Adobe Creative Community

A Skill Based Community Center

AR3B011– *EARTHY*
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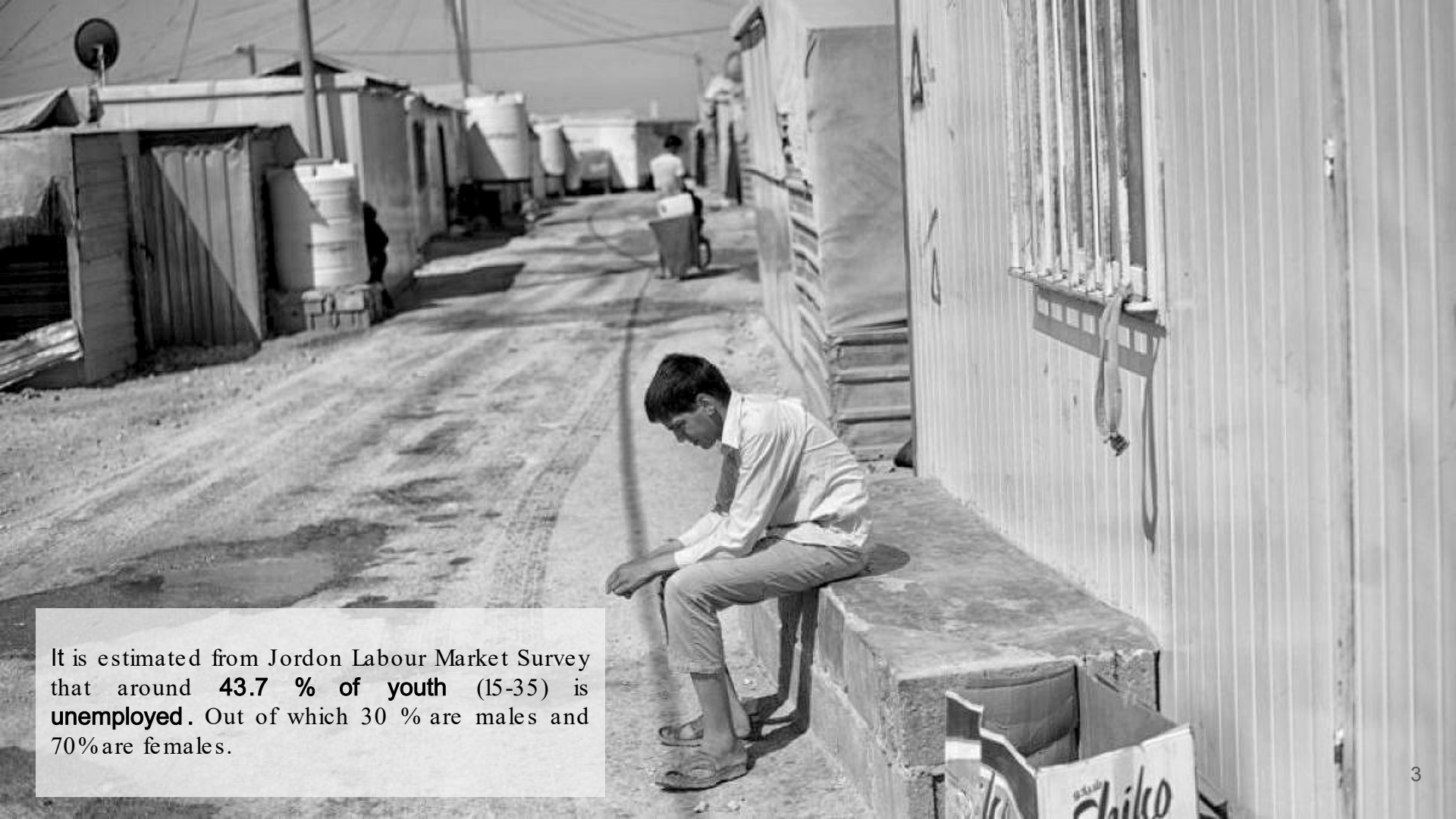
Youth are the ***spirit of life****, they determine how developed or underdeveloped a nations is !!!....However, the* ***organisations lack a vision*** *for the youth in Zaatari.*

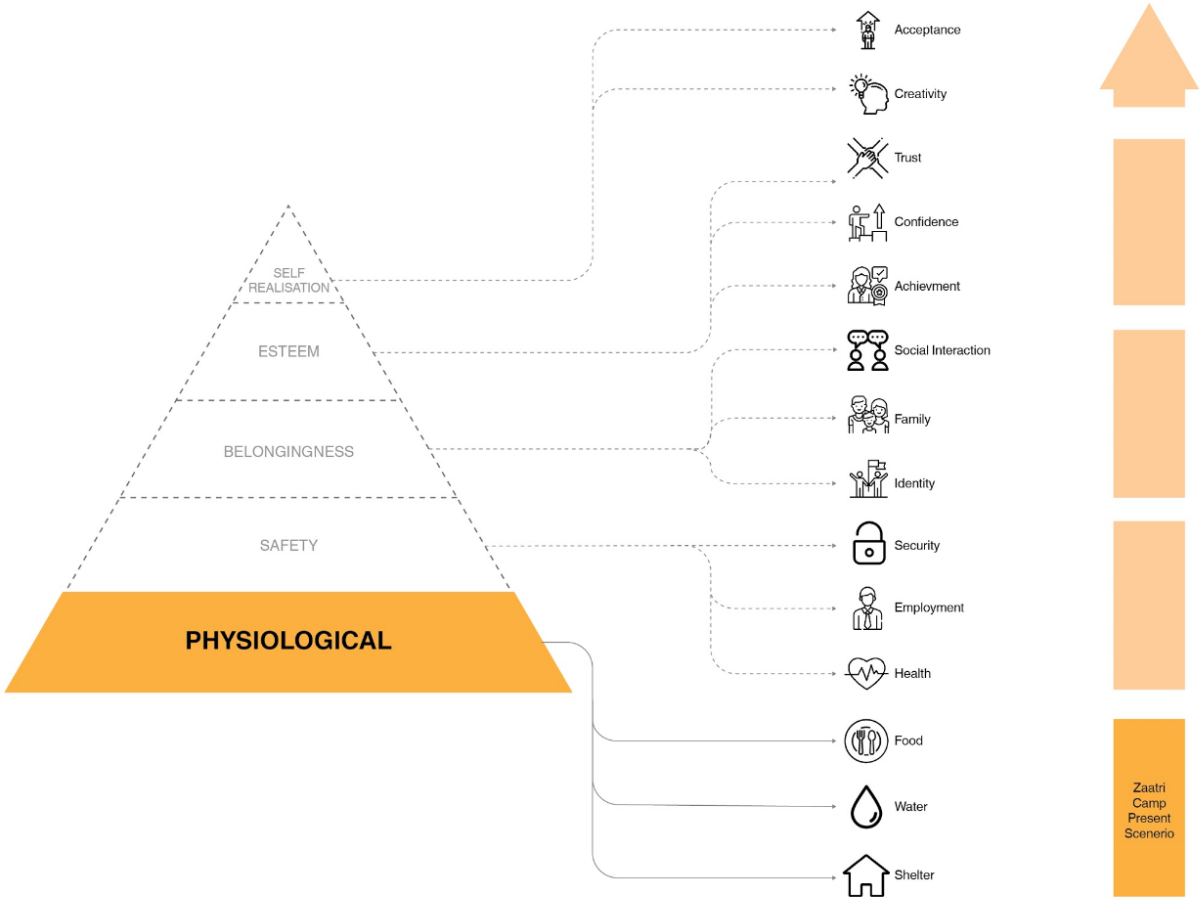
My ambitions and dream were bigger in Syria, but ***difficult reality in Zaatari*** *Camp* ***diminished our hopes.***

- Zaher , Syrian Refugee



It is estimated from Jordon Labour Market Survey that around **43.7 % of youth** (15-35) is **unemployed**. Out of which 30 % are males and 70% are females.

Concern of Basic Needs



Design Vision :

Provide a vocational and technical training for youth helping them climb the Maslow's Pyramid of Basic Needs.

Structure of Presentation

Research & Analysis
Analytical Research on current scenario, urban vision and design development goals.

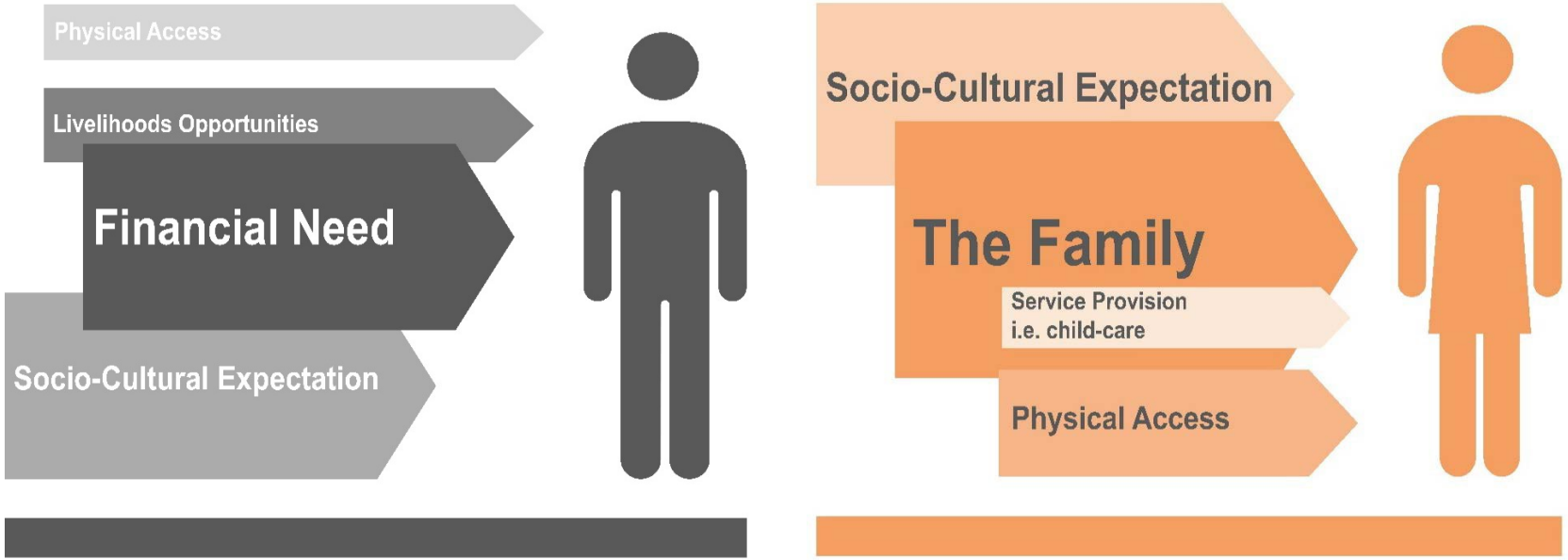
Configuring
POR, Layouting, Architectural Analysis, Configuring Rules, Architectural Drawings

Forming
Meshing rules, Shaping Process, Tessellation Rules

Structuring
Material Properties, Structural Classification, Analysis

Constructing
Construction types, process and details.

Anecdotes : Target Group (15-30 yrs)



Source: Youth Assessment Report, REACH, 2016

Urban Scale: Existing Problems with Youth Center

Distance
45% of the target population has more than 400m to the closest facility

Security
Most of the existing facilities have no access to main roads or public spaces.

Overcrowded
8 of 12 existing facilities serve less than $5m^2$ per person

Source: Youth Assessment Report, REACH, 2016

Urban Scale: Design Goals

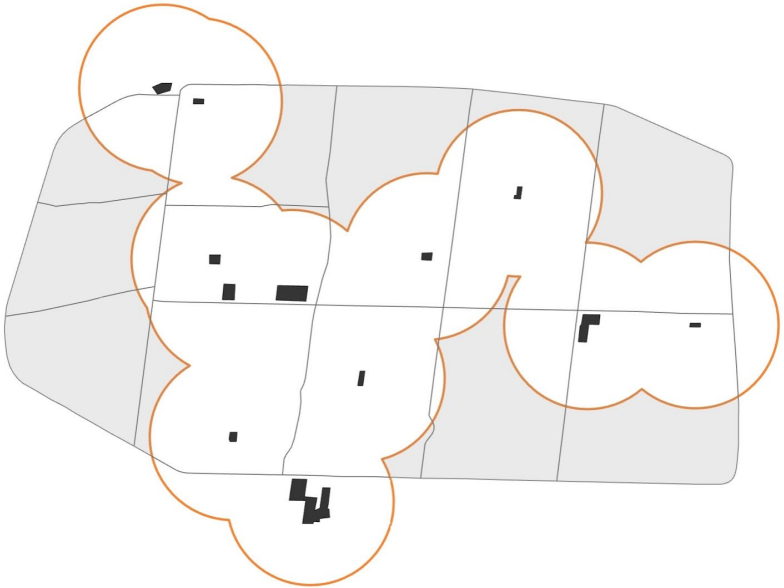
Distance
To locate a youth center within walking radius of **400m.**

Security
Youth Center to be located in vicinity of **public spaces** and **main roads.**

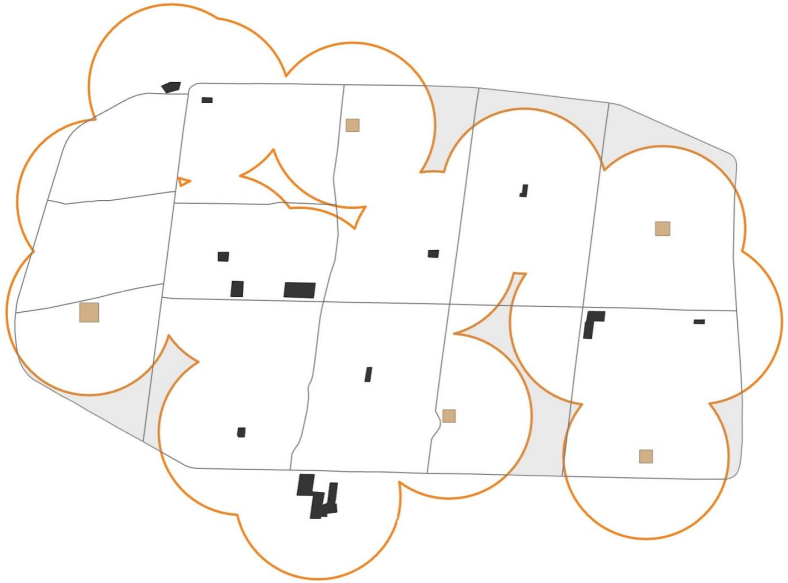
Overcrowded
Each youth center to cater requirement of **5m²/per person.**

Urban Scale: Coverage Map

Criteria : Minimum Distance of 400 m



Existing



Proposed

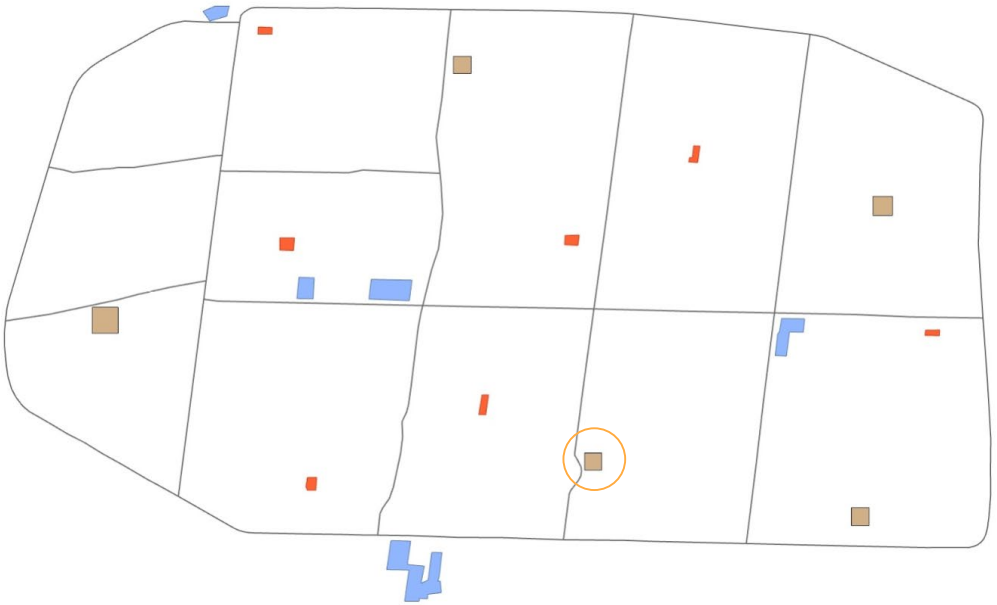
Urban Scale: Stress Map

Criteria : Stress on existing centers , 5m² / person

Existing

Proposed

Urban Scale : Camp Development Strategy



Facilities to increase capacity

Facilities to decrease the capacity

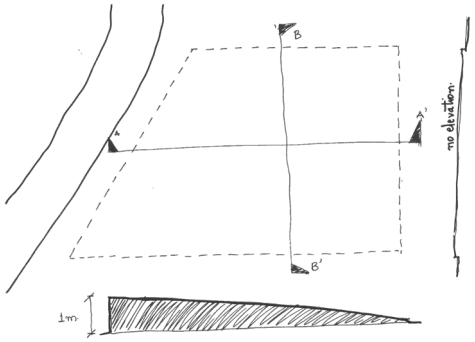
New centers

Scenario	Decision
If population falls outside sphere of influence	Add new facility
If population in sphere of influence > capacity of facility	Increase capacity: ● Expand current facility ● Introduce time slots for use of facility
If population in sphere of influence < capacity of facility	Densify sphere of influence with population of 15-30 years old

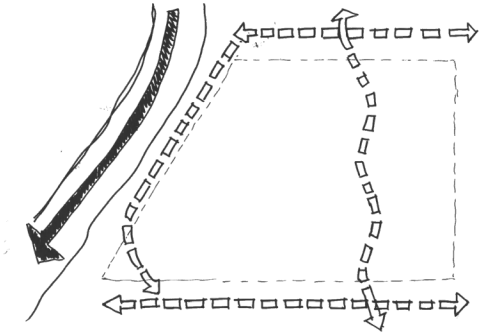
Site Scale : Site Selection

Proximity	Main road,School,Clinic, Playground,Low dense area
Possible Activities	Construction (the area will increase in future with new houses) Basic needs
Number of unskilled people to design the space for	800

