

Museum of Hidden Nature

underground museum

Politecnico di Milano

ARCHITECTURE - BUILT ENVIRONMENT - INTERIORS - MI

Supervisor_Pierluigi Salvadeo

Co-supervisors_Alessandro Rocca
_Andrea Rolando

Authors _Dina Sretenovic 897663
_Katarina Radaljic 897069

Academic Year 2018/19

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ABSTRACT

The project itself is located in the area between Provence-Alpes-Côte d'Azur and Auvergne-Rhône-Alpes. These regions are, in the geological sense, glacial valleys. They are formed when a glacier travels across and down a slope, carving the valley by the action of scouring, which after the ice recedes, leaves the valley with very steep sides and a wide flat floor. The cracks in the floor, called valley steps, are often filled by water forming lakes, streams and rivers, even waterfalls sometimes. If not filled by water these cracks, or ravines, vary from size to depth and they can reach several hundreds of meters deep into the Earth. These are called over-deepenings.

Val di Susa is a prime example of one of these valleys. It extends over 50 km and covers parts of France and Italy. It is surrounded by more than 10 mountain peaks, each reaching heights of more than 3000 m, and a river Dora Riparia flows through it.

Historically these regions are extremely important. During the Roman age Hannibal crossed the Alps to attack the Roman Empire which was a feat unheard of and which would be difficult even today. Several centuries from then Roman Emperor Augustus, who understood the importance of these crossings, built an alliance with then French tribes to build a road through the valley for the transportation of people and merchandise. Due to the frequent travel of people, several abbeys and monasteries were built for the travelling pilgrims. They stand even today, hundreds of years old, and provide a tourist attraction and add to the beauty of the entire region. Novalesa Abbey and Sacra di San Michele abbey are most known and one of the oldest.



1.0 Valle di Susa



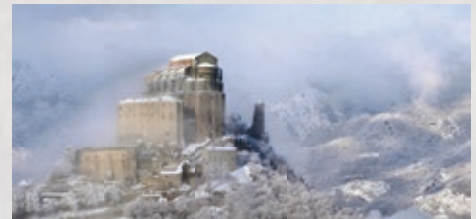
1.1 Mountain over-deepenings



1.2 Nature of the mountains

Later on these roads were heavily used by Napoleon as well. Their importance was so significant that even now people are using them, by building railroad tracks that connect different parts of the Europe.

It all started in 19th century when the construction of the Mont Cenis Tunnel started. It was a rail tunnel nearly 14 km long that linked Italy and France. The construction ended in 1871 and it only took 14 years to complete, which was unbelievable since the original estimation was that it would take nearly 40 years with the technology and knowledge available at the time. This laid ground to a much bigger project that came almost 100 years later – The Ten-T network Europe’s metropolitan line.



1.3 Sacra di San Michele



1.4 Abazia di Novalesa



1.6 Fréjus Rail Tunnel

The Fréjus Rail Tunnel is a rail tunnel of 13.7 km length in the European Alps, carrying the Turin–Modane railway through Mont Cenis to an end-on connection with the Culoz–Modane railway and linking Bardonecchia in Italy to Modane in France.

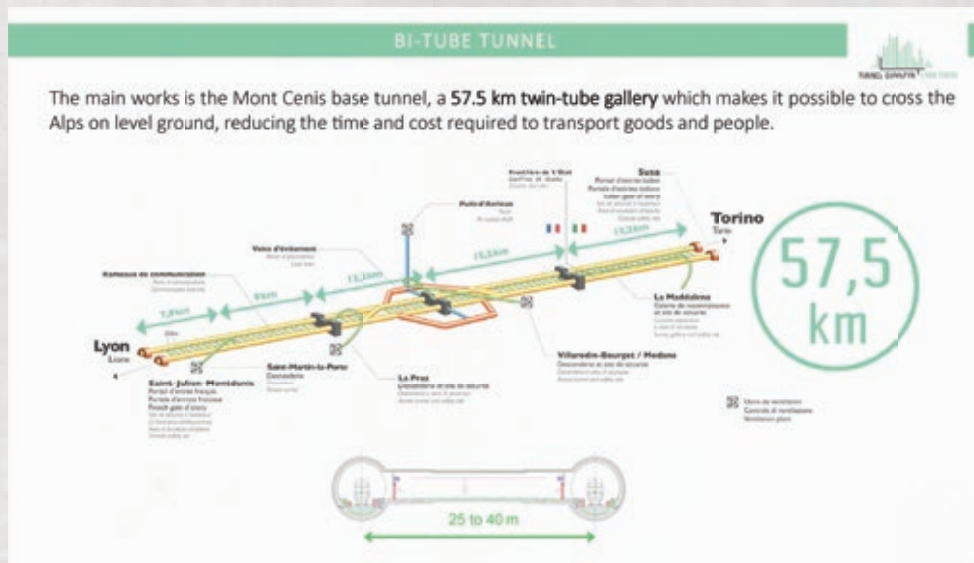


1.5 Fresco

The new European railway network is under construction, its goal to integrate local economies and countries in the global market. Also this way of transportation is key to limiting temperature increase and global warming, since trains provide the most ecological and sustainable means of moving people and goods, while safeguarding cultural and natural heritage. This project is also known as the “new Railway Silk road” since Russia and China are doing the same in Asia. The plan is to connect them all to form a Euro-Asian network which will benefit all economically, culturally, ecologically and in every other way possible.



1.7 Tunnel construction



1.8 Construction details

UNDERGROUND SPACES

Let's recall that caverns and hollows are intrinsically linked to human history: they have been used as dwellings and for food storage since the Paleolithic, millions of years ago. More recently, what can be described as underground cities existed in China (Banpo), Turkey (Cappadocia), and Israel (Maresha) between two and three thousand years ago. Underground passages for emergency evacuation were an inherent part of many medieval cities. Nowadays, there are troglodyte villages in France (nearby Poitiers), Spain (Granada), and others, where thousands of people seem to live a good life.

Speculations are that the living in the mountains will be the future due to the climate changes and overhitting. People will go "back to the roots" way of living when our ancestors were living in the caves.

"Underground spaces are less susceptible to external influences, and their impact on the external environment is less than aboveground facilities." Further, "Deep underground structures suffer significantly less damage during earthquakes than aboveground structures."

Nearly 70 percent of the world population lives in urban areas, and according to the United Nations two billion more people will move into cities in the next 20 years. It is probable that the size of the city itself will grow still faster than its demographic growth rate: 276 percent vs. 66 percent, according to Shlomo Angel and Stephen Sheppard, 20 years from now.

From this perspective, cities are potentially going to be jam-packed with construction, especially considering that future city developments are supposed to be—and designed to be—sustainable.

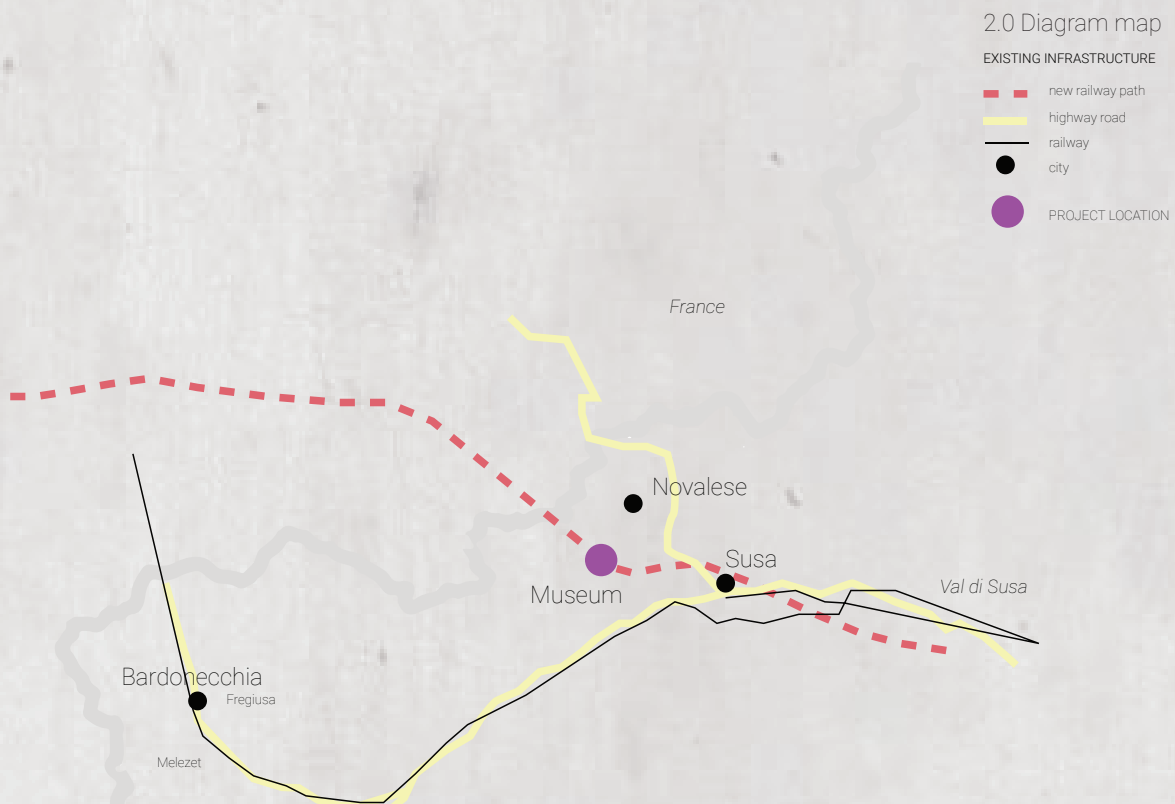
Investing in city undergrounds is necessary to make the cities of tomorrow more sustainable. They are temperate spaces, with less variability in temperature than the surface, as well as conserving heat for future energy savings. Furthermore, potable water would be more easily preserved, thanks to fewer contaminants from surface wastewater. Lastly, geothermal energy already allows us to produce heat and cold by using resources underground.

CONCEPT APPROACH

Concept of the project is to intersect with the new railway line and connect to it by creating new train station under the mountain. The goal is to excavate 140m from the surface of the ground and reach the 650m of earth elevation on which horizontal line the new TAV train will stream.

This whole in the ground might be integrated with many functions now and later, but the idea of this project was to make a museum which has specific content related to the position and form.

Val de Susa has been known as an transit zone trough which are people constantly passing and traveling and this location has potential to create new attraction and to give this area significant point.



UNDERGROUND MUSEUM

Hidden space in the ground is leading to the idea of the Underground Museum which program is to show the secrets of the nature by which we are constantly surrounded but we can not see it since it is either buried under the earth or above the sky limit. Many nature phenomenon, that this Museum wants to represent, is in very small scale such as micro world and its perfect organization lifecycle , or in giant size as the universe consisting all forms of matter and energy.

The concept development has its path of changing and forming to the best solution consisted of main whole reaching the bottom of the station level of 650m elevetaion and escavated volumes around that whole which are serving as an exhibition spaces.

Communication inside the project comes primarily from the new train line station which goes in both directions - to the France and Italy.

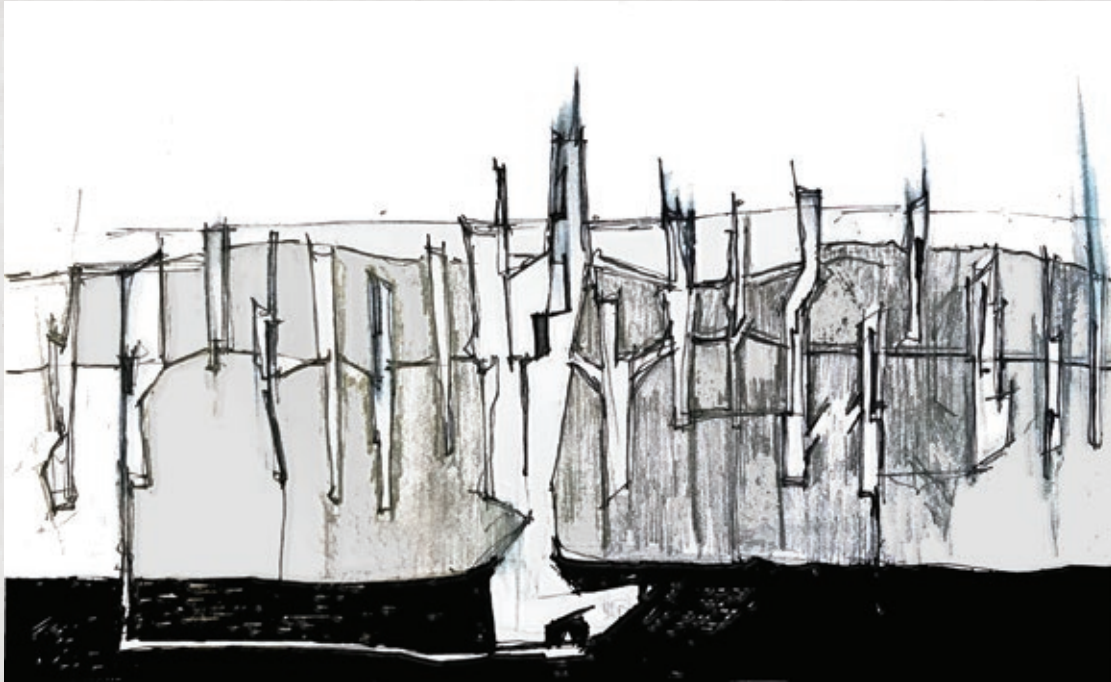
Main communication inside of the vertical whole is lift which reaches the surfaces of the ground, bringing the visitors either from the top or from the bottom of the station. On the top of the building are squares which welcomes the mountain travelers to approach and enter the museum from the top. Inside the building whole between the exhibitions spaces communication is provided with small capsule lifts fastened on the whole wall and are steel bridges which are intersecting the whole.

Train station is divided into two levels which are connected with lifts and stairs, and visual connection of glass exhibiton boxes. First level is the station and mainly the platfrom where the train arrives. On the level below there are exhibition spaces which are showing the interesting side of underground spaces and its way of designing the subterrain constructions. Also the floor below is serving maintance and technical spaces which are important for the building functioning.

Excavations around the main building whole have artificial elements which are overlooking the whole. These spaces are different shapes which forms the exhibition expirience related to its theme.

