

Health And Wellness Resort in Siwa Oasis, Egypt



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Abstract

This thesis explores the integration of vernacular architecture and advanced techniques in the design of a sustainable health and wellness resort in Siwa Oasis, Egypt. The project employs bioclimatic strategies and 3D printing technology using locally sourced materials such as karshif (a mix of salt and clay) and palm-based elements. The resort's design draws from Siwan traditions—including domed roofs, and courtyards—while adopting computational design for form optimization and passive cooling. Field interviews, climate analysis, and structural studies informed the proposal, aiming to preserve cultural identity, reduce environmental impact, and enhance visitor well-being. The result is a context-sensitive and forward-looking resort model rooted in local resources and ecological responsibility.

Health And Wellness Resort in Siwa Oasis, Egypt

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General Abstract

I worked on a resort design for Siwa Oasis in Egypt. Siwa has salt lakes, mud houses, palm trees, and a strong local identity. I didn't want to design something that felt out of place, so I looked at how people there build—using things like clay, salt, and palm trunks. I also explored how 3D printing could work with these materials, not to replace traditions, but to build in a way that still fits the environment. The whole idea was to create a peaceful space for wellness and rest, but still rooted in what Siwa already is.

Brief of Siwa Oasis

An Egyptian city and oasis in the Western Desert, covering a total area of 30 miles.

About 47,000 families lives in the Oasis, most of whom work in agriculture or tourism.

Every year, approximately 70,000 tourists, both local and global, visit The Siwa.

the name of Siwa came from "Sekht Em" which means the land of palms.



Siwa Lakes

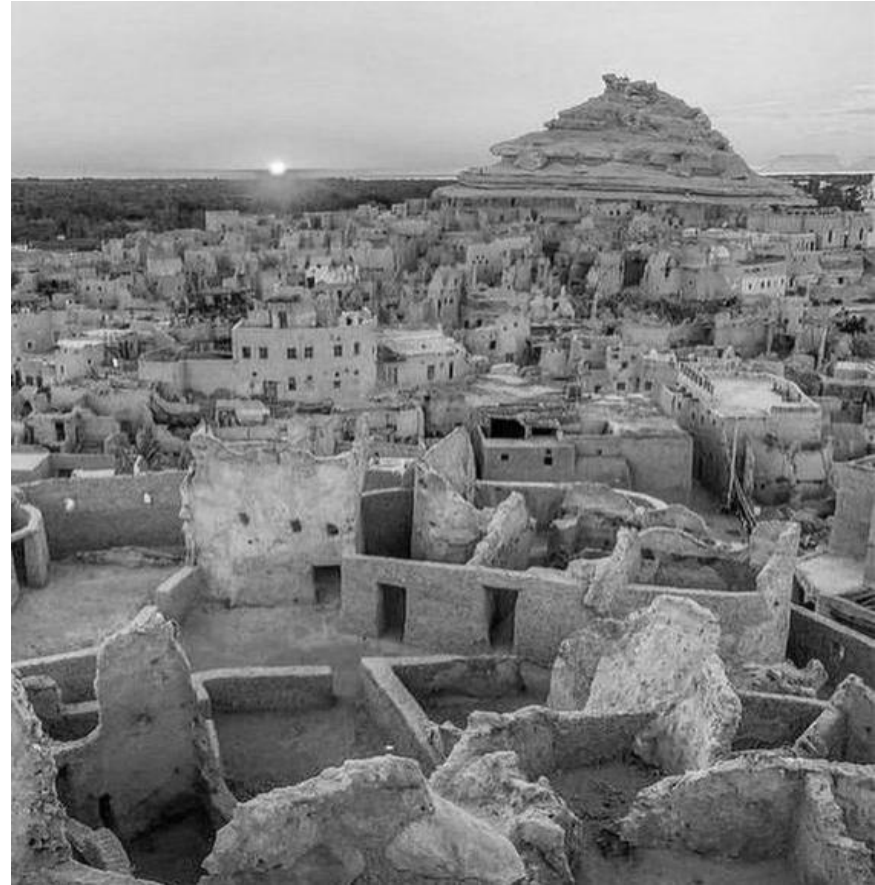
Salt's health benefits, like halotherapy, attract visitors seeking relaxation and natural wellness at the salt lakes.



The old & the new

Old siwa:

Features historical and cultural gems, such as Ancient Oracle of Amun temple, Shali Fortress (the heart of Siwa's old town), Siwan Crafts and Souvenirs.



Current siwa

The current buildings have the culture of the oasis were designed by Hassan fathy and mud-brick architecture.



Tradition Siwan architecture

Incorporate elements of traditional Siwan mud-brick architecture, including domed
Roofs, intricate carvings and Siwan courtyards.



Rhythm

It demonstrates the architectural rhythm in Siwa's buildings, achieved through the repetition of windows in both vertical and horizontal orientations.



Traditional Designs

**Traditions are essential to the essence of Siwa,
And culture is vital in keeping the past alive.**



Siwan People

- **Interviewee (A)**

Mosa, a 26-year-old, is an enthusiastic advocate for Siwa's heritage, particularly its historical sites like Shali.

After completing his studies, he founded a tourism company and later established his own resort in Siwa, Aman Siwa Resort.

He said that *"All Siwains should speak with the Amazigh dialect among themselves because it makes us unique from other societies, and if we don't, this will be considered an insult or a shame from originality."*

Siwa needs marketing plans to recover tourism, which was the most important source of income in Siwa for most people there until 2010. He hopes that in the future, Siwa will have an international marketing plan to attract foreign tourism more than in the present time.



● **Interviewee (B)**

Nabil is a man in his late forties. He has his own workshop, which is located near Paradise Resort, where he works as a salt sculptor.

In his opinion, traditional industries in Siwa, like salt sculptures, should be preserved as part of the region's industrial heritage. According to him *"Any closed society is invaded by openness and technology. Its habits and traditions begin to change as happens in our society, and over time, the heritage of the oasis began to decay faster as time passes."*

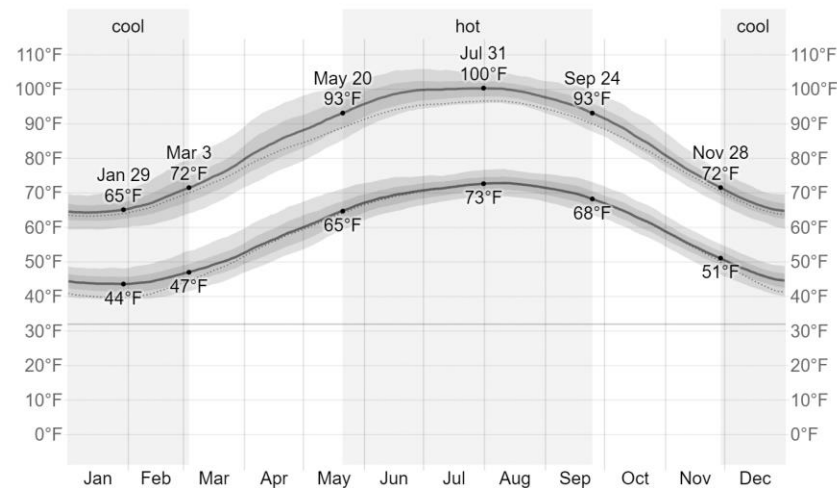


Climate

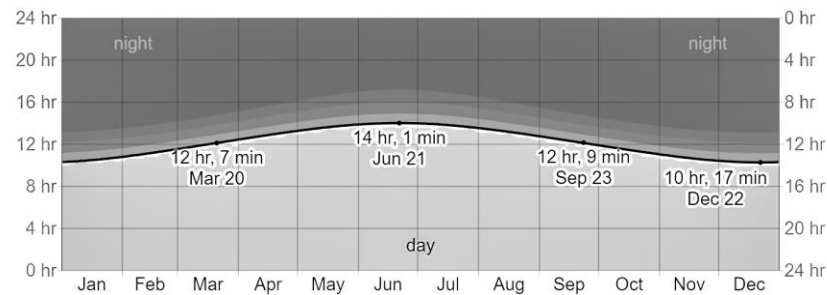
Siwa's weather is warm all year round, with two main seasons, summer and winter.