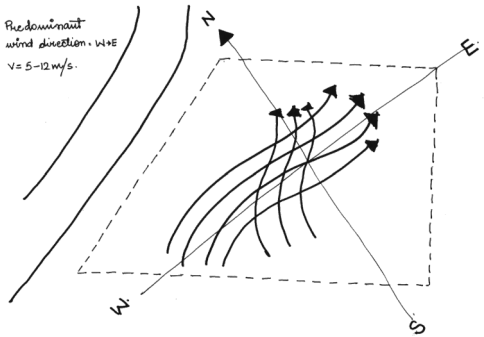
Source: Syria News Daily, 2019



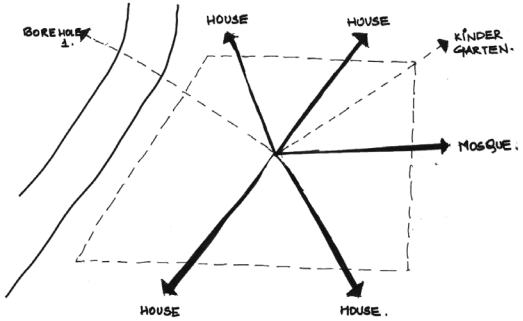
Contours



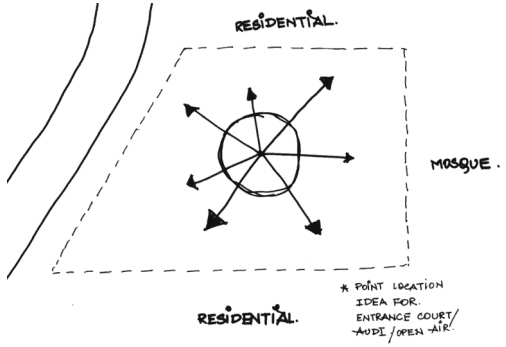
Vehicular and Pedestrian Access



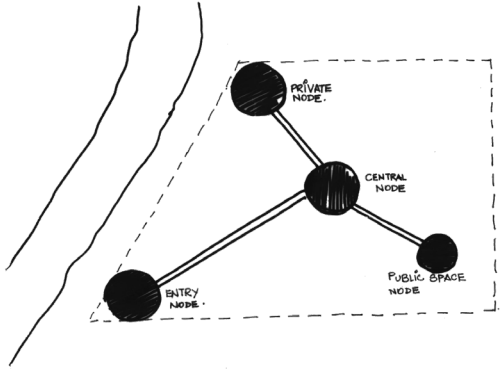
Wind Direction



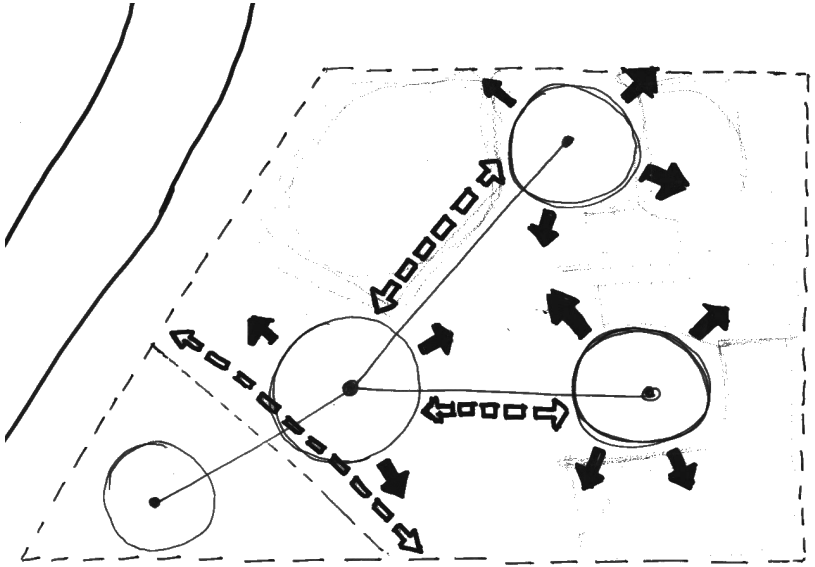
Views



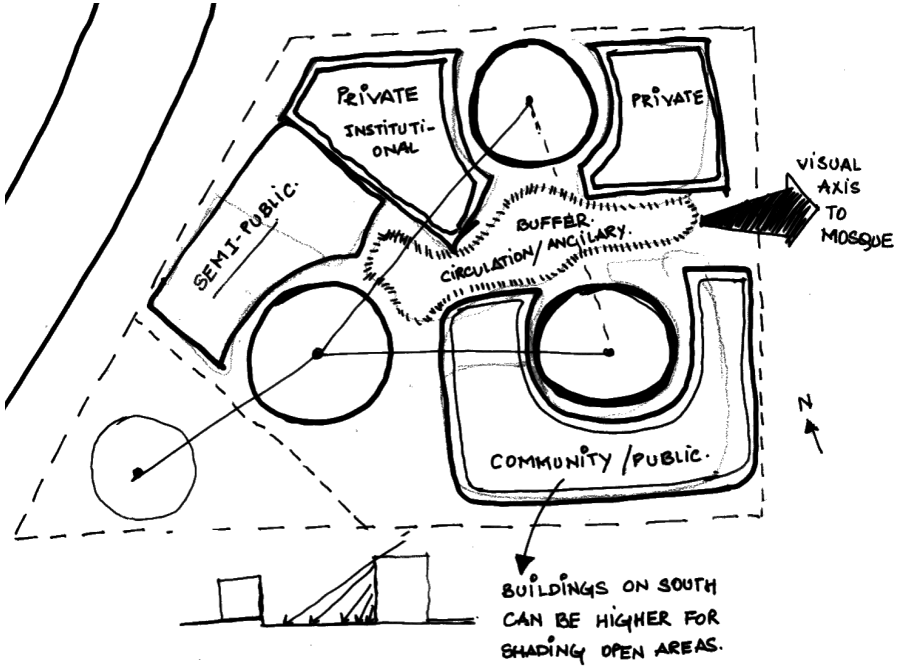
Central point



Nodes

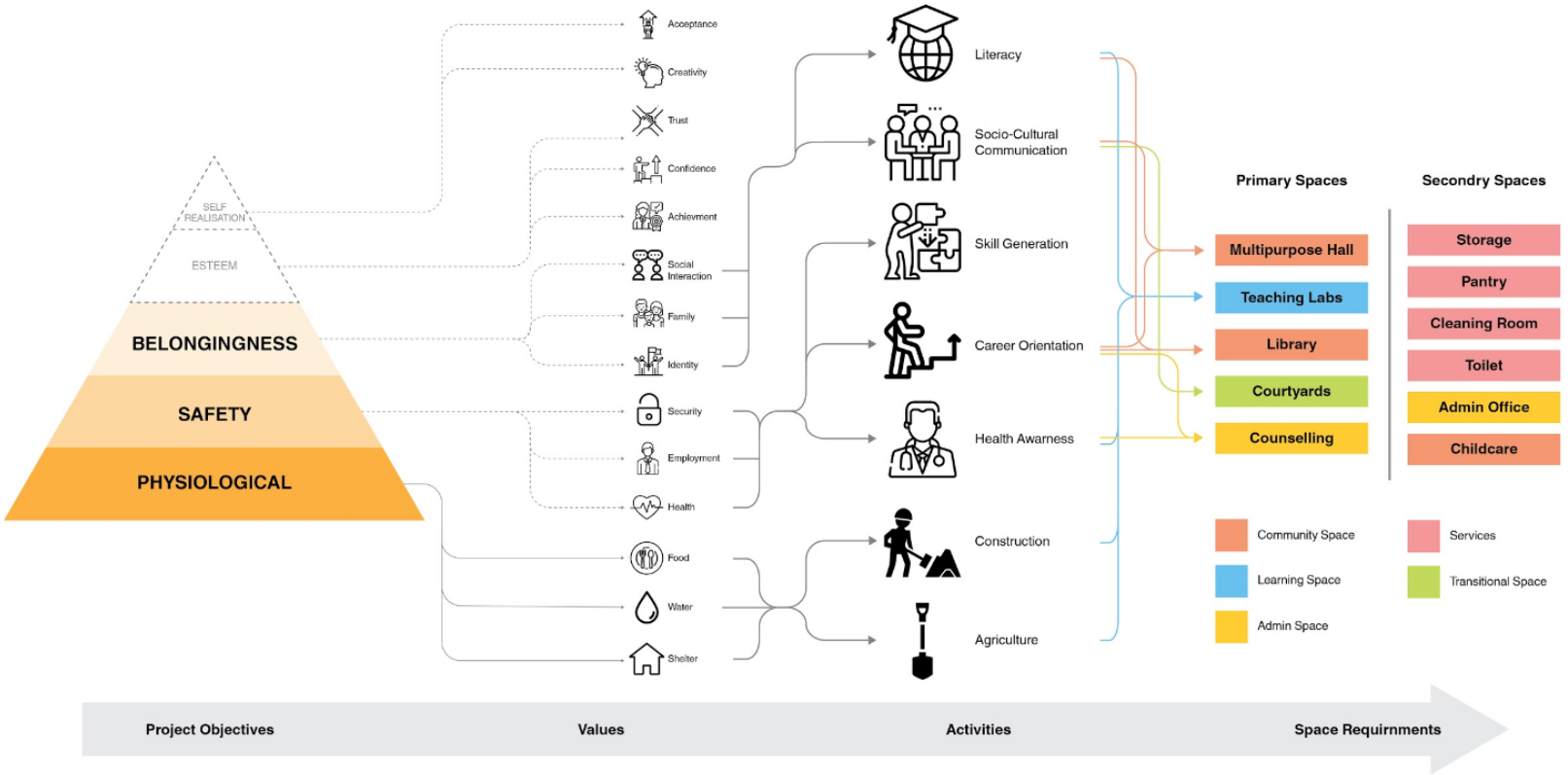


Courtyard Placements :
Fixing courtyard position and setting constraints for its position and size.

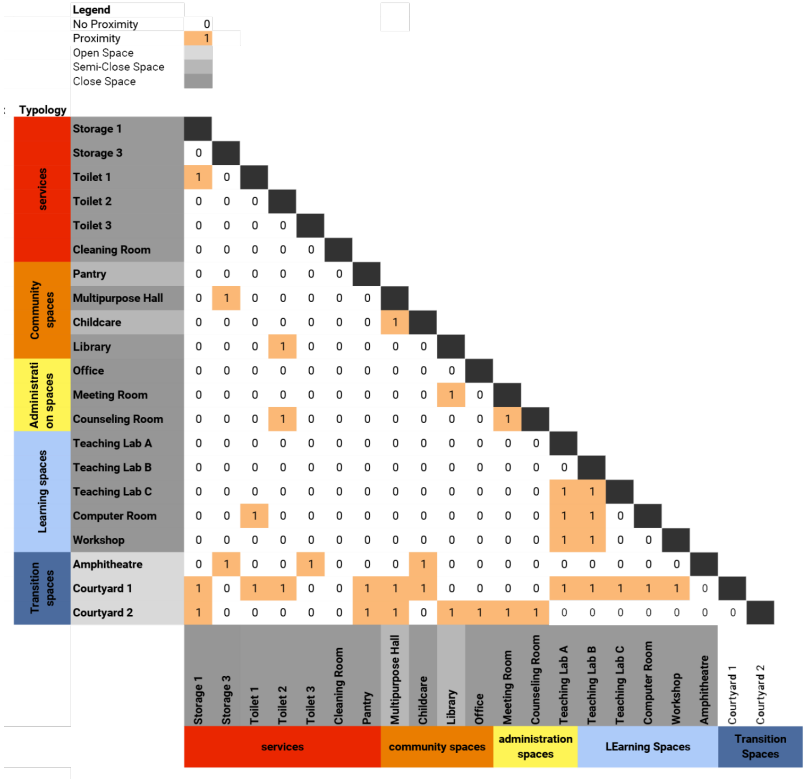


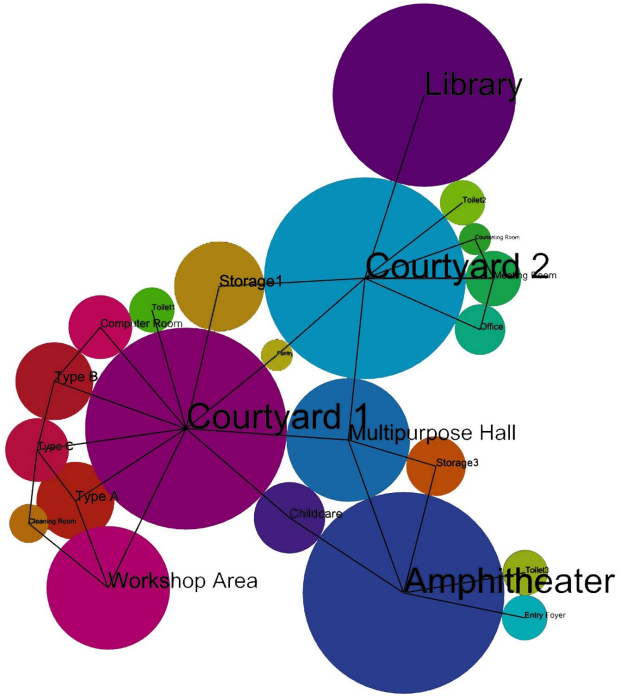
Juxtaposing Layers:
Site Zoning based on site analysis.

Building Scale : Developing Programme



Building Scale : Connections and Adjacencies

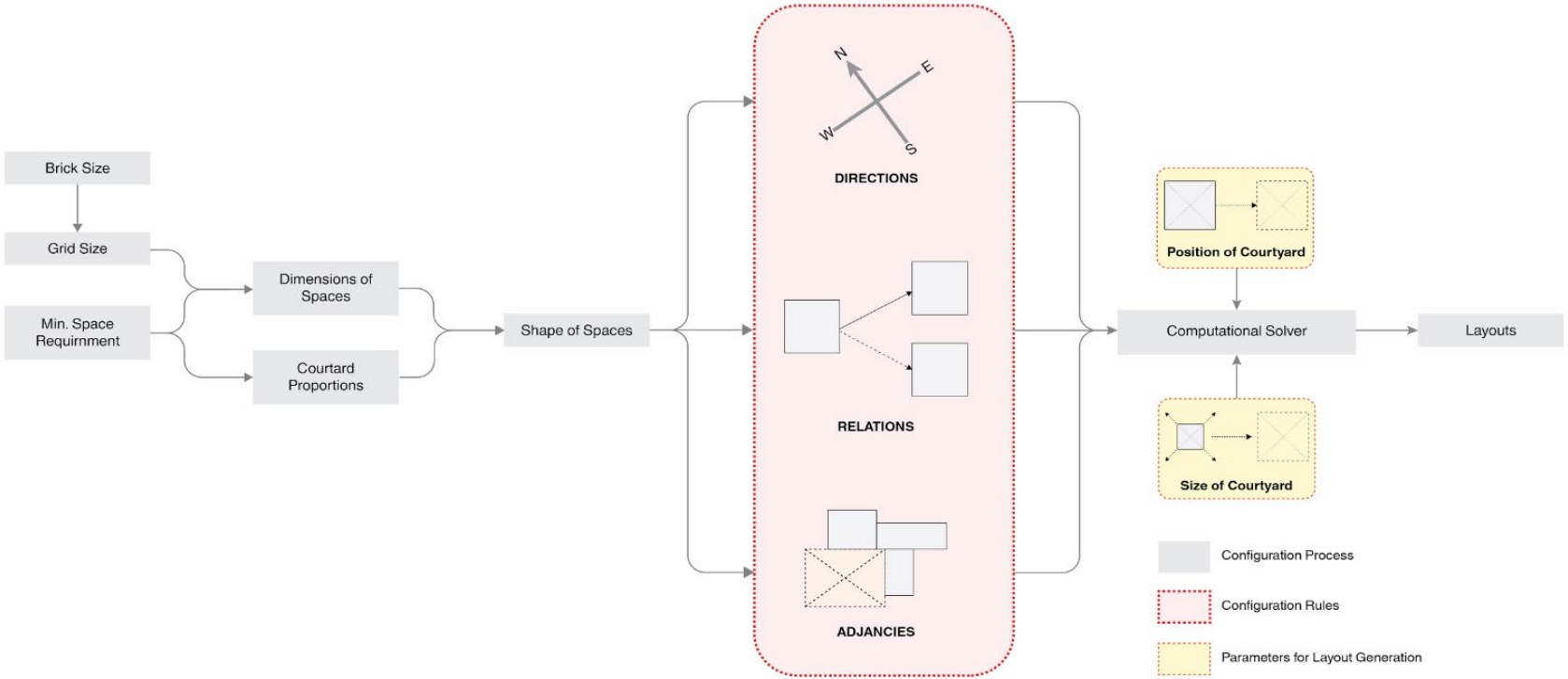




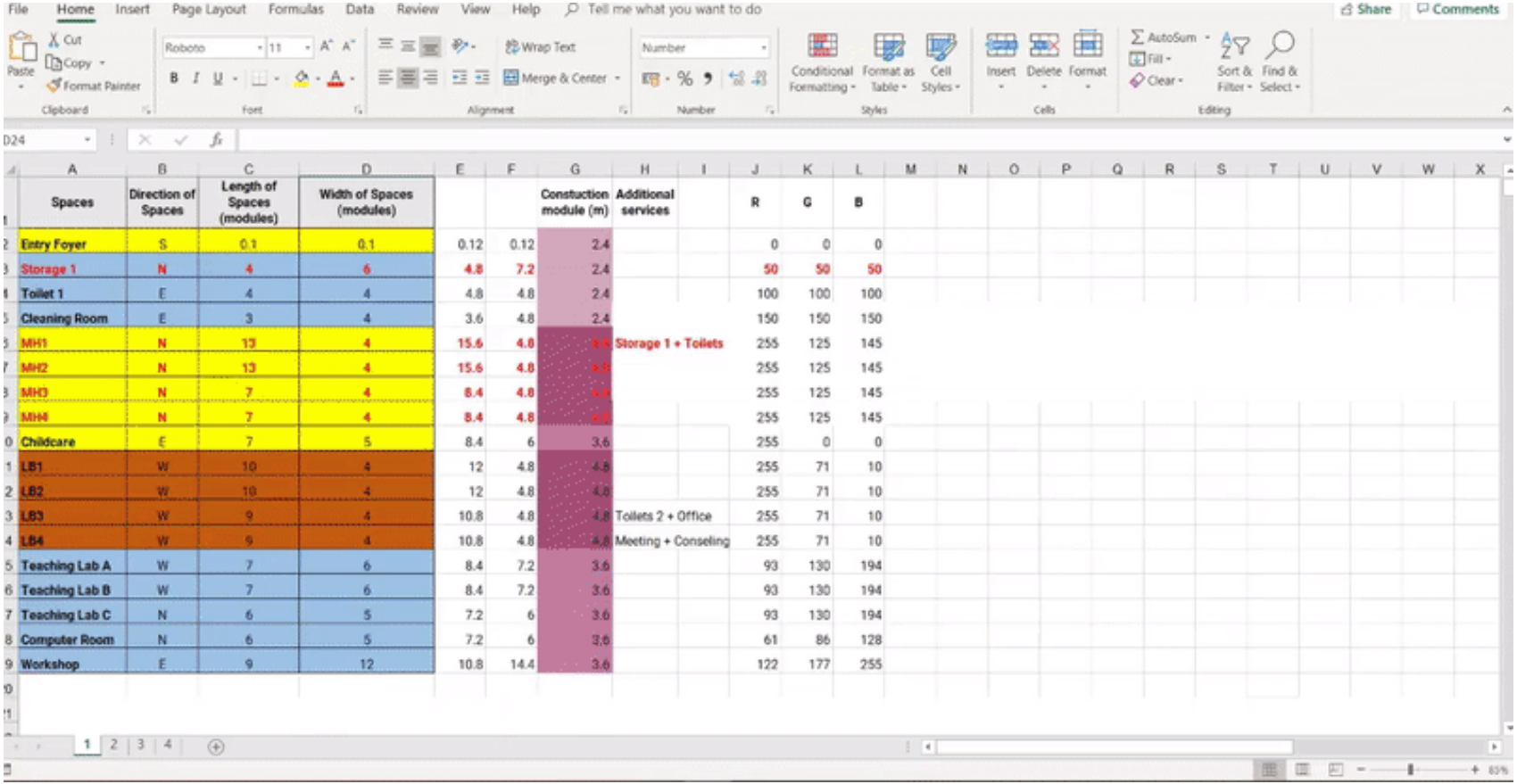
REL Chart: Relations in terms of proximities between spaces.

Bubble Diagram: Connections with adjacencies between spaces.

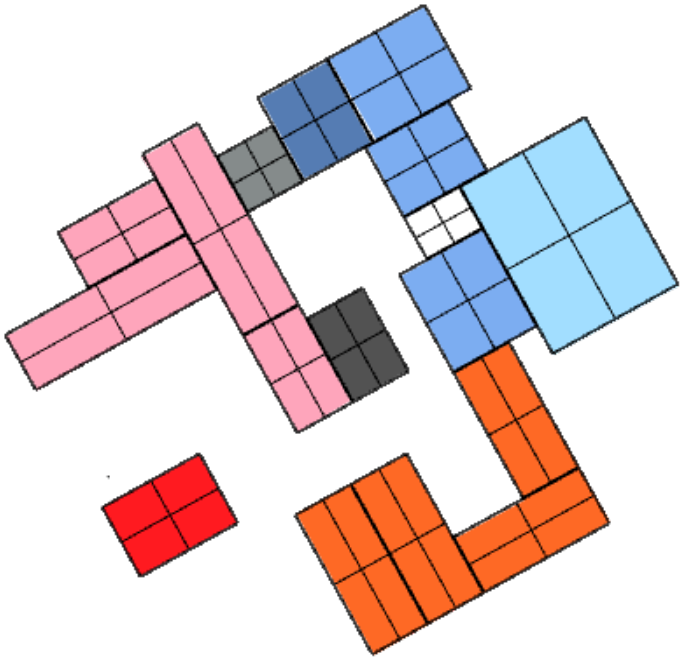
Building Scale : Configuration



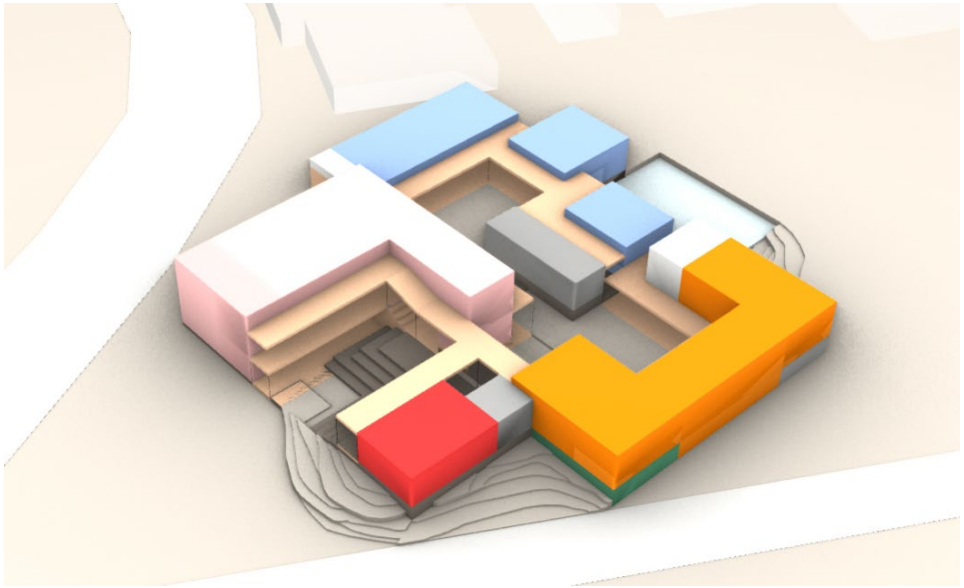
Building Scale : Gradient Descent Optimization



Spaces	Direction of Spaces	Length of Spaces (modules)	Width of Spaces (modules)			Constuction module (m)	Additional services		R	G	B
Entry Foyer	S	0.1	0.1	0.12	0.12	2.4			0	0	0
Storage 1	N	4	6	4.8	7.2	2.4			50	50	50
Toilet 1	E	4	4	4.8	4.8	2.4			100	100	100
Cleaning Room	E	3	4	3.6	4.8	2.4			150	150	150
MH1	N	13	4	15.6	4.8		Storage 1 + Toilets		255	125	145
MH2	N	13	4	15.6	4.8				255	125	145
MH3	N	7	4	8.4	4.8				255	125	145
MH4	N	7	4	8.4	4.8				255	125	145
Childcare	E	7	5	8.4	6	3.6			255	0	0
LB1	W	10	4	12	4.8				255	71	10
LB2	W	10	4	12	4.8				255	71	10
LB3	W	9	4	10.8	4.8		Toilets 2 + Office		255	71	10
LB4	W	9	4	10.8	4.8		Meeting + Conseling		255	71	10
Teaching Lab A	W	7	6	8.4	7.2	3.6			93	130	194
Teaching Lab B	W	7	6	8.4	7.2	3.6			93	130	194
Teaching Lab C	N	6	5	7.2	6	3.6			93	130	194
Computer Room	N	6	5	7.2	6	3.6			61	86	128
Workshop	E	9	12	10.8	14.4	3.6			122	177	255

