

Strata of Arches

Robotic Studio, Spring 2026

Or Polster

Instructor: Tom Shaked

ARCA Lab

School of Architecture

Ariel University



The Arch Brick

This process explores how a simple architectural module can serve as a foundation for creating complex structural systems. The starting point is the basic geometry of a 2D arc. By adding thickness and height, this arc is transformed into a 3D brick with volume and a clear presence in space. Instead of settling for a single uniform unit, the study examines different variations of that individual brick to understand the flexibility of its shape and proportions.

In the final stage, the focus shifts from the single piece to the entire structure by creating patterns of connection and aggregation between multiple units. Through duplication, movement, and alternating arrangements, the basic module develops into a rich architectural language. The result is a range of possibilities - from continuous, flowing walls to airy mashrabiya structures - demonstrating how the simplest unit can evolve into diverse spatial systems with a unique identity.

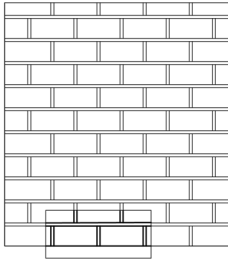


The canaanite gate at Tel Dan

Archaeological Precedent

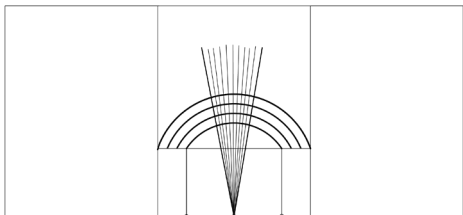
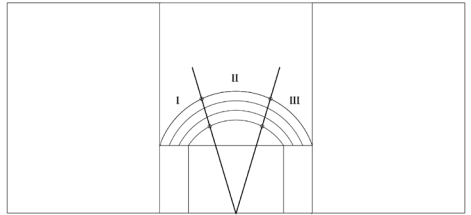
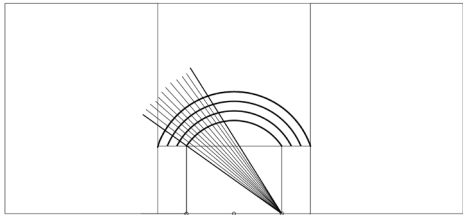
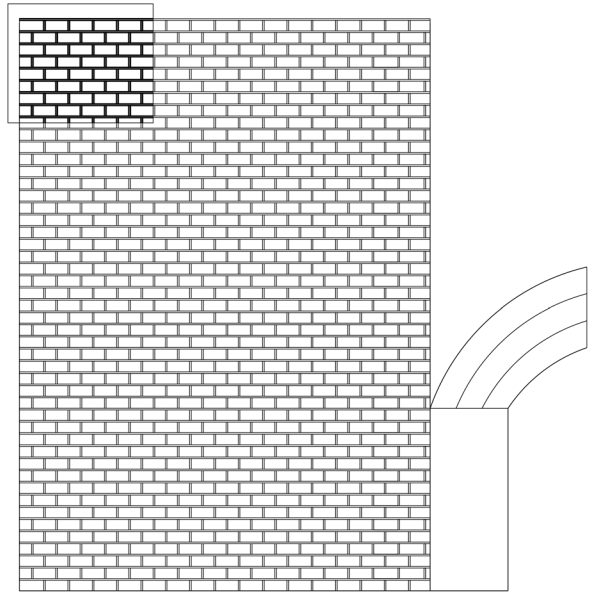
The Triple-Arched Gate at Tel Dan, also known as the “Gate of Laish,” is a unique architectural monument from the Middle Bronze Age IIA-B (c. 1775–1725 B.C.E.). Located in the north of Israel at the foot of Mount Hermon, in the south-eastern corner of the mound, it represents the earliest known example of an intact mud-brick arched gateway in the world. The gate was found in a remarkable state of preservation, primarily because it was intentionally filled with soil and buried within the city’s rampart system shortly after its construction. The structure is composed of two massive towers, each 5.15 meters wide, flanking a central passage. The passage features three consecutive arches: an eastern, a central, and a western arch. These are “basket arches,” each constructed from three radial courses of sun-dried mud bricks. The gate reaches a height of 7 meters, comprising 47 preserved courses of bricks. To reach the gate from the outside, a flight of twenty stone steps was constructed, ascending from the plain to the gate’s threshold. Internally, the gate is divided into four chambers by a central north-south wall, which is 1.7 meters thick. The walls were originally finished with a white lime and calcite plaster, which was found still adhering to the joints between the brick courses. This sophisticated construction reflects the high level of engineering and urban planning achieved in this region during the second millennium B.C.E..

- Biran, A. (1984). The Triple-Arched Gate of Laish at Tel Dan. *Israel Exploration Journal*, 34(1), 1–19
- Frances, R. (2009). The Three-Arched Middle Bronze Age Gate at Tel Dan: A structural investigation of an extraordinary archaeological site. Department of Architecture, Technion - Israel Institute of Technology.



1 Brick (13cm) + 1 Mortar Joint (2cm) =
15cm Unit

$$\frac{\text{Total Height (700cm)}}{\text{Construction Module (15cm)}} \approx 47 \text{ Brick Courses}$$



Stage 1: Dividing the Arch

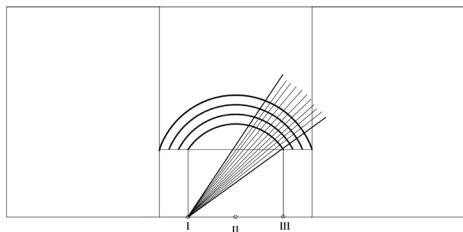
Split the arch into 3 parts: two sides and one top section.

Stage 2: The 3 Centers

Use 3 center points to decide the shape of each part and the angle of the bricks.

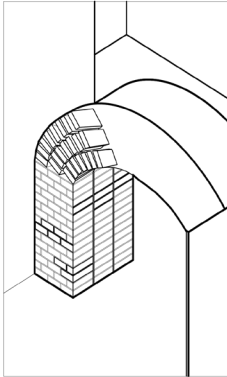
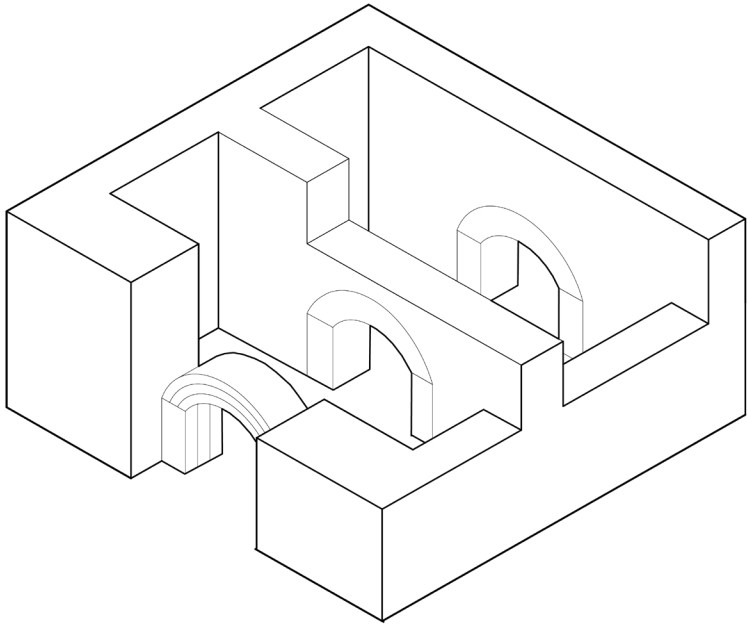
Stage 3: Angles and Weight

The Sides: These point to the far centers to stay strong and push the weight down to the walls.
The Top: This points to a low, deep center to keep the opening wide and flat.