CONCEPT DEVELOPMENT

First concept sketches of excavating the rocks



5.0 Sketch I



5.1 Sketch II



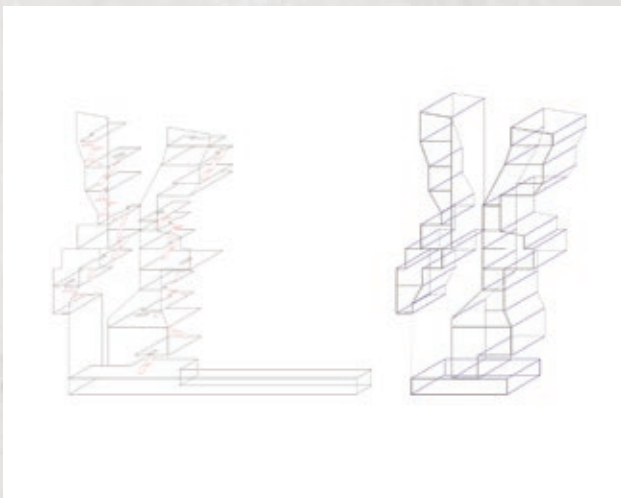
5.2 Sketch III

DESIGN PROCESS

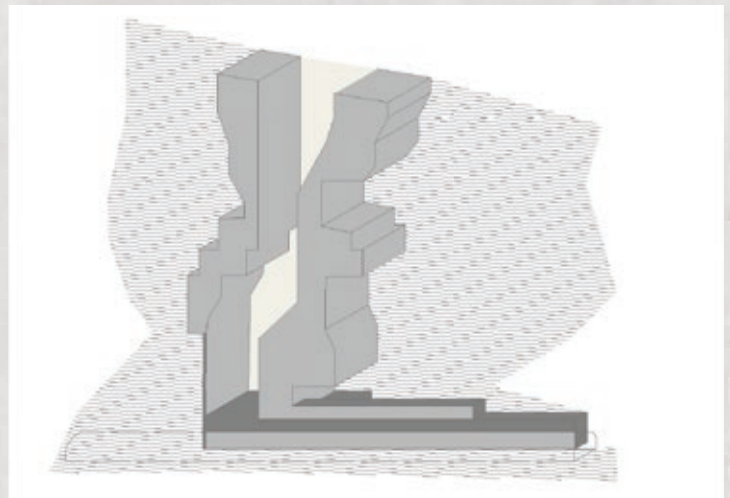
Initial drawings and sketches



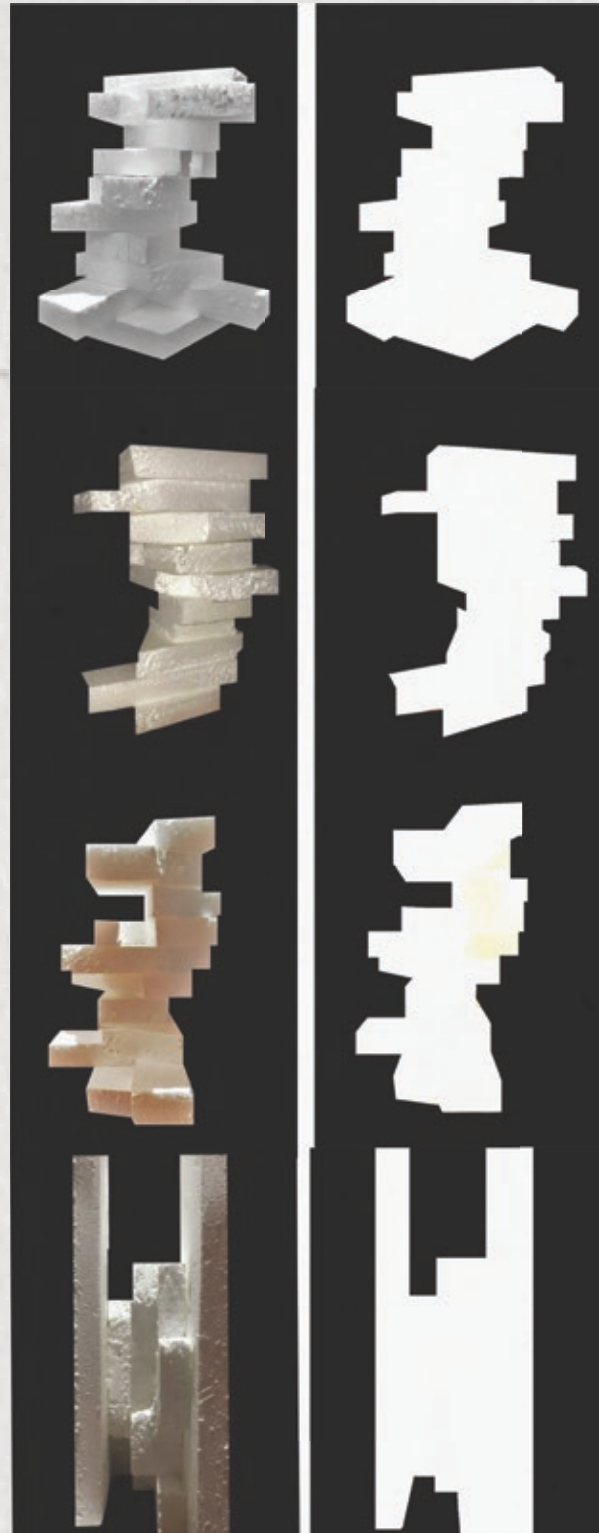
6.0 Section



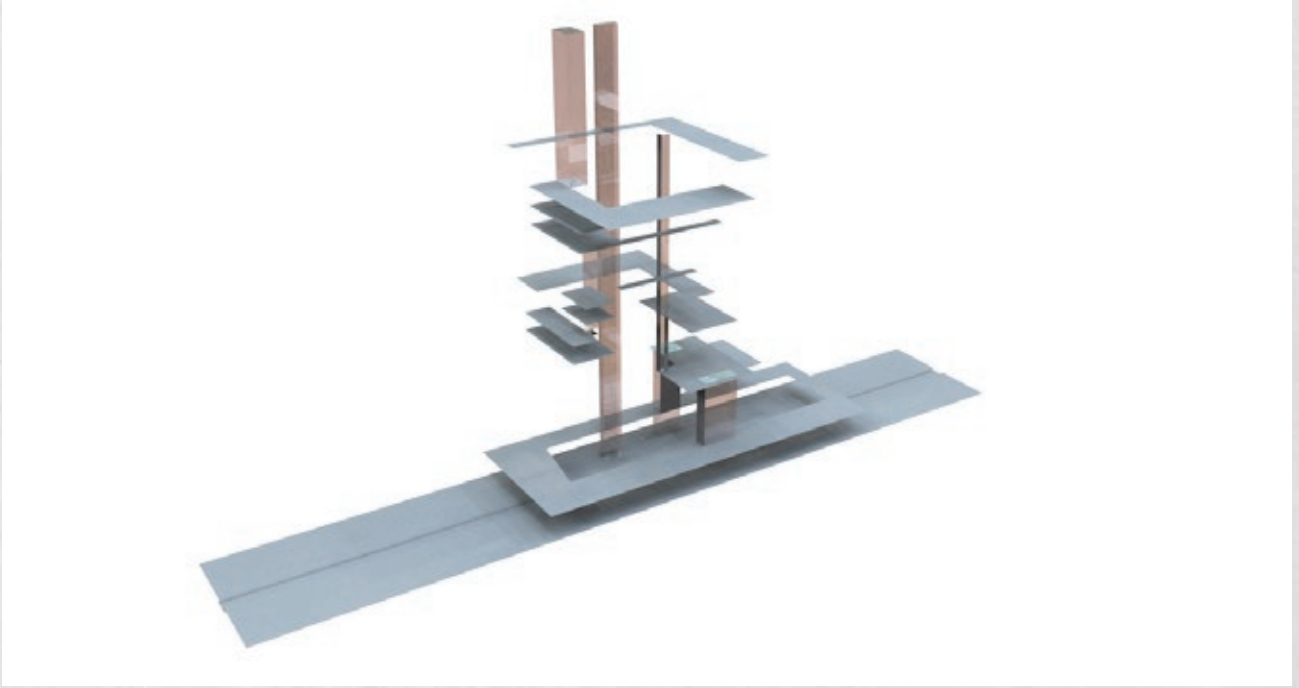
6.1 Diagrams



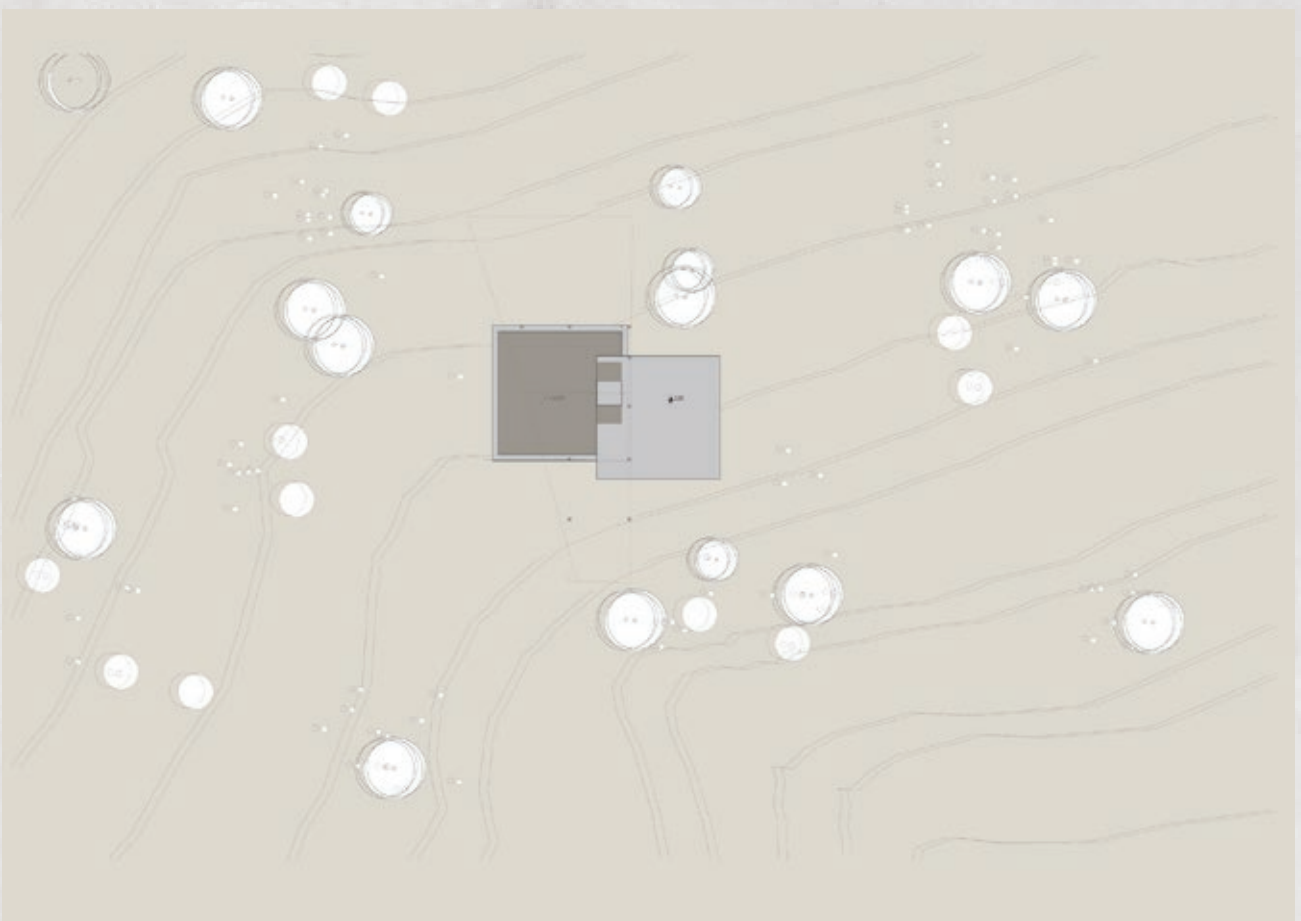
6.2 Volumes



6.3 Playing with the model- inverting the mass into the excavated forms



6.4 Diagram of platforms

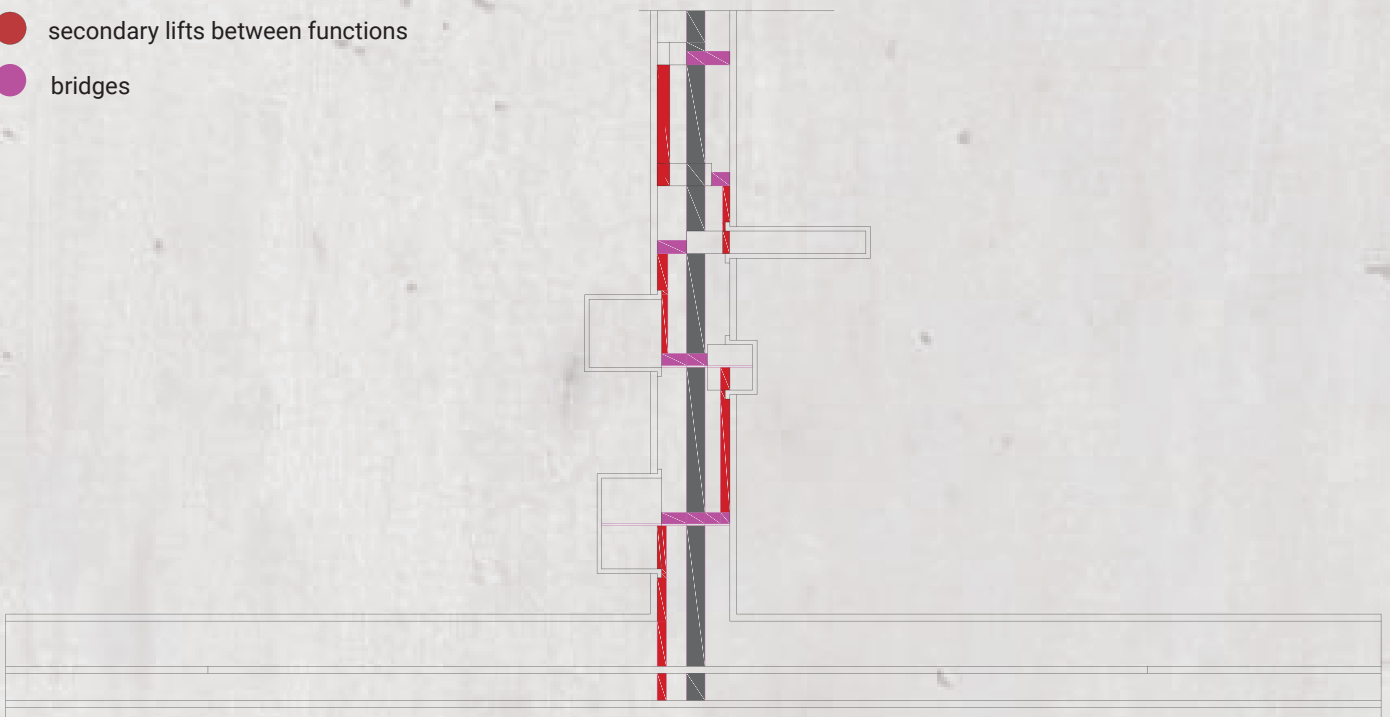


6.5 Situation plan

Final communication diagram

Legend

- main lift from bottom to the top
- secondary lifts between functions
- bridges



6.6 Diagram

N

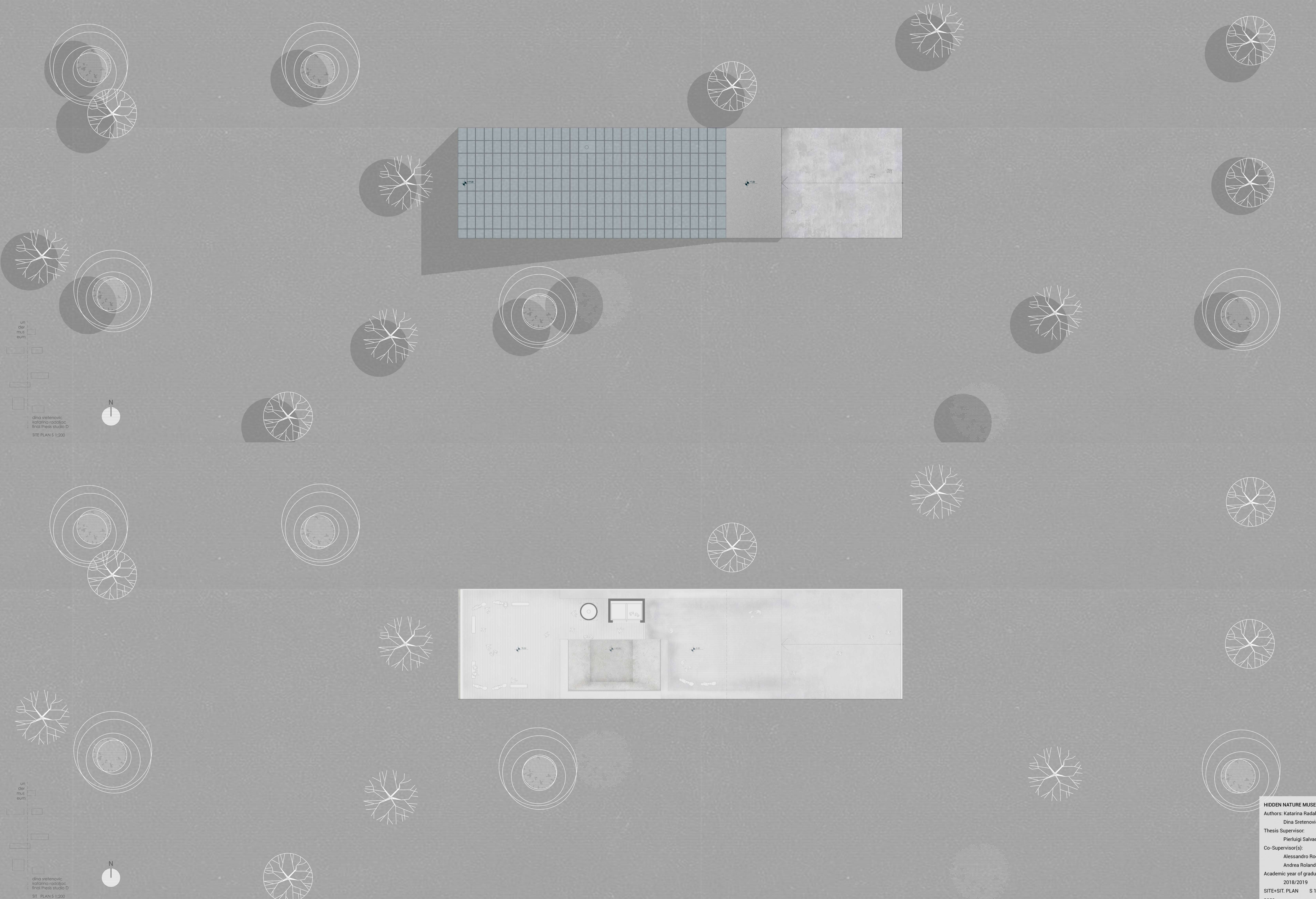
project location

highspeed TAV railway

Chiemonte

Susa

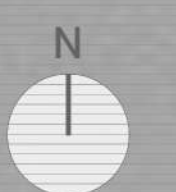
Val di Susa



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dina sretenovic
katarina radaljic
final thesis studio D

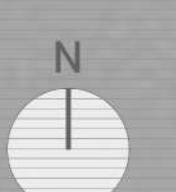
SITE PLAN S 1:200

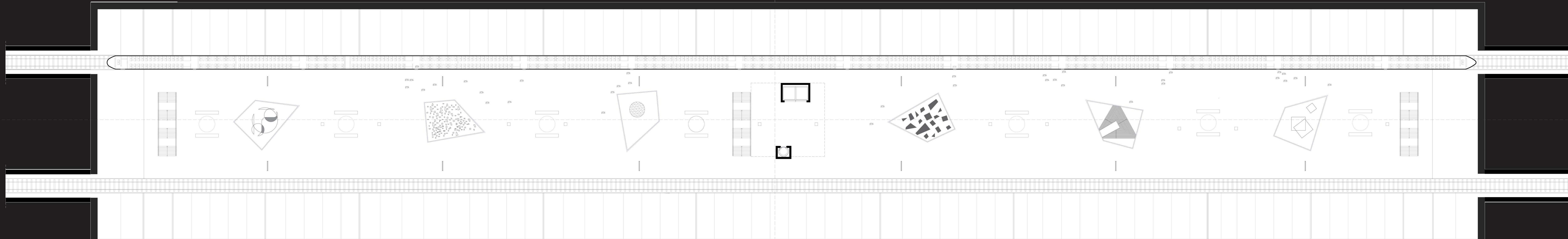


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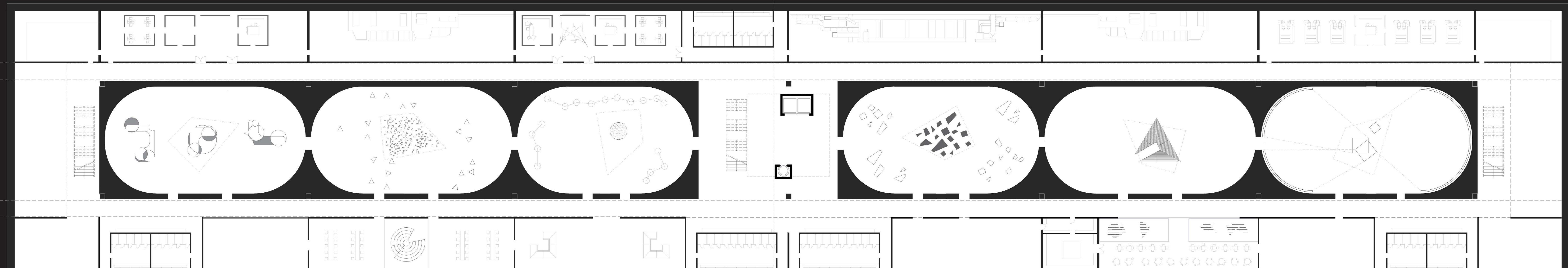
dina sretenovic
katarina radaljic
final thesis studio D

SIT PLAN S 1:200



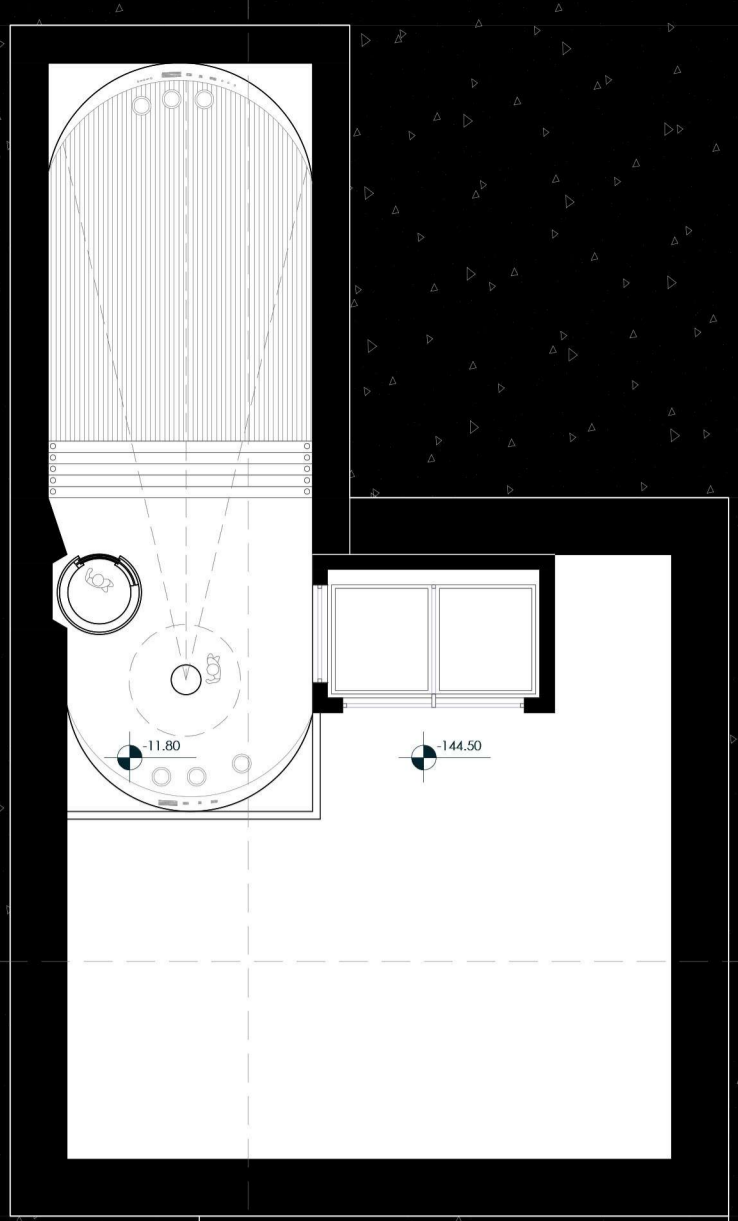


station plan S 1:250

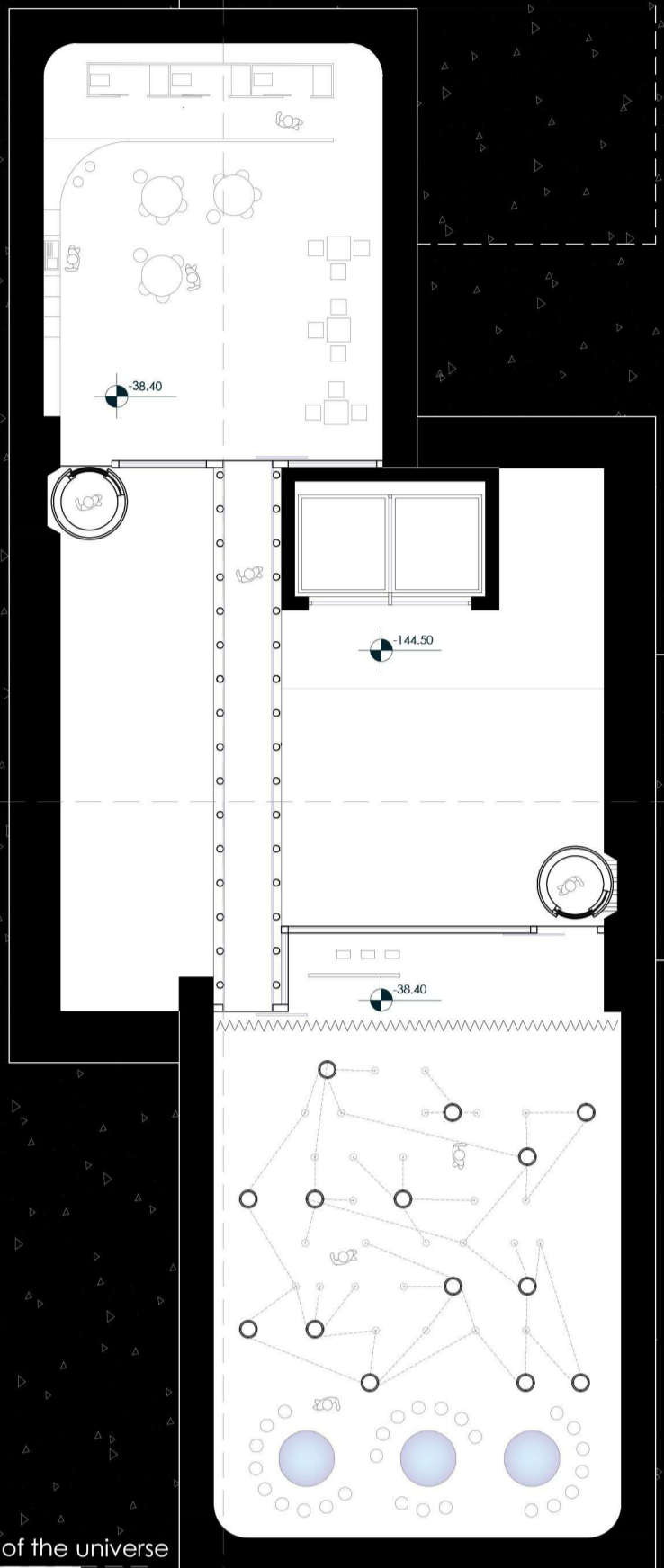


plan of exhibition spaces-elements of underground cities S 1:250

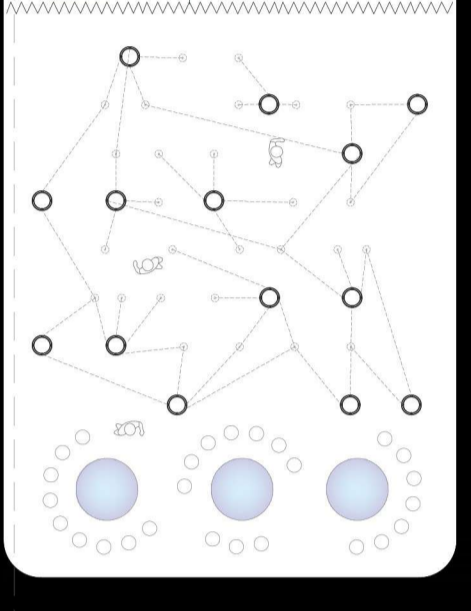
observatory



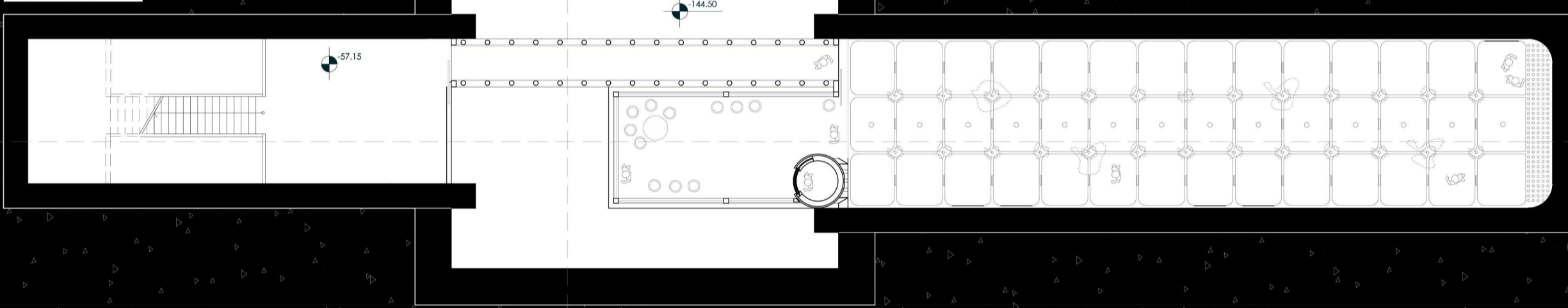
lounge room



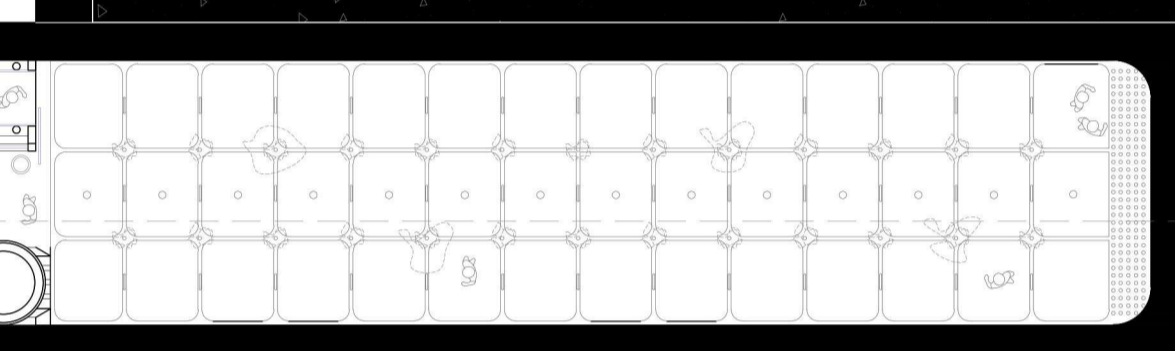
exhibition of the universe



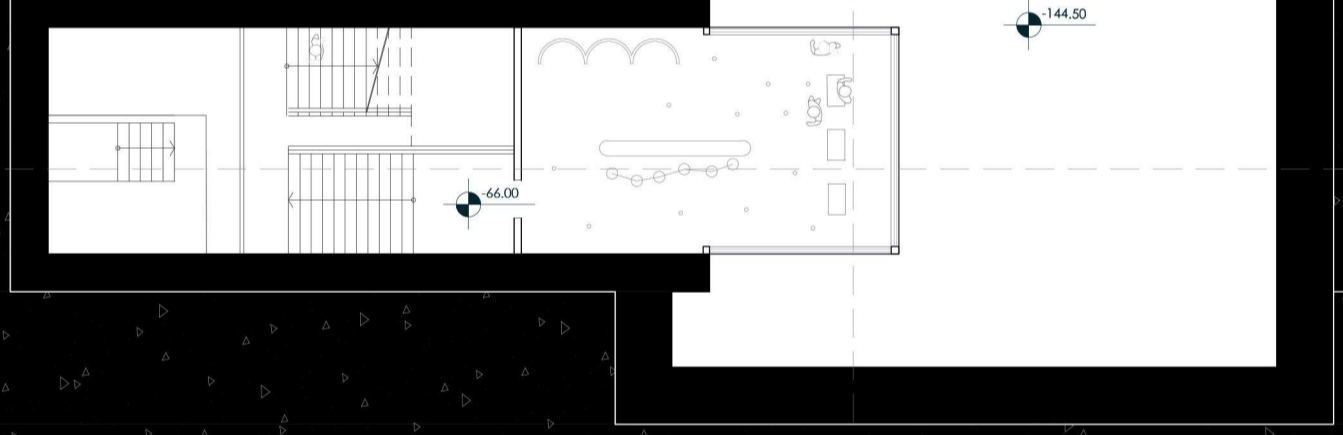
exhibition of the underground micro world



