

# ***ANTHRACITE TRACKS***

***CHLOE LIANG***

200057

THESIS PRESENTATION

ARCHITECTURE & EXTREME ENVIRONMENTS

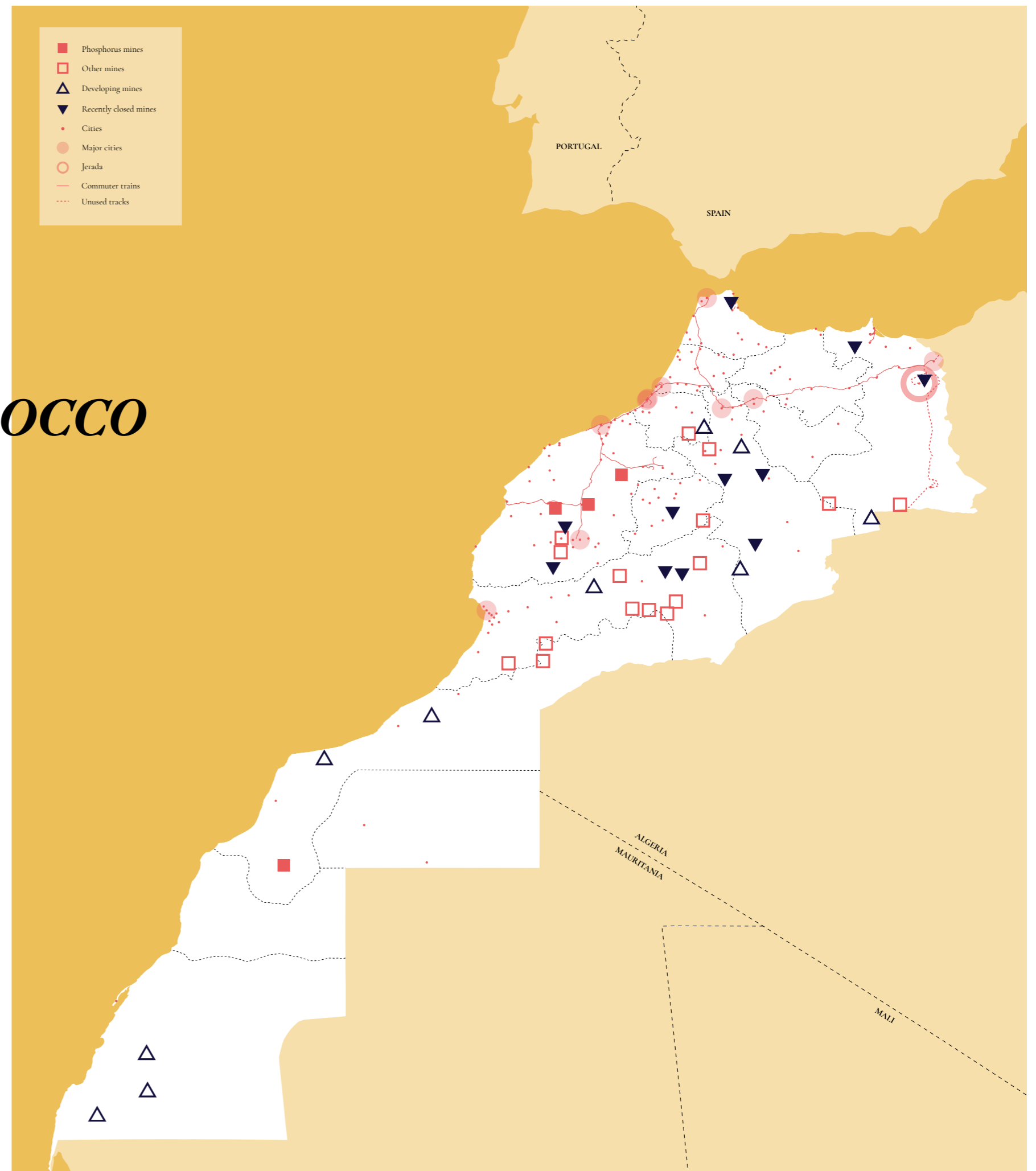
SPRING SEMESTER 2021/22



*An investigation into Jerada, mine waste, and social architecture*

# *EXTRACTION IN MOROCCO*

The mining industry represents 22% of the value of Morocco's exports and contributes 2.5 to 6.5% to the country's GDP depending on the prices of the products. Officially around 240 mines are considered to have been exploited in Morocco, but more than 200 have been abandoned for several years with all the waste produced from the extraction process remaining scattered right at the location of the mine. No effective system has been put in place to manage the abandonment of these old mines as current regulations still do not oblige the operator to rehabilitate a site when operations cease.





## *JERADA'S COAL MINE*

Jerada was once the coal-producing powerhouse of Morocco until the mines were shuttered in the 1990s due to high production costs. This led to economic devastation in the city, with over 9000 jobs lost. After the mine was officially closed and abandoned, Jerada was left with five large hills of mine tailings weighing 20 million tonnes. Though not directly toxic, the loose dust not only coats buildings downwind, it has the potential to cause respiratory distress and long-term health problems to nearby residents as well as contaminating the city's groundwater with unwanted chemicals.



## ***A BRIEF HISTORY***

- **1927** A coal basin is discovered in the site that would become Jerada
- **1936** Industrial exploitation begins in earnest
- **1967** Coal power plant is established in Jerada, allowing the valorisation of extracted coal
- **1994** The national census places Jerada's population at 59 294
- **2001** Jerada mine is officially closed due to CDM filing for bankruptcy, leaving around 9000 unemployed. Remaining coal reserves are estimated at 10 million tons. The thermal plant still functions with imported coal coming via train and truck from the port at Nador. Hundreds of workers continue to mine for coal under the radar, selling to local distributors for a living
- **2004** The national census places Jerada's population at 43 916, a decrease of more than 25% from 1994
- **2014** The national census places Jerada's population at 43 506, a decrease of 1% from 2004
- **2017** A new thermal plant is built in Jerada as an upgrade/extension to the older one. Demonstrations are held in protest of high water and electricity costs. 2 brothers drown in an illicit underground coal mine, fuelling further furore
- **2018** ~2000 of ~3500 of the illegal mines are closed due to the riots, and upgrading works to various parts of Jerada begin
- **2019** The remaining mines are shuttered



## ***EXCERPTS FROM 2021***

My fieldwork conducted in Morocco in the fall semester dealt with the potential mine waste has to be upcycled into useable ceramic tiles. I looked into the abandoned mines at Kettara and Jerada, where both have unique issues posed by the presence of mine waste. My project aimed to create façade tiles using clay, mine waste, and natural additives, and evaluate the aesthetic, functional, and chemical properties of the tiles.