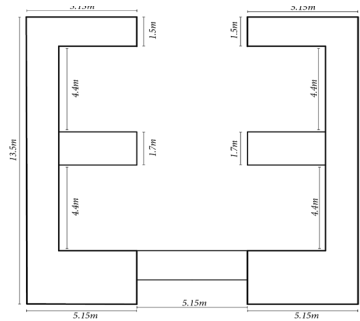


Stage 4: The 3 Layers

Build the arch using 3 layers of bricks. Each layer is 30 cm, making the total thickness 90 cm.

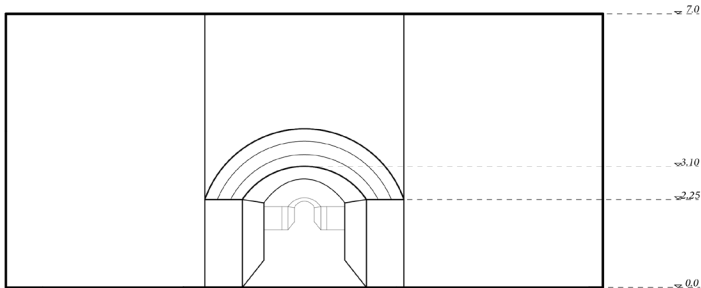


The gate structure consists of three arches along the passageway, each built from three layers of mud bricks stacked one above the other, creating a total thickness of 90 cm.



The building's plan is divided into three equal sections: a continuous central passageway and two side wings divided into equal-sized chambers

Plan

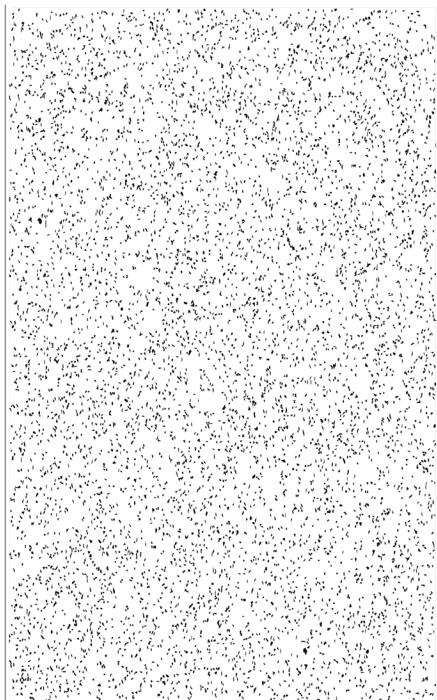


The building's section shows a passageway with a maximum height of 3.10 meters at the apex of the arch, with the vertical walls reaching 2.25 meters and serving as the base for the curve.

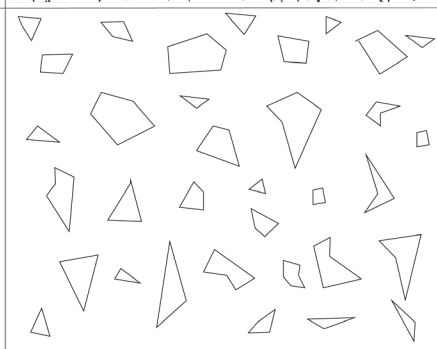
Section

The Mud-Brick

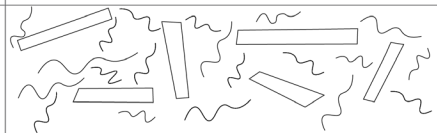
Natural reddish soil 60%



Sherds 30%



Debris 10%





Crow Canyon- Accommodation & Support Facilities

A Case Study For Program Planning

Crow Canyon Archaeological Center is an educational and research site in Colorado, focused on archaeology and experiential learning. The campus is located within an open natural landscape and is designed as a distributed environment, where buildings are spread across the site rather than concentrated in a single structure. The site includes archaeological elements such as a reconstructed pithouse and a pueblo structure, which present historical forms of living and building. Accommodation is a central part of the campus. It includes six modern cabins built in 2015 and ten more rustic cabins based on traditional Navajo hogan structures. The sleeping units vary, with shared rooms for small groups and more comfortable options for longer stays. The cabins are arranged in small clusters, allowing a balance between community and privacy. At the center of the campus are the main support facilities. The Gates Building includes classrooms, laboratories, and offices, while the nearby lodge contains a dining hall and a shared lounge. This area functions as the main hub of daily activity. Outdoor shared spaces, such as seating areas, are also spread across the site and support informal interaction. The layout creates a clear separation between the active central area and the quieter accommodation zones.

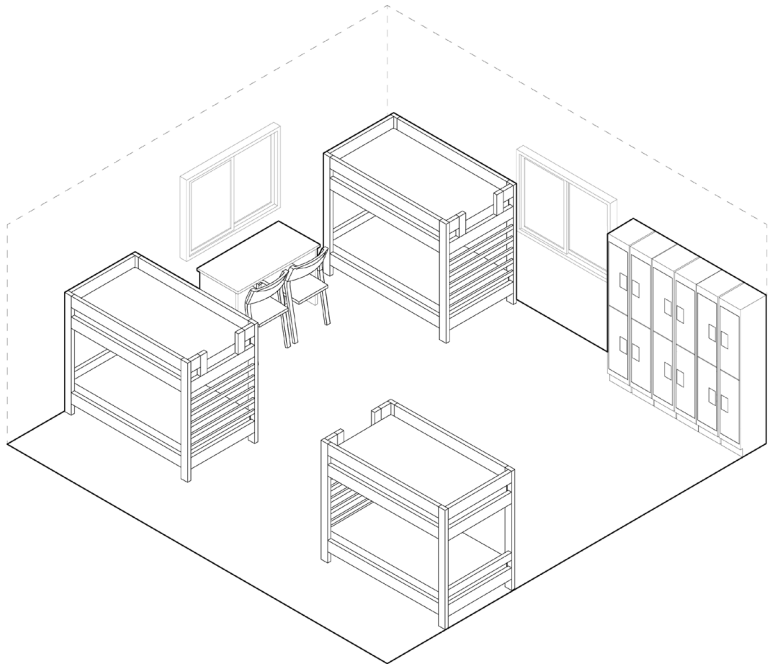
Crow Canyon Archaeological Center. Official Website. <https://crowcanyon.org/>

A Colorado River Journey. <https://ltamerica.org/crow-canyon-archaeological-center-a-colorado-river-journey/>

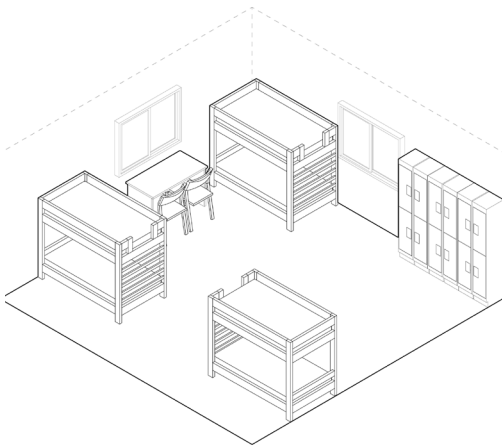
Crow Canyon. Wikipedia. https://en.wikipedia.org/wiki/Crow_Canyon_Archaeological_Center