Winter is from December to February, with a mean temperature ranging from 44°F to 65°F. The summer season is from May to September, with mean temperature during this season ranges from 73°F-100°F.

Siwa gets an average of **10 to 14 hours of sunshine** year-round so they can expect blue skies and warm to hot weather on most days. On average, rain falls only 17 days a year, mainly during winter.



Average High and Low Temperature



Hours of Daylight

Materials palette at Siwa

- 1- Karsheef stone (blend of sand and salt)
- 2- Sandstone
- 3- mud, Adobe or Karsheef brick
- 4- Clay
- 5- Salt
- 6- Wicker
- 7- Palm trees









Destination of use

- | | |
|---------------------|-----------------------|
| ■ Services | ■ Tourist structures |
| ■ Housing | ■ Commercial housing |
| ■ Health structures | ■ Military structures |
| ■ Handicraft only | ■ Sport structures |
| ■ Mosques | ■ Handicraft housing |
| ■ Schools | |



Structure systems

-  Karsheef structure
-  Tobe structure
-  Brick structure
-  Curtain wall made of tobe and bricks
-  Framed structure curtain wall made of tobe & bricks
-  karshif Framed structure made of tobe and karsheef curtain wall



Number of floors

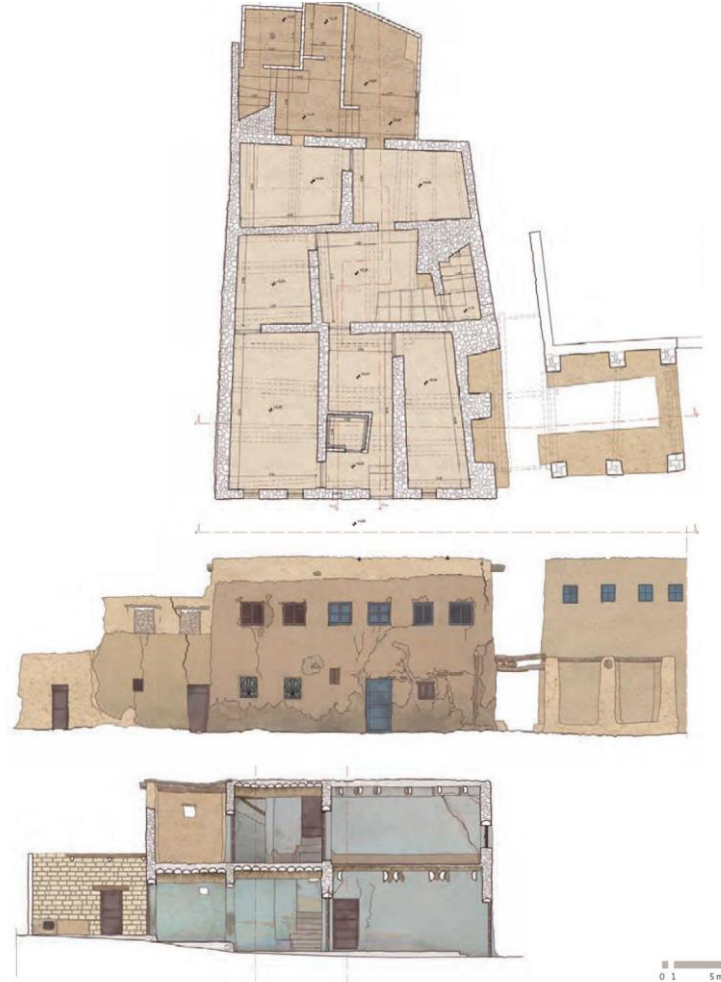
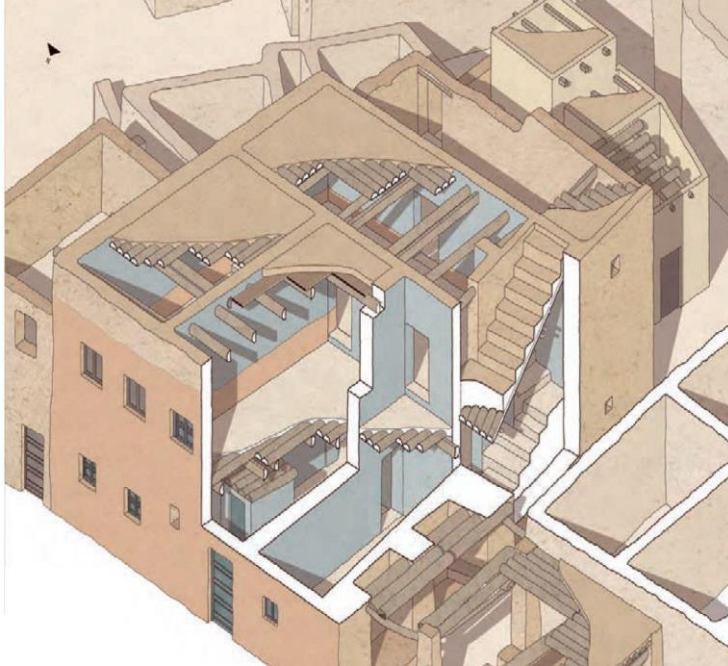


Structure condition

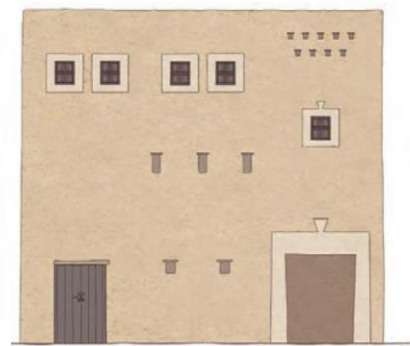
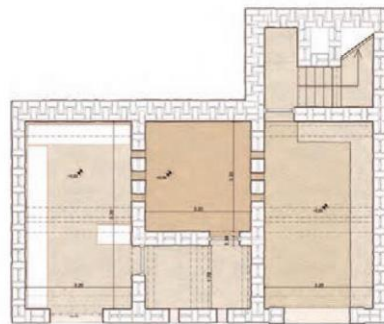
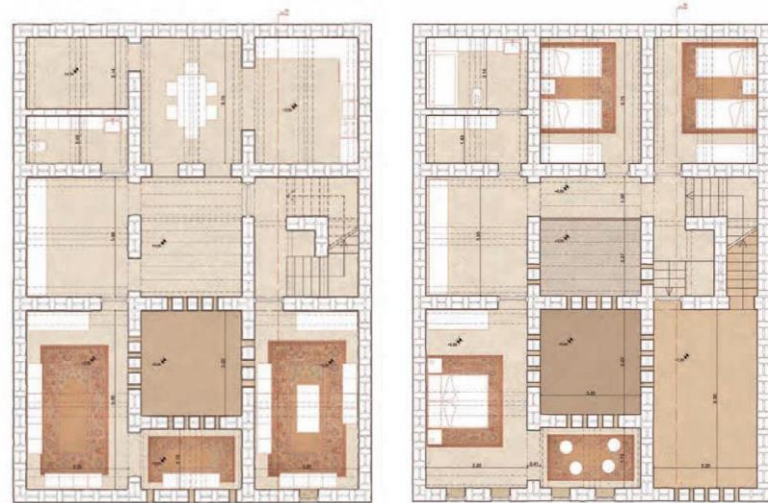
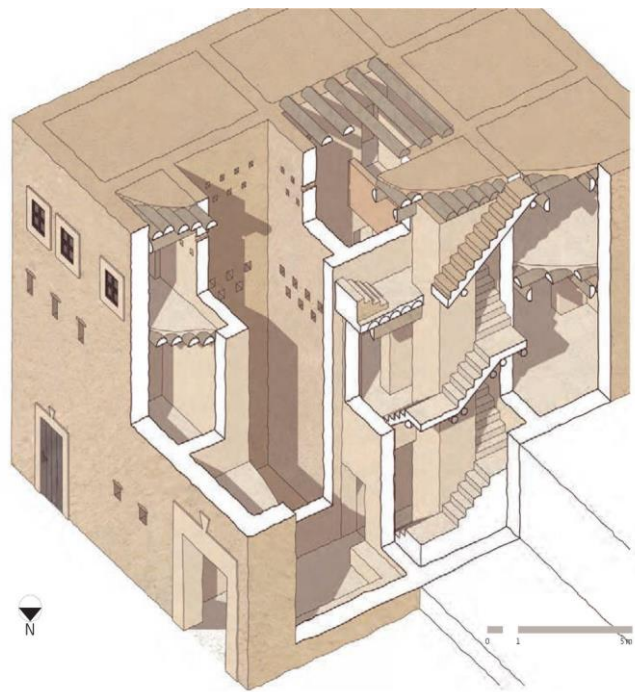
- Structures in good repair
- damaged structures
- very damaged structures



