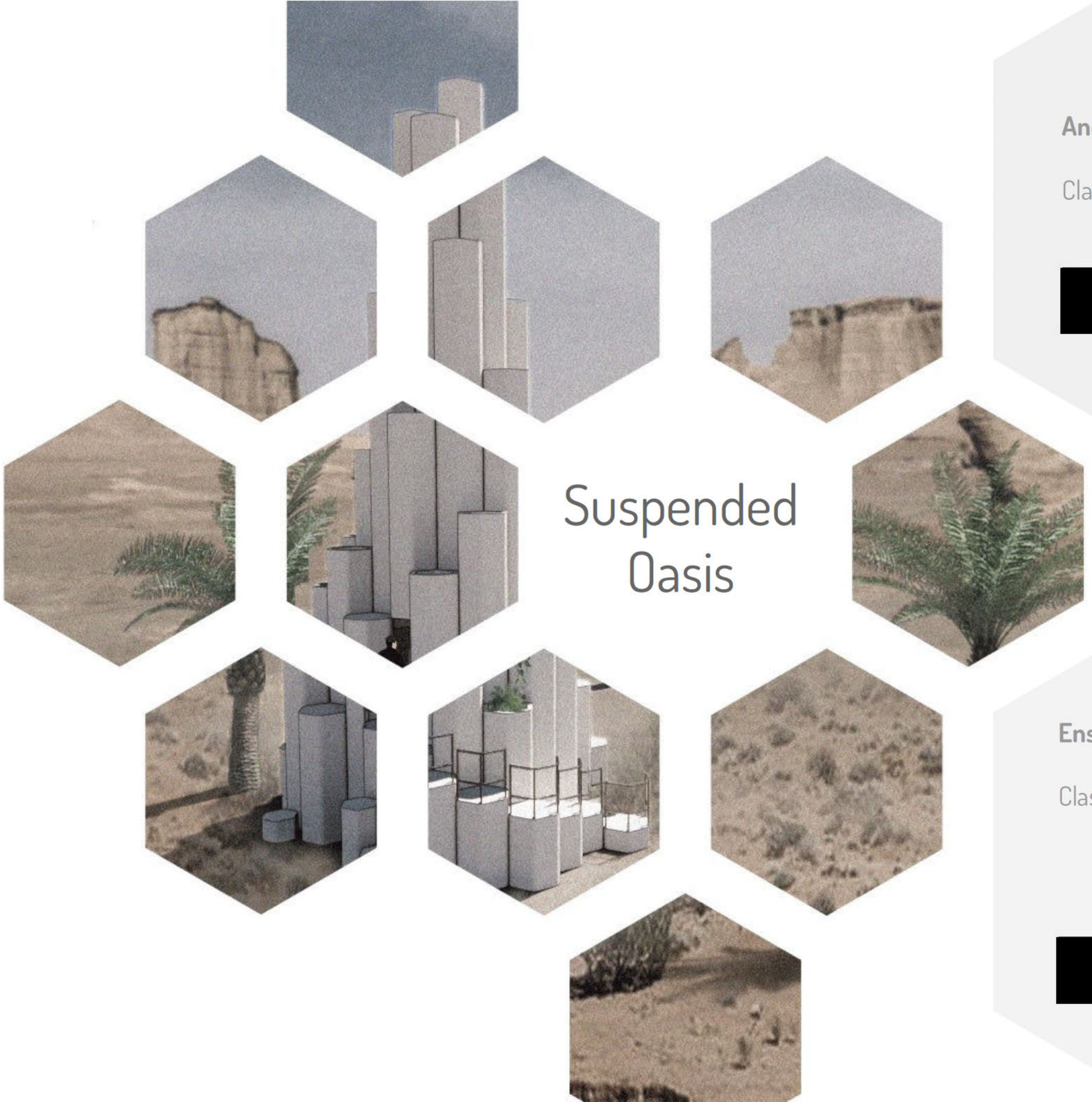


Suspended Oasis

Andrew Runde:

Class of 2022: University of Minnesota
Bachelor of Science in Architecture

[redacted]

Ensar Smailagic:

Class of 2022: University of Minnesota
Bachelor of Science in Architecture
Bachelor of Applied Science in
Construction Management

[redacted]

Andrew Runde

About Me:

I became interested in architectural design the way most 2000's kids did: Minecraft. I had always been good at drawing and math, and by the time I turned 13 I figured that I needed to find some way to put the two skills together. Nowadays, I try to get experience in the field of architecture anywhere I can – whether through the B.S. Arch curriculum at the University of Minnesota, University design research, architecture internships, as well as two MOA design competitions. I still enjoy drawing for fun when I can, although I'm starting to work 3D modeling with Grasshopper into my hobbies. I am a movie enthusiast and a huge nerd for Lord of the Rings and Dune.

Now that I have graduated from the U of M alongside my friend and classmate, Ensar, I plan to move out to the East Coast to pursue architectural work for a few years before returning to school for a master's degree in architecture with the goal of eventually getting licensed as an Architect (but believe me, I'm going to take my time on that front). I am most interested in prefabricated design and what that can offer in terms of affordability and sustainability – something that I've tried to work into all of my studio work and anywhere else that I can. As of 2020, I am also an accredited LEED Green Associate.

I'm excited to participate in the MOA design competition once again and look forward to competing again as a graduate student in the future.

Ensar Smailagic

About Me:

I was born in Mankato - a small town in Southern Minnesota, and ended up moving many times in the following years. Once we settled in the twin cities suburb, Blaine, it was quite difficult for me to be outgoing since I didn't know many people. One activity that I was quite fond of was drawing. As an introverted kid, I could get lost by simply sketching. For the remainder of childhood, I grew to be more outgoing while pursuing my hobbies in drawing and painting. I knew what I excelled at, but I was in early high school, and I had no idea where I wanted to take this. Then one summer, my family and I flew back to our home country of Bosnia and Herzegovina. I hadn't been there since I was a child, so I didn't know what to expect, but what I saw was vastly different. I was in the center plaza of Sarajevo, and stunned by how the built landscape influenced a young me. Then, I began to look around, and saw how other people interacted with their spaces. Bakeries, people entering a Mosque, Orthodox Church, Catholic Church, and Synagogue all at the same time, roads crowded with street vendors. There were children playing soccer in the park to my left, and an old ottoman styled mall. This was all on the same intersection.
I came back to the same place the next day and began to paint with cheap watercolors I got from the local market. Did that painting suck, but I was mesmerized by the surrounding beauty of religious and parliamentary architecture, all seemingly flowing together, creating spaces that people were proud to be around. Then it struck me - this study of urban design and architecture was unique to me. The field studies the way people interact with their spaces, and I knew I wanted to one day achieve that power and put those sketches as a teen into life.