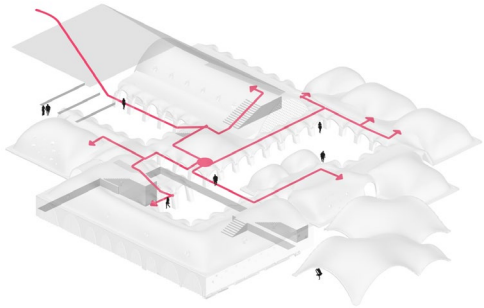


Selected Layout from Computational Output

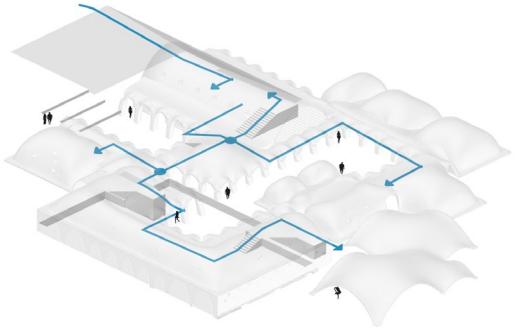


Volumetric Massing

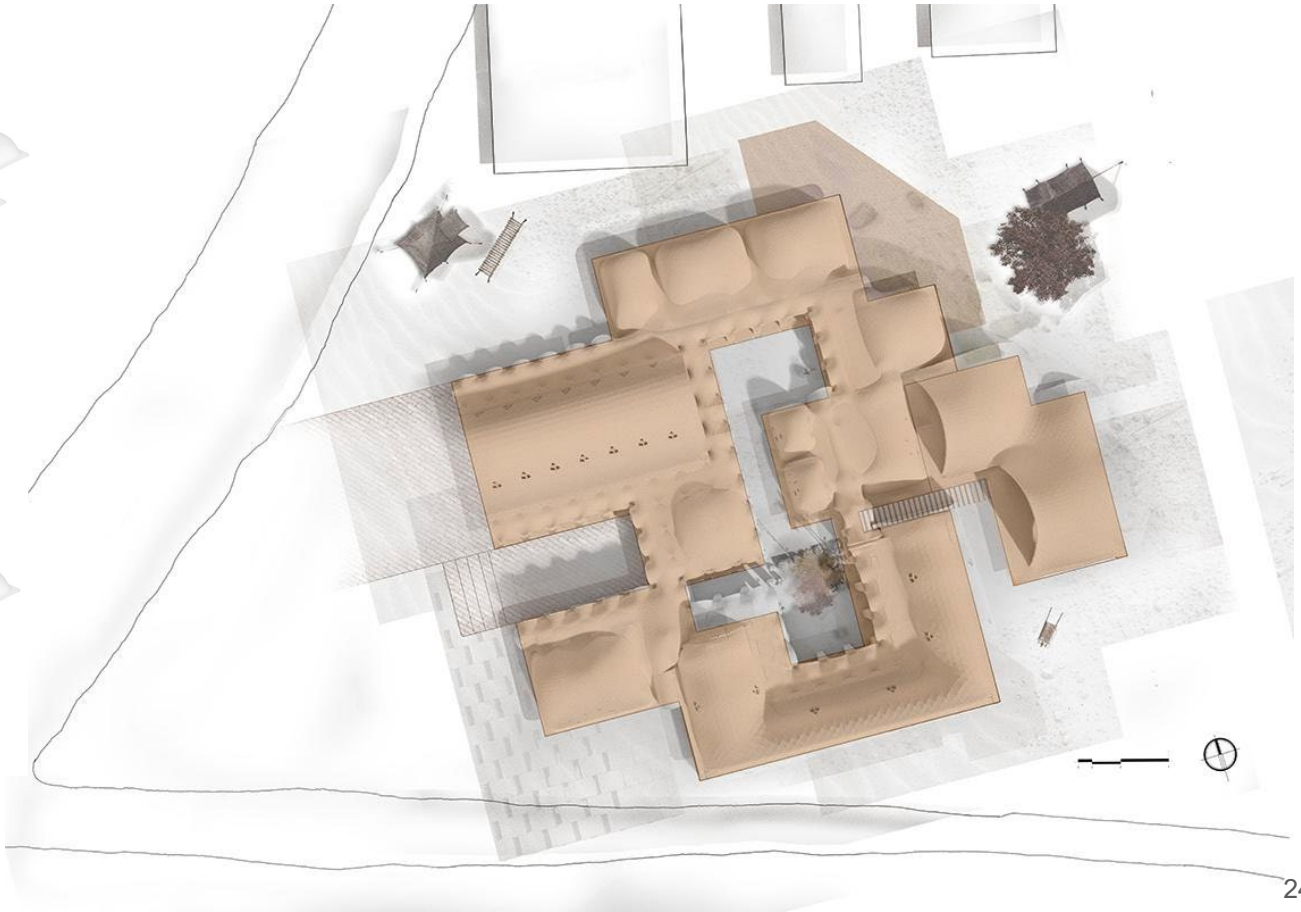
Architecture Scale : Site Plan



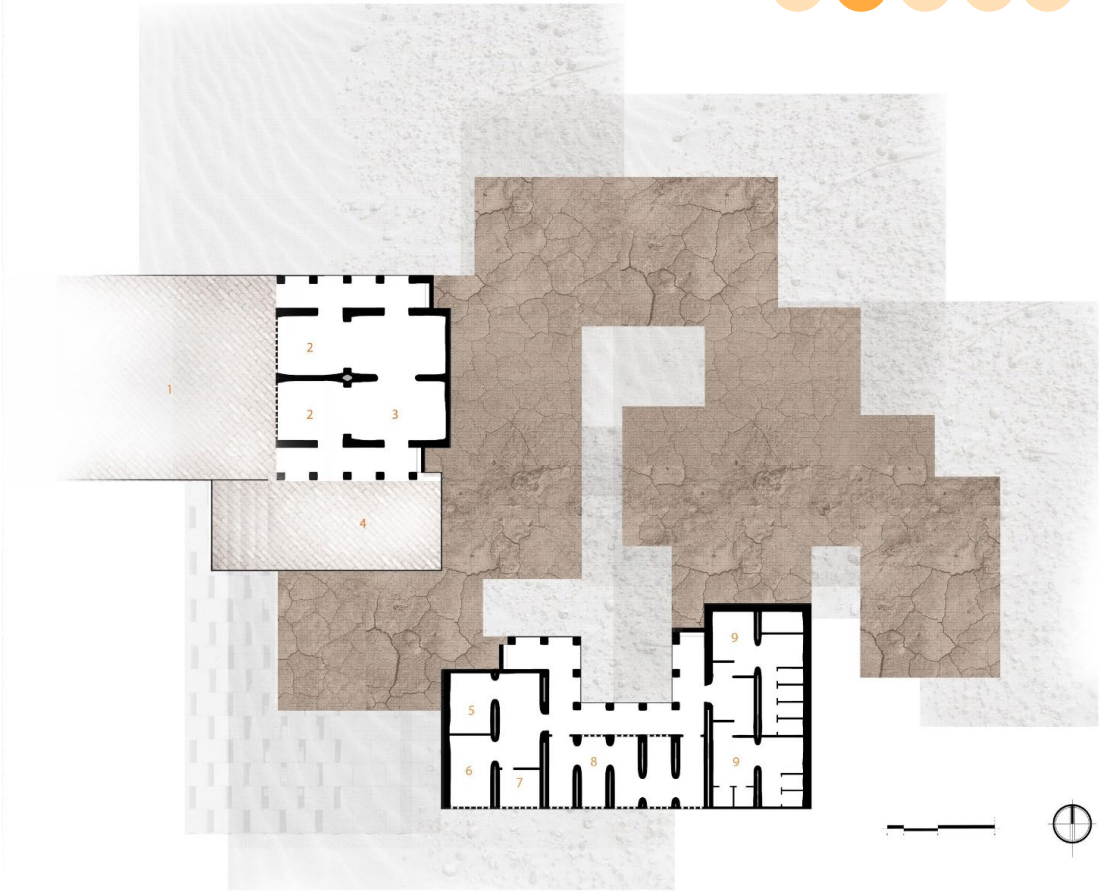
Circulation of User Group



Circulation of Staff

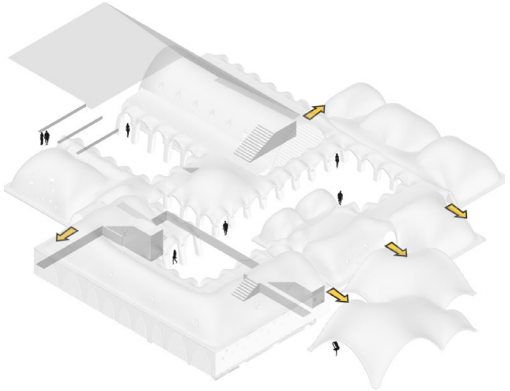


Architecture Scale : Lower Ground Floor Plan

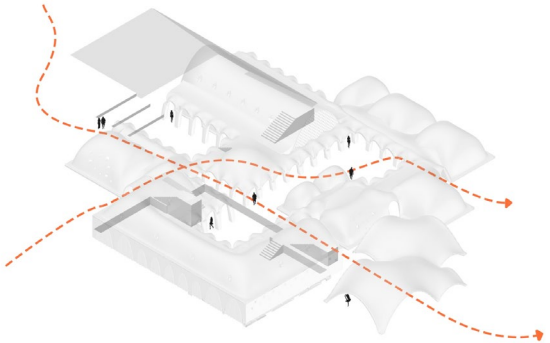


1. ENTRANCE FOYER
2. REGISTRATION DESK
3. STORAGE
4. AMPHITHEATRE
5. OFFICE
6. MEETING ROOM
7. MANAGER CABIN
8. LIBRARY
9. TOILET

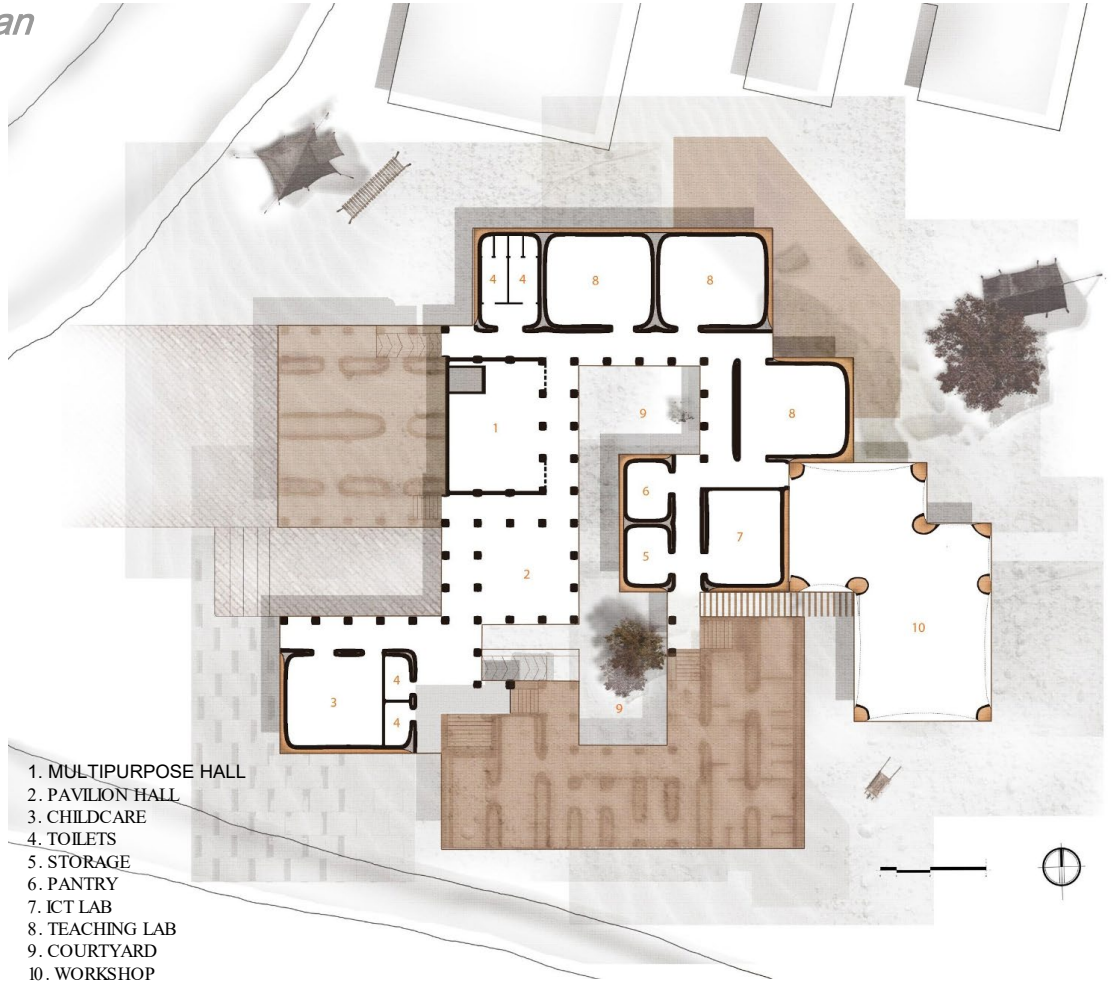
Architecture Scale : Ground Floor Plan



Fire Exits



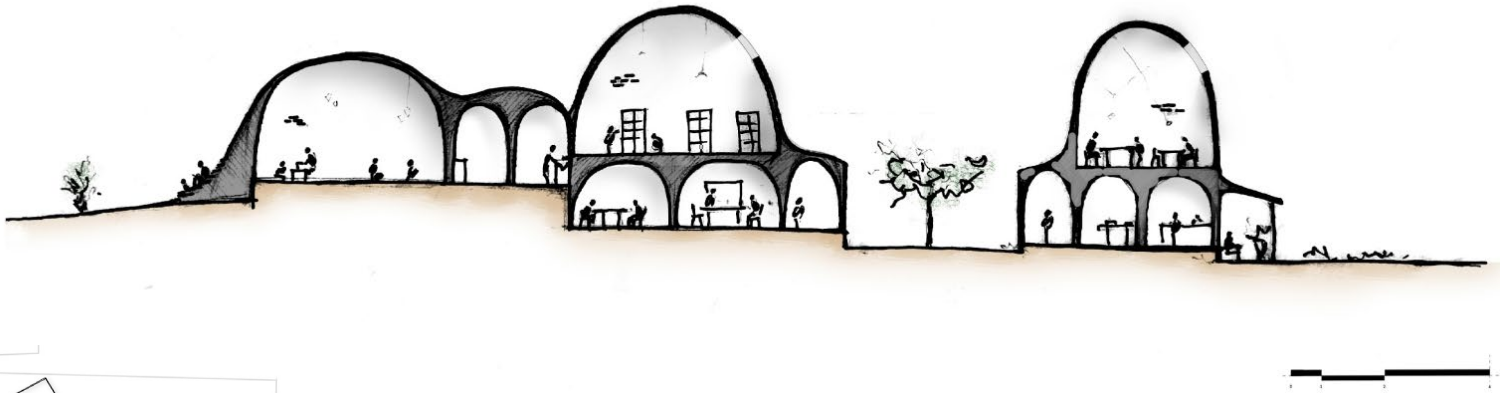
Pedestrian Access Through Building

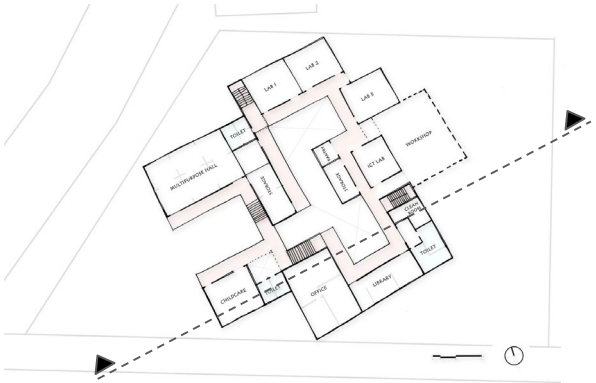


Architecture Scale : First Floor Plan

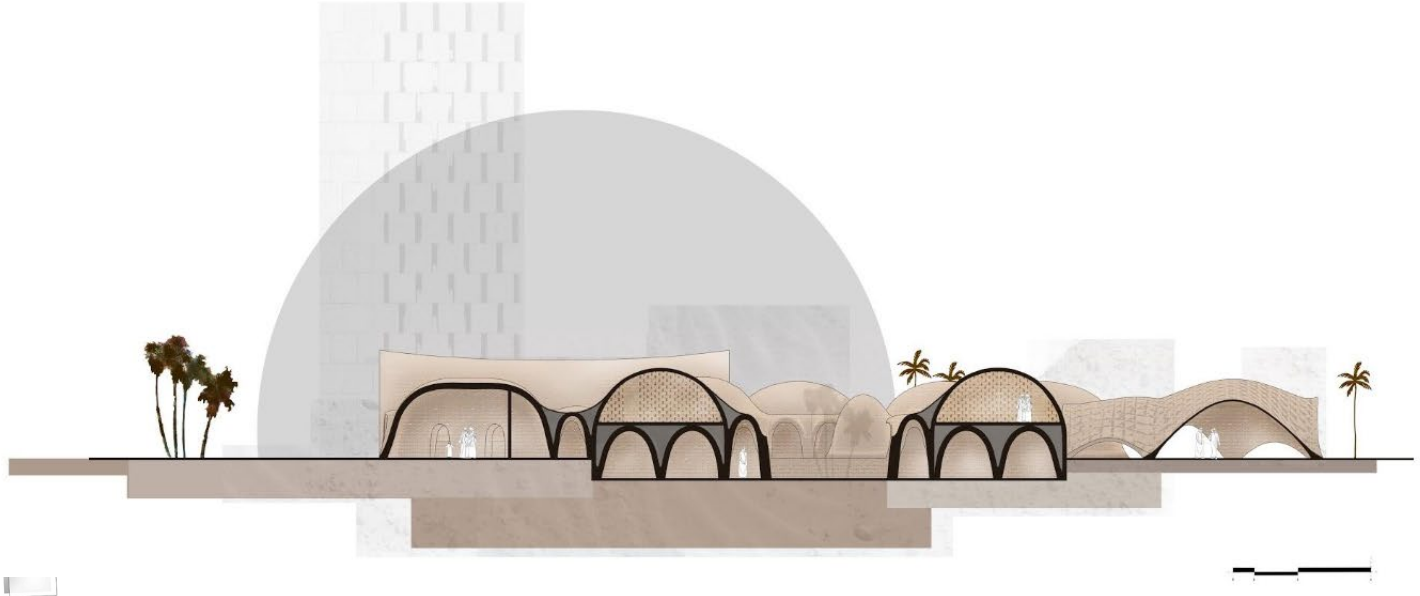
1. MULTIPURPOSE HALL
2. LIBRARY

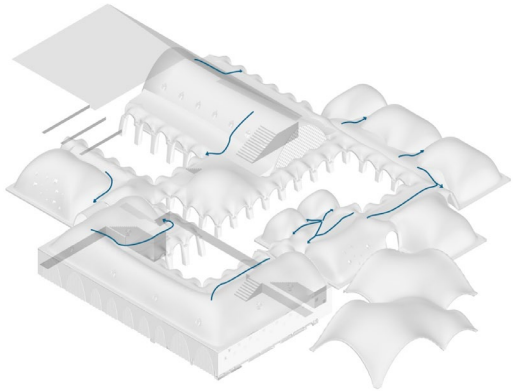
Architecture Scale : *Schematic Section*



