



# “KNIL MAGAZIJNEN”

THE CREATIVE AND LEARNING CLUSTER OF PLASTIC WASTE

BY E. PANGALOU

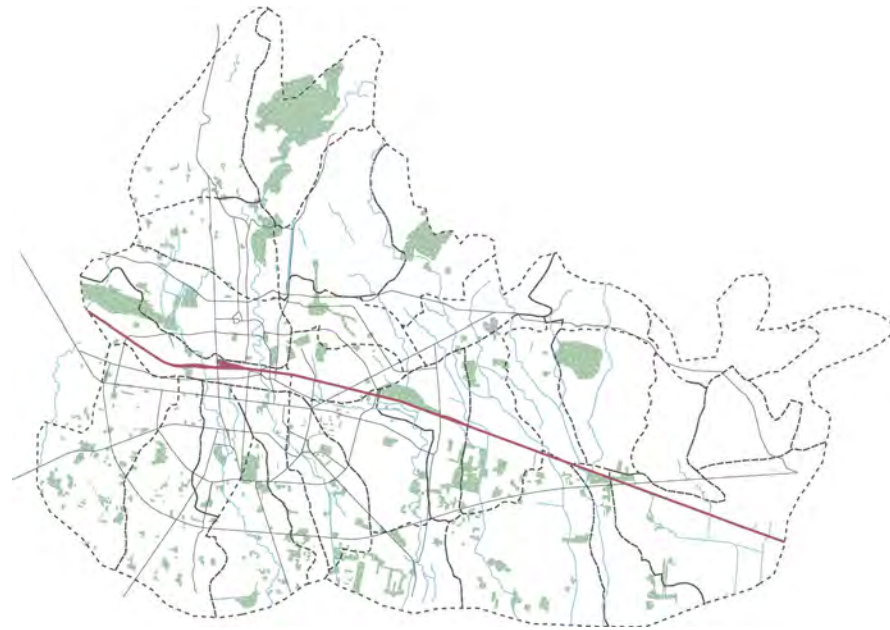


## SHARED HERITAGE LAB BANDUNG



Shared heritage is for the **people** and should be the means to understand our common history and evolution in way that overcomes national borders, political conflicts and government policies.

# SHARED HERITAGE LAB BANDUNG



City scale



Railway backbone



Knil Magazijnen and Military area



Indonesia

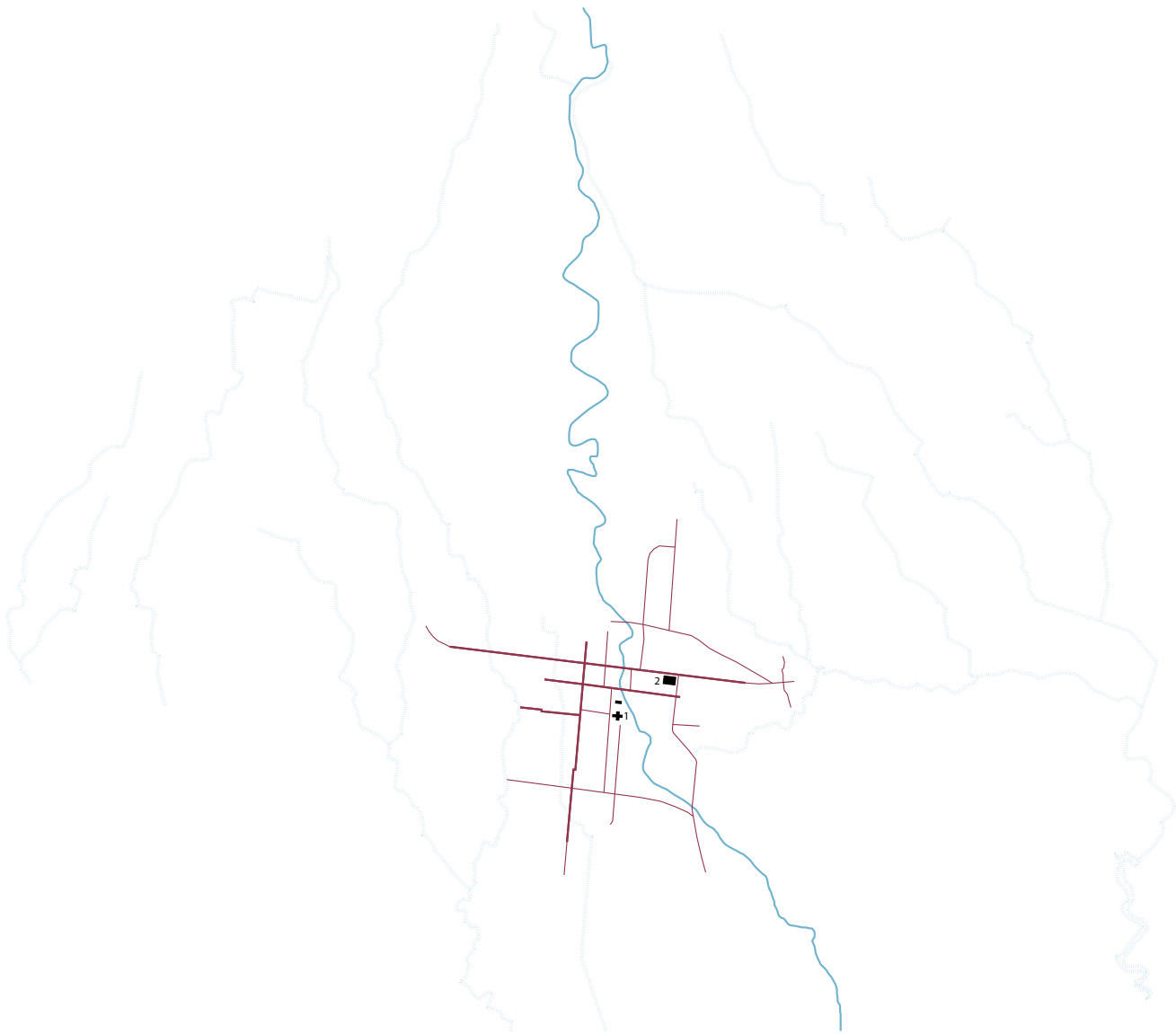
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- I. RESEARCH | CONTEXT | PROGRAMME| SITE
- II. INTERVENTIONS | DESIGN IMPLEMENTATION
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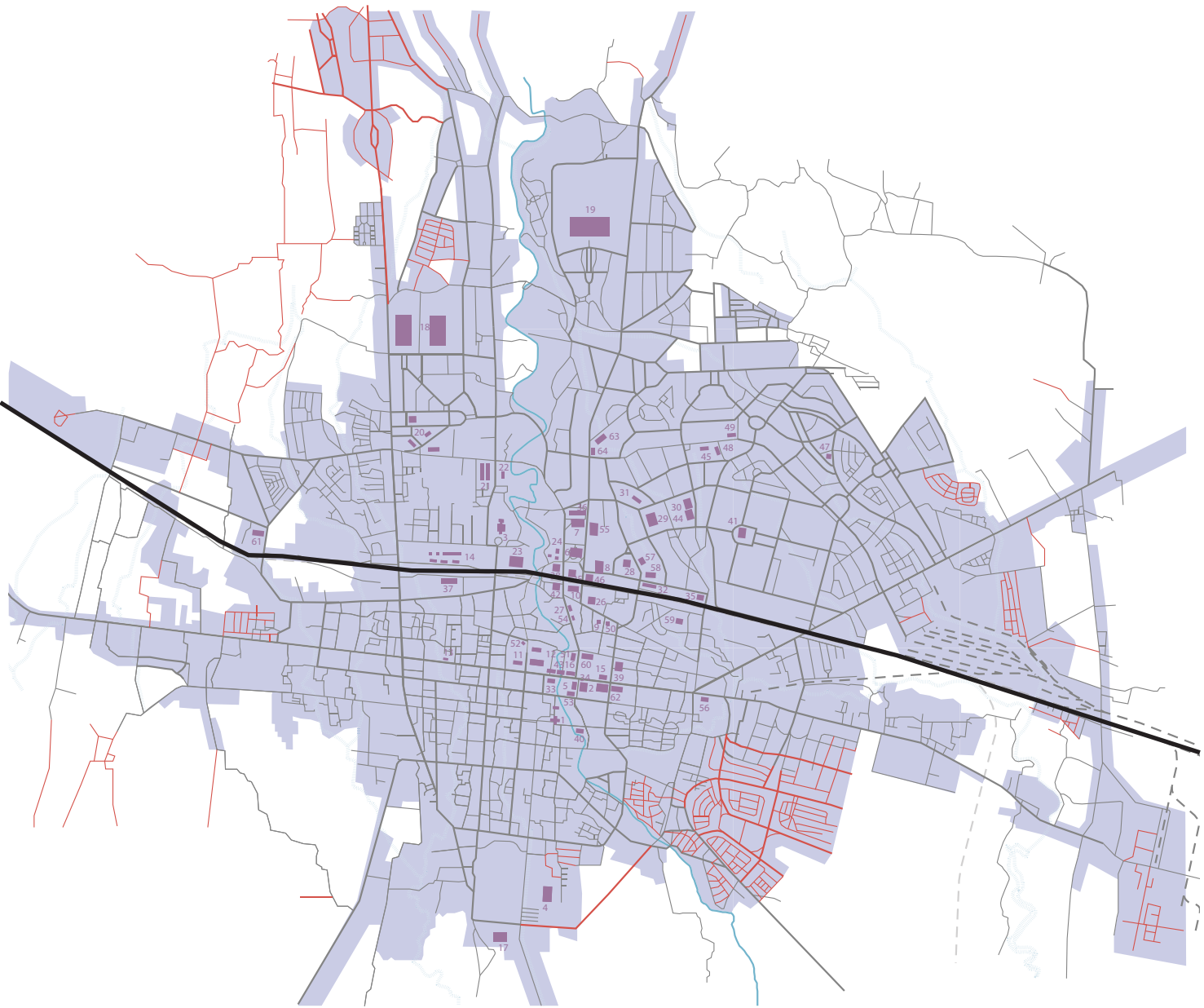


## I. **RESEARCH** | CONTEXT | PROGRAMME | SITE

RESEARCH  
City scale



1825



1953

The Dutch decided to move the capital to Bandung due to its better climate.



Image: Halte Lebak djero, outside Bandung

Source:  
Bandung Shared Heritage Society.



*Bandung, 2019*

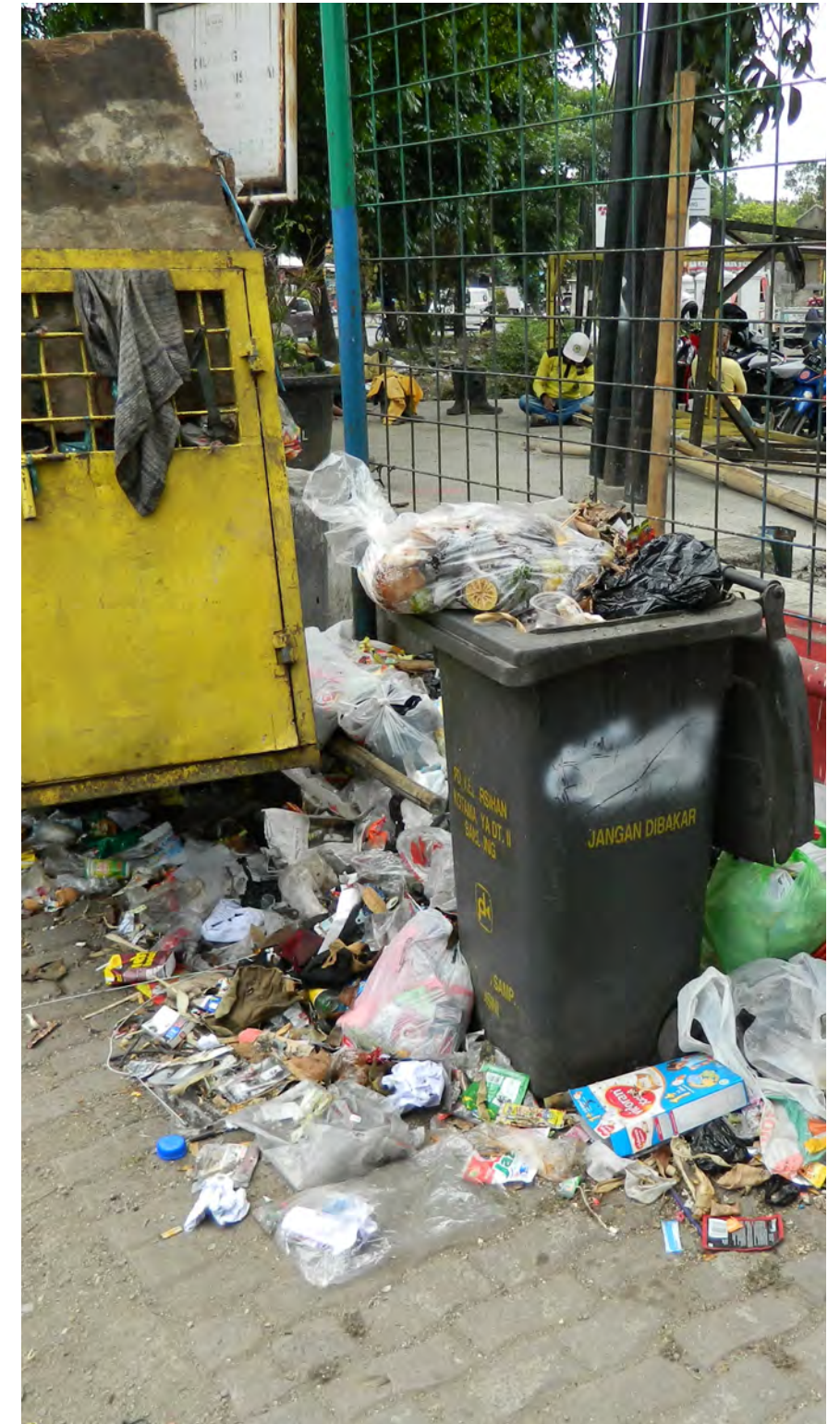


Source:  
<https://www.google.com/maps/place/Bandung>



# RESEARCH

City scale





# RESEARCH

## City scale

Indonesia is the **second country** after China contributing to plastic pollution.

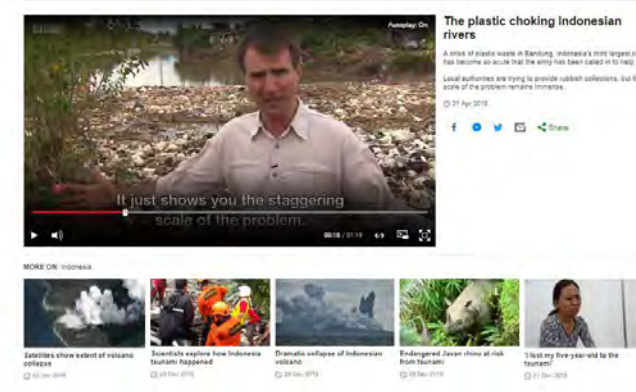
**3.22 million metric tons per year.**



**4 of Indonesian's rivers** are among 20 most polluted rivers in the world.

Target?

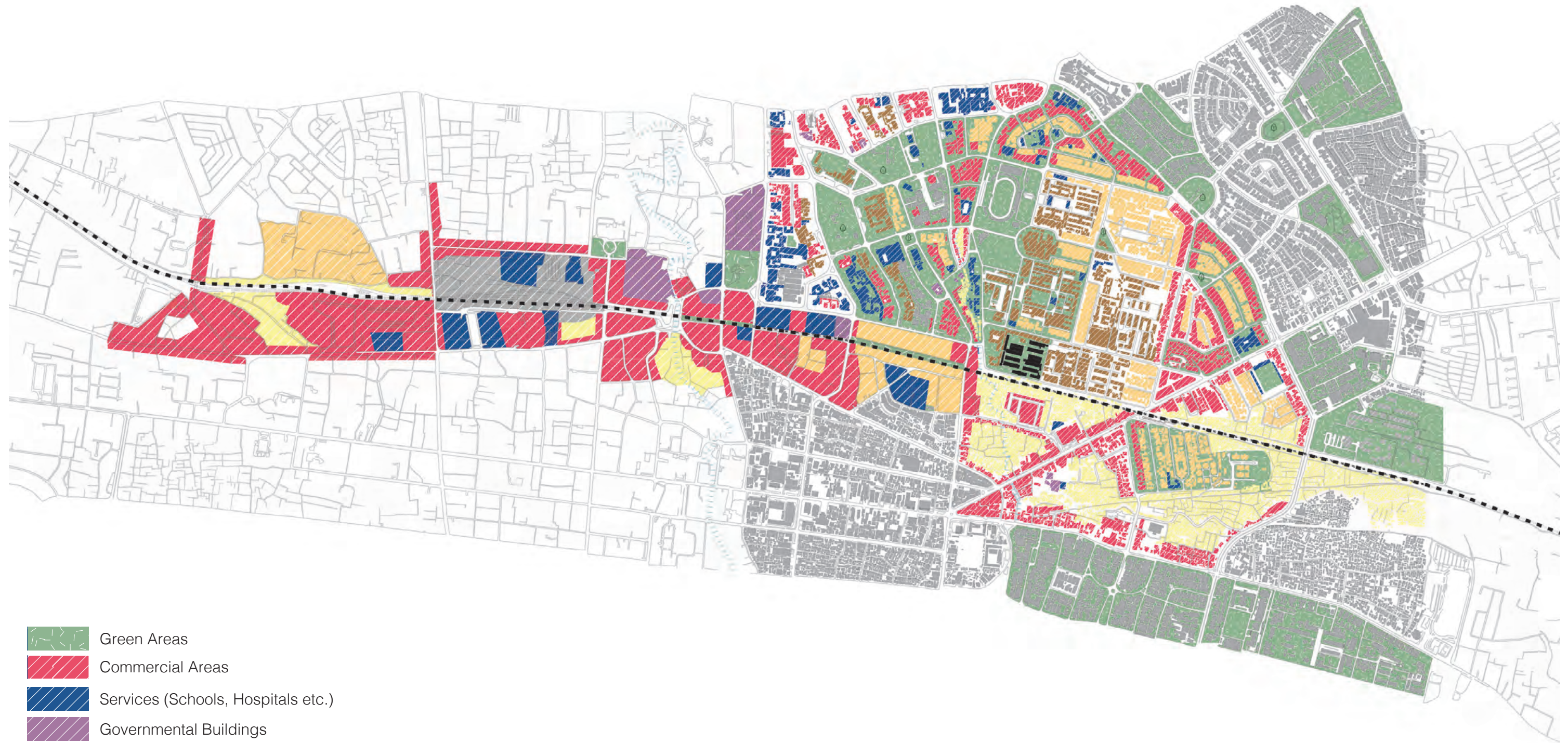
**70%** reduction by 2025





# RESEARCH

Railway Backbone



Land use along the railway

- Green Areas
- Commercial Areas
- Services (Schools, Hospitals etc.)
- Governmental Buildings
- Residential Areas
- Kampung
- PT Kereta Api Assets
- Offices or Unidentified
- Military Areas
- Chosen Site



# RESEARCH

## Railway Backbone



gated, dead-zone that separates the north part of the city from the south part of the city mostly used as a waste landfill.

**Lack of waste management**



A wall is used to separate clearly the buildings and their users from the railway area and thus avoid any interaction with it.

**Social segregation**



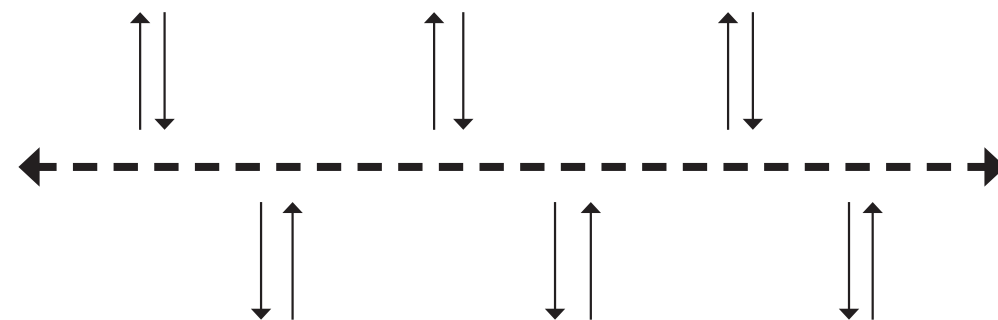
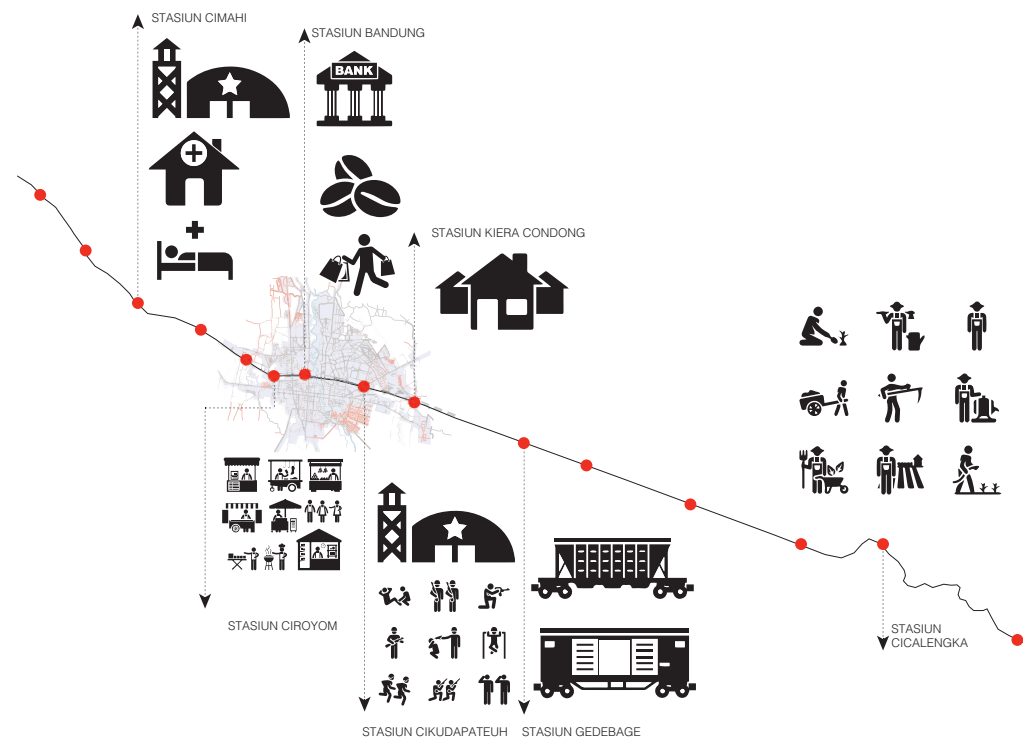
The absence of public space/space in general.

**Inequality**

# RESEARCH

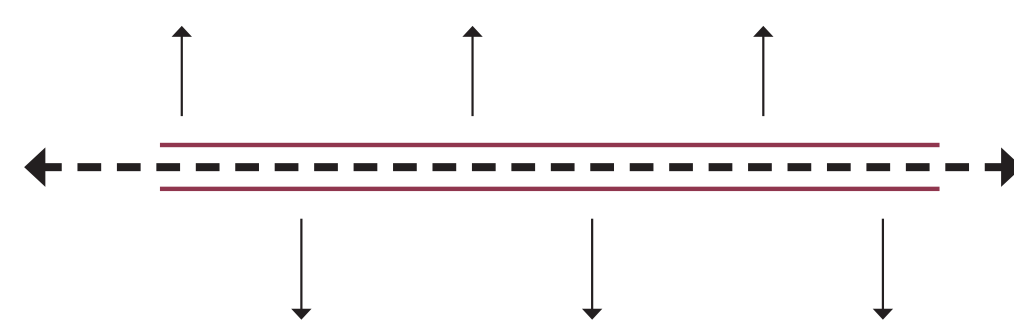
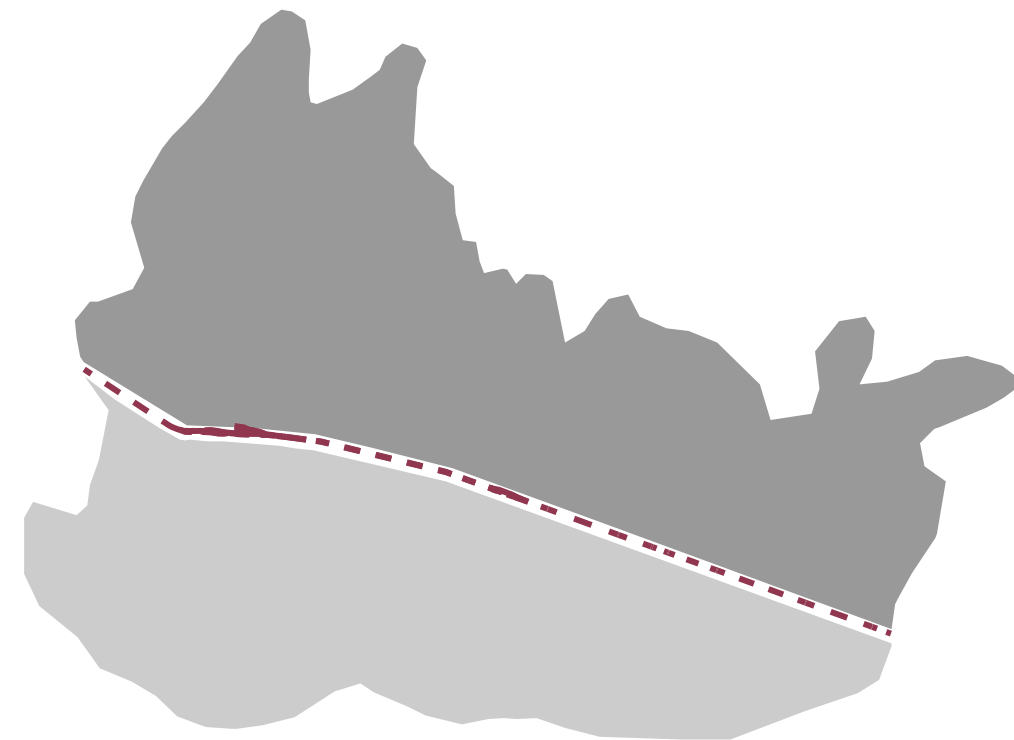
## Railway Backbone as shared heritage

Past



Infrastructural system

Present



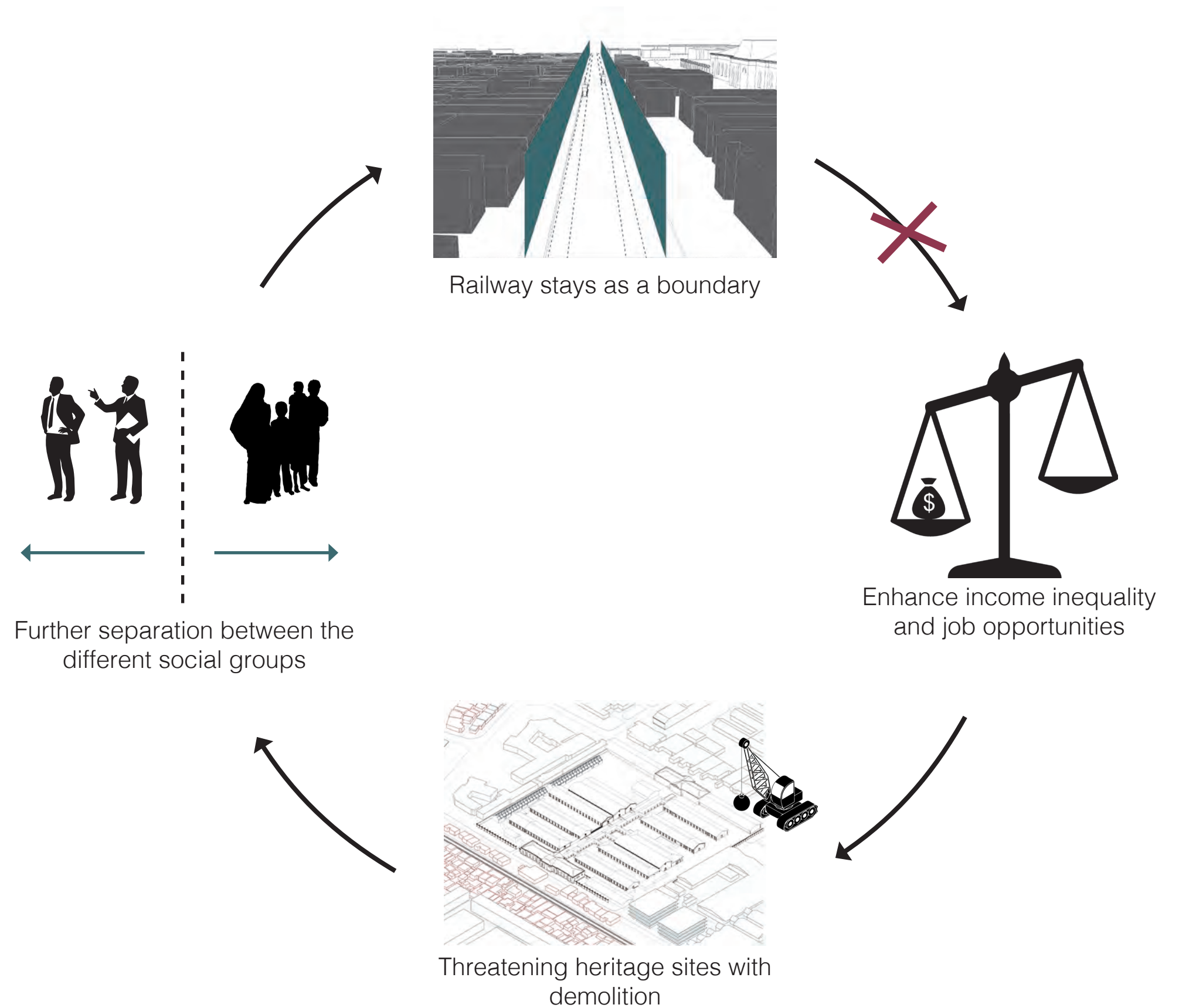
A physical barrier between different social groups that serves as a waste landfill.



I. RESEARCH | **CONTEXT** | PROGRAMME| SITE

## CONTEXT

Social segregation



The most important thing in order to change things is to educated the people and raise awareness about the issue but also provide them with alternatives and the opportunity to explore them.

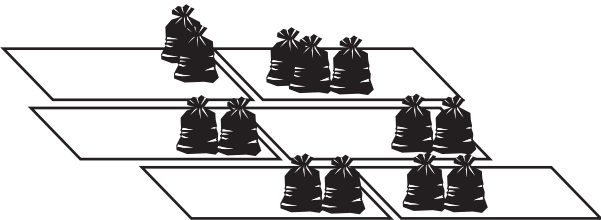
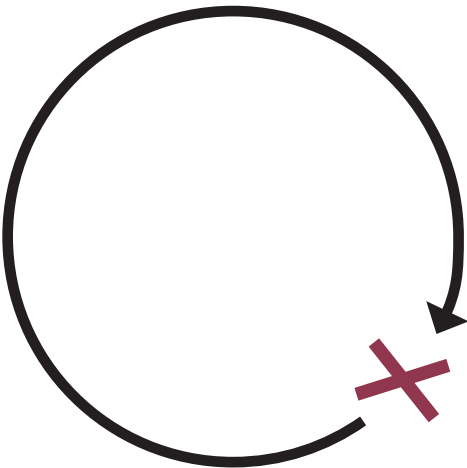
**CONTEXT**  
Plastic waste pollution



Solid waste



Air pollution



Land use problem



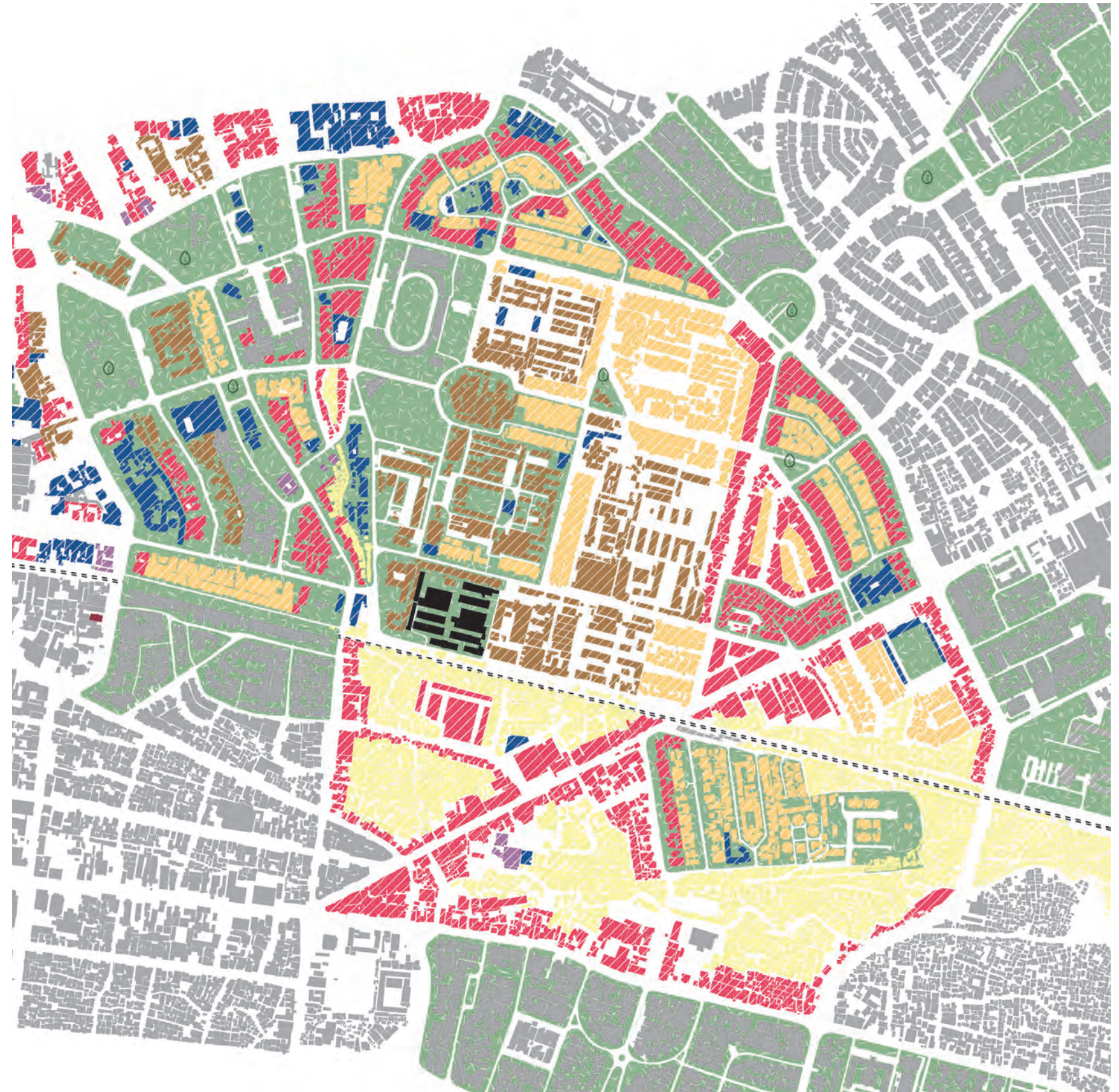
Water pollution



## CONTEXT

Military District - Knil Magazijnen - Pisang Kampung

Intersection point between planned and unplanned residential areas with commercial activity around it. A boundary between the two worlds itself.



- Green Areas
- Commercial Areas
- Services (Schools, Hospitals etc.)
- Governmental Buildings
- Residential Areas
- Kampung
- PT Kereta Api Assets
- Offices or Unidentified
- Military Areas
- Chosen Site



## CONTEXT

Military District - Knil Magazijnen - Pisang Kampung

Seriously suffering from the recycling waste collection area between the Knil Magazijnen and the train tracks.





## CONTEXT

Military District - Knil Magazijnen - Pisang Kampung



Lack of “public” facilities from kids playgrounds to cooking and cleaning space. Everything is densely packed on the small alleys.



The community attempts to improve the environment of the neighbourhood and reduce the amount of plastic waste, by making colourful pots with plants. And if they had more space they would expand their production and also consider selling it.

## CHALLENGE

How heritage adaptive re-use can become the means for **social inclusion** where culture is a process as opposed to a product, raising awareness to the people, in terms of the **plastic waste problem** and environmental pollution while simultaneously creating business opportunities and **empowering the low-income communities?**

## QUESTION

How heritage adaptive re-use can become the means for **social inclusion** where culture is a process as opposed to a product, raising awareness to the people, in terms of the ~~plastic waste problem~~ and environmental pollution while simultaneously creating business opportunities and **empowering the low-income communities?**

**“Anything”**



## SOLUTION

Integration

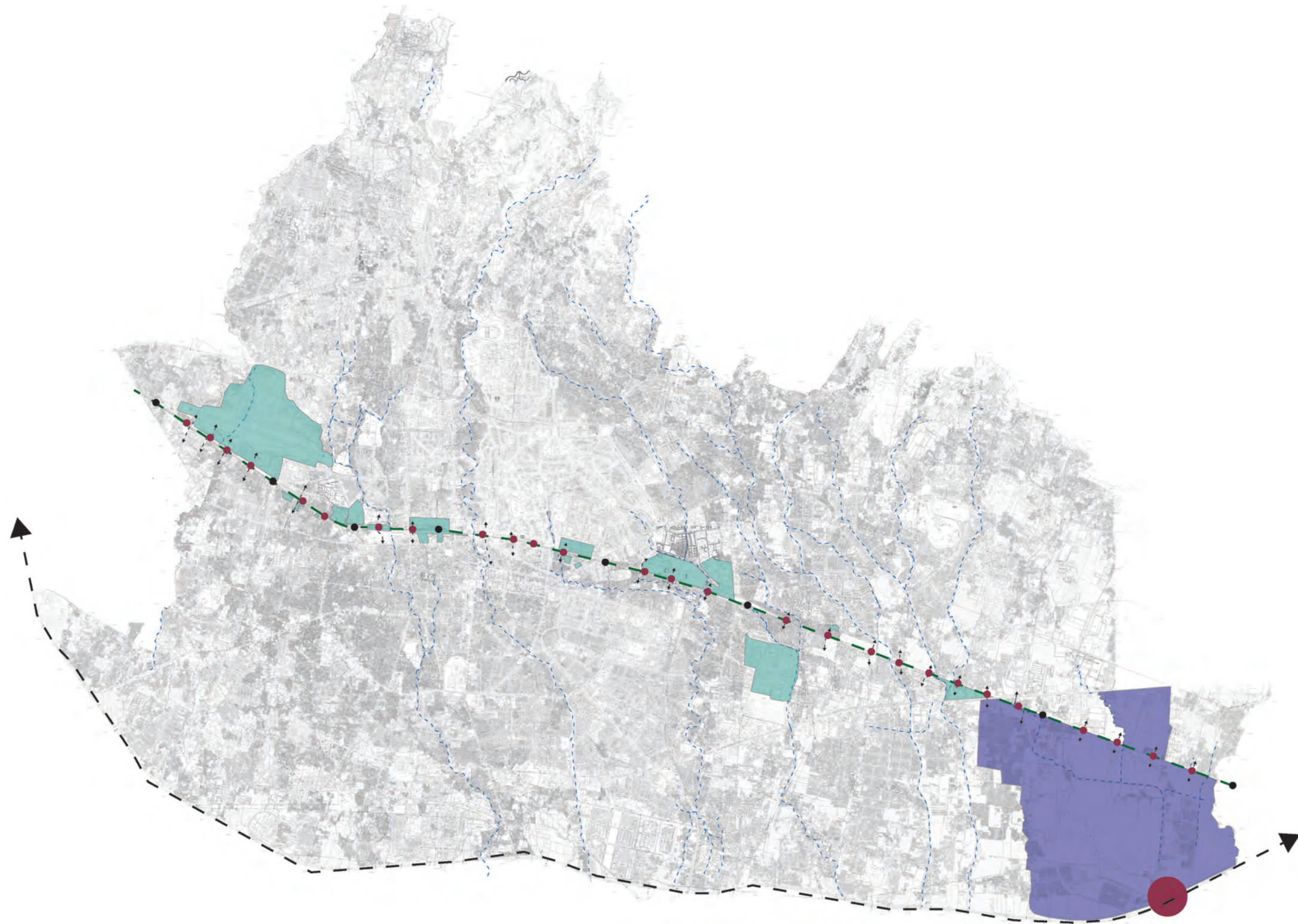
“A cultural or social solution  
to an environmental problem”





# SOLUTION

Urban Scale

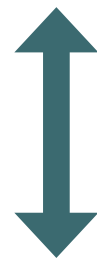


New tram line



# SOLUTION

Urban Scale

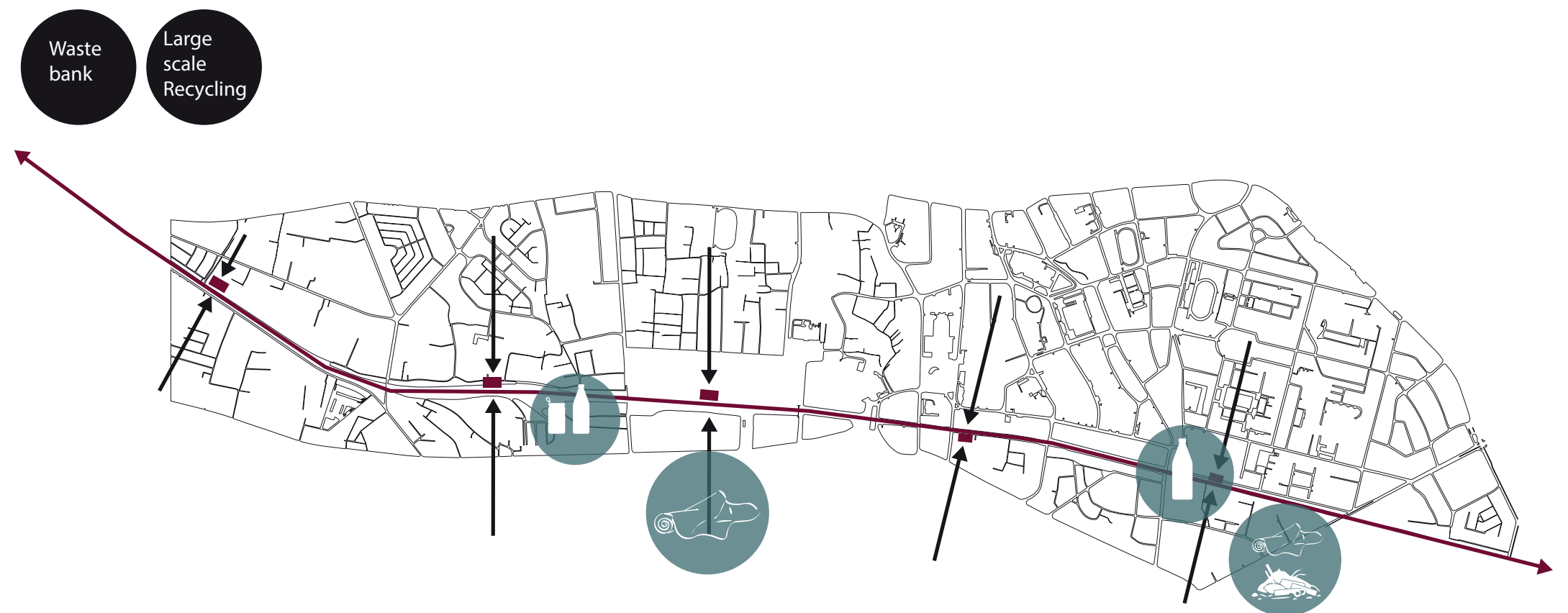


Activate the Edges of the former railway



## SOLUTION

Urban Scale

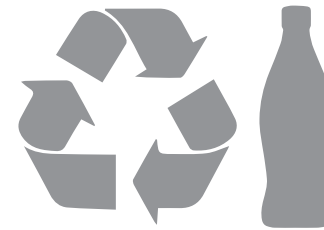


The new tram line is also used as a cargo tram line to transport recycling waste from the city to waste banks and recycling plants.



