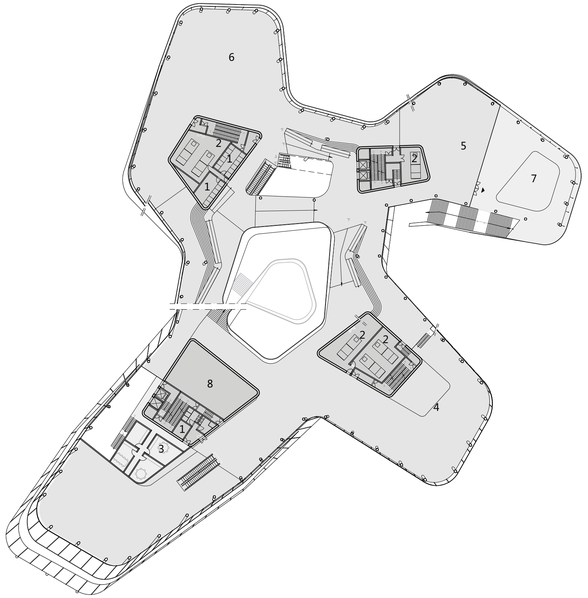
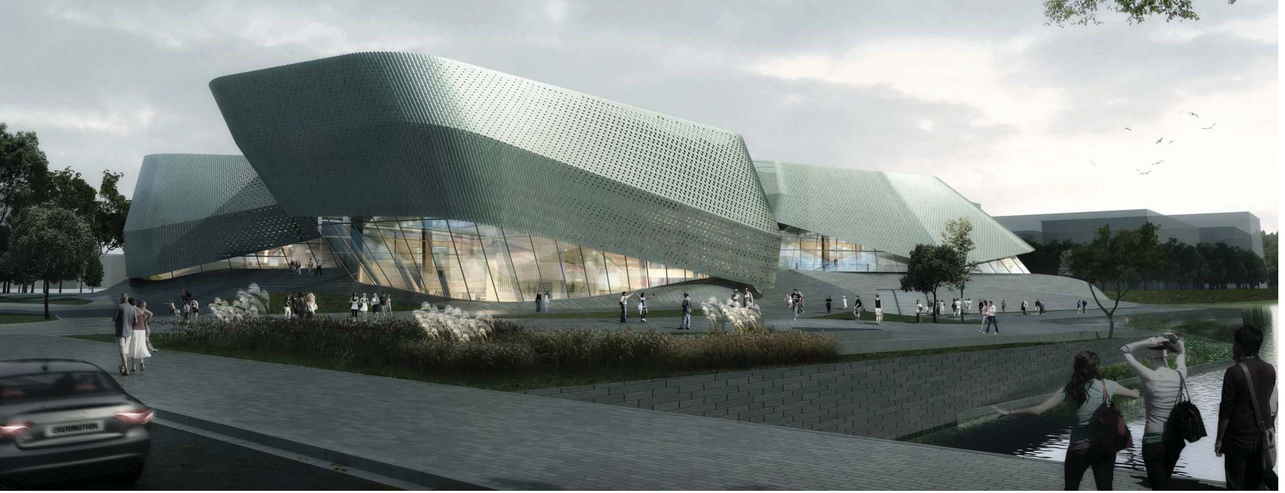
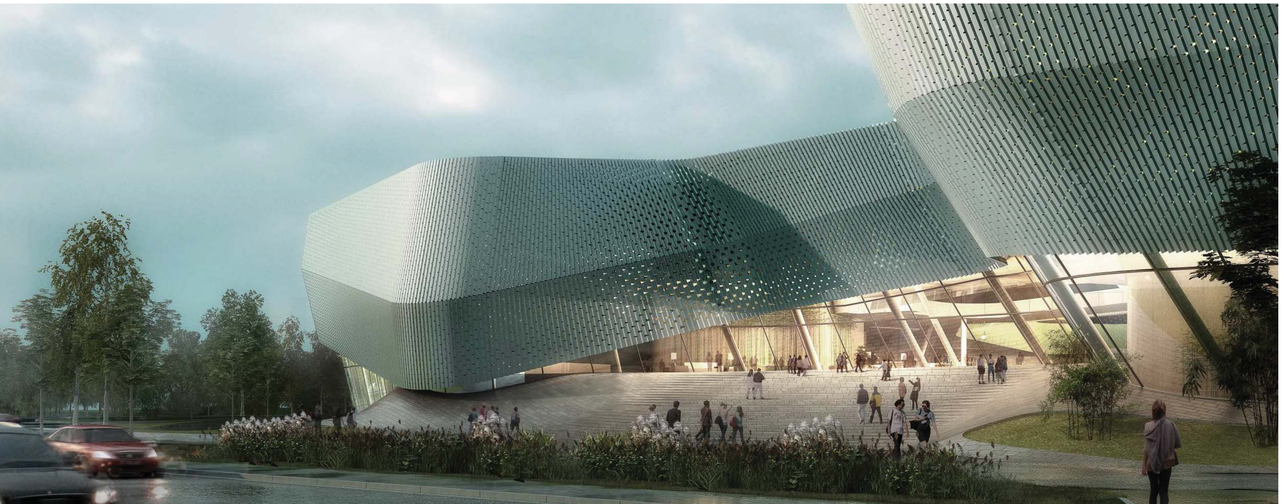
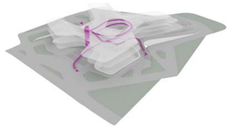
Nathan Melenbrink
work sample



Project: Ningbo Urban Planning Museum
Location: Eastern District, Ningbo PRC
Status: Design Development Phase
Credits: playze, Silk Road CG
Role: Lead facade designer; designed and built mockups and led coordination with ceramics manufacturers and facade engineers. Additional design work included general form, landscape and interior.

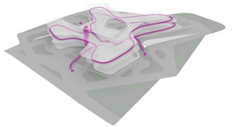






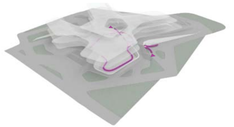
Primary Circulation: travel to 4F via escalator or elevator, spiral down through atrium.

直通流线：观众可通过电梯直达4层，再从中庭旋绕而下。



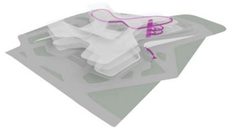
Normal Exhibit Circulation: travel to 4F via escalator or elevator, spiral down through galleries.

普通观众流线：通过电梯直达4层，然后环绕而下进入各个展厅。



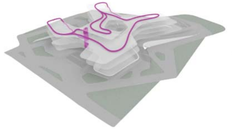
Temporary Exhibition: access from 1F west entrance or ramp down from 2F atrium.

临时展厅：从西侧1层主入口进入或者通过中庭从2层坡道向下进入。



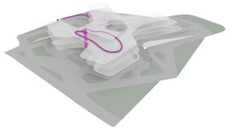
VIP Circulation: access from 1F west entrance, elevator up to 2F + 3F VIP areas and 4F galleries.

VIP流线：从西侧入口进入，通过电梯直达2，3层VIP区域，以及4层各个展厅



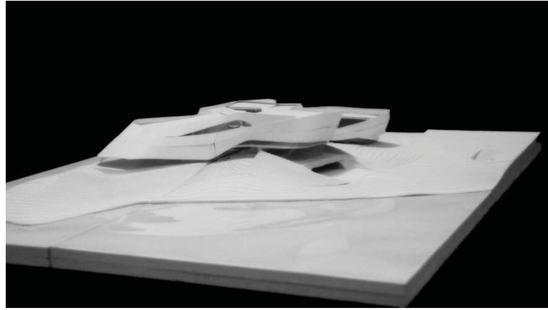
Roof Circulation: access from elevator or exterior stairs up from the landscape.

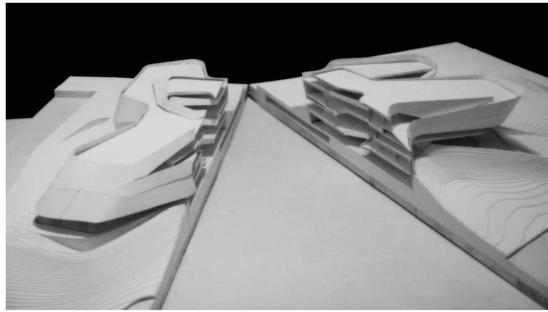
屋顶流线：通过电梯或者室外楼梯直达。

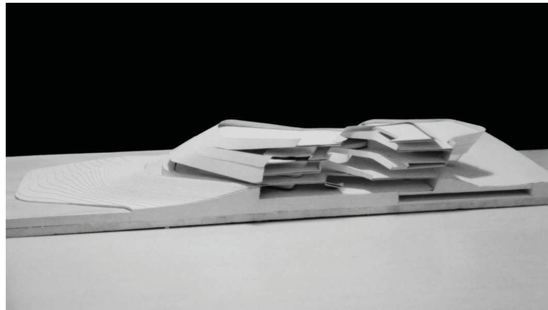


Restaurant: 1F restaurant access from landscape or temp exhibit, roof cafe access from 4F or elevator.

餐饮流线：可通过临时展厅和室外直接进入餐厅，屋顶咖啡厅可通过4层或电梯进入。

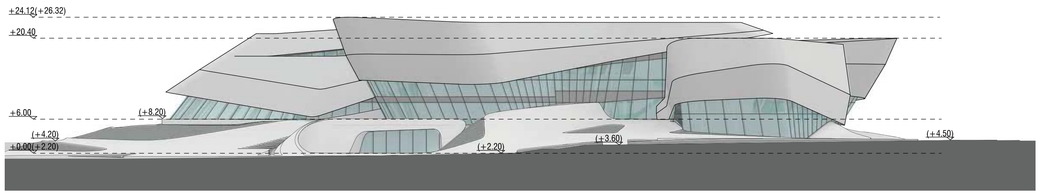






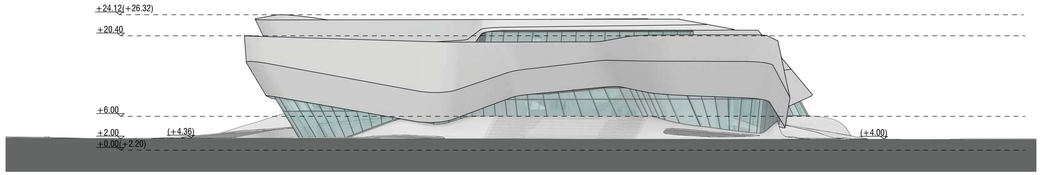
比例：1:500

EAST
东立面

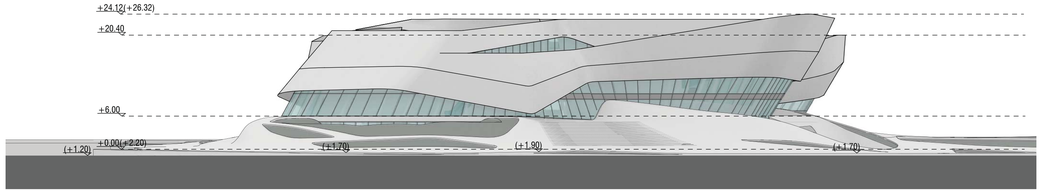


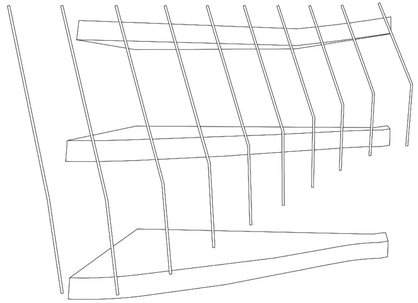
WEST
西立面

NORTH
北立面



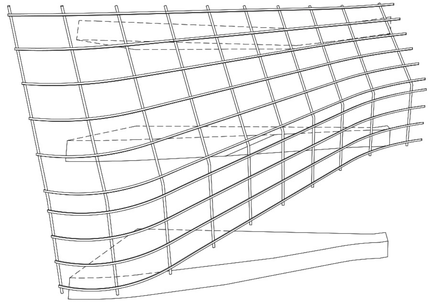
SOUTH
南立面





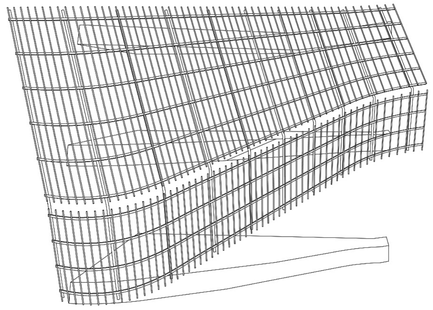
1. Angled and kinked columns span from slab to slab and are attached to the slab directly.

1.成角度弯曲的柱体跨越不同的楼板，并直接附着在楼板上。



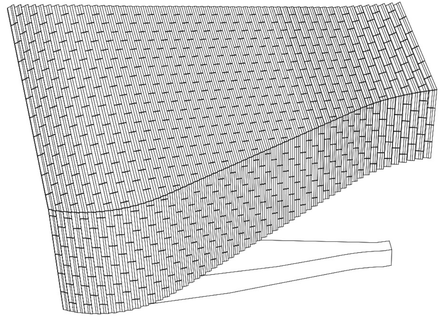
2. Transoms are factory cut to straight lengths and 5m radii and are fixed to the kinked columns.