Andrew Runde, AIAS

Education

Bachelor of Science in Architecture

College of Design, University of Minnesota - Twin Cities | May 2022

Honors Program, Dean's List
GPA: 3.811 / 4.0

Relevant Coursework:

- Architecture Studios I - V
- Design with BIM
- Architecture & Ecology
- Structures I
- Materials & Methods
- Internship Prep for Design

Design Skills

Software:

- Revit
- AutoCAD
- Photoshop
- Illustrator
- InDesign
- Rhinoceros 3D
- Microsoft Office
- ArcGIS

Skills & Accreditations:

- LEED Green Associate
  October 2020
- Drafting / Sketching
- Iterative modeling
- French (proficient)

Profile

An aspiring Architect and Designer passionate about sustainability & affordability in housing design, as well as solutions in prefabrication. I take personal integrity very seriously and strive to improve my designs at every stage of the project.

Experience

Architectural Intern
FMdesign - Minneapolis, MN | June 2021 - August 2021 | January 2022 - Ongoing

- Created interior material renderings with Photoshop & Revit, drafted renovations in AutoCAD, documented and verified project sites
- Assessed building code data, prepared project drawing sheets, closed out finished projects.
- Attended client meetings & developed scope notes, coordinated with clients and vendors.

Design Researcher
University of Minnesota - Twin Cities | January 2020 - May 2020 | January 2021 - May 2021

- Collaborated with Mike Christenson (Director of Graduate Studies - School of Architecture) on 2 separate semester design projects.
- Project 1 - 2020: Created a digital reconstruction of the St. Paul Capitol Approach before the 1930's.
- Compiled historic MNHS maps, synthesized USGS lidar data with Rhinoceros 3D and Grasshopper, resulting in the construction of an accurate topography and historic St. Paul digital model.
- Project 2 - 2021: Examined and analyzed the software Photomodeler as an iterative design tool
- Planned a timeline for the research and deliverables, which allowed the project to progress smoothly
- Both Research Projects culminated in a presentation at the annual UGResearch Symposium

Sales Associate
Hollister & Co. - La Crosse, WI | June 2017 - August 2019

- Designed sales floor, greeted and assisted customers, operated the register

References

- Mike Christenson, AIA, Professor of Architecture & Director of Graduate Studies
  University of Minnesota, School of Architecture | 612.209.0764 | mike001@umn.edu
- Taylor Irish, Store Manager
  Hollister Co. | 608.317.9315 | tai115@charter.net
- Marcus Hulmer, AIA, Senior Architect
  FMdesign | 651.260.2931 | hulm0008@umn.edu

ENSAR SMAILAGIC

I am a University of Minnesota alumni, Twin Cities, who excels in fast-paced, deadline-driven environments. I am Client-focused with superior capabilities on relationship building. Employee development, customer satisfaction, team development and effective communication are some of my greatest strengths which have led to several opportunities throughout my academia. My design capabilities have allowed me to think very creatively and be decisive in situations, furthering me as a dependable asset and strong leader.

[redacted]
[redacted]
[redacted]

EDUCATION

B.S. ARCHITECTURE
MAJOR | 3.6 GPA
University of Minnesota,
Twin Cities
Expected Graduation: May 2022

BACHELOR OF APPLIED SCIENCE
CONSTRUCTION MANAGEMENT
MAJOR 3.6 GPA
University of Minnesota,
Twin Cities
Expected Graduation: May 2022

HIGH HONOR GRADUATE
4.02 GPA
Blaine High School
2014-2018

SKILLS

Autodesk: Revit, ArchiCAD, and AutoCAD

Adobe Suite: Photoshop, Illustrator, Lightroom, Acrobat

Bluebeam Revu, Rhinoceros, and Sefaira

Time Management and Self-Sufficient

Works well under pressure

Adaptive and Self-Motivated

Trilingual: English,
Bosnian-Serbo-Croatian,
(Conversational) Spanish

LEADERSHIP

DEAN'S LIST
University of Minnesota Twin Cities
Fall 2019, Spring 2020

NAHB Student Four-Year Competition
2021, 2022

Youth For Change (Charitable Organization) Co-Leader
2013-2018

EXPERIENCE

Feb 2022 - PRESENT

PROJECT ENGINEER Catalyst Construction Minneapolis, MN

- Prepare, coordinate, schedule, and monitor construction project on site
- Perform and coordinate with city on building inspections
- Perform overall quality control alongside senior project manager and superintendent
- Contact, develop contracts and coordinate with subcontractors on a daily basis

May 2021 - Dec 2022

Construction Project Intern-I Eden Resources St. Paul, MN

- Project Estimating; evaluating plans and providing in-depth takeoffs
- Assisting in research and development including project specific case studies
- Maintenance of project management processes including renewals or additions

Summer 2018, 2019

LAWN CARE FLEUR-DE-LIS CO. Andover, MN

- Specialized in landscaping services including small retaining walls, developing paver patios, and basic lawn care

Suspended Oasis

Site Description

As a host to many incredibly diverse environments, we selected Asia as our site-continent with a focus on the Persian region therein. Our decision was largely facilitated by a back-and-forth design process, which began with a rapid iteration session to develop general sculptural forms and design goals. After distilling a handful of evocative forms, we considered the materials and methods necessary to achieve the essence of each form. Shortly thereafter we found inspiration in Persian architecture, which not only displayed a "tried and true" material strategy but also acted as a precedent for passive cooling systems. We located our design idea where it could make the greatest impact – southern Iran; a region of Asia with some of the greatest temperature extremes. Furthermore, there are few major rivers in the country. Despite this lack of freshwater bodies within deserts, civilizations dating back to 2000 B.C. invented methods of conditioning space and sequestering fresh water – namely the Qanat (a man-made underground aquifer), as well as windcatchers. Thus, our design would have the opportunity to tie into existing qanat infrastructure in areas like Iran, which could greatly reduce the construction impact and footprint. Another major factor in our decision to select Asia is the diversity of materials and architectural styles native to the continent. We had the opportunity to create an abstract form sourced almost entirely from local materials (likely within 100 miles of the site) and entirely sourced from within the continent. In a continent that is urbanizing very rapidly, this was an opportunity to secure an area for functional public refuge that is eco-friendly in contrast to conventional urban/suburban construction.

We felt that this design was especially significant to Asia where designed structures must reconcile Asia's current architecture boom (see for example: China, Korea, and Iran) with its extreme climates and varied urban scales. We believe that there are still lessons to be learned - both for ourselves and for the public - from ancient architecture. The implementation of solar mass, windcatchers and qanats (which are commonplace in historic Persian architecture) prove to be sustainable passive systems, even today. Our design therefore strives to find its place and significance to Asia somewhere between the rapidly developing architectural aesthetic of modernity and the practical teachings of antiquity.

