OASIS DI ORBETELLO

ARCHITECTURE AS AN EDUCATIONAL TOOL FOR SUSTAINABILITY

THE COMPETITION

The competition was for the Oasis di Orbetello, a nature reserve in the lagoon of Orbetello, Italy, belonging to WWF, an organization that focus on the preservation of nature, more specifically of fauna. The program involved two different but connected design requirements, observation cabins and a visitor center. For our purposes I will focus on the visitor center part of project, since its more relevant for this research.
The goal then is to design a building that is not only sustainable, with a proper material choices and design strategies to minimize its's impact on the environment, which I will analyze mostly by its thermal performance and energy usage, and then compare it to the normal Italian standard of this type of architecture to understand if I achieved a good result, but also a building that is able to provide an educational opportunity for fellow architects to learn better design ideas, and a place for general users to learn about nature preservation and sustainable living in an environmentally friendly project to hopefully gain more sustainable habits in their day to day lives.

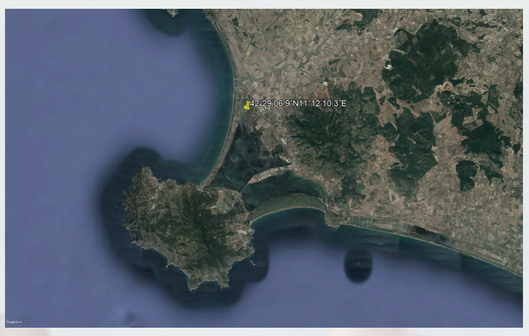
THE LOCATION

LAGOON OF ORBETELLO

LOCAL FAUNA

CITY OF ORBETELLO

"Lagoon, Mediterranean maquis, coastal dune, meadows, pinewood... The Oasis of Orbetello is the perfect habitat for many species of birds.
A wetland of international importance (Ramsar Convention) the Oasis of Orbetello protects 300 hectares of salty lagoon where at times small silt islands covered with swamp vegetation emerge. The Tombolo della Giannella that runs along the coast is covered by a luxuriant Mediterranean maquis while inside the lagoon there is a large carpet of clasping leaved sea purslane. Further inland there are woods of aspen, cork oaks, ash and elms. Southward is the Patanella Woodland characterized by a large extension of heather. Its extension is about 850 hectares."



THE ORGANIZATION

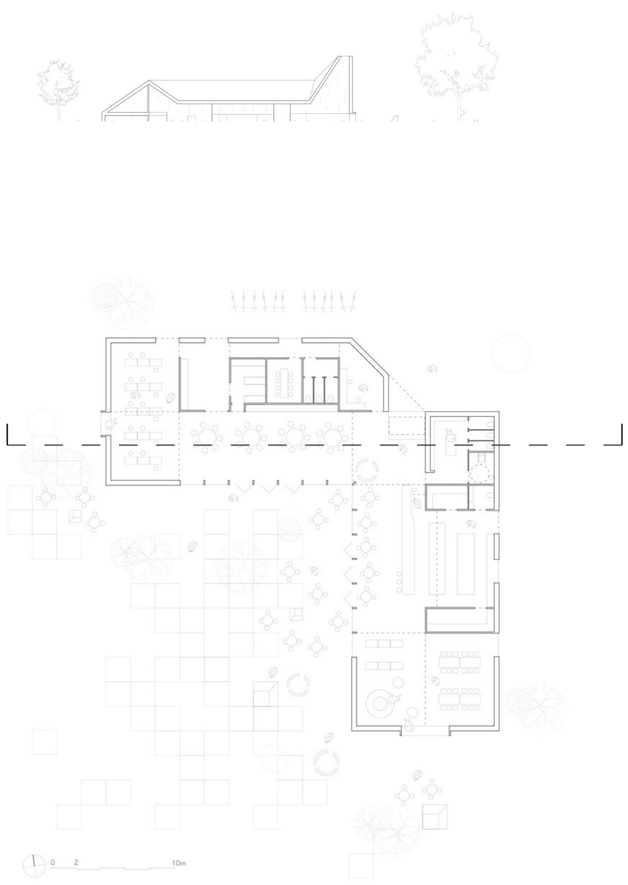
"The WWF Oasis of Orbetello is the most important lagoon of the Tiyrrhenian sea.
Due to its geographical location the WWF Oasis of Orbetello sees the concentration of thousands of birds, especially in winter.
The WWF Oasis of Orbetello is the most important lagoon of the Tiyrrhenian sea. Here it is possible to see the common stilt that in 1964 inspired Fulco Pratesi and Hardy Reichelt's actions to create one of the first WWF protected areas. For WWF, Orbetello is a historical Oasis as well as one of its most famous and important protected areas."

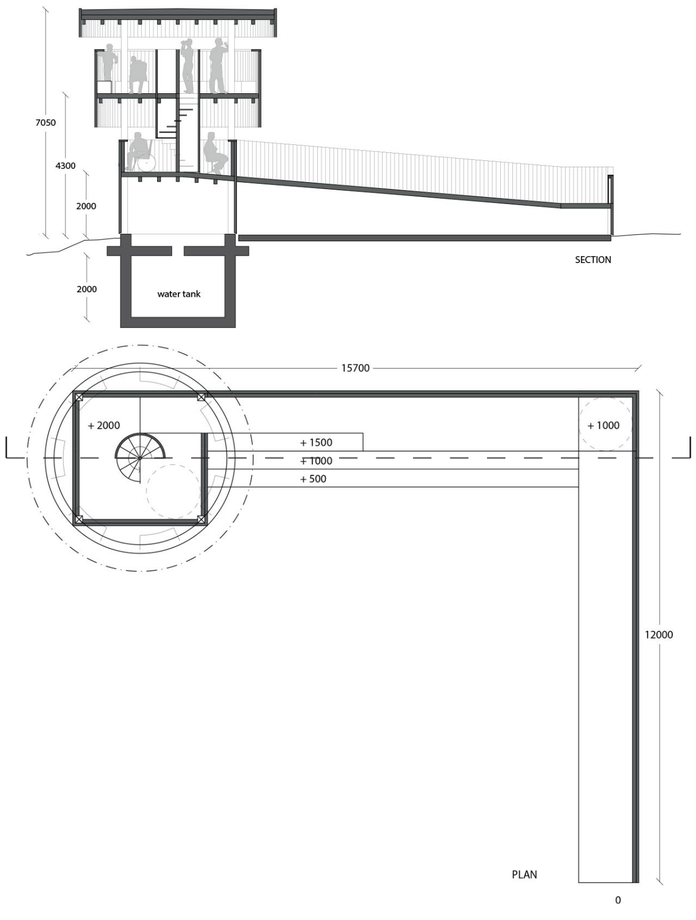
"There is no ecological architecture, no intelligent architecture and no sustainable architecture - there is only good architecture. There are always problems we must not neglect. For example, energy, resources, costs, social aspects - one must always pay attention to all these."
- Eduardo Souto de Moura

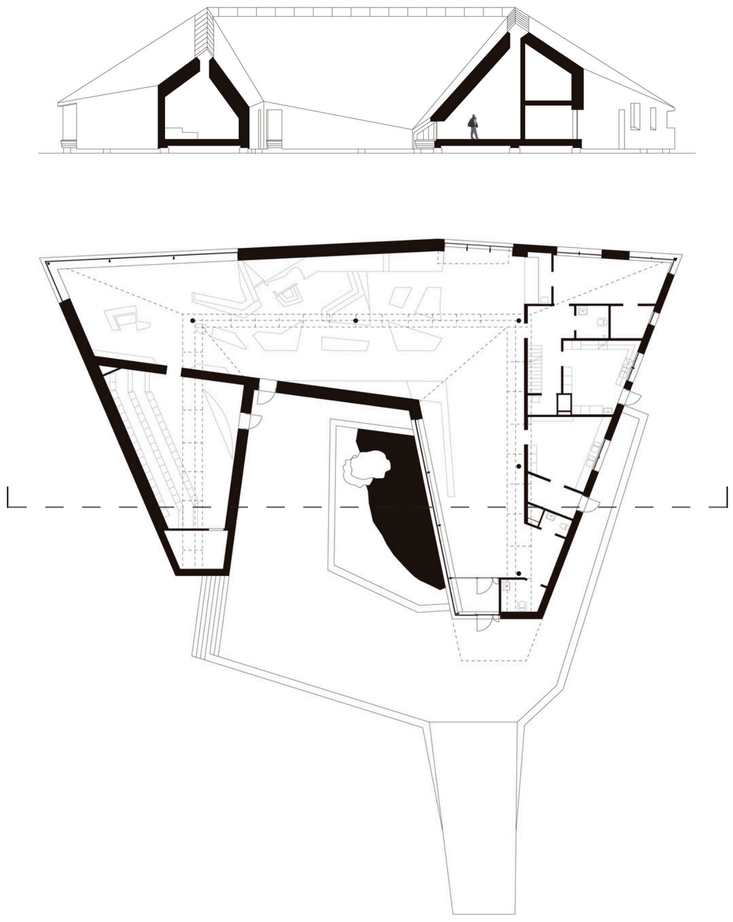
POLITECNICO MILANO 1863

Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

PASSIVE DESIGN AND CASE STUDIES





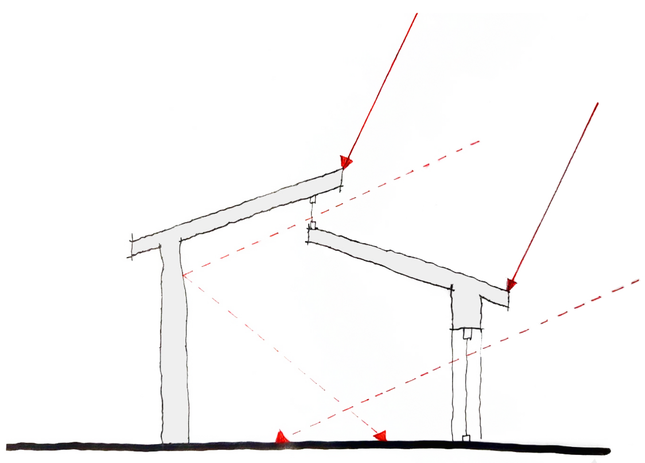


House of Grain / Reiulf Ramstad Arkitekter
Denmark, 680m2, 2020
The way this project uses wood as the main material is absolutely inspiring and very well crafted. It shows what is possible with this kind of materiality. The composition of the building allows for the creation of a very cozy “piazza”.

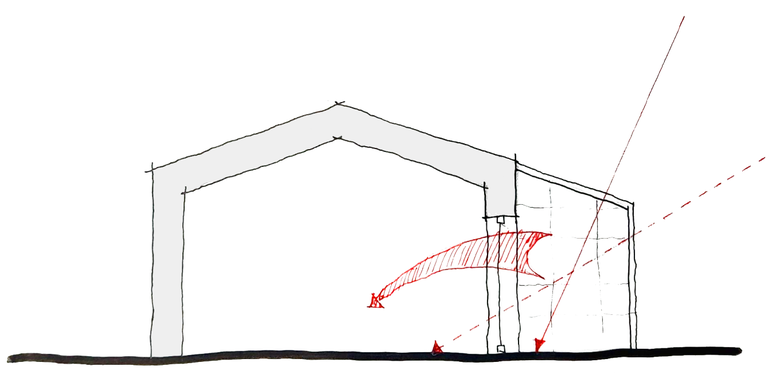
Herdla Birdwatching Tower / LJB AS
Norway, 62m2, 2017
The biggest strength of this project is the way of hiding the people in the watchtower while seeming to fit very well with the surrounding landscape.
It also quite valuable the fact that it allows for accessibility to the first level of the tower.

Facts Tåkern Visitor Centre / Wingårdh Arkitektkontor AB
Sweden, 750m2, 2008
In this case what I’ve found the most interesting is the innovative use of straw as the roofing material for the building (and at the same time not so much since it’s probably the first material to be used as roofed in primitive architecture).