2.在工厂加工成直线部分长度为5m，弯曲部分半径为5m的横框，固定在弯曲的柱体上。



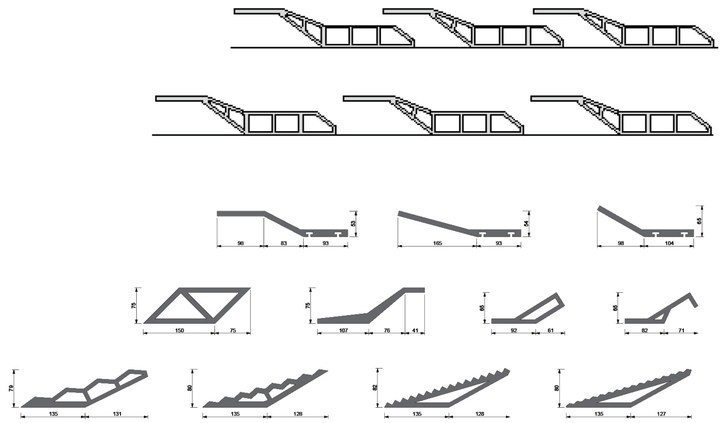
3. Vertical extrusions span the width of the ribbon, supported by the transoms. Attachment clips could be pre-mounted in the factory.

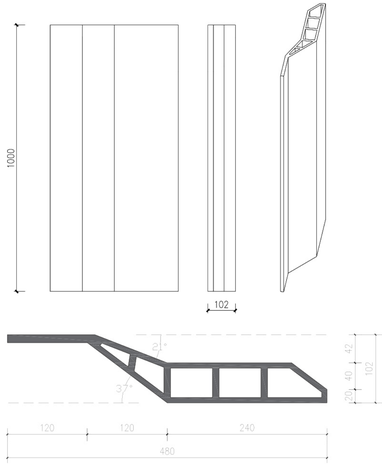
3. 由横框支撑的垂直构件以一定距离分布，用于挂陶瓷的夹片可以在工厂预先固定在上面。

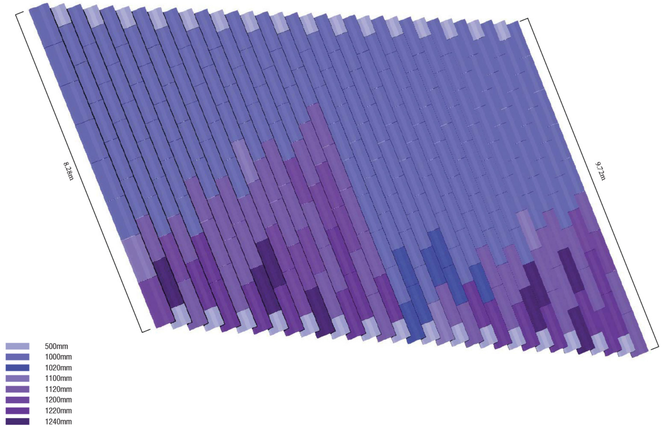


4. Finally, the tiles are hung on the clips.

4. 最后，陶瓷瓦片悬挂固定于夹片上面。







Extensive research was conducted to develop a customized and unique facade system. The constraints were that the surface curvature was consitently changing, there needed to be a method of opening up the facade to control light, and the facade structure had to attach to the concrete slabs, which were also irregular. Working with a team of engineers and advisors, a specialized structural system was developed that could allow the tiles to be hung from the facade structure.

Additionally, a multitude of tiling options were considered. Finally, a decision was reached to use a tile profile which allowed for variable overlap; in other words, it could at times completely cover the next tile, thus blocking the light, or it could start spreading out in the horizontal direction to allow light to enter the building at certain positions (specifically, circulation areas are well-lit, while exhibition areas should be kept dark).

1 宁波2030 Ningbi@2030

2 临时展厅 Temp.exhib.

3 办公室 Office

4 储藏室 Storage

5 VIP区 VIP

6 图书室 Library

7 书店 Bookstore

8 临时展厅 Temporary exhib.

9 门厅 Entrance hall

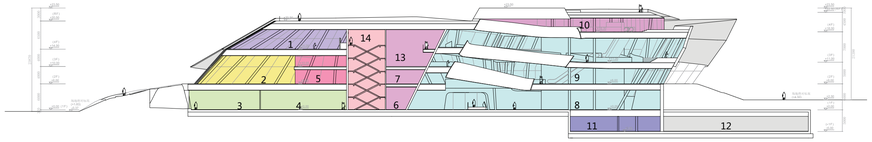
10 咖啡厅 Cafe

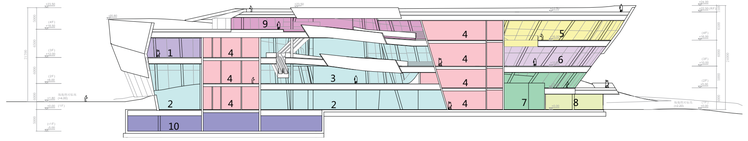
11 设备用房 Technical Room

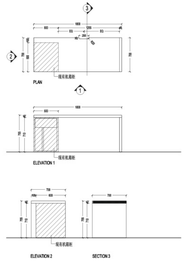
12 停车场 Paking

13 宁波2030 Ningbo@2030

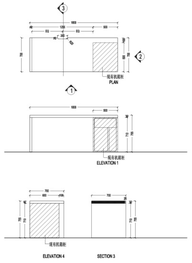
14 核心筒 Core



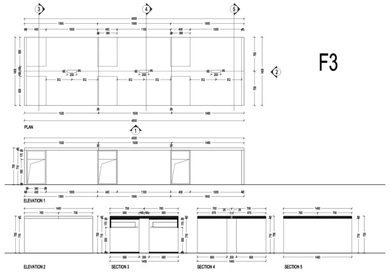




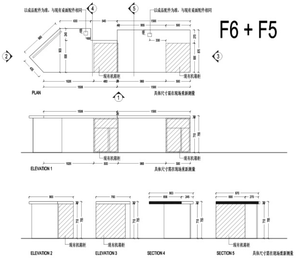
F1



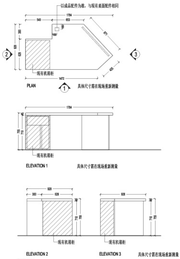
F2



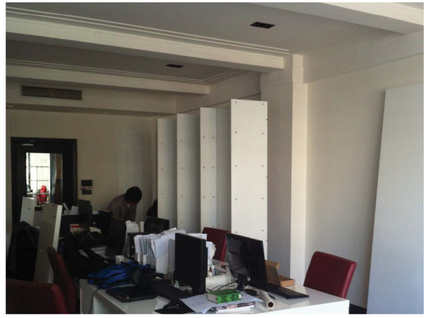
F3

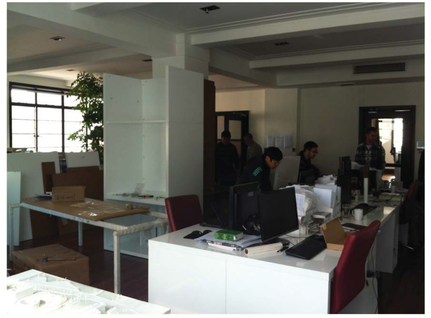


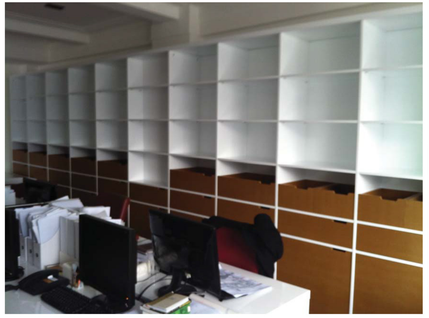
F6 + F5

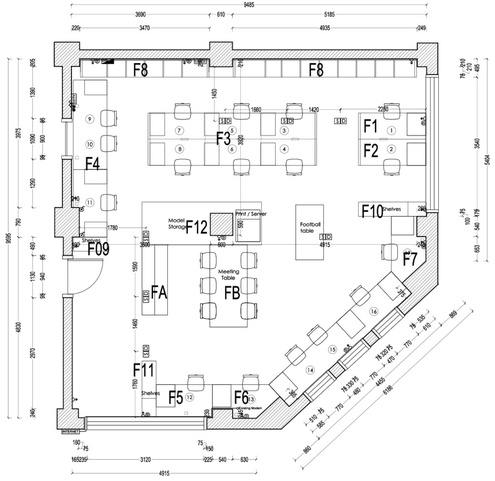


F7

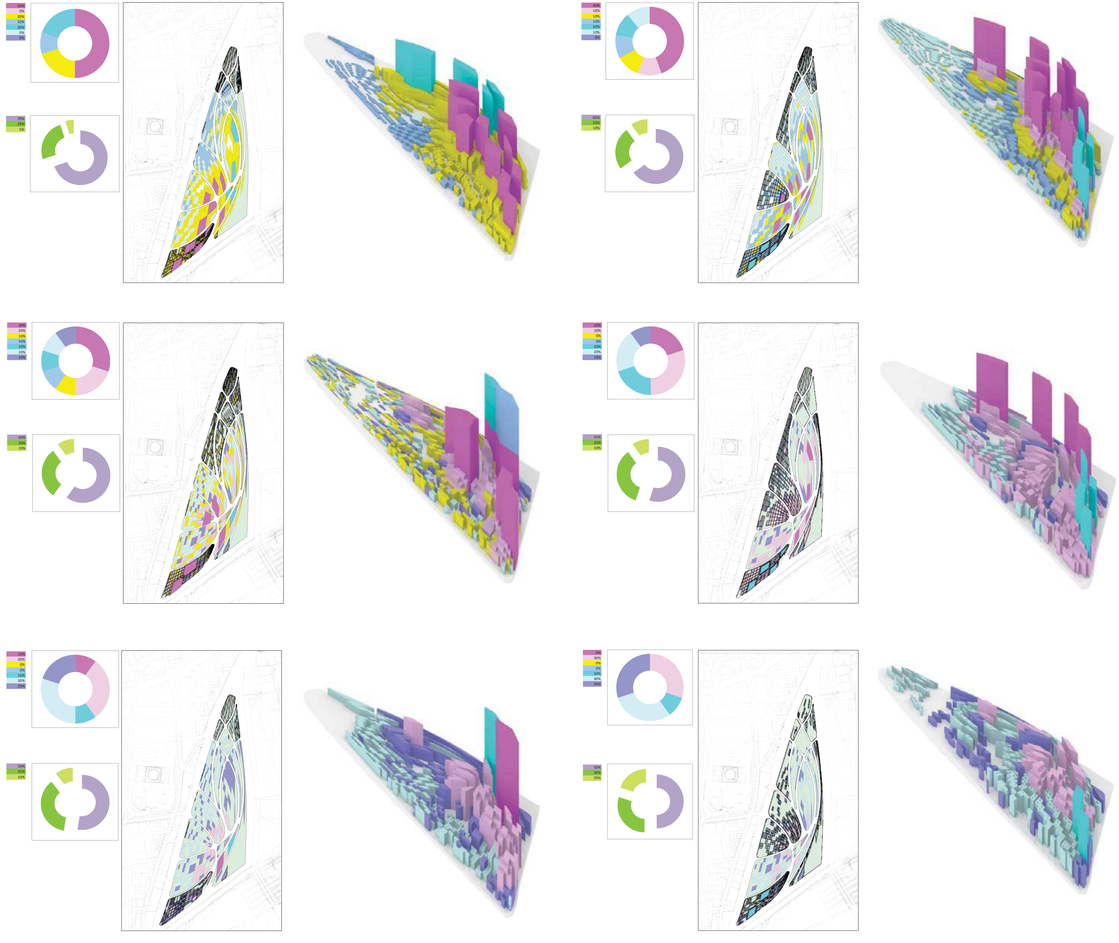


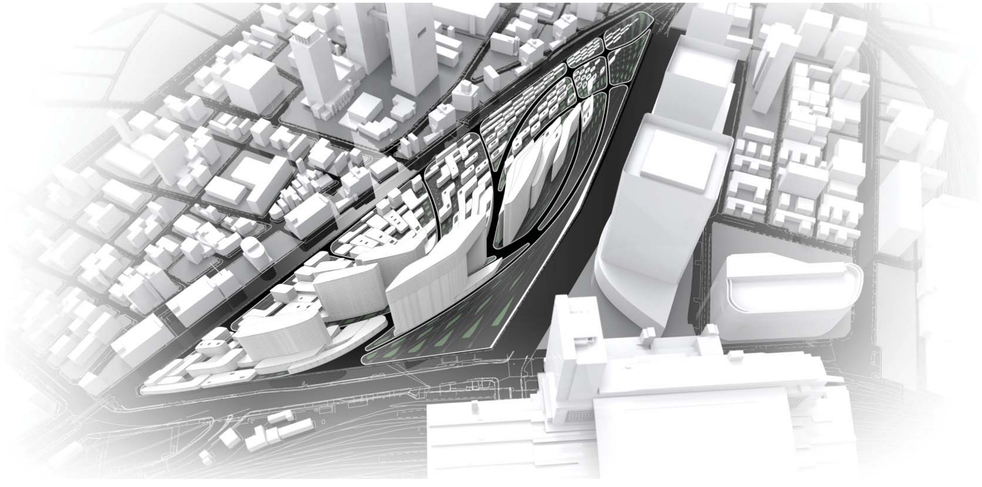


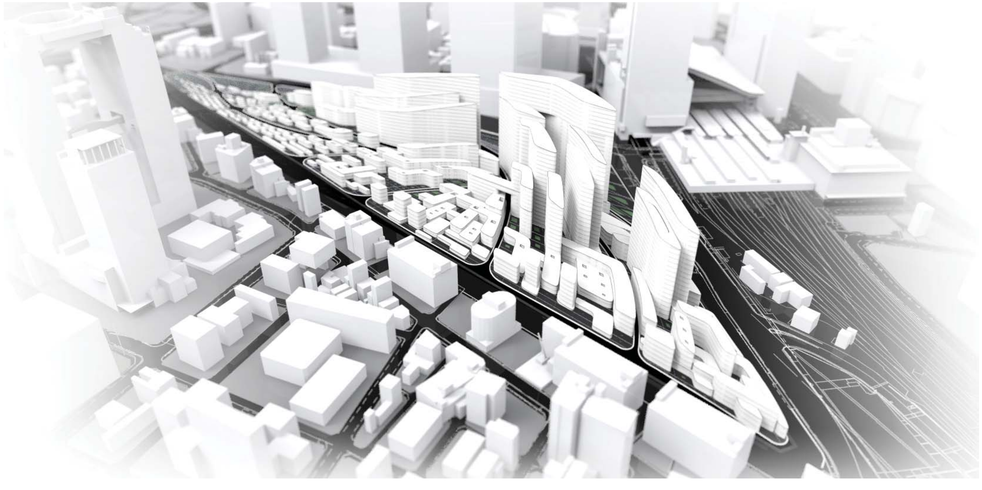




Project: Playze Office Interior Design
Location: Huangpu District, Shanghai PRC
Status: Completed 2013
Role: Lead design and
construction administration