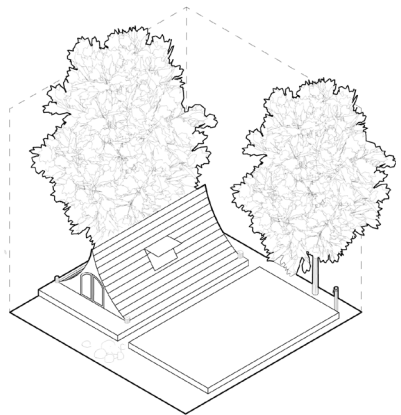
Accommodation



01 Dormitory

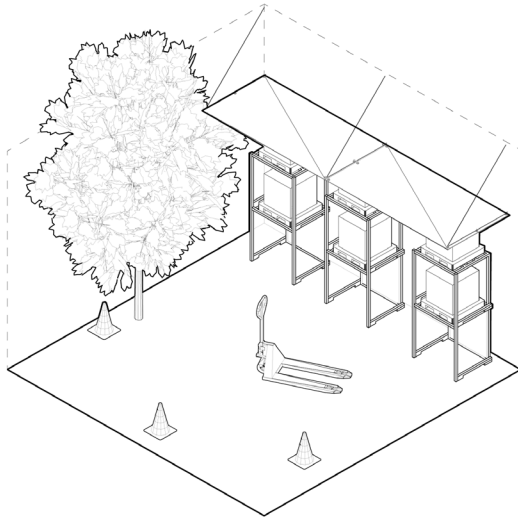


02 Shared Room

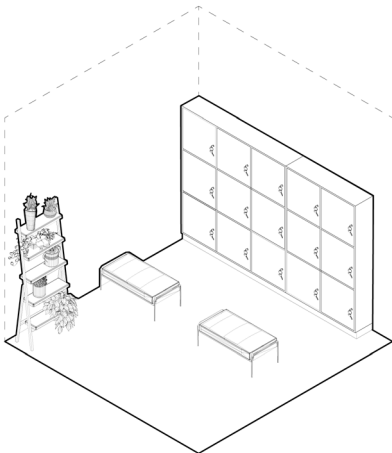


03 Field Camp

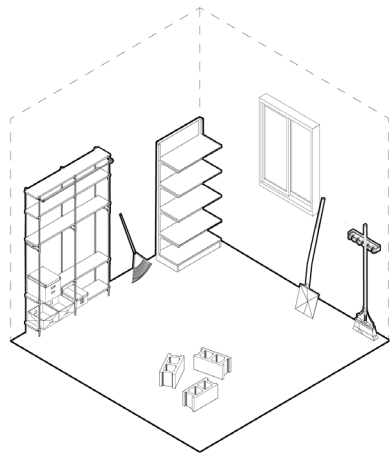
Storage



04 Material Storage

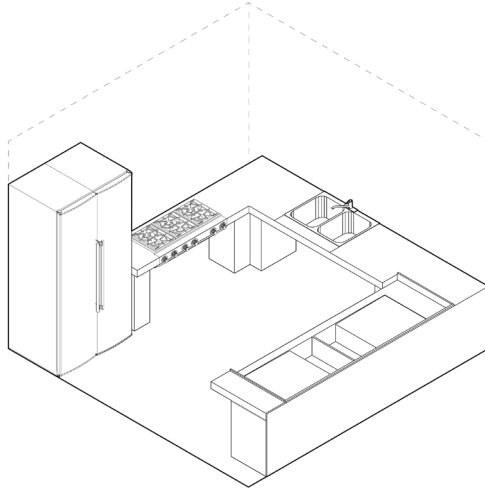


05 Personal Storage

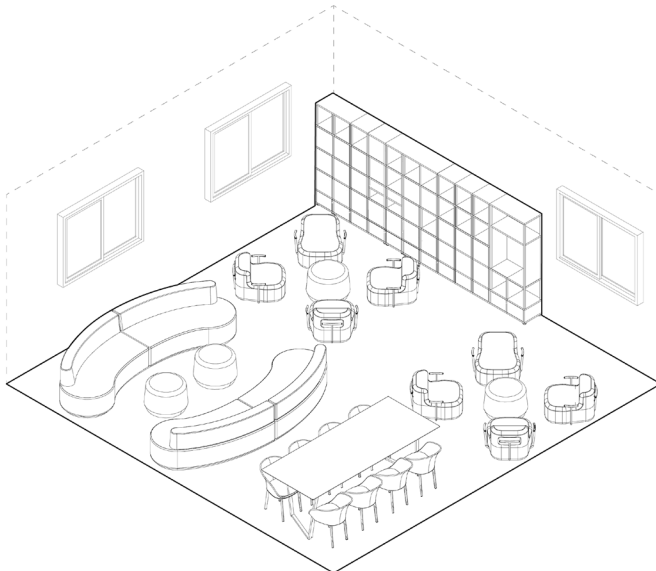


06 Tool Storage

Communal

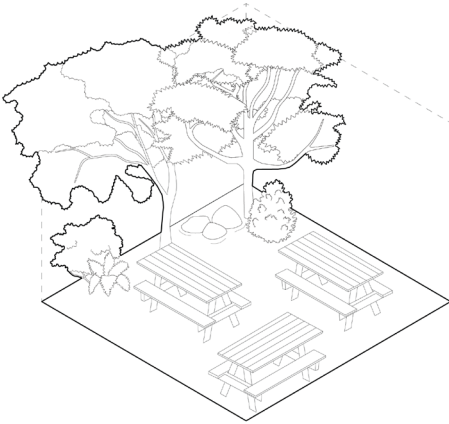


07 Shared Kitchen

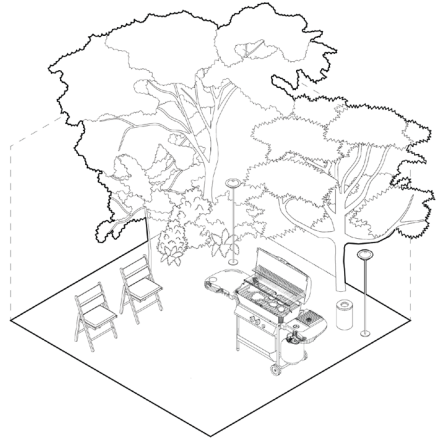


08 Lounge Space

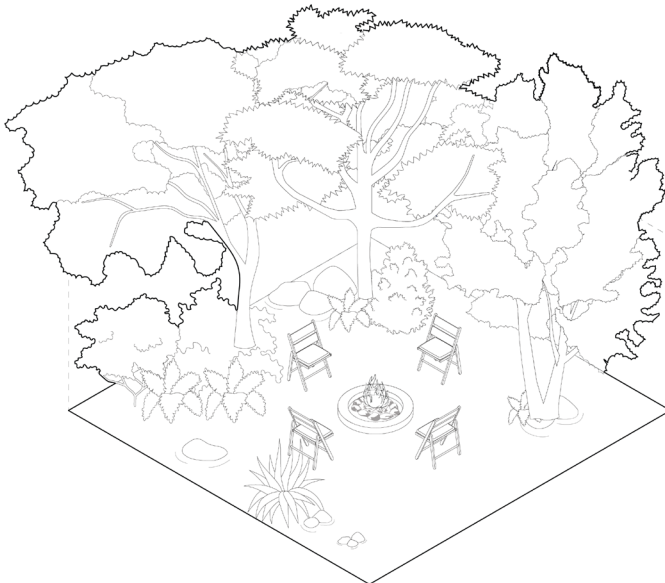
Communal



09 Outdoor Seating

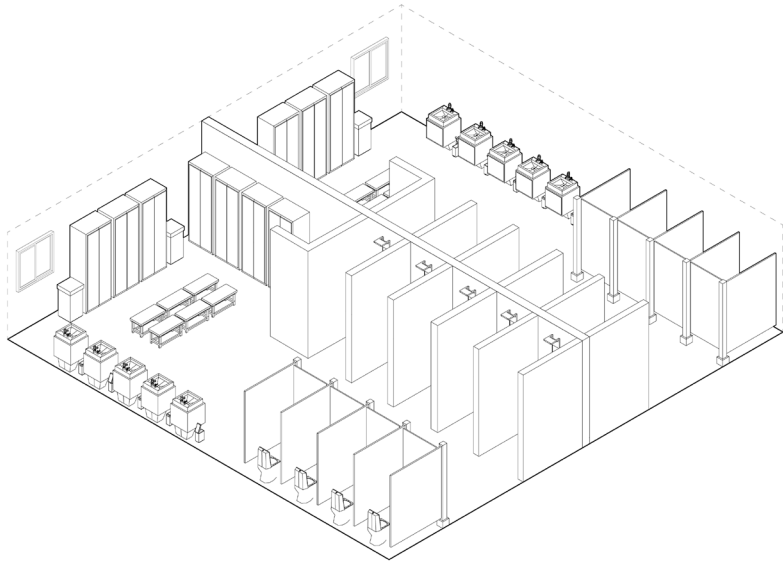


