerce in addition to being the birthplace of advertising and the new field of publicity.[1] While the Fair focused on industry and its achievements, it "created two apparently contrary trends: one directed toward cosmopolitanism and international cooperation, and on oriented towards nationalism and nation-building."[2]

In the second half of the twentieth century, television and the globalization of media meant that companies could promote a more highly controlled image to larger audiences at a fraction of the cost of participating in International Exhibitions. Fairs responded by shifting their focus from displays of consumer goods and industrial achievements to broad and often ill-defined humanistic themes.[3] At this time countries began erecting their own purpose-built pavilions to better promote their identity abroad and these became the defining elements of the Expositions that followed. "The world expositions changed in nature to such an extent that a visitor to the Crystal Palace would see no correspondence at all with the exhibitions of today."[4]

Pieter van Wesemael outlines five national pavilion types developed: historical reconstructions of national monuments, allegorical trophies typically emphasizing nature, ideological monuments where shear size is often used to convey grandeur, the plaza pavilion that encourages personal contact and exchange, and the avant-garde pavilion where young architects are given freedom to express technological advancement.[5] At the World Exhibition in Osaka (1970), Canada was represented by both a plaza pavilion to promote the country, an agora surrounded by much praised multimedia displays, and a less successful allegorical trophy for the province of British Columbia which constructed its own pavilion and was complete with "rocks, waterfall and stuffed reindeer -- immediately evoked memories of the nineteenth-century Canadian wood trophies."[6]

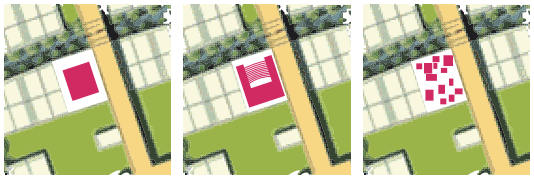
While the Canadian pavilion, an agora surrounded by novel multimedia presentations, garnered much praise, it represents for Wesemael a trend in pavilions for the architecture to become totally subsumed by their multimedia content and leads him to wonder:

> *"How will it be possible to integrate architecture and a multimedia show presenting educational entertainment in such a way that the typical qualities of architecture -- spatial, material and aesthetic beauty, and explanatory, narrative, illustrative and symbolic capabilities -- can be fully exploited, instead of allowing them to sink into the twilight of film projections or the virtuality of computer simulations?"*[7]

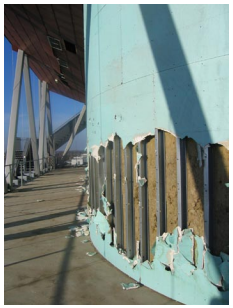
Canada at Shanghai in 2010

Canada, as with past exhibitions, was the first country to submit an application to take part in the World Expo. They have reserved the largest possible plot, 6,000m^2 and are now required to fill 60-80% of the site with the pavilion's footprint, a building that would take up one third of a New York City block. They are constrained by a maximum height of 20 meters and must return the site to it's original condition within six months of the Exposition's closing. Organizers have called for the building to be re-assembled on another site after the Expo.

Three possible site strategies could be one centralized building, the building's mass broken open by an outdoor ampitheatre or the building broken up into multiple pavilions.



At the last Expo in Aichi, Japan, the Canadian pavilion was visited by 18% of the 15 million visitors in attendance, resulting in 15,000 to 20,000 visitors per day. The pavilion was designed to move 210 people through a choreographed multi-media display every 8 minutes. Shanghai promises to be the best attended expo in history, attracting 70 million people, suggest-



ing that 13 million may visit the Canadian pavilion. This will result in 70,000 attendees every day, or 1000 visitors every 8 minutes. Like dog years, the building can be expected to age half a century in half a year.

Case Study Pavilions

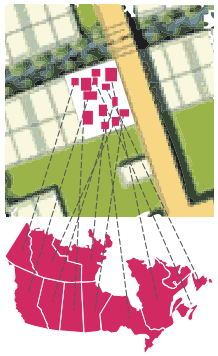
The Dutch Pavilion at the Hannover Expo in 2000 by MVRDV dealt with national identity by taking various nostalgic elements of the Dutch landscape such as flowers and windmills, by stacking them one atop the other to create a strange collage in a presentation that stripped these references of their romanticism and betrayed the artificial condition of the Dutch landscape.

Conceived of literally as an image (the idea grew directly out of a quick collage made in the office), the building was "consumed" during the Fair. Afterwards, the built artifact lost all it's meaning and was abandoned, while the image of the work still very much lives on and is referenced widely. Fully neglected, the building itself quickly deteriorated, becoming a ruin less than 3 years after closing. Today, after an unsuccessful attempt to sell the building on e-bay and having been scavenged by thieves for its windmills and other valuable components, the pavilion remains only as a curiosity and drinking refuge for the local teens who regularly trespass into it.

Other pavilions dealt with similar issues in various ways. The Lithuanian Pavilion, among others, was designed for a longer life by being demounted and reassembled back in it's home country. The Japanese Pavilion by Shigeru Ban and Frei Otto was built almost entirely of paper and was completely recycled after the exposition. Perhaps the most interesting example was the

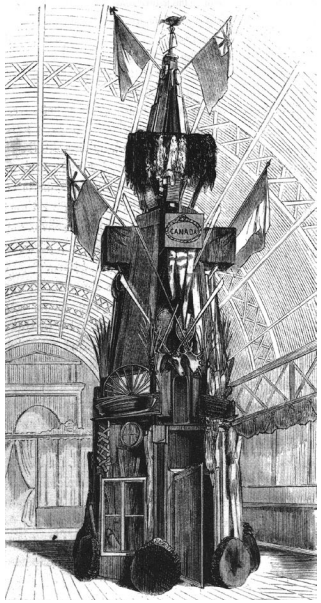
Swiss Pavilion by Peter Zumthor which was assembled from thousands of fir and larch wood members, simply stacked in their commercially available dimensions. The nature of the wood as a commodity was such that its value increased over the time of the exposition and the members, which were never processed, were simply sold for a profit at shows end.

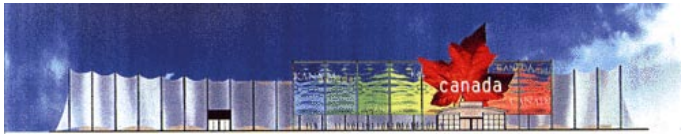
The Dutch pavilion was clearly not built to last longer than the six month exhibition schedule, the materials which deteriorated so rapidly afterward were chosen for the economy of their short life. But with four times the projected visitors to the Shanghai exposition over the same six month period, one could try to find opportunity in this situation of extremely high traffic volume over such a short period of time. Perhaps the materiality could betray it's fast consumption through by actively designing it's wear to be both seen and celebrated. The way that stone steps are worn down over hundreds of years to reveal their use, an expo pavilion could similarly register change in just a few months by carefully selecting materials that would age quickly but in a controlled manner that could lead to an increase in the value as opposed to simple obsolescence.



As with other examples from the Hannover Expo, a pavilion for Shanghai could be designed for an afterlife by being recycled, or demounted and reassembled elsewhere. One possible strategy could be to make construct the Canadian pavilion from a series of smaller buildings that could later be resurrected across multiple sites back in Canada after the Fair. Another could be to construct the pavilion out of elements that could be later recombined to erect a different design.

At the 2005 exposition in Aichi, Japan, two countries used traditional handicraft techniques native to their homeland but in a stunning new deployment that stripped them of the nostalgia associated with the material. Foreign Office Architects (FOA) designed the façade of the Spanish pavilion out of thousands of ceramic tiles,





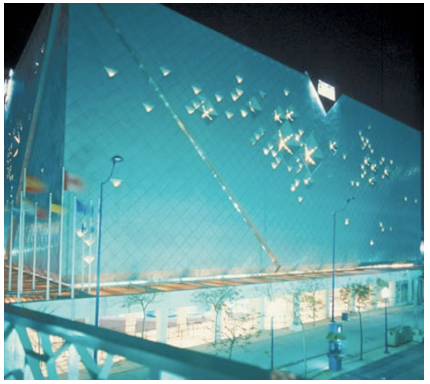
referencing the long tradition of tile work in Spain. However, their choice of a vibrant, non-traditional colour scheme and a playful take on the hexagonal tile kept the façade from lapsing into a romantic rehashing of a traditional craft. Most important to this renewal was their choice to create a very deep tile and puncturing each with a hole to reveal it's new three-dimensionality.

The Polish Pavilion by Ingarden & Ewy Architekci used traditional Polish wicker, employing hundreds of aging craftswomen to fashion their façade by hand. The wicker was, however, not used to create baskets or furniture as is the tradition, but rather to make cladding panels that took advantage of the forgiving nature of their material to create a complex three-dimensionally curved surface. Unfortunately, the much criticized interior lapsed into nostalgia by offering visitors a theatre set in a pastiche of scaled replicas of spaces within the Wieczka Salt mine.

Canada has had a presence at nearly every Exhibition since 1851.[8] The resulting Canadian pavilions may be grouped into three broad categories. First, is the "blank-box" pavilion, essentially an existing warehouse space rented from the host country. The architecture of these is typically reduced to graphics applied to the exterior, usually leaving the maple leaf as all-encompassing symbol to demarcate the site as Canadian and then relying entirely on the content of their displays within for their representation of Canada.

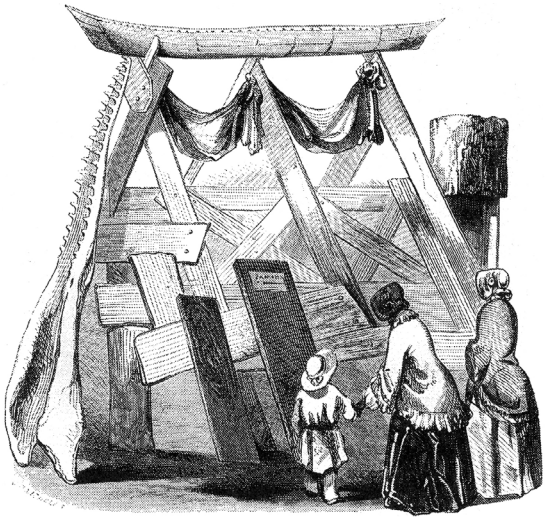
The other approaches have involved site-specific interventions that fall into two types; the first and most common, references Canada through a pastiche of physical elements taken from Canada and meant to evoke something of the whole country through their juxtaposed assembly. The most stark examples are the Canadian trophies at the 1851 and 1855 Expositions, but these set a trend that continued all the way through to the British Columbia pavilion in Osaka, 1970 which attempted to recreate an "authentic" Canadian landscape complete with trees and stuffed animals.

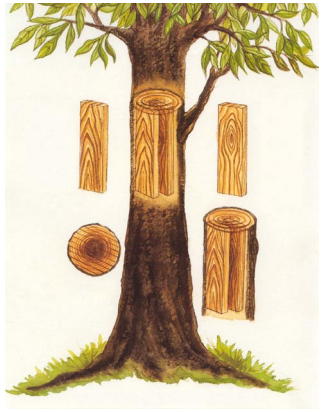
The other type attempts to represent Canada through a more abstract architecture and often includes



some attempt to relate to the local context of the host country. At the 1970 Expo in Osaka, Arthur Erickson designed the Canadian pavilion as an abstract representation of the Canadian landscape without reference to traditions in Canadian construction. The result was a pyramid split open into four masses with a hollowed out interior to form an agora. The leaning forms of the exterior were meant to evoke the scale of mountains while their mirror-glass finish reflected the sky to play out the architect's curious thesis that, "from a country [Canada] where the sky is often the most telling feature of the landscape, this brings to a country [Japan] which almost ignores the sky in its aesthetic preoccupation with the earth, some sense of the breadth and openness of the Canadian landscape."[9] The multi-media rich interior was supplemented with a colourful kinetic stained-glass like roof that revolved to create an ever-changing kaleidoscopic effect.

In Seville, for the Expo there in 1992, architect Bing Thom sought to "make a small building express the vastness and diversity of Canada in a bold way that also would speak in a familiar tone to Spain." His choice to relate to the local context by creating not "a Canadian building, but a Spanish one with Canadian characteristics"[10] may have been inspired by the decision to donate the pavilion to the Spanish Government after the Expo for use as a technical training school. And so, rather than providing a pastiche of Canadian references, Thom employed Spanish tropes of courtyard, colonnades and tiles, giving them a Canadian reference in their materiality; Canadian water in the courtyard, Canadian lumber for the colonnades and Canadian titanium zinc for the tiles.





Canada = Wood?

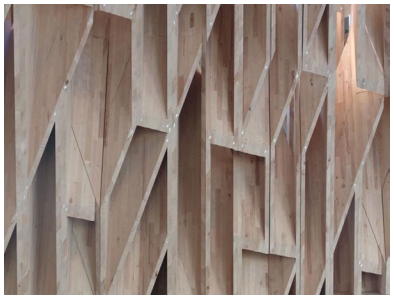
Wood has been virtually exhausted as a material to represent Canada at World Expositions; the cliché has proven irresistible, even when reduced from symbol to surface treatment. However, in the history of Canadian pavilions wood has yet to be used for its material properties in a manner integral to the structure of the pavilion itself, with the curious exception of Gottfried Semper's Canadian "trophy" at the Crystal Palace. I also intend to use wood, but with none of the attendant romanticism or nostalgia.

Canada has the potential to become a world leader in CNC wood construction, because it has a large and highly developed lumber industry that enjoys much government subsidy and further, the government sponsors a great deal of research in the building technology of wood construction systems. I aim to use the pavilion as a vehicle for the creation and display of a formally inventive and playful architecture as a display of technological and industrial potential.

In "Formative Education, Engineering Form, Ornament" Ernst Bloch argues that the appearance of nouveau riche and mechanical reproduction in the middle of the nineteenth century spelled the end of craftsmanship.[11] However, it is precisely now that technology may reintroduce it. For Adolf Behne, "technology is nothing but perfected craft" and what has changed from earlier conceptions of craft is a division of labour. The designer and creator are no longer one in the same person as with nostalgic models of craftsmanship, but the result is craft nonetheless.[12]

I aim to focus specifically on adapting engineered lumber to construction systems that exceed our formal expectations of the material. Parallam, microlam and LVLs are ideal materials for this thesis because it has been stripped by technology of it's nostalgic reference back to timber rough cut from the tree's trunk to create a product that is structurally and environmentally superior to its romanticized forbearer.

Although able to be extruded in virtually any section, engineered wood is presently produced in forms that mimic dimensional lumber. Only a few products, such as the



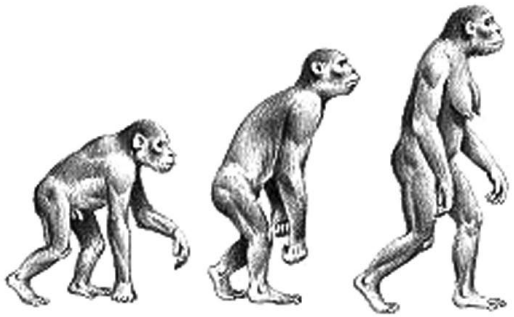
strip shelf or presswood shipping pallet, have been developed that harness the plastic potential of engineered wood to take full advantage of the qualities inherent to the material. Questioning some of the basic production logics of engineered lumber could lead to the development of new sections, perhaps enabling the combination of structure and surface into a single element.

Structure and Ornament

The dualism of structure and ornament affects the way we conceive, construct and criticize architecture.[13] Anne-Marie Sankovitch underlines the importance of recognizing that this binary is not some "eternal truth", as it has been largely accepted to be in architectural discourse, but rather a "manufactured conceptual structure"[14] that would have been unthinkable prior to the nineteenth century.[15] She traces the first building to be conceived of explicitly in terms of this dualism to Henri Labrouste's Bibliotheque Ste- Geneviève (1838-50).[16] The relative newness of the concept has not prevented many historians then and now from applying it in their analysis of many much earlier buildings that could not possibly have conceived of with a conscious separation of structure and ornament.[17]

> *"The emergence of structure as an independent and essential entity in the nineteenth century meant that it was able to assume a representational role that previously had been almost exclusively the domain of ornament. As a result, the potential superfluity of ornament and its slide into the merely, superficially, or decadently decorative was virtually inevitable"*[18]

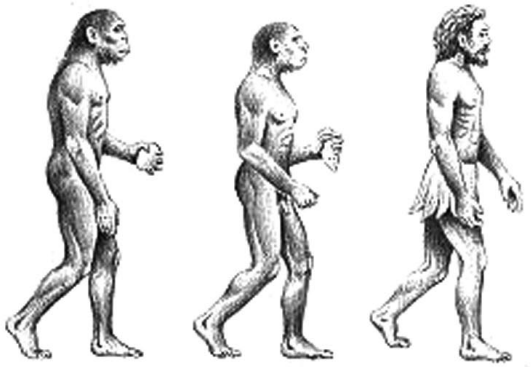
With ornament thus reduced to that which could be detached, the stage was set for the Modern-

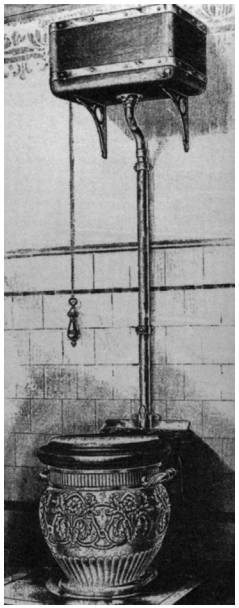


ists to cement the structure/ornament binary[19] by calling for ornament's extermination. All architects to follow in the twentieth century, regardless of their position for or against ornament, continued to perpetuate the duality of structure and ornament as separate entities.[20] It is striking to note that earlier theorists subscribed to a more expanded notion of ornament. Unlike the Modernists who saw ornament as "the added presence of some material thing," Alberti could conceive of it as the "absence of a quality." He went further, describing ornament as anything, even empty space, which reveals the "inherent beauty of architecture." Sankovitch extracts from Alberti's writing his intention that "everything is ornament and everything is structure."[21] This more fluid conception of structure and ornament serves as a 500 year old call to reconsider the more recently constructed structure/ornament dualism, or, as Jan Zwicky puts it, to be "most radical of all, to pursue a non-binary way of thinking."[22]

Modernism, from Adolf Loos[23] to Le Corbusier[24] and through the Bauhaus[25] on down, rejected ornament largely on moral grounds. Loos went so far as to argue that rejecting ornament was the culmination of a grand cultural evolution that begins with amoral primitive man and his tattooed face and ends with enlightened Modern man who has shed all ornament.[26] However, a close reading of Loos suggests that he was not so categorically anti-ornament (he agreed with it had a place in art, for example) as he was "opposed to the moral pretension involved in disguising chamber pots as Greek vases."[27] That is to say, he specifically objected to the manner in which ornament was being used by designers of his day. This calls up the possibility that it was more a question of motive than a blanket rejection of ornament in any form. Since his argument is pinned to an evolutionary model, and evolutions by their nature are never complete, then it is open to the generations that followed Loos to identify the subsequent developments in his evolution.

Ernst Bloch relates Modernism's desire for clarity with the technological feats of the age; that technology could do more with greater efficiency with the mantra: bigger, better, faster.[28] But this age of technological advance at the industrial scale has come to pass,





today the new frontiers are biotechnological and occur at the nano-scale. Taut, muscular skyscrapers stabbing the sky, arrival halls of infinite span stretching to the horizon, antiseptic, free of clutter and full of space have become so commonplace as to pass unnoticed in our everyday lives. Technology has come of age and is ready to be judged for the qualitative aspects it enables rather than quantitative achievements.

