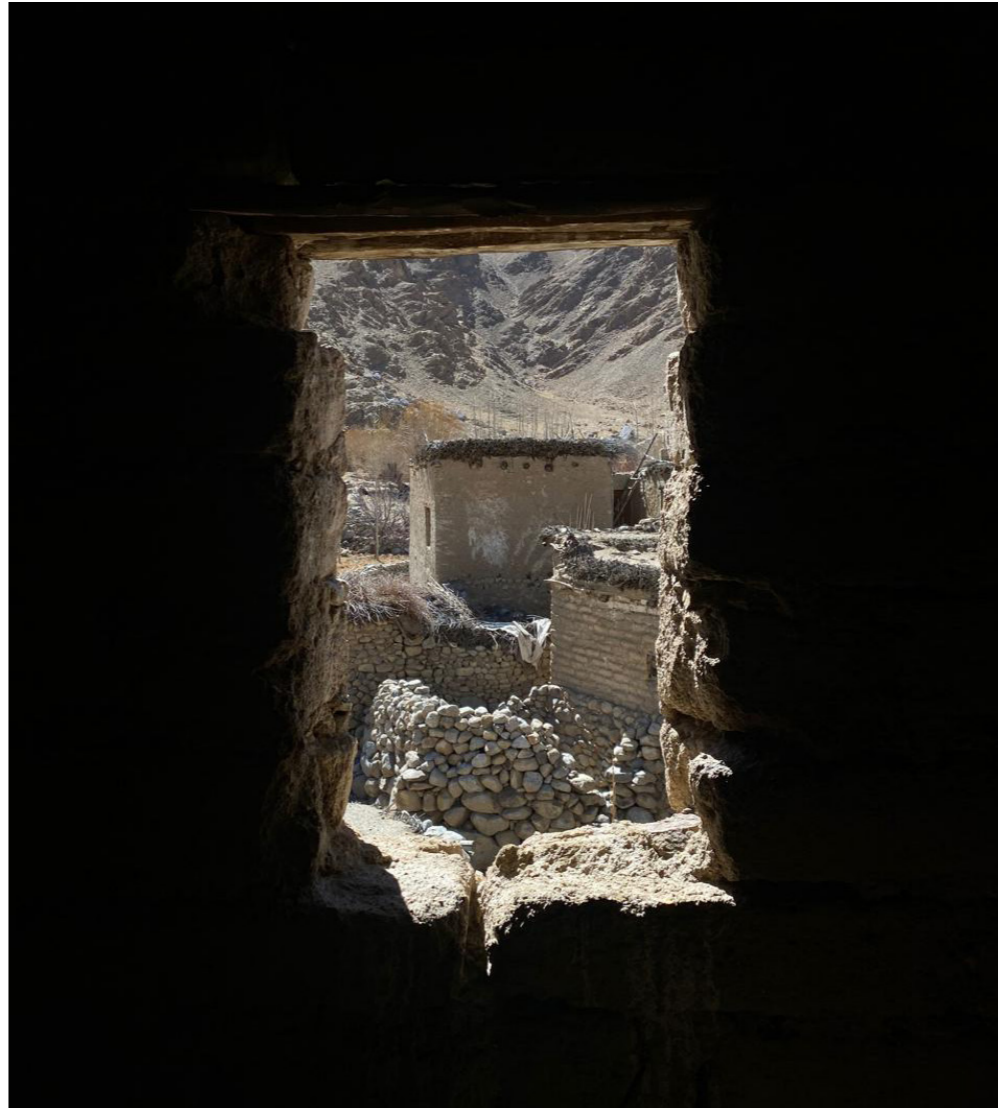
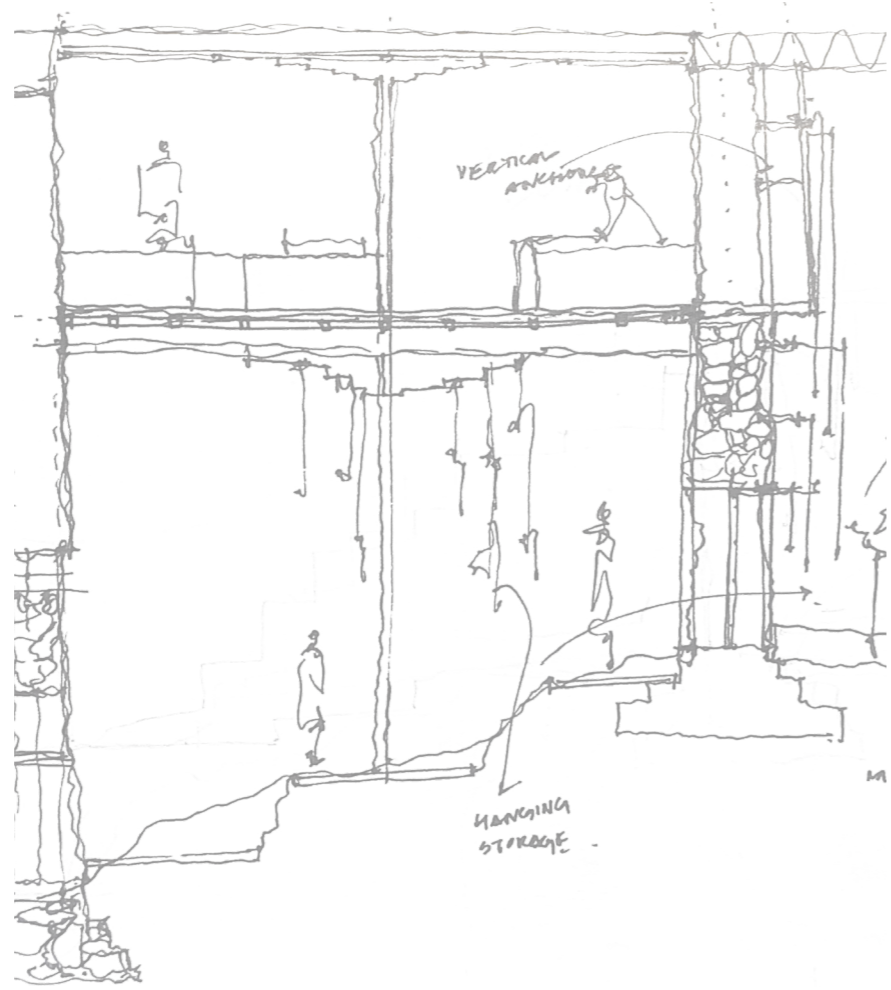


Gangchen-Yu1 // Village of the Glaciers



A4 Exhibition
AR4EX310
Sagarika Sengupta /6185614
(Roel van de Pas/Inge Bobbink)

I Context

II Existing Systems and Guiding Forces

III The Concept

IV Architectural Interventions

V Reflections

I Context

- Site Specifics | Living in the Extreme
- Geographical and Historical Background
- One of Many Villages
- Climate Change Impact
- Site Chronology
- Objective
- Research Question
- Methodology

Satellite Image of
Kulum via Google
Earth



Indus

Lower Village
7 homes
3 inhabited
3600m altitude

Upper Village
5 homes
1 inhabited
3800m altitude

Glaciers
4200m altitude

Kulum is a remote, high-altitude village (3500m-3800m) located in the trans-Himalayan desert region of Ladakh, India. It experiences an extreme, arid cold desert climate characterized by short, mild summers, bitterly freezing winters, minimal annual precipitation, and intense solar radiation with temperatures ranging from 20°C to -30°C.



*Varying landscape
typologies through
the terrain*



*An photographic
montage section of
the upper village*



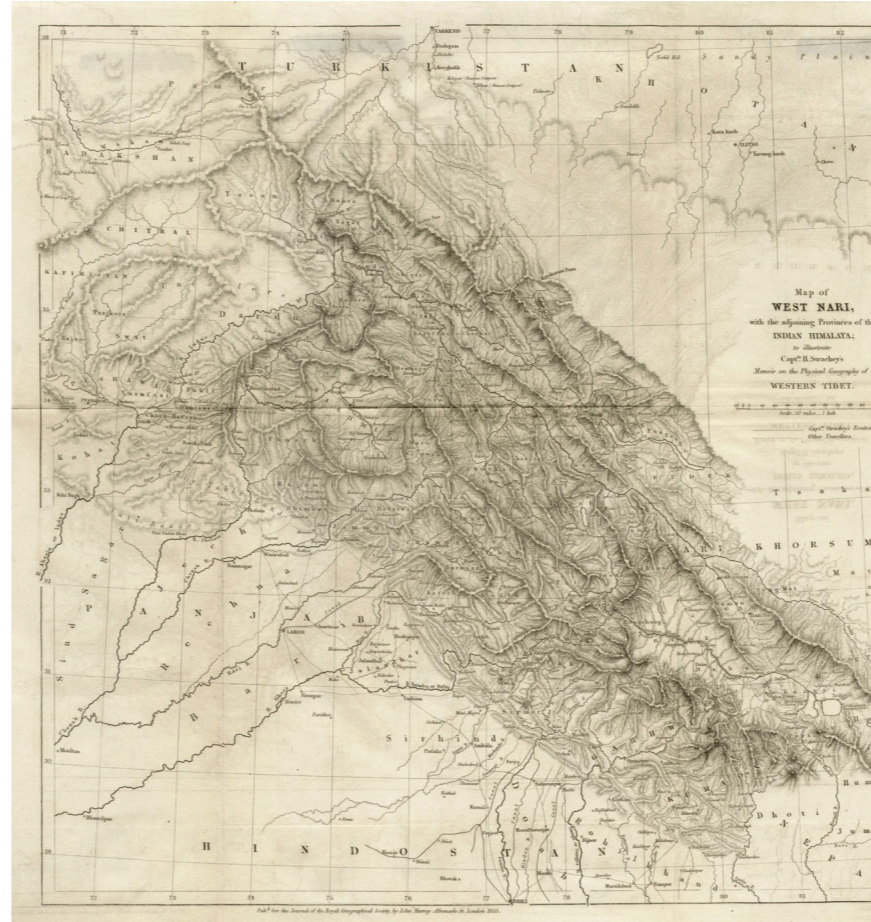
Seemingly small on the satellite image, Kulum boasts a wide range of architectural and landscape characteristics which highlight the core vernacular mindset of the built-scape molding with the landscape.

to be printed in
a3s

Ladakh, India via
Google Earth



Locating Ladakh
Map of Western Tibet by
H. Strachley, 1853

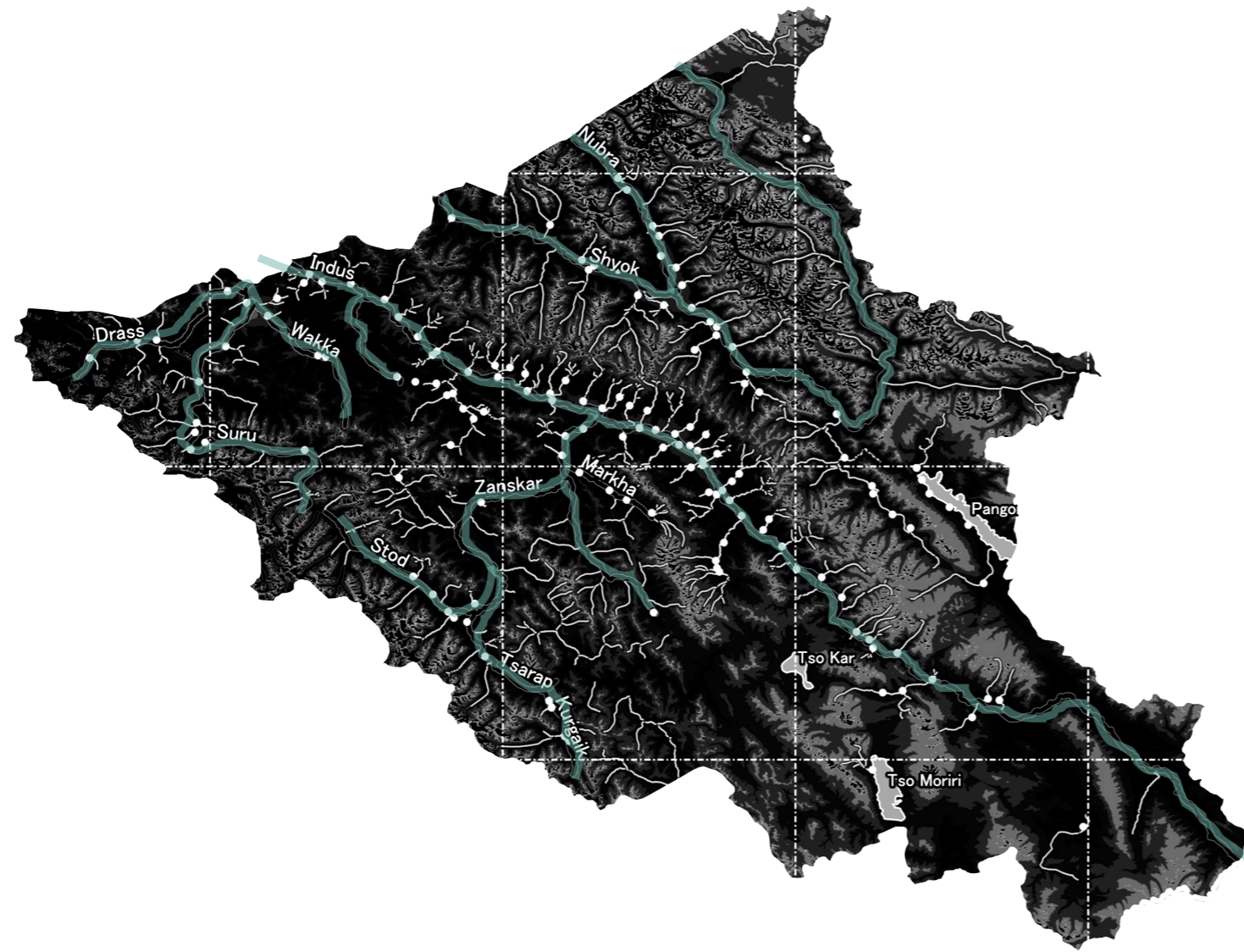


Depiction of Ladakhi villages
"An Atlas of the Himalayas by
a 19th Century Tibetan Lama"



Located in the northernmost point of the Indian subcontinent, Ladakh occupies a strategically significant position at the crossroads of several regions, bordering Tibet to the east, Xinjiang to the north, Baltistan to the north-west, Kashmir to the west, and Himachal Pradesh to the south. Historically situated along the Silk Route, the region's economy was closely tied to trade and commercial exchange.

Rivers, Glacial Streams, Settlements: Geological Survey of India, Bhukosh Repository



Photographs of Ladakhi villages - via self and Edoardo Paolo Ferrai



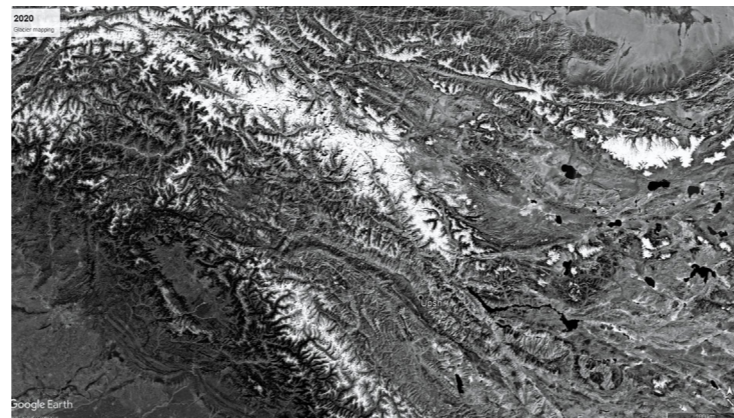
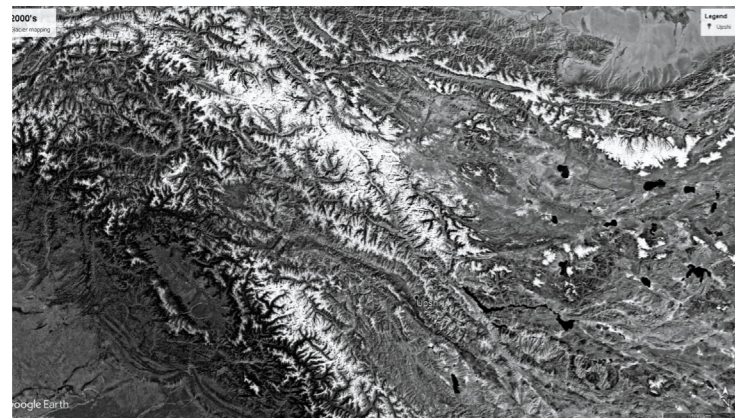
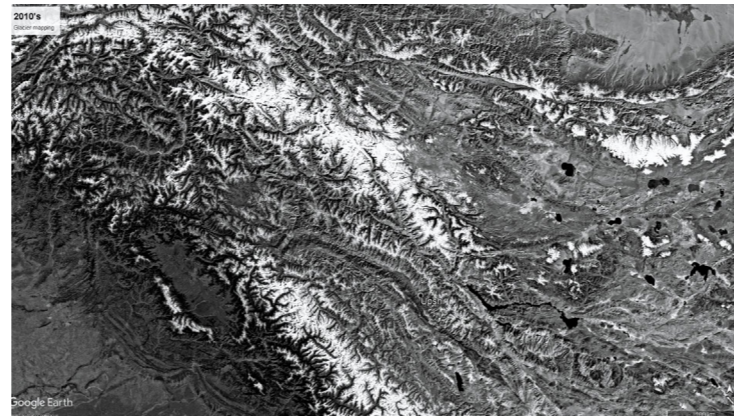
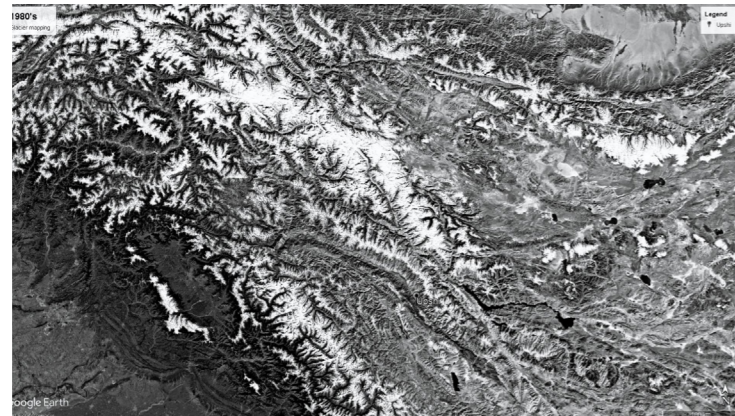
Kulum is not an isolated typology of a settlement. Ladakh is composed of many such agrarian communities that have relied on the Indus and glacial networks for long term sustenance. These communities work cohesively with the extreme conditions of Ladakh and have molded their lifestyles with the same over many centuries.