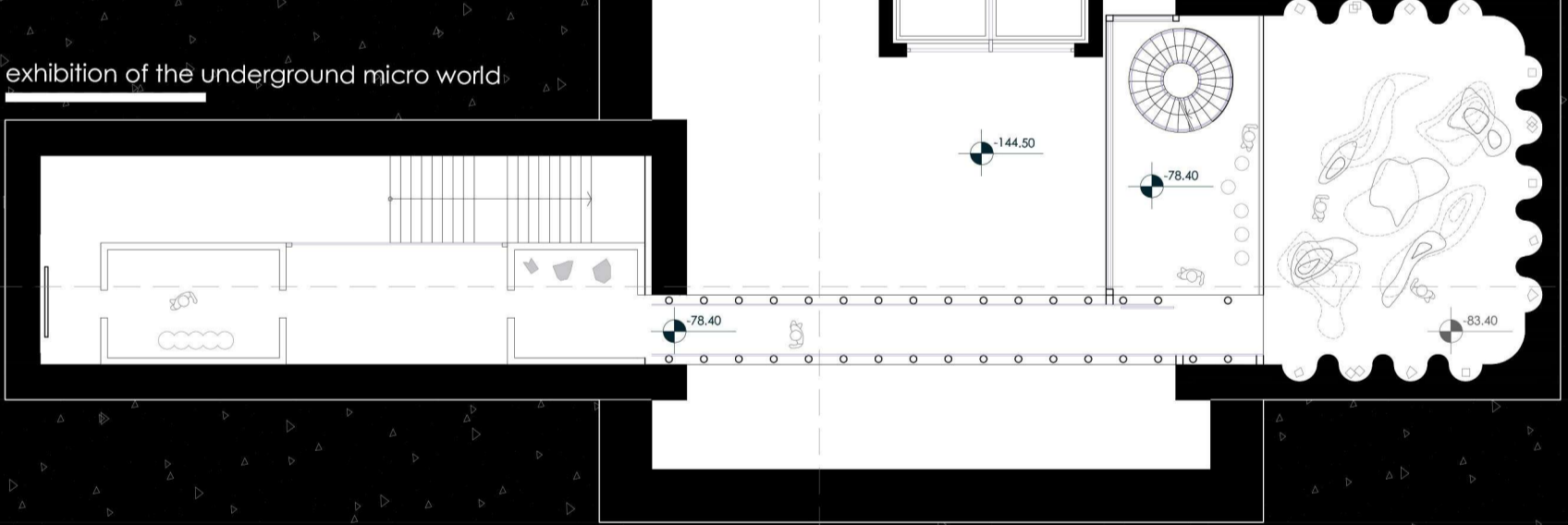
exhibition of water and steam



exhibition of the underground micro world



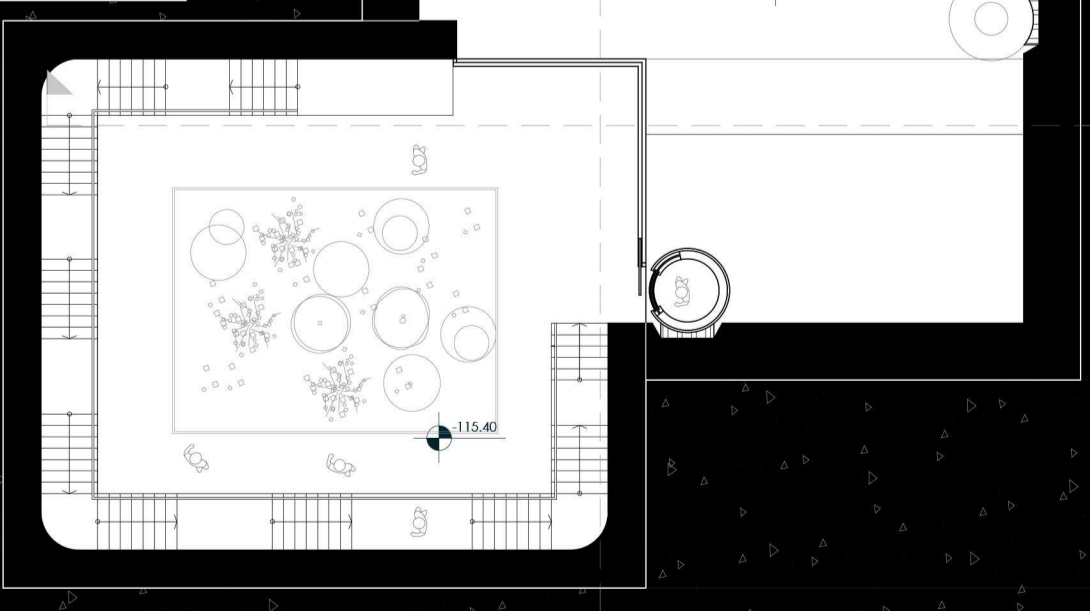
exhibition of the underground rocks



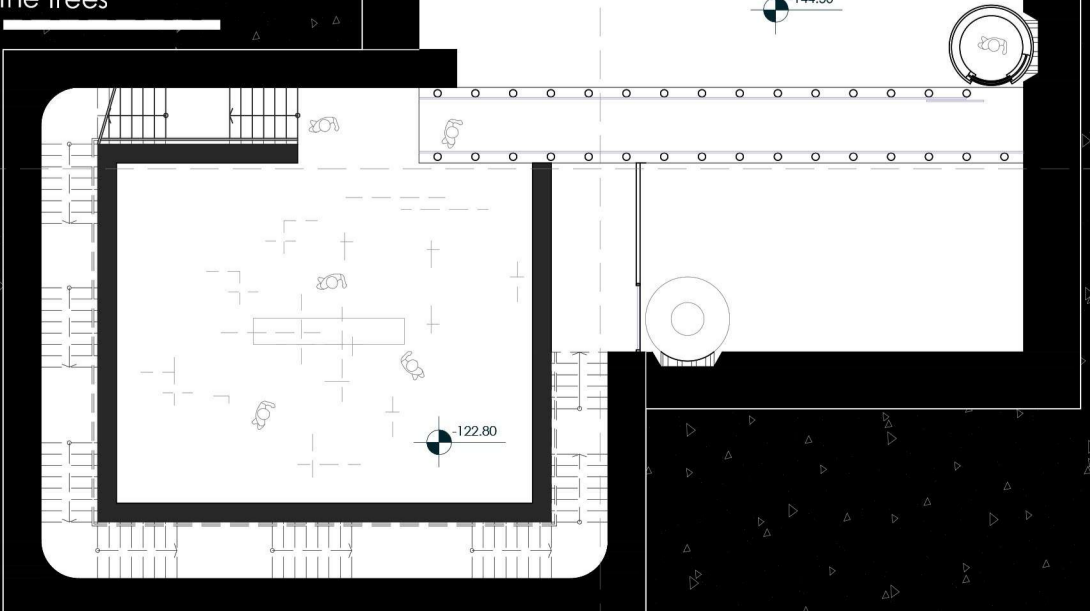
exhibition of the underground rocks

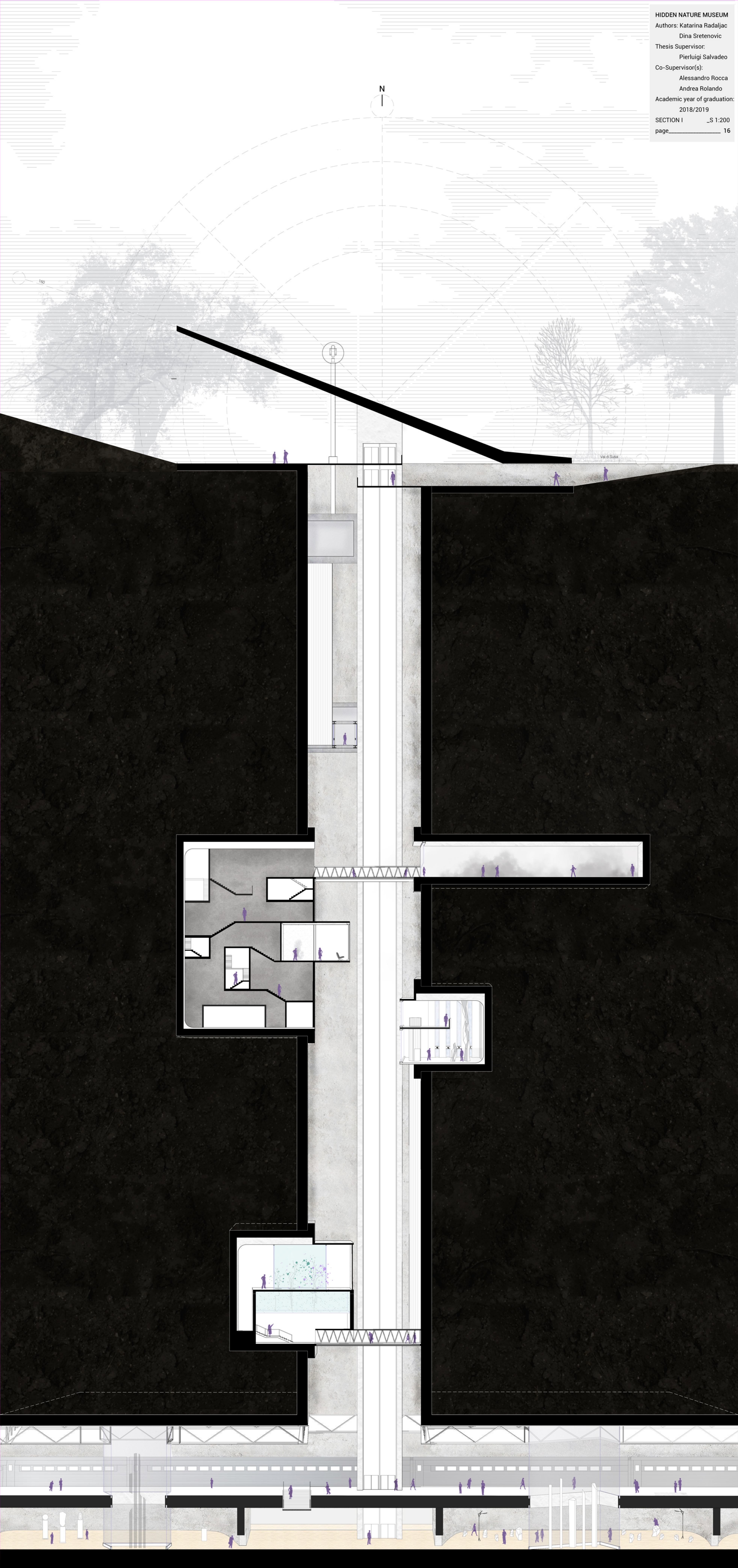


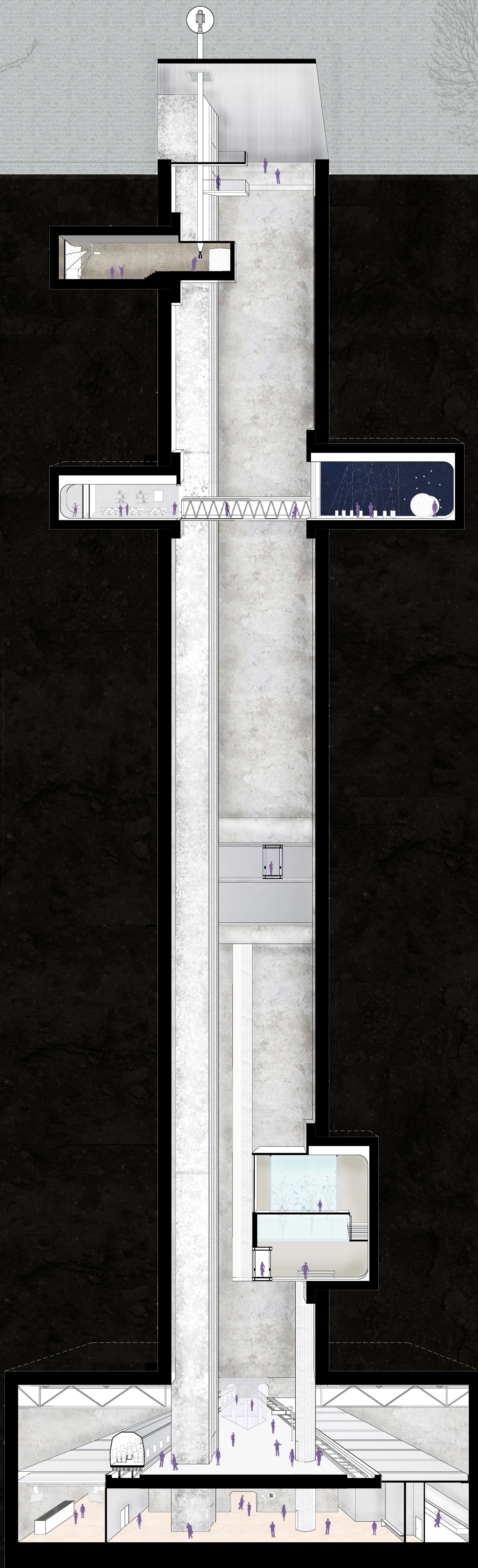
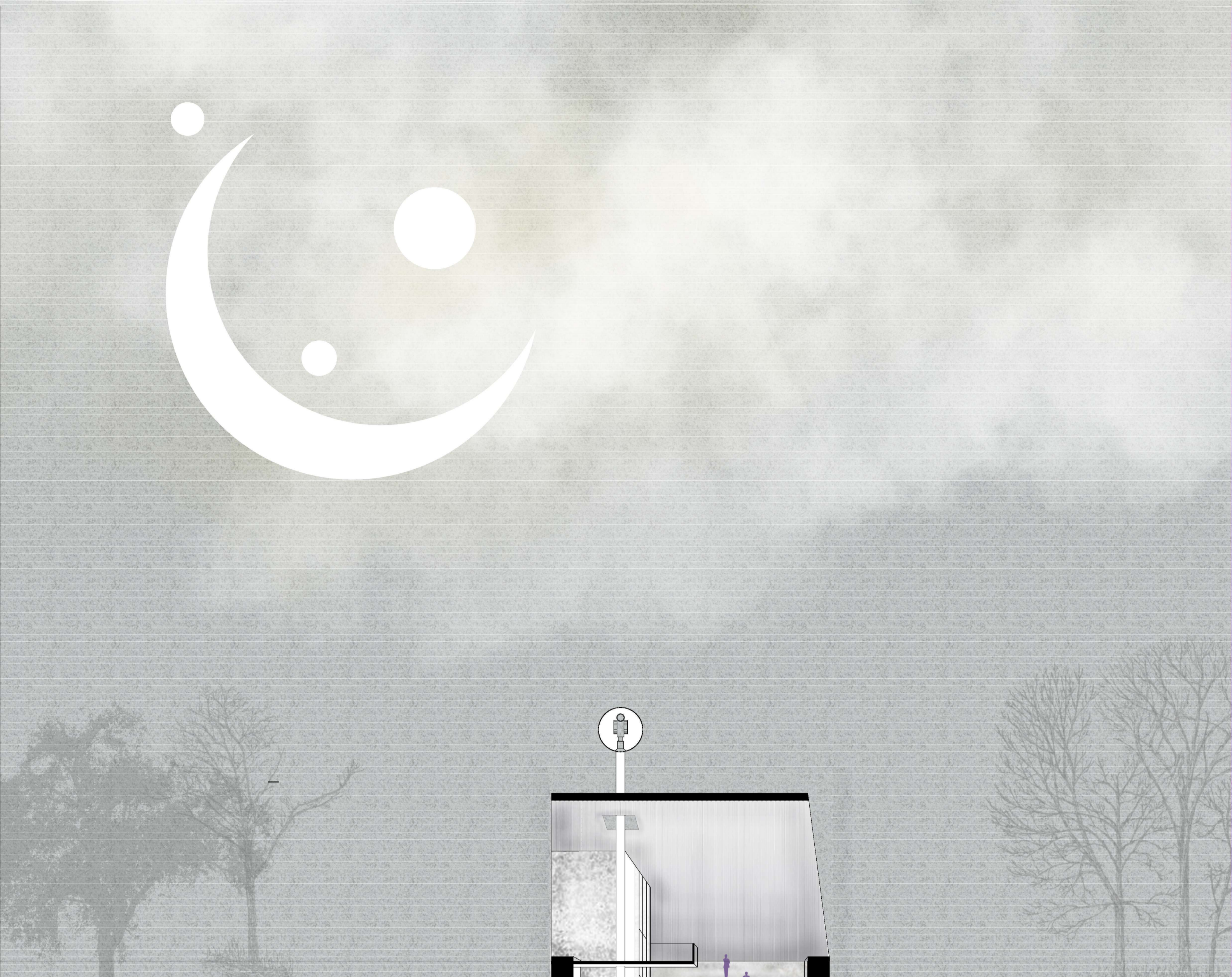
exhibition of the hidden depth of the trees