In 1908, Loos declared, "The lack of ornament is a sign of intellectual power."[29] Adolf Behne, writing 14 years later, attributed heightened intellectualization to technology.[30] Both, writing at about the same time, imagine the outcome to be spaces stripped bare, unadorned temples to the new industrial age. Railing against their bourgeois era of excess and all it's attendant schizophrenic rococo, their response was both timely and necessary[31] (and as Sankovitch argues, inevitable). But, as Bloch points out, Modernist clarity has come to be "merely an ideology of monotonous vacuity" which has resulted in "geometrical monotony, alienated from purpose, together with an undernourishment of the imagination and extreme self-alienation, all represented by this coldness, this vacuous non-aura."[32] The very technology that freed us from ornament and heightened our intellect is now used to precisely anti-intellectual ends. The Modernist war waged at the beginning of the century has wrought the dubious victory of value-engineered junkspace.[33]

Technology is (again) providing the answer. In the burgeoning age of computer-numerically-controlled processes and mass-customization we can use technology to re-invest our space with intellect once more. This necessitates not ornament as camouflage for industrial processes, as Le Corbusier argued against,[34] but rather ornament as expression of industrial processes. What will emerge is an integral Albertian ornament as the next, paradoxical step in Loos' evolution.

Endnotes

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8 Heritage Canada "Canada at International Expositions" (2006) http://www.pch.gc.ca/progs/expo/pre_e.cfm

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18 Sankovitch (1998), p710.

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27 Zwicky (2002), p214.

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30 Behne (1990), p325.

31 Bloch, (1997), p45.

32 Bloch, (1997), p45.

33 Koolhaas, Rem. "Junkspace" in Harvard School of Design Guide to Shopping. Edited by Judy Chung, Jeffrey Inaba et al. Cologne: Taschen, 2002.

34 Le Corbusier (1987), p49.

Illustrations

First Page — At the 2005 World Exposition in Aichi, Japan Canada constructed a black box and filled it with a multimedia display.

Blogs make it clear that the dominant expo experience is waiting in line. Canada has declared that in 2010 they will provide "comfortable spaces and rich activities for visitors to enjoy while waiting to enter the pavilion"

Second Page — Site plan for 2010 World Exposition in Shanghai with detail of Canada's lot.

Three potential strategies for the pavilion design; large centralised building, building mass penetrated by an outdoor ampitheatre, building as a series of smaller pavilions.

Third Page — Dutch Pavilion by MVRDV at 2000 World Exposition in Hannover. The pavilion presents a anti-nostalgic pastiche of the dutch landscape. Shown in it's original condition and while trespassing during a visit five years after it's closing.

Japanese Pavilion by Shigeru Ban and Frei Otto at Hannover 2000. The paper building elements were recycled after the Expo.

Fourth Page — The Swiss Pavilion at Hannover by Peter Zumthor was made of unprocessed wood that was resold at exhibition end.

Spanish Pavilion at 2005 World Exposition in Aichi, Japan by Foreign Office Architects (FOA). The facade was made of thick tiles as a play on traditional Spanish finishing.

Polish Pavilion at Aichi by Ingarden & Ewy Architekci. Traditional crafts-women wove the wicker panels that make up the facade whose form does not imply romanticism of its making.

Fifth Page — The Canadian Trophy at the 1855 World Exposition in Paris was made of every type of wood and finish commercially available in Canada.

The Canadian Pavilion at Aichi 2005, Hannover 2000 and Brisbane 1988 relied on the maple leaf as a graphic treatment on the facade to signify Canada.

Sixth Page — The Canadian Pavilion at 1970 World Exposition in Osaka by Arthur Erickson was meant to evoke mountains with the grandeur of its form and reflect the sky with its mirrored facade. Detail of kaleidoscopic skylights.

The Canadian Pavilion at 1992 World Exposition in Seville by Bing Thom was intended to reference the building culture of Spain made with Canadian materials.

Seventh Page — The "Canadian Timber Trophy surmounted by a Canoe of Bark" by Gottfried Semper at the Crystal Palace, 1851.

Historic photograph of a lumber yard

The romantic recollection of the tree's trunk embedded in dimensional lumber.

Standard engineered lumber products

The Strip Shelf by Casey Mack is extruded from engineered lumber using a custom die.

Presswood pallets take advantage of the plastic properties of engineered lumber before it is set to create a nestable product that is stronger than it's conventional counterpart made of dimensional lumber.

Eighth Page — "Algorithmic Space" Beach House by studio001

For the Lincoln Center, Diller Scofidio + Renfro have developed a backlit laminated veneer product that can formed into three dimensional curvature.

CAAD Swissbau Pavilion by designtoproduction.

Sculpture by Studio Daniel Libeskind, CNC fabrication consulting by design-toproduction.

Ninth Page — Bibliotheque Ste- Geneviève by Henri Labrouste, 1838-50.

Statue of Leon Battista Alberti in the courtyard of the Uffizi Gallery, Florence.

Ascent of man according to Adolf Loos.

Tenth Page — Chamber pot as greek vase.

Junkspace in Toronto's underground "Path" system.

Canada
France
Germany
Italy
Japan
Russia
United Kingdom
United States

G8

Canada≠G8

The Group of Eight (G8) is an international forum for the governments of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States. Together, these countries represent about 65% of the world economy.

Canada's population, economy and power make it the least likely member of the G8 and was invited to participate only at the behest of US President Gerald Ford. This grouping however forms the basis by which Canada judges its place in the world — even if they are the only ones who see it this way. The following statistics represent a more realistic view of Canada's place in the world — a quantitative look at the countries with which it shares characteristics.

Canada
China
United States
Brasil
Australia

AREA

Countries between 7,500,000 and 10,000,000 km2 in area (Canada is nearly 10,000,000 km2)
http://en.wikipedia.org/wiki/List_of_countries_and_outlying_territories_by_total_area

Guyana
Libya
Canada
Botswana
Mauritania
Iceland
Australia
Mongolia
Western Sahara

DENSITY

DENSITY
Countries with fewer than 5 inhabitants per square kilometer
http://en.wikipedia.org/wiki/List_of_countries_by_population_density

GDP
Countries with a GDP per capita of between 35,500 and $42,500 (Canada is $39,000)
http://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29_per_capita

Sweeden
Netherlands
Finland
United Kingdom
Austria
Canada
Belgium
Australia

GDP

FOREIGN AID
Countries that spend greater than 0.24 and less than 0.36% of their GDP on foreign aid (Canada donates 0.3%)
http://www.globalissues.org/TradeRelated/Debt/USAid.asp#ForeignAidNumbersinChartsandGraphs

Germany
Spain
Australia
Canada
New Zealand
Japan
Portugal

FOREIGN AID

IMMIGRATION
Countries where more than 15 and less than 23% of their population are immigrants (Canada is 19%)
http://en.wikipedia.org/wiki/List_of_countries_by_immigrant_population

Australia
Latvia
Canada
Gabon
Lebanon
Kazakhstan
New Zealand
Gambia
Estonia
Belize

IMMIGRATION

MILITARY
Countries with more than 60,000 and less than 68,000 active troops (Canada has 64,000)
http://en.wikipedia.org/wiki/List_of_countries_by_size_of_armed_forces

Kazakhstan
Yemen
Canada
Rwanda
Armenia
South Africa
Singapore
Uganda

MILITARY

GOVERNMENT
Countries with a parliamentary system and a ceremonial constitutional monarchy (Countries with a population under 500,000 omitted)
http://en.wikipedia.org/wiki/List_of_countries_by_system_of_government

Australia
Belgium
Cambodia
Canada
Denmark
Jamaica
Japan
Lesotho
Luxembourg
Malaysia
Nepal
Netherlands
New Zealand
Spain
Sweden
United Kingdom

GOVERNMENT

POPULATION
Countries with between 26,000,000 and 40,000,000 inhabitants (Canada has 33,000,000)
http://en.wikipedia.org/wiki/List_of_countries_by_population

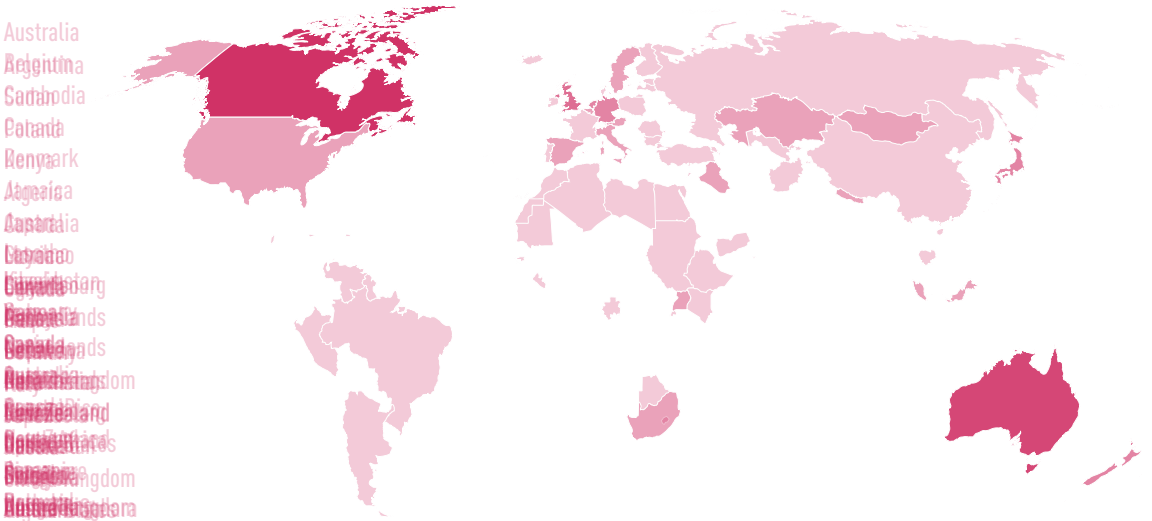
Argentina
Sudan
Poland
Kenya
Algeria
Canada
Morocco
Uganda
Iraq
Nepal
Peru
Venezuela
Uzbekistan
Malaysia
Afghanistan

POPULATION

Liberia
Italy
Canada
Qatar
Puerto Rico
Germany
Romania
Bulgaria

FOUNDING

FOUNDING
Countries founded between 1847 and 1887
(Canada was 1867)
http://en.wikipedia.org/wiki/List_of_countries_by_
date_of_statehood

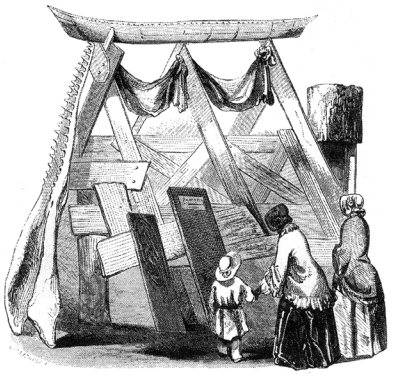


OVERLAY OF ALL STATISTICS
Countries which have the most in common with Canada
appear darkest

In the authoritative Architecture of Instruction and Delight: A socio-historical analysis of World Exhibitions as a didactic phenomenon (1798-1851-1970) Pieter van Wesemael outlines five national pavilion types

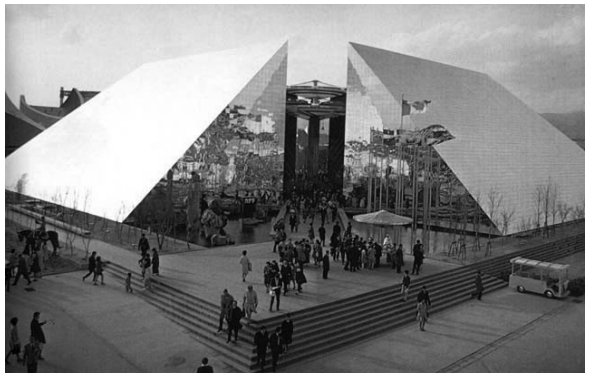
National Pavilion Types

Historical reconstructions of national monuments (Egyptian Pavilion, Aichi 2005)



Allegorical trophies typically emphasizing nature (Canadian Pavilion, London 1851)

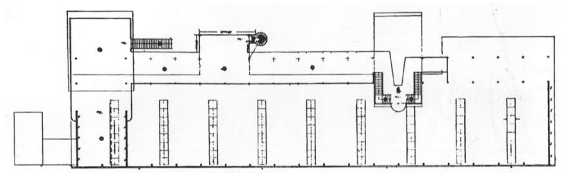
Ideological monuments where shear size is often used to convey grandeur (Japanese Pavilion, Aichi 2005)

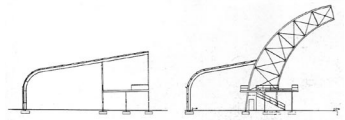


The plaza pavilion that encourages personal contact and exchange (Canadian Pavilion, Osaka 1970)

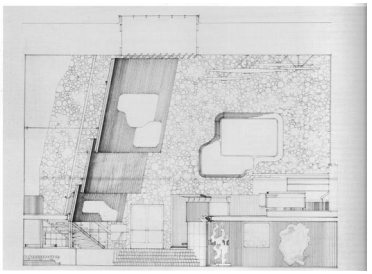
Avant-garde pavilion where young architects are given freedom to express technological advancement (Dutch Pavilion, Hannover 2000)

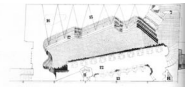
Ideological Pavilion Precedents



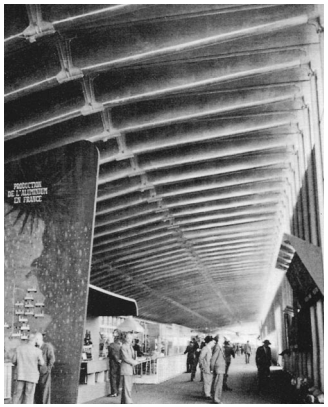


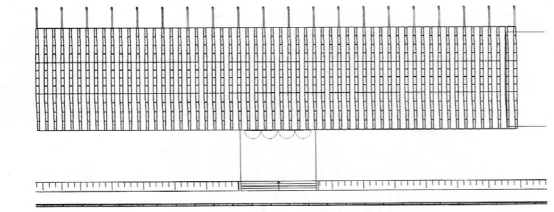
1930
Erik Gunnar Asplund
Transport Pavilion, Stockholm Exhibition, Sweden



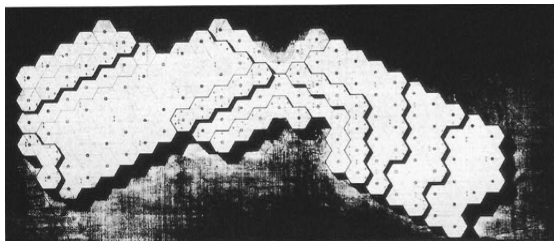


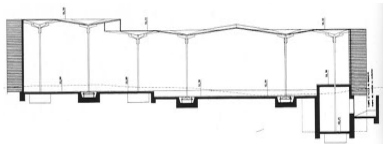
1939
Alvar Aalto
Finnish Pavilion, World's Fair, New York

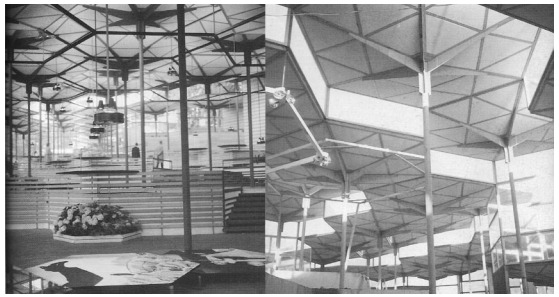




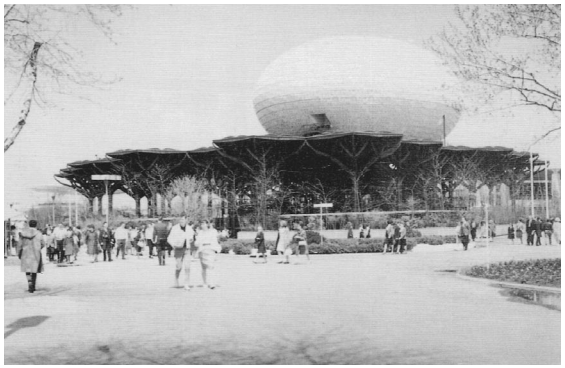
1954
Jean Prouve
One Hundred Years of Aluminum Pavilion, Paris



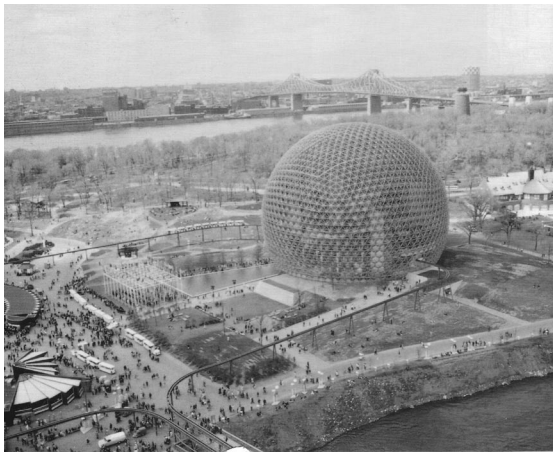




1958
Corrales & Molezun
Spanish Pavilion, World Exposition, Brussels



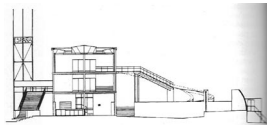
1964
Charles & Ray Eames
IBM Pavilion, World's Fair, New York

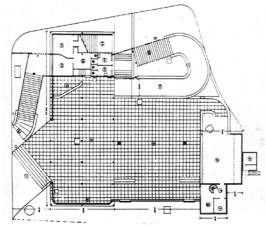


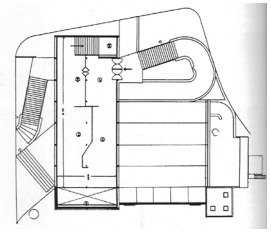
1967
Buckminster Fuller
United States Pavilion, World's Fair, Montreal

