# *‘Transhumance’*

*Year round farm: a research into the revival of the alpine farming life in the Western Italian Alps.*

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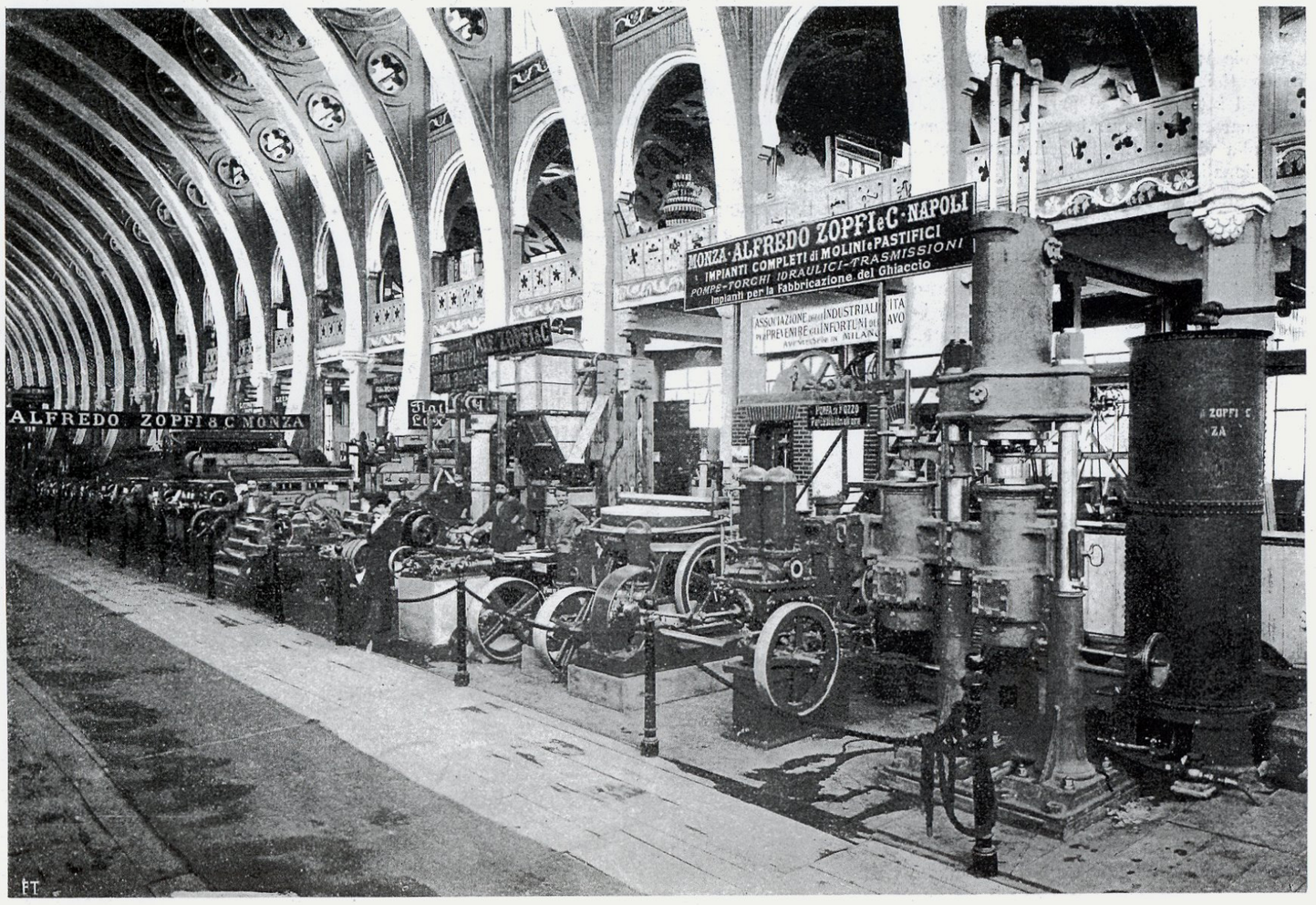
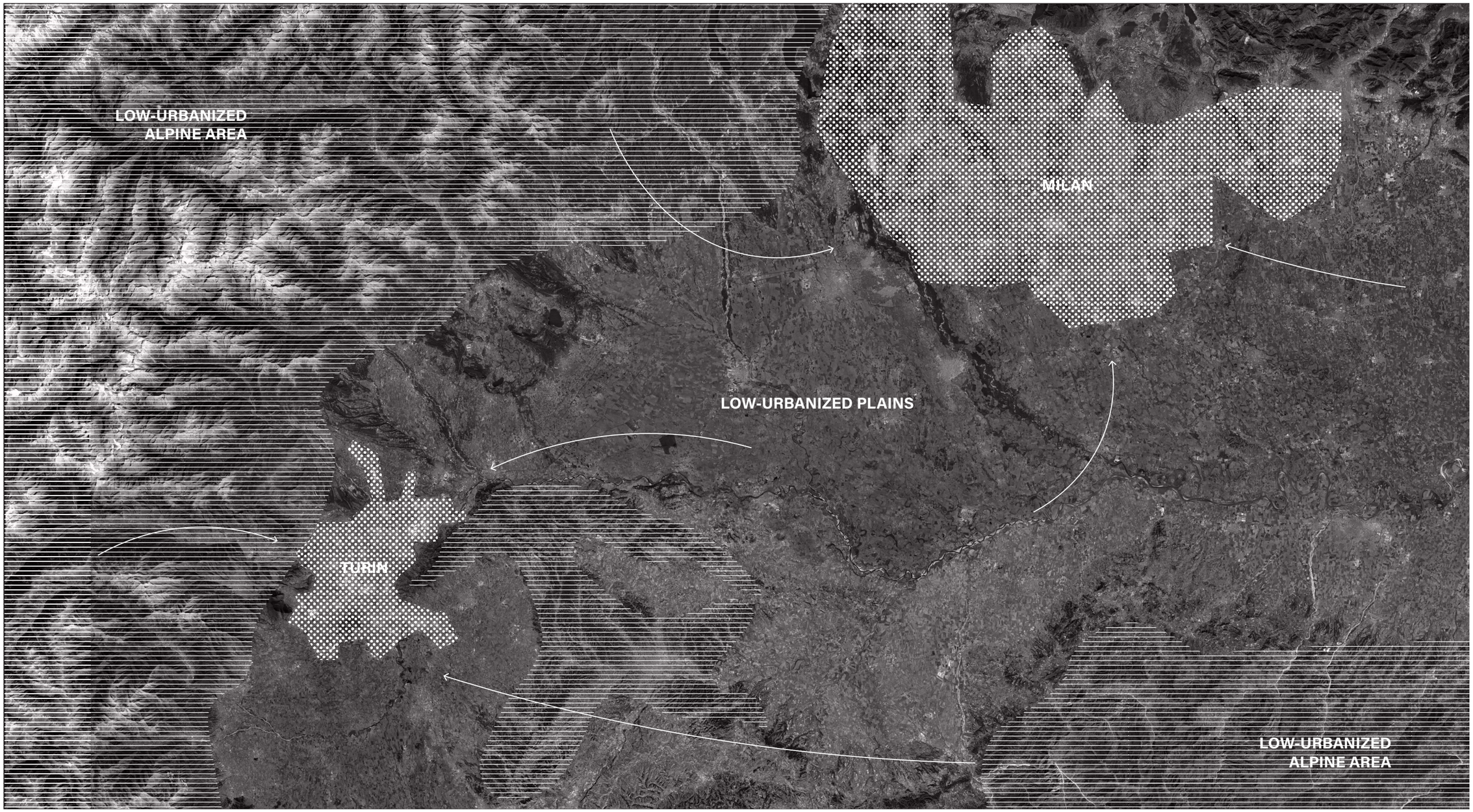
*Msc Architecture graduation*
*Architectural Engineering studio*

L'Illustrazione Italiana Anno II n. 35 del 28 agosto 1898 pag.152




Mostra Zopfi all' Esposizione nazionale a Torino.

**SECOND INDUSTRIAL REVOLUTION**
*Italy, 1900*

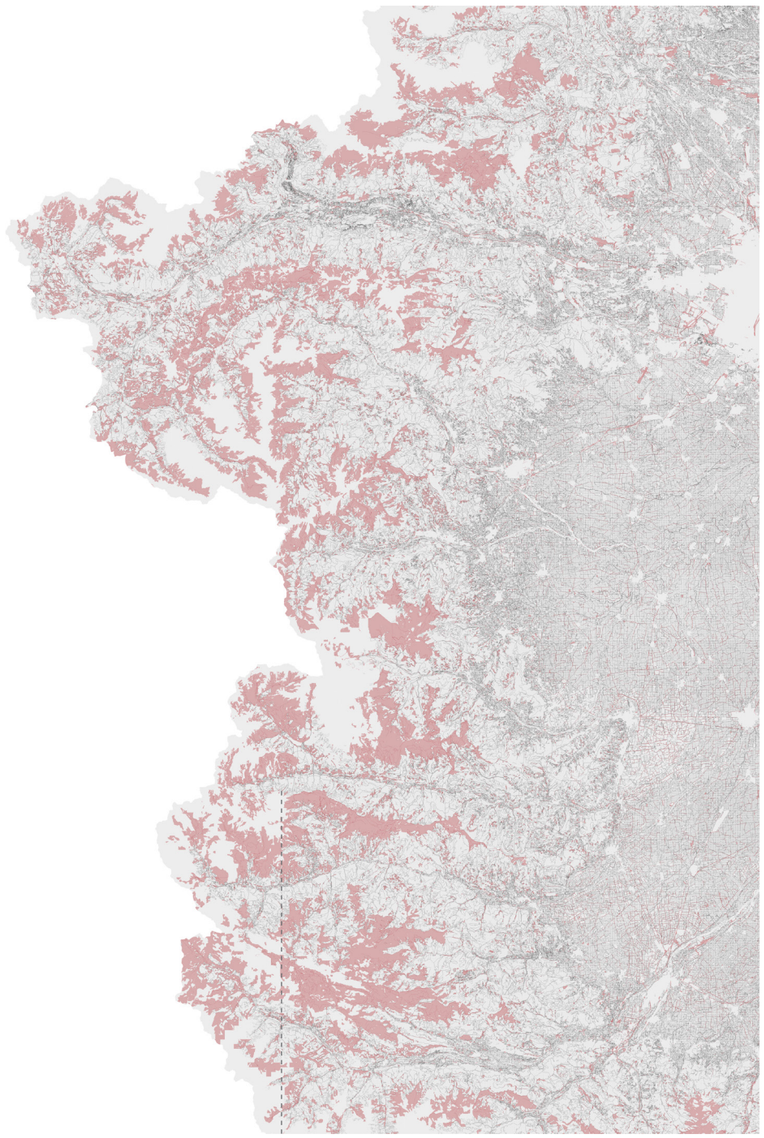



**CENTRALIZATION**

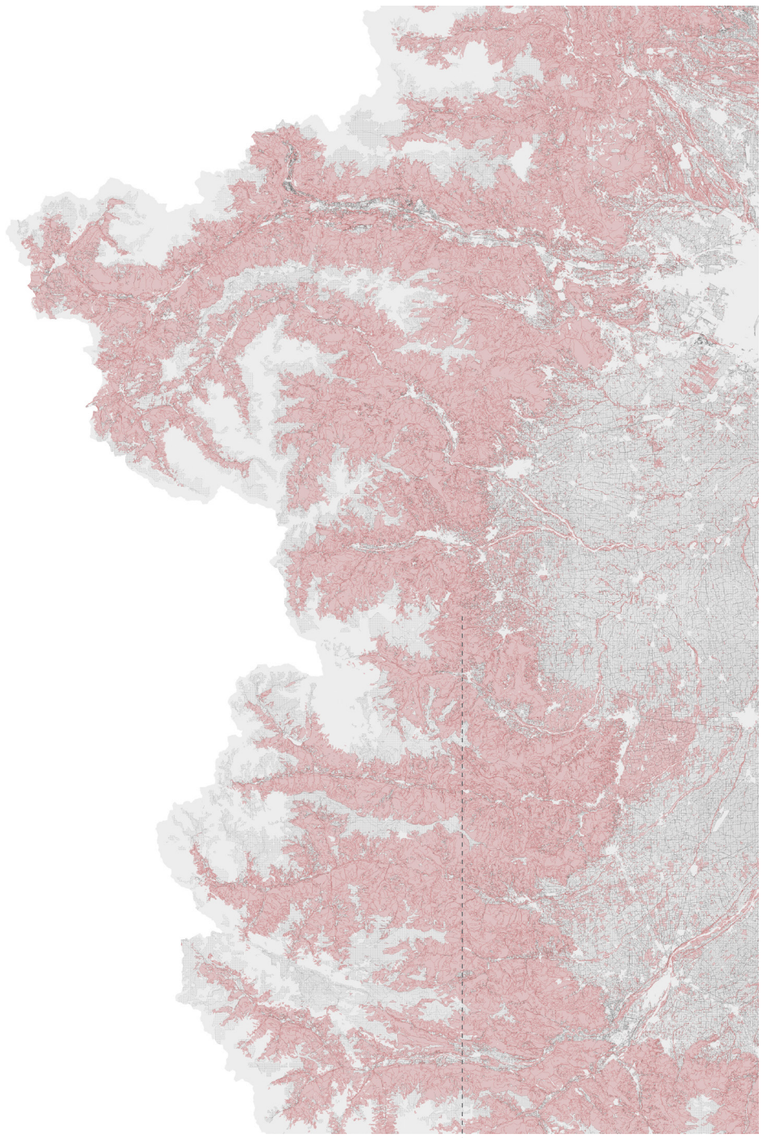
*Amenity migration / Decentralization*

**RURAL TOWN**

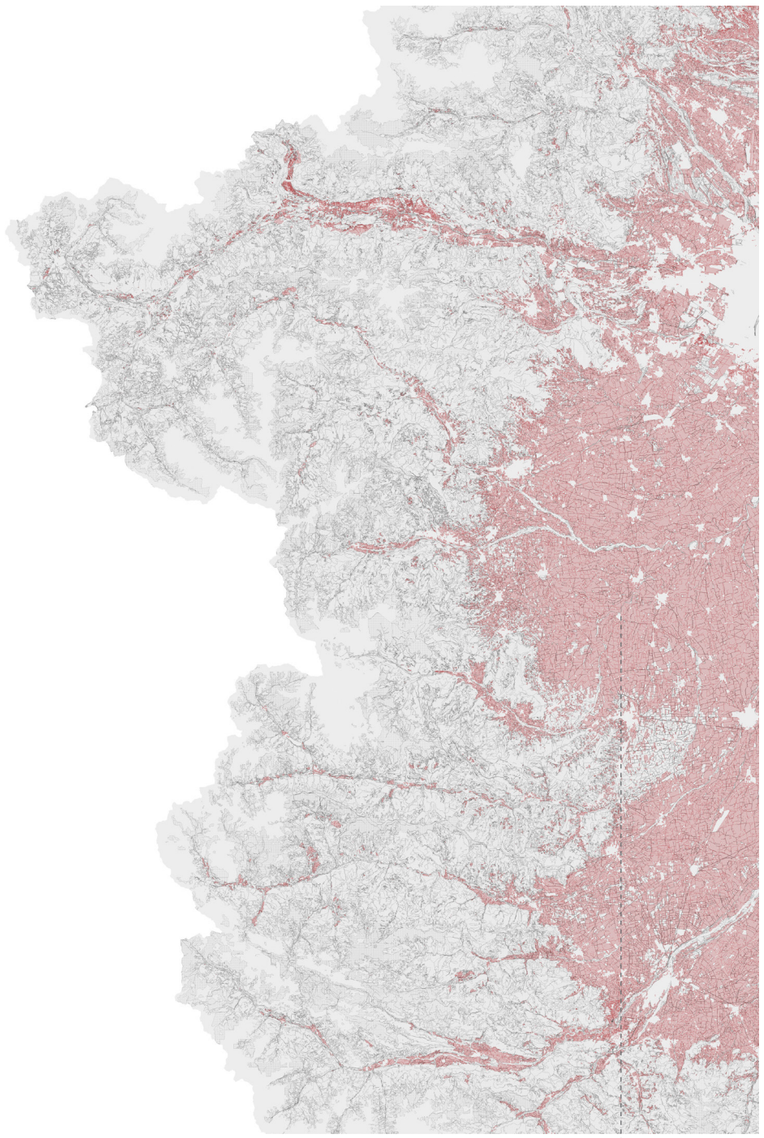
*Alpine village with, influence of, surrounding farms*



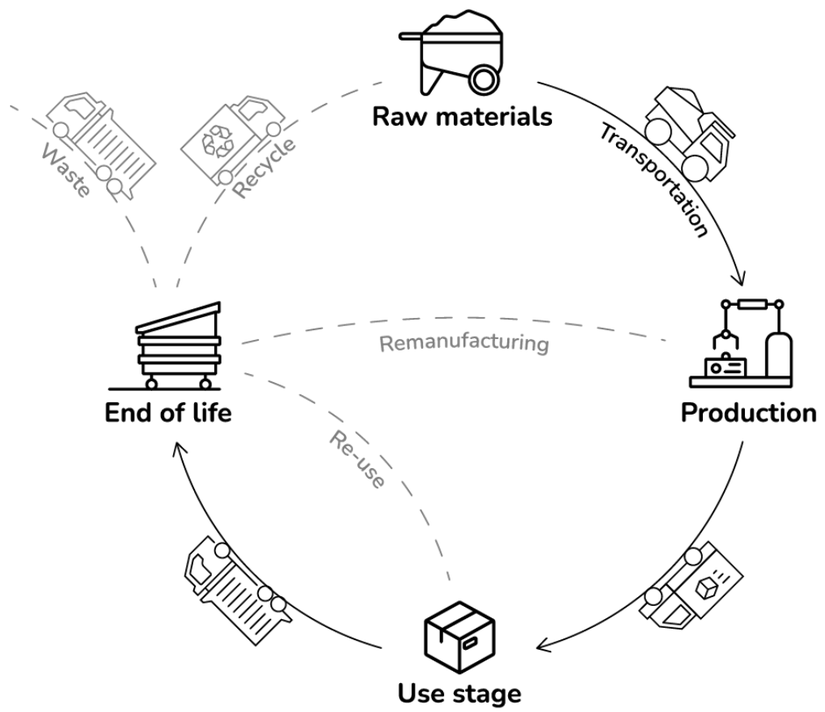
*Alpine meadow*
*Sub-alpine zone*



*Forest*
*Below treeline*



*LARGE SCALE FARMS*
*Low-lands*


Raw materials
Transportation
Production
Use stage
End of life
Waste
Recycle
Remanufacturing
Re-use

Chapter 1

Chapter 2

Chapter 3

Knowledgecycle

Desired building materials

Plantation methods

Desired method of implementation

Possible production methods

Productcycle

Seeds

Harvest

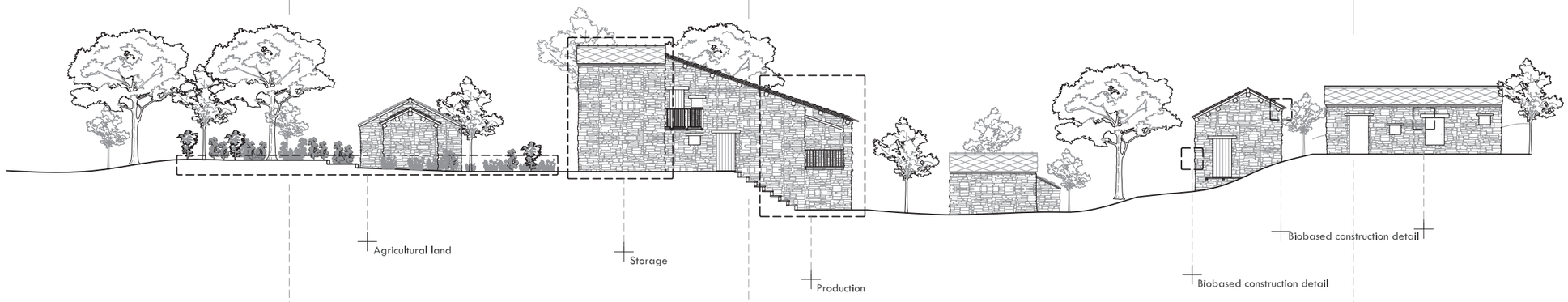
Buildingproducts

Natural leftover & used products

Growth

Production

Implementation




Cultural heritage

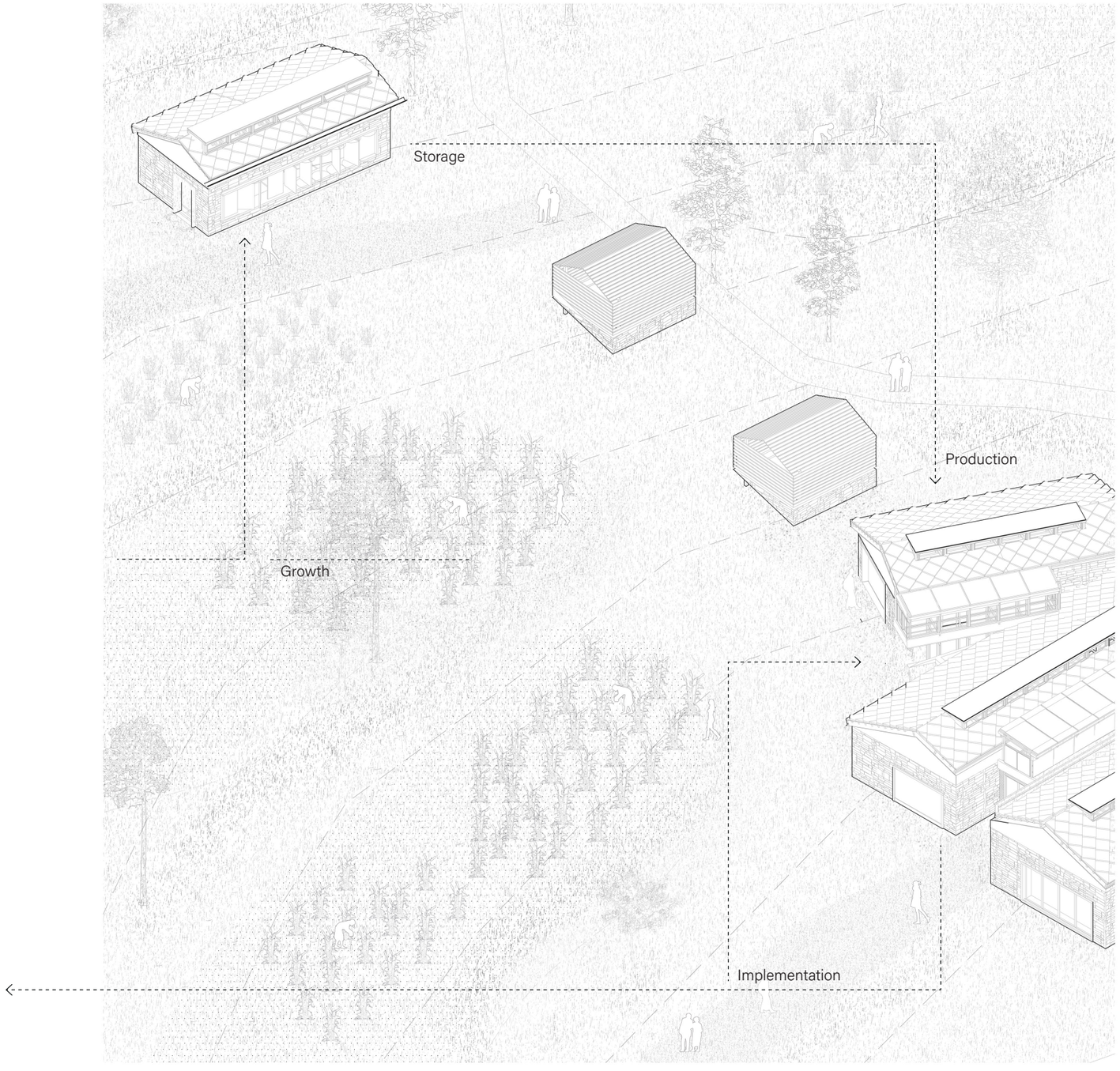
Alpinefarming

Education

Construction techniques

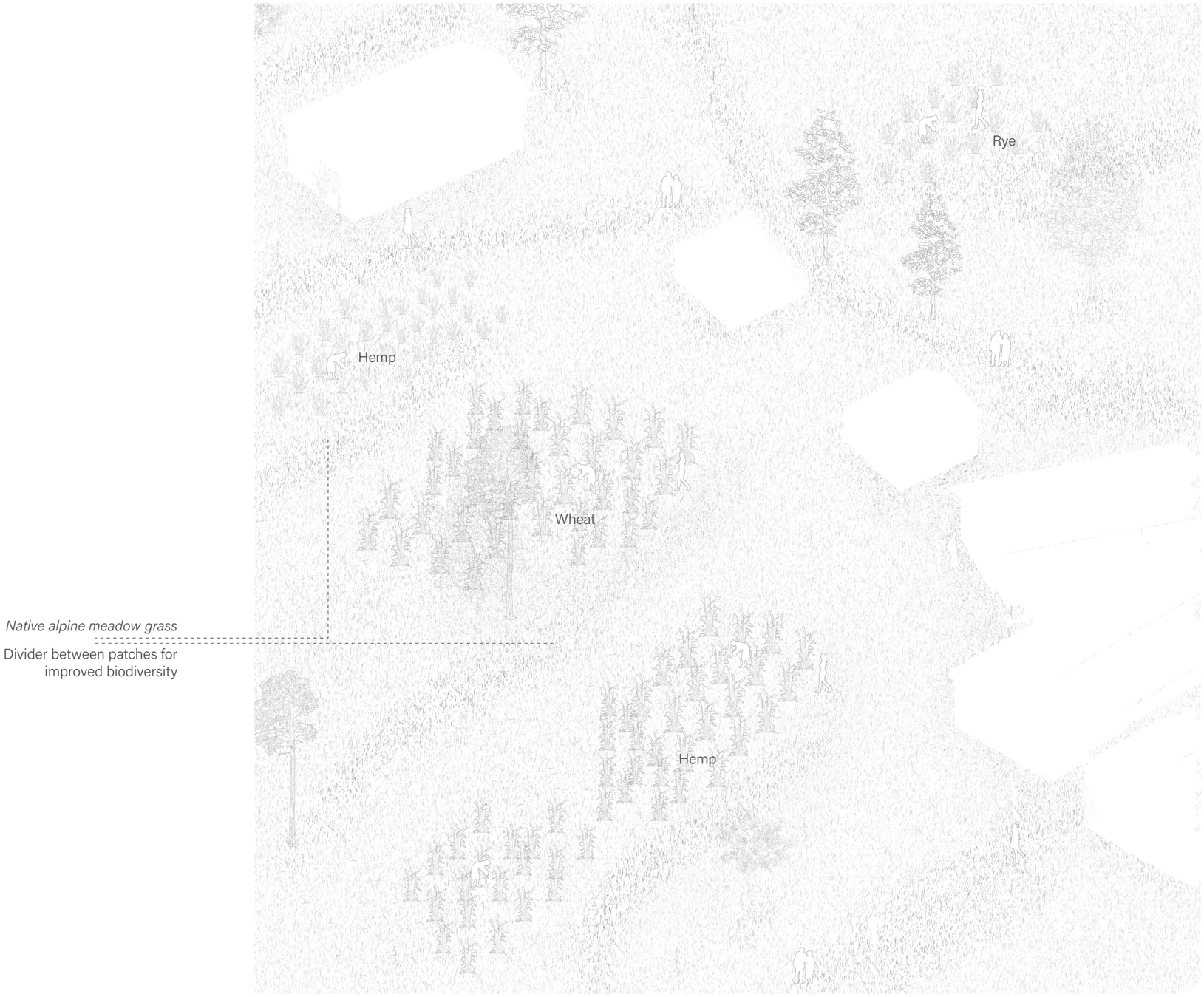
**RESEARCH QUESTION**

*How can the **growth, production and implementation, in local architecture,** of **biobased materials** support the preservation of the **farm (towns) at sub-alpine** elevation in the Western Italian Alps?*




Project organisation in design

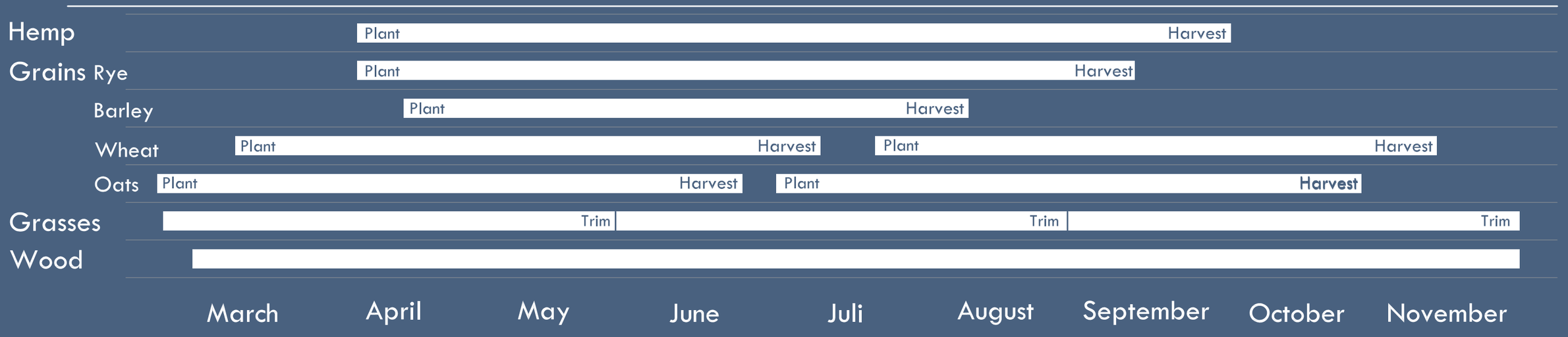

Patched fields
Native dividers

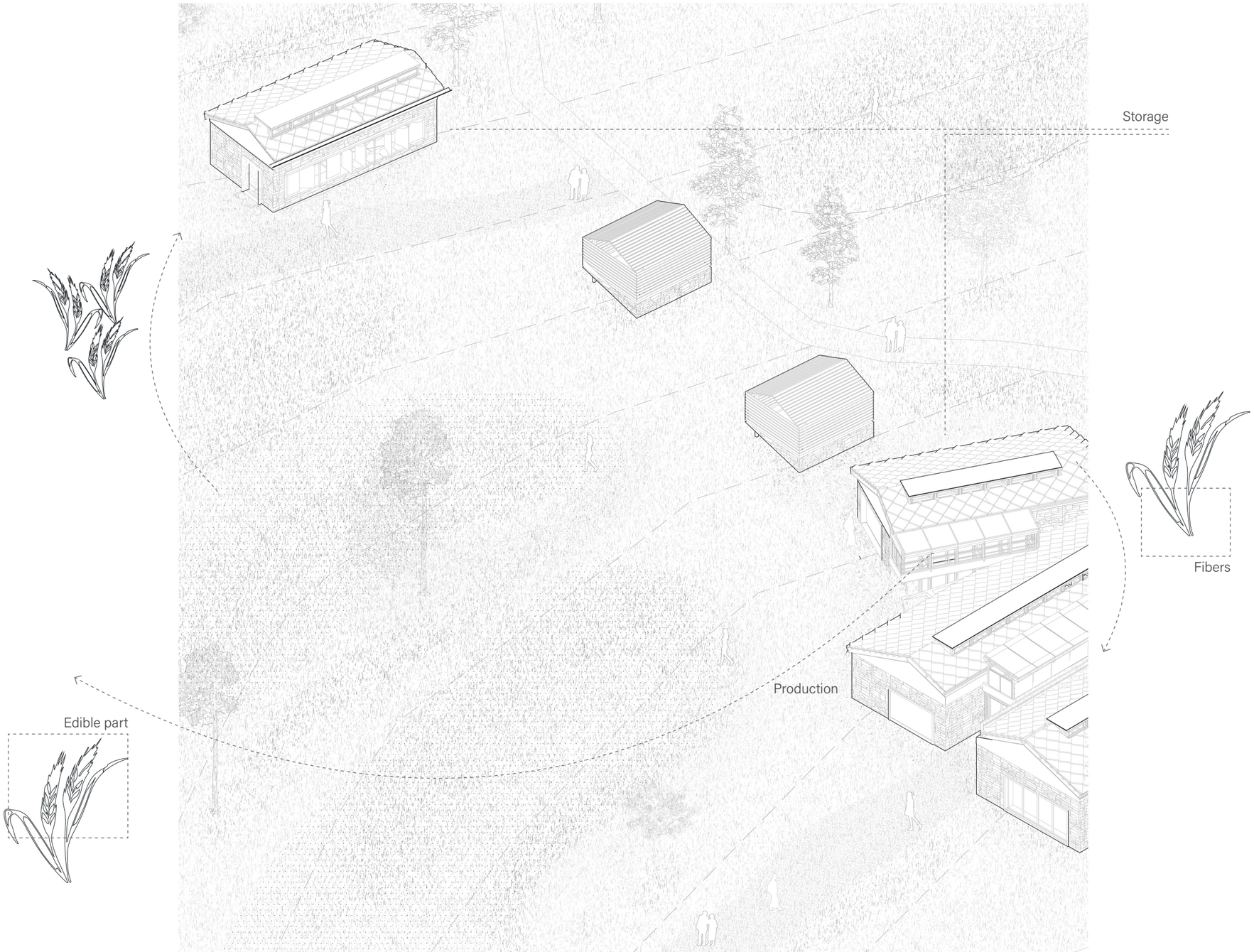

Rye
Hemp
Wheat
Native alpine meadow grass
Divider between patches for
improved biodiversity
Hemp