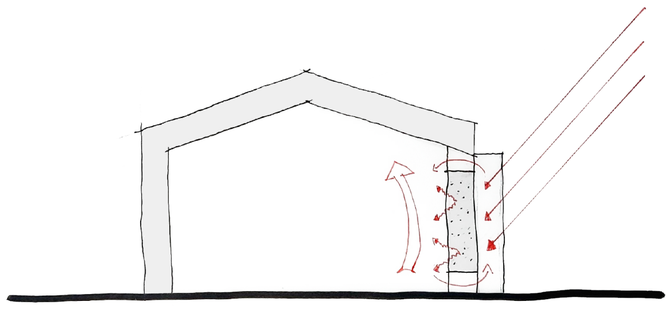
The idea of passive design in architecture is a simple one to understand but a more difficult one to implement, therefore one that requires proper attention and study to be able to properly apply it.
The main idea is to create a system in a building that self regulates its temperature without the intervention of machines to either heat it or cool it.
As we have seen before, heating and cooling a building uses a lot of energy so this kind of strategy is important to keep that energy spending at a minimum possible.
Passive design strategies have two moments or components, that match with the warm season and with the cold season, they are the passive cooling and passive heating, and they work in slightly different ways but must be interconnected in the whole system to become the most efficient possible, you cannot just have passive heating and not the other and vice-versa.



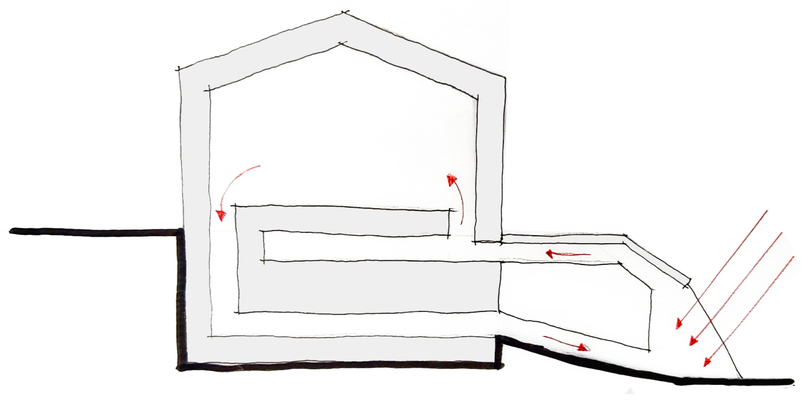
Direct Solar Gains System



Semi-Direct Solar Gains System



Indirect Solar Gains System



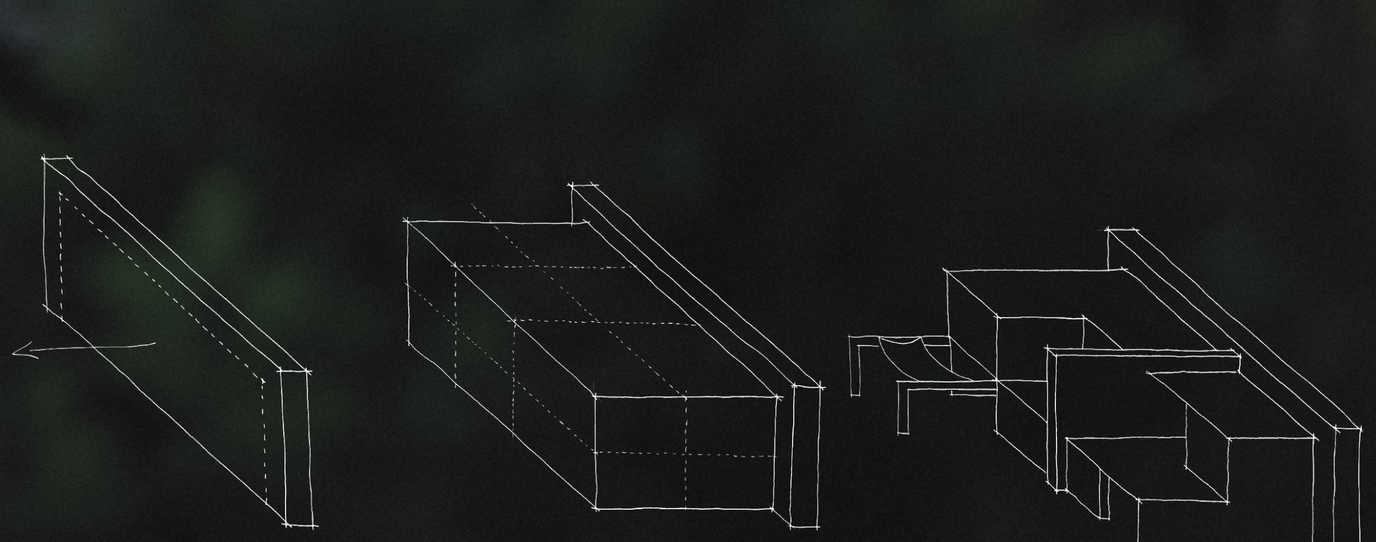
Independent Solar Gains System

OASIS DI ORBETELLO

VISITOR'S CENTER

The concept works in three phases, from "louder" to more "silent". The first area is called **Nature's Piazza**, where people first arrive at the oasis will be a more active area, as the visitors center will have a lot of functions and act sort of the downtown of the oasis, the near outdoor areas will be flexible to have picnics, shows, events, school days and summer camps and a general nice park for families to enjoy the free time.
In a second phase, the idea is to have a transition from a more intense human activity to a quieter one so nature can be at peace and show itself, this area as the intent to be an exploration area where you can get lost, in a good way, one that you can learn new things, a so-called **Exploration Labyrinth**.
To finish you arrive at the "gold pot", one where you must be **Hidden In Plain Sight** to observe the majestic life of the local fauna, where the observation points are not completely hidden but where humans must be mostly hidden to not frighten the animals.

Conceptual Scheme



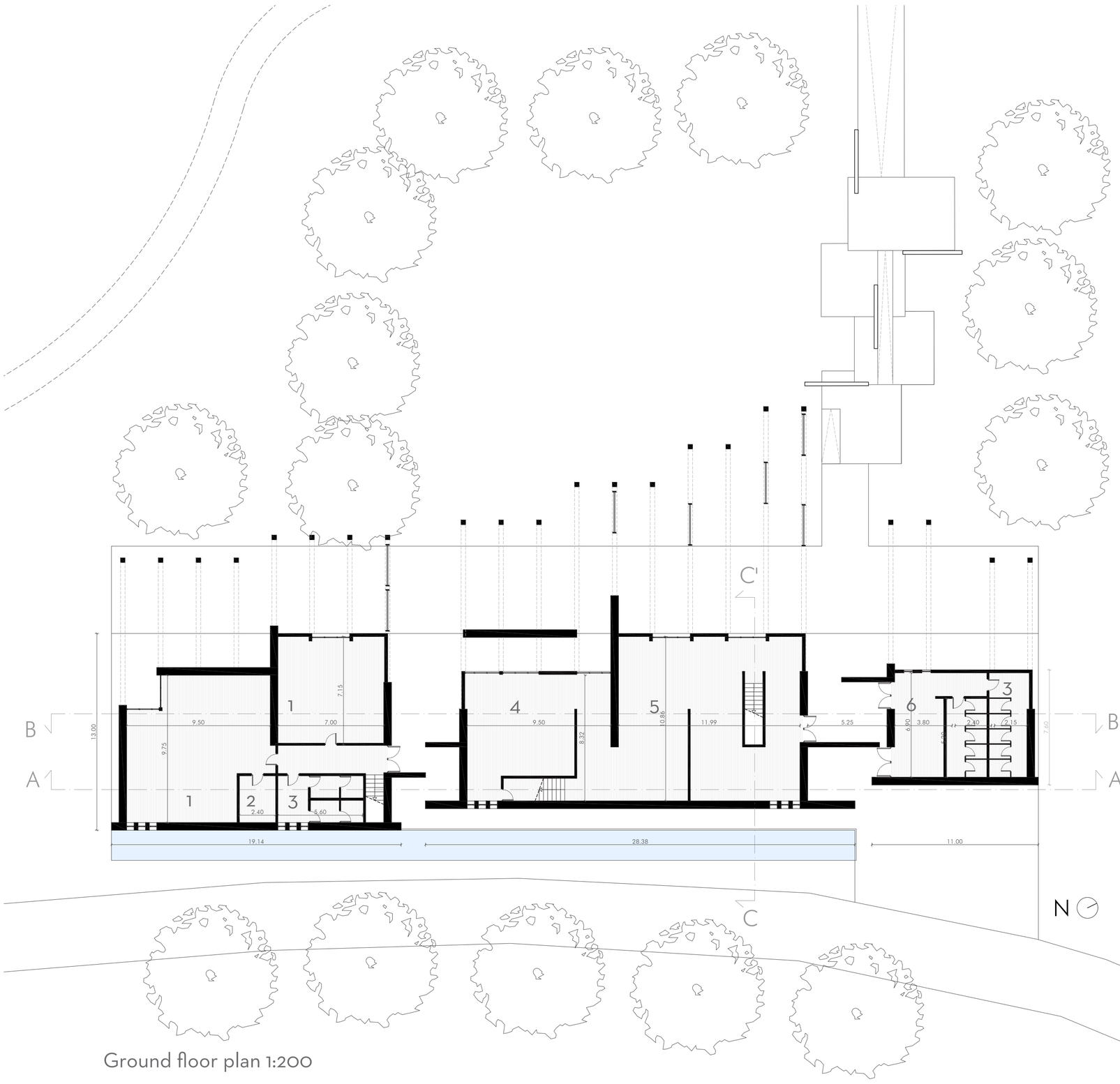
Site Plan 1:3000

1. Visitor's Center **2.** Guest house + Restaurant **3.** Exploration Labyrinth
4. AIR Observation Point **5.** WATER Observation Point **6.** EARTH Observation Point

POLITECNICO MILANO 1863

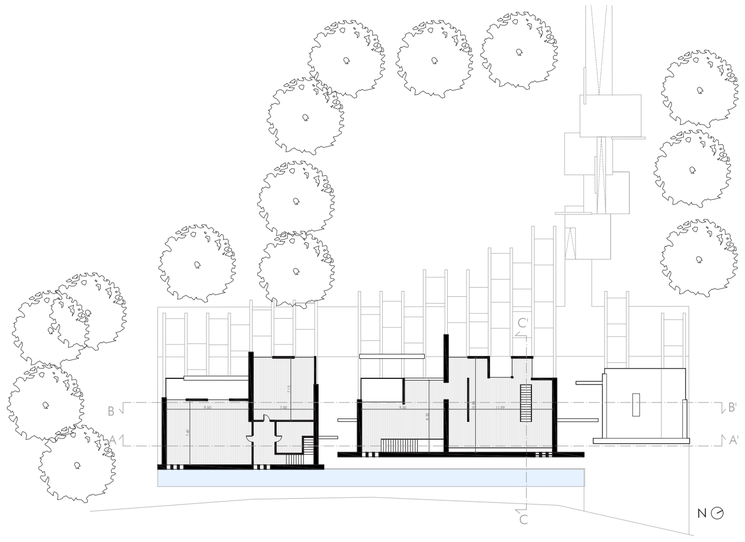
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

VISITOR'S CENTER

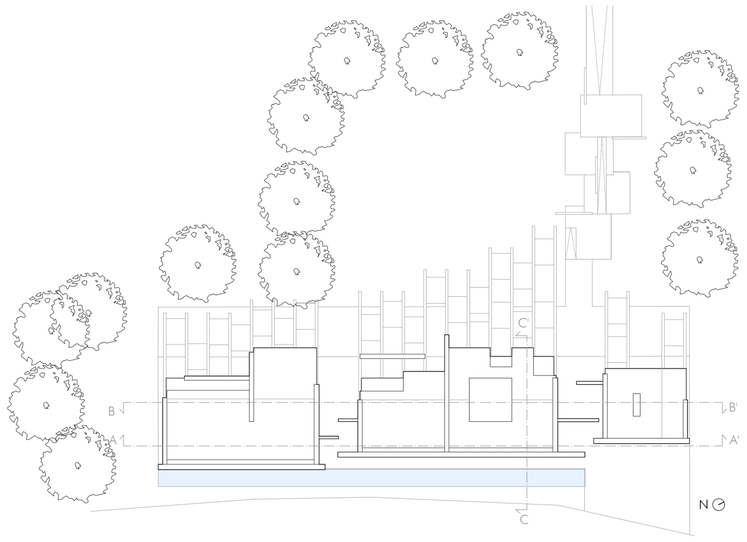


Legend:
1. Training Room
2. Storage Room
3. Toilet
4. Bookshop
5.Exhibition Space
6.Reception Desk

