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Recreation Center in Nin, Croatia

Masterarbeit



ausgeführt zum Zwecke der Erlangung des akademischen Grades
einer Diplom-Ingenieurin
unter der Leitung vom

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E253

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eingereicht an der

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Abstrakt

Die Masterarbeit beschäftigt sich mit dem Thema einer Rekreationszentrum an der Adriaküste in Nin, Zadar. Als Rekreationszentrum ist es das Ziel einen Spa und Wellnesszentrum für aktive und passive Erholungen mit direkten Verbindung zum Natur zu errichten.

Das Bauort liegt auf einer Halbinsel zwischen der historischen Altstadt und Nins National Park. Naturerbe ist eine regionale und nationale Attraktion. Das Gebiet hat einzigartige Flora und Fauna: in Nin Lagune findet man zahlreiche seltene und endemische Pflanzen und Tieren. Der heilende Schlamm gehört auch zu den wertvollsten Potentiale der Region. Die Wirksamkeit des Peloids wurde von der Zadar Health Institution geprüft und überwacht. Diese einzigartige natürliche Behandlung kann mehrere Krankheiten wie rheumatische Erkrankungen, Wirbelsäulenverformungen, Muskel- und Skelettsystemprobleme und verschiedene Hauterkrankungen heilen.

Abstract

The master thesis outlines a design proposal for a new recreation center on the Adriatic Coast, in Nin, Zadar County. As a recreation center the aim is to ensure a perfect location for active and passive recreation using the town's most valuable natural potential, the medicinal mud (peloid). The effectiveness of the peloid has been tested and supervised by the Zadar Health Institution. This unique natural treatment can cure several diseases such as rheumatic diseases, spinal deformities, muscular and skeletal system problems, female infertility and various skin diseases. The project seeks to create a relaxing atmosphere for both local and visiting patients, just as people who would like to relax and recover surrounded by the nature.



Ill. 1 The view towards the Queen's Beach in Nin

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“The prospect of direct and personal access to the discovery and enjoyment of the planet’s resources constitutes a right equally open to all the world’s inhabitants. [...] Family, youth, student and senior tourism and tourism for people with disabilities, should be encouraged and facilitated.”

United Nations World Tourism Organisation: Global Code of Ethics for Tourism -

Article 7, Right to Tourism

Introduction and Motivation

This master thesis has been evolved at the Department of Construction at the Vienna University of Technology. It represents my final architectural project and aims to create an integrated design solution to the Recreation Center on the Adriatic Coast in Zadar County next to the historic town of Nin.

Motivation

Tourism is one of the fastest growing economic sector. Due to the ageing population of the developed countries the potential of senior consumers is significantly growing.(World Tourism Organization, 2015). Consequently, the demand for accessible tourism destinations and facilities is increasing as well. The needs and

interests of the group of elderly people highlights the importance of creating suitable buildings for them. Accessible buildings, facilities for all ages, and universal everyday objects are ensuring an easier and enjoyable life for not only seniors and disabled people, but for people with temporary injury or when one carries luggages or pushes pram. . This need of accessible design inspired me to work on a project where these special needs are in the focus as well as to benefit of the beautiful nature of the Adriatic sea.

Besides the social and health aspect, the project has important economical advantage or the region. Croatia, and especially the Adriatic Coast has great potentials for attracting visitors from all over the world and health tourism

can be a unique opportunity in the area thanks to the medical mud.

Objective

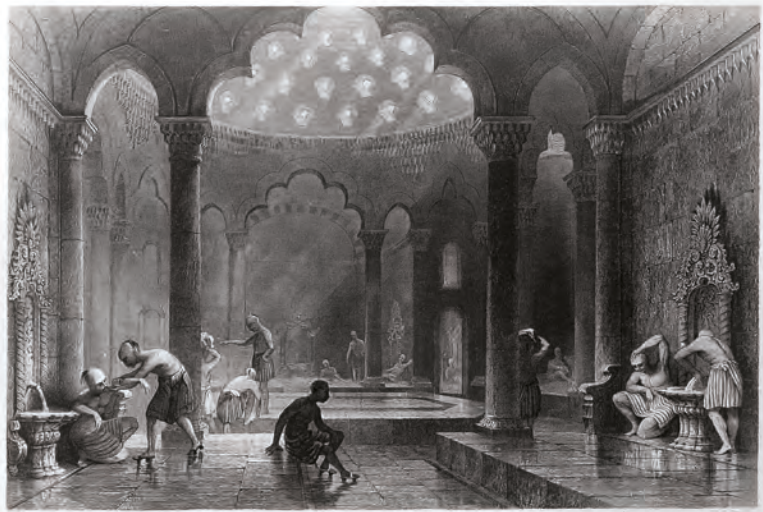
The architectural objective is to create a place that connects land and sea while providing a frame for relaxing and revitalizing environments. The building should fit into the surrounding nature with its form, materials and structure. It should accomodate all functions for wellness and medical purposes as well, always with the rules of accessible design in view.

Analysis



Framework
Programme
Place

Framework



Ill. 2 A Turkish bath. Engraving by M.J. Starling after T. Allom

The Spa and its role

The first public baths with healing purpose emerged in the age of classical antiquity. The typical “thermae”, the Roman bath built around hot springs, following the form of the surrounding terrain. These baths were important scene of social meet-ups, place of long discussions, spiritual and physical relaxation. In the 12th century, the Islamic spa culture from the Orient refreshed the bath culture in Europe, but its architectural significance has not been so important as in the ancient times. After the long wars of the Middle age, the 15th century brought a flowering spa culture into Europe. In the next centuries, especially around the 19th century architecture of baths went through a noticeable specialisation. Spa buildings are separated regarding their purposes: drinking halls, spa houses and thermal baths were waiting for the guests. After the 19th century, social life of spas are getting a more important role – many great spas of the century were designed for social interactions: these buildings have additionally accommodation, restaurants, libraries and great gardens.

Health Tourism

Travelling for health reasons has been always existing, but the possibilities are developing highly in the past decades. Getting a better, or cheaper medical service, having treatment in a region, where a cure has an ancient tradition, or spending some time in an area, where the natural sources have healing effect is an attractive way of travelling for everyone, who is seeking a solution for health problems.

The increasing number of patients, health professionals and developed medical technology results new patterns in global healthcare services. Low-cost treatments and cheap flights are offering more and more possibilities to people, who are seeking to heal their diseases, or finding relaxing activities in natural environment.

The tendency of growing health tourism shows, that due to its economic factor has great potential to less developed countries.



Croatian Architecture

Traditional Croatian architecture is defined by the natural and social factors of the region. Due to its geographical position, The Pannonian Basin, the Dinaric Alps and the Adriatic Alps are representing the main geomorphological parts of the country.

The main building material in the region is stone. Foundation, walls, and roof covering by stone is typical, but soil, clay, straw, rye, wheat can be also found in the area.

Soil, tile, wood and stone are the main building materials

Croatian architecture has its roots since the seventh century, but several buildings have been preserved from the earlier ages as well.

Ill. 3 Typical croatian stone house

Programme

Brief analysis

The need of a building for hosting wellness and hospitality functions in the area is a popular issue in the past years. Since the region's main source of income is the tourism industry, the building should aim to please the group of tourists' needs. Besides this, the building should offer activities and possibilities throughout the whole year, included the off-seasons (from October until April). Despite the surrounding towns are relative small and rare-populated the building should offer recreational and sport activities for the locals as well.

Function

Fulfilling all these requirements the building has to be divided into four main functions: medical, wellness, sport and hospitality functions. All four functions are closely related to the qualities of the coast and the sea. The functions require different levels of intimacy, transparency and accessibility, these aspects are the main guiding lines during the design process.

Users

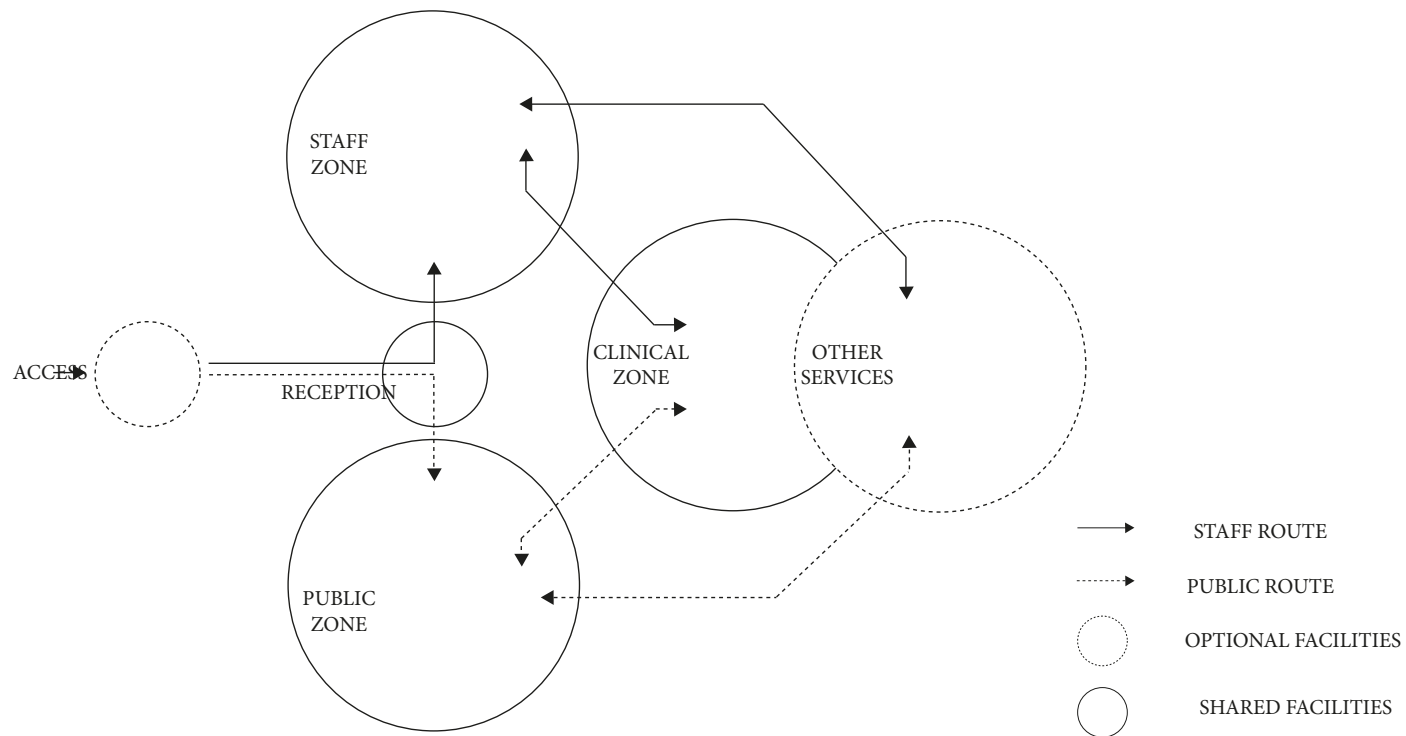
The recreational park seeks to target locals and tourists, families and individuals, old and young - but the main target group is people, who would like to spend a quality time in the nature, eventually with supervised medical services for rehabilitation and recreation

Architectural intent

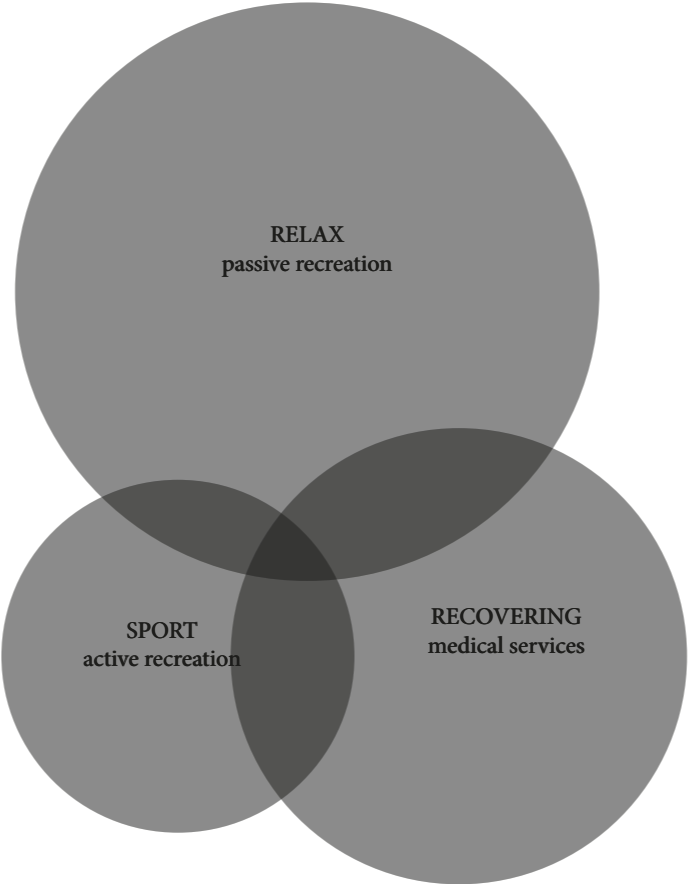
The program calls for a distinctive architectural work, which simultaneously fits into the natural surroundings between land and sea.