Eezy Inc., 2022
https://www.vecteezy.com/vector-art/5353665-doodle-freehand-drawing-of-asia-map

Figure 1 - Elevation

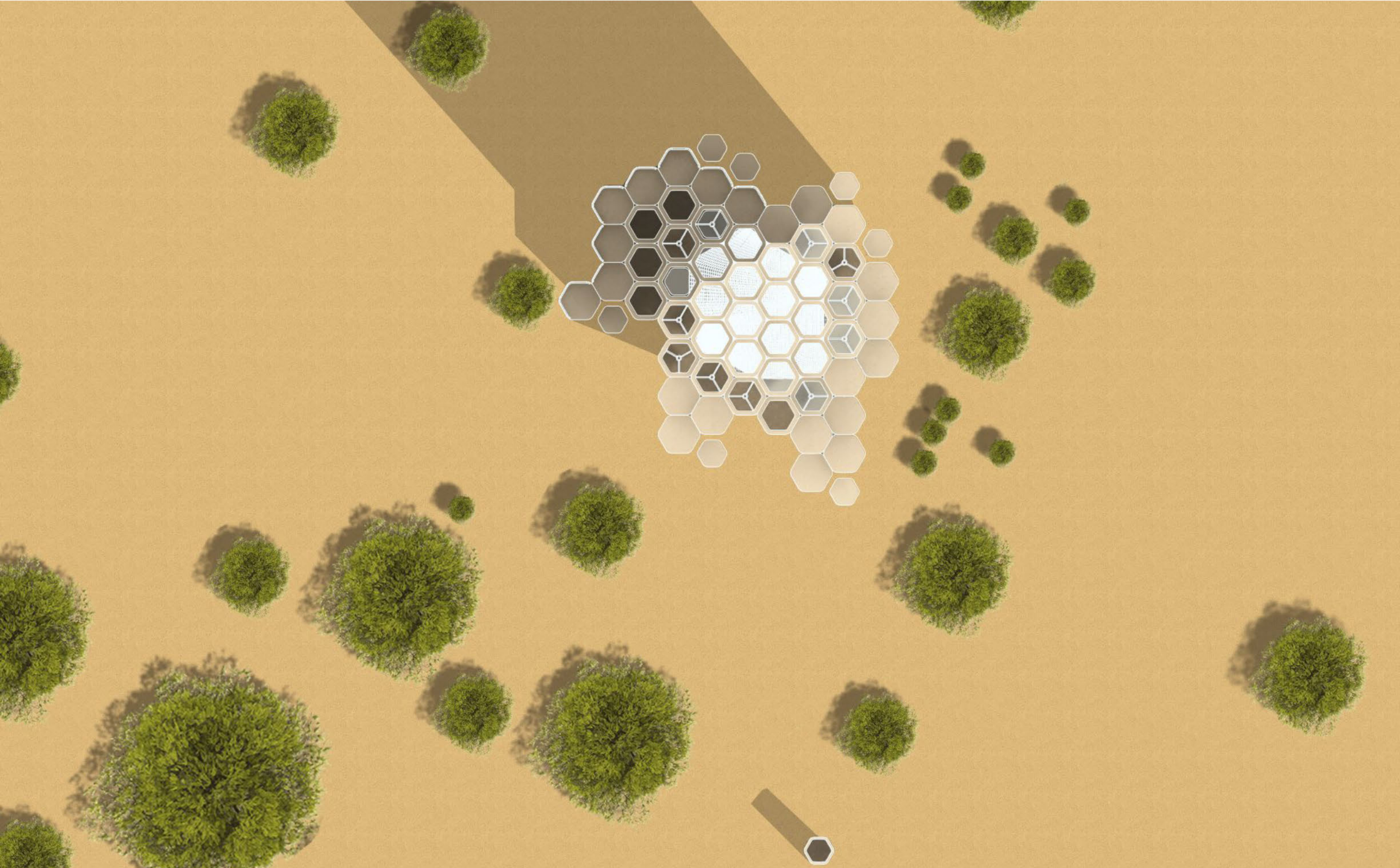