Satellite images of Igoo,
Phyang and Shara



These satellite images show the typical morphology of villages in relation to the landscape and points towards an agricultural priority.

Satellite image showing glacial depletion via Google Earth



In recent times, climate change has led to significant loss of glaciers, floods and other natural calamities. This has significantly impacted communities that relied solely on glacial sources for sustenance and made them increasingly vulnerable.

BBC

Himalayas bare and rocky after reduced winter snowfall, scientists warn

7 days ago

Navin Singh Khadka
Environment correspondent

Much less winter snow is falling on the Himalayas, leaving the mountains bare and rocky in many parts of the region in a season when they should be snow-clad, meteorologists have said.

Ice stupas bringing life back to Ladakh's ghost villages

7 days ago

Navin Singh Khadka
Environment correspondent

HOW A STUPA WORKS

A water source is identified and the land for the stupa built at another place. Both connected through an insulated pipe.

Stupas are seasonal structures supported by a tripod. Water is channelled through a pipe to the stupa. In the ground, the water forms up to a certain depth to reach a height of at least 10 metres. A 30-metre tall stupa can store around 10 lakh litres of water.

Stupa projects in Ladakh are being supported by the government and other agencies. The project is being implemented in Ladakh and other parts of the region. The project is being implemented in Ladakh and other parts of the region. The project is being implemented in Ladakh and other parts of the region.

REACH LADAKH
Experience the Richness

རིག་གནས་ལས་ལུས་

REACH LADAKH BULLETIN

HOME SOCIAL NEWS INTERVIEW EXPERT TALK OPINION POLITICS MORE TRAVEL TO

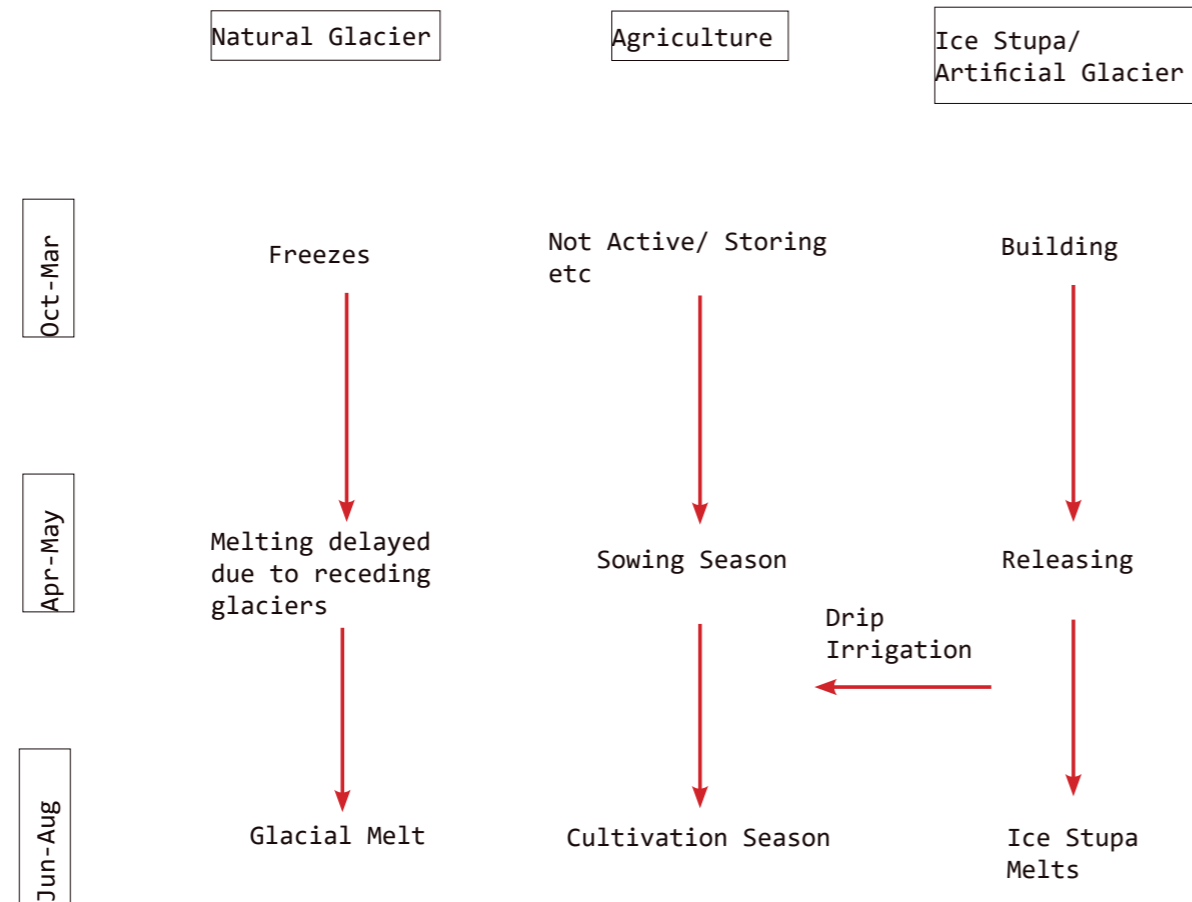
Kulum Water Crisis: A wake-up call for Ladakh

Residents forced to migrate due to water scarcity

By Stanzin Dasal | KULUM, Feb 20, 2021

Old abandoned house of Kulum village.

News Articles highlighting effects of climate change



Pipeline connects the ice stupa to a source on higher ground, drawing water downhill



A fountain system sprays and freezes water in a domed structure



As ice accommodates, more piping can be added to increase the height of the structure.



Drip irrigation systems distribute their meltwater

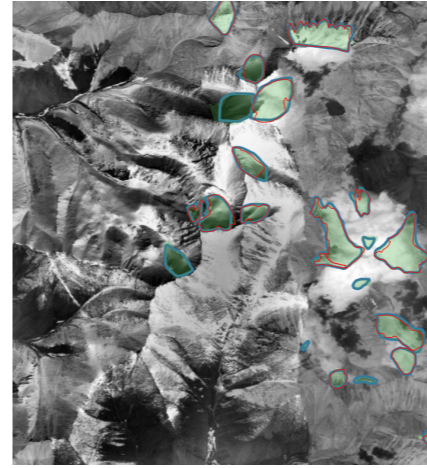
Chewang Norphel (b. 1937), an 88-year-old retired civil engineer from Leh known as the “Ice Man,” pioneered artificial glaciers in Ladakh in the late 1980s. By building cascade walls across high-altitude streams, he slowed water flow to promote winter ice formation. The ice melts in spring, providing crucial irrigation water during sowing season



part of silk route



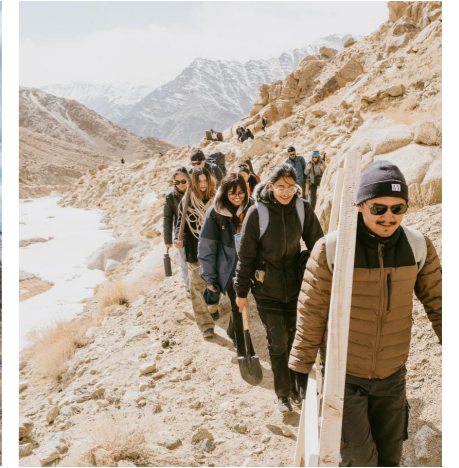
Floods causing agricultural decline



Glacial depletion mapping



Artificial glaciers



New demographic of researchers and volunteers helping maintain the glacier

Photographs via self



a host of people / active agriculture and activity



Residential abandonment



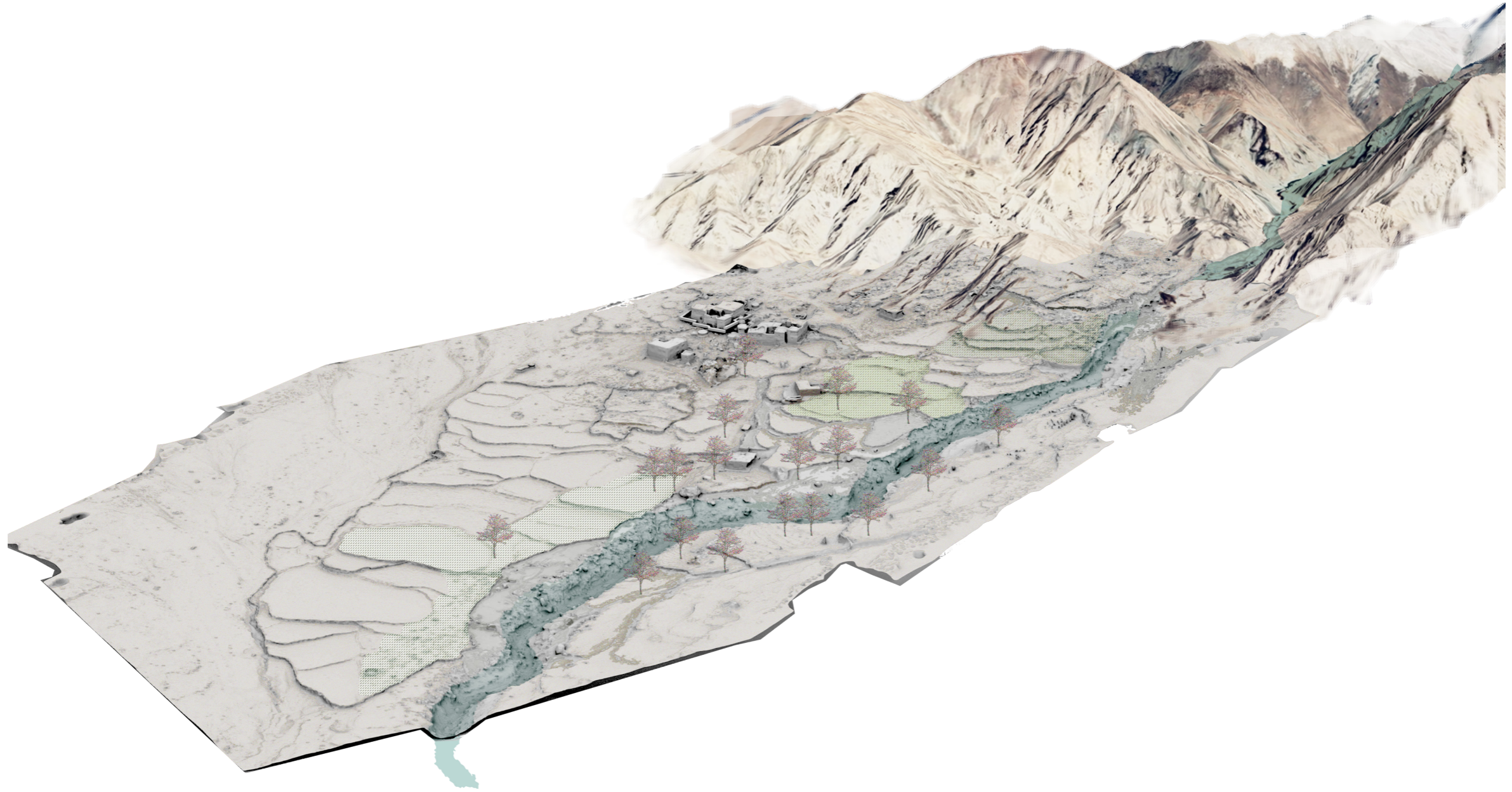
Active agriculture



Architectural restoration still needed

Kulum has emerged as one of the vulnerable villages that has also gained recent traction via various research and volunteering groups. Once a thriving agrarian village with about eleven households and ten families-- the 2010 floods led to agricultural loss and abandonment which was only exacerbated by the glacial loss. The agricultural and glacial loss has been tended to via measures such as the ice stupa or artificial glaciers which has incentivized re-inhabitation.

Drone shot of the site via
self



To propose a community anchored, vernacularly informed restoration model that enables the revival of self sustenance in Kulum. Further, creating a prototype for many such ecologically threatened villages.

Research Question

How have the Ladakhi villages displayed resilience in the face of extreme climatic and geographical challenges and what is the value in preserving them?

Design Question

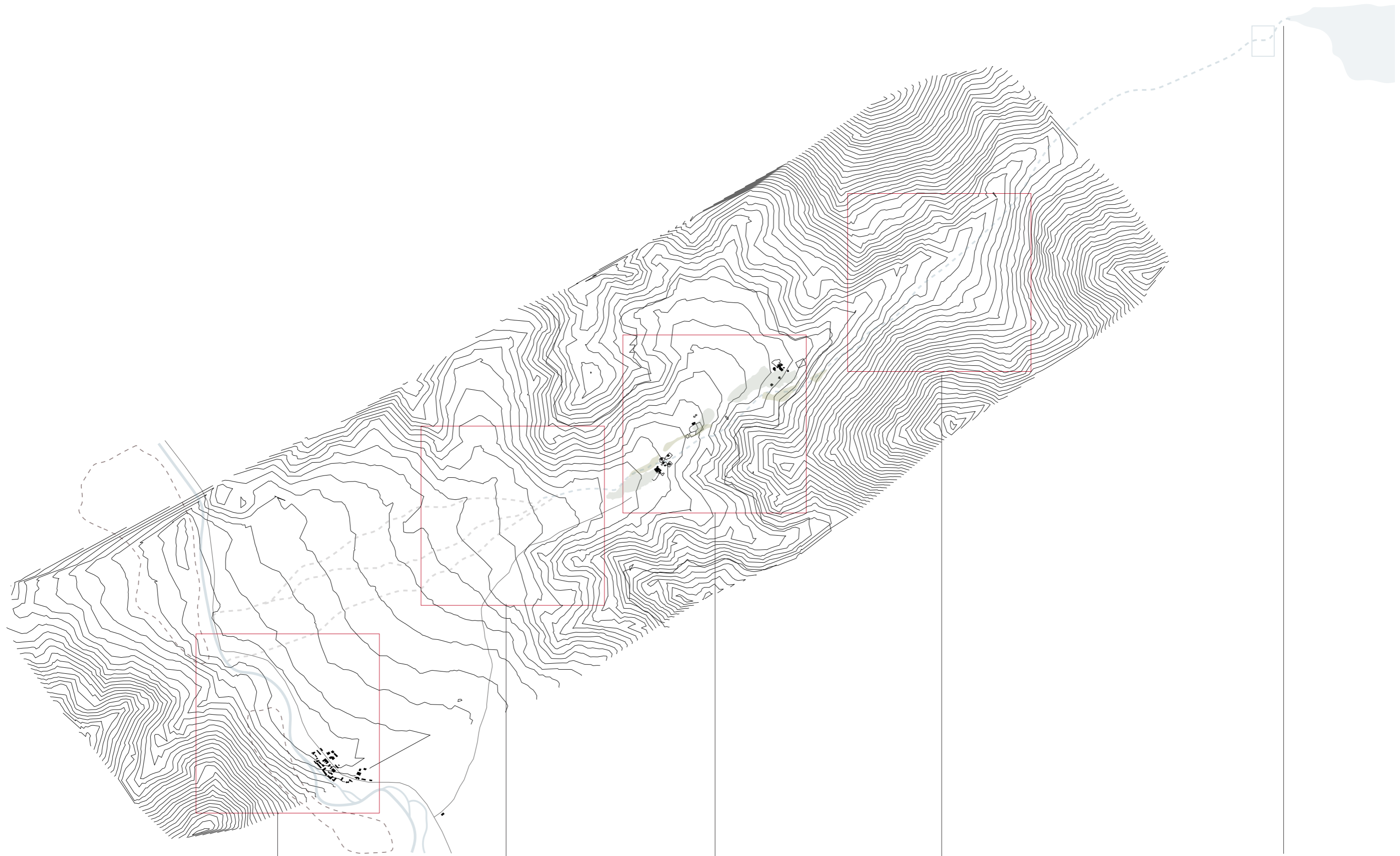
How can we build a self sustaining village model for Ladakh in the face of climate change and threats of abandonment?