Room programme

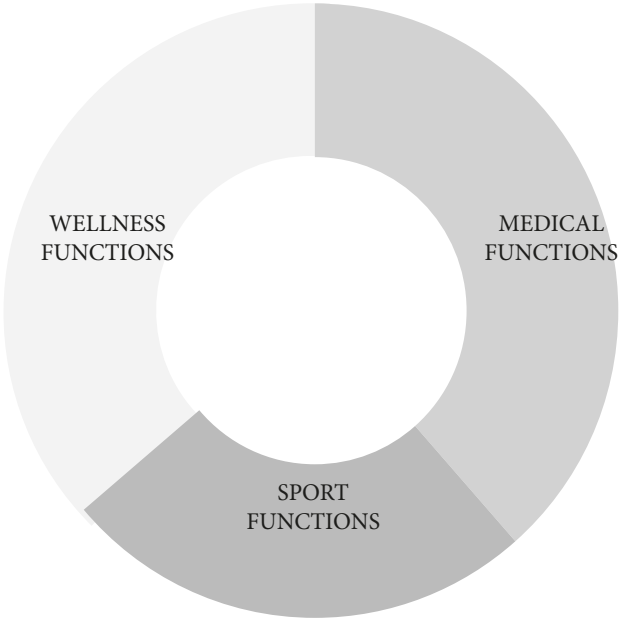
main connections



Program analysis



Ill. 5 Required functions and overlappings

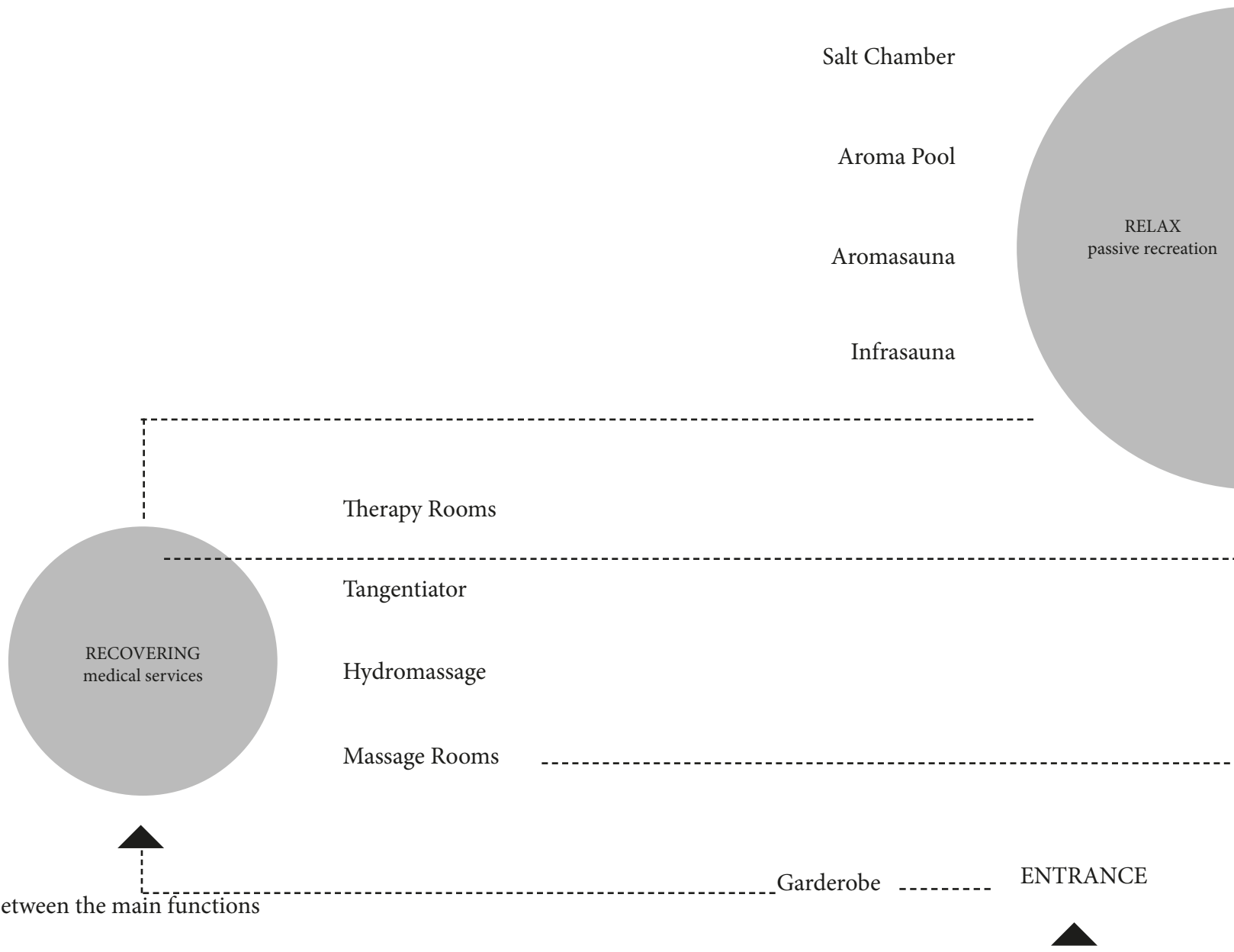


Ill. 6 Required area

Room programme

detailed list with all rooms and functions

Function	Space	Area in m2	Function	Space	Area in m2
Reception Area	reception	56,47	Staff Area	staff's lounge	65,95
	vitamin bar	5,58		staff's kitchen	27,83
	lobby/waiting room	22,05		office	13,48
	garderobe (women)	44,77		bathroom	6,2
	garderobe (men)	44,59		total	113,46
	total:	173,46			
Spa Area			Technical Area	technical room	71,72
Therapy Area	therapy rooms	26		laundry	111,87
	massgae rooms	26		storage room	50,18
	relax area	31,5		total	233,77
Sauna Area	sauna	12,62	Rooftop	sundeck	390,71
	steambath	12,62		yoga area	347,06
	salt chamber	5,50		total	737,77
	aromasauna	5,50			
	shower	24,21	Total Area:	2212,93	
	relax area	30,35			
Thermal Baths	ice dip	9,66			
	hot bath	26,44			
	hydromassage	14,55			
	relax area	29,38			
Swimming pools	swimming pool (inside)	188,61			
	swimming pool (outside)	64,13			
	relax area (inside)	143,47			
	relax area (outside)	303,93			
	total:	954,47			



Ill. 8 Routes and connections between the main functions



Outdoor pool (w)

Indoor Pool (w)

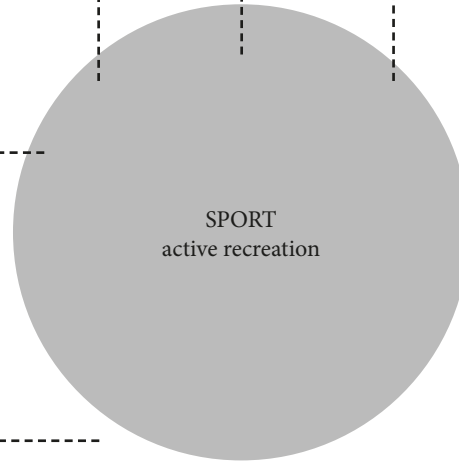
Sauna

Relaxing area

Indoor Pool (c)