10 Outdoor Cooking

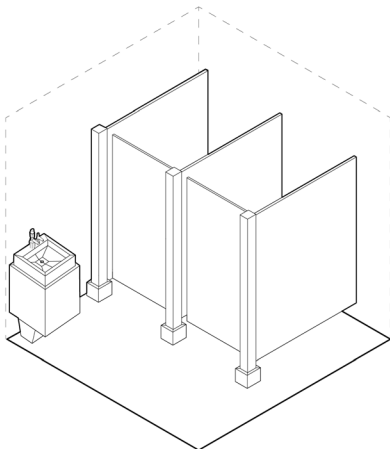


11 Gathering Space

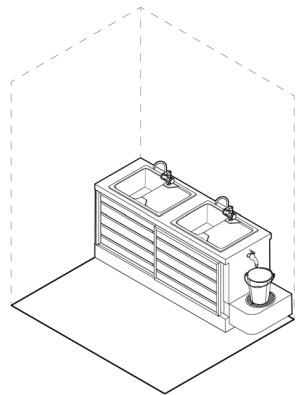
Sanitary



12 Sanitary Block

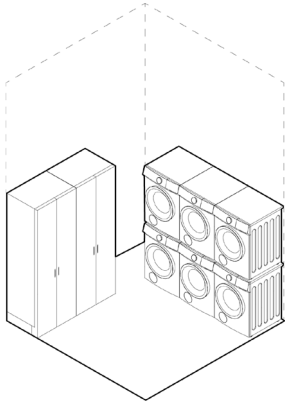


13 Work Area Toilets

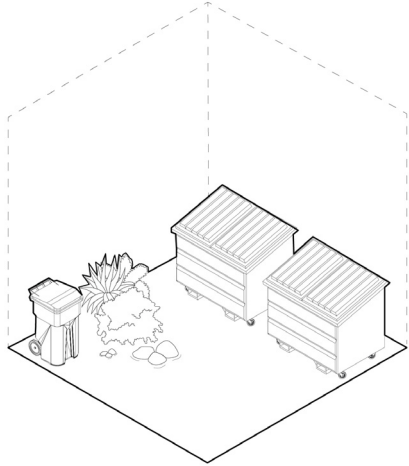


14 Outdoor Washing

Sanitary

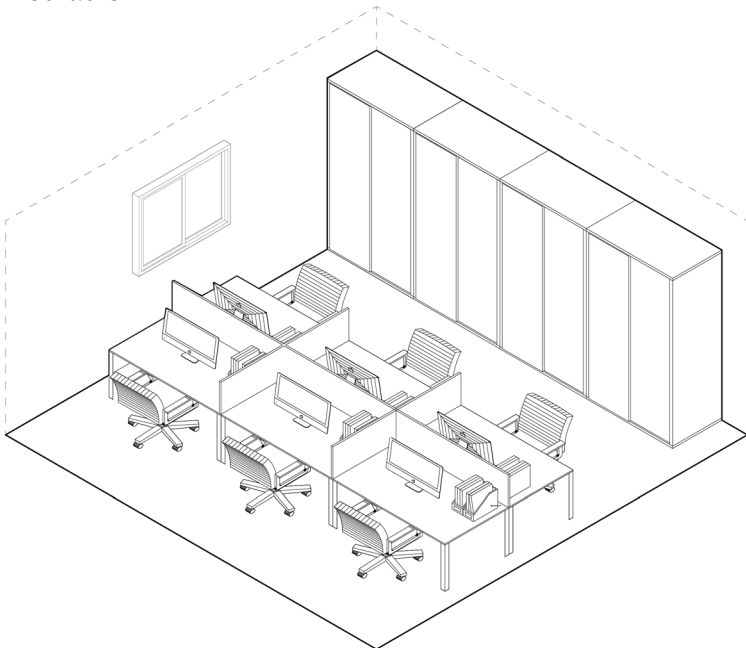


15 Laundry Area



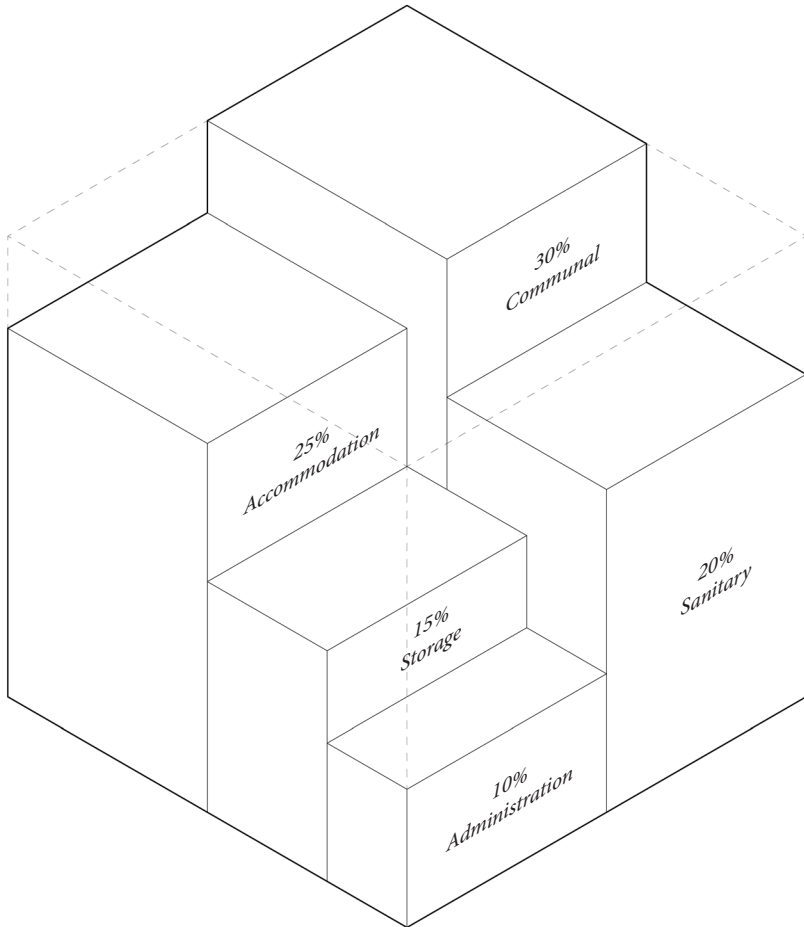
16 Waste Area

Administration



17 Staff Office

Accommodation & Support Facilities

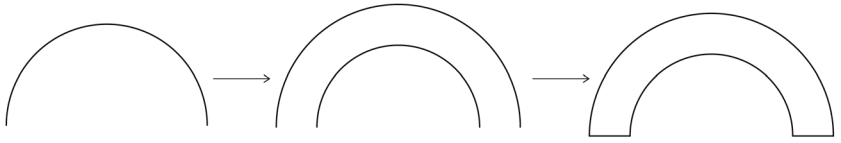




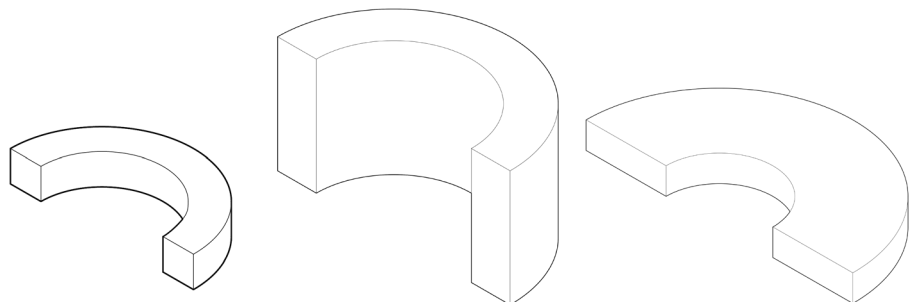
Lodge Building- Shared Space | Source: Crow Canyon Archaeological Center