I Context

II Existing Systems and Guiding Forces

- Preliminary Site Analysis
- Interdependent Systems



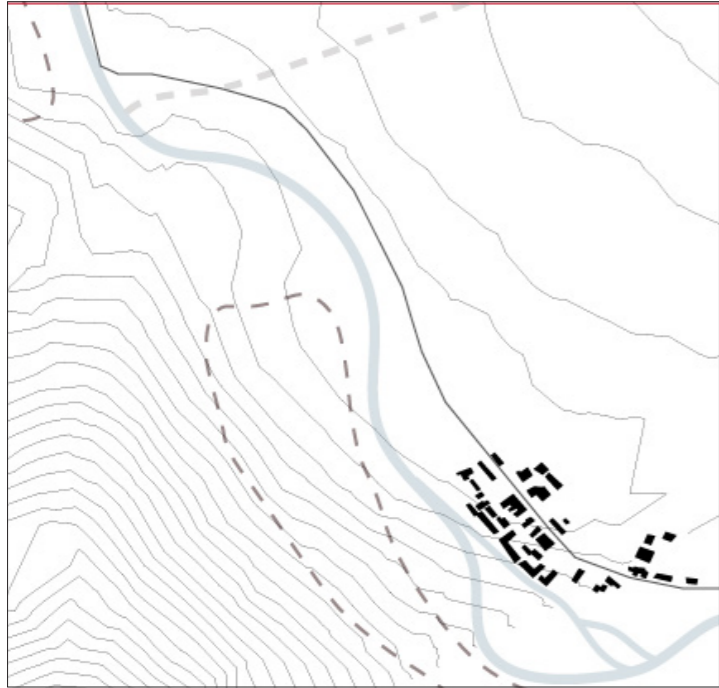
Town of Upshi and military areas

Newly built road leading to lowest part of village

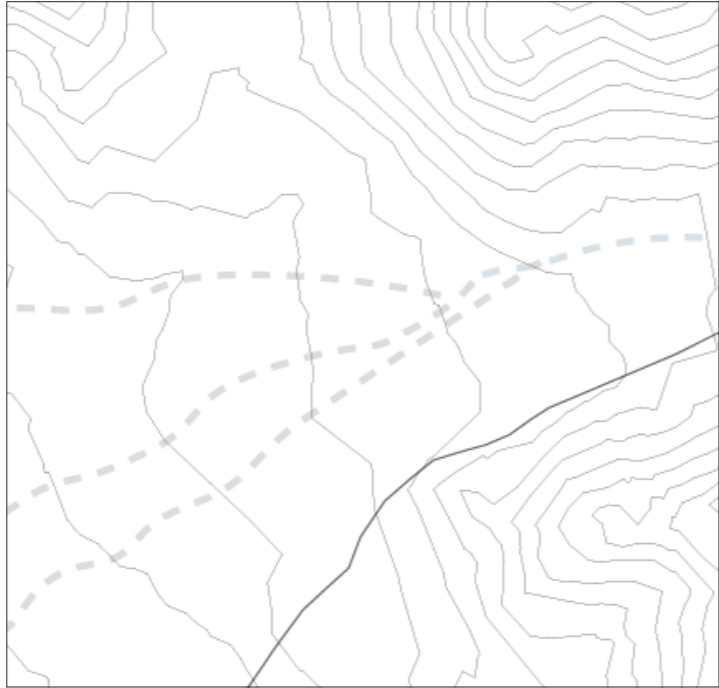
Kulum

Way to Glaciers/Ice stupa

Glaciers/Ice stupa



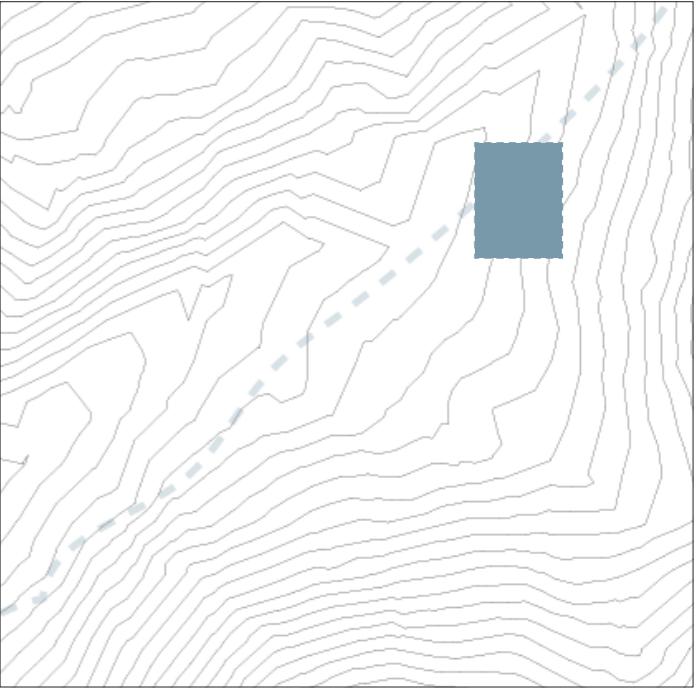
Town of Upshi and military areas



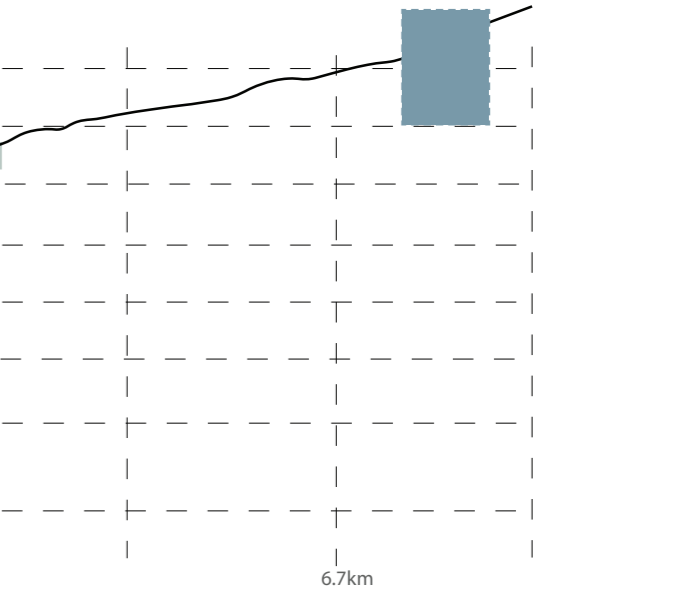
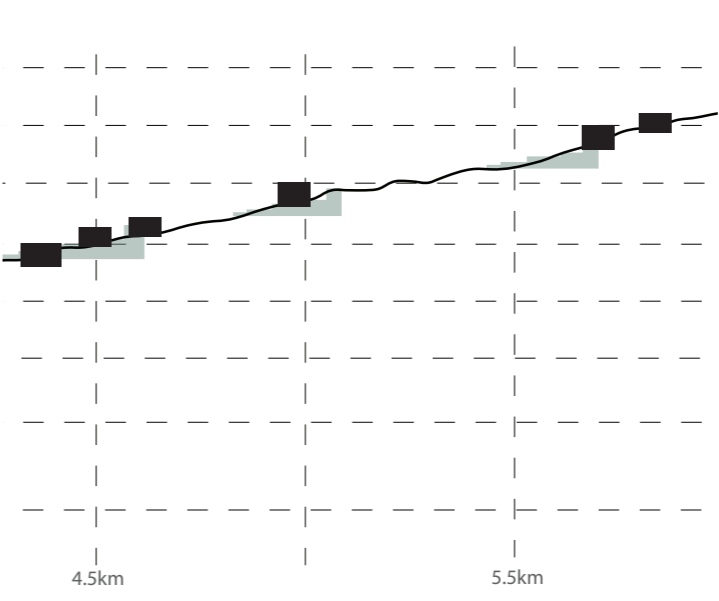
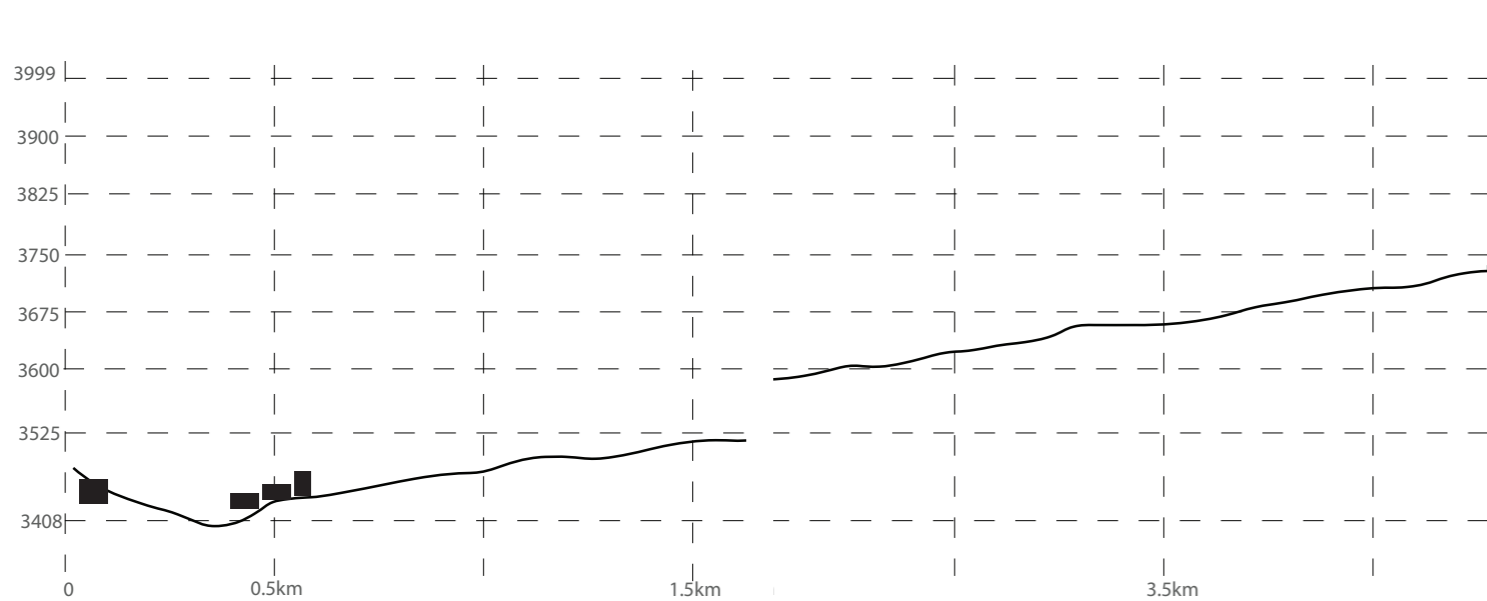
Newly built road leading to lowest part of village

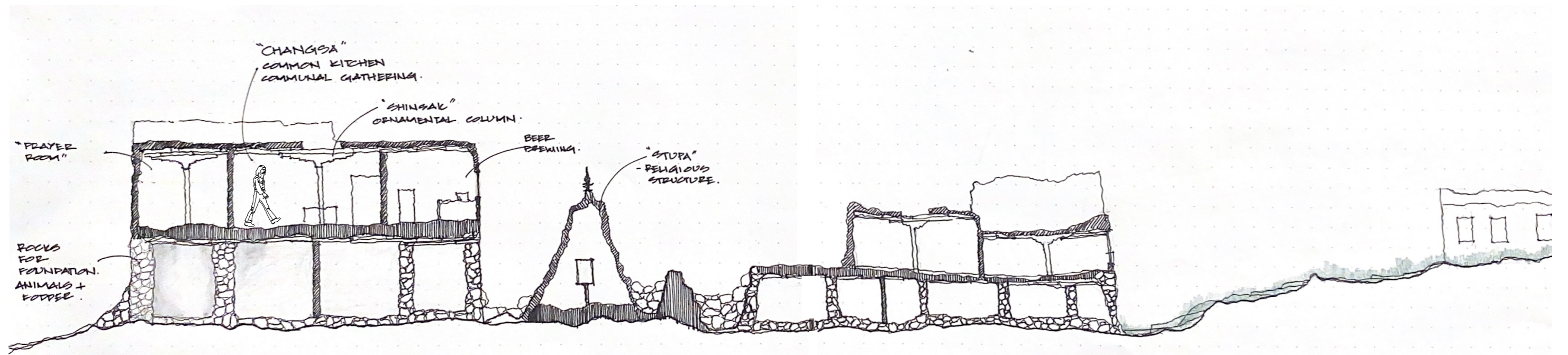


Kulum



Way to Glaciers/Ice stupa





Photographs via self

Basement for cattle, fodder, and granaries

Upper Courtyard where people would potentially get together

Main fireplace room or changisa

Low windows and low heights characterise the spaces and are important to keep warm in the cool months

Prayer rooms are key in every house and timber for ornamentation is used based on economic viability



PRODUCTION SYSTEMS

DEMOGRAPHIC SYSTEMS

LIVING SYSTEMS

**ICE STUPA/ARTIFICIAL
GLACIER**

AGRICULTURE

LOCALS

VISITORS

SPACES FOR LOCALS

SPACES FOR PRODUCE

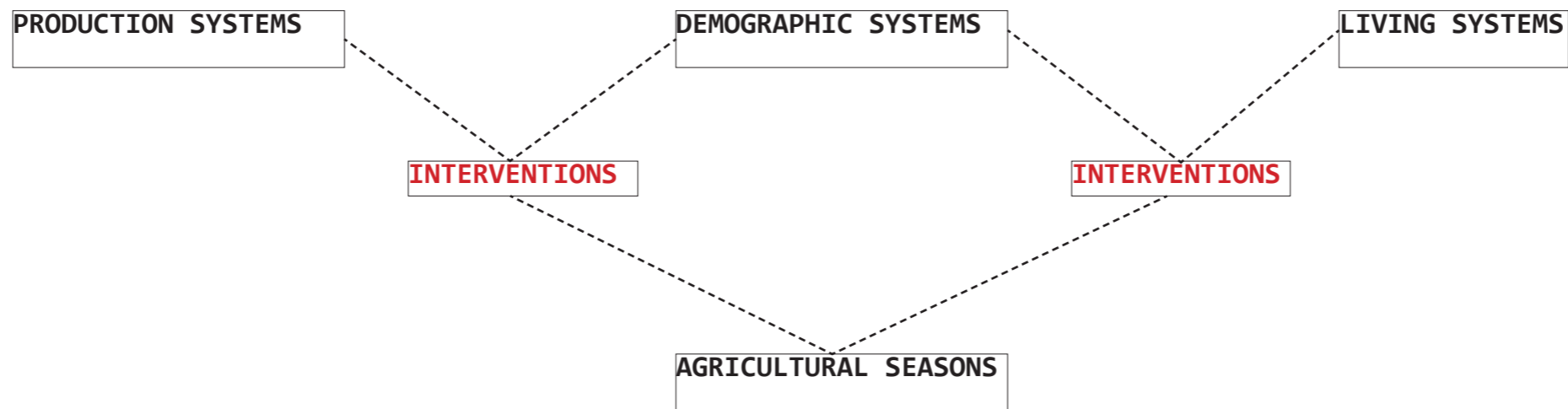
RESEARCHERS

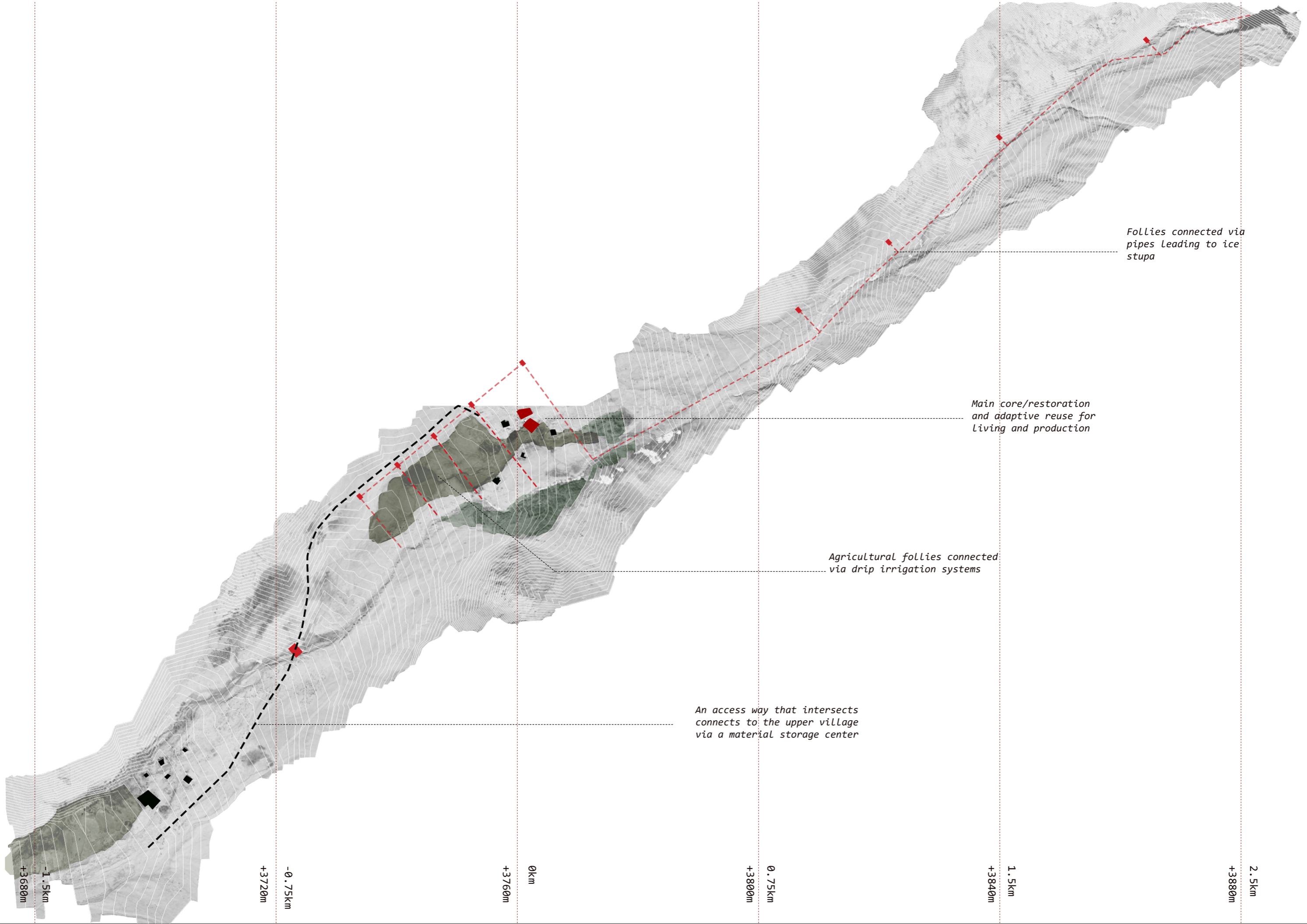
I Context

II Existing Systems and Guiding Forces

III Re-establishing Systemic Relations

- Design Concept
- Site Plan
- Architectural Ideations





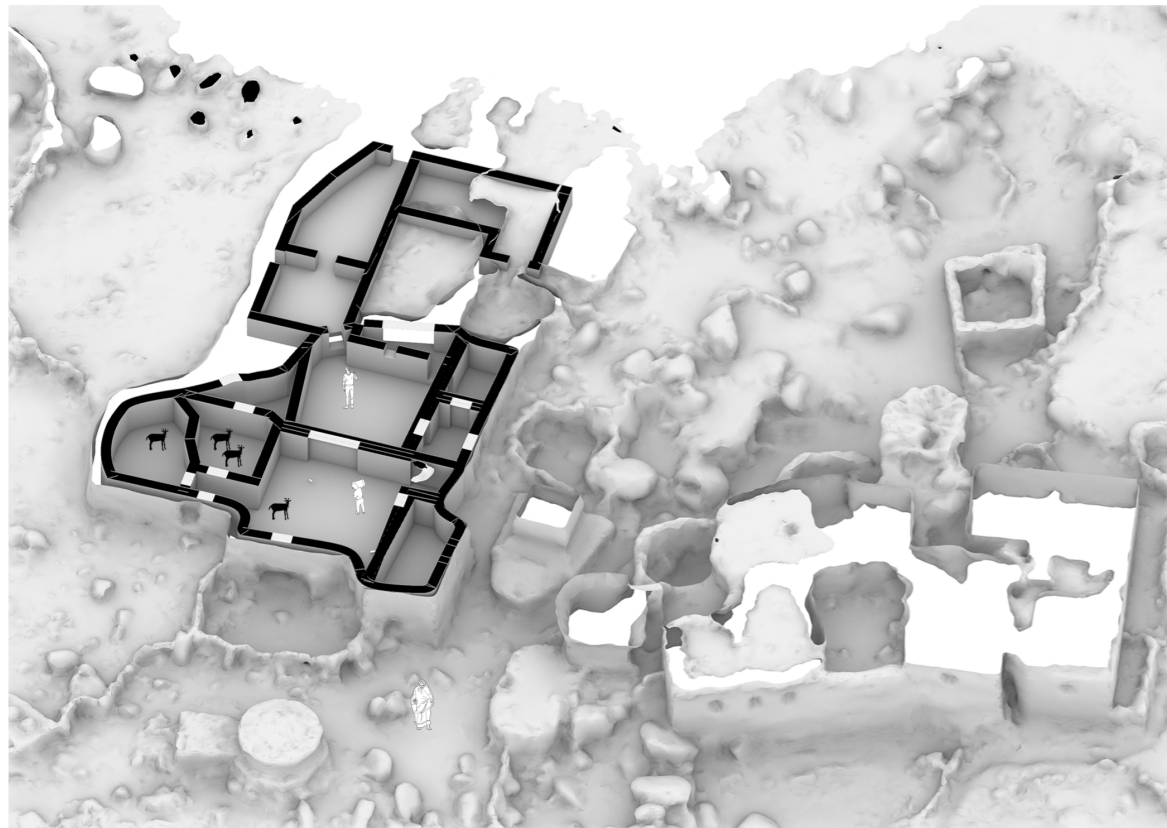
Follies connected via pipes leading to ice stupa