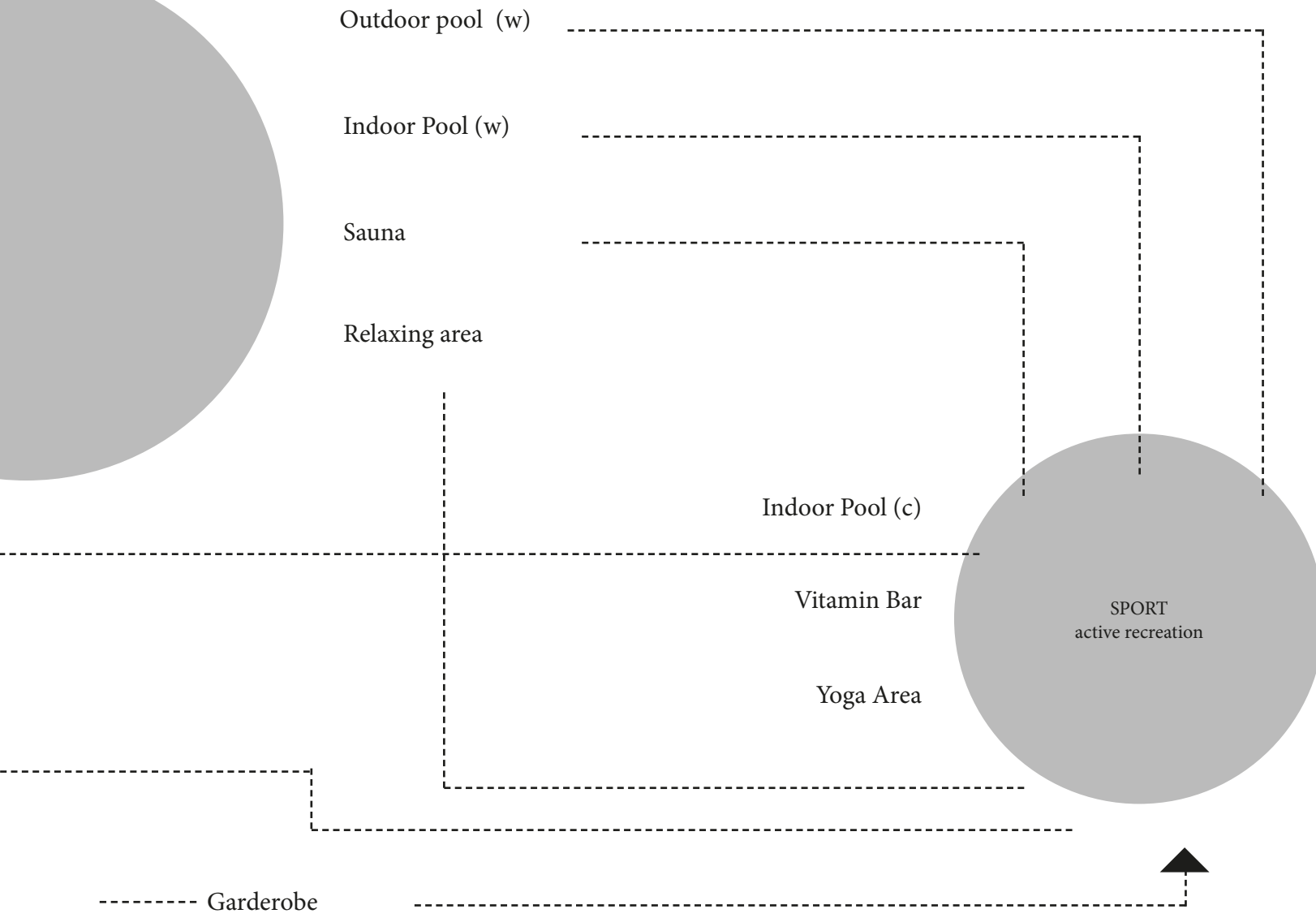
Vitamin Bar

Yoga Area



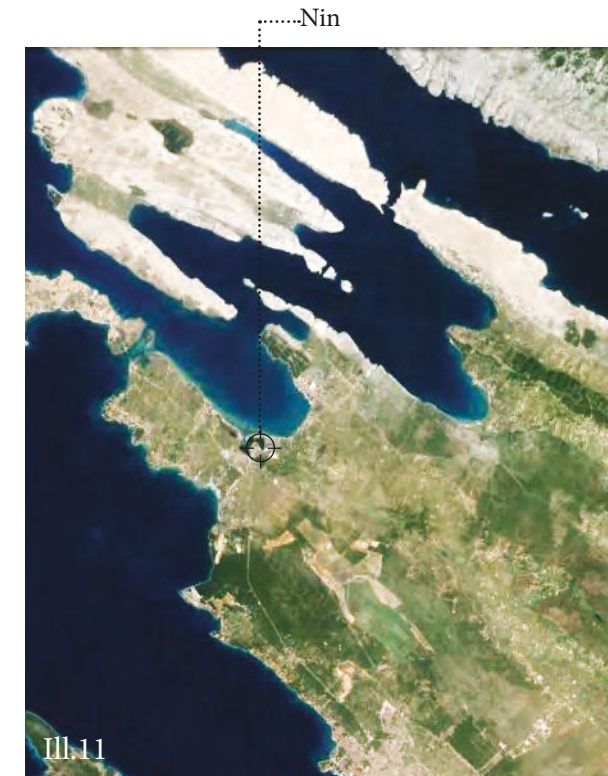
SPORT
active recreation

----- Garderobe



Place

A thorough introduction into the geography, climate, culture and identity of the site at which the Recreation Center is situated



Dalmatia is a long and narrow region in the south part of Croatia. The area has 79 larger and ca. 500 smaller islands on the western side, along the coast and the huge mountains and valleys of the Dinaric Mountains are stretching on the eastern side.

The County of Zadar is situated on the northern part of the region. Half of the region's total area is covered by the sea, the length of the coastline (including the islands) is 1300 km. The Zadar Archipelago includes more than 300 islands, spread around the coastal line.

Nin is a small antic town, located 15 km away from the county's center, Zadar. The town has nowadays a population of ca. 1100 persons.

Despite now it is a small and silent town, Nin had an important role in the ancient times. In the medieval ages, Nin was the centre of the Christian Bishopric, later the centre of the autonomous Croatian Branch of the Church was also located here.

The historical center is on a 500 diameter island, in the lagoon area of the Adriatic Sea. Two footbridges are connecting it to the mainland, both of them remained

here from the 16th century. The town is surrounded by the salt mines on the east side, sandy beaches on the north side, forests and natural areas on the west side.

The town won the title of "European Destination of Excellence" (EDEN) for its special medicinal mud, unique national park and the antique churches and cathedrals which are attracting thousands of tourists in every year.





28 Ill.13 City map of Nin

BUILDING SITE

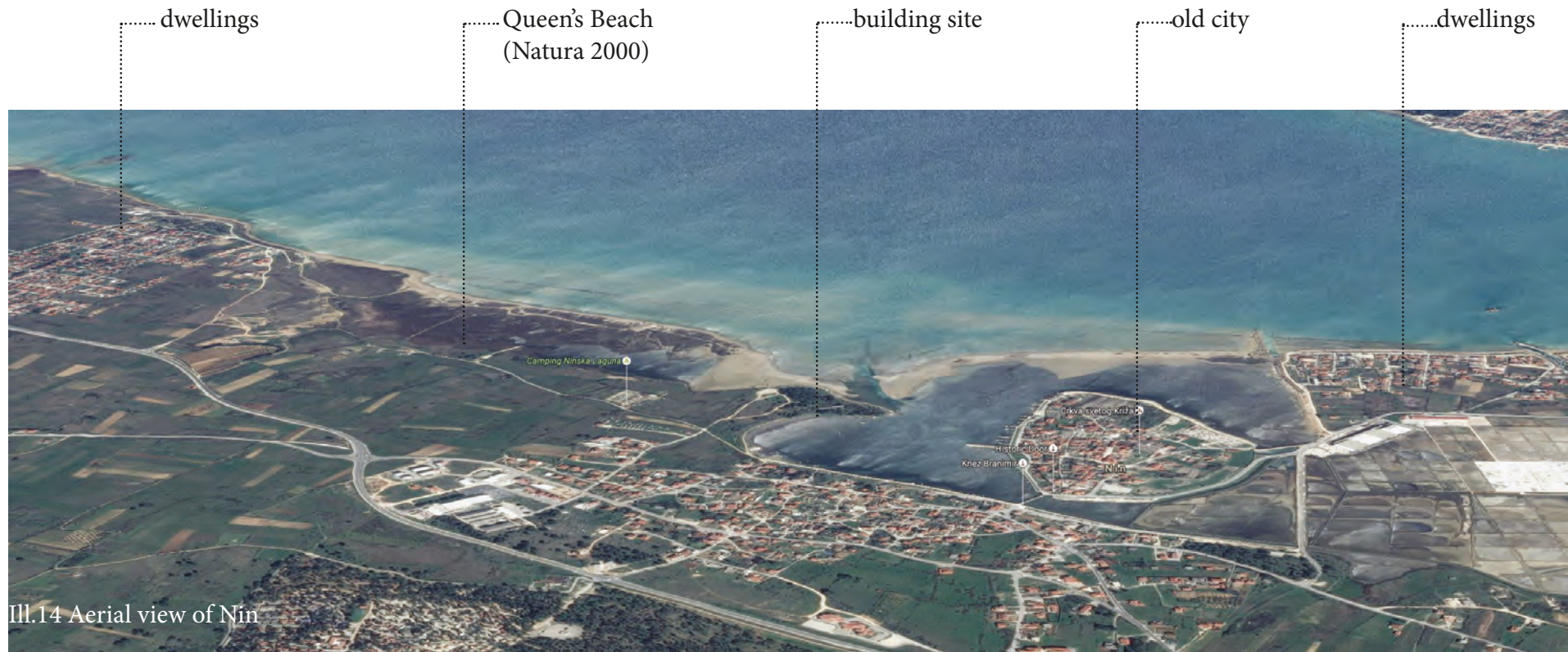
GPS coordinates:
44.24,15.18



City plan 1:10000

Nin's most famous beach is the three-kilometer long Queen's Beach. The area is named after the wife of King Tomislav, the first Croatian king. According to the legend, the beach with the special healing mud was the favourite place of the Queen.

The area is still very popular. The coastal stripe has a sandy beach. Towards the mainland we can reach the protected national park: the area has several rare, endemic plants and animals.



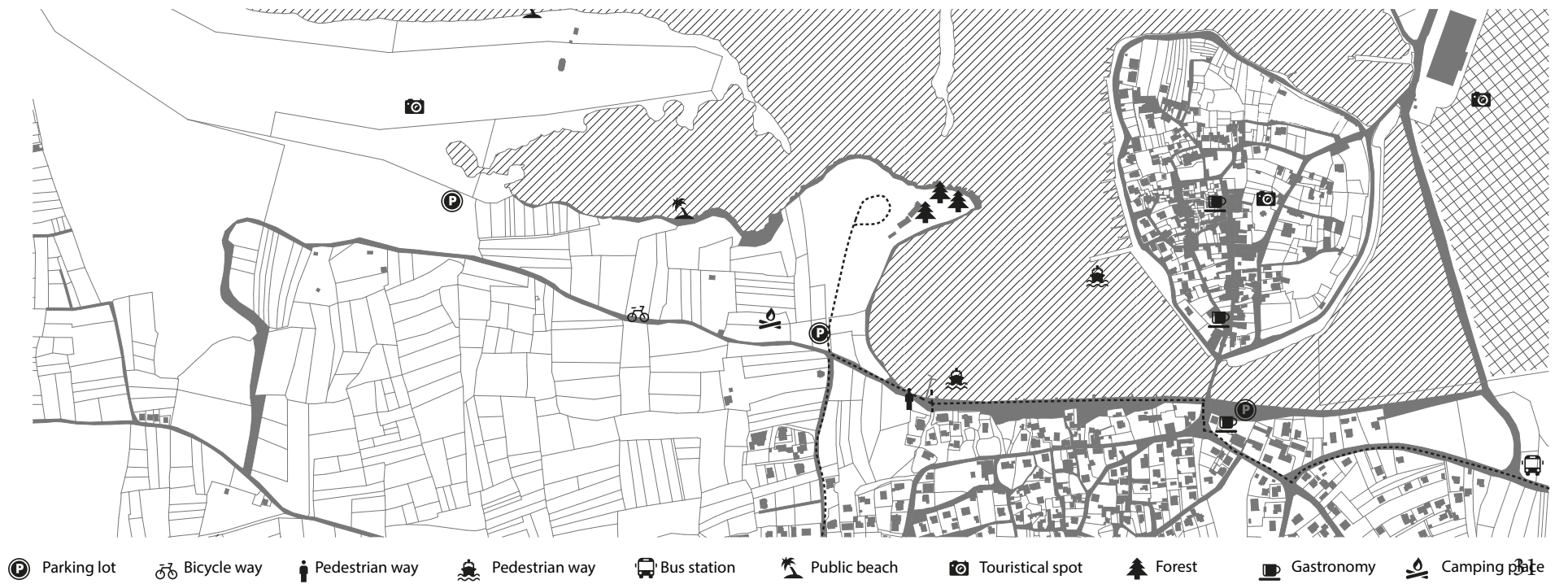
Ill.14 Aerial view of Nin



Ill.16 Aerial view of Nin

Ill.15 Routes and connection in Nin

Connections



Mappings

National mapping

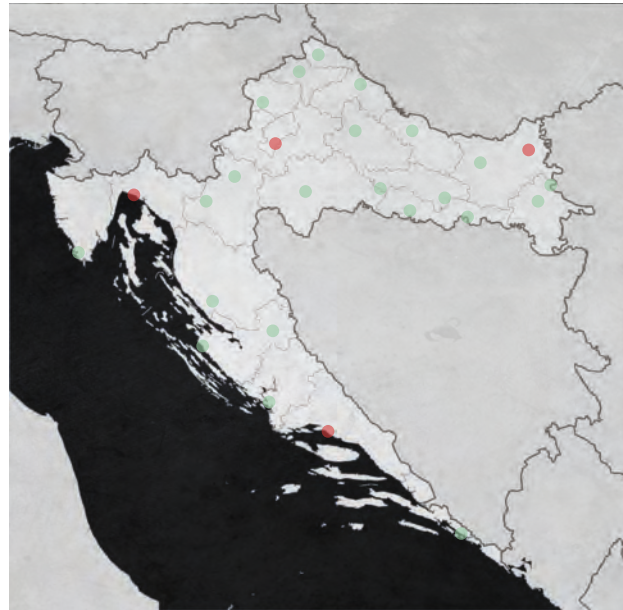
main cities in the area



The Dalmatian coast with its 1185 islands and 4057 km long coastline is one of the most popular tourist destinations in the region.