One Module of arc brick



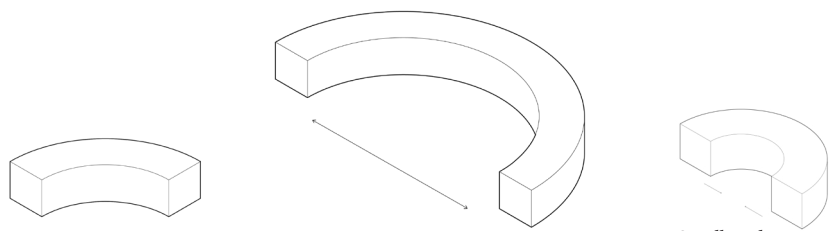
The Creation Process of the Base Brick



Basic

Vertical

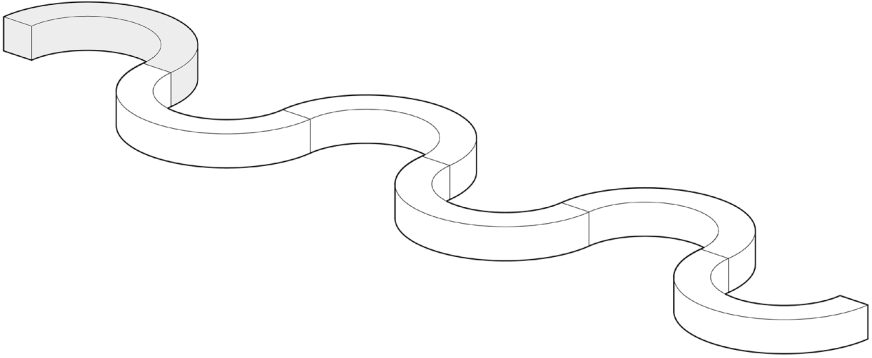
Horizontal



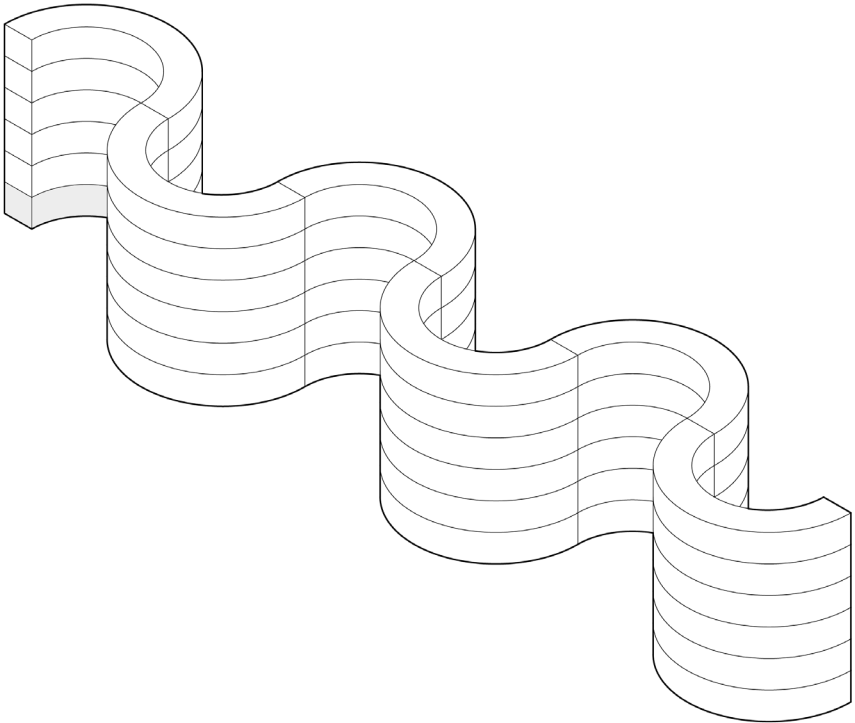
Half

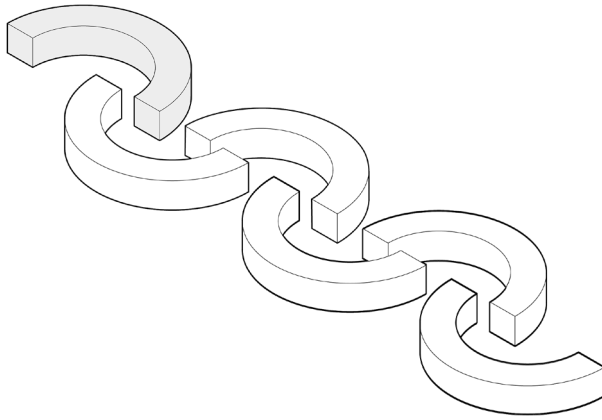
Big Radius

Small Radius

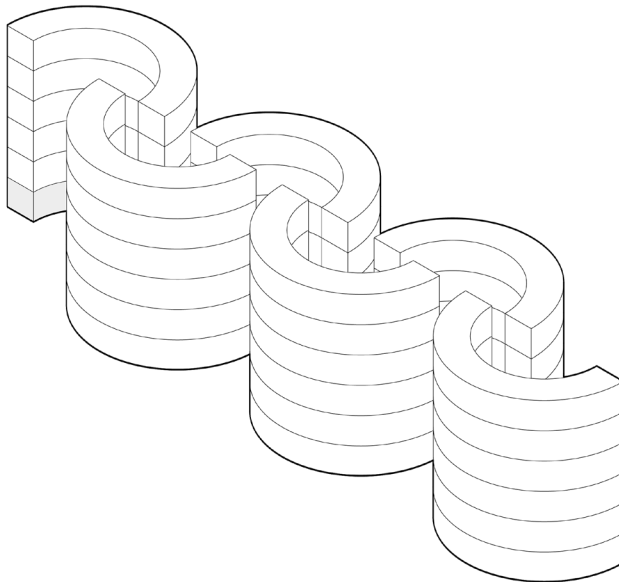


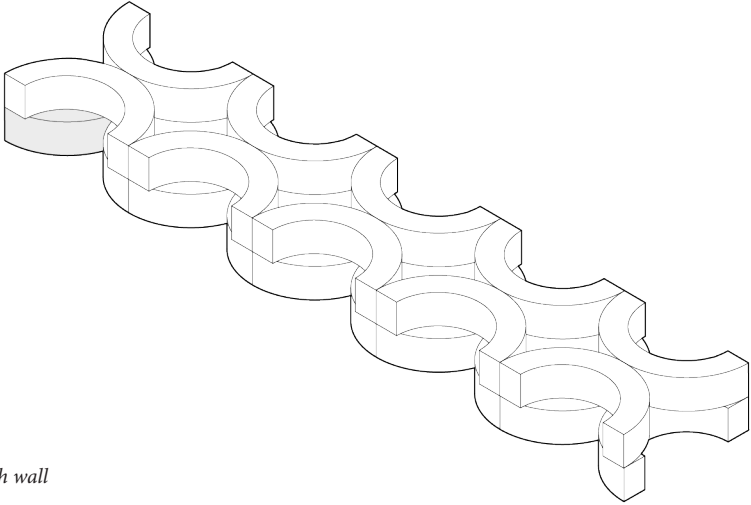
Wave wall



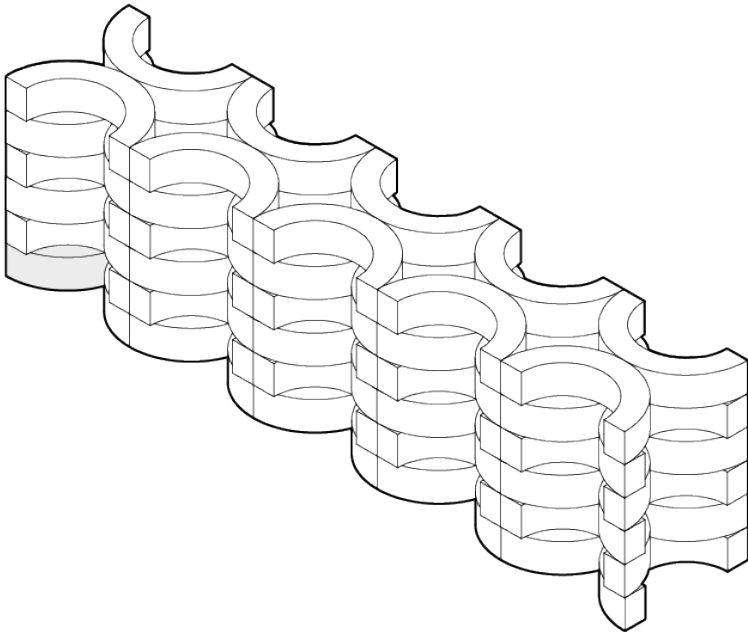


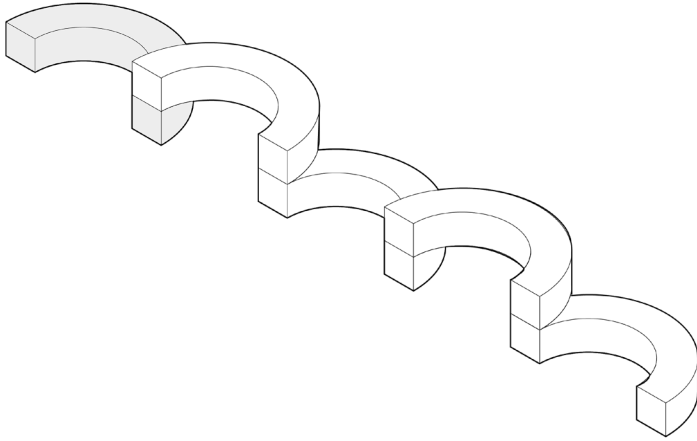
Shift wall



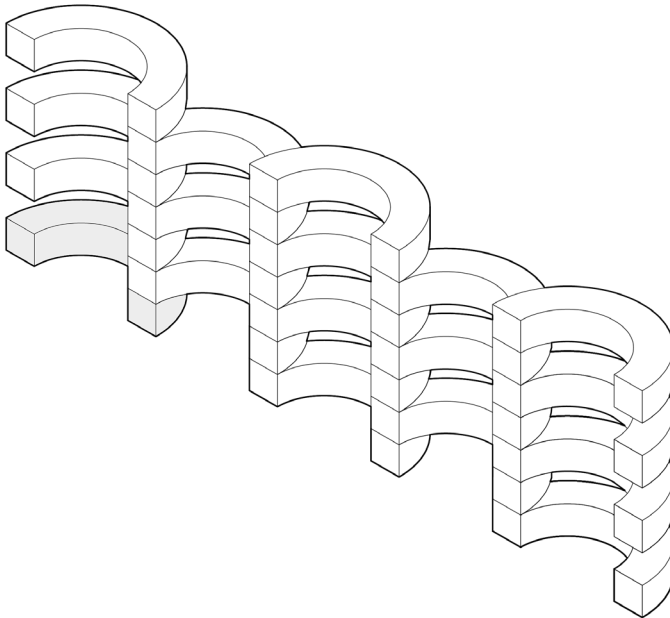