Main core/restoration and adaptive reuse for living and production

Agricultural follies connected via drip irrigation systems

An access way that intersects connects to the upper village via a material storage center

+3680m -1.5km +3720m -0.75km +3760m 0km +3800m 0.75km +3840m 1.5km +3880m 2.5km



COLLECTIVE LIVING

BASEMENT | FOUNDATION | PRODUCTION

Prayer Room

Brewing Rooms

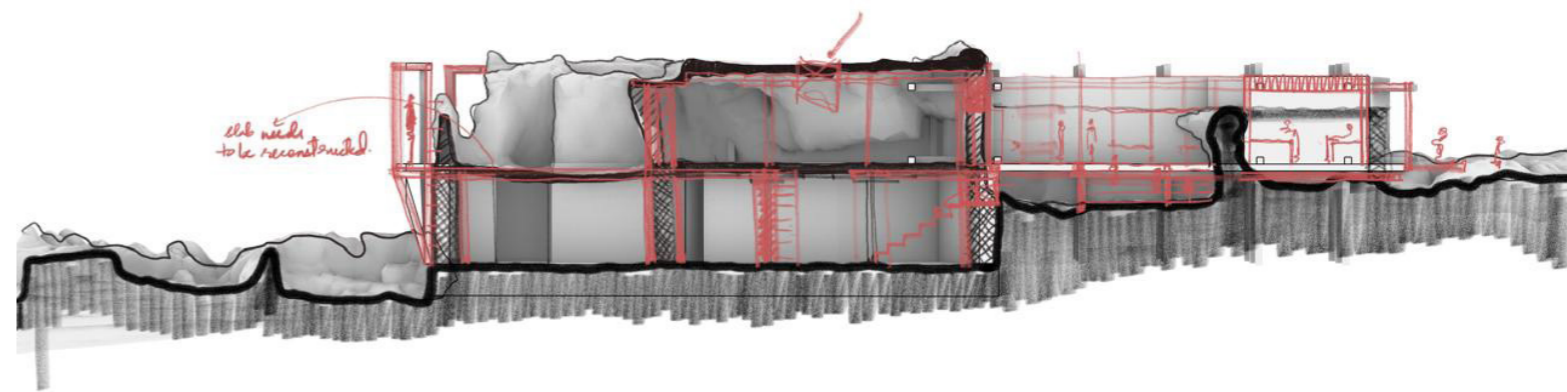
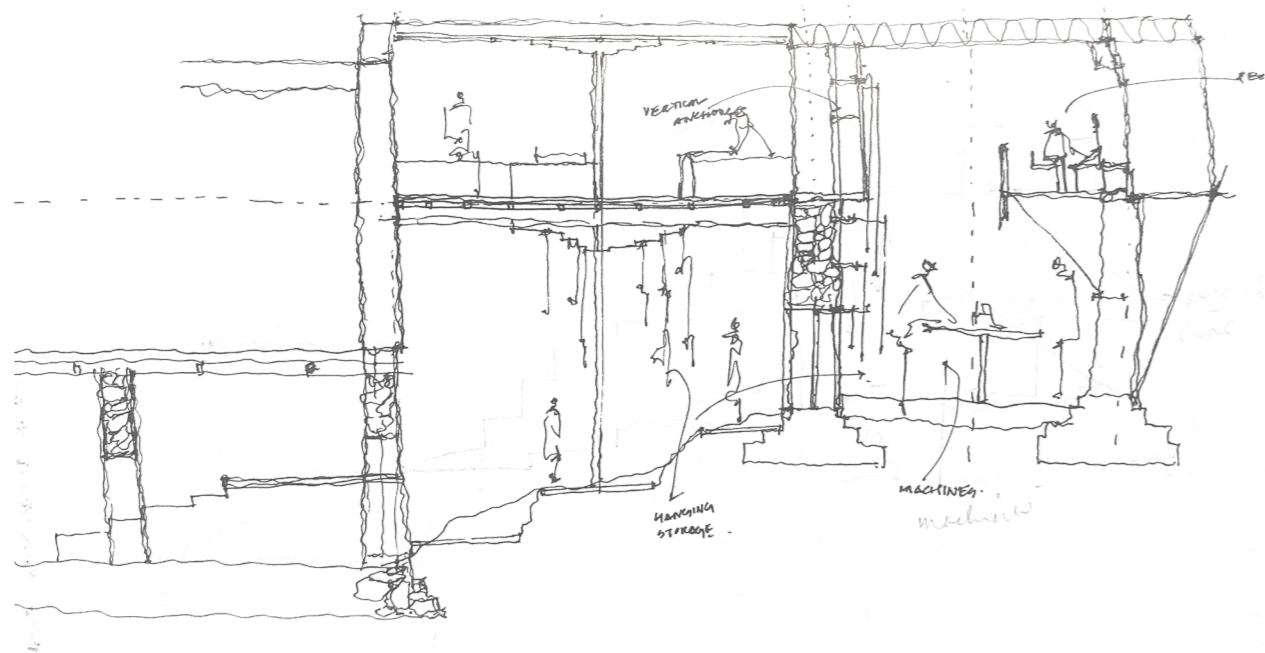
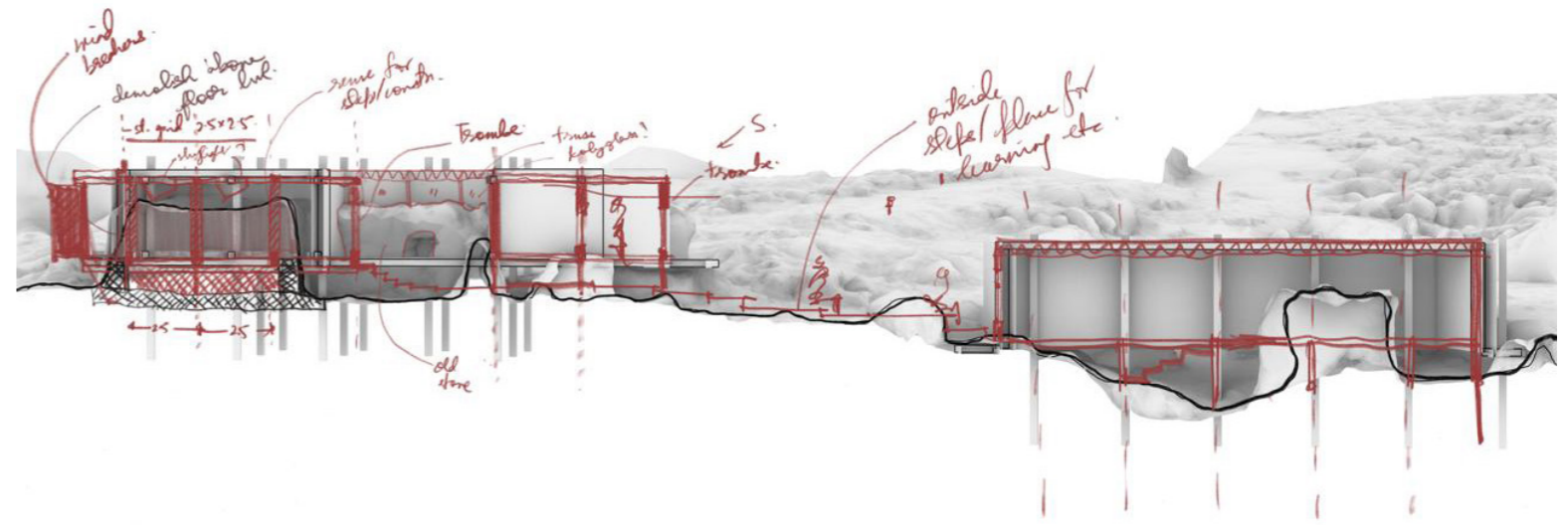
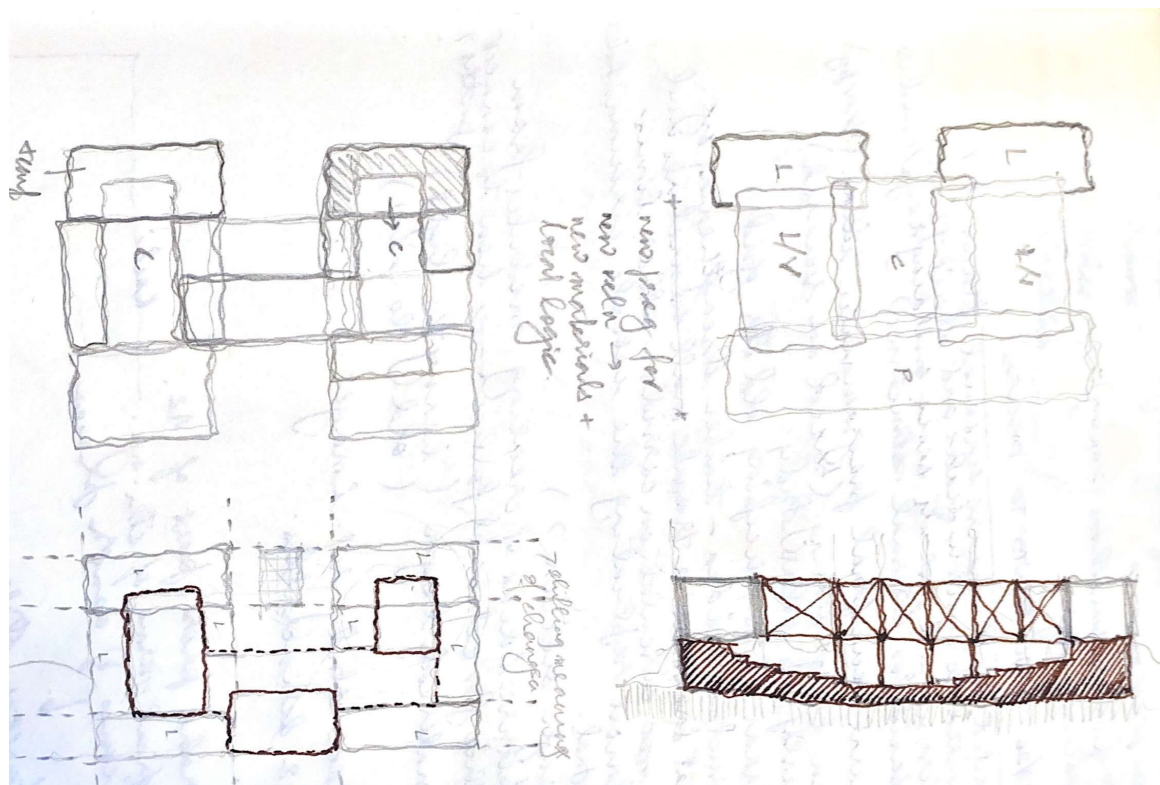
Central Living Room/Chansa

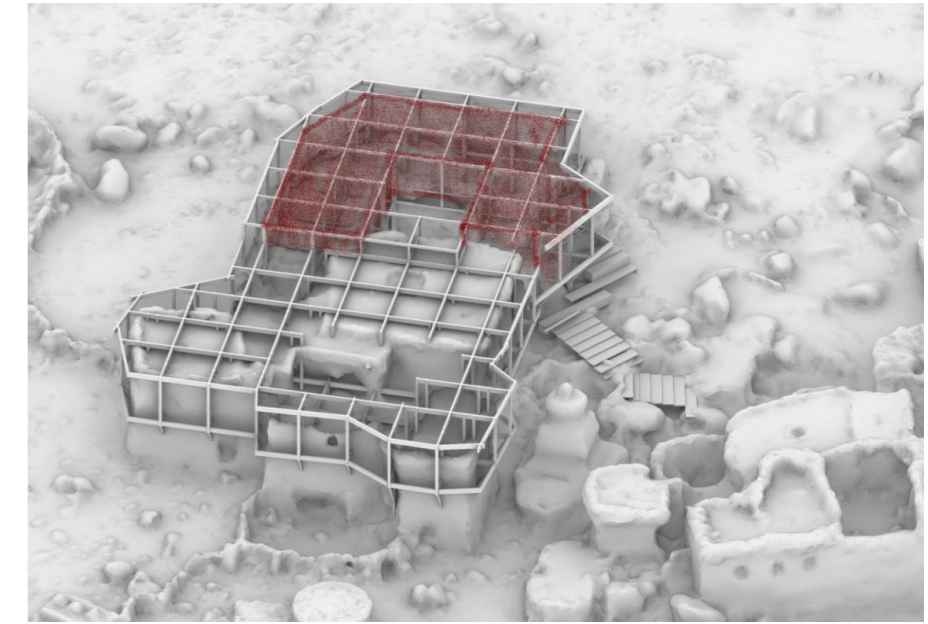
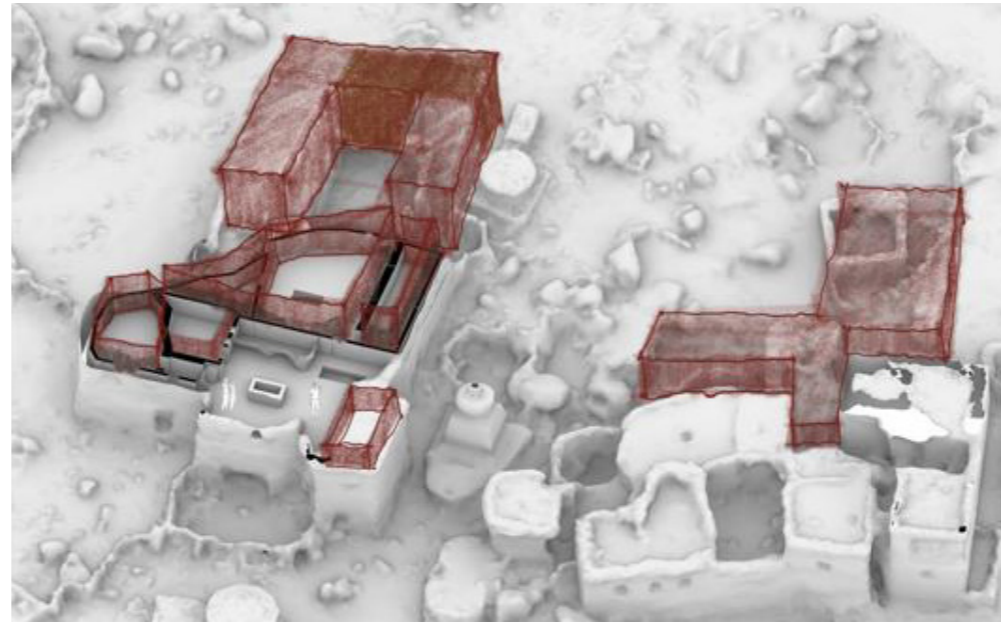
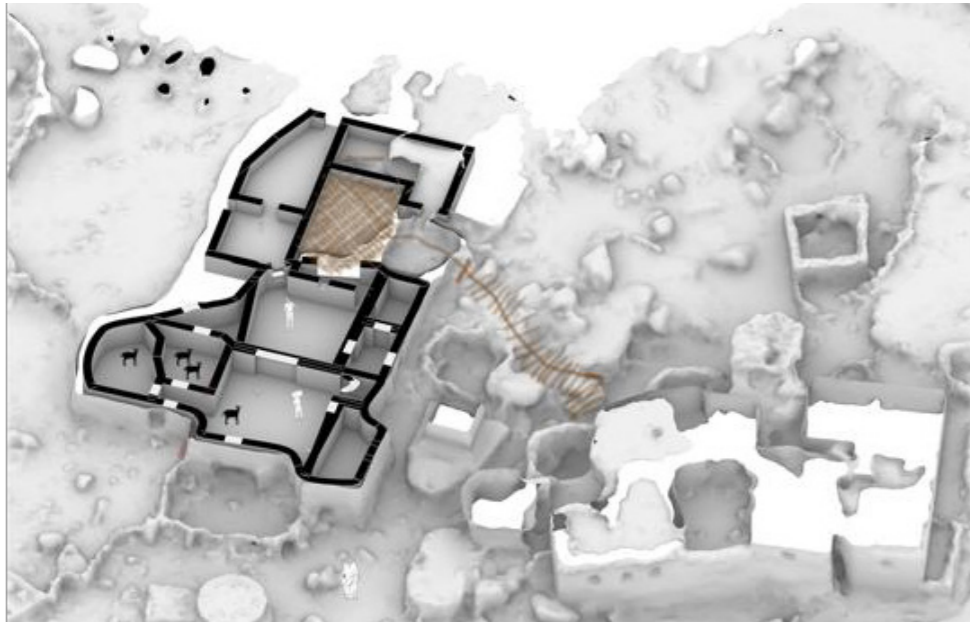
Sleeping Rooms