House survey in Shali Fortress 1



House survey in Shali Fortress 2



3D printing

- **Material Innovation** – Uses **Siwan kershef** elbarud ,elbaniatsus rof (dnas ,yalc ,tlas)
.serutcurts
- **Climate-Responsive Design** – Thick walls enhance **passive cooling** ygrene gnicuder ,
.noitpmusnoc
- **Organic Forms & Parametric Design** – Enables fluid geometries, vaulted spaces, and shading for better ventilation.
- **Structural Efficiency** – Optimizes material use with precise layering, ensuring stability with minimal waste.
- **Rapid Prototyping** – Speeds up design testing and iteration for **modular designs** laedi ,
.stroser dna segdol-occe rof



Salt

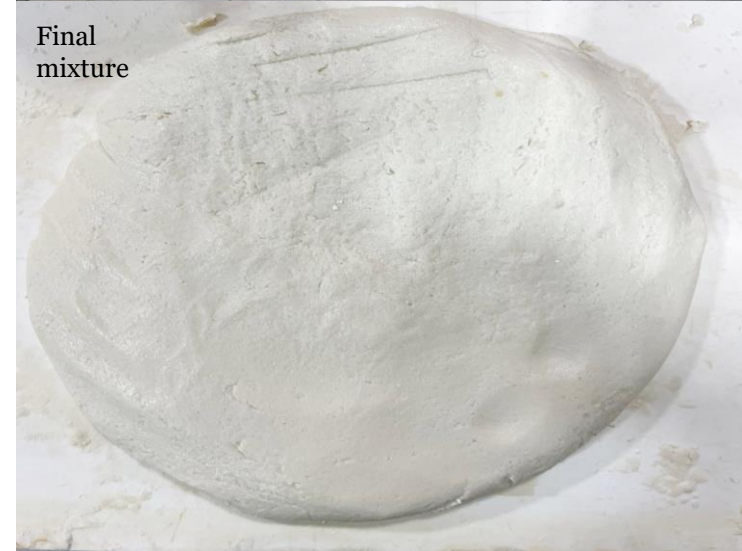
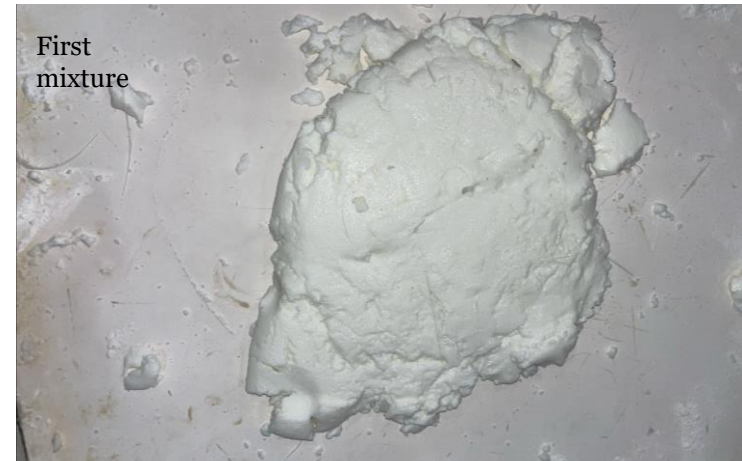
- **Zero Cost & Abundant.** snoiger tresed/latsaoc ni yllaicepse ,erutan ni elbaliava yleerF :
- **Low Energy & No Emissions** 2 OC on htiw erutarepmet moor ta seird ;dedeen nlik oN :output.
- **Fully Recyclable & Biodegradable** → elbulos-retaW :zero-waste, closed-loop cycles.
- **Low Environmental Impact.** tniirptoof tropsnart decuder ,gnissecorp laminim ,gninim oN :
- **Non-Toxic & Antibacterial:** Safe to handle; naturally resists mold, bacteria, and VOCs.
- **Improves Air Quality:** Helps absorb moisture and dust; supports respiratory health like asthma.
- Construction process robots...etc