Growth

## SEASONAL PLANNING

*Growth chapter conclusion*






Growth export

Hemp fibres

*Fibre insulation*

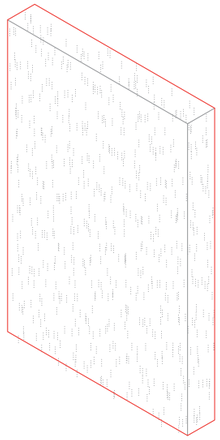
*Strawbales*

*Hempcrete*

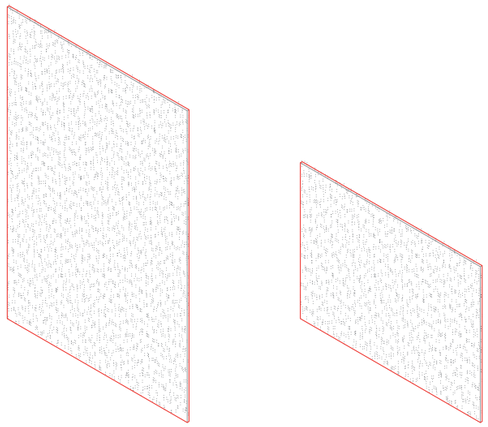
## MATERIAL PROPERTIES

*Production chapter overview*

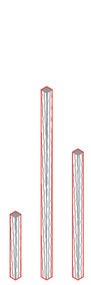
| | | Insulation | Thermal conductivity W/m/K | Density kg/m3 | Moisture regulation | Toxicity | Application methods | Load bearing capacity | Other applications |
|---|---|---|---|---|---|---|---|---|---|
| Hempfibres | | Insulation | 0.048-0.058 | 35 | High | Low | Panels | None | Finishing plates<br>Application board<br>Acoustic panels<br>Textiles |
| | | Concrete aggregate | 0.06-0.6 | 200-960 | Medium | Low | Masonry blocks or in situ | Own weight | |
| Grainfibres (Wheat, barley, rye, oats) | | Insulation | 0.038-0.08 | 65 - 350 | High | Low | Bales | Own weight | Acoustic panel<br>Application board |
| | | Concrete aggregate | 0.09 | 400 | Medium | Low | Masonry blocks | Own weight | |
| Grassfibres | | Insulation | 0.041 | 30-40 | High | Low | Panels | None | Acoustic panel |
| | | Concrete aggregate | 0.058 | 120 | Medium | Low | Masonry blocks | Own weight | |
| Wood | | Fibre insulation | 0.036 | 70-270 | High | Low | Fibre insulation | None | Construction frame<br>Application board<br>Finishing<br>Facade |
| | | CLT | 0.192 | 480-500 | Medium | Low | Panels | Constructive | |
| Cement | | Concrete | 0.7 | 2400 | Low | Medium | Masonry blocks or in situ | Constructive | |
| Glass fibres | | Insulation | 0.03 | 12-48 | Medium | High | Panels | None | |



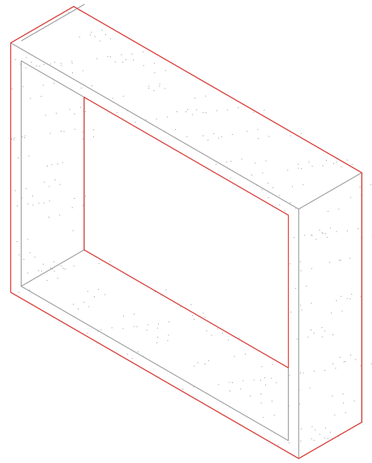
Fiber insulation panels



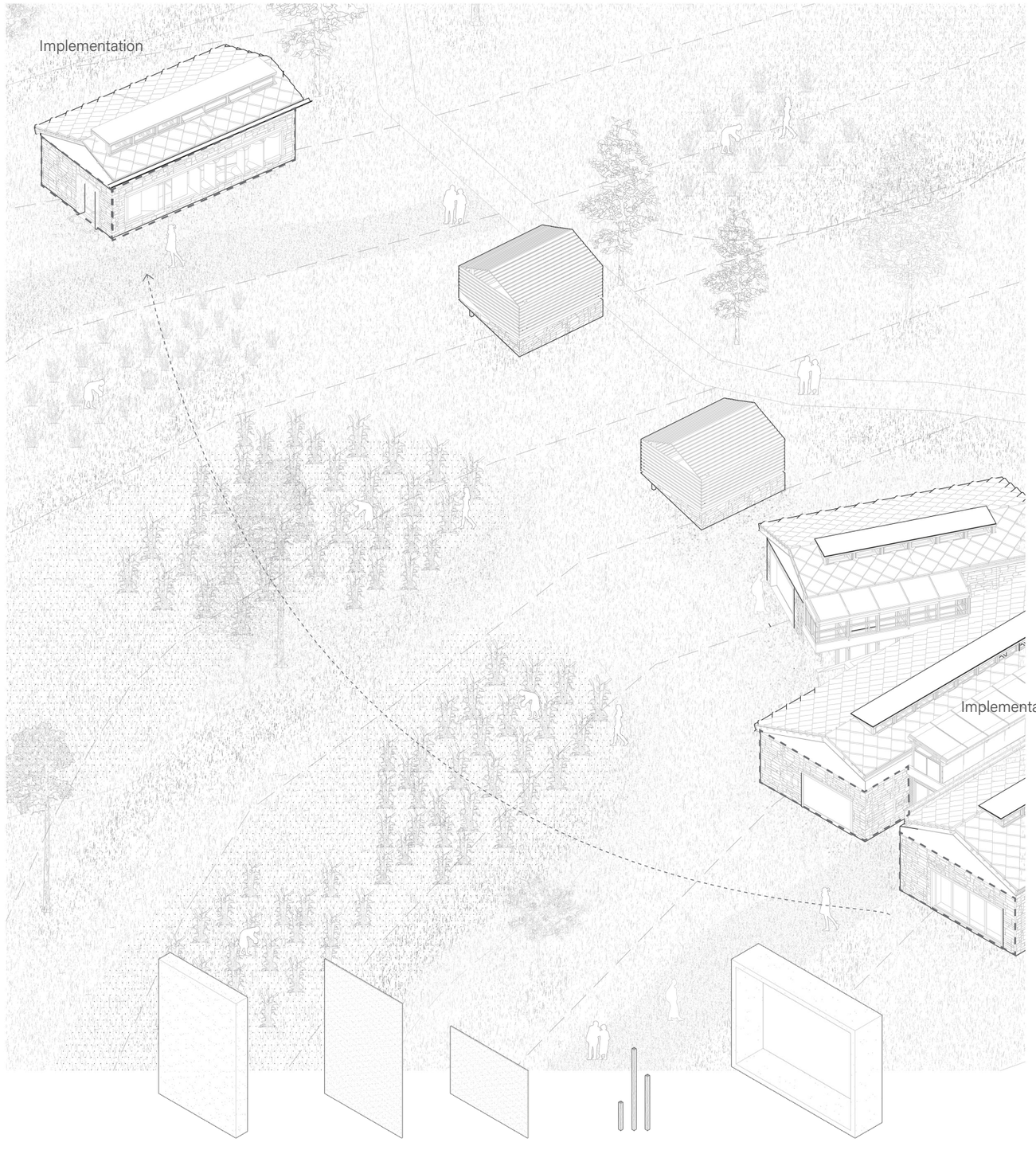
Acoustic boards



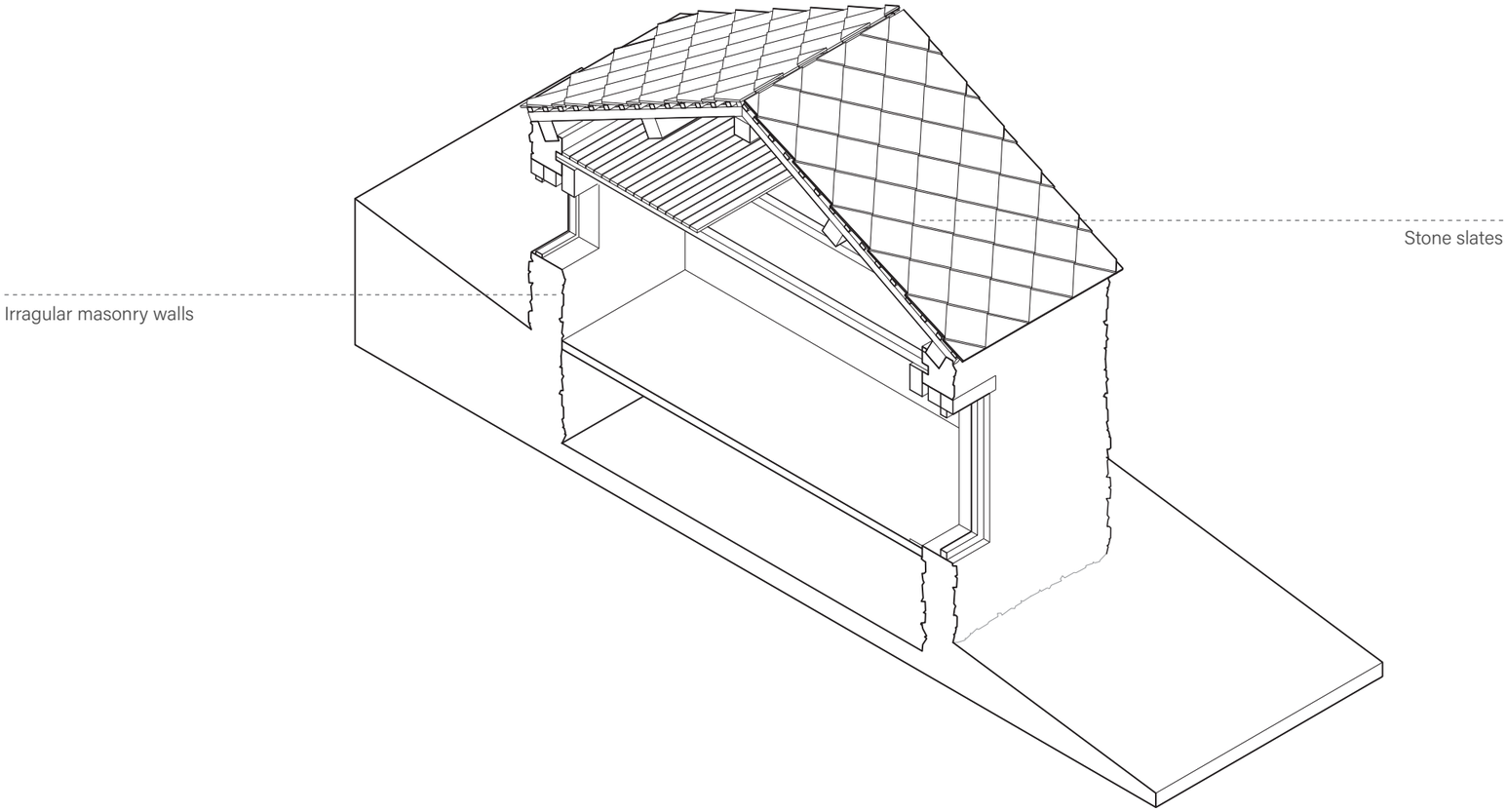
Beams

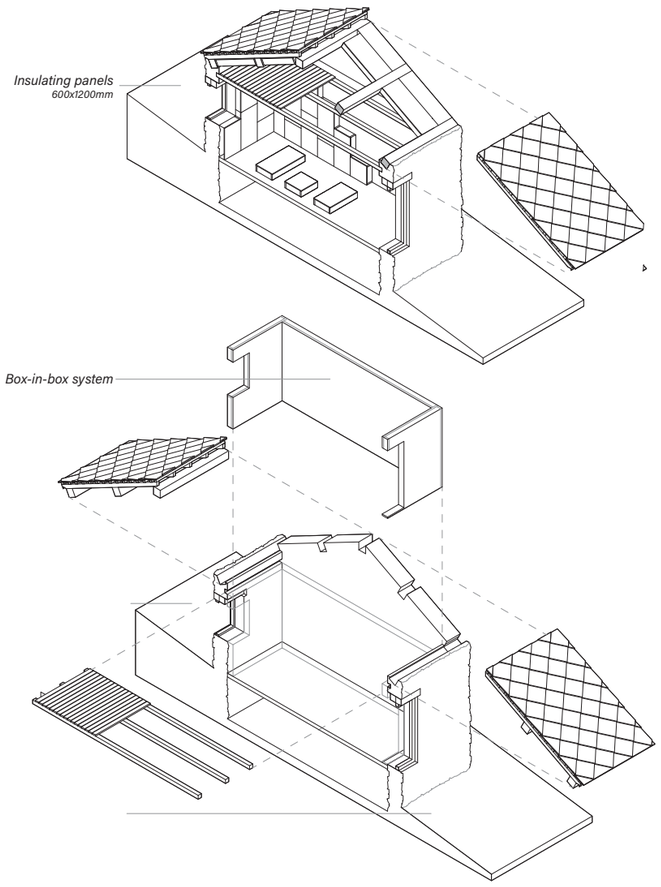


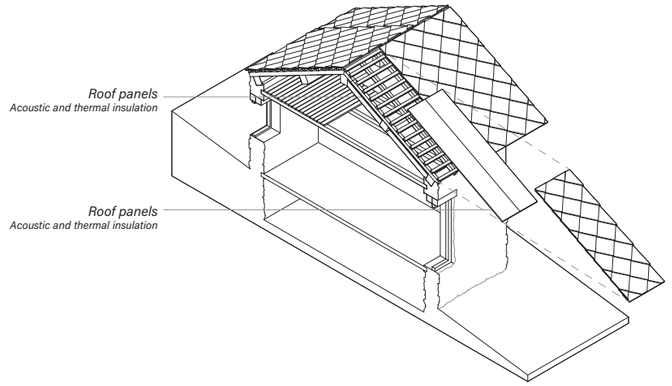
Hempcrete frame

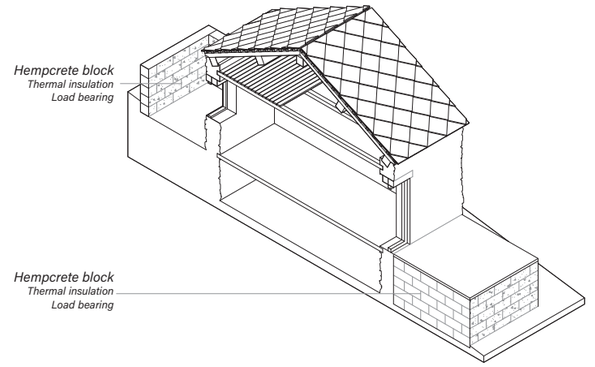


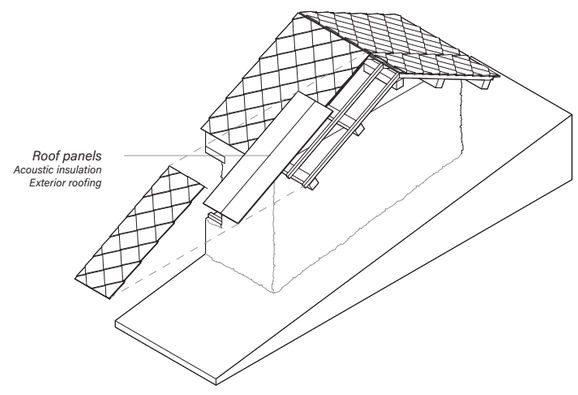

Implementation

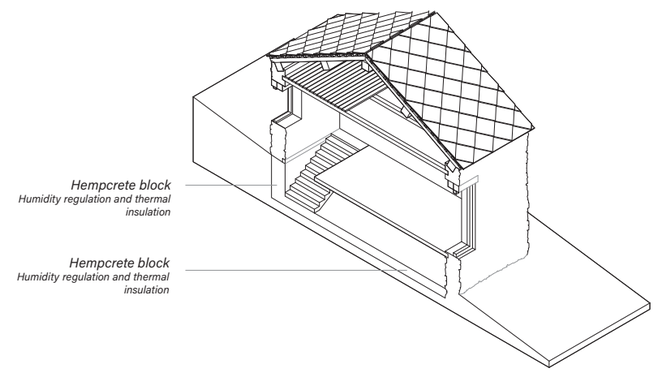

Stone slates
Irragular masonry walls

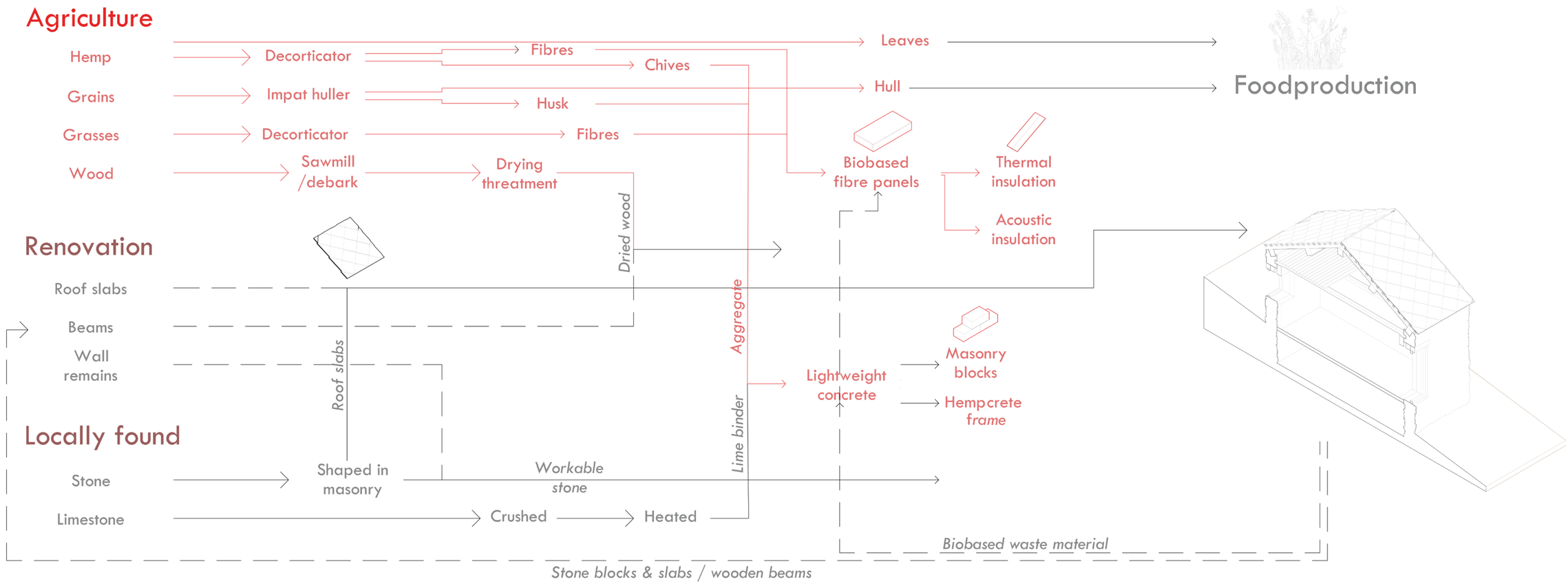

Insulating panels
600x1200mm
Box-in-box system


Roof panels
Acoustic and thermal insulation
Roof panels
Acoustic and thermal insulation

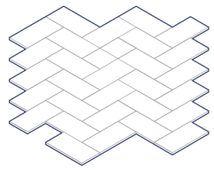

Hempcrete block
Thermal insulation
Load bearing
Hempcrete block
Thermal insulation
Load bearing


Roof panels
Acoustic insulation
Exterior roofing


Hempcrete block
Humidity regulation and thermal insulation
Hempcrete block
Humidity regulation and thermal insulation

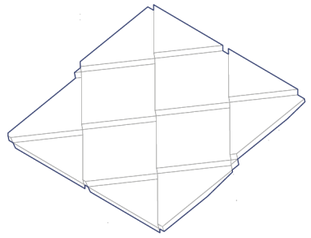

Agriculture
Hemp
Grains
Grasses
Wood
Decorticator
Impat huller
Decorticator
Sawmill /debark
Drying threatment
Fibres
Chives
Husk
Fibres
Leaves
Hull
Foodproduction
Biobased fibre panels
Thermal insulation
Acoustic insulation
Renovation
Roof slabs
Beams
Wall remains
Dried wood
Roof slabs
Aggregate
Lime binder
Lightweight concrete
Masonry blocks
Hempcrete frame
Locally found
Stone
Limestone
Shaped in masonry
Workable stone
Crushed
Heated
Biobased waste material
Stone blocks & slabs / wooden beams

## *Traditional materials*



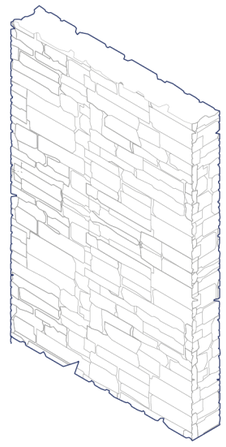
*Terracotta tiles*

*200x100x70mm*



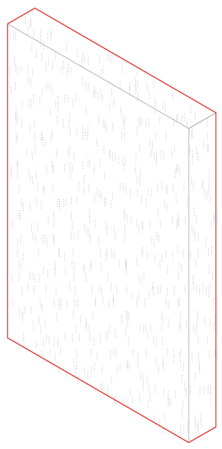
*Stone slates*

*1000x1000x100mm*



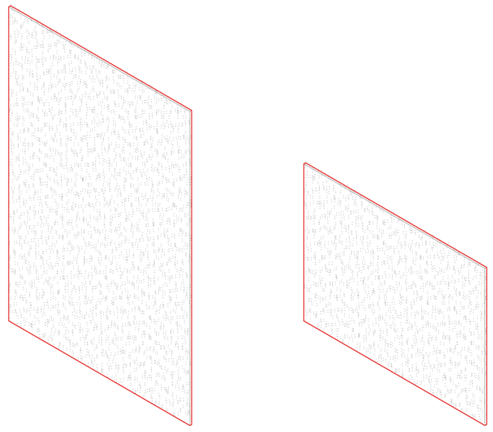
*Irragular stacked stone wall*
*300mm*

## *New biobased materials*



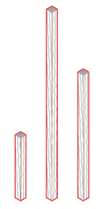
*Fibre insulation panels*
*Natural fibres*

*3000x1500x300mm*



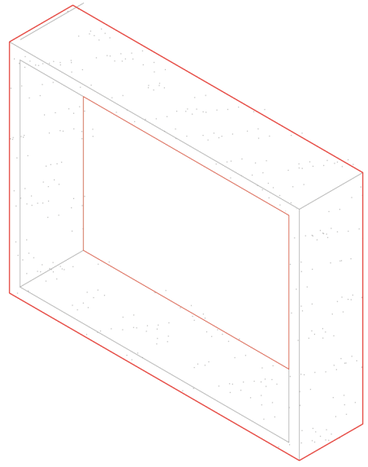
*Acoustic panels*
*Natural fibres*

*3000x1500x40mm*



*Timber beams*
*Wood*

*80x80x...mm*



*Hempcrete windowframes*
*Hemp*

*100x400x...mm*

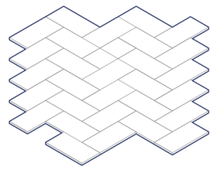
## DESIGN QUESTION

*How can the* **traditional farms** *of the hamlet of* **Pian della Regina** *in the Italian Alps be revived troughout the principle of* **new farming** *and the implementation of* **biobased materials**, *maintaining the  cultural identity and ecological biodiversity?*

**New farming -** *beginning farmers, back-to-the land migrants looking for a more fulfilling lifestyle and self-decided economic success . Can be linked to activities of service such as care, tourism and land maintenance.*

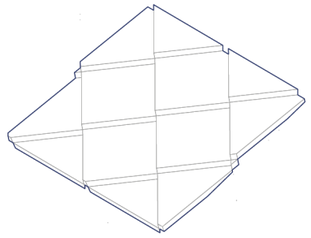
(Gretter et al. 2019)

## *Traditional materials*



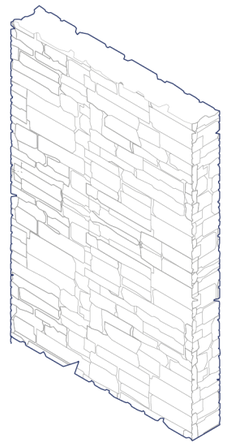
*Terracotta tiles*

*200x100x70mm*



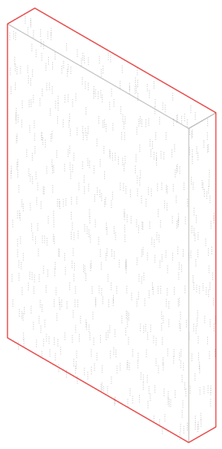
*Stone slates*

*1000x1000x100mm*



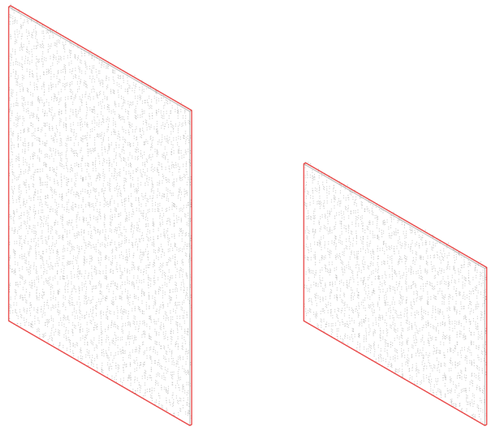
*Irragular stacked stone wall*
*300mm*

## *New biobased materials*



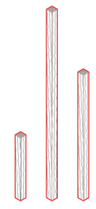
*Fibre insulation panels*
*Natural fibres*