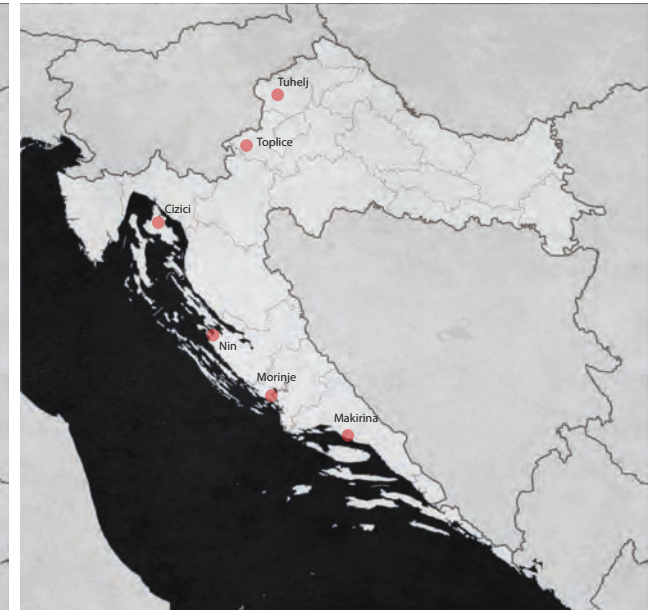
32 Ill.17- 19 Mapping of Croatia

hospitals and clinics



Several clinics are doing research about medicinal possibilities of the peloid. Most of them are offering treatment programs in the specific areas.

peloid sources



The Adriatic region has rich sources of minerals, but sandy beaches are rare. Nin is one of these unique towns.

Regional mapping

dwellings



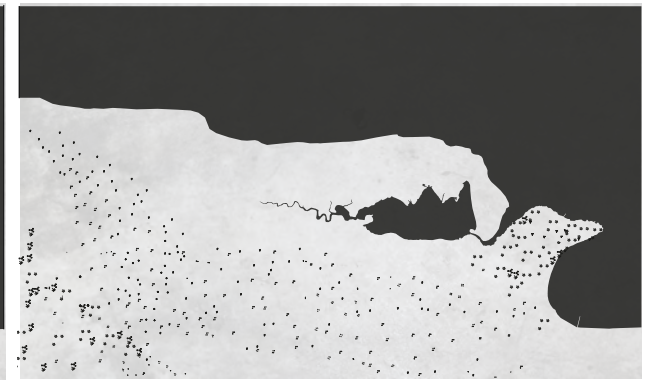
The town is divided into three main areas. The historic center is on the island on the eastern side, connected to the mainland with two footbridges and one bridge for vehicles. The middle part of the city is a strictly protected national park. On the west and east part of the town, the newly built family houses and apartment houses are taken place.

paths



The small town has low car traffic, most of the locals are using bicycle or motorbikes, the regional bus network is also popular. The smaller, narrow streets are mainly used by passangers. The area of the national park and the coastal stripe is only accessible by foot, bicylcle, or water vehicles from the direction of the surrounding towns: Pag, Vir or Vrasi.

vegetation

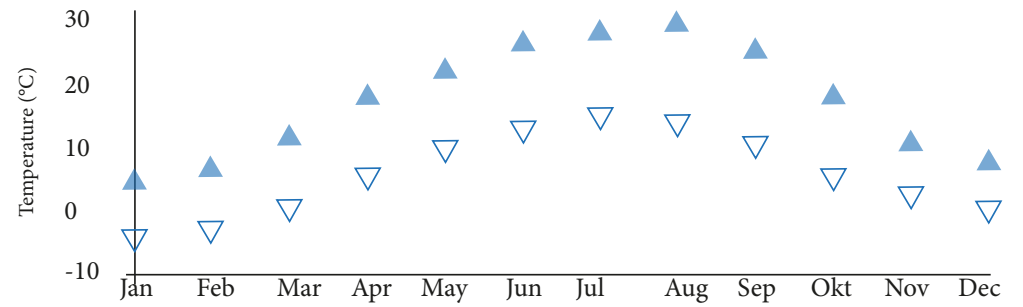


The representative vegetation in the area is typically Mediterranean. Due the area's shallow water and the high concentration of salt, the coastal stripe and the lagoons are home for many endemic and rare plants, birds and various animals. Walking further from the coast, the landscape is changing from muddy and sandy shores to rocky grasslands.

Climate

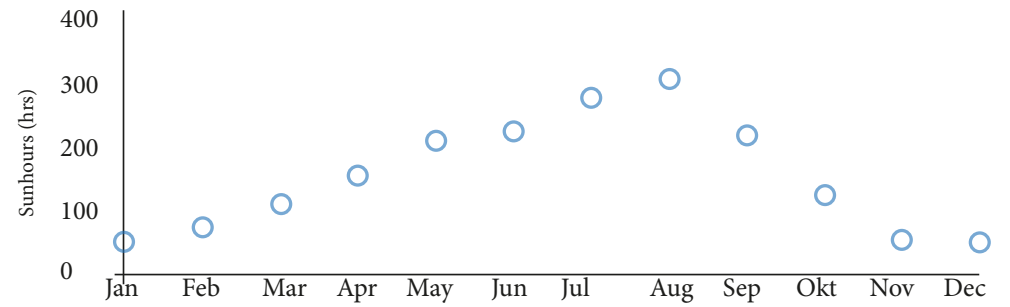
Temperature

Average min and max temperatures



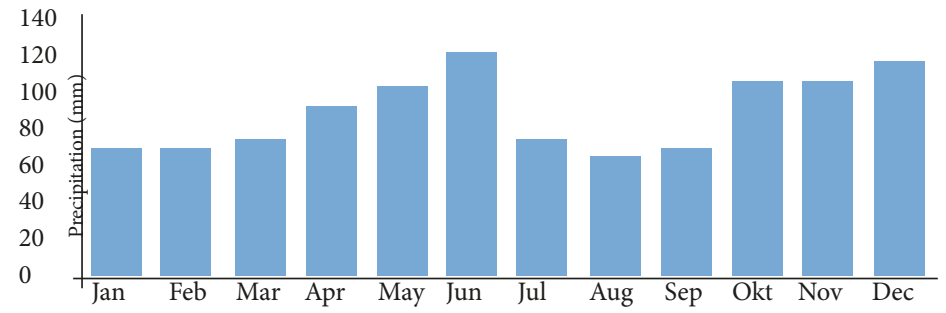
Sunhours

Average monthly sunhours



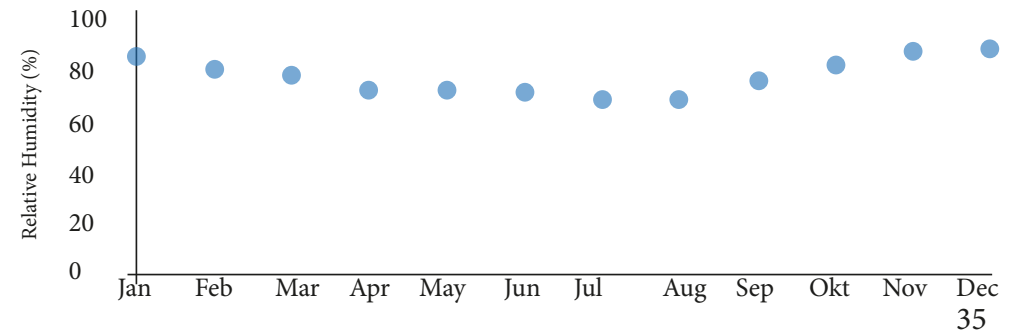
Precipitation

Average percipitation (rain/snow)