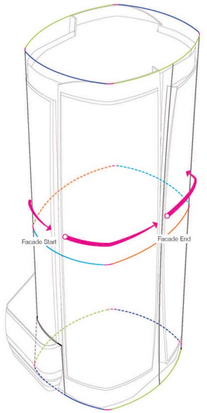


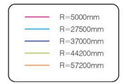
Project: Adaptive Urban Patterns
Location: Osaka Station, Tokyo Japan
Status: Competition Entry
Team Credits: Tom Verebs, Nathan Melenbrink, Mohamad Ghamlouch
Role: 3D Massing Strategies, Renderings, Plans and Diagrams

MASSING

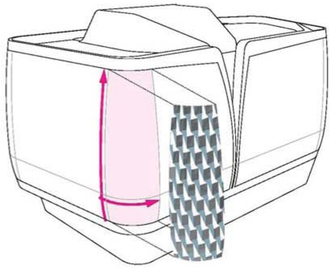
EXTERIOR ROUTING

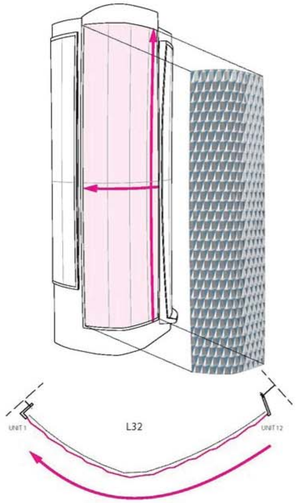
INTEIOR ROUTING

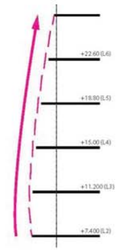


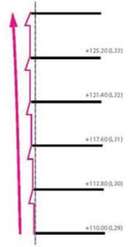


Project: SOHO Hailun Plaza Office Complex
Location: Hongkou District, Shanghai PRC
Status: Under Construction
Credits: UNStudio, LiFang CG, Inhabit Group
Role: Primary facade designer from concept through completion of design development. Coordinated with client and facade consultants. Additional design work included general form, landscape and interior.

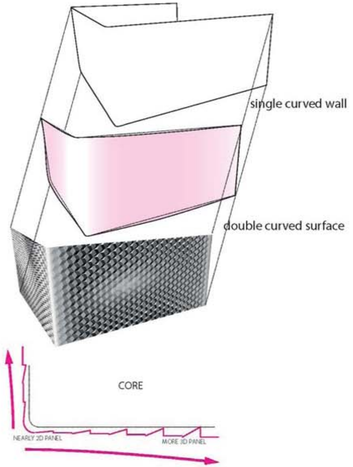




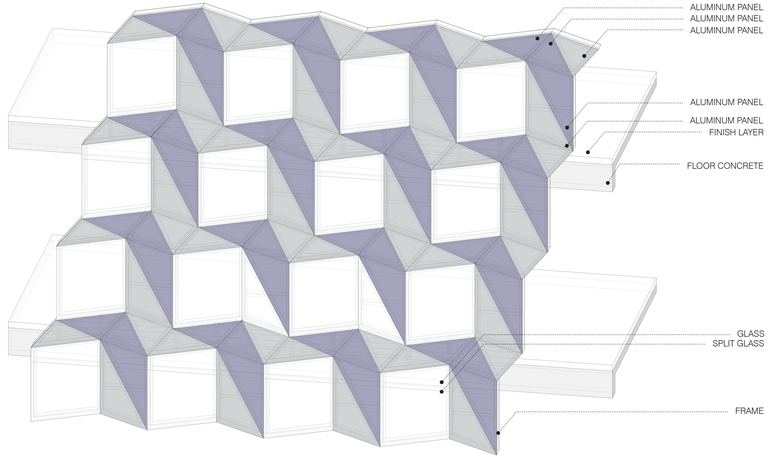


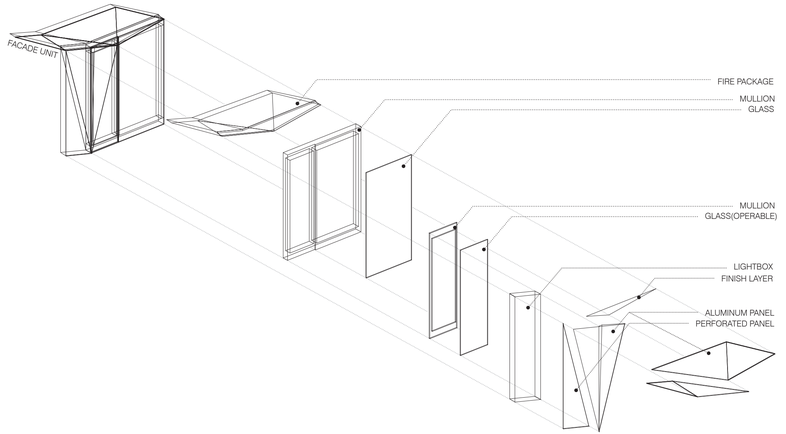


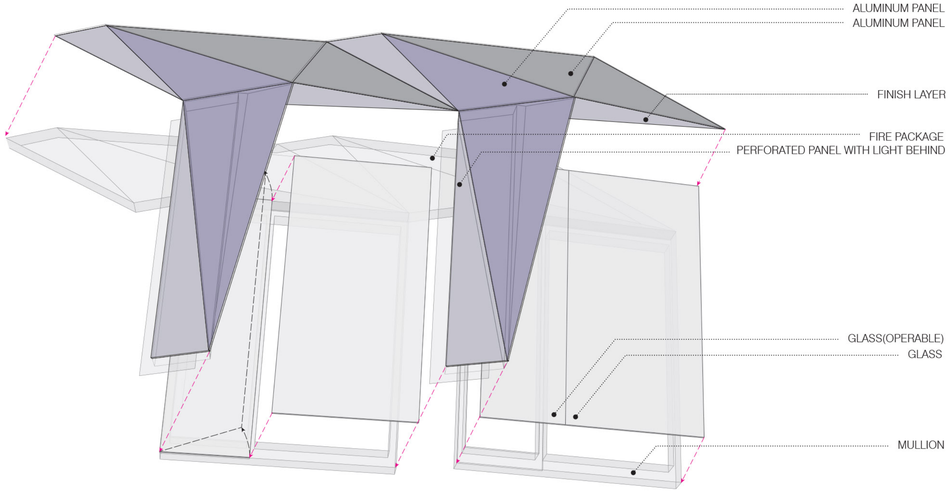
Facade units
3d facade units enable to keep double curvature of pavilions and tower without douve curvaed surface.

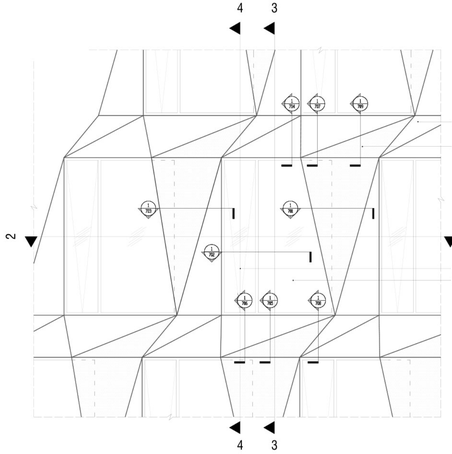


Interior panelization
3d units make the plain single curved wall have double curvature qualities.

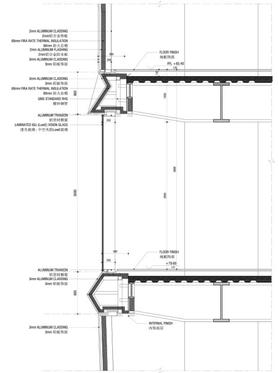




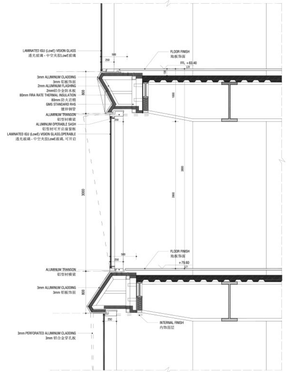




TYPICAL TOWER ELEVATION 1:25 (1)
立面



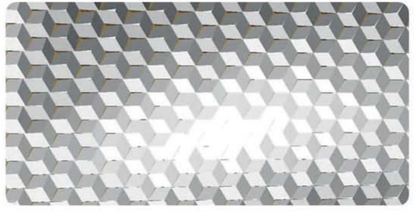
SECTION A 1:25 (3)
剖面A



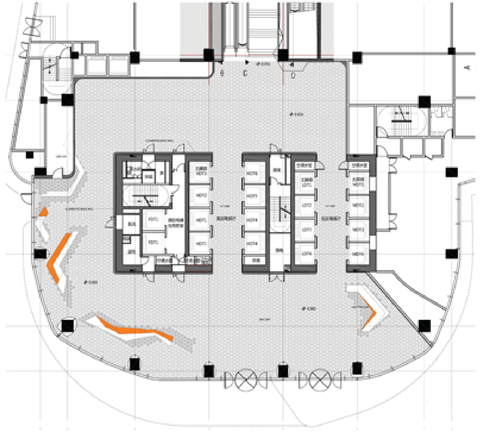
SECTION B 1:25 (4)
剖面B

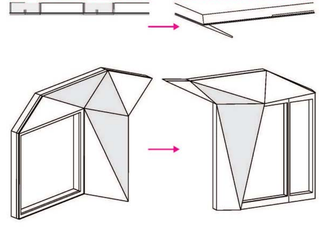
PAVILION PATTERN
2D geometry tesselation
3D visual appearance

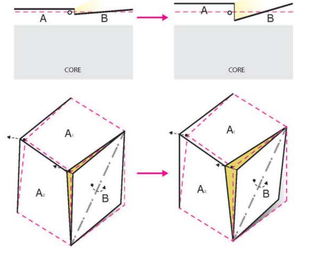
TOWER PATTERN
3D geometry tesselation
3D visual appearance



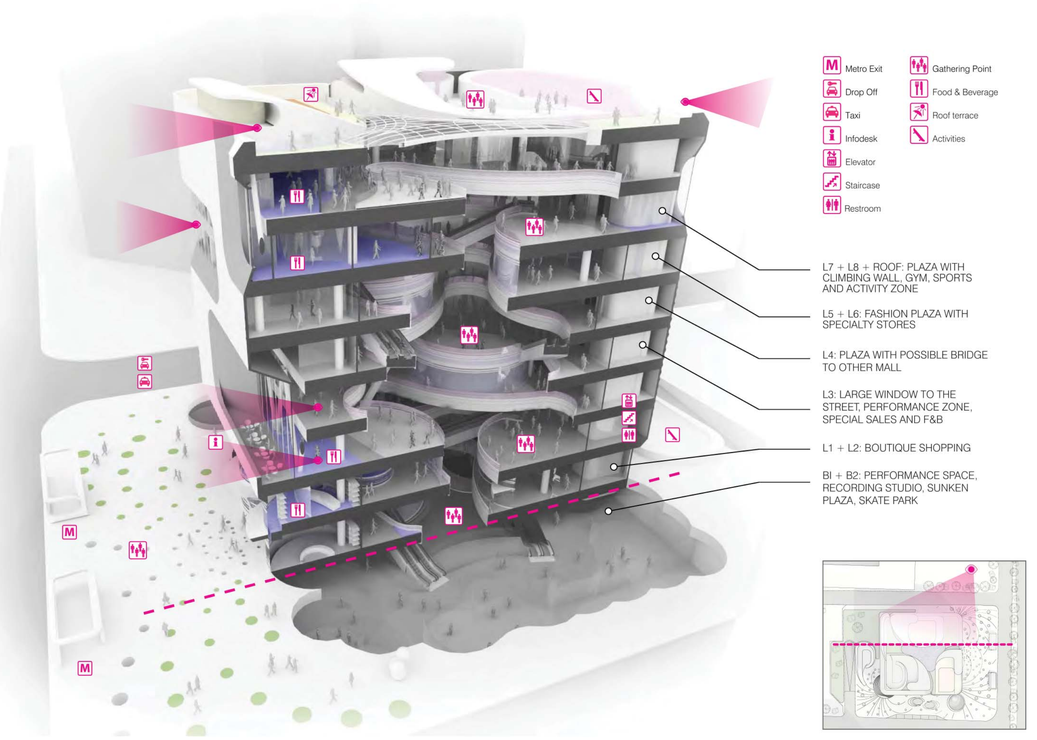
INTERIOR PATTERN
3D geometry abstraction
3D & 2D visual appearance

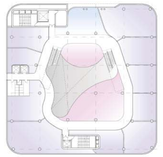






Project: KWG Fashion Mall
Location: Beijing, PRC
Status: Competition Entry, On-going
Credits: UNStudio, LiFang CG