# SOLUTION

Neighbourhood



Manage recycling waste  
in a healthier more  
efficient way



Inclusive and safe



Community spirit and  
vibrant street life



New cultural  
layer/community



Sport facilities



Urban farming



New meeting points and  
transitions



Mixed uses



## SOLUTION

Neighbourhood

Green space and fresh air - **Military District**





# SOLUTION

Neighbourhood

## Vibrant Street Atmosphere - **Kampung Pisang**





I. RESEARCH | CONTEXT | **PROGRAMME** | SITE

# PROGRAMME

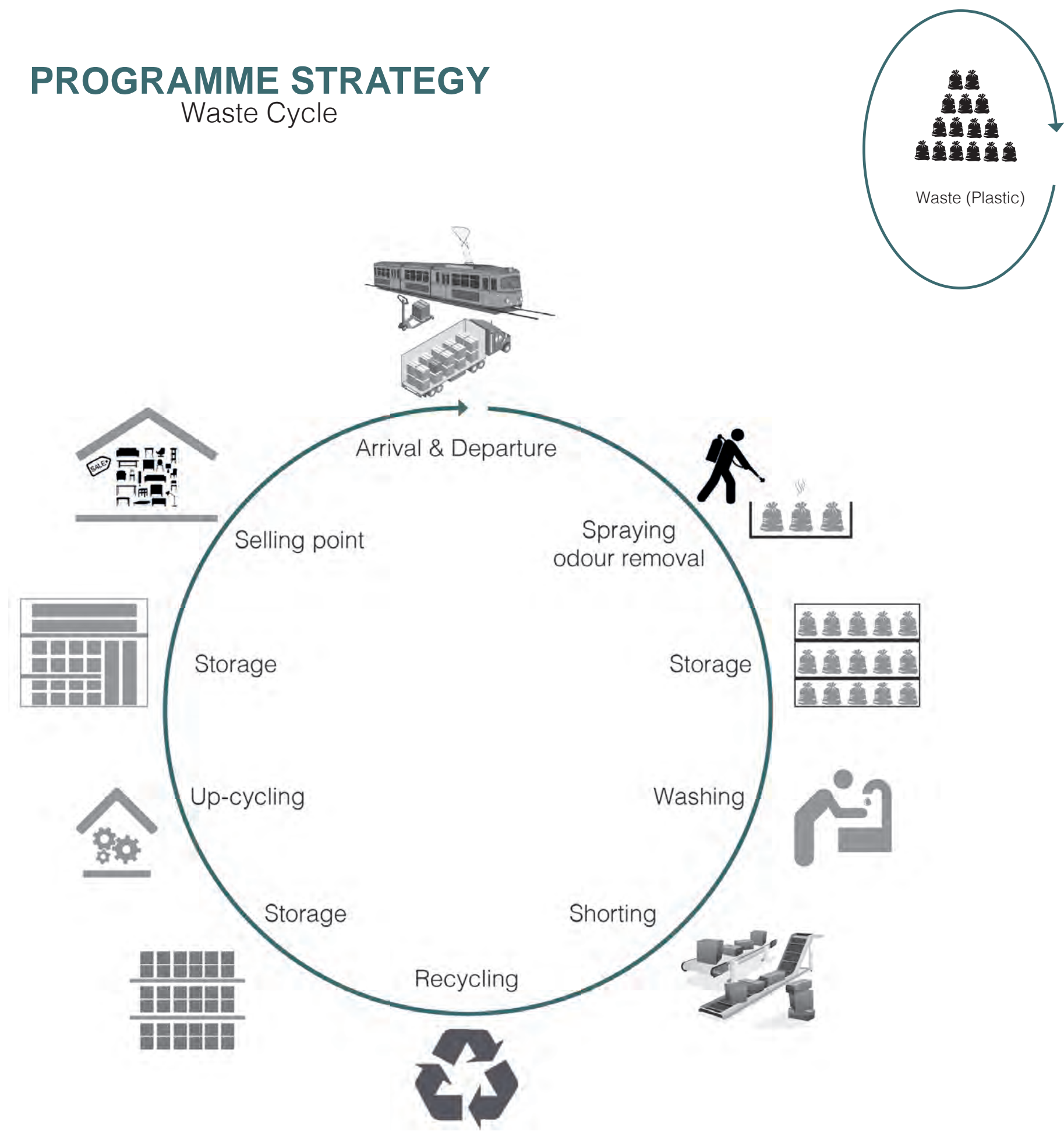
Concept





# PROGRAMME STRATEGY

Waste Cycle



# PROGRAMME STRATEGY

Public cycle





# PROGRAMME STRATEGY

Integration



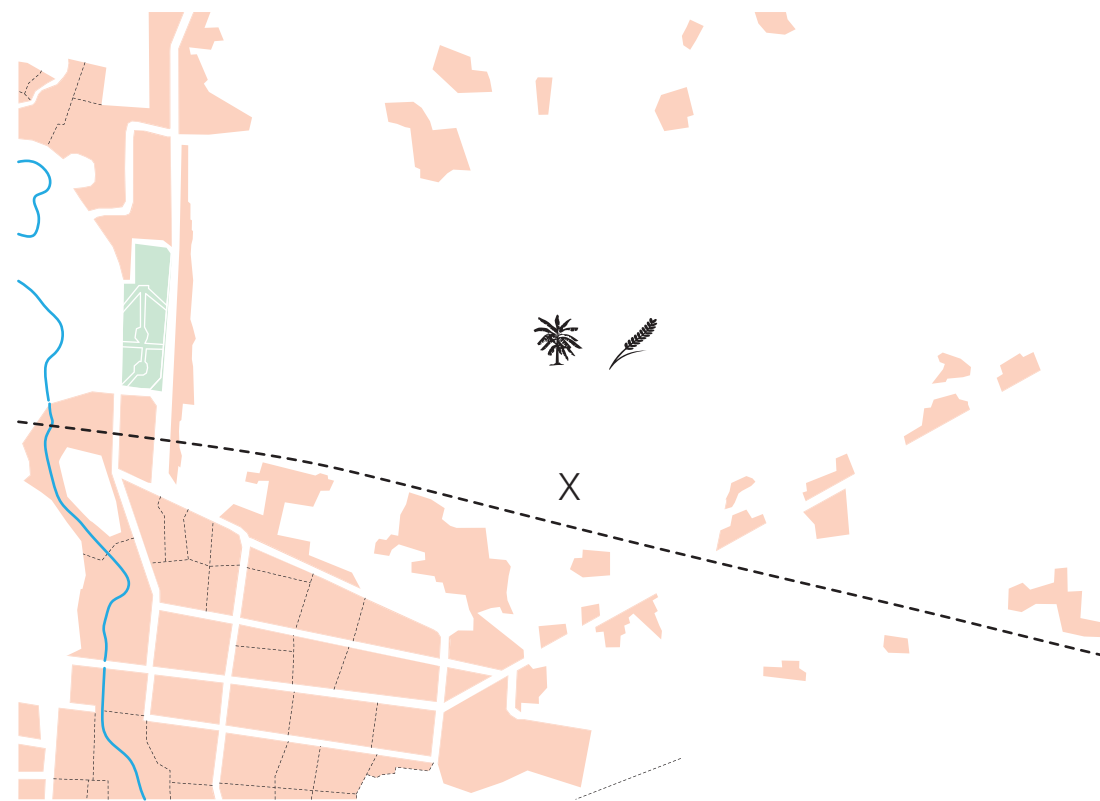
THE CREATIVE AND LEARNING CLUSTER OF PLASTIC WASTE

I. RESEARCH | CONTEXT | PROGRAMME | **SITE**

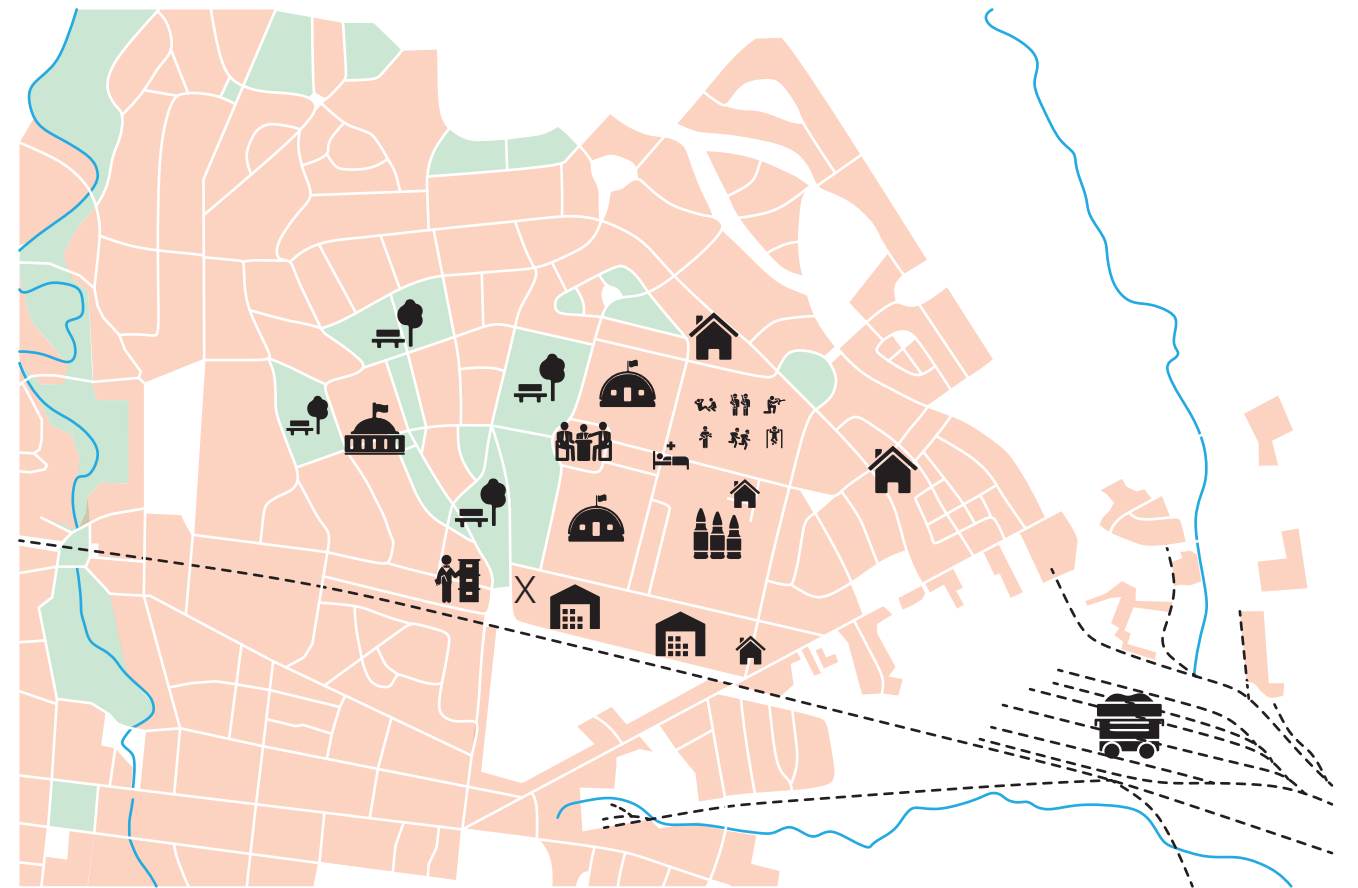


# SITE

Introduction

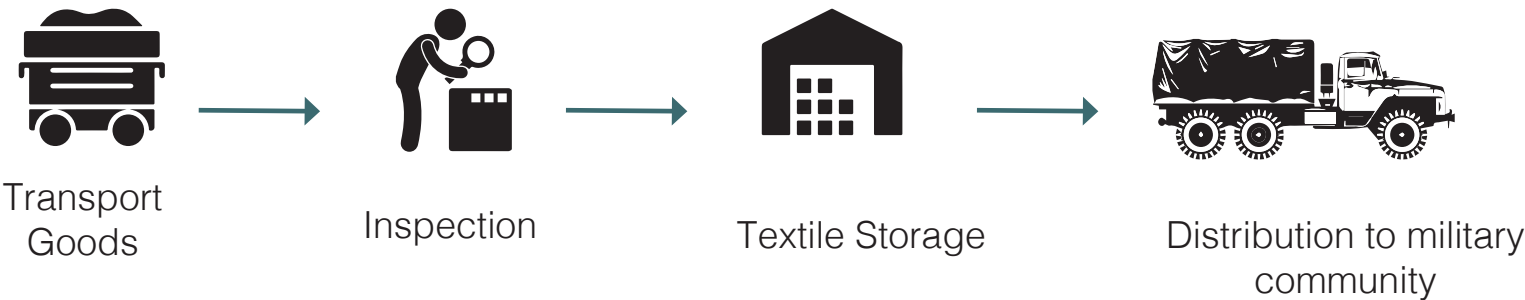
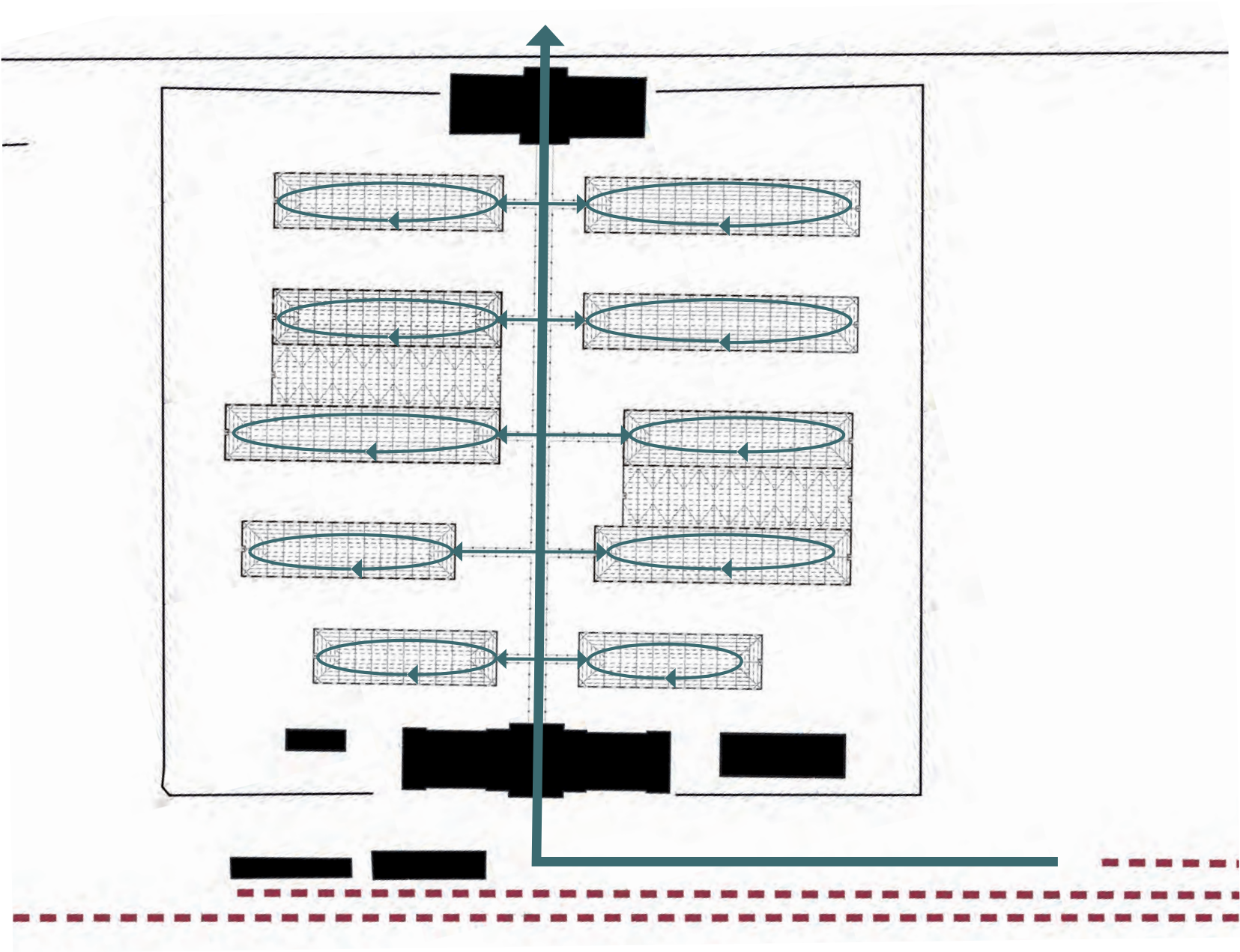


1882



1946

SITE  
Introduction





## SITE

Why this site?



A lost connection to the railway



## SITE

Why this site?



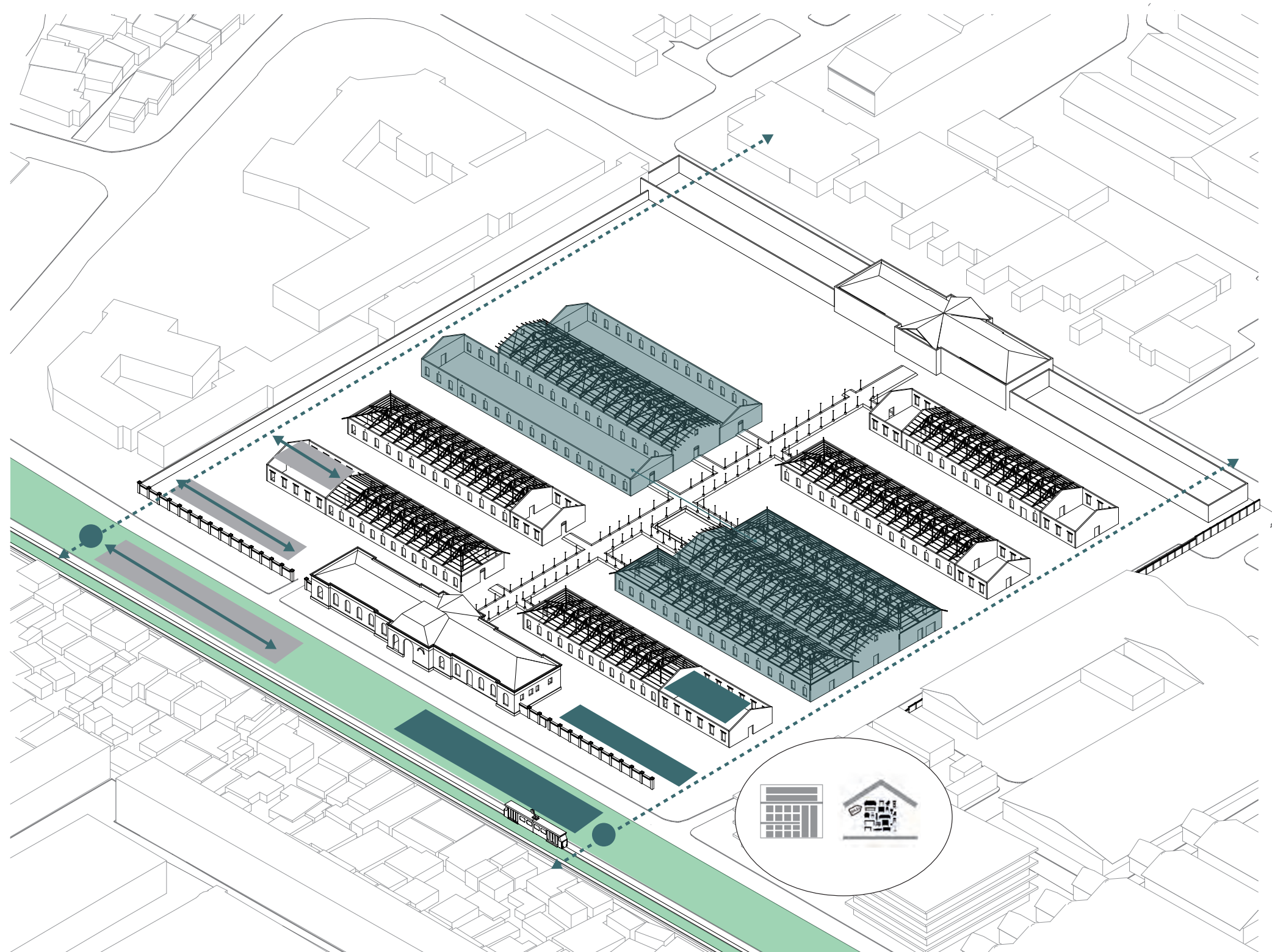
An industrial system already in place



# SITE

Programme Adaptation

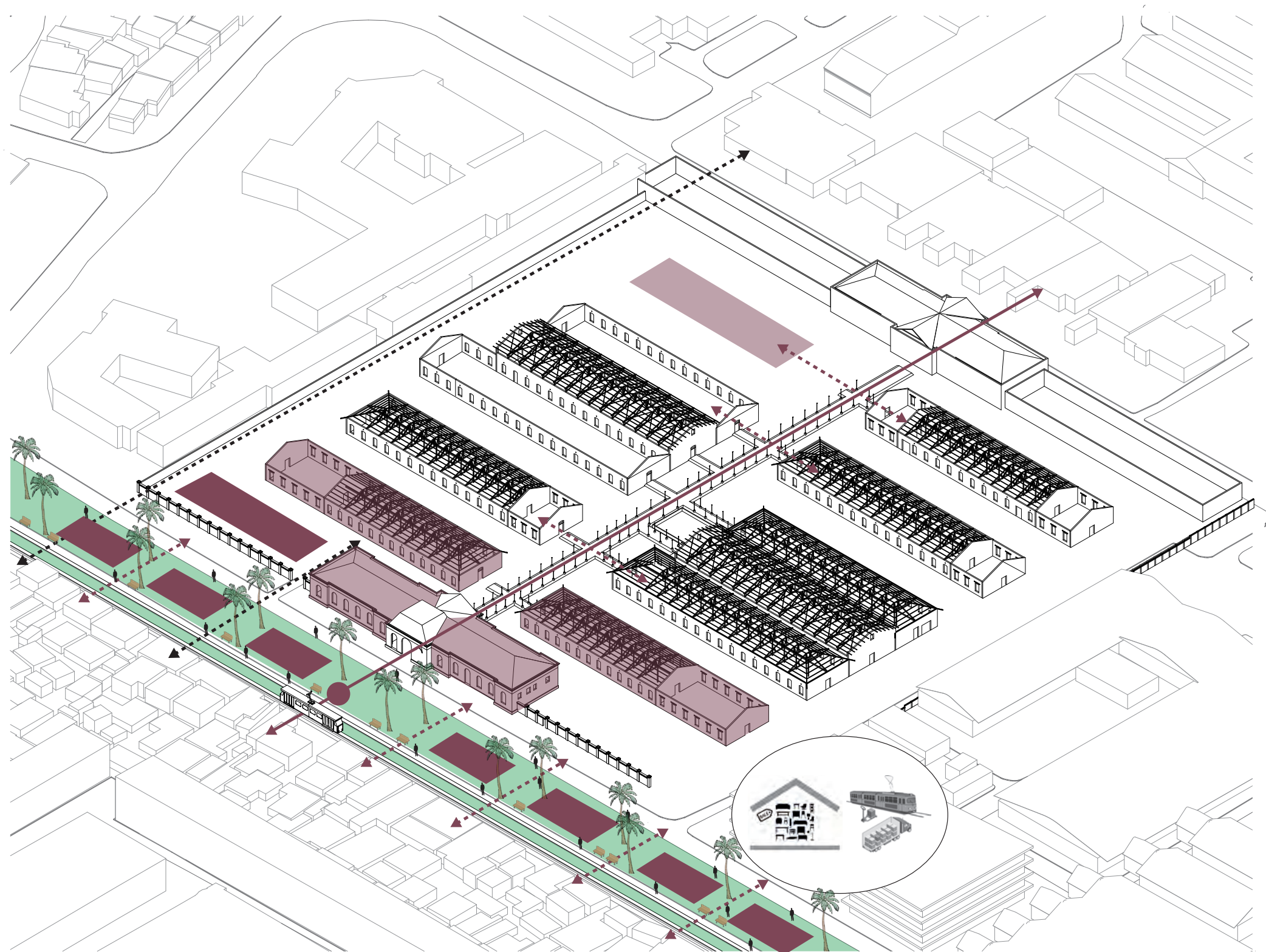
## Waste cycle



# SITE

Programme Adaptation

## Public cycle

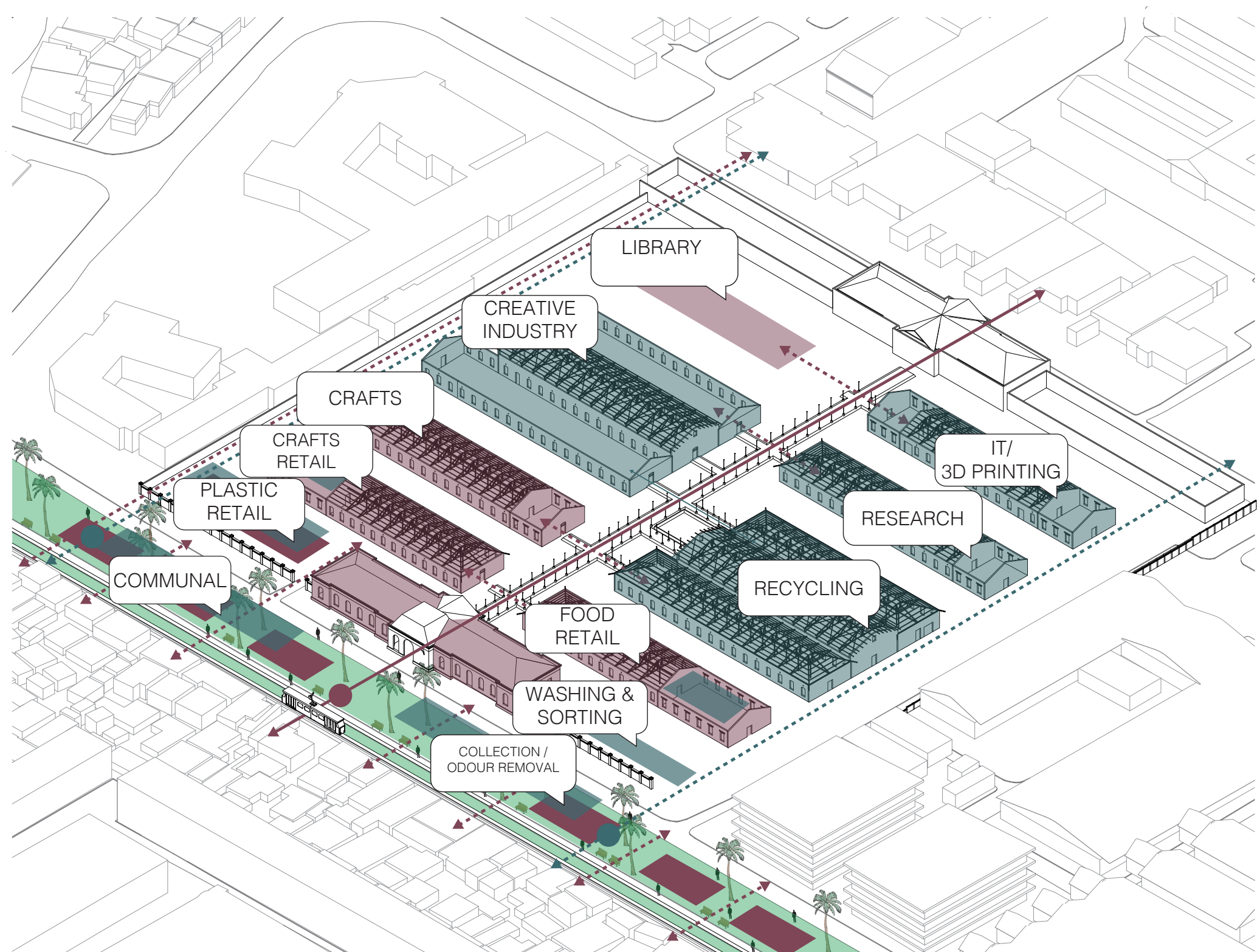




# SITE

Programme Adaptation

## Integration



## SITE

Design Question



How to **open up an enclosed** complex while **maintaining its enclosure** to facilitate the needs of the new programme.

How to keep it enclosed so that it reflects its history while striving for social and spatial inclusion?

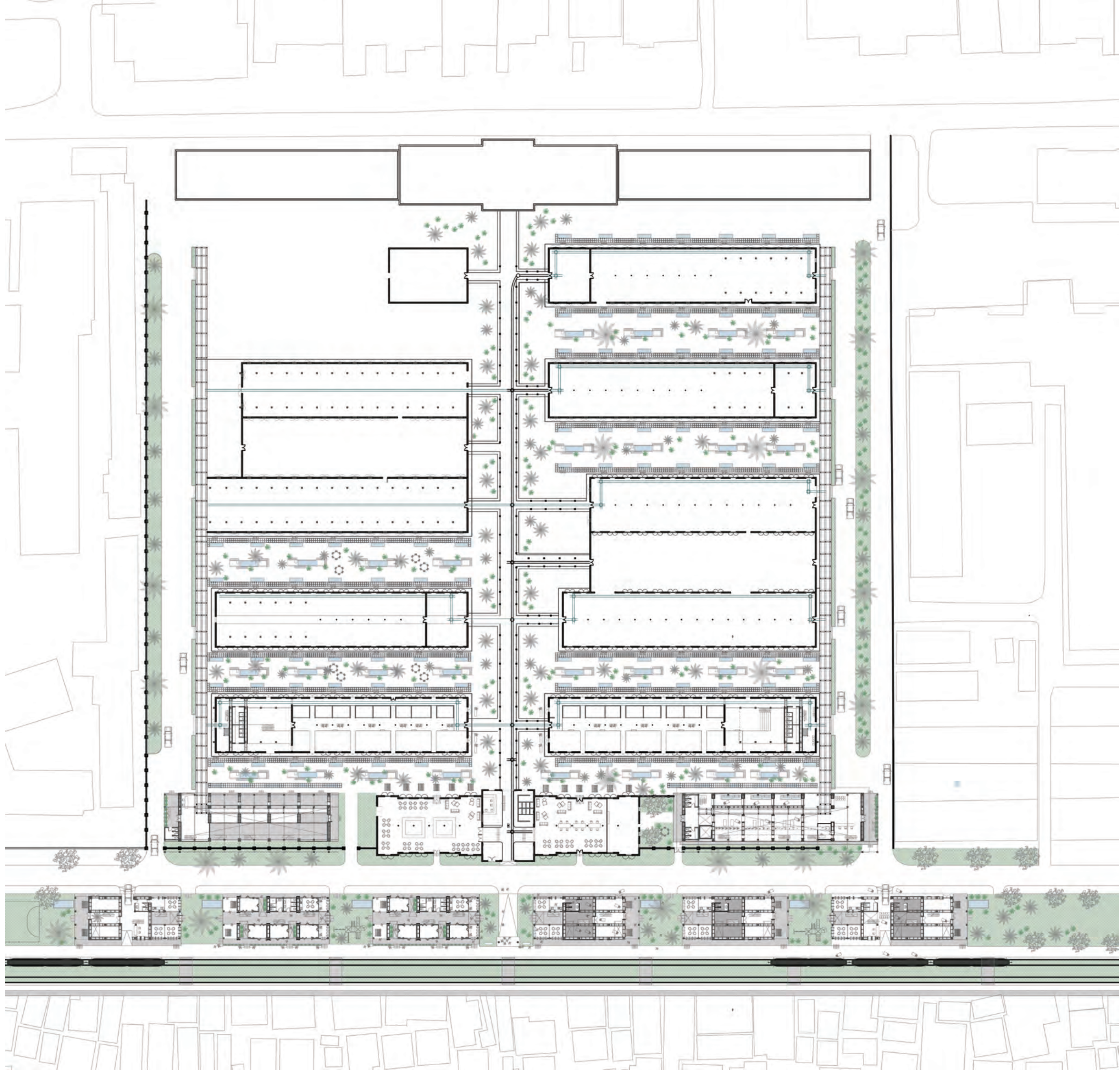


## II. INTERVENTIONS | DESIGN IMPLEMENTATION

# DESIGN

Implementation

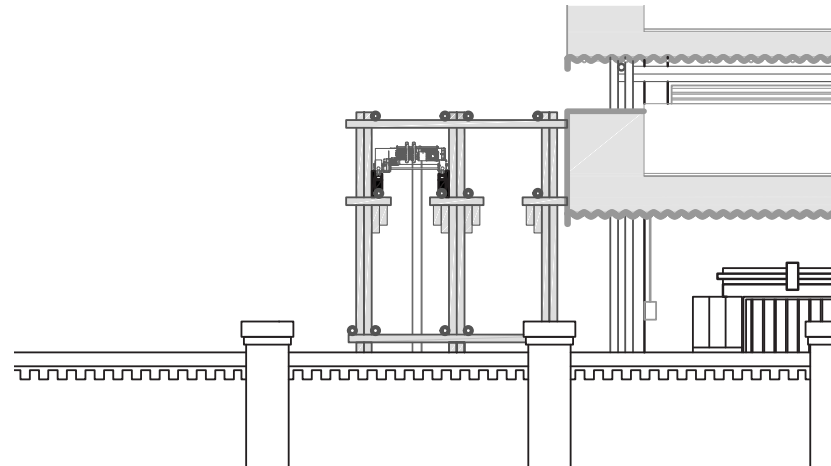
## Master plan





# DESIGN

Interventions



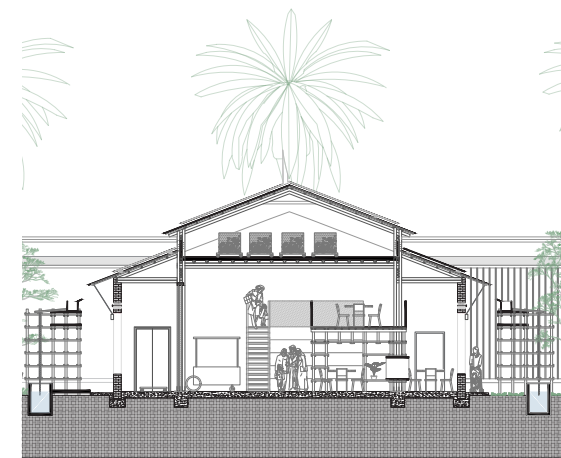
a new trolley track



a pavilion



a new storage space

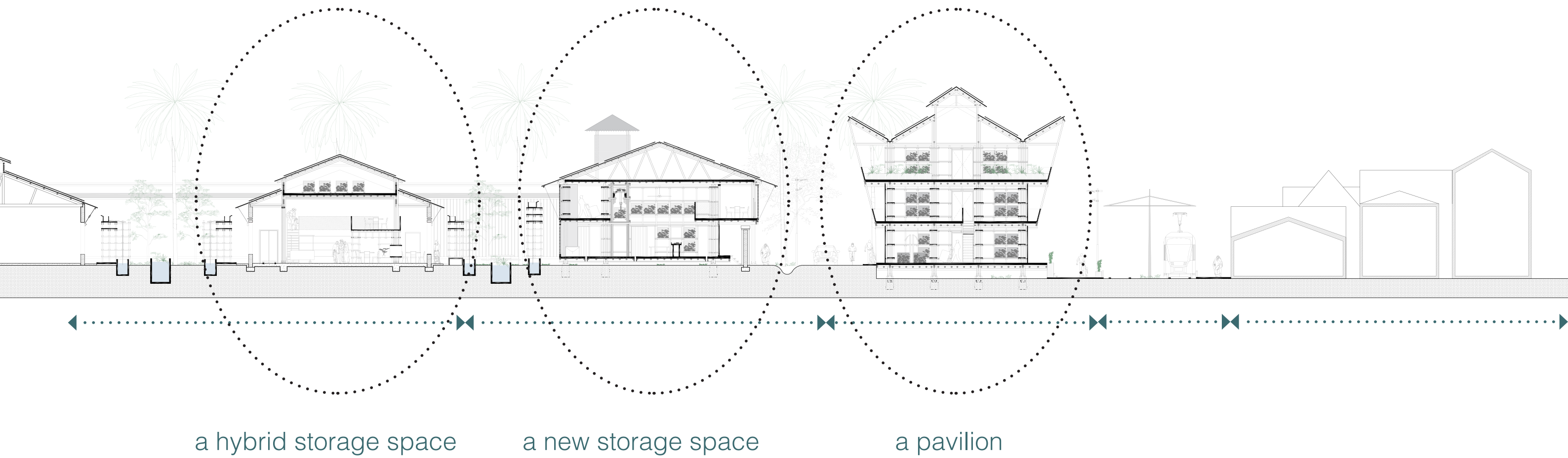


a hybrid storage space

# DESIGN

Interventions

## 3 Different Identities





# DESIGN

Implementation

One common theme

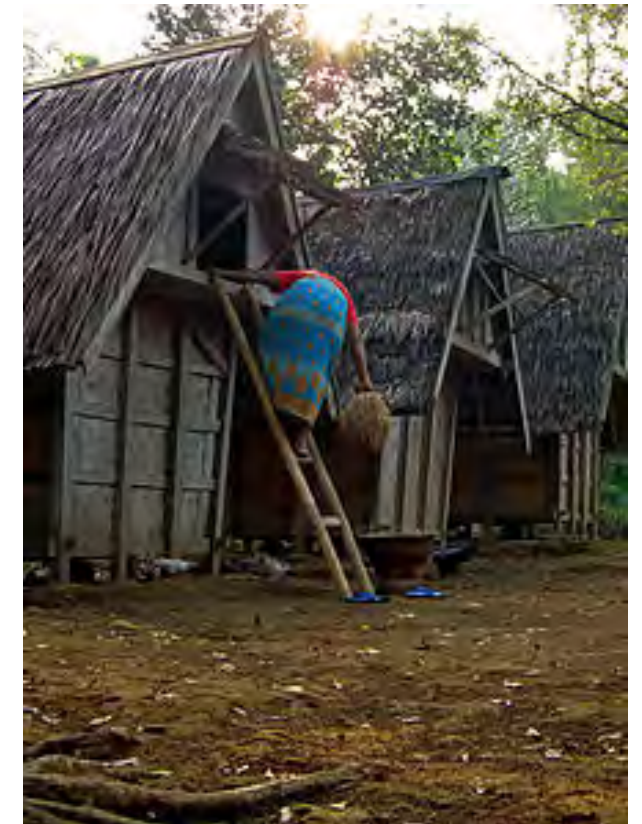
Indigenous storage spaces



Toba Batak Barns



Pavillions (berugaq)