# *REVITALISING JERADA*



Making an isolated community more accessible



Rejuvenating a discarded workforce



Forging a local identity

## *RESEARCH QUESTION*

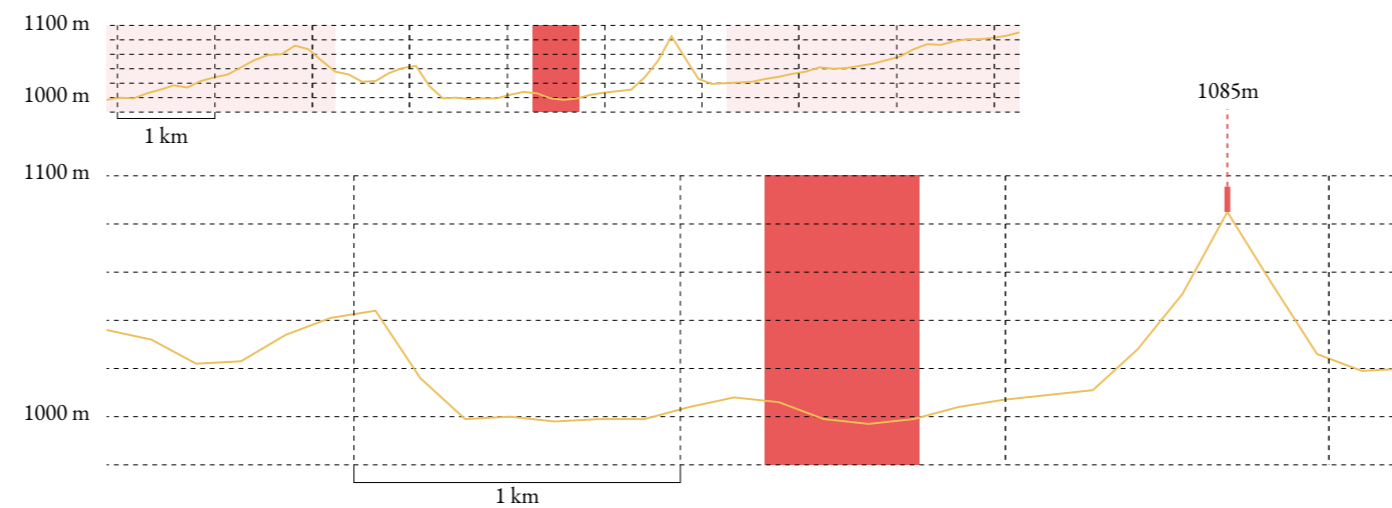
# *CAN MINE WASTE BE A FOUNDATION FOR SOCIOECONOMIC GROWTH AND REHABILITATION?*

How can the **mine waste** be utilised to create a **resilient community** even after it has been exhausted?

How would a building that can be **continually reconstructed and reshaped** while inhabited look like?

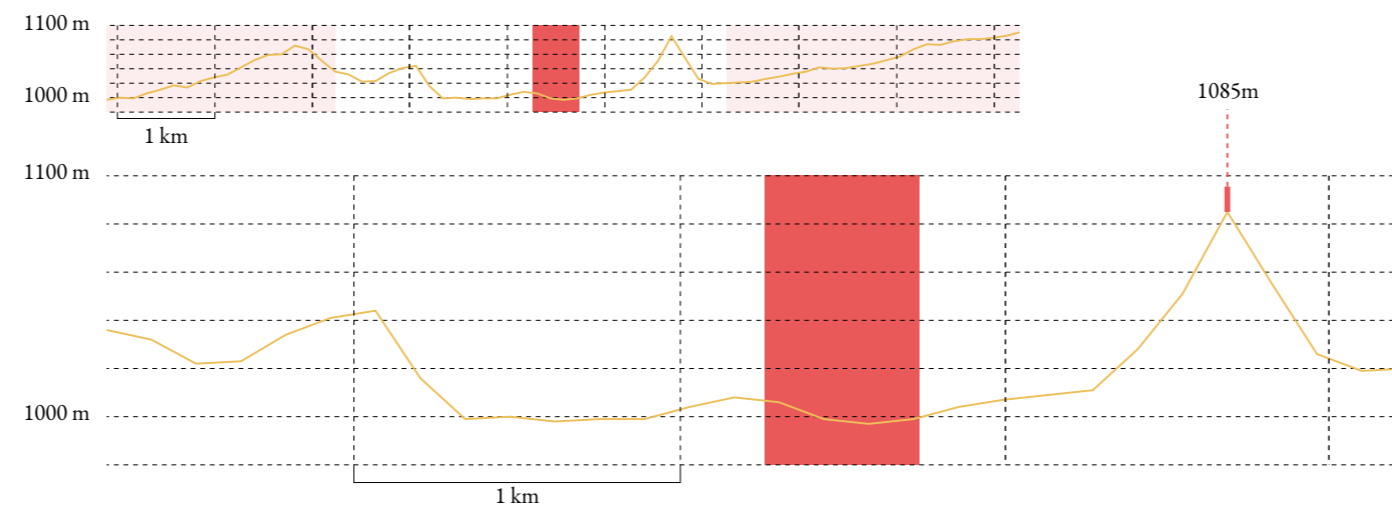
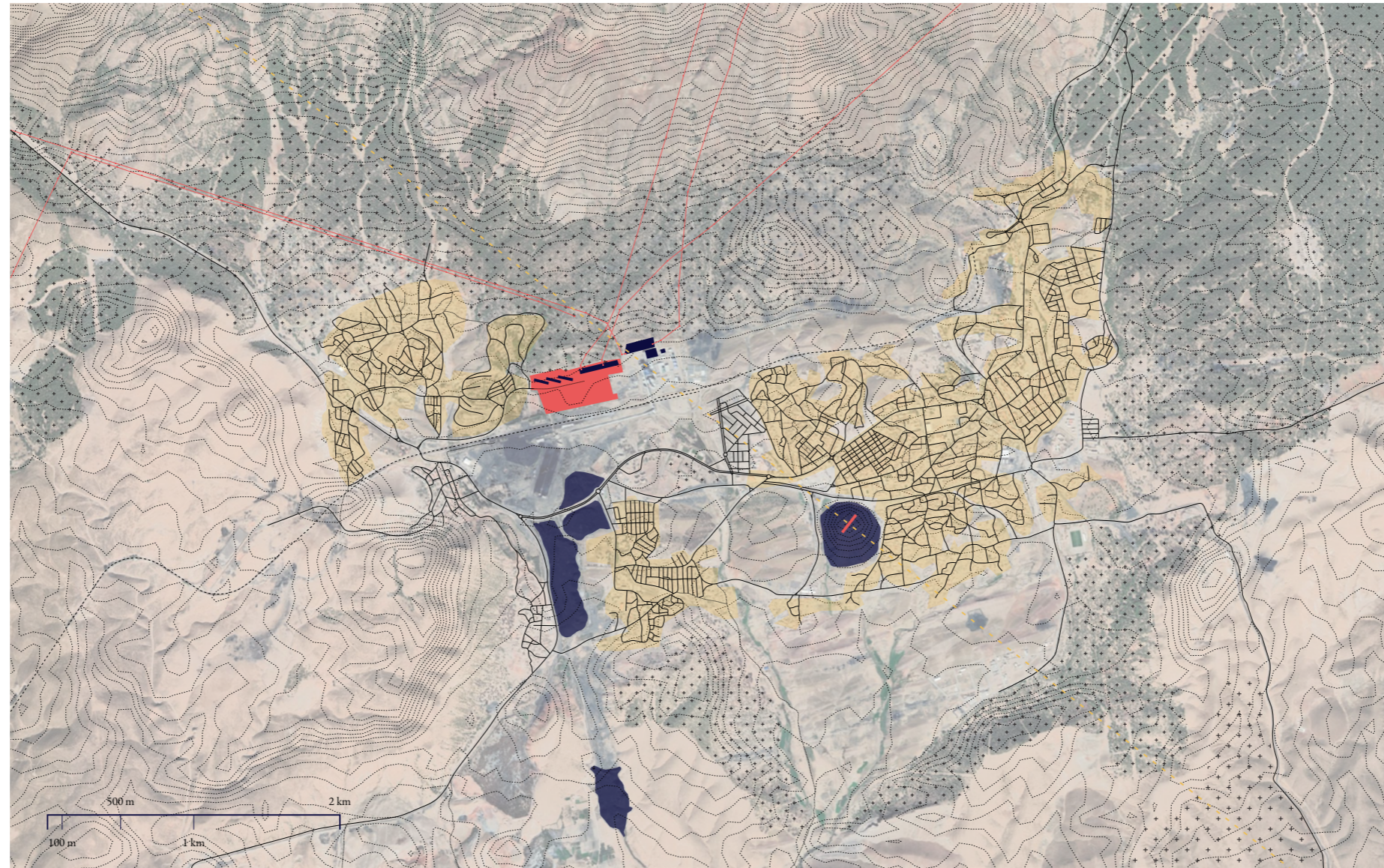
How can the **community** be a **driving factor** for a building's function and design?