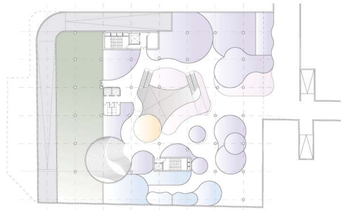


L5

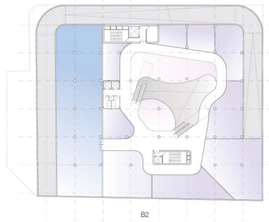
L6

L7

L8



B1



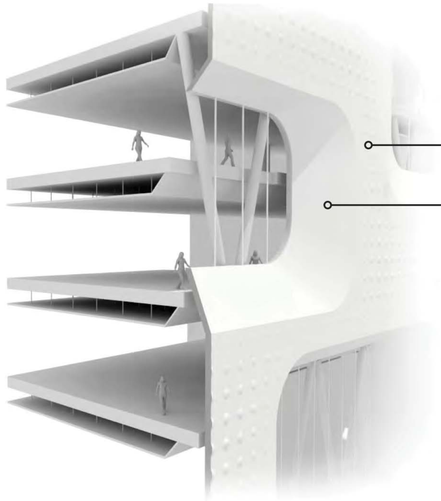
B2

Program

- Special shops
- Shops
- Shops (Low Front)
- Food & Beverage
- Show Area
- Sports
- Void
- Supermarket
- Back of house & VIP area

GFA Check

Retail	9833
F&B	1,804
Circulation	3,422
Core	1,660
Total GFA	16719
Request GFA	16320
Efficiency	69.6%



Fiberconcrete (FRC) Panel

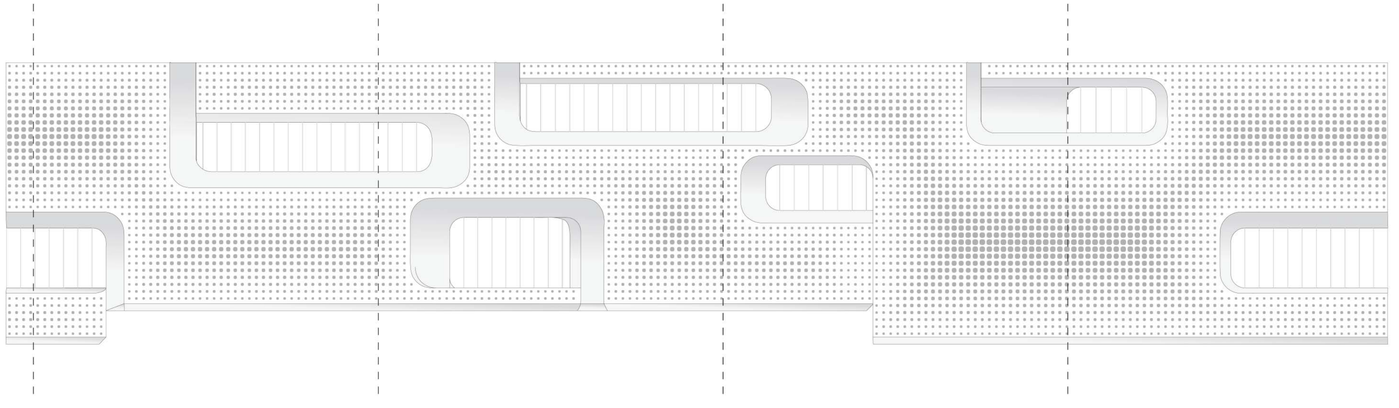
Alucobond Panel

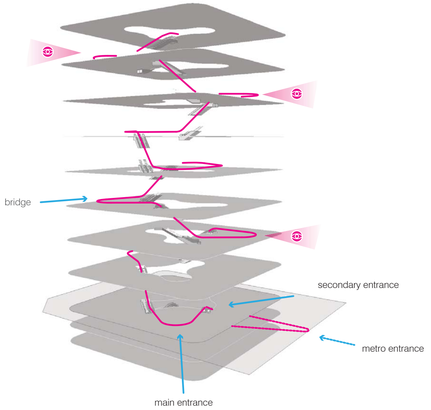
Facade Components

Radius - Elevation

Depth - Section

Block 1	0mm	200mm
Block 2	200mm	220mm
Block 3	250mm	245mm
Block 4	300mm	275mm
Block 5	350mm	305mm
Block 6	400mm	335mm
Block 7	450mm	365mm
Block 8	500mm	400mm



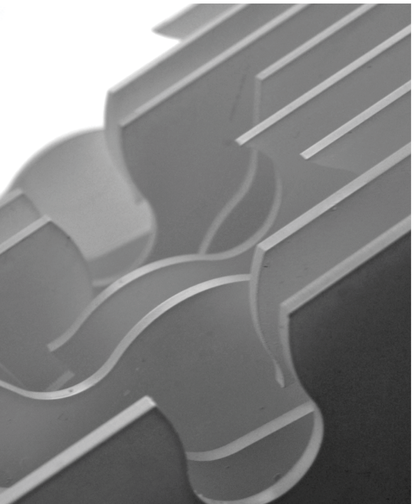


roof
L8
L7
L6
L5
L4
L3
L2
L1
B1
B2

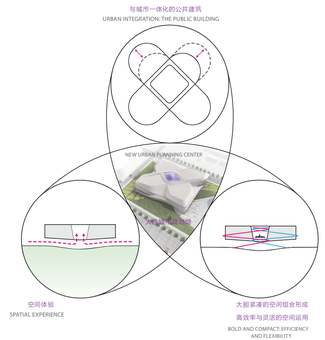
leisure and sports

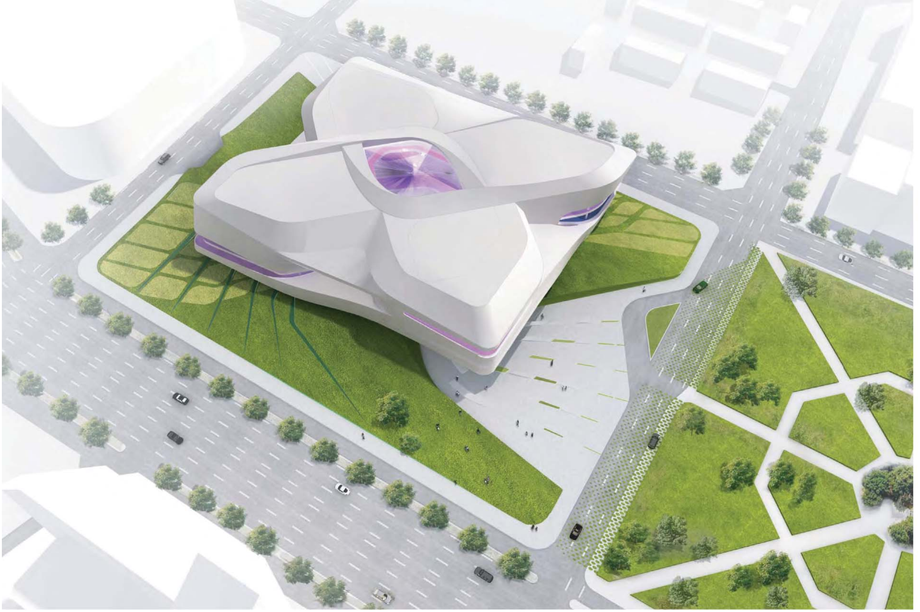
fashion plaza

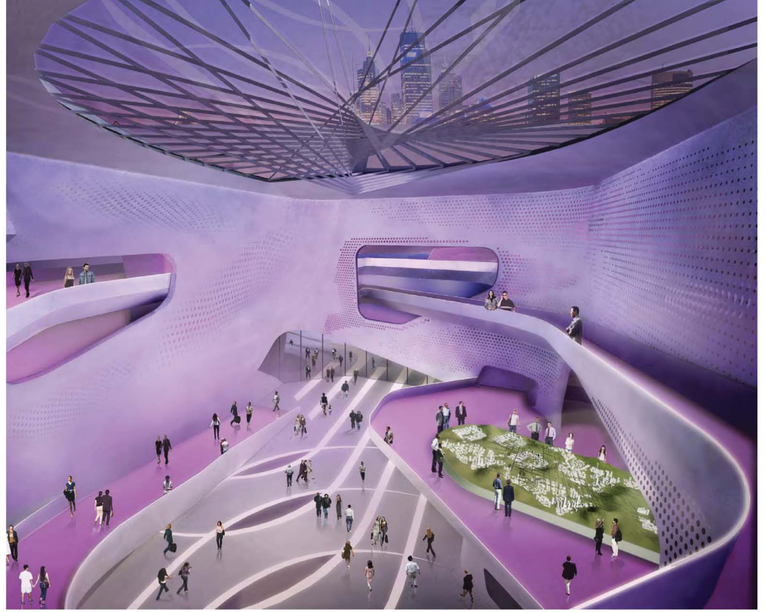
boutique shopping



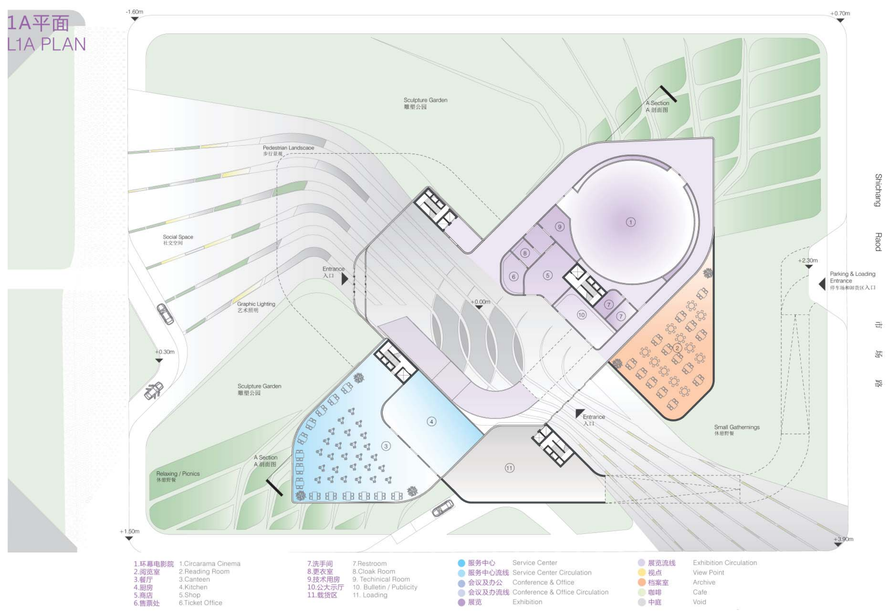
Project: Dalian Urban Planning Center
Location: Dalian, PRC
Status: Competition Entry
Credits: UNStudio, LiFang CG







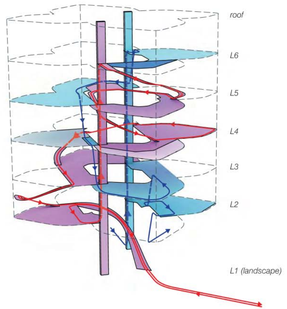
1A平面
L1A PLAN

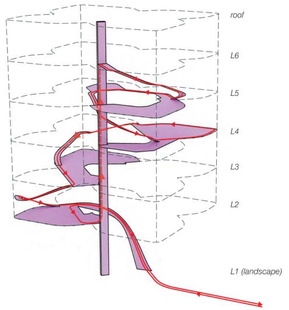


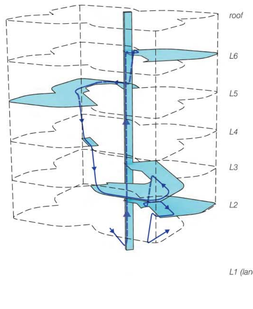
1.环幕电影院 1.Circarama Cinema
2.阅览室 2.Reading Room
3.餐厅 3.Canteen
4.厨房 4.Kitchen
5.商店 5.Shop
6.售票处 6.Ticket Office
7.洗手间 7.Restroom
8.票衣室 8.Cloak Room
9.技术用房 9. Technical Room
10.公共宣厅 10. Bulletin / Publicity
11.载货区 11. Loading

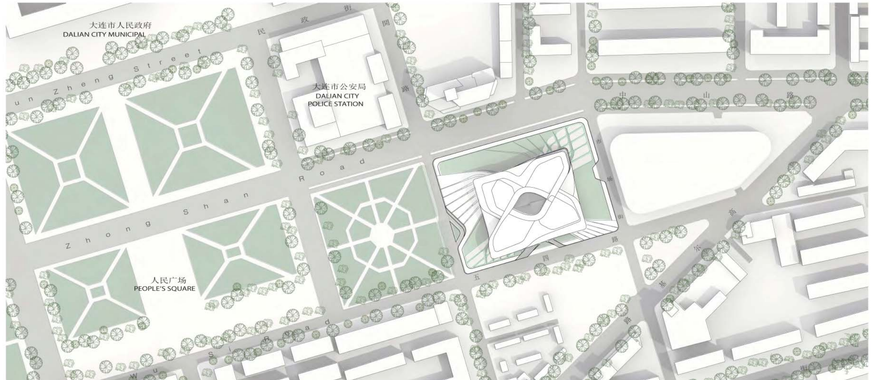
服务中心 Service Center
服务中心流线 Service Center Circulation
会议及办公 Conference & Office
会议及办流线 Conference & Office Circulation
展览 Exhibition

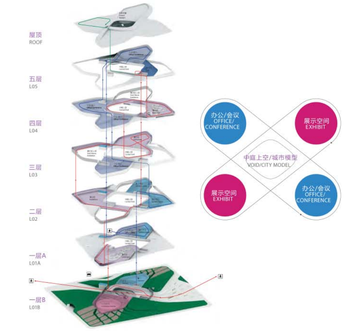
展览流线 Exhibition Circulation
视点 View Point
档案室 Archive
咖啡 Cafe
中庭 Void











Endurance and Obsolescence

The following images represent a small subset of the work done for the seed grant research project entitled “Endurance and Obsolescence” under the supervision of Professor Tom Verebes at the University of Hong Kong. A primary goal of this project was to develop a parametric tool box to facilitate more responsible urban design in mainland China. Specifically, these tools were developed to promote both a reorganization of over-familiar building typologies as well as a more harmonious engagement with topographical environments, in an attempt to steer away from the increasingly generic conditions currently found in Chinese cities.