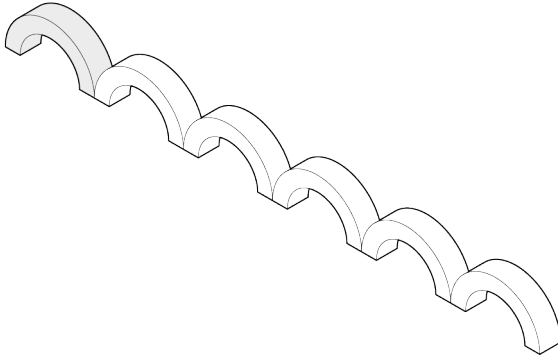
Inverted arch wall



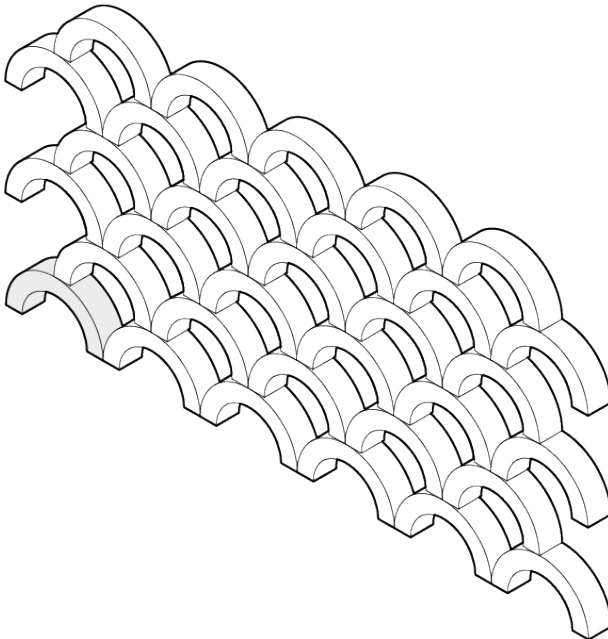


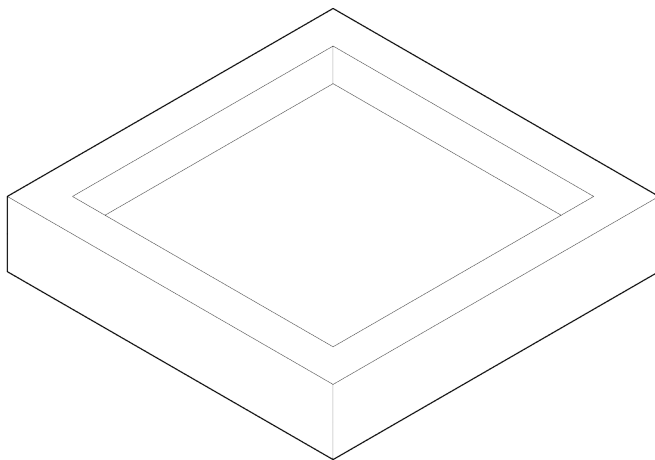
Mashrabiya wall



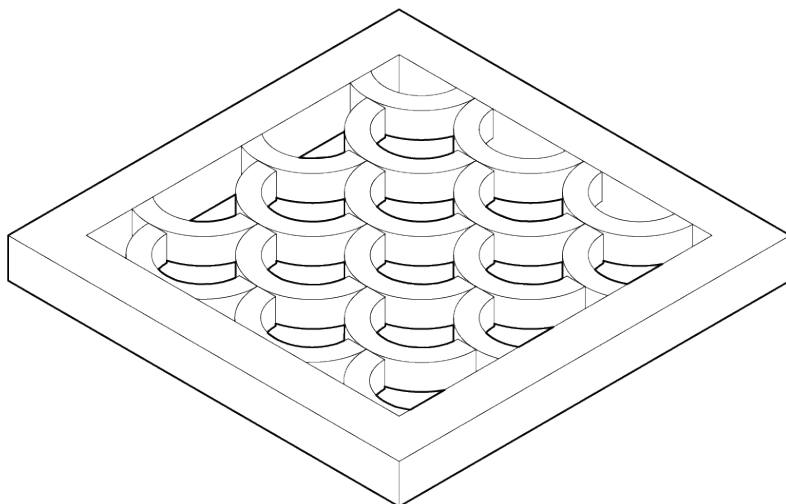


Face wall

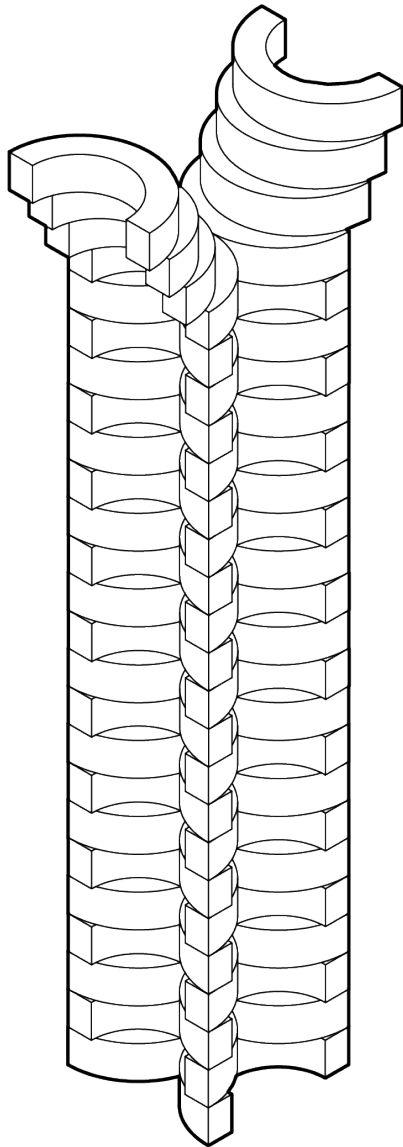




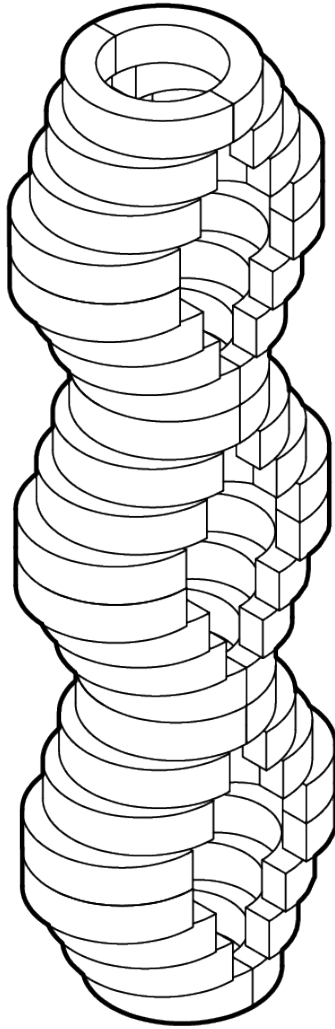
Sealed ceiling



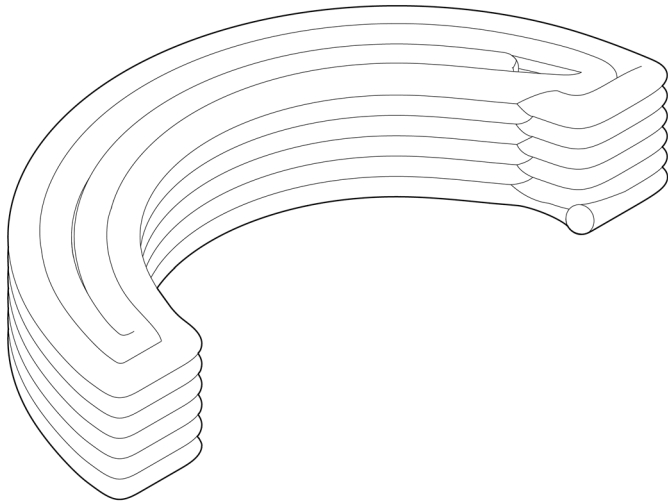
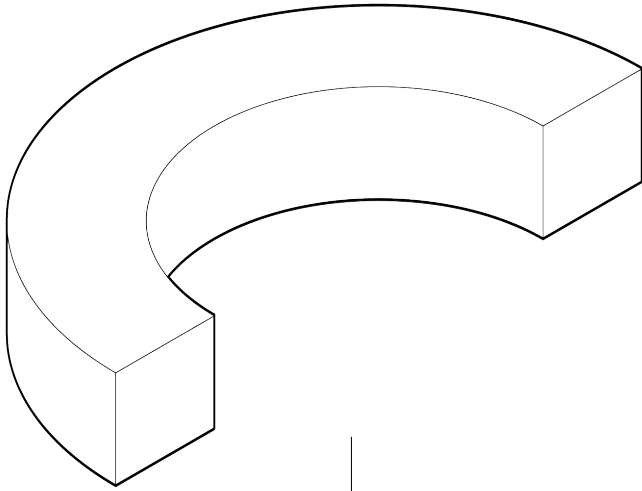
Open ceiling



Inverted arch column



spacious column

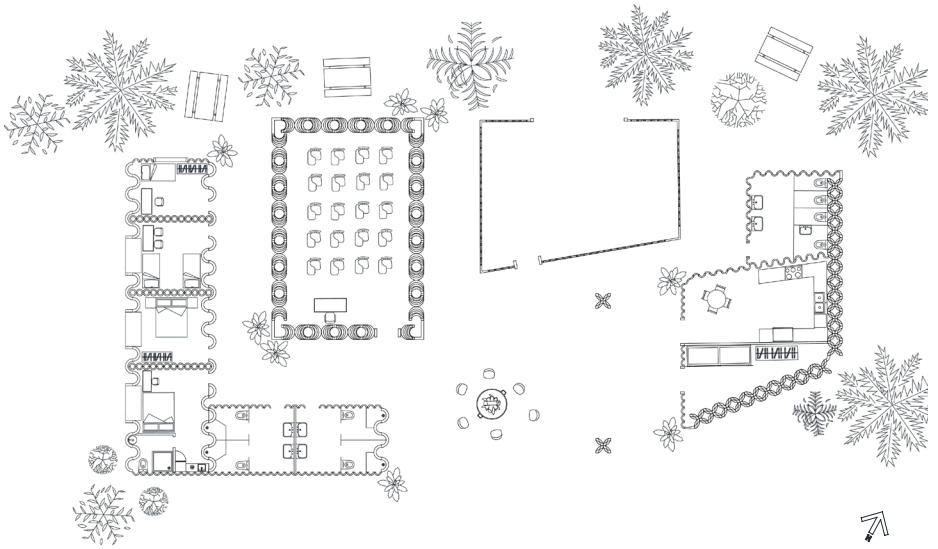


Experimental Archaeology Complex – Ariel University