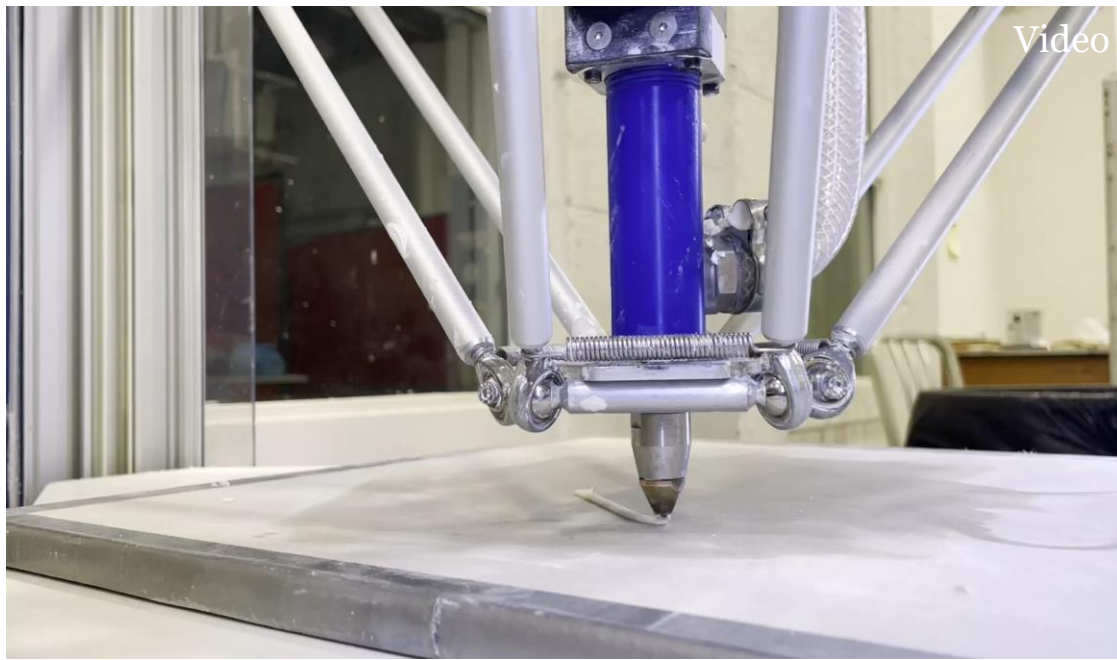


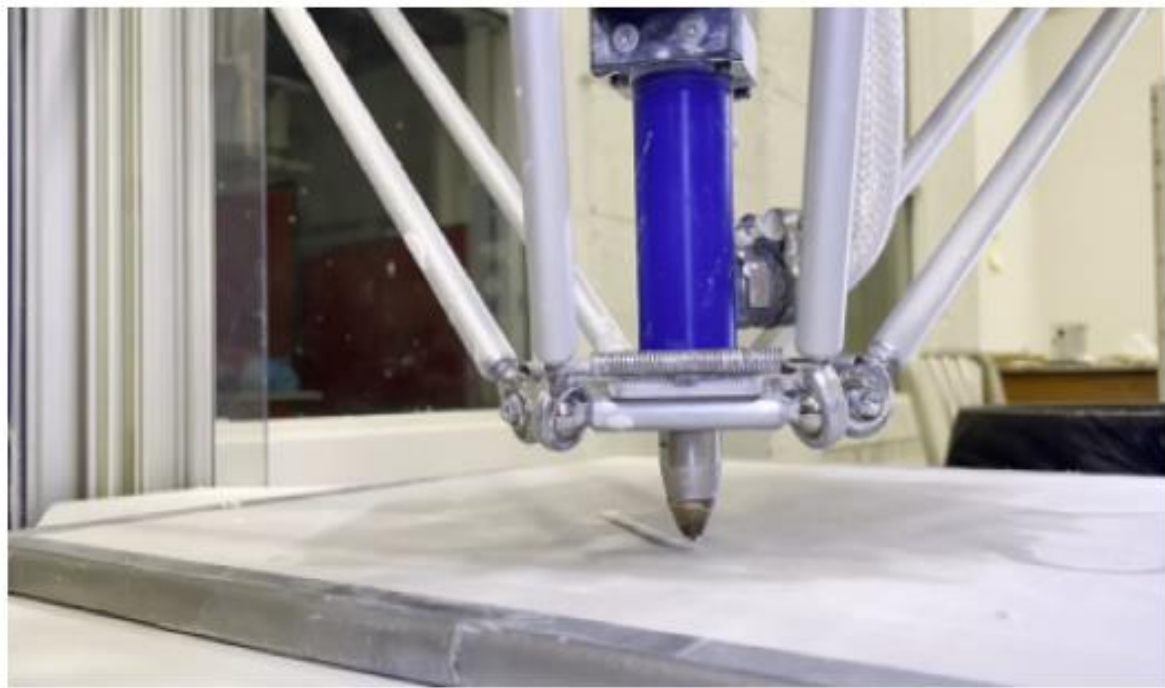
Salt experiment

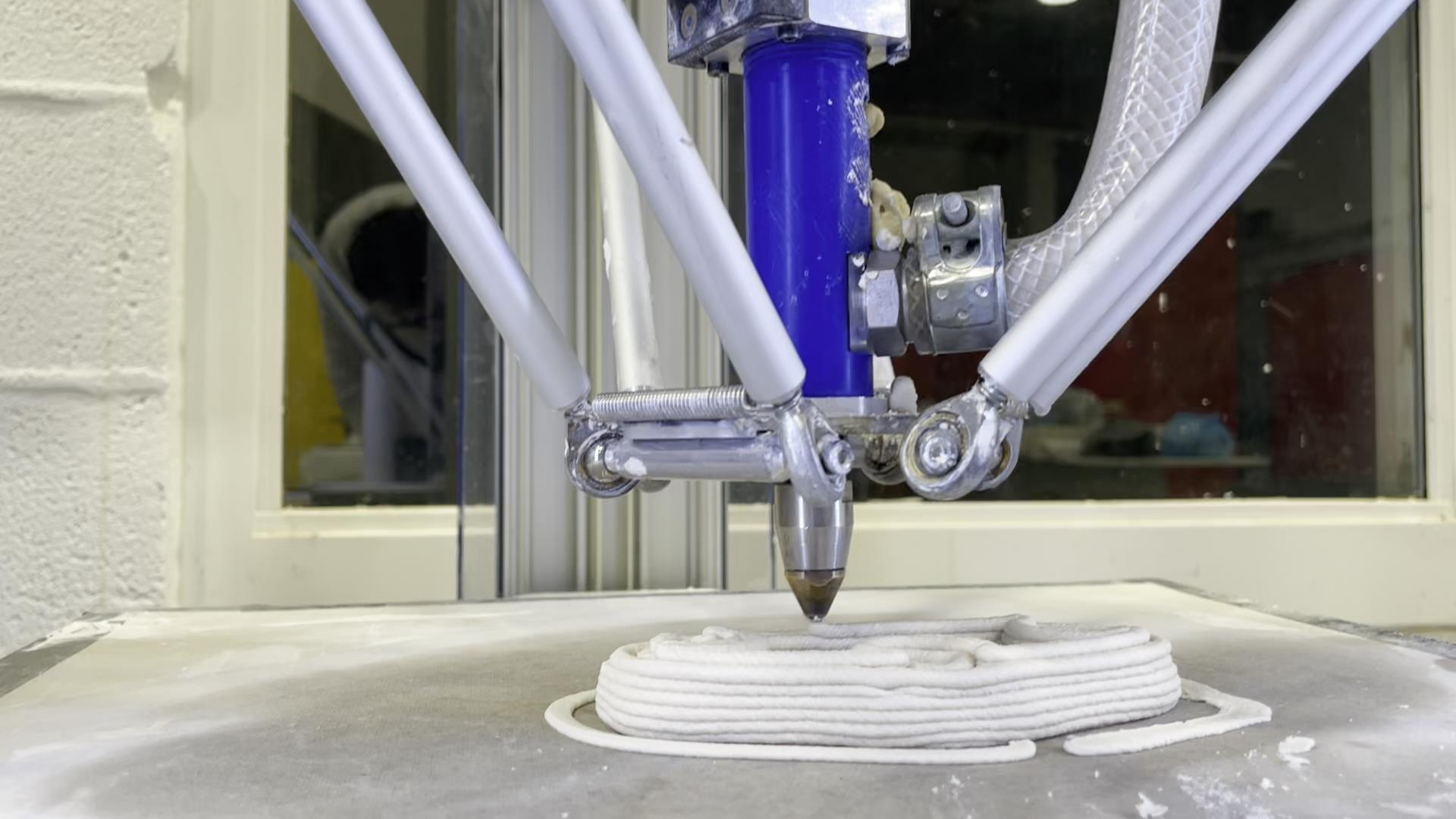
This mixture is designed for 3D printing, where salt serves as the main material, providing structure, while clay reduces solubility in water and ensures a smooth, flowable mixture. The composition in percentage form is:

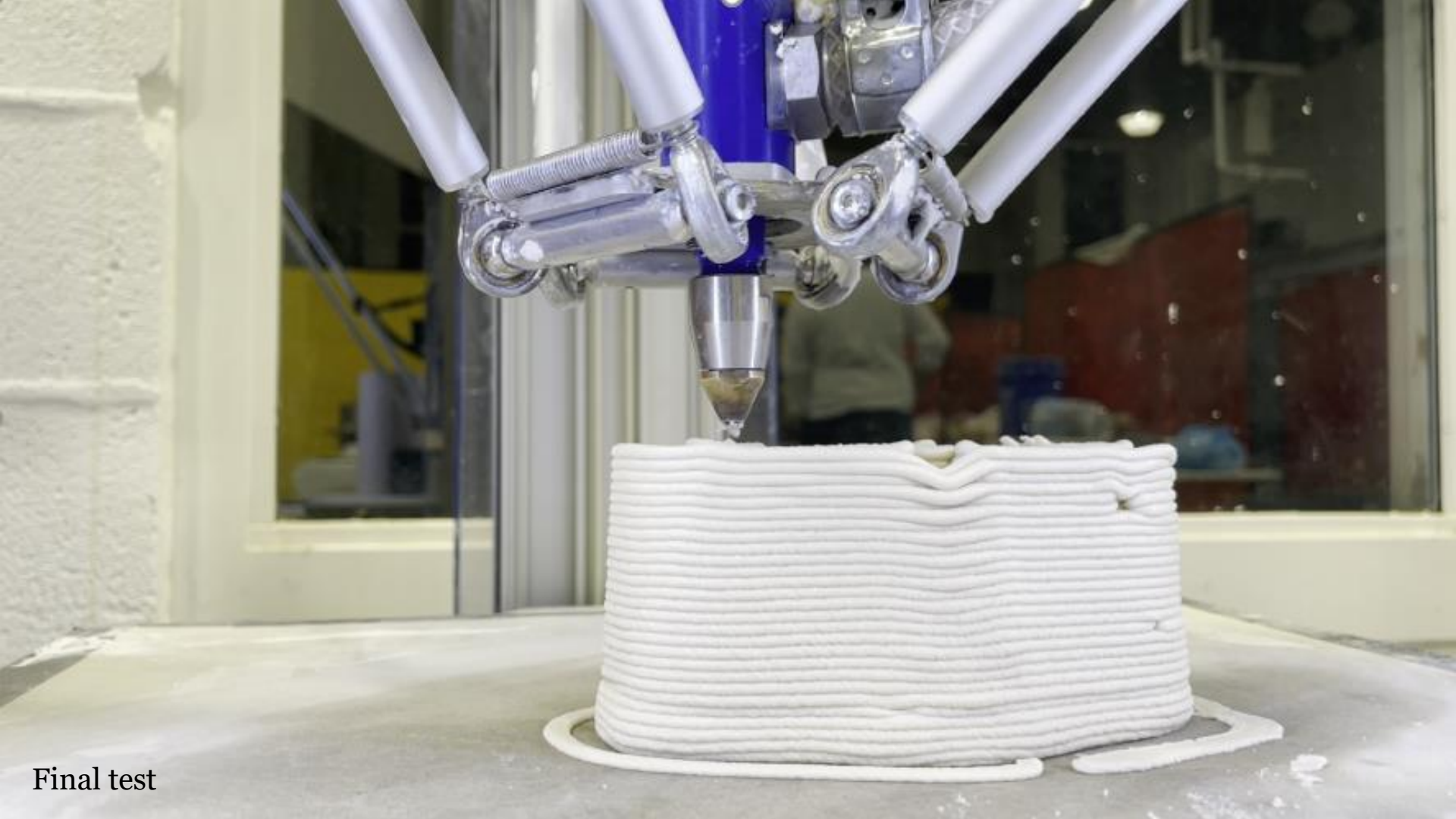
- Salt: 66.7%
- Clay: 8.3%
- Starch: 8.3%
- Water: 16.7% to 20.8%
- Alcohol: 2.1%
- Glycerin: 2.1%