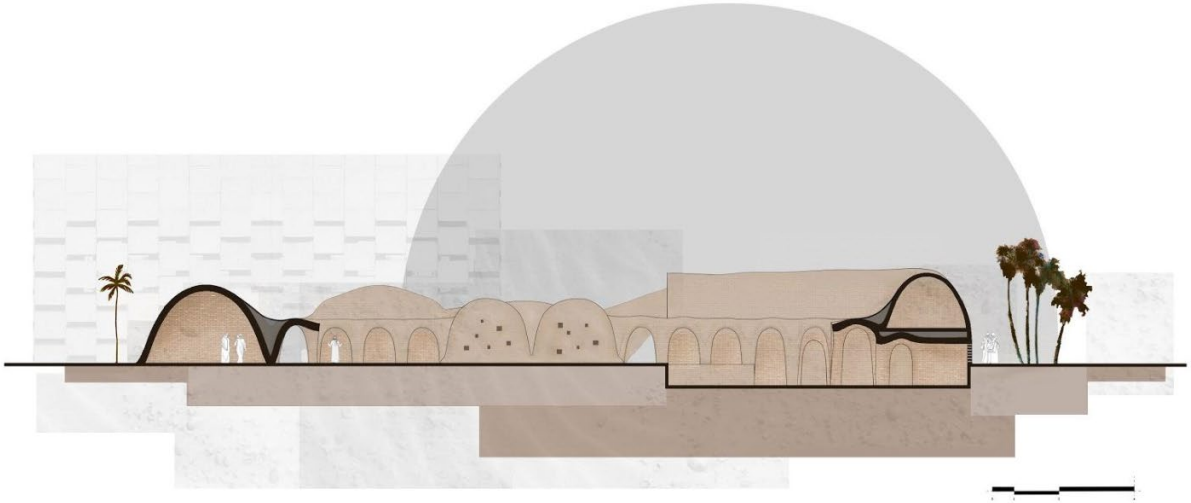


Architecture Scale : Sections





Drainage Pattern

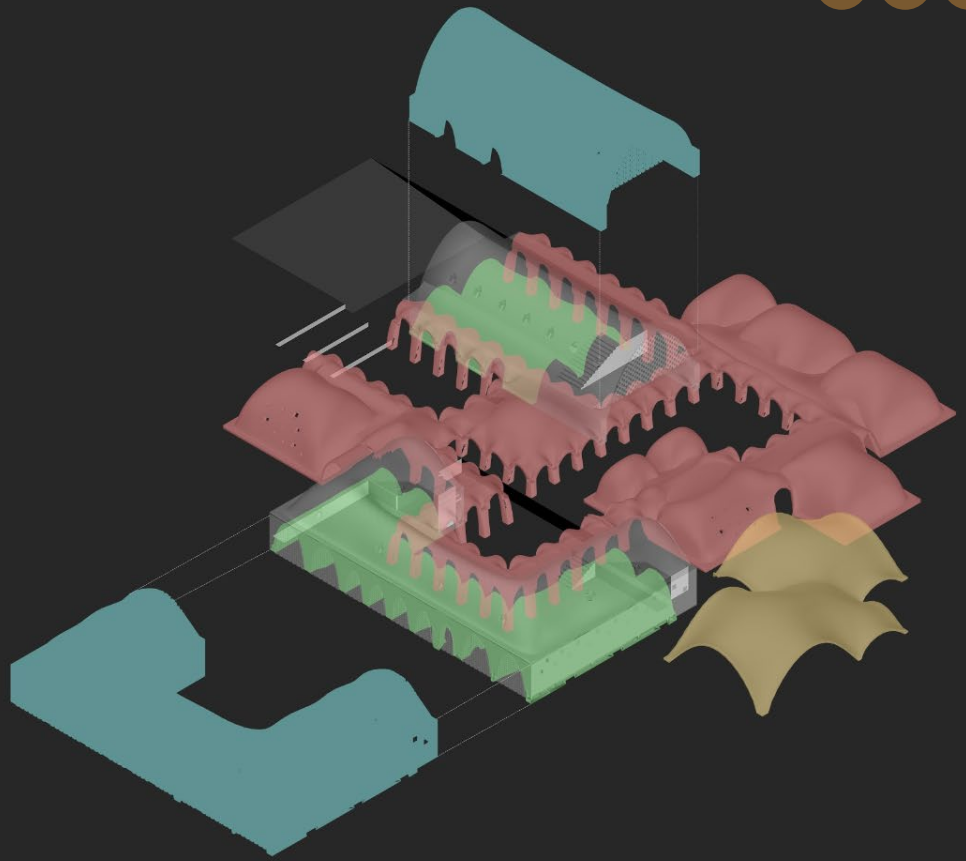


Material : Brick Testing Results

Brick Type	Sample Size	Compressive strength [MPa]		
		10% Deformation	At Break	S.F. = 2
Adobe Bricks	62	0.7	1.33	0.6
Adobe+Straw	32	0.8	2.7	1.35
Adobe+Wood Chips	22	0.9	2.1	1.05
Adobe+Straw+ Starch	5	1	6.22	3.11

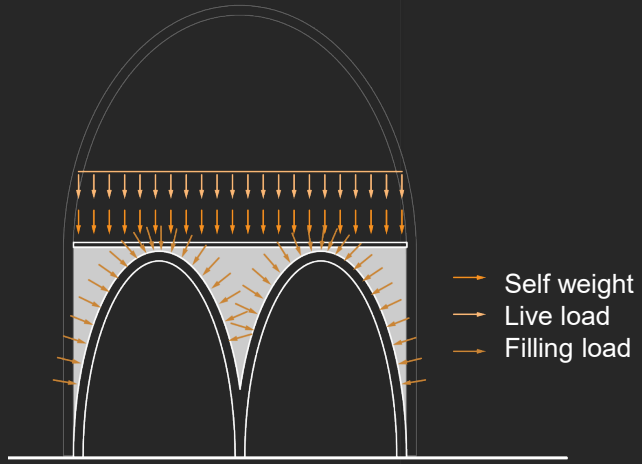
Design Values	
Brick Type	Adobe+Straw+ Starch
Compressive Strength	1 MPa
Young's Modulus	80 MPa
Tensile strength (1/10 Compressive Strength)	0.1 MPa

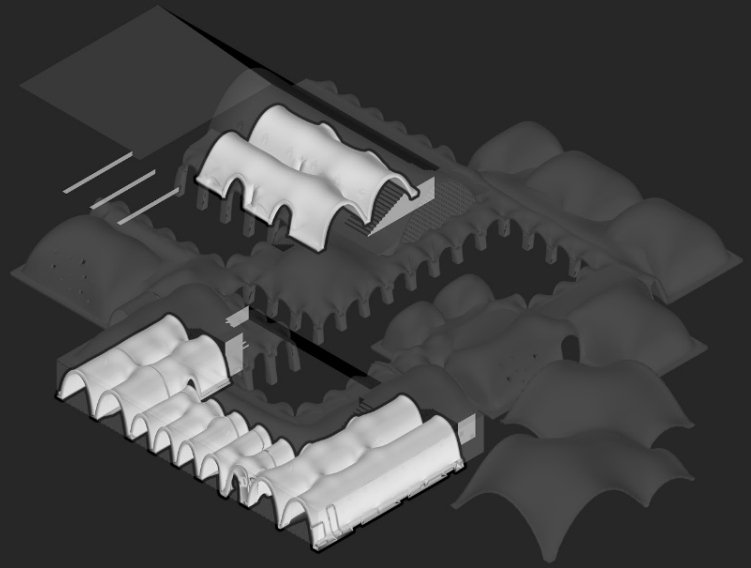
Structural Classification

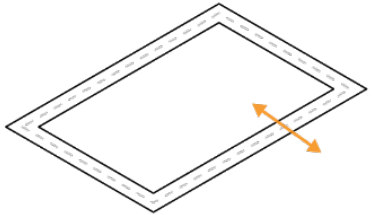


- Shell
- Nubian Vault
- Free Form Vaults
- Free Form Domes

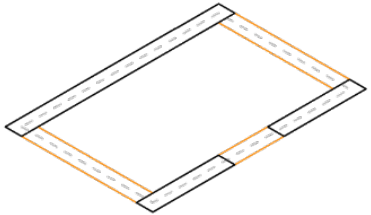
Structural Scheme: Nubian Vaults



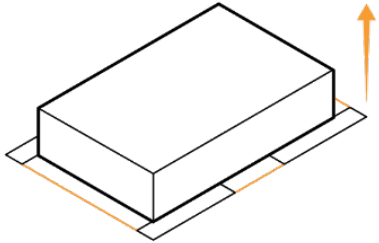




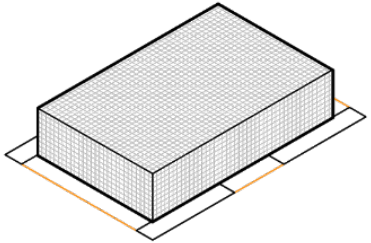
1. Offset of 0.6m for the walls



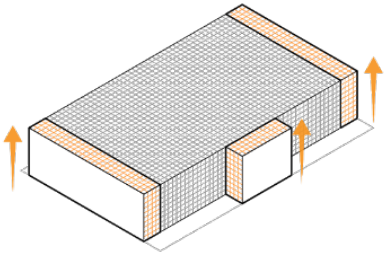
2. Identify the doors



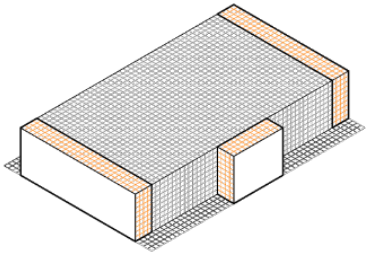
3. Extrude the room up to 1.5m



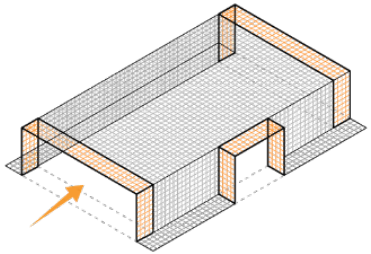
4. Regular grid of 0.15m



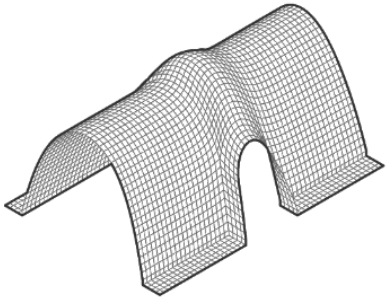
5. Extrude the doors



6. Regular grid to doors

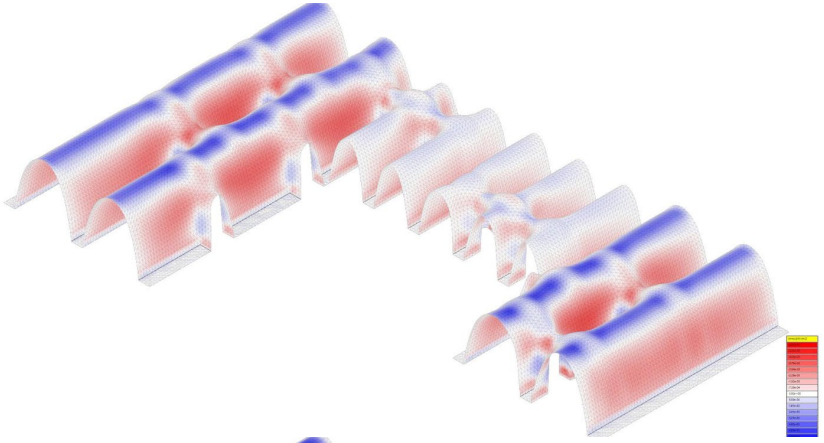


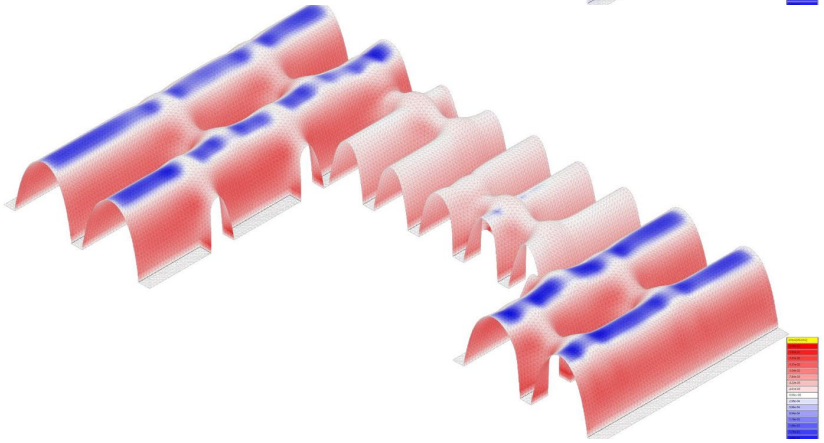
7. Final mesh to relax with openings

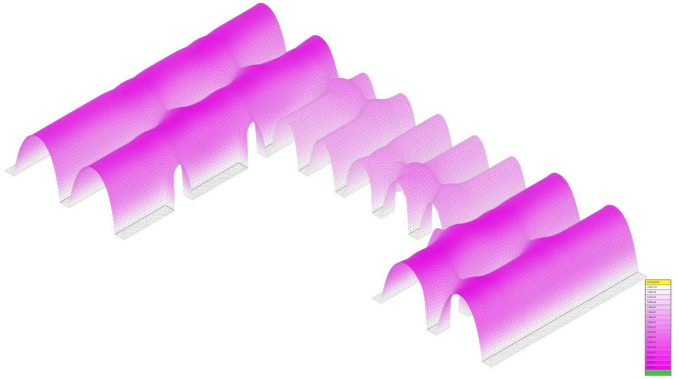


8.Final shape with anchor points up to 0.3m

Structural Analysis

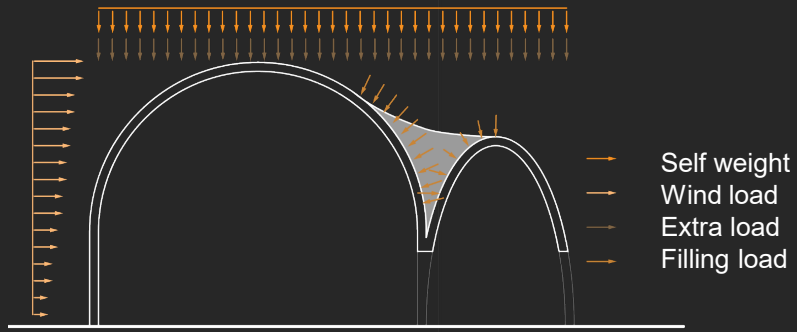


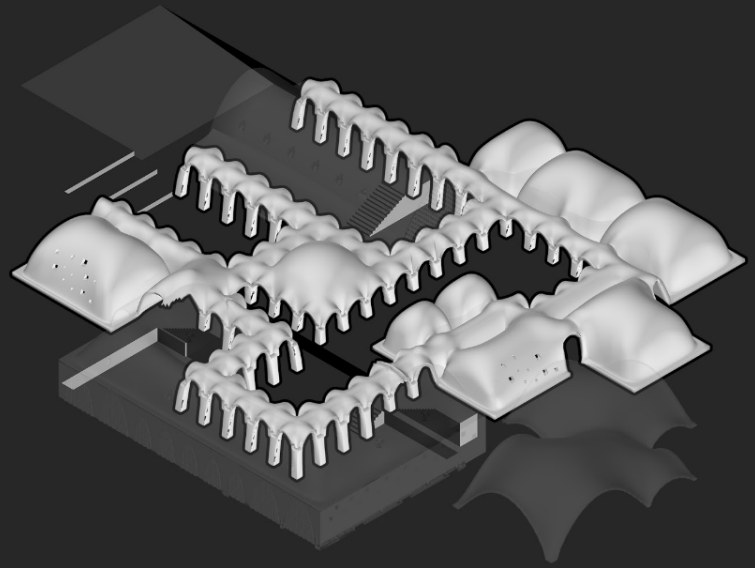




	Peak	Allowable
Compressive Strength	0.2 MPa	1 MPa
Tensile strength	0.05 MPa	.05 MPa
Deflection (span / 400)	5 mm	7.5 mm
Young's Modulus	80 MPa	
Cross sectional Thickness	300 mm	