Images: Puente, 2000

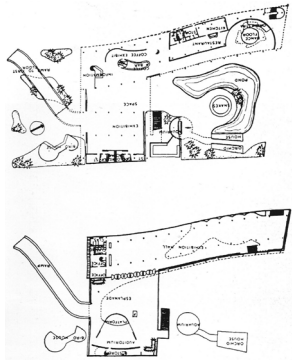
Plaza Pavilion Precedents



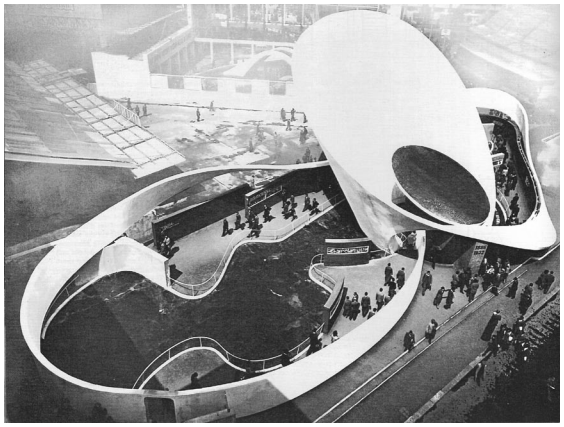


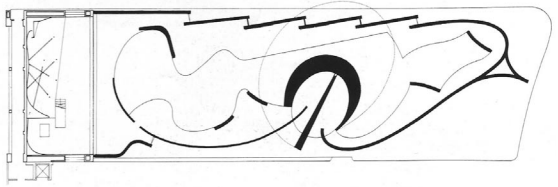


1937
Josep Sert
Spanish Pavilion, International Exhibition, Paris

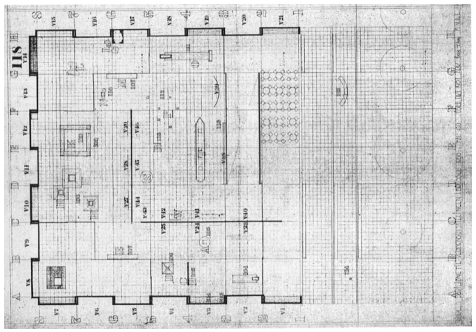


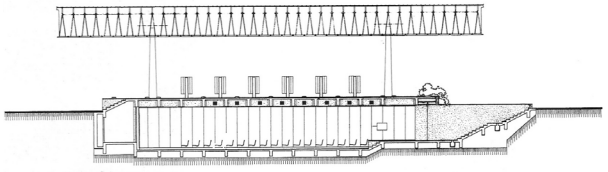
1939
Oscar Niemeyer
Brazilian Pavilion World's Fair, New York

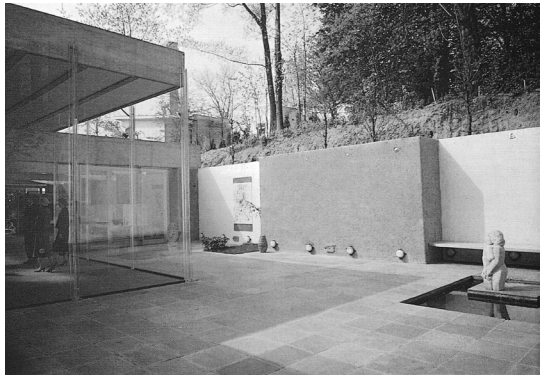


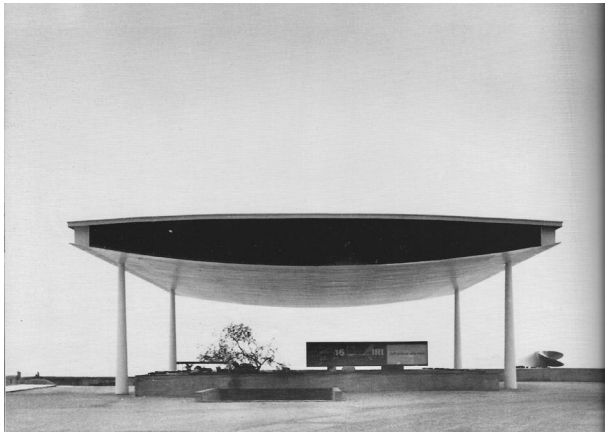


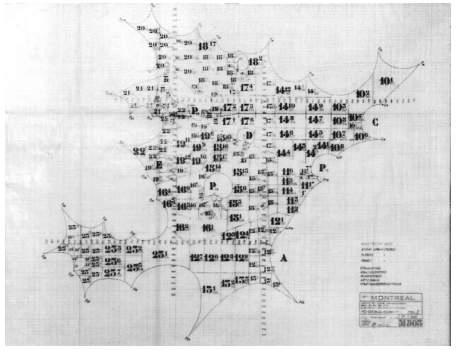
1952
Luciano Baldessari
Breda Pavilion, XXX Milan International Fair, Milan











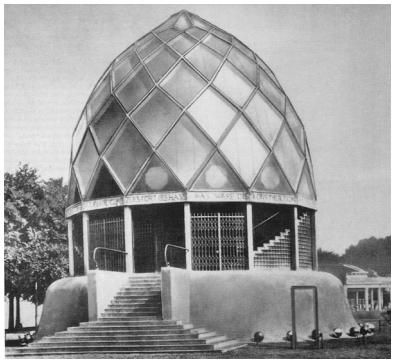
1958
Sverre Fehn
Norwegian Pavilion, World Exposition, Brussels

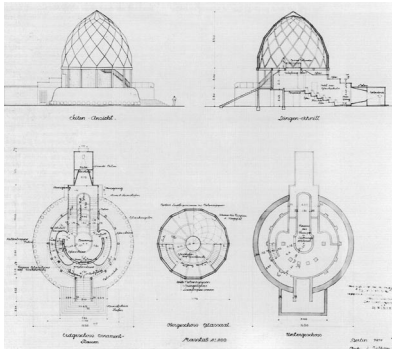
1963
Angelo Mangiarotti
IRI Pavilion, Maritime Fair, Genoa

1967
Frei Otto
West German Pavilion, World's Fair, Montreal

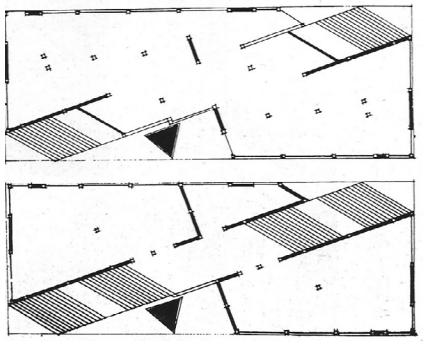
Images: Puente, 2000

Avant-garde Pavilion Precedents

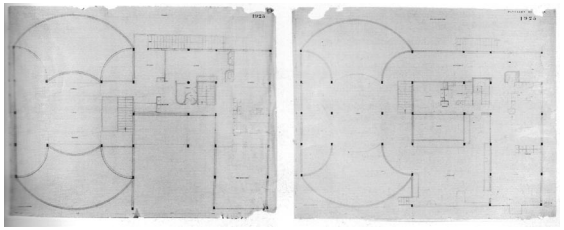


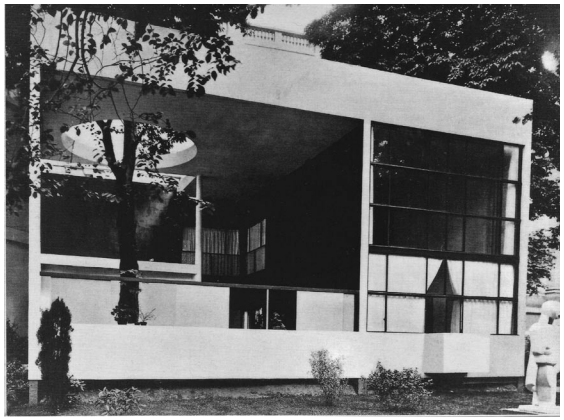


1914
Bruno Taut
Glashaus, Deutsche Werkbund Exhibition, Cologne

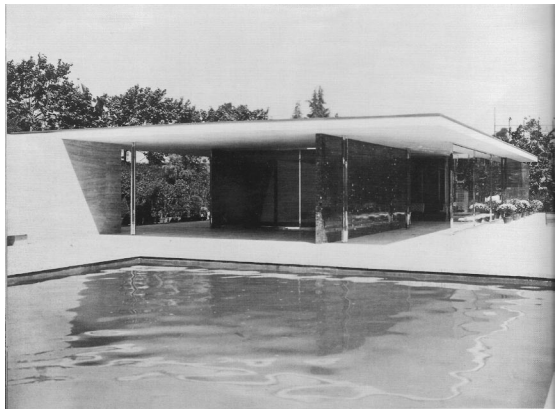


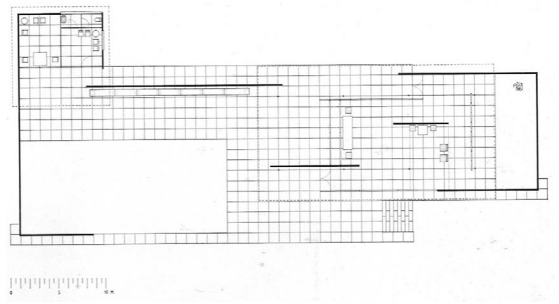
1925
Konstantin Melnikov
Soviet Pavilion, Exposition des Arts Decoratifs, Paris



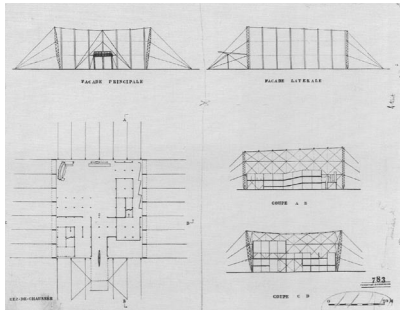


1925
Le Corbusier
L'Esprit Nouveau, Exposition des Arts Decoratifs, Paris

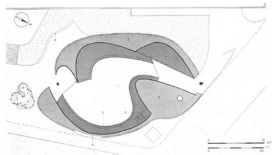


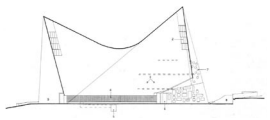


1929
Mies van der Rohe
German Pavilion, International Exhibition, Barcelona



1937
Le Corbusier
Les Temps Modernes, International Exposition, Paris





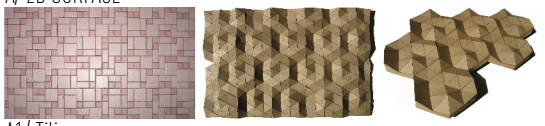
1958
Le Corbusier
Philips Pavilion, World Exhibition, Brussels

Images: Puente, 2000

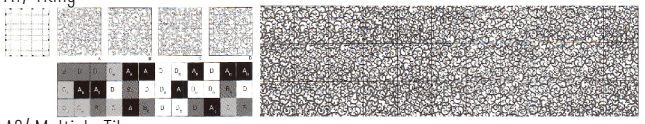
MANERISM

Modular Apparently Non-Repeating Systems

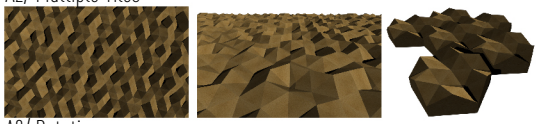
A/ 2D SURFACE



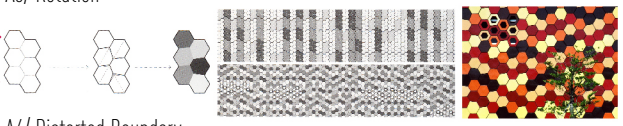
A1/ Tiling



A2/ Multiple Tiles

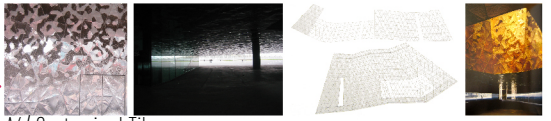


A3/ Rotation



A4/ Distorted Boundary

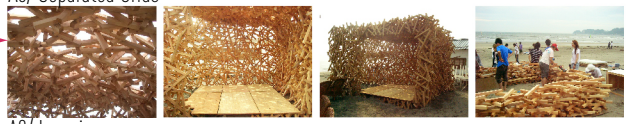
A5/ 2D Random



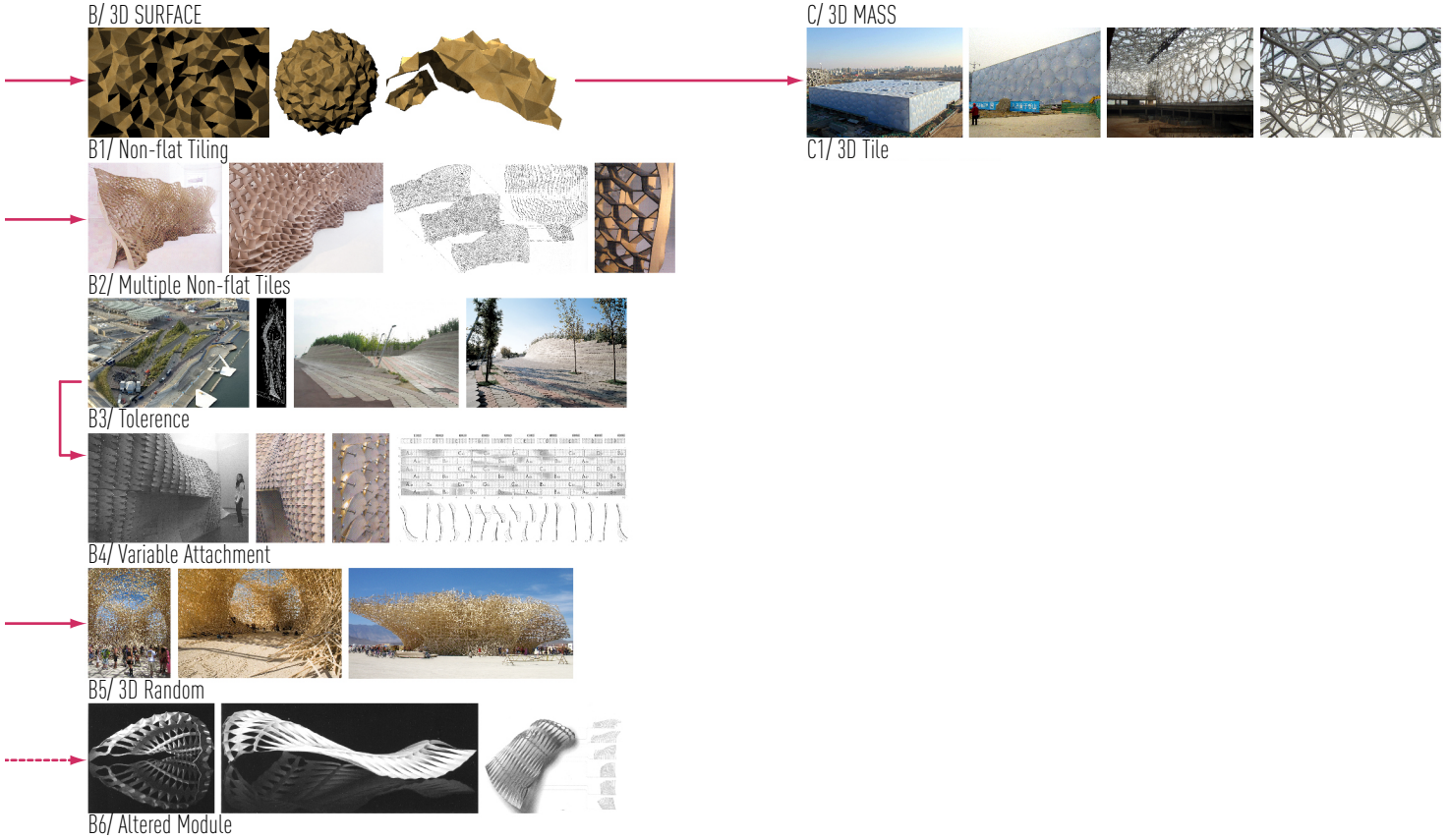
A6/ Customized Tile

A7/ Overlain Grids

A8/ Separated Grids

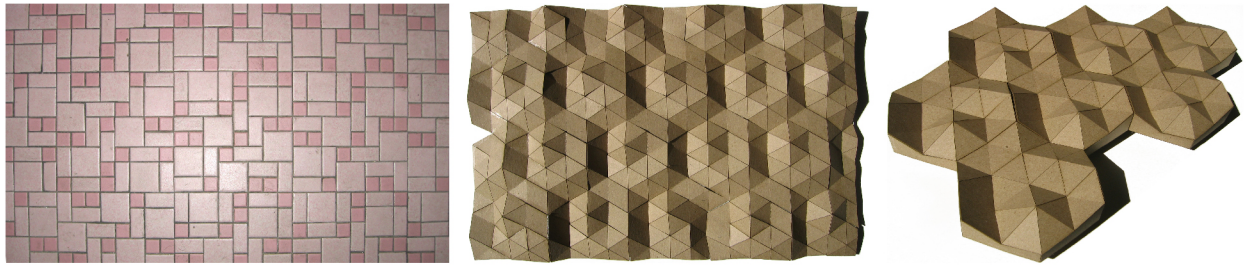


A9/ Layering

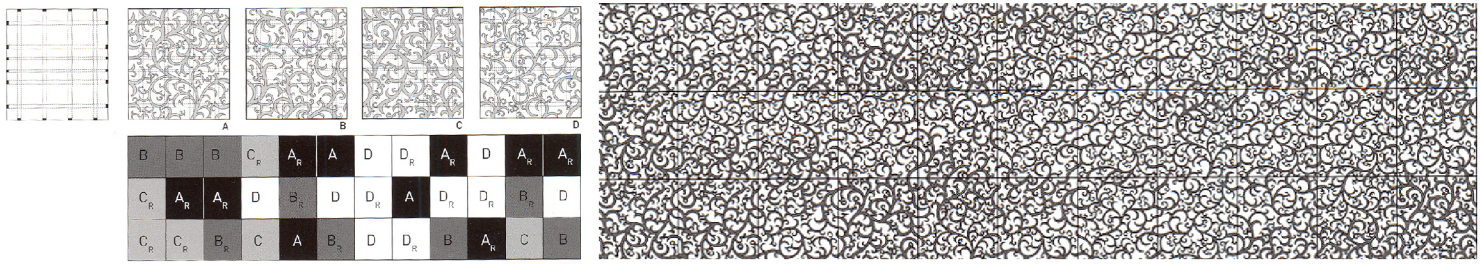


Initial Investigation

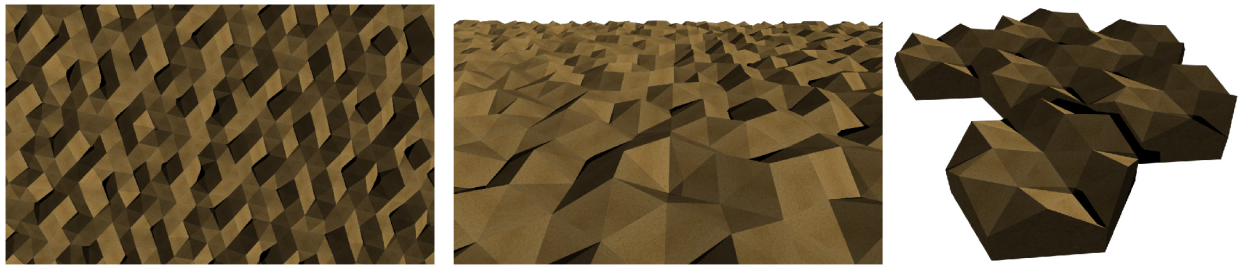
September 2007



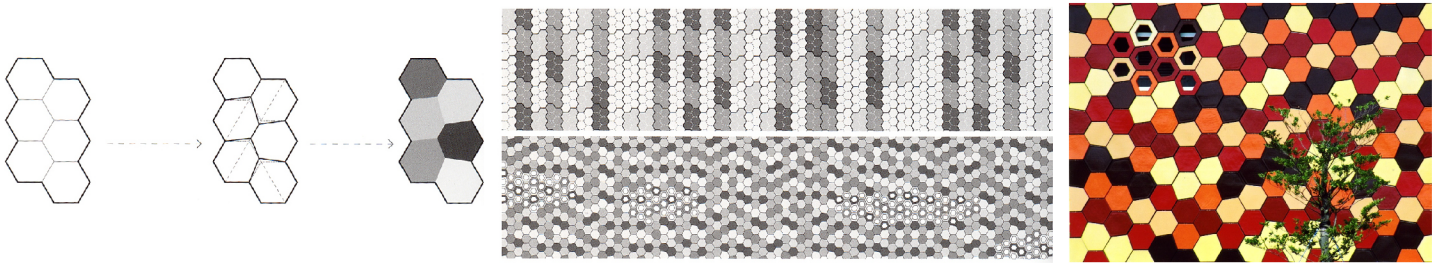
A1/ TILING_ Patern generated using colour, shapes and/or articulated surface (Annonymous Bathroom Tiles)