exhibition of the hidden depth of the trees





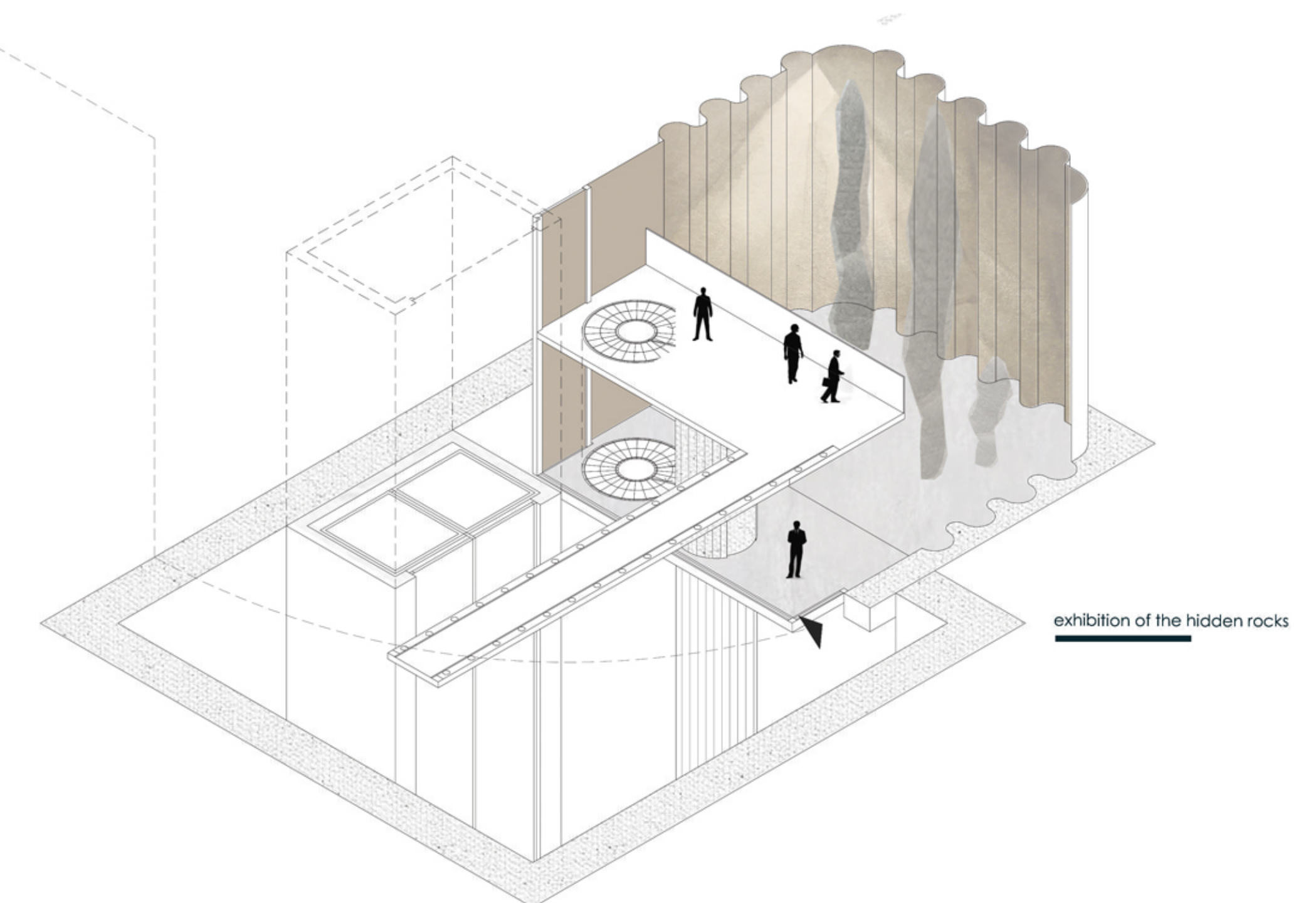
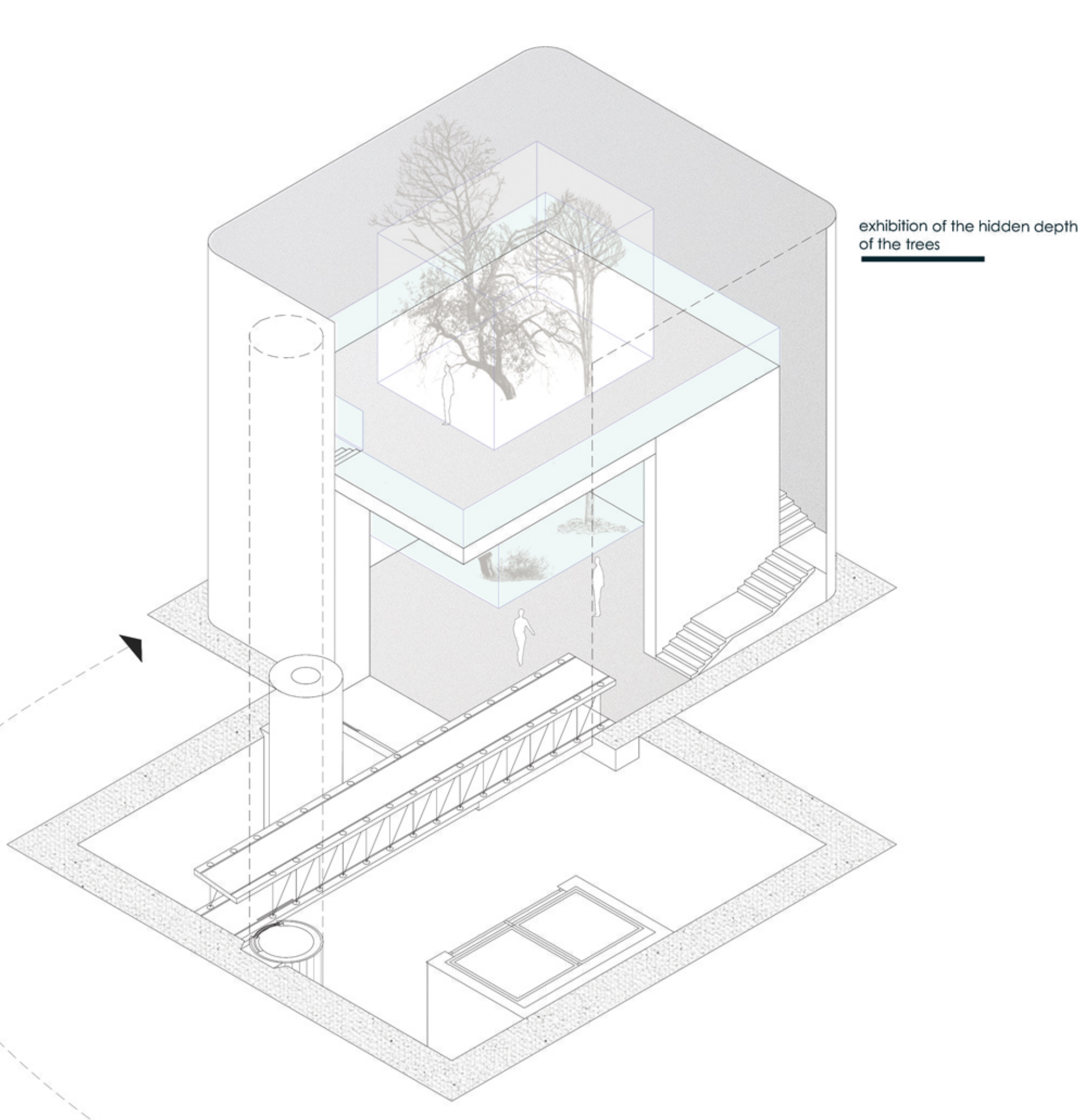
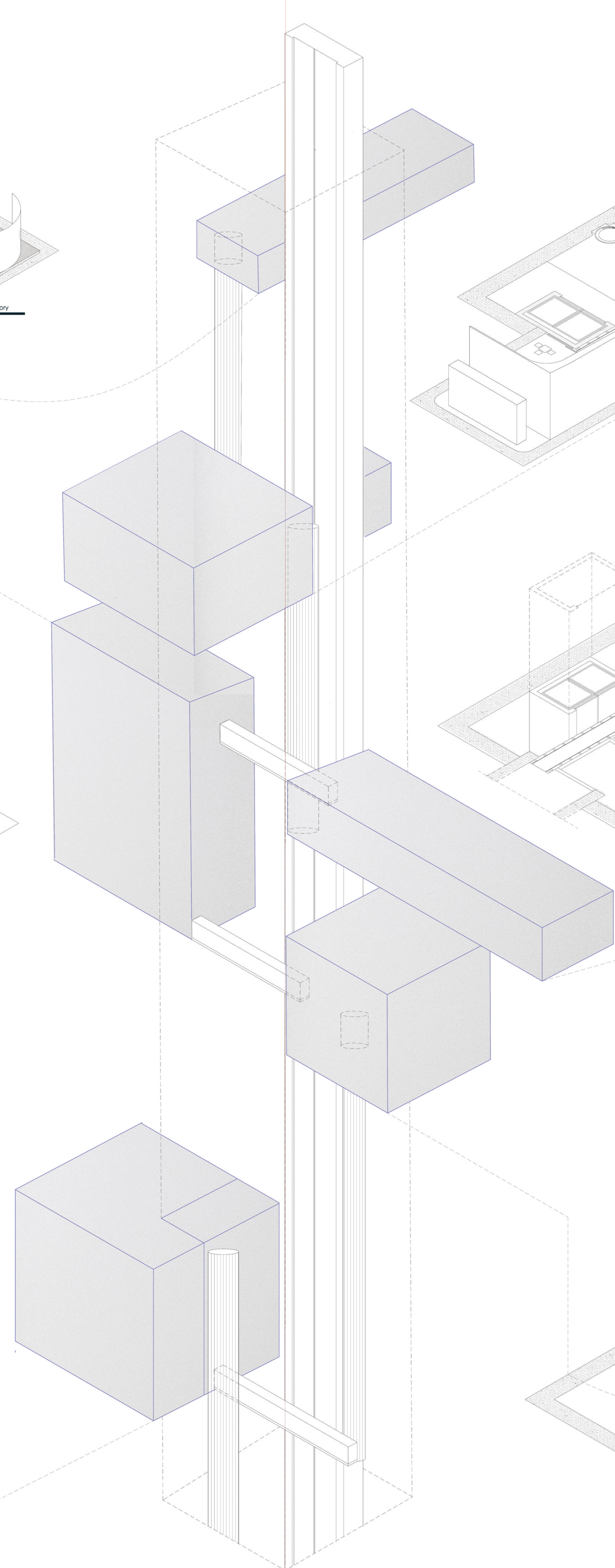
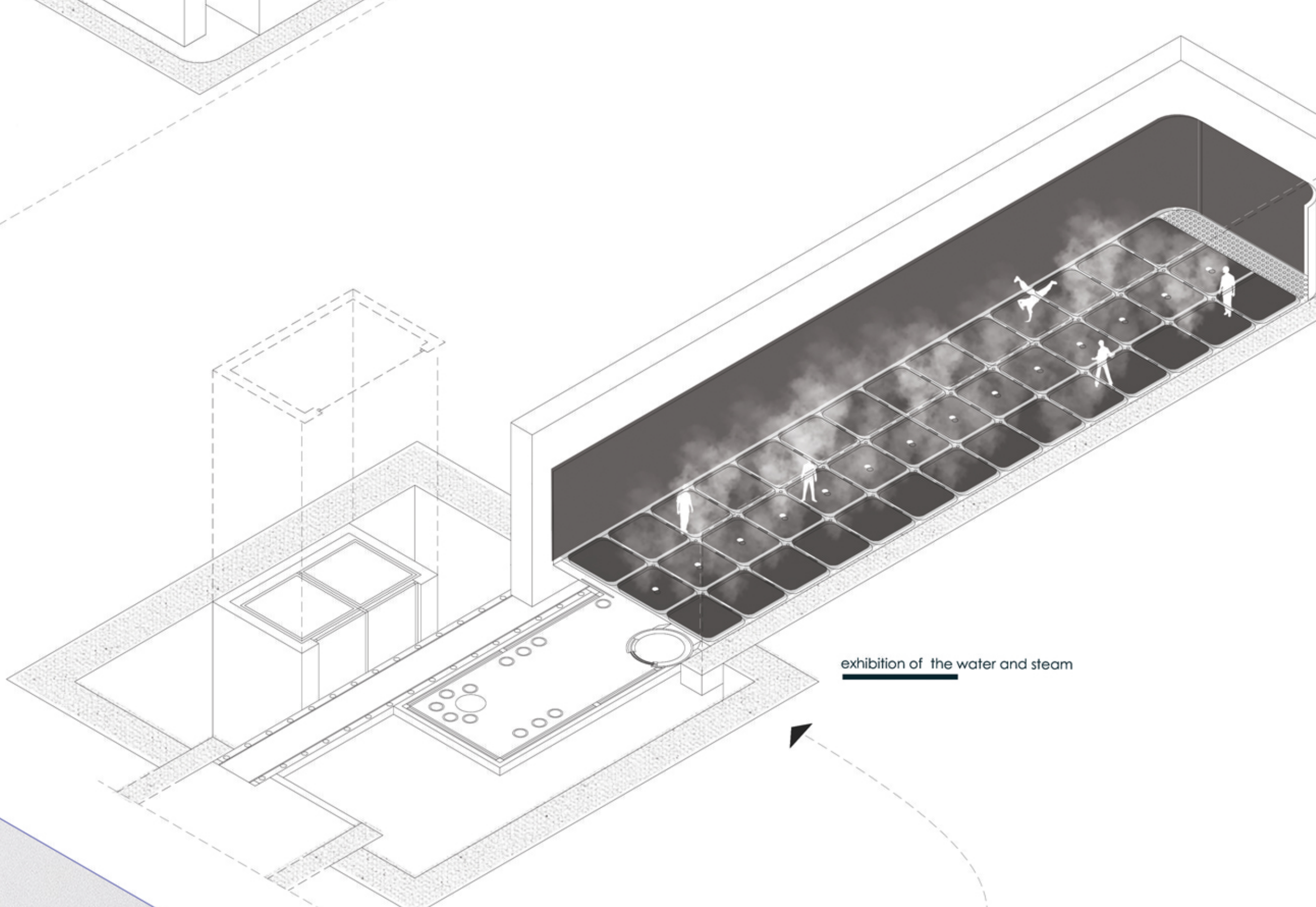
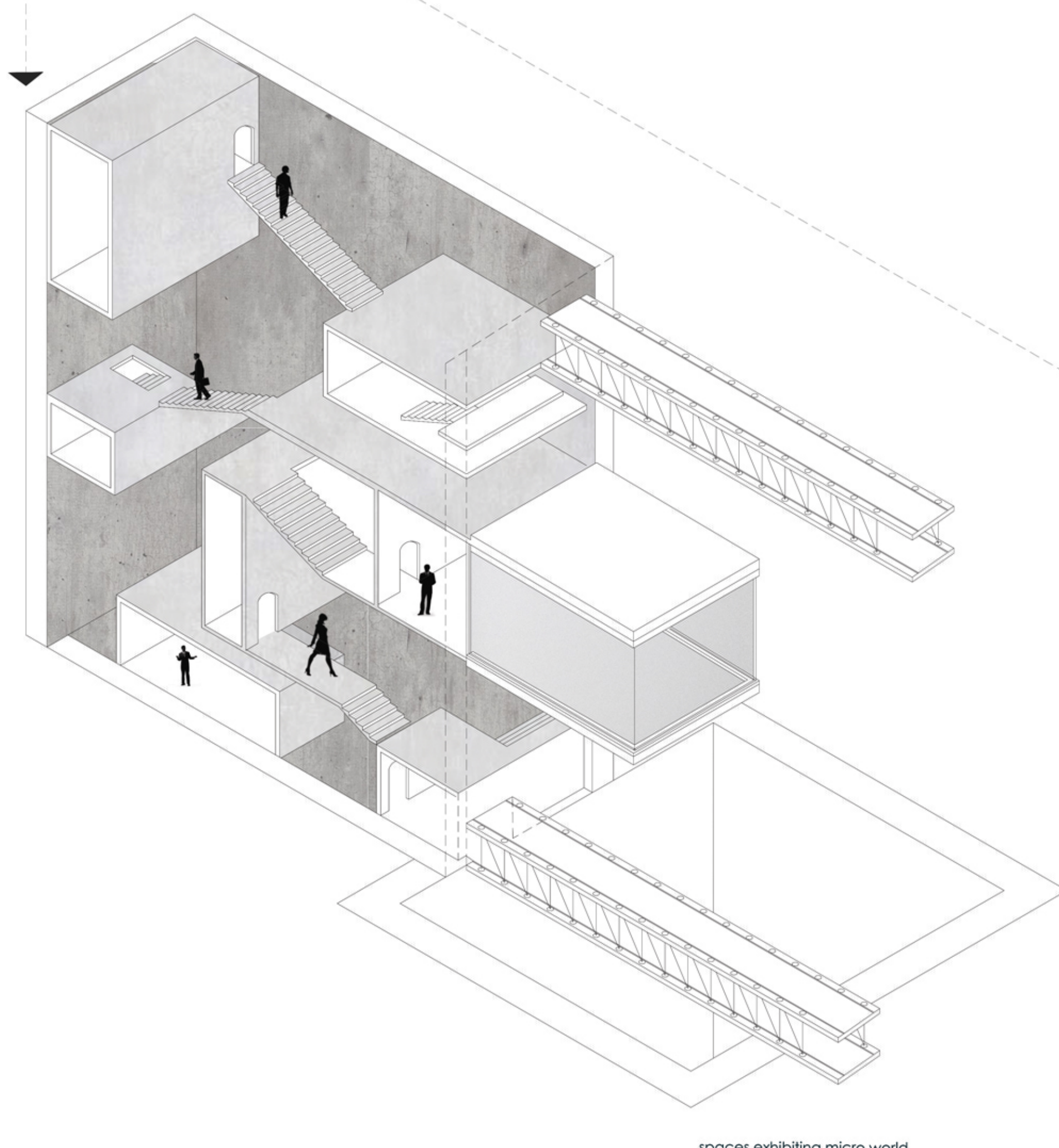
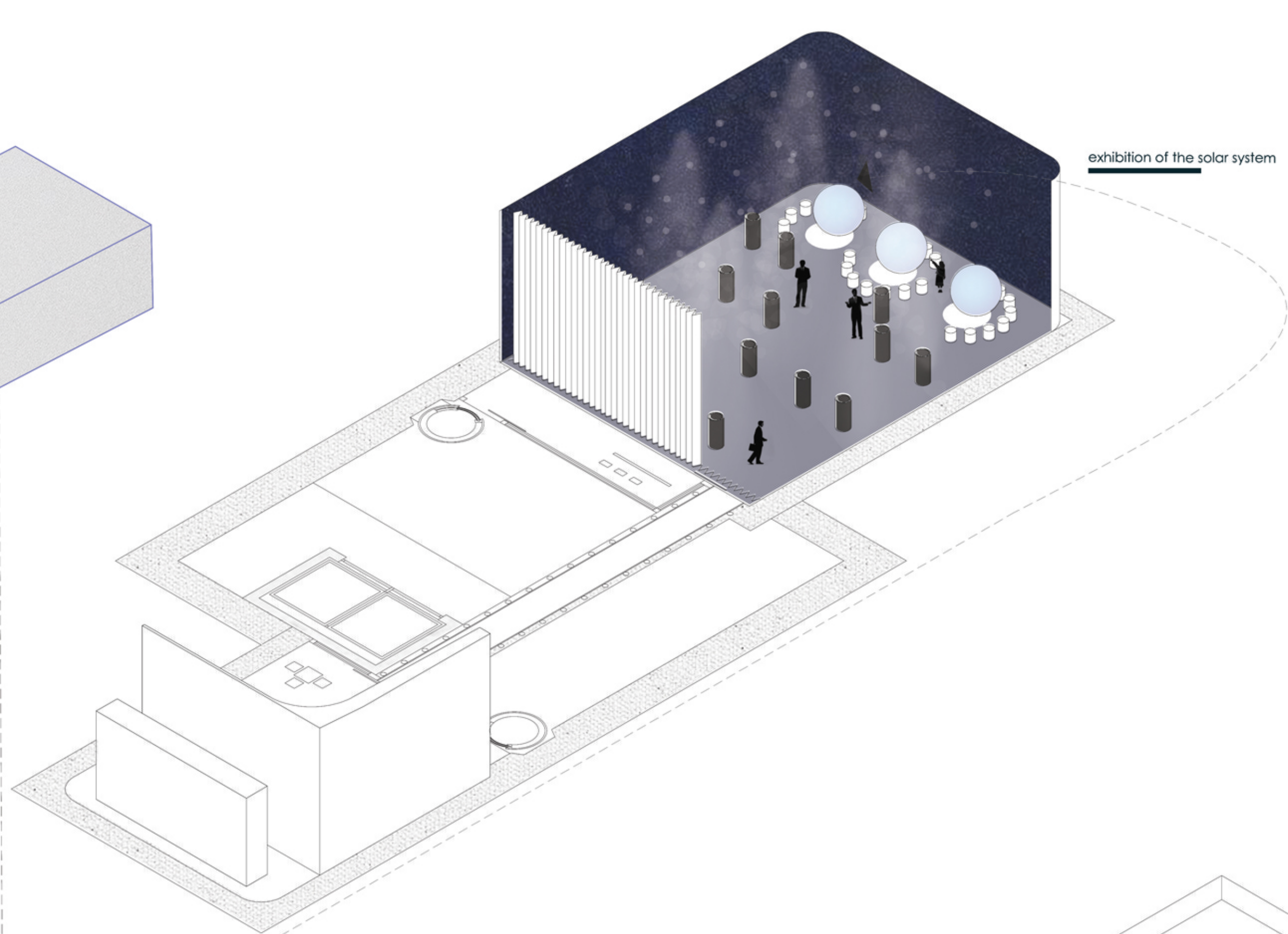
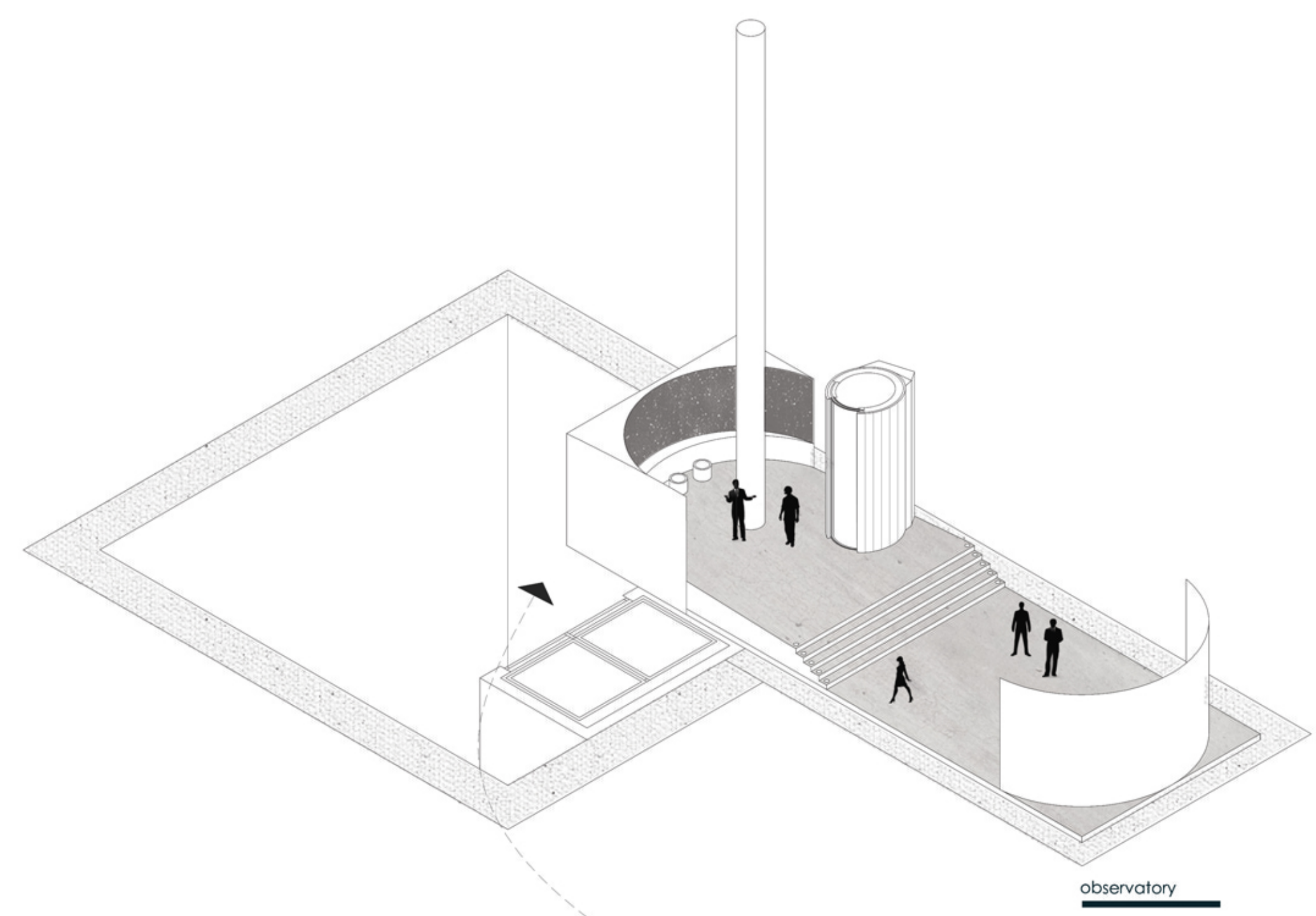


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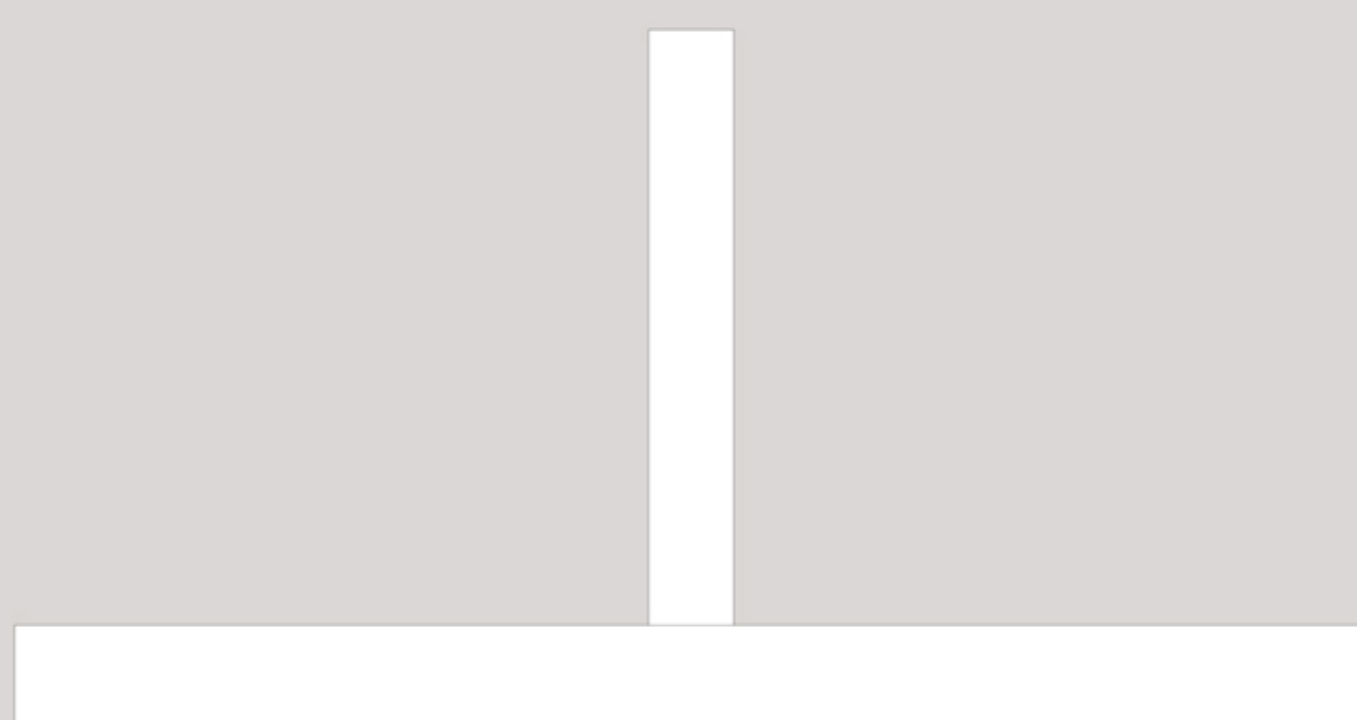
SECTION S 1:200

HIDDEN NATURE MUSEUM
Authors: Katarina Radaljic
Dina Sretenovic
Thesis Supervisor:
Pierluigi Salvadeo
Co-Supervisor(s):
Alessandro Rocca
Andrea Rolando
Academic year of graduation:
2018/2019
SECTION II _S1:200
page_ 17