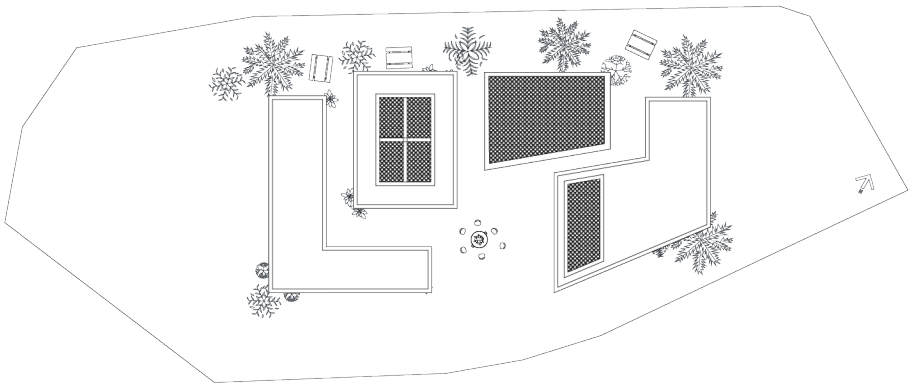
From Component to Complex: Integrated Earth

Designed as a comprehensive facility for the Faculty of Archaeology, this project seamlessly integrates research laboratories, educational classrooms, guest accommodations, and museum exhibition areas. The architectural language is defined by its materiality, constructed entirely from traditional earthen bricks of varying sizes and thicknesses. By manipulating this single modular element, the design generates a rich diversity of tactile textures across the walls and ceilings.