A2/ MULTIPLE TILES_ Tiles share common edgepoints to generate different combindations of patterns larger than one unit (FOA, John Lewis Dept Store)

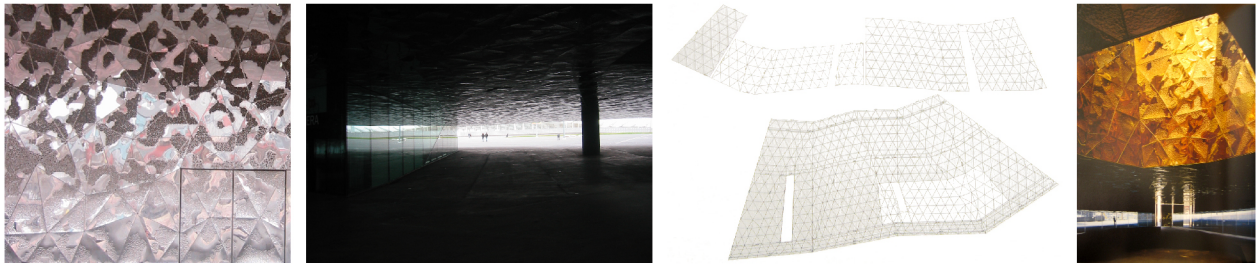


A3/ ROTATION_ Each side of a module is rotationally symmetrical allowing it to be rotated randomly as it tiles

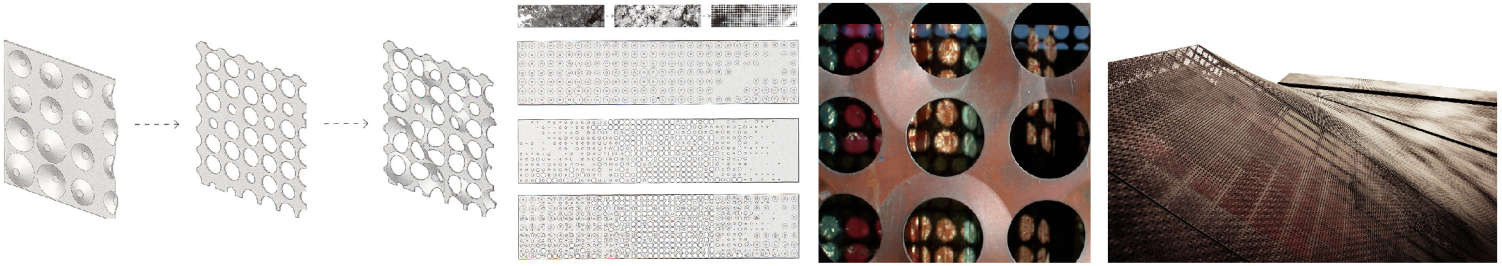


A4/ DISTORTED BOUNDARY_ Boundary disguised to mask repetition (FOA, Spanish Pavilion)

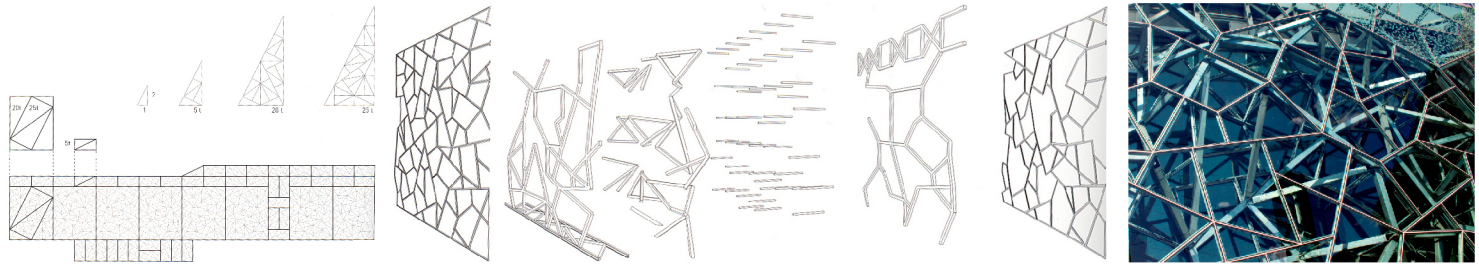
A5/ 2D RANDOM_ Module repeated randomly to generate a surface (Hackenbroich Architekten,Traffic of Clouds)



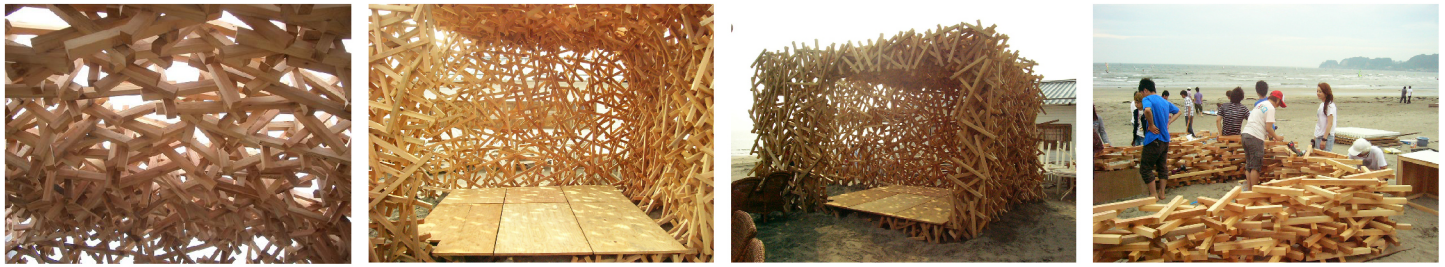
A6/ CUSTOMIZED TILE_ Suface of each module with custom surface treatment (Herzog & de Meuron, Barcelona Forum)



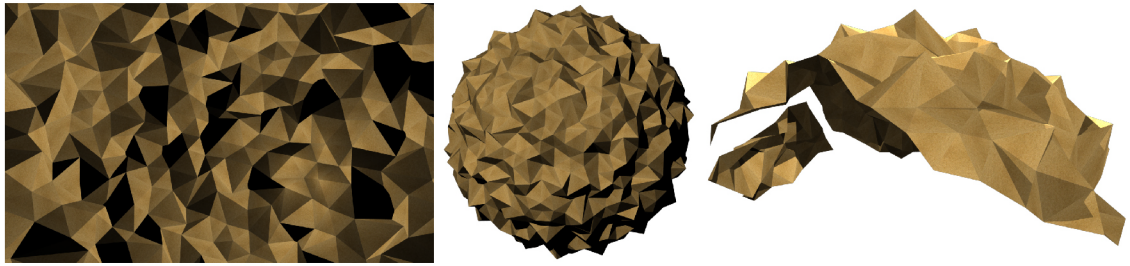
A7/ OVERLAIN GRIDS_ Two independent grids are superimposed on one another (Herzog & de Meuron, de Young Museum)



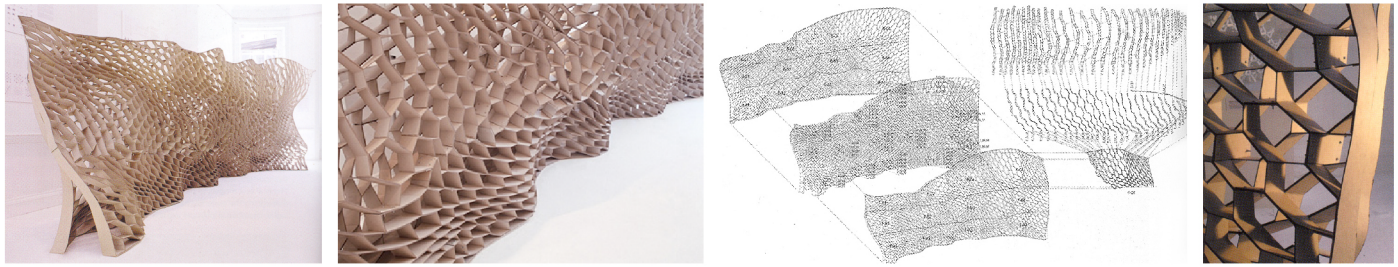
A8/ SEPARATED GRIDS_ Two independent grids held apart from one another (Lab Architecture Studio, Federation Square)



A9/ LAYERING_ One unit repeated on several offset layers (000studio, Algorithmic Space)

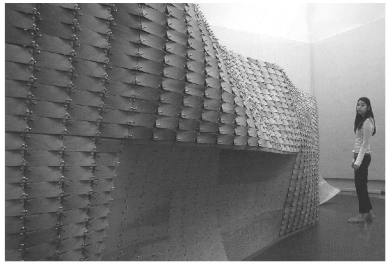
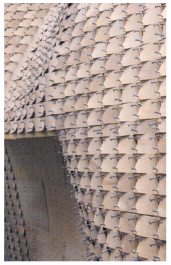
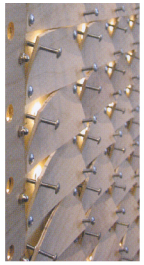
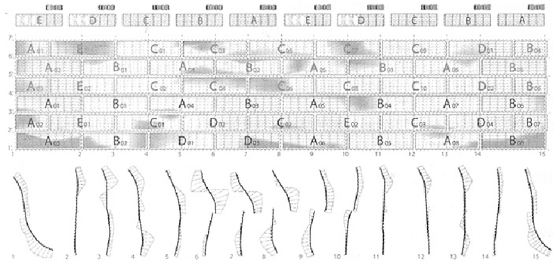


B1/ NON-FLAT TILING_ Module which encloses space as it tiles uniformly

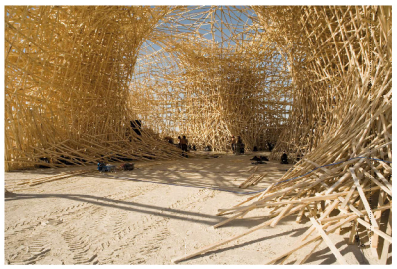


B2/ MULTIPLE NON-FLAT TILES_ A variety of tiles combined to create non-uniform geometry (Andrew Kudless, Honeycomb Morphologies)

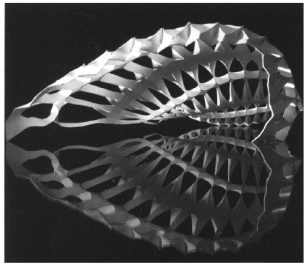
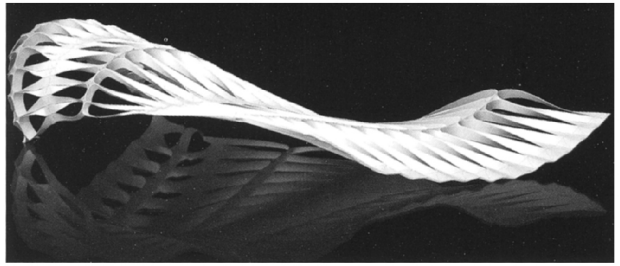
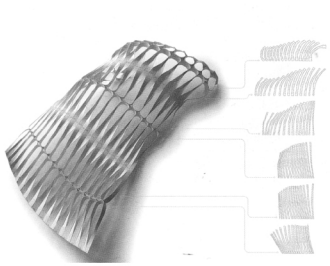
B4/ TOLERENCE_ Single module repeats non-uniformly with deformations taken up by tolerence between tiles (FOA, Coastal Park)

B3/ VARIABLE ATTACHMENT_ Module repeats with variation in attachment (Joseph Kellner & David Newton, Metapatch)

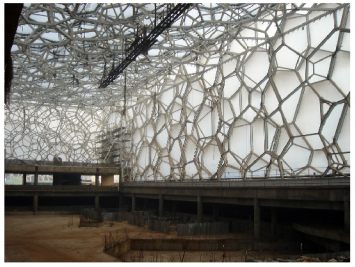
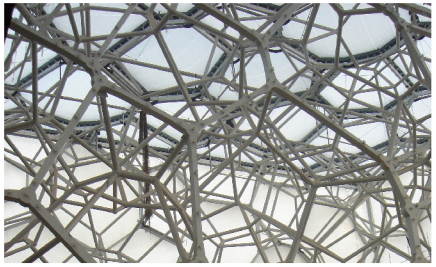




B5/ 3D RANDOM_ Module repeated randomly to enclose space (Jan Kriekels & Arne Quinze, Uchronia)

B6/ ALTERED MODULE_ Module altered with each iteration (Achim Mendes, Paper-Strip Experiment)

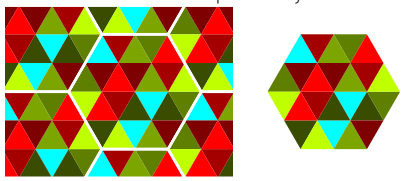


C1/ 3D TILE_ Module fills space by tiling in X, Y and Z planes (PTW Architects, Watercube)

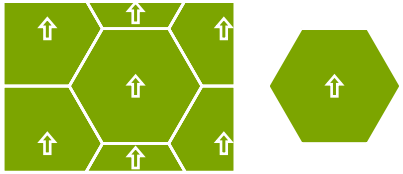
A1 TILING

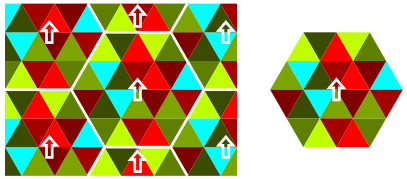
Beginning with a tiling system of hexagons as the regular polygon with the most sides that can be periodically tiled



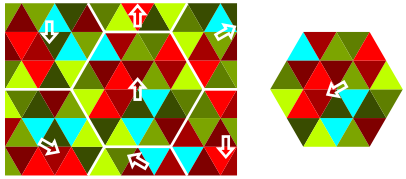
Tile is tesselated to help disguise its perimeter

A3 ROTATION



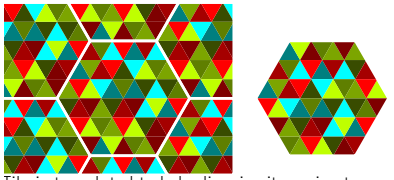


Tile is tesselated to help disguise its perimeter

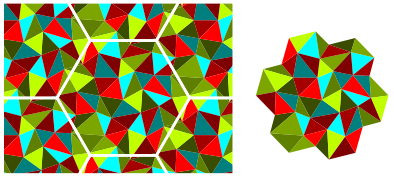


Tile randomly rotated into one of six possible orientations. A rotationally symmeterical perimeter allows the pattern to flow across the tiles

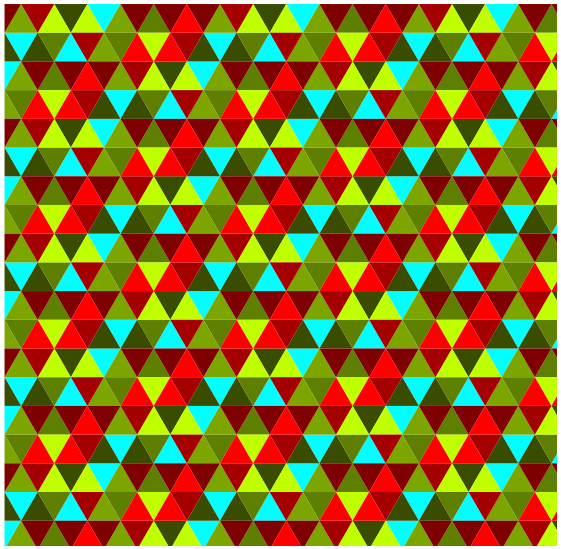
A4 DISTORTED

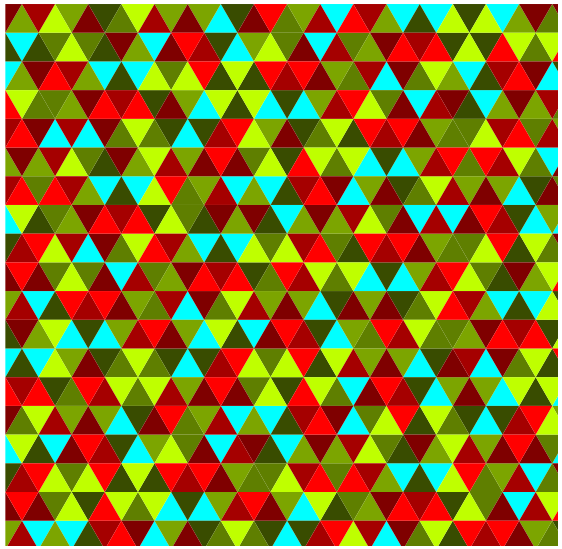


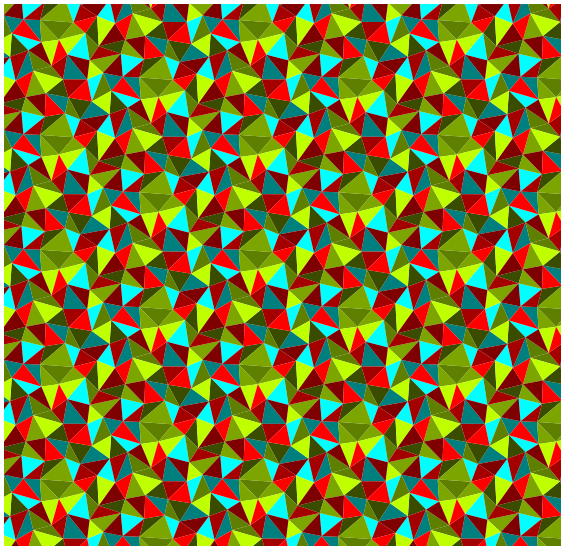
Tile is tesselated to help disguise its perimeter

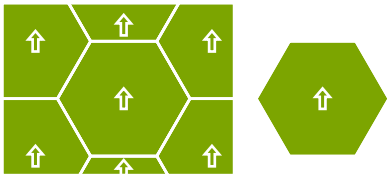


The perimeter is distorted to help camouflage the tile's form

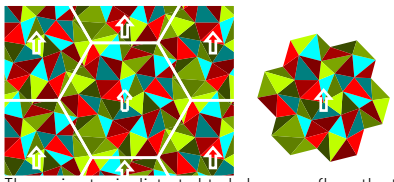




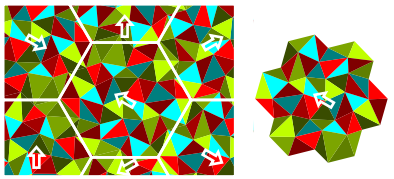




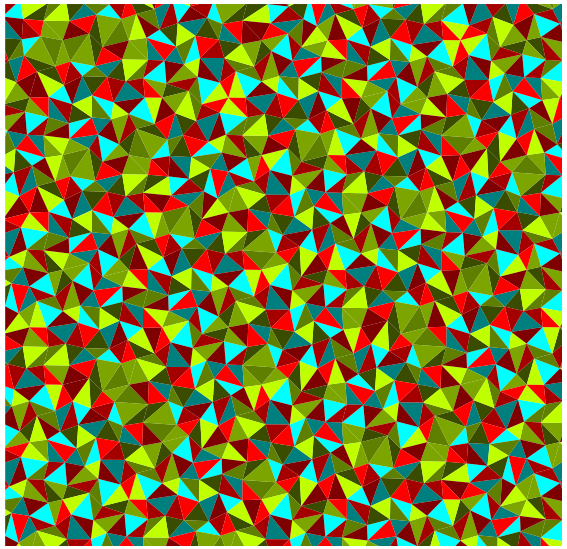
A4+3 DISTORTION & ROTATION

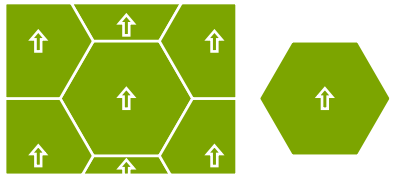


The perimeter is distorted to help camouflage the tile's form

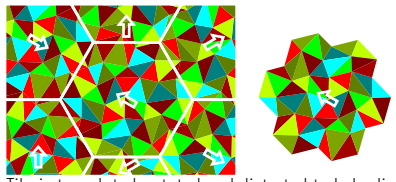


Distorting the perimeter with rotational symmetrical allows the tile to be rotated into one of six orientations at random