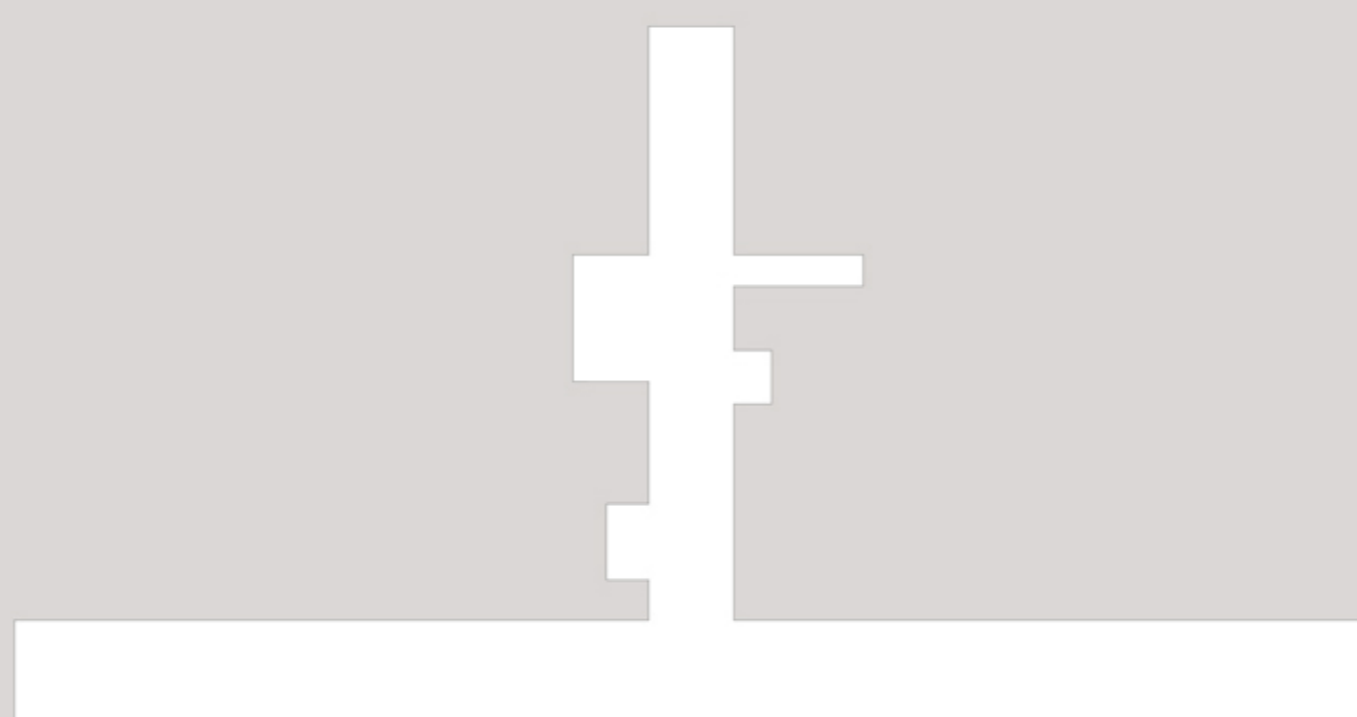
phase_1

y: 2019
excavation of the tunnel and main hole (16x16m; h=156m)



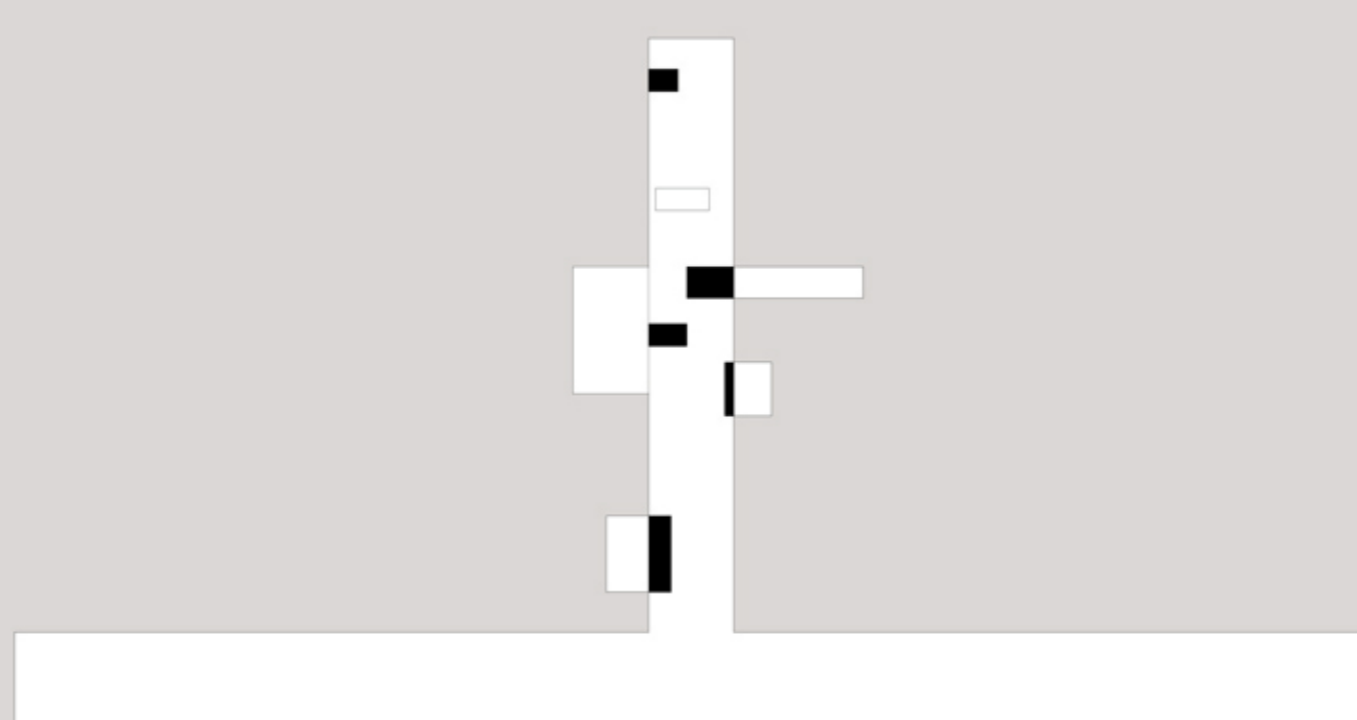
phase_2

p: 2025-2035
smaller excavations around the hole



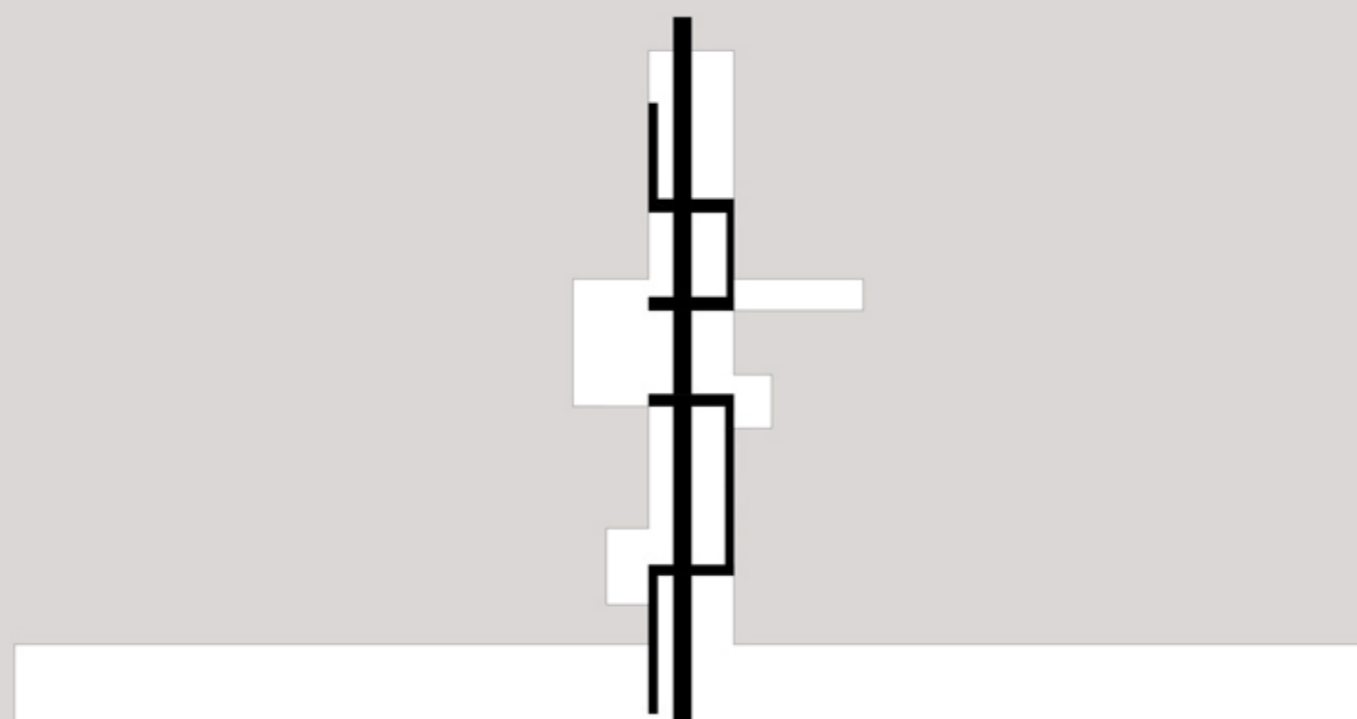
phase_3

p: 2035-2040
insertion of elements inside the hole



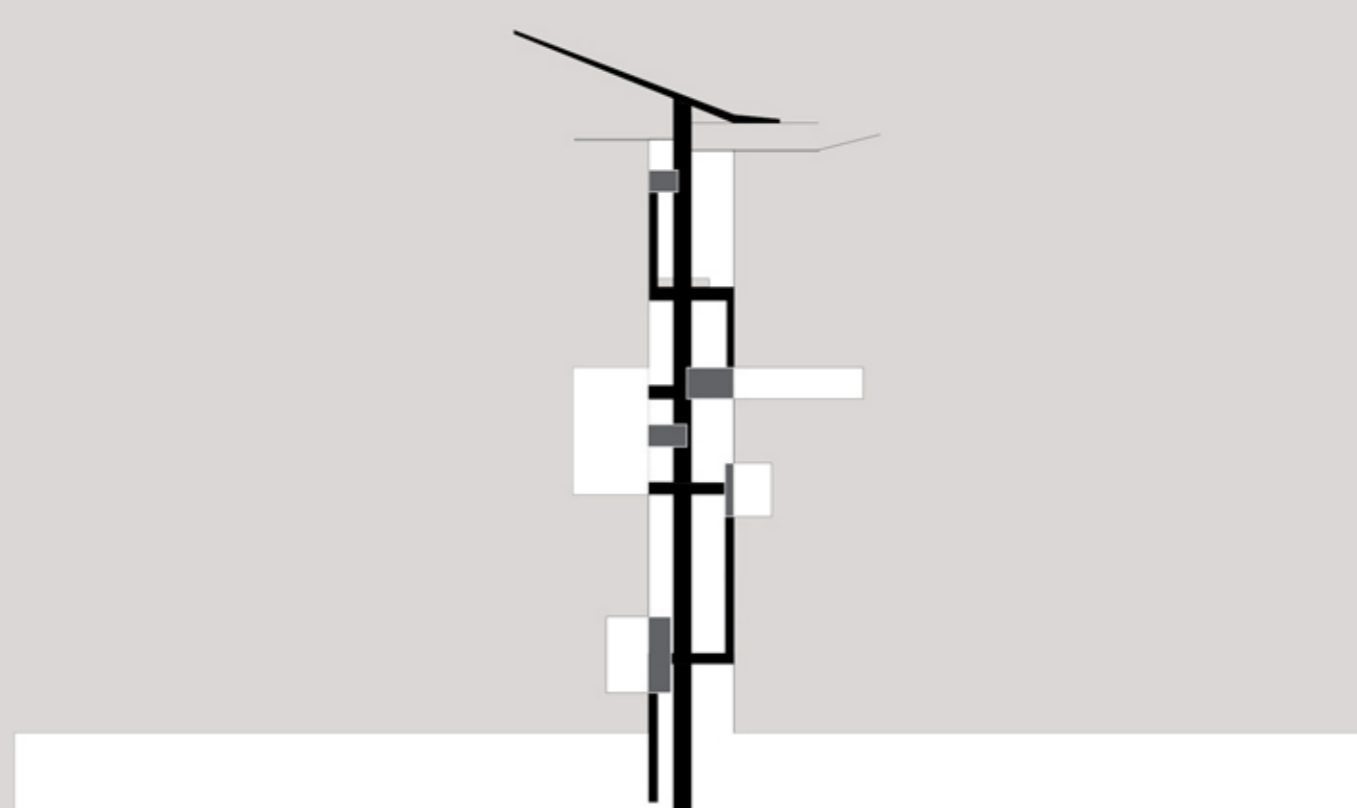
phase_4

p: 2040-2045
insertion of elevators and bridges

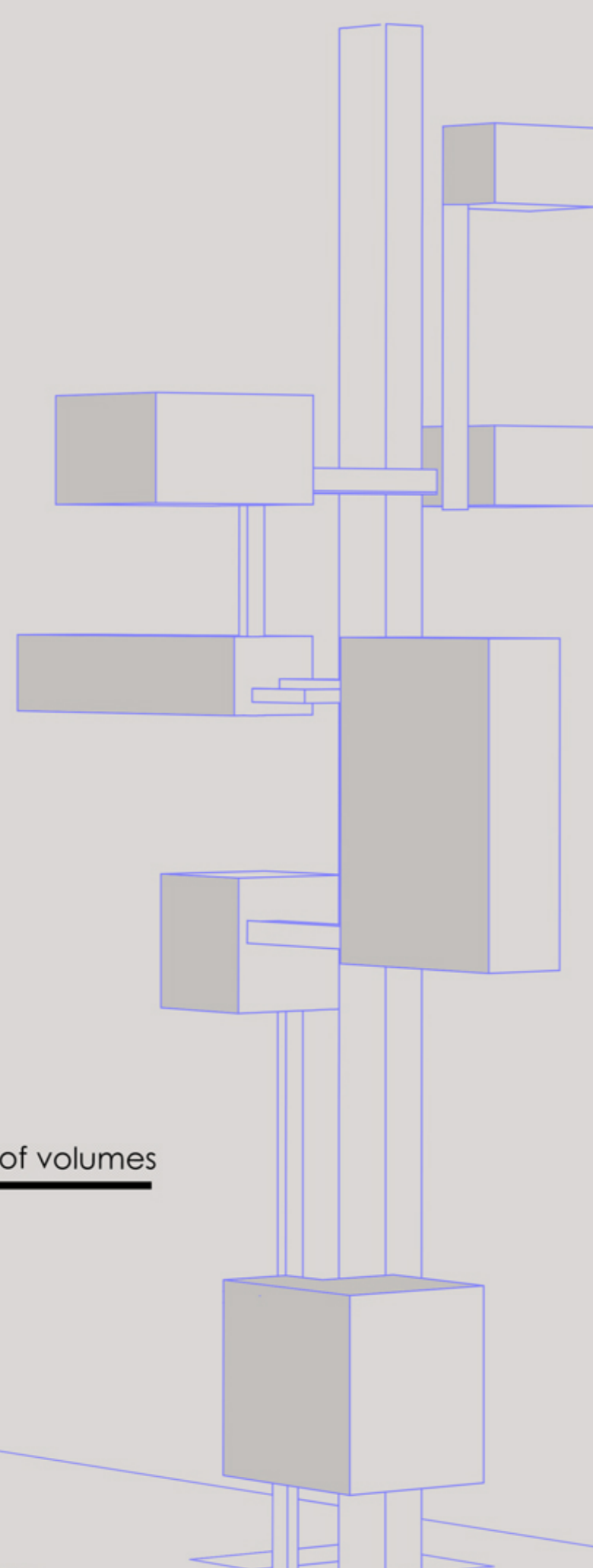


phase_5

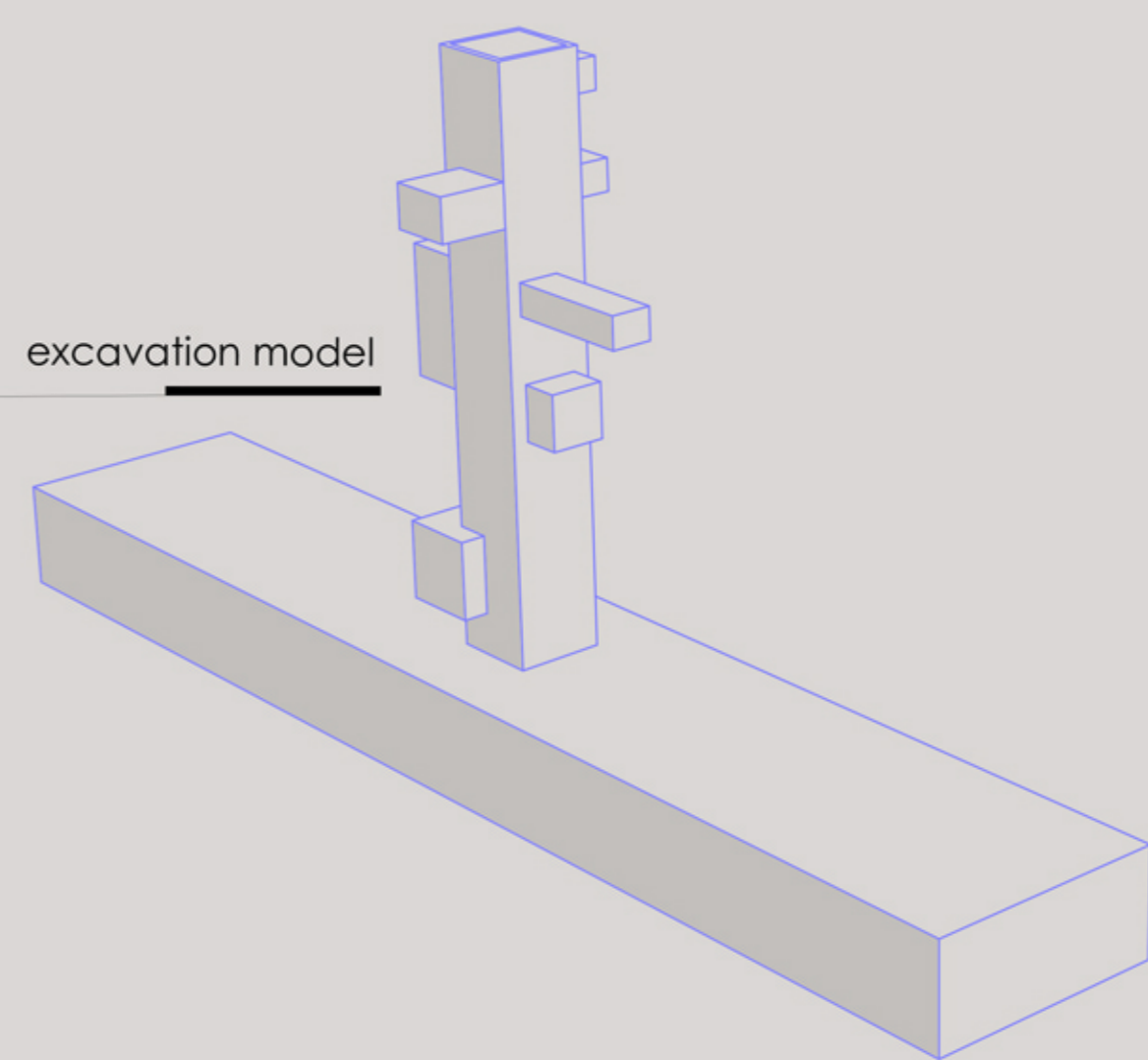
p: 2045-2050
installation of a solar overhang above the hole



axonometry model of volumes



excavation model



under
museum

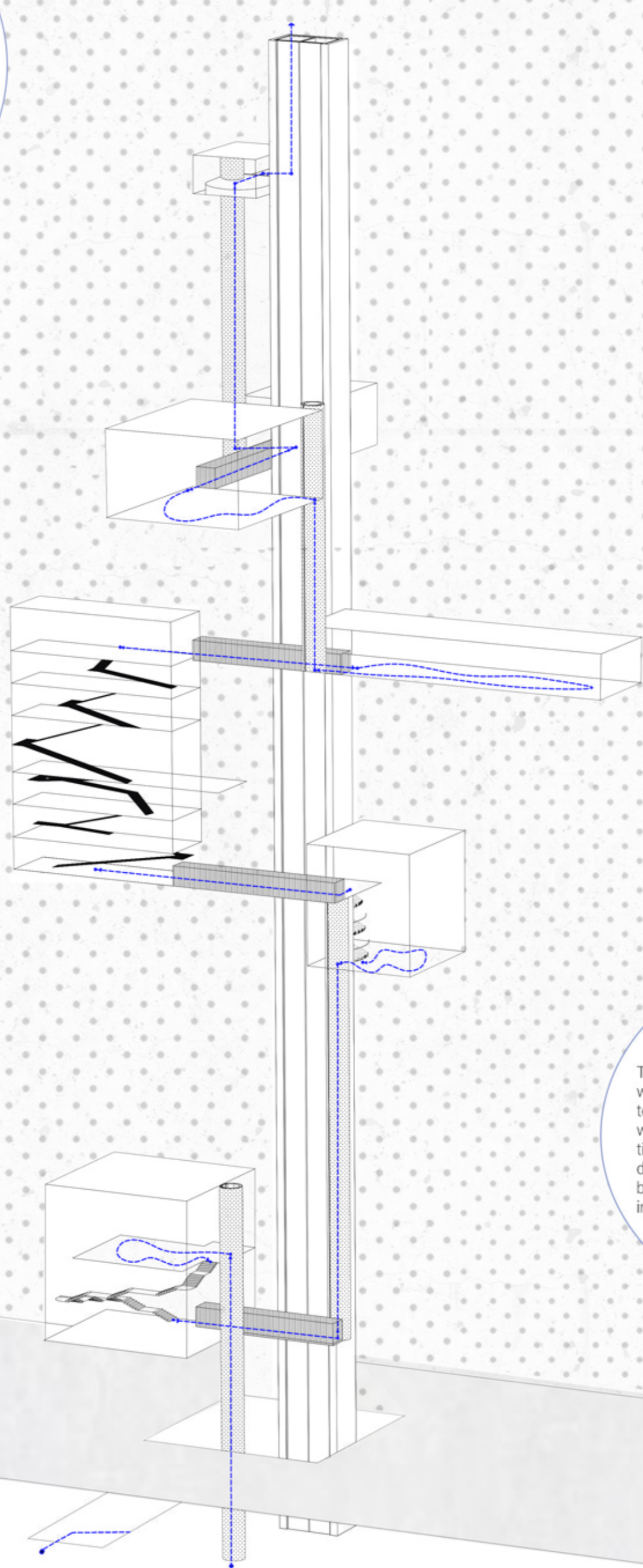


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1_communication diagram
2_functions description