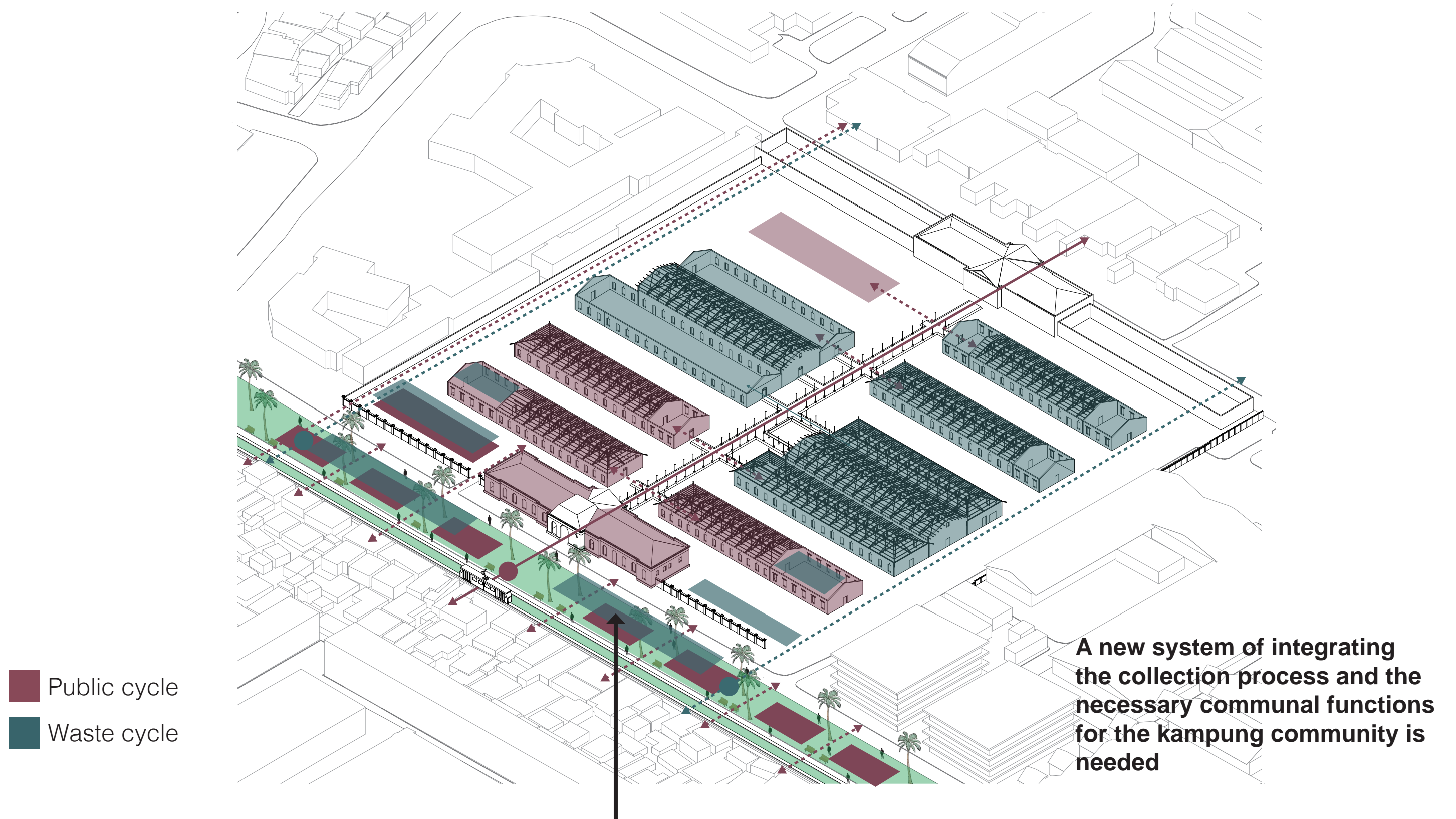
Rice barns (lumbung)



# DESIGN

Interventions

## A pavillion





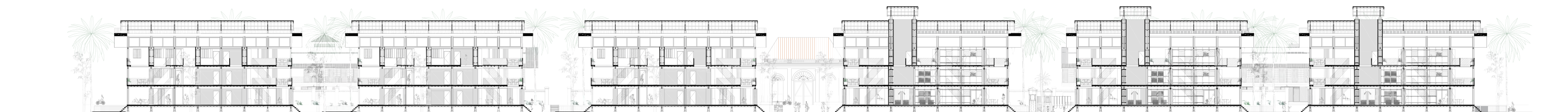
# DESIGN

Interventions

## A pavilion



all public



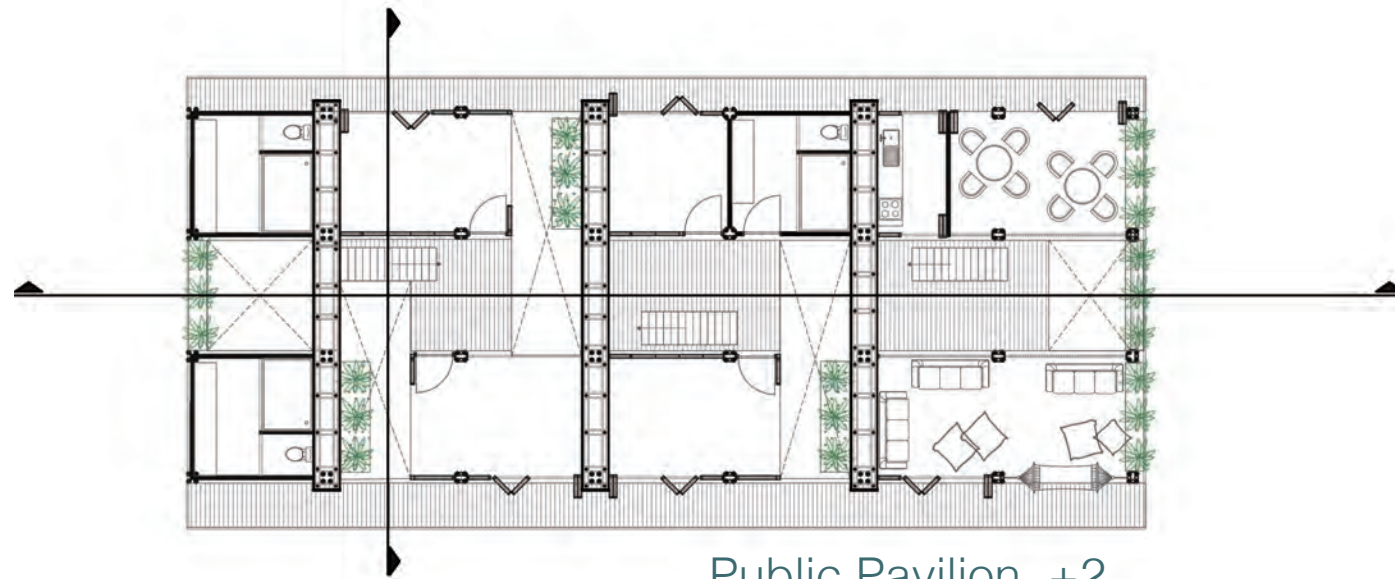
half public half waste



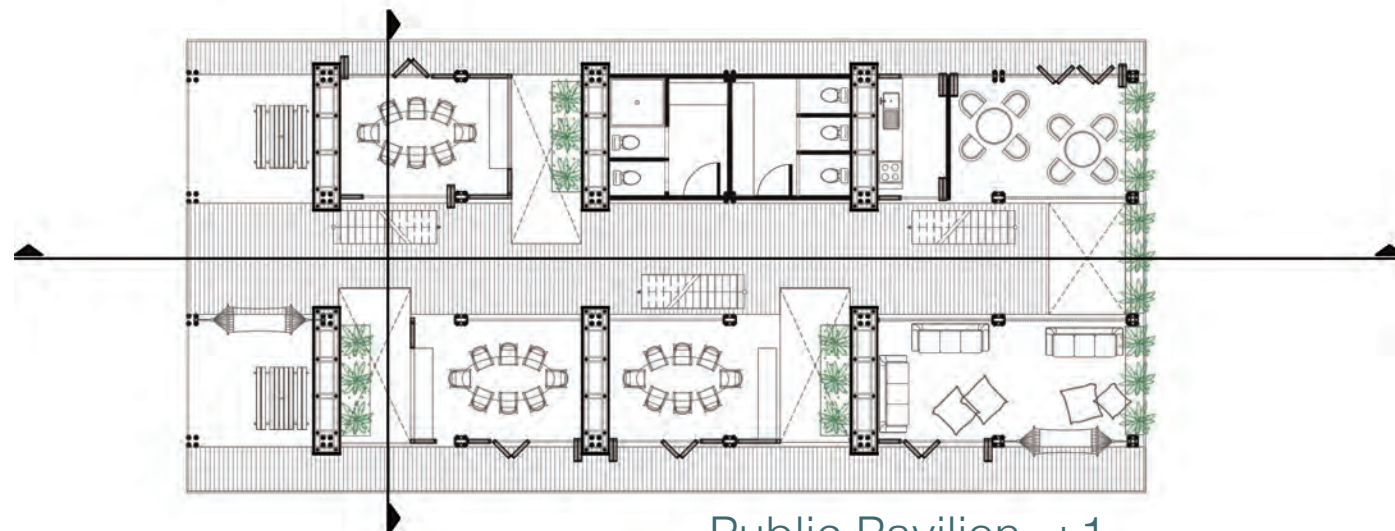
# DESIGN

Interventions

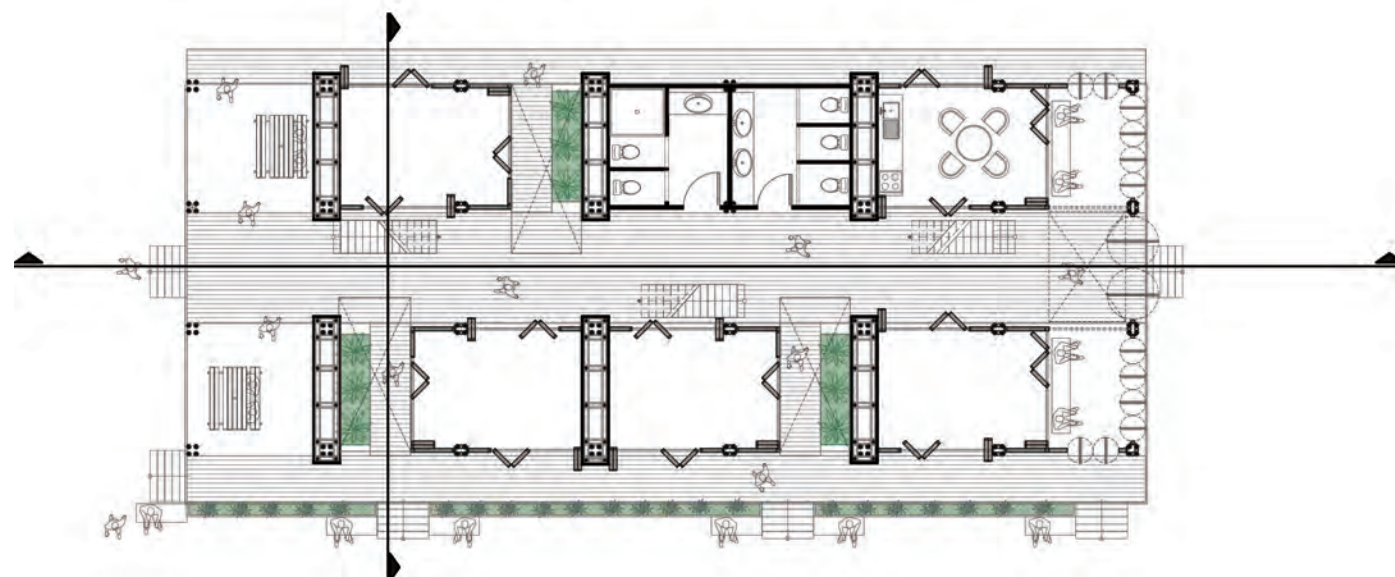
## A pavilion



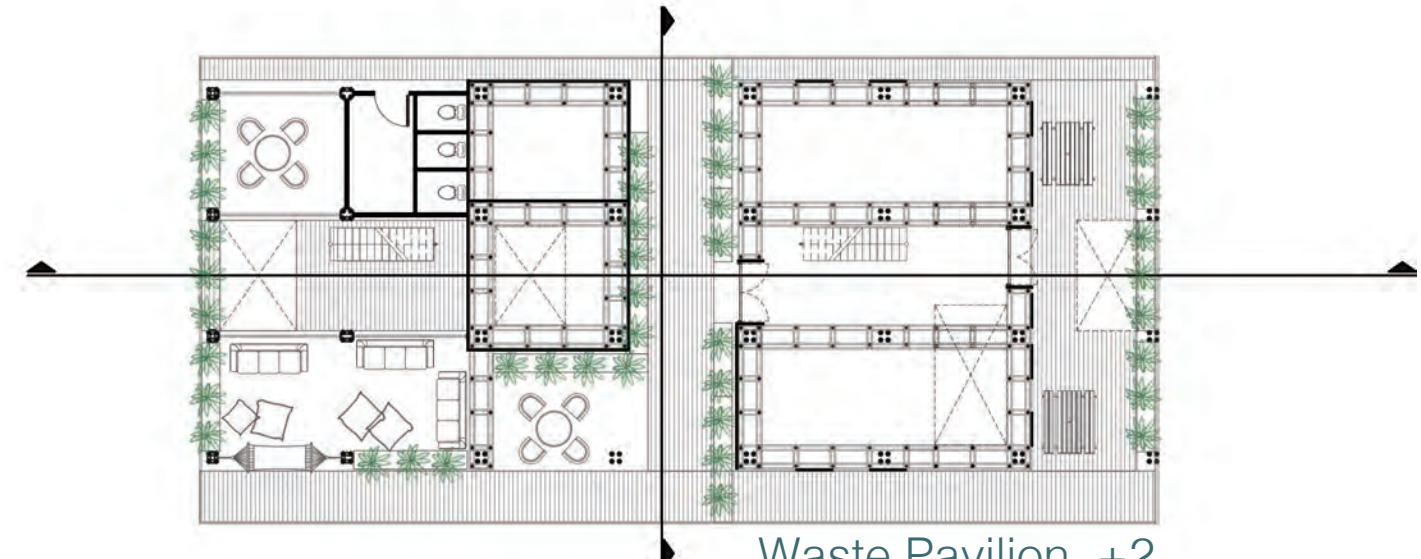
Public Pavilion, +2



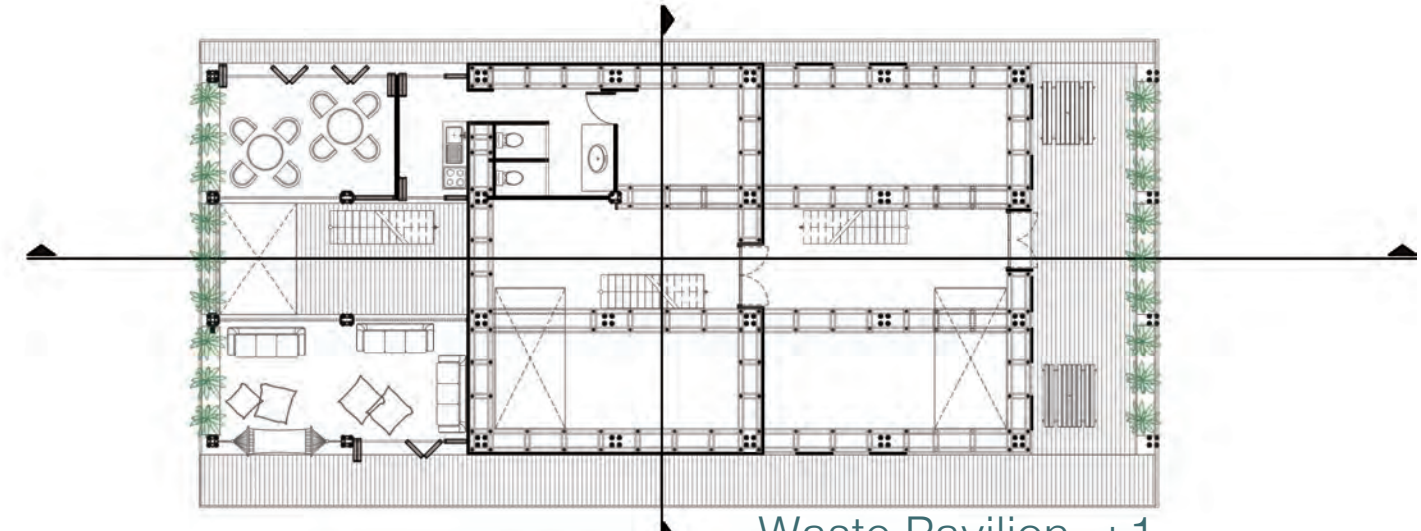
Public Pavilion, +1



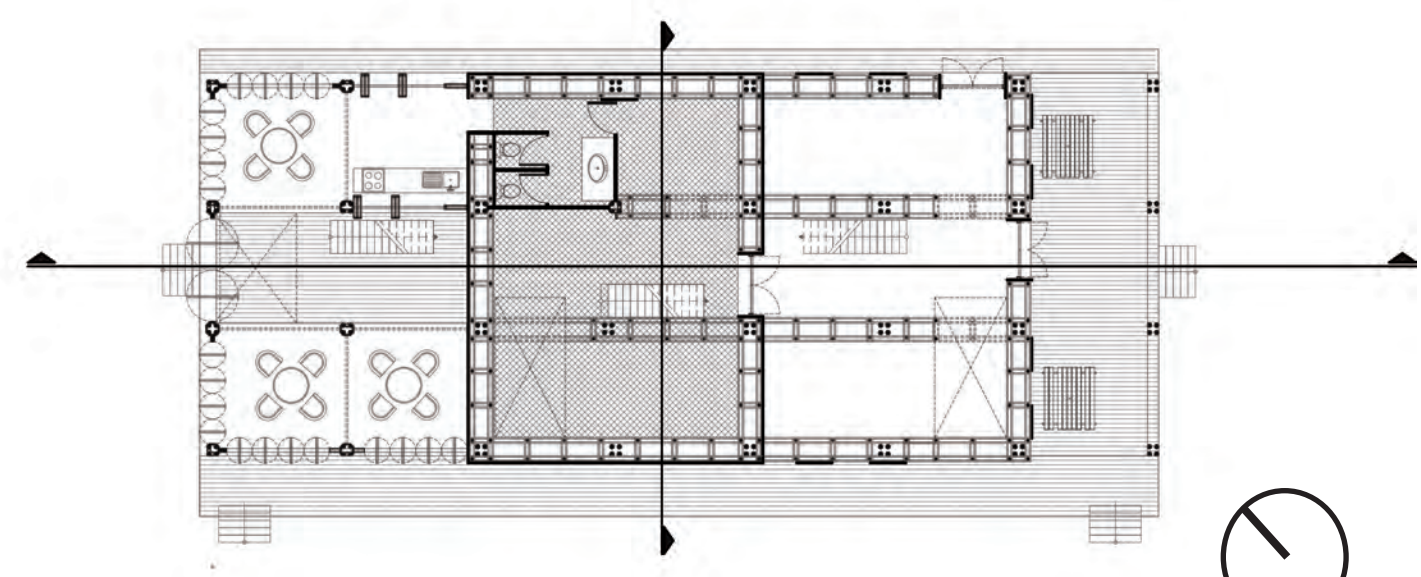
Public Pavilion, +0



Waste Pavilion, +2



Waste Pavilion, +1



Waste Pavilion, +0

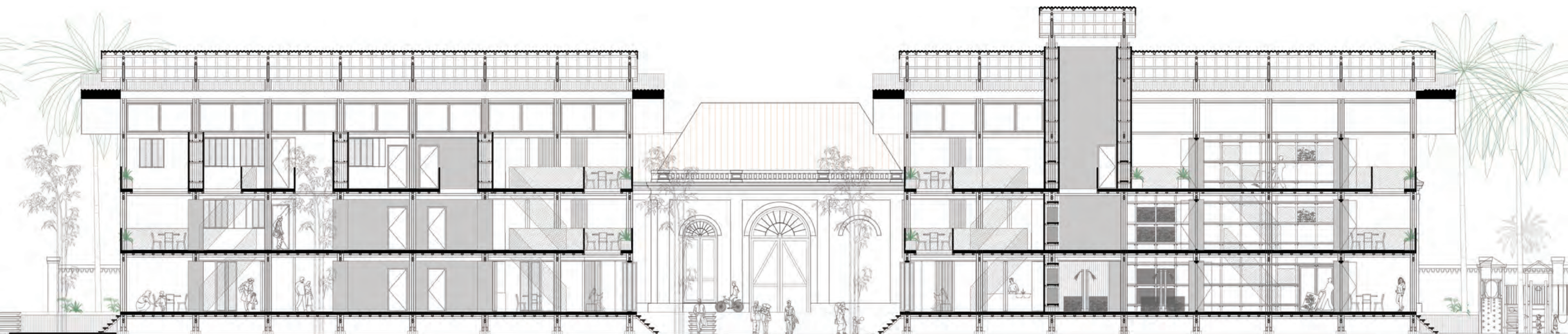




# DESIGN

Interventions

## A pavilion



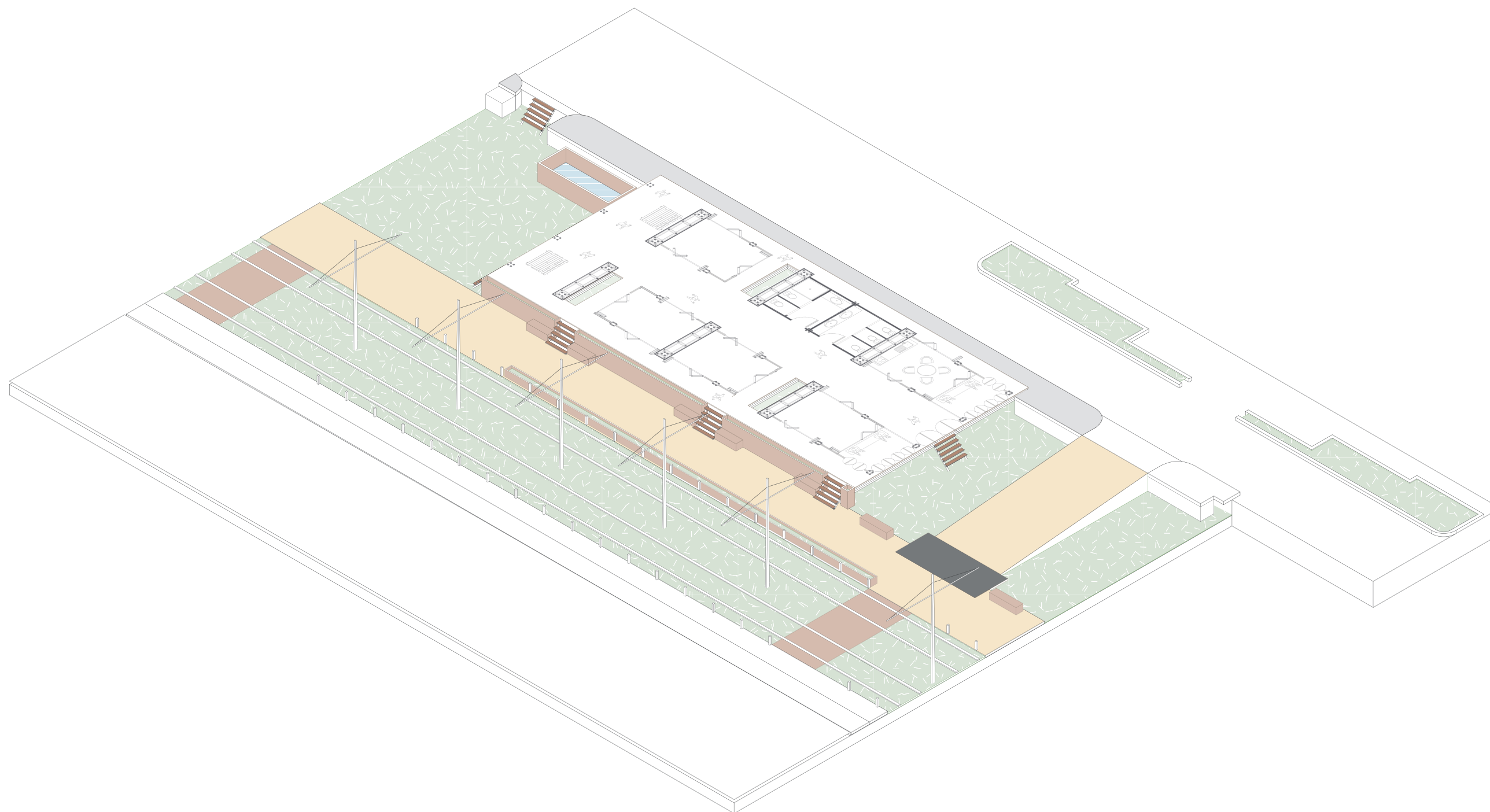
Public Pavilion

Waste Pavilion

# DESIGN

Interventions

## A public pavilion



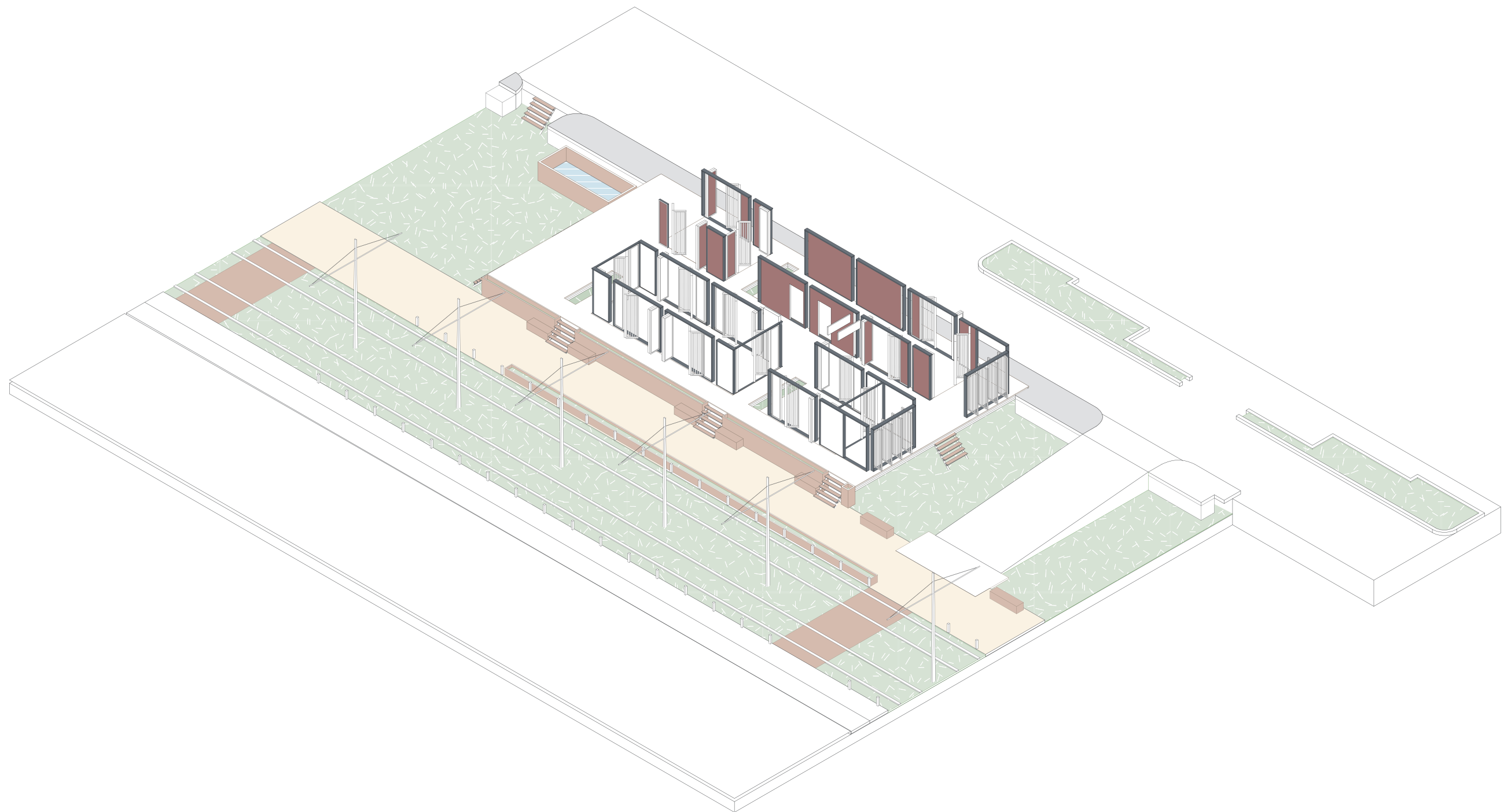
- Flexible space plan and multiple entrance points -