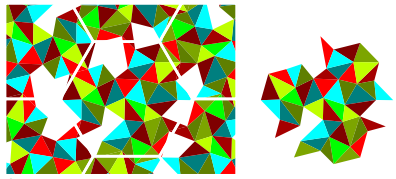




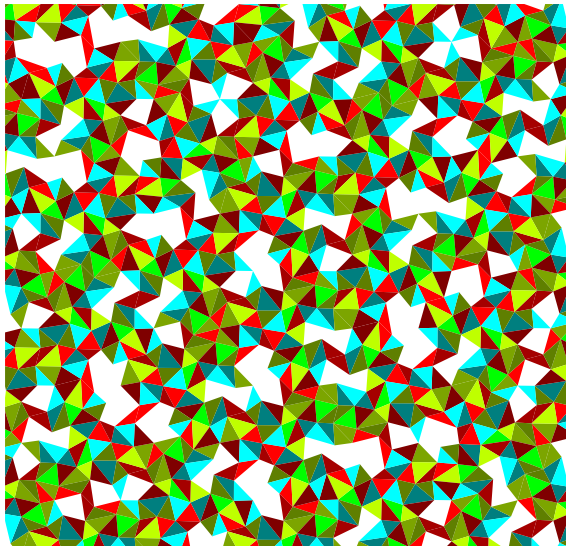
A10+4+3 SUBTRACTION, DISTORTION & ROTATION

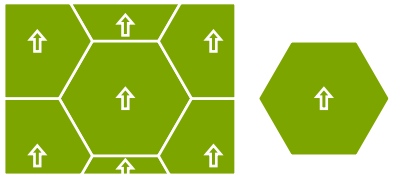


Tile is tesselated, rotated and distorted to help disguise its perimeter

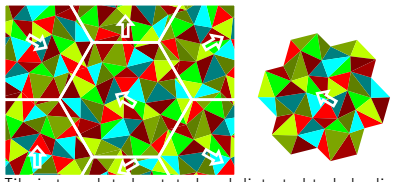


Some facets are removed from the tile which assemble varying openings in the pattern because of the rotation

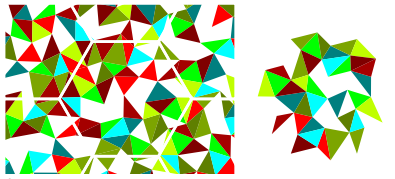




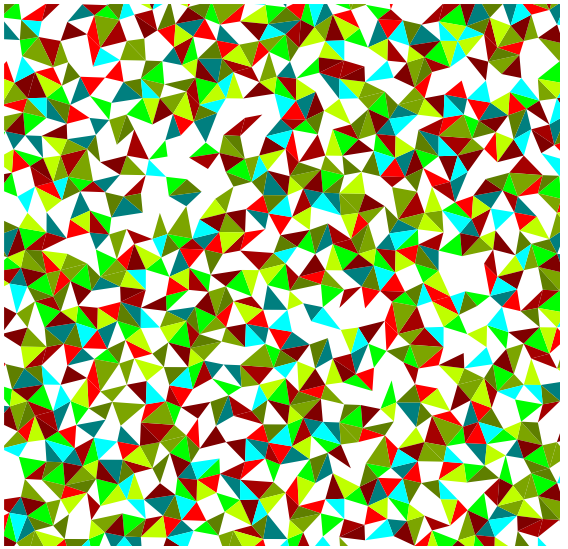
A10+4+3 RANDOM SUBTRACTION, DISTORTION & ROTATION

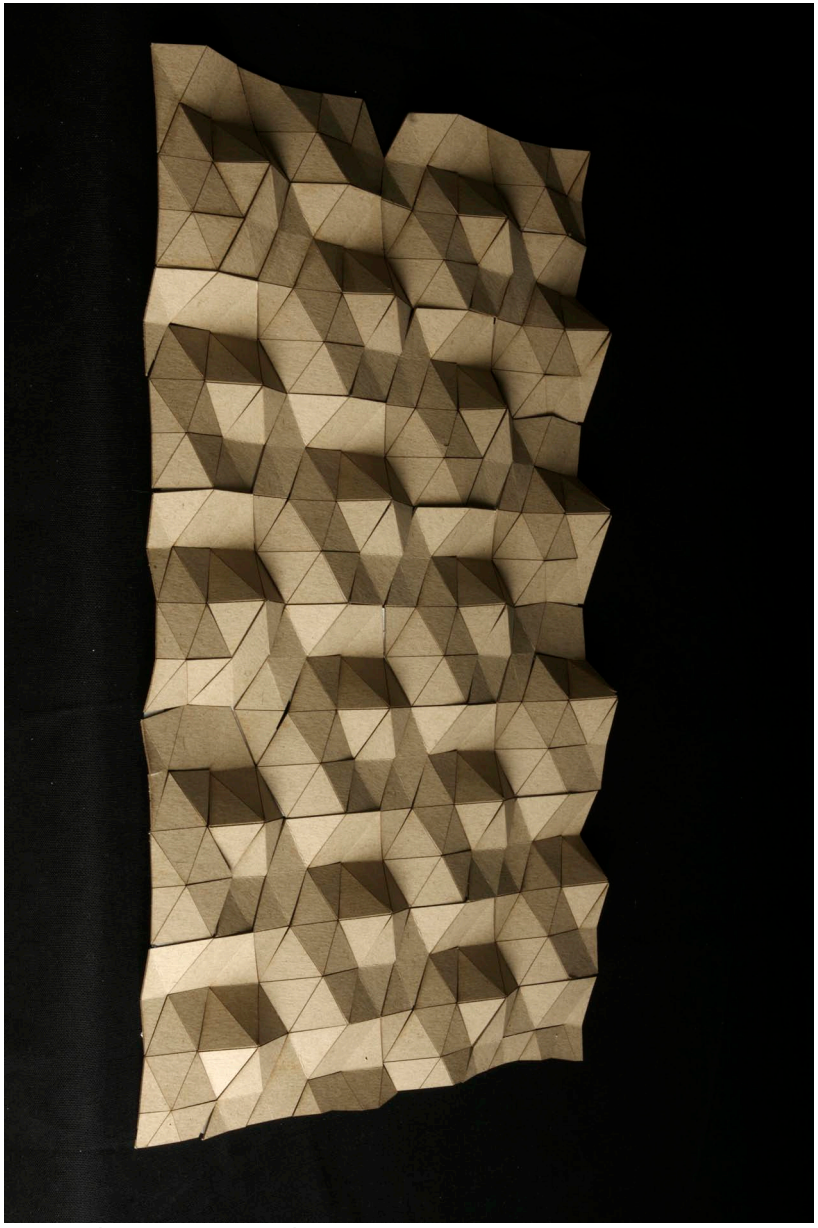


Tile is tesselated, rotated and distorted to help disguise its perimeter

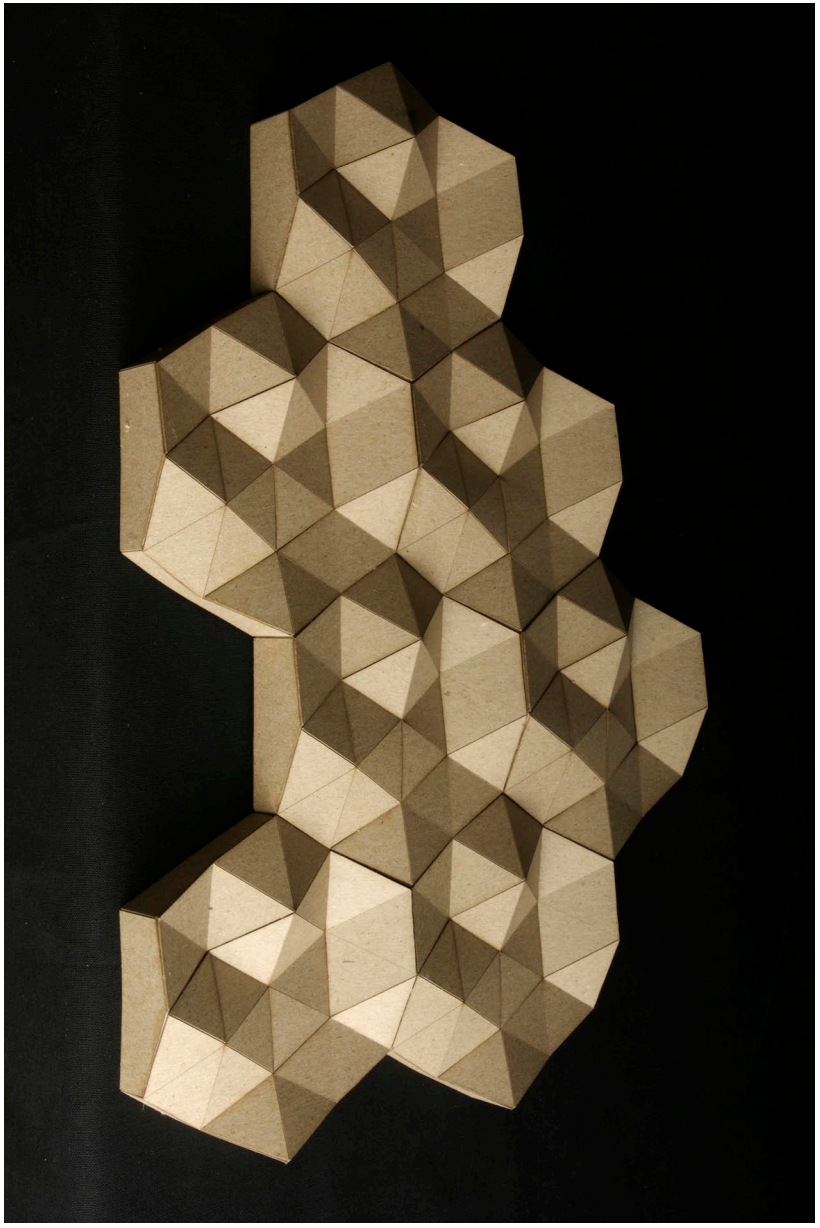


One third of the facets are randomly removed from each tile after they have been arrayed



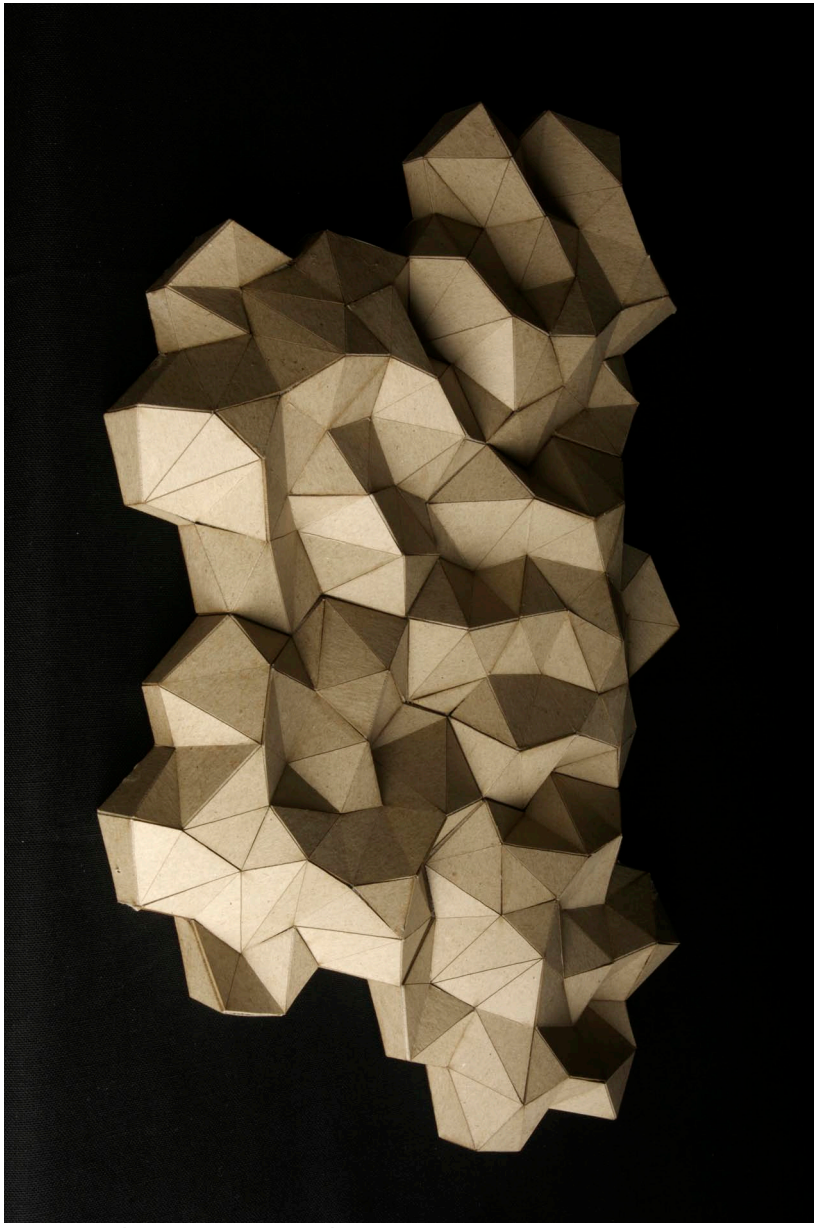


A1 TILING/ Articulated Surface/ Assembled as a single surface



A1 TILING/ Articulated Surface/ Assembled from seven identical tiles

A3+4 TILING/ Rotation + Distortion/ Underside of tiles

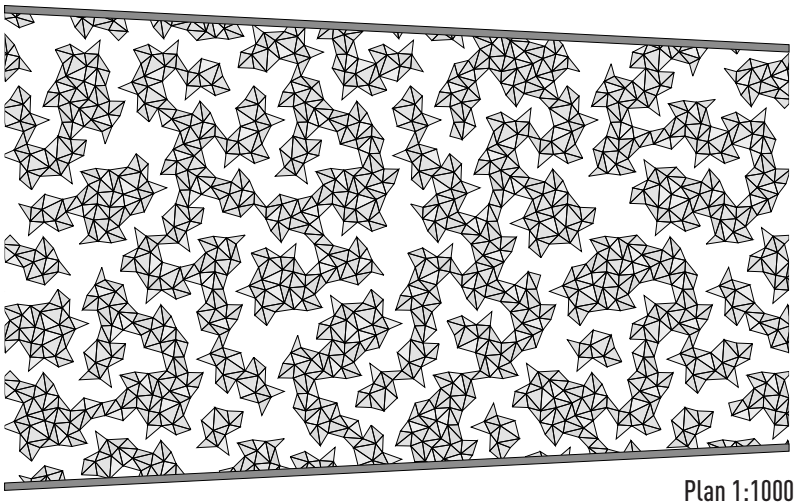


A3+4 TILING/ Rotation + Distortion/ Assembled from five identical tiles

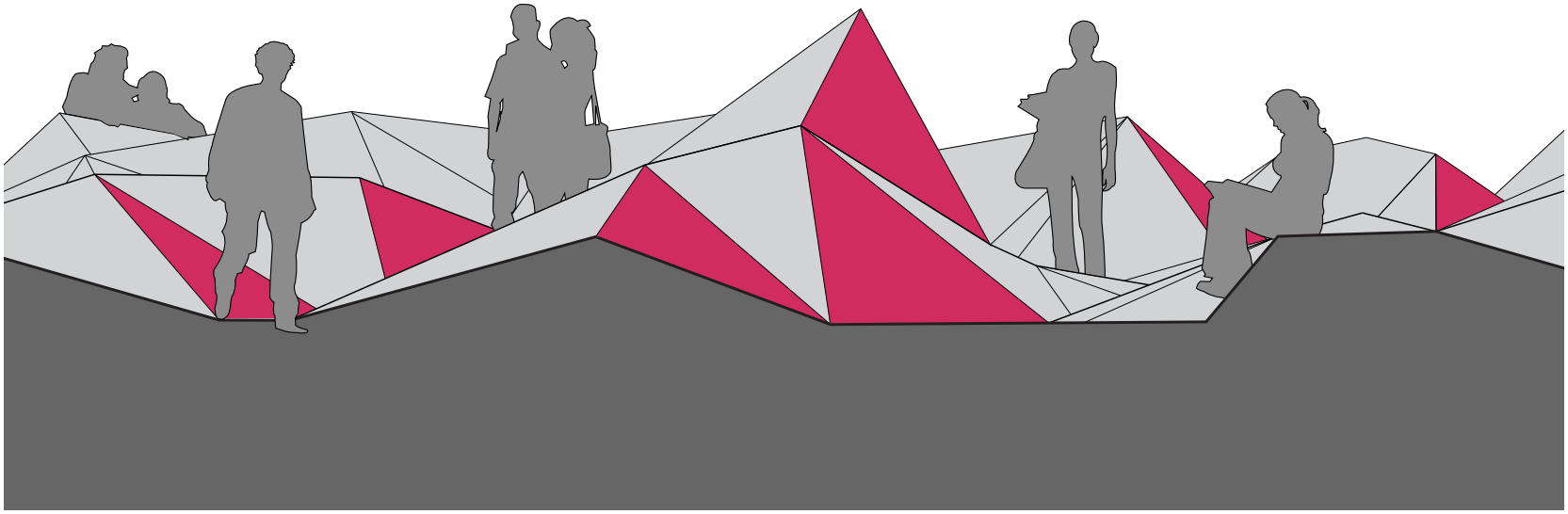
Former Prime Minister Mackenzie King once quipped that "the problem with Canada is too little history and too much geography." It is precisely this lack of history that makes our excess of geography so appealing in our difficult search for Canadian identity. Few Canadians ever visit and even fewer call it home, so it is paradoxical that the incomprehensibly vast wasteland of the North should be so indispensable to our national identity. For most of us this magnificent expanse of almost nothing can exist only as an "imagined void."