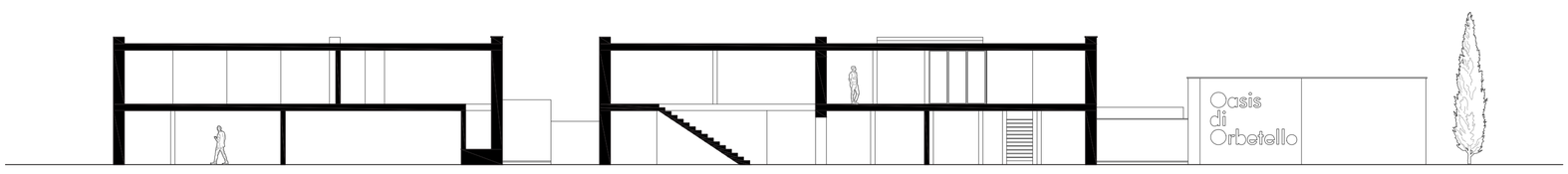
Ground floor plan 1:200



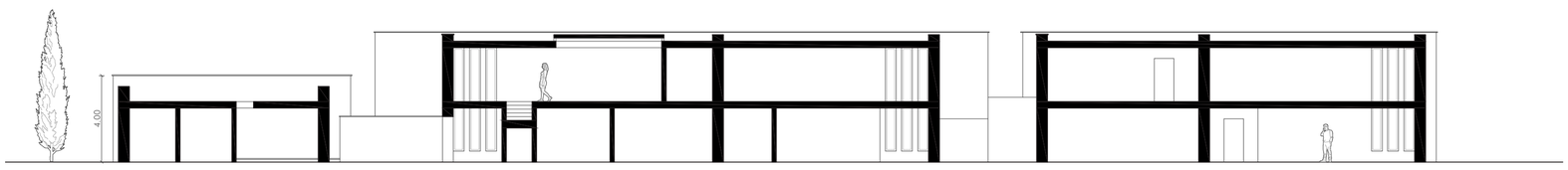
First floor plan 1:500



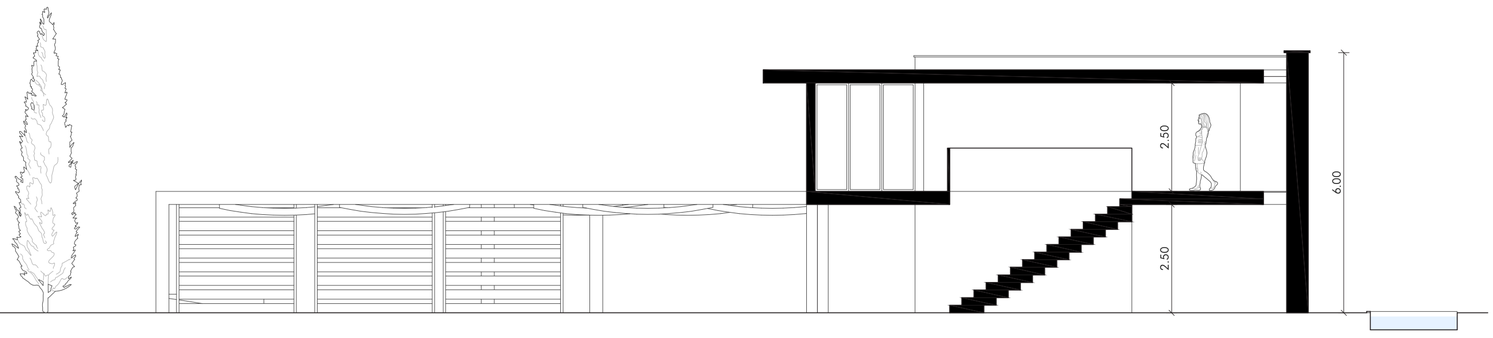
Roof plan 1:500



Section AA' 1:200



Section BB' 1:200



Section CC' 1:100

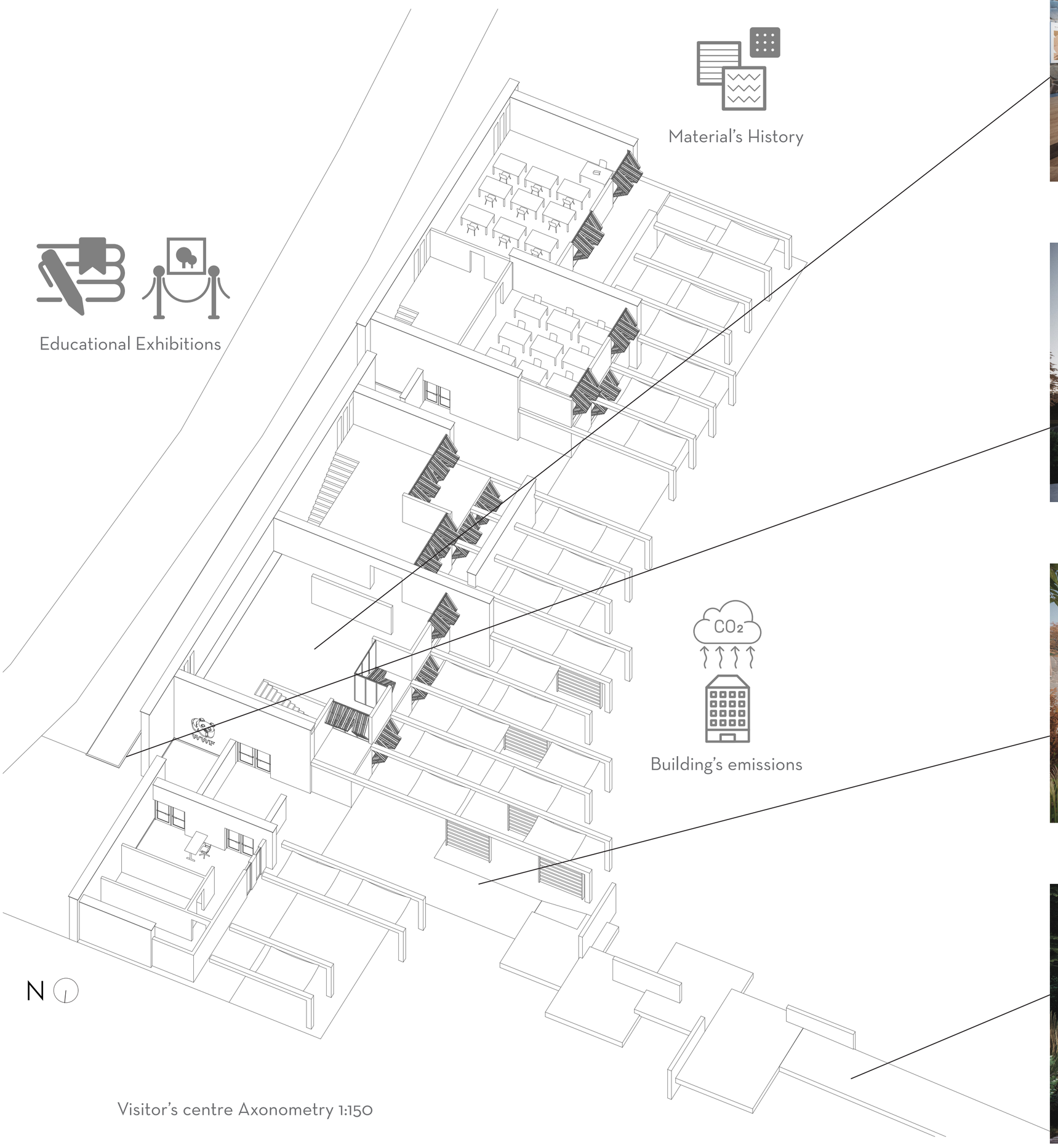
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

POLITECNICO
MILANO 1863

VISITOR'S CENTER

Material's History

Educational Exhibitions



Building's emissions

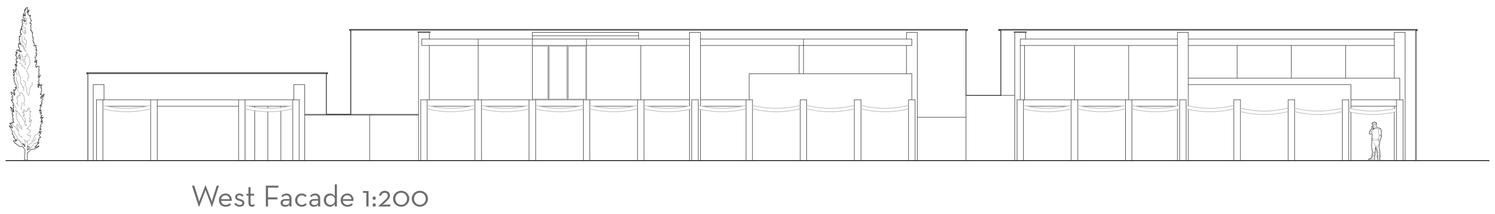
Visitor's centre Axonometry 1:150

Exhibition space

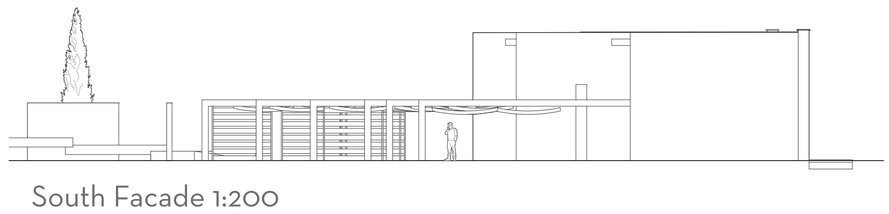
Oasis's entrance

Nature's Piazza

Exploration Labyrinth

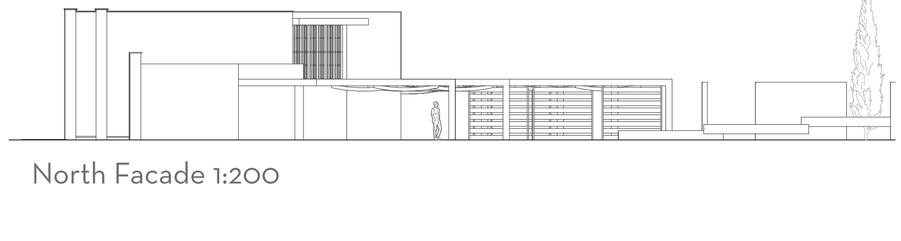


West Facade 1:200



South Facade 1:200

East Facade 1:200



North Facade 1:200

POLITECNICO
MILANO 1863

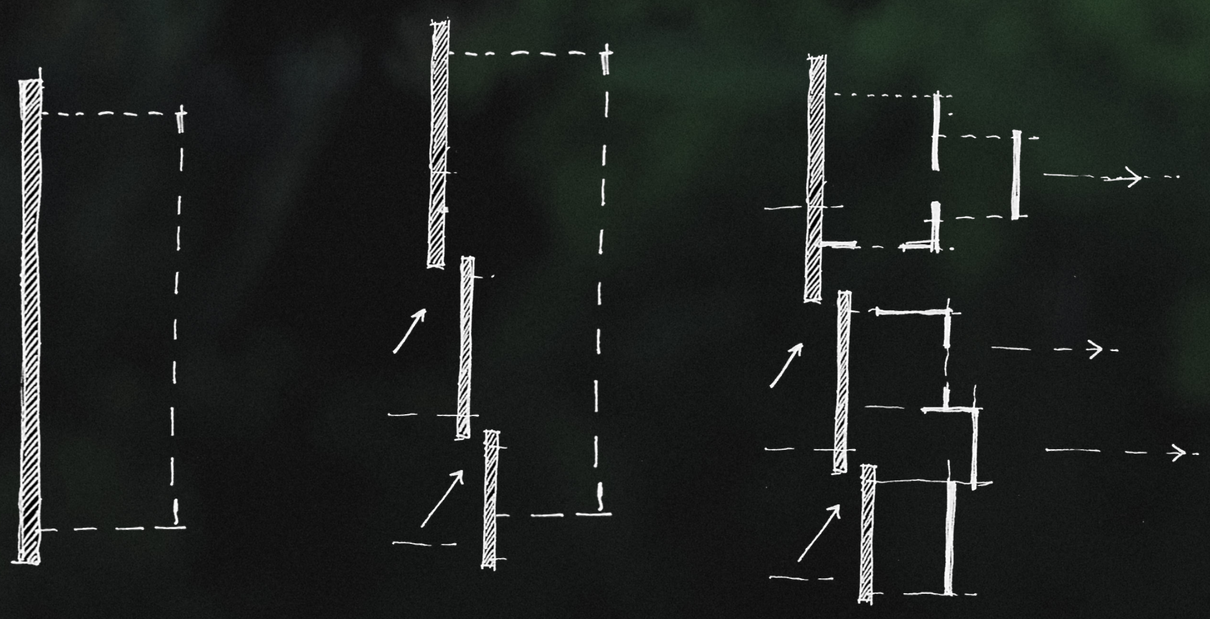
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

OASIS DI ORBETELLO

GUEST HOUSE + RESTAURANT

Located very close to area B is area C, where the restaurant and guest house are the main components, in this case they follow a very similar compositional design but with a less emphasis on the labyrinth idea since the functions demand a slightly different layout composition. Both however share the same concept of the stone walls facing the urban side and the wooden “boxes” facing the natures side, in this this case the guest has a bit of an opening on the stone wall to break a little bit the intensity of that wall, making it a bit more balanced. As in the visitor center the stone walls have some green vegetation going on them to show how nature is the one in charge here. The restaurant has two main dining rooms and a kitchen, of the two rooms one is bigger and the other one can be used for special events with a bit more privacy, and of course both have big window opening to the outside, where the same pergolas as the visitor center exist for the same design reasons and for outdoor dining.