Humidity

Average relative humidity



Queen's Beach



Ill.27 The surrounding environment



Arrival

Ill. 28 - 33 Visual impressions on the way to the building site





Current conditions

Ill. 34 - 37 existing buildings and infrastructure on the site



40 camping site



massage pavilion

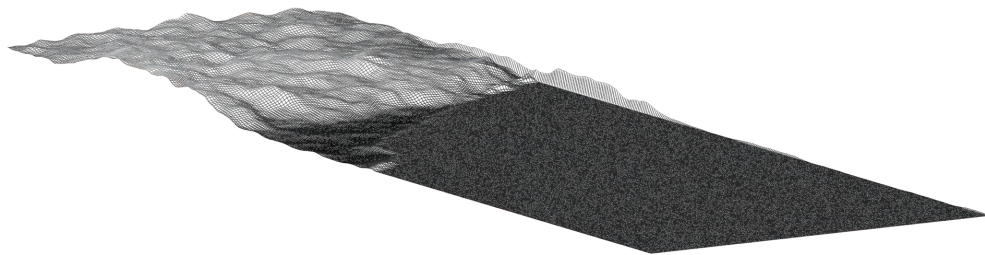


therapy cabins



restaurant

Sections



Surfaces

stones



sand



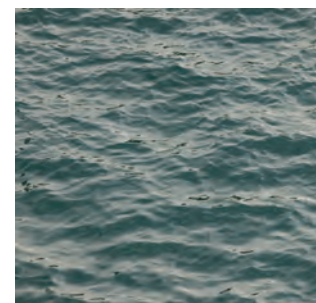
wooden decks



grass/vegetation



water



Ideation



Concept

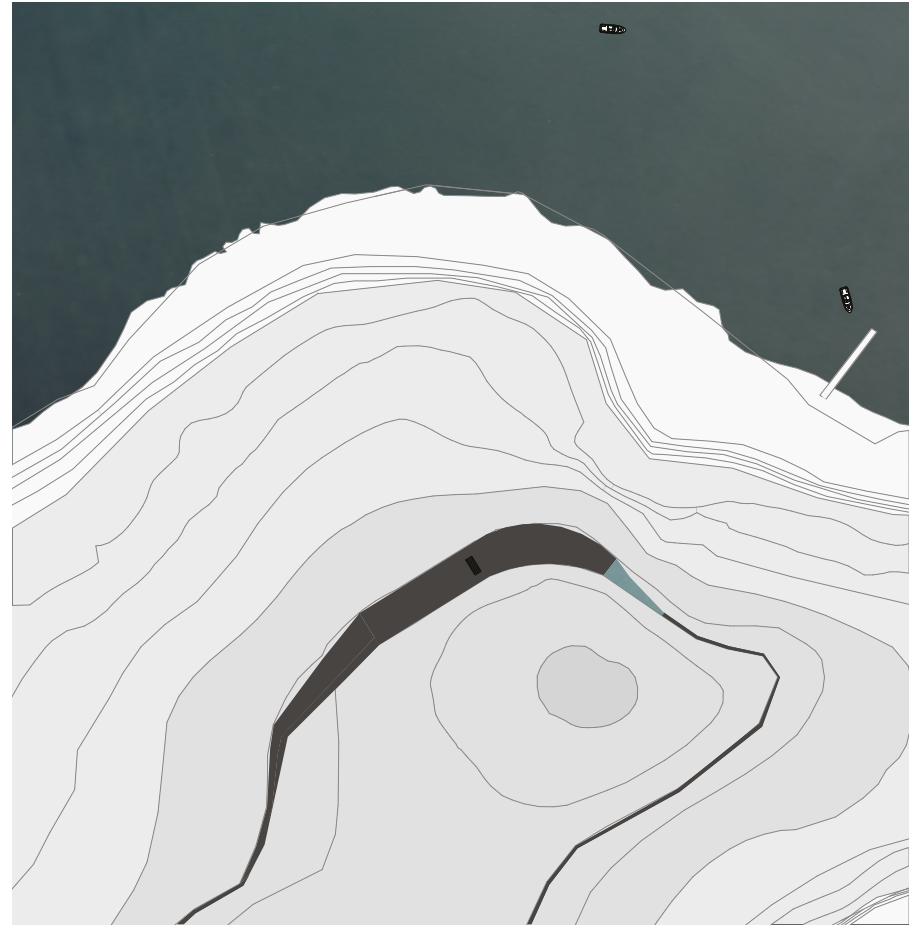
Form

Organisation

Atmospheres

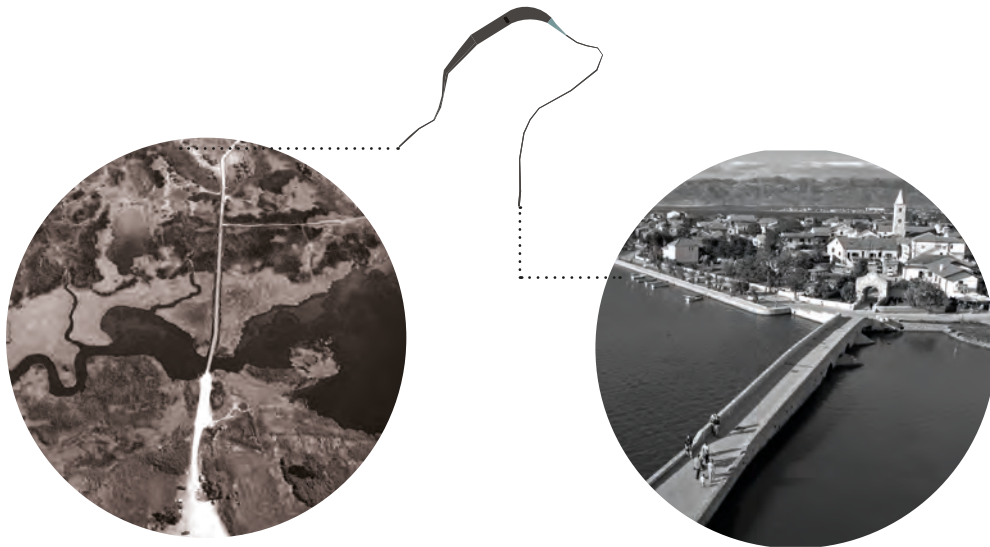
Concept

The concept is a form, which follows the significant terrain lines, integrates the building into the nature and creates a smooth connection between the spa and the surrounding area. In the national park the wooden piers are marking the walking paths for the visitors and hikers, this path offers them a continuous experience. The building is part of this route, on the peak of it the visitors can enjoy the panoramic view from the rooftop of the Recreation Center towards the archipelagos of Zadar.



Path as inspiration

Connections between the old town and the nature

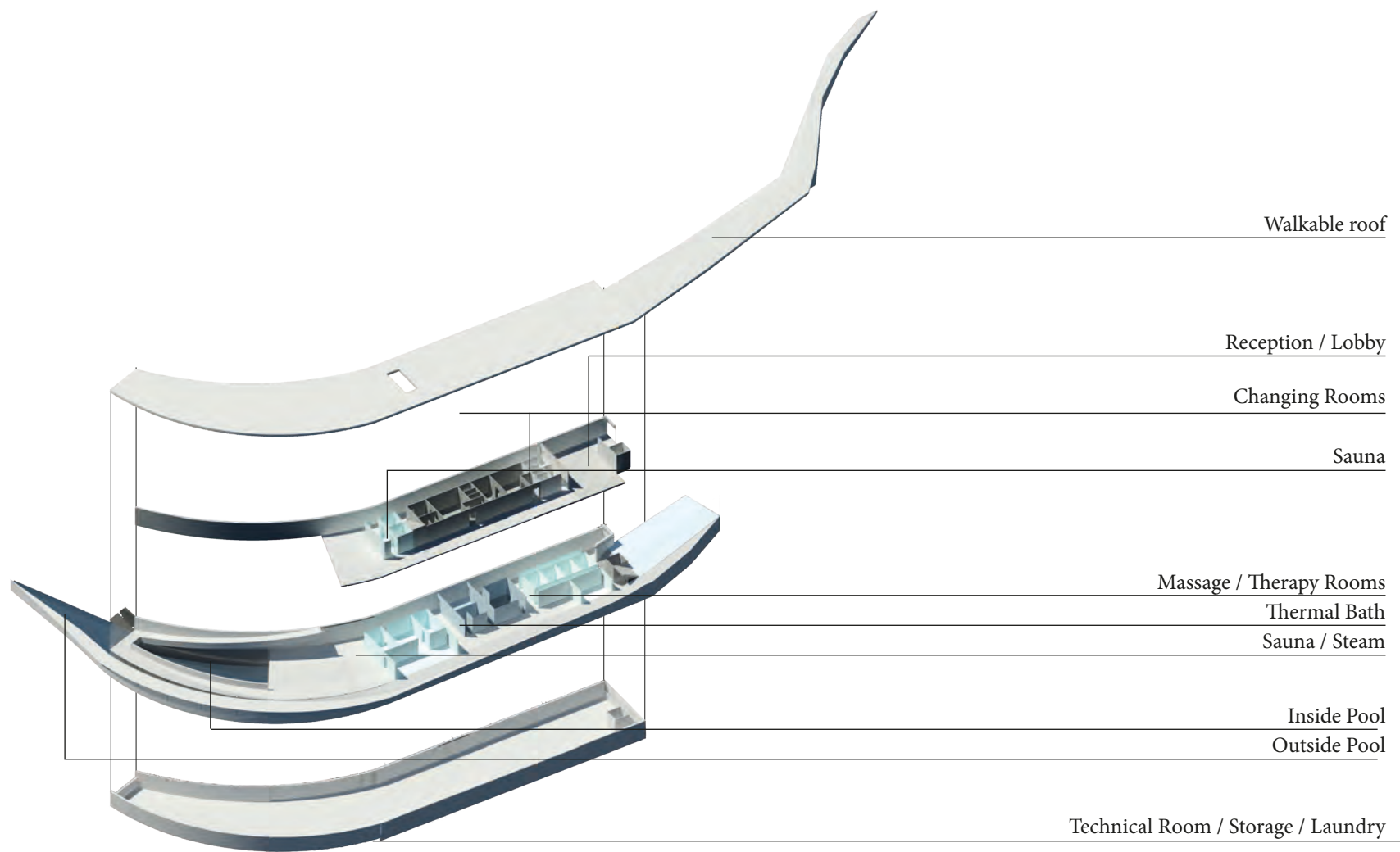


Ill. 46 - 51 Piers as paths and routes at the Queen's Beach



Organisation

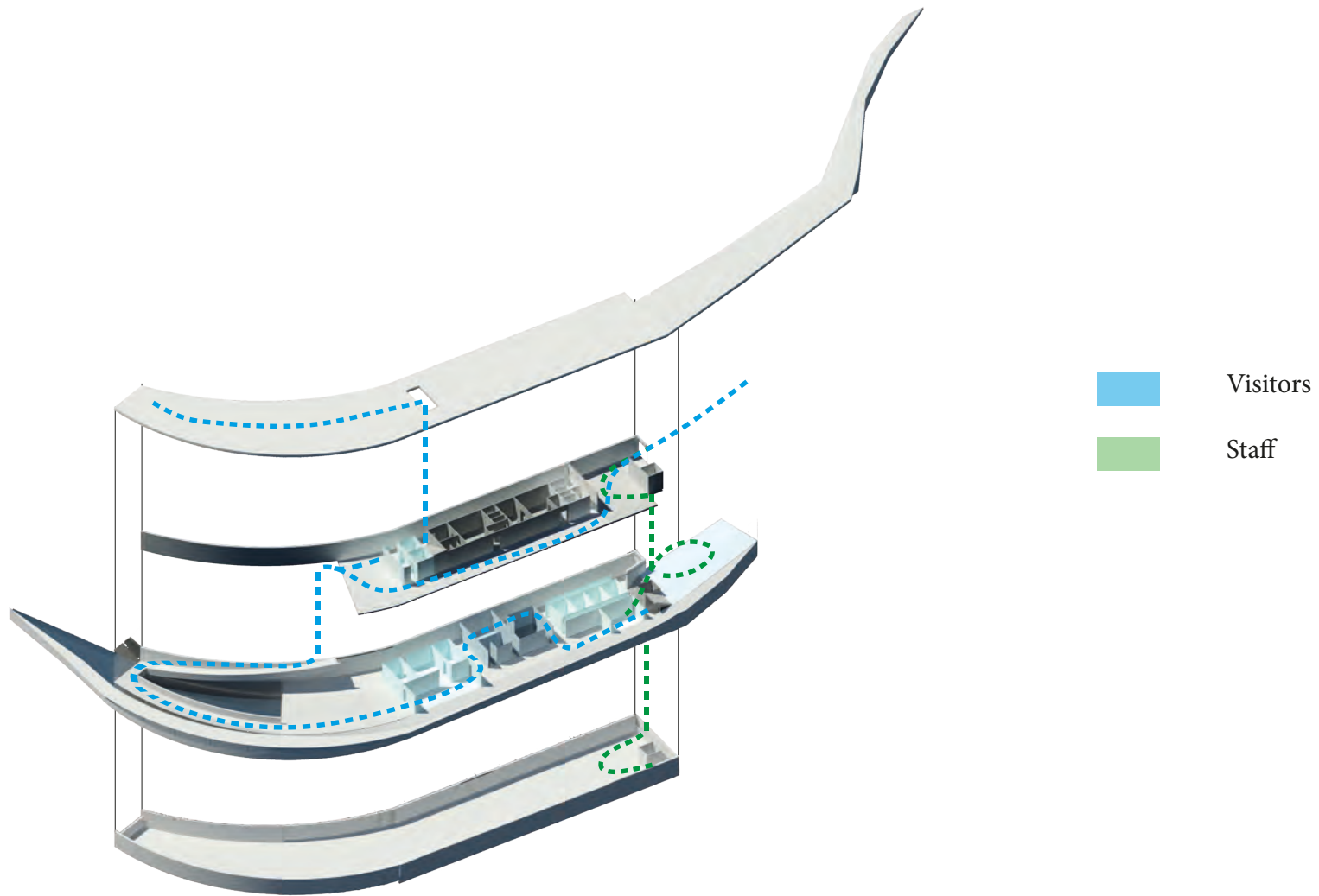
From the ground level one way leads up to the rooftop, another is the entrance to the building. After reaching the reception guests can enjoy the Vitamin Bar of the Center, or go directly to the changing rooms. One sauna is located in the groundfloor, from here there is a quick access to the rooftop. The underground level can be reached through a slight ramp with a panoramic view towards the sea. On the underground level can be found the main spa facilities: the swimming pools, the thermal baths, the sauna and steam cabin, the massage and therapy rooms. The basement is reserved for technical and storage functions. An alternative route for the staff can be found in the eastern part of the building.



Ill. 52 Spatial organisation in the building

Circulation

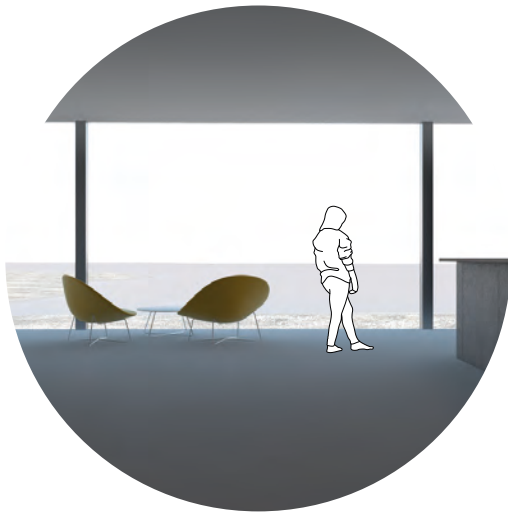
The building has two main transportation routes: one is for the guests, using the main ramp, or the staircase to the rooftop. The other route is for the staff: next to the main entrance can be found a staircase which is passing by at first the staff area, then the therapy rooms of the spa, finally the technical area. The elevator is located also here. Both the elevator and the ramp is designed according to the standards of barrierfree regulations.