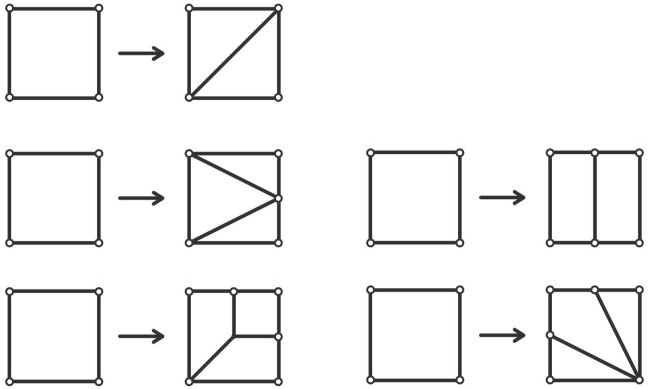
Structural Scheme: Free Form Domes



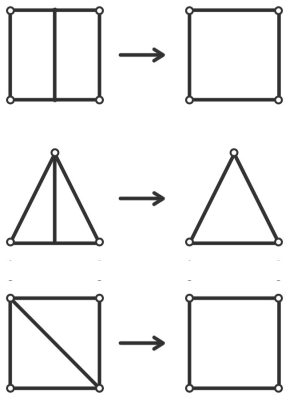


Tessellation Rules - Optimization through Topology as Structural Patterns

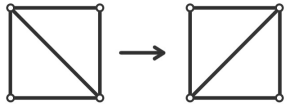
MESH RULES



Mesh Refining Rules



Mesh Coarsening Rules



Mesh Directional Rule

SOFT RULES

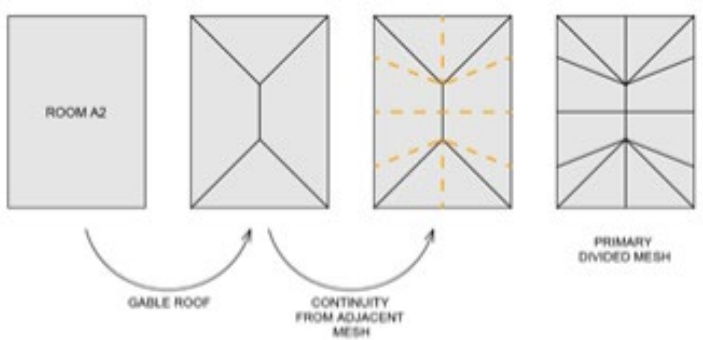
Symmetrical

Topological

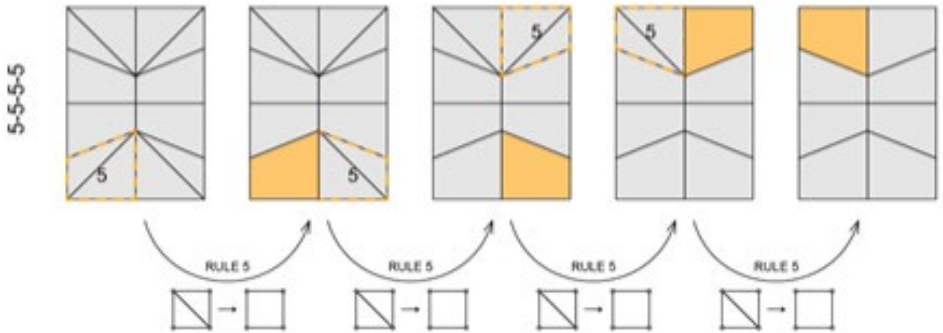
Scalable

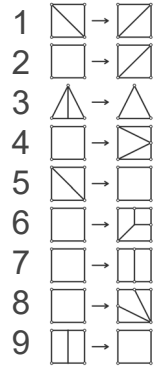
Source: Block Research Group

Tessellation Rules - Optimization through Topology as Structural Patterns

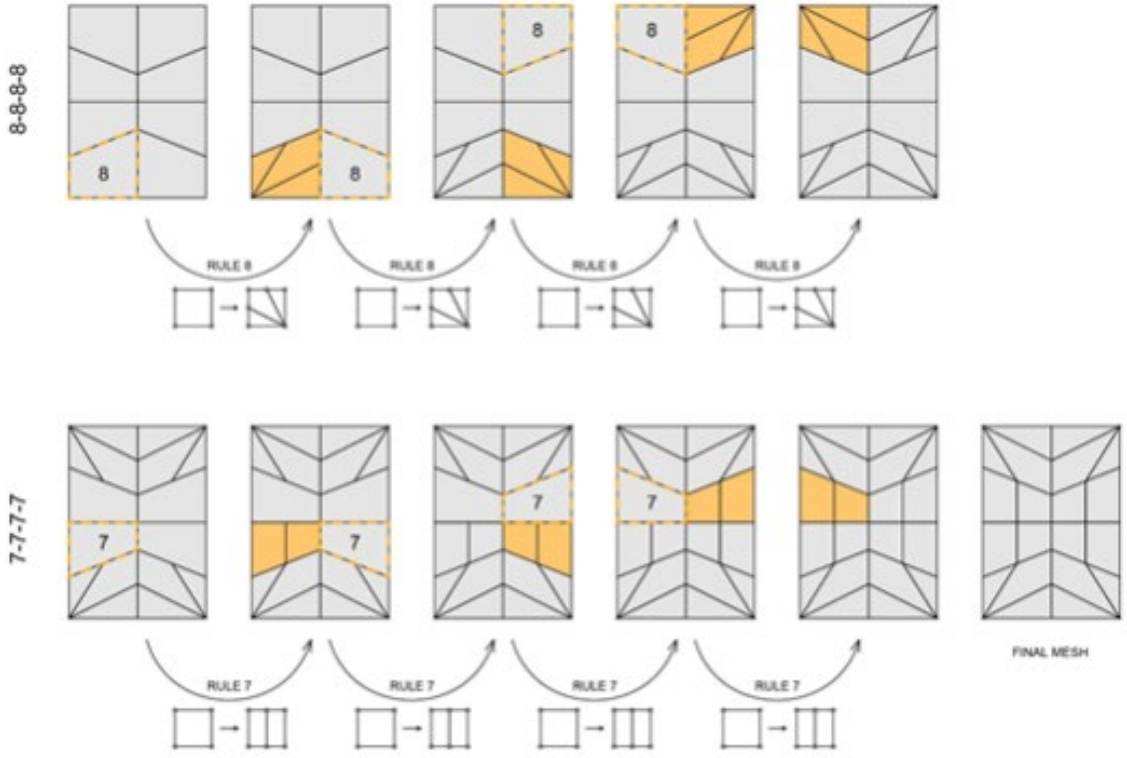


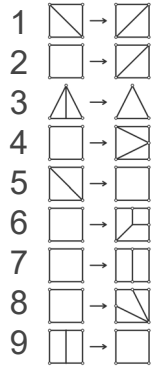
ROOM A2: 5-5-5-5 8-8-8-8 7-7-7-7



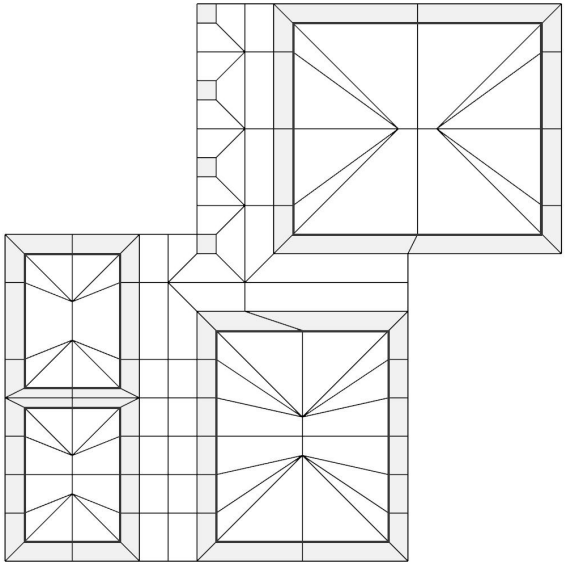


Tessellation Rules - Optimization through Topology as Structural Patterns



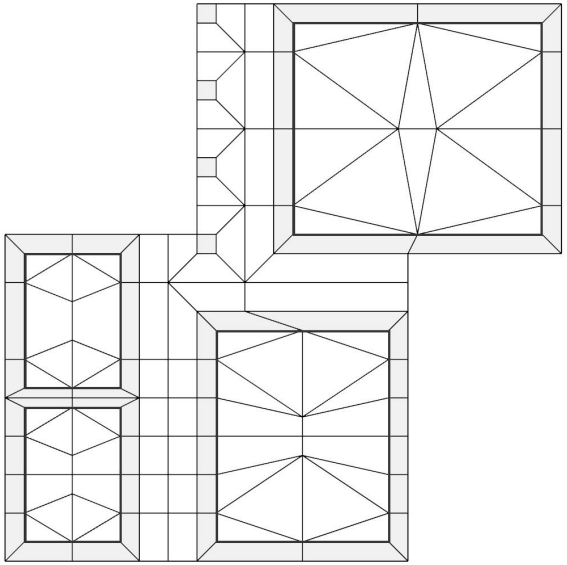


Tessellation Evolution - 1

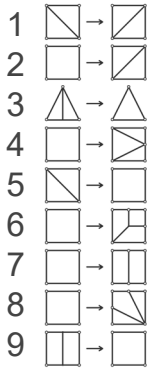


1 →
2 →
3 →
4 →
5 →
6 →
7 →
8 →
9 →

Tessellation Evolution - 2



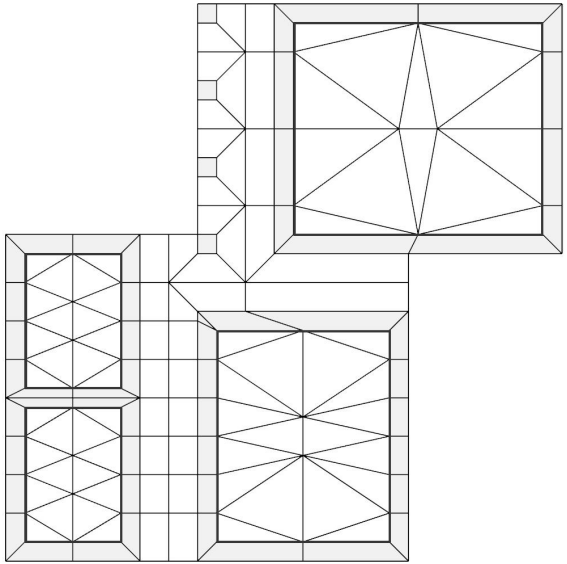
ROOM A1: 1-1-1-1
ROOM A2: 1-1-1-1
ROOM B1: 1-1-1-1
ROOM C1: 2-2 3-3 1-1-1-1



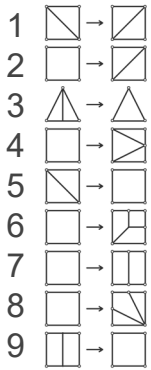
0.081

Peak Compressive Stresses (MPa)
Change studied keeping constant thickness
and literature values

Tessellation Evolution - 2A

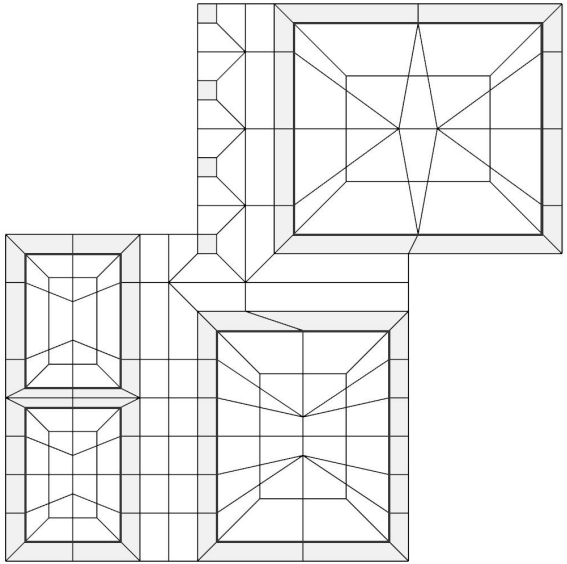


ROOM A1: 1-1-1-1 4-4
ROOM A2: 1-1-1-1 2-2-2-2 3-3
ROOM B1: 1-1-1-1 2-2-2-2 3-3
ROOM C1: 2-2 3-3 1-1-1-1

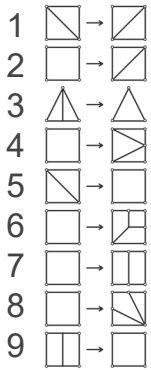


Peak Compressive Stresses (MPa)
Change studied keeping constant thickness and literature values

Tessellation Evolution - 3

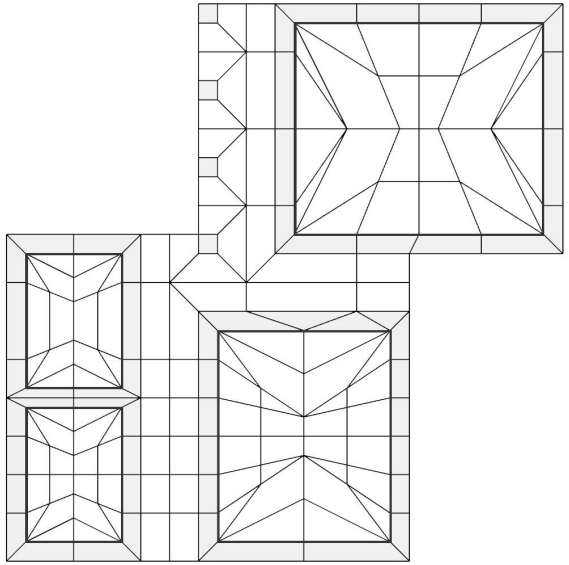


ROOM A1: 5-5-5-5 6-6-6-6 7-7
ROOM A2: 5-5-5-5 6-6-6-6 7-7-7-7
ROOM B1: 5-5-5-5 6-6-6-6 7-7-7-7-7-7
ROOM C1: 2-2 3-3 5-5-5-5 6-6-6-6 7-7-7-7-7-7

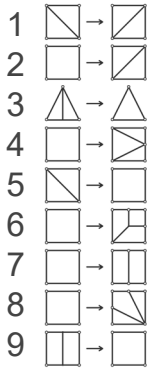


Peak Compressive Stresses (MPa)
Change studied keeping constant thickness and literature values

Tessellation Evolution - 4

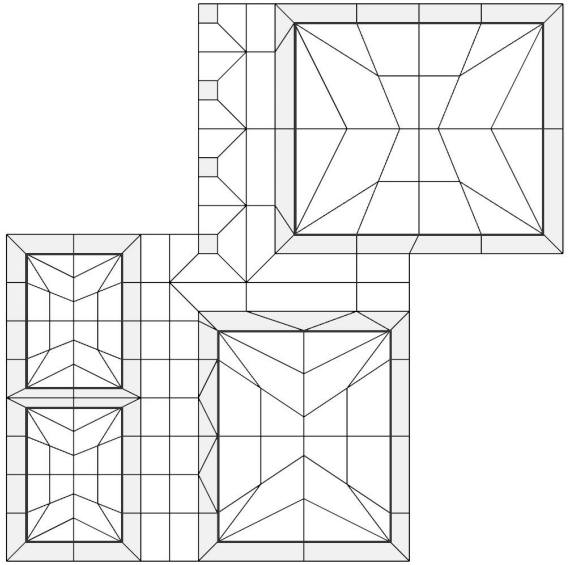


ROOM A1: 5-5-5-5 8-8-8-8 7-7
ROOM A2: 5-5-5-5 8-8-8-8 7-7-7-7
ROOM B1: 5-5-5-5 8-8-8-8 7-7-7-7-7-7-7-7
ROOM C1: 7-7-7-7 3-3-3-3 3-3-3-3 8-8-8-8 7-7-7-7

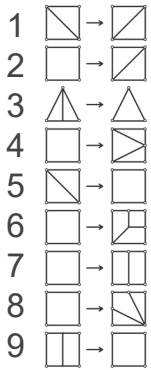


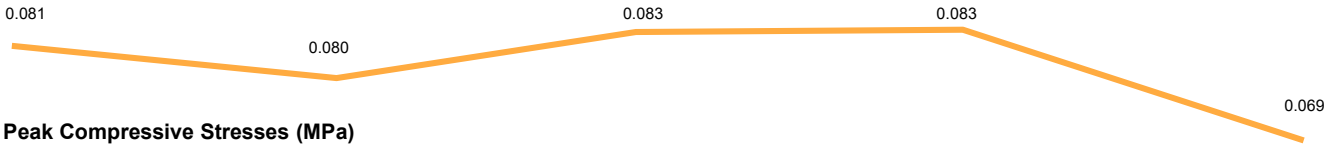
Peak Compressive Stresses (MPa)
Change studied keeping constant thickness and literature values

Tessellation Evolution - 4A

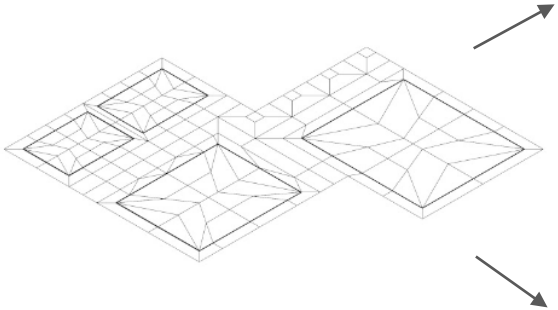


ROOM A1: 5-5-5-5 8-8-8-8 7-7 7-7-7-7
ROOM A2: 5-5-5-5 8-8-8-8 7-7-7-7
ROOM B1: 5-5-5-5 8-8-8-8 9-9-9-9-9-9-9-9
ROOM C1: 7-7-7-7 3-3-3-3 3-3-3-3 8-8-8-8 7-7-7-7 3-3-3-3

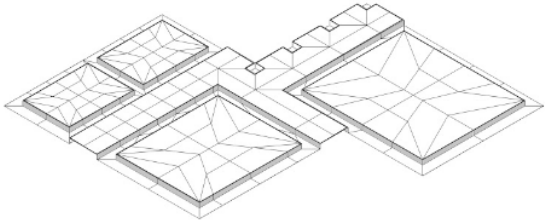




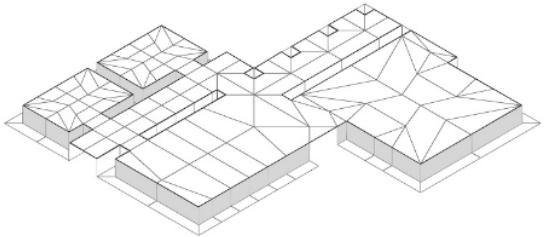
Peak Compressive Stresses (MPa)
Change studied keeping constant thickness and literature values



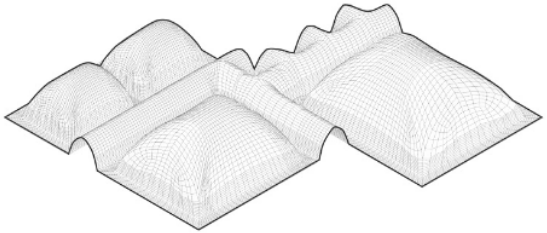
Room and Support Mesh

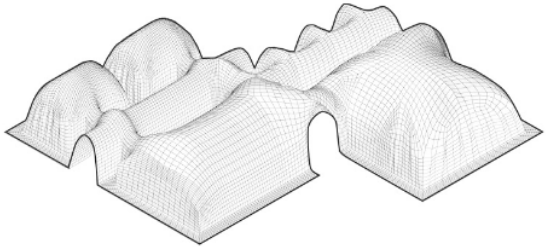


Seperate opening Mesh

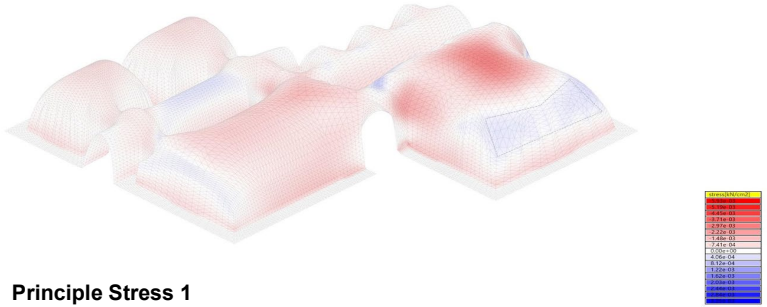


Combined opening Mesh

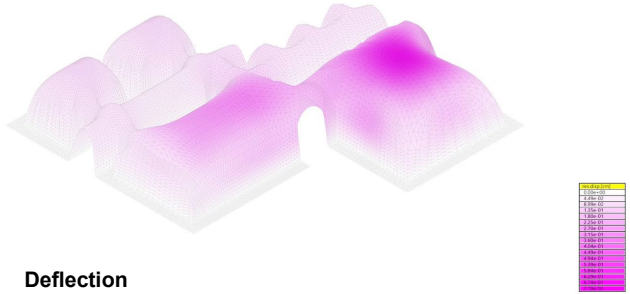




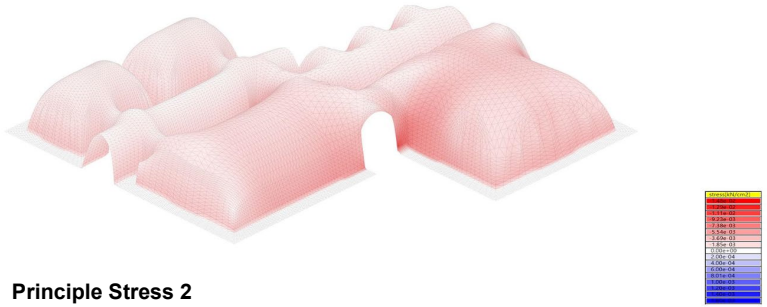
Structural Analysis



Principle Stress 1



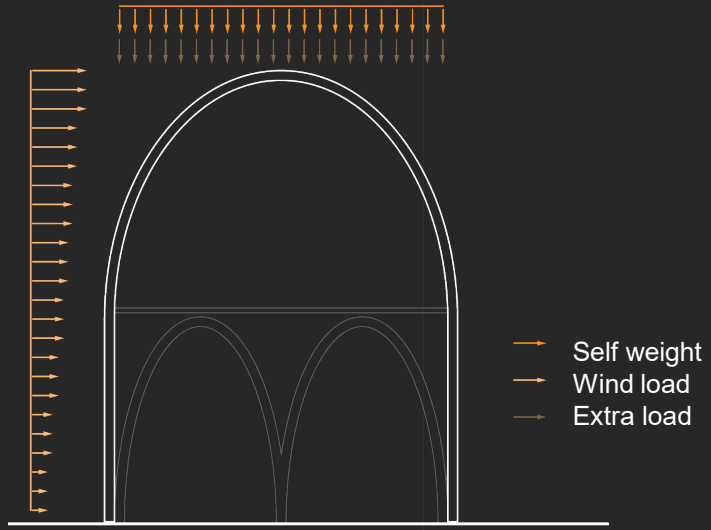
Deflection

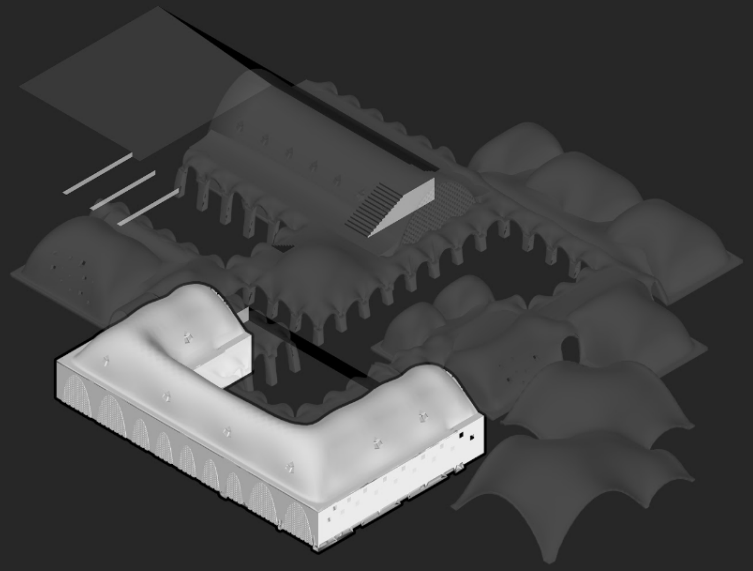


Principle Stress 2

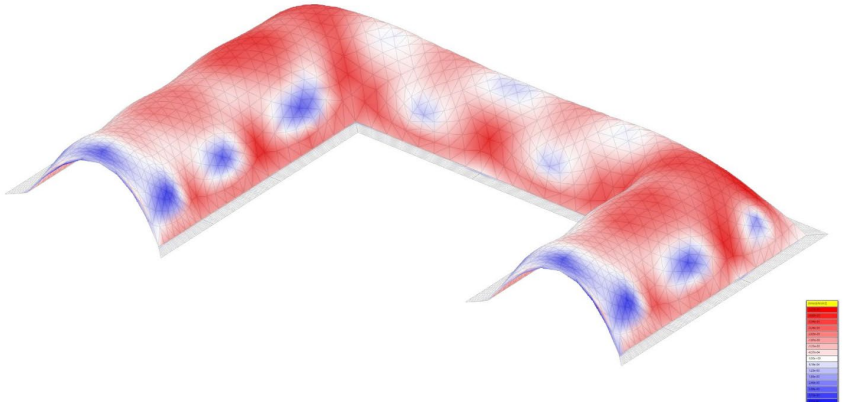
	Peak	Allowable
Compressive Strength	0.1 MPa	1 MPa
Tensile strength	0.03 MPa	0.1 MPa
Deflection (span / 400)	7 mm	18 mm
Young's Modulus	80 MPa	
Cross sectional Thickness	300 mm	