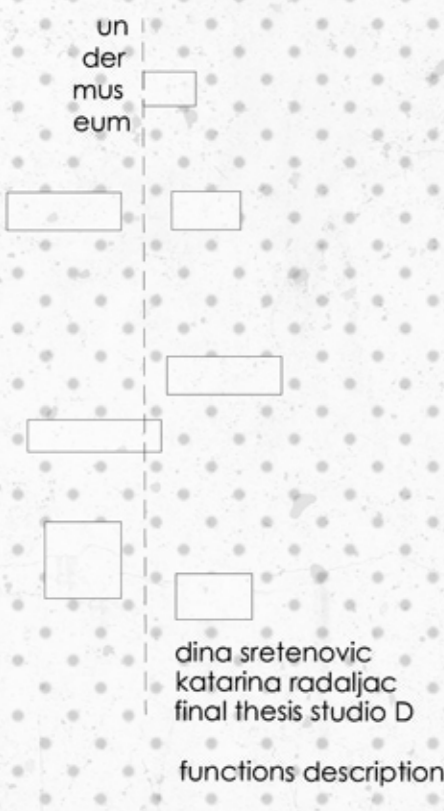
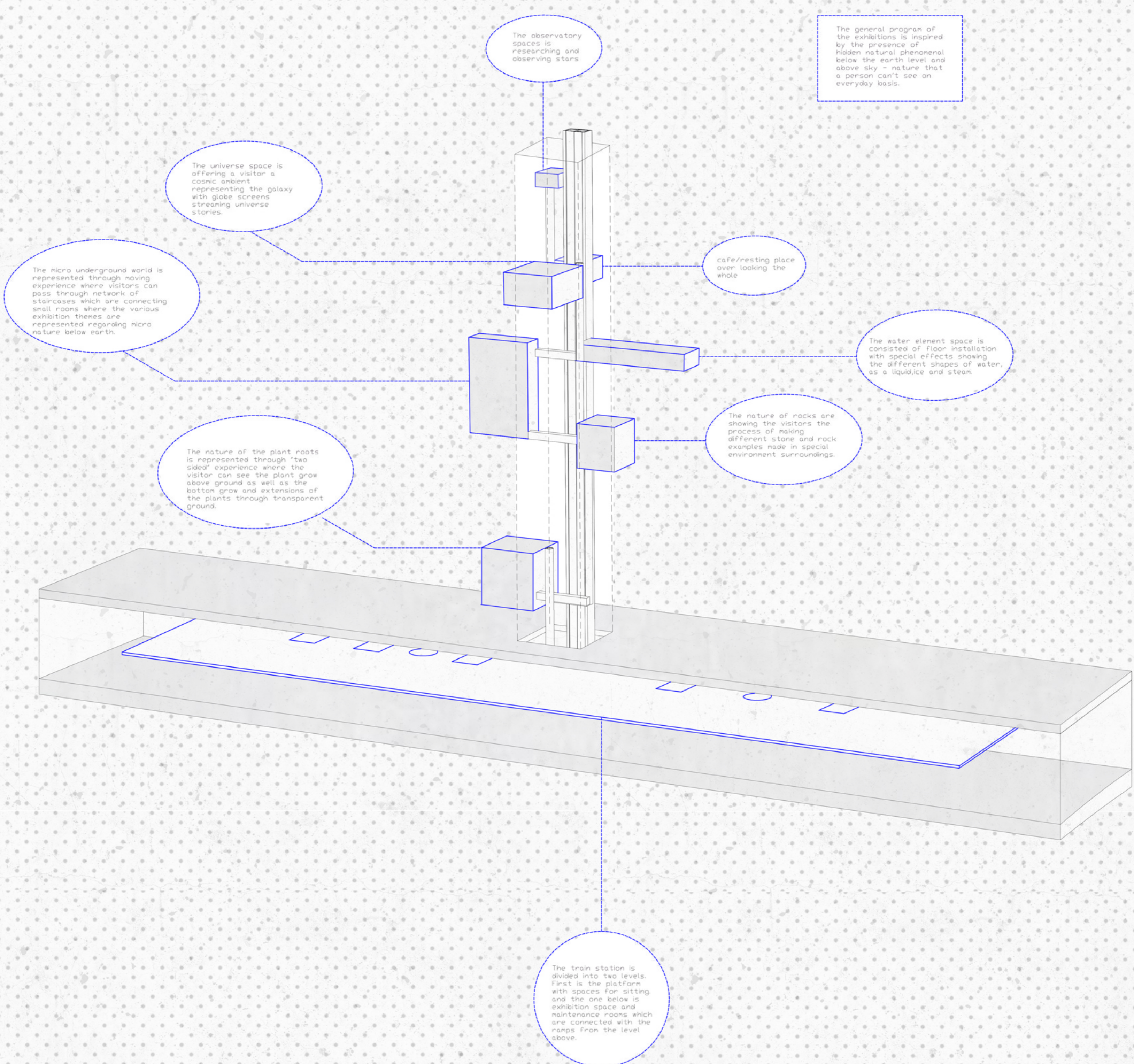
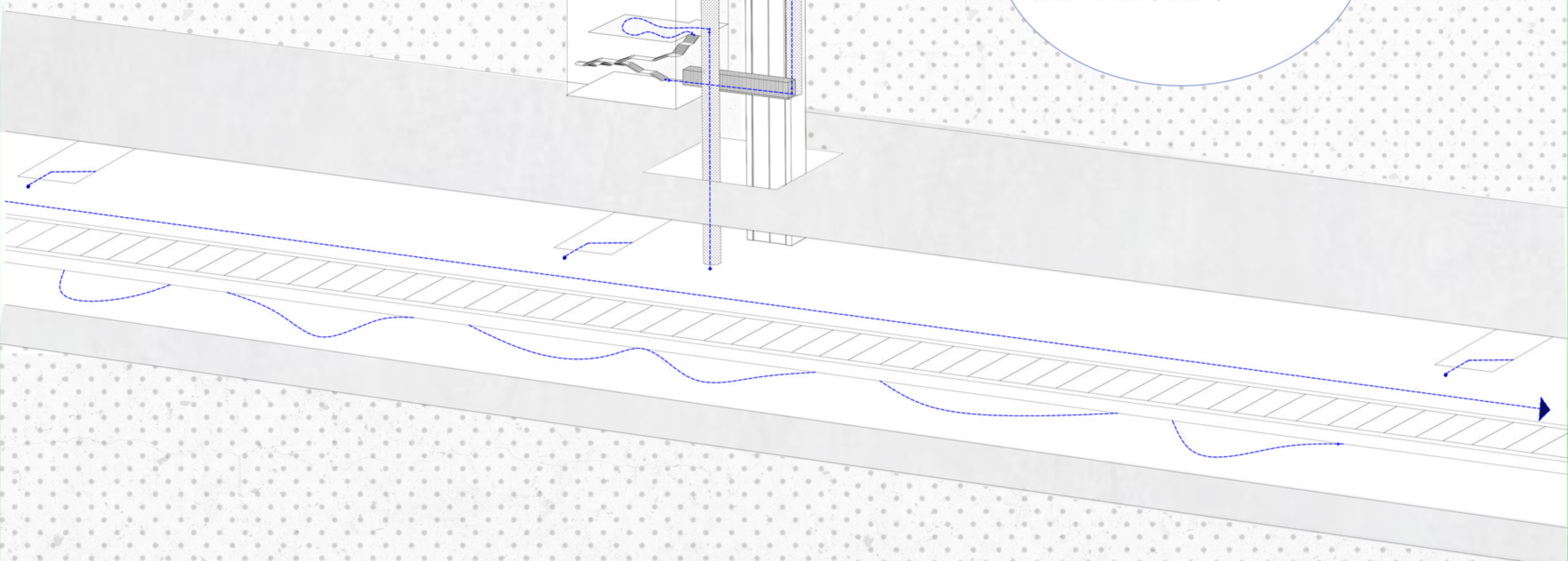
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Thesis Supervisor:
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Andrea Rolando
Academic year of graduation:
2018/2019
CONCEPT DIAGRAM
page 19

Main communication inside of the vertical whole is lift which reaches the surfaces of the ground, and bringing the visitors either from the top or from the bottom of the station. On the top of the building is piazza which welcomes the mountain travelers to approach and enter the museum from top. Inside function communication is provided with small capsule lifts fastened on the whole wall. Between the excavated spaces there are steel bridges connecting rooms and intersecting the whole.

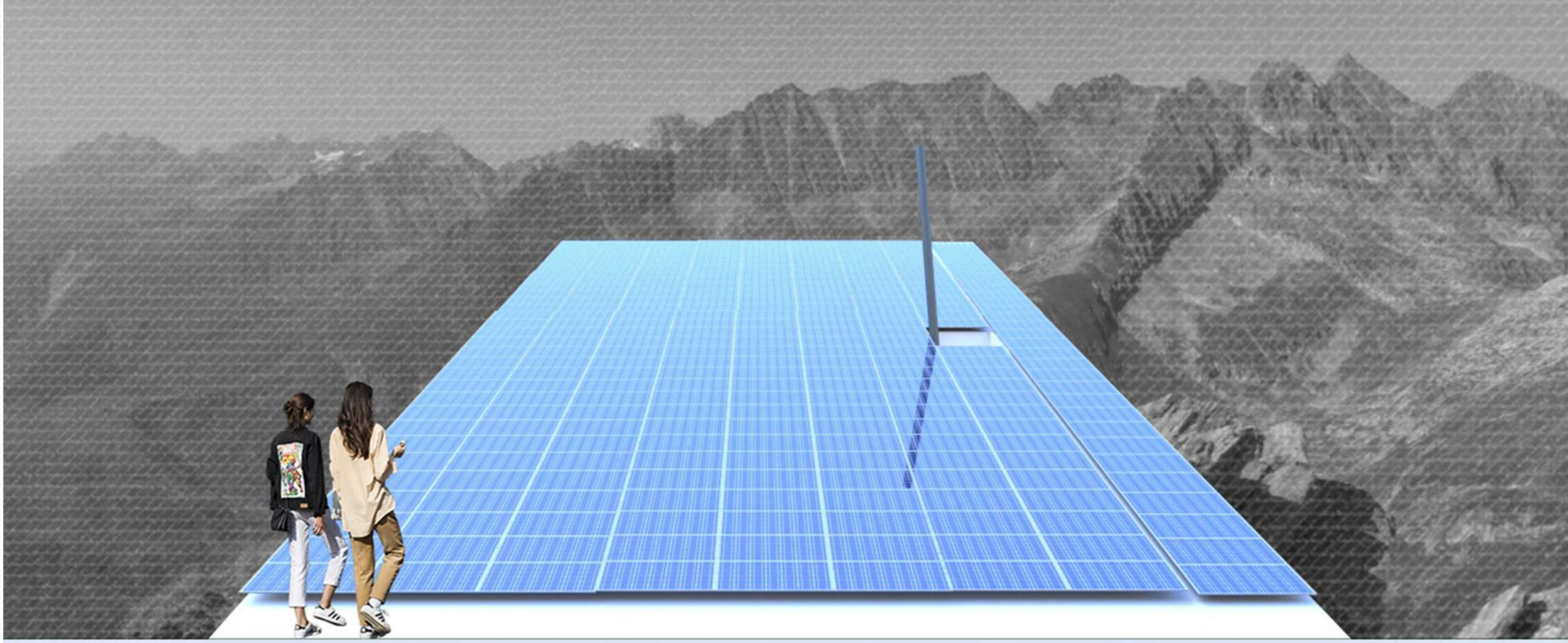
communication:
 □ main elevator
 ▨ "capsule" elevators.
 ■ bridges
 main elevator goes from the station to the top
 capsule elevators are connecting different functions
 bridges as communication and structure elements



Train station is divided into two levels which are connected with lifts and stairs, and visual connection of glass exhibition boxes. First level is the station and mainly the platform where the train arrives. On the level below there are exhibition spaces which are showing the interesting side of underground spaces and its way of building. Also the floor below is serving maintenance and technical spaces which are important for the building functioning.