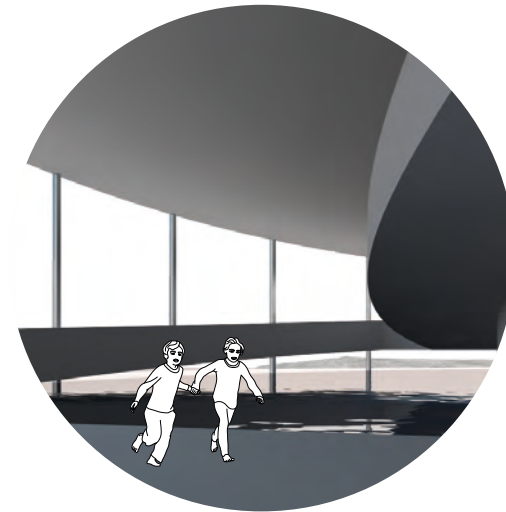
Ill. 53 Routes and connections in the building

Atmospheres

All spaces in the building are designed in order to create a direct connection to the surrounding nature.



Arriving to the spa



View from the relax area towards the pool



Thermal bath with sauna



Relax area with a view to the sea

Presentation

The Recreation Center

Site

Arrival

Plans, sections and flows

Facades

The Recreational Center

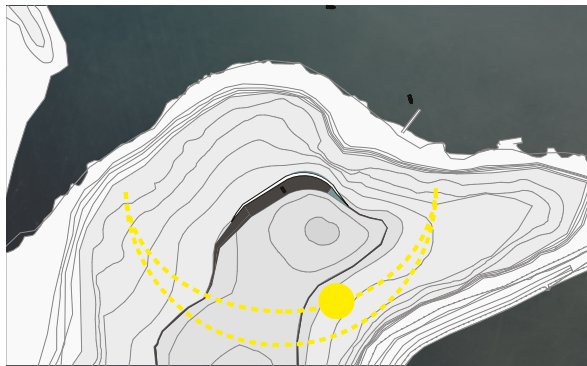


Ill. 58 View with the Recreation Center and the surrounding nature



Site plan

The building site is located between the national park and the old town of Nin. Reaching this point is an experience itself: the path leads along the seaside, across a small forest or through the national park. The location is accessible via hiking trails, bicycle way, boat routes, and regional buses.



58 Ill. 59 Sun study at the site (08.07. 10:00)



Ill. 60 Site plan 1:2000

Arrival

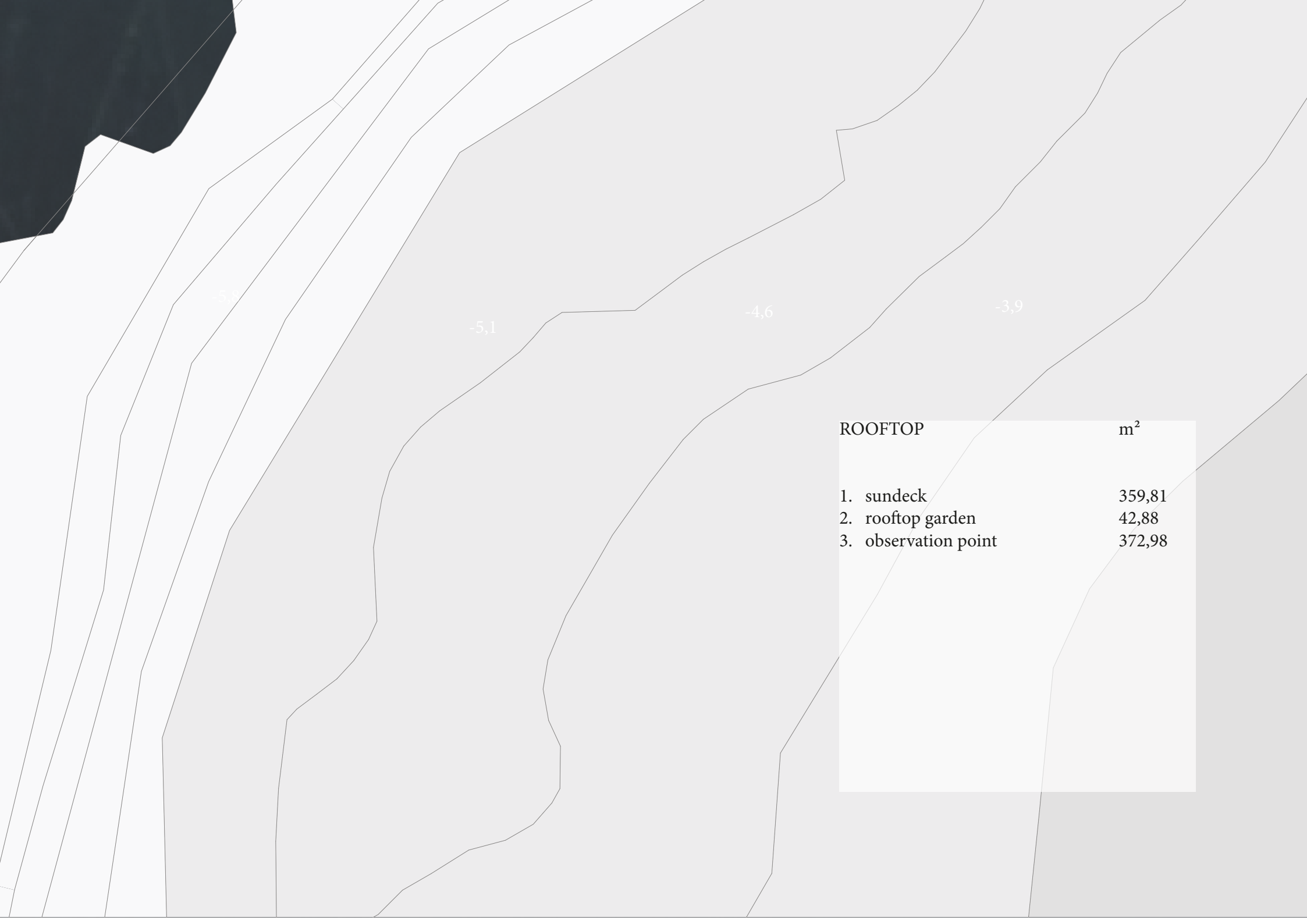
Ill. 61 Connections to the site



The site can be reached by bicycle, foot, by boat and also possible to swim here from the lagoon. Visitors with car can park their vehicles at the parking lot at the entrance of the peninsula, or at the city gate. Regional buses are also can be found. People with disabilities can leave their vehicles in the limited parking lot next to the building.



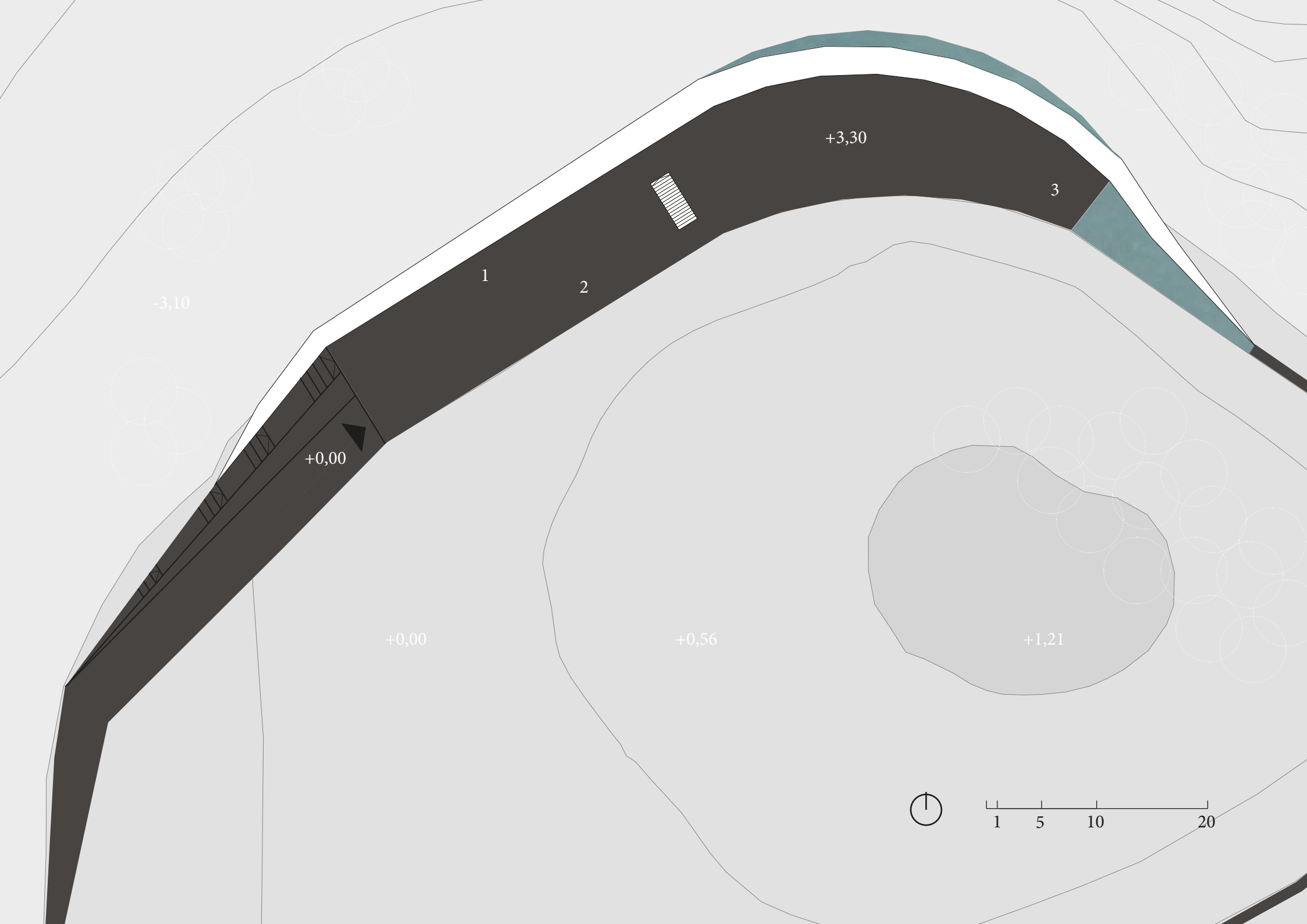
Ill. 62 Entrance and ramp to the rooftop



ROOFTOP

m²

- | | |
|----------------------|--------|
| 1. sundeck | 359,81 |
| 2. rooftop garden | 42,88 |
| 3. observation point | 372,98 |