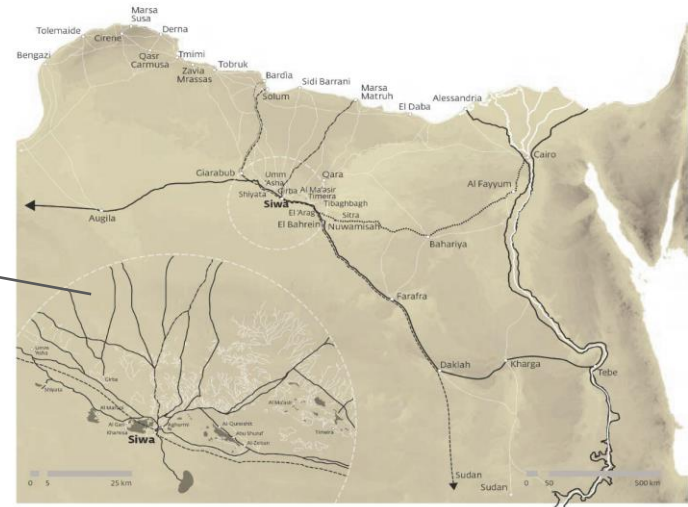
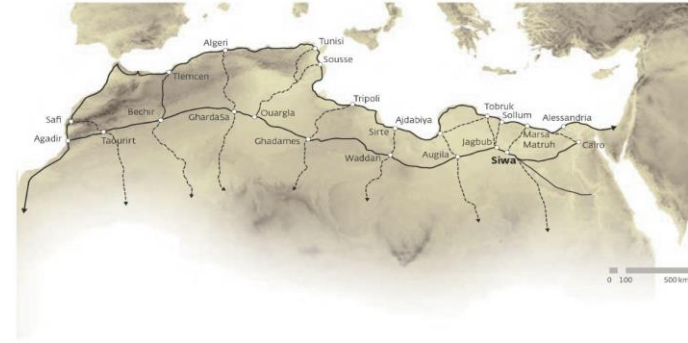
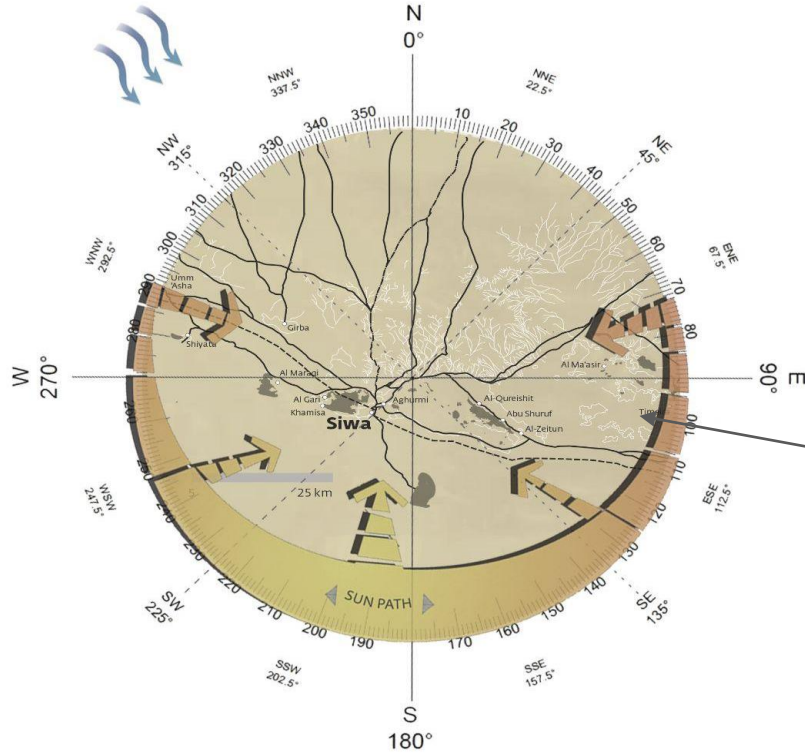






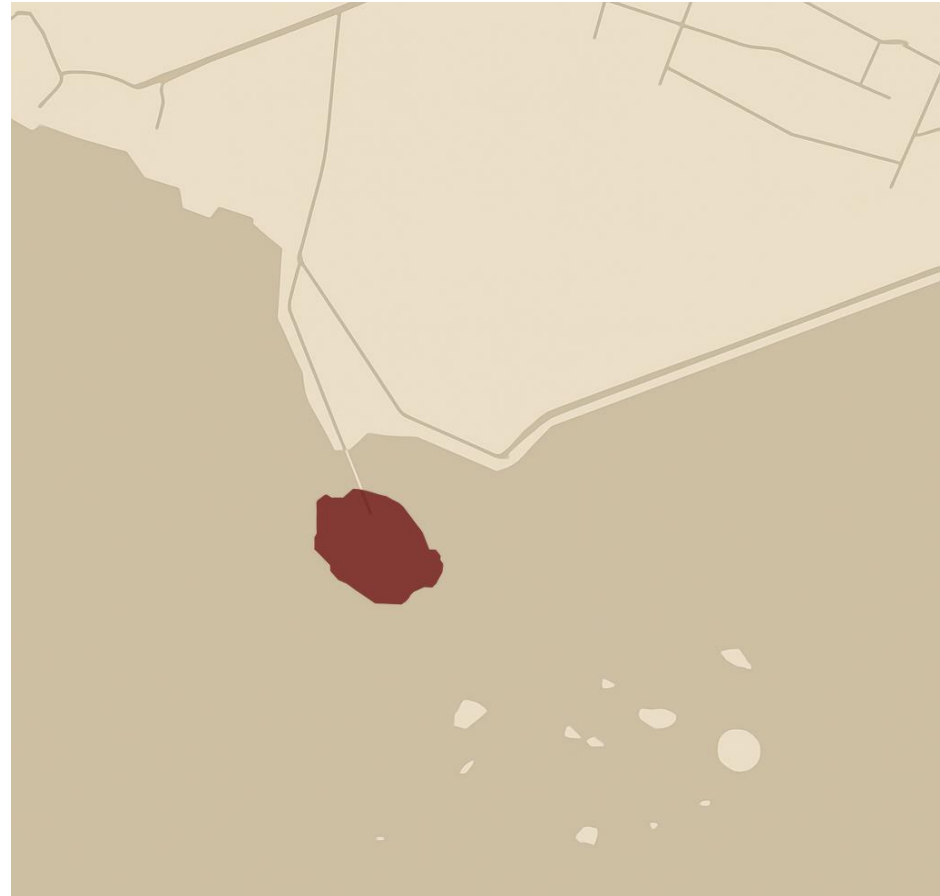
Final test

Siwa location

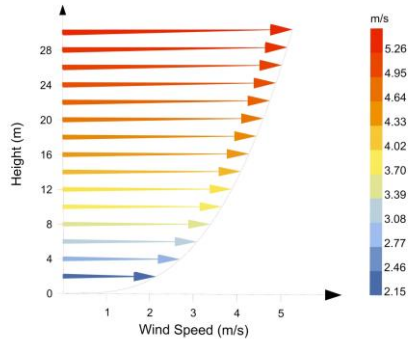


Location

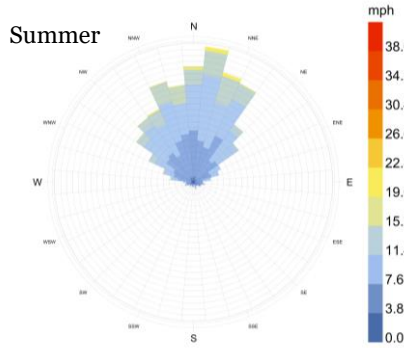
For the site, I selected one of the small islands located in the middle of the Siwa salt lakes. This unique location offers a deeper **integration with the natural context** of Siwa—surrounded by salt, water, and palm trees.