Conceptual Scheme



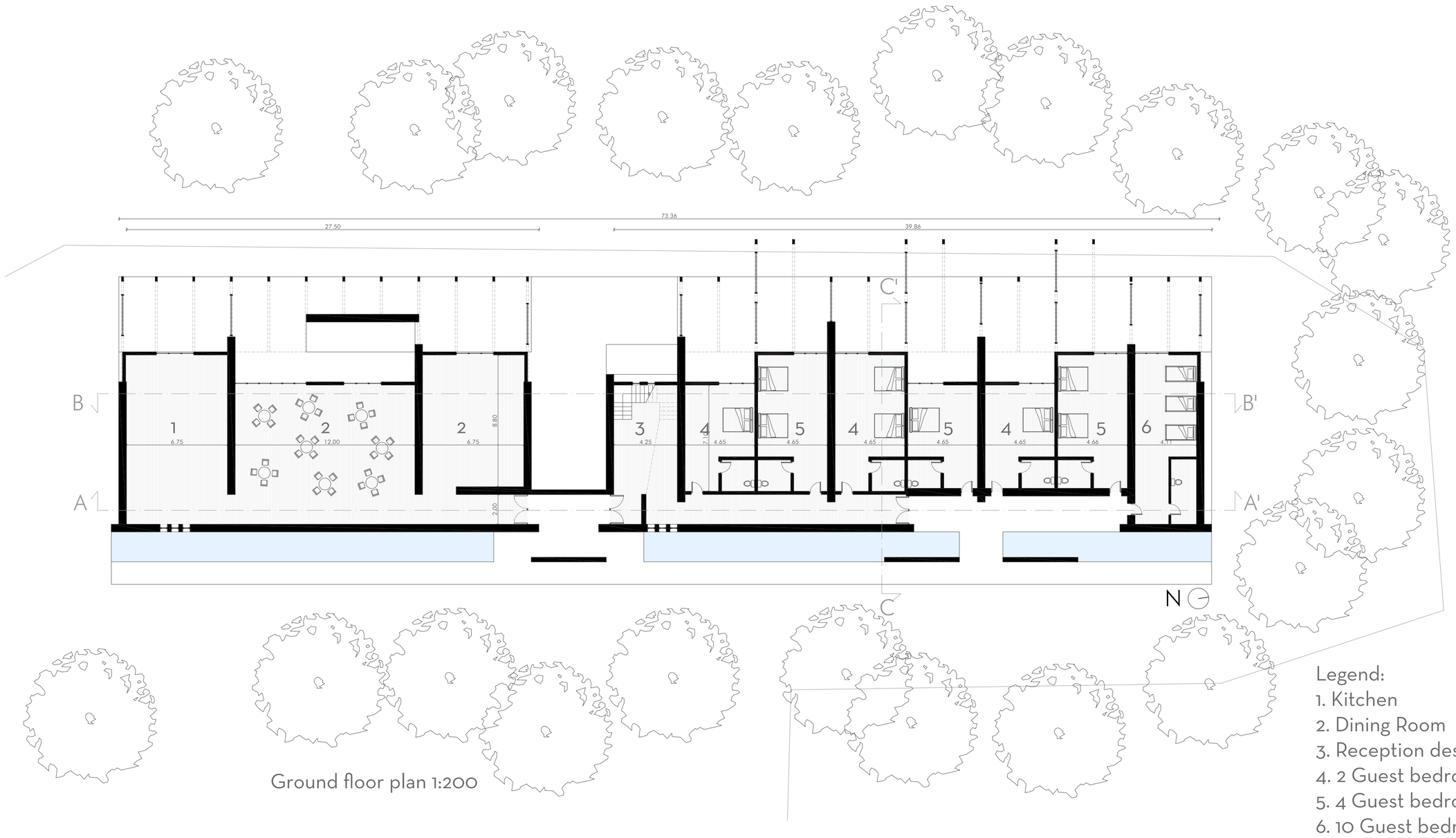
Site Plan 1:3000

1. Visitor ’s Center **2.** Guest house + Restaurant **3.** Exploration Labyrinth
4. AIR Observation Point **5.** WATER Observation Point **6.** EARTH Observation Point

POLITECNICO MILANO 1863

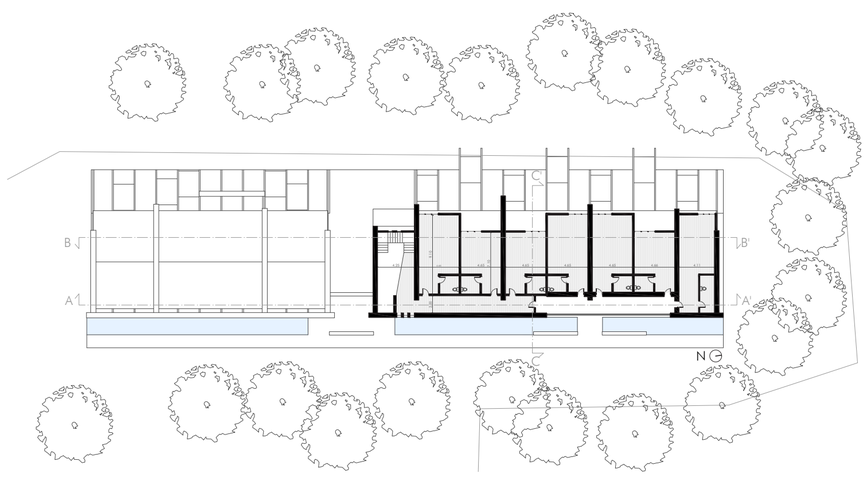
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

GUEST HOUSE + RESTAURANT

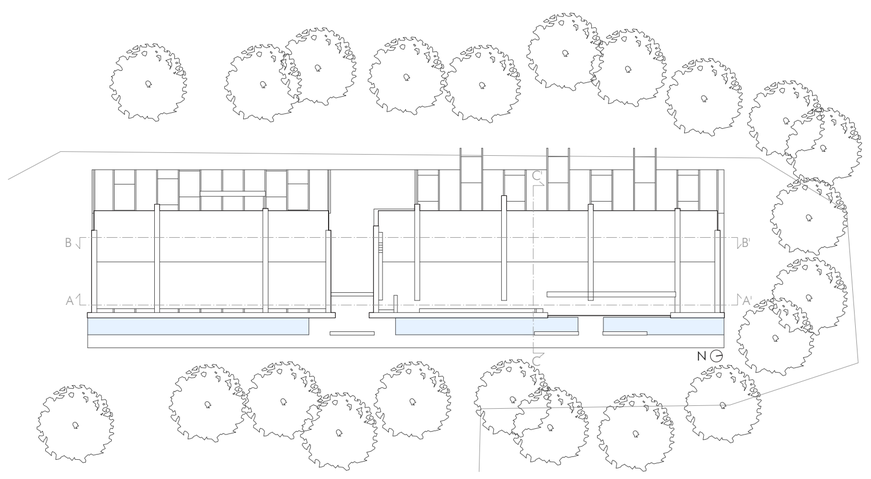


Legend:
1. Kitchen
2. Dining Room
3. Reception desk
4. 2 Guest bedroom
5. 4 Guest bedroom
6. 10 Guest bedroom