*3000x1500x300mm*



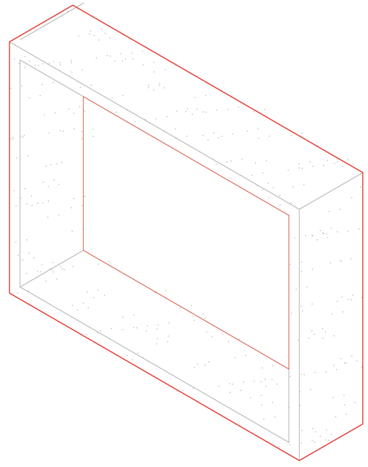
*Acoustic panels*
*Natural fibres*

*3000x1500x40mm*



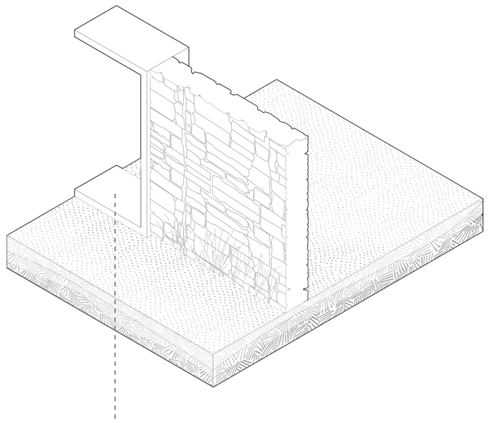
*Timber beams*
*Wood*

*80x80x...mm*

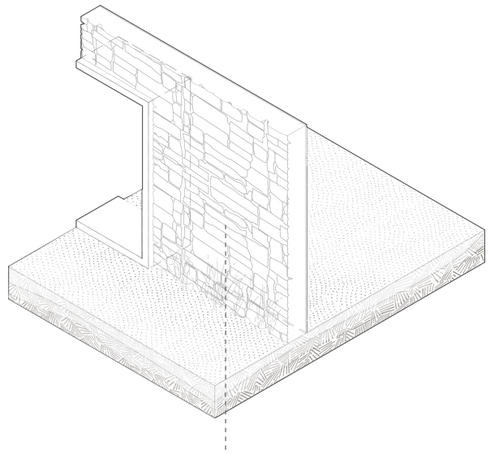


*Hempcrete windowframes*
*Hemp*

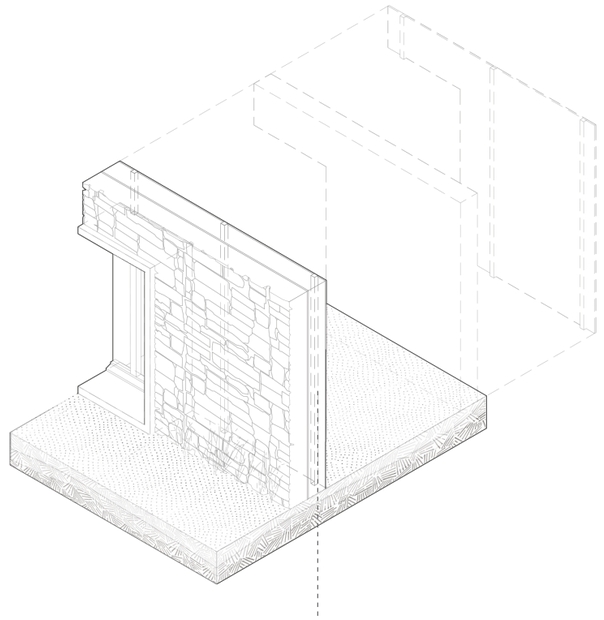
*100x400x...mm*



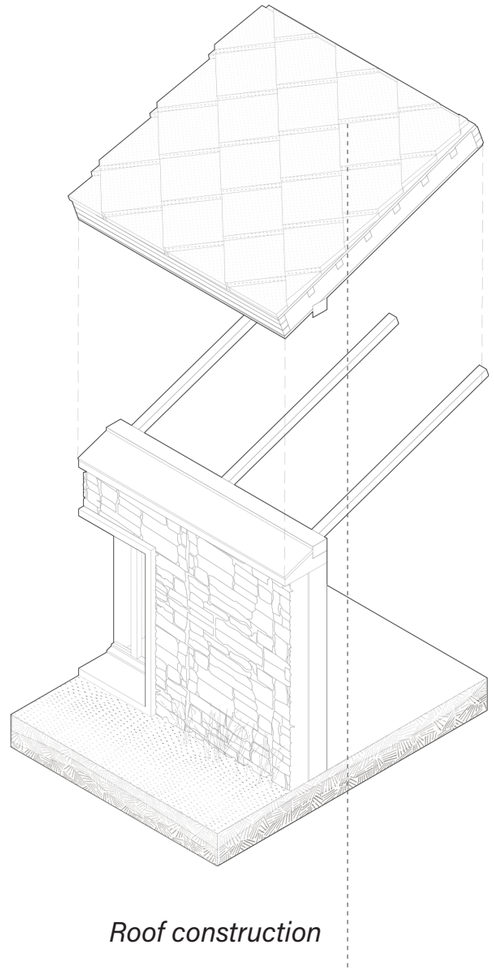
*Hemprete windowframe*



*Traditional stone loadbearing wall*

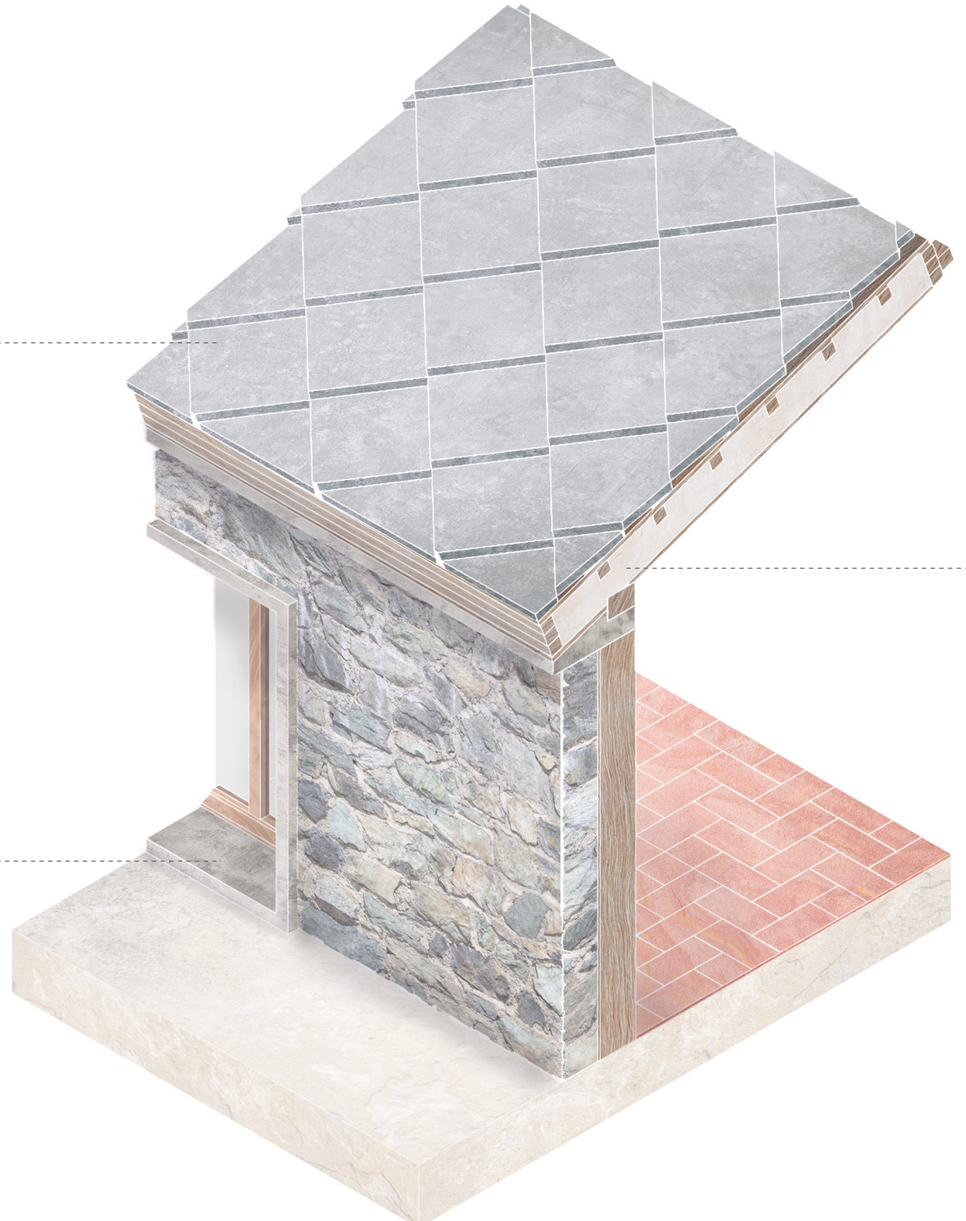


*Biobased climate regulating layers*



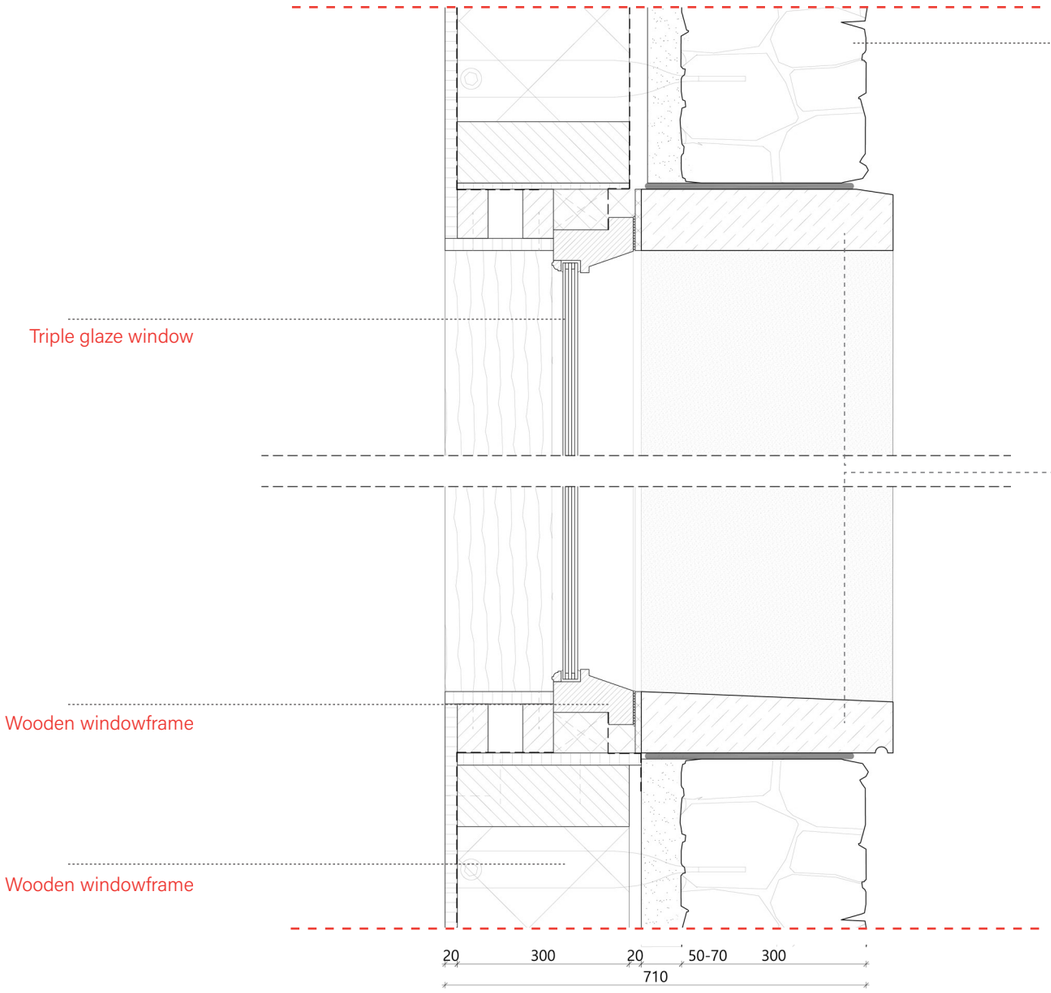
*Roof construction*

Traditional stone outer layer



Biobased interior

Hempcrete windowframe

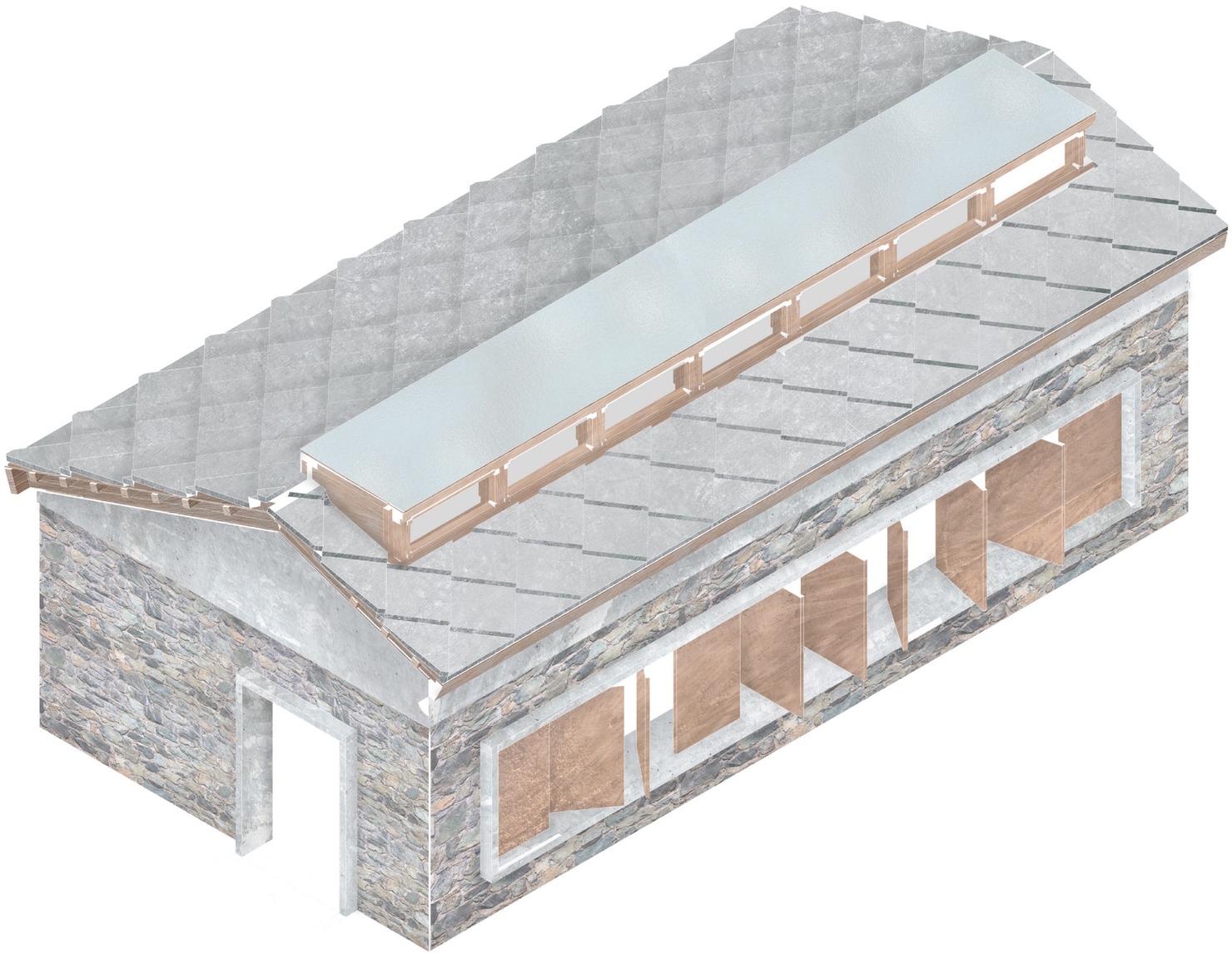


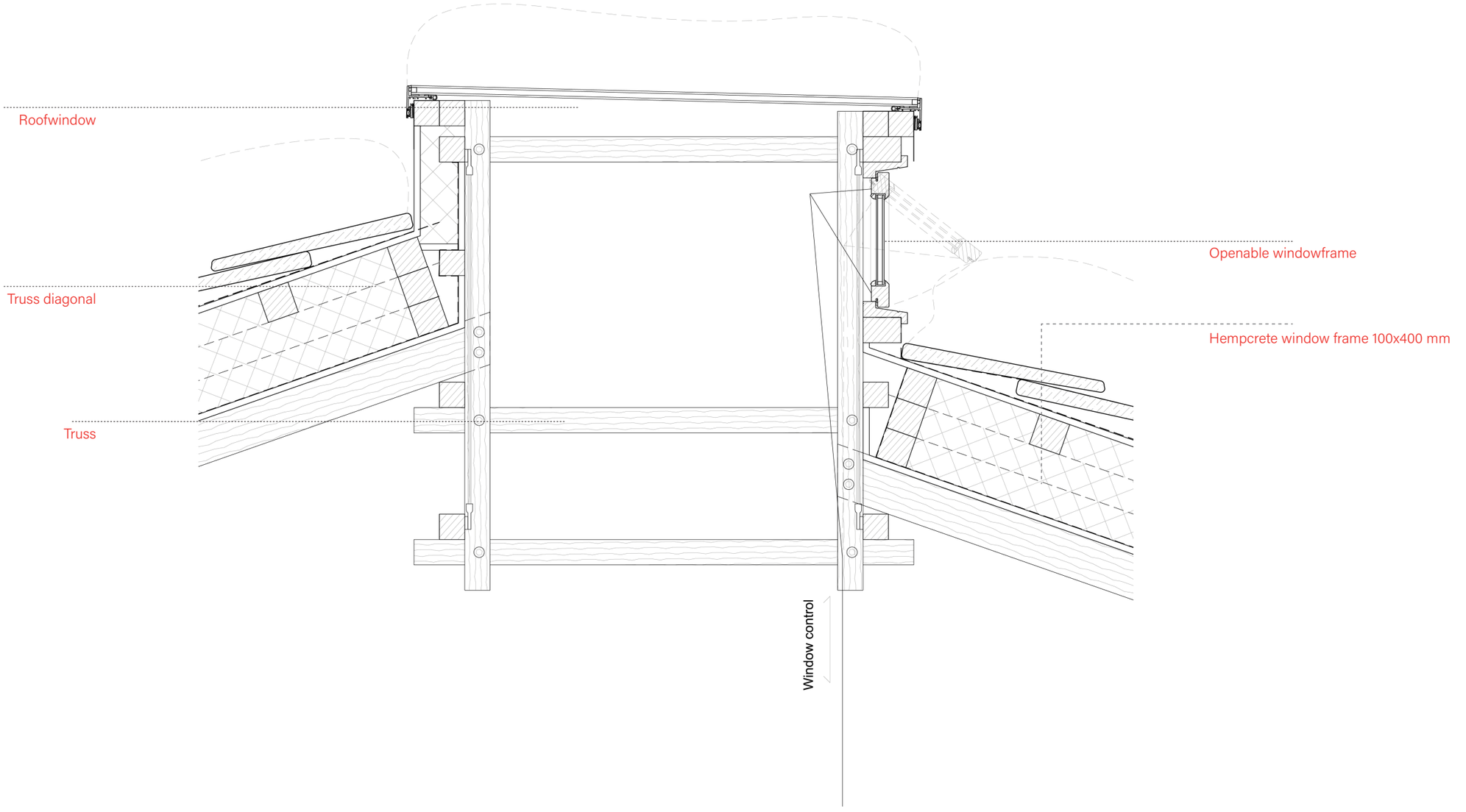

Fibre board 18mm *
Vapour barrier 2mm
Fibre insulation 300mm *
Clay 50-70 mm
Stacked stone 300 mm

Hempcrete window frame 100x400 mm

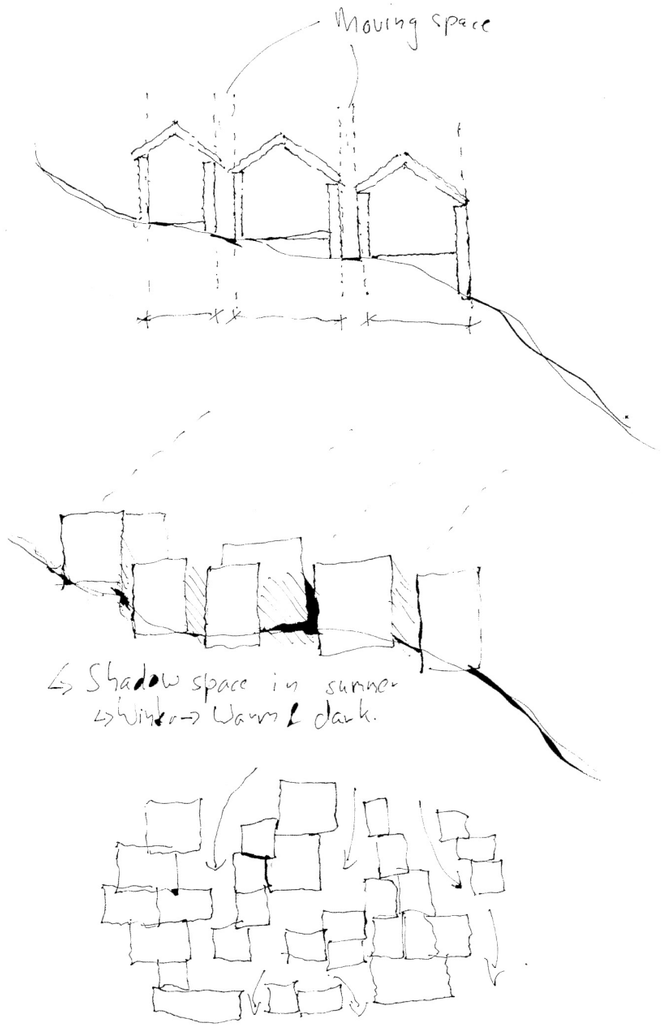
* Based off different plant fibres, depending on what is harvested: hemp, grain, grass

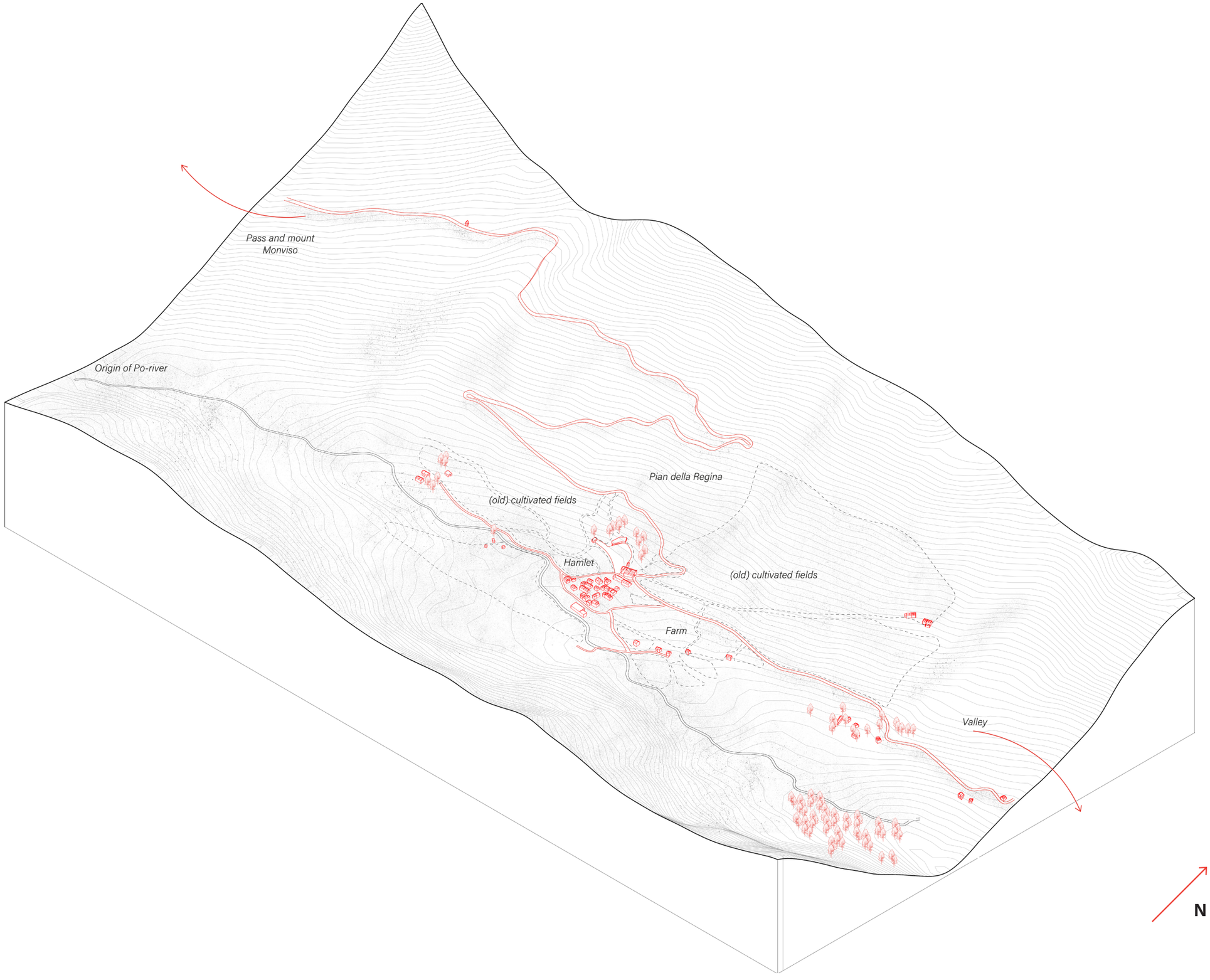
**Window**
*Detail*






Ridge fragment **1:10**


Moving space
Shadow space in summer
winter → warm & dark.



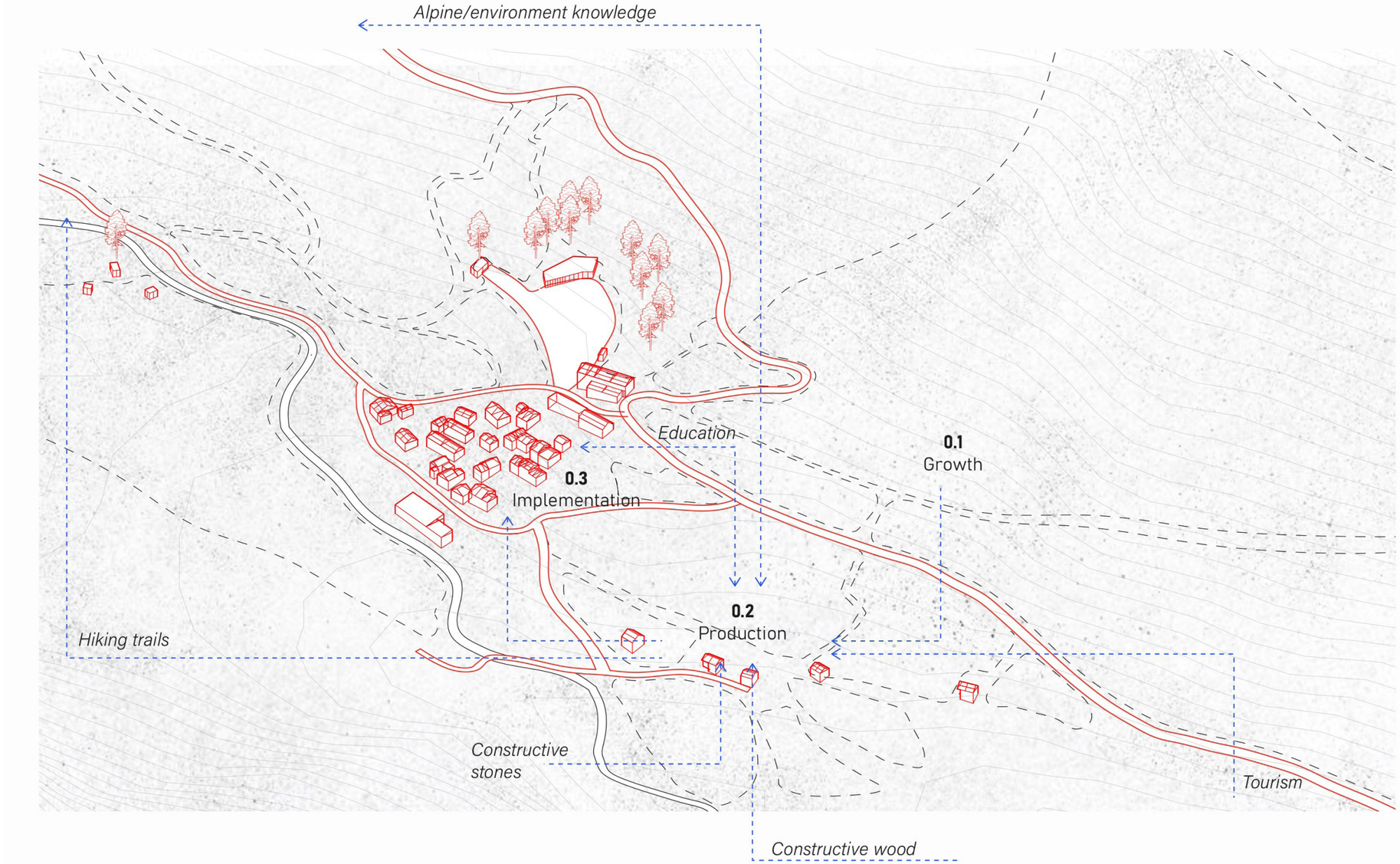

Site overview **Pian della Regina**

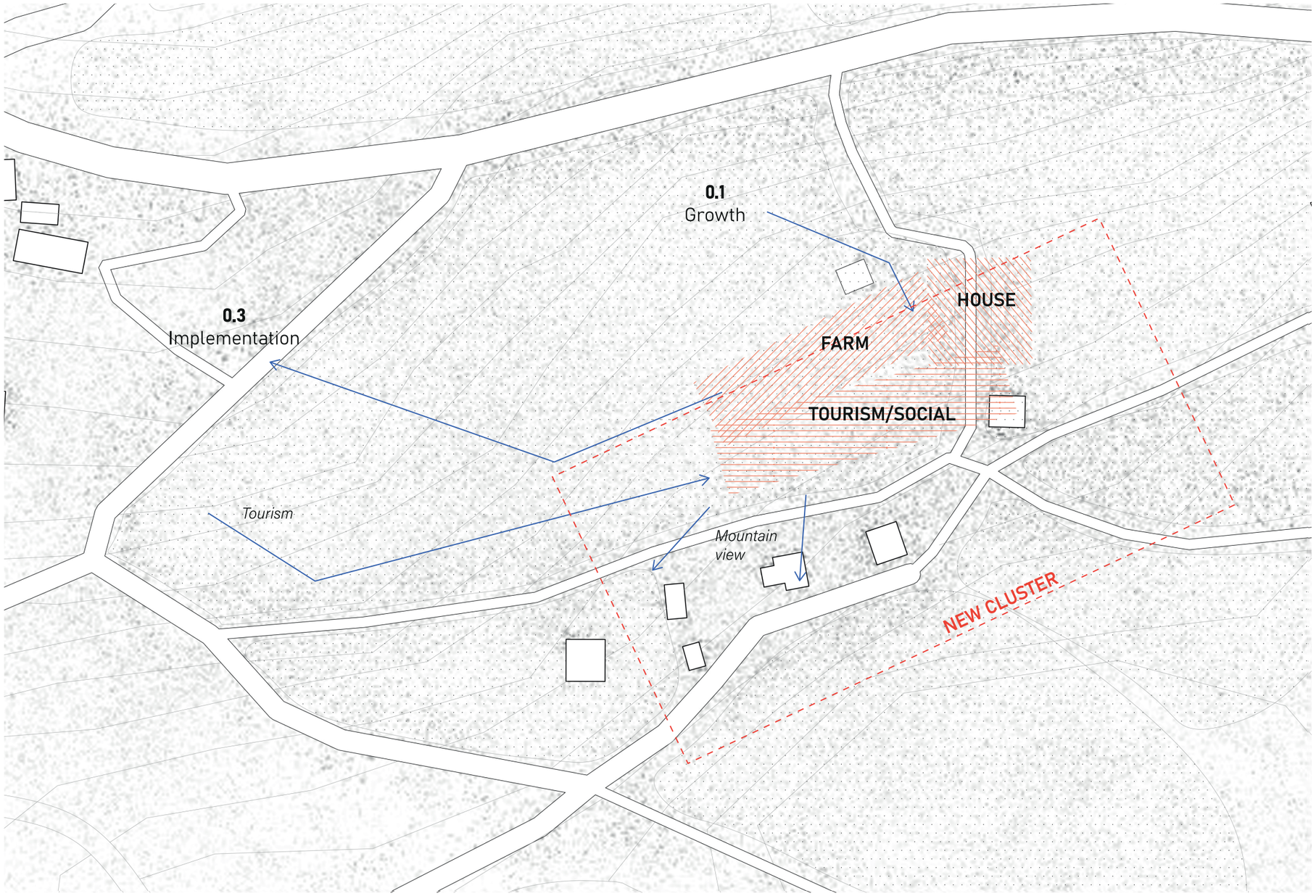
Farm relief

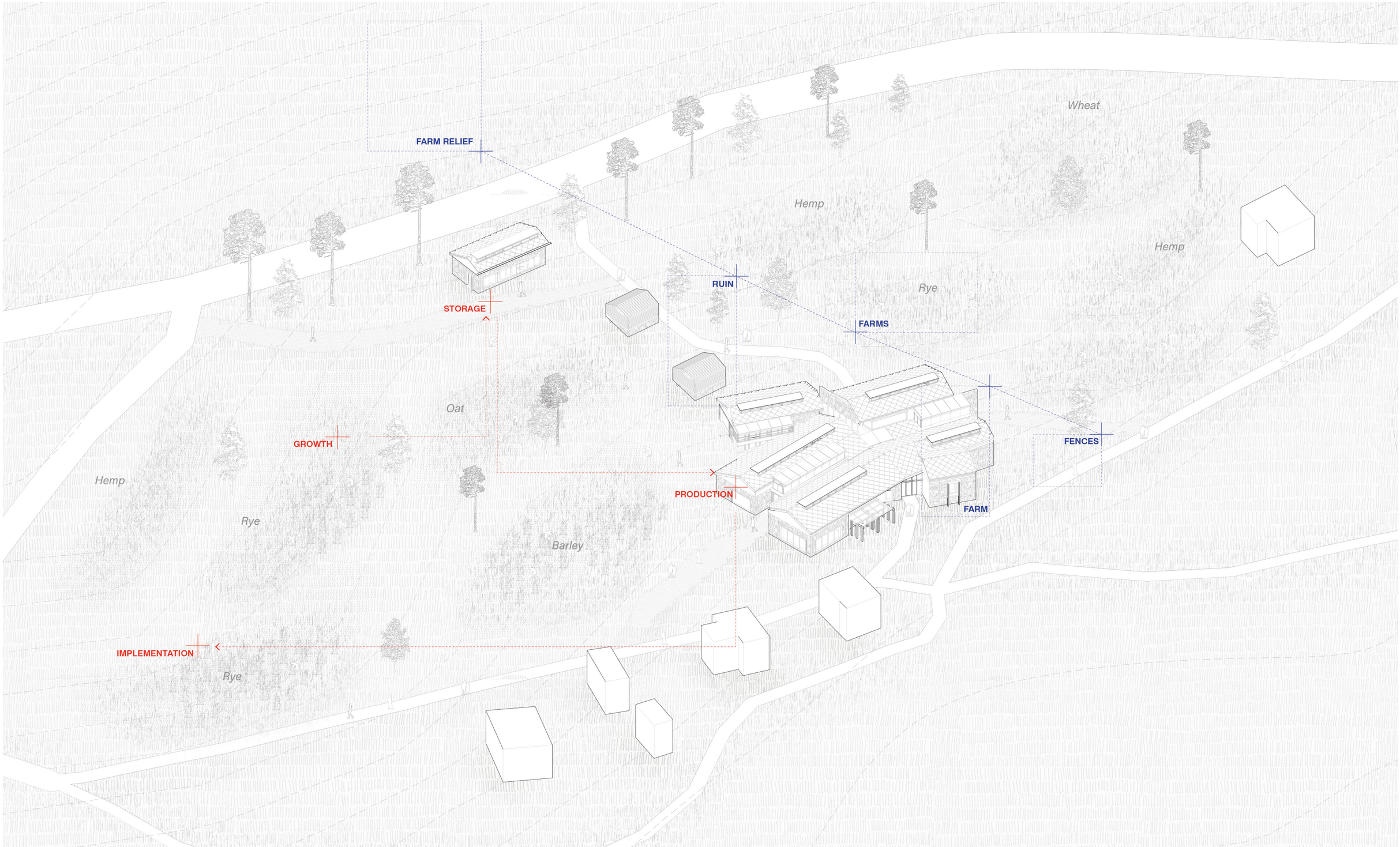

Barn

Dividing fence

Farm relief


Alpine/environment knowledge
Education
0.1
Growth
0.3
Implementation
0.2
Production
Hiking trails
Constructive
stones
Tourism
Constructive wood