Wind analysis



Siwa - City Terrain
 Prevailing Wind Direction = N
 Average Met Wind Speed = R 16 m/s

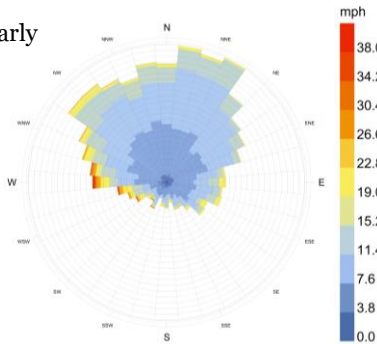


Wind Speed (mph)
 time-zone: 2.0
 source: SRC-TMYx
 city: Siwa
 country: EGY
 period: 7/1 to 9/30 between 0 and 23 @1
 Calm for 0.0% of the time = 0 hours.
 Each closed polyline shows frequency of 0.5% = 10 hours.



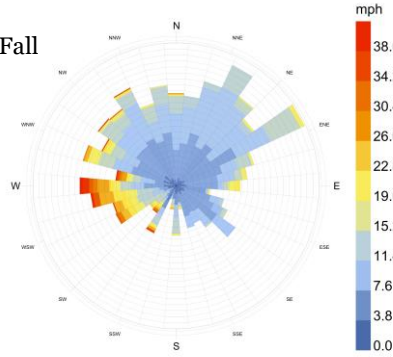
Wind Speed (mph)
 time-zone: 2.0
 source: SRC-TMYx
 city: Siwa
 country: EGY
 period: 4/1 to 6/30 between 0 and 23 @1
 Calm for 0.0% of the time = 0 hours.
 Each closed polyline shows frequency of 0.3% = 6 hours.

yearly



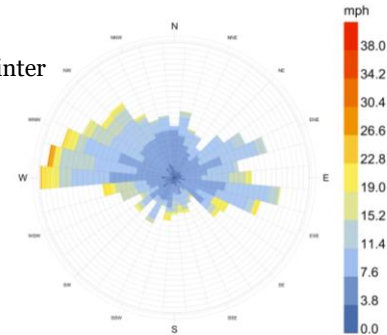
Wind Speed (mph)
 time-zone: 2.0
 source: SRC-TMYx
 city: Siwa
 country: EGY
 period: 1/1 to 12/31 between 0 and 23 @1
 Calm for 0.0% of the time = 0 hours.

Fall



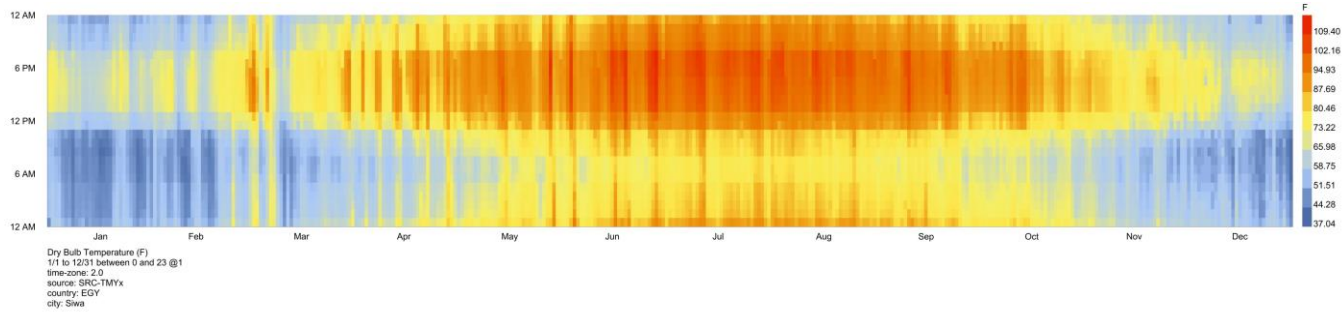
Wind Speed (mph)
 time-zone: 2.0
 source: SRC-TMYx
 city: Siwa
 country: EGY
 period: 10/1 to 12/31 between 0 and 23 @1
 Calm for 0.82% of the time = 18 hours.
 Each closed polyline shows frequency of 0.2% = 5 hours.