Cattle

Granaries

Agricultural Sorting Spaces





BASEMENT | FOUNDATION | PRODUCTION

COLLECTIVE LIVING

CIRCUMAMBULATION CORRIDOR

Cattle

Granaries

Agricultural
Sorting Spaces

Prayer Room

Brewery

Central Living
Room/Chansa

Sleeping Rooms

Climate Comfort

Structural Reinforcement

Ice Stupa
Production
Space

Library

Changsa

School and-
community
Space

Courtyard/
interactive
Learning

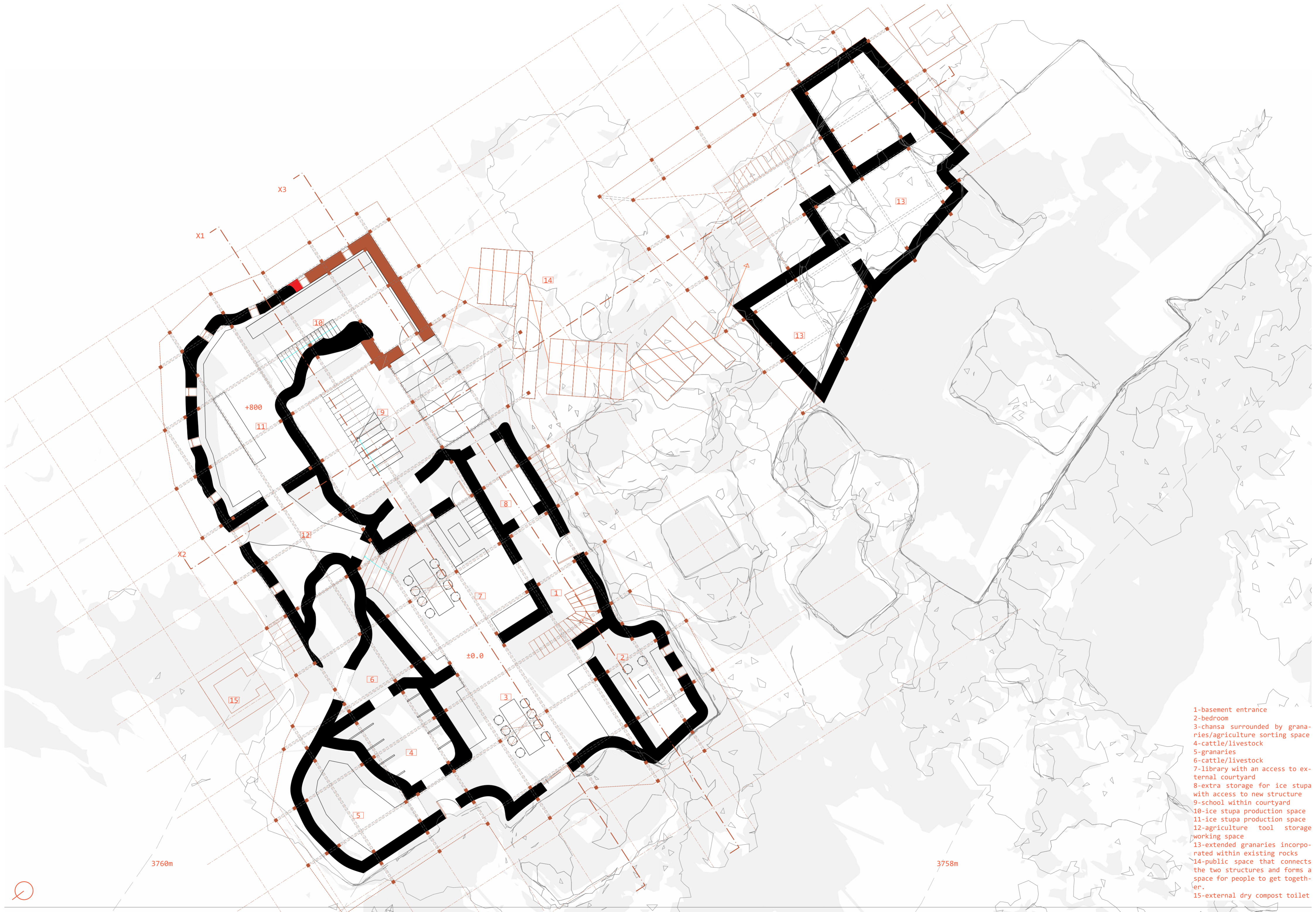
I Context

II Existing Systems and Guiding Forces

III Re-establishing Systemic Relations

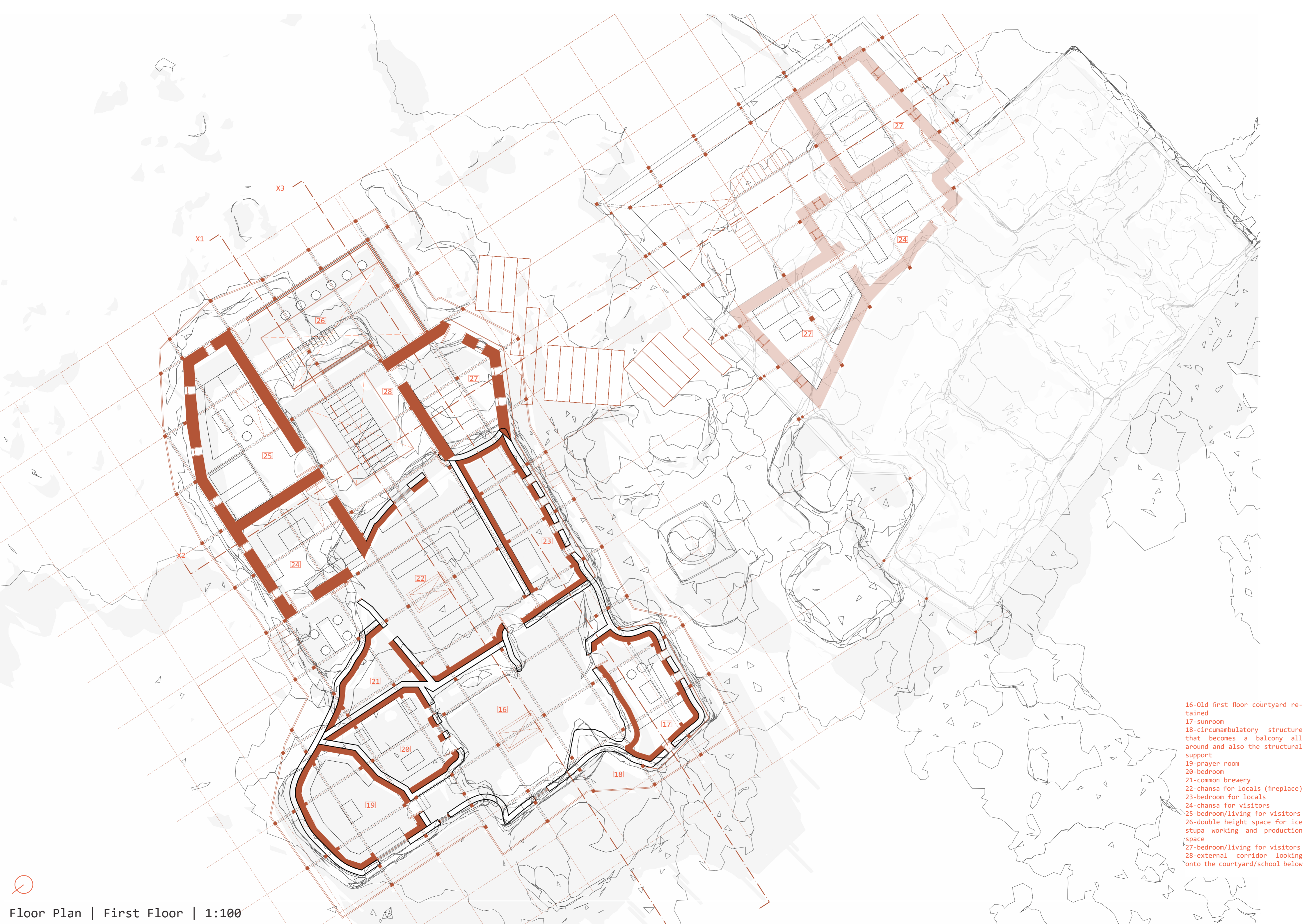
IV Architectural Interventions

- Floor Plans
- Sections
- Elevations
- Construction Details
- Construction Process
- Final Visualization

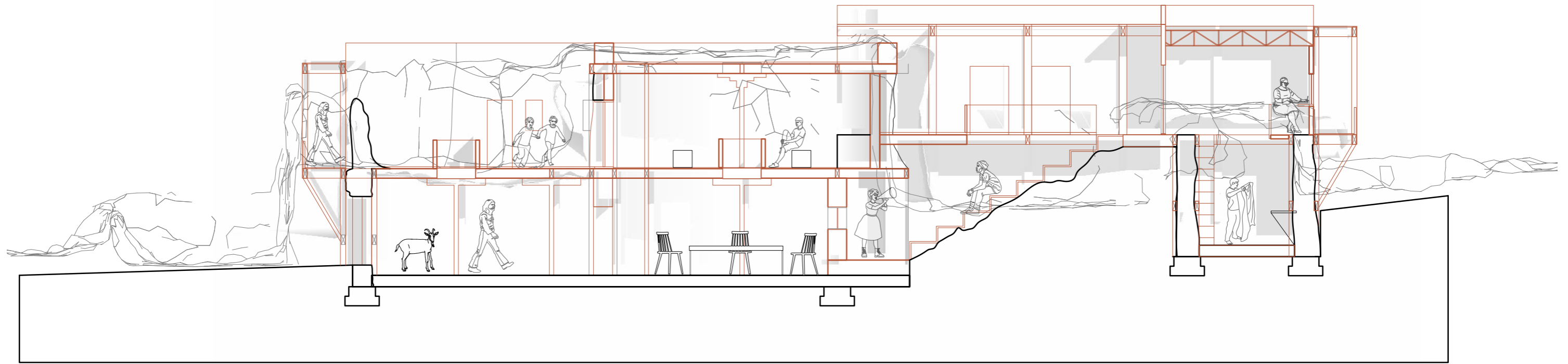


- 1-basement entrance
- 2-bedroom
- 3-chansa surrounded by granaries/agriculture sorting space
- 4-cattle/livestock
- 5-granaries
- 6-cattle/livestock
- 7-library with an access to external courtyard
- 8-extra storage for ice stupa with access to new structure
- 9-school within courtyard
- 10-ice stupa production space
- 11-ice stupa production space
- 12-agriculture tool storage working space
- 13-extended granaries incorporated within existing rocks
- 14-public space that connects the two structures and forms a space for people to get together.
- 15-external dry compost toilet

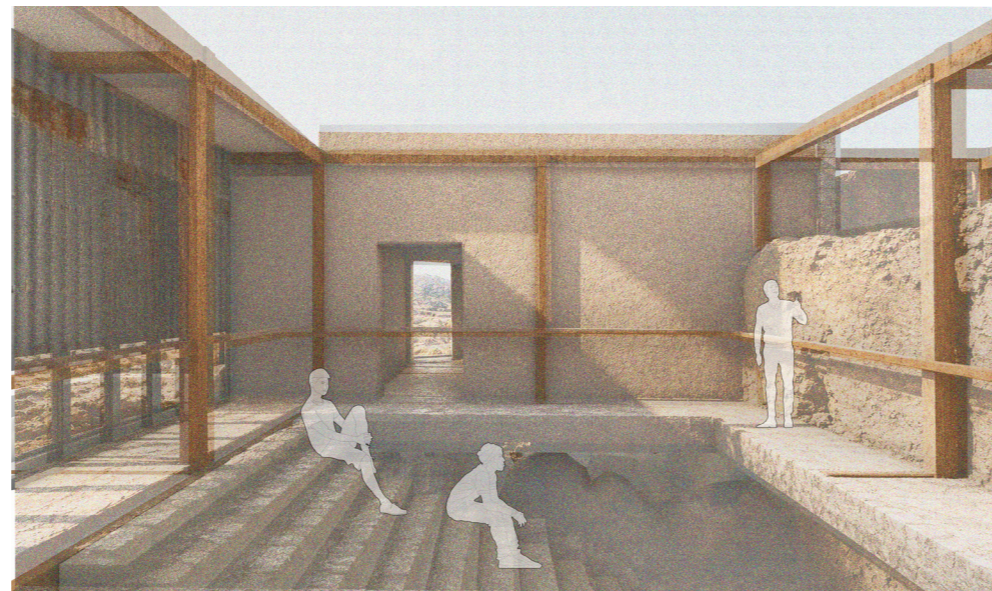


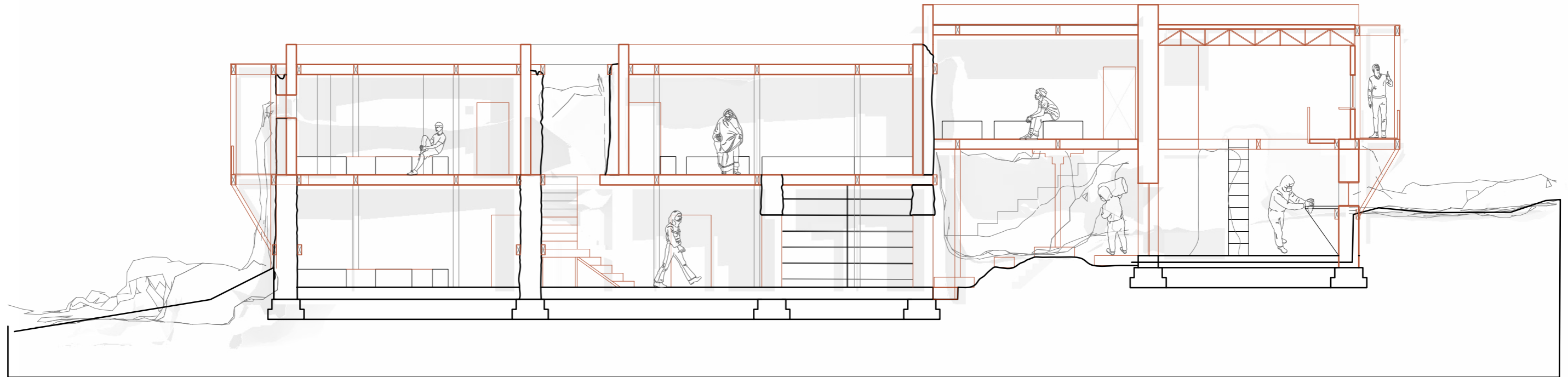


- 16-Old first floor courtyard re-tained
- 17-sunroom
- 18-circumambulatory structure that becomes a balcony all around and also the structural support
- 19-prayer room
- 20-bedroom
- 21-common brewery
- 22-chansa for locals (fireplace)
- 23-bedroom for locals
- 24-chansa for visitors
- 25-bedroom/living for visitors
- 26-double height space for ice stupa working and production space
- 27-bedroom/living for visitors
- 28-external corridor looking onto the courtyard/school below



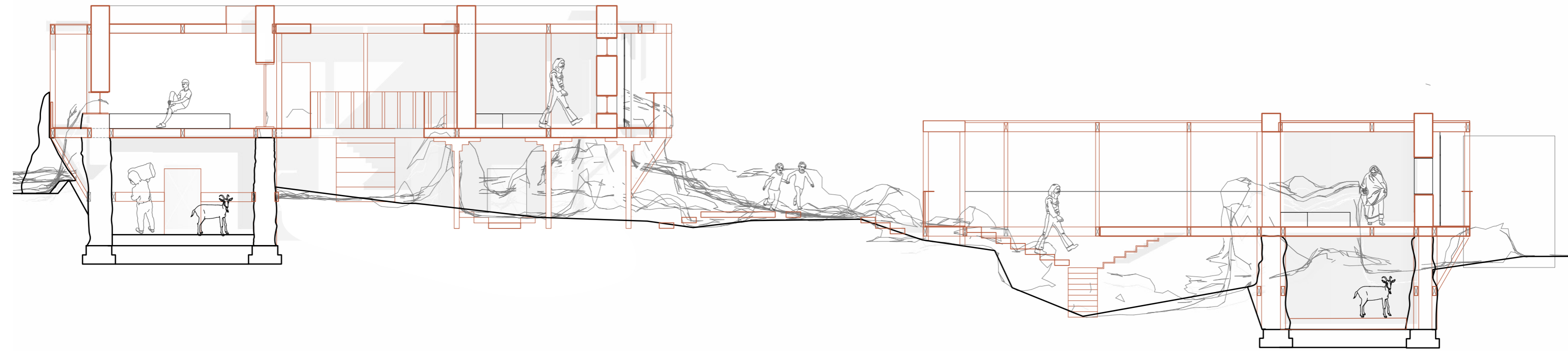
Using the existing basement to re-establish new links between production and living. The intersections between these new archetypes create a space for learning or interaction—a vocational school for locals that could be taught by volunteers thus ensuring increased self-reliance. The architectural language changes toward the ice stupa production spaces by using material that redefine the vernacular.