# ***SITE CONTEXT***





# ***SITE CONTEXT***





***PROPOSED SITE***



# PROPOSED PROGRAMME AND AUDIENCE



Tourists



Commuters



Cargo



Tourists



Families



Commuters



Local workers



Local workers



Commuters



Commuters



Families

TRAIN STATION



MARKETPLACE



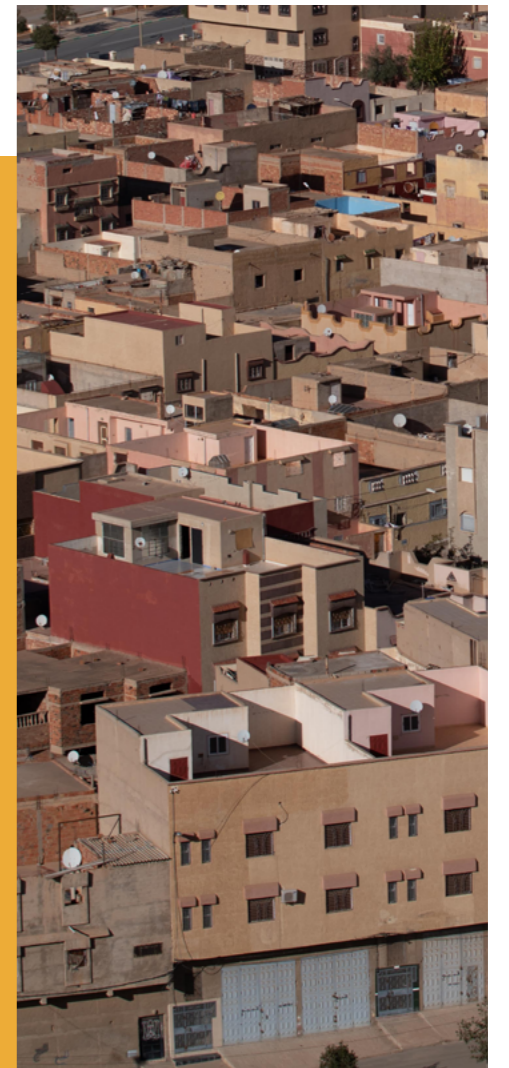
WASTE PROCESSING



CRAFT WORKSHOPS



RESIDENCES



## COAL MINE WASTE

Millions of tonnes of mine tailings leftover from when Jerada had an active coal mine that can be used as an additive in ceramics.

*Current use:* Left in tall heaps around the city

*Mode of transport:* Truck

## GOODS

With a unique focus on upcycled ceramics, Jerada has the opportunity to become a keystone of the industry, catering to clients all over Morocco.

## NEW TALENT

Attracting new talent is a way to encourage social and economic development in Jerada and can be achieved through being a pioneer in the commercial field of upcycling mine waste.

## MISC. MINE WASTE

Tailings from other mines in Morocco are widely available due to negligent industry practices. The waste can be brought to Jerada, then stored and used in this project.

*Current use:* Discarded on site

*Mode of transport:* Train



## GOODS AND SERVICES

New methods of production could incentivise the development of additional businesses in Jerada that would cater to those living in the city.



## LOCAL MANPOWER

The mine's closure reduced the number of available jobs in Jerada. A burgeoning ceramics and waste upcycling industry could provide new opportunities for locals to find employment.

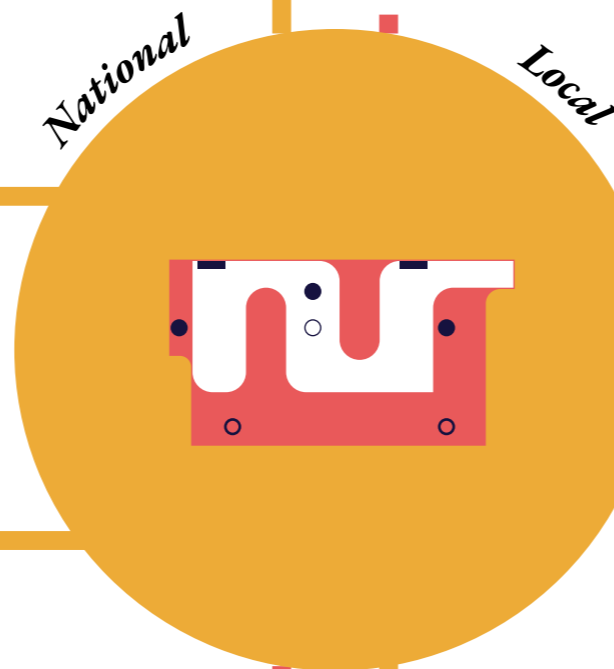


## FLY ASH

Waste from the coal power plant adjacent to the site that can be used as an additive in ceramics, concrete, and other building materials.