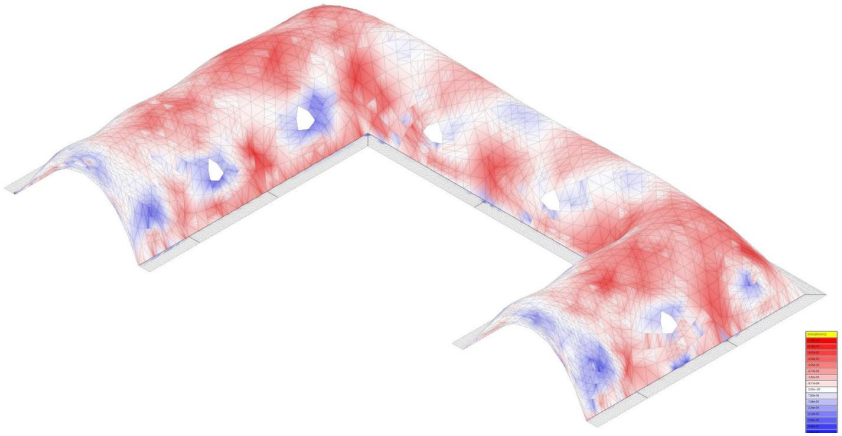
Structural Scheme: Free Form Vault



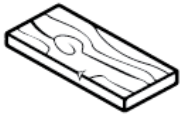


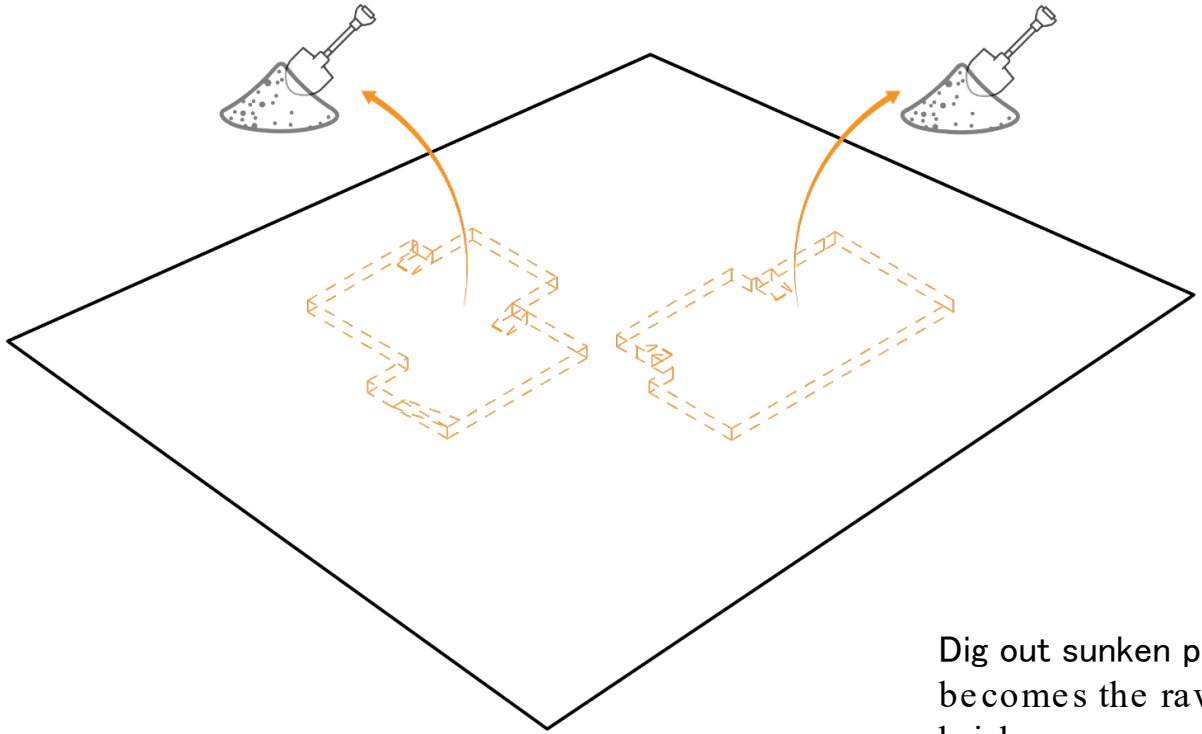
Structural Analysis : Openings



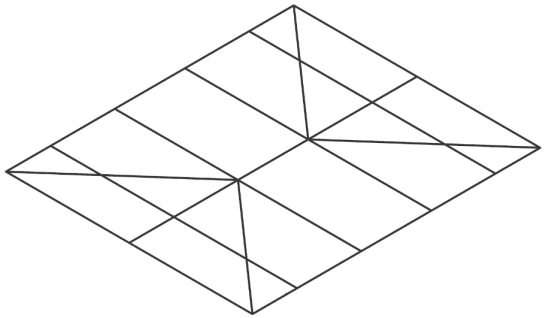


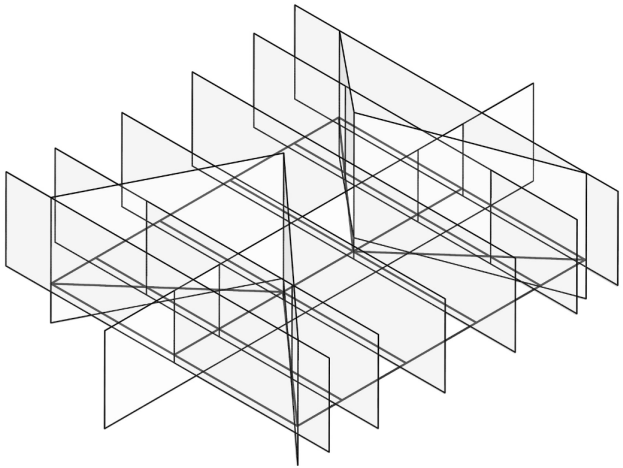
	Peak	Allowable
Compressive Strength	0.28 MPa	1 MPa
Tensile strength	0.06 MPa	.05 MPa
Deflection (span / 400)	14 mm	16.5
Young's Modulus	80 MPa	
Cross sectional Thickness	150 mm	

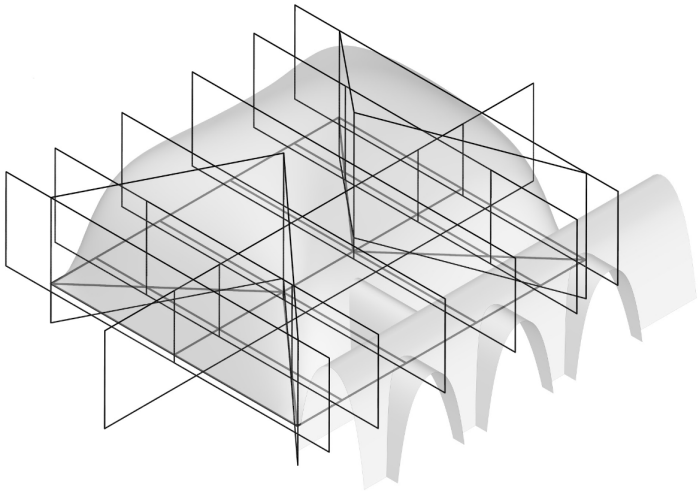
	 **Showel**	 **Handmixer**	 **Bucket**	 **Scrapwood**	 **Rope**
Application	Digging site Moving earth	Mixing soil mixture	Container for mixture	To make brick moulds	Measuring
Sourcing	Hardware store UNHCR	Hardware store UNHCR	From Camp	Waste in camp	From camp
Re-usablility	Used for construction workshops	Used for construction workshops	Used for construction workshops	Used for construction workshops	Used for construction workshops

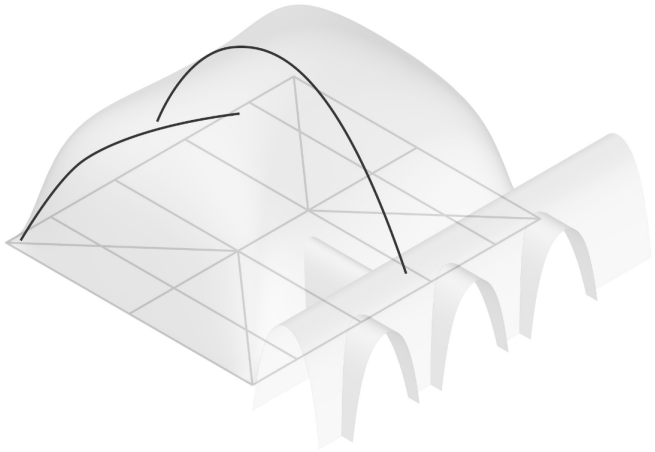


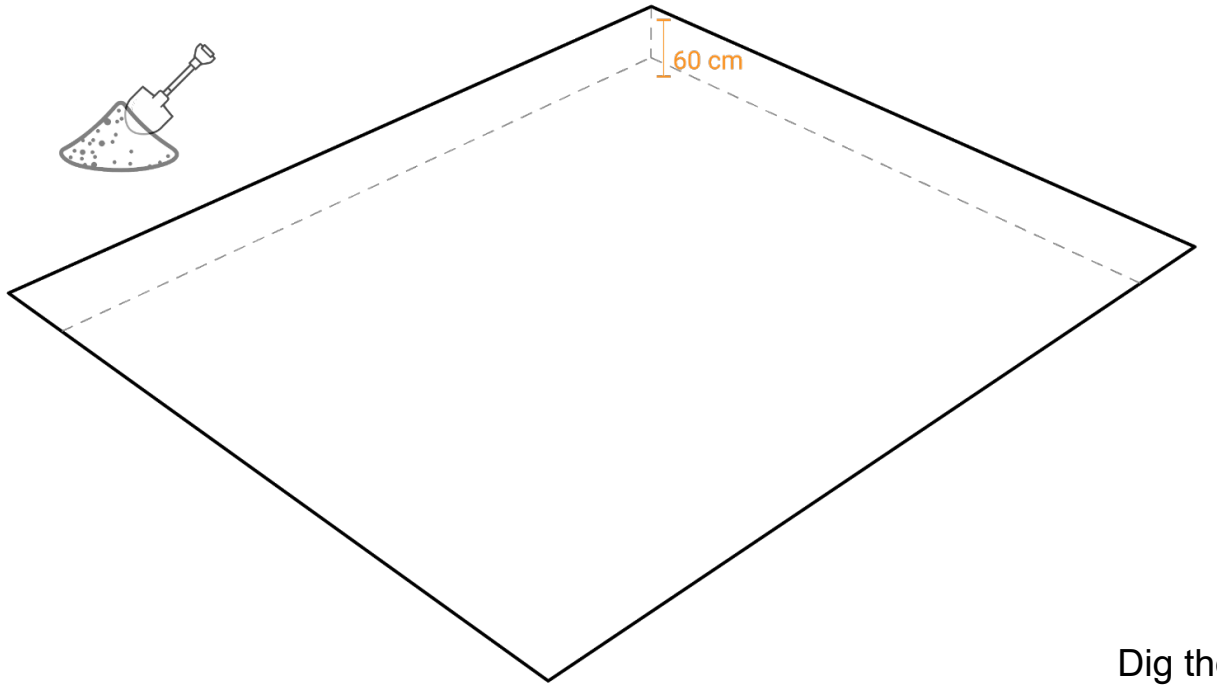
Dig out sunken parts of site → this becomes the raw material for bricks



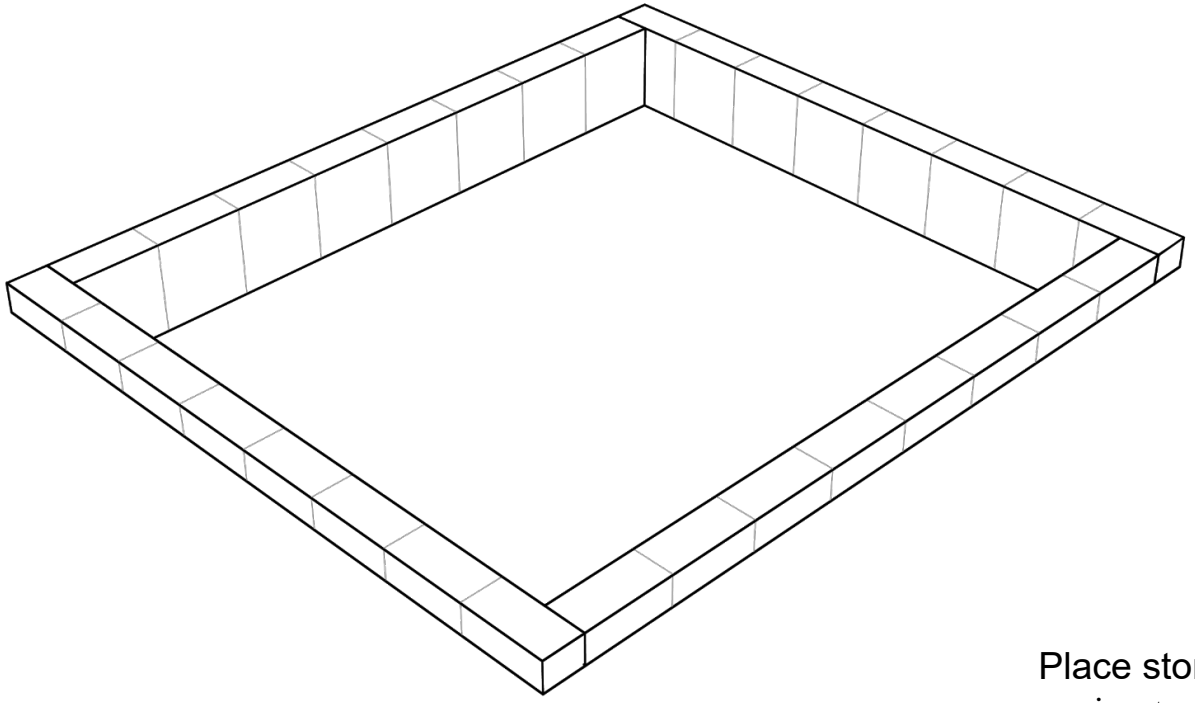




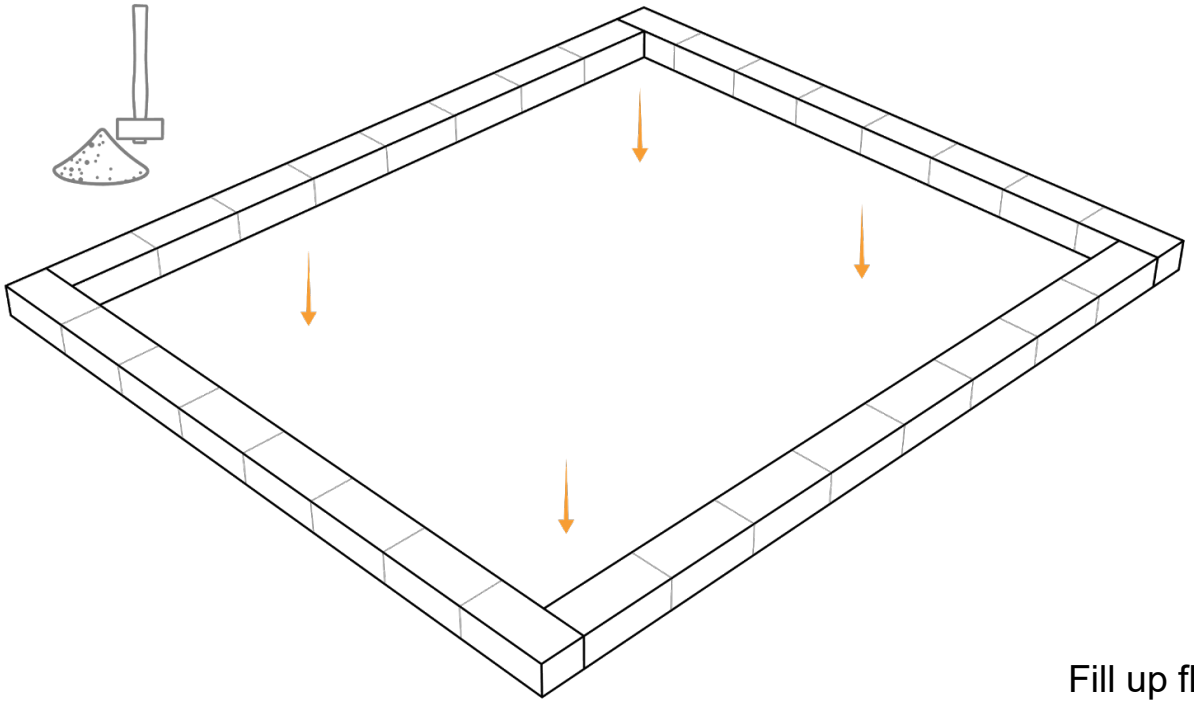




Dig the site

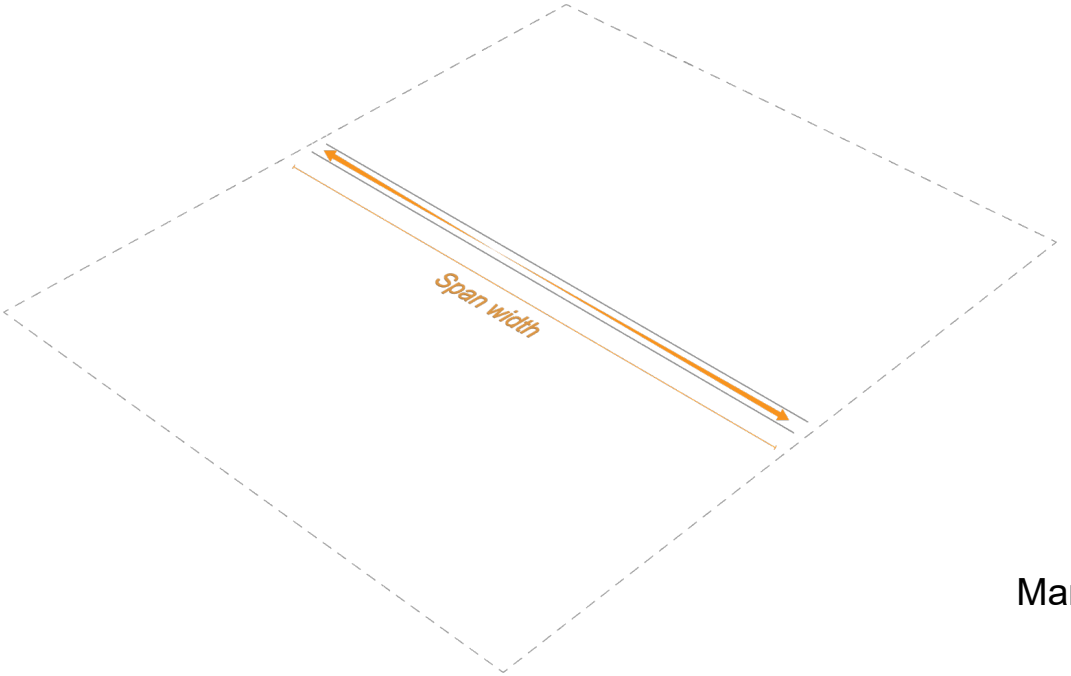


Place stones along the perimeter

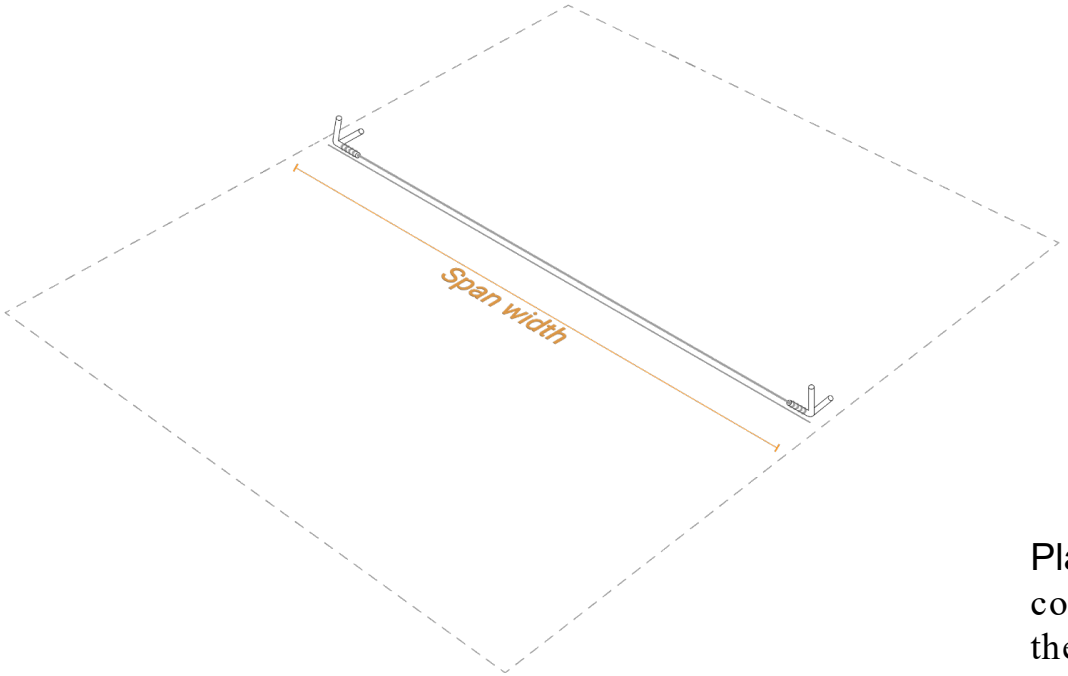


Fill up flooring and ram
with hand rammer

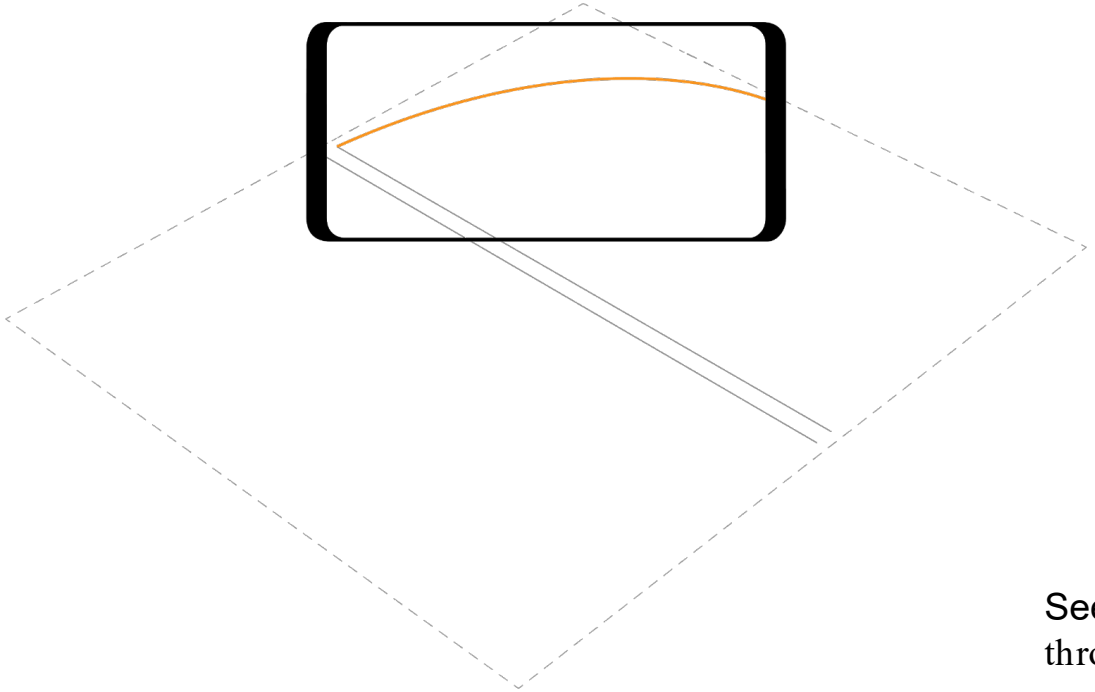
	 **Plumbing connection**	 **Rebar rods**	 **Bolts**	 **Nails**	 **Rope**
Application	Holding guiding rods	Act as guiding rod	Attache guiding rod to plumbing connection	Act as guide to shape guiding rod	Attach both ends of guiding rods. Support for bricks
Sourcing	Hardware store UNHCR	From camp UNHCR	Hardware store From camp	Hardware store From camp	From camp
Re-usablility	Used for construction workshops	Used for construction workshops	Used for construction workshops	Used for construction workshops	Used for construction workshops