Figure 2 - Site Plan

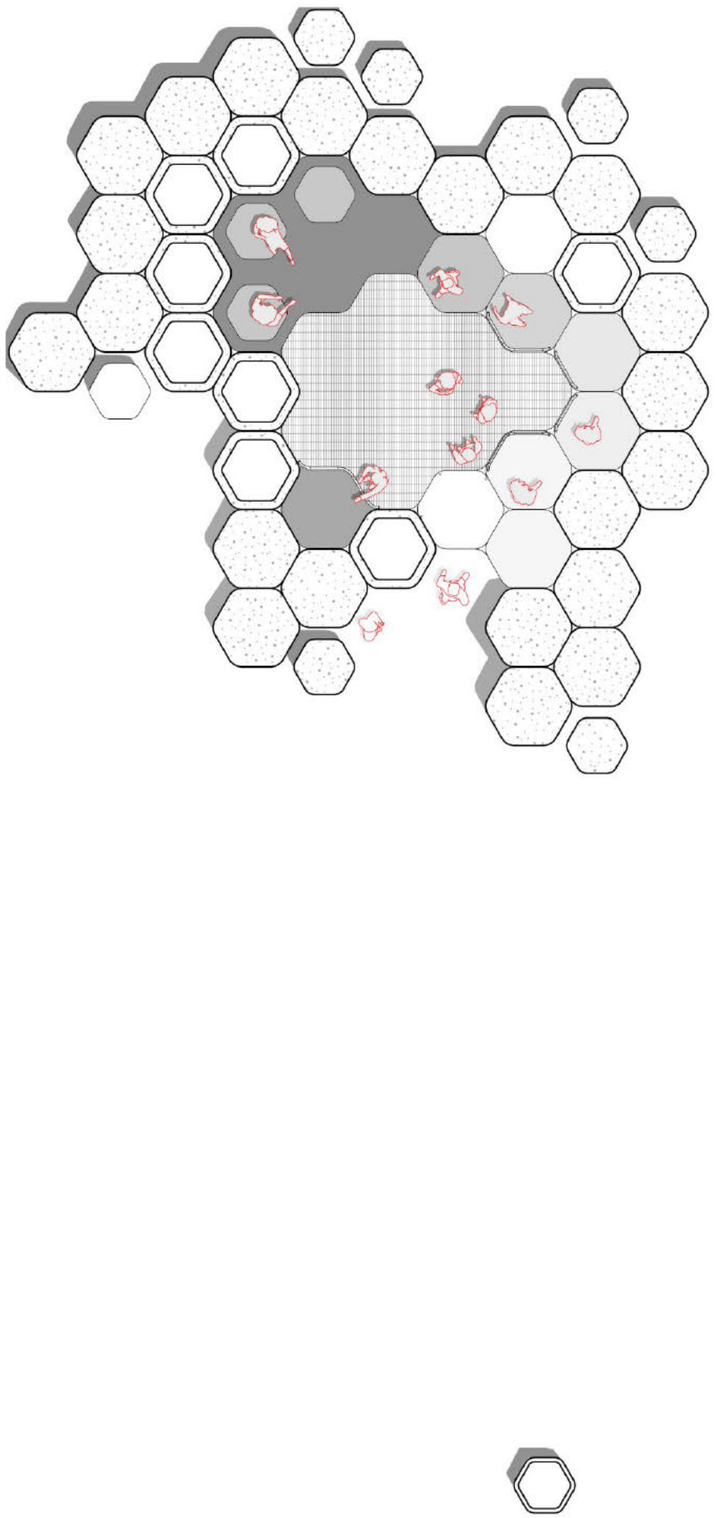


Figure 3 - Ground Floor Plan

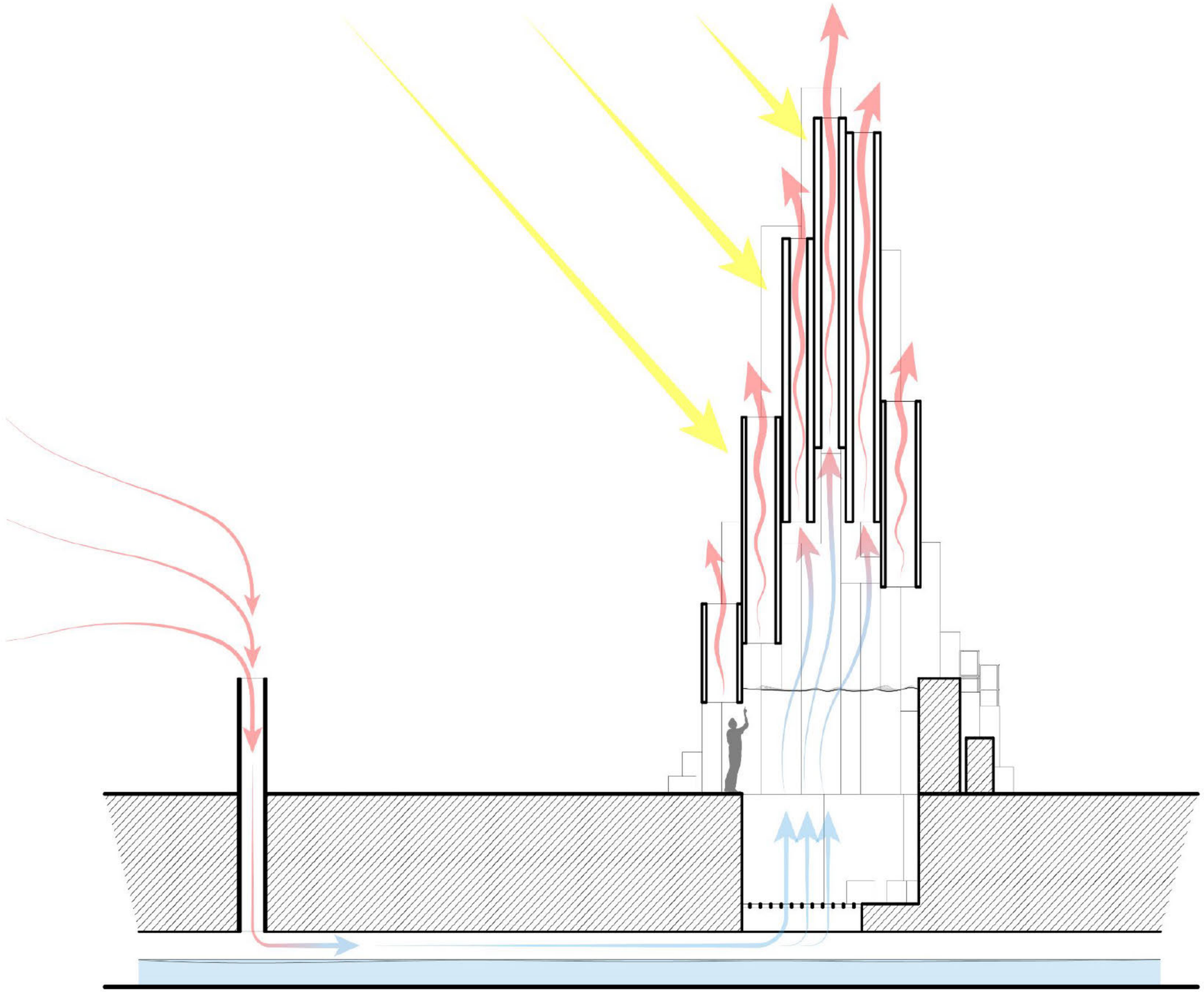
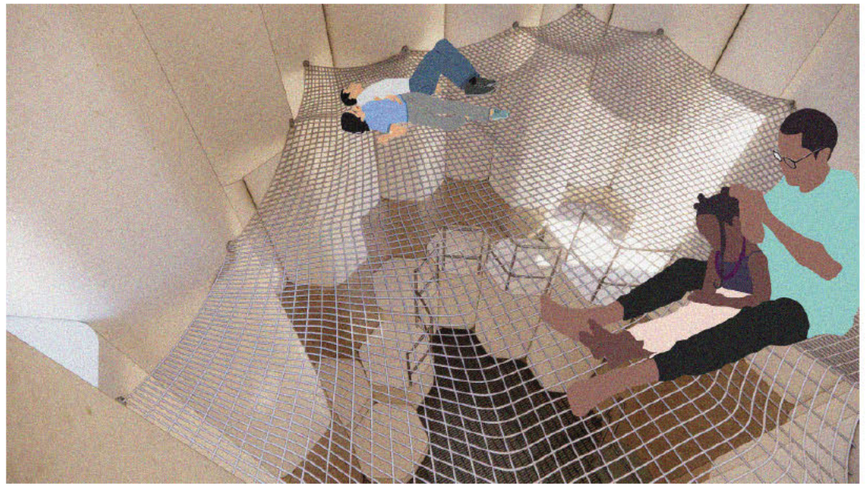