# DESIGN

Interventions

## A public pavilion

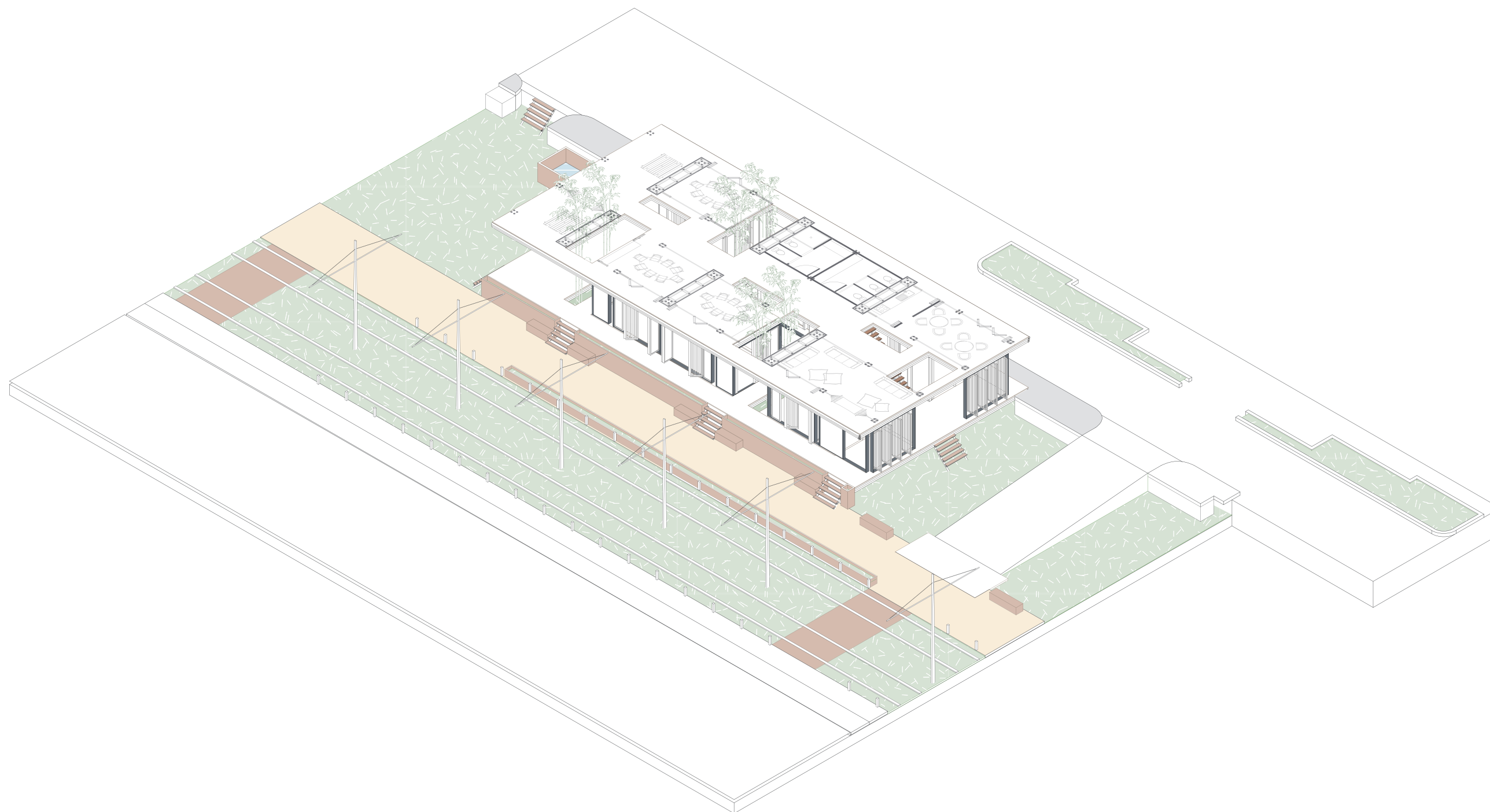


- movable walls -

# DESIGN

Interventions

## A public pavilion



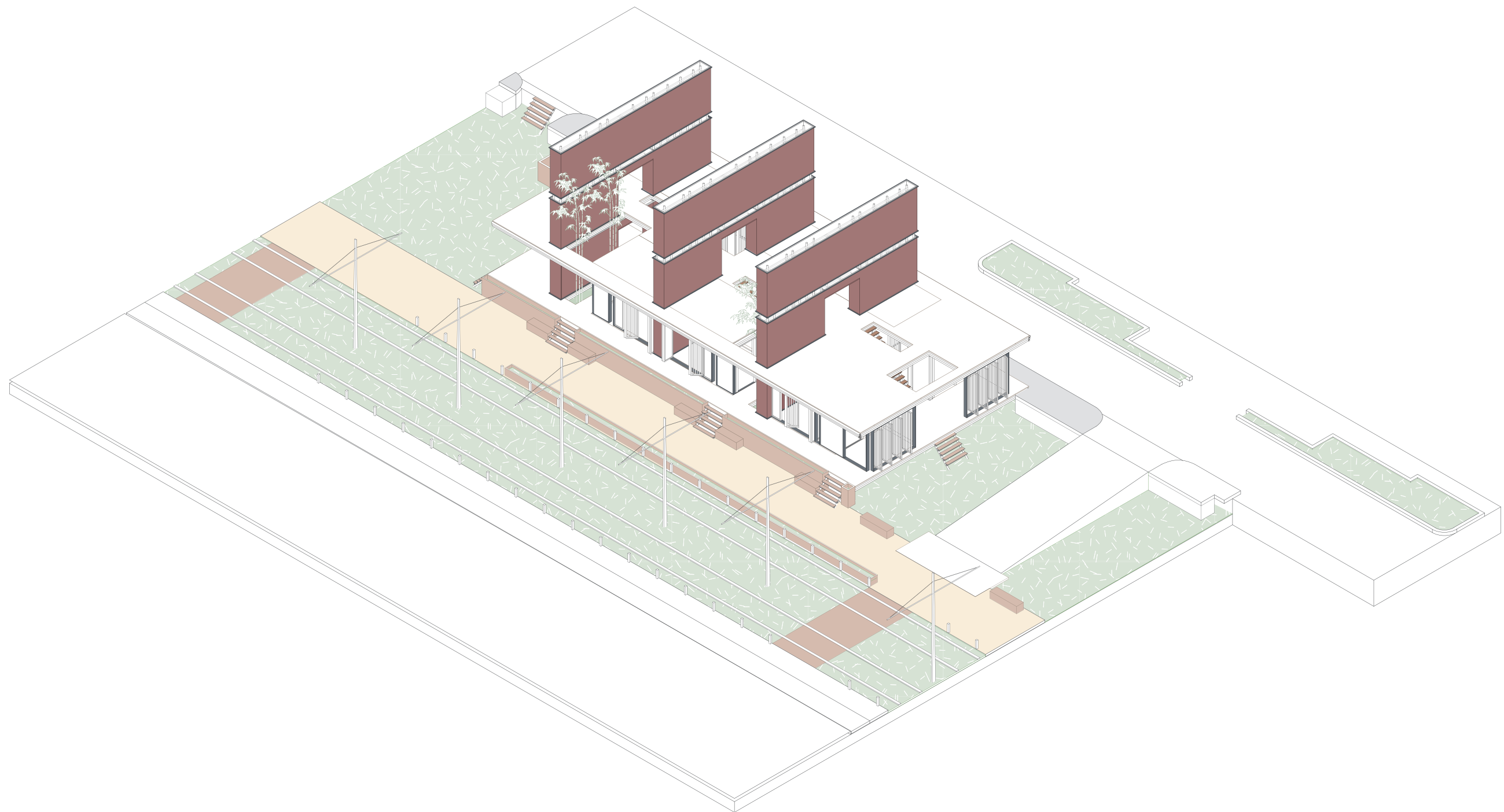
- Openings -



# DESIGN

Interventions

## A public pavilion

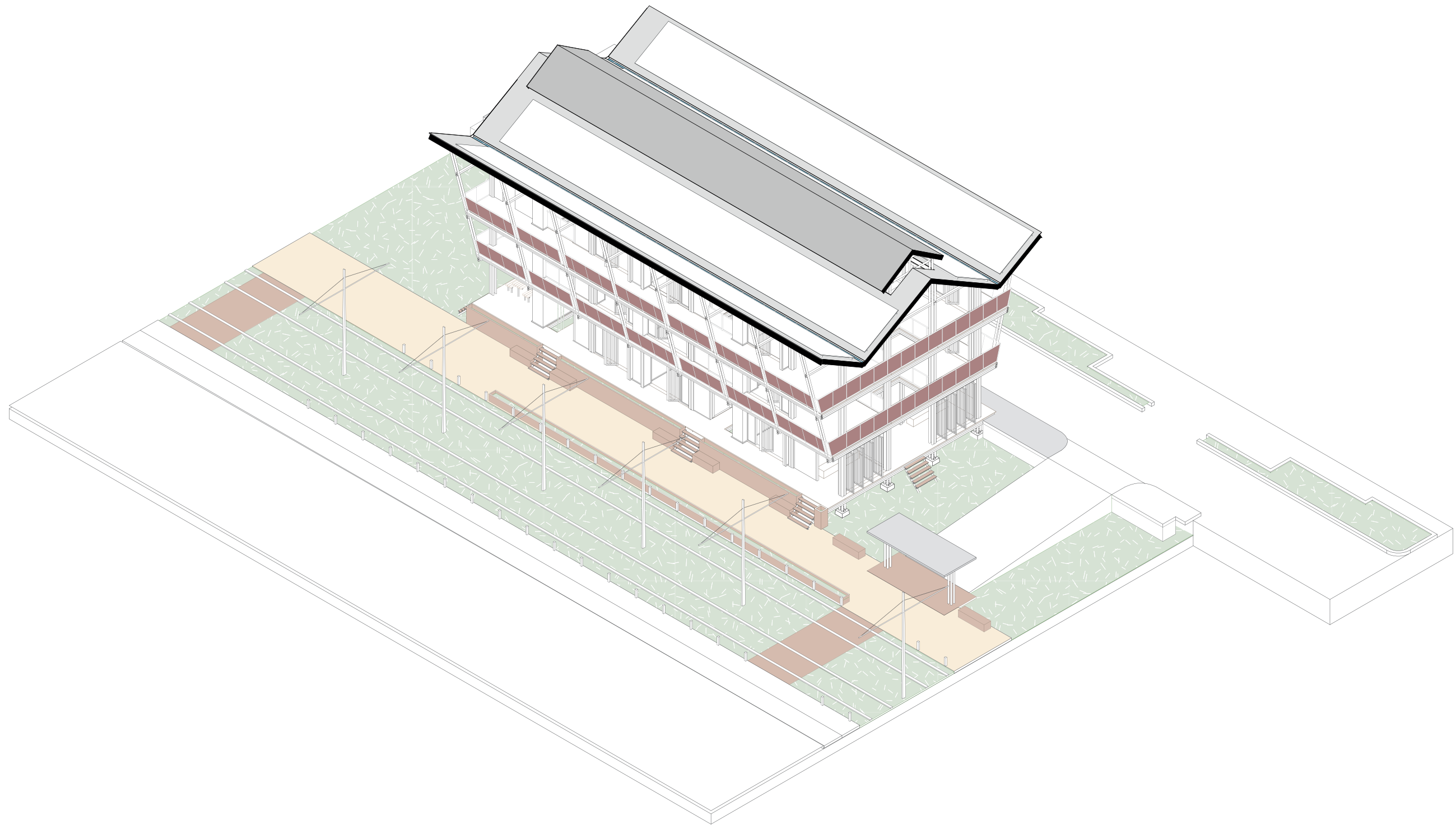


- Storage wall to enclosed wall -

# DESIGN

Interventions

## A public pavilion

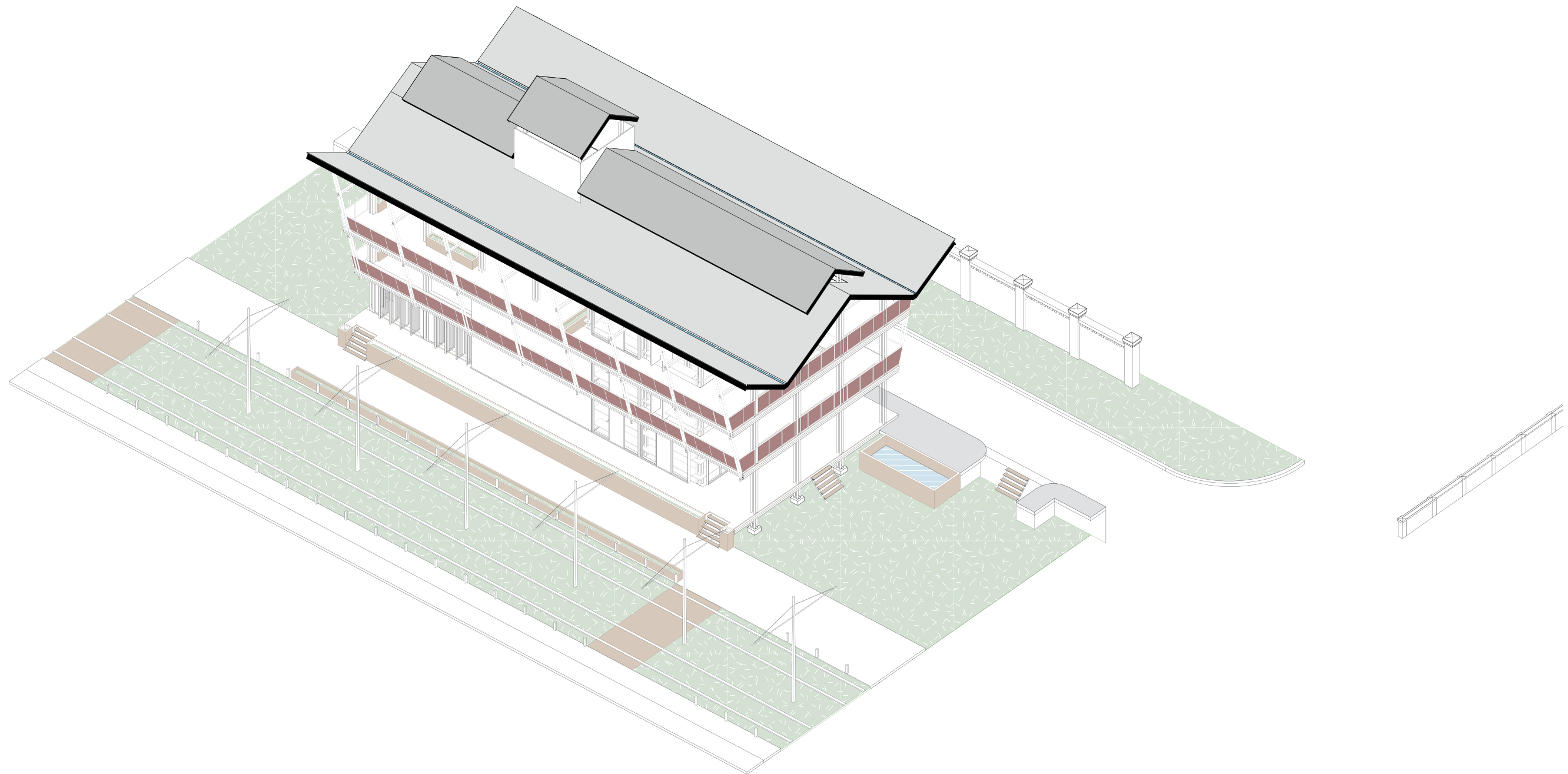




# DESIGN

Interventions

## A waste pavilion



# DESIGN

Interventions

## A waste pavilion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

## Waste Pavillion





# DESIGN

Interventions

a new storage space

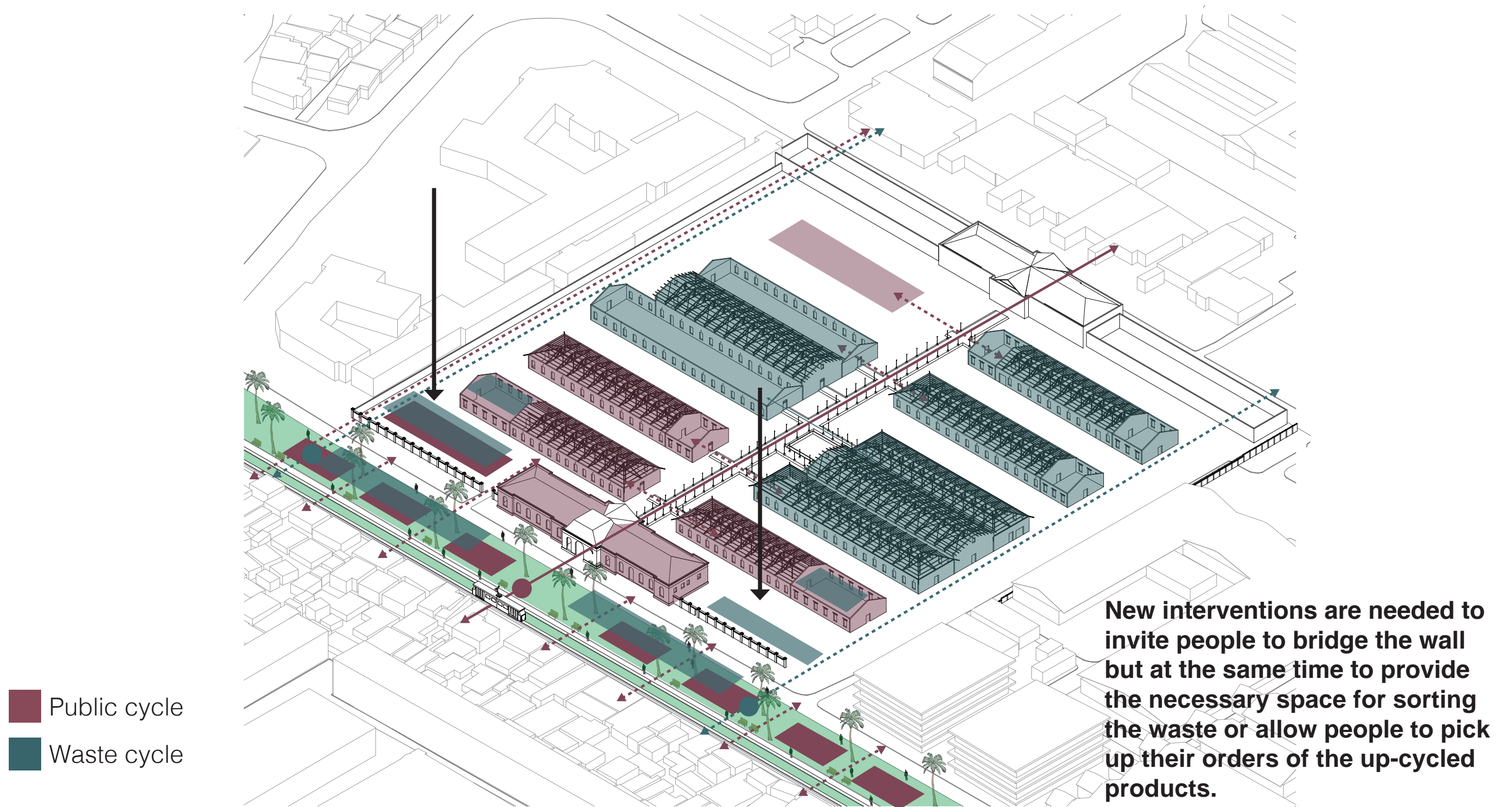




# DESIGN

Interventions

a new storage space





# DESIGN

Interventions

a new storage space





# DESIGN

Interventions

a new storage space



Dominant gate, inviting character



Enclosed private courtyard



Current public entrance invisible

Starting points



# DESIGN

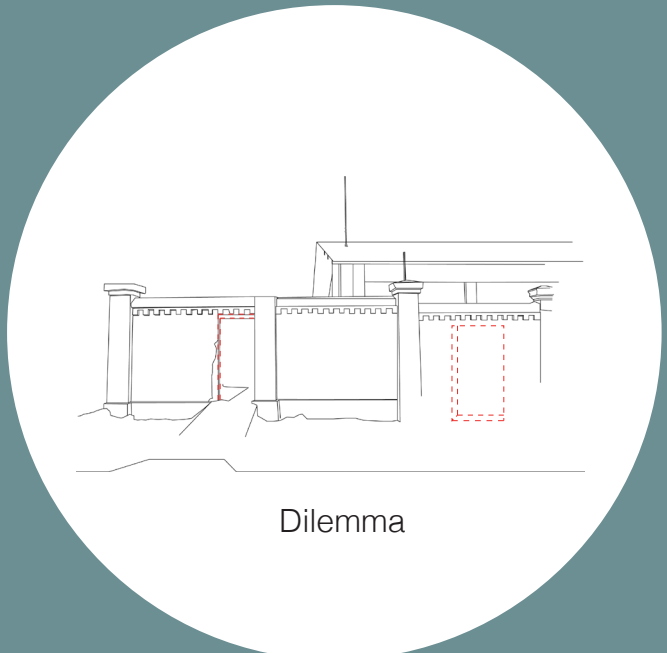
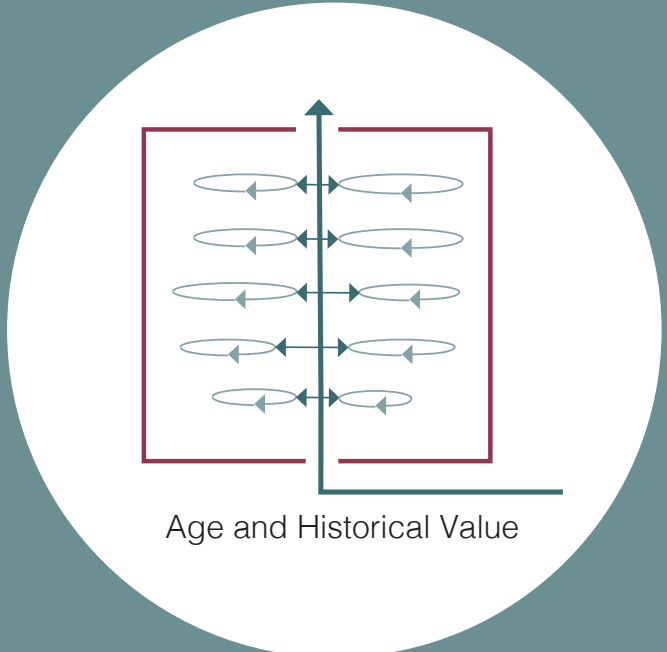
Interventions

a new storage space



Enclosed by a wall

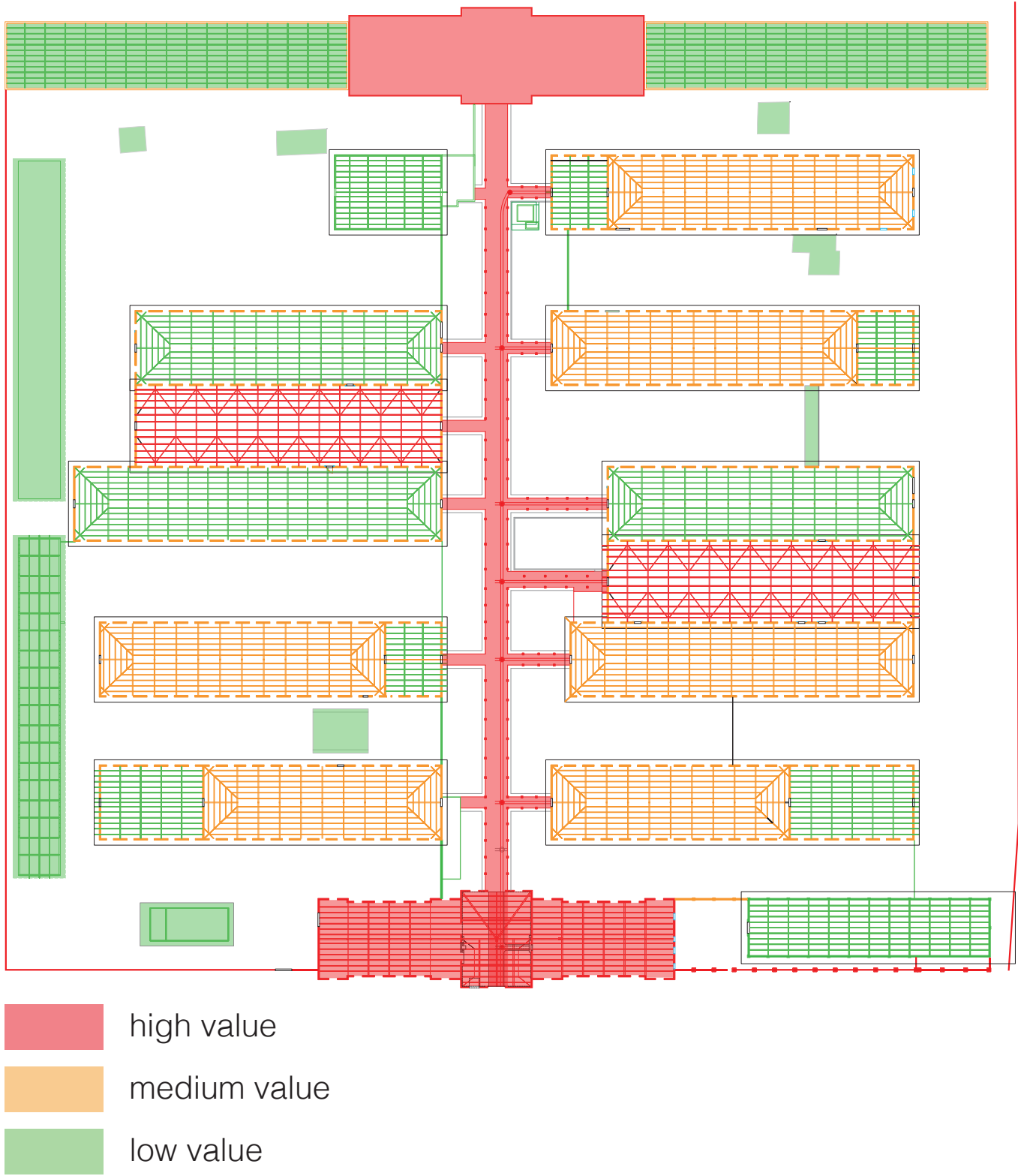




# DESIGN

Interventions

a new storage space





# DESIGN

Interventions

a new storage space



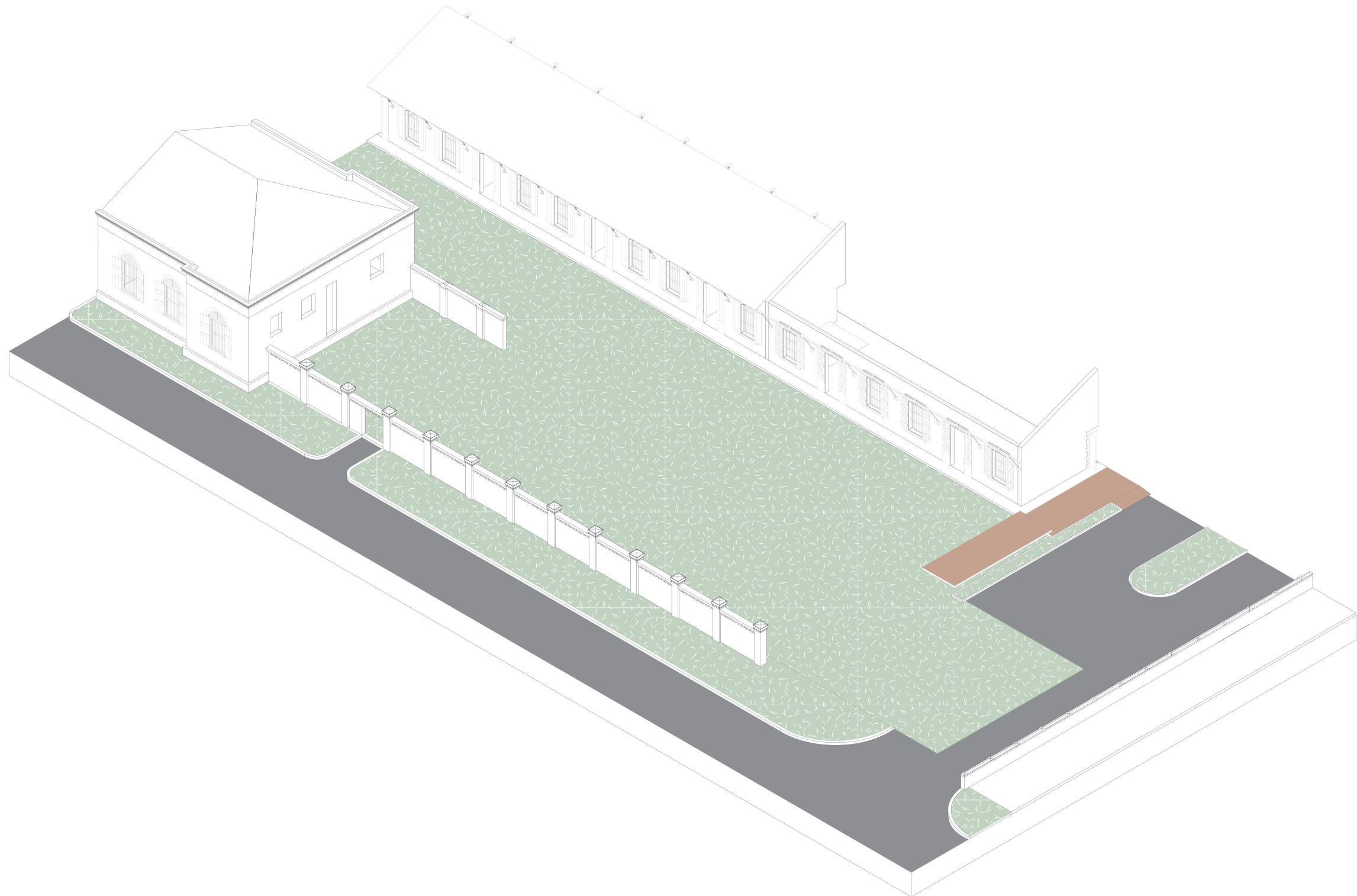
Starting points



# DESIGN

Interventions

a new storage space



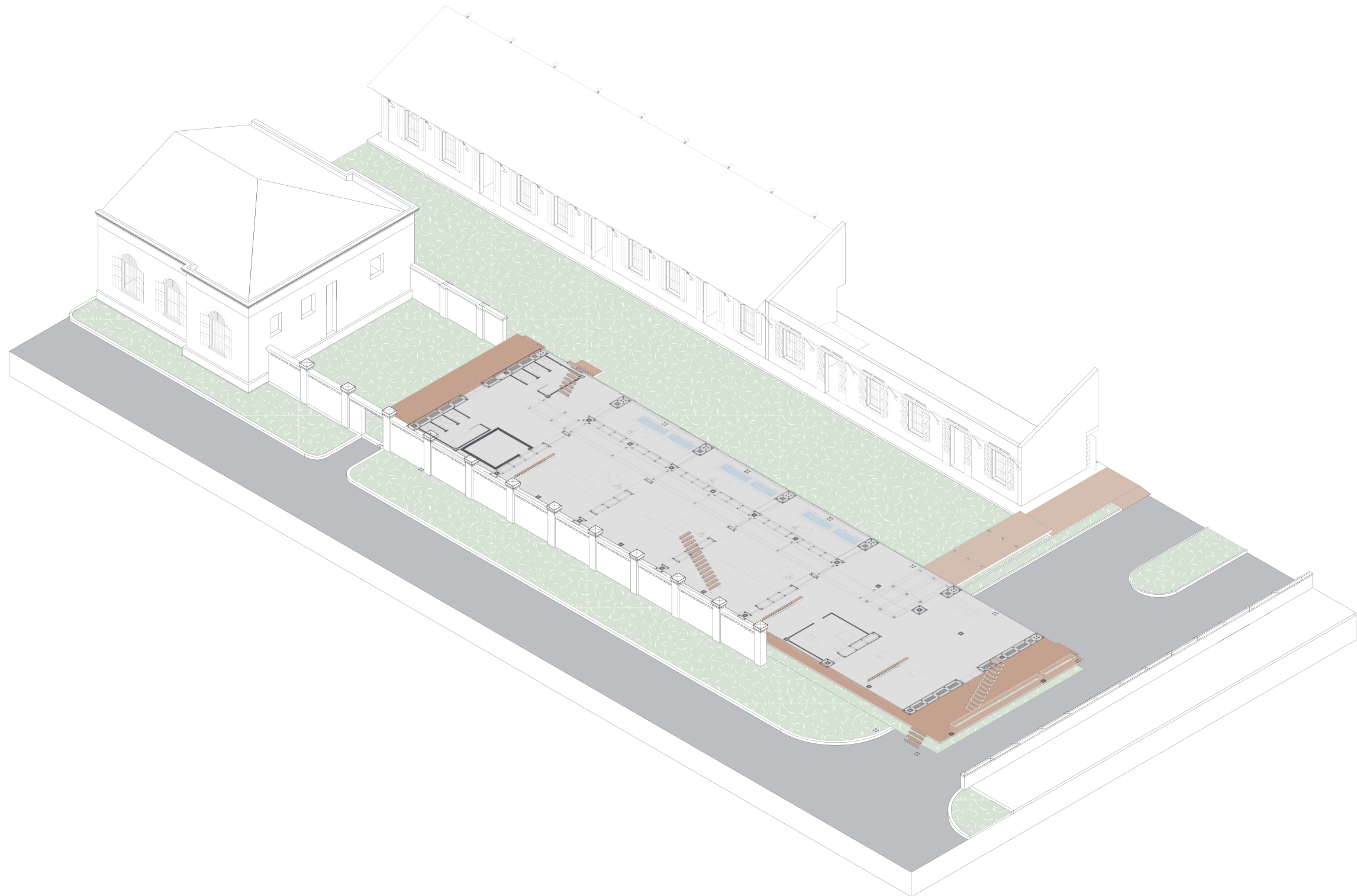
- Site -



# DESIGN

Interventions

a new storage space



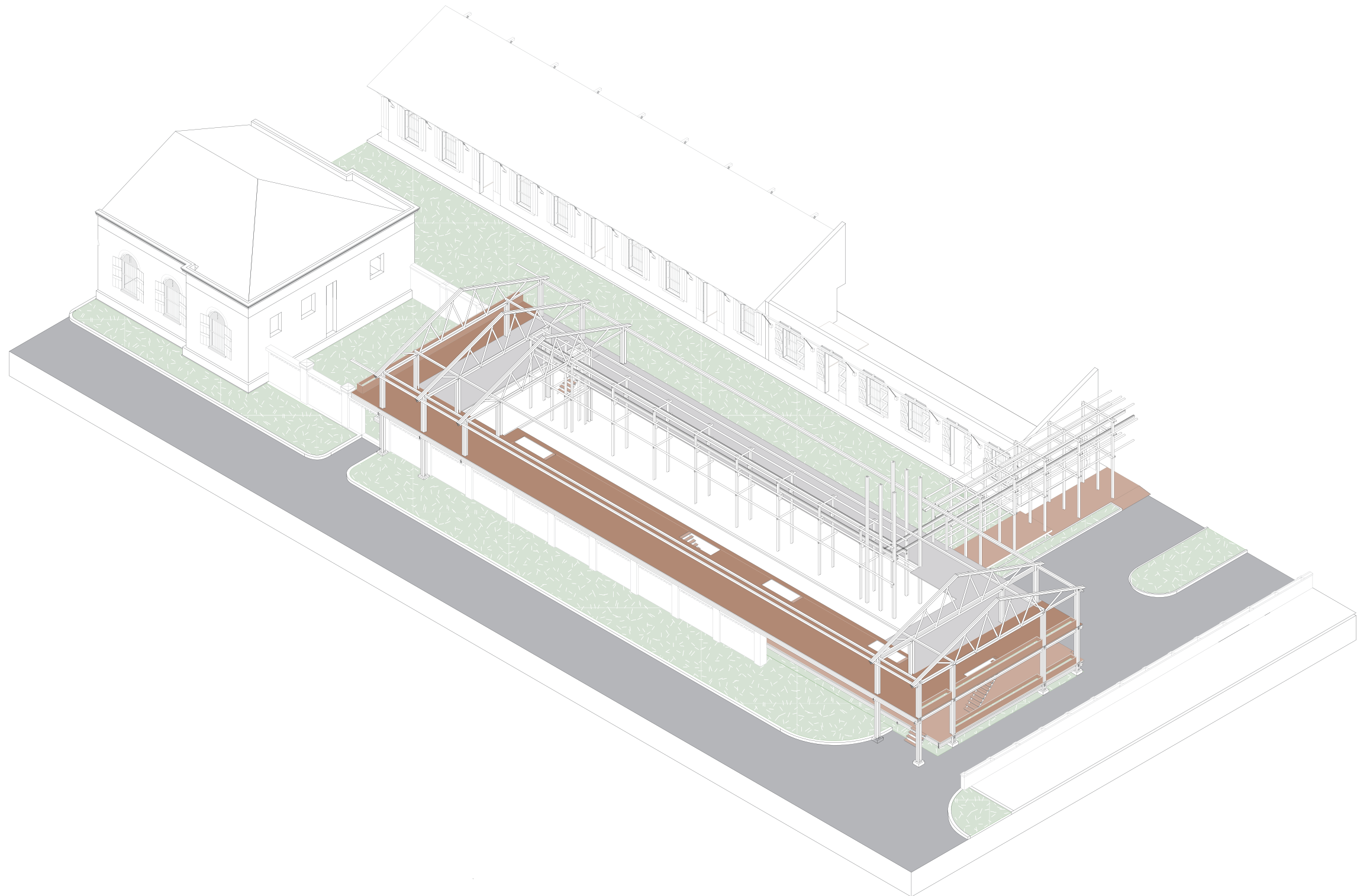
- Space Plan -



# DESIGN

Interventions

a new storage space



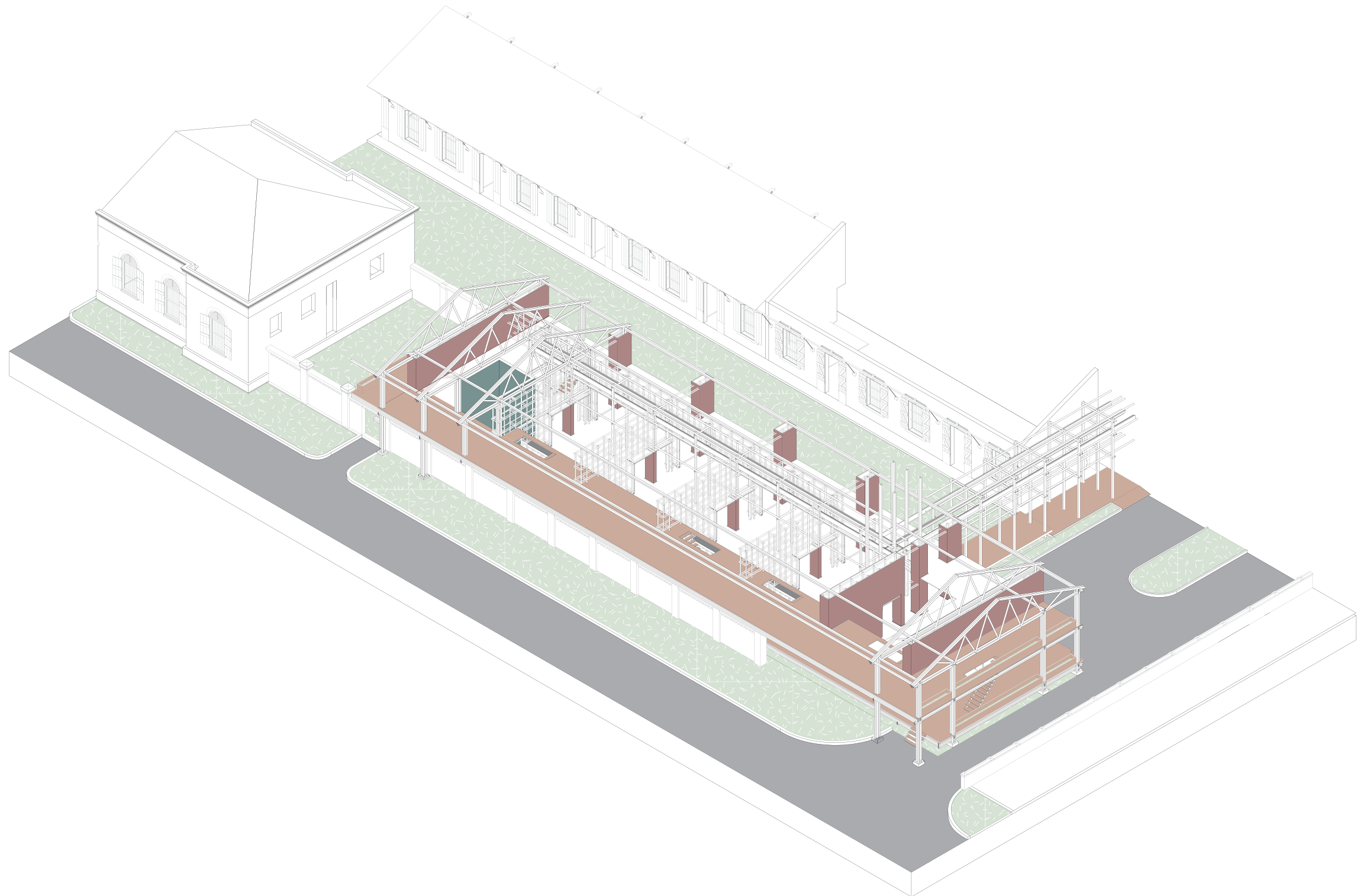
- Structure -



# DESIGN

Interventions

a new storage space



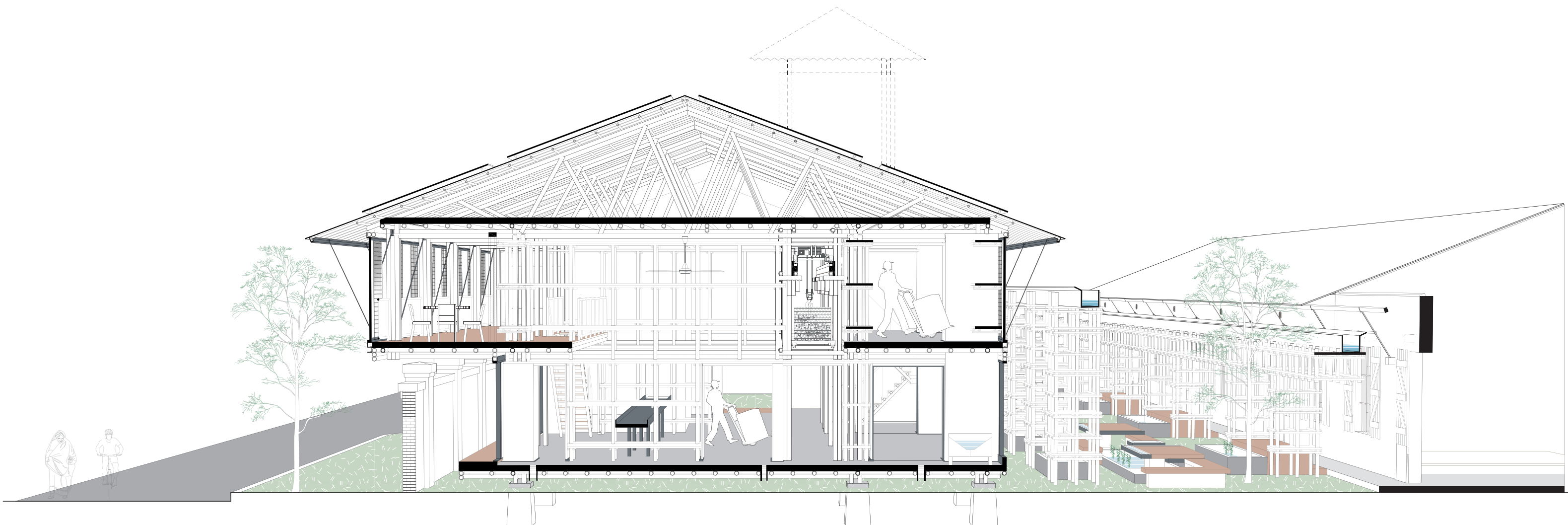
- Wall Concept -



# DESIGN

Interventions

a new storage space



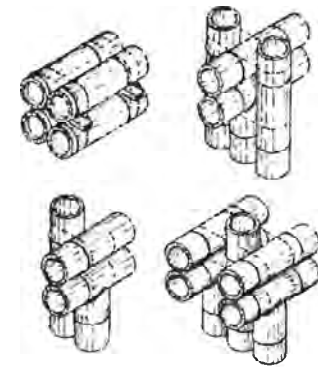
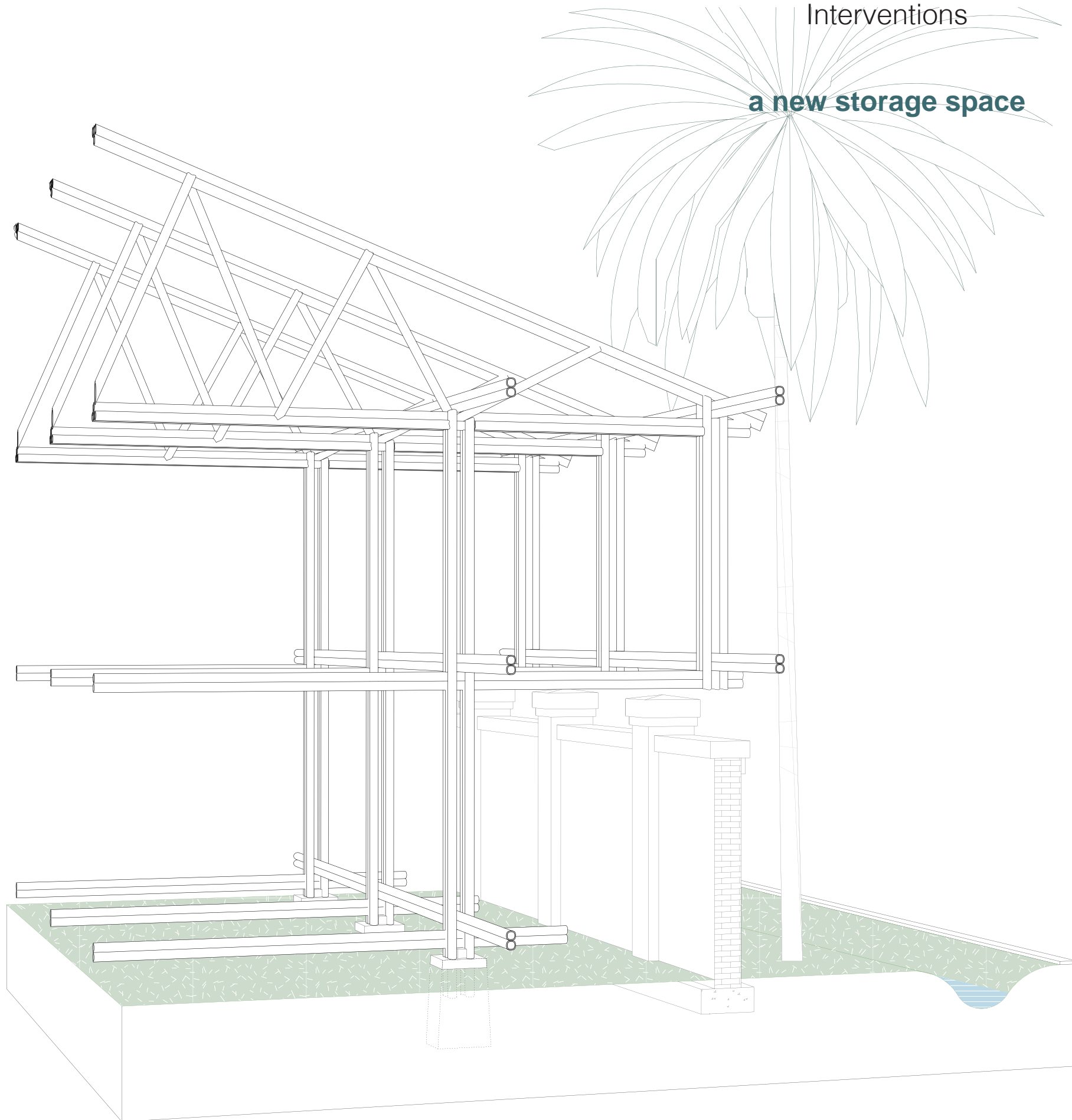
- Green Space -



## DESIGN

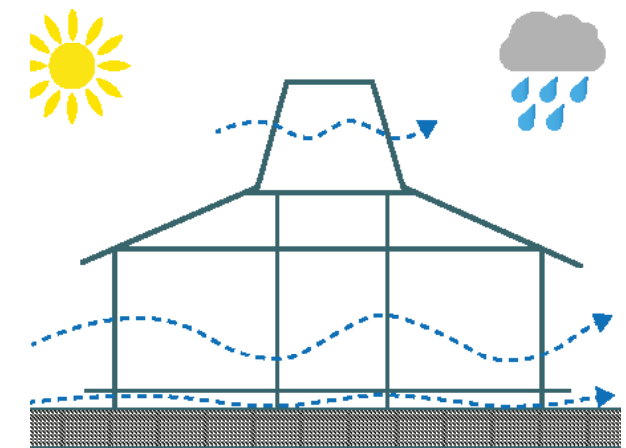
Interventions

a new storage space



### “Knock-down” approach

For easy dismantling and reassembling, especially since a significant amount of the materials used are processed and made on site. Easy maintenance and repair.



### Climate

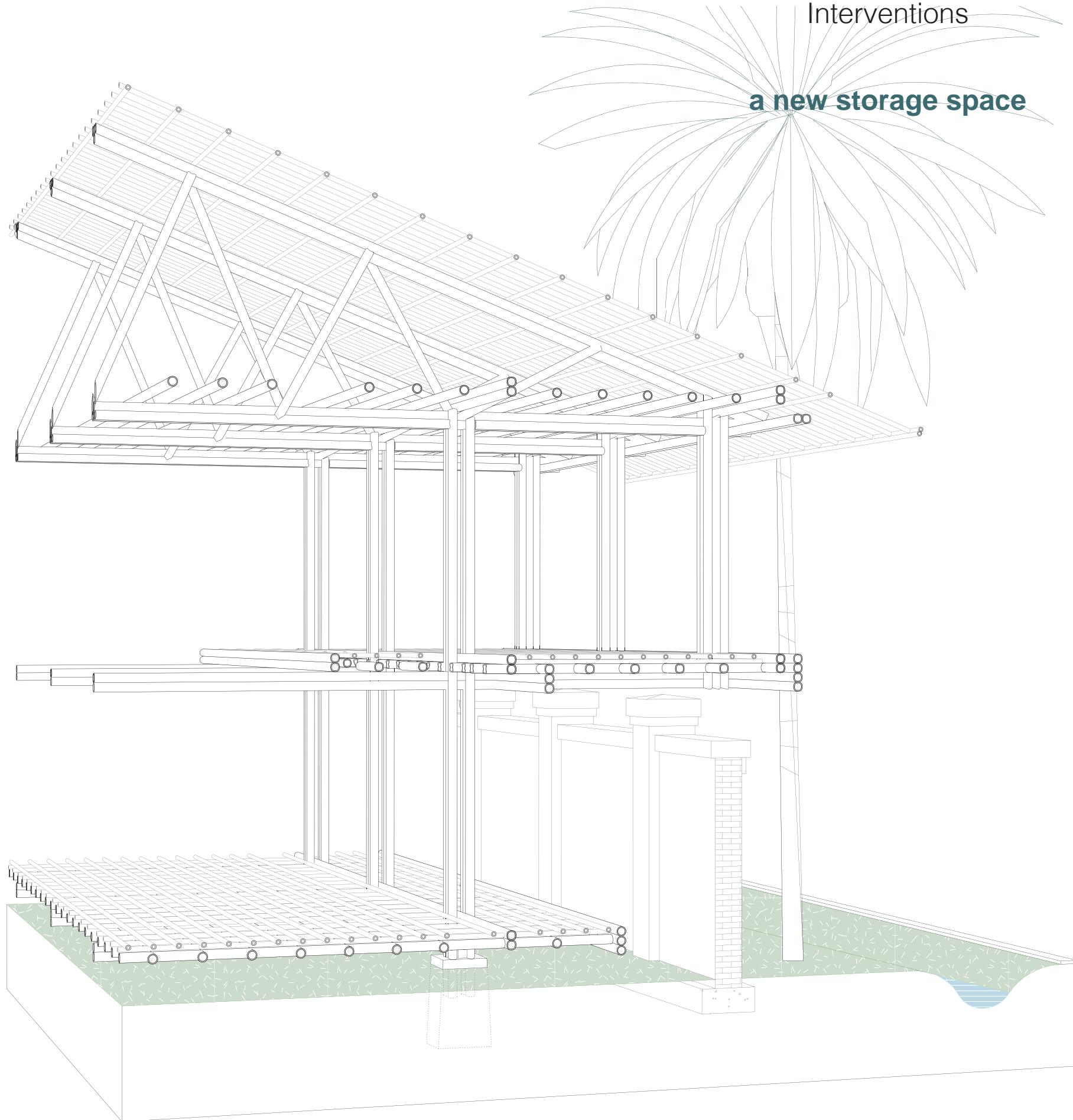
Natural and permeable materials for the wall and roof are a priority to protect from direct sunlight and heavy rainfall as well as good ventilation strategies against smell coming from waste.