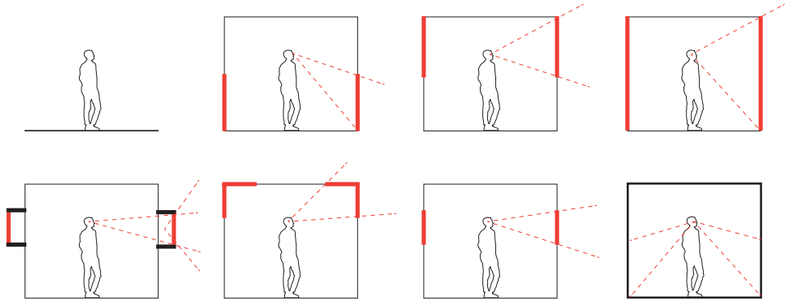

0.1
Growth
0.3
Implementation
HOUSE
FARM
TOURISM/SOCIAL
Tourism
Mountain
view
NEW CLUSTER


FARM RELIEF
STORAGE
RUIN
FARMS
FENCES
GROWTH
PRODUCTION
FARM
IMPLEMENTATION
Wheat
Hemp
Hemp
Rye
Oat
Hemp
Rye
Barley
Rye

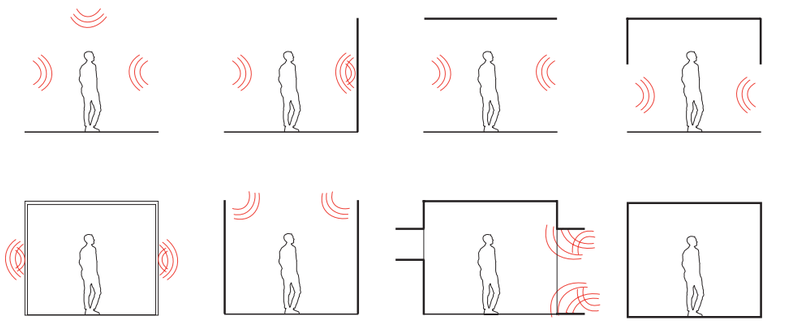
**SEASONAL CHANGE**
*Pian della Regina*

Jurre de Zwart

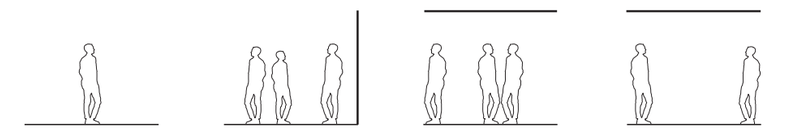
*Visual system*



*Auditory system*

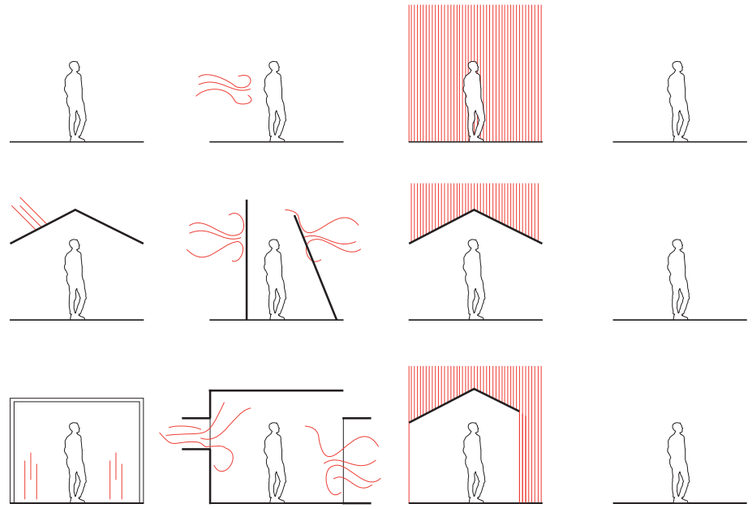


*Surrounding bodies*

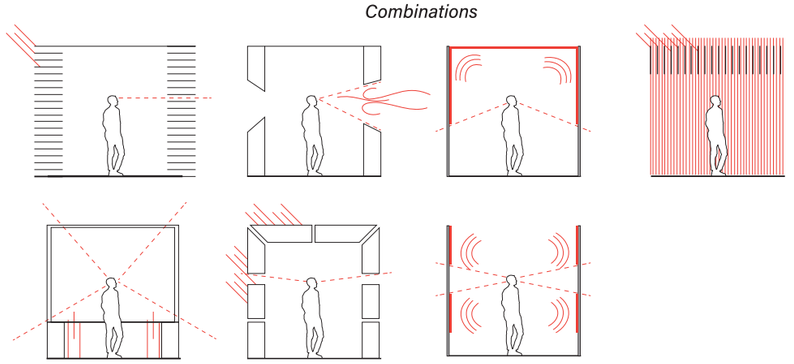


*Haptic system*

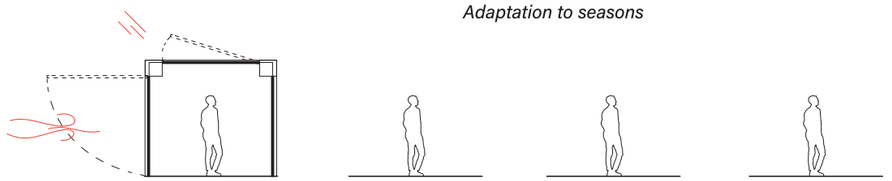
*Heath* *Wind* *Water* *?*



*Combinations*

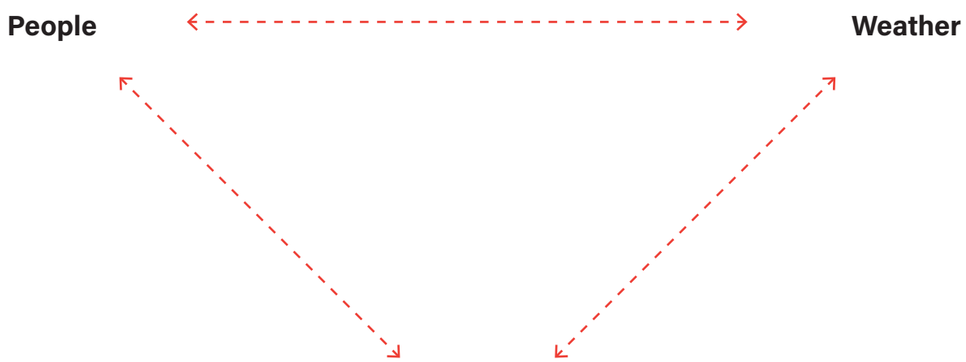


*Adaptation to seasons*



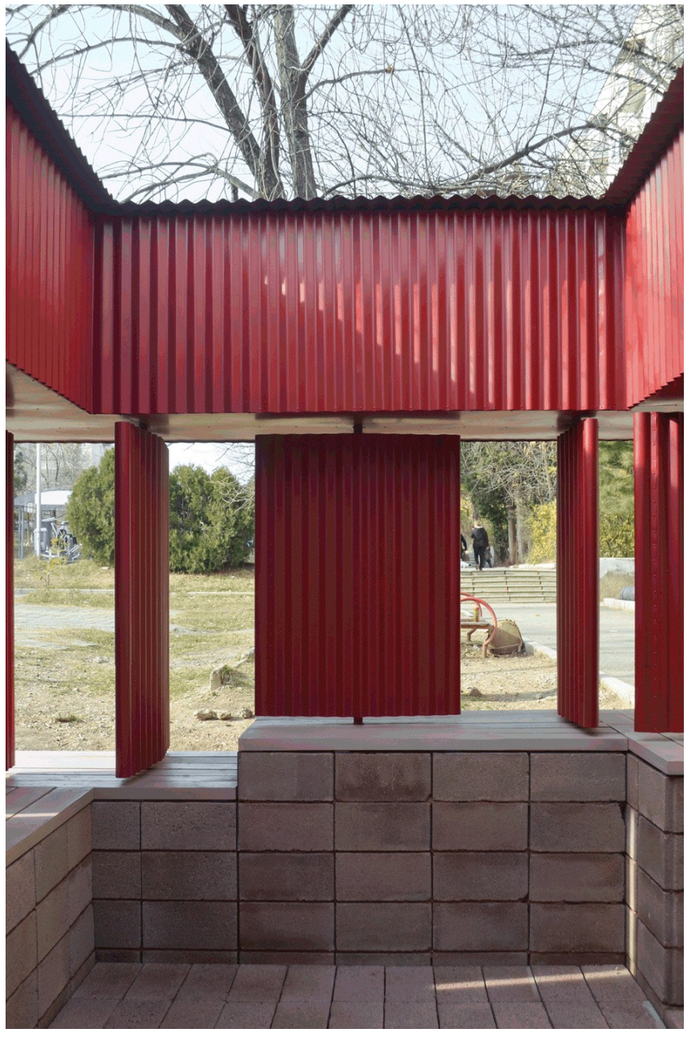
**EMBODIED EXPERIENCE**

*Architectural design of spaces*




*Making architecture through being human (Philip D. Plowright)*

**EMBODIED EXPERIENCE**
*Besides building a machine*

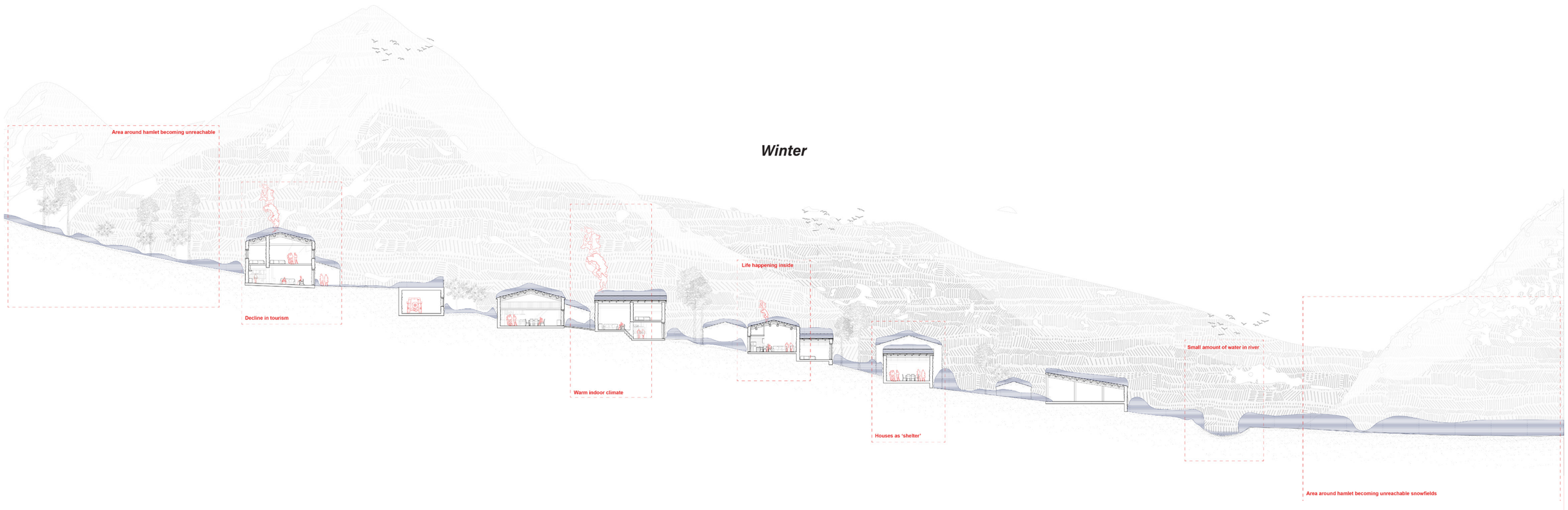


**HUMAN-BUILDING INTERACTION**
*Engagement*

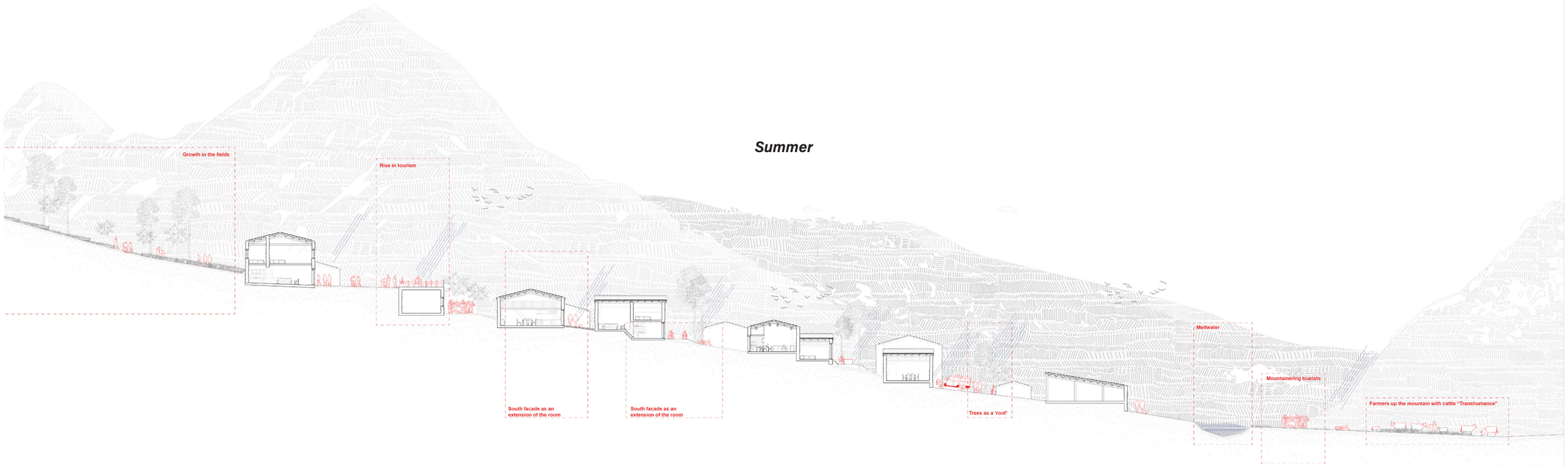
# *“Transhumance”*

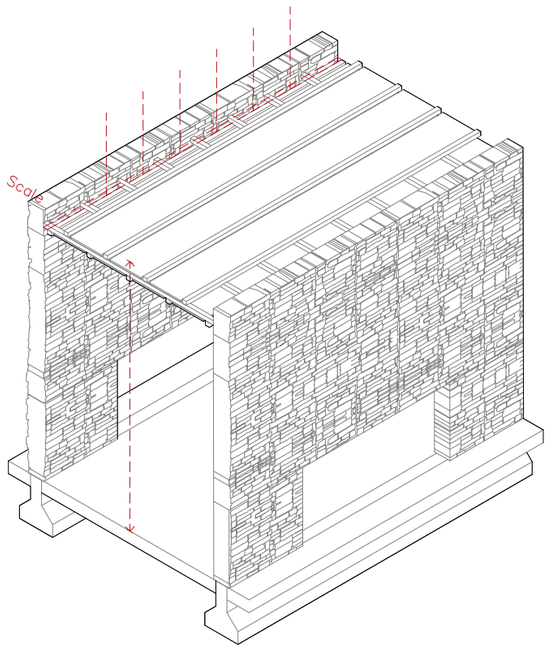
The action or practice of moving livestock from one grazing ground to another in a seasonal cycle, typically to lowlands in winter and highlands in summer.