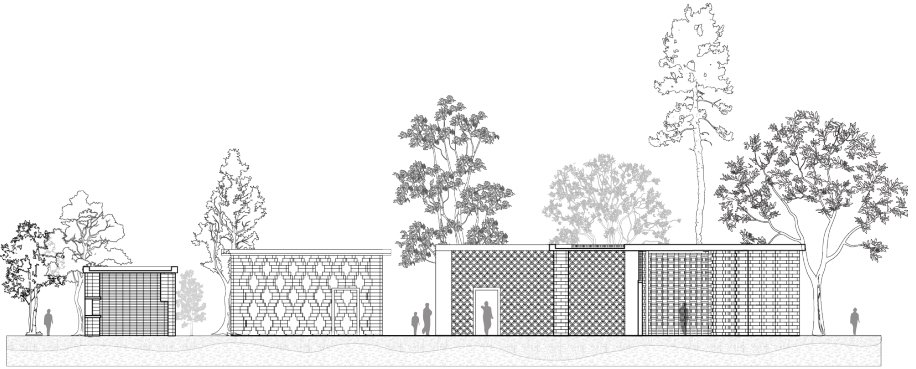
A primary focus of the spatial arrangement is the strategic choreography of natural light. The varied brickwork acts as a porous envelope, drawing daylight deep into the interior to create dynamic, illuminated atmospheres that adapt to the distinct functional needs of studying, researching, and living.



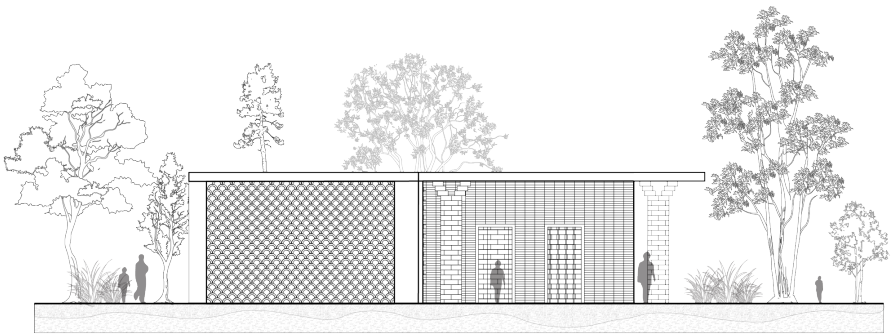
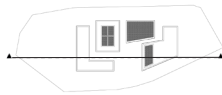
First Floor Plan | Scale 1:200



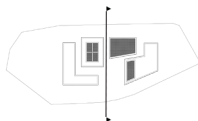
Ground Floor Plan | Scale 1:200

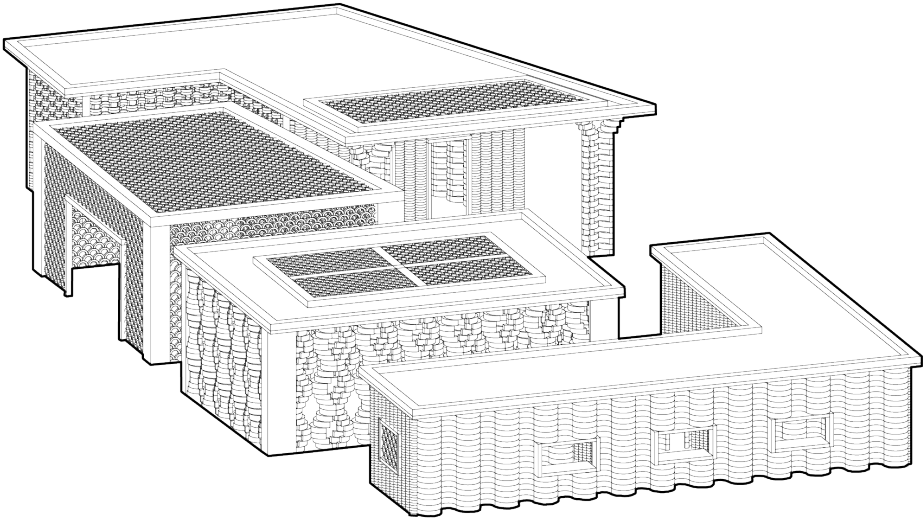


Section A-A | Scale 1:200

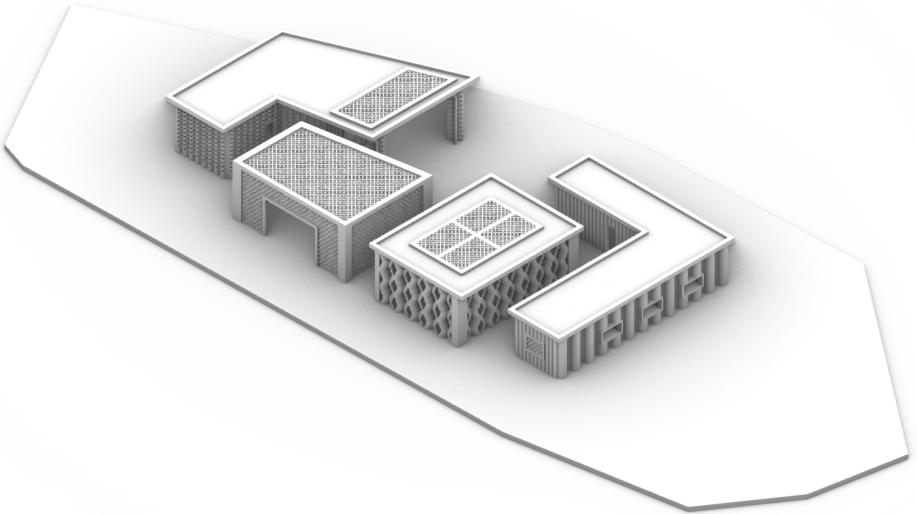
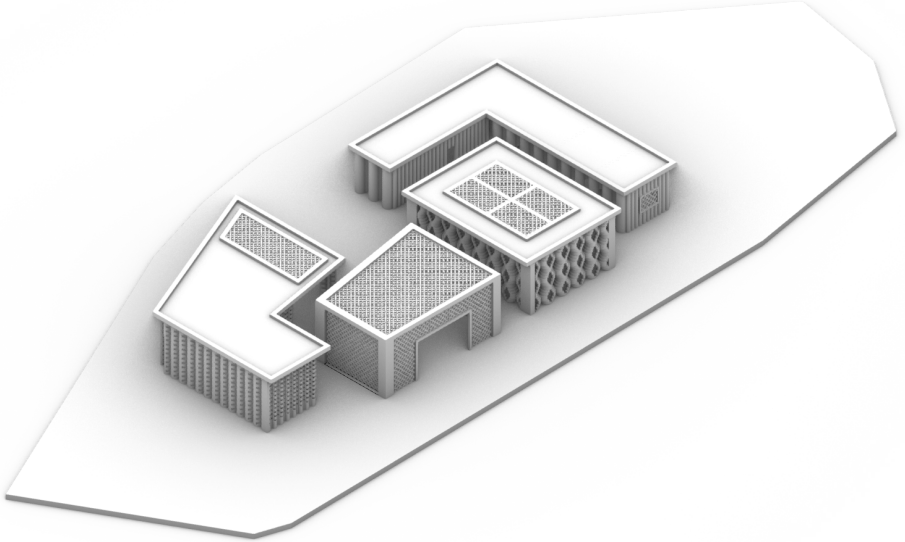


Section B-B | Scale 1:200





Isometric view



Rendered view