-3,10

+0,00

+0,00

+0,56

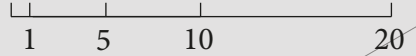
+3,30

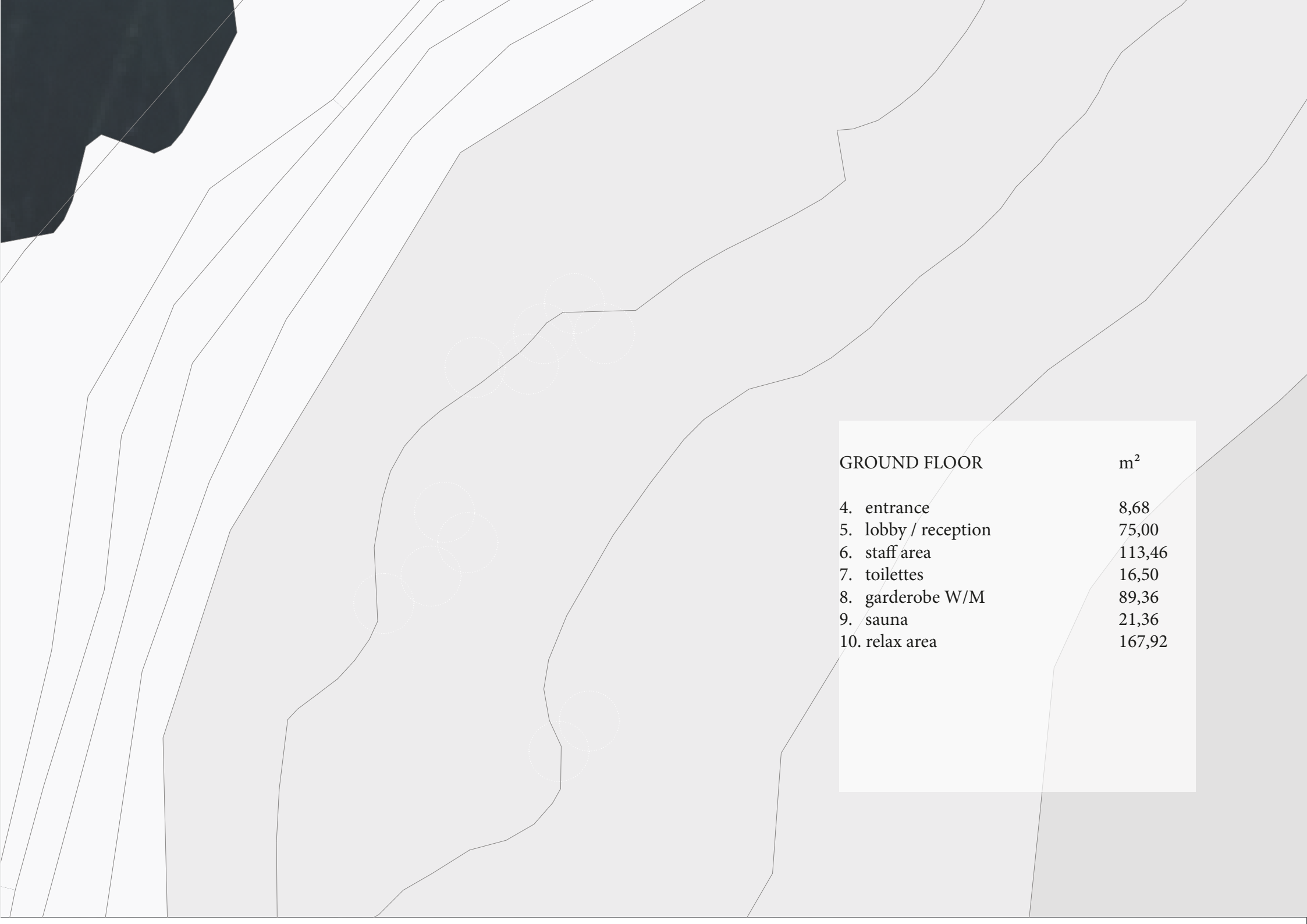
+1,21

1

2

3

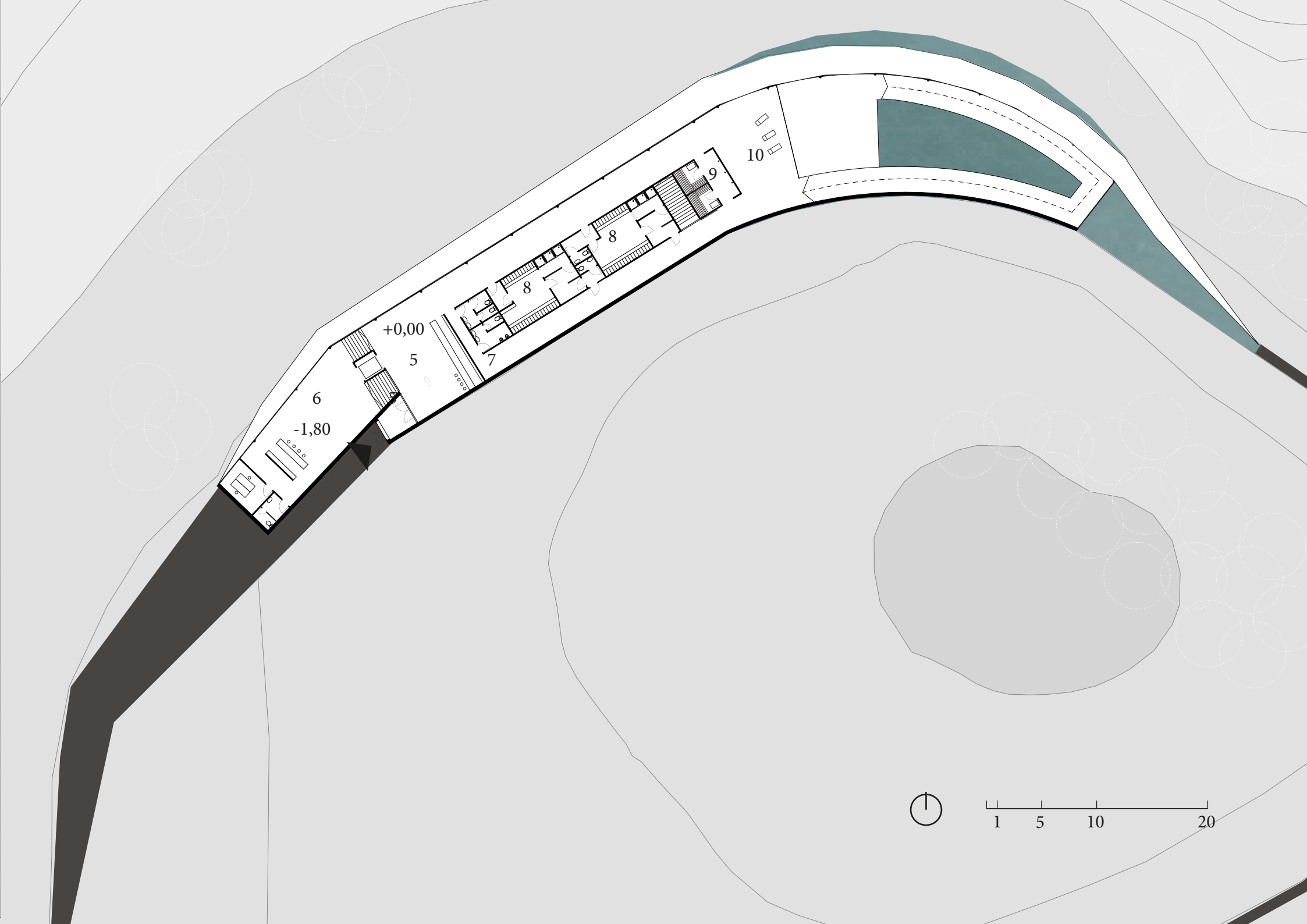




GROUND FLOOR

m²

4. entrance	8,68
5. lobby / reception	75,00
6. staff area	113,46
7. toilettes	16,50
8. garderobe W/M	89,36
9. sauna	21,36
10. relax area	167,92



-1,80

+0,00

6

5

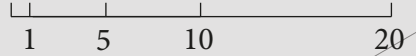
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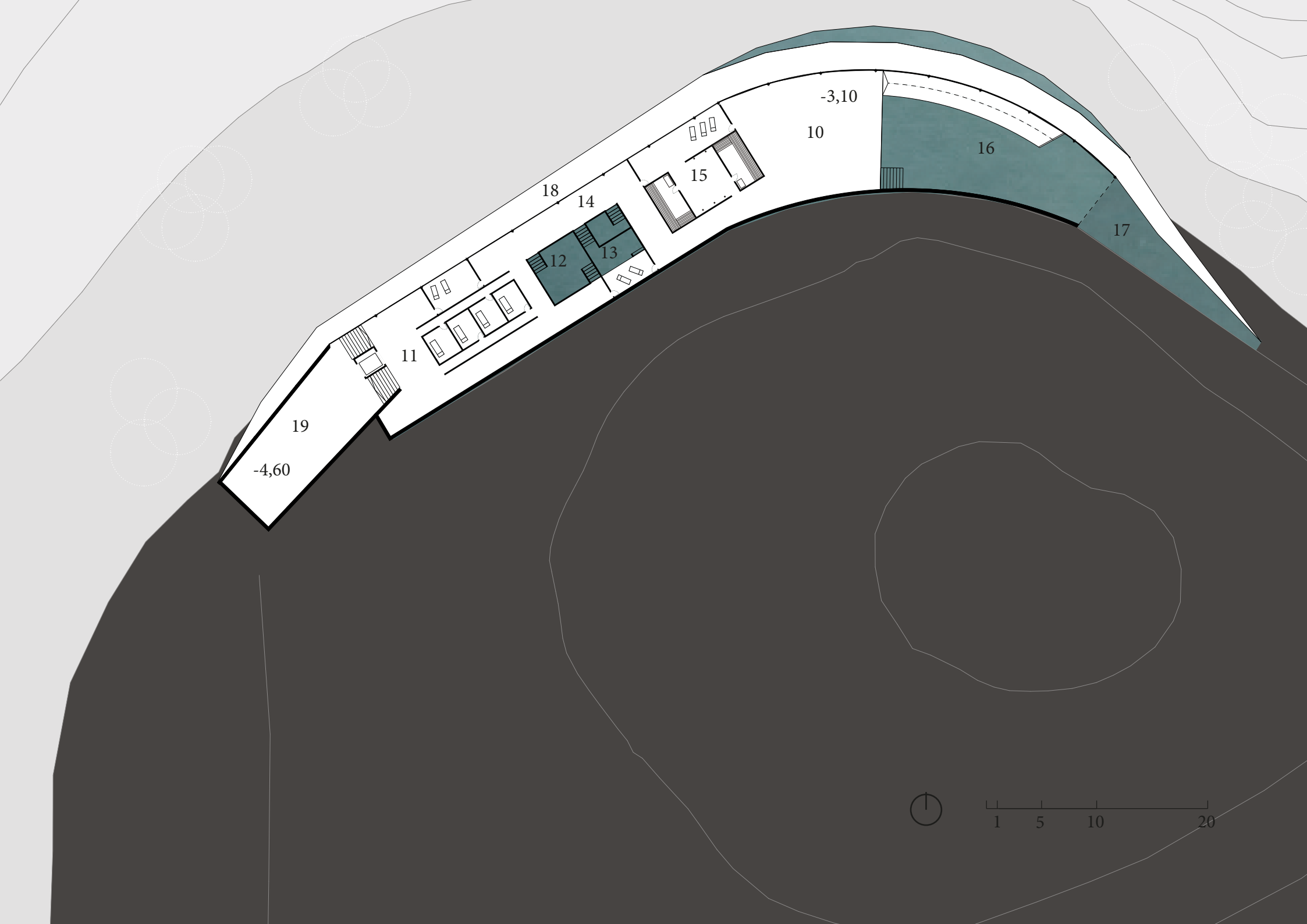




LEVEL - 01

m²

11. therapy/ massage rooms	52,00
12. thermal bath (hot)	16,44
13. hydromassage	14,55
14. thermal bath (cool)	9,66
15. sauna and steam	25,24
16. swimming pool inside (28°C)	188,61
17. swimming pool outside (28°C)	64,13
18. sundeck	303,93
19. laundry and storage room	111,87