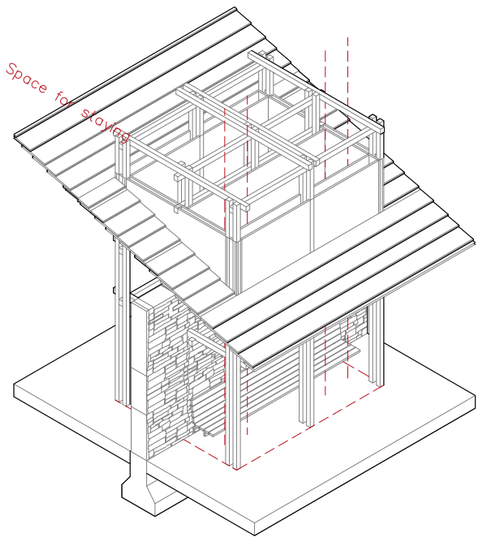
## *Winter*

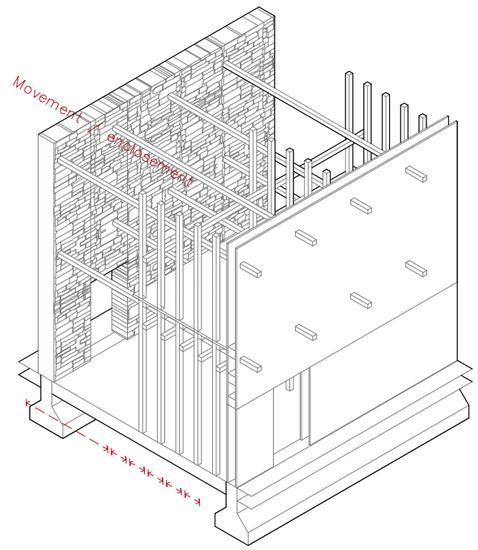


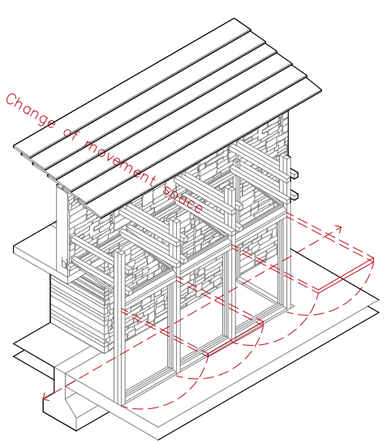

## *Summer*

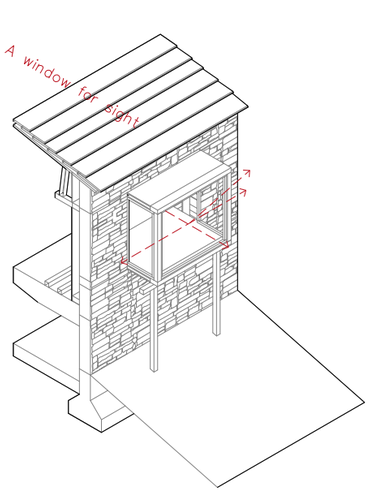


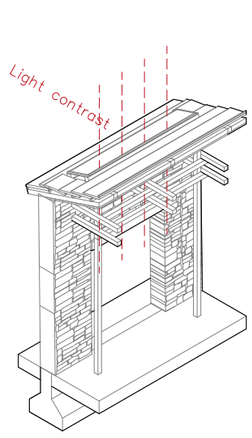

Scale

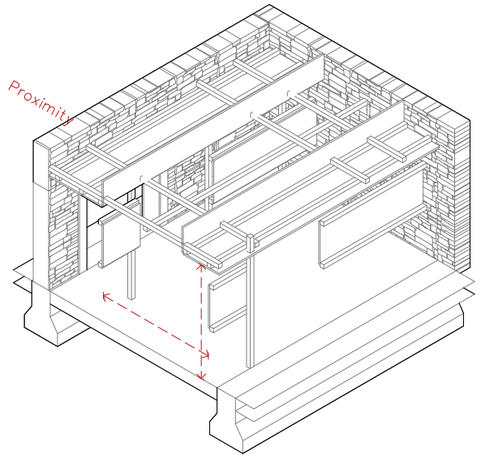

Space for staying

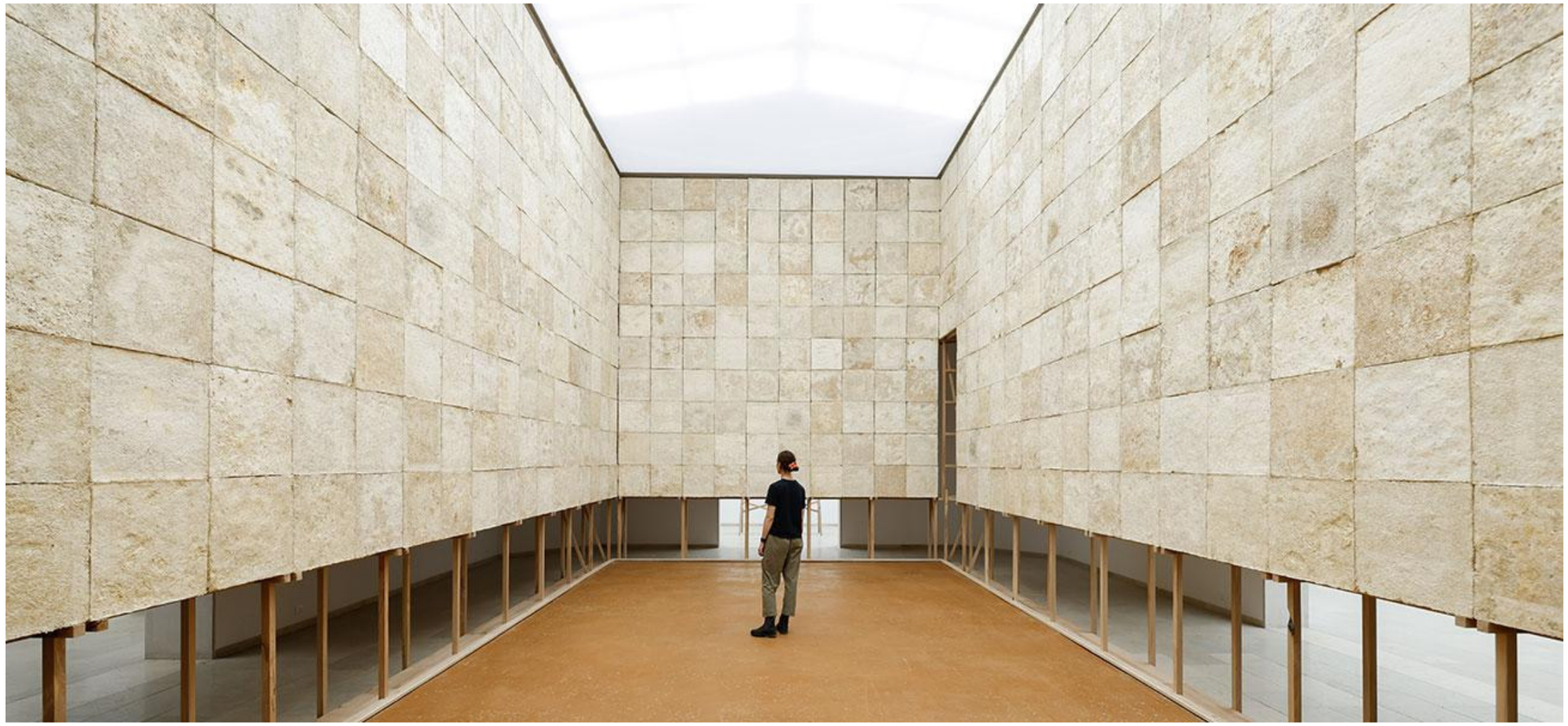

Movement in enablement

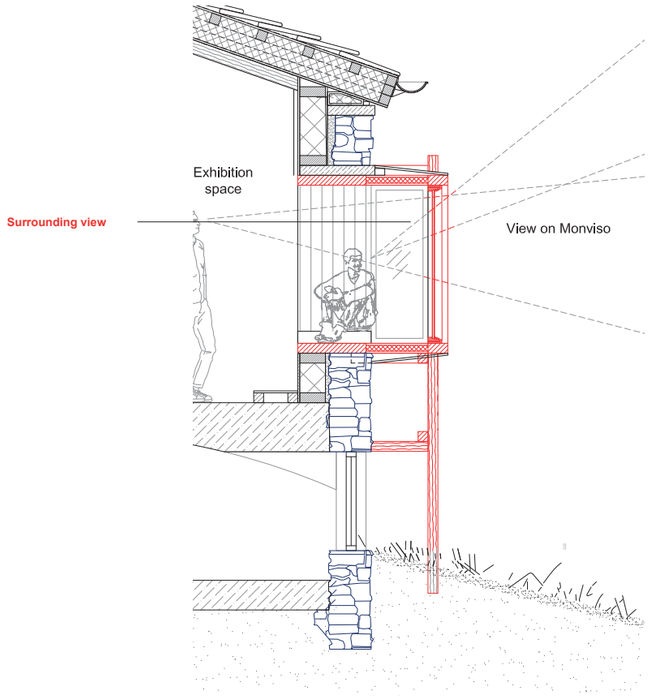

Change of movement space


A window for sight

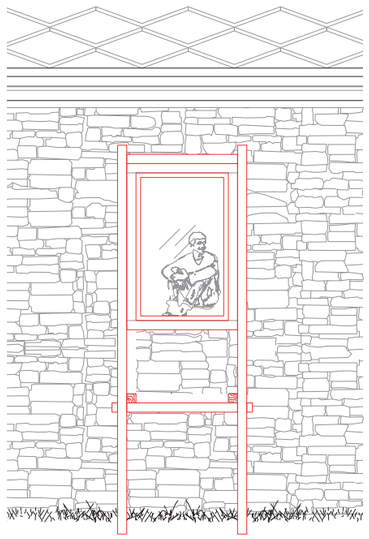

Light contrast


Proximity

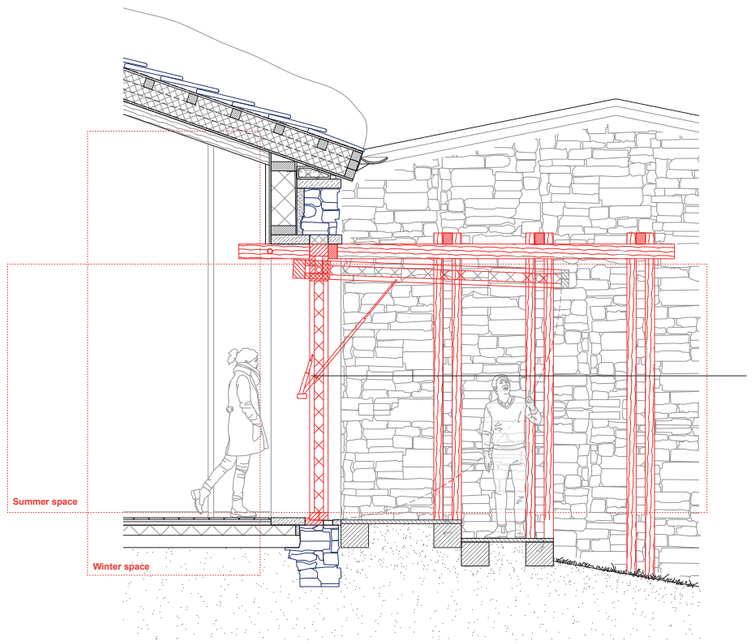




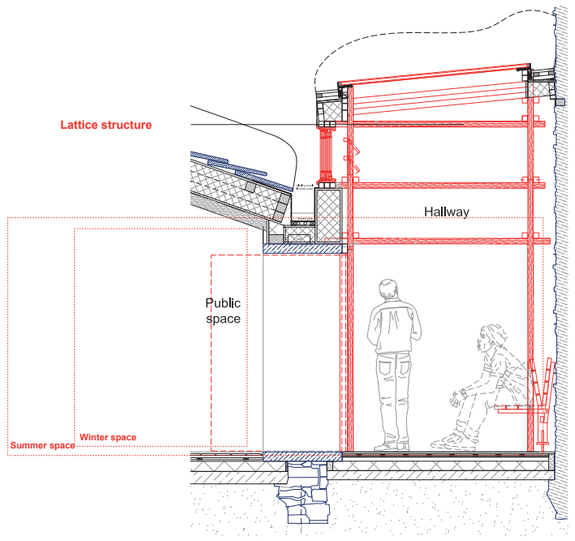

*Window*



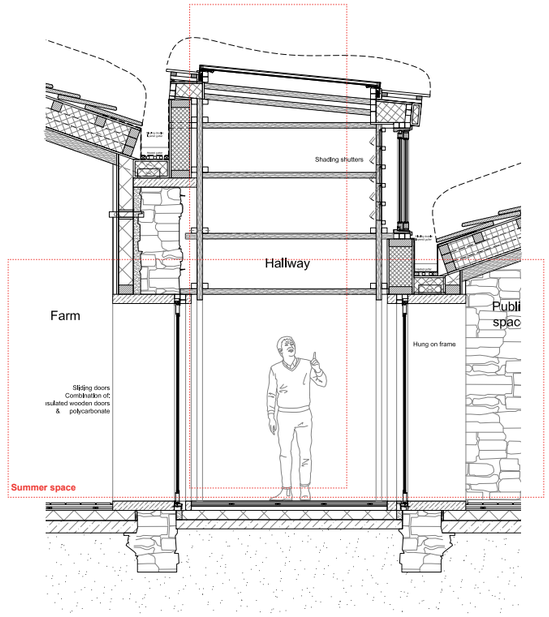
*Window*



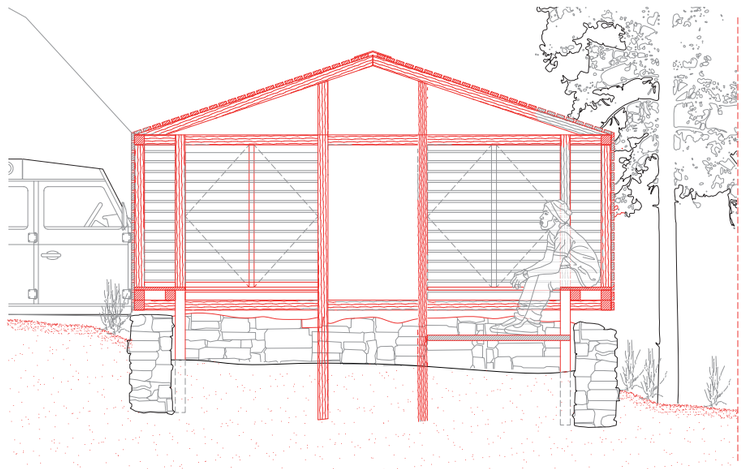

*South facade*




*Hallway 2*



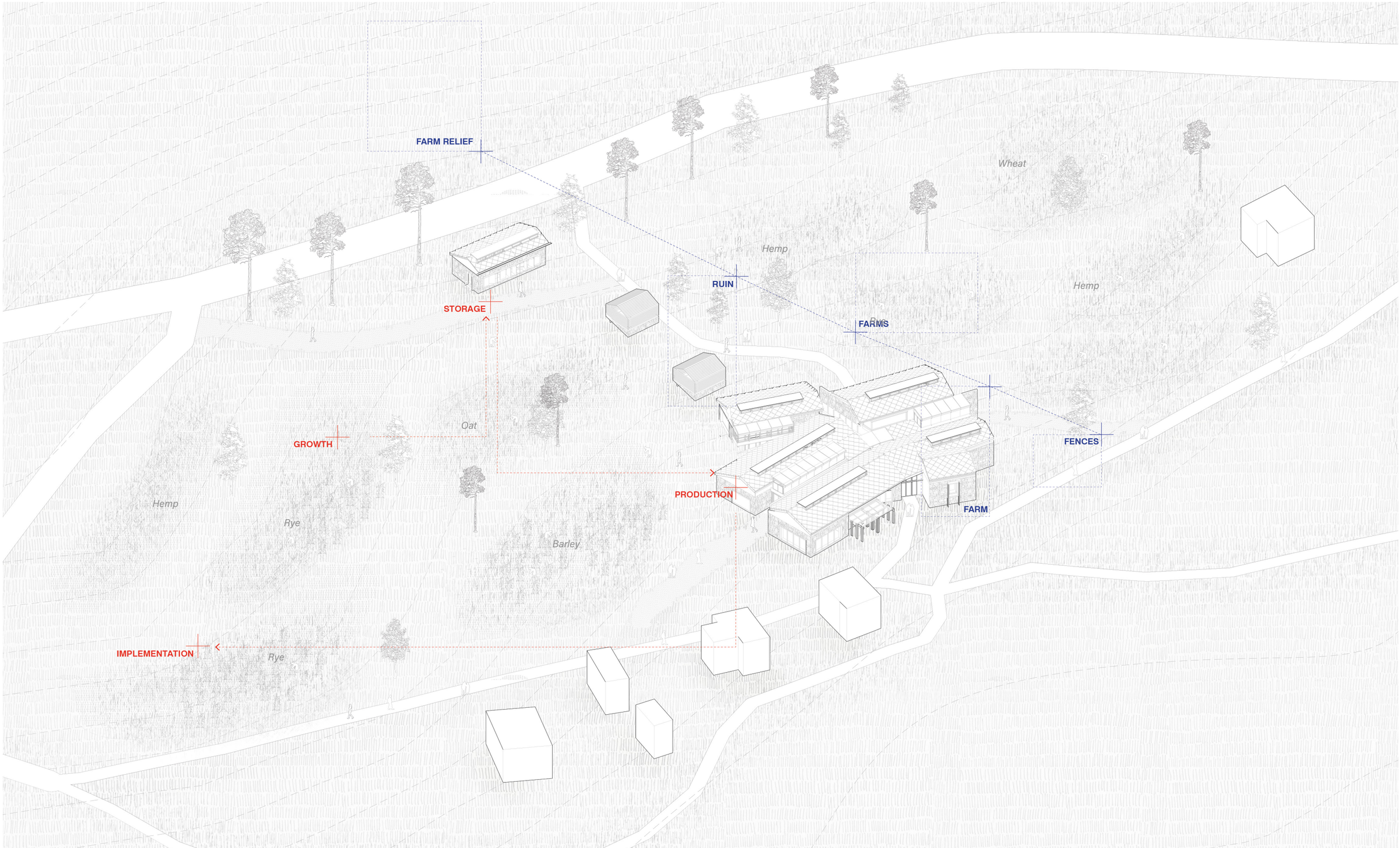

*Hallway*



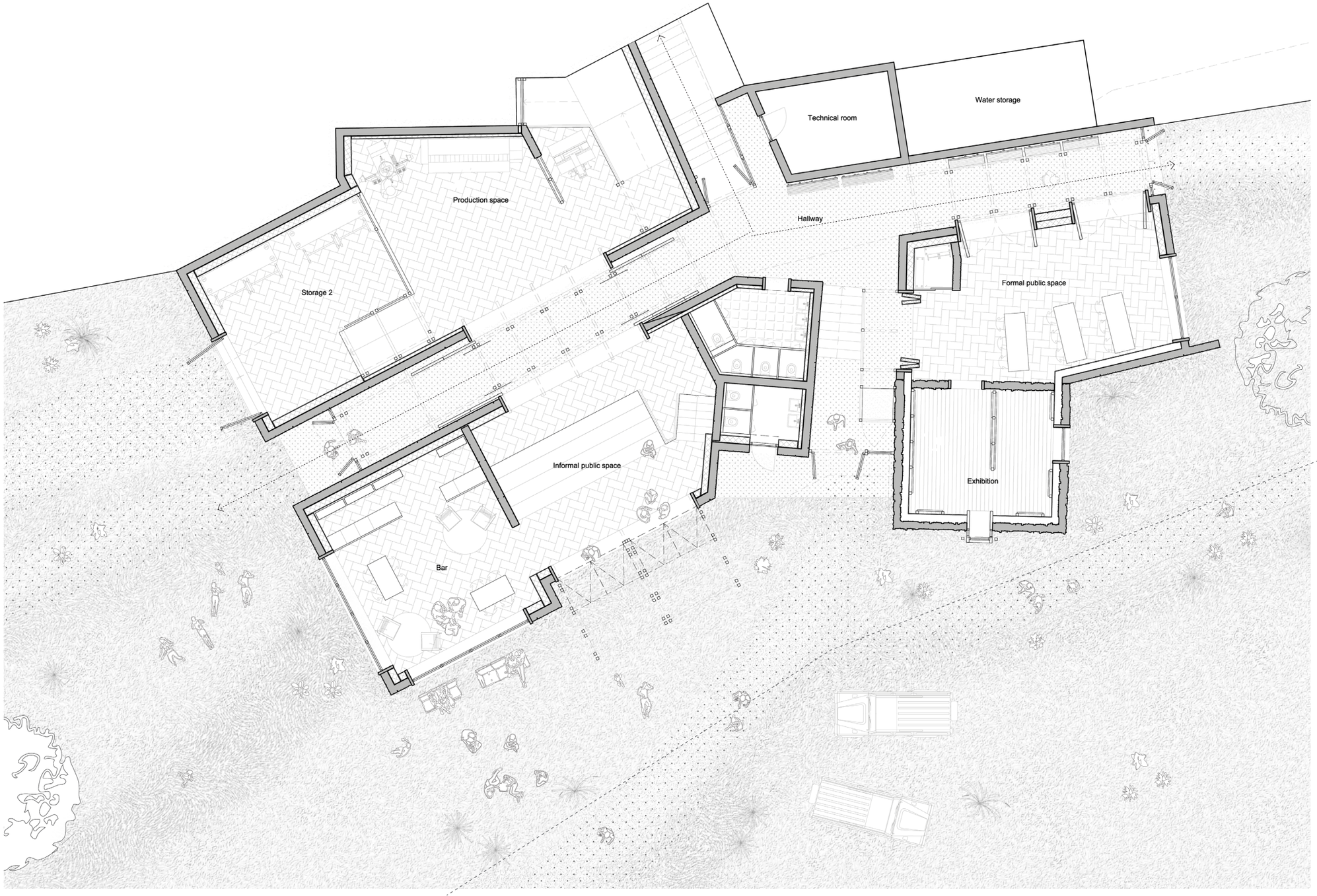
*Ruin*

*Side*

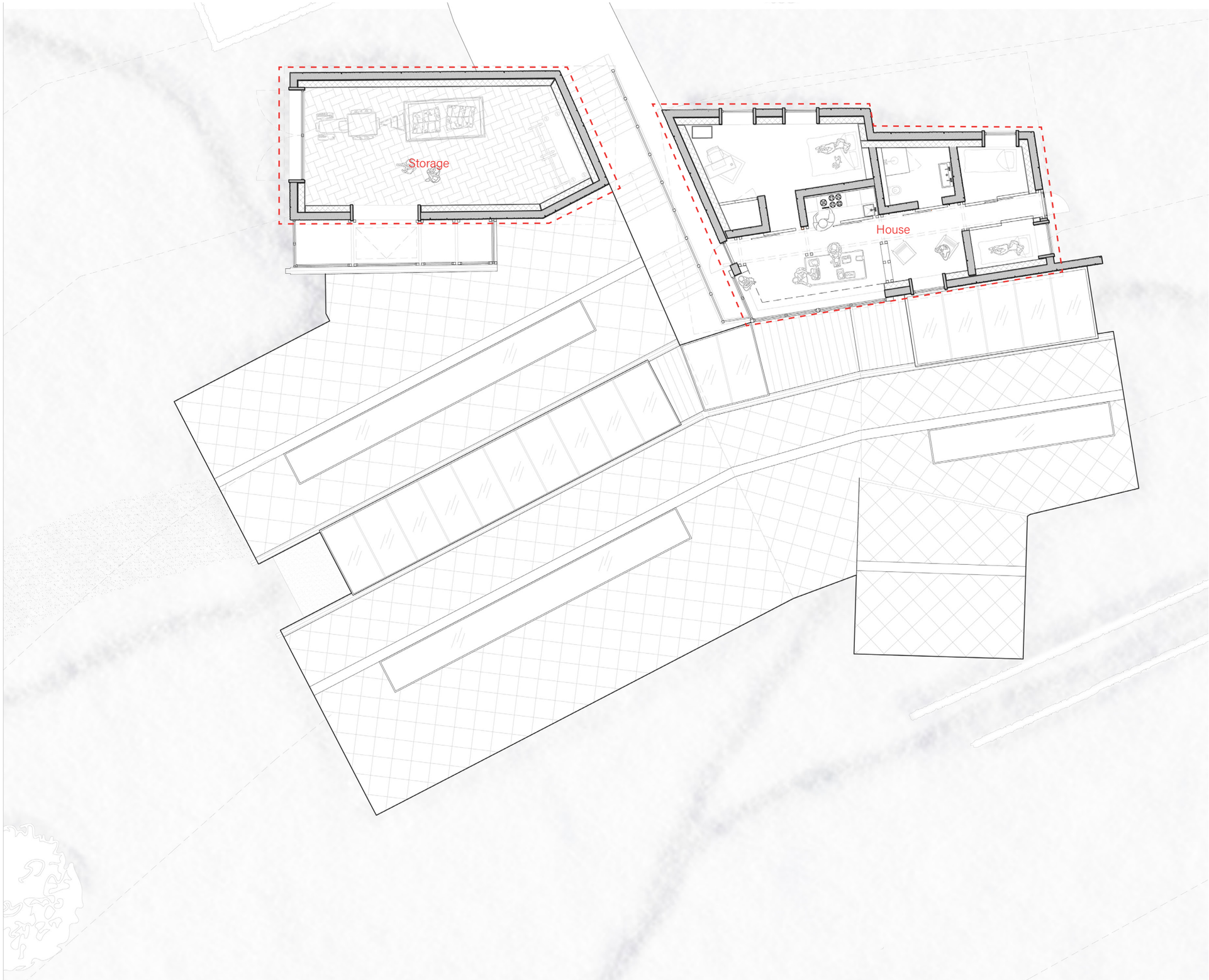
*Front*


FARM RELIEF
Wheat
Hemp
RUIN
Hemp
FARMS
STORAGE
Oat
GROWTH
FENCES
PRODUCTION
FARM
Hemp
Rye
Barley
IMPLEMENTATION
Rye

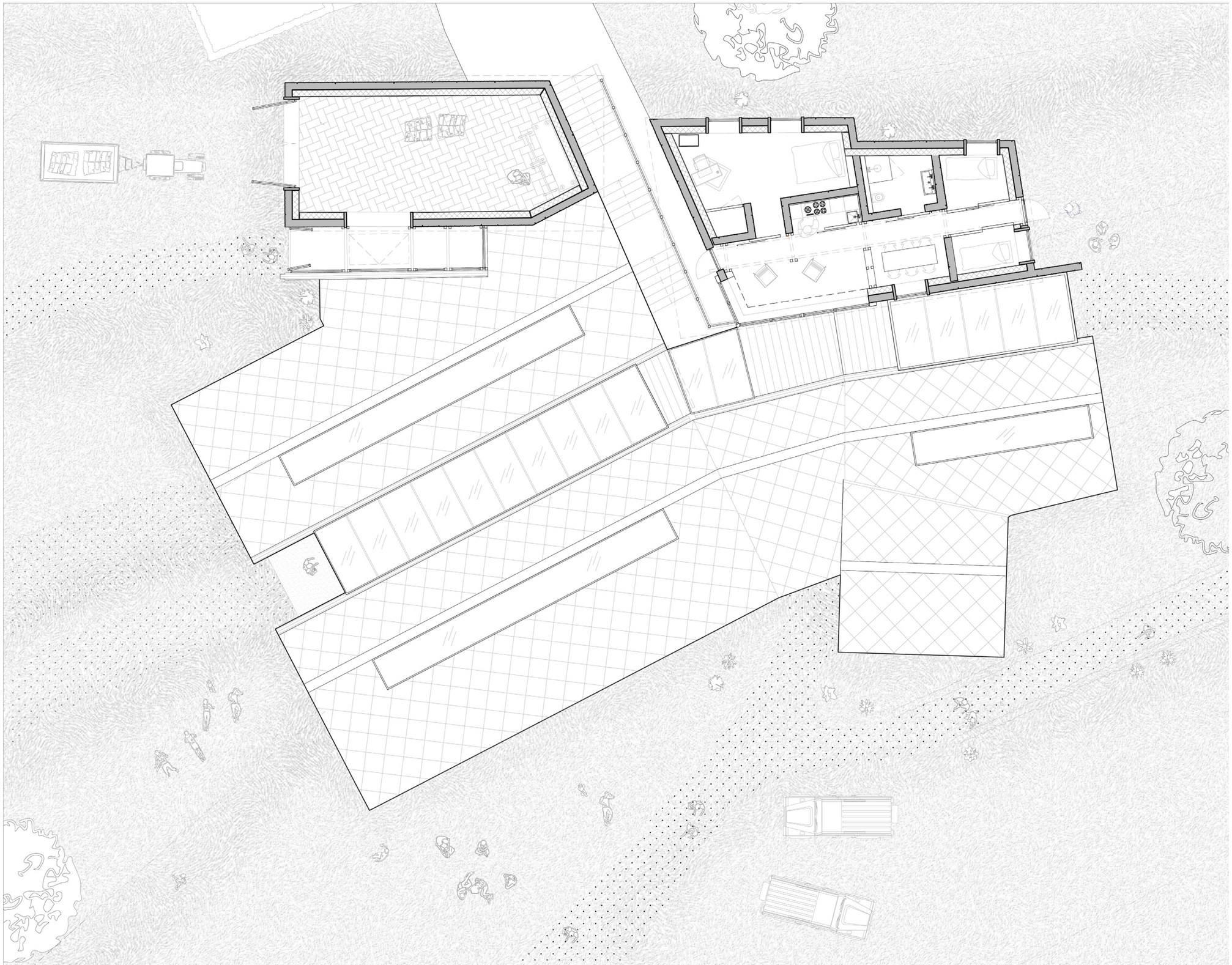

Bottom floor **Winter**



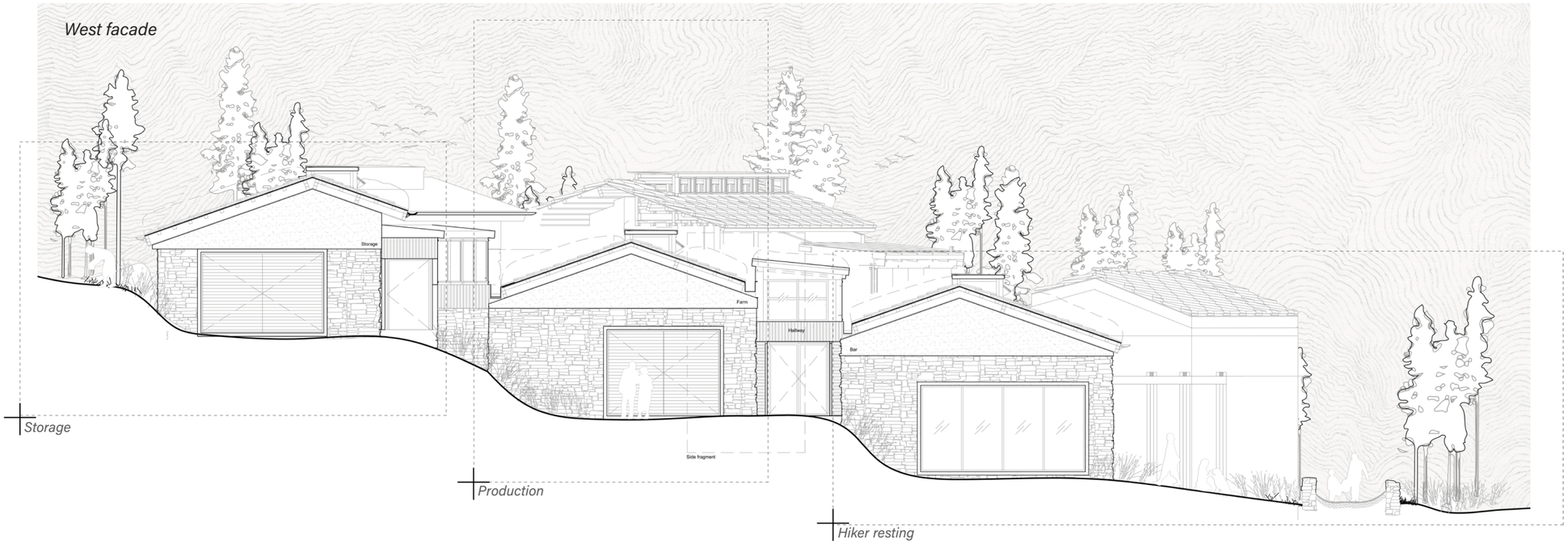

Bottom floor **Summer**

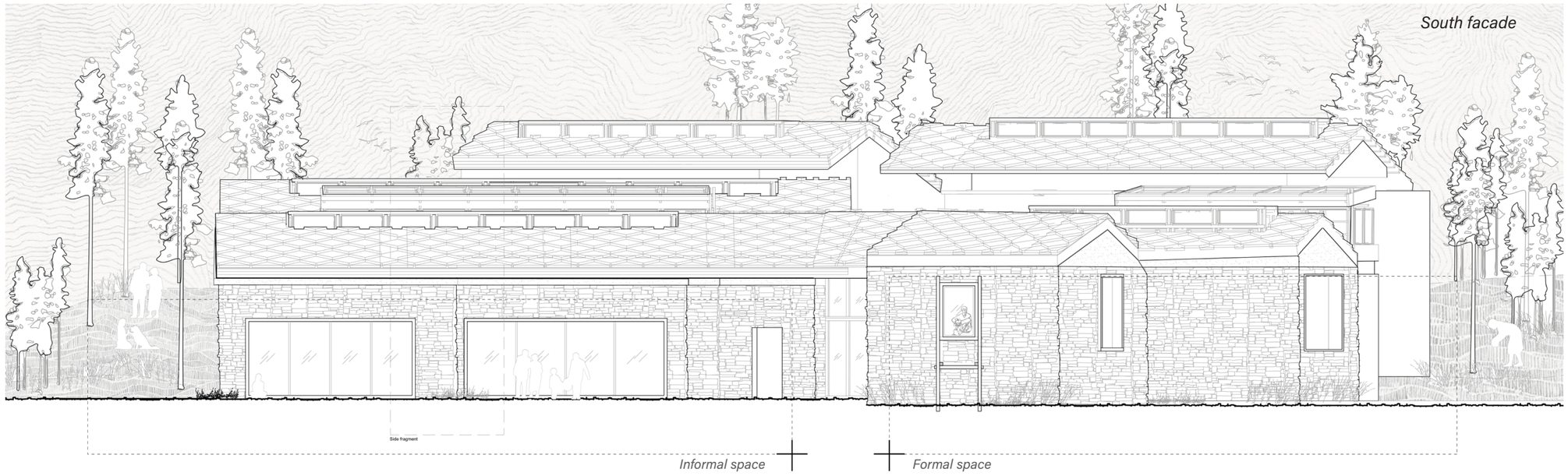


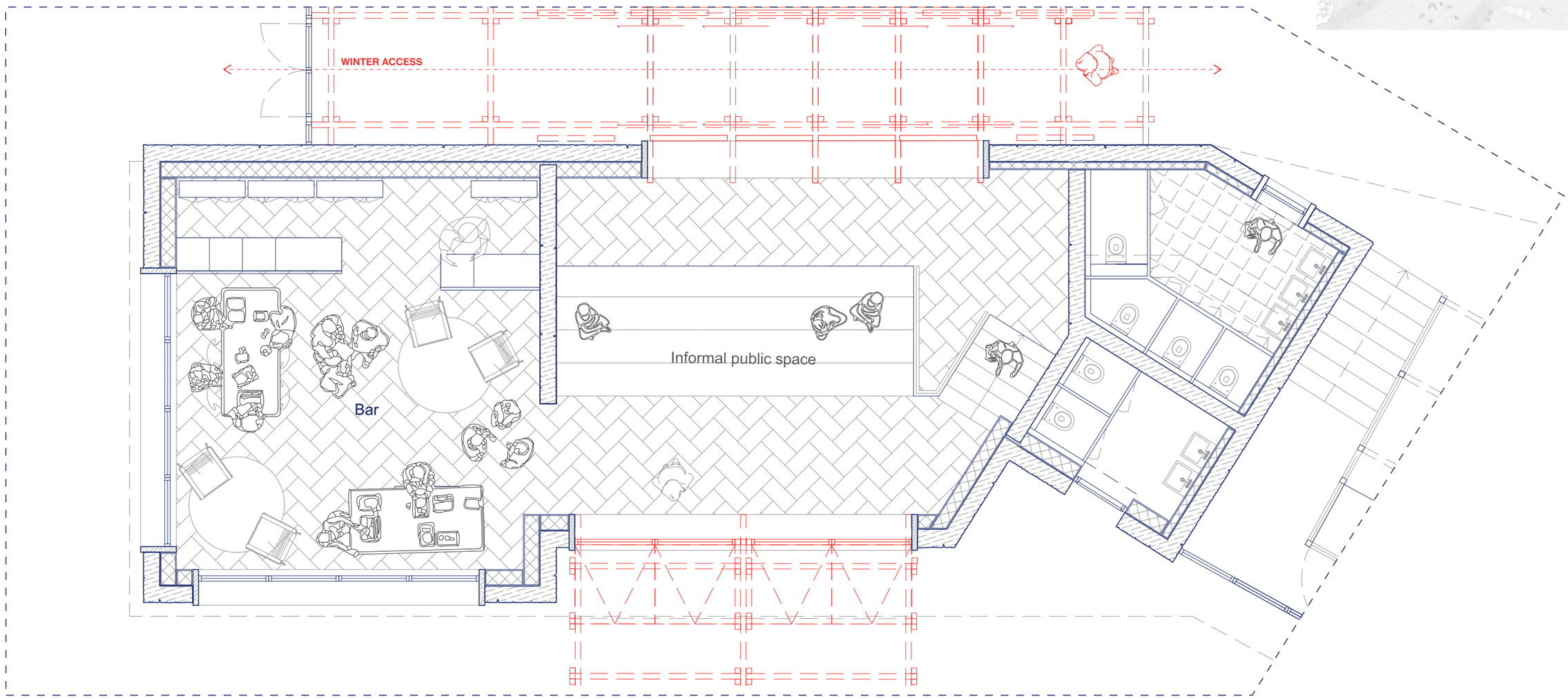

Top floor **Winter**

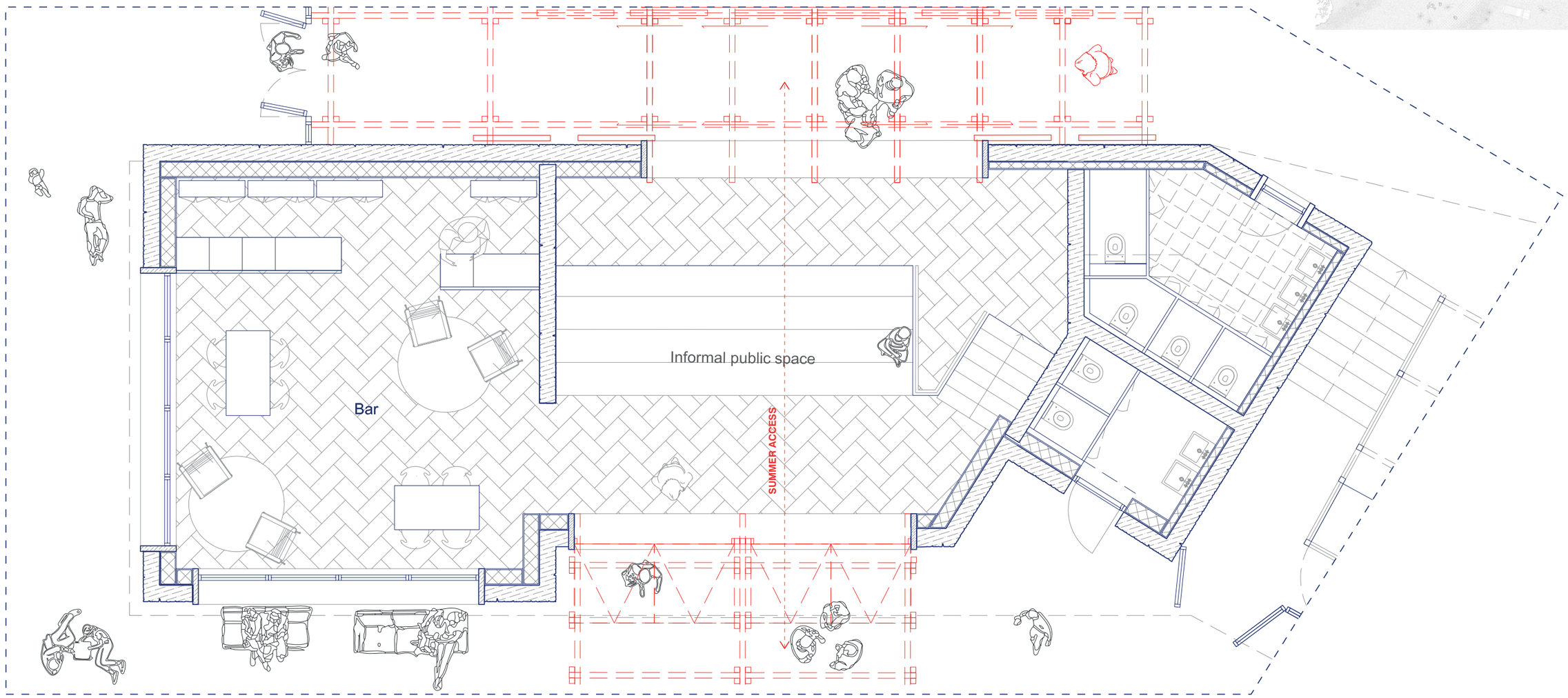


Top floor **Summer**

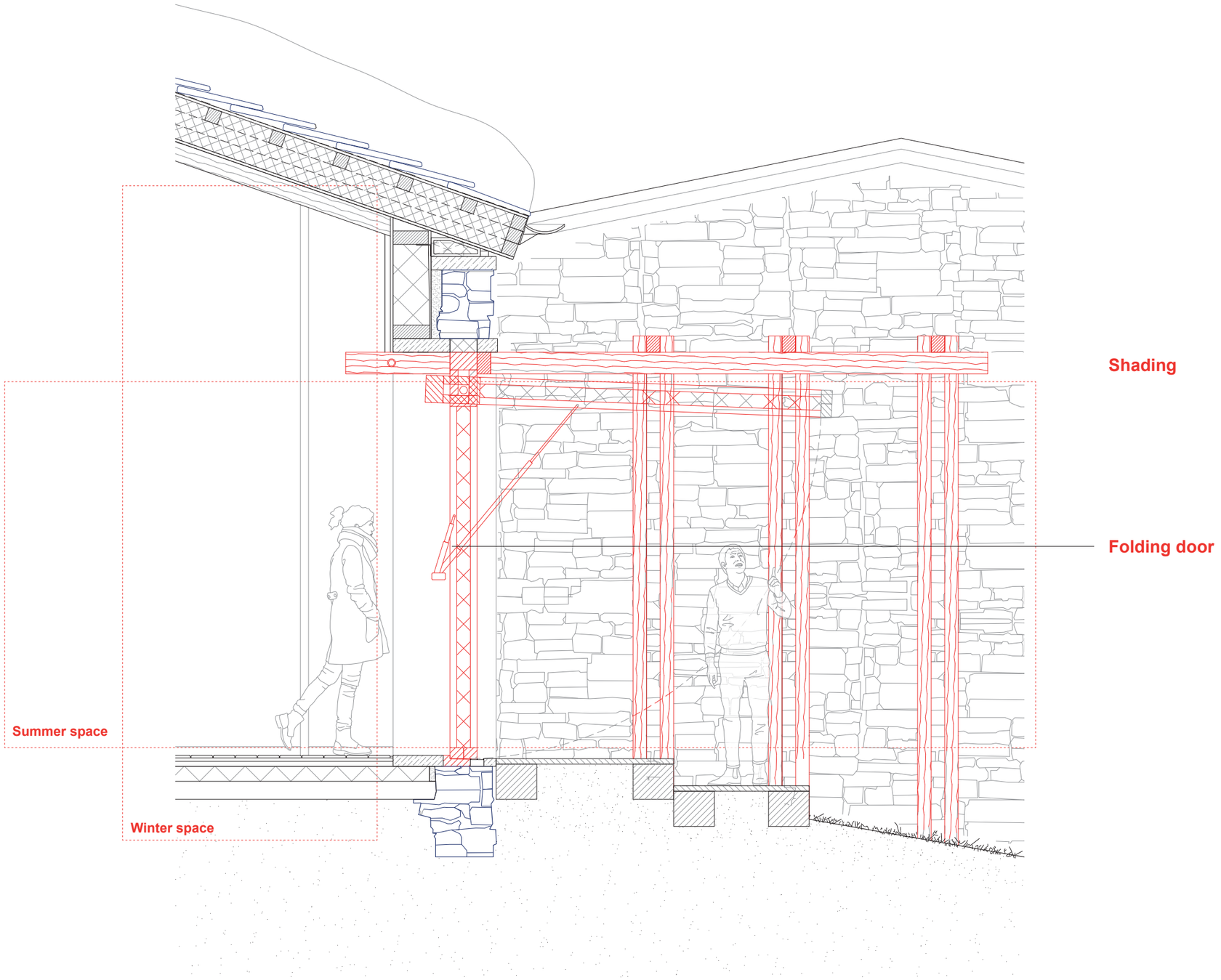

West facade
Storage
Farm
Hallway
Bar
Side fragment
Storage
Production
Hiker resting