OVERHANG_SOLAR PANEL OUTDOOR VIEW _1



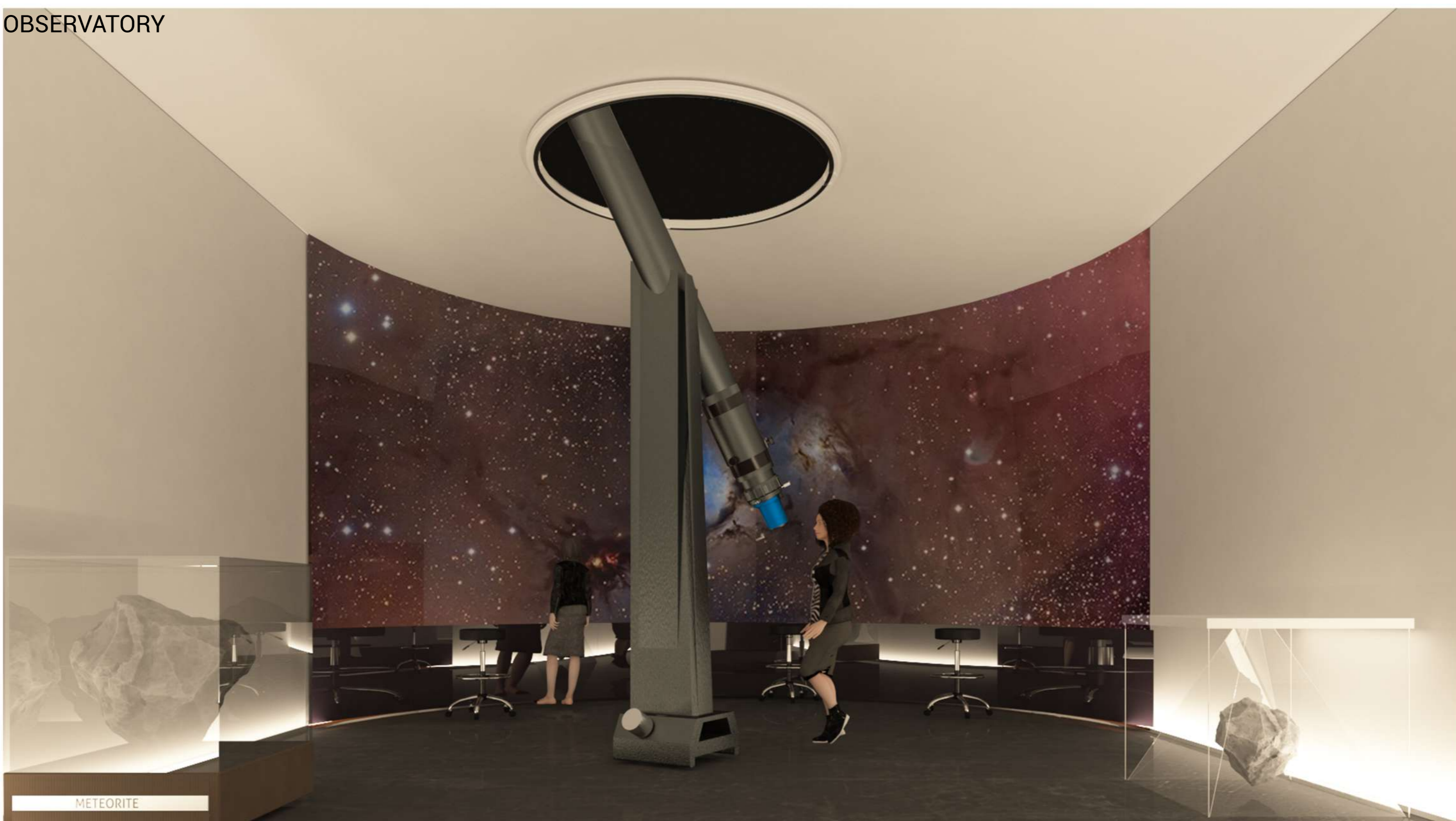
OVERHANG_SOLAR PANEL OUTDOOR VIEW _2



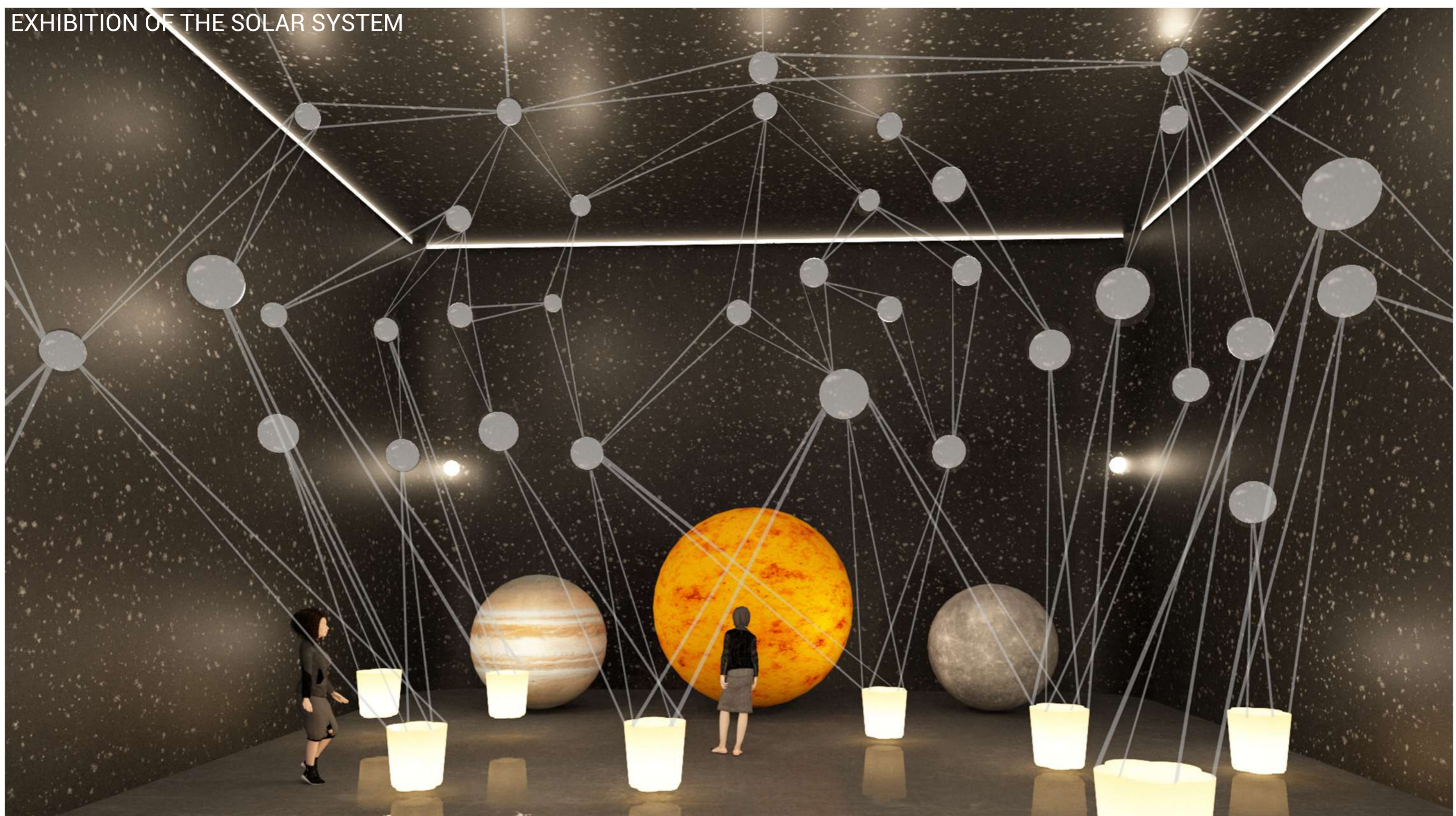
OVERHANG_SOLAR PANEL INDOOR VIEW



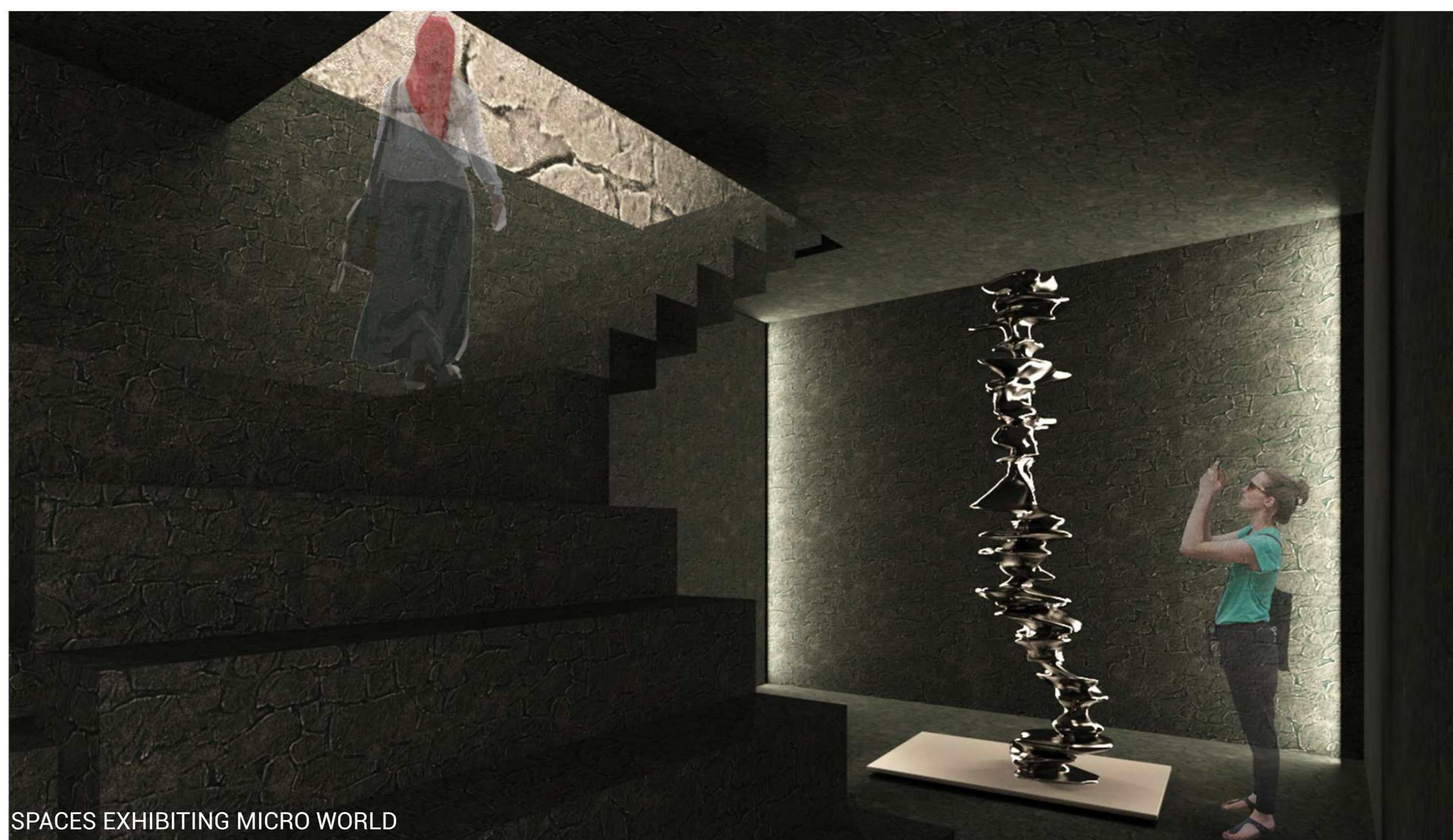
OBSERVATORY



EXHIBITION OF THE SOLAR SYSTEM



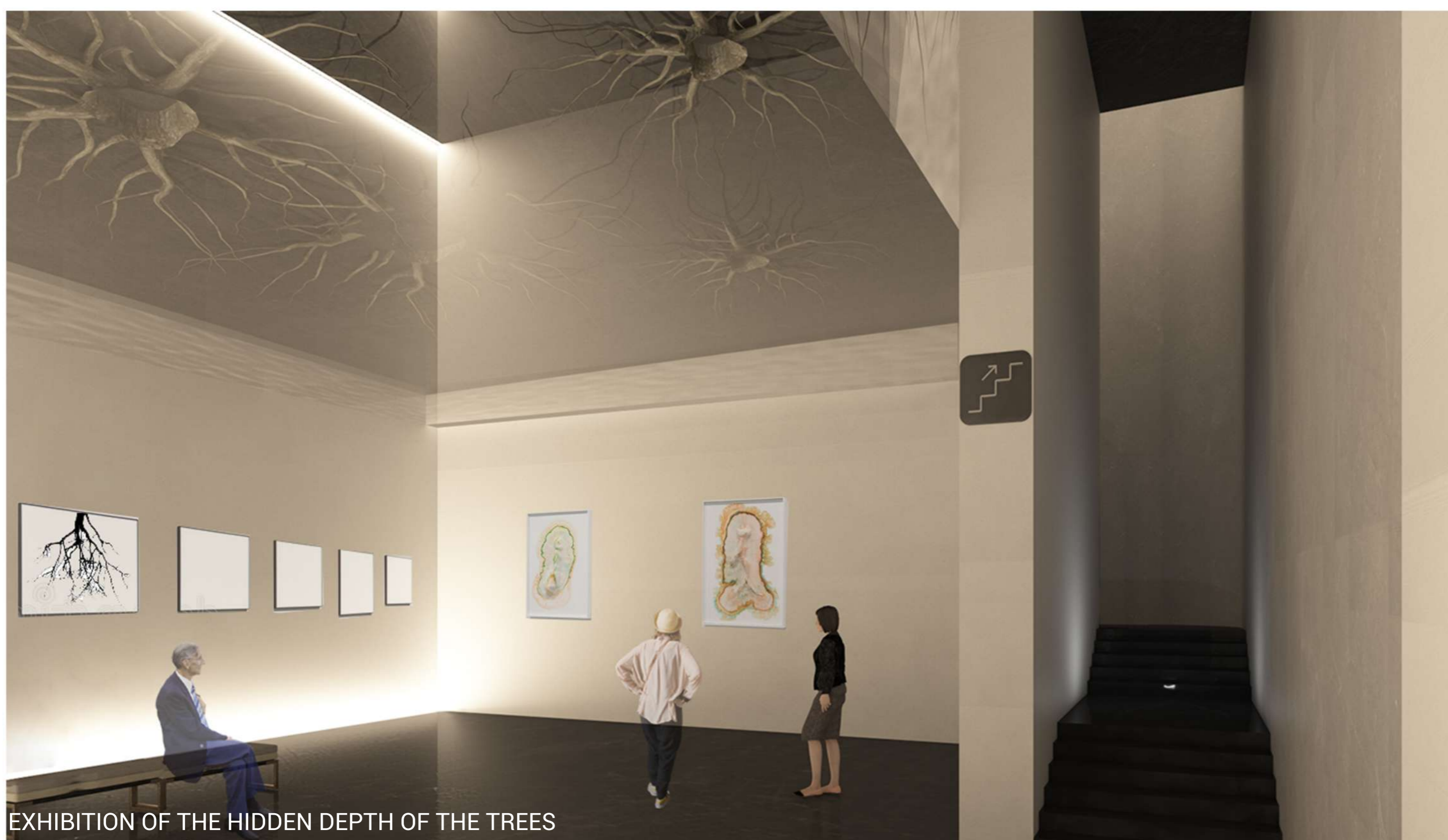
EXHIBITION OF THE WATER AND STEAM



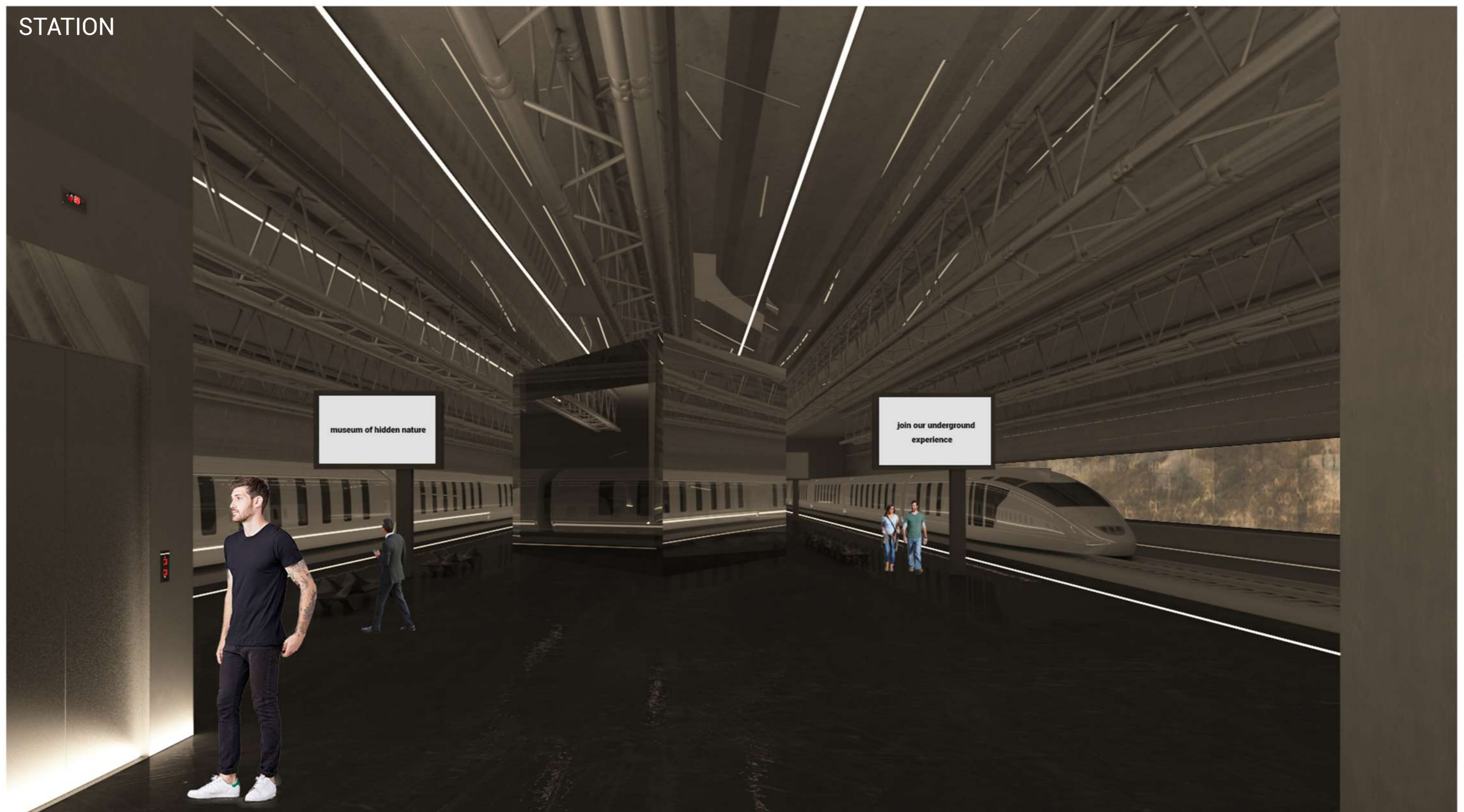
SPACES EXHIBITING MICRO WORLD



EXHIBITION OF THE HIDDEN ROCKS



EXHIBITION OF THE HIDDEN DEPTH OF THE TREES



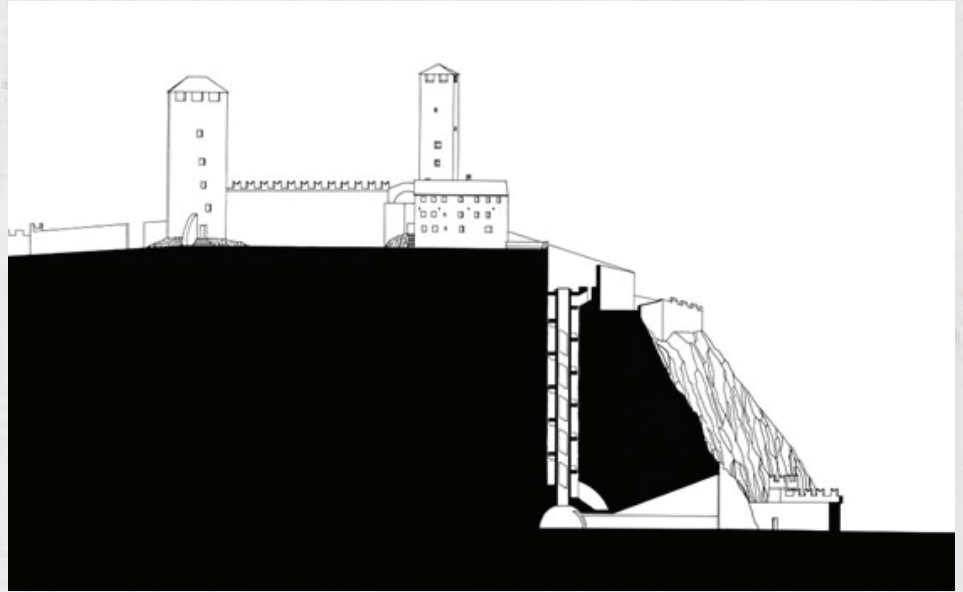
STATION

REFERENCES



a. **Matera, Italy**

Known as *la città sotterranea* ("the underground city"), its historical centre "Sassi" contains ancient cave dwellings. The exact date when these were first occupied, and the continuity of subsequent occupation, are questions that scholars still debate. Sassi, along with the park of the Rupestrian Churches, was awarded World Heritage Site status by UNESCO in 1993.



b. Aurelio Galfetti Castelgrande, Bellinzona, Italy

Combined modern architecture with a sense of Medieval pride, in order to create an “Acropolis of Light”. Aurelio Galfetti joined together pieces that form spaces in which light, objects and landscape carry a silent communication



c. Derinkuyu, Cappadocia, Turkey

Cappadocia city, located in central Turkey, is home to no less than 36 underground cities, and at a depth of approx. 85 m, Derinkuyu is the deepest. Discovered in 1963, the subterranean network of tunnels and rooms include all the institutions and rooms you would find in a regular city: living quarters, stables, churches, storage rooms, refectories, and wineries – and the underground is said to have possibly held more than 20,000 people.



d. **Belgrade underground, Serbia**

Belgrade underground reveals the most hidden secrets of this city. Rich history is kept by caves, dungeons, walled rivers, tunnels, bunkers, and numerous constructions demolished and built by nations that settled here during time

Underground tells the legend about Belgrade from Roman, Austrian, Turkish and Serbian period. Everyone of these époques carries authentic charm. Roman Hall preserves the tower of the main gate of the Roman fortress from 2nd century.

Army bunker from the period of Informbiro reveals the spy secrets and President Tito's political games between great forces after the World War II.

Gunpowder warehouse walls tell the stories about defense of Christian Europe from Turkish Empire. This warehouse is now Roman lapidarium that keeps sarcophagus, tombs and altars from territory of Serbia. Wine cellar exudes the time of Serbian liberation from the Turkish rule.



e. Piazza Garibaldi / Dominique Perrault, Napoly Italy

This infrastructure project includes metro station,two station share piazza:open space, composed of irban park, luxuriant gardens, large ponds, a protected area, a hypogeum covered with a large pergola and an open promenade with boutiques lining both sides.

Through structurally and materially different, the new roof fits right into the aligment and the extensions of the central station's roof.

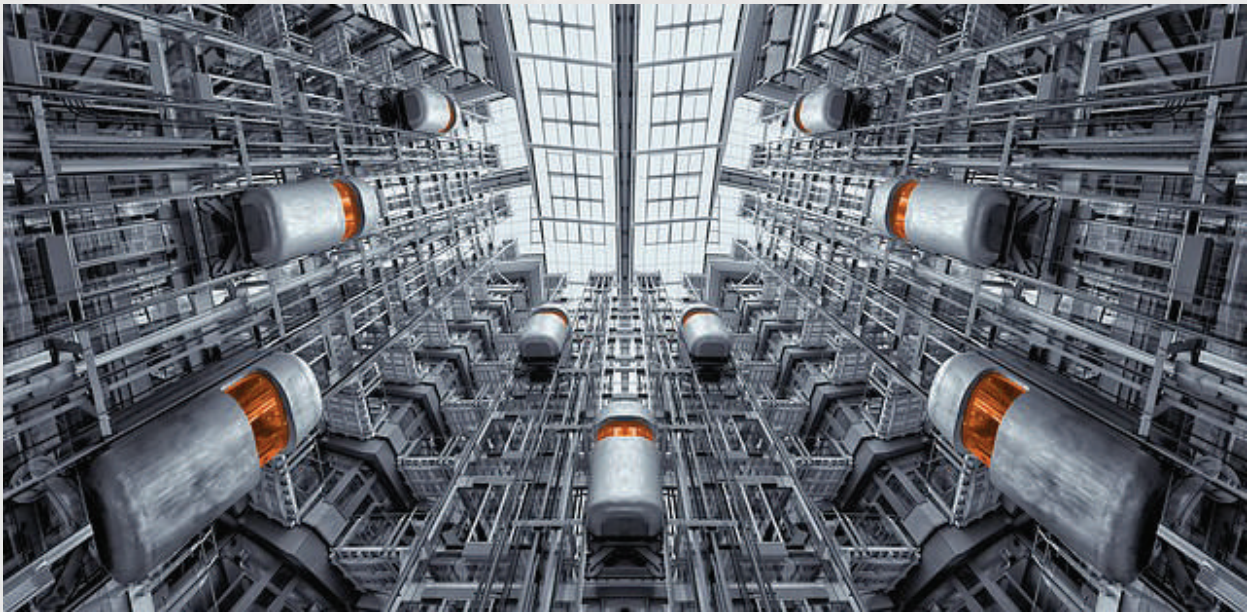
Composed of a series of eight metallic trees, in simple variations of three patterns, creates a framework resembling clusters of knotty and flexible bamboos talks. the covering is a vast prismatic surface composed of different types of perforated metal in varying densities, whose appearance is constantly changing.



f. Wieliczka Salt Mine, Krakow, Poland

Located in the town of Wieliczka just over 9 miles outside of Krakow, the Wieliczka Salt Mine was built back in the 13th century and has produced table salt continuously until 2007.

One of the biggest tourist draws of Poland, this underground salt city has evolved from a series of dark caves to a complex labyrinth now comprising over 185 impressive miles of galleries, about 3000 chambers and nine floors, with the first three open to the public



g. Ludwig-Erhard-Haus, Nicholas Grimshaw, Berlin, Germany

Nicknamed the Armadillo due to its armoury-style steel-clad roof, this futuristic Postmodernist conference and office building was designed by British architect Sir Nicholas Grimshaw in the mid-1990s. The atrium of the high-tech building is just as likely to feature in a sci-fi thriller as it is to play host to the Berlin Stock Exchange, with its dramatic ribcage of steel and elevator capsules with orange-tinted windows

BIBLIOGRAPHY

- <https://www.thenatureofcities.com/2017/01/22/future-cities-live-underground-thats-not-pile-schist/>
- <https://grimshaw.global/projects/ludwig-erhard-haus/>
- <http://hiddenarchitecture.net/castelgrande/>
- <https://www.momondo.com/discover/article/secret-underground-cities-in-the-world>
- <https://www.archdaily.com/805982/mercedes-benz-museum-unstudio>
- <https://theculturetrip.com/europe/germany/articles/11-futuristic-places-in-germany-that-are-straight-out-of-blade-runner/>
- <https://grimshaw.global/projects/ludwig-erhard-haus/>
- http://www.perraultarchitecture.com/en/projects/2497-piazza_garibaldi.html
- https://en.wikipedia.org/wiki/Ant_colony_optimization_algorithmsv
- <https://phys.org/news/2014-02-size-depth-subsurface-biosphere.html>
- <https://www.popsoci.com/humans-survive-underground>
- <https://www.dezeen.com/2016/11/04/rasem-kamal-oppenheim-architecture-conceptual-subterranean-housing-wadi-rum-excavated-sanctuaries-jordan/>
- <http://www.firecurtains.co.uk/underground-cities-the-future-or-foily/>
- <http://archeyes.com/architecture/utopian-projects/>
- <http://www.periodicodaily.com/v-giornata-del-patrimonio-archeologico-della-valle-di-susa-villa-romana-di-grange-di-rivera-ricetto-di-san-mauro-e-cappelle-a-porte-aperte/>
- <http://www.maurizioweb.it/montagna/piemonte/jafferai/index.php>
- <http://edwardogosta.com/dwelling-without-a-plan/dwelling-without-a-plan-edward-ogosta-architecture-13>

Museo della natura nascosta

Studio di tesi finale D

Politecnico di Milano 2019

Museo della natura nascosta

Politecnico di Milano 2019

Studio di tesi finale D

Professori_ Alessandro Rocca

_ Pierluigi Salvadeo

_ Andrea Rolando

Mentore di tesi_ Pierluigi Salvadeo

Studenti_ Dina Sretenovic

_ Katarina Radaljic

IL RIASSUNTO

Il progetto stesso si trova nell'area tra la Provenza-Alpi-Costa Azzurra e l'Alvernia-Rodano-Alpi. In senso geologico, queste regioni sono valli glaciali. Si sono formate quando un ghiacciaio è attraversato e sceso un pendio, scolpendo la valle con l'azione della purga, che dopo che il ghiaccio si sono ritirati, ha lasciato la valle con i lati molto ripidi e un ampio piatto terreno. Le crepe nel terreno, chiamate gradini della valle, sono spesso riempite d'acqua che forma laghi, corsi d'acqua e fiumi, a volte persino cascate. Se non riempite dall'acqua, queste crepe o burroni variano dalle dimensioni alle profondità e possono raggiungere qualche centinaio di metri di profondità nella Terra. Questi sono chiamati gli approfondimenti. La Valle di Susa è un ottimo esempio di una di queste valli. Si estende per oltre 50 km e copre parti della Francia e dell'Italia. È circondato da più di 10 cime delle montagne, ognuno dei quali raggiunge altezze più di 3000 m, e un fiume Dora Riparia scorre attraverso della valle.

Storicamente queste regioni sono estremamente importanti. Durante l'epoca romana Annibale attraversò le Alpi per attaccare l'Impero romano che era un'impresa inaudita e che sarebbe difficile anche oggi. Pochi secoli dopo, Augusto, l'imperatore romano, che comprese l'importanza di questi attraversamenti, costruì un'alleanza con le tribù francesi per costruire una cavalcata attraverso la valle per il trasporto di persone e merci. A causa del frequente viaggio di persone, furono costruite diverse abbazie e monasteri per i pellegrini in viaggio. Questi monasteri ed abbazie esistono ancora oggi, dopo centinaia di anni, e forniscono un'attrazione turistica e aggiungono alla bellezza dell'intera regione. L'abbazia di Novalesa e l'abbazia della Sacra di San Michele sono le più conosciute e le più antiche.



La Valle di Susa



Successivamente queste strade furono pesantemente utilizzate anche da Napoleone. La loro importanza era così significativa che anche ora le persone li stanno usando, costruendo binari ferroviari che collegano diverse parti d'Europa.

Tutto è iniziato nel secolo diciannovesimo, quando è cominciata la costruzione del tunnel del Mont Cenis. Quello era un tunnel ferroviario lungo quasi 14 km che collegava Italia e Francia. La costruzione è finita nel 1871 e ci sono voluti solo 14 anni per completarla, ma questo era incredibile poiché la stima originale era che ci sarebbero voluti quasi 40 anni con la tecnologia e le conoscenze disponibili a quello momento. Ciò ha gettato le basi per un progetto più grande che è arrivato quasi 100 anni dopo: la rete Ten-T della linea metropolitana europea.



Il Traforo ferroviario del Frejus

Il Traforo ferroviario del Frejus è un tunnel ferroviario di 13,7 km di lunghezza nelle Alpi europee, che trasporta la ferrovia Torino-Modane attraverso il Mont Cenis fino a un collegamento diretto con la ferrovia Culoz – Modane e collega Bardonecchia in Italia a Modane in Francia.



Sacra di San Michele



Abazia di Novalesa



La nuova rete ferroviaria europea è in costruzione, con l'obiettivo di integrare le economie locali e i paesi nel mercato globale. Anche questo modo di trasporto è la chiave per limitare l'aumento della temperatura e il riscaldamento globale, poiché i treni forniscono i mezzi più ecologici e sostenibili per spostare persone e merci, salvaguardando nel contempo il patrimonio culturale e naturale. Questo progetto è anche noto come la "nuova via della seta ferroviaria" poiché Russia e Cina stanno facendo lo stesso in Asia. Il piano è di collegarli tutti per formare una rete euroasiatica che andrà a beneficio di tutti gli aspetti economici, culturali, ecologici e in tutti gli altri modi possibili.



SPAZI SOTTERRANEI

Ricordiamo che le caverne e le cavità sono intrinsecamente legate alla storia umana: sono state utilizzate come abitazioni e per la conservazione del cibo dal Paleolitico, milioni di anni fa. Più recentemente, quelle che possono essere descritte come città sotterranee esistevano in Cina (Banpo), Turchia (Cappadocia) e Israele (Maresha) tra i due e i tremila anni fa. I passaggi sotterranei per l'evacuazione di emergenza erano parte integrante di molte città medievali. Oggi ci sono villaggi trogloditi in Francia (vicino a Poitiers), in Spagna (Granada) e altri, dove migliaia di persone sembrano vivere una bella vita.

Le congetture sono che la vita in montagna sarà il futuro a causa dei cambiamenti climatici e del surriscaldamento. Le persone risaliranno alle origini, la loro vecchio modo di vivere, quando i nostri antenati vivevano nelle caverne. "Gli spazi sotterranei sono meno suscettibili alle influenze esterne e il loro impatto sull'ambiente esterno è inferiore rispetto alle strutture fuori terra." Inoltre, "le strutture sotterranee profonde subiscono significativamente meno danni durante i terremoti rispetto alle strutture fuori terra."

Quasi il 70 per cento della popolazione mondiale vive nelle aree urbane e, secondo le Nazioni Unite, due miliardi di persone in più si trasferiranno nelle città nei prossimi 20 anni. È probabile che la dimensione della città stessa crescerà ancora più velocemente del suo tasso di crescita demografica: il 276% contro il 66%, secondo Shlomo Angel e Stephen Sheppard, tra 20 anni.

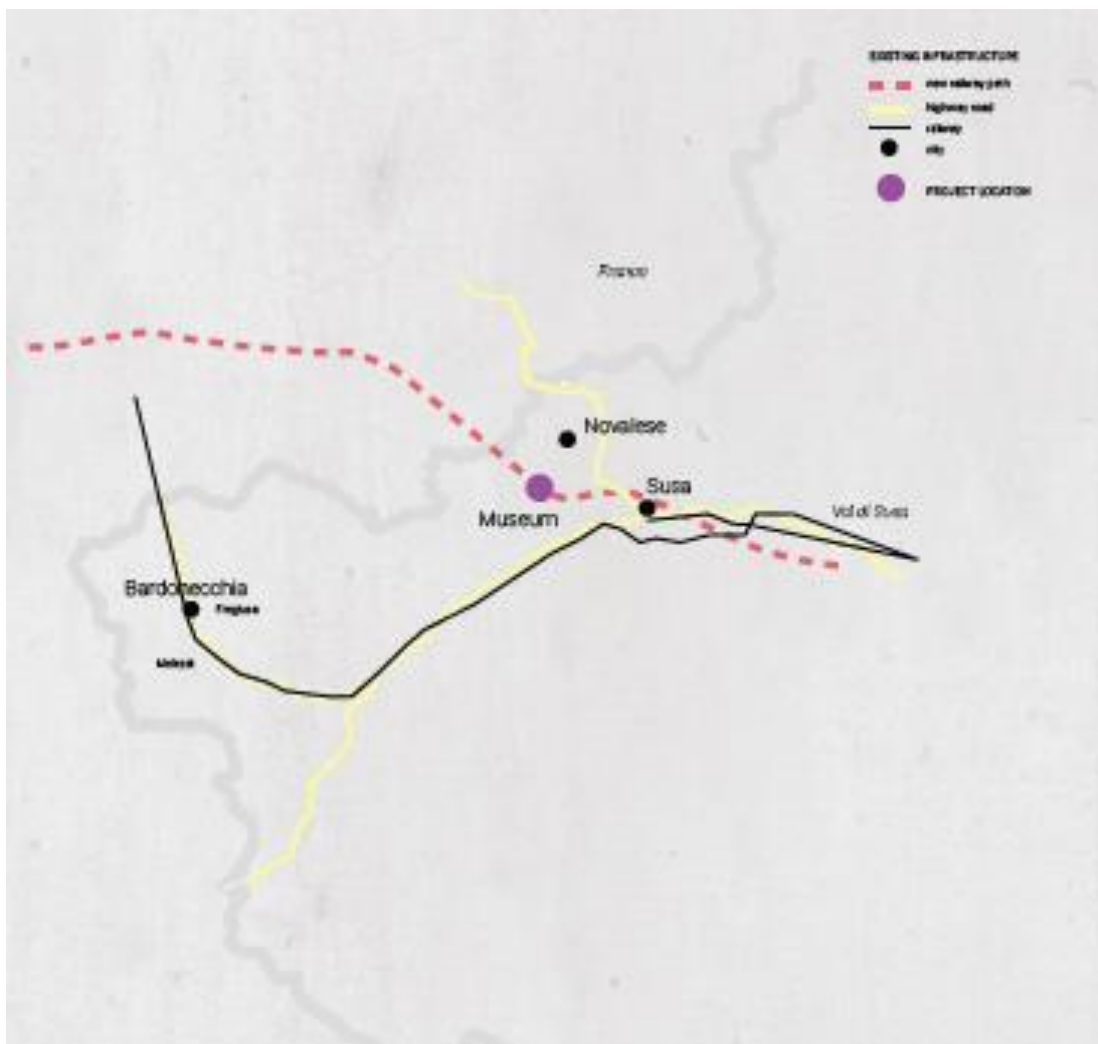
Da questo punto di vista, le città saranno potenzialmente piene di costruzioni, soprattutto considerando che i futuri sviluppi delle città dovrebbero essere - e progettati per essere - sostenibili. Investire nei sotterranei delle città è necessario per rendere le città di domani più sostenibili. Sono spazi temperati, con meno variabilità di temperatura rispetto alla superficie, oltre a conservare il calore per futuri risparmi energetici. Inoltre, l'acqua potabile sarebbe più facilmente conservabile, grazie a un minor numero di contaminanti dalle acque reflue superficiali. Infine, l'energia geotermica ci consente già di produrre calore e freddo utilizzando le risorse sotterranee.