1st Committee Meeting

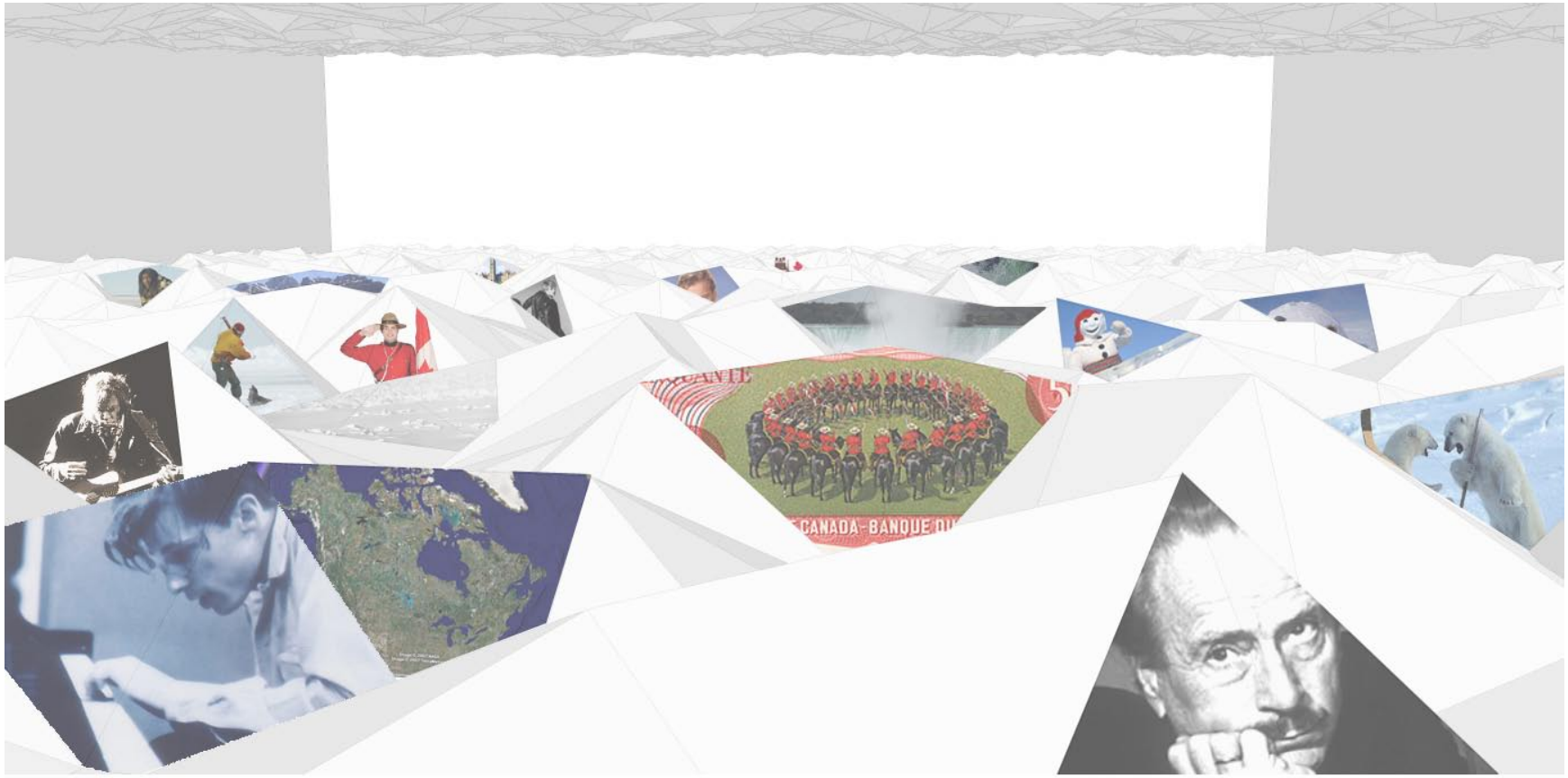
04 October 2007



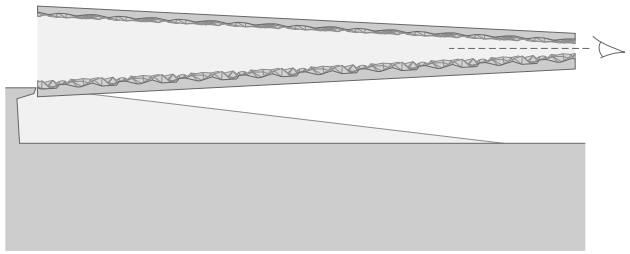
Plan 1:1000

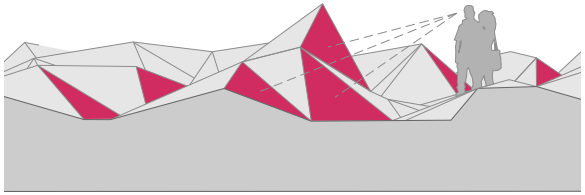


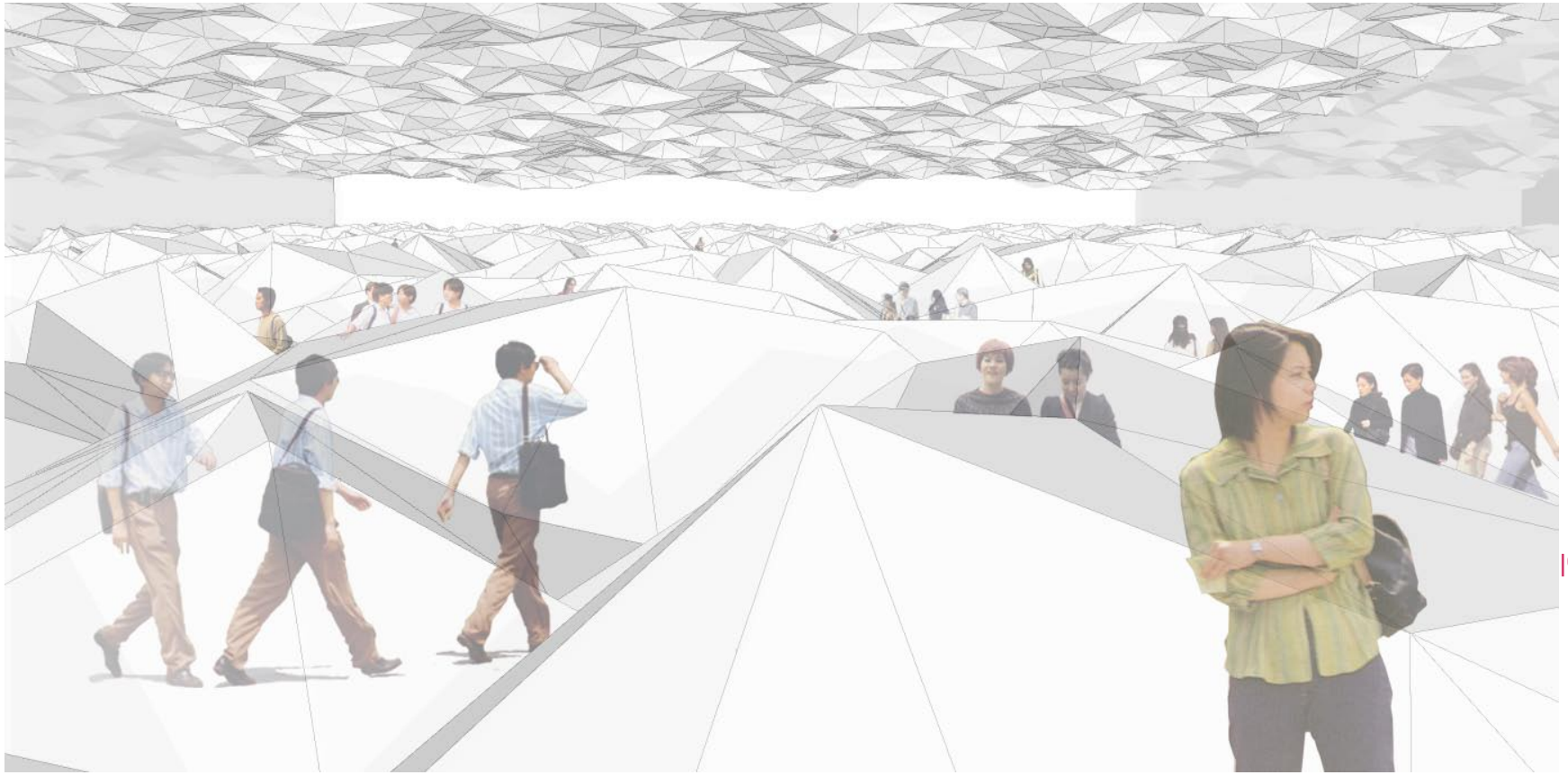
Section through display system



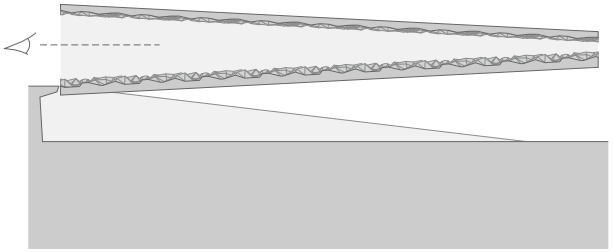
All displays face the same direction so that from the top end of the pavilion looking back the viewer is overwhelmed with all the information simultaneously. Together with the tapering of the walls, ceiling and floor it has the effect of flattening or collapsing the space.

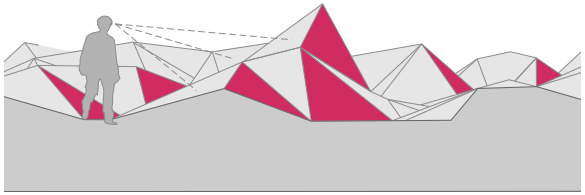


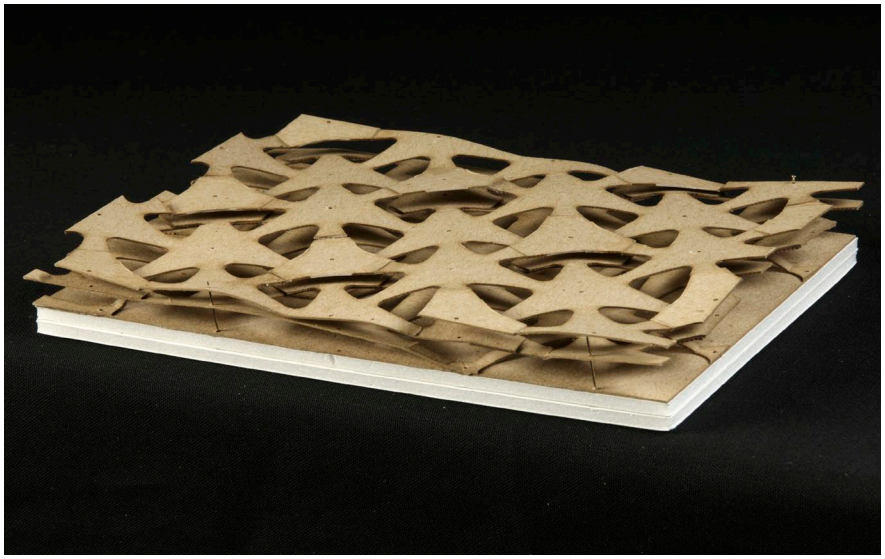




When the visitor enters the pavilion there appear to be no displays, just crowds filtering through a vast, empty space accentuated by the walls, ceiling and floor which taper for the illusion of greater depth.