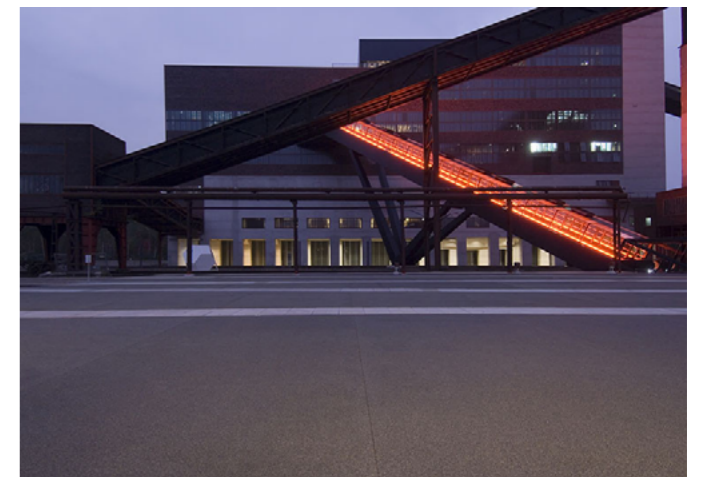
*Current use:* Dumped at a nearby reservoir

*Mode of transport:* Delivery chute



# A CONDUIT FOR CHANGE

# *DESIGN