The work displayed consists of documentation of these tools and their outputs. Some of the tools are analytical; taking 3D models of urban swatches as input, and outputting data on the area’s building mass, typologies, zoning, and local clustering. This analytical data can then be used as reference for future urban development, in order to maintain some semblance of the local urban character. Other tools produce specific design outcomes. For example, a significant part of the project was invested in developing systems of road networks that are unique to the site topography. The algorithms within these programs aim to maximize connectivity and site access while minimizing slope deviation and impact to the site. Other design tools are more architectural, generating arrays of building geometries shaped by transforming and mixing typologies, as well as employing site-specific solar vectors to optimize daylighting conditions. Additional tools then test these outcomes for viability in terms of solar exposure, programming, and massing properties. All tools were developed using either Rhinoscript or Grasshopper/VB Script.

Analysis: Reduce Existing Structures

This tool was designed as a means of strategically reducing the number of existing structures in a given urban swatch, in preparation for surgical urban intervention.

Input:
Swatch with buildings represented as polysurfaces

Variables:
Percent of cumulative volume to remove

Output:
Swatch with reduction of existing structures

Three sets of reductive logic; largest volumes first, random, and smallest volumes first. The sets progress left to right from 0% to 90% reduction by volume.

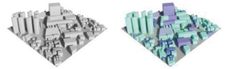
Analysis: Typology Classification

Using a set of processes in Rhinoscript, this tool takes a given urban swatch and colorizes buildings by typology. The typology is determined by the attributes of the geometry of each building; height, footprint size, volume to surface area ratio, etc.

Input:
Swatch with buildings represented as polysurfaces

Variables:
Building height, ratio of surface area to volume, footprint size, number of faces

Output:
Swatch, colorized by probable typologies.



Before and after: the swatch is colorized based on geometric attributes of the polysurfaces.

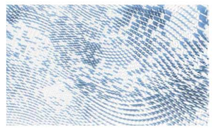
Irregular Grid Generator

This definition takes as input a 2D surface, and creates an array of curves that represent footprints of extruded volumes. The definition also uses attractor curves and proximity properties to generate differentiation across the field.

Input:
2D NURBS surface, attractor curves

Variables:
Footprint size, proximity to attractor curves, rotations and scaling vlaues

Output:
Warped grid of 2D footprints in different groups according to their type



An example of a warped 2D grid being used as a foundation for extrusions and other massing studies.

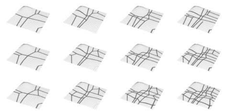
Road Grid Generator

This tool was designed with the intention of encouraging road network designs to more harmoniously engage with topography. Rather than simply imposing a rigid orthogonal grid, the road network is distorted to minimize slope and to avoid areas of extreme topographical features, which would require extensive damage to the landscape for construction.

Input:
NURBS surface topography

Variables:
Maximum allowable slope, grid density (number of roads in U/V directions)

Output:
Road network as a trimmed 3D NURBS surface, resulting subdivided blocks as 3D trimmed NURBS surfaces.



Road grid array, using consistent surface topography. Exhibits an increase in road density from left to right, and an increase in maximum allowable slope from top to bottom.

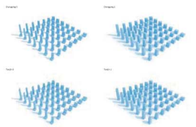
Solar Studies: Local Carving

The research has become oriented toward using site-specific solar vectors to initiate a process of boolean carving. This method became a way of transforming a simple extruded volume into one that was faceted in a way that would allow for greater daylight penetration to its surroundings.

Input:
Lines representing solar vectors

Variables:
Range of volumes, heights, and footprint areas; size of volumes array, optional rotation angle

Output:
Array of carved volumes



Array of volumes, displaying the effect of the solar carving operations on masses with varying heights and footprint dimensions. The masses rotate relative to the southern face, causing additional variation of massing effects.

Analysis: Solar Massing Proportion

This analysis tool is designed to study the properties of masses with consistent volumes but differing proportions. The masses are analyzed in terms of solar exposure and surface area. More suitable solutions are those that maximize solar exposure and surface area relative to the volume.

Input:
Range of X, Y, Z dimensions

Variables:
Grid size, solar exposure, surface area, volume

Output:
Color-indexed array of polysurfaces, with darker colors representing more suitable volumes.

Array of masses, all with a consistent volume, color-indexed with darker colors representing the masses with more suitable proportions.

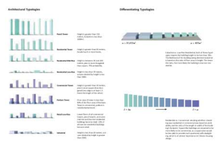
Analysis: Urban Data Miner

The urban data miner is a series of processes in RhinoScript that describes the spatial context of a given urban swatch. Typologies are determined by spatial properties of each building. The script returns a series of statistics on the spatial composition of the swatch.

Input:
Urban swatch with buildings modelled as polysurfaces

Variables:
Typology, height, volume, surface area, proximities

Output:
Table of data describing the typological make-up of the swatch, proportions, volumes, dimensions and deviations.



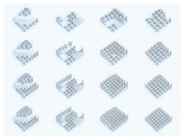
Mixed-Typology Arrays

This definition builds upon a previous road network generator definition, which dictates, according to the topography, where buildings can be built, and the size and shape of their footprints. The user can adjust the size of the array as well as the range of heights, rotations, footprints, and faceting conditions of the geometries.

Input:
NURBS surface topography

Variables:
Maximum allowable slope, grid density, range of heights, rotations, footprint size, faceting

Output:
Array of mixed-typology volumes, as dictated by the buildable area of the topography and the user-adjusted variables.



Series of arrays showing how the topography deforms the road network and prevents building in certain areas. Building height, footprint, rotation and faceting are all variable in the definition.

Site Envelopes

This application builds upon previous road network-generating methods, applied to a topography of any size. The definition then uses input solar vectors to create building envelopes on the city block scale.

Input:
NURBS surface topography

Variables:
Maximum allowable slope, grid density (number of roads in U/V directions), solar vectors

Output:
Road network as a trimmed 3D NURBS surface, trimmed polysurfaces representing building envelopes.

Series of site envelopes using a consistent set of solar vectors over a range of grid densities.

Solar Studies: Urban-Scale Carving

Building upon the previous operations of solar vector carving on individual volumes, this tool aims to apply those operations to a city scale, considering contexts such as topography and surrounding volumes. Thus, a simple urban massing diagram becomes a cohesive group of faceted structures, with specific geometries resultant of proximities, densities, and topography.

Input:
Lines representing solar vectors, massing volumes

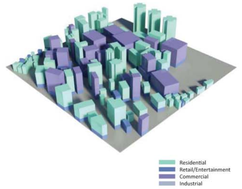
Variables:
Amount of carving allowed (volumetric deviation from original geometry)

Output:
Volumes carved to maximize solar exposure and minimize volume loss

Array of volumes, displaying the effect of the solar carving operations on masses with varying heights and footprint dimensions.

Chongqing

Central Business District



Number of Buildings: 120

Mean Building Height: 45.51m
Min Building Height: 11.08m
Max Building Height: 100m
Building Height Deviation: 22.53m

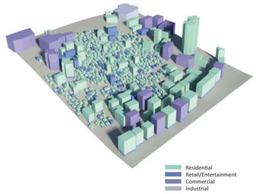
Mean Building Footprint: 640.2m2
Min Building Footprint: 44.13m2
Max Building Footprint: 4965.45m2
Building Footprint Deviation: 785.32m2
Cumulative Building Footprints: 76824.53m2

Mean Floor Area: 8529.51m2
Min Floor Area: 219.8m2
Max Floor Area: 69516.34m2
Floor Area Deviation: 11443.51m2
Cumulative Floor Area: 1023541.15m2

Floor Area Ratio: 4.09

Chongqing

Inner City



Number of Buildings: 602

Mean Building Height: 10.66m
Min Building Height: 6.05m
Max Building Height: 106.3m
Building Height Deviation: 10.42m

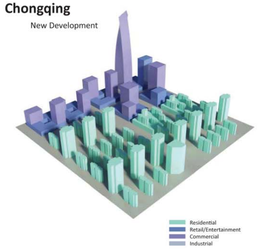
Mean Building Footprint: 127.71m2
Min Building Footprint: 20.3m2
Max Building Footprint: 5384.49m2
Building Footprint Deviation: 318.08m2
Cumulative Building Footprints: 76883.82m2

Mean Floor Area: 786.42m2
Min Floor Area: 20.3m2
Max Floor Area: 48460.37m2
Floor Area Deviation: 3128.4m2
Cumulative Floor Area: 473423.9m2

Floor Area Ratio: 1.89

Chongqing

New Development



Number of Buildings: 49

Mean Building Height: 56.96m
Min Building Height: 15m
Max Building Height: 282.01m
Building Height Deviation: 41.39m

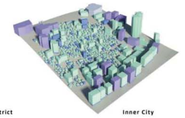
Mean Building Footprint: 1695.34m2
Min Building Footprint: 379.49m2
Max Building Footprint: 5925.28m2
Building Footprint Deviation: 2713.87m2
Cumulative Building Footprints: 83071.79m2

Mean Floor Area: 29059.5m2
Min Floor Area: 3035.93m2
Max Floor Area: 233132.1m2
Floor Area Deviation: 55451.2m2
Cumulative Floor Area: 1423915.74m2

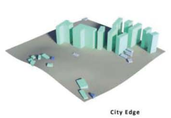
Floor Area Ratio: 5.7

Chongqing


Central Business District


Inner City


Outer City

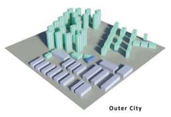

City Edge

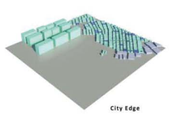

New Development

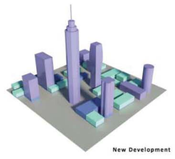
Tianjin

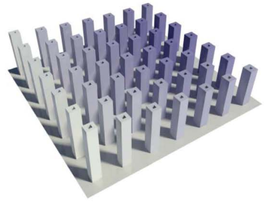

Central Business District

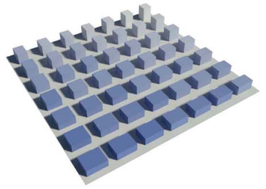

Inner City

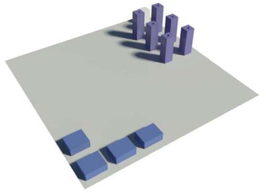

Outer City


City Edge

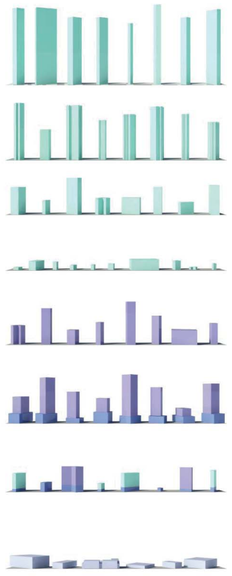

New Development







Architectural Typologies



Pencil Tower

Height is greater than 150 meters, footprint is less than 1000m².

Residential Tower

Height is greater than 60 meters, facade has 8 or more facets.

Residential Mid-Rise

Height is between 30 and 100 meters, plan is more elongated than square, 70% probability.

Residential Low-Rise

Height is less than 30 meters, volume divided by height is less than 5000.

Commercial Tower

Height is greater than 30 meters, plan is more square than elongated (one edge is at least 1.5 times the length of the other)

Podium Tower

Floor area of tower is less than 90% of the floor area of the base. Tower is commercial, podium is retail/entertainment.

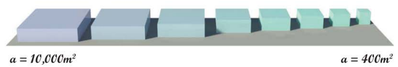
Retail Low-Rise

Lower floors of all commercial towers, pencil towers, and some mid-rise and low-rise residential buildings become retail. 10% of all low-rise residential buildings become retail.

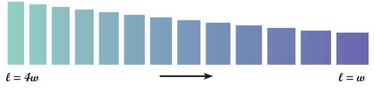
Industrial

Height is less than 30 meters, volume divided by height is greater than 5000.

Differentiating Typologies

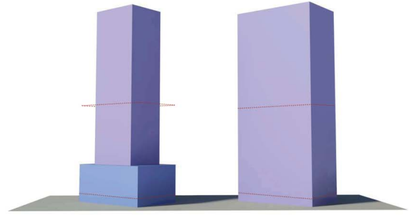


Industrial vs. Low-Rise Residential: Both of these typologies require the building height to be less than 30m. The likelihood of the building being deemed industrial is based on the ratio of floor area to height. The lower the ratio, the more likely the building is low-rise residential.