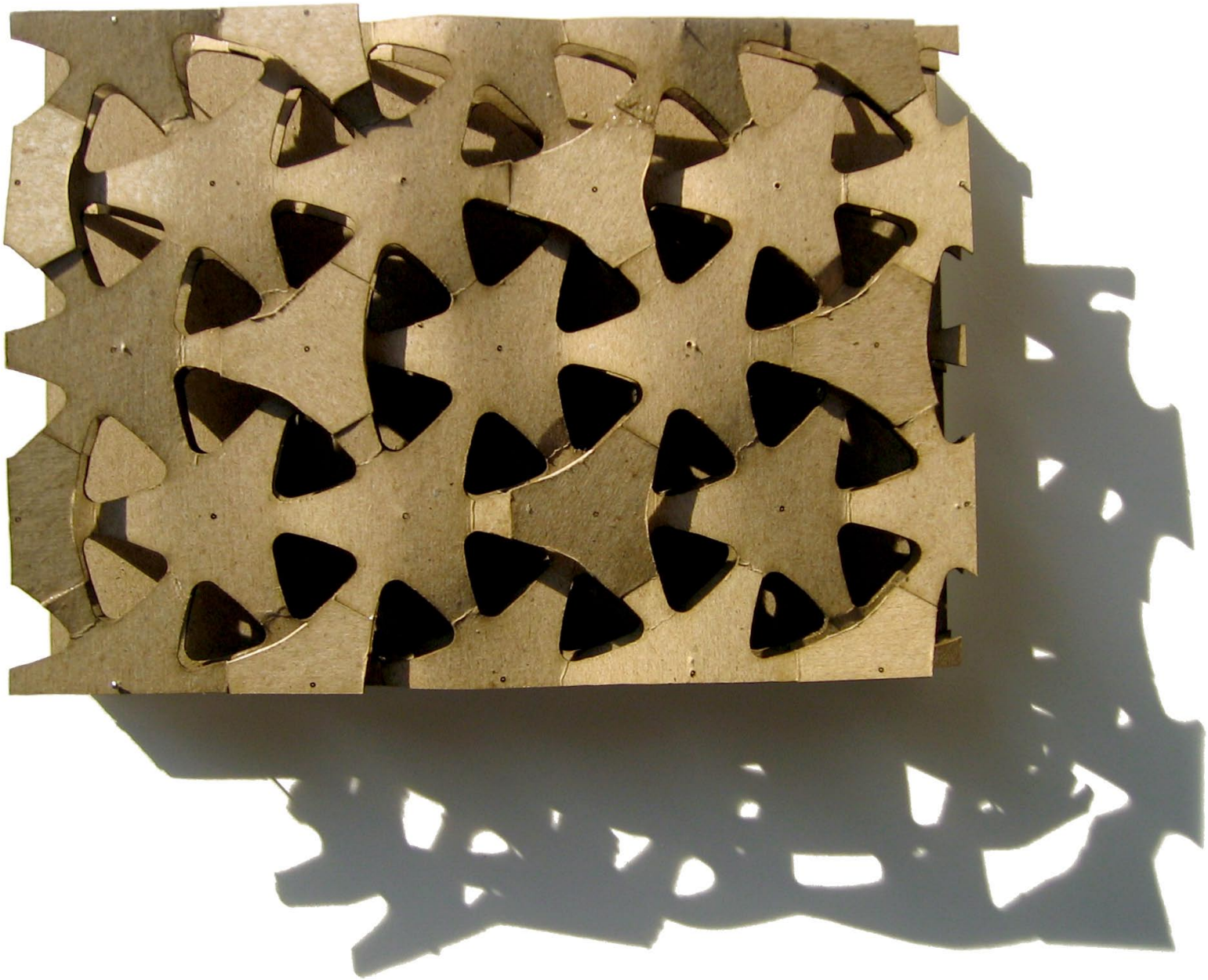


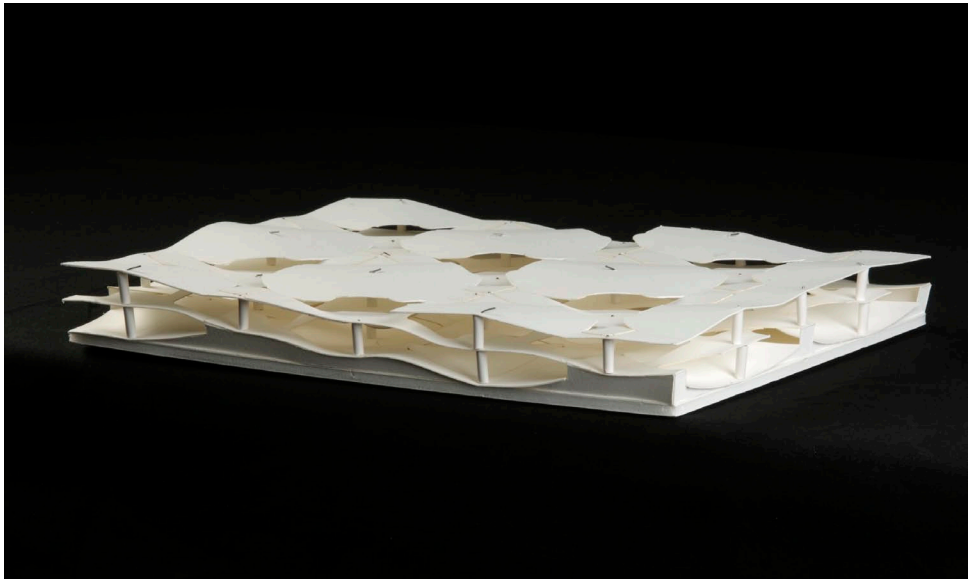


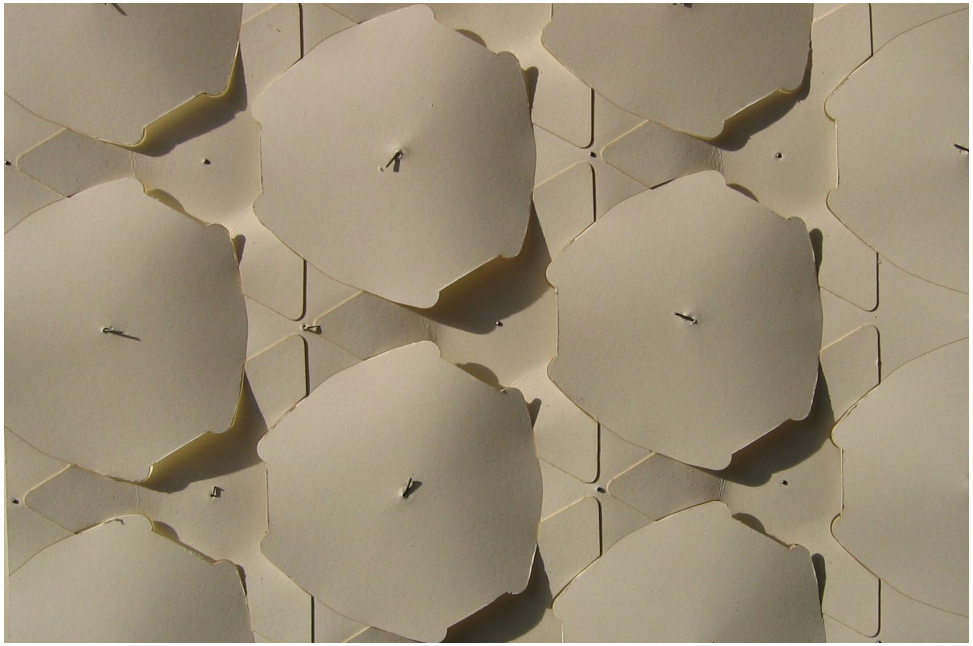


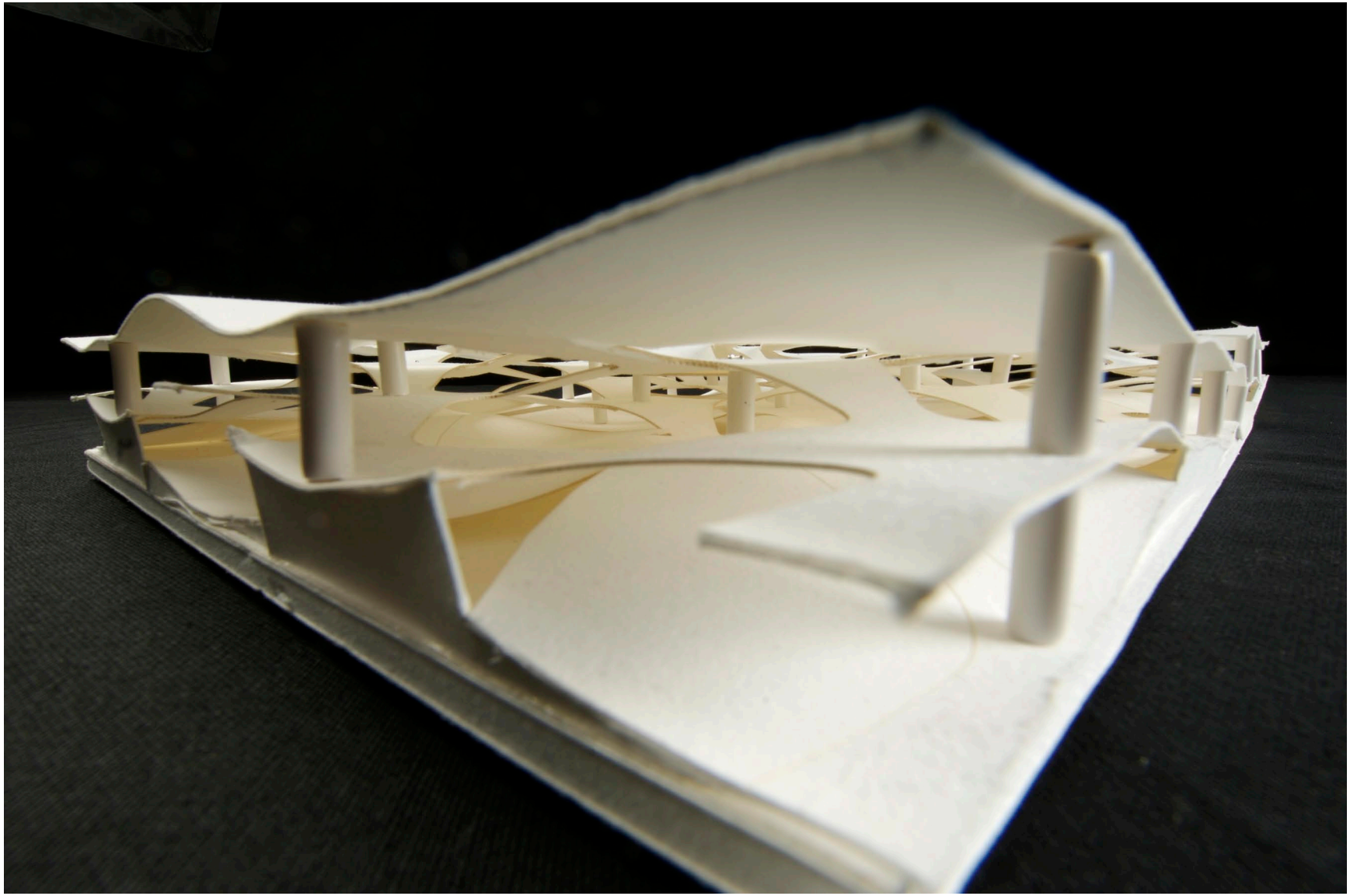
Single-surface experiments

Initial experiments using single-surface models to create a multi-level building with a networked circulation offering maximum choice and no discernable transition between floors.





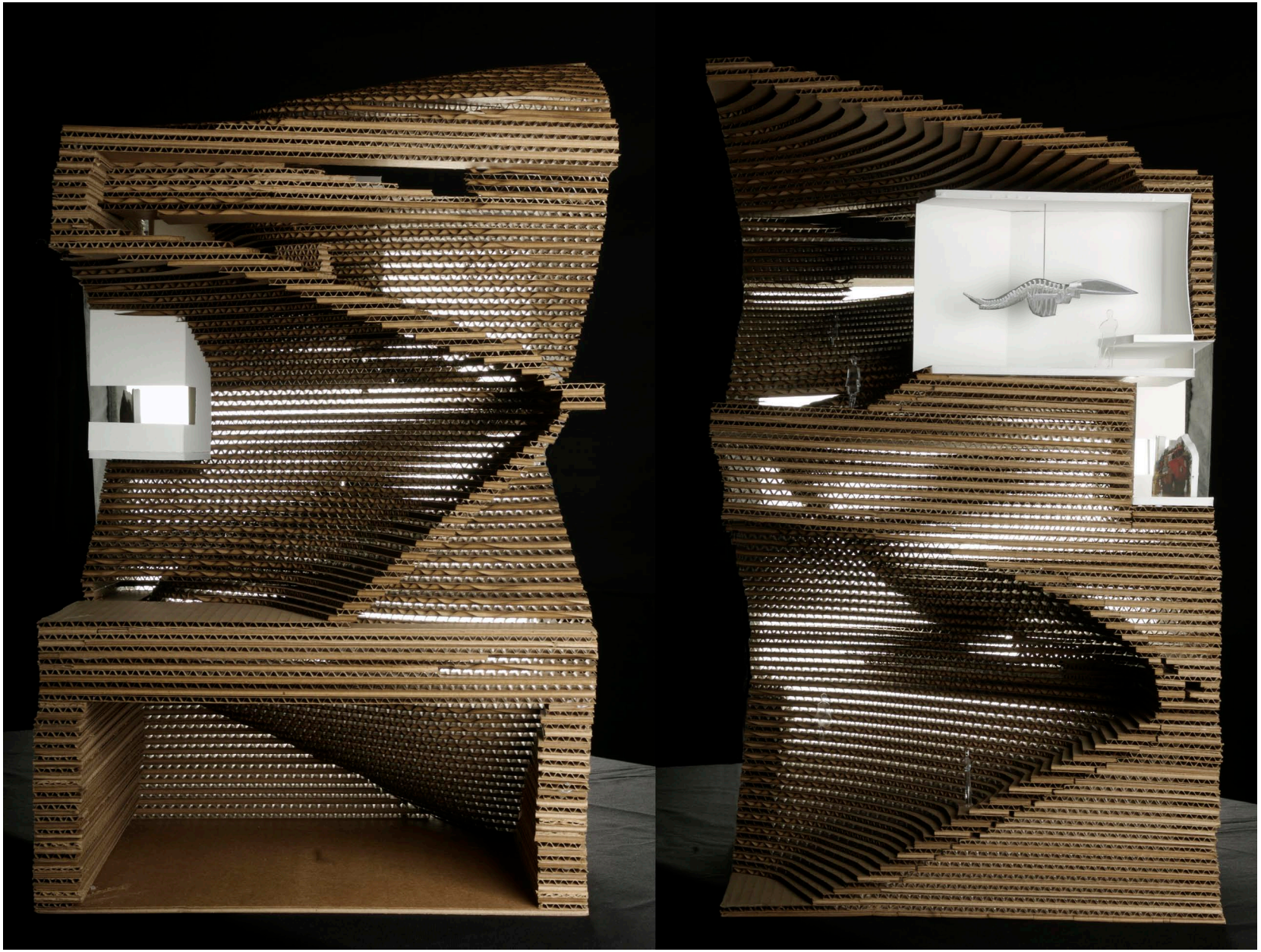


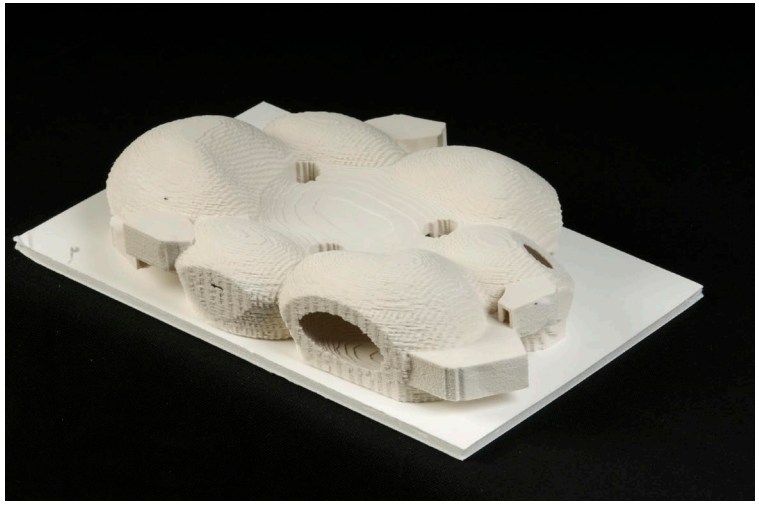


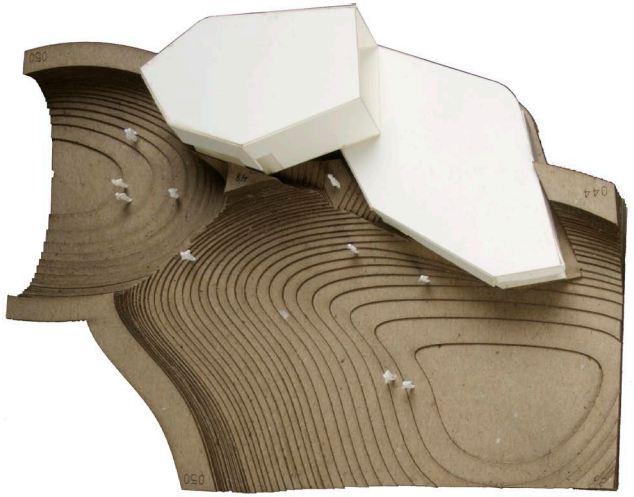
Once placed on the model a finger could trace every surface without ever being lifted off

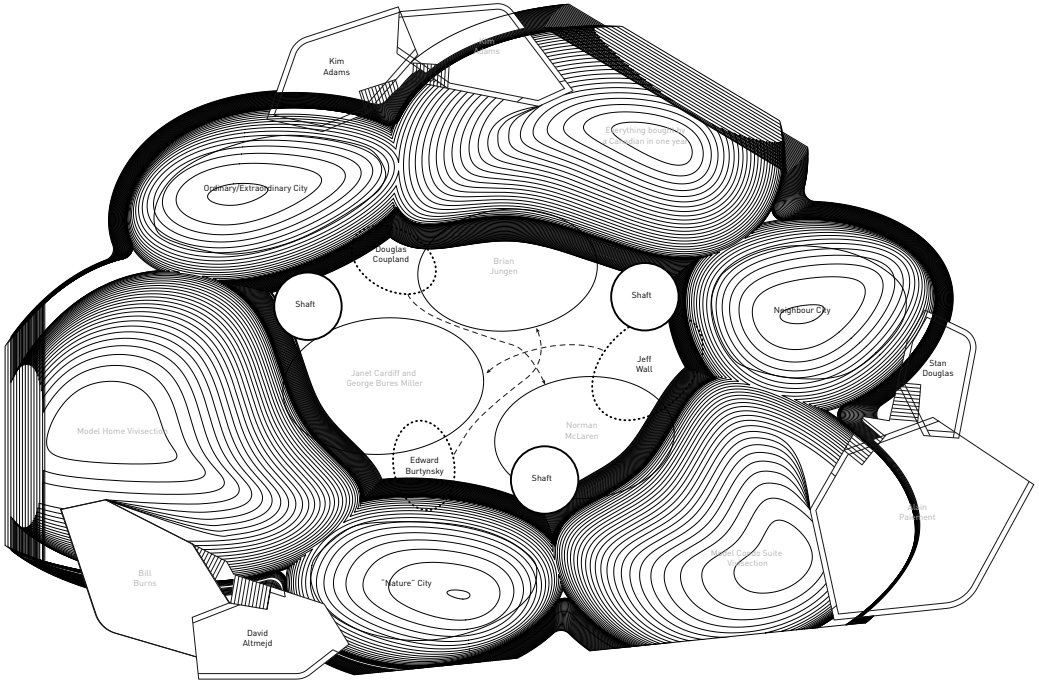
Midterm Review

02 November 2007

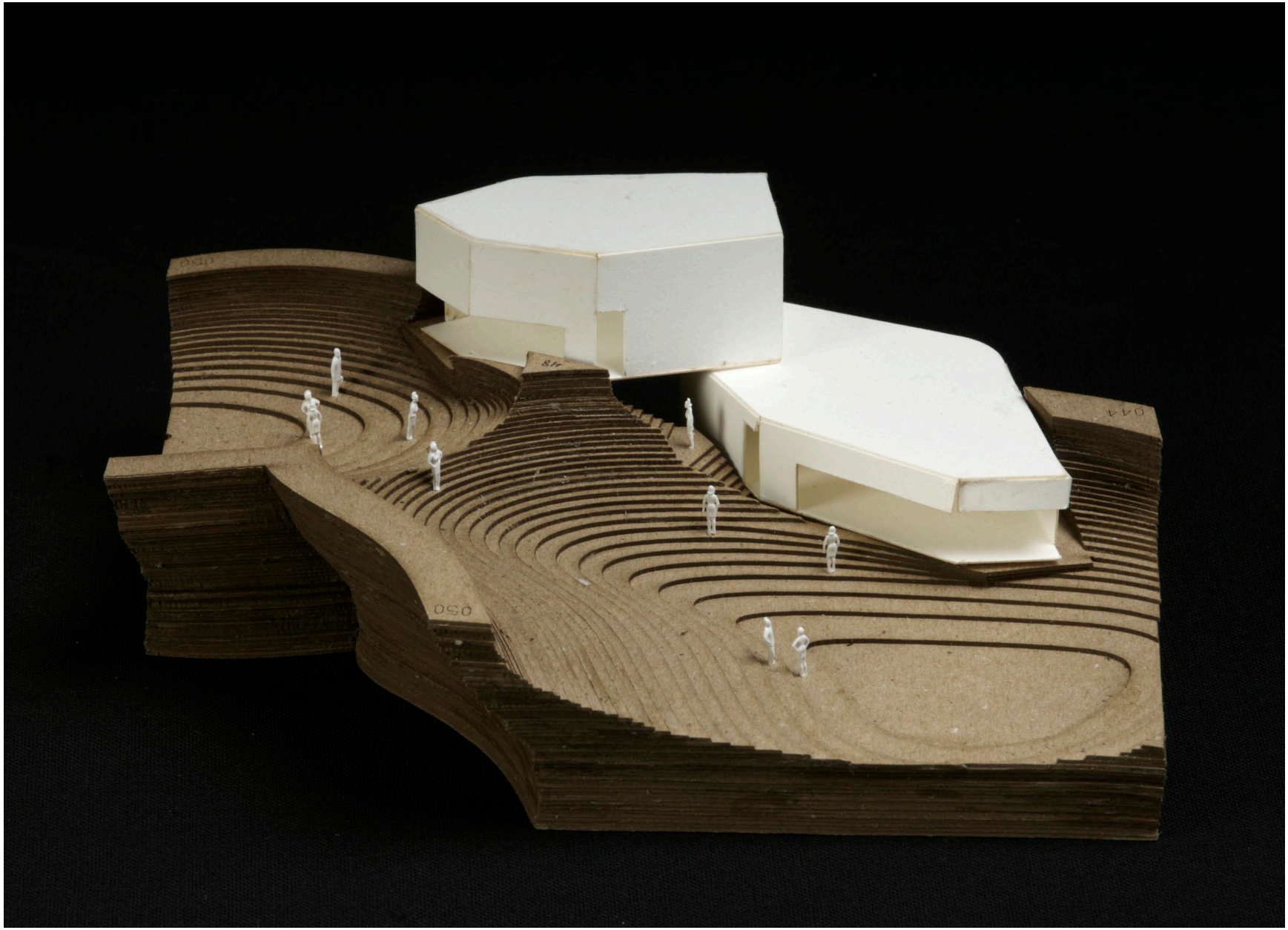


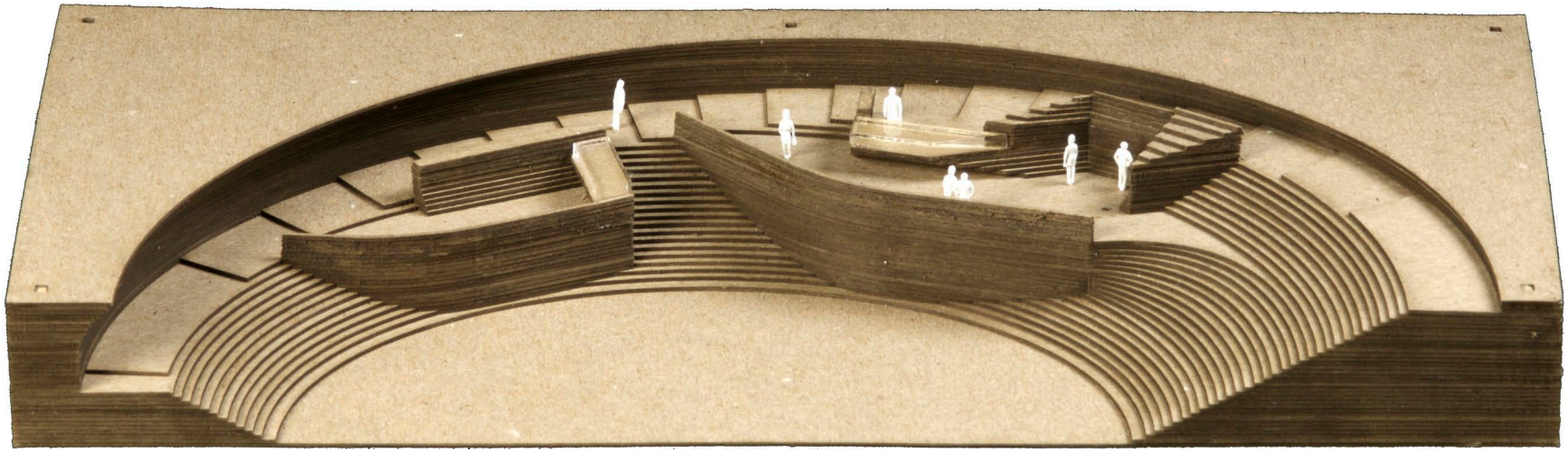


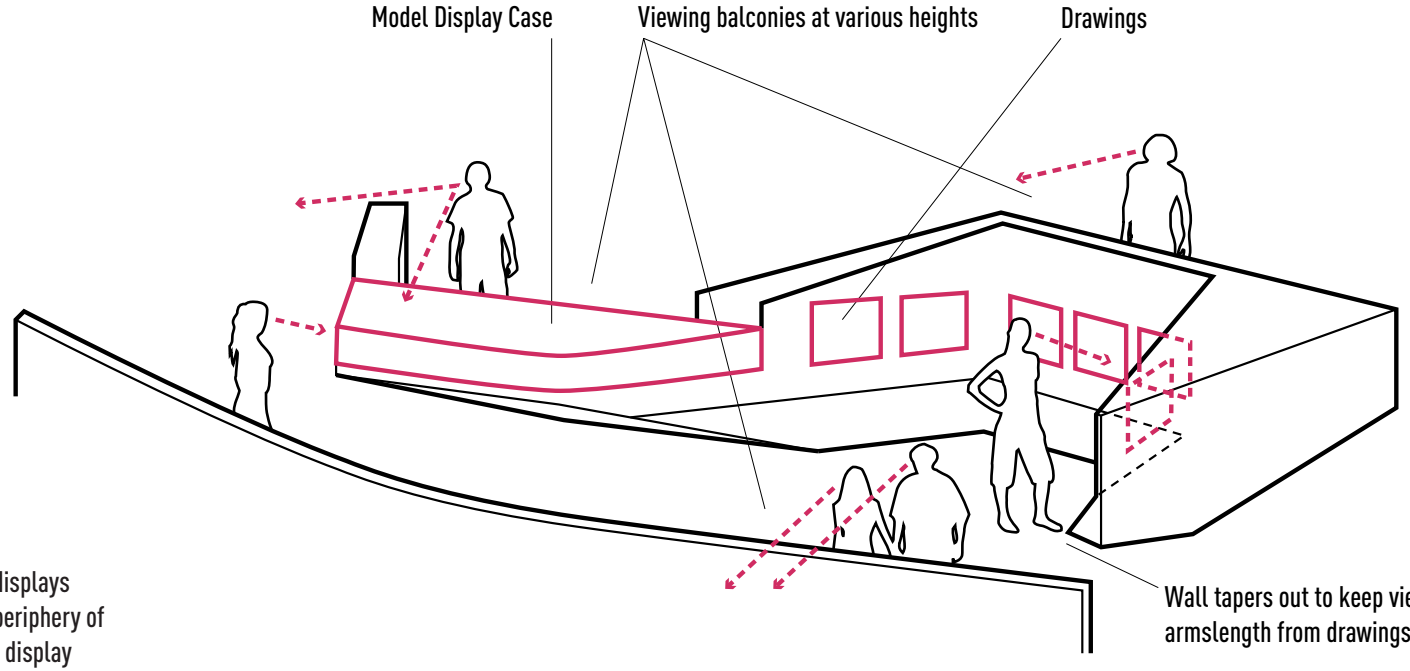




The pavilion is conceived as s eries of interlocking volumes, the floor of each is pulled upward in a series of concentric steps to afford clear views toward the centre and for use as informal furniture to promote lingering