REFERENCES*

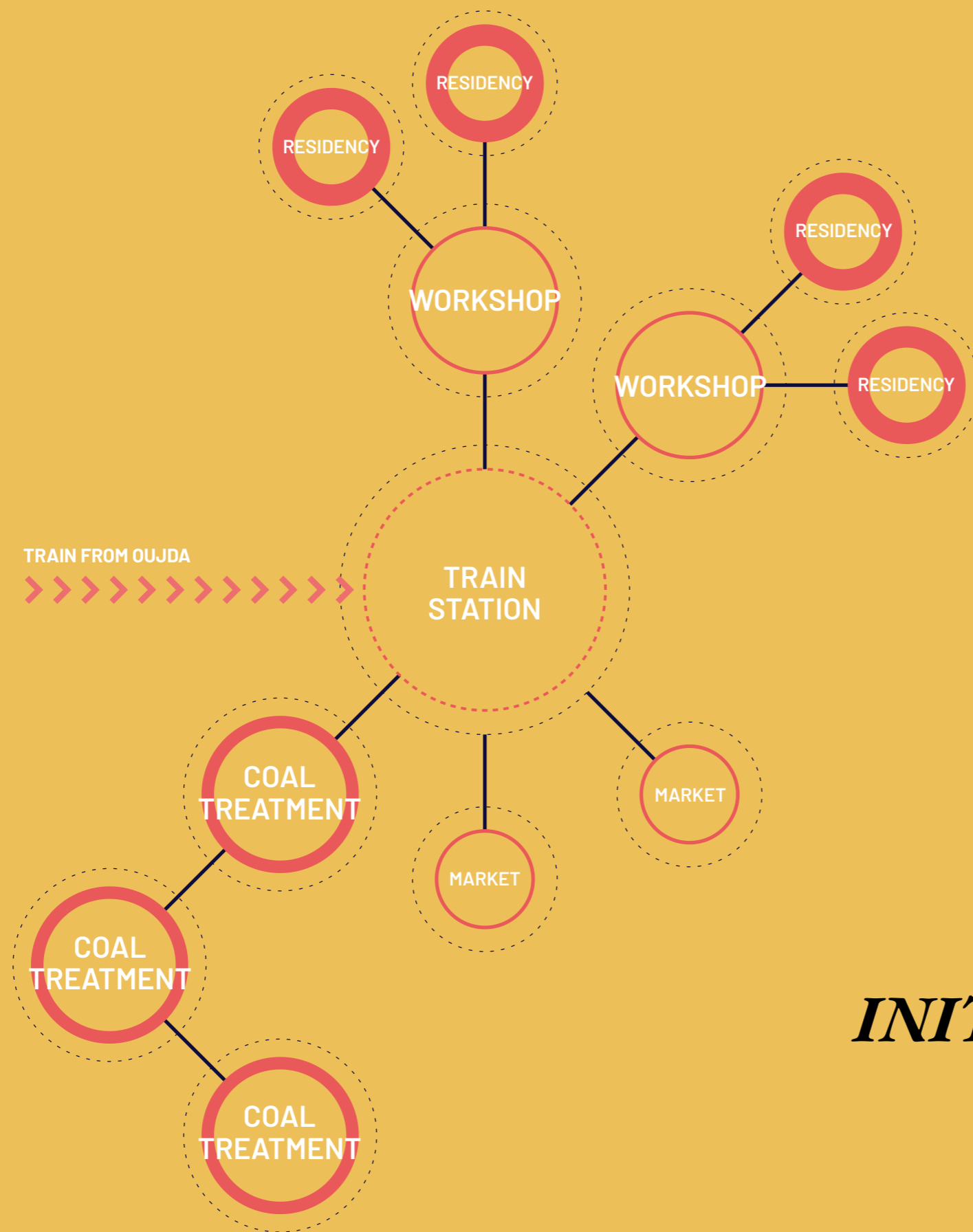


*ASSORTED PROJECTS*  
ELADIO DIESTE

*LA FABRICA*  
RICARDO BOFILL

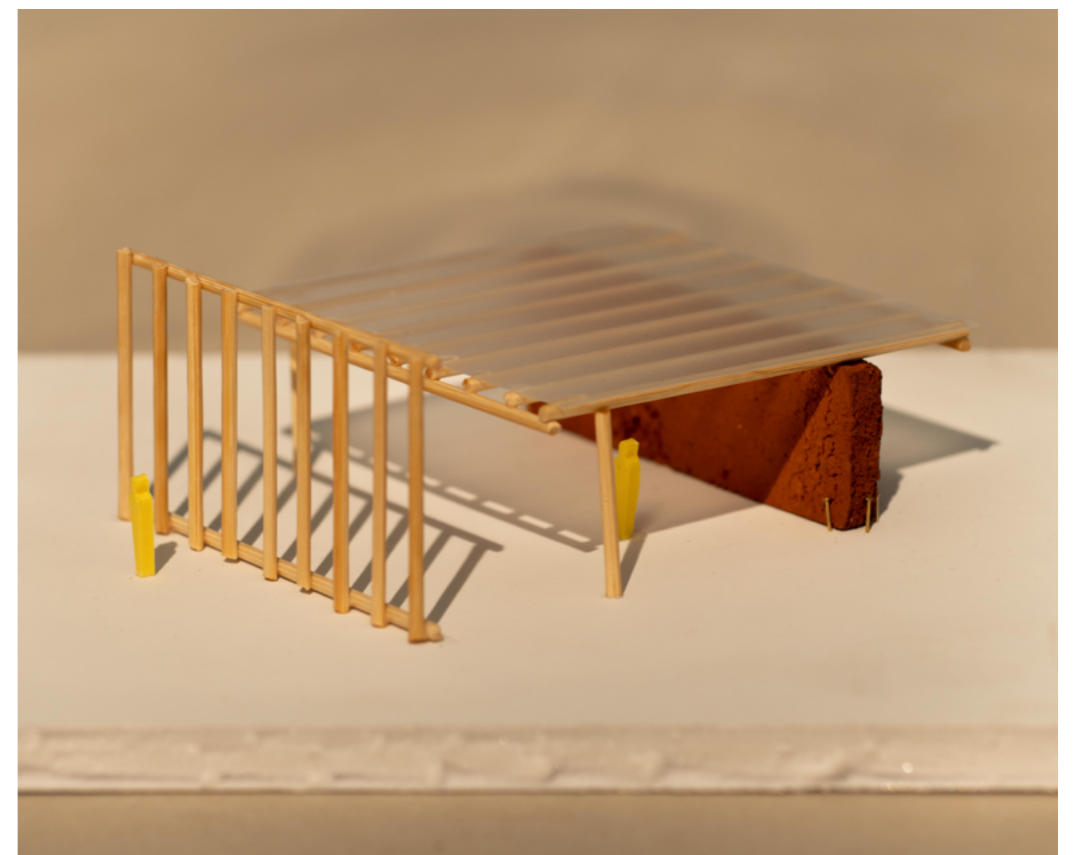