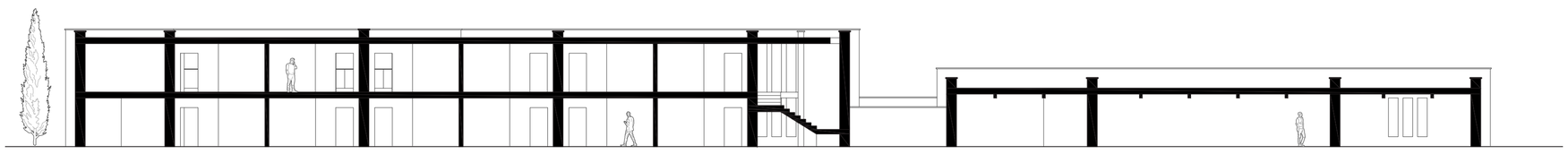
Ground floor plan 1:200



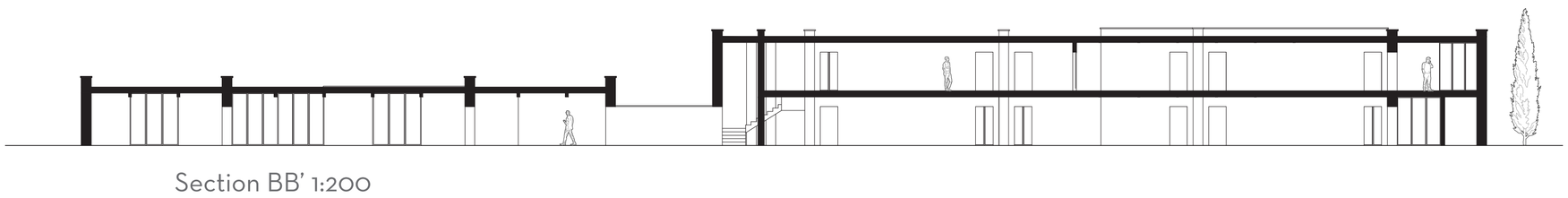
First floor plan 1:500



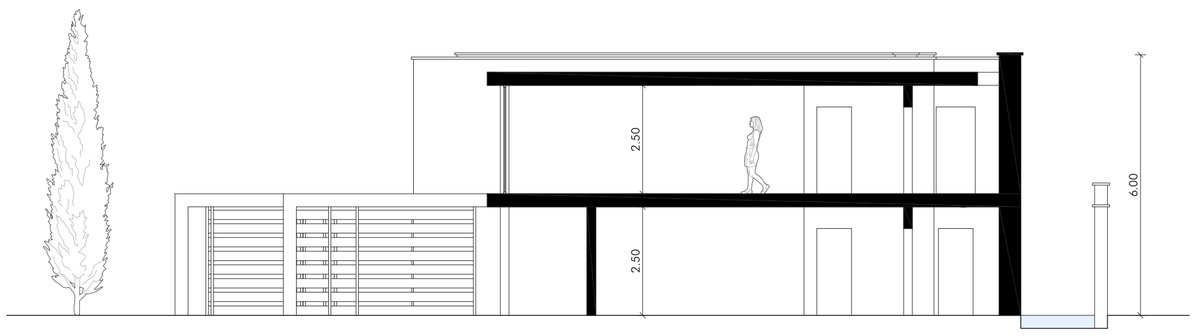
Roof plan 1:500



Section AA' 1:200



Section BB' 1:200

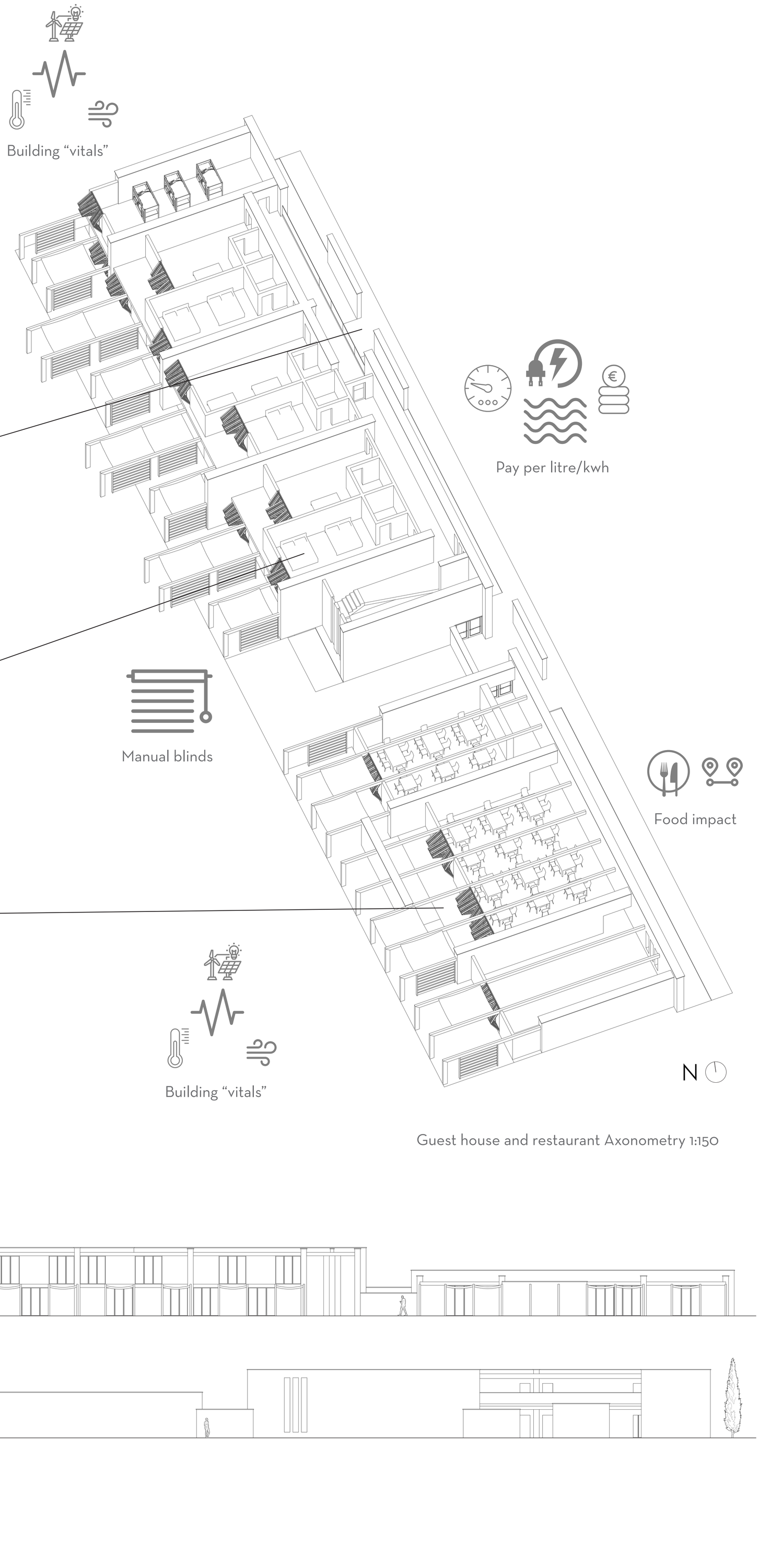


Section CC' 1:100

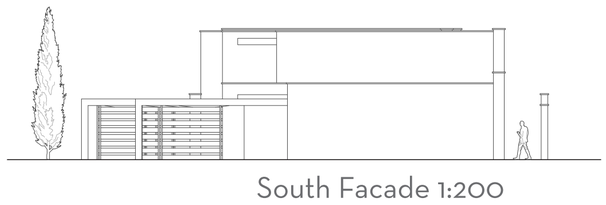
POLITECNICO MILANO 1863

Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

GUEST HOUSE + RESTAURANT



Guest house and restaurant Axonometry 1:150



South Facade 1:200

West Facade 1:200

East Facade 1:200

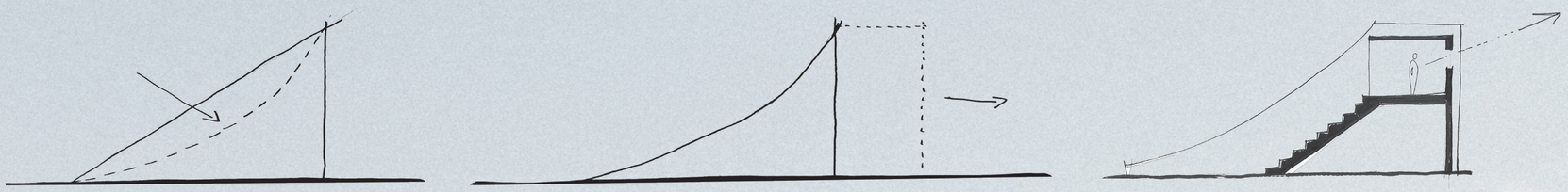
POLITECNICO MILANO 1863

Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

OASIS DI ORBETELLO

AIR

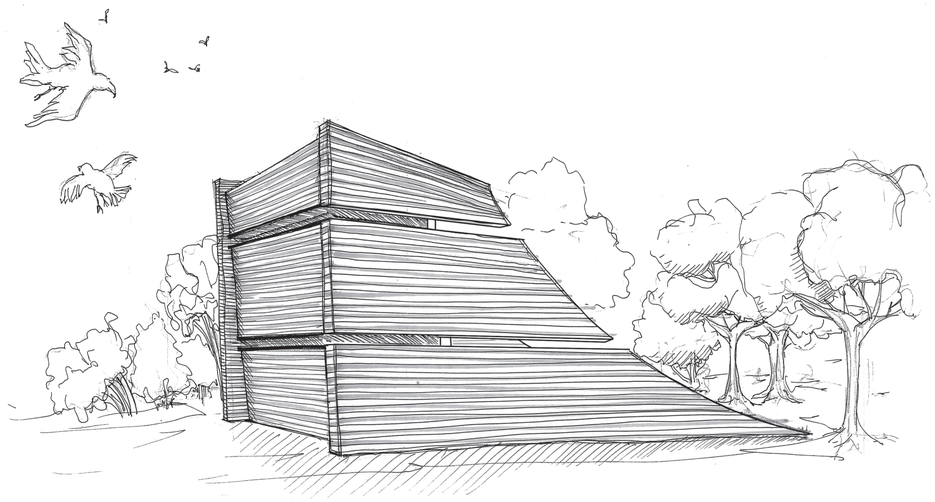
Last but not least, the area A of the natural reserve, what I have called the “Hidden In Plain Sight” area, is where you are in true contact with nature, where the cabins are located and where the human activity has to be kept to a minimum, to preserve the nature of the site and to not disturb the local fauna.
At the “Air” observation point, you will find a watchtower for which to ascend to the skies and appreciate the whole reserve, literally, from a bird’s eye perspective, with a design that as well serves as a transition from the ground to the air, launching you metaphorically into the clouds. While at the “Air” point you will elevate yourself to the bird realm.