APPROCCIO CONCETTUALE

Il concetto del progetto è quello di intersecarsi con la nuova linea ferroviaria e collegarsi ad essa creando una nuova stazione ferroviaria sotto la montagna. L'obiettivo è quello di scavare 140 m dalla superficie del suolo e raggiungere i 650 m di elevazione terrestre su quale linea orizzontale scorrerà il nuovo treno TAV.

Tutto questo nel terreno potrebbe essere integrato con molte funzioni ora e più tardi, ma l'idea di questo progetto era quella di creare un museo con contenuti specifici relativi alla posizione e alla forma.

La Valle di Susa è stata conosciuta come una zona di transito attraverso la quale le persone passano e viaggiano costantemente e questa posizione ha il potenziale per creare nuova attrazione e dare un punto significativo a questa zona.



MUSEO SOTTERRANEO

Lo spazio nascosto nel terreno porta all'idea del Museo sotterraneo che programma è quello di mostrare i segreti della natura da cui siamo costantemente circondati ma non possiamo vederlo poiché è sepolto sotto la terra o sopra il limite del cielo. Molti fenomeni naturali, che questo Museo vuole rappresentare, sono in scala molto ridotta come il micro mondo e il suo ciclo di vita organizzativo perfetto, o in dimensioni gigantesche come l'universo costituito da tutte le forme di materia ed energia.

Lo sviluppo del concetto ha il suo percorso di cambiamento e formazione verso la migliore soluzione, ma consisteva nel fatto che l'intero complesso raggiungesse il fondo del livello della stazione di 650 m di altezza e volumi scavati attorno a tutto il tutto che fungono da spazi espositivi.

La comunicazione all'interno del progetto proviene principalmente dalla nuova stazione ferroviaria che va in entrambe le direzioni - verso la Francia e l'Italia.

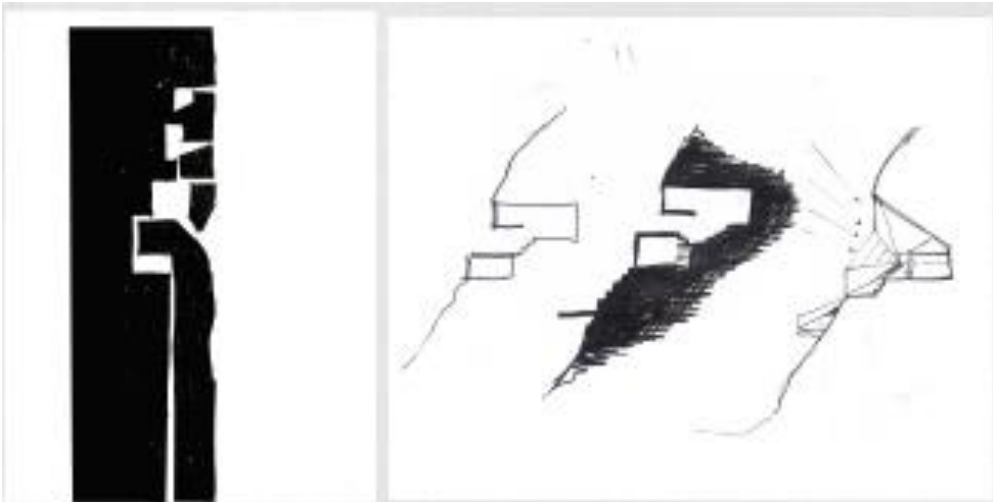
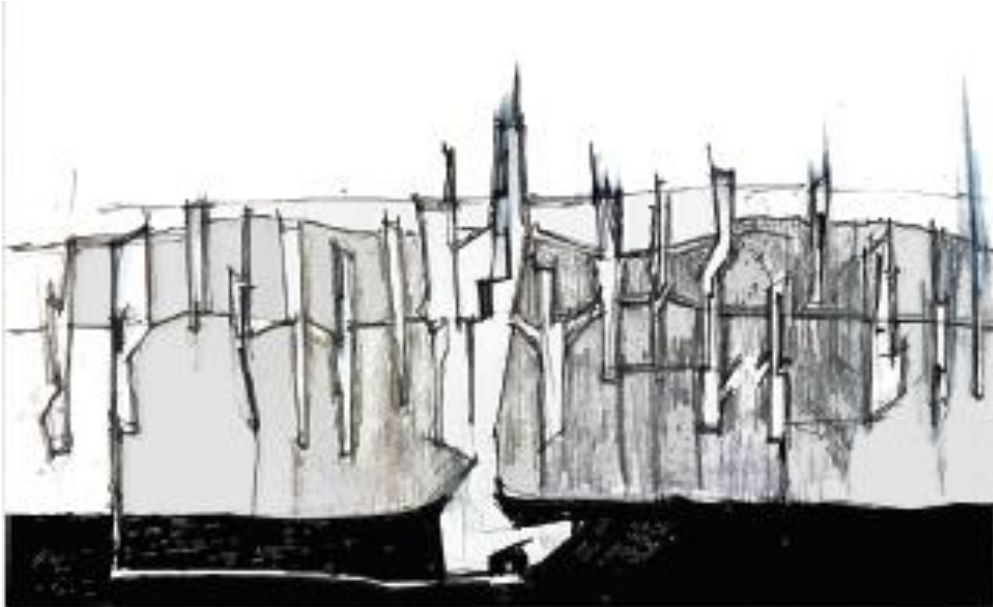
La comunicazione principale all'interno dell'intero verticale è l'ascensore che raggiunge le superfici del terreno, portando i visitatori dall'alto o dal basso della stazione. Nella parte superiore dell'edificio sono posti quadrati che accolgono calorosamente i viaggiatori di montagna per avvicinarsi ed entrare nel museo dall'alto. All'interno dell'edificio tra spazi espositivi la comunicazione è fornita con piccoli sollevatori a capsula fissati su tutta la parete e sono ponti in acciaio che si intersecano con il tutto.

La stazione ferroviaria è divisa in due livelli che sono collegati con ascensori e scale e connessione visiva di scatole espositive in vetro. Il primo livello è la stazione e principalmente il platform dove arriva il treno. Al piano inferiore ci sono spazi espositivi che mostrano il lato interessante degli spazi sotterranei e il suo modo di progettare le costruzioni sotterranee. Anche il piano sottostante serve manutenzione e spazi tecnici che sono importanti per il funzionamento dell'edificio.

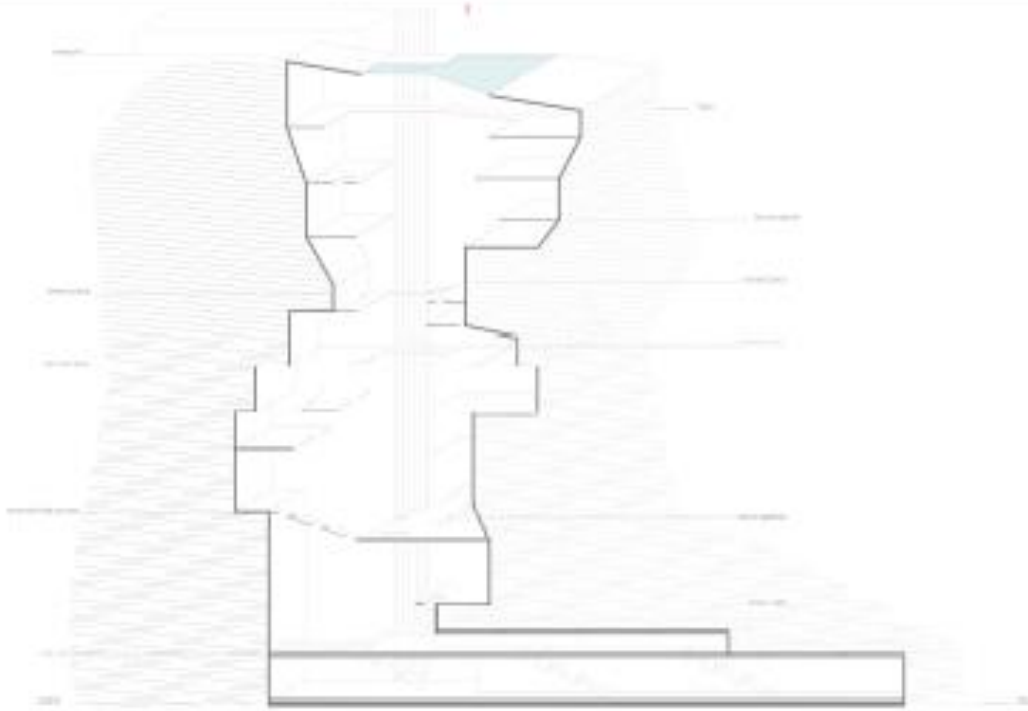
Gli scavi intorno all'edificio principale presentano elementi artificiali che si affacciano sull'insieme. Questi spazi hanno forme diverse che formano l'esperienza espositiva legata al suo tema.

SVILUPPO DEL CONCETTO

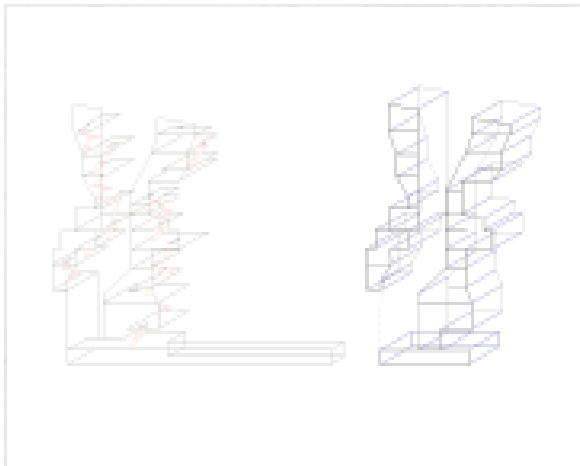
Primi schizzi concettuali di scavo delle rocce



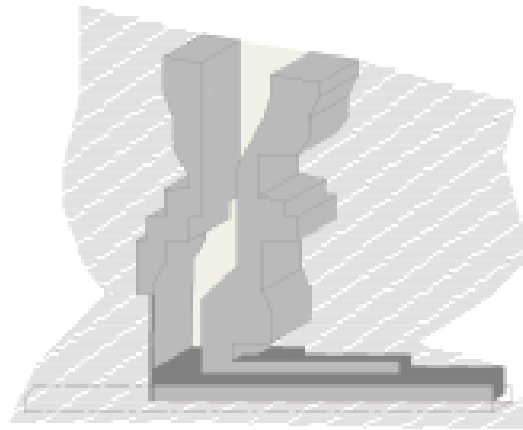
DISEGNO ED ABBOZZO INIZIALI



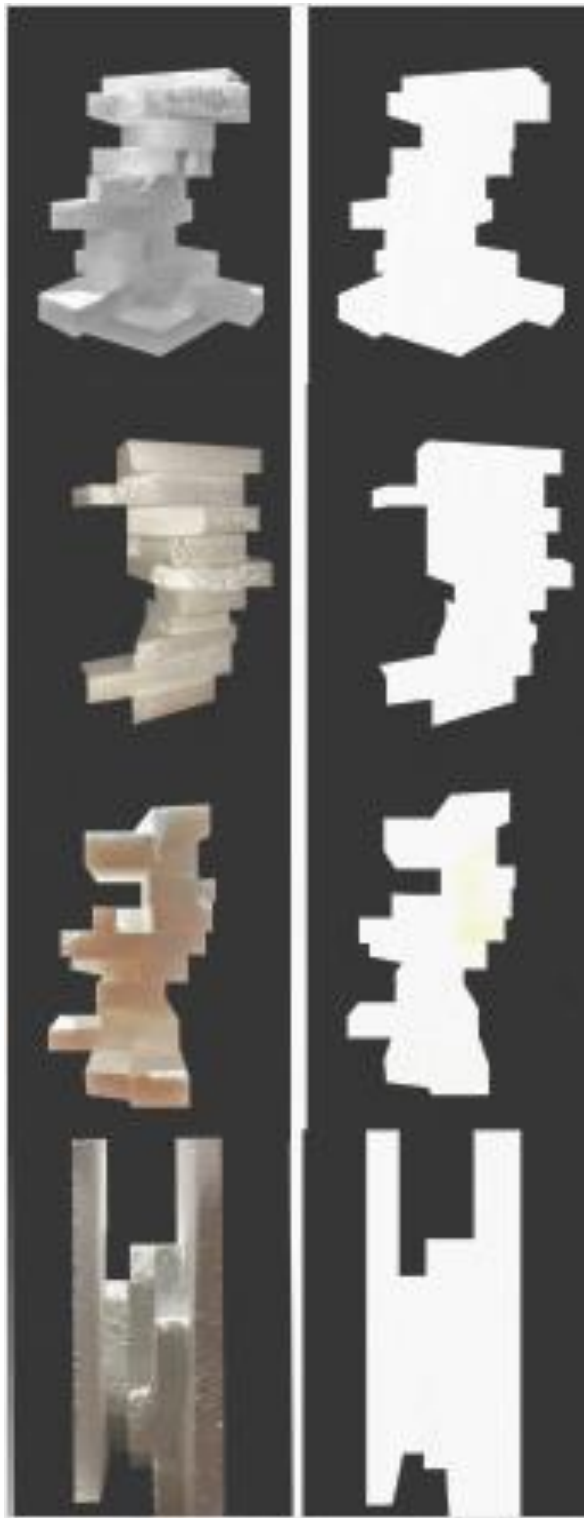
Sezione



Diagrammi



Volumi



Giocando con il modello, invertendo la massa nelle forme scavate

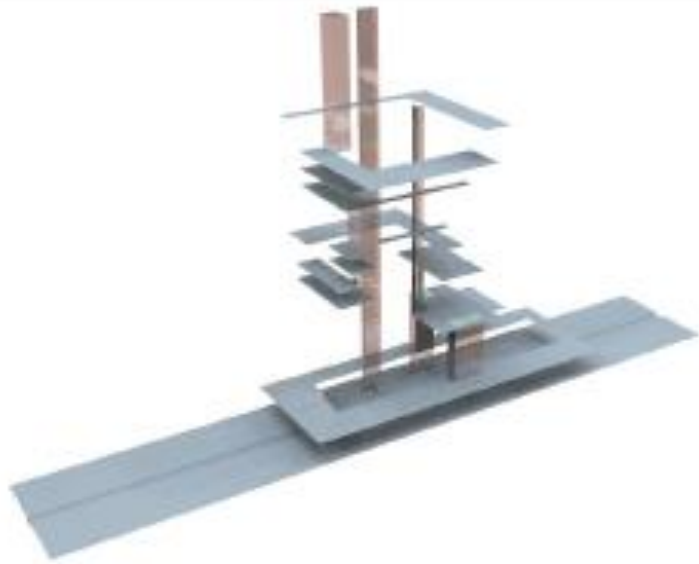
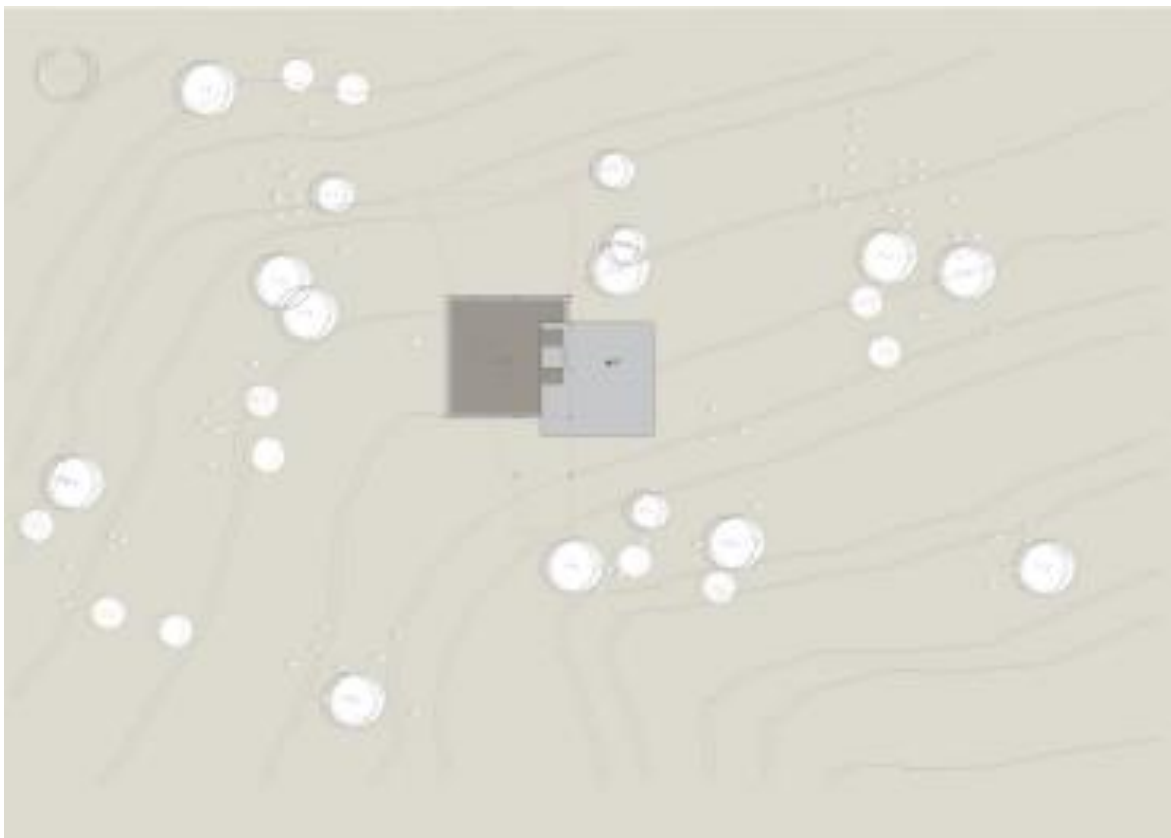
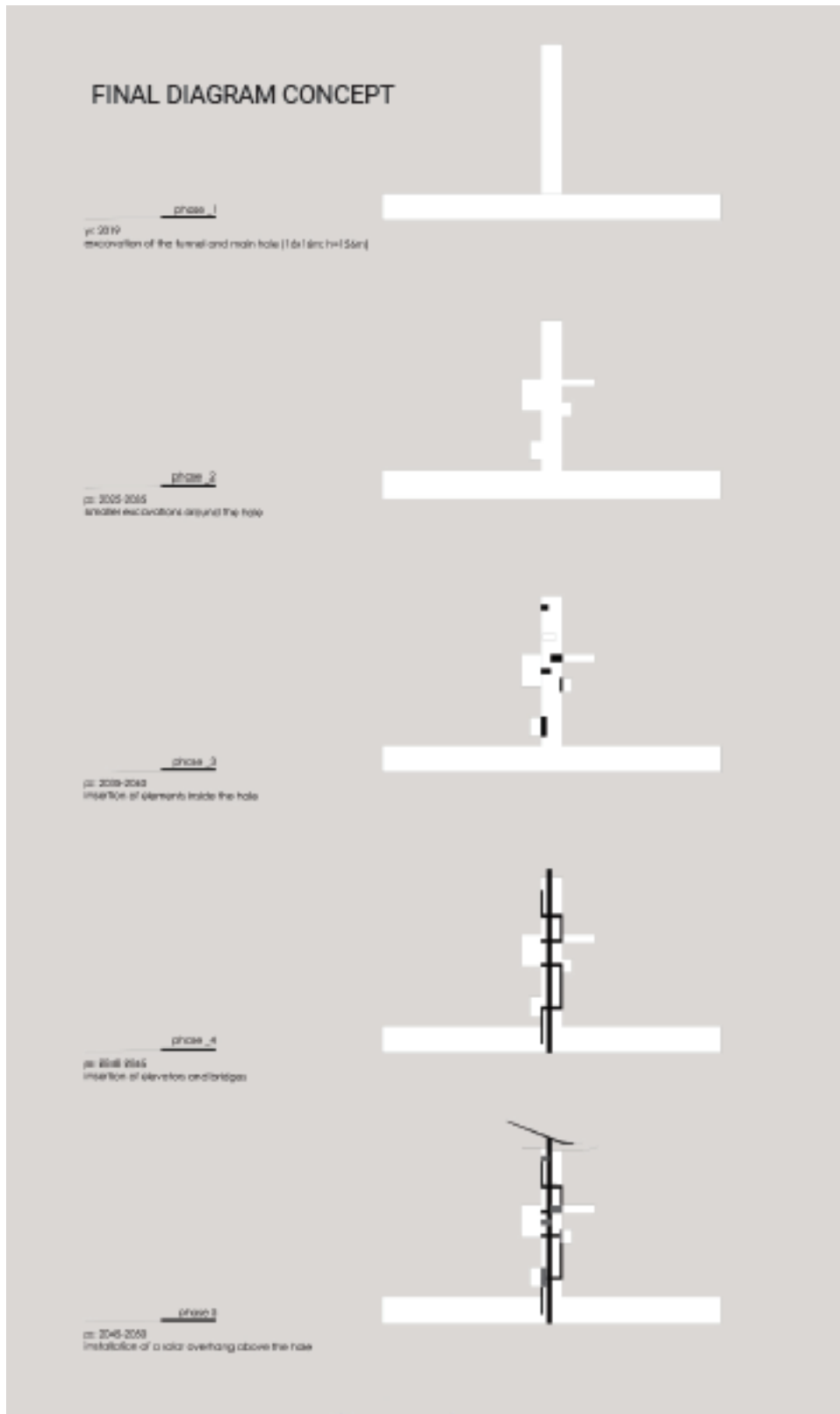


Diagramma dei platfrom



Piano di situazione

CONCETTO DEL DIAGRAMMA FINALE



main lift from bottom to the top – ascensore principale dal basso verso l'alto
secondary lifts between functions - ascensori secondari tra le funzioni
bridges - ponti

communication diagram - diagramma di comunicazione