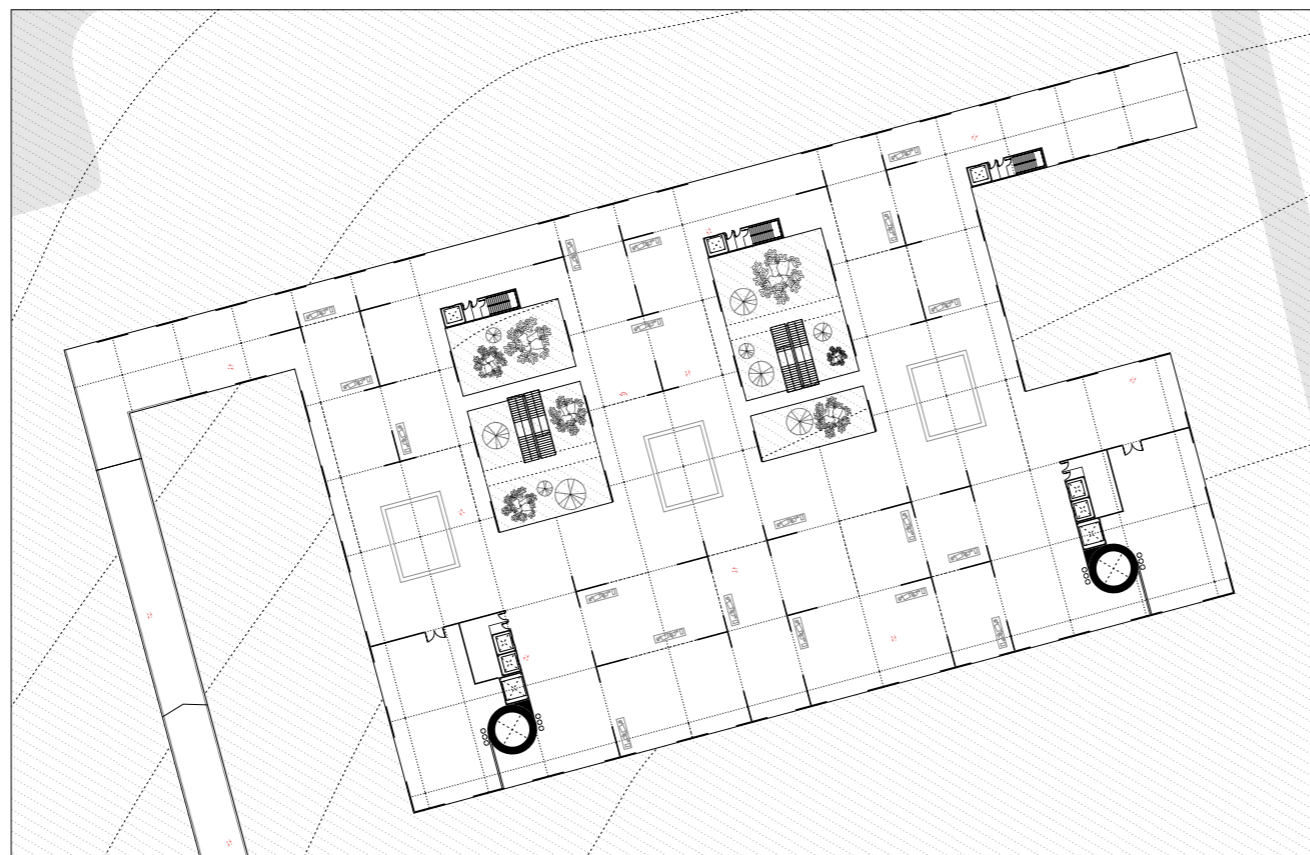
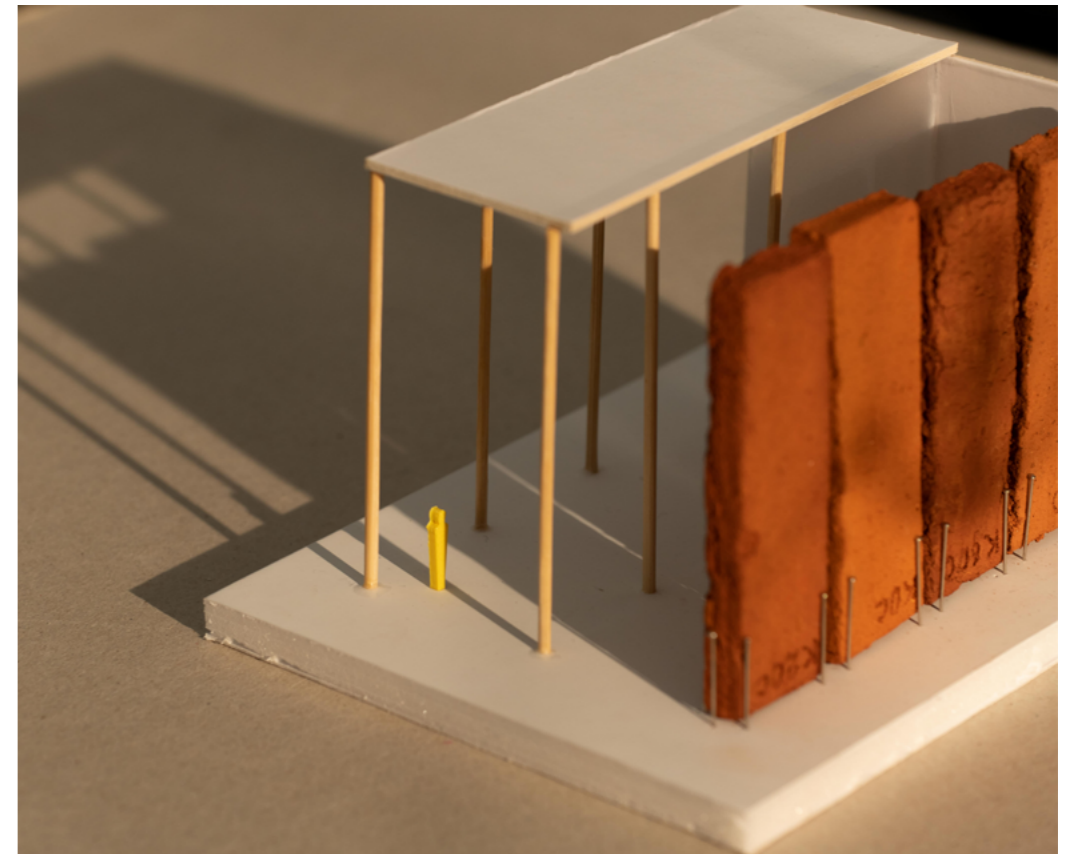
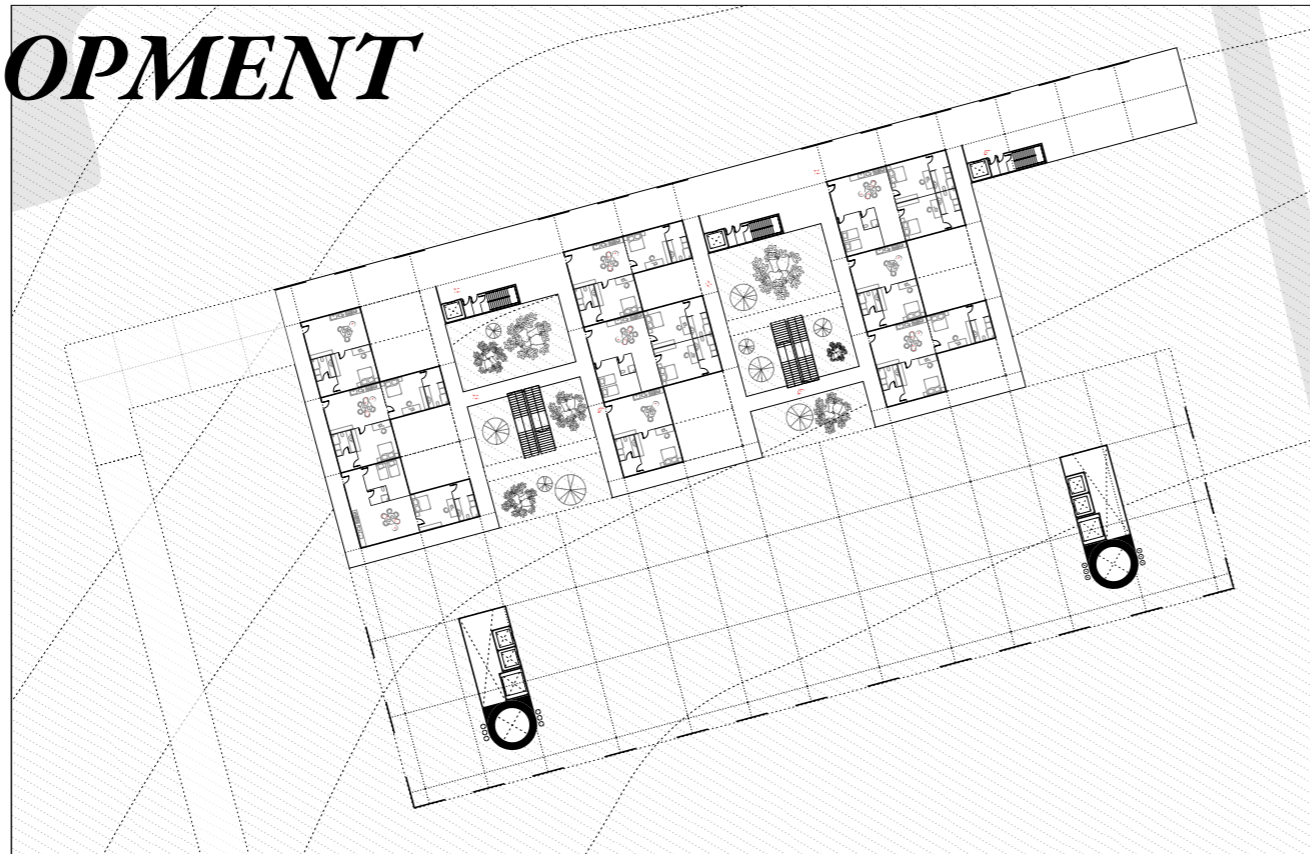
*SESC POMPÉIA*  
LINA BO BARDI