South facade
Side fragment
Informal space
Formal space


WINTER ACCESS
Informal public space
Bar



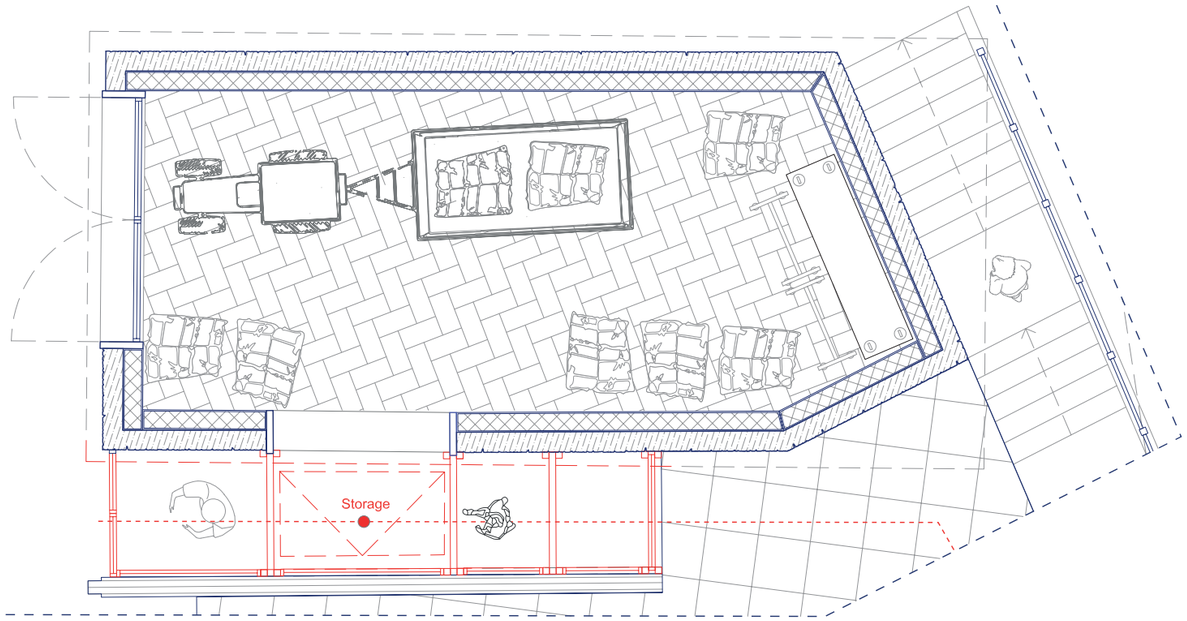

Informal public space **Summer**



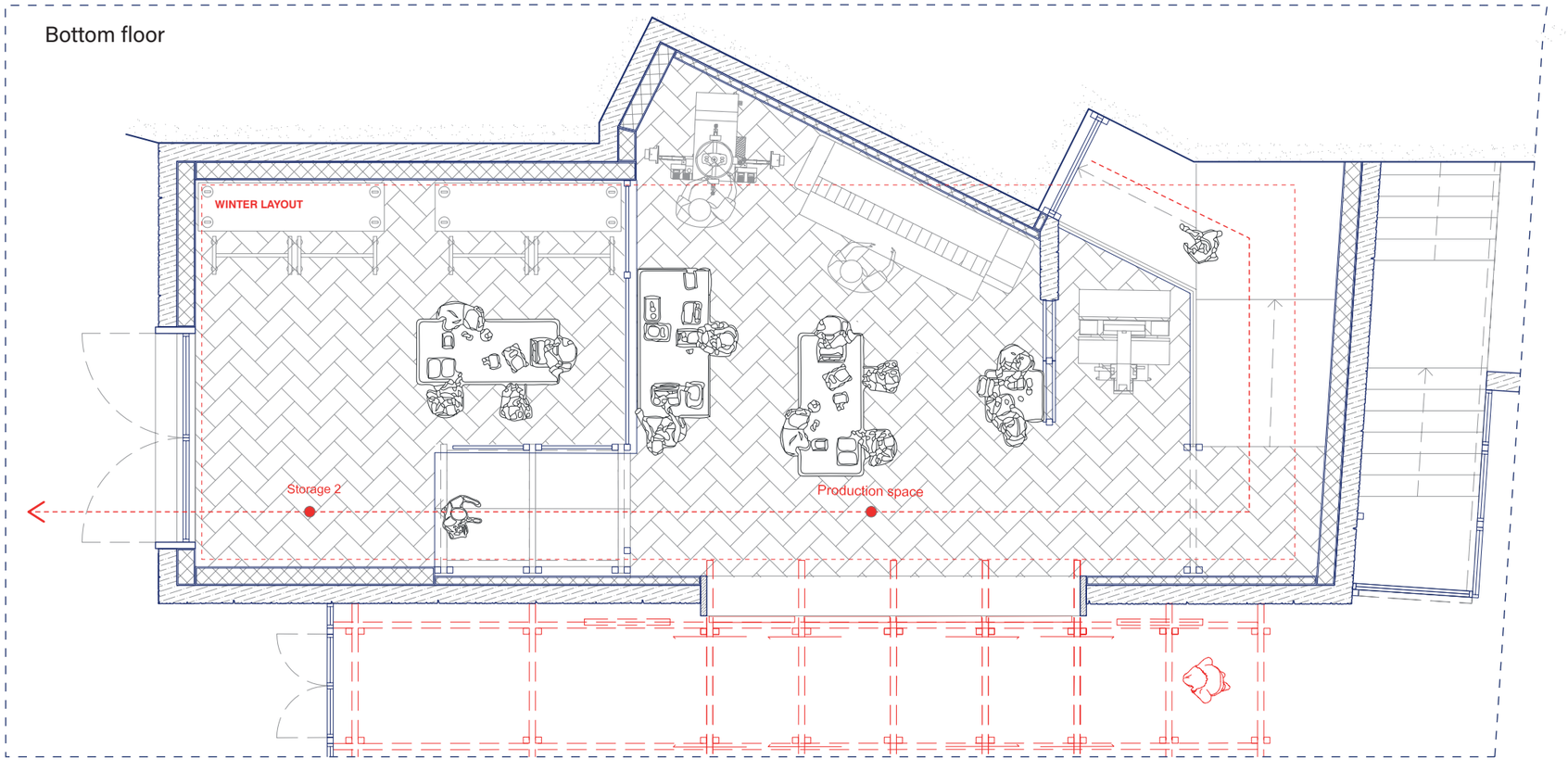

Facade fragment **1:20**

Front facade

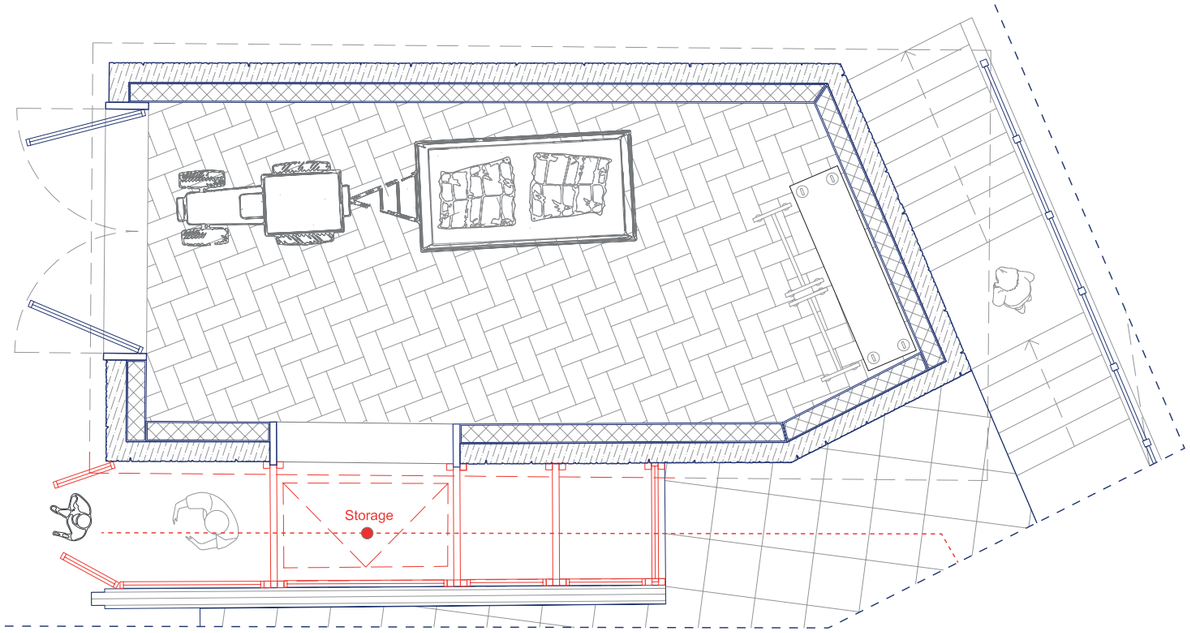
Top floor



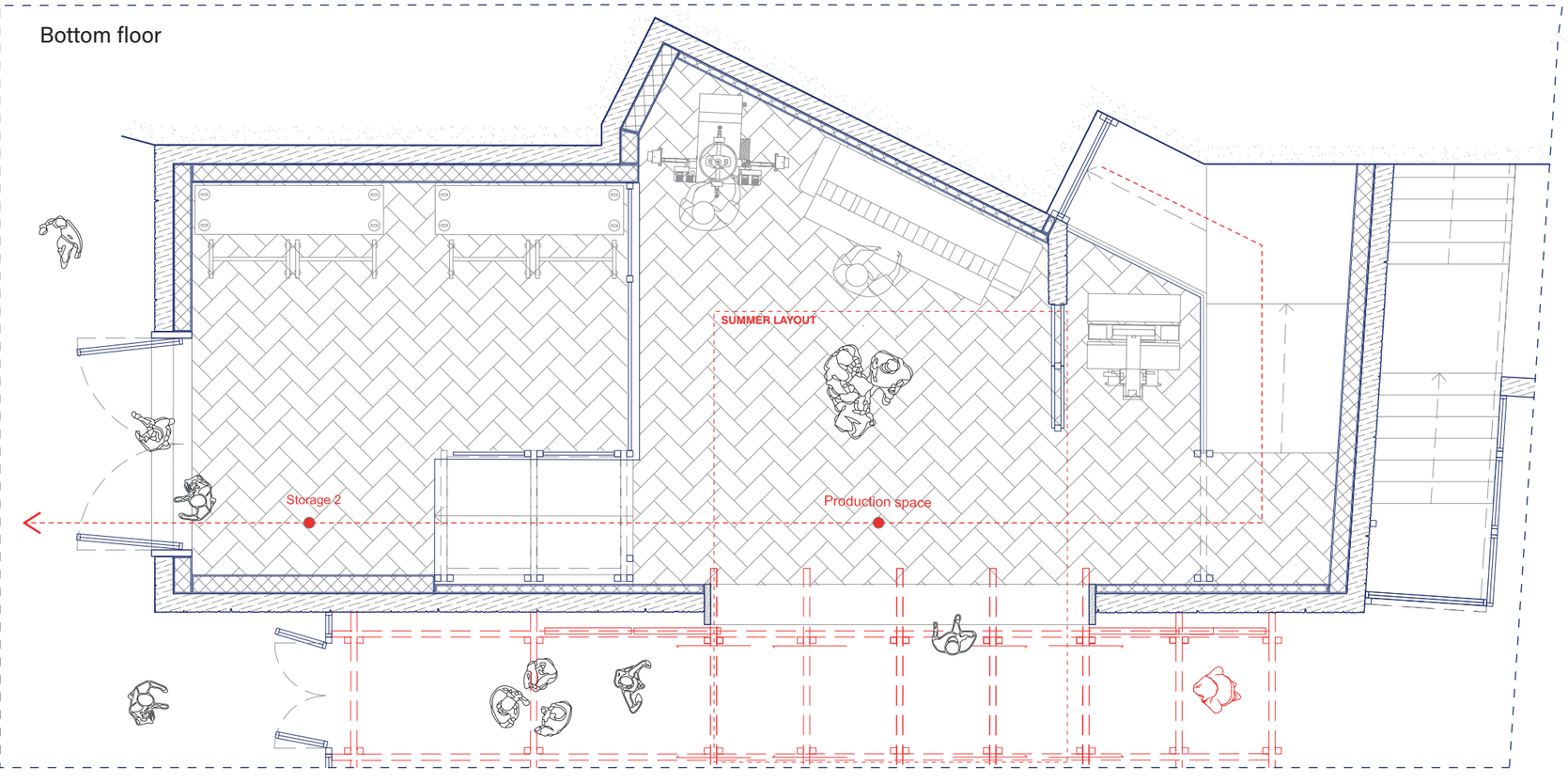

Bottom floor

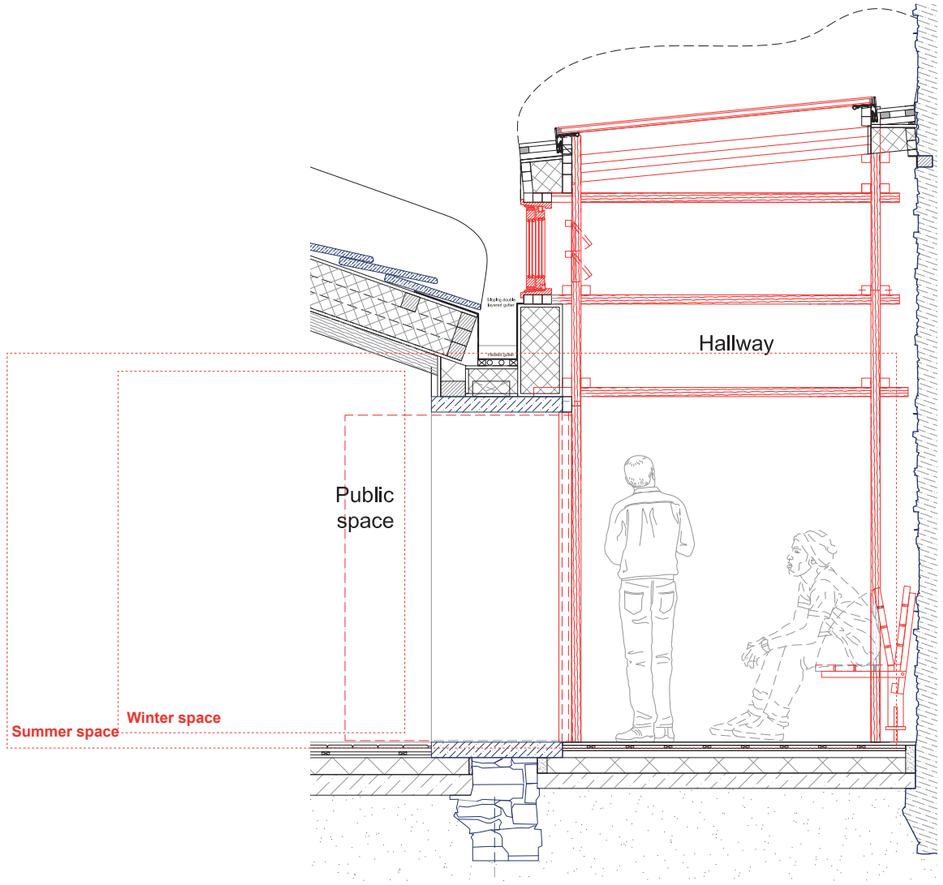


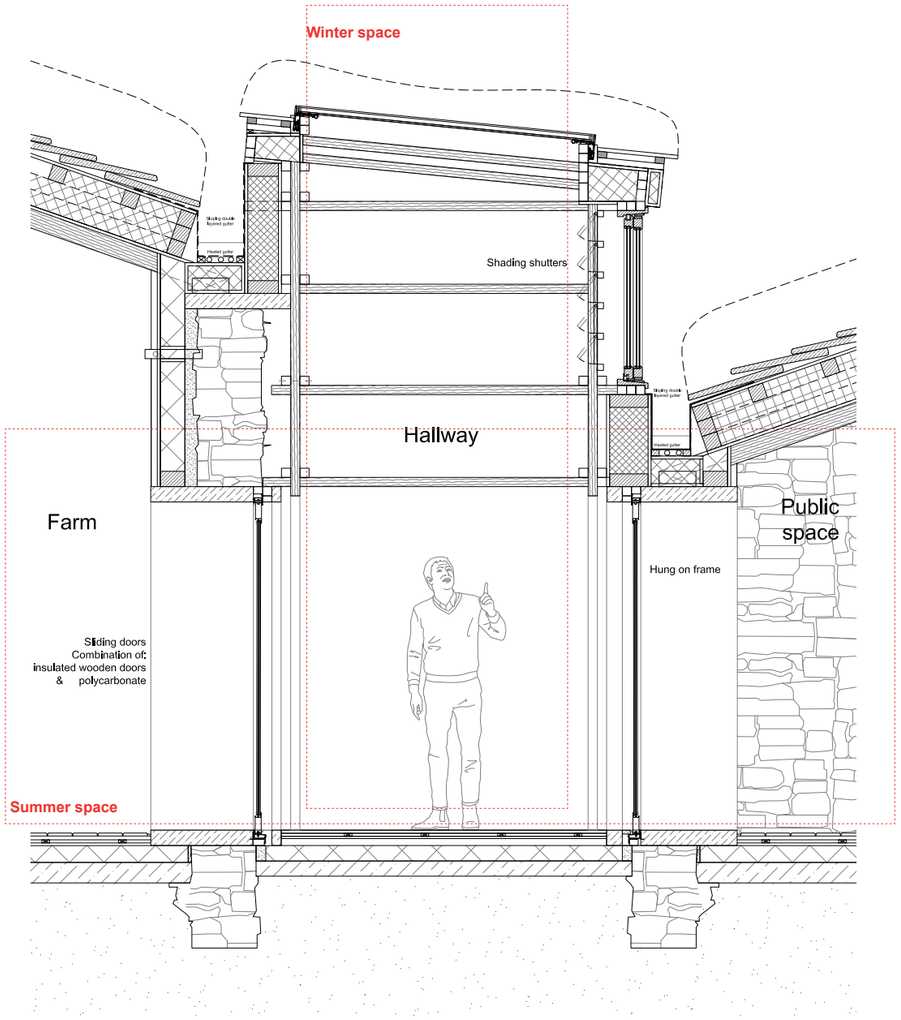
Top floor




Bottom floor

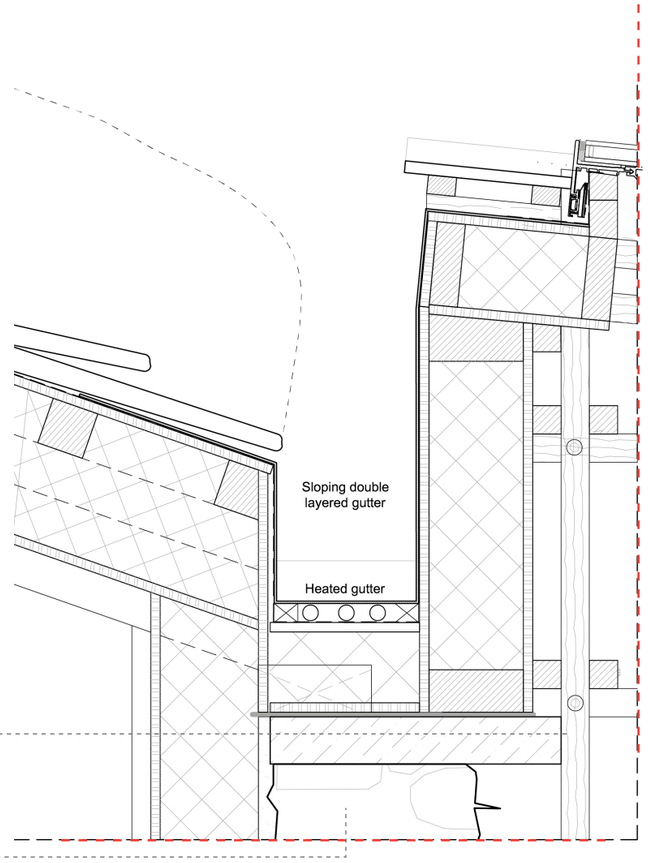




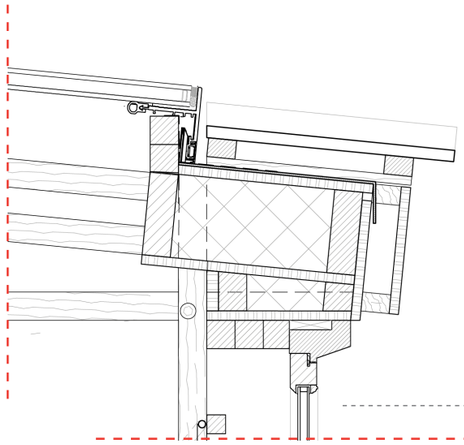

Hallway fragment

Hallway




Lattice structure

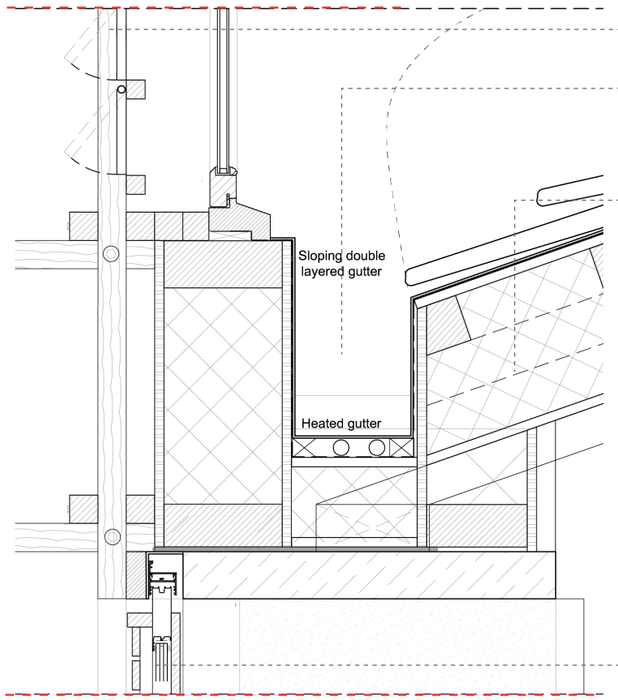
| | |
|---|---|
| Columns | 60x60mm |
| Fibre board | 18mm * |
| Vapour barrier | 2mm |
| Fibre insulation | 150mm * |
| Clay | 10-50 mm |
| Stone | 300 mm |



Triple glaze sliding window

Shutters

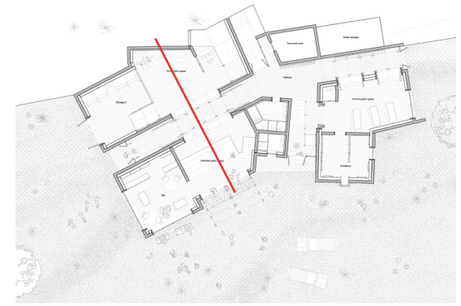
Heated gutter




| | |
|---|---|
| Ceiling beams | 120x60mm |
| Fibre board | 18mm * |
| Vapour barrier | 2mm |
| Fibre insulation & vertical beams | 200mm * |
| Fibre insulation & horizontal beams | 100mm |
| Fibre board | 18mm |
| Water barrier | 2mm |
| Stone slates | 5mm |

Sliding doors

* Based off different plant fibres, depending on what is harvested: hemp, grain, grass