## DESIGN

Interventions

a new storage space



*“Gigantochloa atrovioleacea”*  
or Java Black

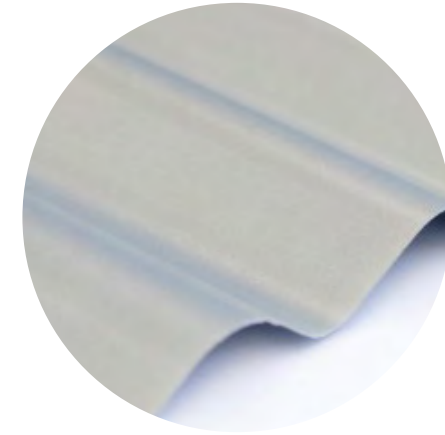
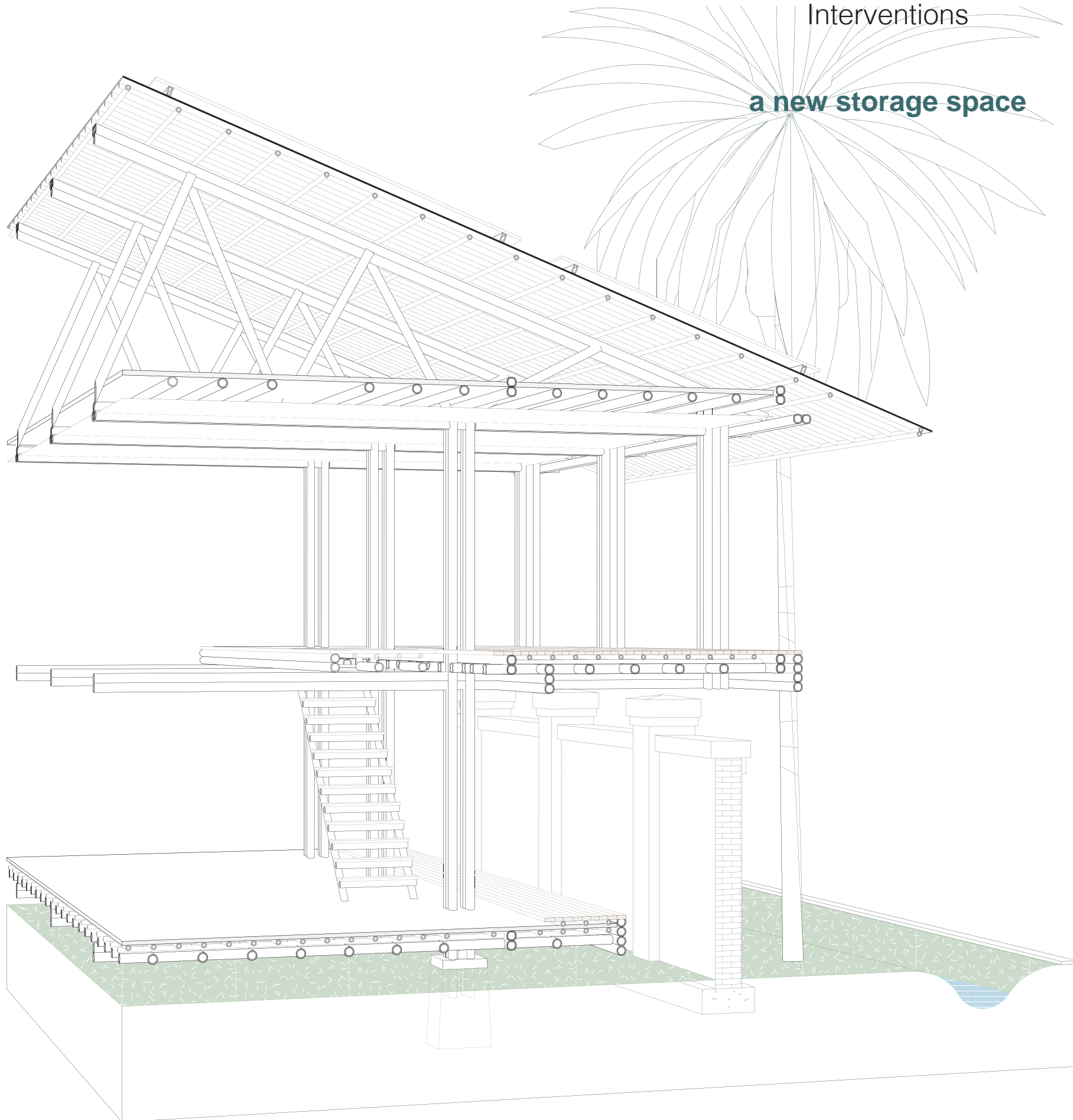
Ø varying from 6-12 cm



# DESIGN

Interventions

a new storage space



“Corrugated steel Roof Cladding”



“Teak Wood Deck”



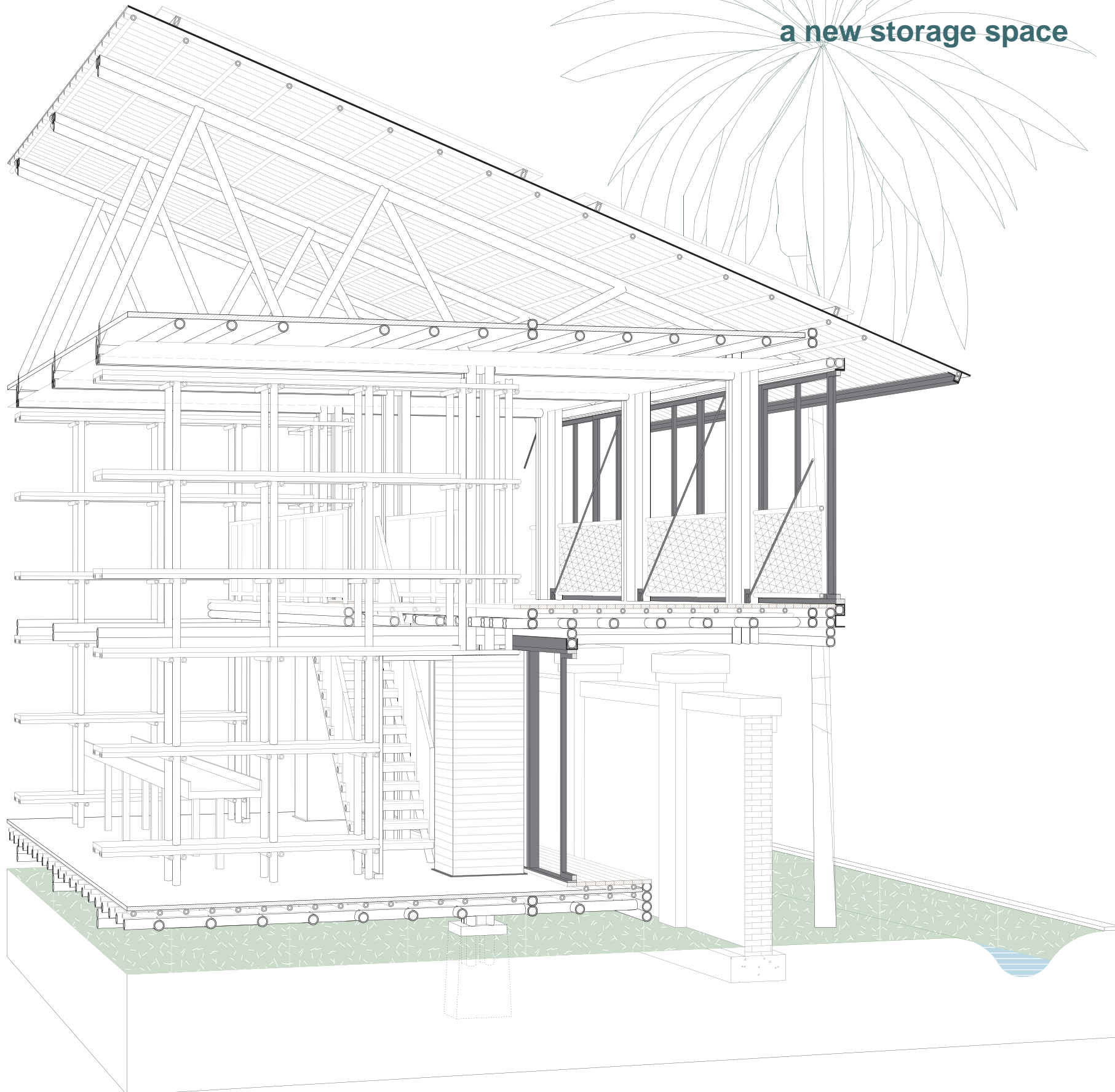
“Rubber flooring”



## DESIGN

Interventions

a new storage space



“Recycled Plastic Cladding Tiles”



“Steel Rod Bracing”



“Recycled plastic balustrade”

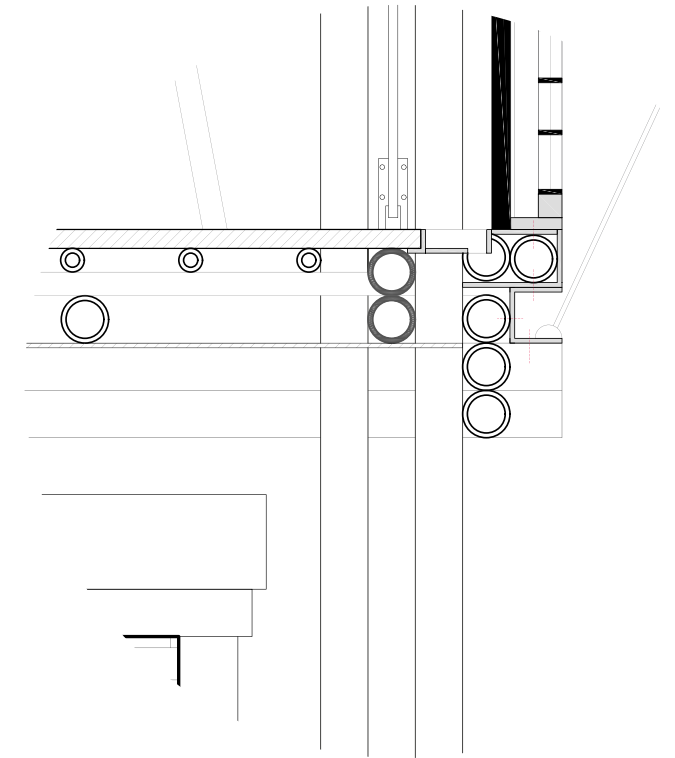
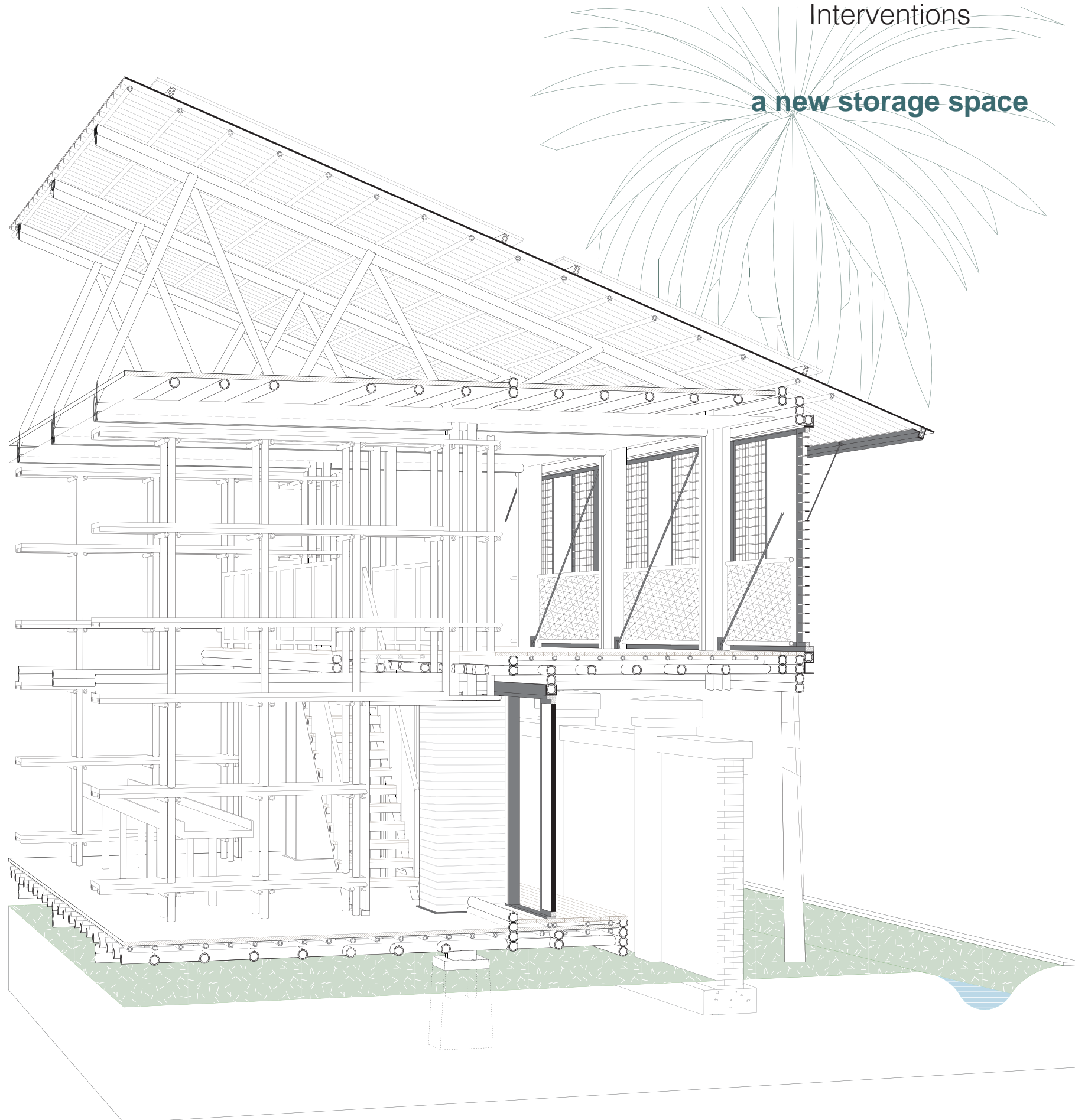
Inspired by La Pacha Mama in Bali.



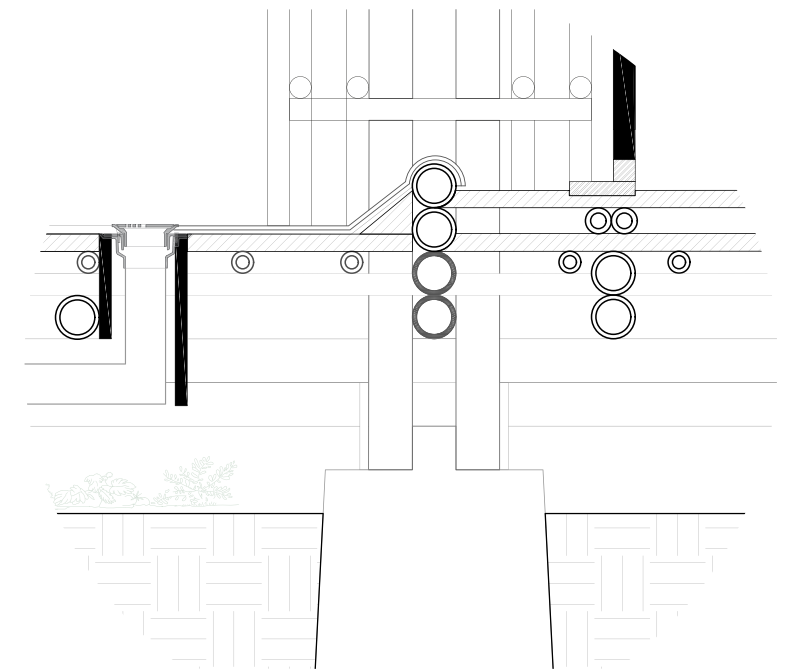
# DESIGN

Interventions

a new storage space



Overhang Detail



Floor Detail



# DESIGN

Interventions

a new storage space

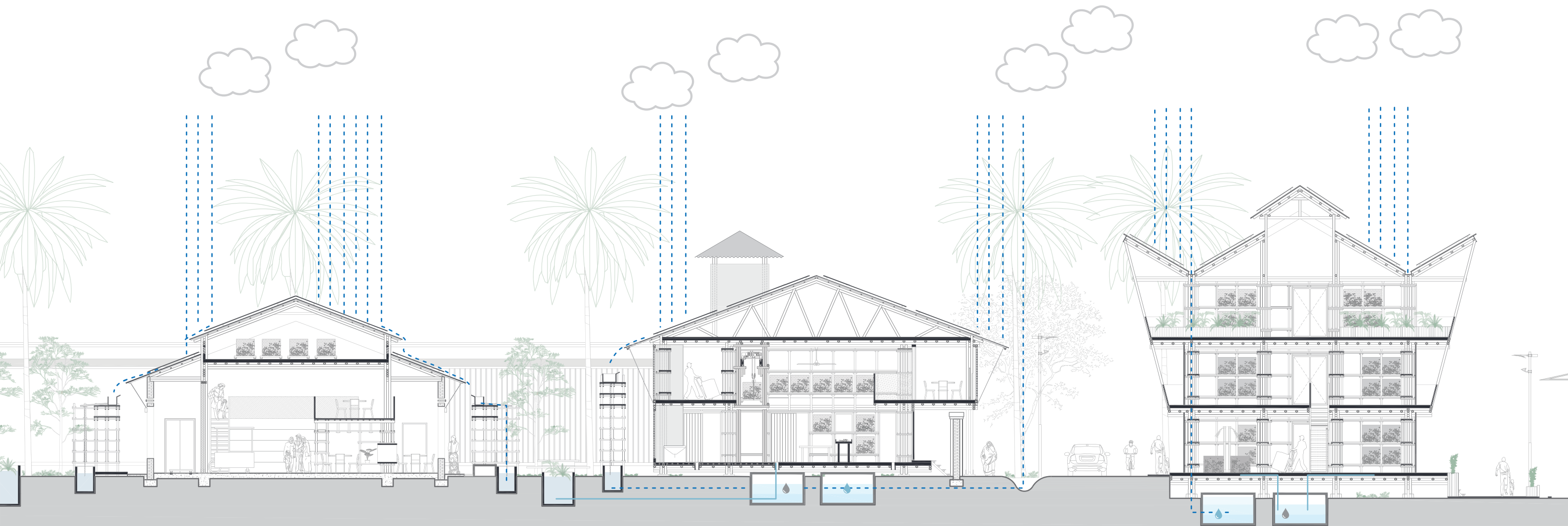




# DESIGN

Interventions

## Climate Concept



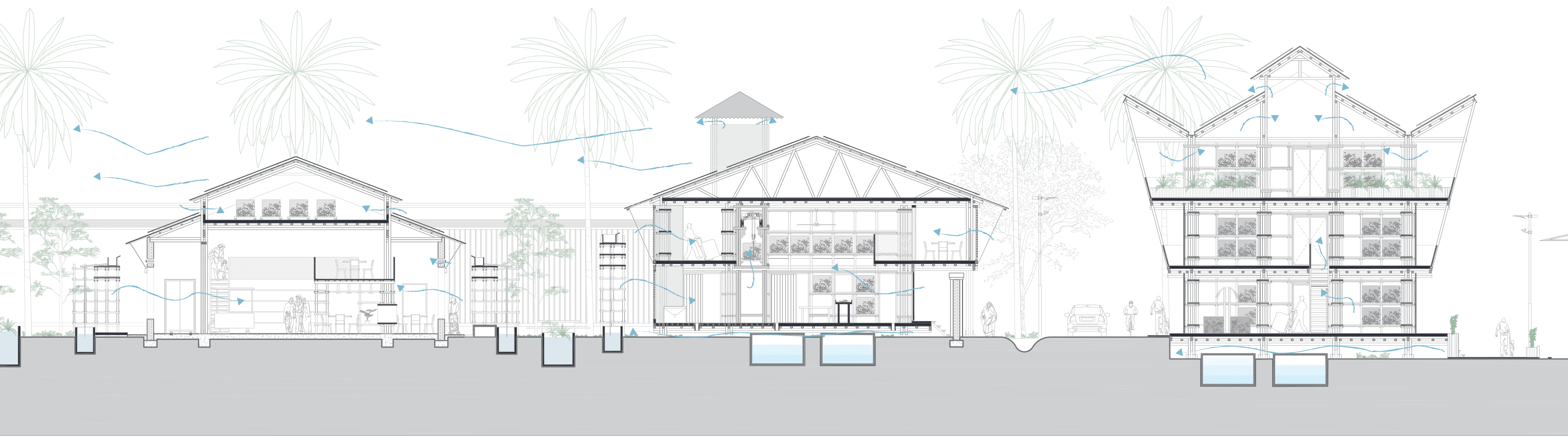
Water management Strategy



# DESIGN

Interventions

## Climate Concept



Ventilation Strategy



# DESIGN

Interventions

a new storage space





# DESIGN

Interventions

## public entrance

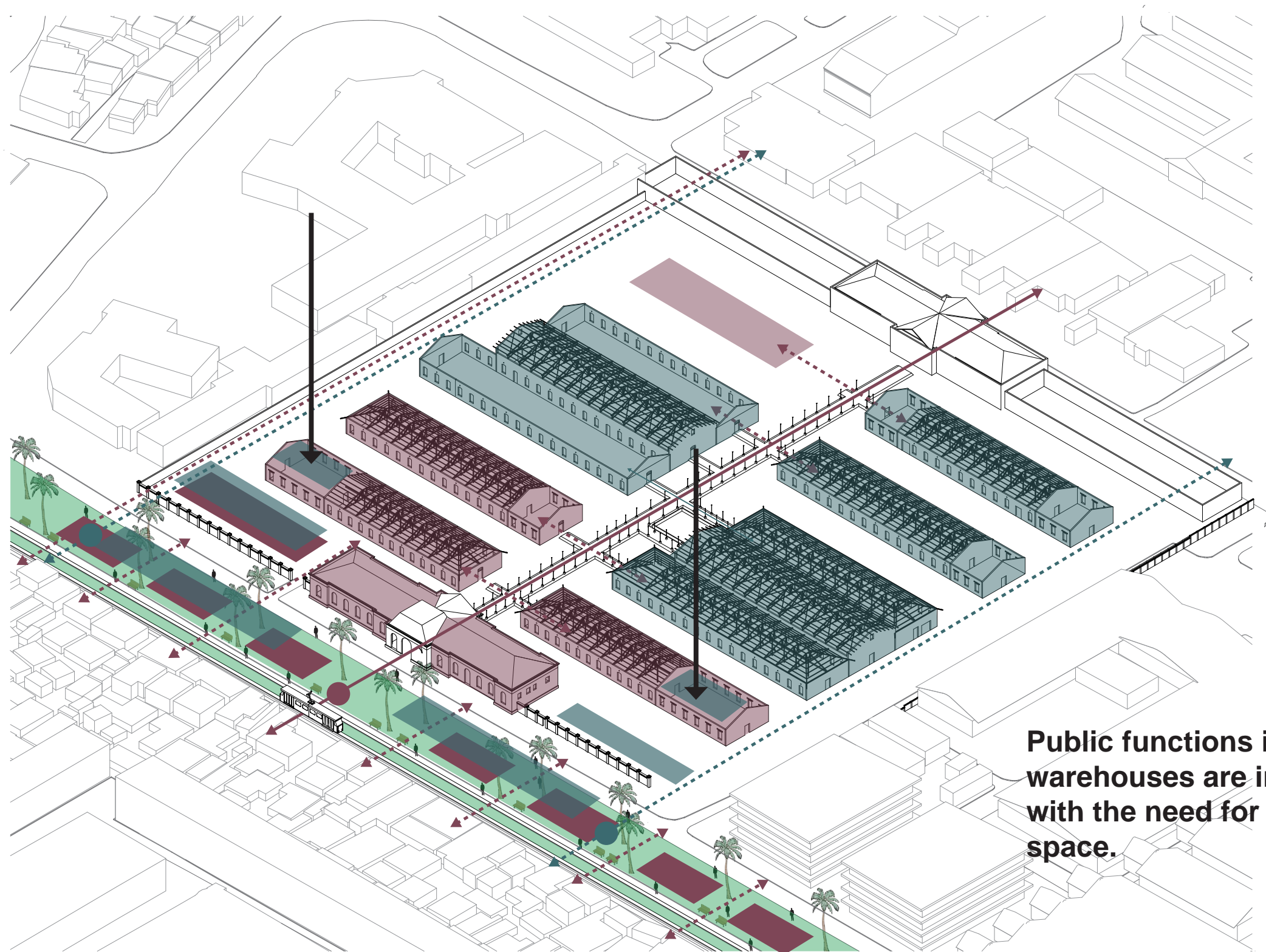




# SITE

Programme Integration

## Conflicts



**Public functions in the existing warehouses are in conflict with the need for more storage space.**

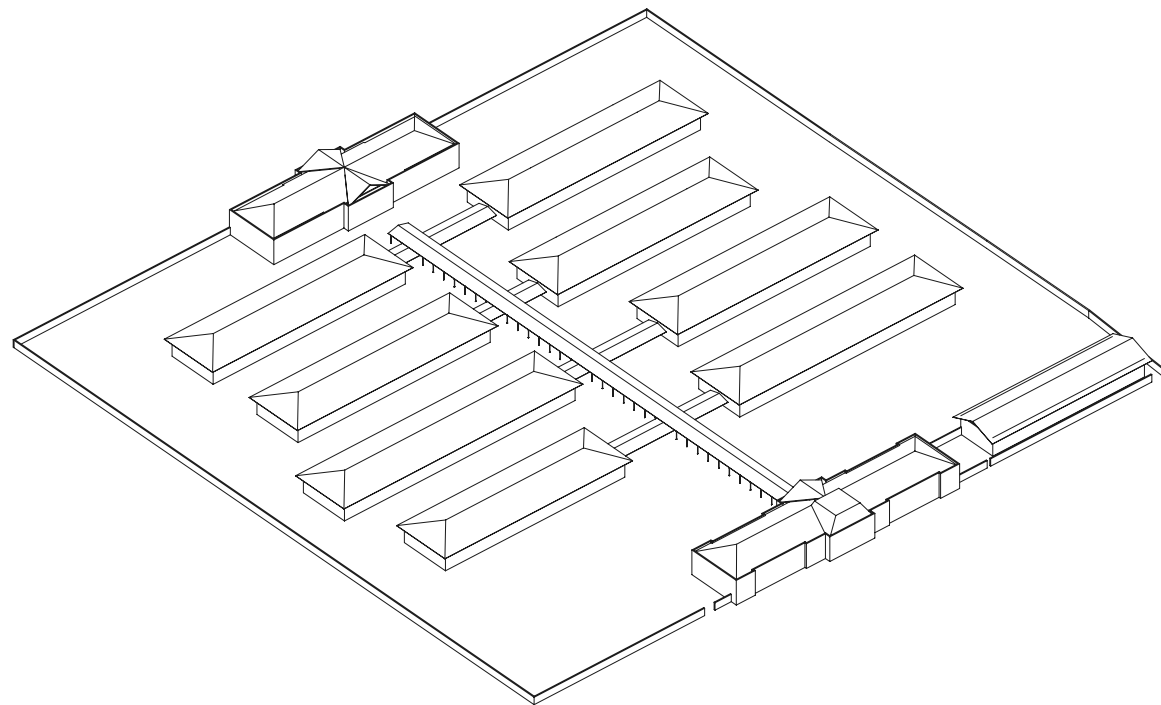


# DESIGN

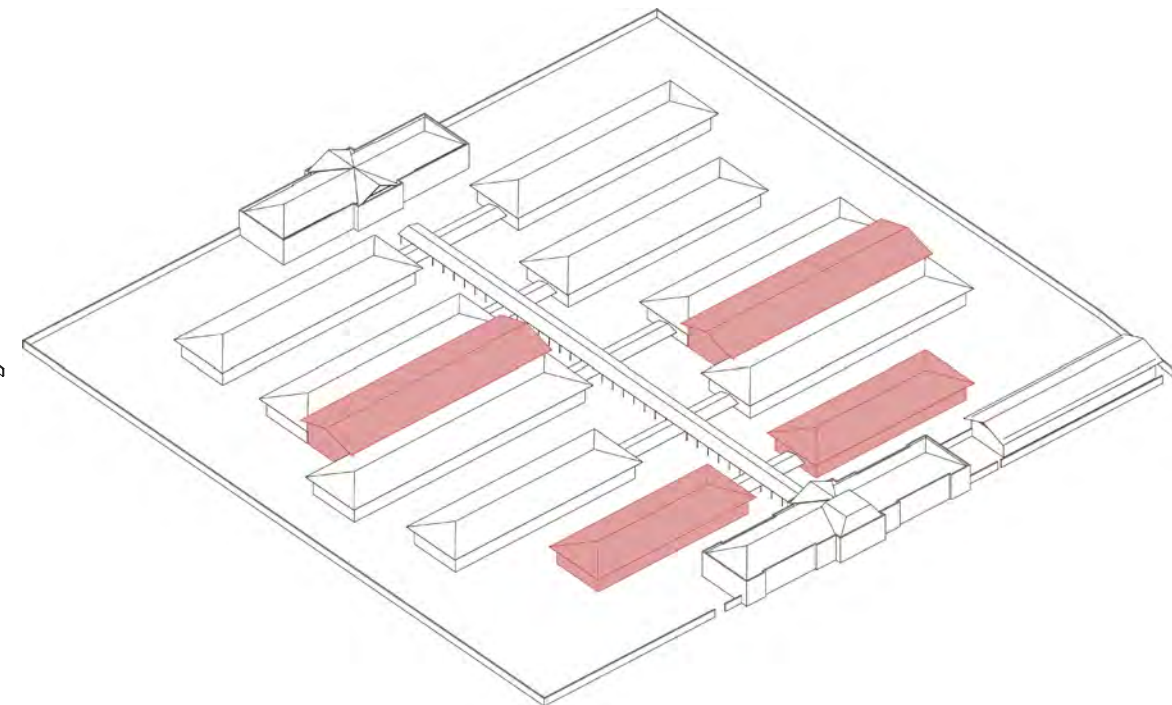
Interventions

## a hybrid storage space

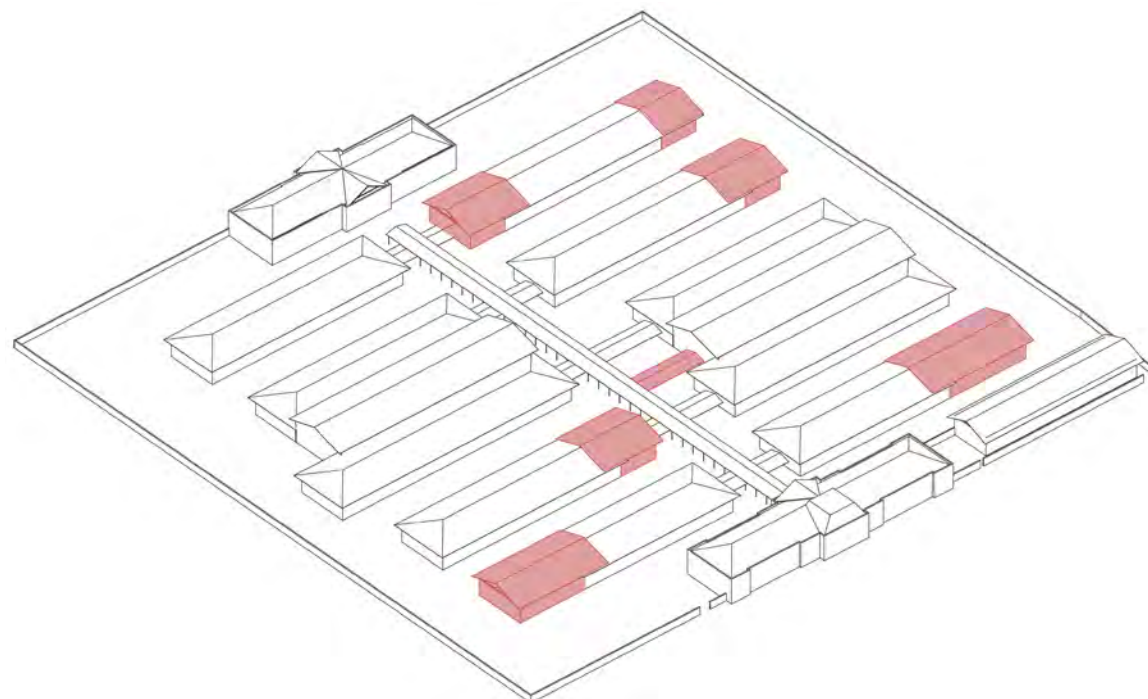
1910



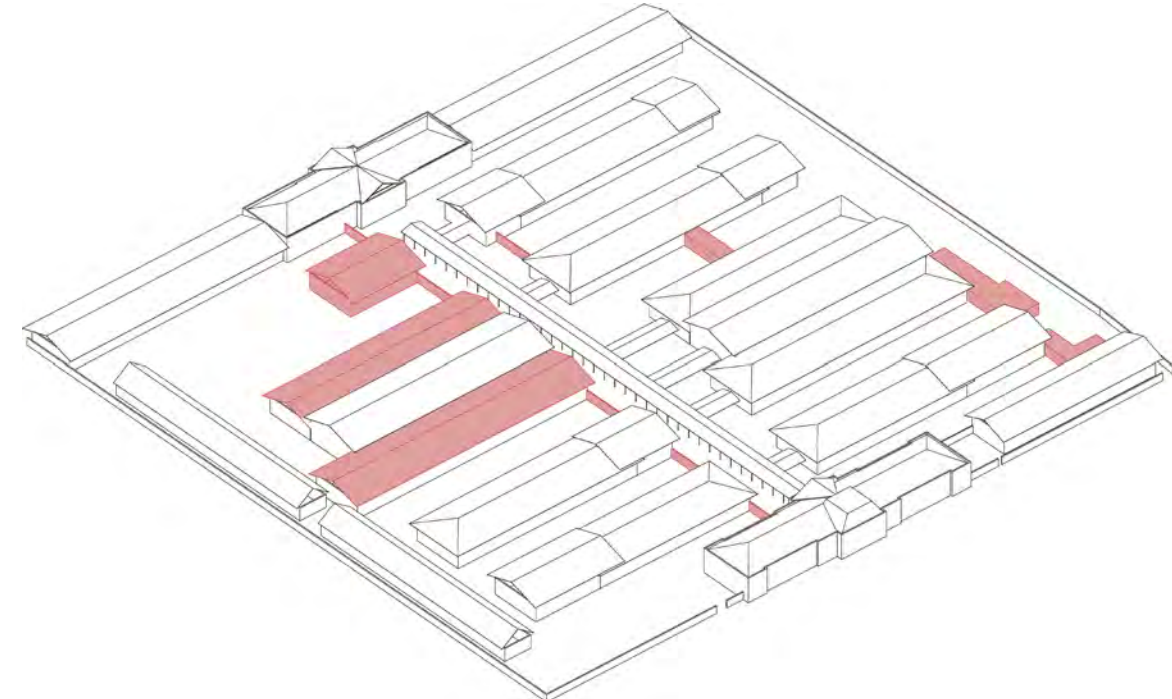
1921



Between 1921 and 1942



Until 2017





# DESIGN

Interventions

a hybrid storage space




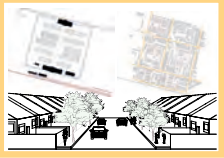


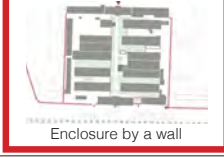

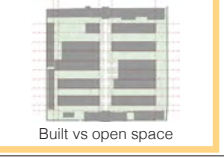


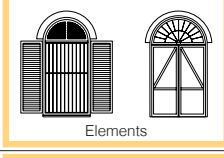
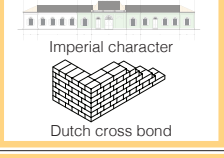
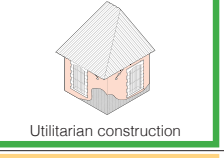

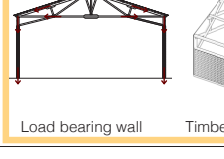
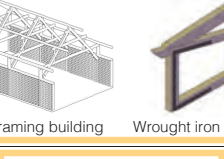
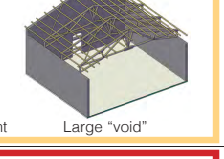

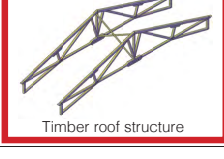
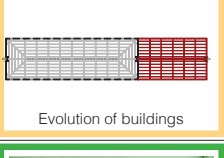
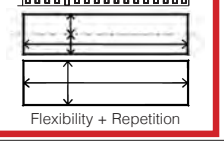



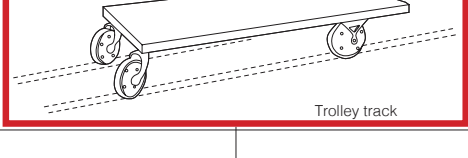
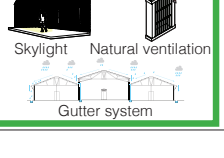
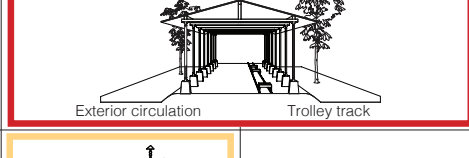
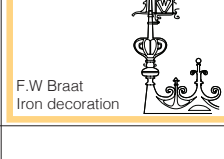
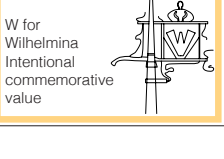
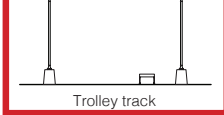

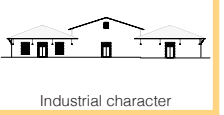


Starting points



# DESIGN

## Interventions

### a hybrid storage space

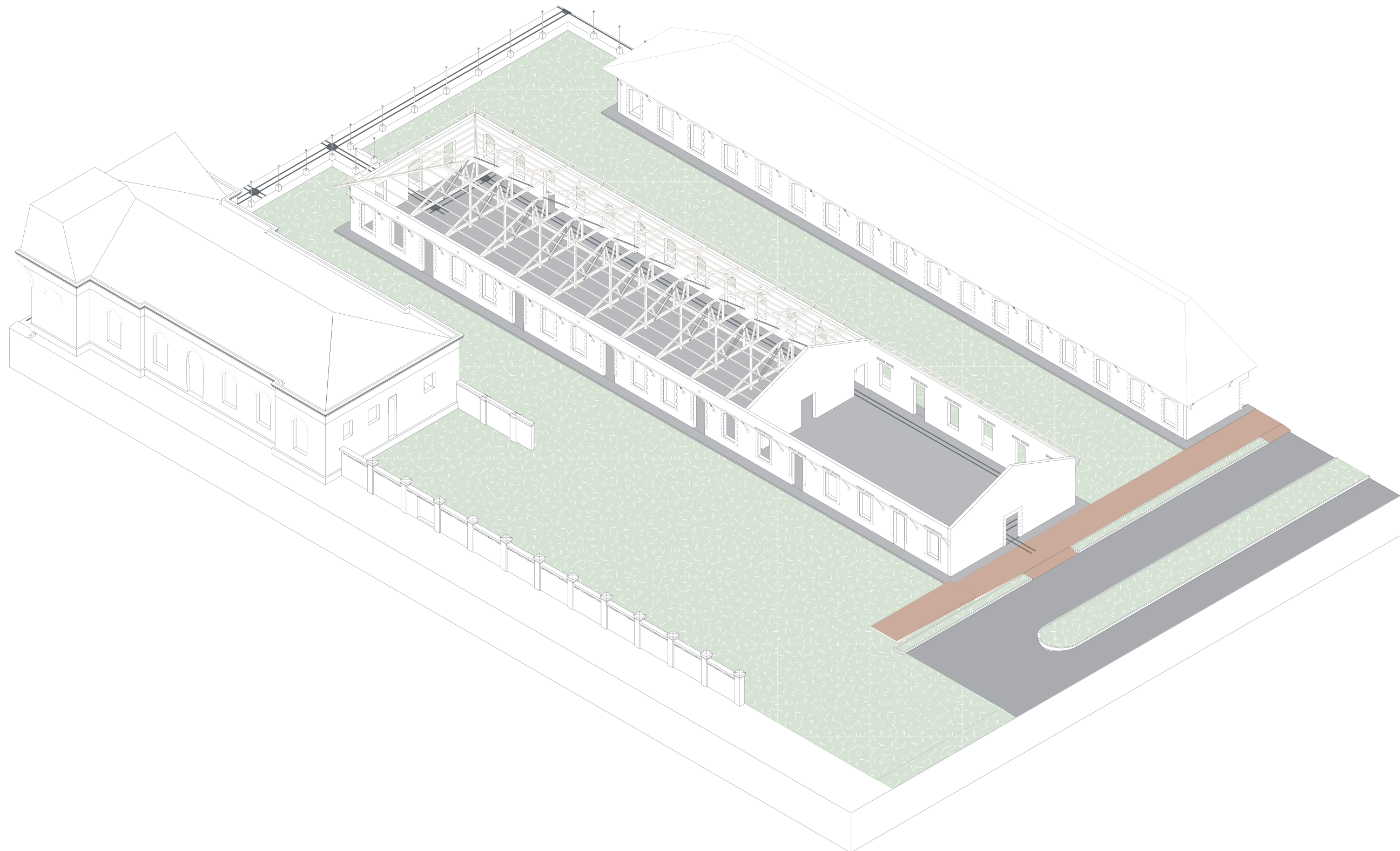
	AGE VALUE	HISTORICAL VALUE	USE VALUE	NEW-NESS VALUE	RELATIVE ART VALUE	RARITY VALUE	OTHER VALUES	DILEMMAS
SURROUND SETTING	 Railway as a spatial element		 Combination of land uses					 Military dominance
SITE	 Enclosure by a wall	 Layers of military history	 Built vs open space			 Connection through central axis	 New social uses	
SKIN	 Elements	 Imperial character Dutch cross bond	 Utilitarian construction		 Ornaments on openings			
STRUCTURE	 Load bearing wall	 Timber framing building	 Wrought iron joint Large "void"		 Cast iron column Tension Rods	 Timber roof structure		
SPACE PLAN		 Evolution of buildings	 Flexibility + Repetition					
SURFACES	 Patina	 Military green colour					 Re-use	
SERVICES	 Trolley track		 Skylight Natural ventilation Gutter system		 Exterior circulation Trolley track			
STUFF					 F.W Braat Iron decoration		 W for Wilhelmina Intentional commemorative value	
SPIRIT OF THE PLACE	 Trolley track	 Enclosed / Military presence	 Industrial character	 New social uses				 Patina