Winter

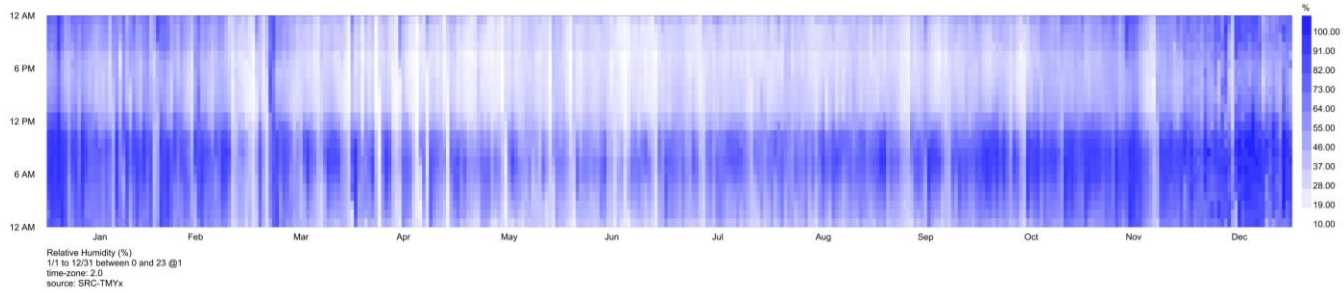


Wind Speed (mph)
 time-zone: 2.0
 source: SRC-TMYx

Dry bulb Temp



Relative Humidity



Thermal comfort 2004

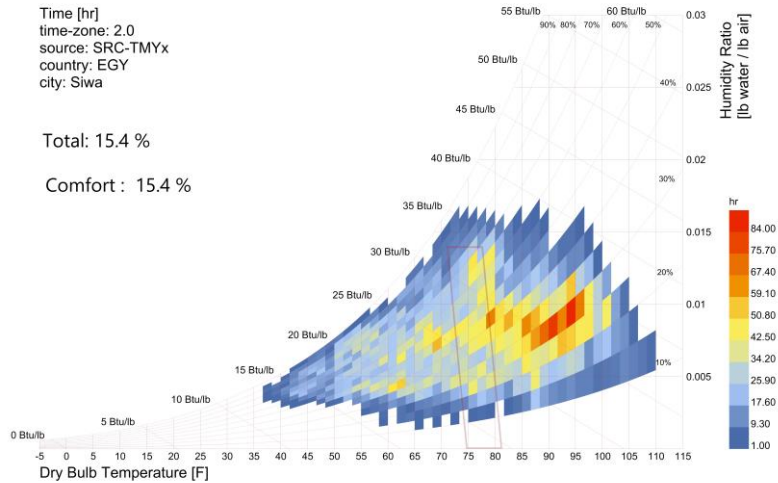


Psychrometric charts

Time [hr]
time-zone: 2.0
source: SRC-TMYx
country: EGY
city: Siwa

Total: 15.4 %

Comfort : 15.4 %



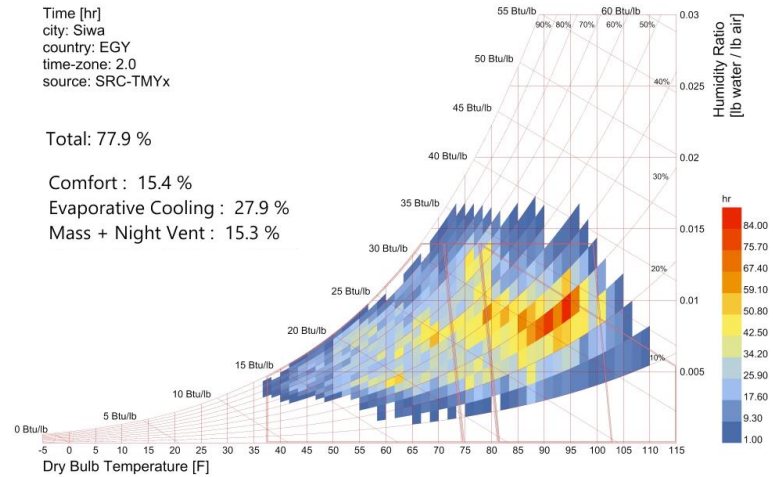
Time [hr]
city: Siwa
country: EGY
time-zone: 2.0
source: SRC-TMYx

Total: 77.9 %

Comfort : 15.4 %

Evaporative Cooling : 27.9 %

Mass + Night Vent : 15.3 %



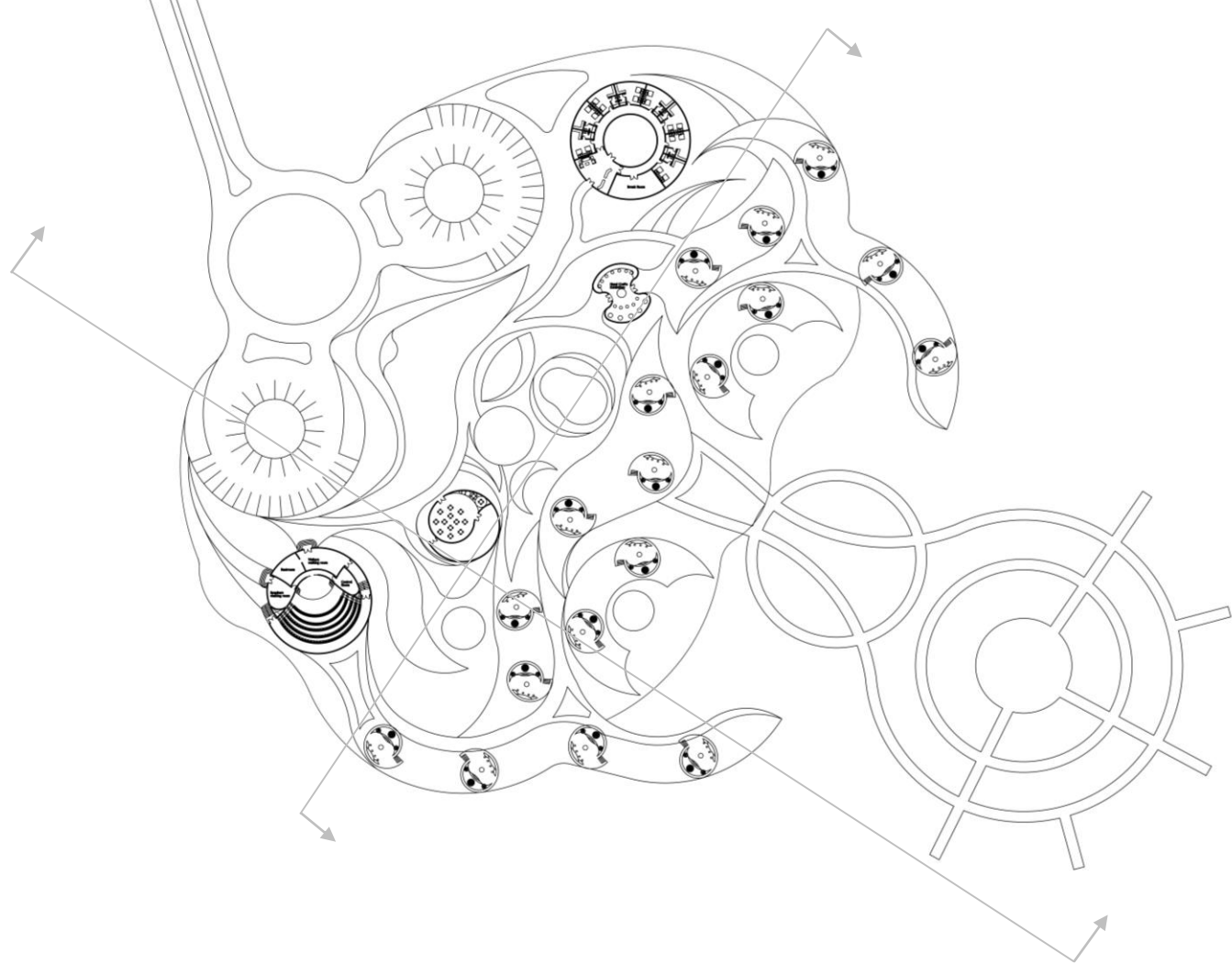
Health And Wellness Resort in Siwa Oasis, Egypt

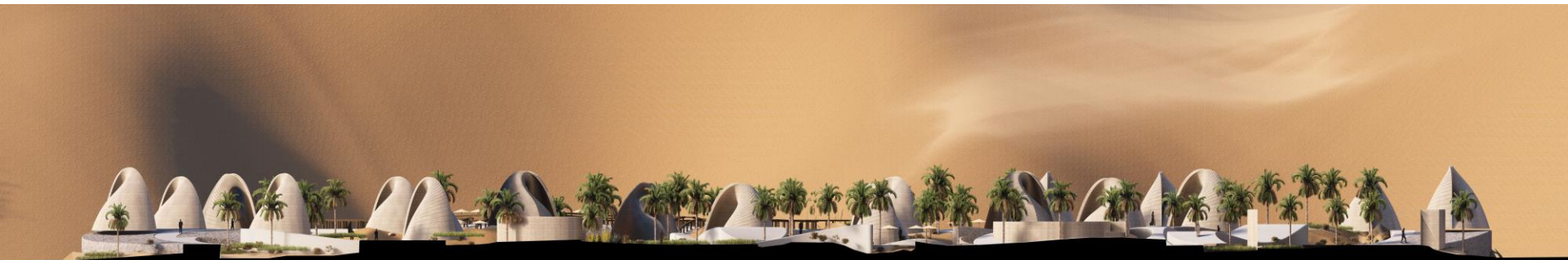
The main design concept draws inspiration from the natural flow of sand dunes in Siwa. These organic lines shaped not only the landscape design but also influenced the form and layout of the residential units. The curved lines of the dunes were used to define circulation paths, create smooth transitions between indoor and outdoor spaces, and form building envelopes that feel naturally integrated with the desert environment.