Figure 4 - Passive Ventilation Section



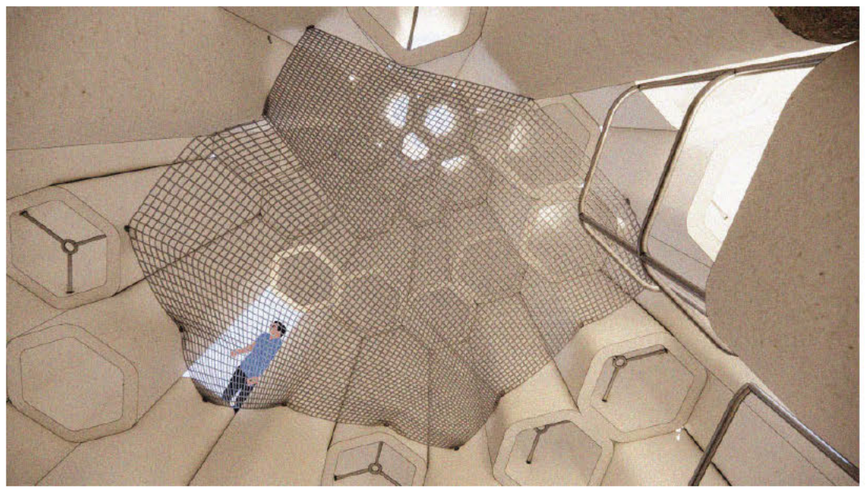


Figure 5-7 - Interior Renderings

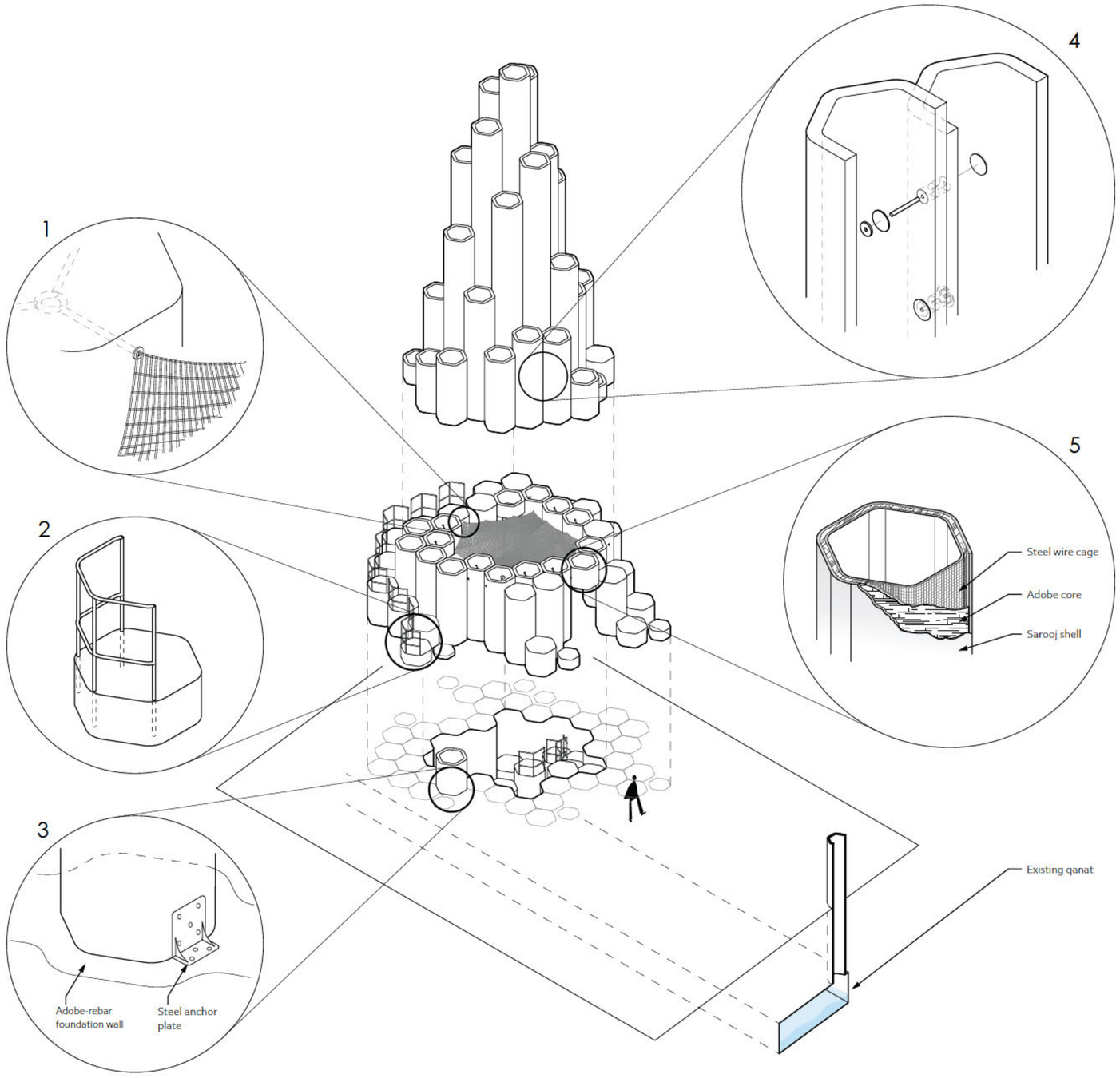


Figure 8 - Structural Systems Axon

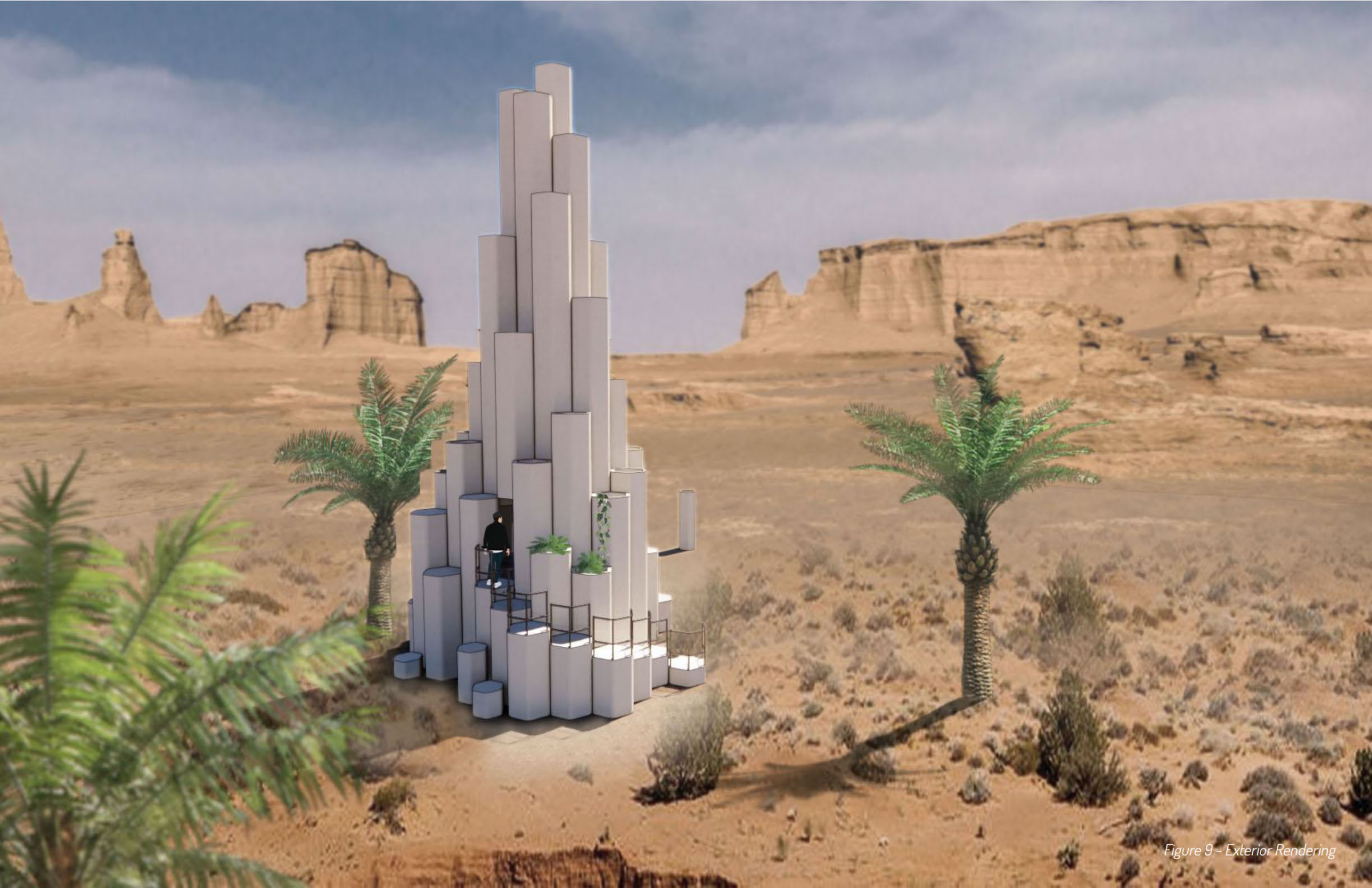


Figure 9 - Exterior Rendering

Suspended Oasis

Narrative: Question #1

The structural integrity for the Suspended Oasis is provided by its hexagonal tubule system. Using similar material strategy to traditional Persian architecture, the composition of each tubule consists of an adobe core reinforced by a steel wire cage (for tensile strength), and then sealed with an outer shell of "sārooj" – an ancient plaster composed of sand, clay, lime, goat hair, ash (which acts as an insulator), and occasionally egg whites. This mixture creates a highly impermeable coating, which also calcifies the outer layer of the adobe clay core, increasing rigidity and waterproofing it (Meddah, et al). As the use of sārooj-adobe construction has been established for thousands of years in the Middle East, nearly all of the required materials could be locally sourced from the area (perhaps no further than the borders of Iran). The only exception would be the required custom steel fittings that are cast into the tube and used to fasten them to each other and the foundation. Nonetheless, all steel fittings would still be sourced from Asia. The hexagonal composition of the structure itself acts much like a beehive to distribute loads laterally between tubules. Embedded steel fittings then connect tube to tube and feature a washer-plate to prevent cracking. Specialized triangular steel fittings are cast into the center of hollow tubules that will form a connection to the hammock – touching three walls of the tubule allows the fitting to spread the force to all walls of the tubule and prevent cracking.

The major difference between the construction process of our structure and that of traditional sārooj-adobe construction is the use of metal reinforcement and *prefabrication*. While traditional methods require lengthy on-site casting and coating, our strategy sees tubules assembled and outfitted with fasteners off-site so that they can essentially be assembled on-site via crane like tinker-toys. One single ring of cast-in-place solid adobe tubes rests on the foundation wall and forms the anchor point for the hollow tubules. The tubules are attached to the foundation ring or to each other with anchor plates and steel fittings.

Narrative: Question #2

Coordination with the city is going to be crucial for permits, primarily due to the trenching required for access to the qanats below. With the structure equating roughly 500 square feet in building footprint, about 2016 cubic feet of sand needs to be excavated to reach the 8 foot depth. During excavation, trenching will simultaneously take place in order to immediately access the Qanats. During trenching, the first wind tubule will be constructed prior to the structure in order to test the quality control for the the natural ventilation. This also means the structural engineer is coordinating in order to get the steel grate and footings both assembled in this step. Excavation in the desert is not difficult, and should require 1 day for grading, with 1 weeks max dedicated for excavation. A month would be required to cast and cure the adobe footing/foundation perimeter. This and several other tubules will be casted in place, meaning steel will be brought on site while the formwork is being built.