# DESIGN

Interventions

a hybrid storage space



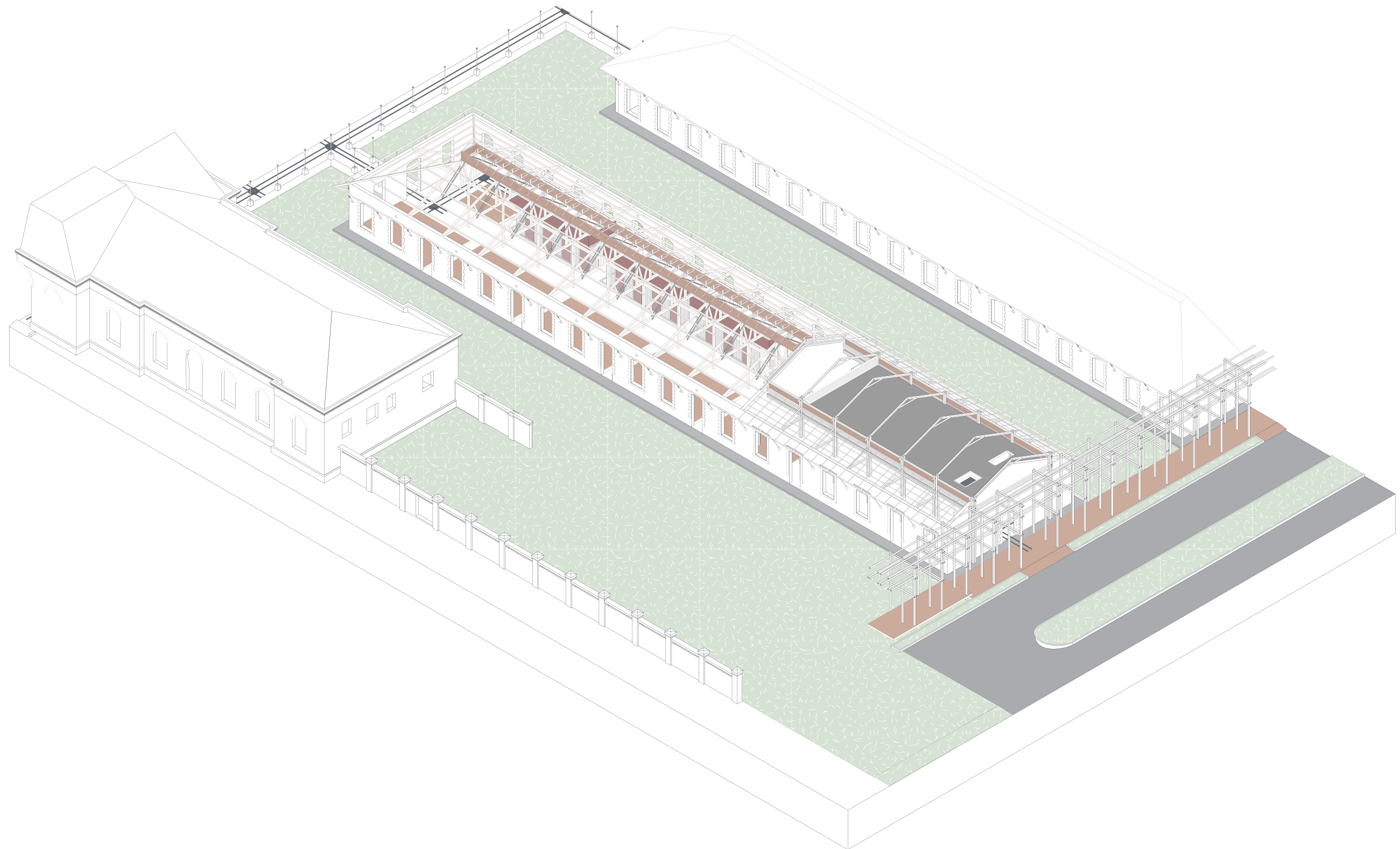
- Openings and Extended trolley track -



# DESIGN

Interventions

a hybrid storage space





# DESIGN

Interventions

## a hybrid storage space





# DESIGN

Interventions

a hybrid storage space





## DESIGN

Interventions

a new storage space (public)





# DESIGN

Interventions

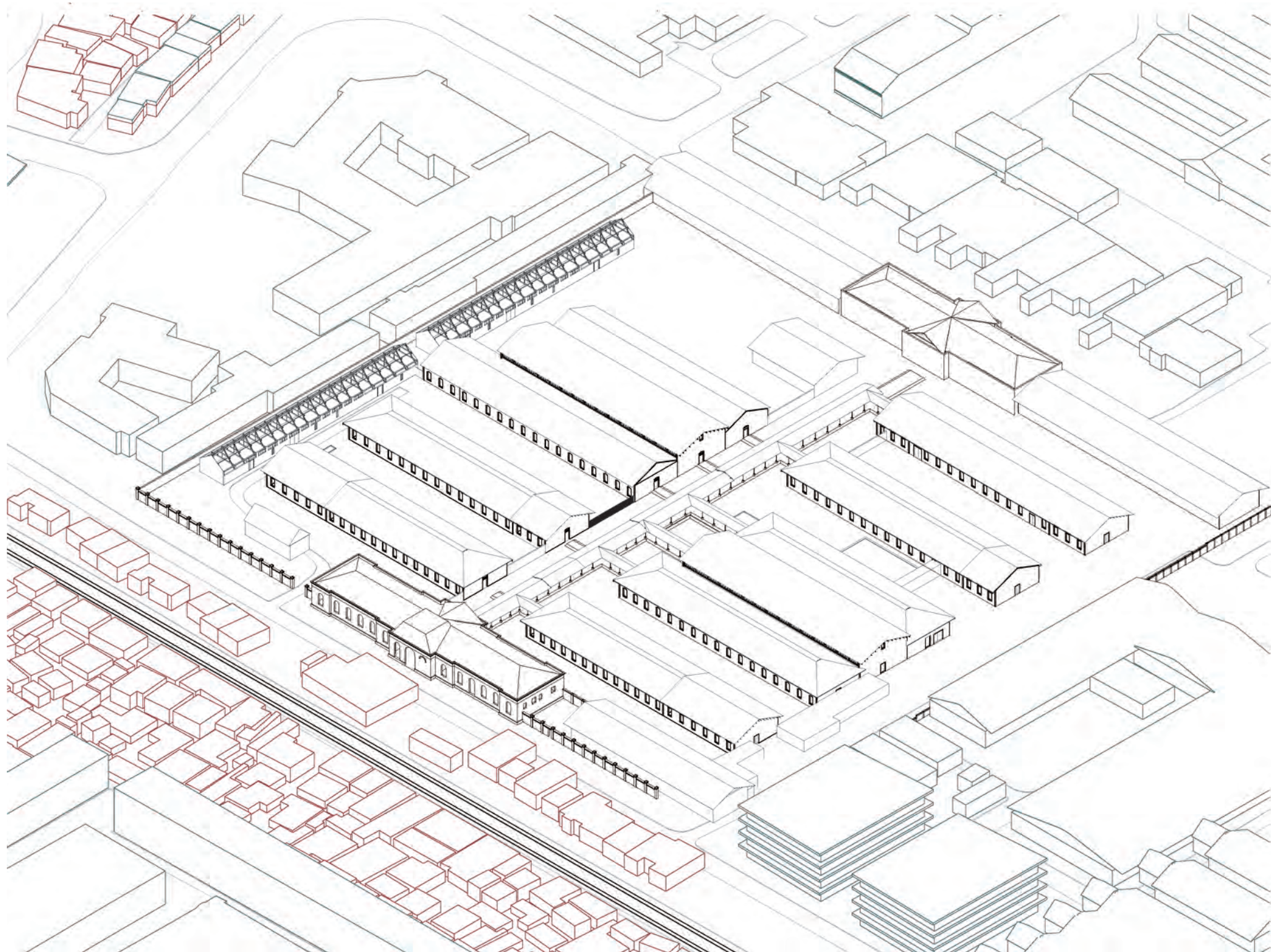
a new storage space (public)





# SUMMARY

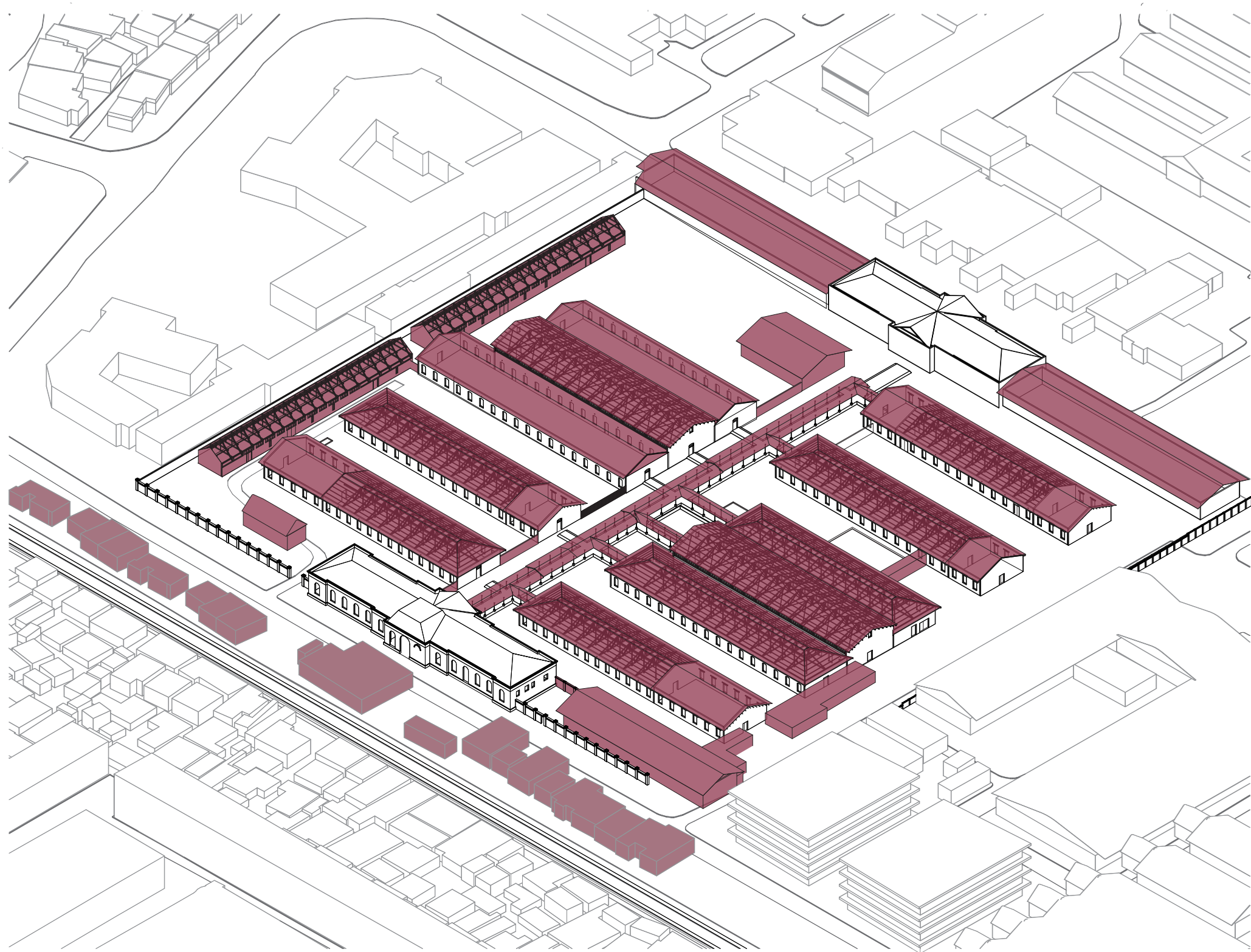
Existing Site





# SUMMARY

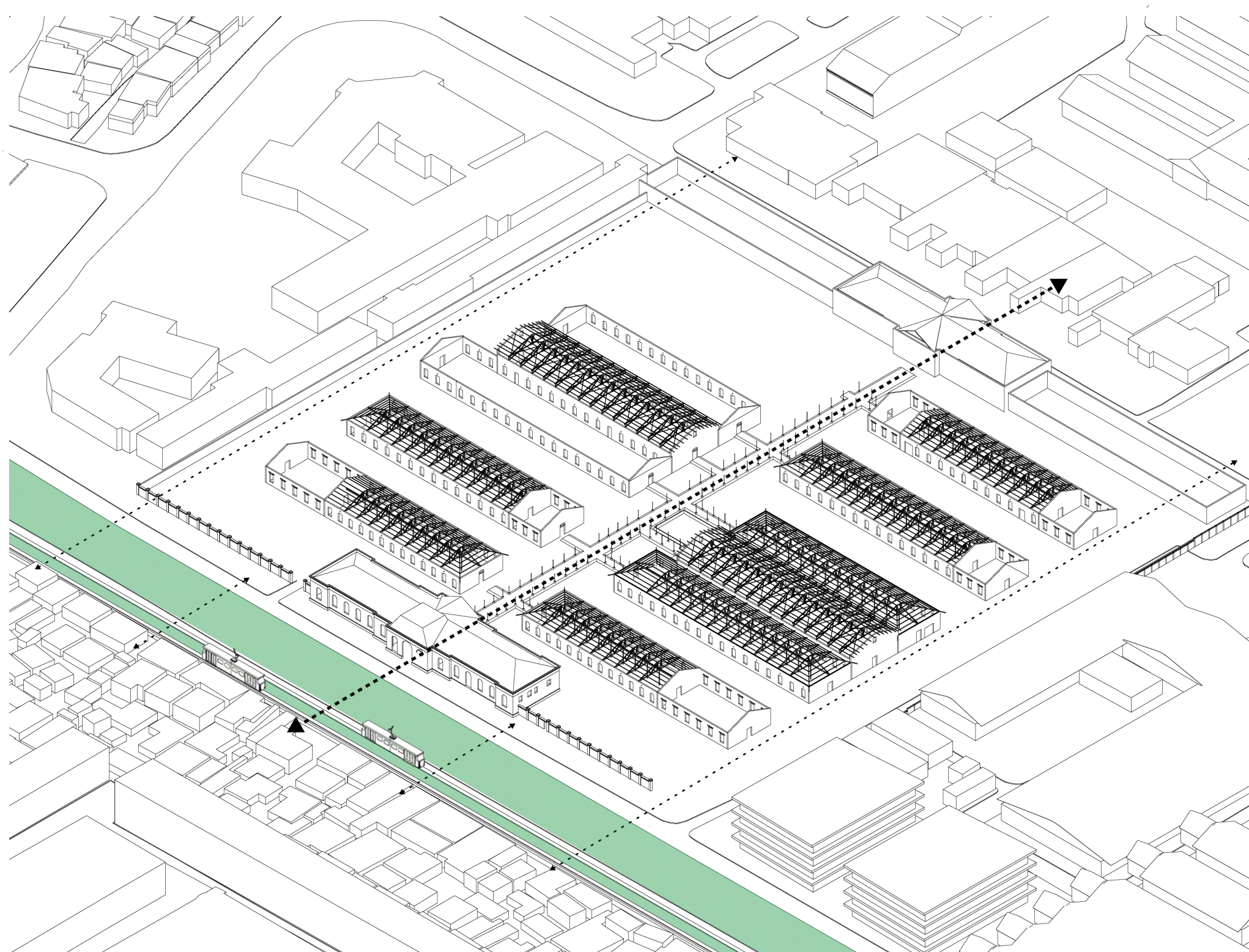
Remove





# SUMMARY

Repair





# SUMMARY

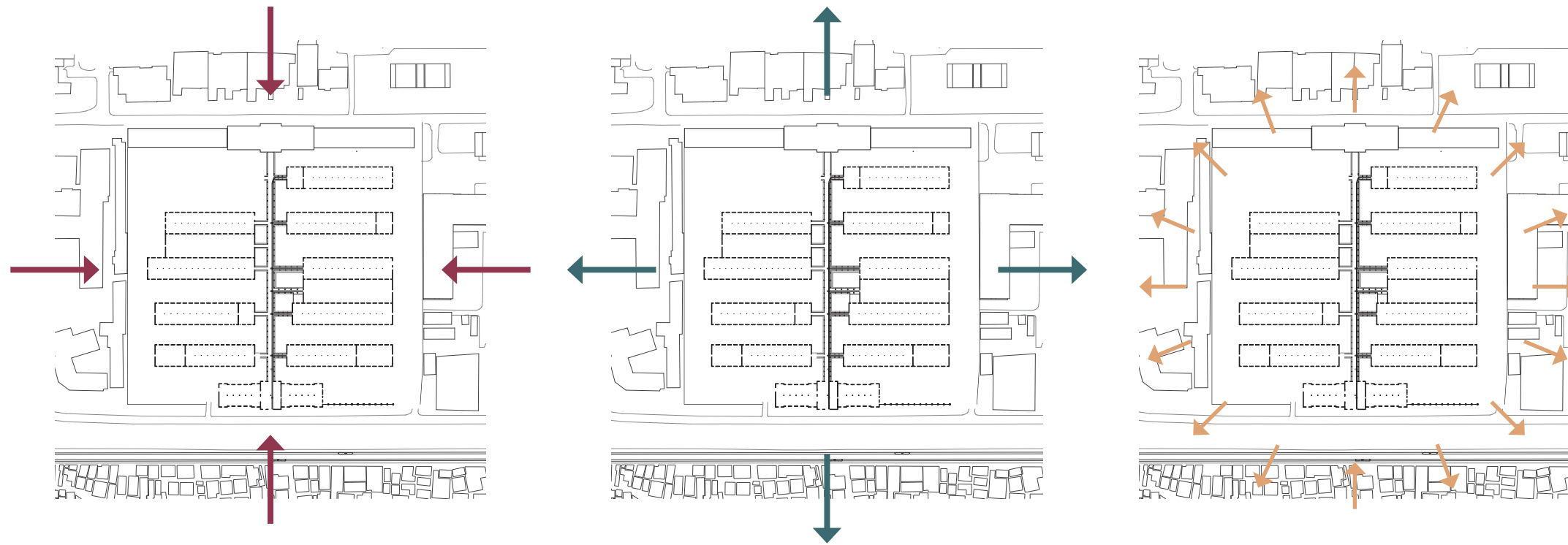
New design





# AMBITION

Neighbourhood Scale



## a showcase for the city

of how boundaries can become mediators or connectors to achieve social inclusion and equality. How integration of bottom up and top down approaches can benefit the whole city.

## an influence

of how you can approach heritage adaptive reuse by putting first the people and their needs. In an attempt to show that the answers can be found in the *"context."*

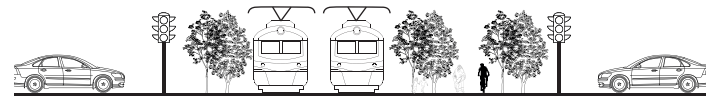
## an inspiration

of how the integration of a solution for an environmental problem with more communal and cultural facilities can have a stronger impact in the society.



## AMBITION

Urban Scale



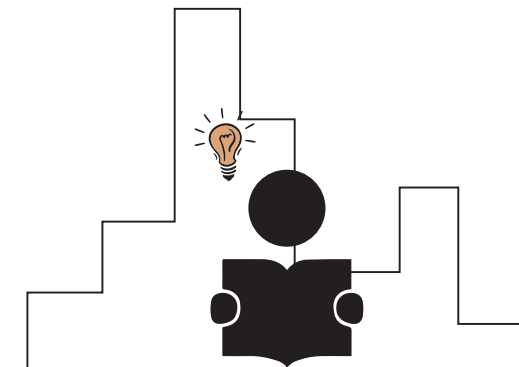
to improve the mobility of the city and manage recycling waste transportation



to make a healthier city



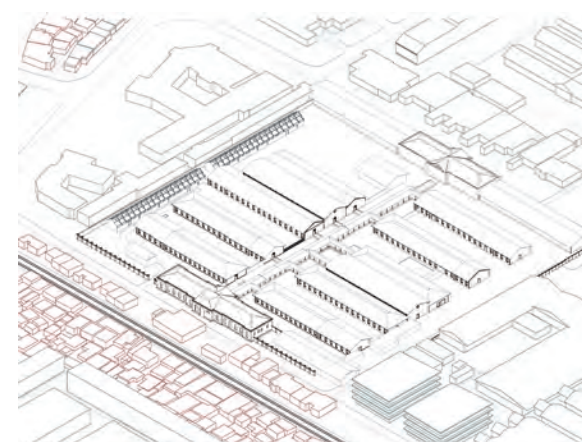
to create a new destination



to educate/raise awareness about plastic pollution



to generate new business opportunities



an alternative approach to heritage conservation





thank you.







## APPENDIX



APPENDIX  
I. RESEARCH | CONTEXT | PROGRAMME | SITE



# APPENDIX

Research

Bandung City's waste may go **up to 1,750 tons'**  
**per day.**

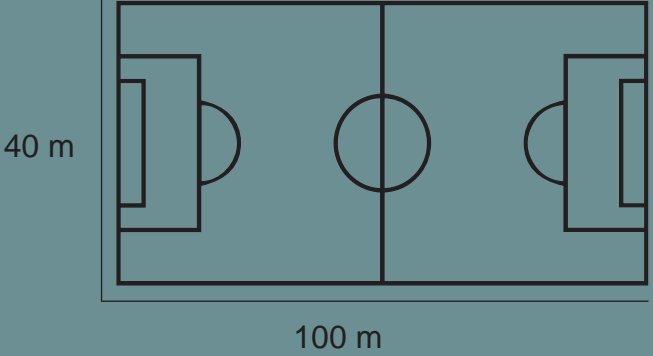
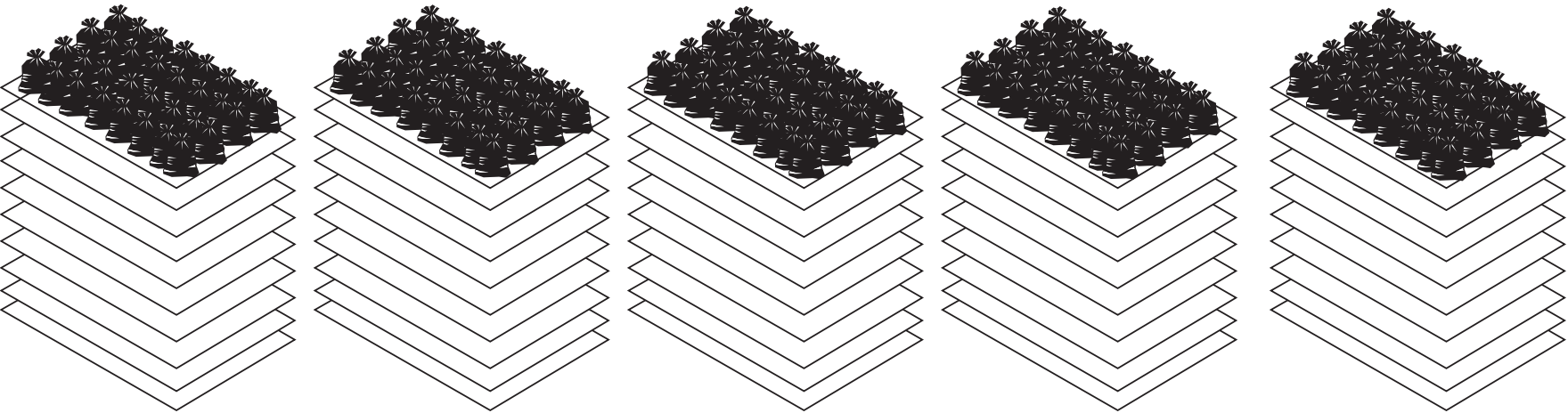
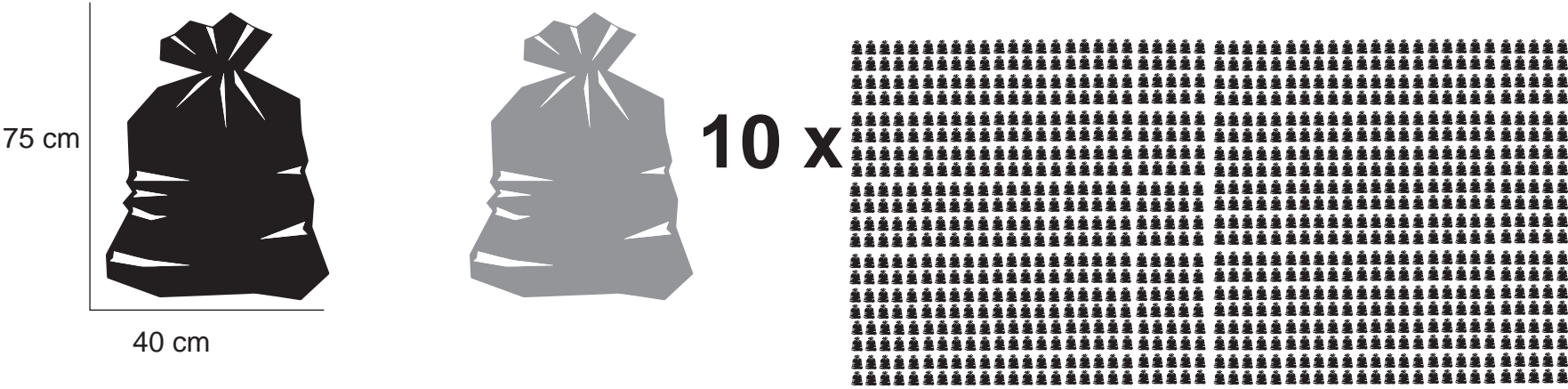
**2%** of that number is from **plastic debris**, which  
amounts to about

**35 tons of plastic waste per day in**  
**Bandung.**

**Equal to 1,750,000 plastic bags.**

**the plastic debris can cover the land**  
**up to 52.50 hectares.**

That's the same size as **50 football fields**,  
creating a mountain of plastic.





# APPENDIX

## Research

Jakarta

Source:  
<https://www.thejakartapost.com/news/2018/08/10/jakarta-generates-up-to-2400-tons-of-plastic-waste-daily.html>





## APPENDIX

Research



**65% - 75%**  
sent to solid waste landfill



**10% - 20%**  
Reduce & Reuse



Locals are paid small amounts of money to return over their old plastic garbage to recycling projects

Workers will sort out the trash according to the value of their polymer materials



# APPENDIX

Research

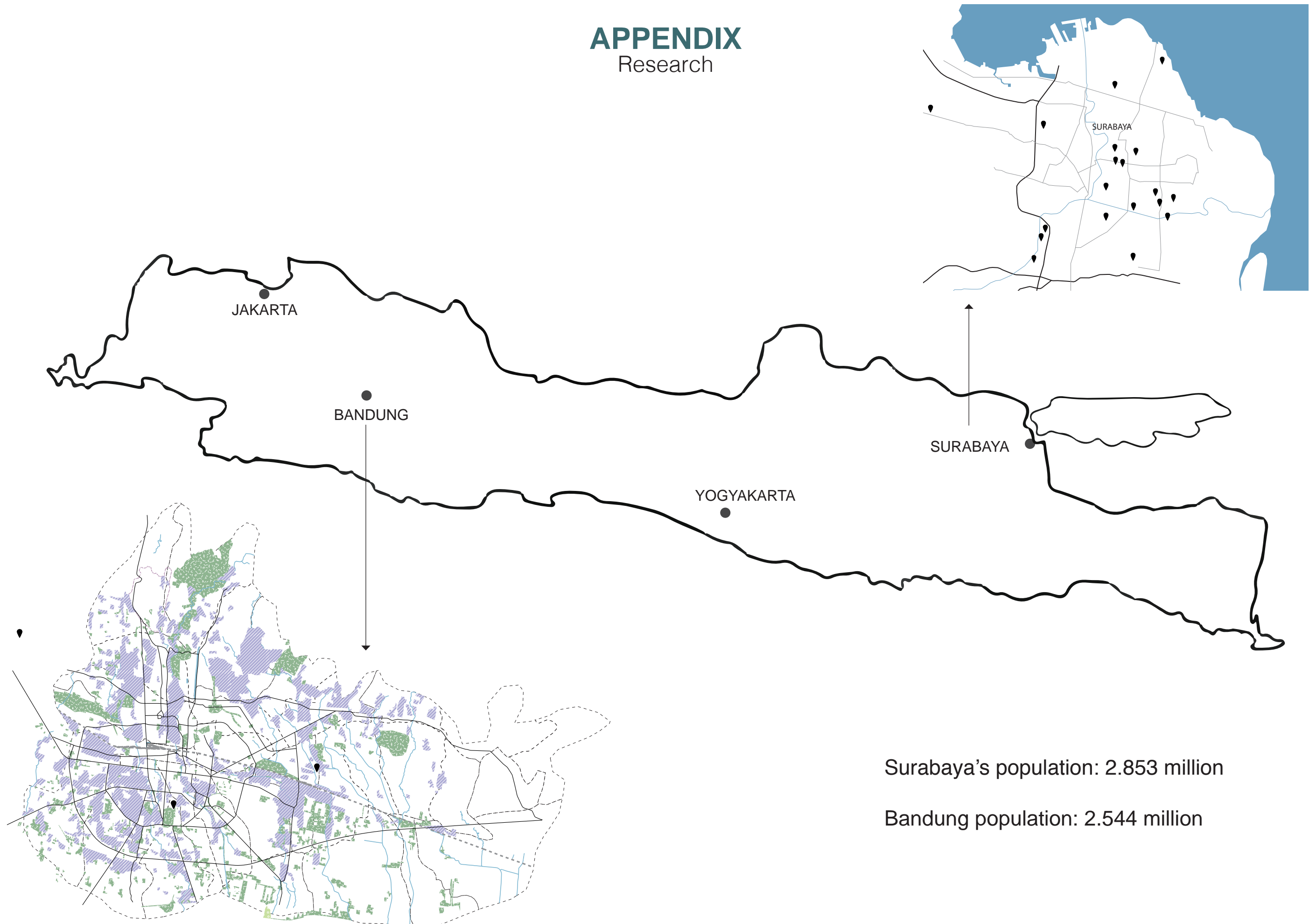


Bandung  
“KNIL MAGAZIJNEN”



## APPENDIX

Research





## APPENDIX

Research



population keeps increasing

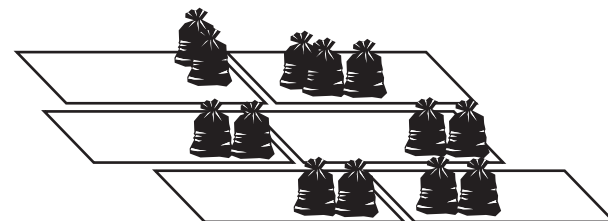


plastic waste will keep increasing

Further enhancing the following environmental issues:



Solid waste



Land use problem



Air pollution

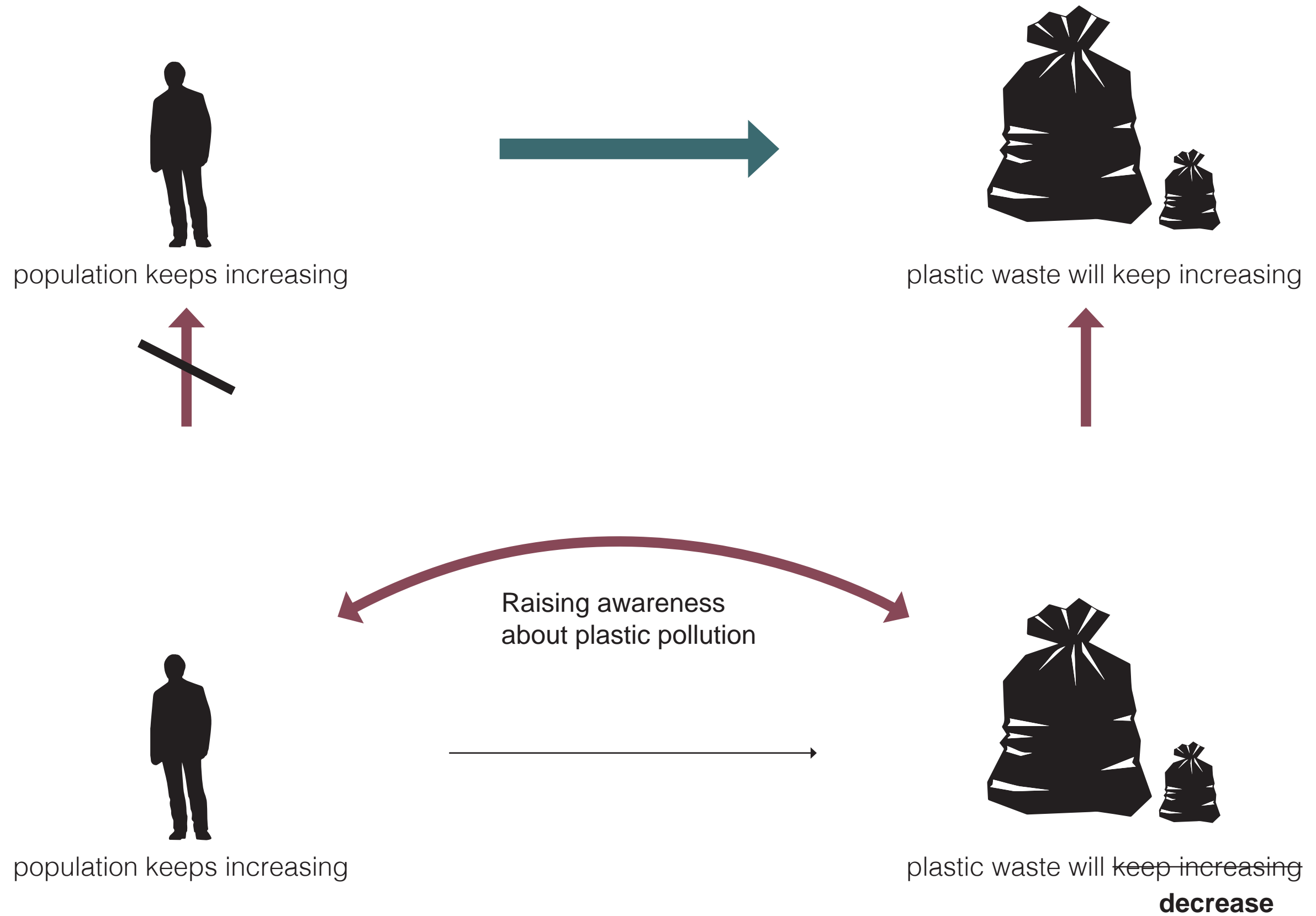


Water pollution



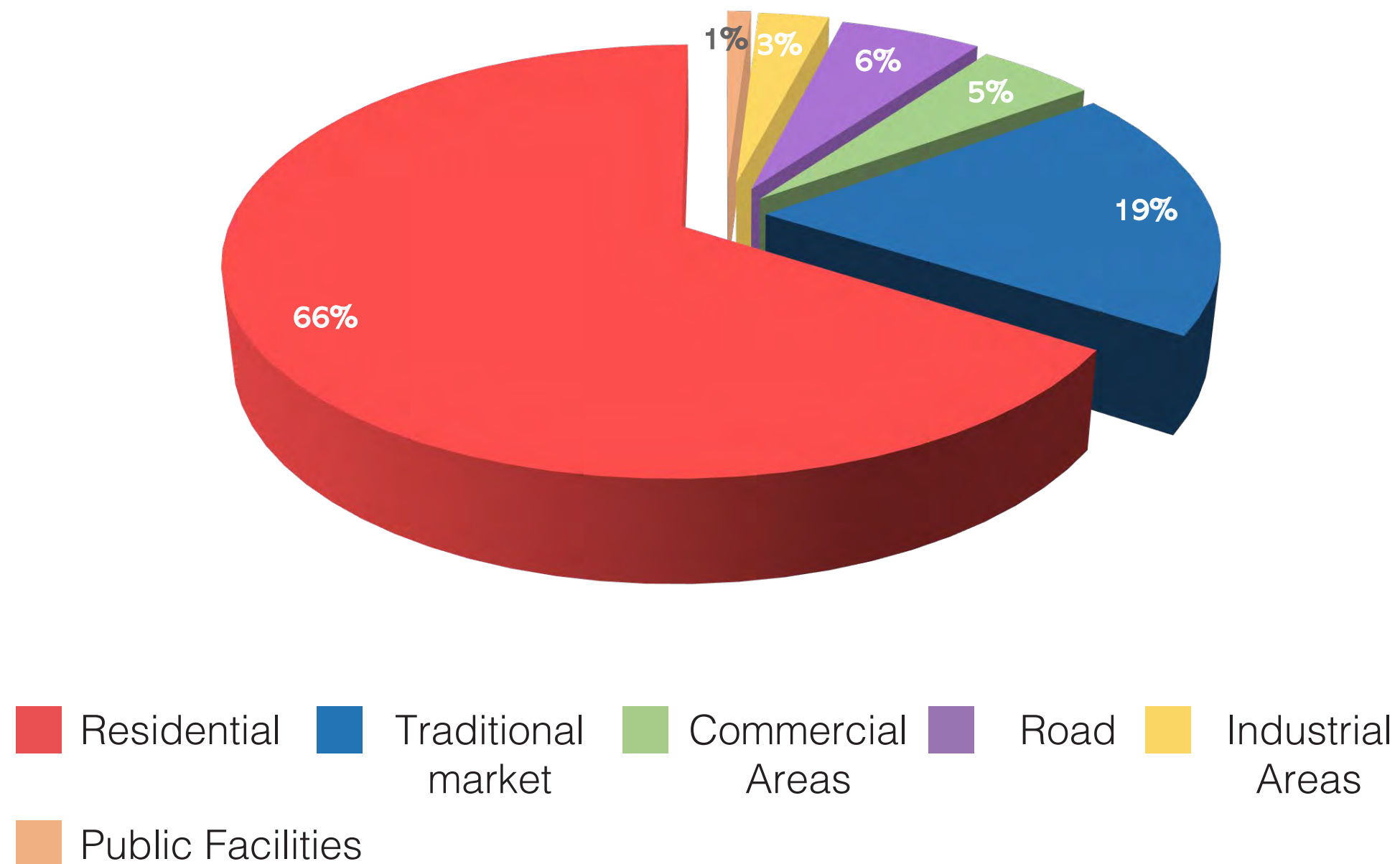
## APPENDIX

Research





### Sources of Bandung's Waste





# APPENDIX

Research

## Residential sector in Bandung

### FORMAL - PLANNED



### INFORMAL - UNPLANNED





## APPENDIX

### Research

Used for the Disposal of:

- Flat glass
- Metal
- bulky goods
- Earthenware
- Plastic bottles
- Corks
- Coffee capsules made of Aluminum



STADT ZÜRICH  
Tiefbau- und  
Entsorgungsdepartement

Source:  
[https://www.stadt-zuerich.ch/ted/de/index/entsorgung\\_recycling/publikationen\\_broschueren/fahrplan\\_cargo\\_tram\\_und\\_e\\_tram.html](https://www.stadt-zuerich.ch/ted/de/index/entsorgung_recycling/publikationen_broschueren/fahrplan_cargo_tram_und_e_tram.html)



## APPENDIX

### Programme

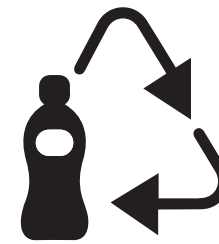
#### Recycling plant



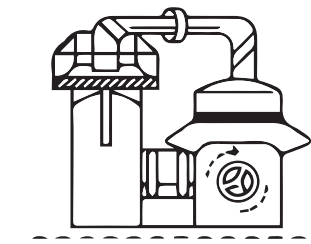
Connection  
with tram



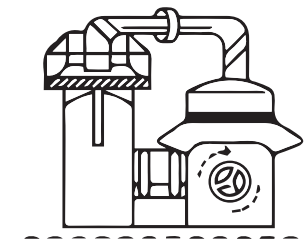
Collection  
space  
(storage)



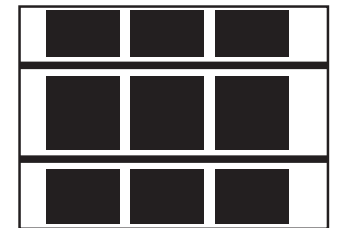
Processing  
(Sorting)



Processing  
(Shredding)

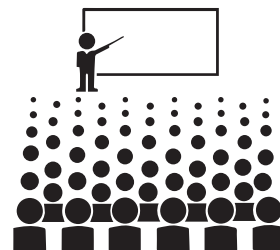
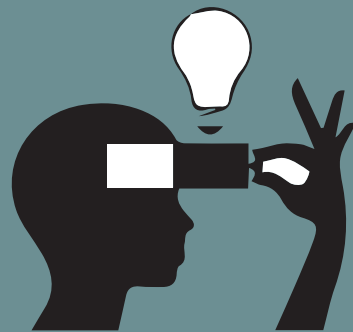


Processing  
(Washing &  
Melting)



Processing  
(Compact  
storage)