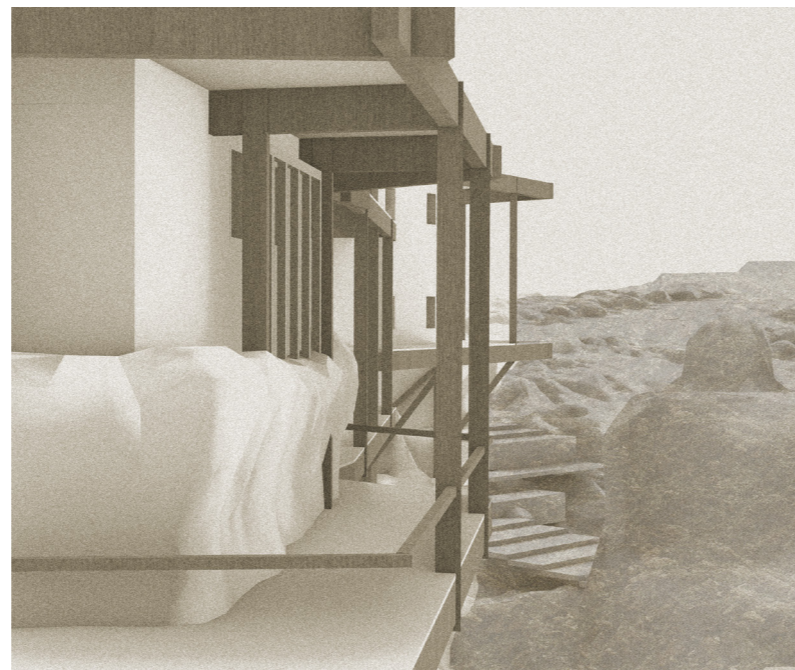


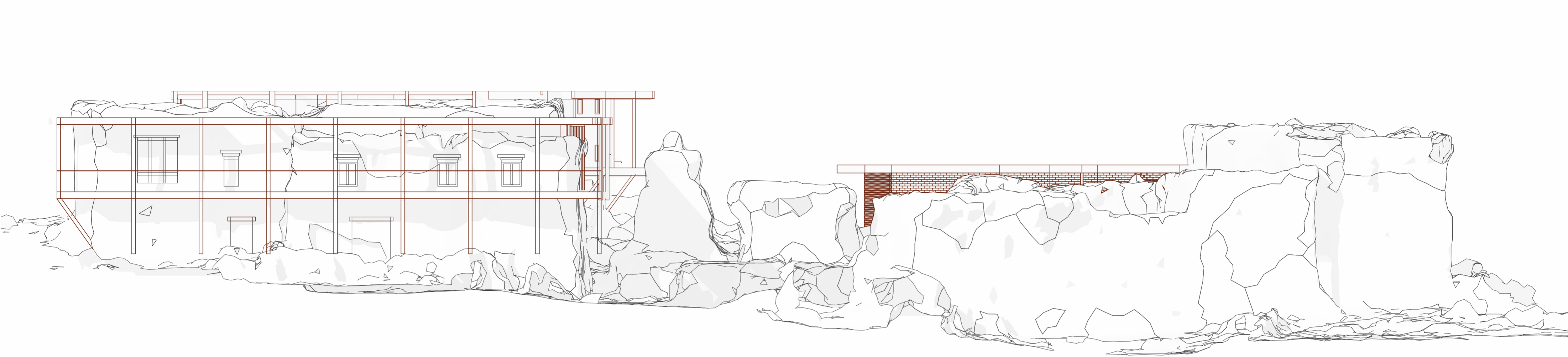
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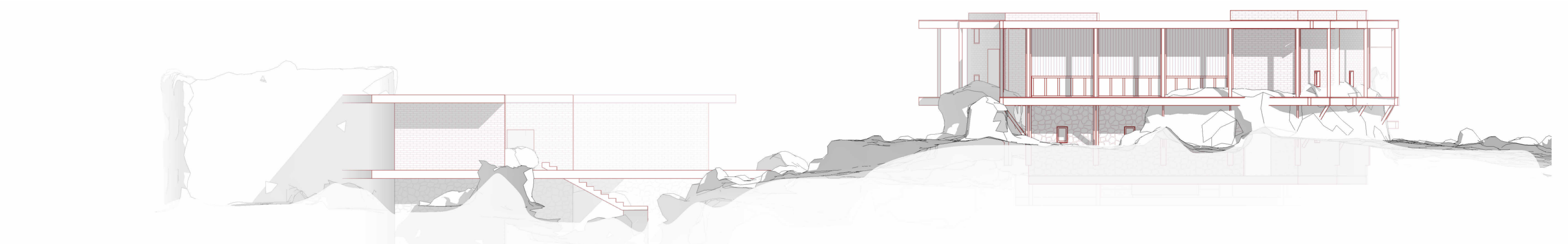


An exterior pathway is created that forms a public congregation space for many community events that take place around agricultural seasons. This is built from rough stones sourced locally that blend with the landscape and go around the religious stupa without interrupting the movements

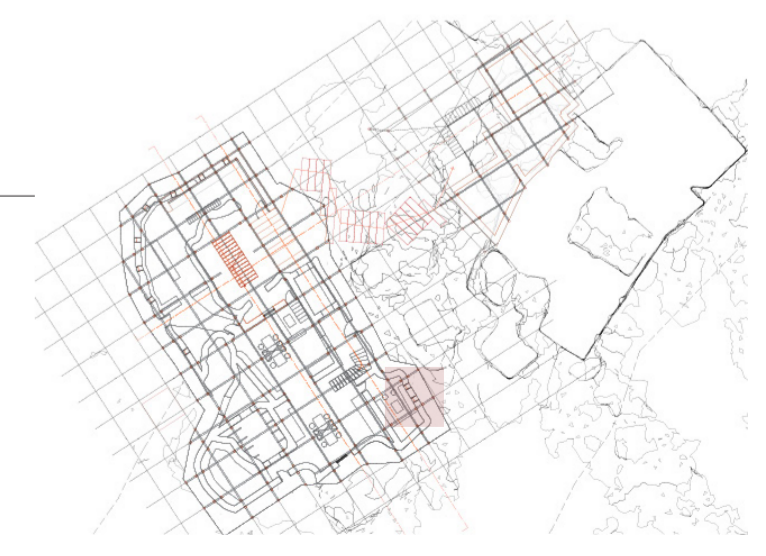
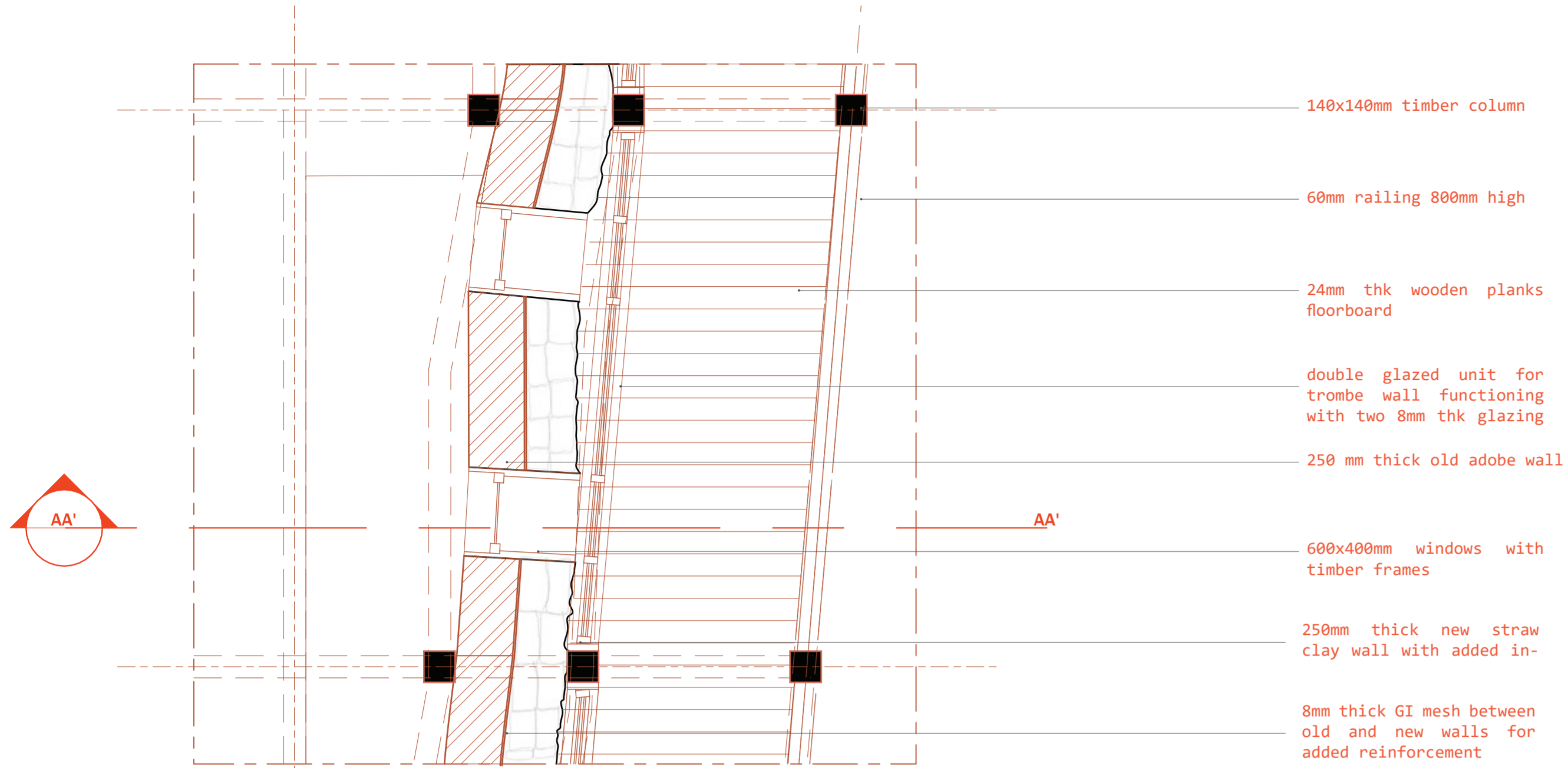


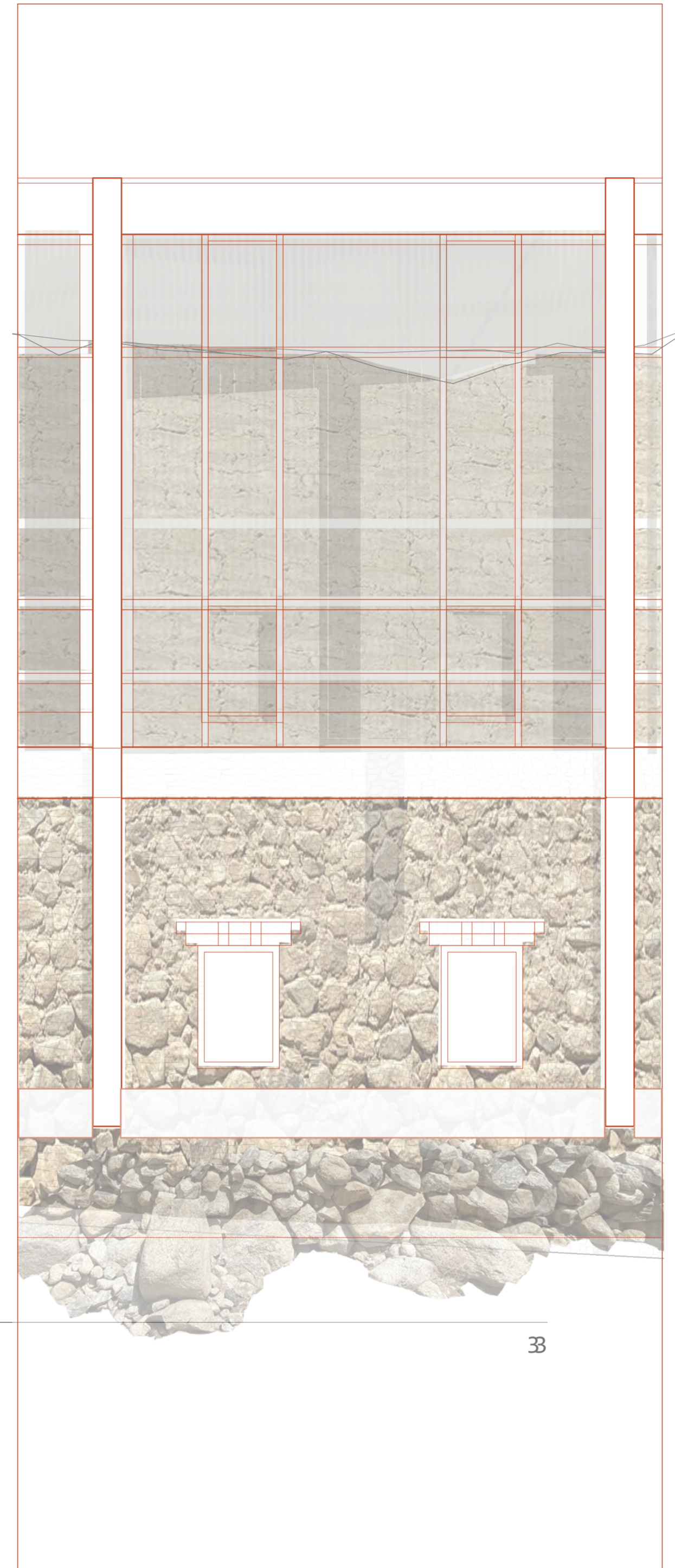
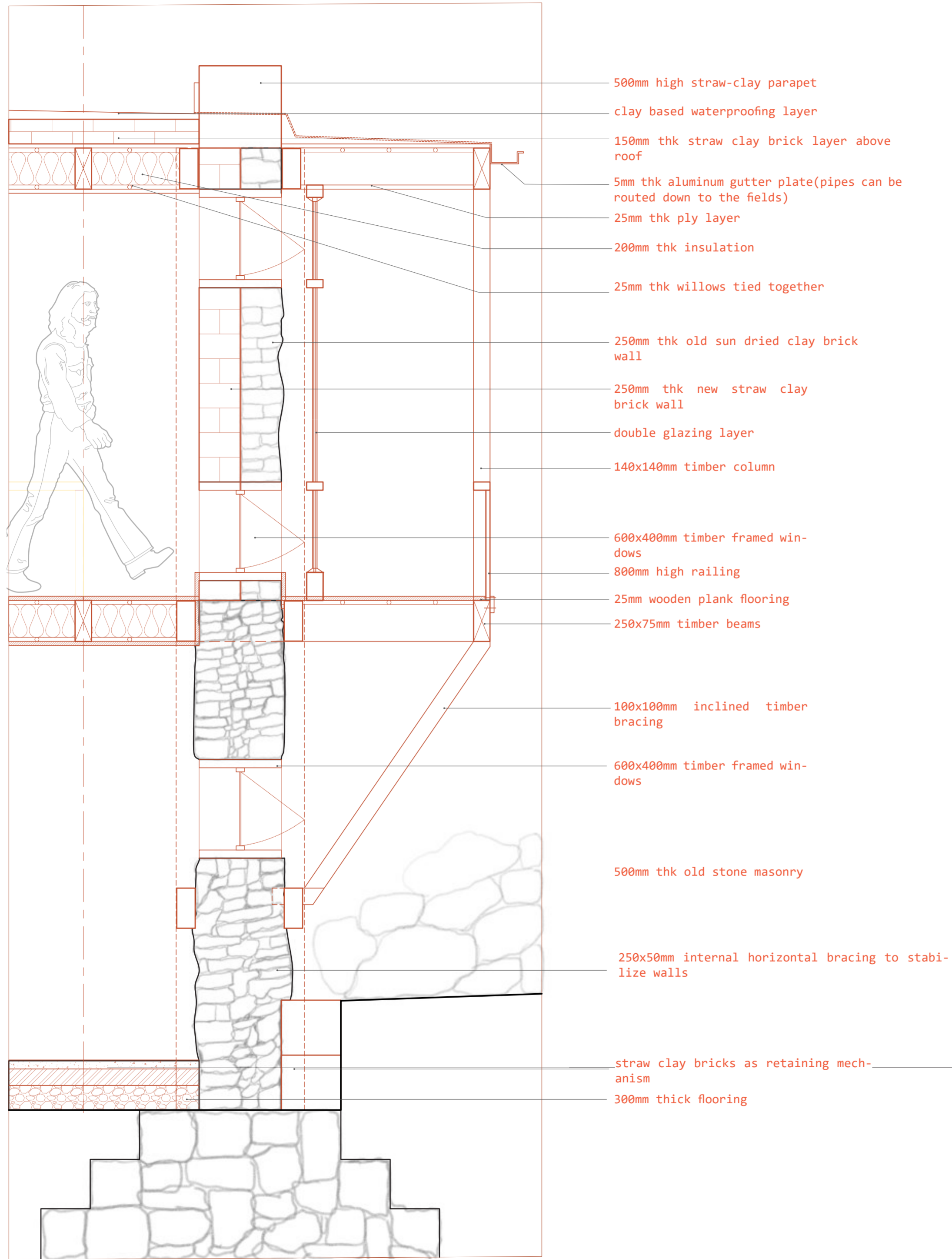


Front Elevation



Rear Elevation





Satellite image of site via Google Earth



Riverine Rocks from the Glacial Stream 1-2km

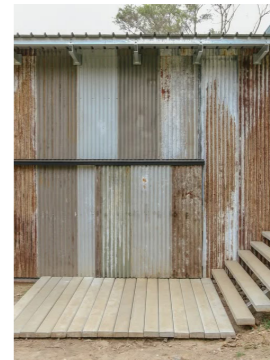
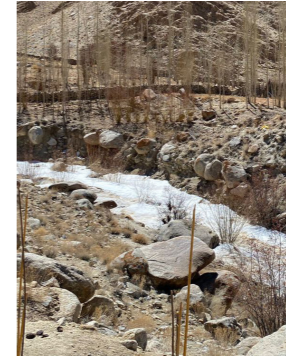
Clay from surrounding mountains 1-4km