Because adobe requires 3-4 weeks to fully form and cure, it should take roughly a month or so to produce prefab tubules offsite (which includes shaping the metal wire cages and applying/curing the sarooj coating). This can occur concurrently with excavation and foundations. Much of the transportation can be done in a couple trips for delivery to the site. As precast tubes are being assembled and the foundation is beginning to cure, it would take roughly a month to cast-in-place base tubules. This is also concurrent with the curing duration for foundations and off-site tubule production. After this step, another week is dedicated to bolt the prefab tubules into place. The project takes roughly a month to assemble, this is because of the convenience in the pre-cast and on site coordination. 100% of the materials are native to Asia. Additionally, there is a smaller material palette, meaning lead times shouldn't significantly cause project delays.

Suspended Oasis

Narrative: Question #3

As in many prefabricated design projects, the ability to reap the benefits of the prefab process would largely depend on the fabricators. The tubules are produced and outfitted off-site so that the only work that remains is to create the foundation, cast base tubes and assemble the tubules on-site. The role of the designer, then, is quality control for both fabrication and construction. They must ensure that the specifications and dimensions for the tubules are incredibly clear, as the fabricator must cast steel fittings very precisely into each tube in advance (for proper tube-tube alignment and hammock attachment during construction). Ideally, the contractor will work alongside the designer well before construction to verify the proposed construction methods and materials (such as the capacity of a given crane to operate on sand, and to lift objects as heavy as the tubules).

Narrative: Question #4

The structure is intended to act as an "oasis" or shelter in its arid climate. The simplicity of the aesthetic design allows the structure to offer unique conditions: for example, the ground level is a space to cool off below grade and even access the qanat below via the opening at the corner of the floor grate, while level 2 features a large hammock space to relax and experience the artificial breeze from below. In contrast to the arid climates found across southern Asia, this project is intended to act as a relaxing and therapeutic structure that shelters the community from heat, while also providing public access to otherwise potentially private water canals.

The space bounces enough sunlight inside for the user to see clearly inside and to socialize. Hollow tubules provide access to sunlight and wind, while those near the perimeter of the structure may even be filled with soil to accommodate endemic plantings (as suggested in previous renders). The ground floor is accessed from an entrance at grade, while the level 2 hammock is accessed from an exterior staircase that wraps around the other side of the structure.