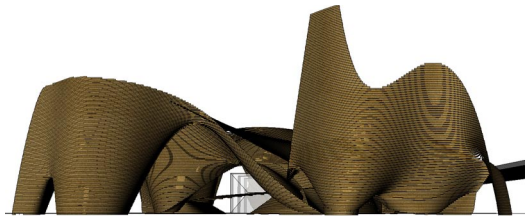




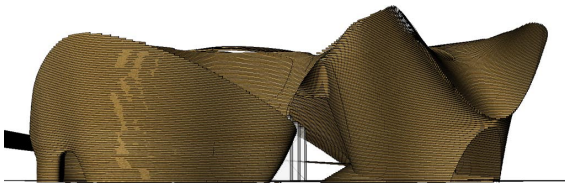
System for ancillary displays arranged around the periphery of the main model home display

Penultimate Review

30 November 2007

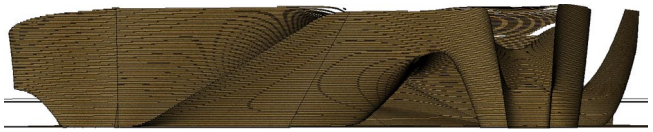


North Elevation

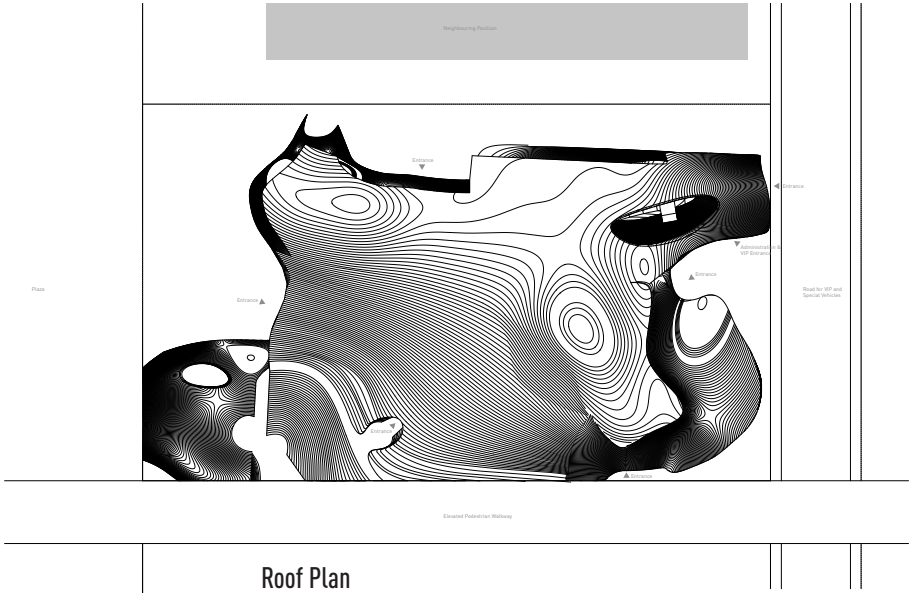


South Elevation

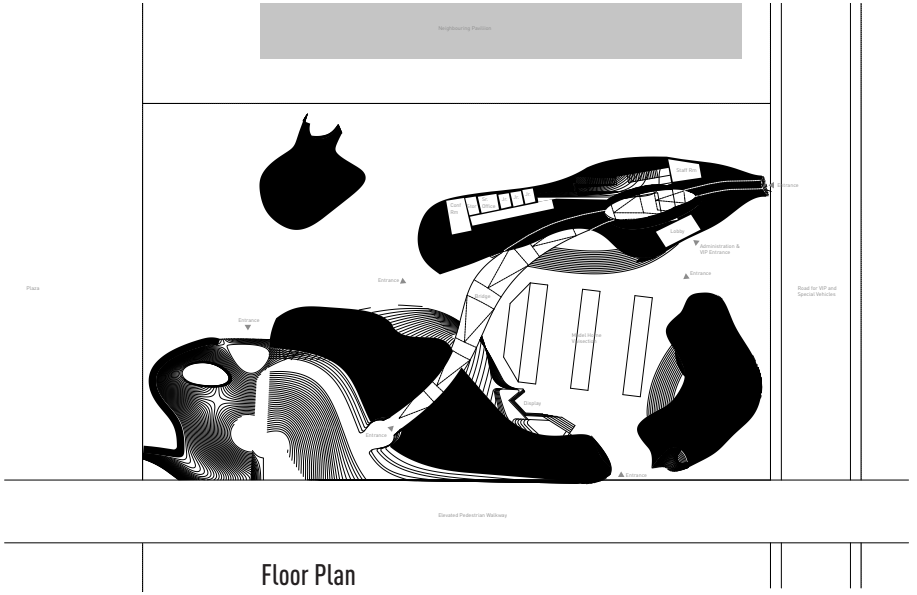
West Elevation



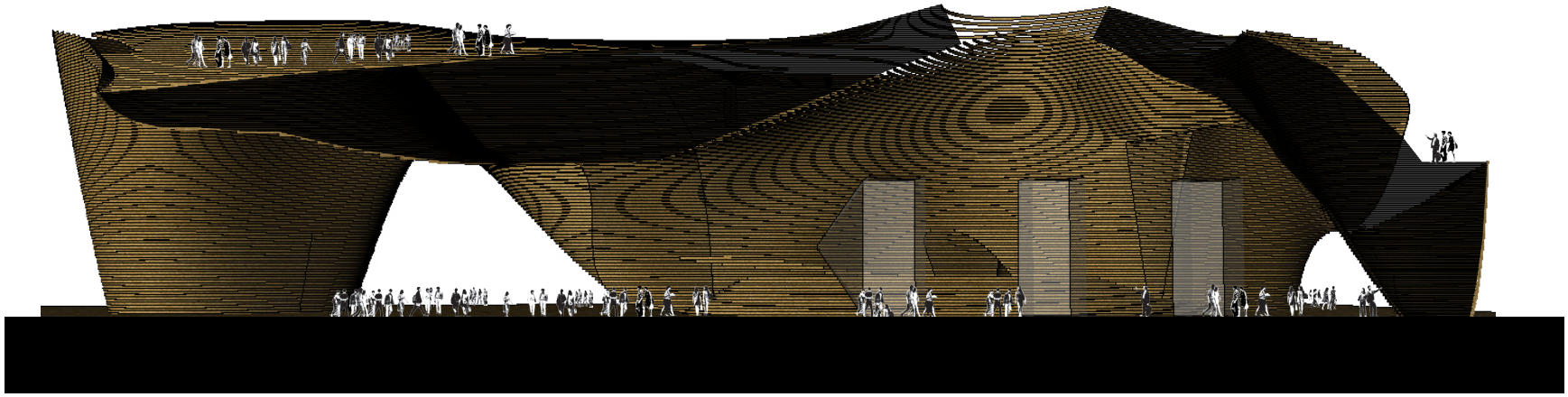
East Elevation



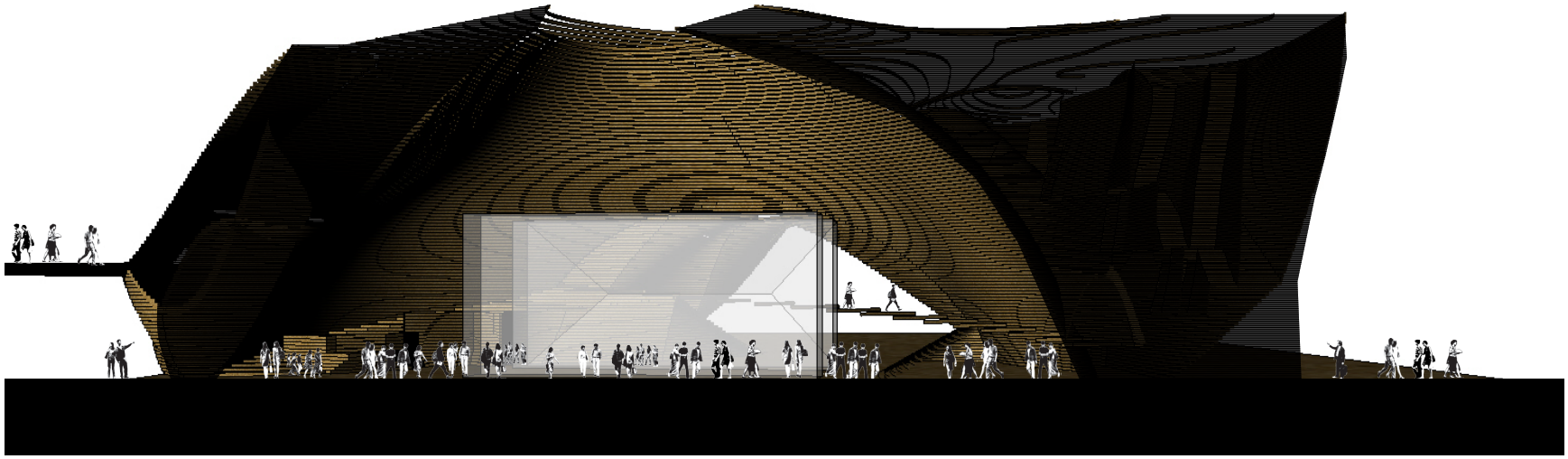
Roof Plan



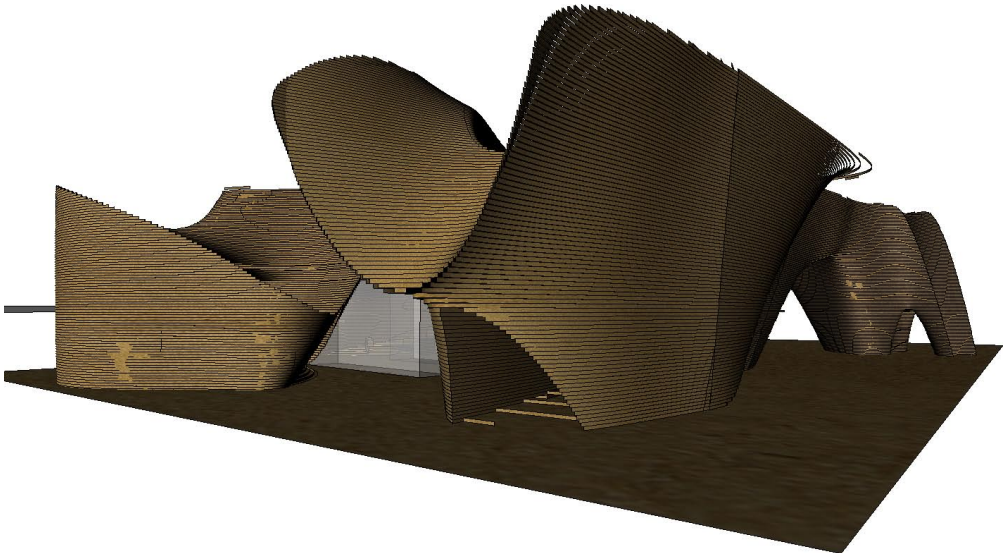
Floor Plan



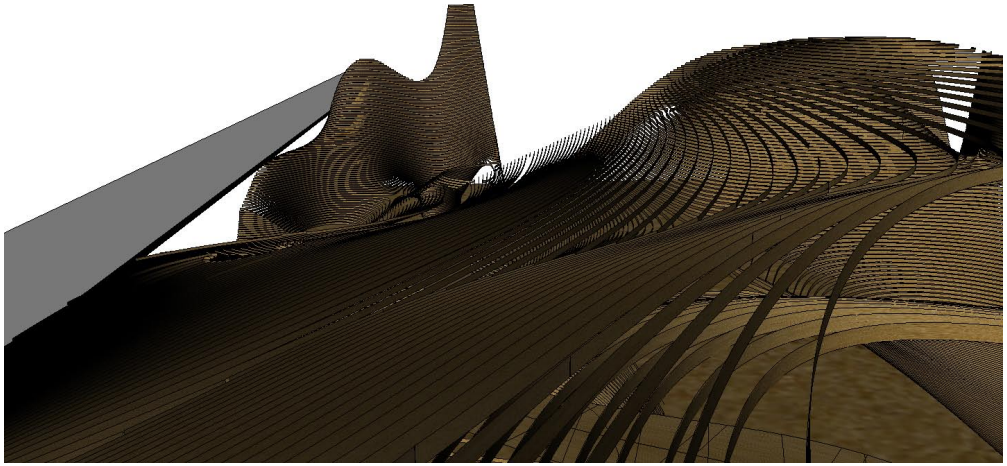
Longitudinal Section through main entrance and model home display space



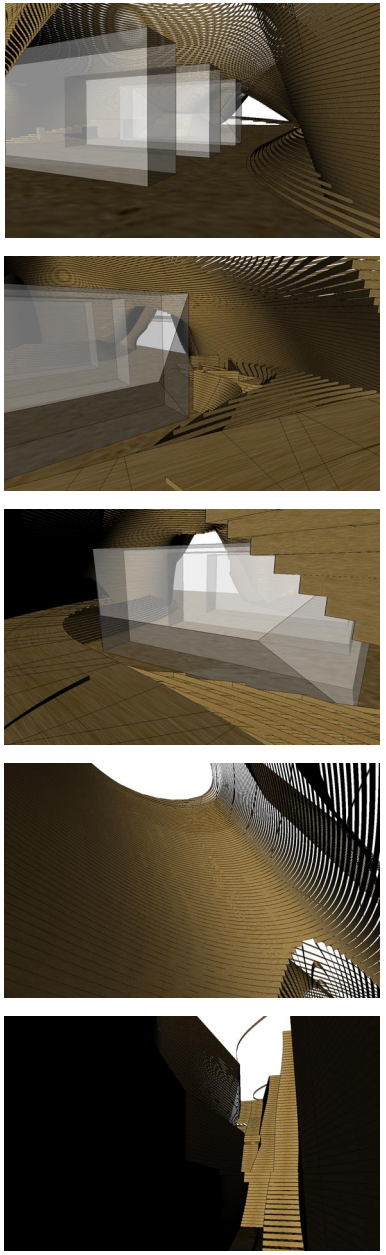
Cross Section through elevated walkway and model home display space



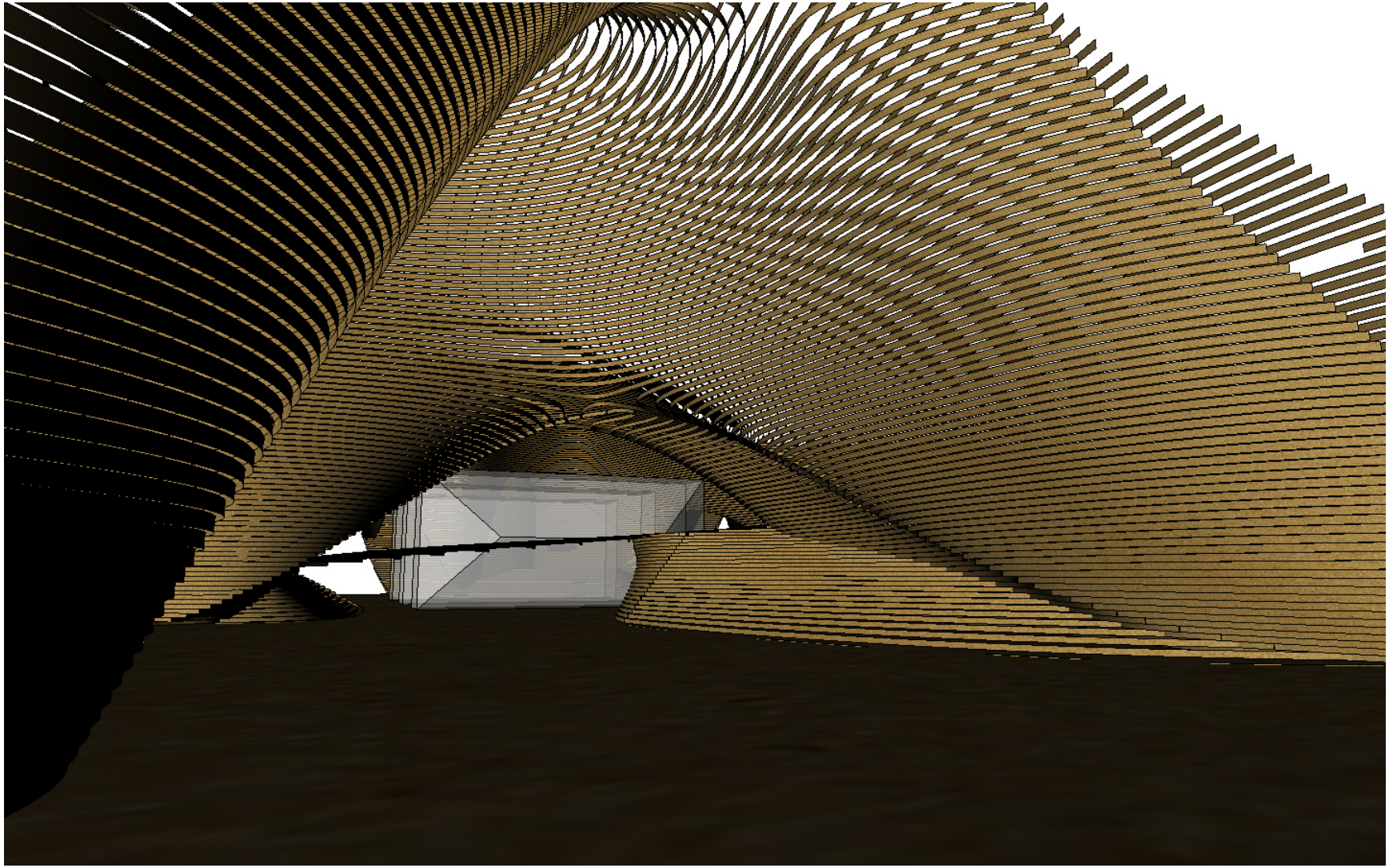
View of south elevation



View from ampitheatre to elevated walkway



Entrance and exit sequence



View from main entrance

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http://www.expo2010china.com/expo/expoenglish/index.html