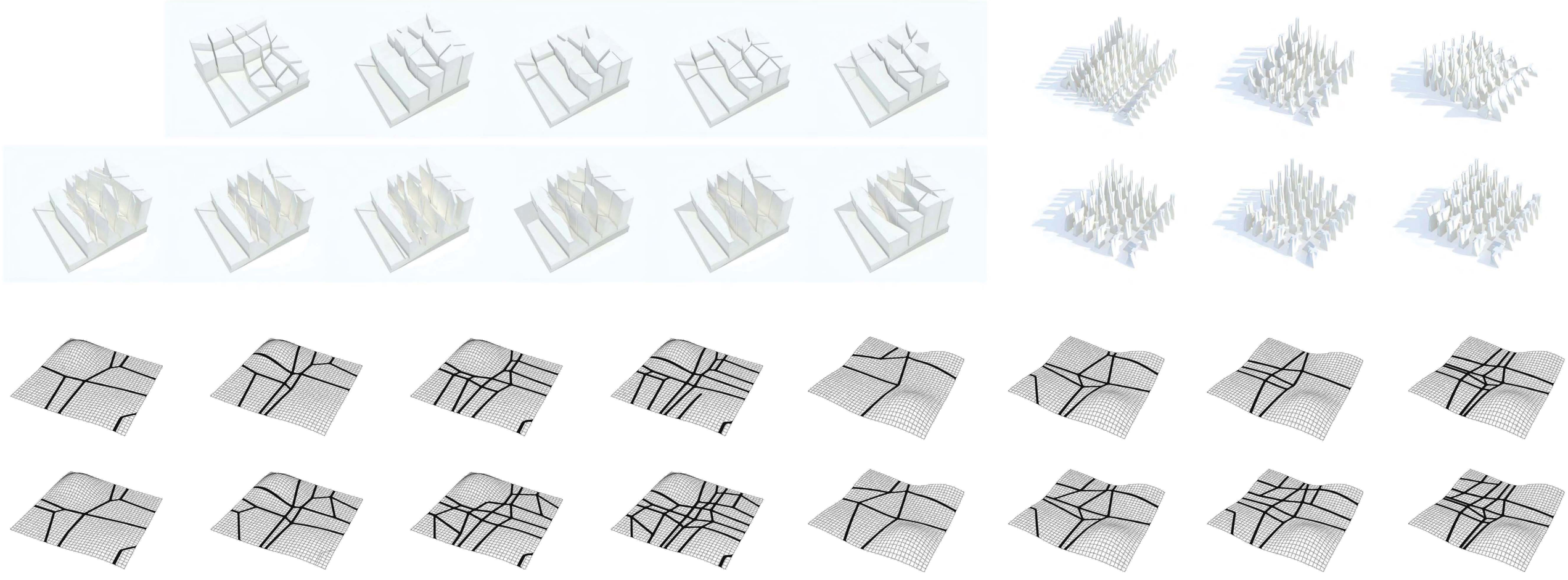


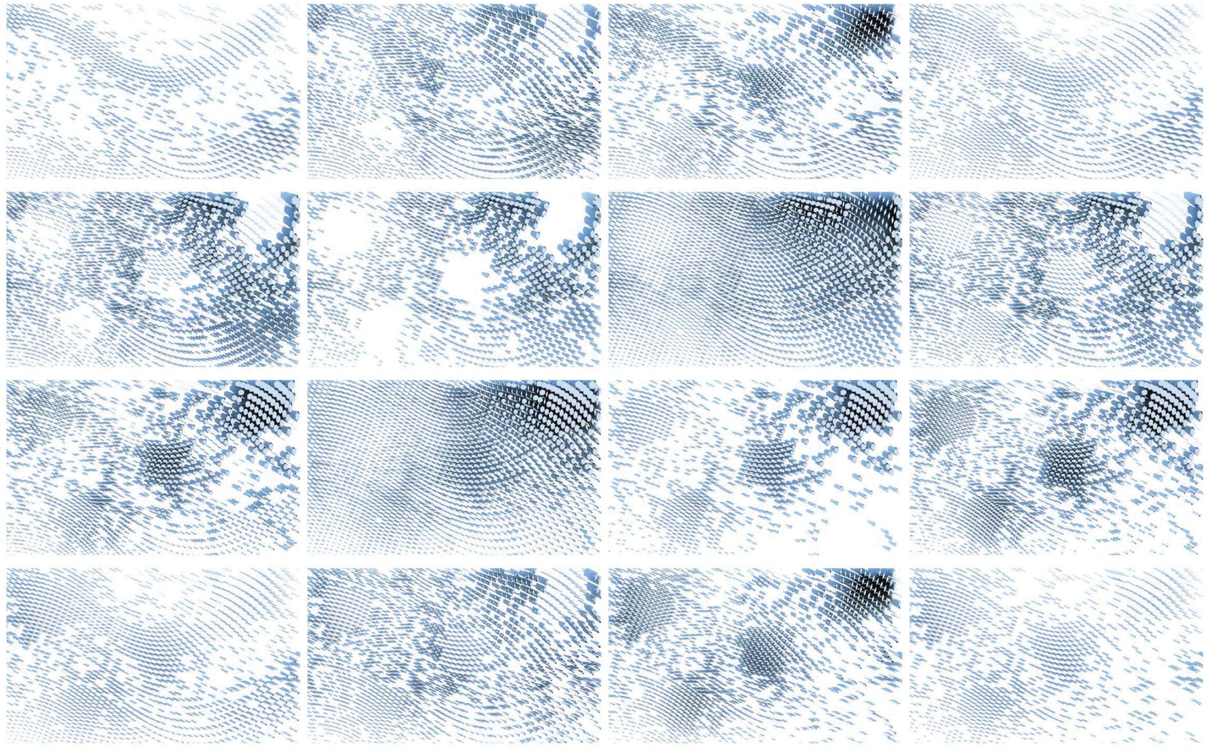
Residential vs. Commercial: deciding whether a building was residential or commercial was based on probability and the ratio of the length to width of the building's footprint. Square-like buildings are assumed to be more likely to be commercial, as a square plan would be less able to provide each apartment with daylighting, which is of utmost importance in Chinese housing design.

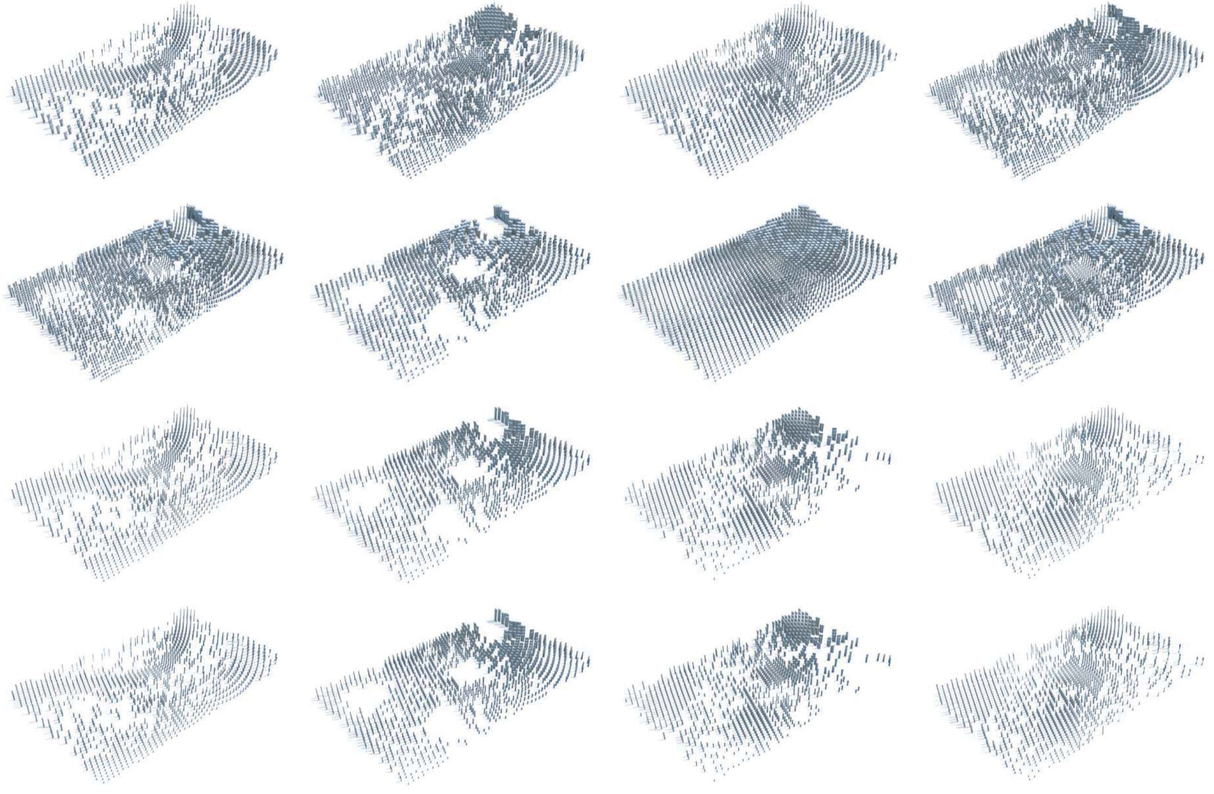
A showcase of the analytical tools developed: a wide range of sites are selected and modeled as 500m x 500m swatches. An "urban data miner" script analyzes each urban swatch and assesses the typological composition of each. The diagrans below illustrate the criteria used to analyze each swatch. The image on the left shows a range of geometries that are analyzed for performance in terms of solar exposure, surface area and volume.

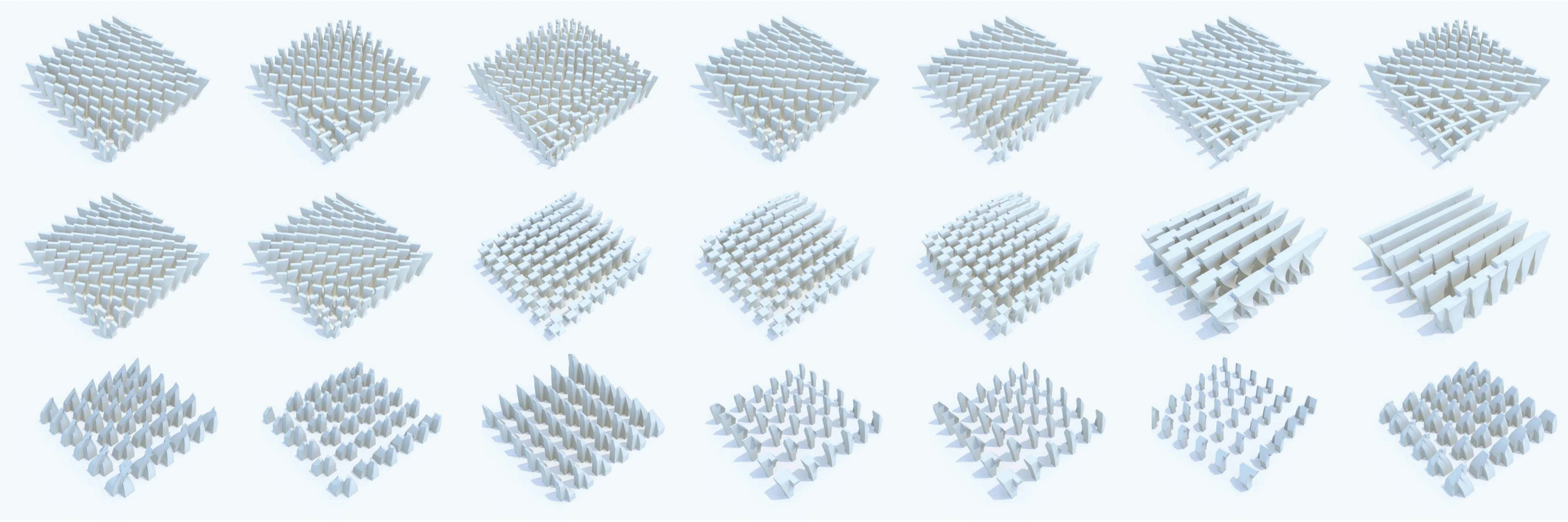


Podium Tower: This architectural typology is easily identified by comparing the area of the first floor to the area of the middle floor. If the area of the middle floor is less than 90% of that of the first floor, the building is assumed to fall under the podium typology, with the base being retail/entertainment and the tower being commercial.









This series of arrays illustrates a variety of procedures used to introduce typological deviation, mixing, and reorganization. In addition to the scaling and rotations used, the bottom row employs a method of "solar carving" using site-specific solar vectors to shape building geometries in such a way that they maximize their daylighting potential while minimizing shading and visibility impact to their surroundings.

Digital Simulation Lab

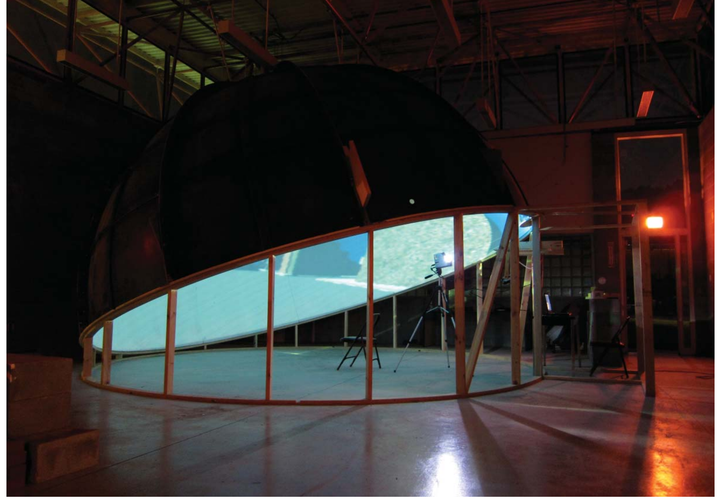
In the summer of 2010 during my Adjunct Faculty appointment at Virginia Tech College of Architecture and Urban Studies, I initiated a proposal for a Digital Simulation Lab. I enlisted the support of other faculty in the Colleges of Architecture and Urban Studies and Engineering, School of Visual Arts and the Department of Computer Science.