P=0+2600

P=0

P=0-1800




**WINTER LAYOUT**

P=0+2600

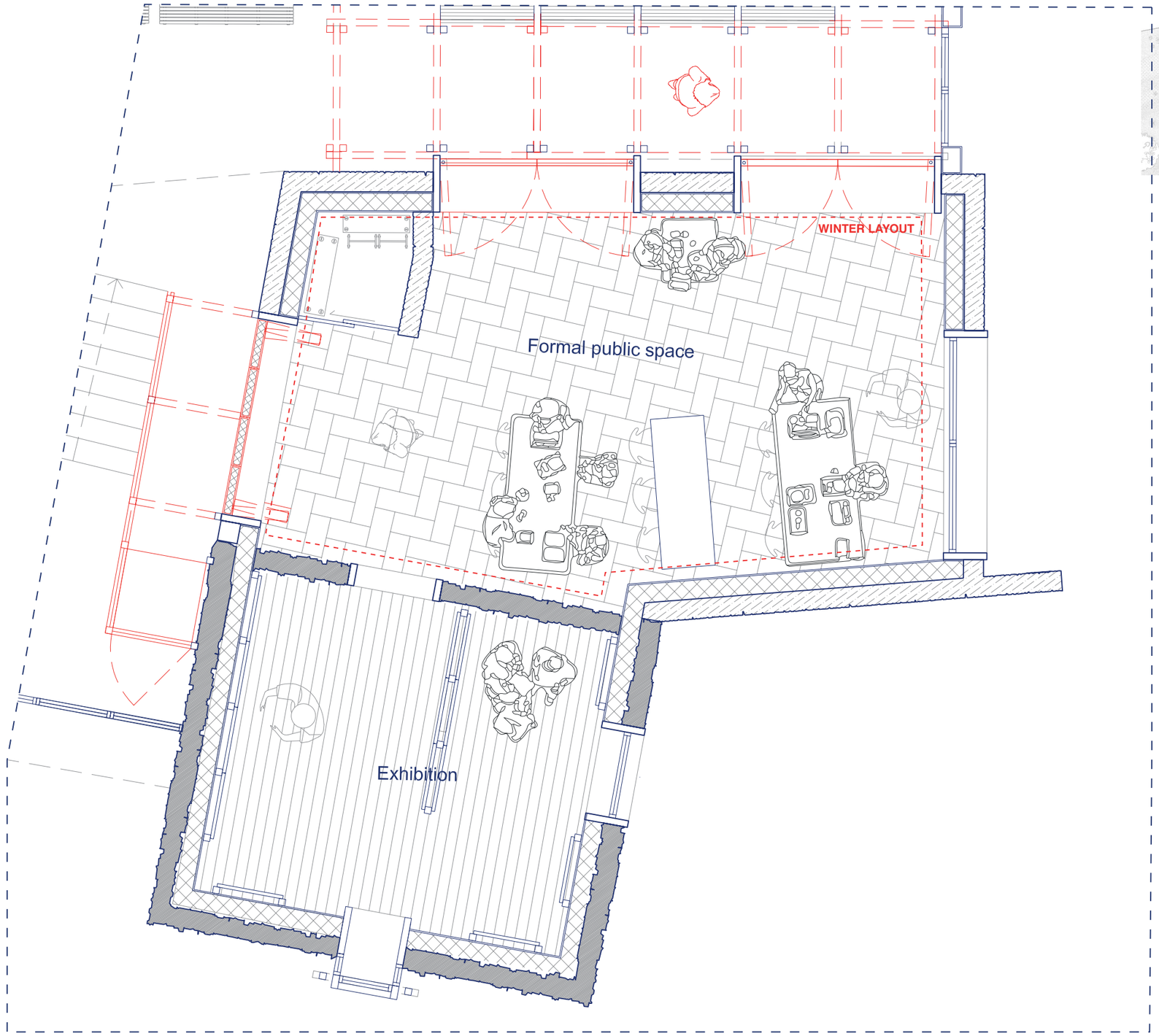
P=0

P=0-1800

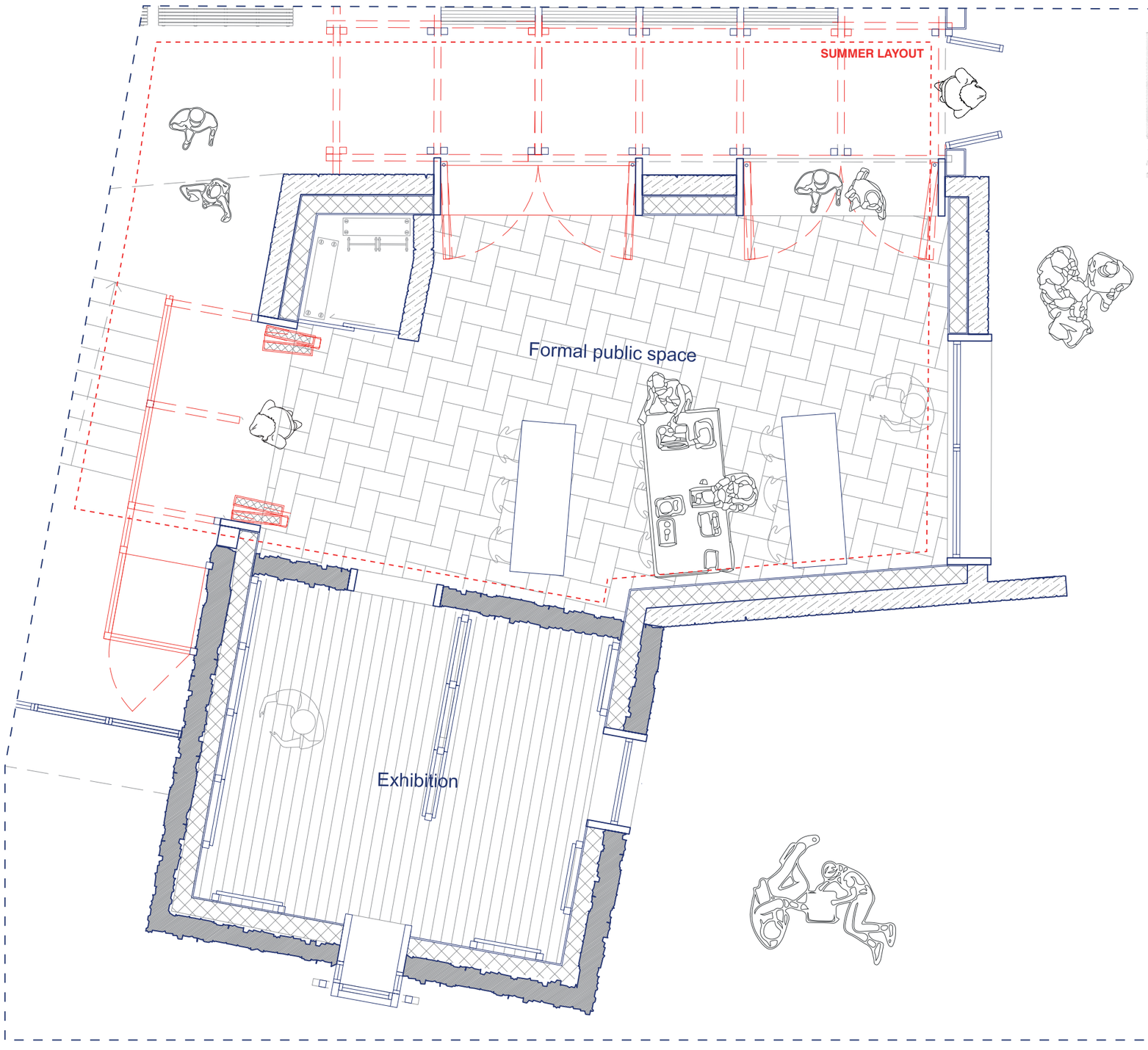


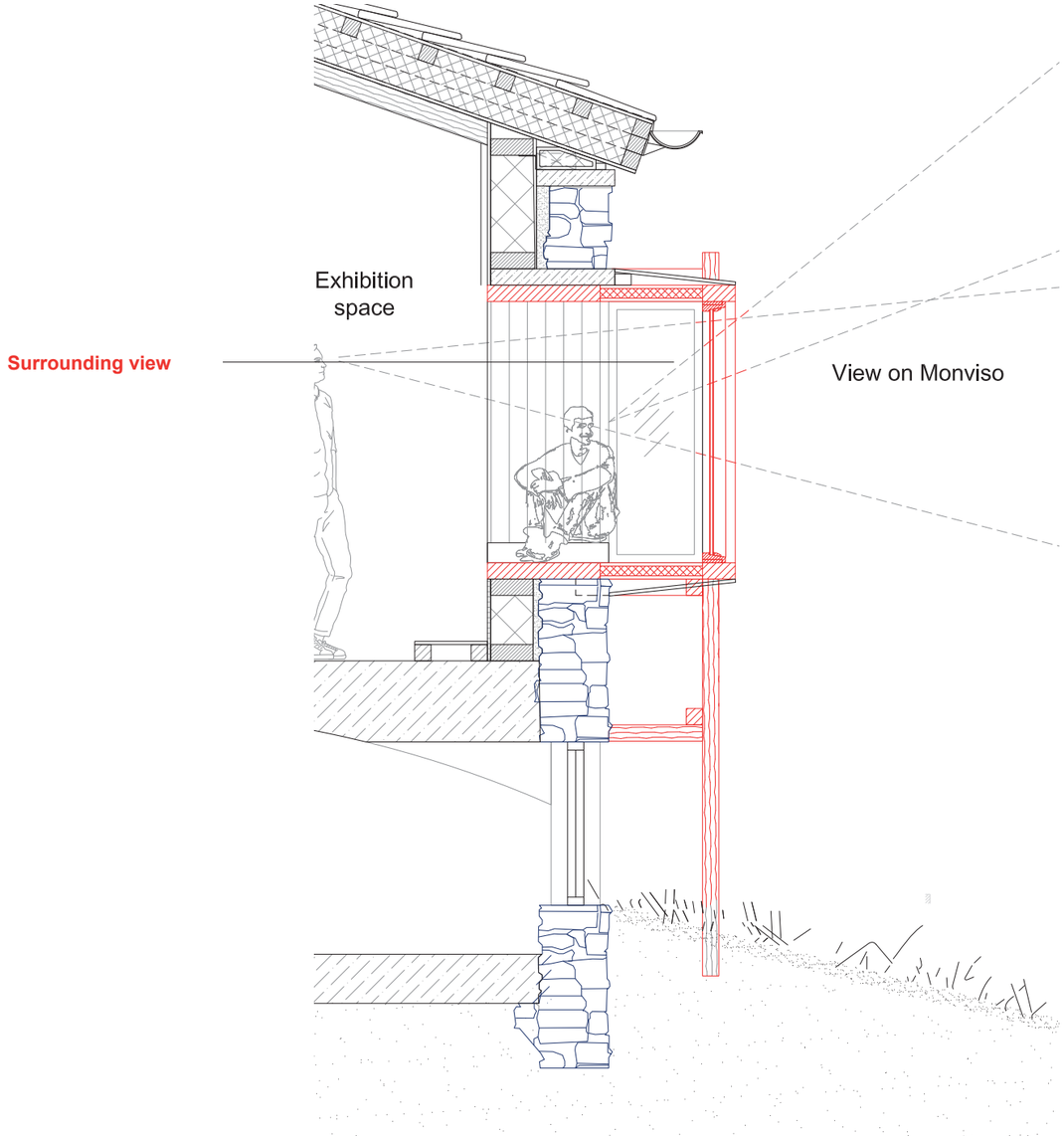

**SUMMER LAYOUT**

Section A

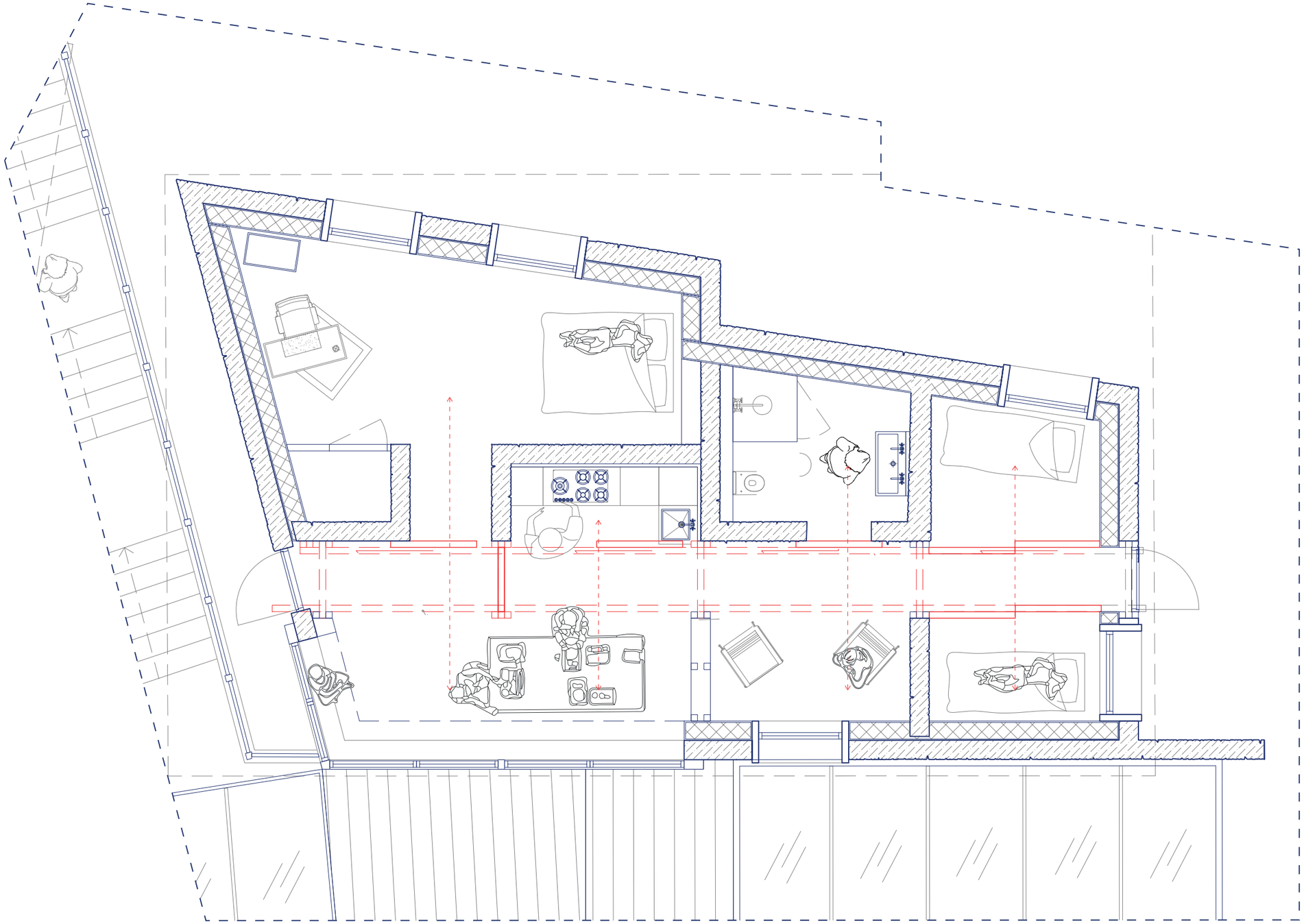


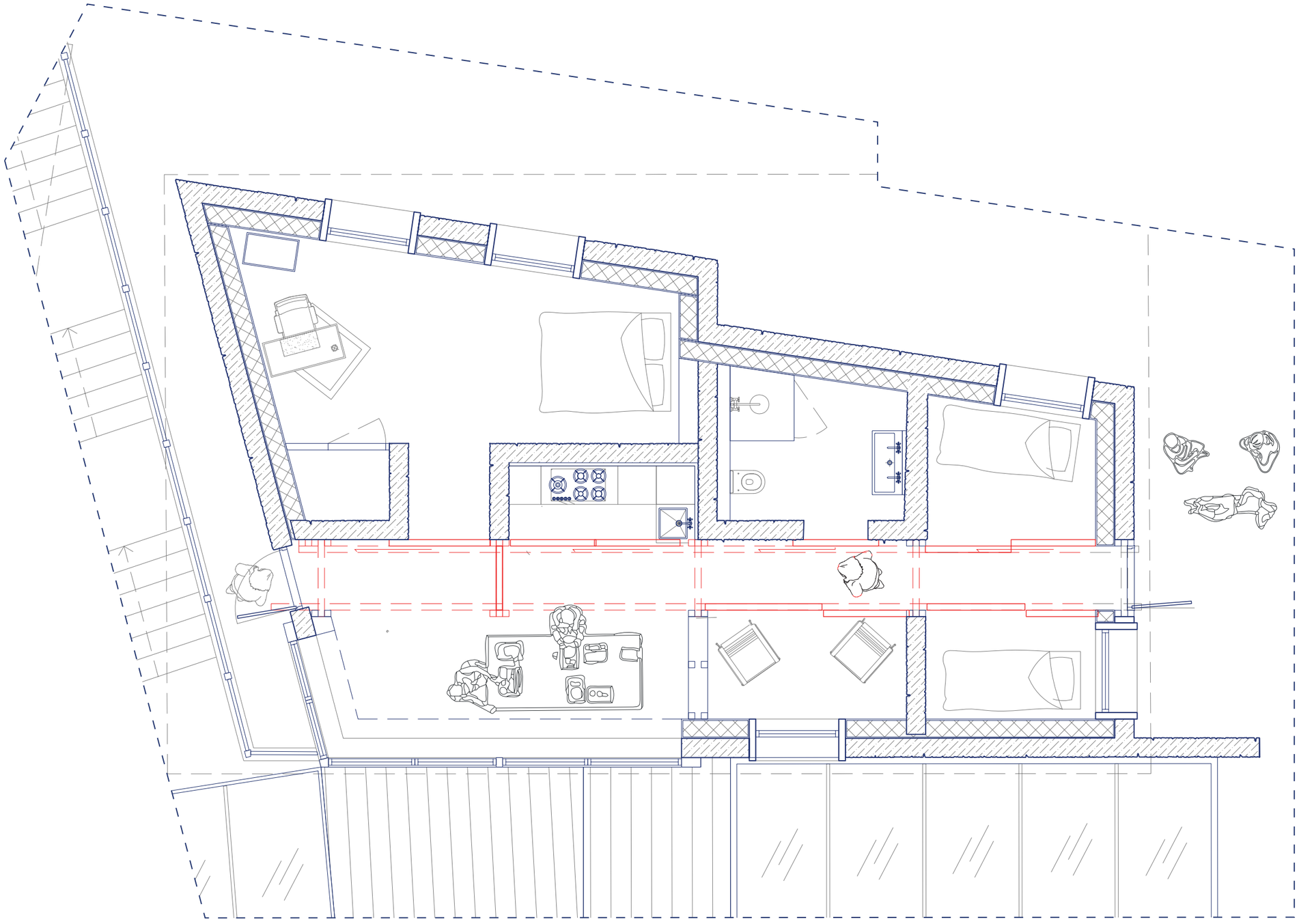

Formal public space **Summer**

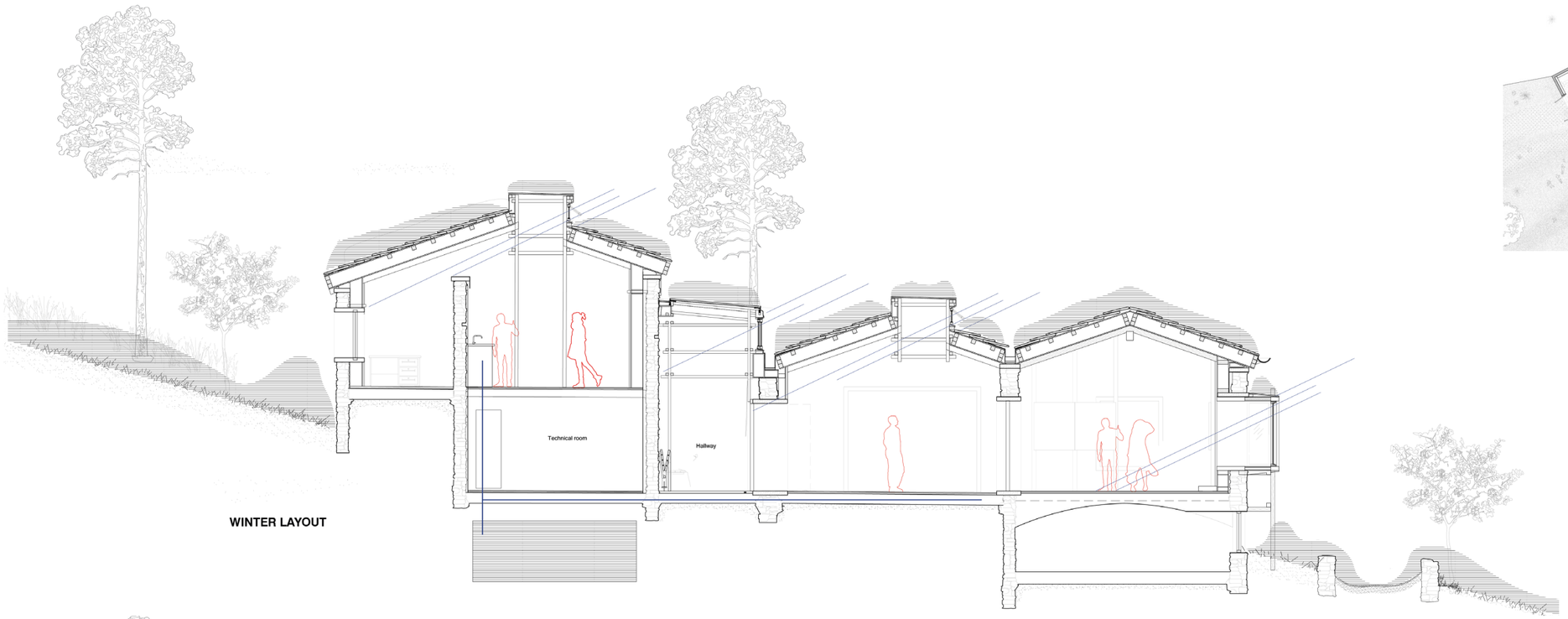

SUMMER LAYOUT
Formal public space
Exhibition



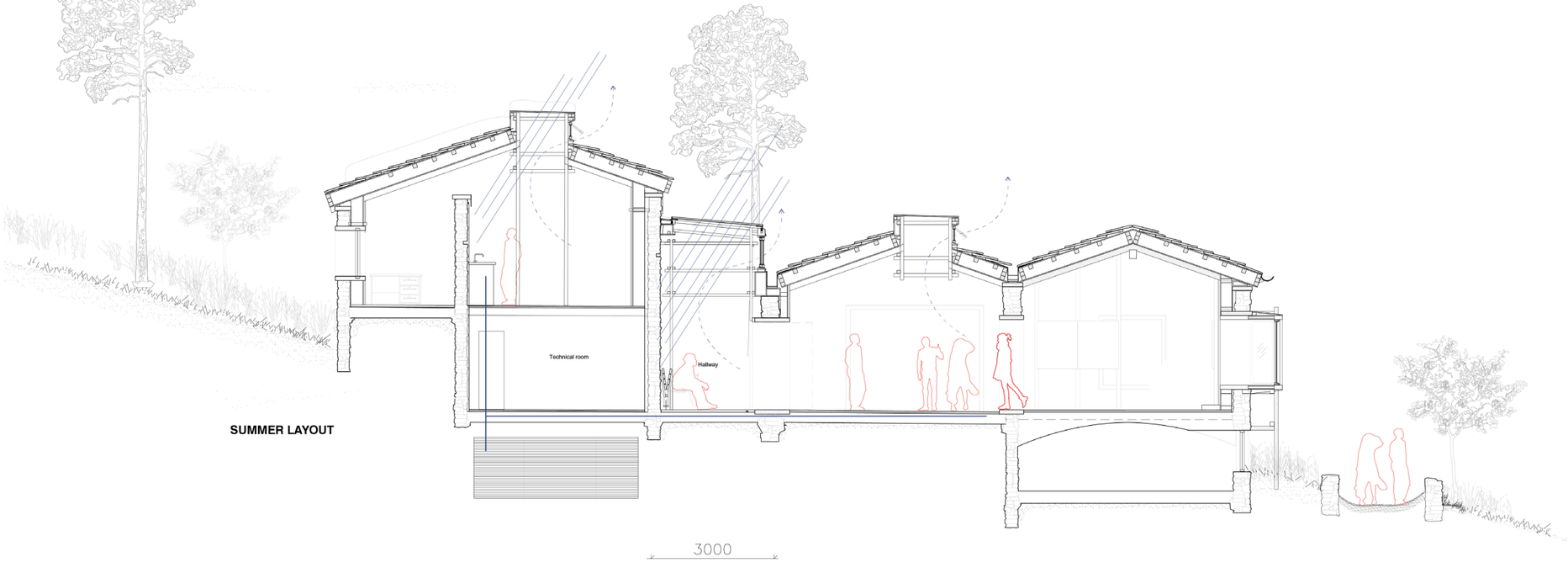

Window fragment **1:20**



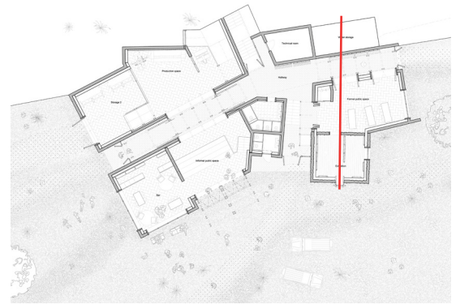




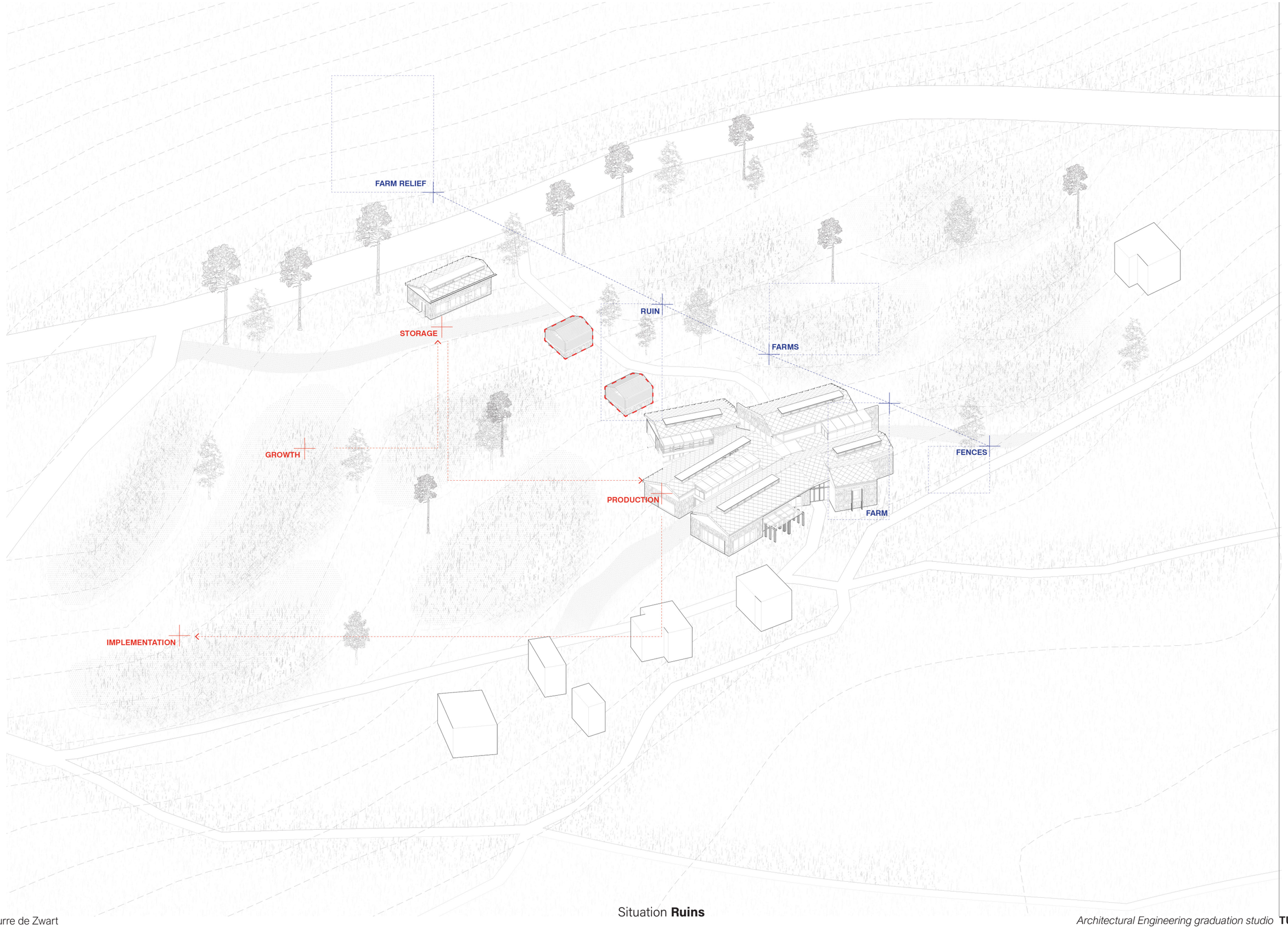

**WINTER LAYOUT**




**SUMMER LAYOUT**



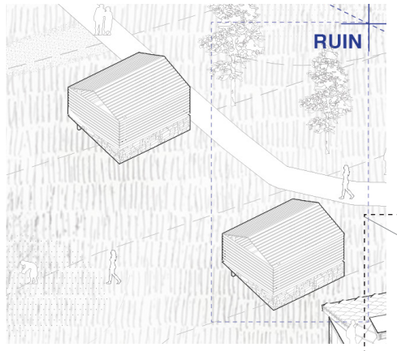
Section B

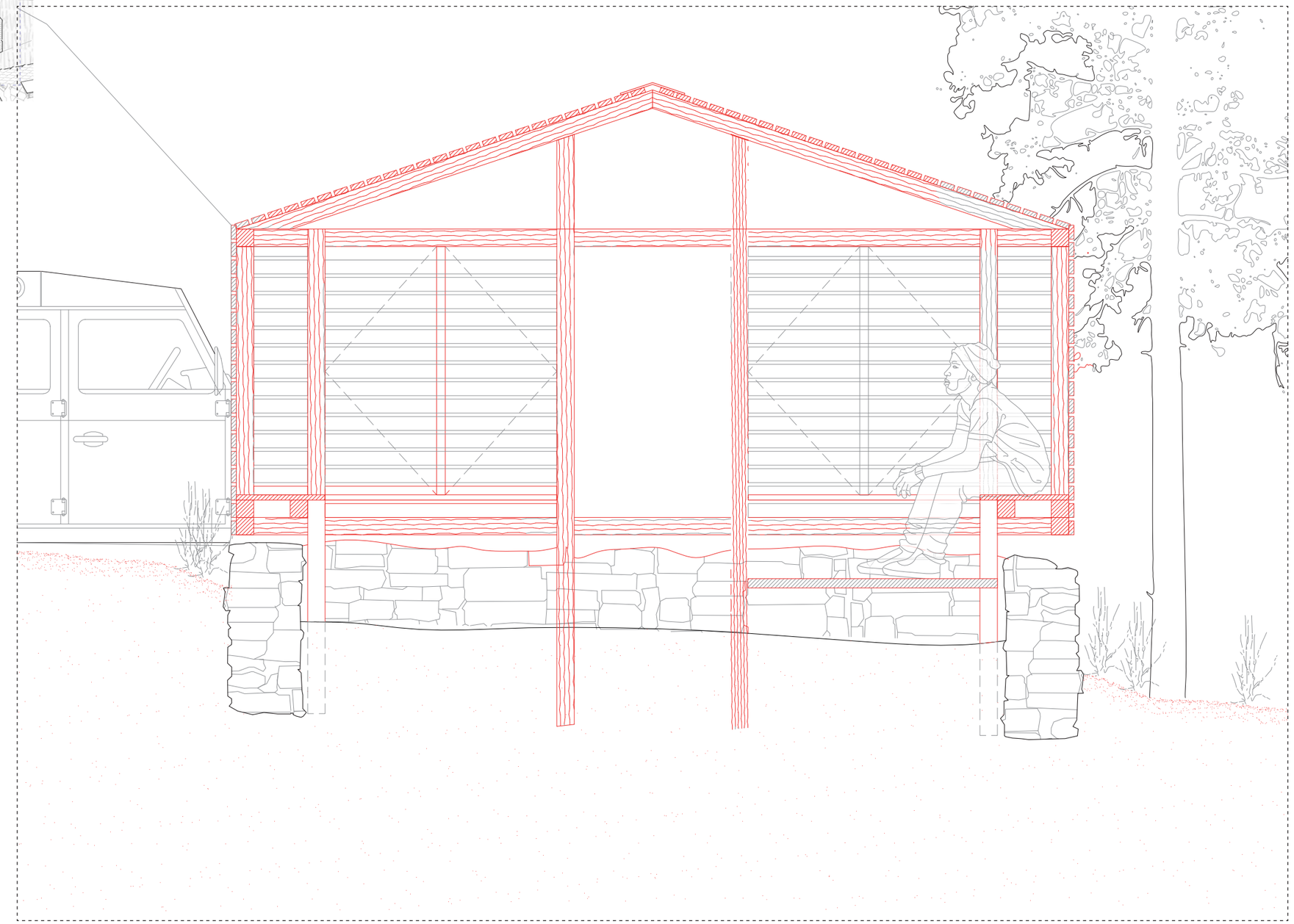



Jurre de Zwart

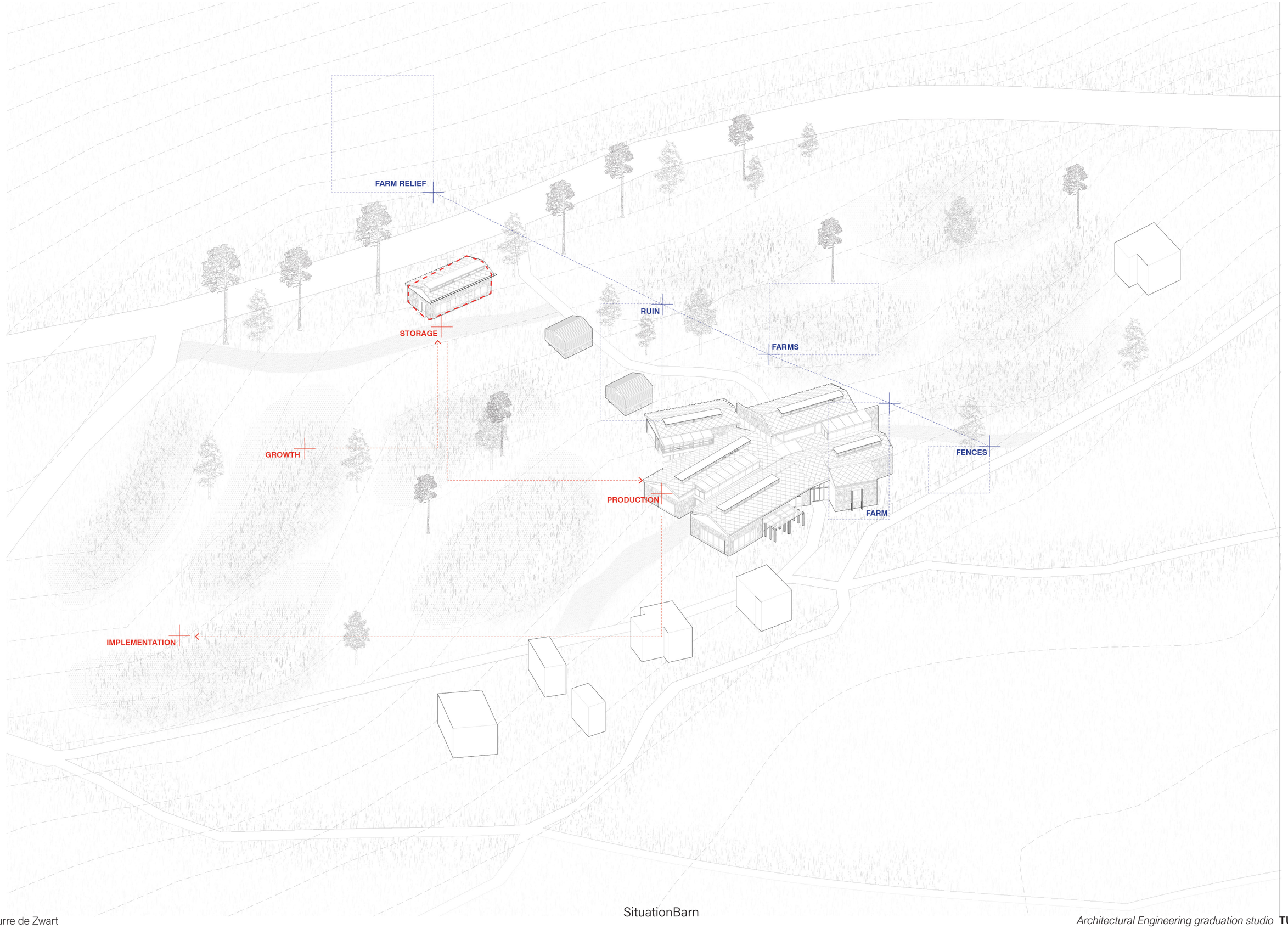
Situation **Ruins**

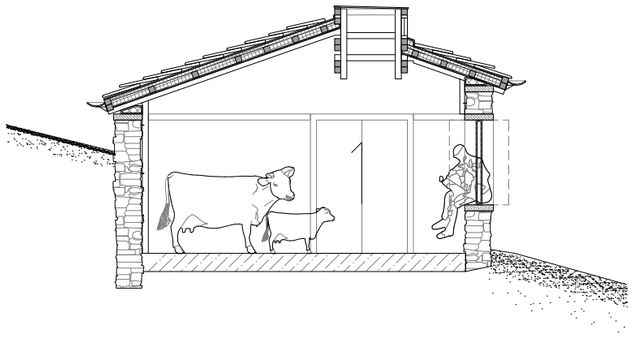
*Architectural Engineering graduation studio* **TU Delft**