Suspended Oasis

Narrative: Question #5

Designed for an arid or desert climate, the structure must contend with incredibly hot days (an average of 99 degrees Fahrenheit during the summer in southern Iran) and cold nights. As such, the structure utilizes thermal mass and ties into an existing underground canal (qanat) system to take advantage of the "chimney"/ "stack" effect. The height of the tubules creates a large surface for the sun to heat, which in turn heats the air inside the tubules. The hot air then rises, creating a vacuum that draws in air through the windcatcher/qanat system up through the bottom of the structure to create a cool upward breeze inside the space. At night, the mass of the structure slowly releases the heat it retained during the day into the interior spaces, keeping occupants warm.

Narrative: Question #6

The design is a mixture of ancient and modern technology. The material system itself draws from ancient methods and monolithic materiality, while the implementation draws from the modern practice of prefabrication and "kit of parts" assembly to drive down costs and construction time. The design relies on custom steel fasteners to adhere tubules to one another and properly distribute forces but may use regular concrete fasteners as a precedent in this. Because many tubules are suspended above the ground, they also require steel tensile reinforcement – something that didn't necessarily exist in ancient construction.

The design also features an elaborate hammock/net system that ties into the corners and sides of certain tubules. In combination with this permeable net, the platform-grate flooring allows cooled air to pass upward throughout the structure. The overall form of the design was created with computer technology (Rhinoceros 3D and Grasshopper) to extrude every tubule up to an intersection point with an irregular parabolic surface.

Suspended Oasis

Narrative: Question #7

Over 80% of the Suspended Oasis is locally sourced, while 100% of the materials are native to Asia. There is no reliance whatsoever on concrete (and thus avoids its carbon footprint). The only building element that would contribute to CO2 emissions within the structure comes from the steel fittings, railings, floor grate, and the wire cage within the tubes: overall comprising less than 20% of the structure's mass. The structure requires no active systems to cool and heat the interior, and through prefabrication reduces construction waste. Furthermore, there are no harsh chemicals, volatile organic compounds, or ozone-depleting substances required by the structure.

Narrative: Question #8 - Research Sources

- On Sarooj as a modern building material:

  M.S. Meddah, N. Benkari, S.N. Al-Saadi, Y. Al Maktoumi, "Sarooj mortar: From a traditional building material to an engineered pozzolan -mechanical and thermal properties study", *Journal of Building Engineering, Volume 32*, 2020. https://www.sciencedirect.com/science/article/pii/S2352710220333878

- On Adobe construction and material properties

  Brinson, Linda C., "How Adobe Construction Works", (HowStuffWorks, 2022)

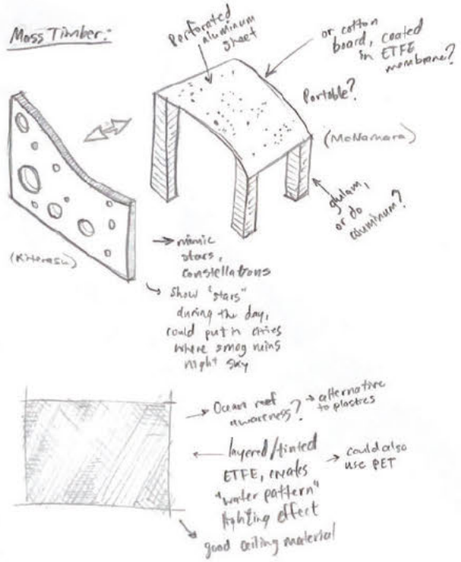
  https://home.howstuffworks.com/home-improvement/construction/materials/adobe-construction2.htm

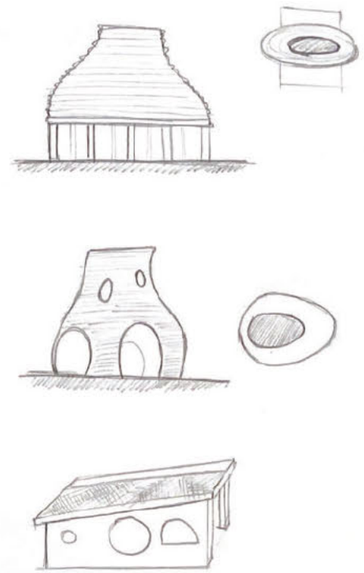
- On global iron production (graphic):

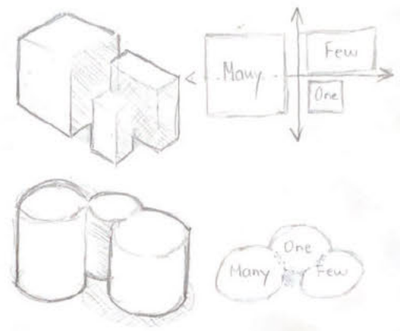
  V. Ryan, "Where is iron ore mined?", 2021, https://www.technologystudent.com/joints/iron2.html

Estimate							
Category	**Activity**	**Description**	**Cost / Unit**	**Unit**	**Quantity**	**Total Cost**	**%**
Sitework							
Excavation	**Clearing/Grubbing**	Minimal Excess Waste Removal, Sand Removal, and Temporary Retaining Wall	$10,000.00	L.S.	1	$10,000	6.59%
	Rough Grading	Strip ~2' around perimeter and Rough Grade	$1.15	L.F.	1,500	$1,725	1.14%
	Trenching	Trenching - Excavating into Qanat	$3.88	L.F.	1,200	$4,656	3.07%
	Qanat	Extension of Qanat below structure	$12,250.00	L.S.	1	$12,250	8.07%
Subtotal						**$28,631**	**18.87%**
Foundation							
	Foundation Wall	24" Adobe Foundation, Footing, and Retaining Wall	$4.98	S.F.	1,500	$7,470	4.92%
Subtotal						**$7,470**	**4.92%**
Steel							
Structural Steel	**Embeds/Fasteners**	Custom fasteners that provide structural integrity, suspended tubes, and hammocks	$98.00	EA	10	$980	0.65%
	Embeds/Fasteners	Embedded Fasteners within Tubes	$98.00	EA	360	$35,280	23.25%
	Grate	Custom Grate above Qanat on Level 1	$4,590.00	L.S.	1	$4,590	3.02%
	Rebar Chicken Wire	Reinforced steel within both cast in place and precast columns	$4.05	L.F.	9,000	$36,450	24.02%
Misc. Steel	**Railing**	Custom Railing for both exterior and interior platform stairs	$45.00	L.F.	38	$1,688	1.11%
Subtotal						**$78,988**	**52.05%**
Structure							
	Adobe Precast Tubules	Primary Structure - Prefabricated tubules delivered on site	$3.22	S.F.	4,541	$14,622	9.63%
	Adobe Cast In Place Tubules	*Formwork for tubules made on site - poured and cured*	$3.22	S.F.	4,350	$14,007	9.23%
	Sarooj	Insulate and mortar material coating for all Adobe tubules - mix made on site	$0.60	L.F.	12449.8	$7,470	4.92%
Subtotal						**$36,099**	**23.79%**
Finishes							
	Hammock	Custom Hammock above grade within structure	$575.00	L.S.	1	$575	0.38%
Subtotal						**$575**	**0.38%**