#### Learning Centre



Auditorium  
&  
Lecture rooms



Workshops



Library



Shops  
related to  
waste  
up-cycling

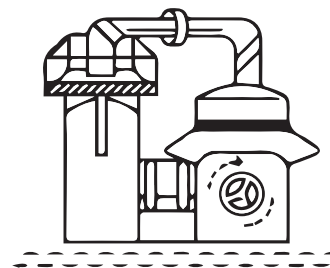


Restaurant



Meeting space

#### Creative Industry



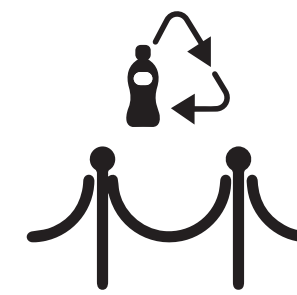
Machinery



Workshops



Meeting space to  
exchange ideas



Exhibition space

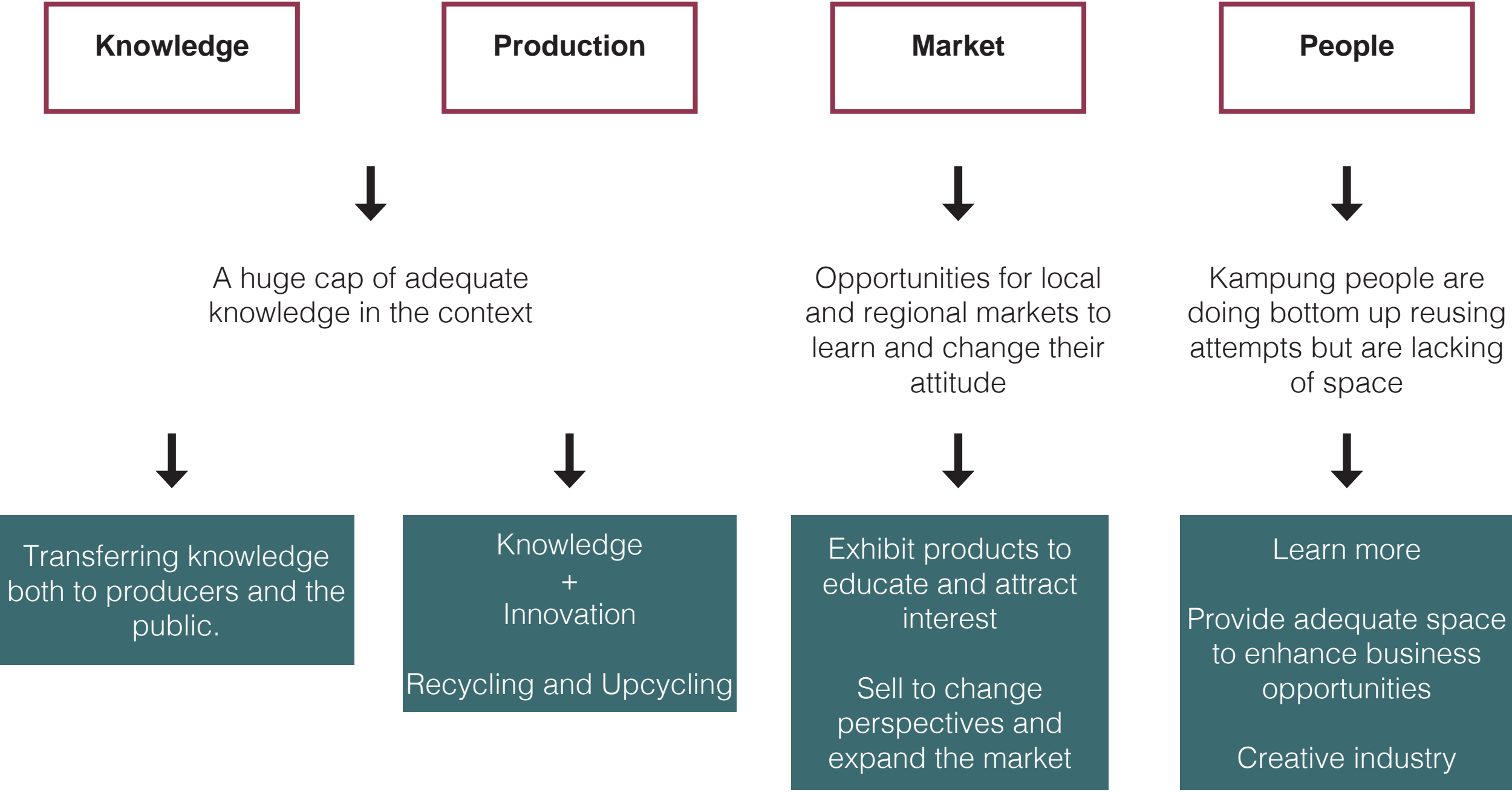


Shops to sell  
their products



# PROGRAMME STRATEGY

Integration





# APPENDIX Programme



Waste processing (3000 m<sup>2</sup>)
  Up-cycling (2.200 m<sup>2</sup>)
  Crafts (2000m<sup>2</sup>)
  R.I.E + Library (3500m<sup>2</sup>)
  Commercial (2800m<sup>2</sup>)



## 3D Printing Laboratory

### APPENDIX Programme

Zero Waste Lab 3D Prints  
Street Furniture from Household  
Plastic Waste

Source:  
<https://www.archdaily.com/909542/zero-waste-lab-3d-prints-street-furniture-from-household-plastic-waste>





## APPENDIX

### Programme



Zero Waste Lab 3D Prints  
Street Furniture from Household  
Plastic Waste

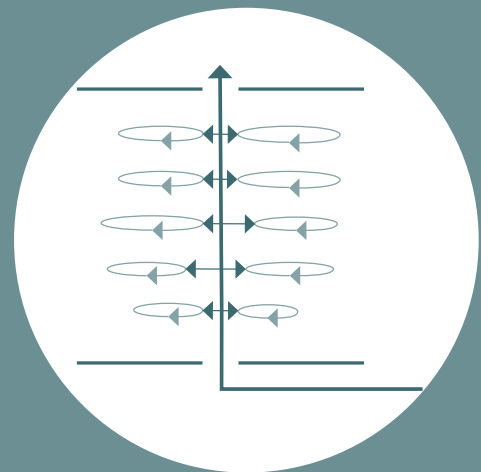
Source:  
<https://www.archdaily.com/909542/zero-waste-lab-3d-prints-street-furniture-from-household-plastic-waste>



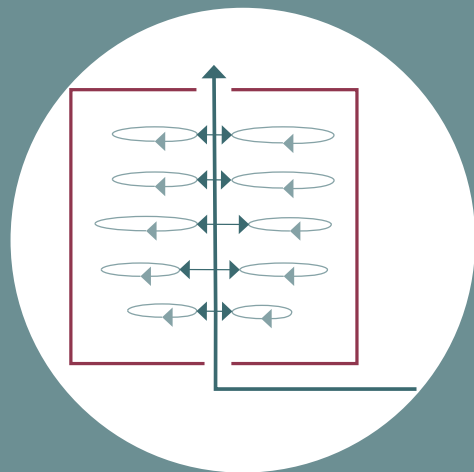
Zelenew

Source:  
<https://preciousplastic.com/en/community-profiles/zelenew.html>

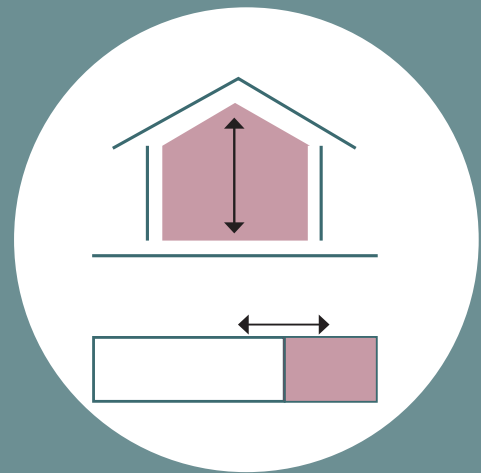




Connection with the railway  
and with the warehouses



Enclosure by a wall



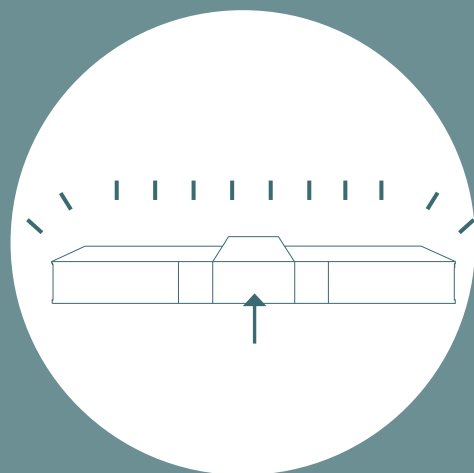
Atmosphere and flexibility  
of warehouse



Trolley Track



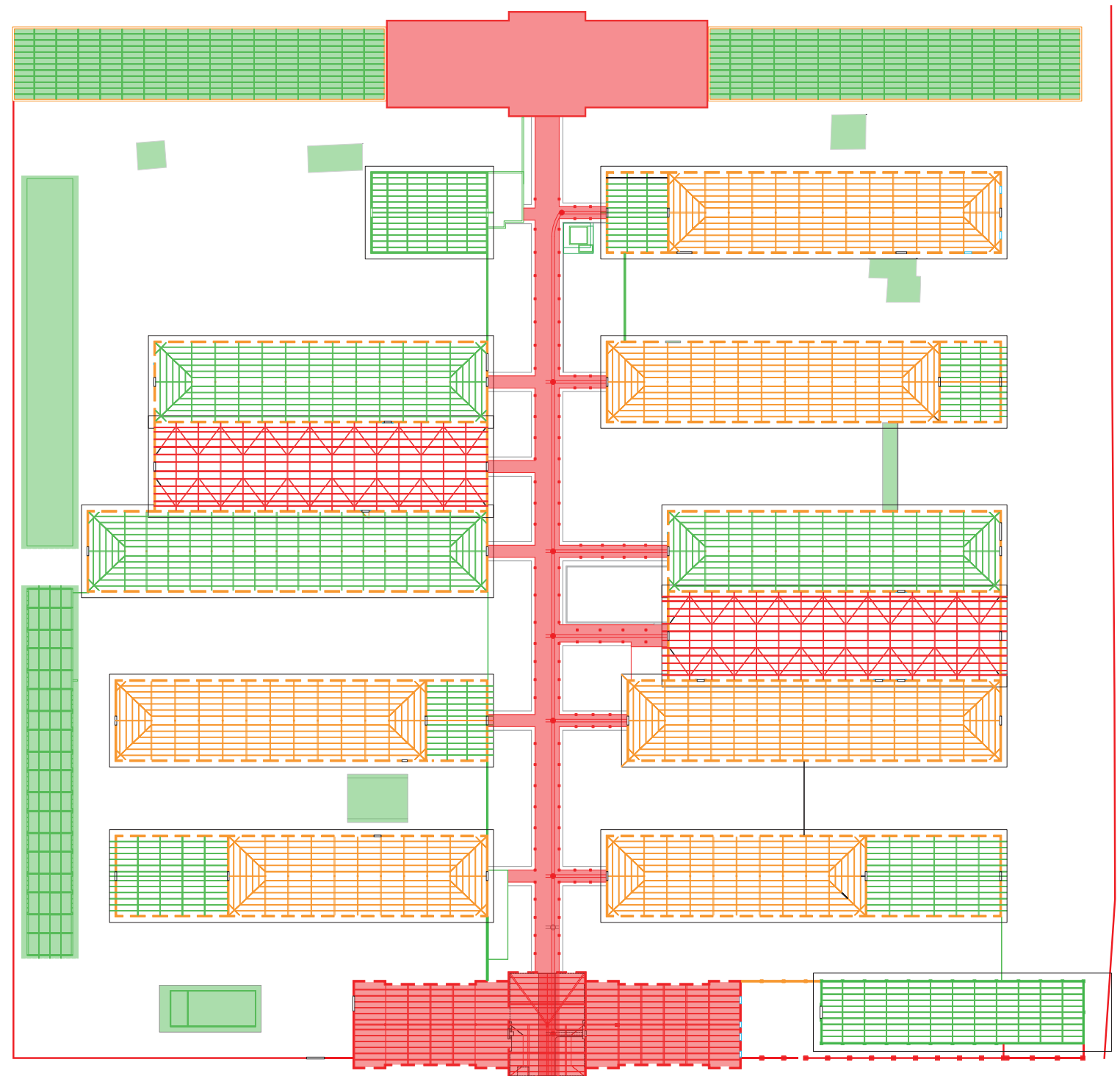
Rare elements



Connect entrance building to  
street life.