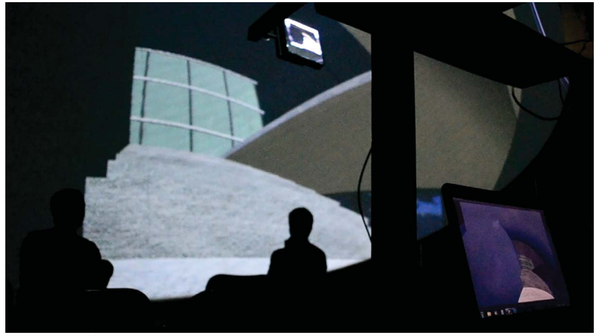
A primary feature of this Digital Simulation Lab was to be a dome projection space, which would be primarily used for immersive architectural visualizations. I believe dome projection, whether monoscopic or stereoscopic, to be superior to CAVE environments or commercial virtual reality systems, because the absence of a reference plane makes the projection more convincing. In architectural terms, this would give designers an opportunity to break away from the planarity of their screens and experience the spaces they were creating at a level not previously available.

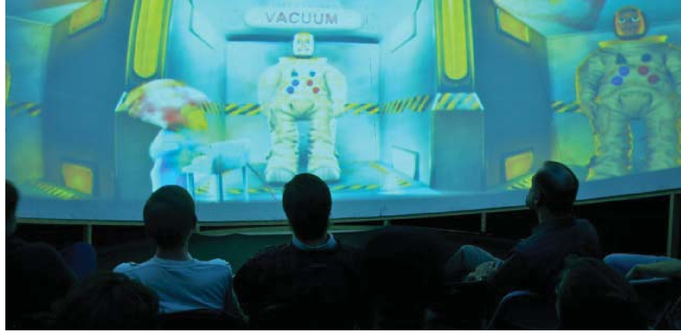
I contacted a third party donor and secured the temporary use of a 20′ fiberglass dome and hemispherical projection system. With the help of another faculty member, I designed a base and console for the dome, then installed and calibrated the dome and projection system. Using video game development software called Unity3D, I coded a system that would warp a 3D environment in real-time so that it would appear geometrically accurate within the dome. The software was designed to simulate the experience of an environment at a one-to-one scale, as a counter to the types of fly-throughs and birdeye renderings that are increasingly commonplace in the profession, and which I believe can cause architects to lose track of scale.

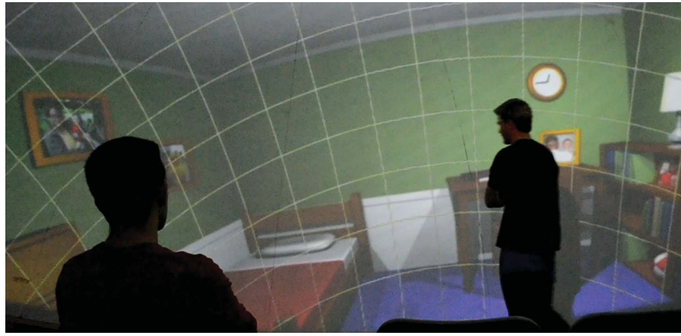
The dome was used extensively for architectural visualizations, thesis projects, presentations and full-length feature film projections. Unfortunately, due to budget cuts and my departure, the project was abandoned.

Additional Credits: ASH Enterprises, Chip Clark, Dennis Jones, Brian Squibb, Ico Bukvic







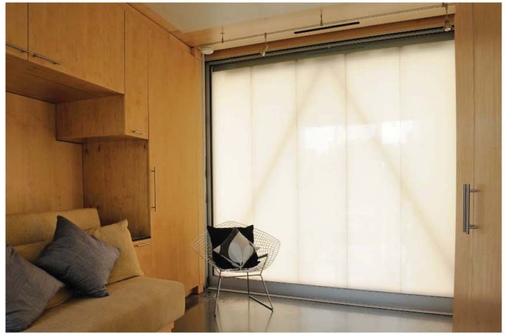


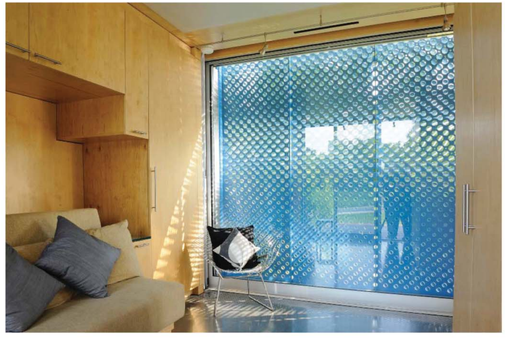
Solar Decathlon House

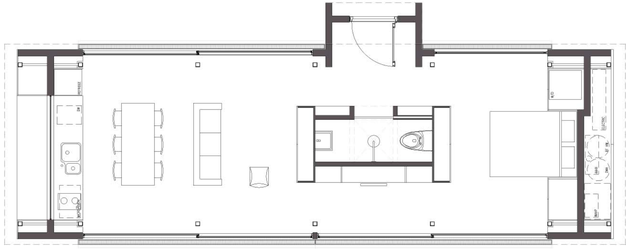
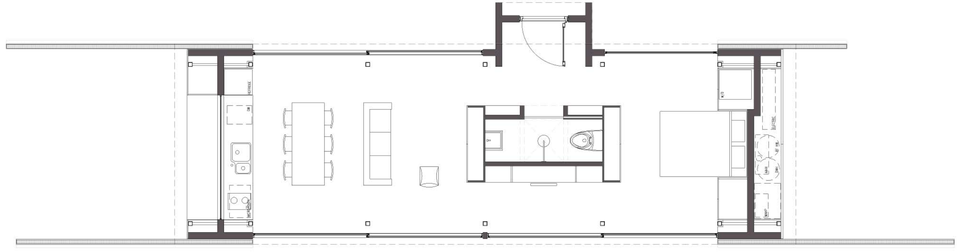
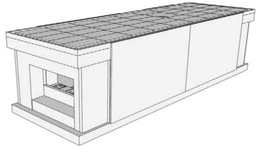
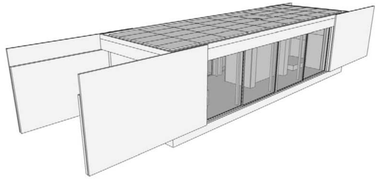
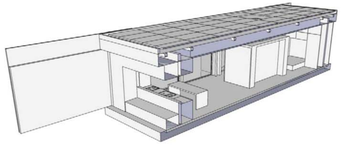
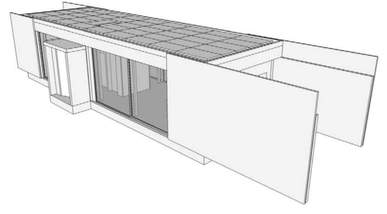
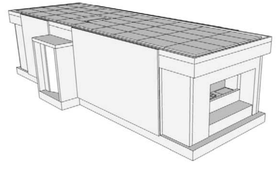
The Lumenhaus was an interdisciplinary design/build project conducted at Virginia Tech, designed for entry into the 2009 Solar Decathlon competition. It was bound to the requirements of being under 800ft^2 and able to generate 100% of its own energy exclusively from the sun. My involvement ranged from the beginning of the project in 2006 until the construction process in 2009, working for pay for two summers and for credit for 4 semesters. The first phases of the project involved thorough research and investigation of preliminary design concepts. Our initial team of 3 designers arrived at our first design proposal in 2008, entitled the "Slip House" and based on the idea of creating a transparent, modernist-inspired structure that would still be capable of a high level of thermal performance. This first proposal involved a submission of a full set of Design Documentation drawings, as well as a comprehensive documentation of the design and systems. Later on, my role was leading the research and design of innovative facade systems for the house, proposing a series of designs and construction methods and coordinating with the manufacturing company. Due to my departure to China, the final facade design was a collaborative effort.

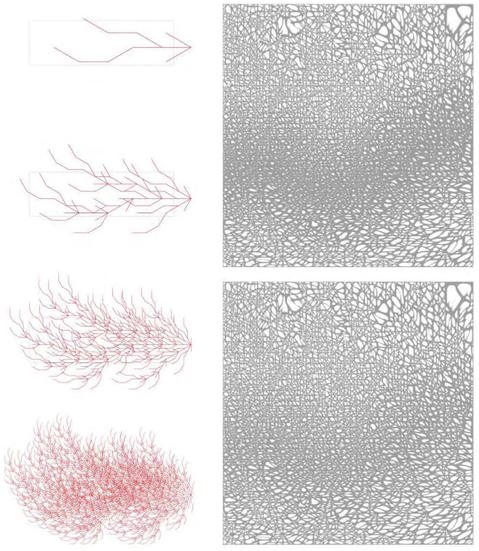
All images courtesy of Virginia Tech.

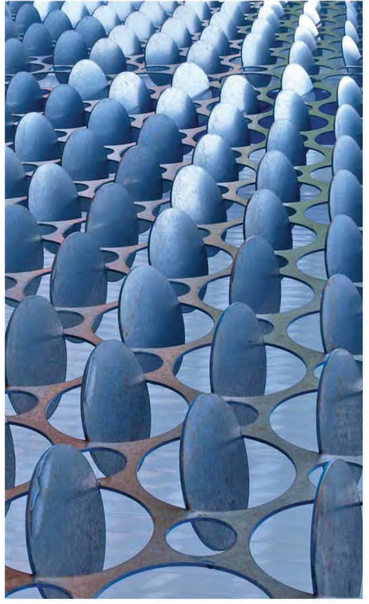
lumenHAUS

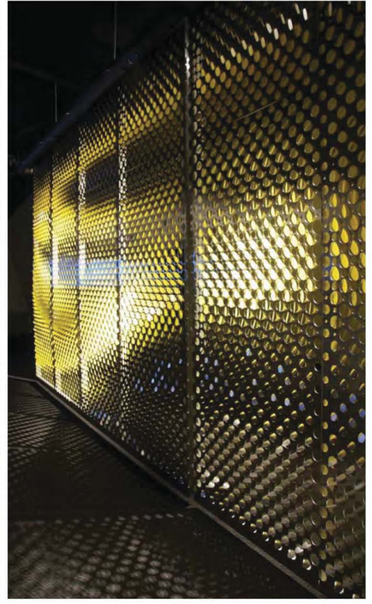


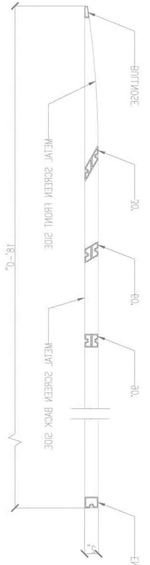











SHEET KEYNOTES

1. PHOTOVOLTAIC ARRAY
2. SIPS WALL PANEL
3. ZINC CLADDING SPEC 074619
4. PVC MEMBRANE ROOFING SPEC 075419
5. TAPERED INSULATION ON SIPS ROOF PANEL
6. MAPEI VENEERED WOOD CABINETRY–PLYBOND BY COLUMBIA FOREST SPEC 064113
7. GRANITE COUNTERTOP
8. MAPEI VENEERED BASE CABINETRY SPEC 064113
9. CONCRETE FLOOR ON STEEL DECK (SEE SPECIFICATIONS 030000 FOR CONCRETE SPECS)
10. SPRAY FOAM INSULATION SPEC 072119
11. IPE WOOD DECKING SPEC 061533
12. FOUNDATION SUPPORT
13. METAL SHADING/PRIVACY SCREEN
14. INSULATION PANEL
15. SLIDING GLASS DOOR SYSTEM
16. AUTOMATED DRAPERY SYSTEM
17. STRETCHED FABRIC CEILING SYSTEM
18. PLYWOOD SOFFIT FRAME
19. STEEL COLUMN BEYOND