Sources of Information:	https://www.swiftestimator.com/SE7Help/CE/help/Miscellaneous/Section66Costs.htm	**Total Cost**	**$151,762**
	From MSU Subdivision Development Costs 2003		
	Adjusted for inflation and double checked against other industry pricing		


Mass Timber
Perforated aluminum sheet
or cotton board, coated in ETFE membrane?
Portable?
(McNamara)
(Kitawasu)
mimic stars, constellations
show 'stars' during the day, could put in cities where smog ruins night sky
Ocean reef awareness?
→ alternative to plastics
layered/tinted ETFE, creates "water pattern" fighting effect
→ could also use PET
good ceiling material

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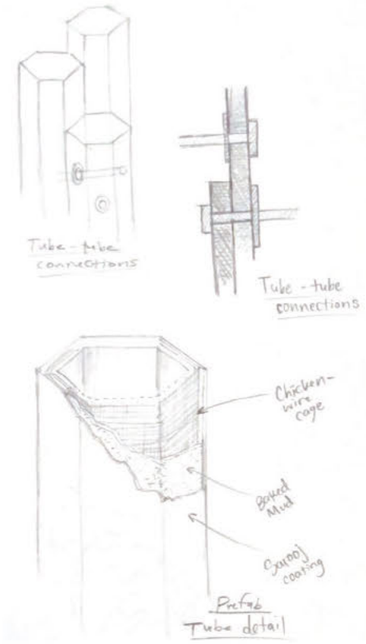
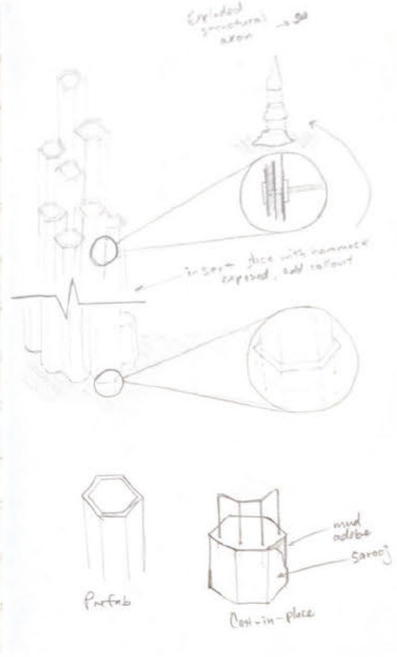
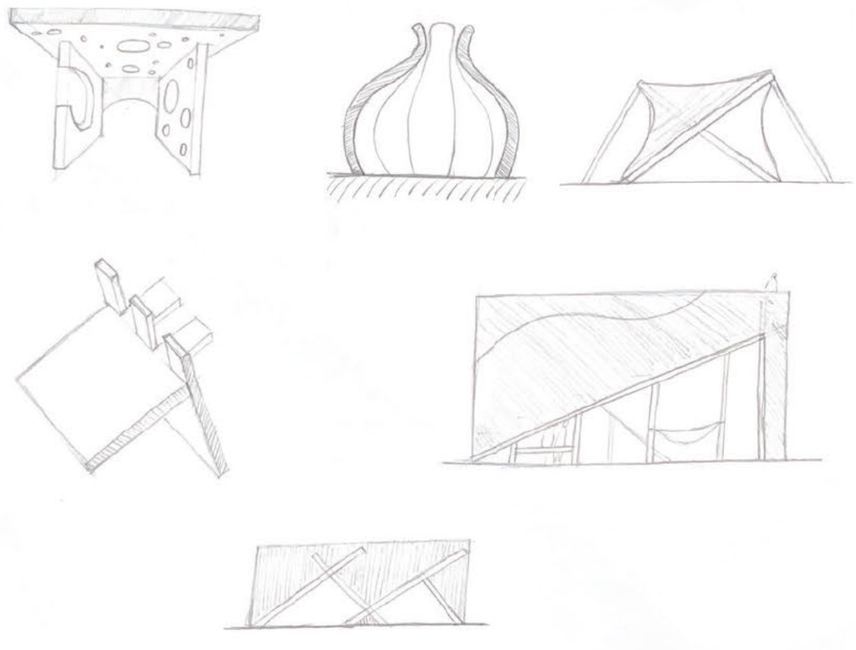

Tube - tube connections
Tube - tube connections
Chicken-wire cage
Baked Mud
Charred coating
Prefab
Tube detail


Exploded structural axon
Prefab
mud adobe
Cast-in-place

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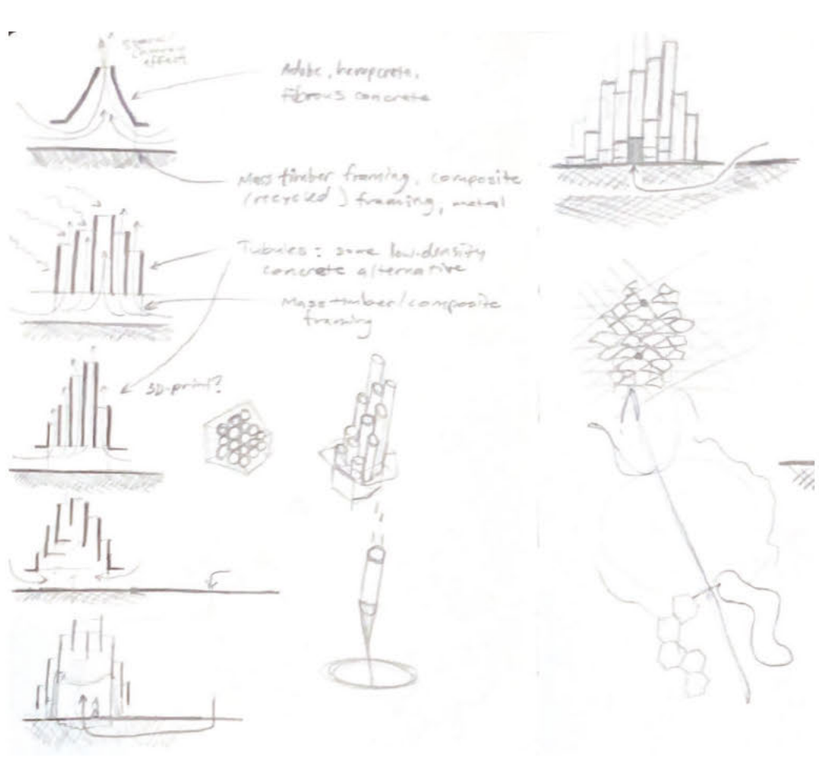
Adobe, bamboo, fibrous concrete
Mass timber framing, composite (recycled) framing, metal
Tubes: some low-density concrete alternative
Mass timber/composite framing
3D print?