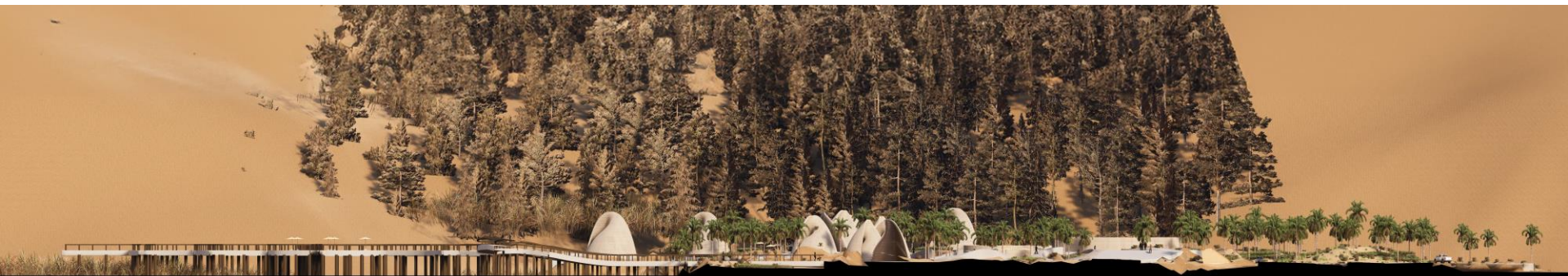






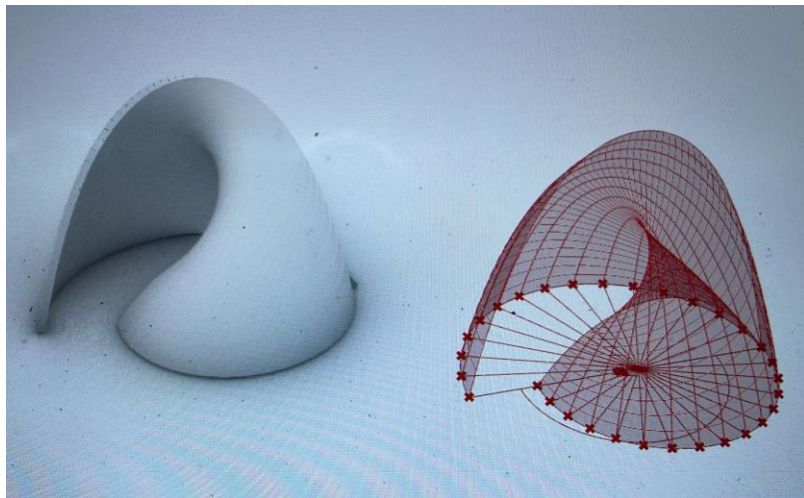


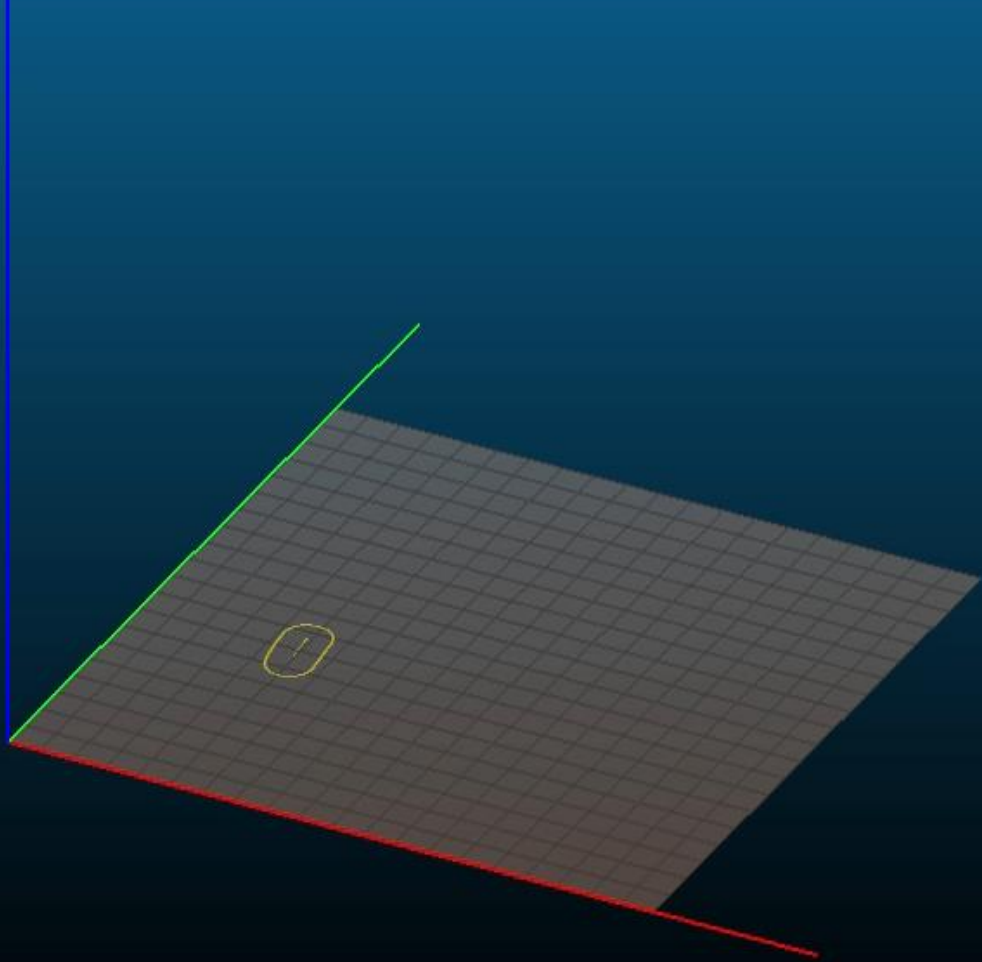
Section A-A

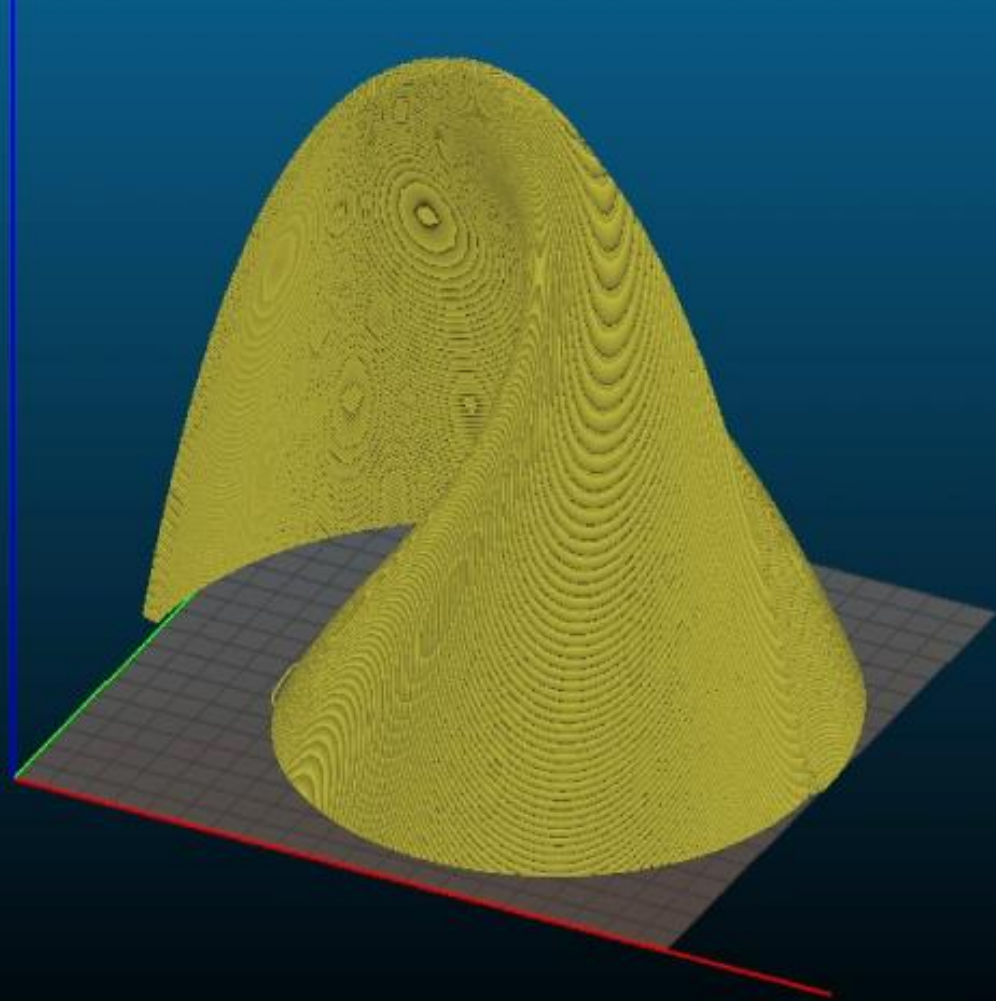


Section B-B

Units design





















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