Willow and Poplar from the site 1-2km

Straw waste from farm waste from nearby villages 6-20km

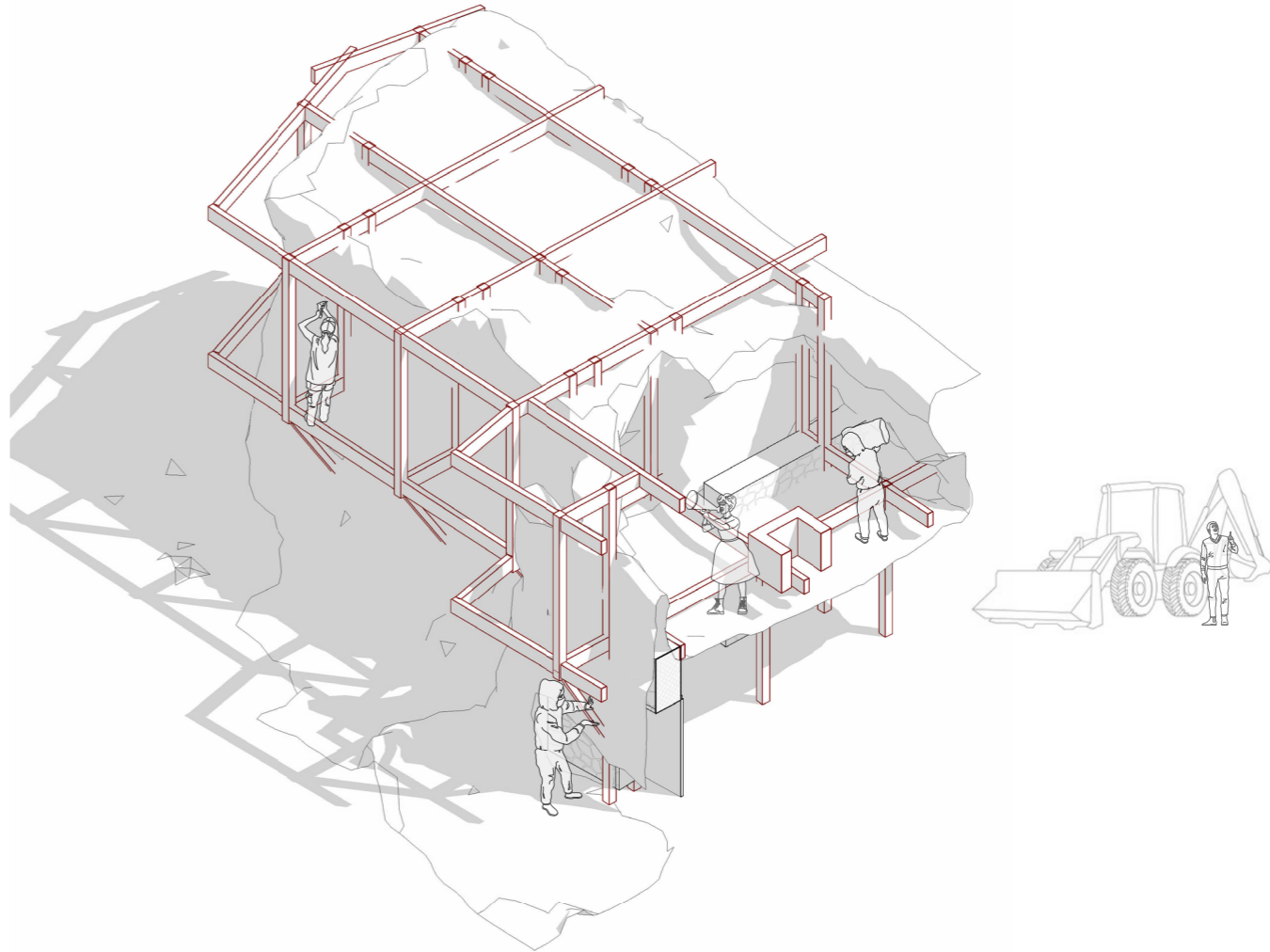
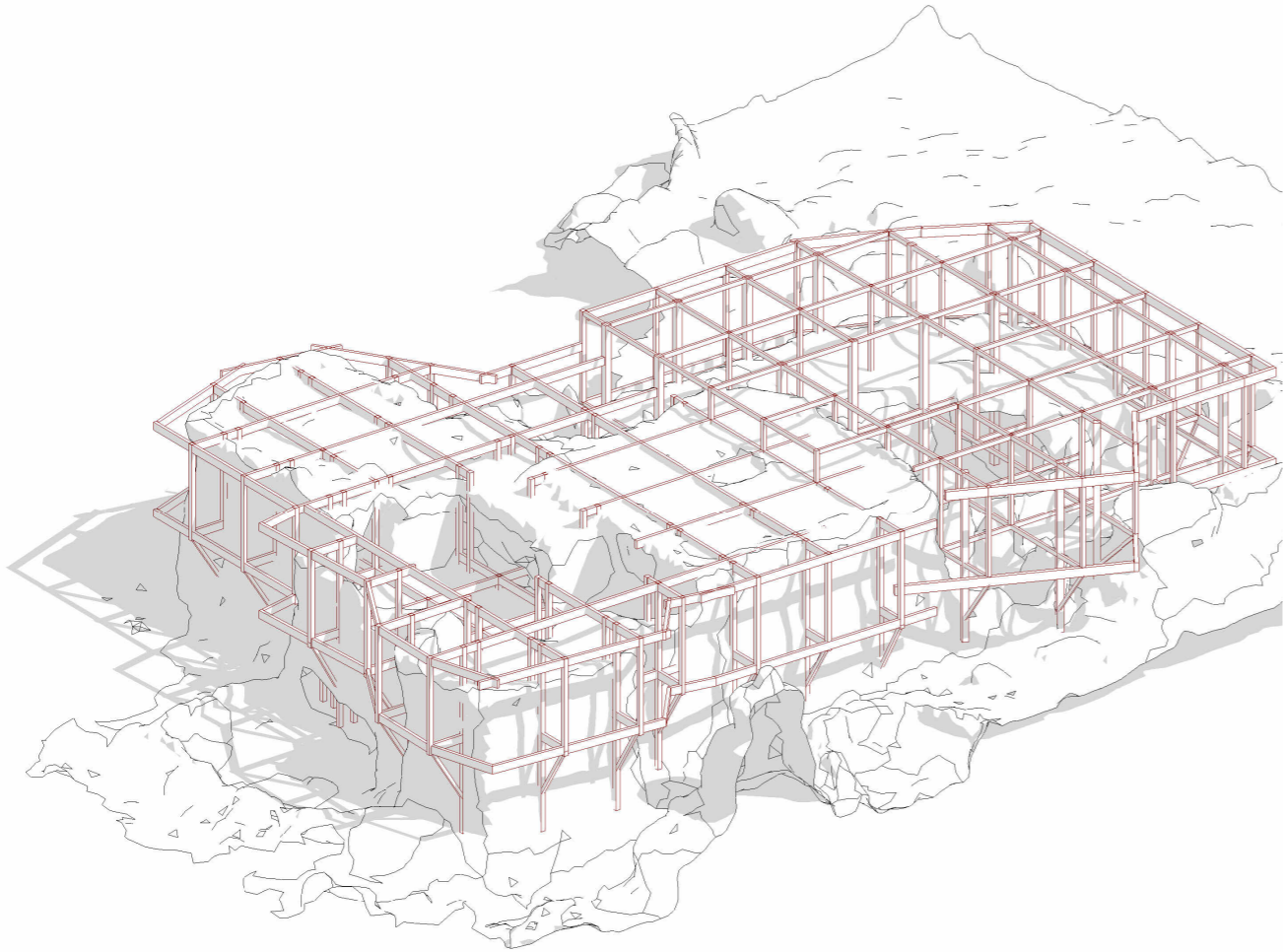
Metal Waste from Military Camps~7-30km

Timber from Kashmir and surrounding states

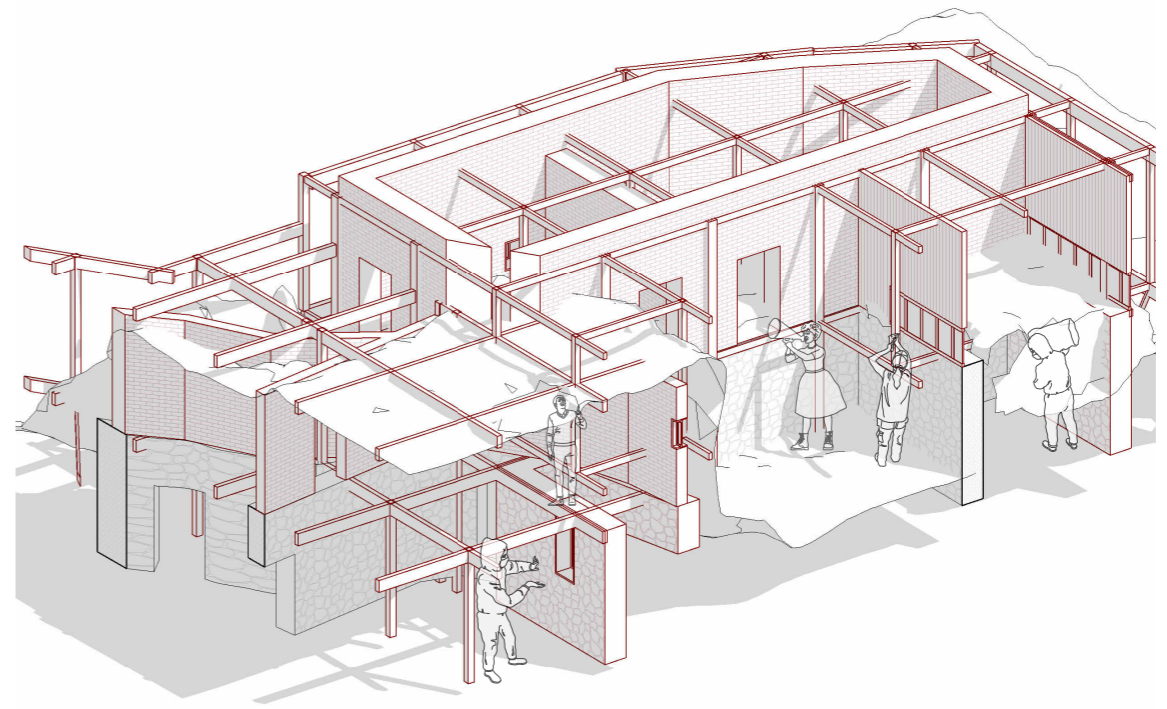
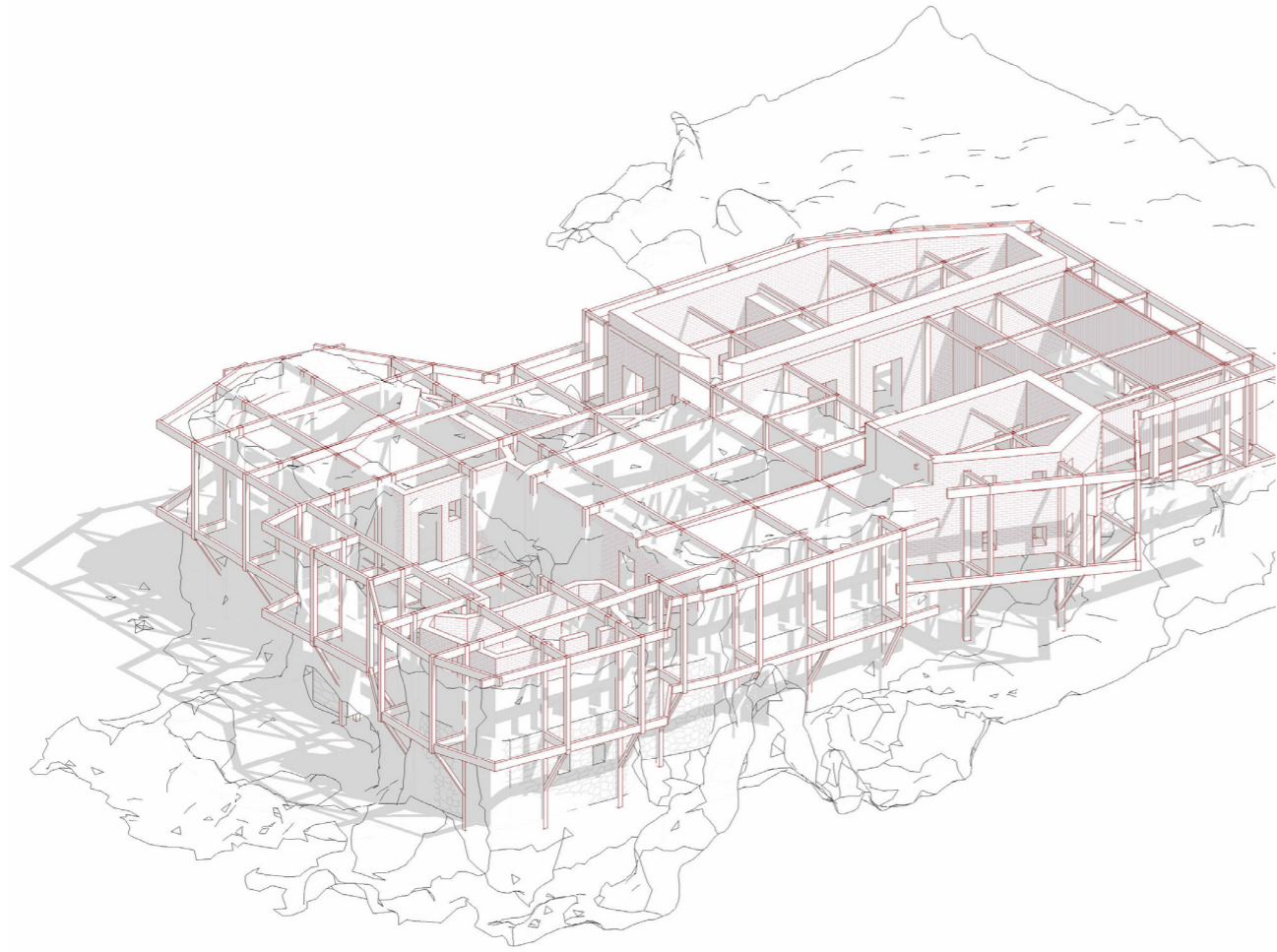


Material sourcing and preparation photos via self

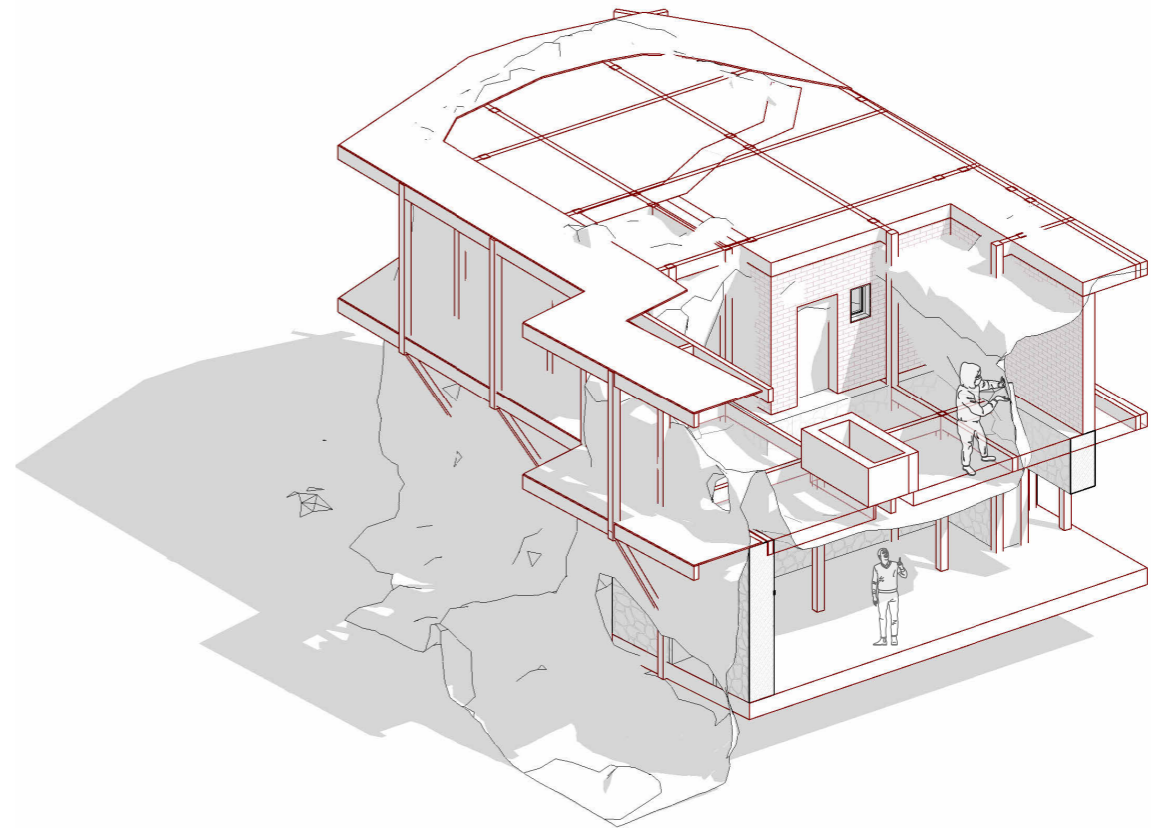
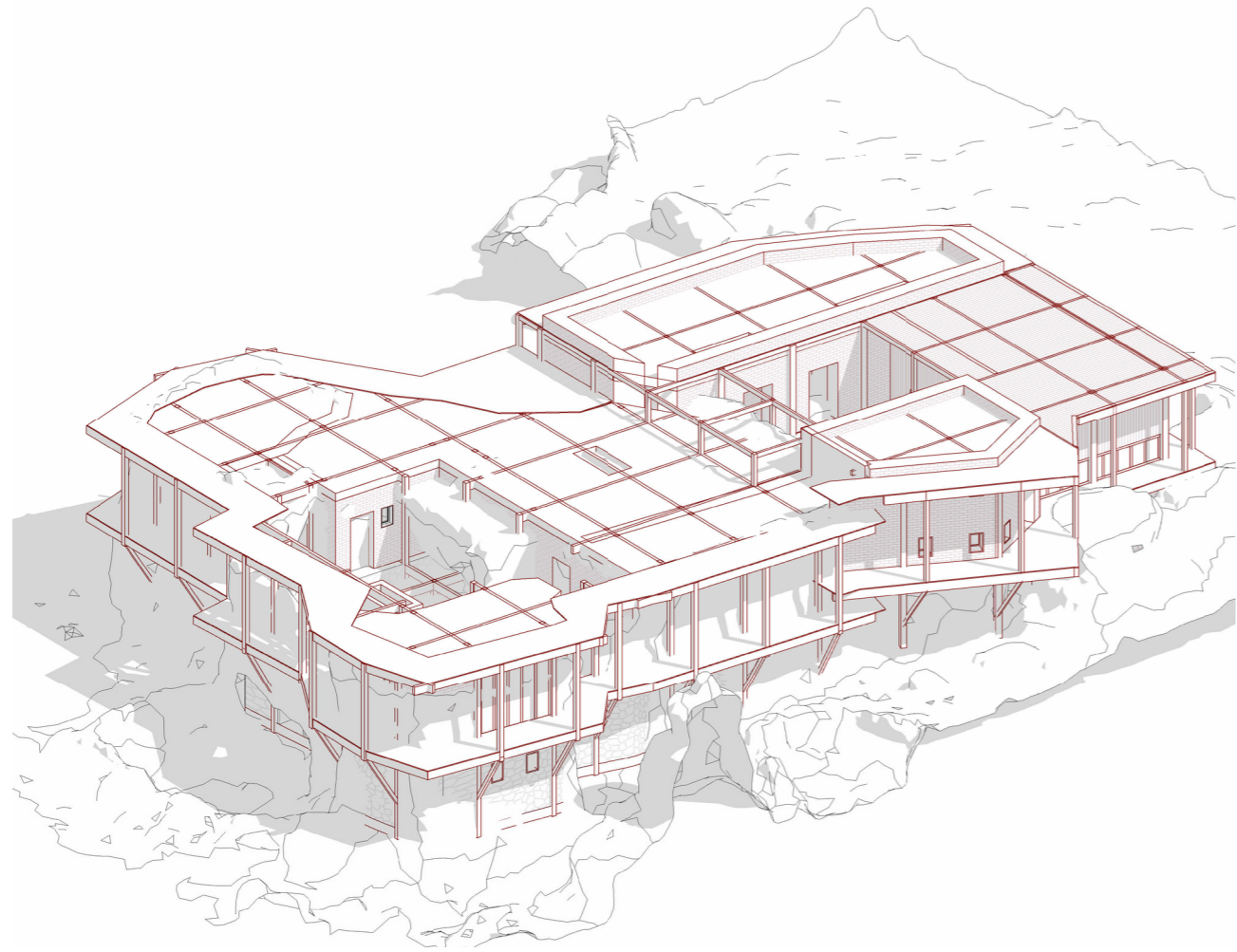
One summer before construction season is a good time for taking stock of materials and preparing them. This would mean riverine rocks from the glacial stream, clay from the surrounding mountains, straw from farm waste, timber from surrounding states, metal waste from military camps etc.