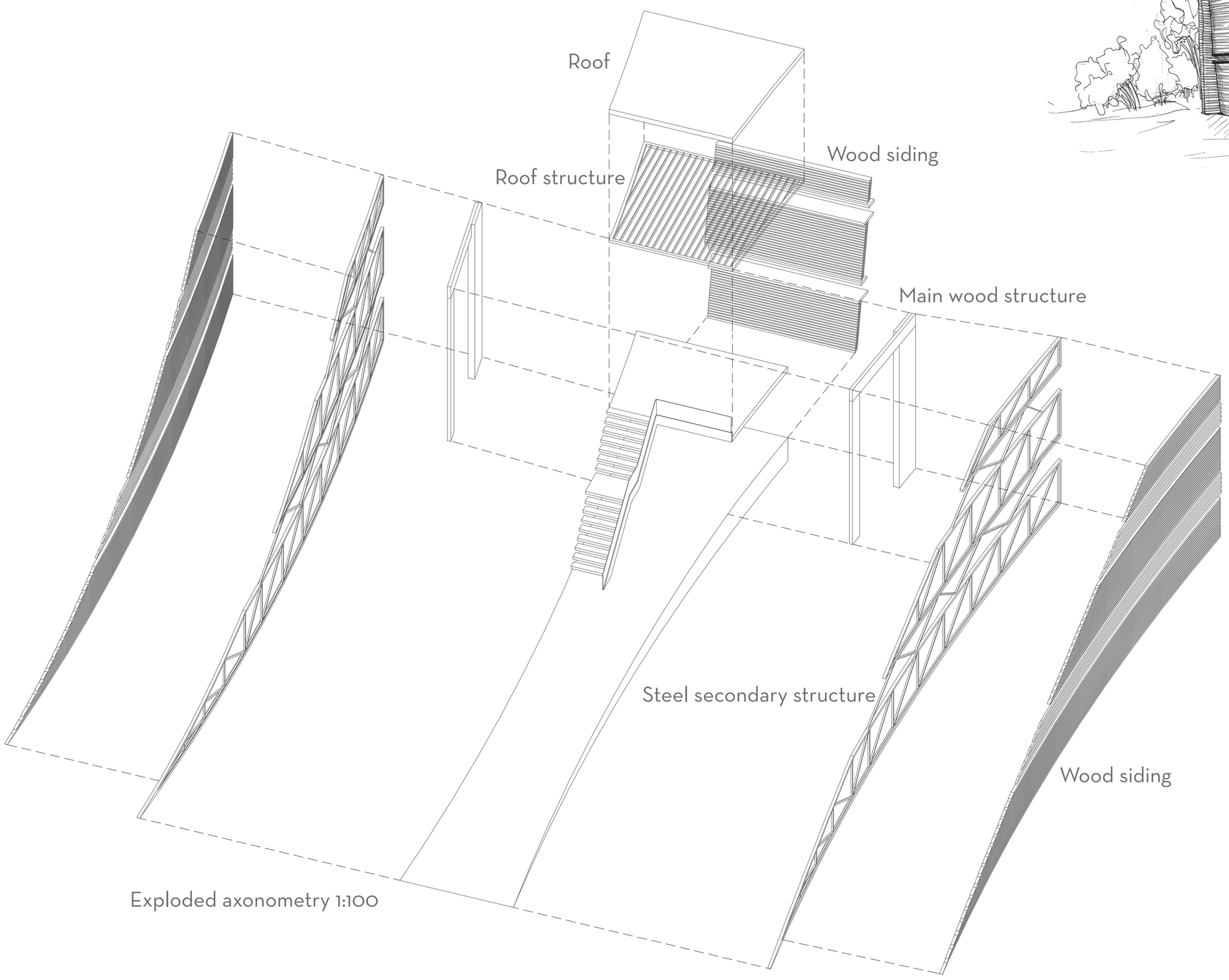


Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

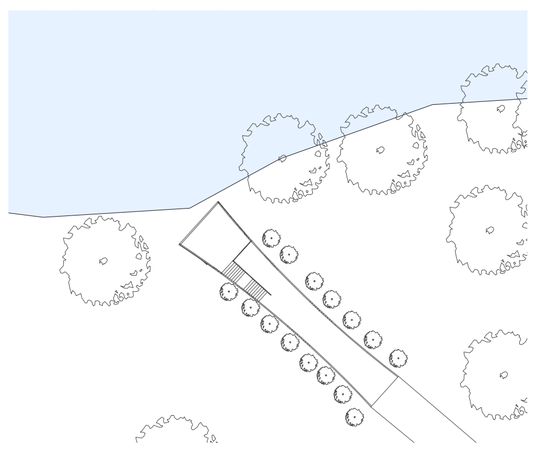
POLITECNICO MILANO 1863

AIR OBSERVATION POINT

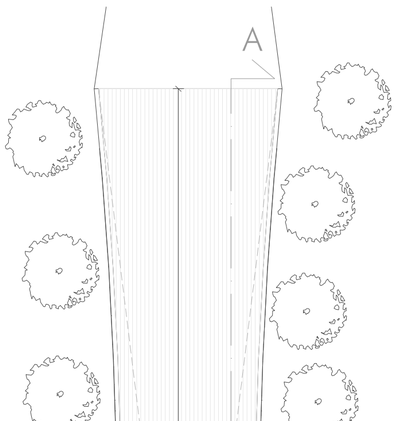




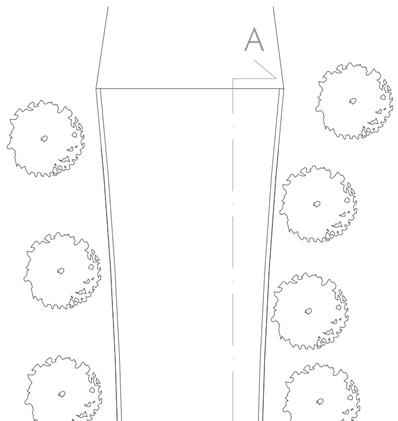
Exploded axonometry 1:100



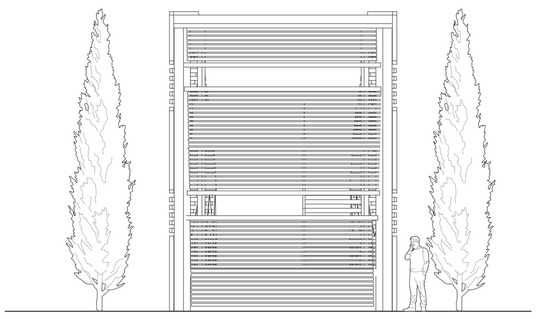
Site plan 1:1000



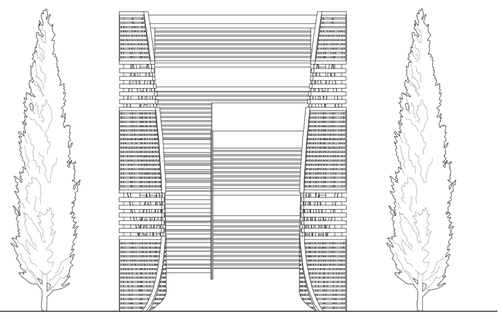
Ground floor plan 1:100



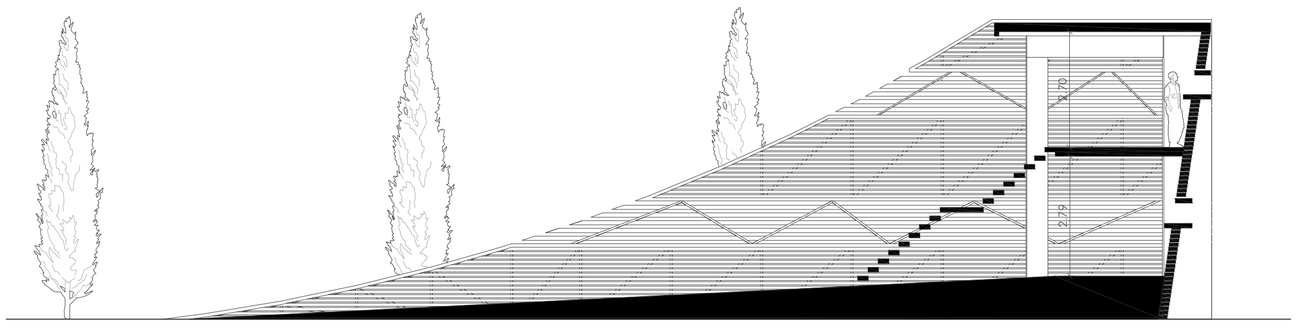
First floor plan 1:100



Front facade 1:100



Back facade 1:100



Section AA' 1:100

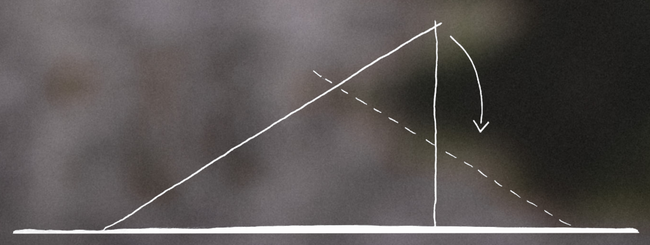
Side facade 1:100

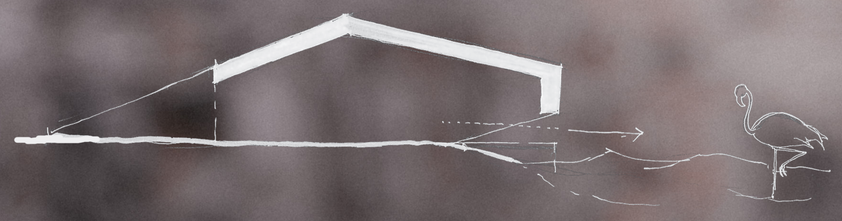
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

OASIS DI ORBETELLO

WATER

In the "Water" point you will have to get yourself down to the land of the fish and crawl into the point again literally to be able to observe nature from an unusual perspective, the architecture of the observation forces the visitor to have to crawl down to the viewing spot, making you feel like you are truly hiding from the animals and becoming a silent observer of the world around you. It's an instance where the User has to adapt to the architecture unlike the usual of architecture adapting to the User. The goal is to make humans less of the protagonist of this environment allowing the User to become in a sense smaller and less impactful in the surroundings.