*ZOLLVEREIN*  
ASSORTED ARCHITECTS

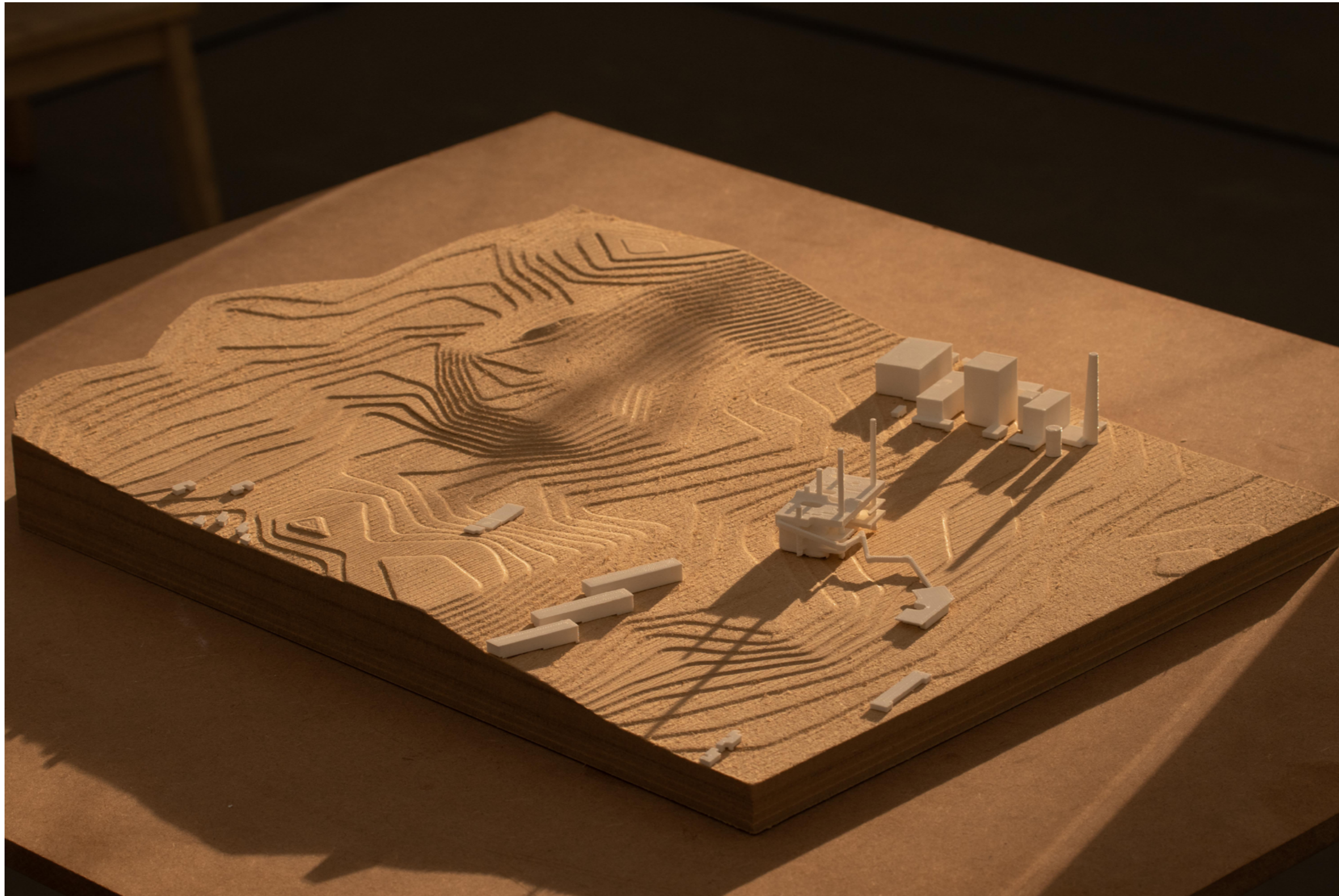


***INITIAL FUNCTION  
DISTRIBUTION***

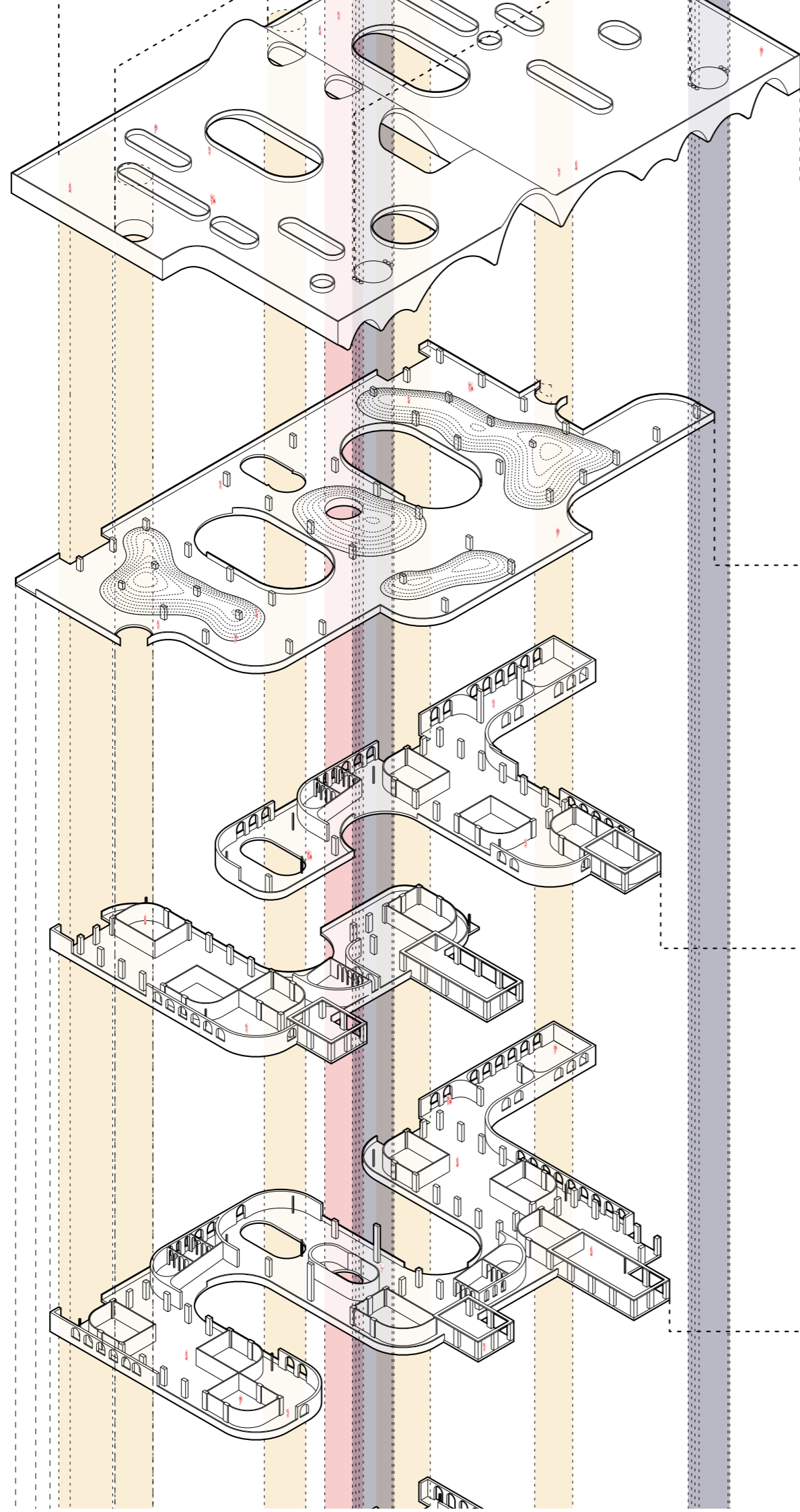
# *INITIAL FORM DEVELOPMENT*



# *SUNLIGHT STUDIES*







**ROOFTOP**

L 10 / + 48.50 m

Drying ceramics and panoramic views

*Main audience:*  
craftsmen, tourists

Useable area: 7700 sqm

**ELEVATED SQUARE**

L 9 / + 40.00 m

Open space with an articulated landscape of ceramic tiles

*Main audience:*  
vendors, locals

\* Open for future development

Connects to the pedestrian ramp from the train station and carpark

**RESIDENTIAL**

L 8 / + 36.00 m

Residential housing with open spaces for new builds

*Main audience:*  
craftsmen, residents

\* Open for future development