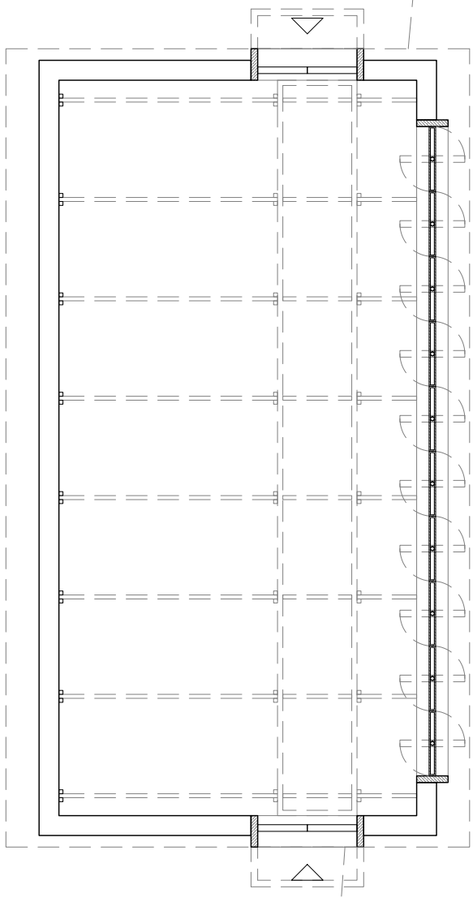


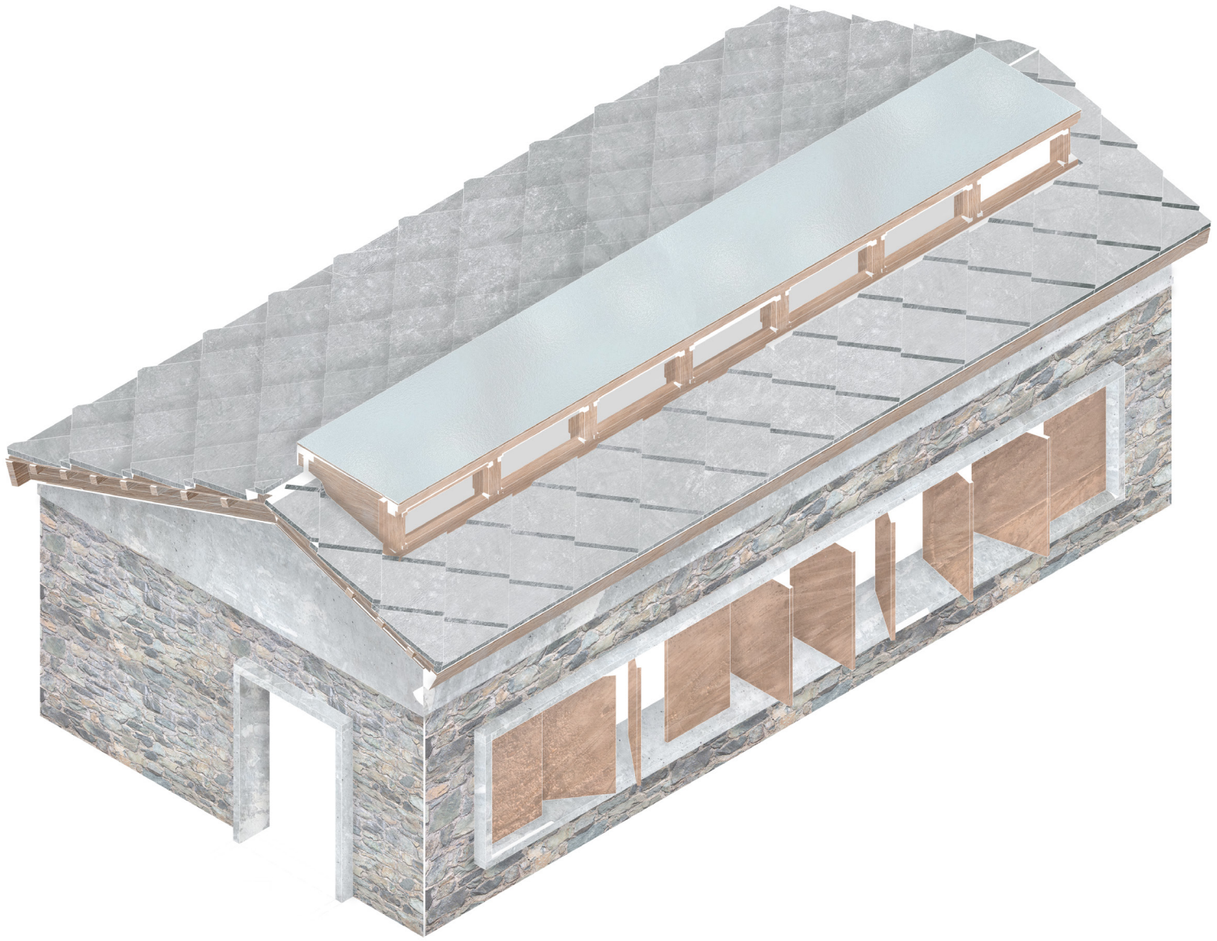



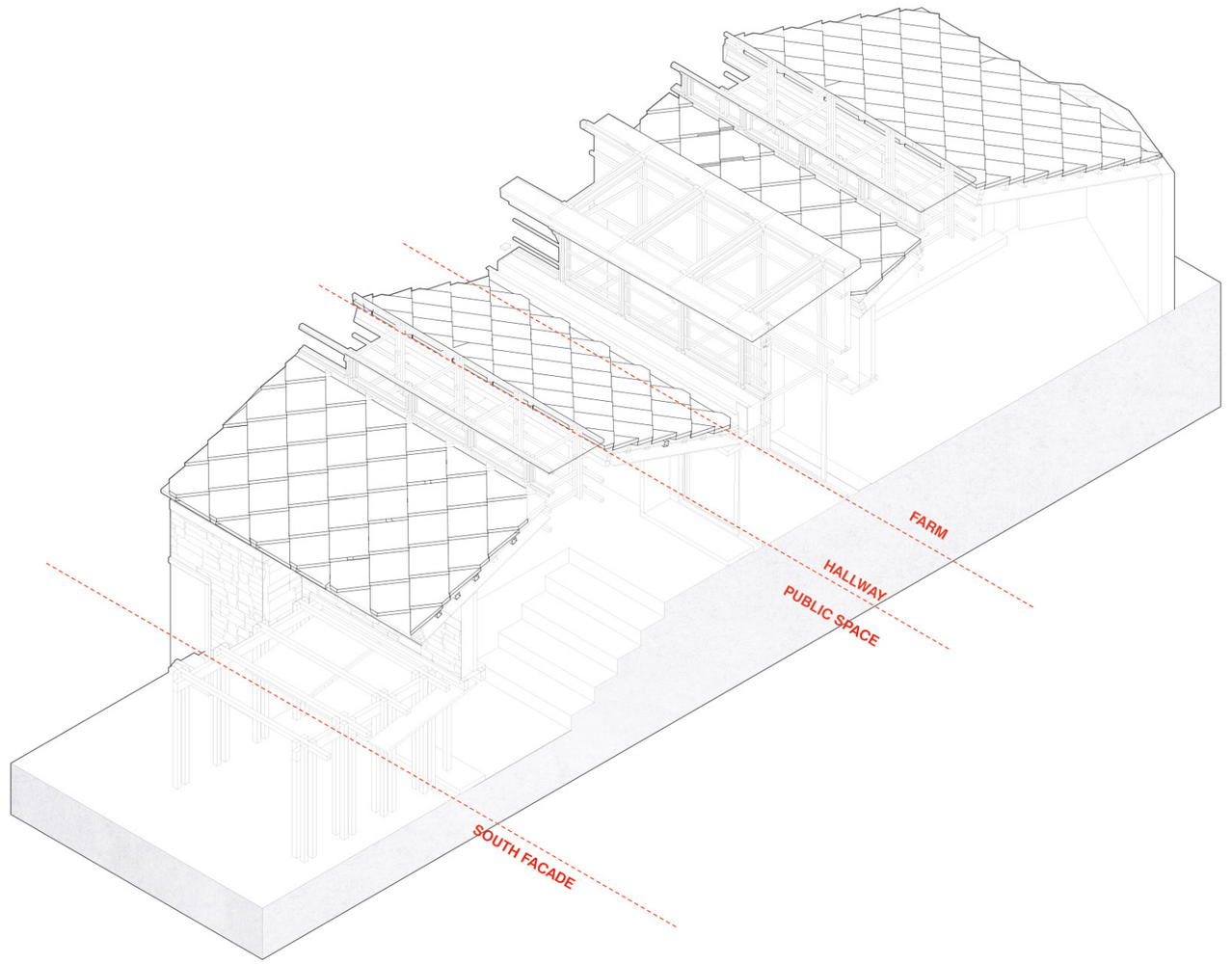
Ruin landscape fragment **1:20**

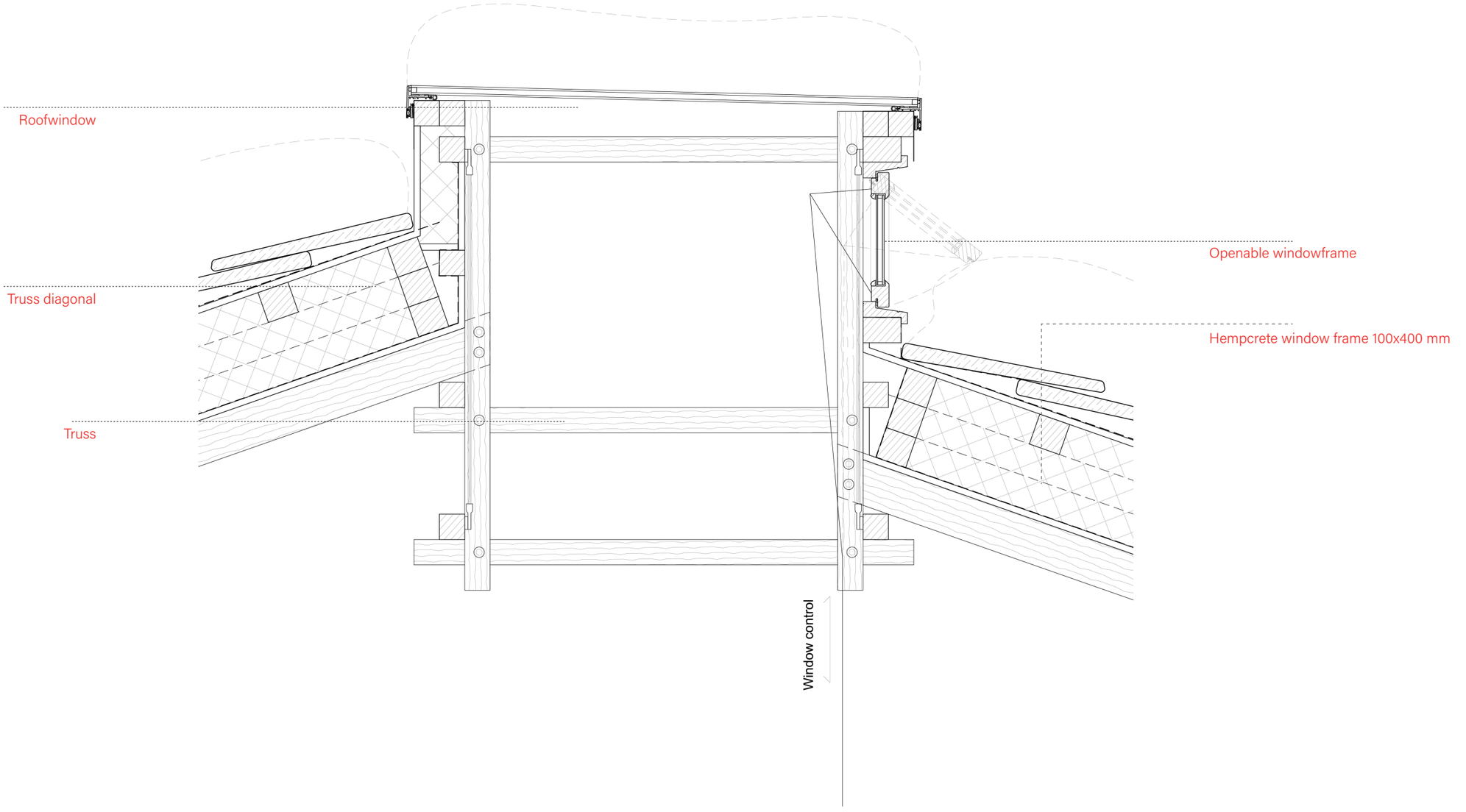

FARM RELIEF
STORAGE
RUIN
FARMS
FENCES
GROWTH
PRODUCTION
FARM
IMPLEMENTATION



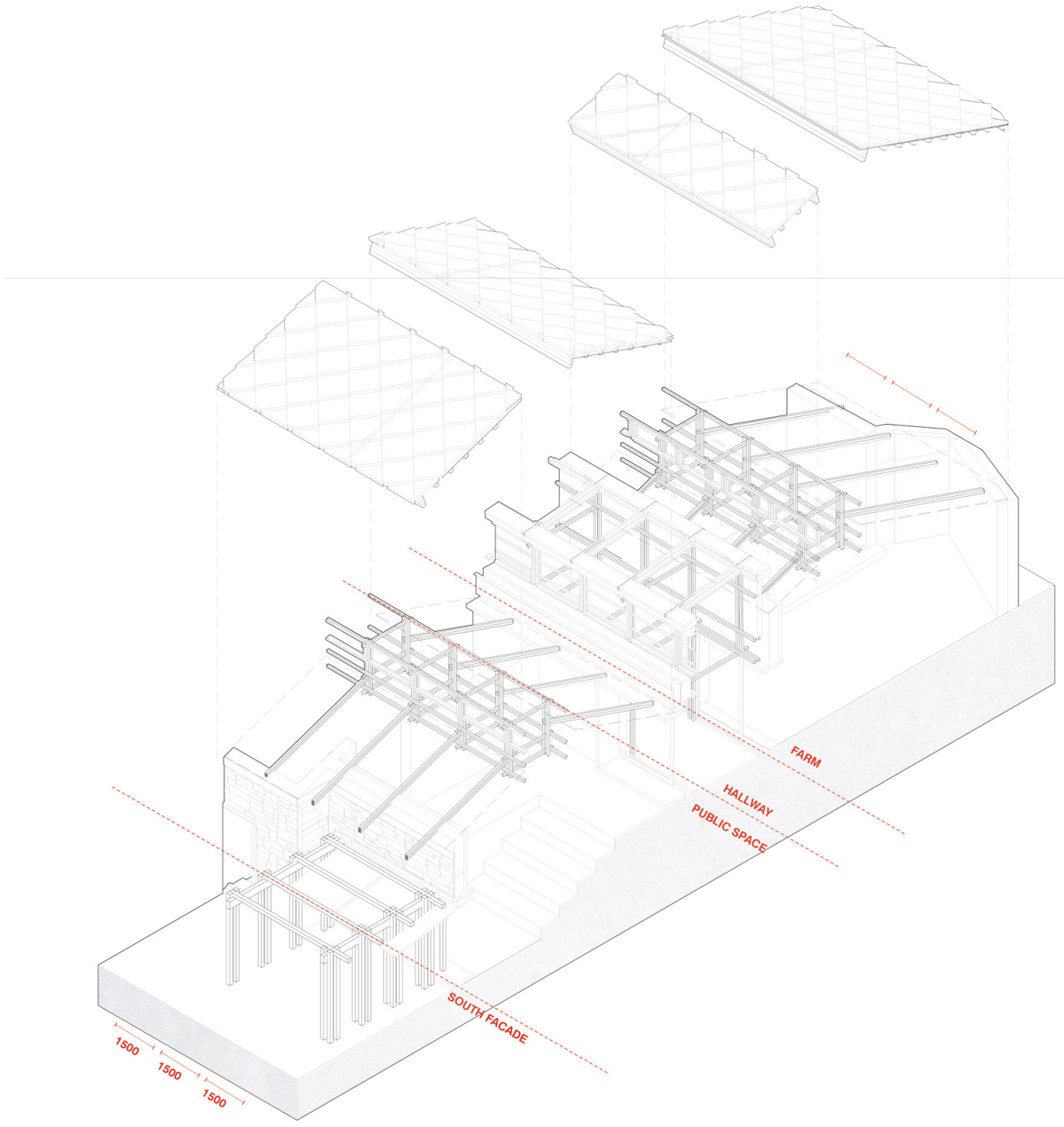




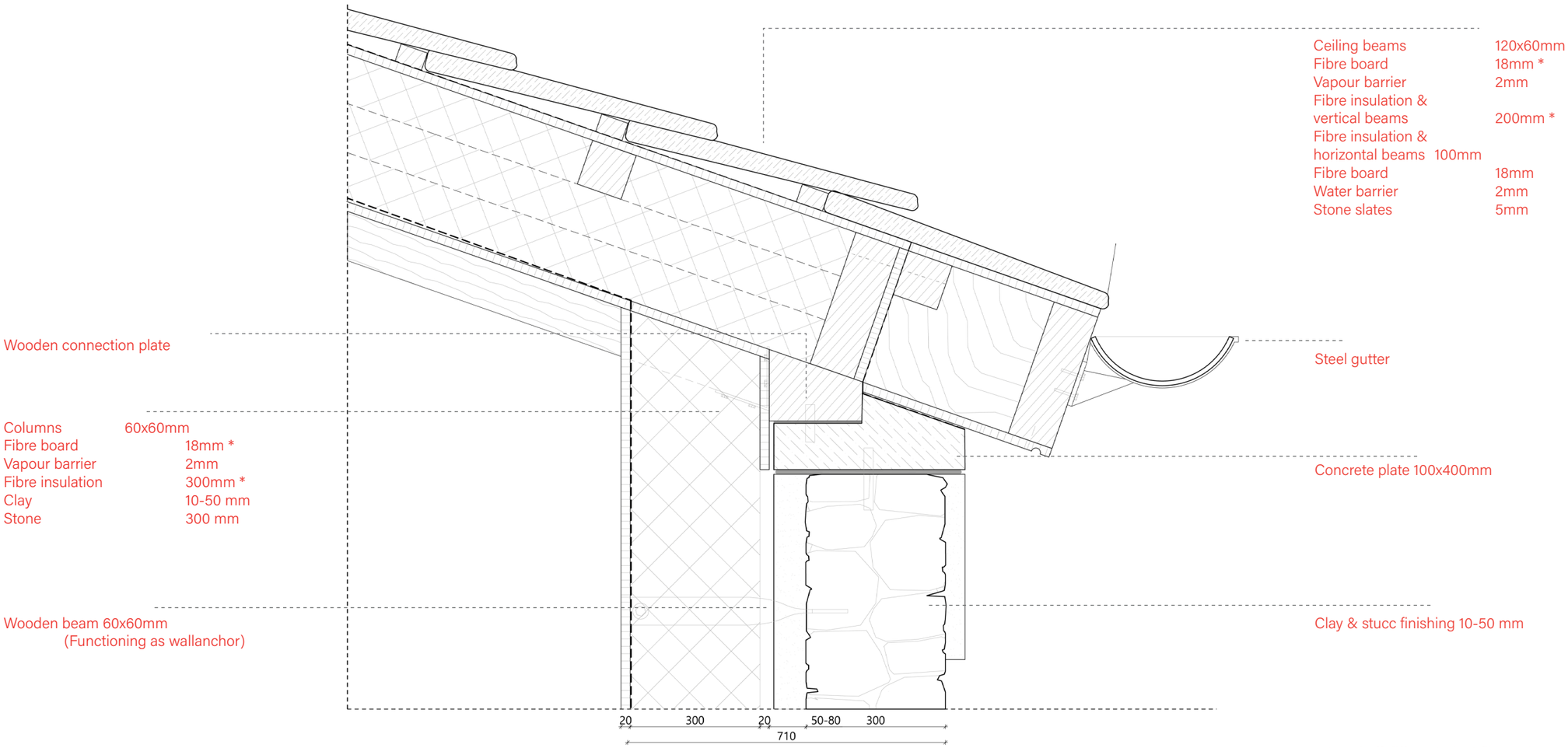

FARM
HALLWAY
PUBLIC SPACE
SOUTH FACADE



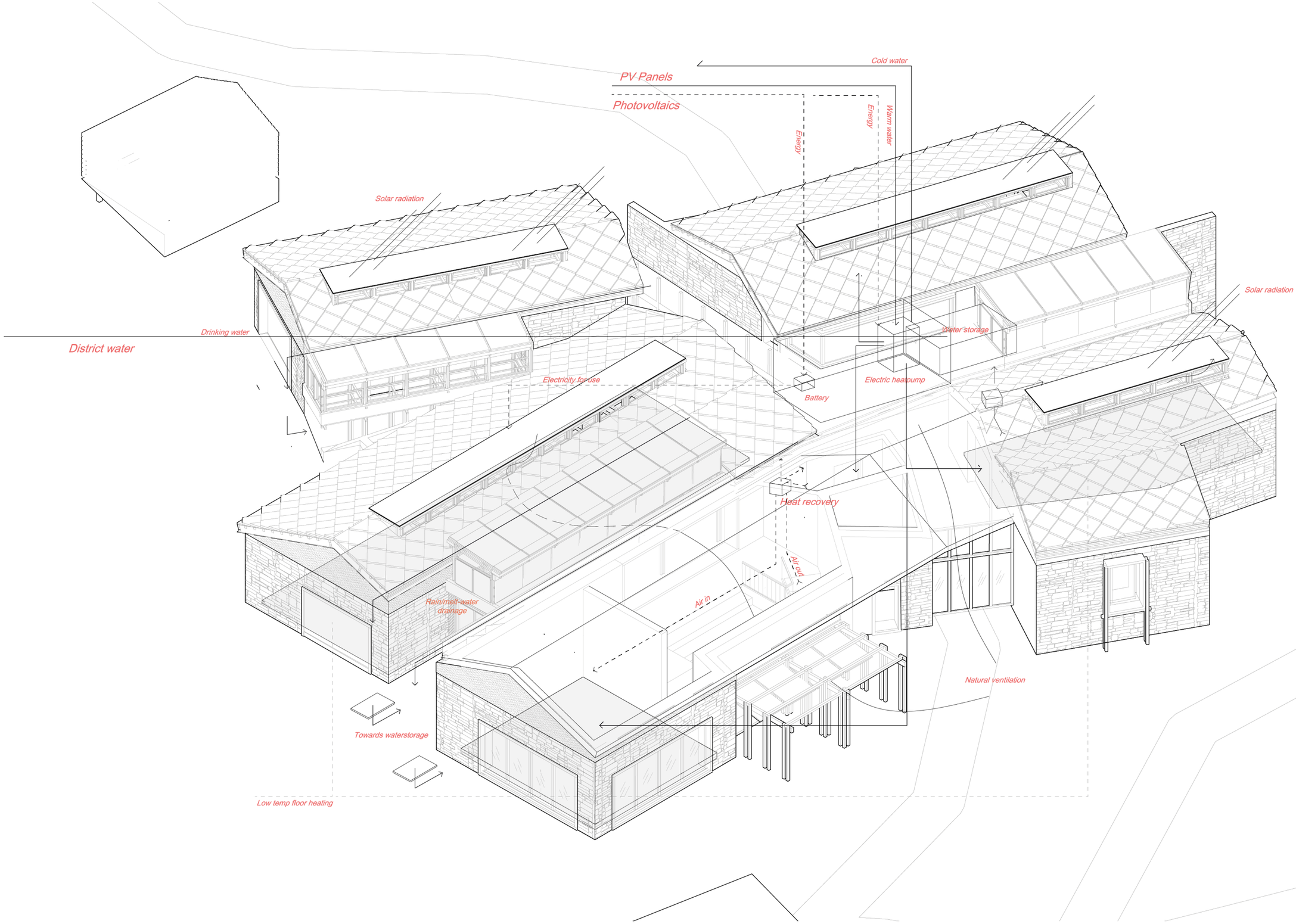

Ridge fragment **1:10**

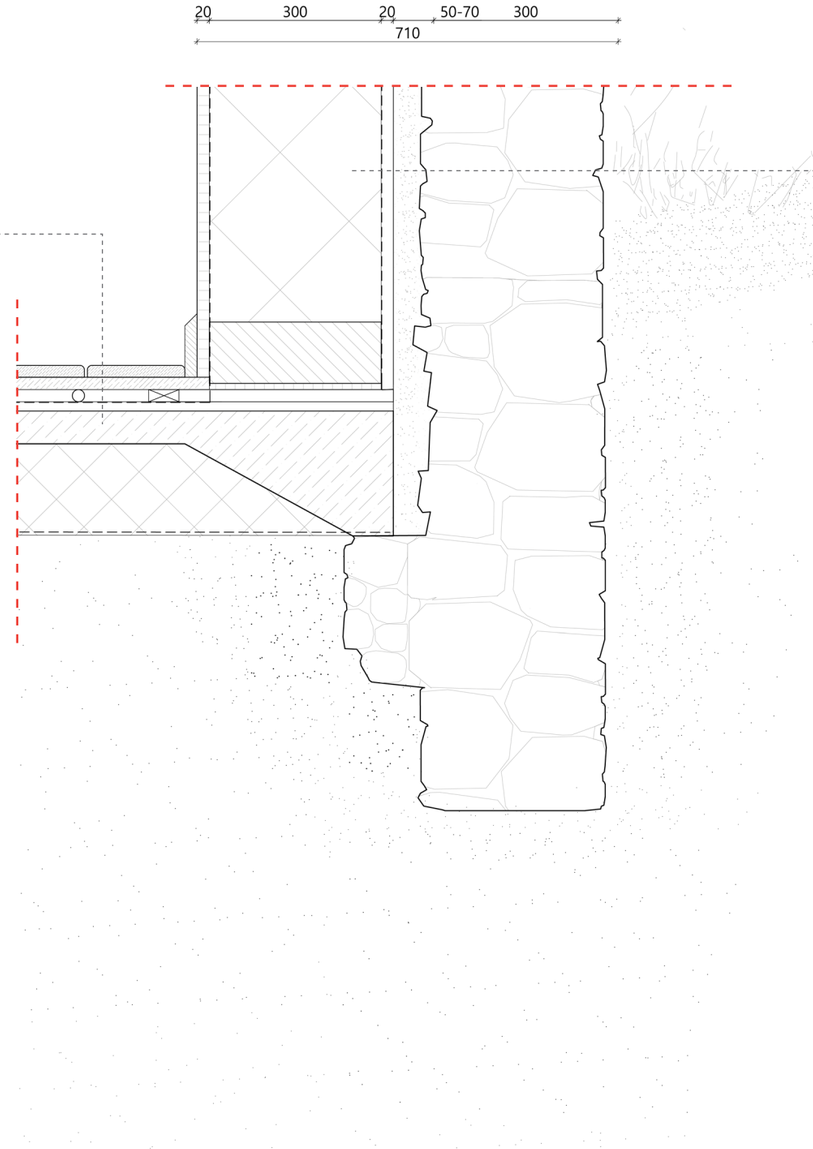



Construction axo **Exploded**




* Based off different plant fibres, depending on what is harvested: hemp, grain, grass


Cold water
PV Panels
Photovoltaics
Energy
Energy
Warm water
Solar radiation
Solar radiation
Drinking water
District water
Water storage
Electricity for use
Electric heatpump
Battery
Heat recovery
Air out
Air in
Rain/melt-water drainage
Towards waterstorage
Low temp floor heating
Natural ventilation

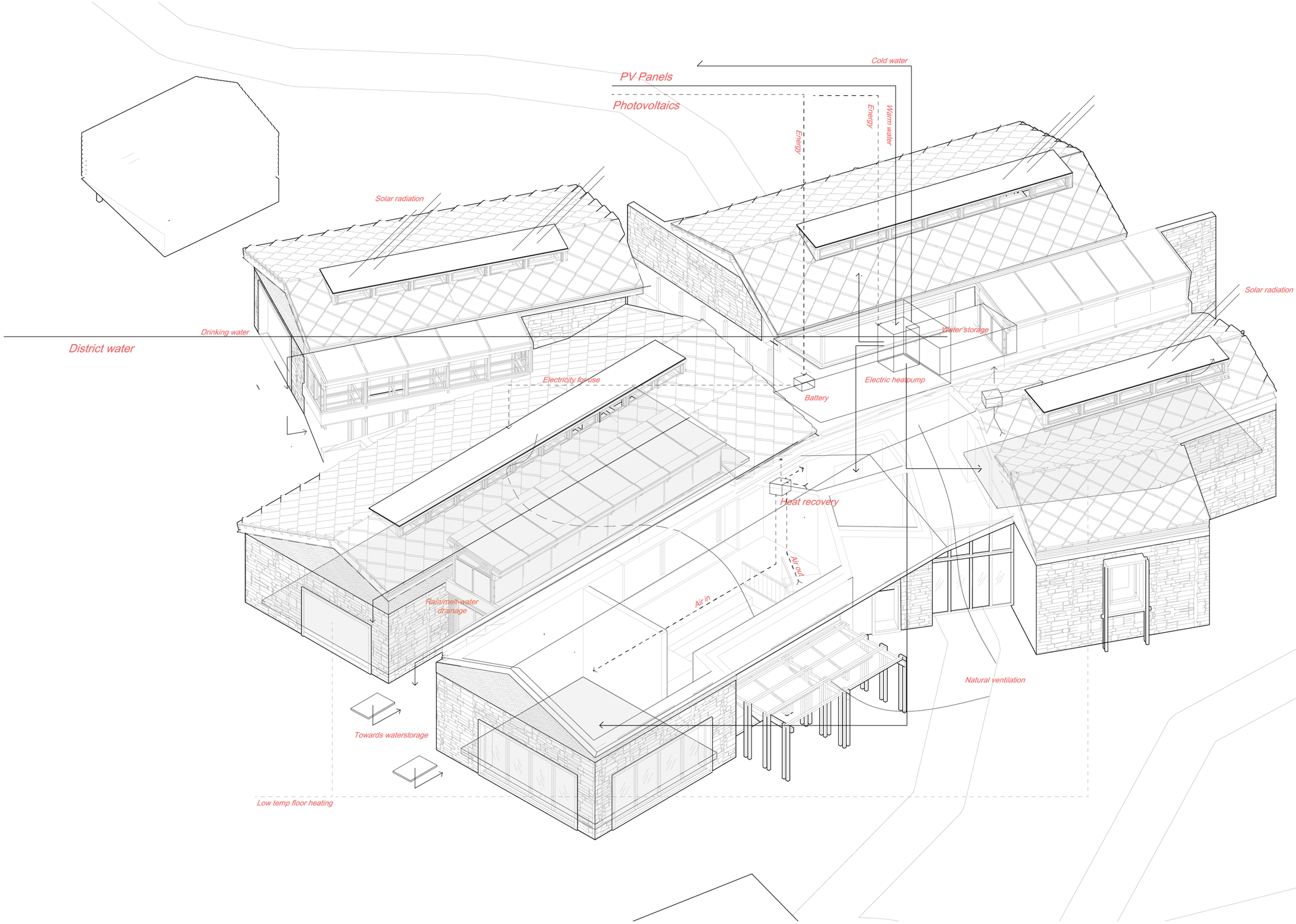



| | |
|---|---|
| Terracotta tiles | 200x200x30mm |
| Concrete finishing | 30mm |
| Floor heathing | 60mm |
| Vapor barrier | 2mm |
| Concrete floor | 100mm |
| Fibre Insulation & concrete beams | 200mm |
| Water barrier | 2mm |

| | |
|---|---|
| Columns | 60x60mm |
| Fibre board | 18mm * |
| Vapour barrier | 2mm |
| Fibre insulation | 300mm * |
| Clay | 10-50 mm |
| Stone | 300 mm |

* Based off different plant fibres, depending on what is harvested: hemp, grain, grass

Wall floor **1:5**


PV Panels
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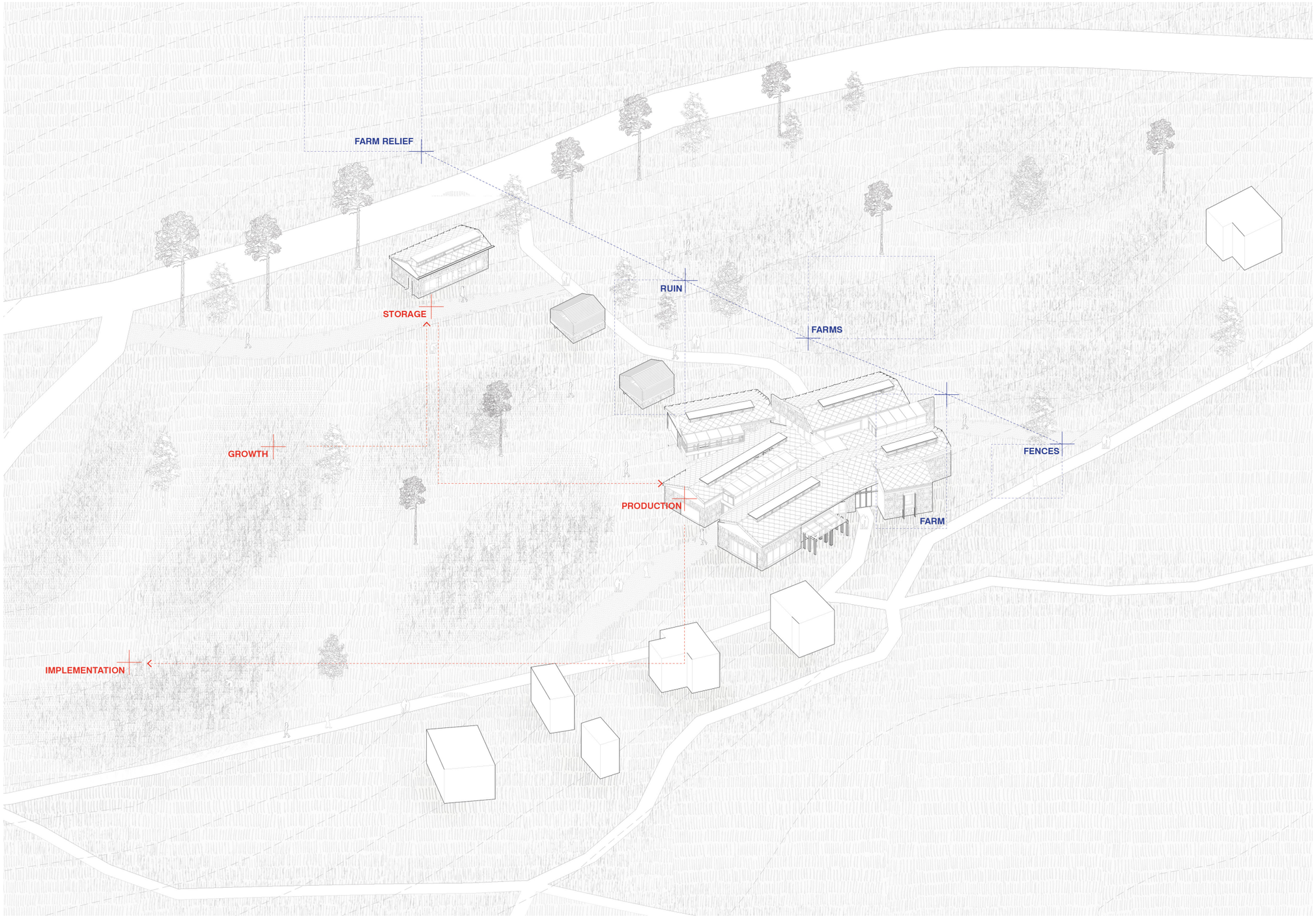
FARM RELIEF
RUIN
FARMS
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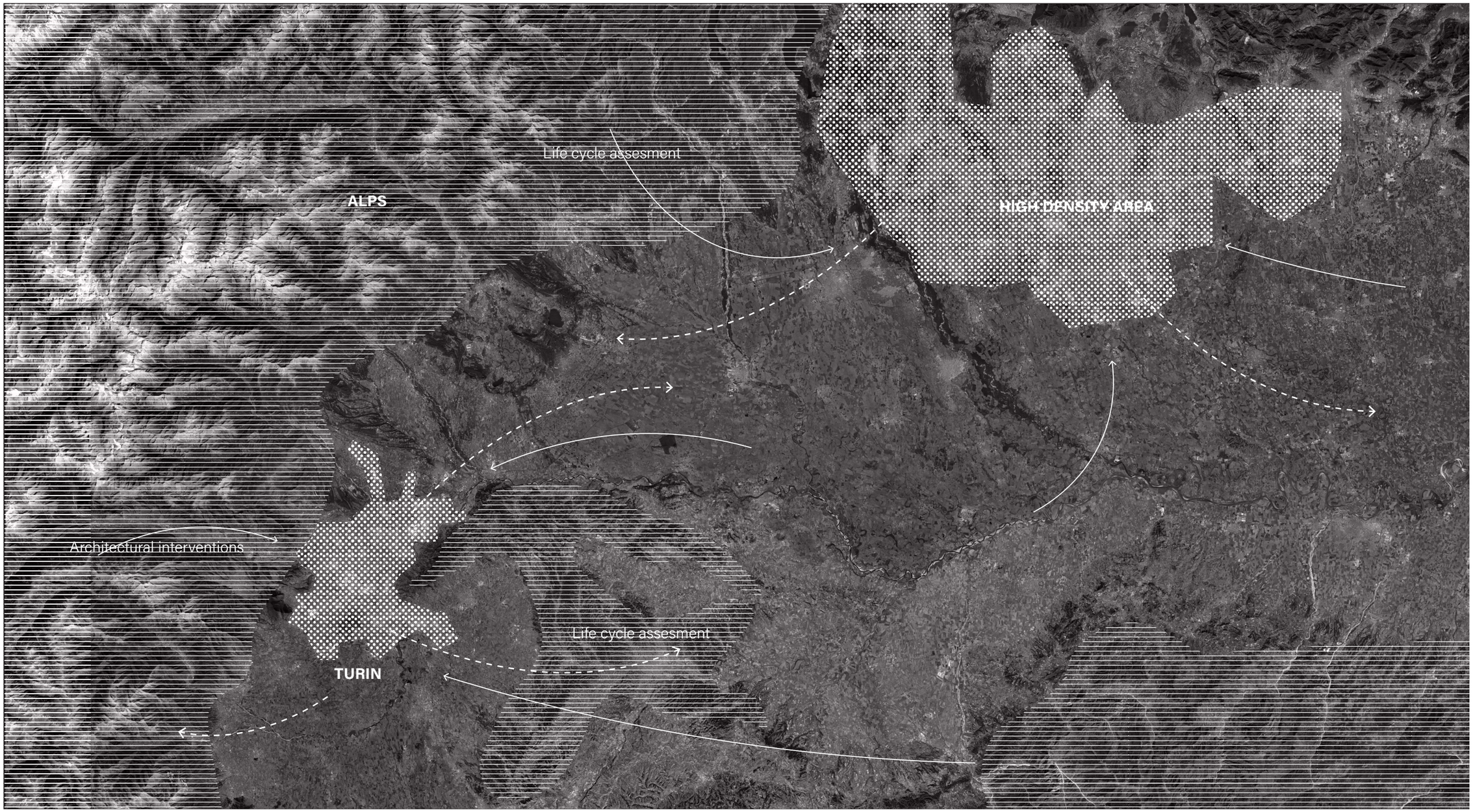
PRODUCTION
FENCES
FARM
IMPLEMENTATION




Larger scale relevance

# *Transhumance*

**Jurre de Zwart**

*Year round farm: a research into the revival of the alpine farming life in the Western Italian Alps.*

*Architectural Engineering graduation studio* **TU Delft**