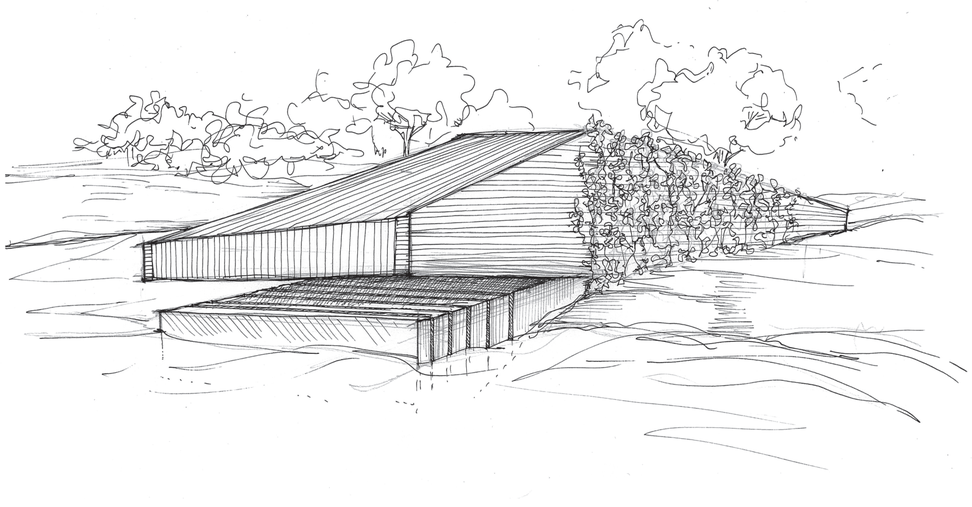


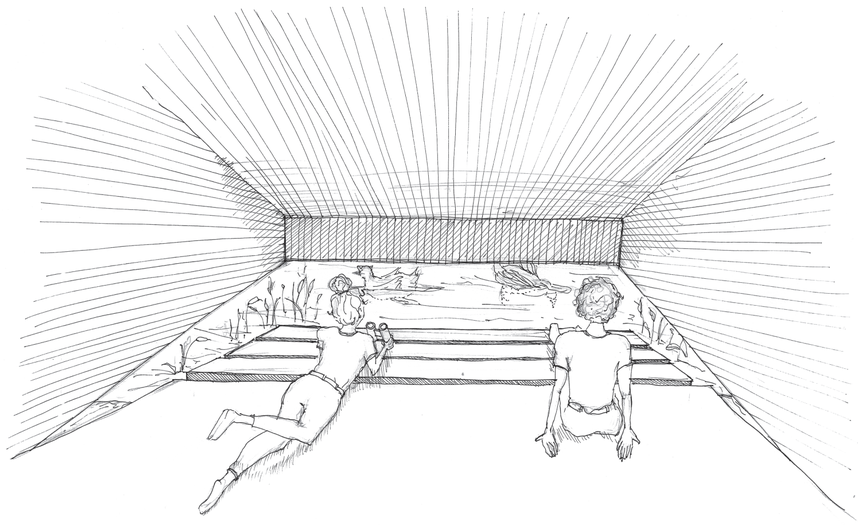


POLITECNICO
MILANO 1863

Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

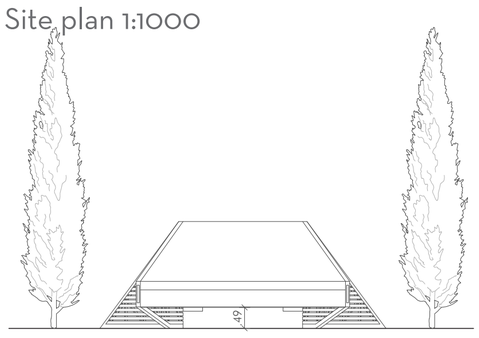
WATER OBSERVATION POINT



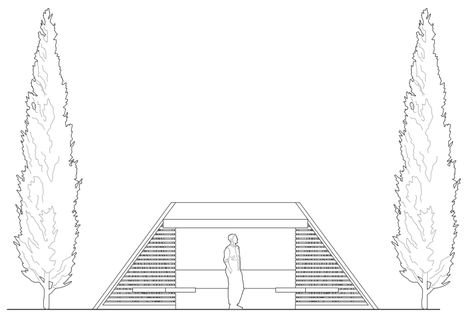


Exploded axonometry 1:50

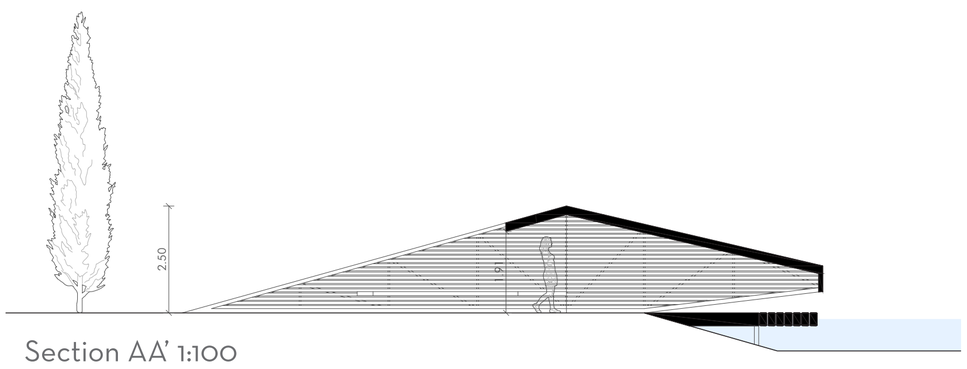
Site plan 1:1000



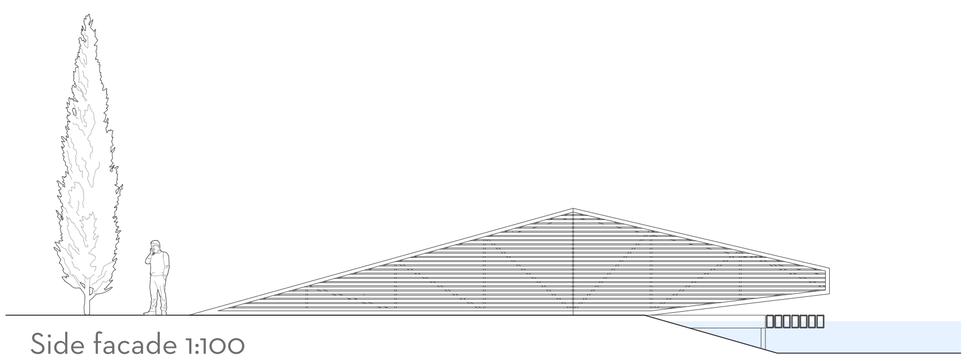
Front facade 1:100



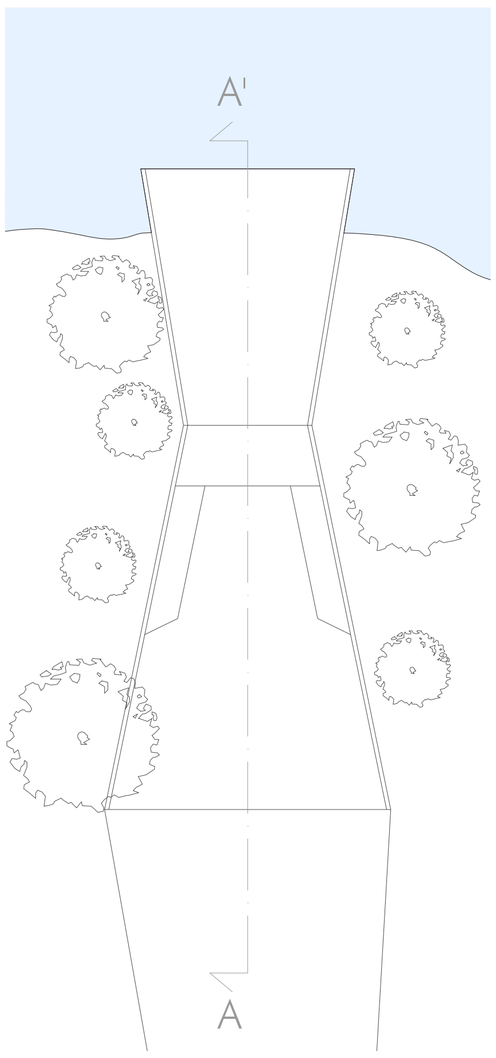
Back facade 1:100



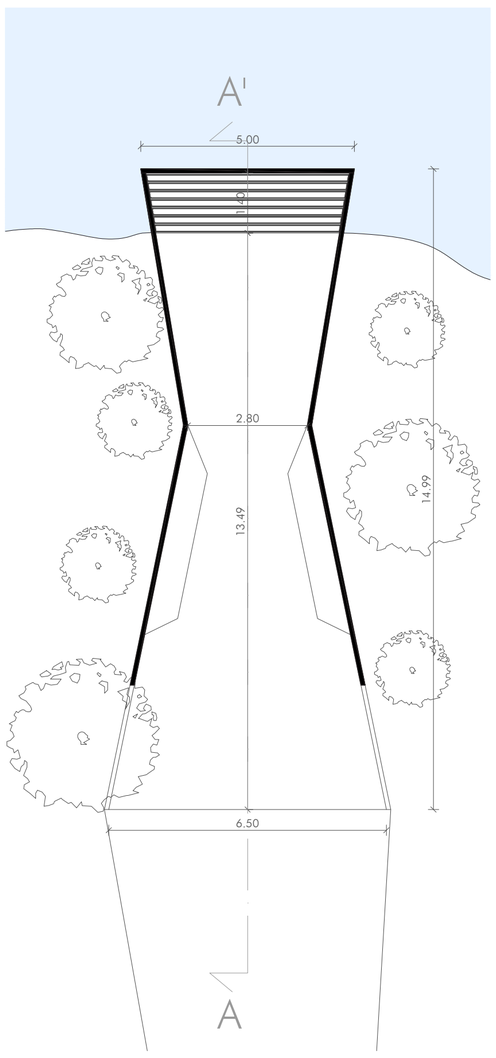
Section AA' 1:100



Side facade 1:100



Roof plan 1:100



Ground floor plan 1:100

POLITECNICO MILANO 1863

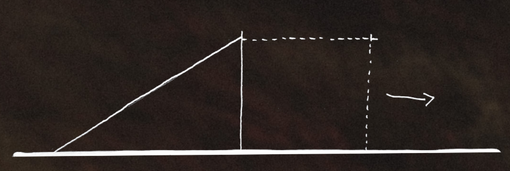
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis

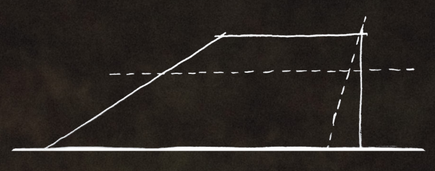
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

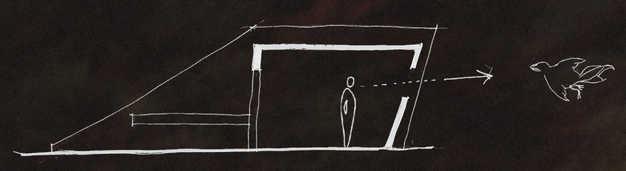
OASIS DI ORBETELLO

EARTH

And finally at the "Earth" point you just must keep quiet and enjoy nature as usual. This a place of learning patience, a place to truly immerse yourself in the nature of the Lagoon of Orbetello natural reserve and enjoy the life around you. This a point designed for people to stay as along as they wish, with an architecture that allows you to see almost in a 360° perspective, it's prepared for any kind of nature observer, since the most skilled bird watcher to the most curious nature enthusiast. The way the cabin is designed is to also allow for a sort of transition from the outside to the inside, that is covered on two sides by the wooden structure, a structure that allows for the growth of vines that day by day will make the cabin fit in more with its surroundings.

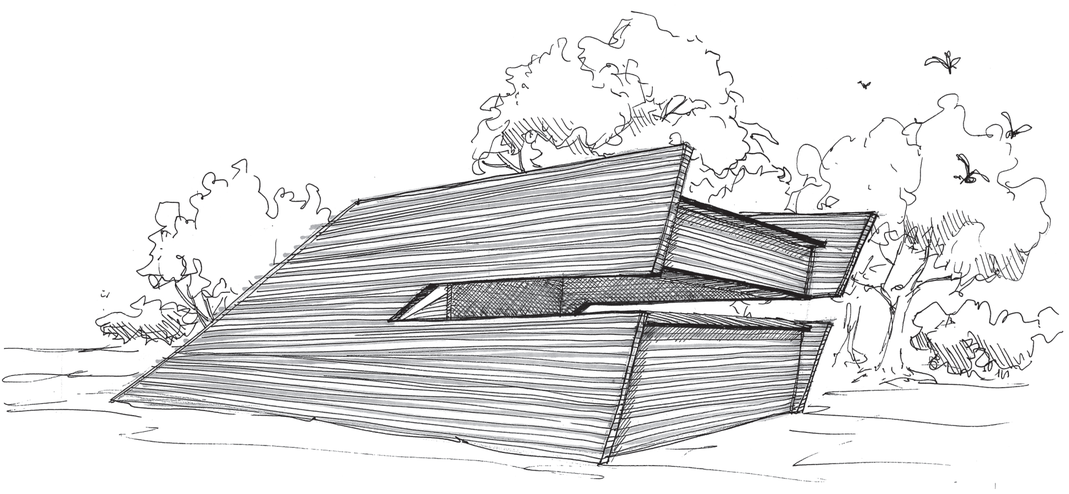


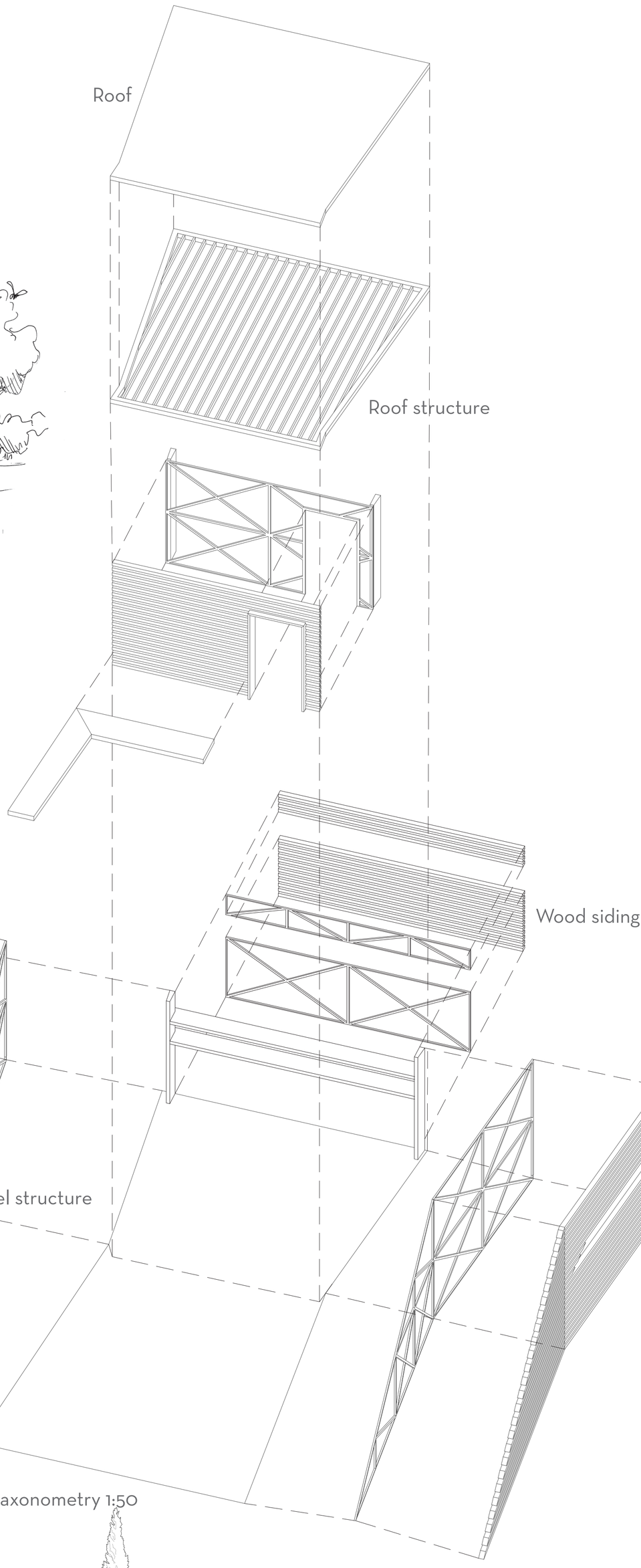




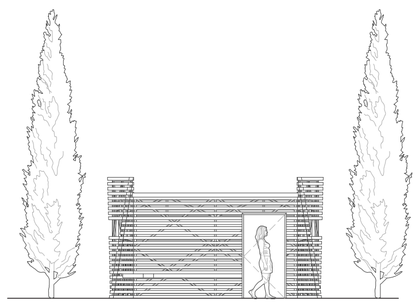
Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis
Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