Built capacity: 7 x 70 sqm  
Projected capacity: 21 x 70 sqm

Includes: Shared prayer rooms, community gathering spaces

**RESIDENTIAL**

L 7 / + 32.00 m

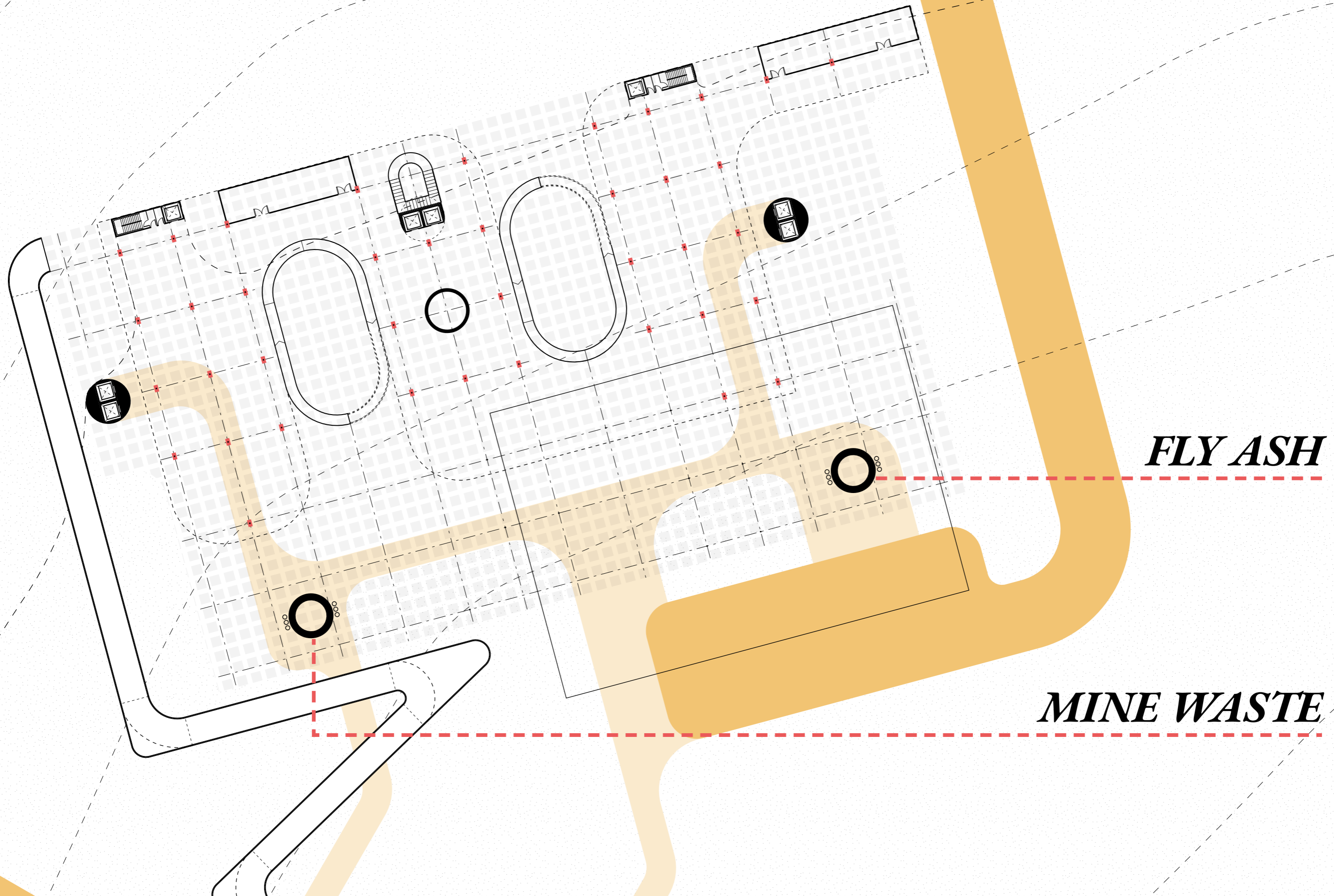
Residential housing with open spaces for new builds + community oven

*Main audience:*  
craftsmen, residents

\* Open for future development

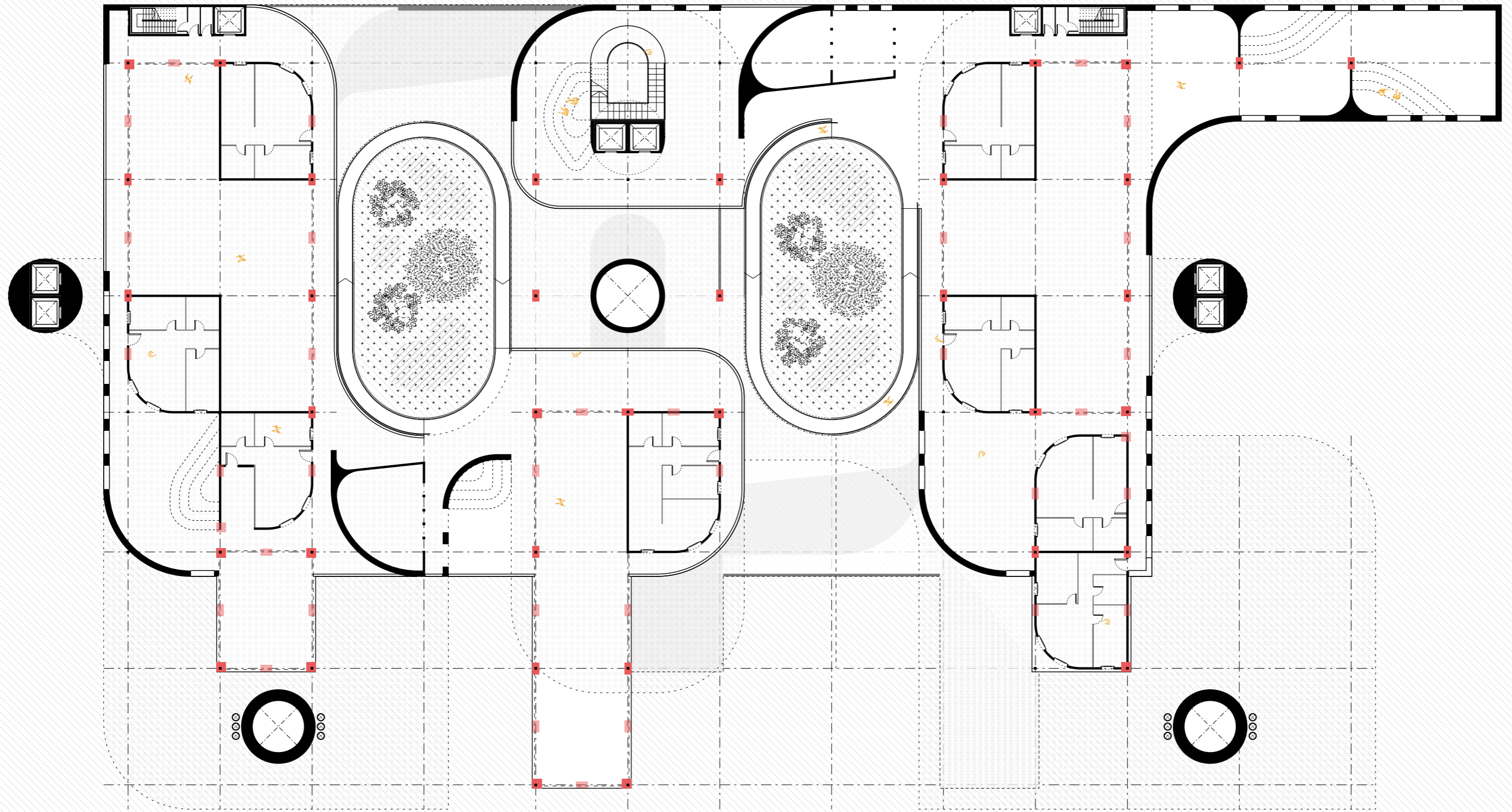
Built capacity: 7 x 70 sqm  
Projected capacity: 21 x 70 sqm

Includes: Community oven, shared prayer rooms, community gathering spaces



***FLY ASH***

***MINE WASTE***



**RESIDENTIAL TYPE B**  
FLOOR PLAN  
L 2, 4, 8  
1:250





***DEVELOPMENT OF AN IDENTITY  
...THROUGH ARCHITECTURE***



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## ***POST-PROJECT CONSIDERATIONS***