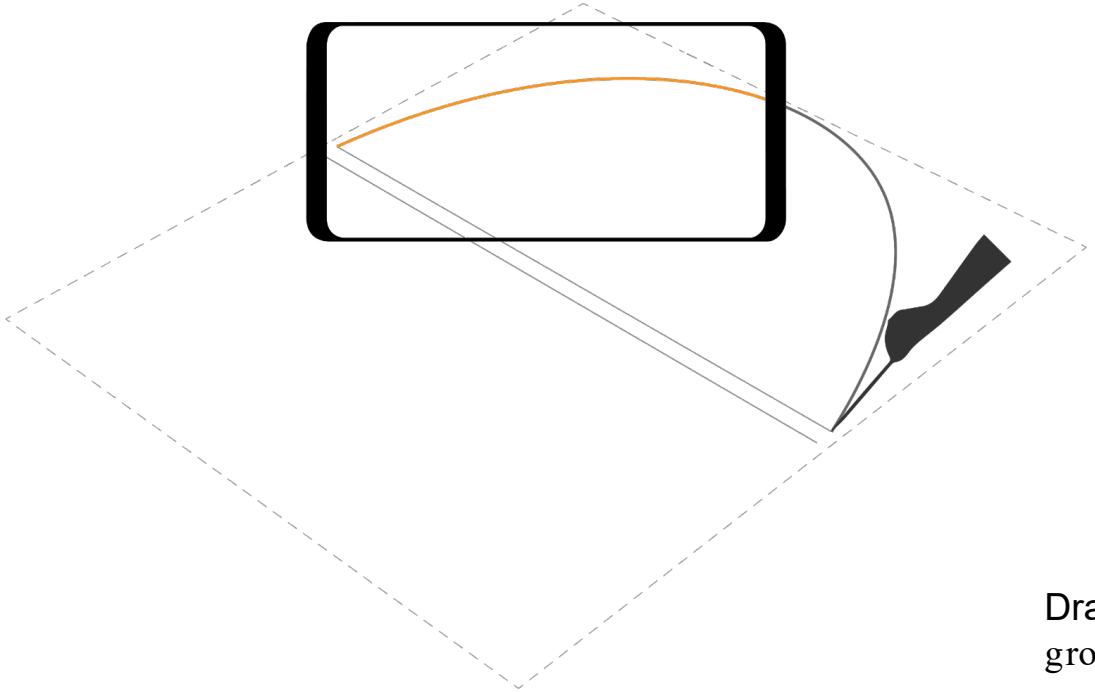
Mark boundaries of classroom



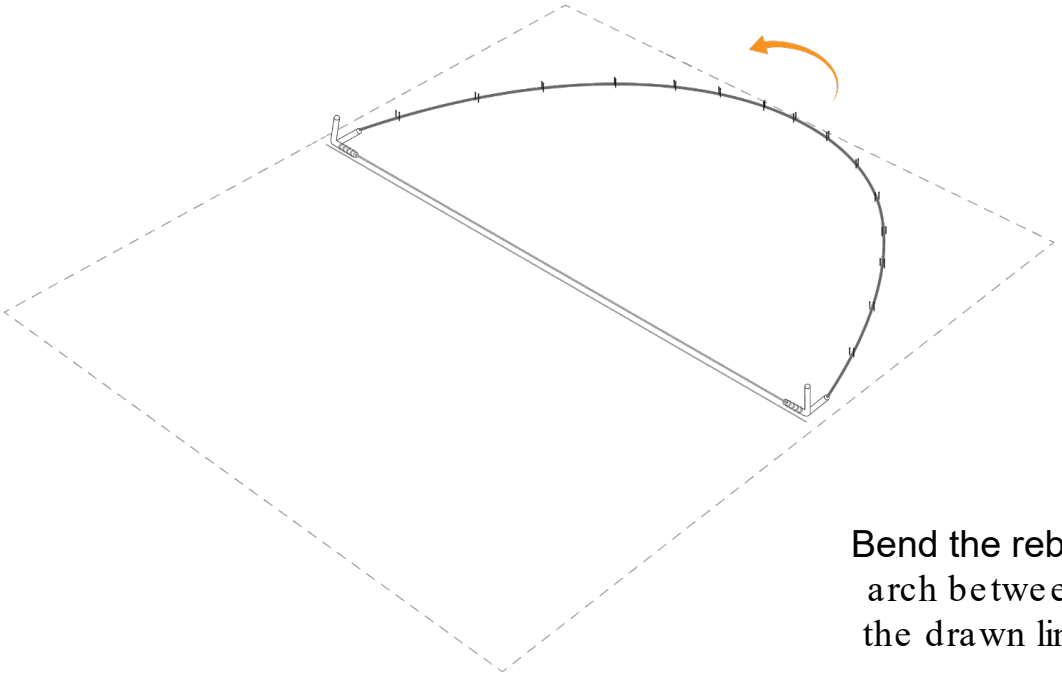
Placing the T-connection with the rope knotted to it



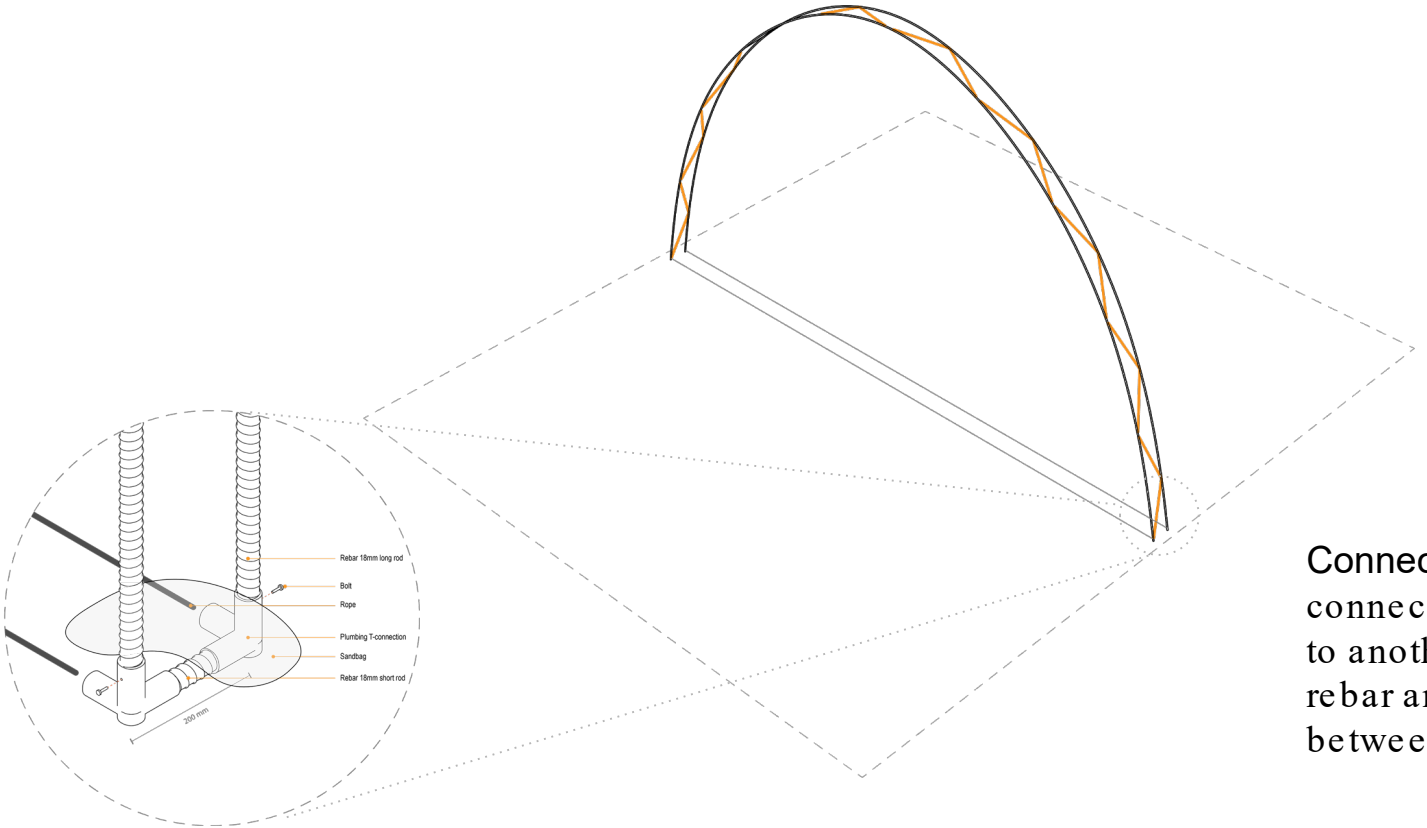
See curves
through
augmented reality
via smartphone



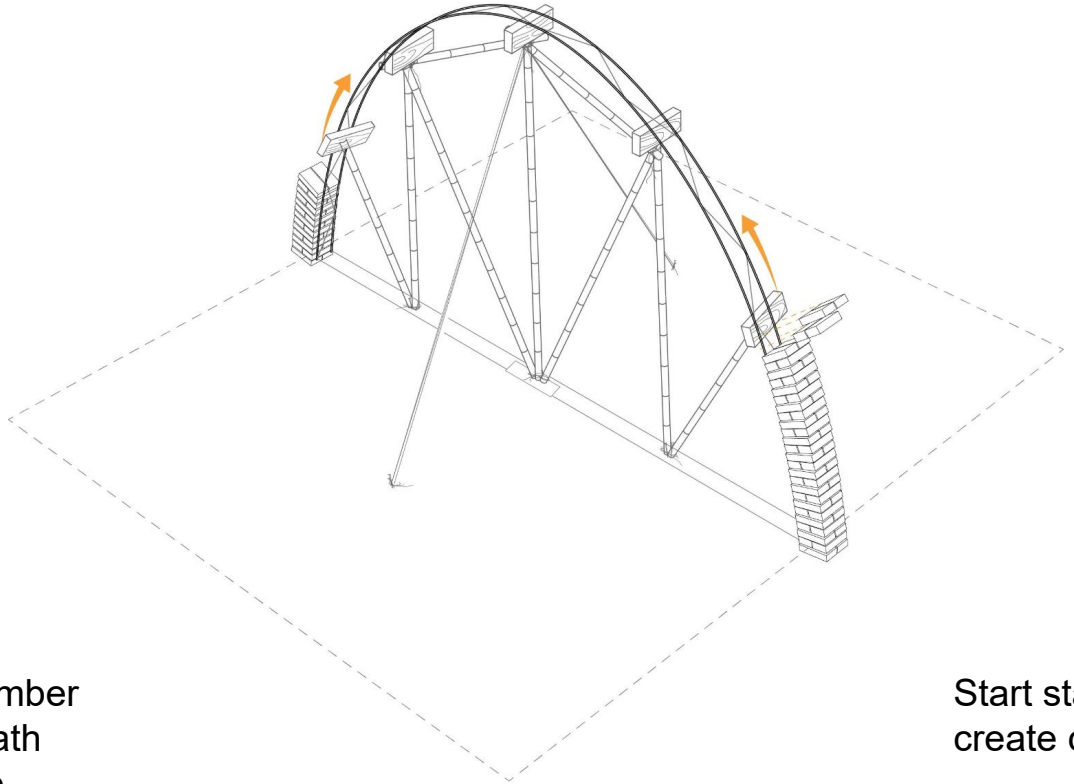
Draw curve on ground with augmented reality and smartphone



Bend the rebars into catenary arch between the nails using the drawn line on the ground

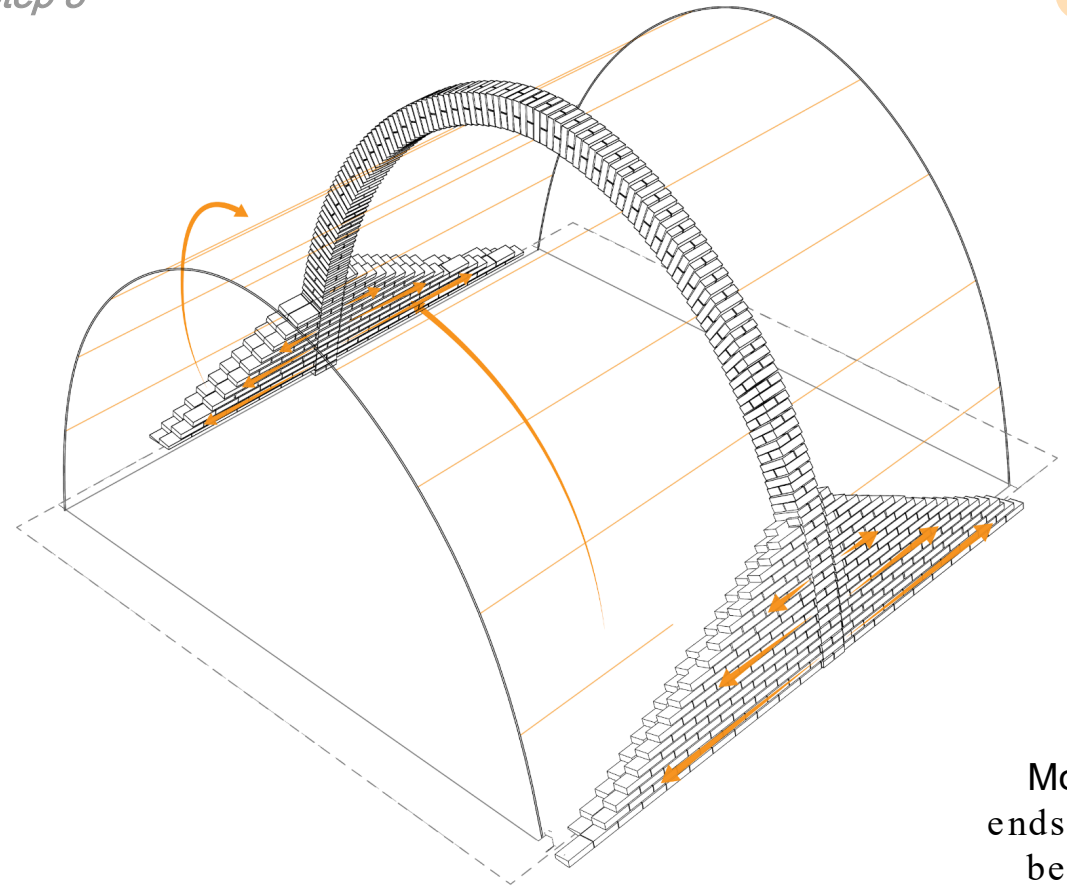


Connect rebars to T-connections with bolts and to another arch with short rebar and zigzag a rope between the two arches

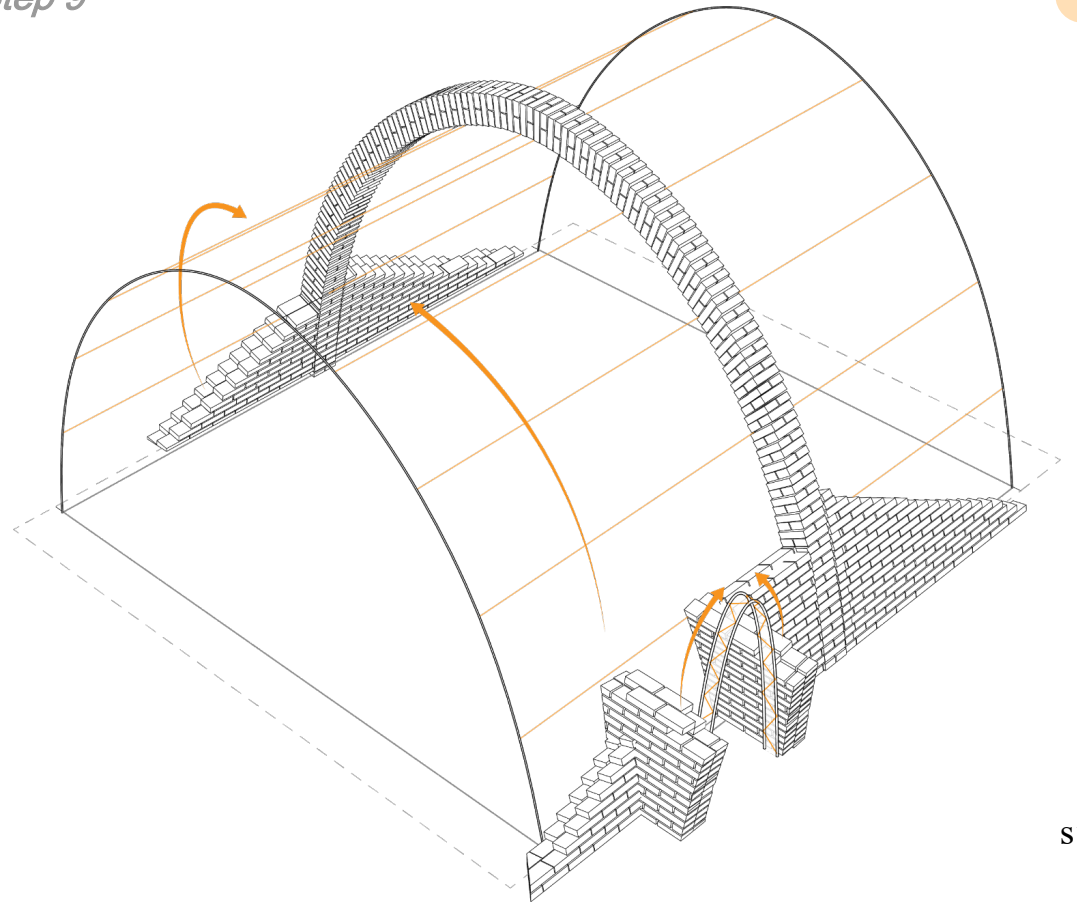


Build bamboo and timber scaffolding underneath arch and tie ropes to ground for stability

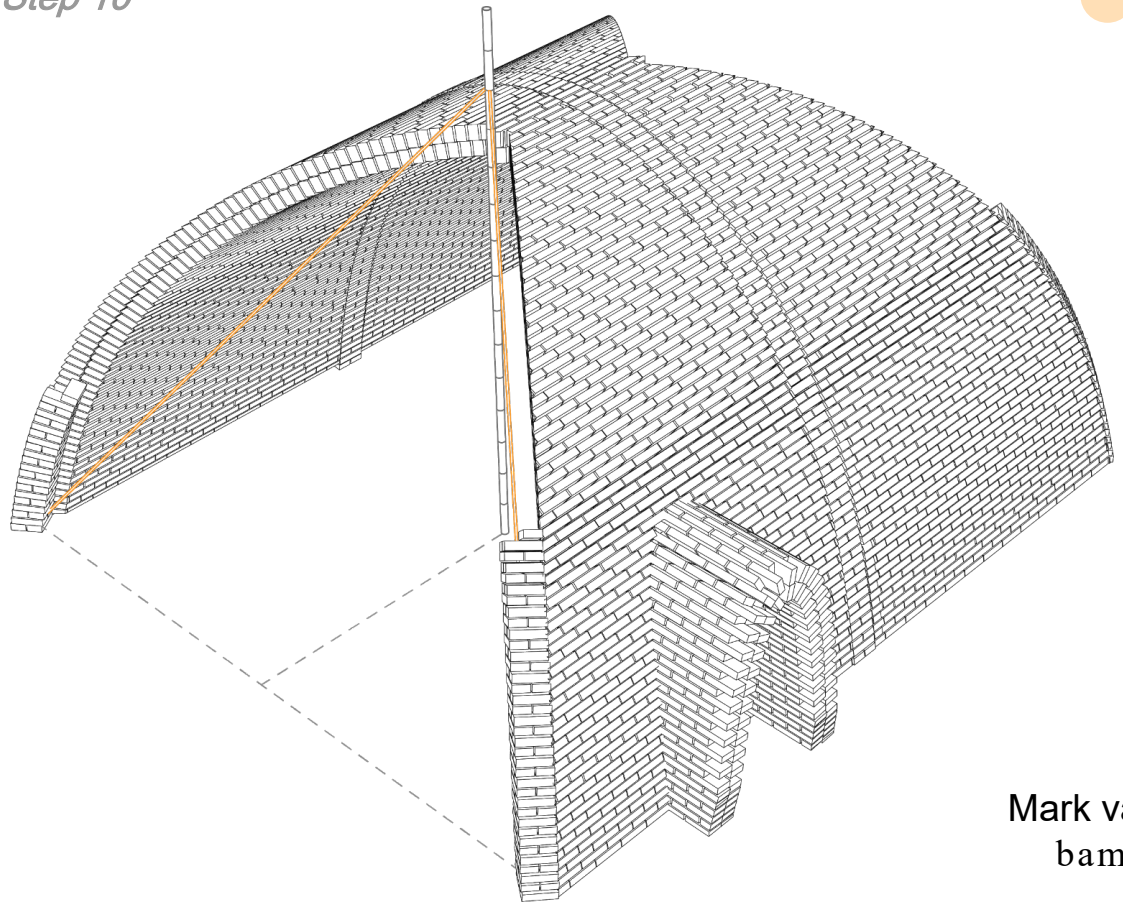
Start stacking bricks to create central catenary