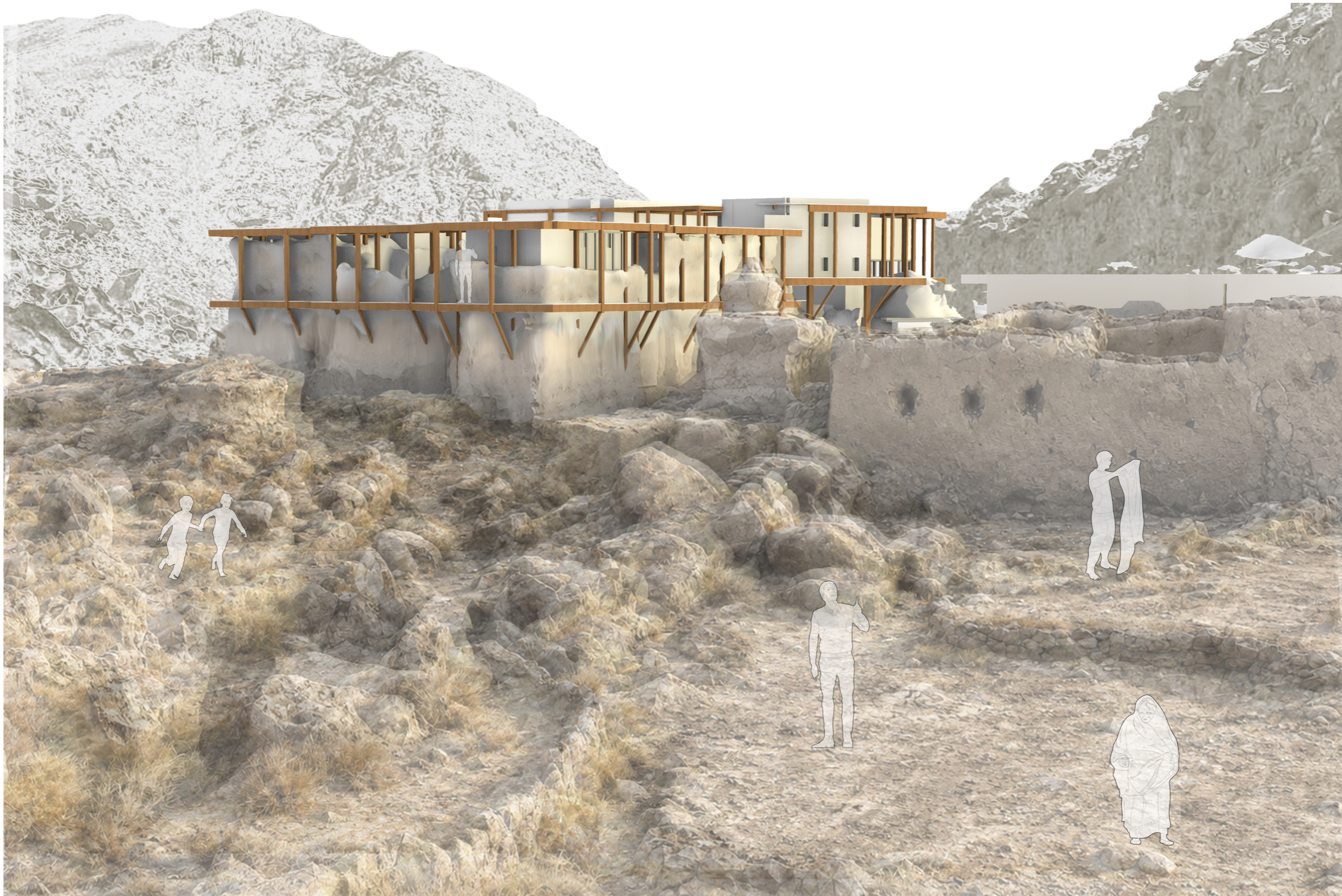
Timber from Kashmir cut and prepared / Structural footprint laid out/ Walls Strengthened/Slabs Demolished



Add new walls to the old structure and additional walls to the new structure

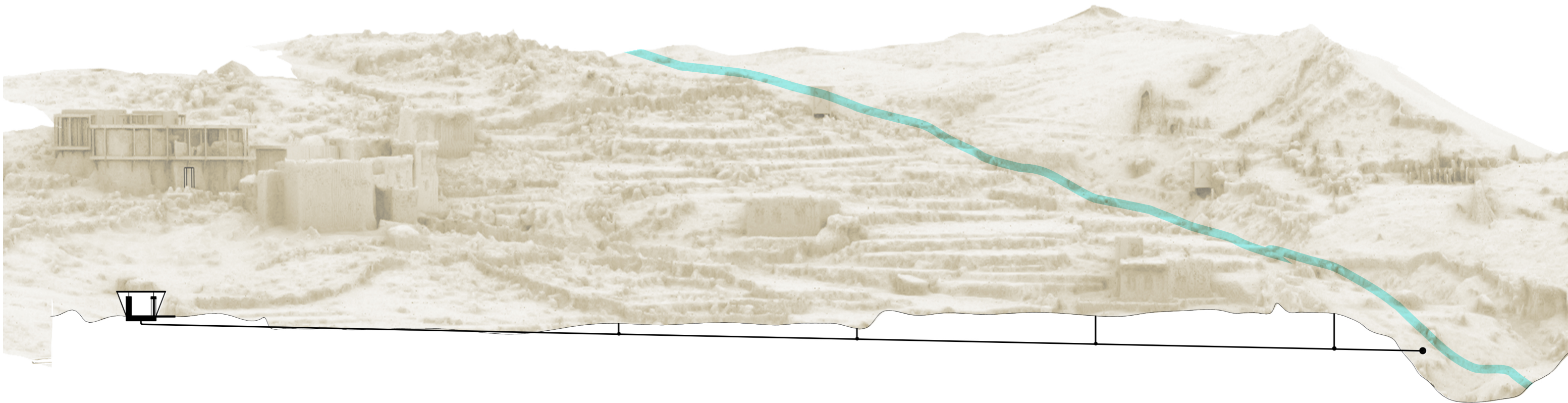


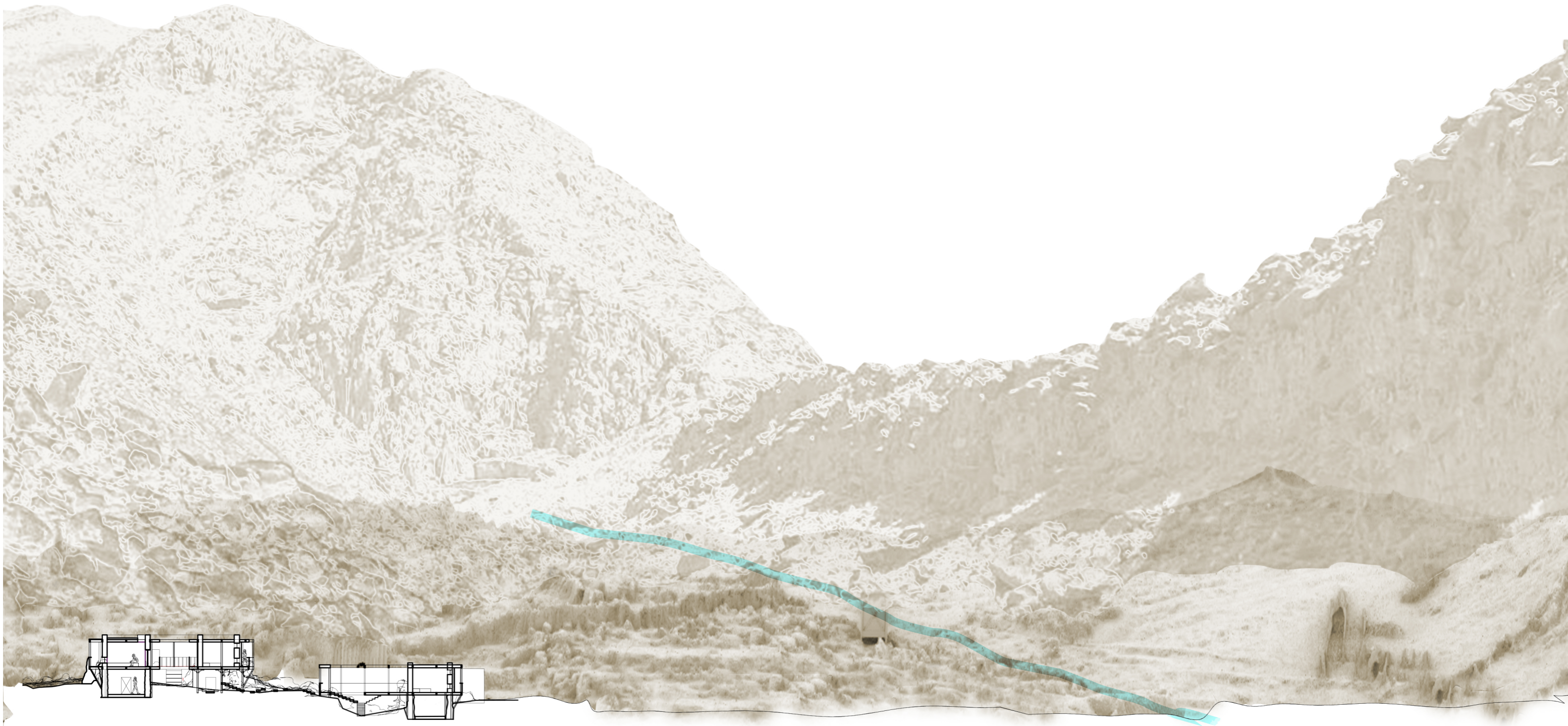
Adding floor slabs/ Final Touches/ Preparing for a new communal winter celebrating fresh beginnings

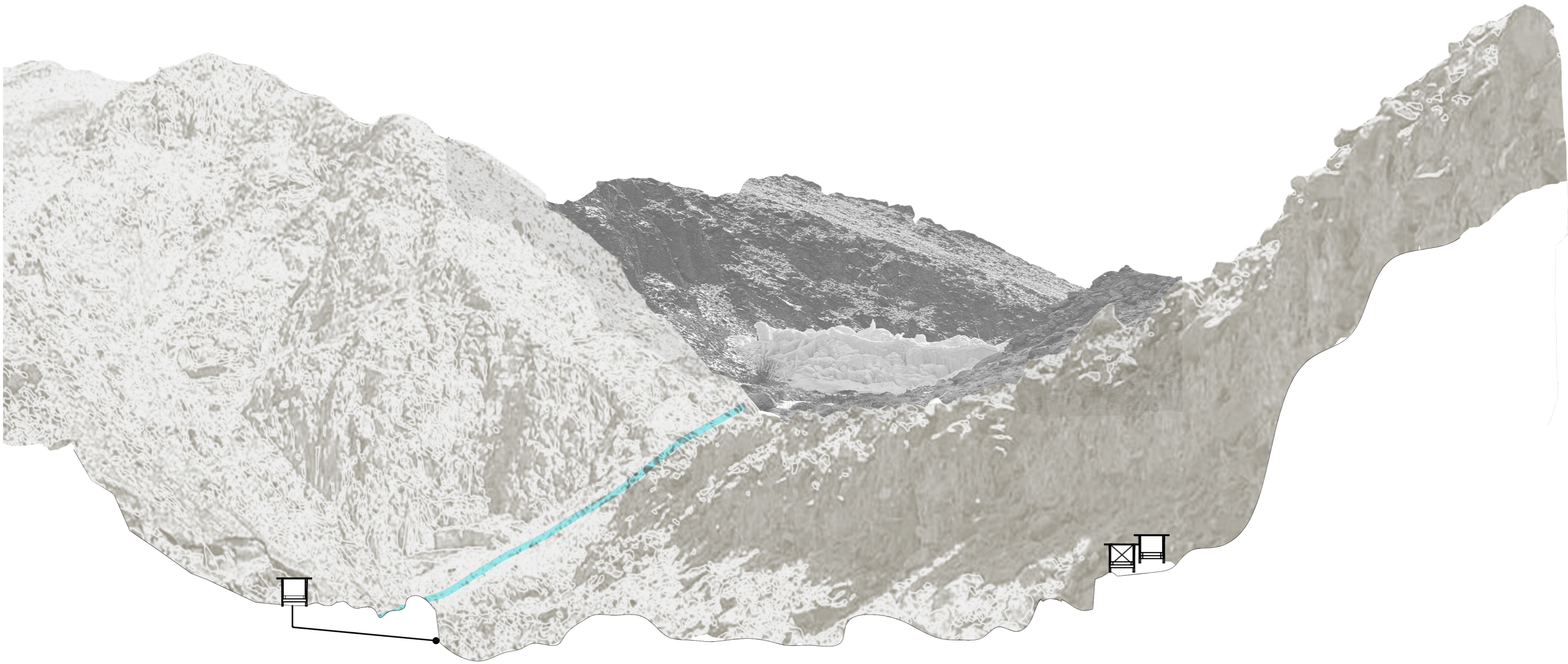


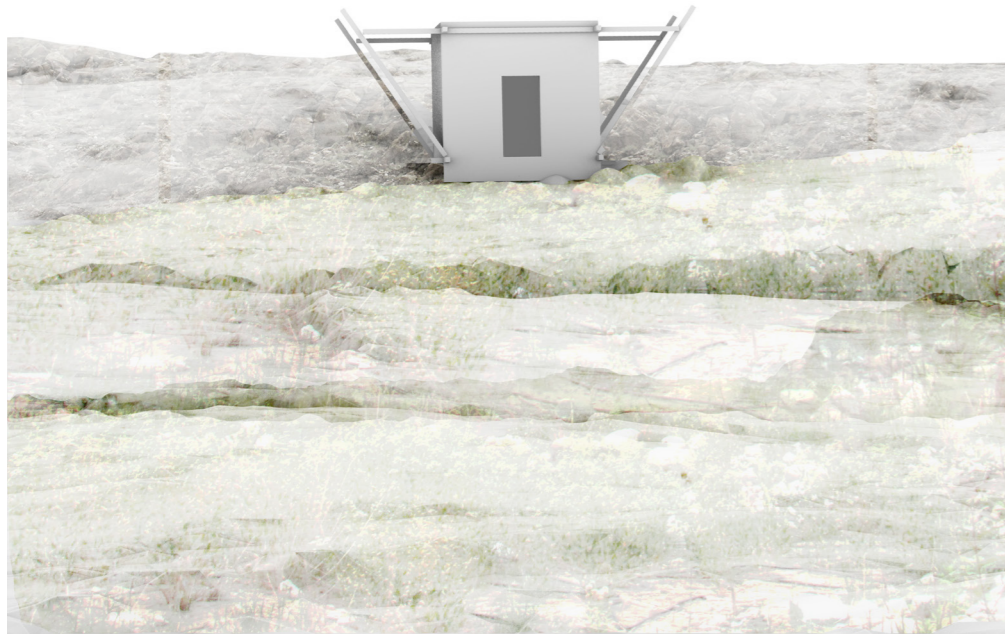
Various communities coming together for celebrating renewed homes and spaces

Scenes from the first step of construction





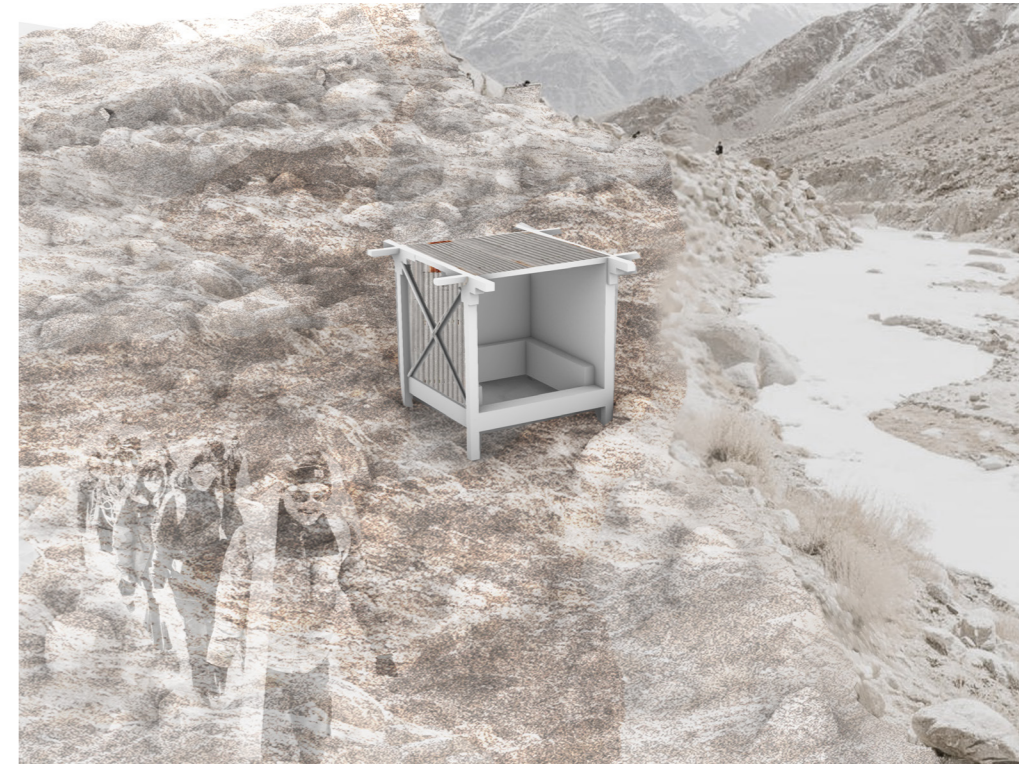




Agricultural follies supporting different agricultural stages through common granaries, infrastructural support and a place for farmers to halt in the hectic cultivation season



The core living and production space that becomes a prototype for restoring ever-evading links between production and living. The follies are spatial extractions of the same.



Follies leading up to the ice stupa and becoming much needed resting and storage spots to aid labor intensive construction processes especially during winters when the daylight hours are minimal.

I Context

II Existing Systems and Guiding Forces

III Re-establishing Systemic Relations

IV Architectural Interventions

V Reflections



Kulum has gained increasing amounts of attention since I last worked on the site especially because of the ice stupa. But this design process through explore lab has allowed me to deeply investigate a vernacular that is unique in the way it molds itself to the harsh terrain. These are vital knowledge systems that are being lost as they are only recorded within the walls of these communities. Therefore, in the face of climate change and our fast paced modern times, it becomes ever so critical to not only architecturally restore but create an integrated restoration framework that ties landscape, production and living together.