EARTH OBSERVATION POINT

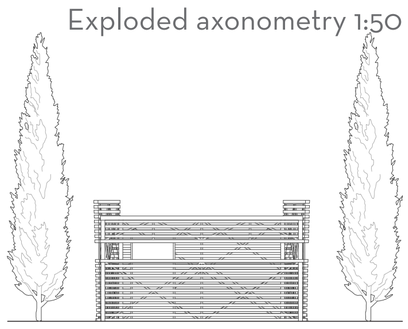




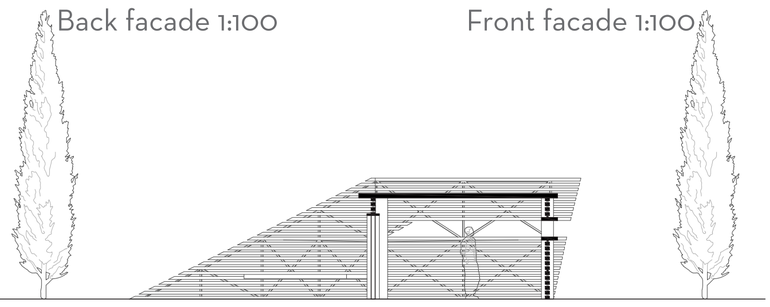
Exploded axonometry 1:50



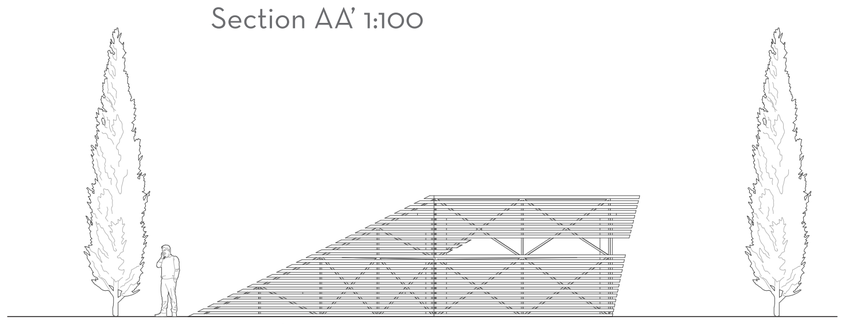
Back facade 1:100



Front facade 1:100

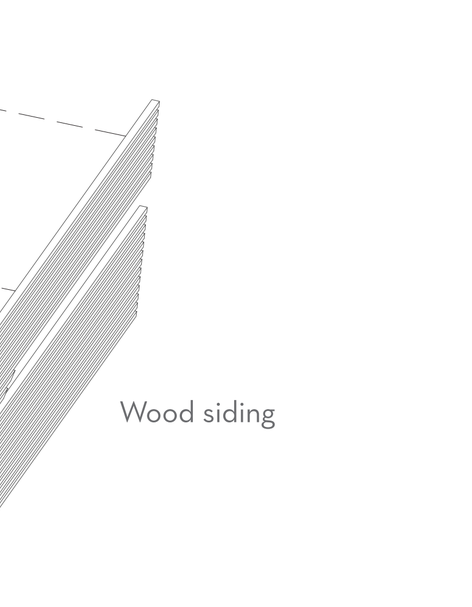


Section AA' 1:100



Side facade 1:100

Ground floor plan 1:100

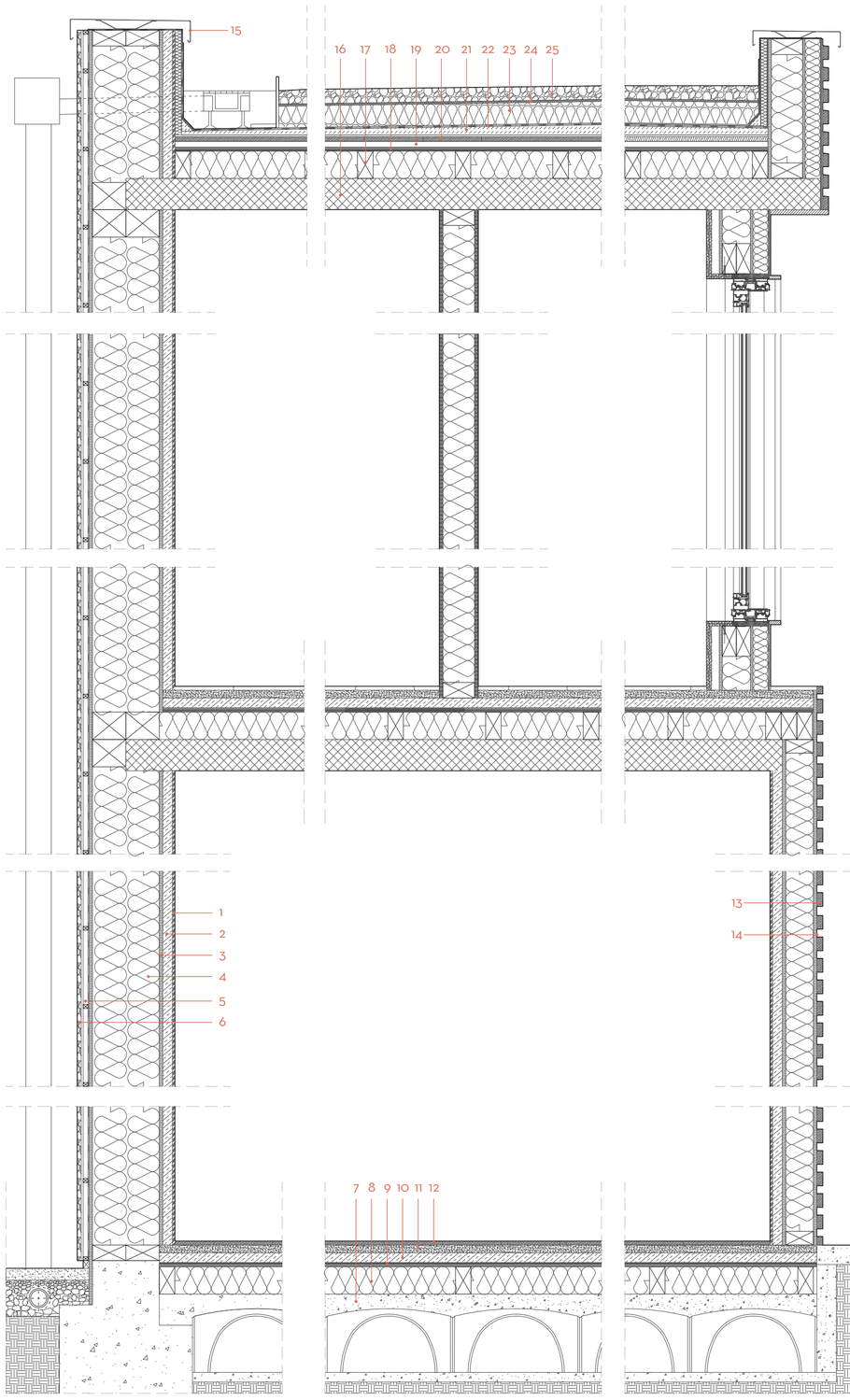


Ground floor plan 1:100

Name Frederico Neves Antão Ermida Parreira **Matricola Number** 940787 **Academic Year** 2020/2021 **Semester** Second **Project** Final Thesis

Thesis Director Alessandro Rogora **Co-relator** Mauro Piantoni

PASSIVE DESIGN STRATEGIES AND MATERIAL CHOICES



Detail ground to roof section 1:20

Legend:
1. Drywall 12.5mm
2. Wood wool 50mm
3. OSB Board 18mm
4. Cellulose insulation 340mm
5. Aluminum struc./ventilated
6. Tuscan stone finish 60mm
7. Concrete foundation 400mm
8. Cellulose insulation 140mm
9. OSB Board 20mm
10. Wood wool 50mm
11. Foam pad 40mm
12. Hard wood flooring 20mm
13. Wood siding finish
14. UV protection sheath
15. Corten steel protection 50mm
16. Laminated wood panels XLAM 160mm
17. Vapor barrier
18. OSB Board 20mm
19. Strips for slope creation 50mm
20. Wood board 24mm
21. Wood wool 20mm
22. PVC sheet
23. Cellulose insulation 110mm
24. Geo-textile 10mm
25. Gravel

The strategies I wanted to implement were simple but important, some were easier to implement over the others, of course due to program restrictions, such as for example the orientation of the building, since it was delineated already the area of construction of the building which didn't leave much space to orientate properly south the building.

What I was able to implement over was, big opening glass opening in the southwest façade to provide as much solar gains as possible, while the northeast façade was more closed. The implementation of massive thermal masses to store the suns energy and then release them during the night, which in this case are the stonewalls that are located mostly on the north and east façade.

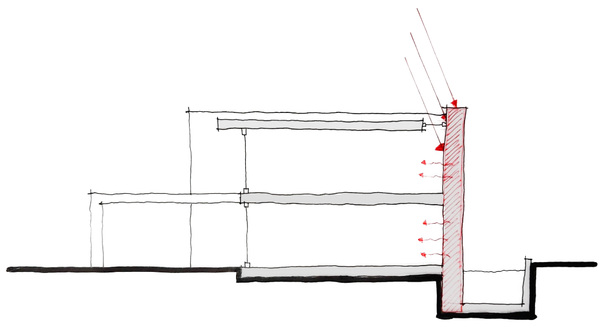
Not only these walls will act as thermal masses but also due to their thickness we would be able to attach technical equipment to them and run easily throughout the building, leaving the wooden walls a bit lighter and more focused on insulation.

Tuscan Stone

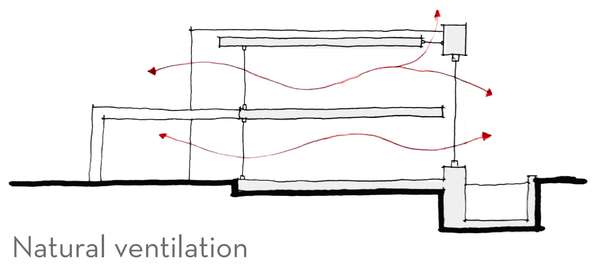
Wood Structure

Corten Steel

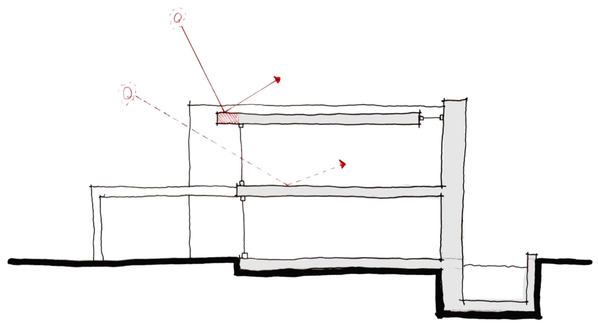
Detail correspodent facade 1:20



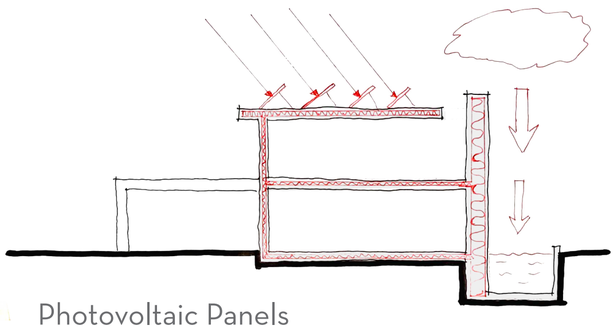
Stone wall as thermal mass



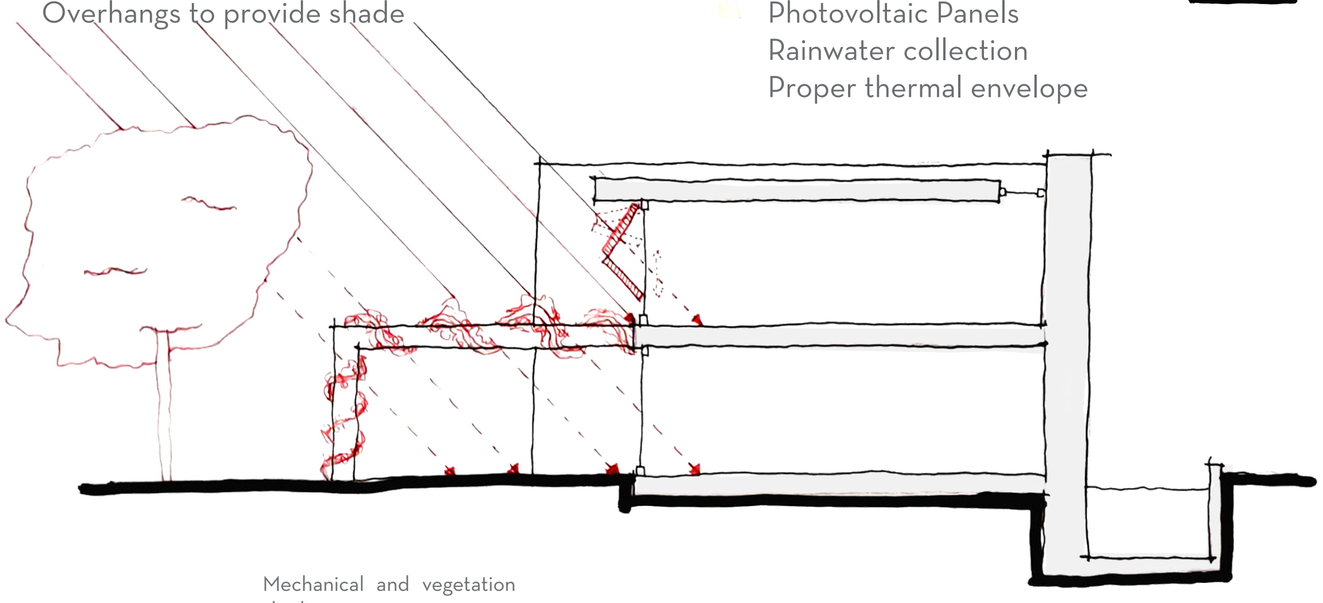
Natural ventilation



Overhangs to provide shade



Photovoltaic Panels
Rainwater collection
Proper thermal envelope



Mechanical and vegetation shading