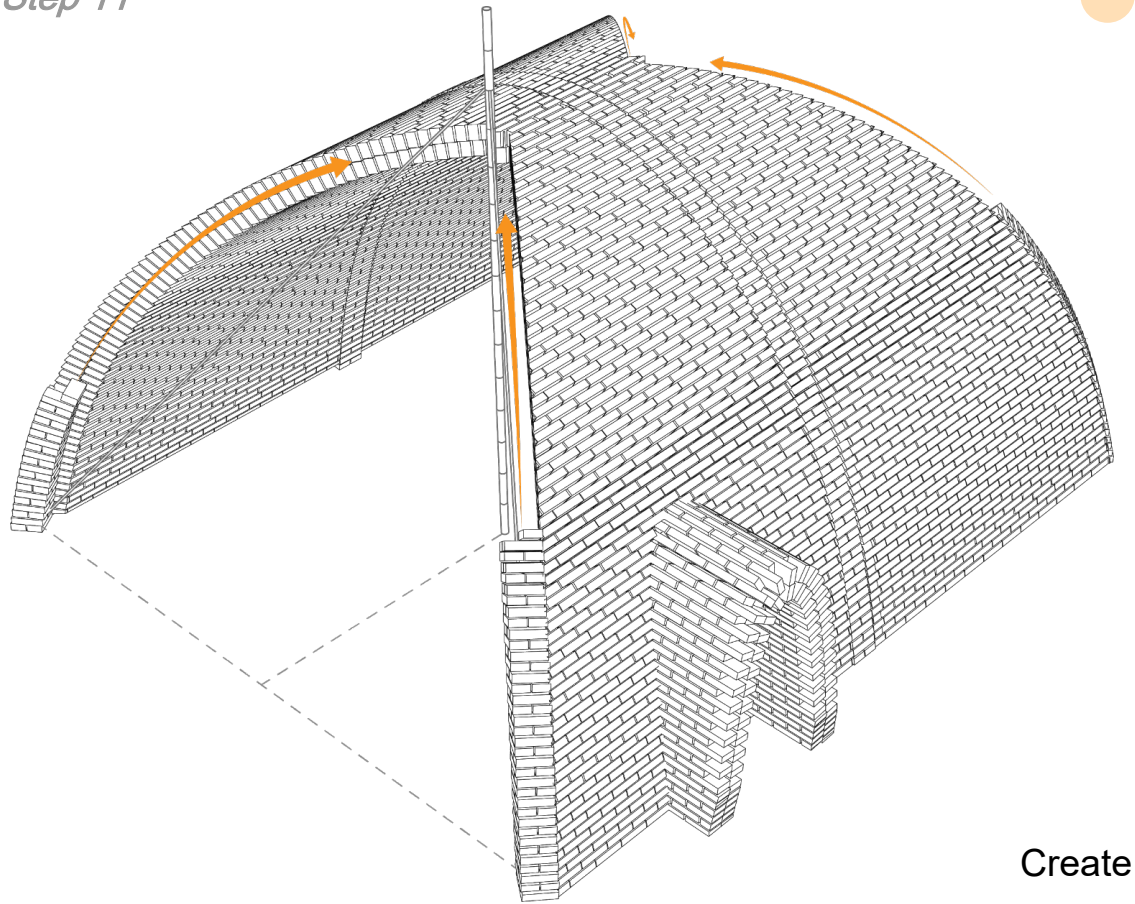
Move rebar supports to ends and span new ropes between them to act as guides for brick stacking



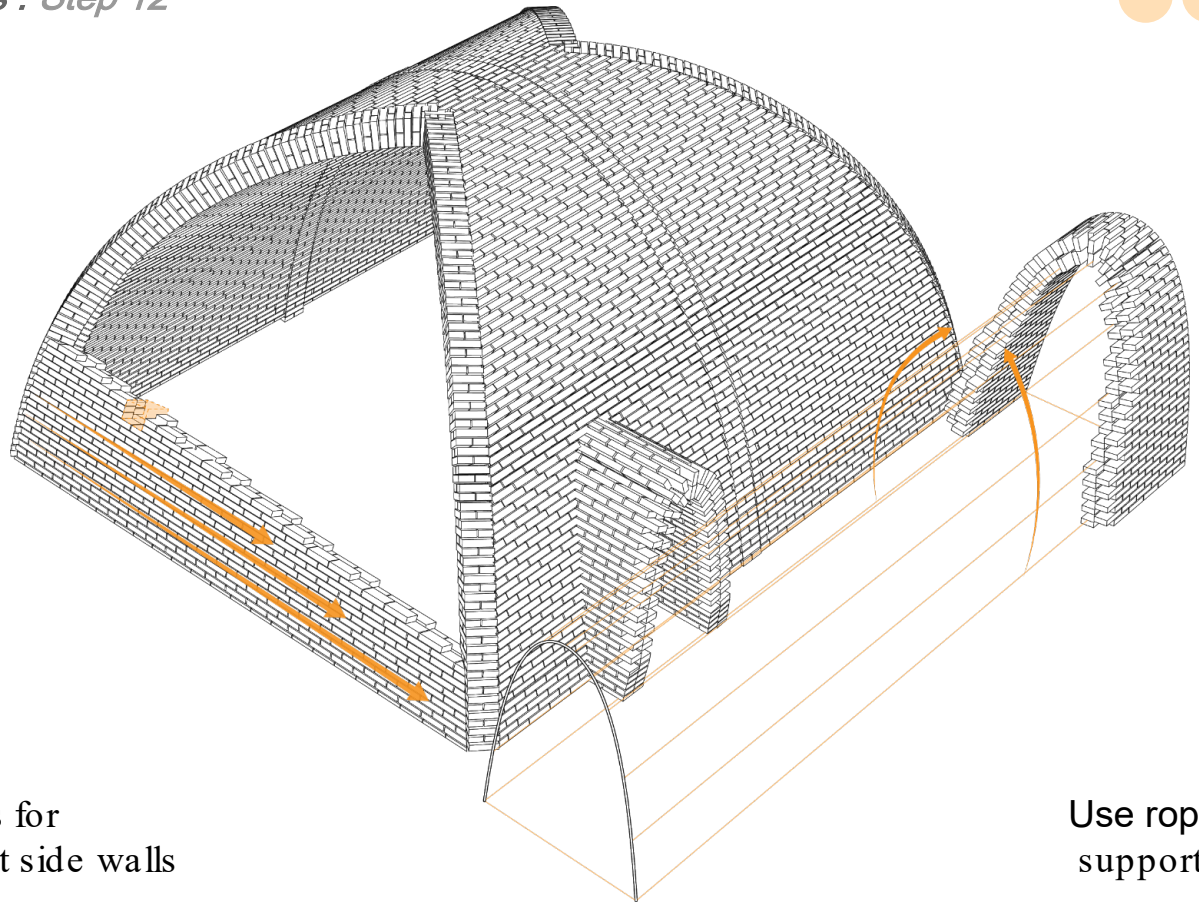
Use small rebar support to create openings to the corridor



Mark vault vertex with
bamboo and ropes

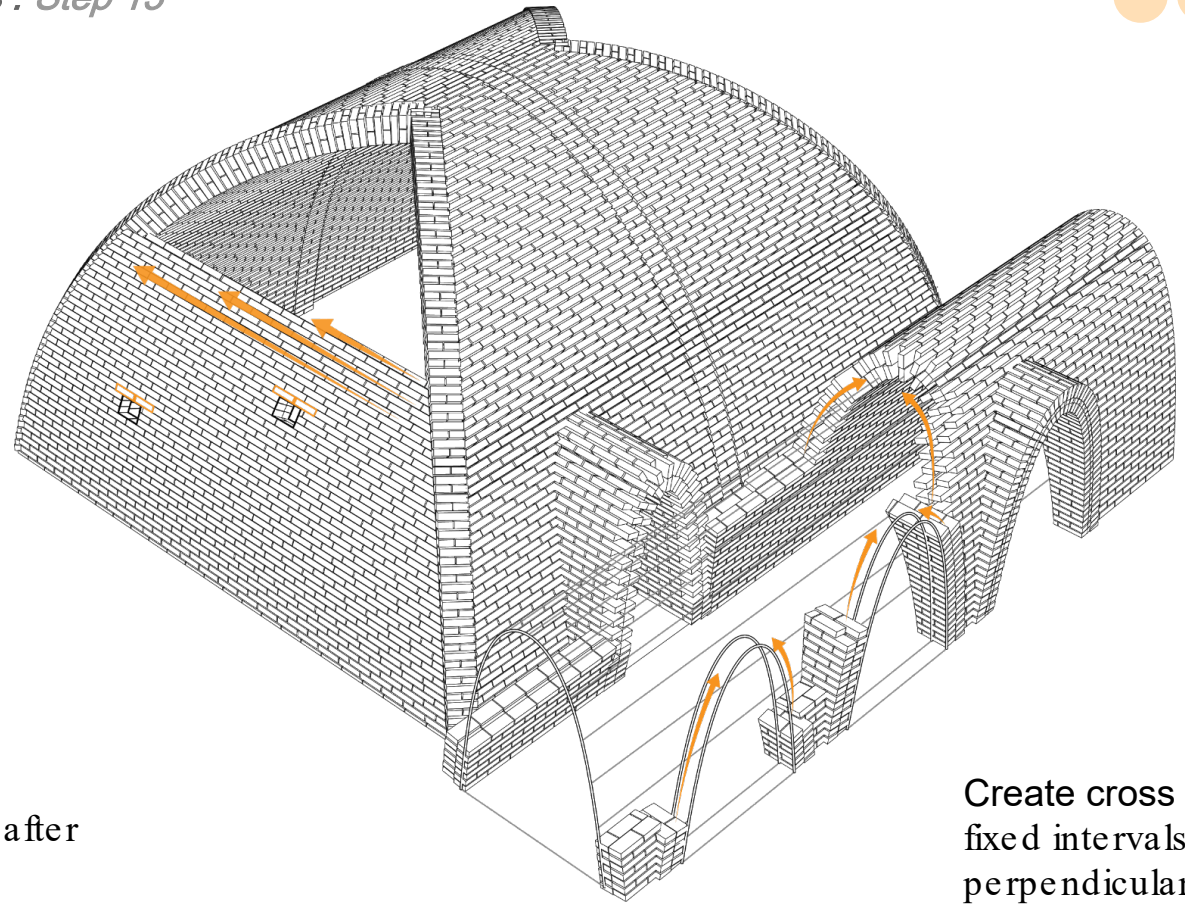


Create corner arches



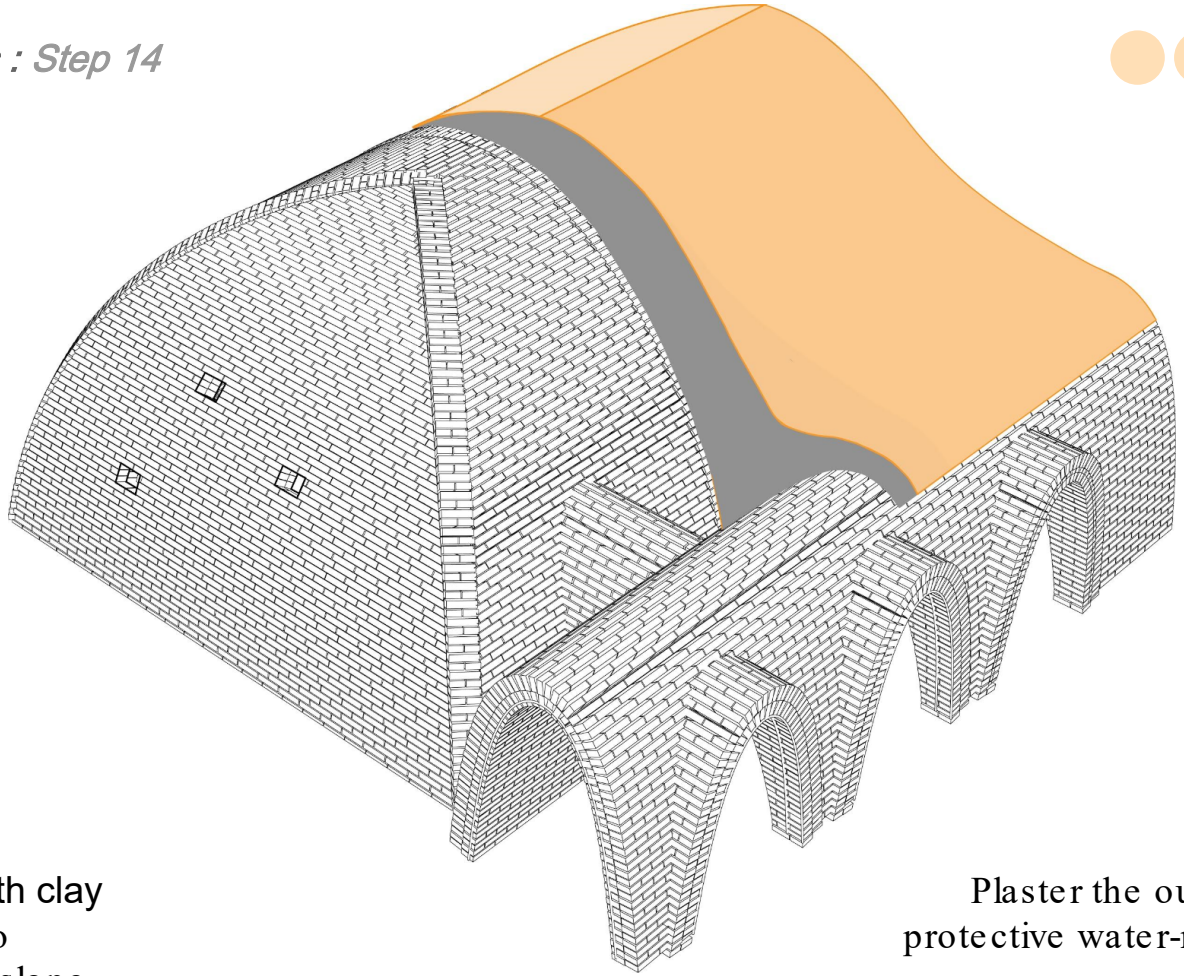
Leave brick gaps for
openings in short side walls

Use ropes and rebar
support create vault



Close brick gaps after three rows

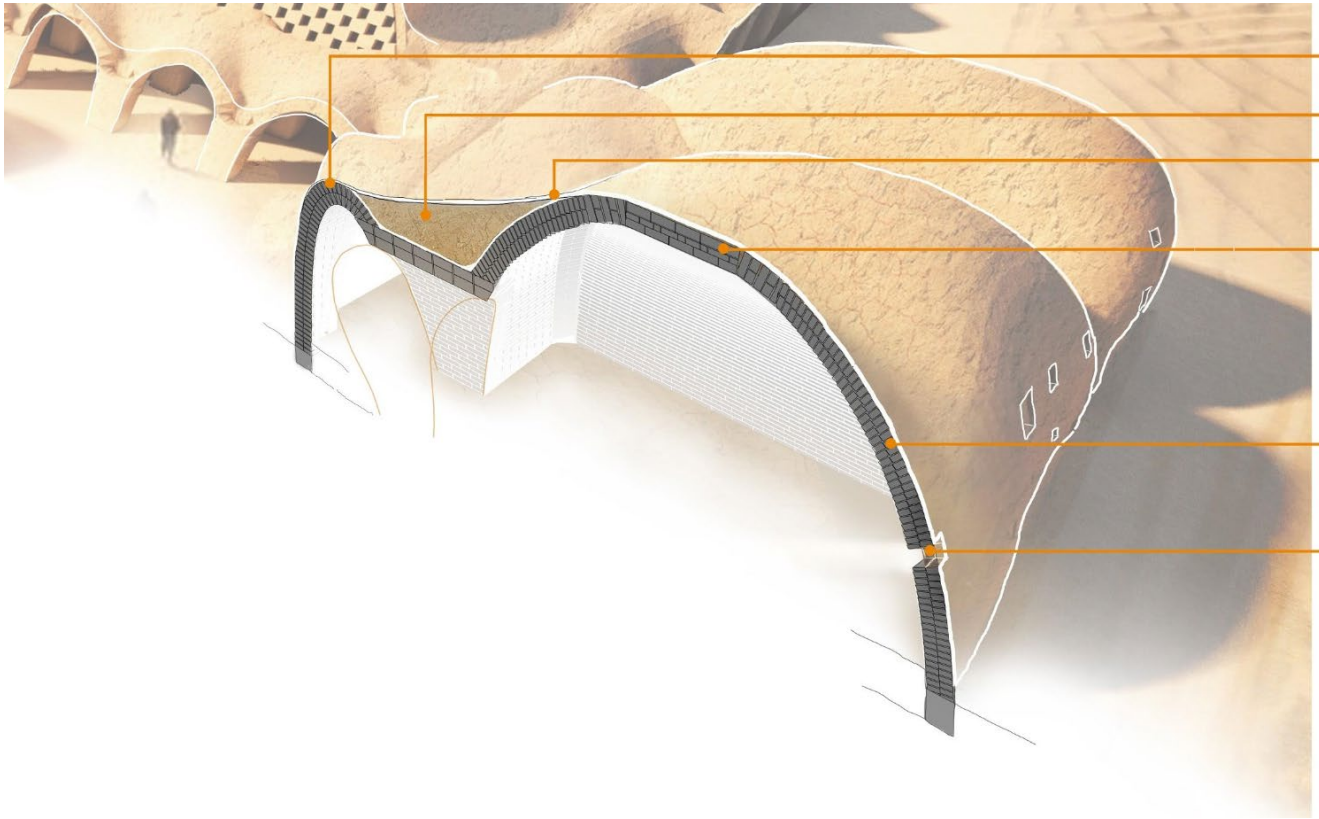
Create cross vaults at fixed intervals in perpendicular direction



Fill in the gaps with clay and hay mixture to achieve the drain slope

Plaster the outer surface using protective water-resistant clay mix.

Detail Section



Bricks for smaller arch

Hay filling

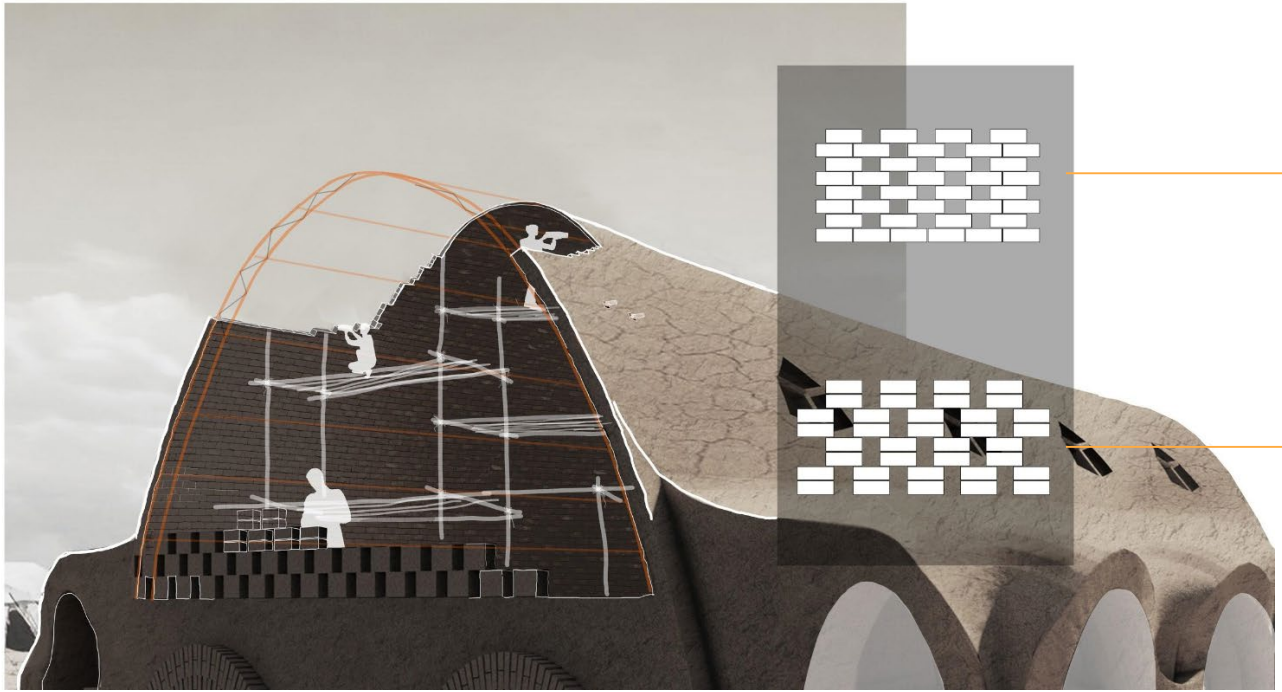
Protective water resistant mud plaster layer

Roof bricks

Bricks for large arch

Bricks left out for openings

Detail Section



Jali Screen patterns
(Half bat Brick openings)

Jali Screen patterns
(Soldier Brick openings)

*Youth are the **spirit of life**, they determine how developed or underdeveloped a nations is !!!....*

Syria will need this Youth Force to Build back their home….

Reflections

- **Computational** and **Human** approaches need to work in synergy for good design.
- Computational tools can generate **many unbiased options** based on predefined multi objective parameters and also analyse those much faster.
- The **most suitable** options have to be **found manually** from the clutter.

Role of designer in the future?

Designer

/dɪˈzʌɪnə/

Noun

An **empathetic person** who understand the human challenges and **translates** those **challenges** into quantitative parameters and can attain suitable solutions in **cooperation** with **Artificial Intelligence**.