## APPENDIX

### Site

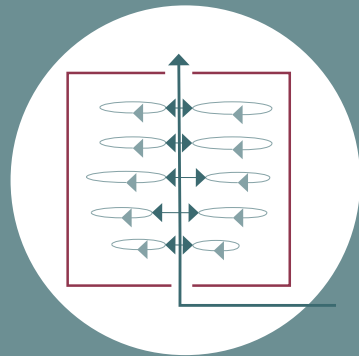


- high value
- medium value
- low value

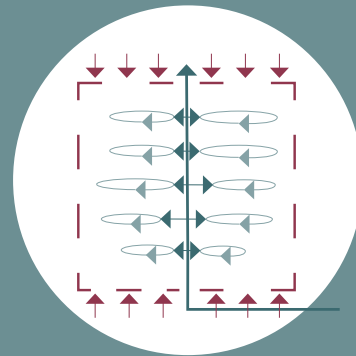


# APPENDIX

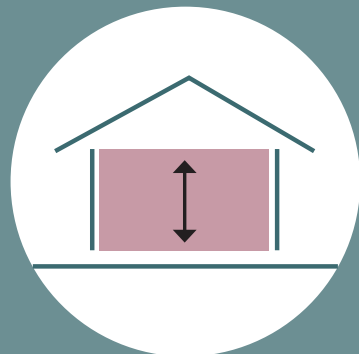
## Site



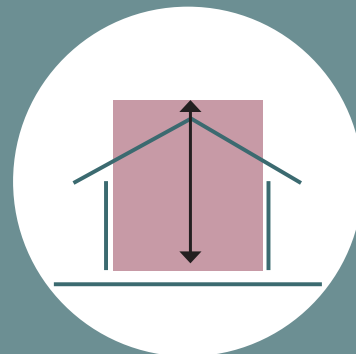
Age and Historical Value



Use value



Historical and Age value



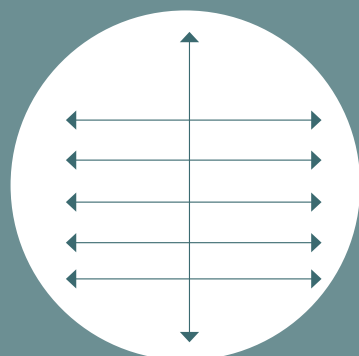
New use requirements



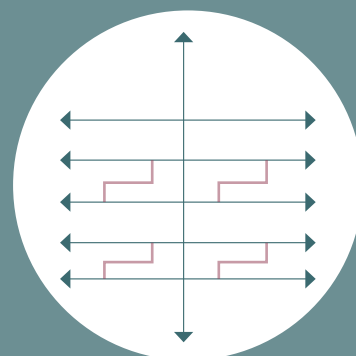
Outdoor space



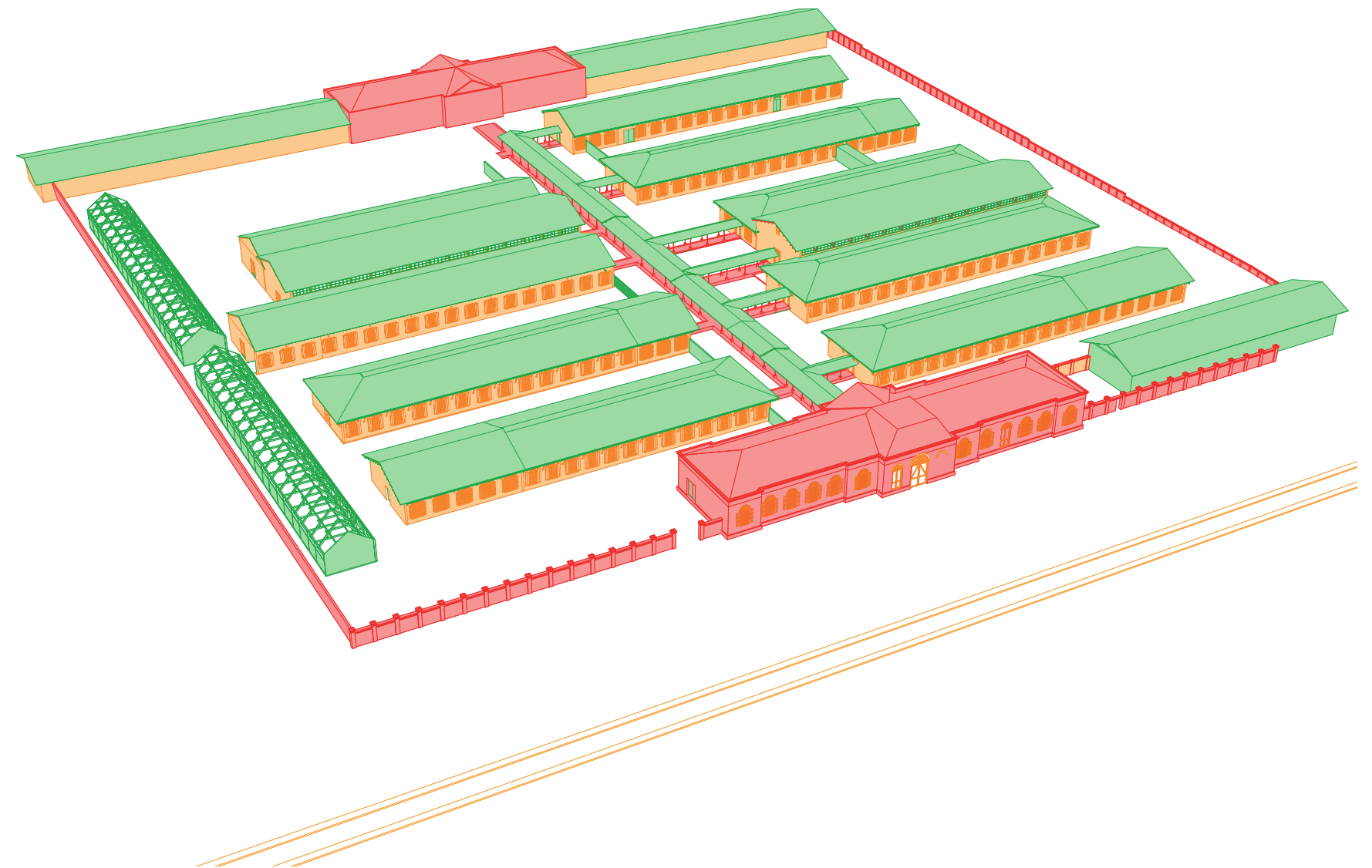
New use requirements



Space plan



Connections





APPENDIX

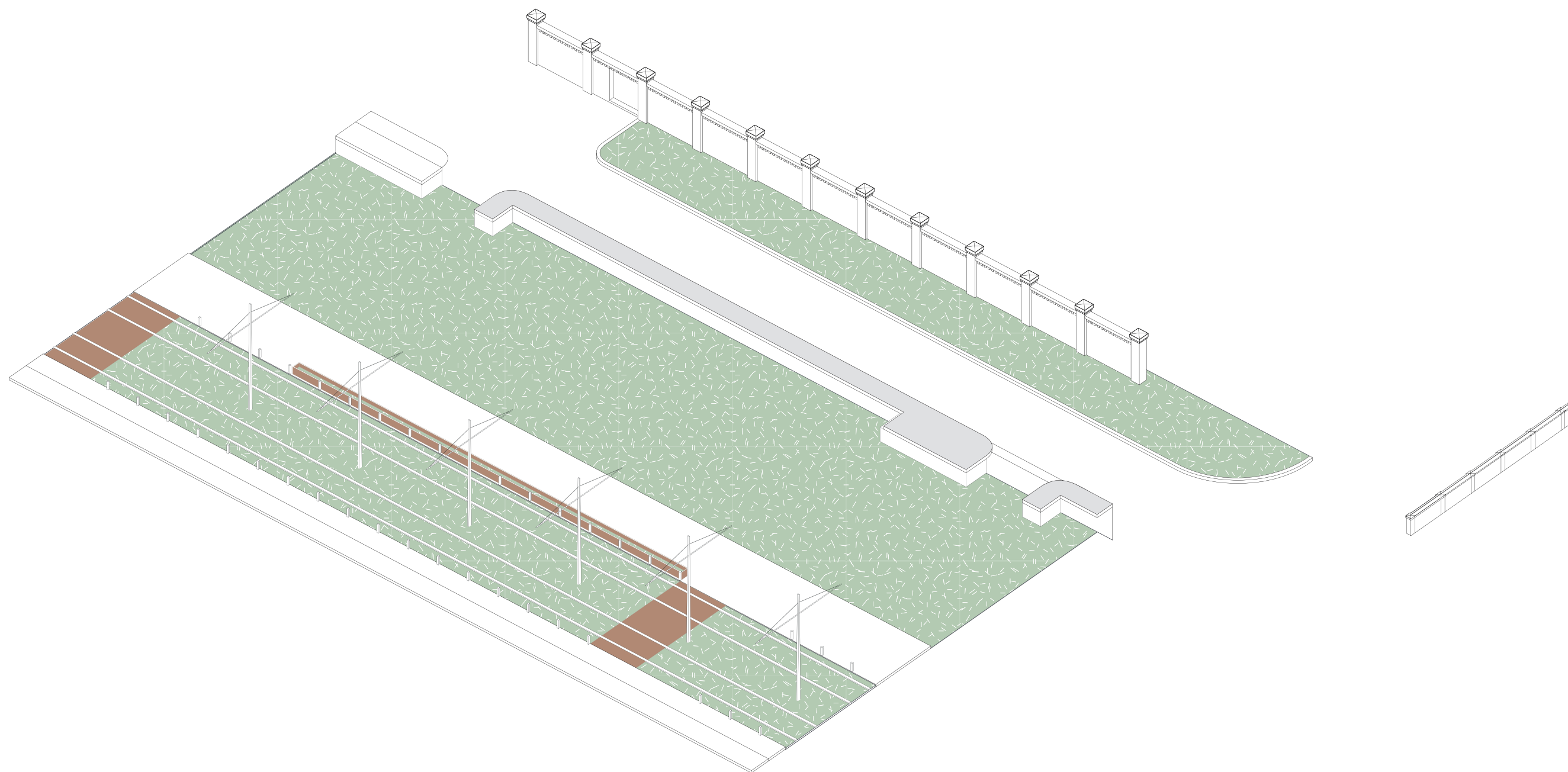
**II.** INTERVENTIONS | DESIGN IMPLEMENTATION



# APPENDIX

Interventions

## Waste Pavillion



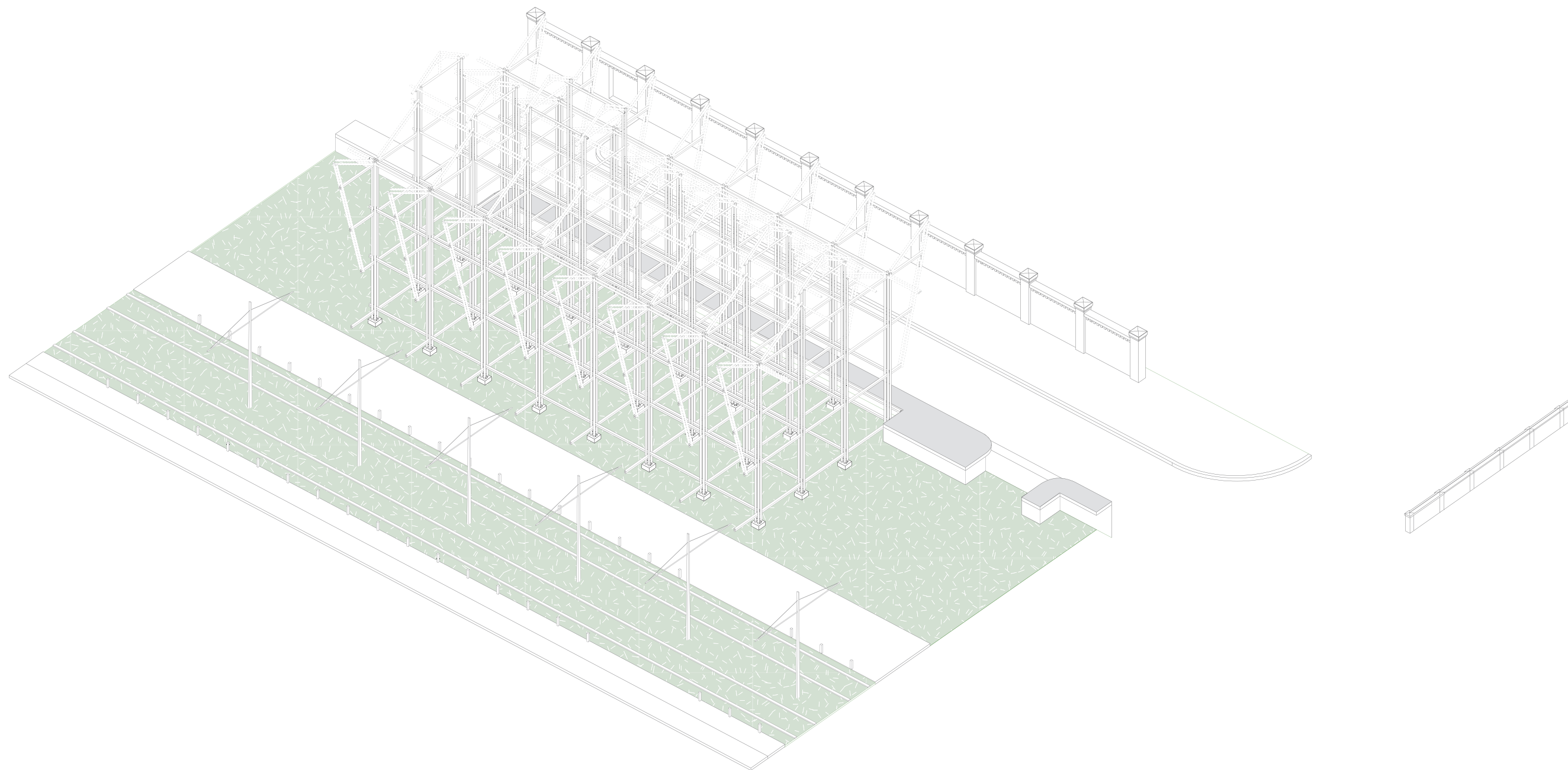
- Site -



# APPENDIX

Interventions

## Waste Pavillion



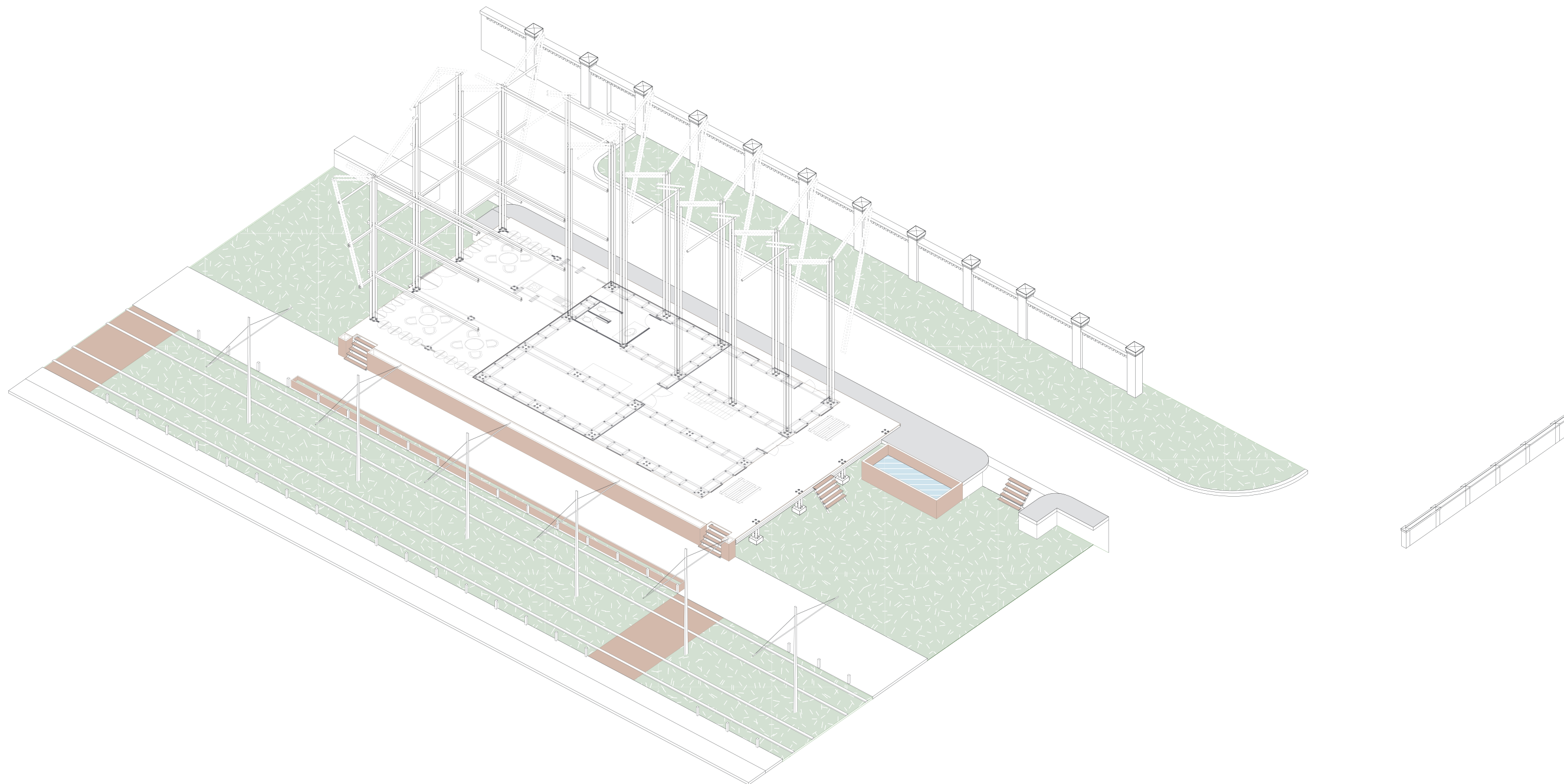
- Structure -



# APPENDIX

Interventions

## Waste Pavillion



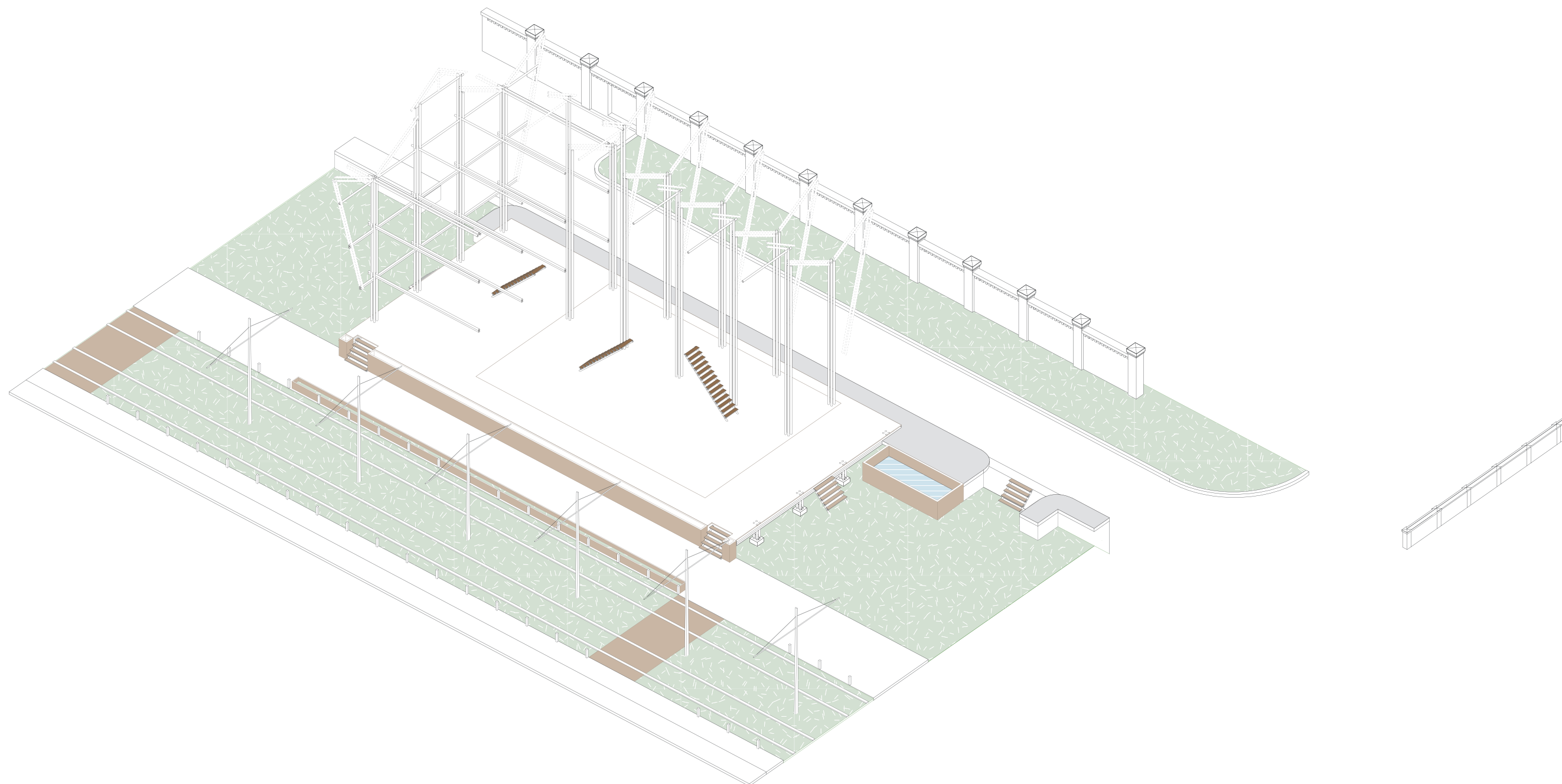
- Space Plan -



# APPENDIX

Interventions

## Waste Pavillion



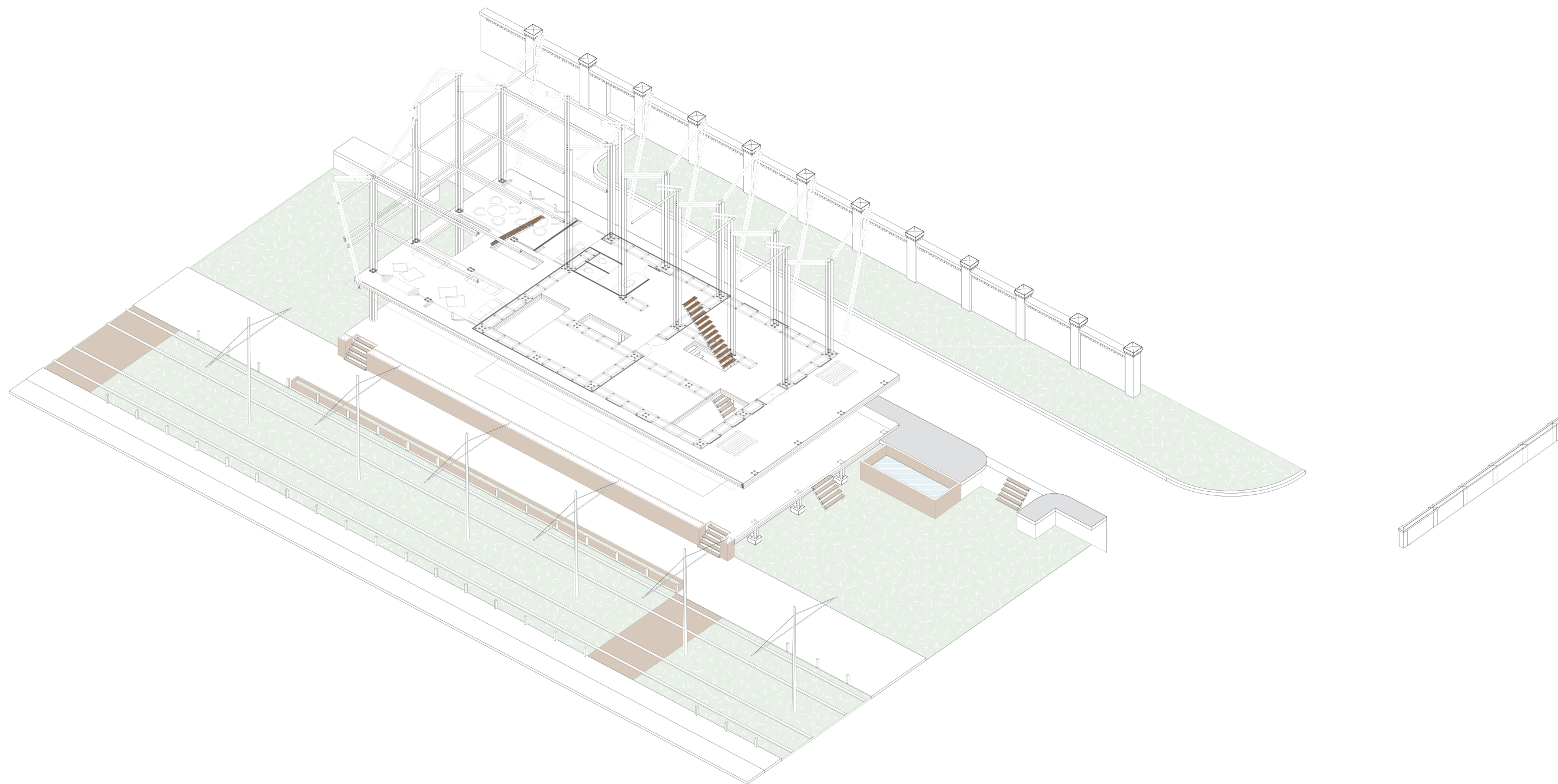
- Circulation -



# APPENDIX

Interventions

## Waste Pavillion



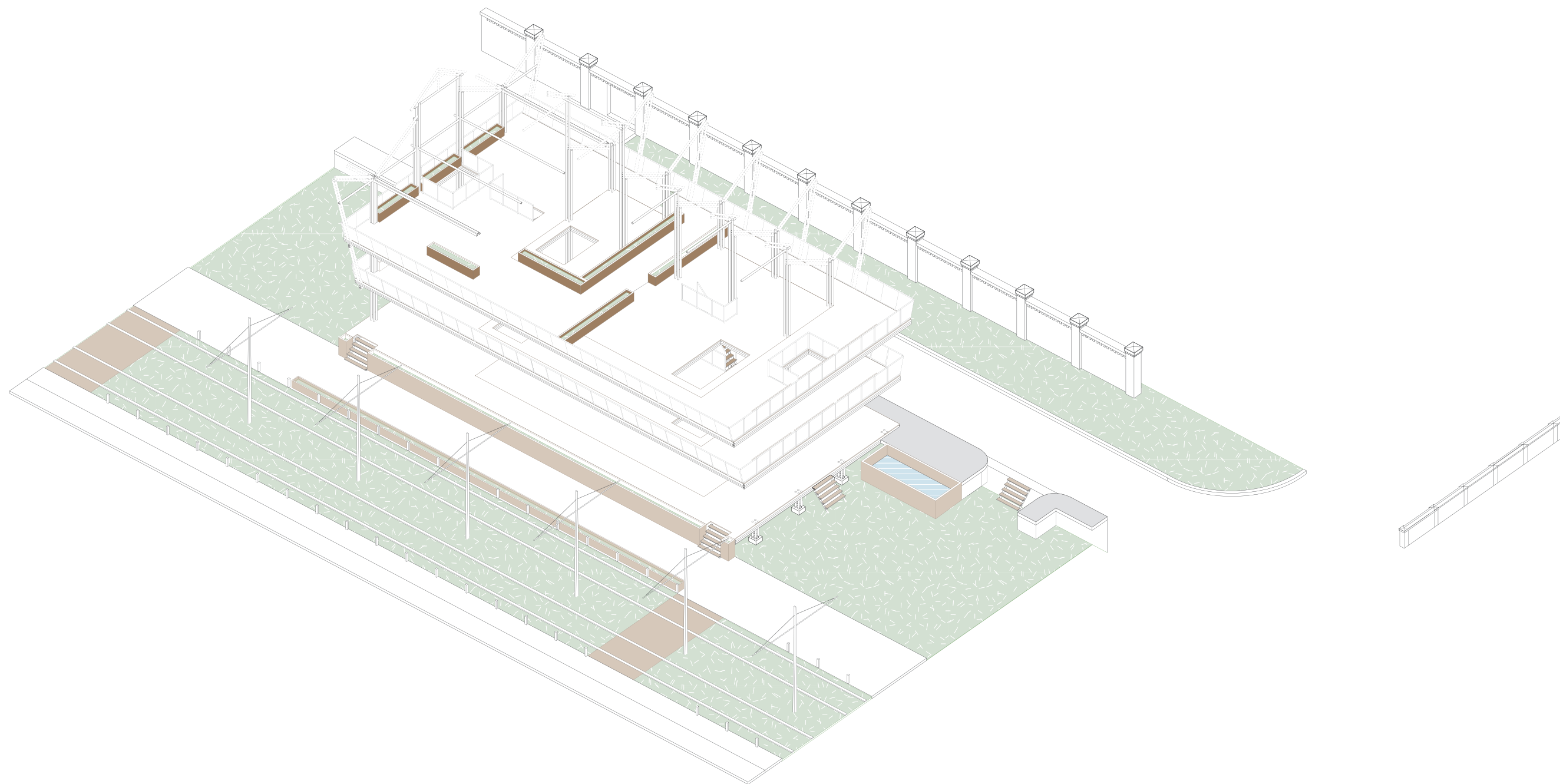
- Circulation -



# APPENDIX

Interventions

## Waste Pavillion



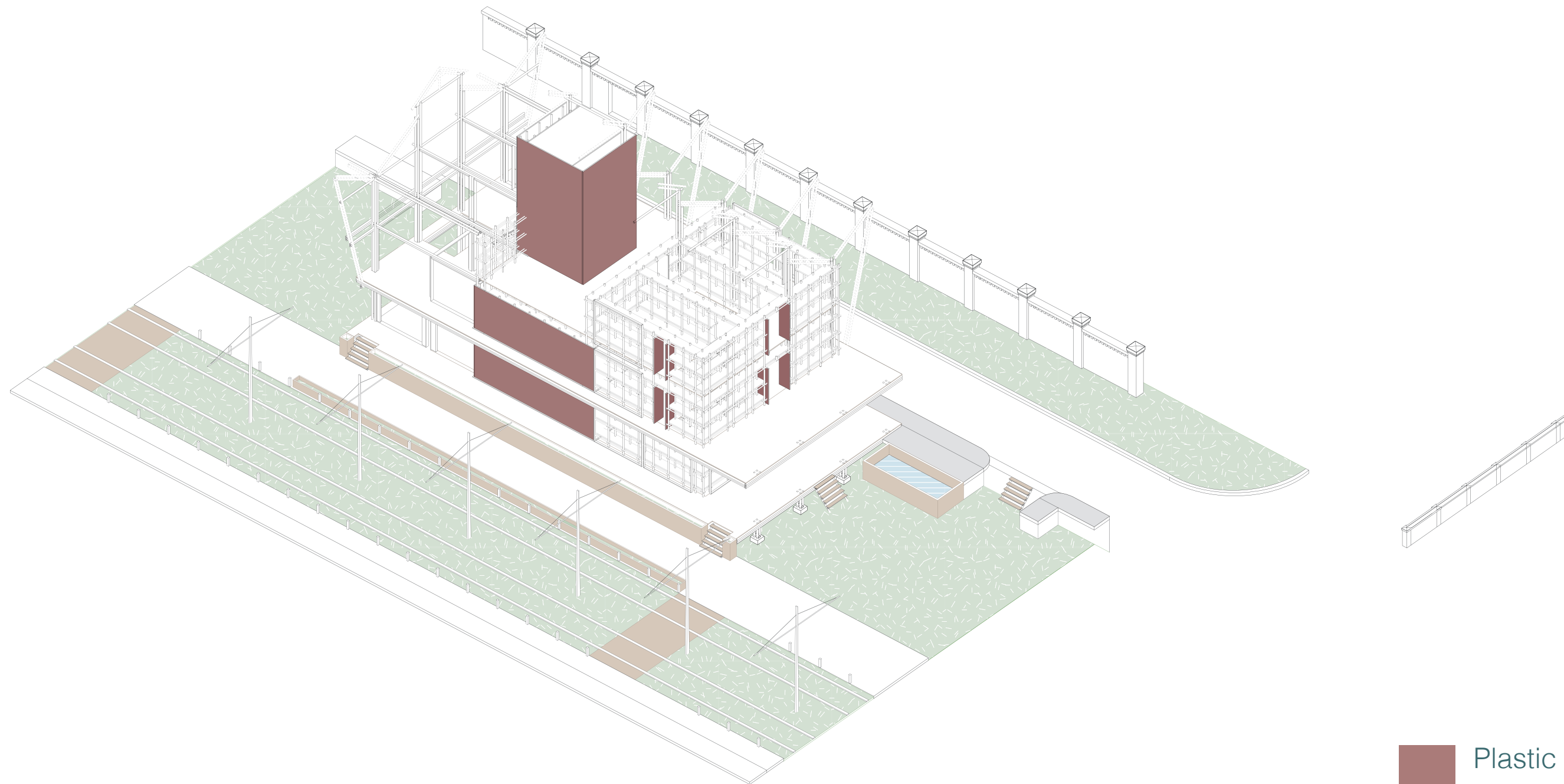
- Circulation -



# APPENDIX

Interventions

## Waste Pavillion



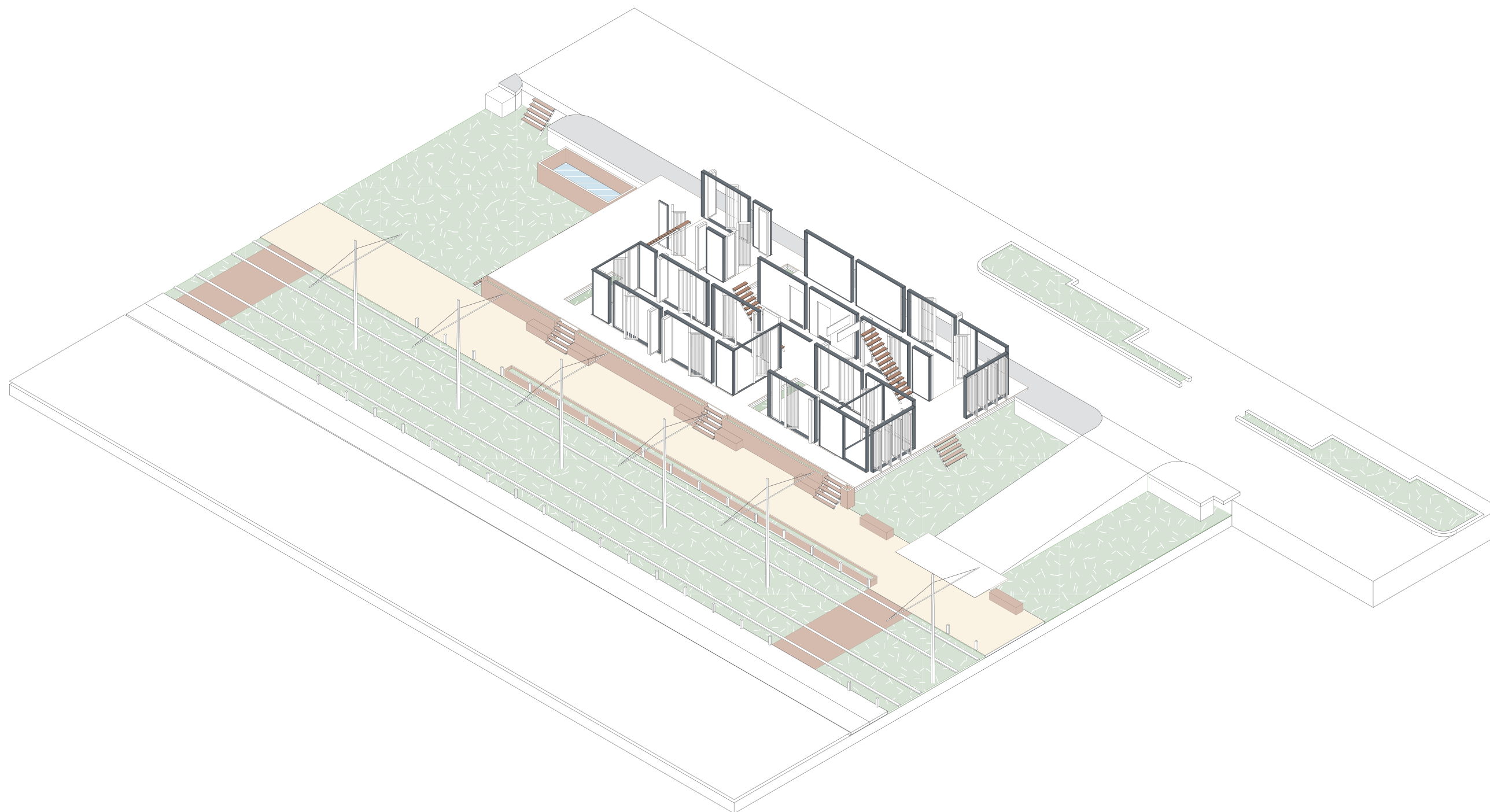
- Wall Concept -



# DESIGN

Interventions

## A public pavilion



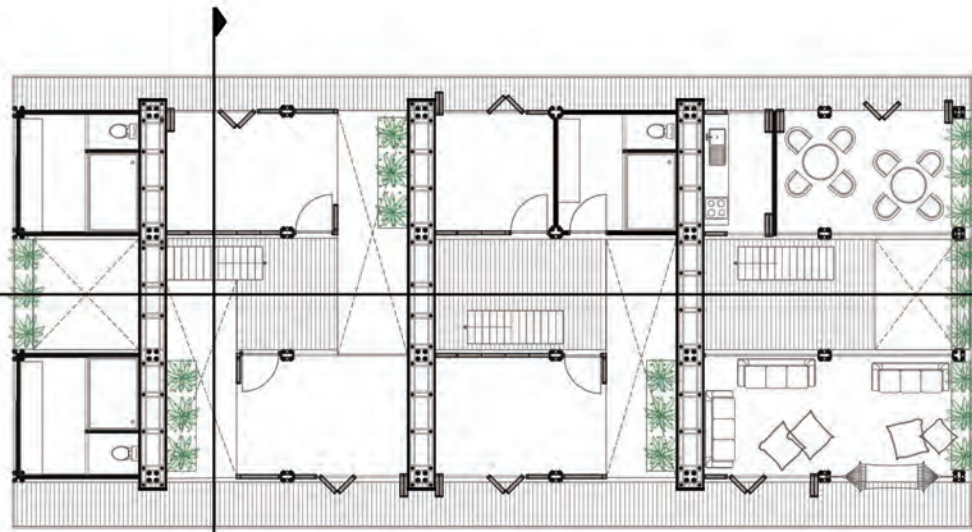
- Circulation -



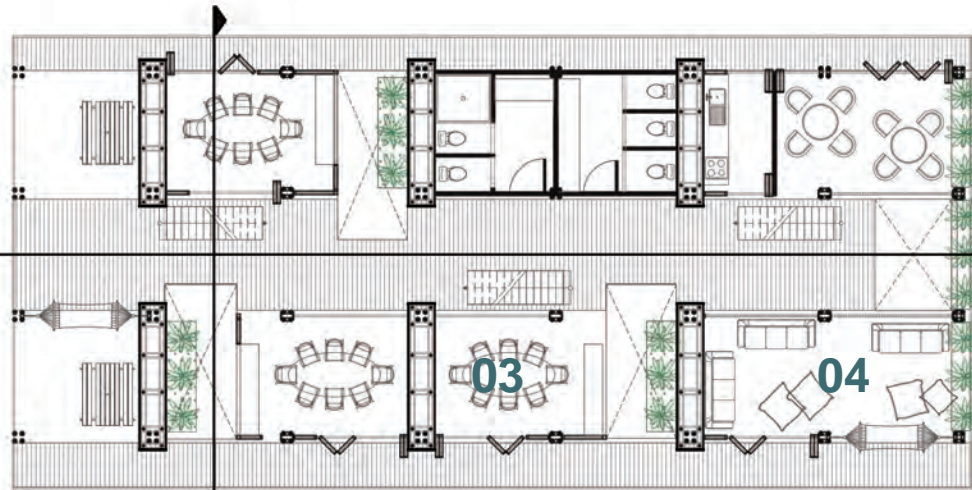
# APPENDIX

## 2D Drawings - Plans

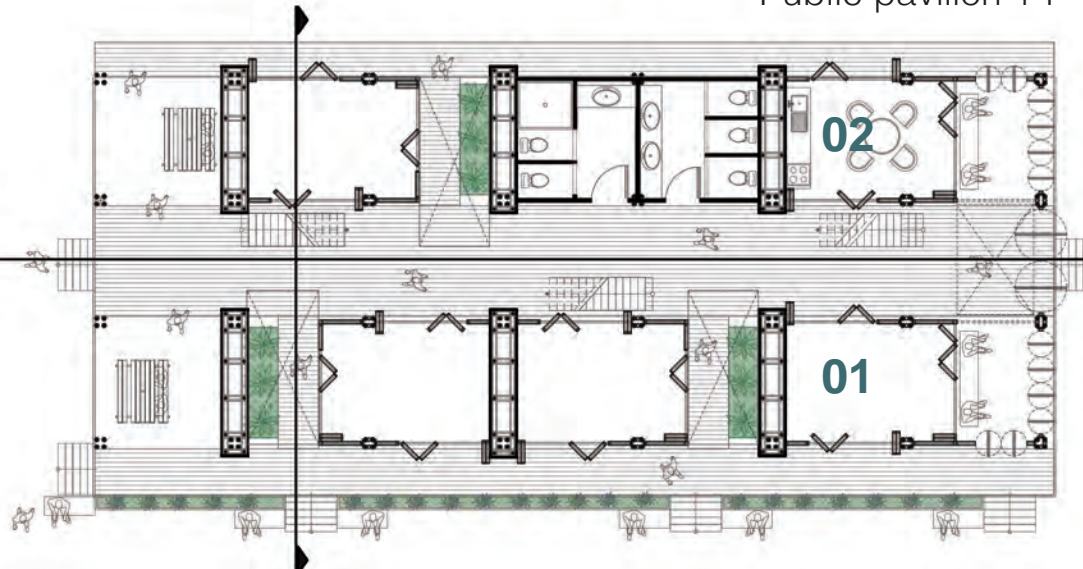
### A pavilion



Public pavilion +2

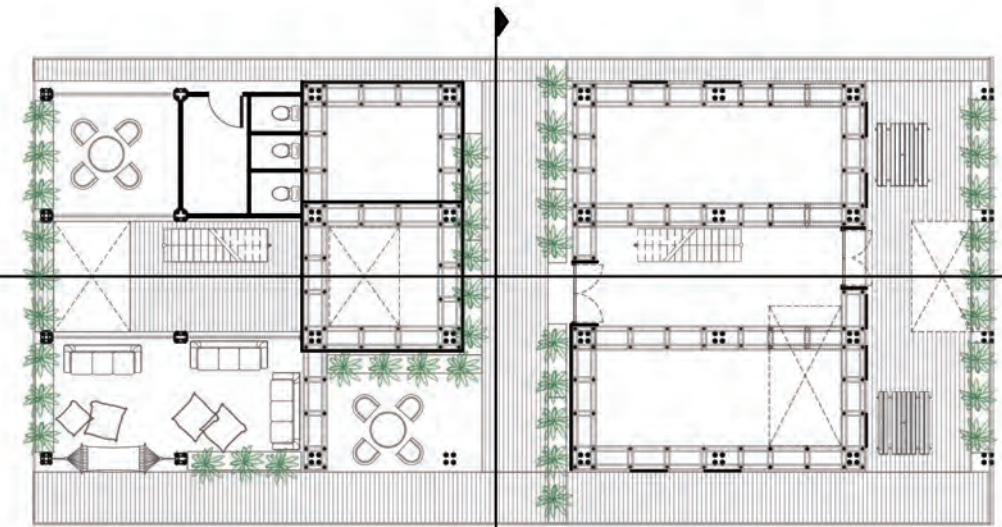


Public pavilion +1

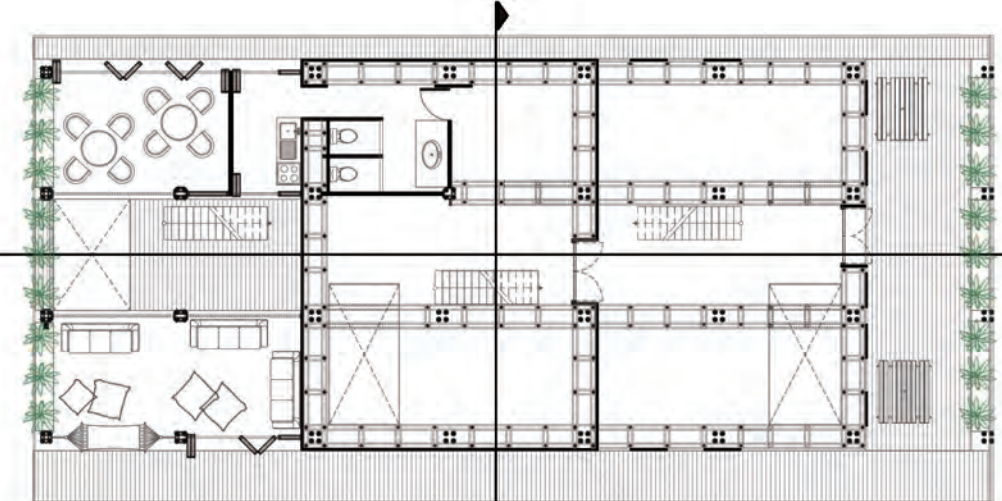


Public pavilion +0

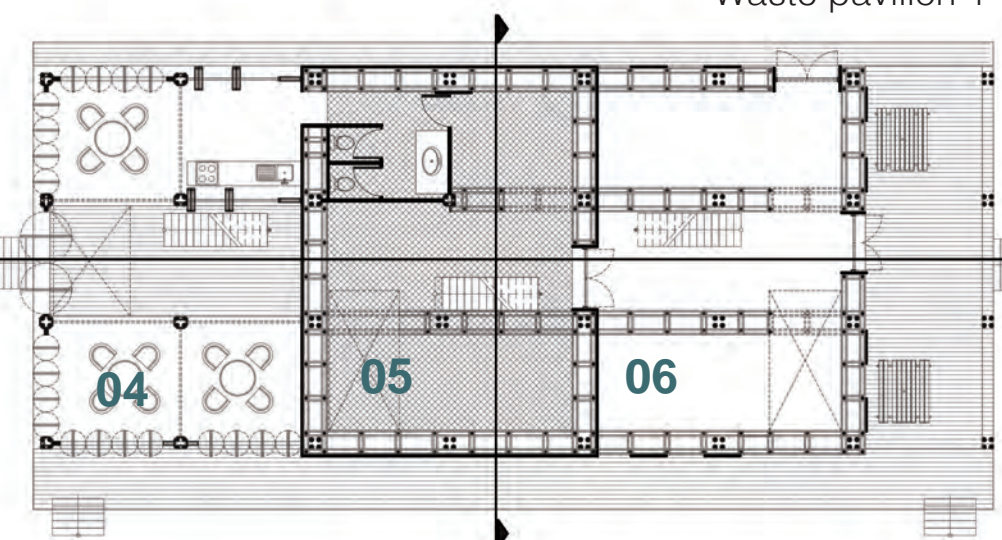
- 01. Shops/Commercial
- 02. Kitchen Facilities
- 03. Working space
- 04. Meet & Relax
- 05. Washing Waste
- 06. Temporary storage



Waste pavilion +2



Waste pavilion +1



Waste pavilion +0

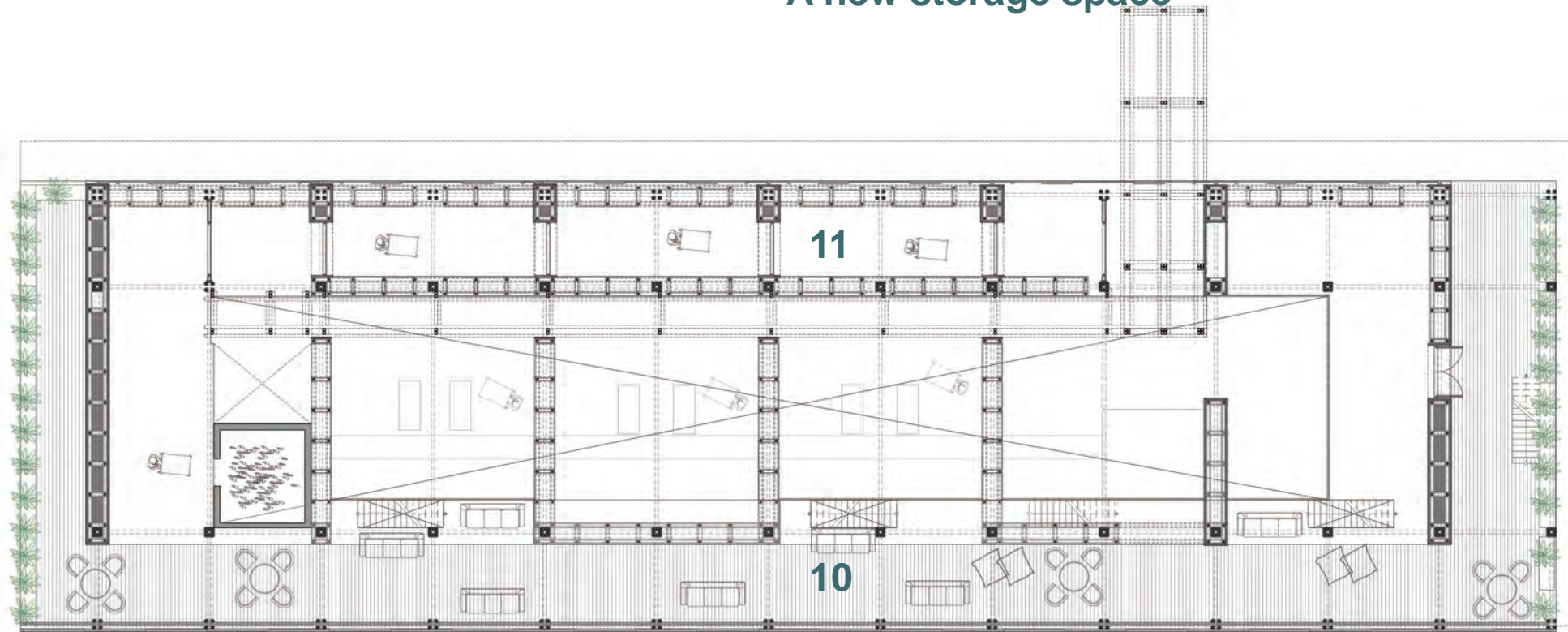




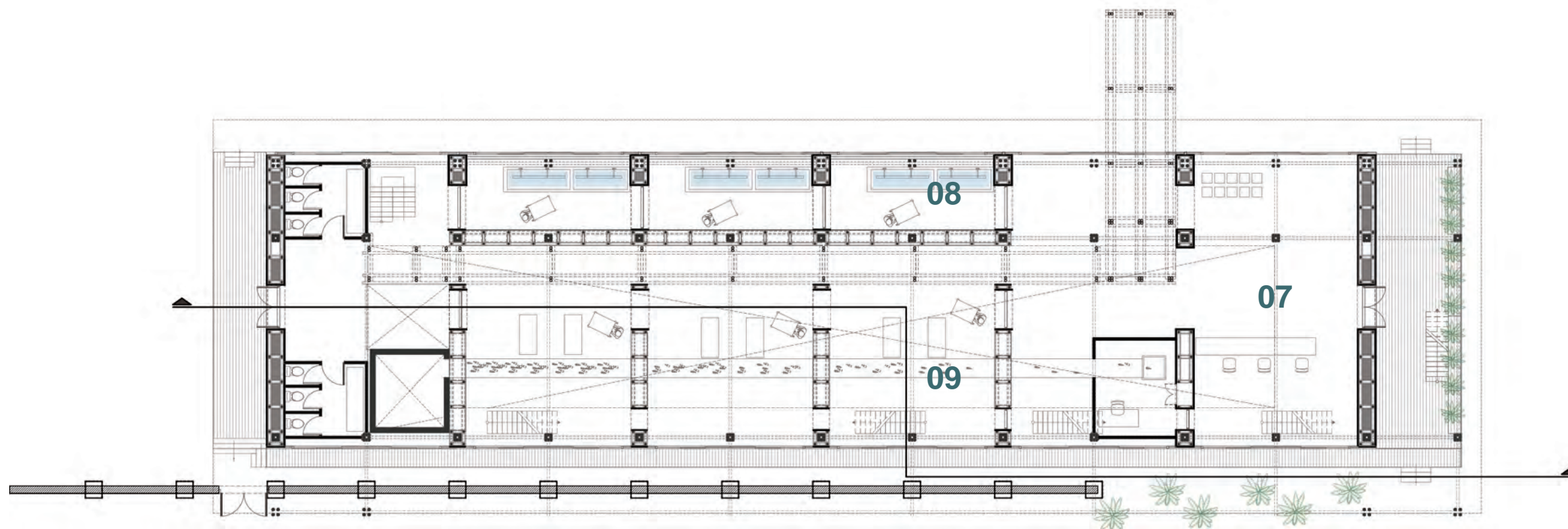
# APPENDIX

## 2D Drawings - Plans

### A new storage space



- 07. Drop off/Reception
- 08. Washing rooms
- 09. Sorting space
- 10. Sit and Relax/ Working space
- 11. Storage Space

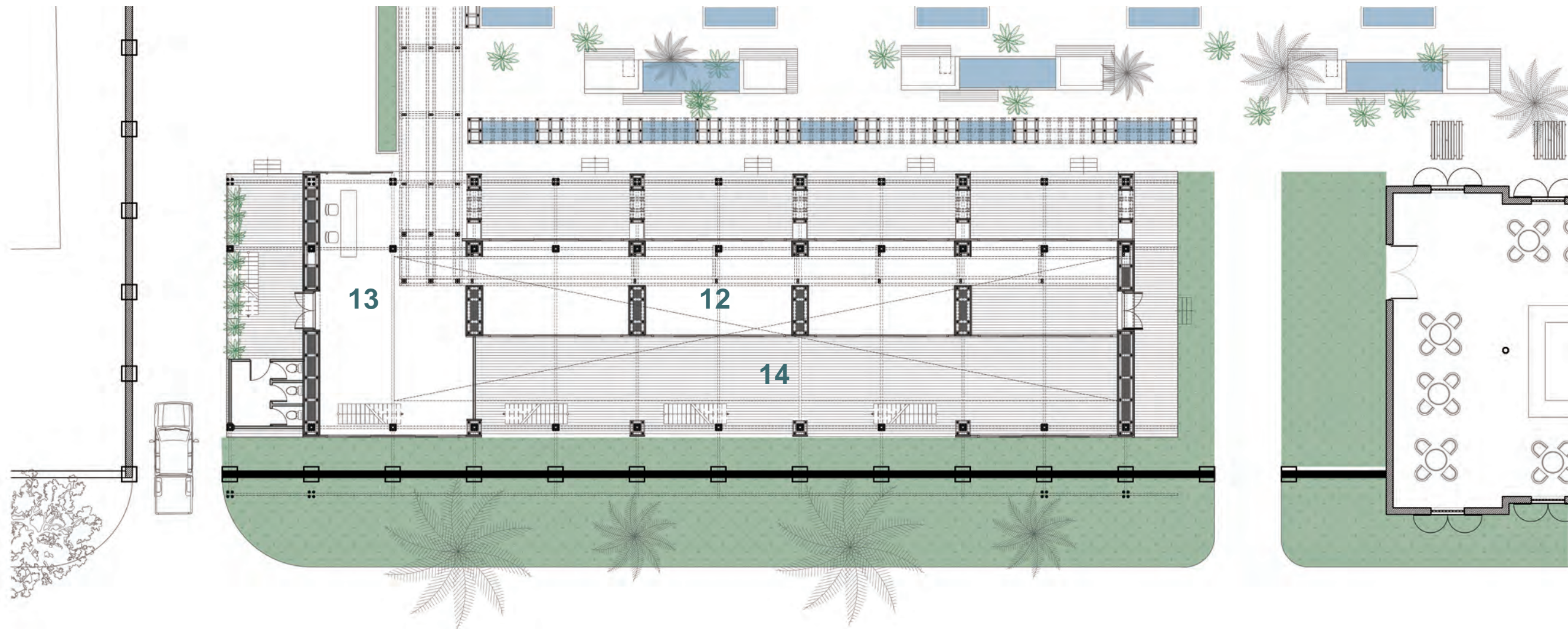




# APPENDIX

2D Drawings - Plans

## A new storage space



- 12. Shops for plastic products
- 13. Pick up point/reception
- 14. Flexible open space





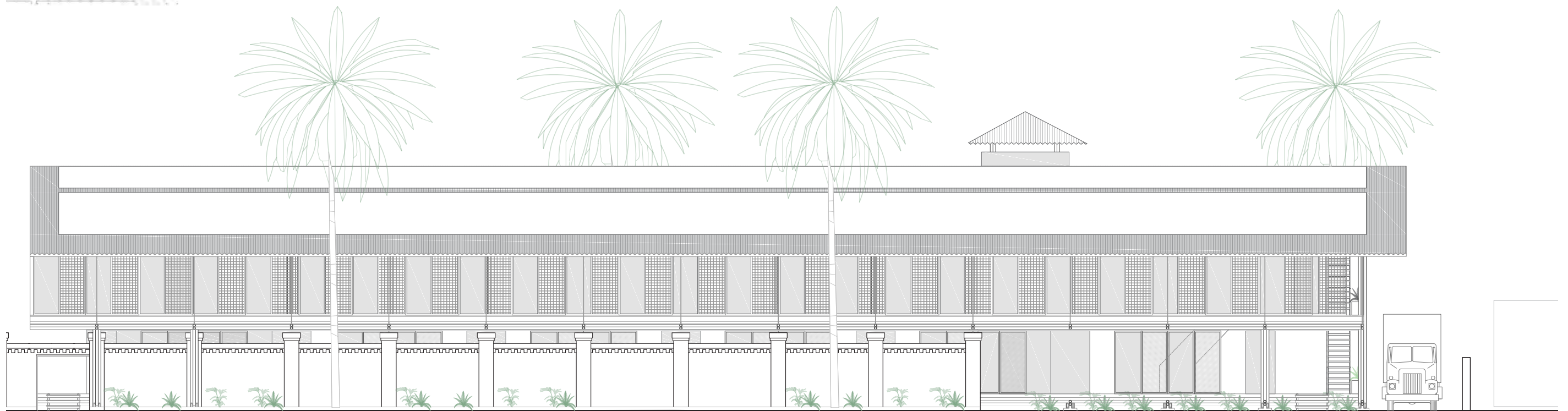
# DESIGN

Implementation

a new storage space



Section



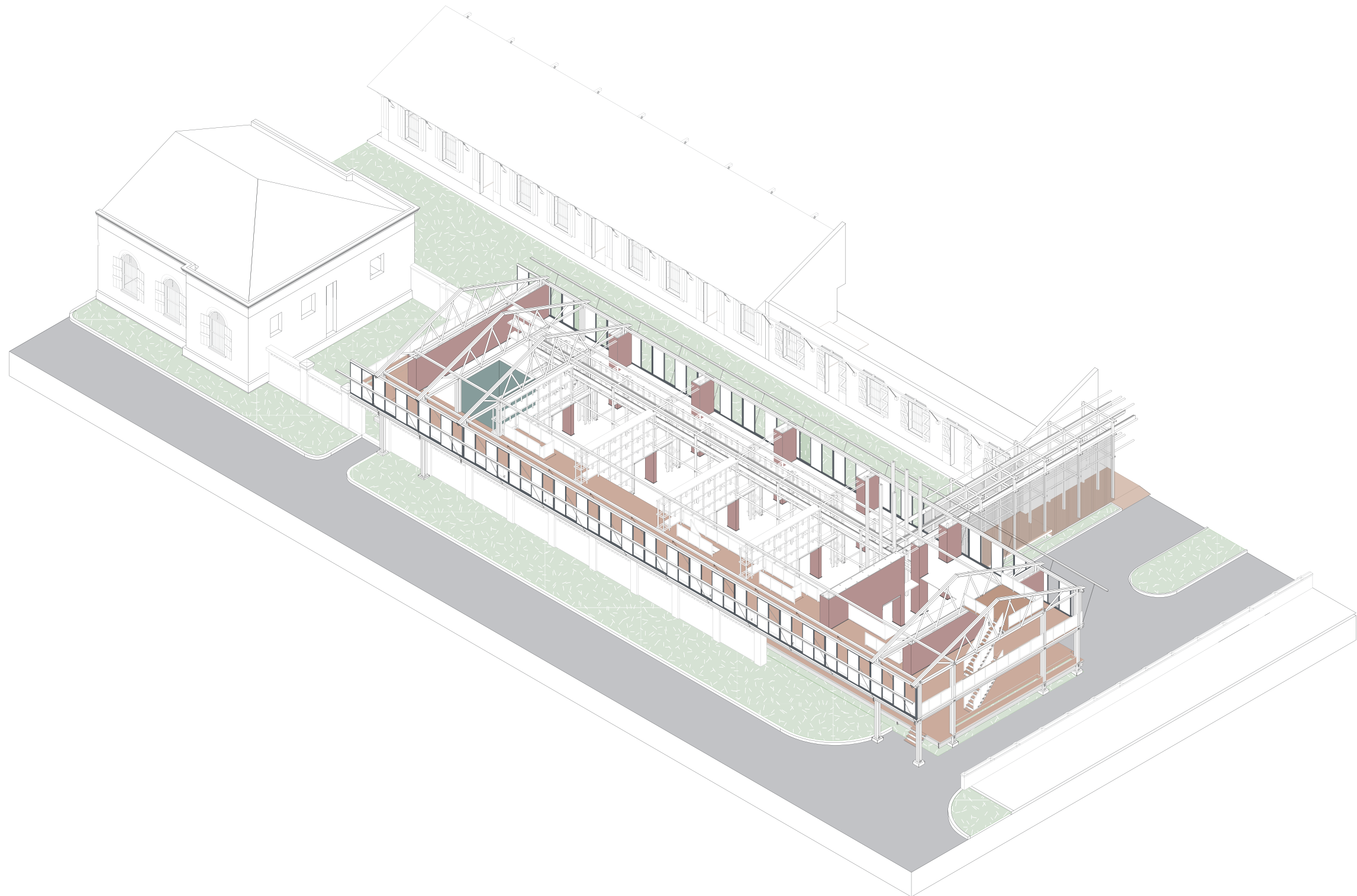
Elevation



# DESIGN

Interventions

a new storage space



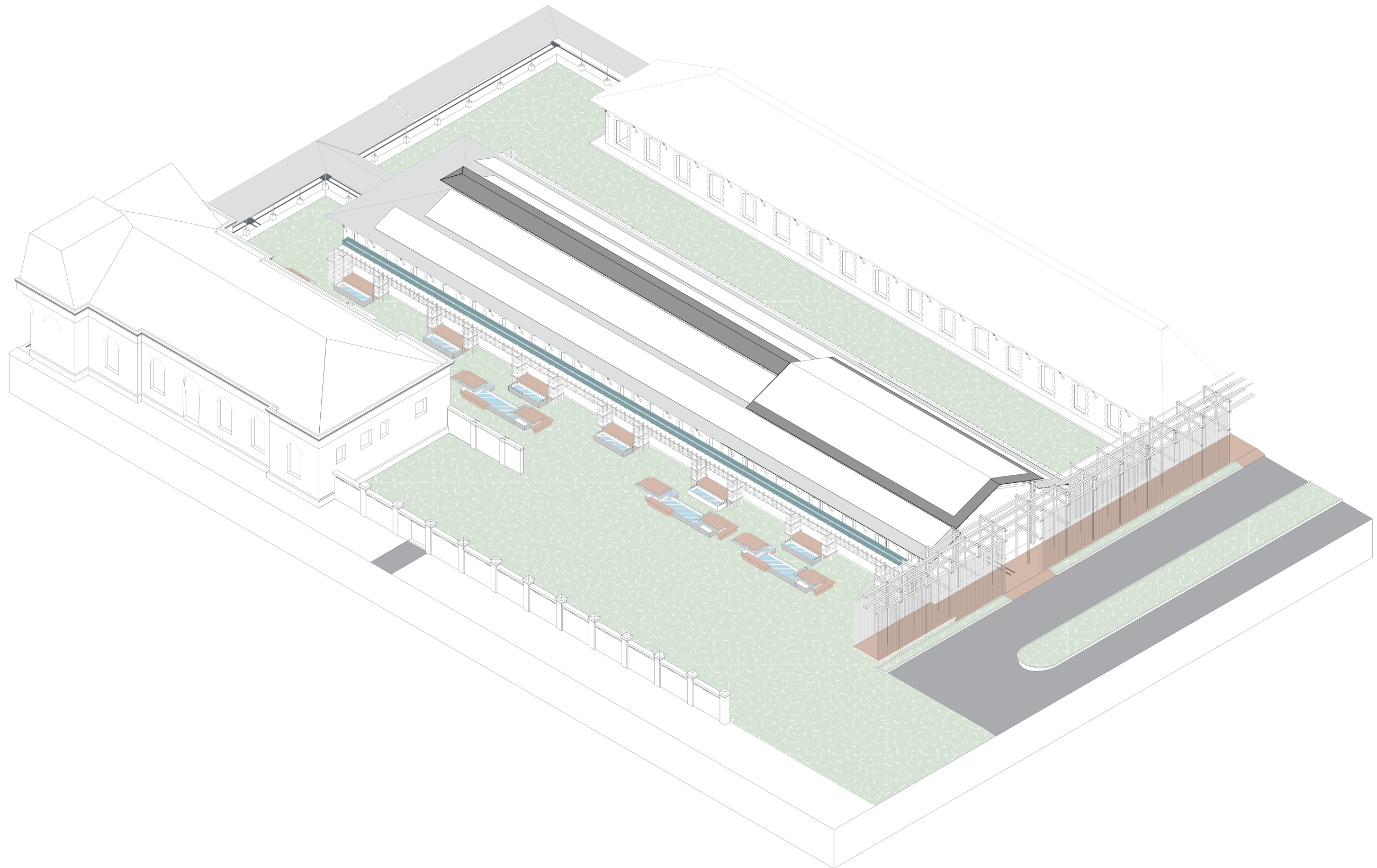
- Permeability - Visibility - Plastic -



# DESIGN

Interventions

a hybrid storage space

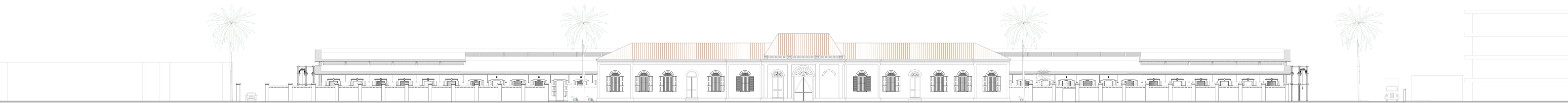




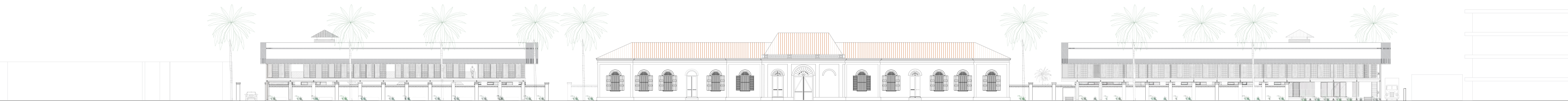
# APPENDIX

## 2D Drawings - South Elevations

### AII



Existing Warehouses (Hybrid Storage)



New Storage Building



Pavilions

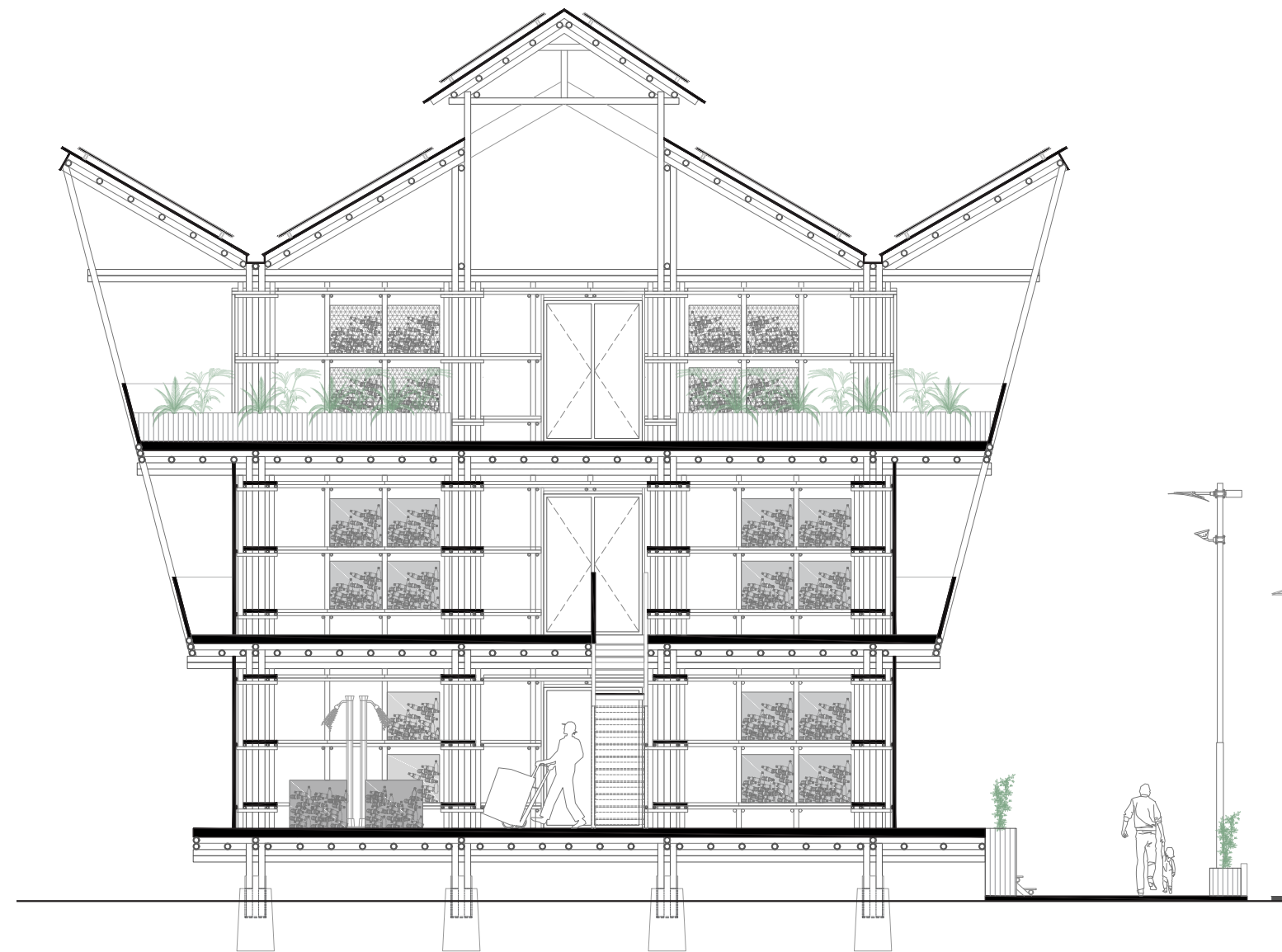


# APPENDIX

## 2D Drawings - North South Sections Pavilions



public



waste



# DESIGN

Interventions

## Waste Pavillion