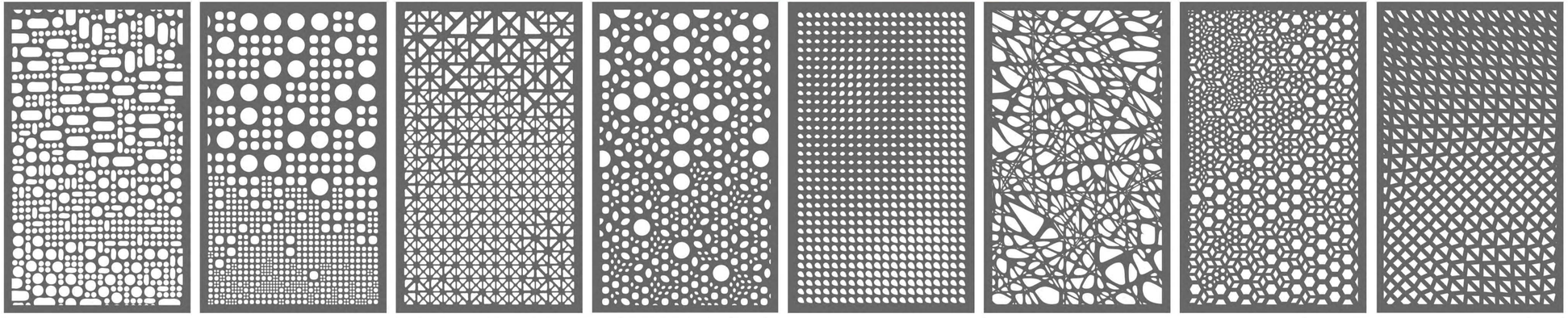
SHUTTER SHADES

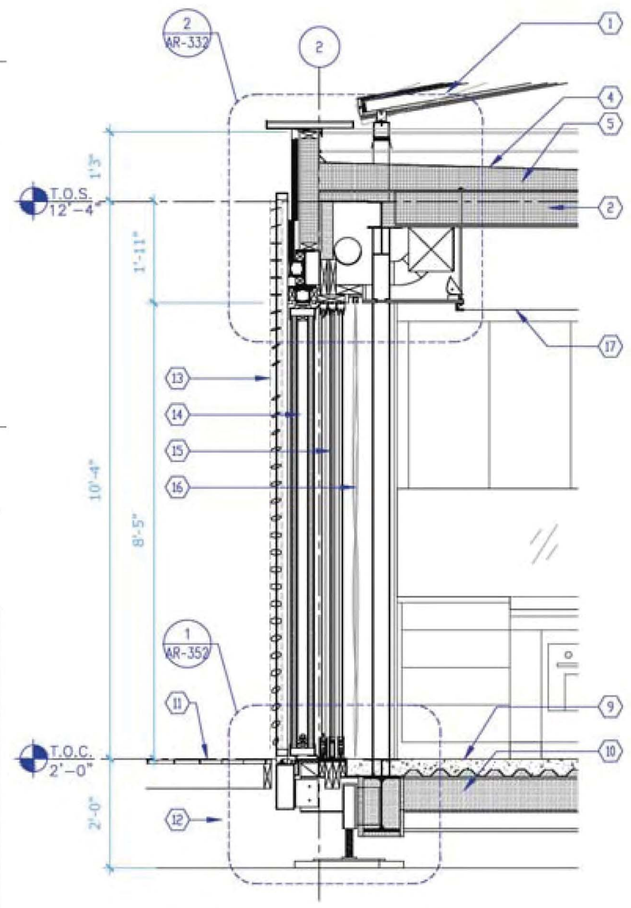
BLOCKS DIRECT SUNLIGHT

STEEL FABRICATION

RECYCLABLE MATERIAL

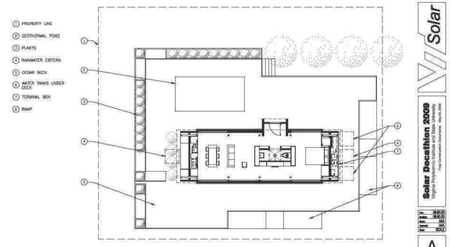
ADJUSTABLE FOR SUN COLLECTION AND USER PREFERENCE



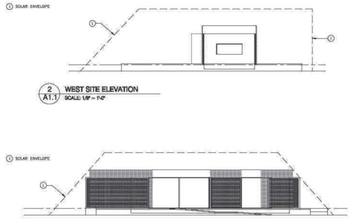


1 AR-341 WALL SECTION

SCALE: 1/2" = 1'-0"

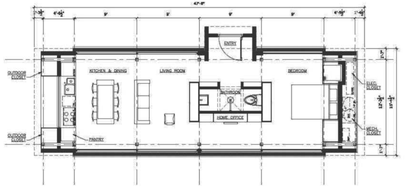


1 SITE PLAN
A1.0 SCALE: 1/8" = 1'-0"

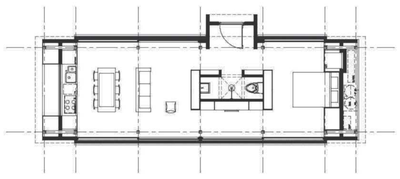


2 WEST SITE ELEVATION
A1.1 SCALE: 1/8" = 1'-0"

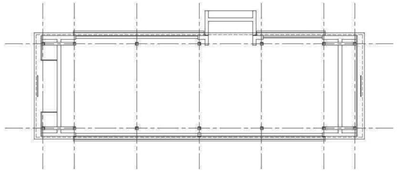
1 SOUTH SITE ELEVATION
A1.1 SCALE: 1/8" = 1'-0"



1 PLAN
A1.2 SCALE: 1/8" = 1'-0"

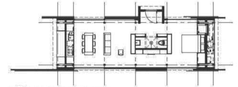


1 MATERIAL PLAN
A1.3 SCALE: 1/8" = 1'-0"

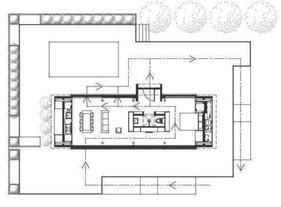


1 REFLECTED CEILING PLAN
A1.4 SCALE: 1/8" = 1'-0"

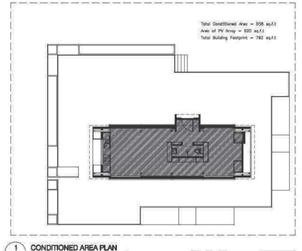
2 PLAN CONFIGURATION
A1.5 SCALE: 1/8" = 1'-0"



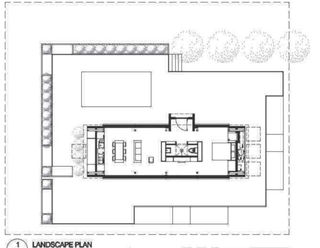
1 PLAN CONFIGURATION
A1.5 SCALE: 1/8" = 1'-0"



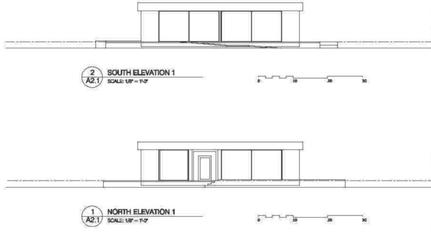
1 TOUR & ADA PLAN
A1.6 SCALE: 1/8" = 1'-0"



1 CONDITIONED AREA PLAN
A1.7 SCALE: 1/8" = 1'-0"

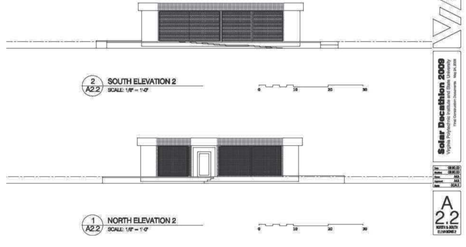


1 LANDSCAPE PLAN
A1.8 SCALE: 1/8" = 1'-0"



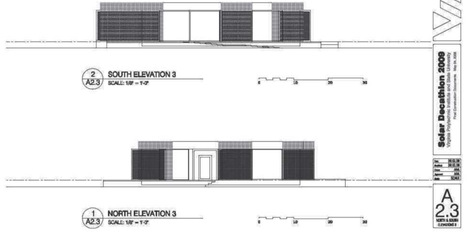
2 SOUTH ELEVATION 1
A2.1 SCALE: 1/8" = 1'-0"

1 NORTH ELEVATION 1
A2.1 SCALE: 1/8" = 1'-0"



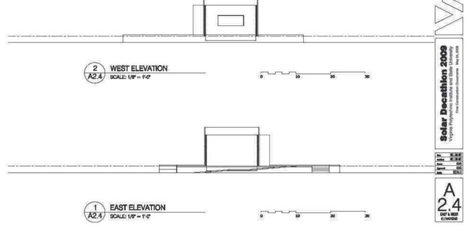
2 SOUTH ELEVATION 2
A2.2 SCALE: 1/8" = 1'-0"

1 NORTH ELEVATION 2
A2.2 SCALE: 1/8" = 1'-0"



2 SOUTH ELEVATION 3
A2.3 SCALE: 1/8" = 1'-0"

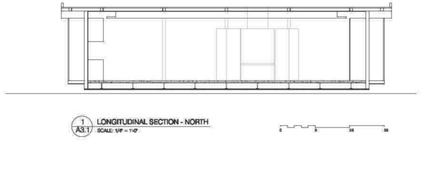
1 NORTH ELEVATION 3
A2.3 SCALE: 1/8" = 1'-0"



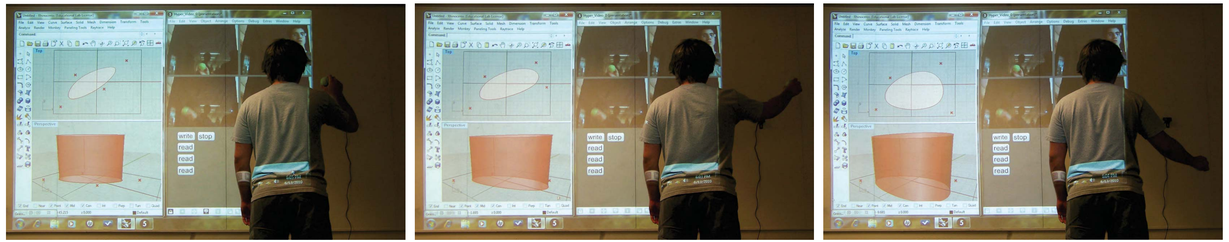
2 WEST ELEVATION
A2.4 SCALE: 1/8" = 1'-0"

1 EAST ELEVATION
A2.4 SCALE: 1/8" = 1'-0"

1 SECTION @ DINING
A3.0 SCALE: 1/8" = 1'-0"



1 LONGITUDINAL SECTION - NORTH
A3.1 SCALE: 1/8" = 1'-0"



A demonstration of the color-tracking interface. The user moves a tennis ball in front of the camera, which streams tracking data into Max/MSP at a speed of 33 fps(right side of screen). Four quadrants represent four movie clips; three pre-recorded (temporarily paused fordemonstration) and one live feed (bottom right quadrant). The data is then sent to Rhino via Grasshopper, where it is developed into a volume.

Solar Charging Station

The Solar Charging Station was a fast-paced 6-week design/build project that was used as a manifestation of the thesis ideas presented earlier in the text. It began as a senior design project for a team of eight mechanical engineers, as a means of raising support for a larger project to build a solar powered medical clinic in Kenya. The intent was that people who use the station would gain a better understanding the accessibility and efficacy of solar energy, and hopefully volunteer or make a contribution to the Kenya project.

The intention for the charging station was that it be installed in a high-traffic area on campus, in order to maximize exposure and usage. It needed to include a means of supporting the two photovoltaic panels as well as a housing to enclose the electrical components. Additionally, there needed to be a seating surface as well as a table surface. This would create an ideal outdoor work station, with access to solar charging, internet (from adjacent buildings on campus), and shading provided by the photovoltaic panels themselves.

Unfortunately, this concept was met with some opposition. While our intent to locate the charging station on campus granted us optimal exposure, it significantly aggrandized the amount of red tape and bureaucracy that was levied upon the project. Discerning which offices and individuals needed to approve the design was no small task in and of itself, as an installation of this kind had seemingly few if any relevant precedents at Virginia Tech. Ultimately, we had to confer regularly with the departments of Environmental Health & Safety, Building & Grounds, the University Architect, University Planning, Design & Construction, and of course the schools of Architecture + Design and Mechanical Engineering.

Once an acceptable form was decided upon, as was the case in the charging station project, the geometry was "baked" from Grasshopper, creating editable NURBS geometry. At this point, the generator curves were drawn, and the L-system script was run. The surfaces were then unrolled and made into cut files, which were routed using an in-house CNC machine. A similar L-system script was run to generate the forms for the structural members, which were also cut with the CNC. The skin panels and structural members were then laminated, sanded, painted, and assembled off site. The engineers organized and installed the electrical system, including two GFCI outlets and 6 charging cables (micro-USB, iPod, and common cell phone chargers). Finally, after six weeks, the station was moved to the site and installed.

Clockwise from left: CNC milling of the bendable plywood skin; view from inside the structure; filling and sanding the plywood panels; sealing the plywood panels; assembling electrical components.

Below: Layout of the cut sheets for the six horizontal plywood panels (excludes the top panels).

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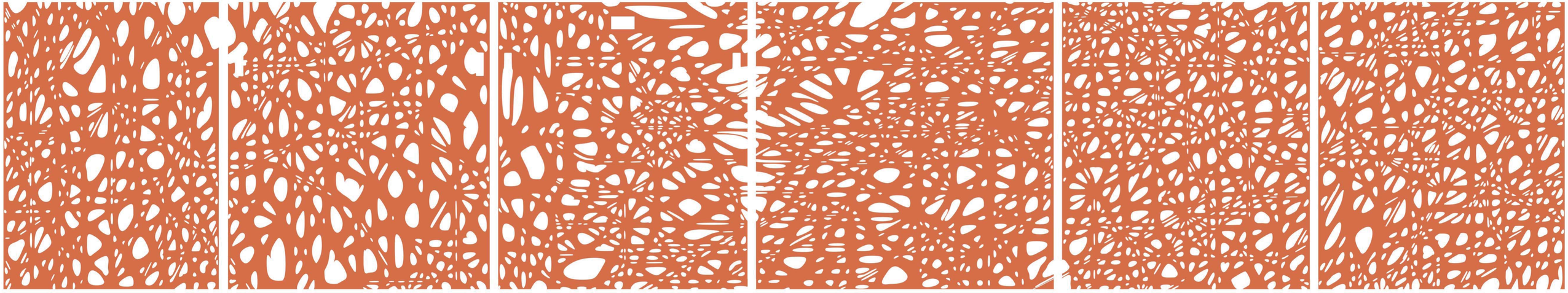
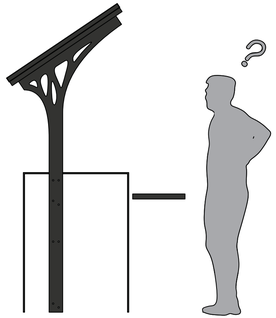
Dave Myers
Eric Eichelberger
Jeff Leininger
Nihar Samal
Shivani Handa
Cheikh Michel Ngom
Alice Jaworski

Special Thanks to:

Emily Reid
Payton Bridge
Liz Lyons
Cody Ellis
Chip Clark
Doug Becker
Corey McCalla
Scott Fundling



1. Initial intention is that the charging station include seating to encourage use.



2. University requires seating be removed from the plans, for fear of loitering outside of the student center.

3. Student-initiated solution: chairs are borrowed from the adjacent outdoor seating area.