-4,60

19

11

18

14

12

13

15

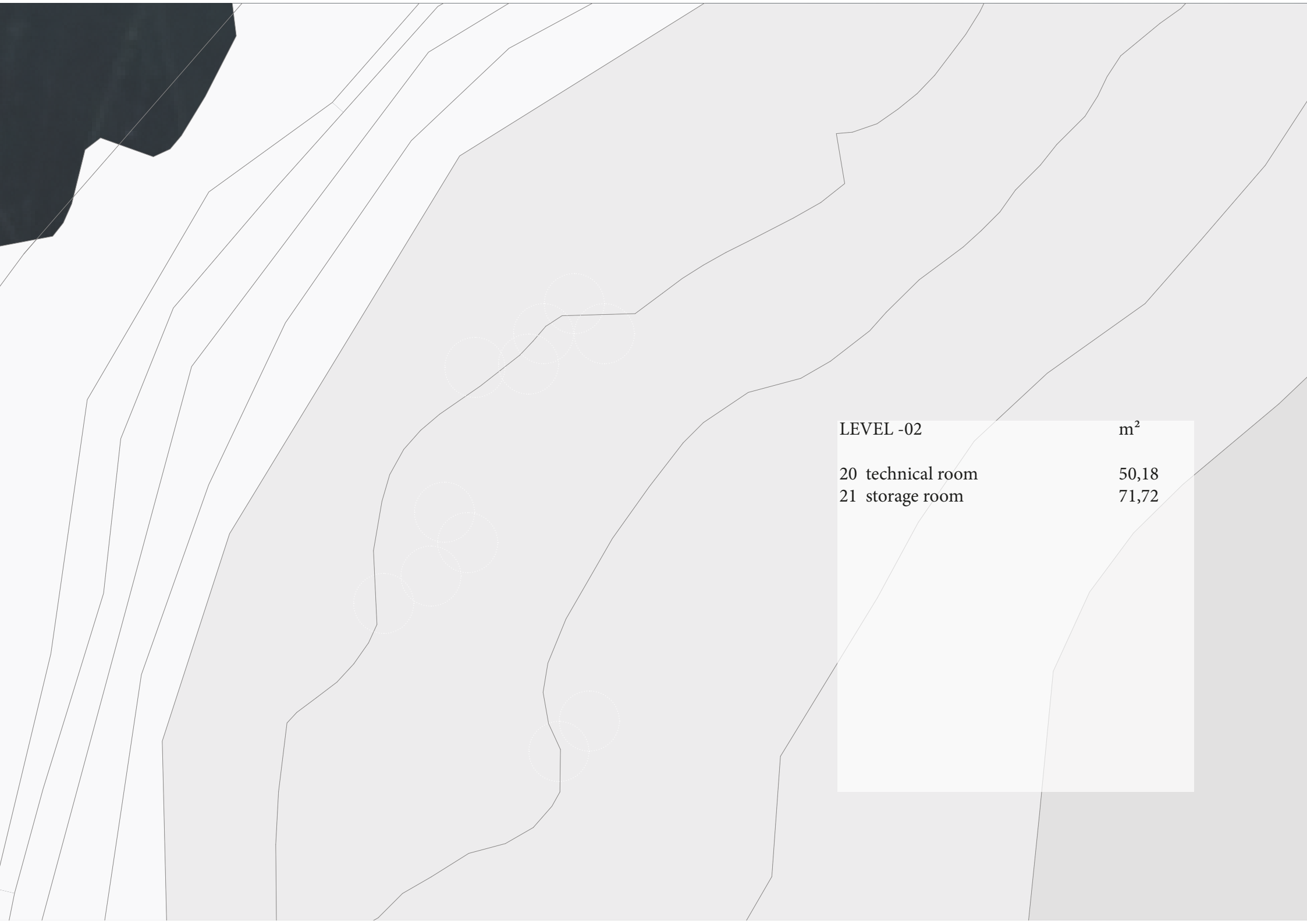
10

-3,10

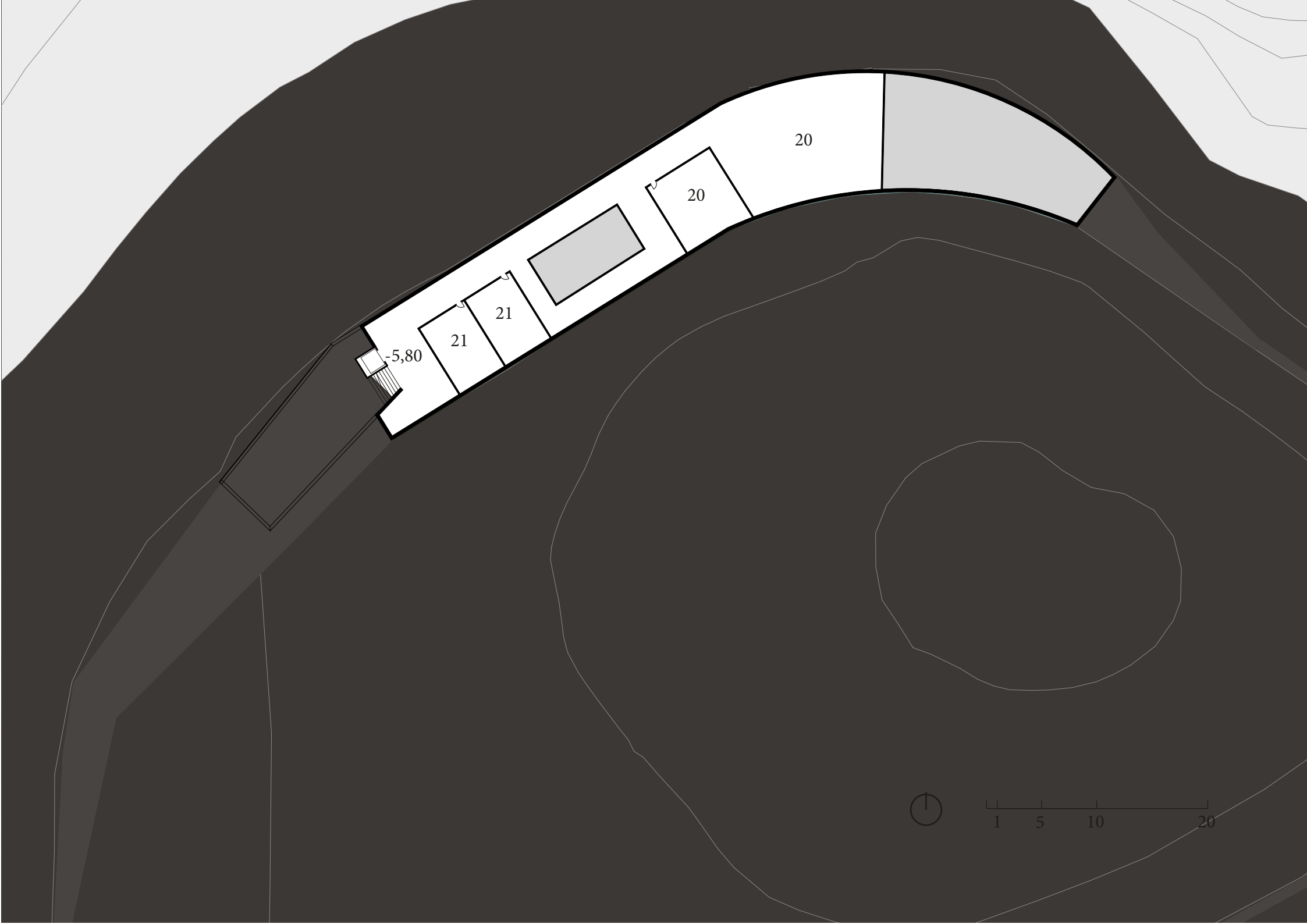
16

17





LEVEL -02		m ²
20	technical room	50,18
21	storage room	71,72



Rooftop



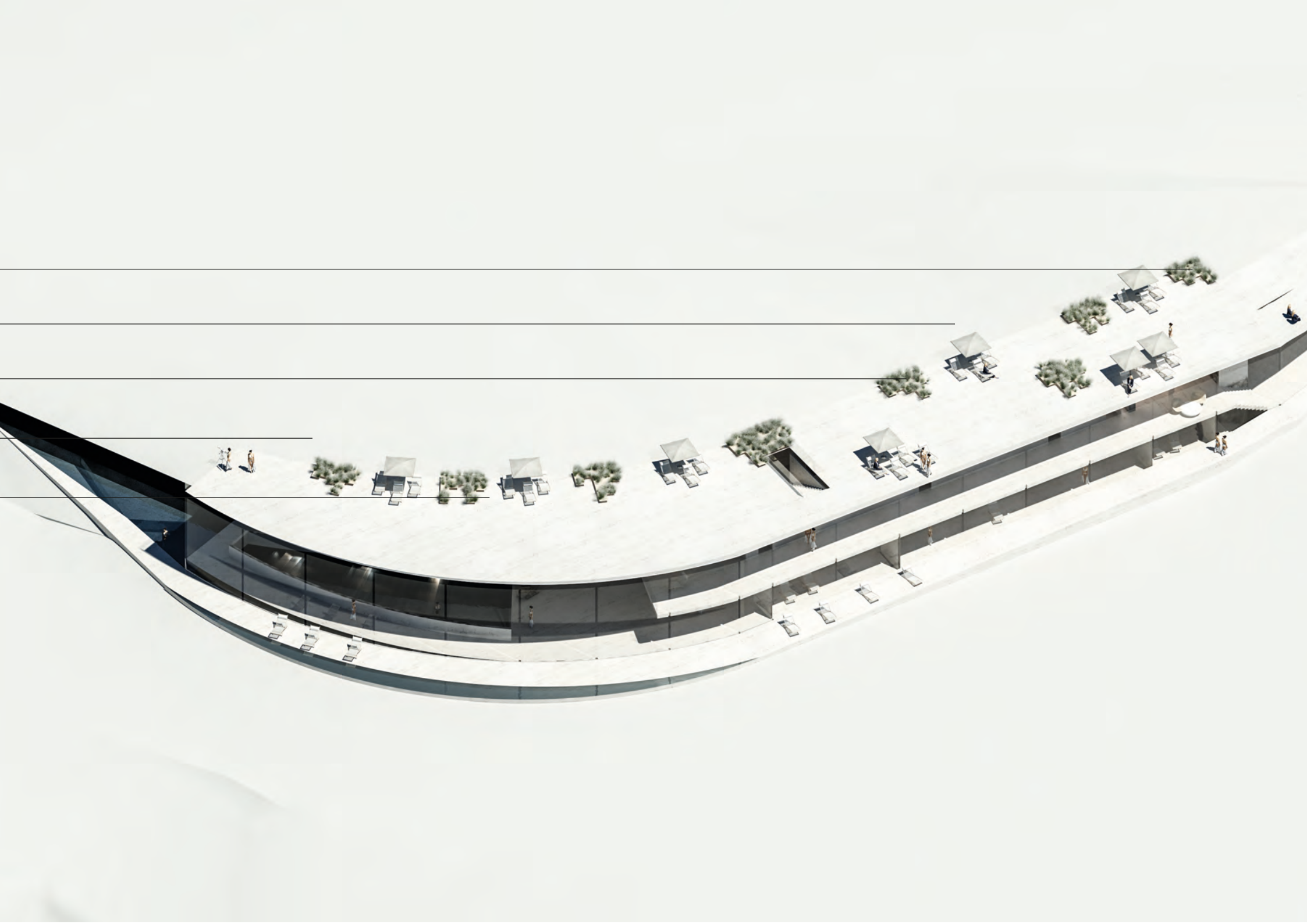
stairs/relax zone

rooftop garden

sundeck

observation point

yoga deck



Level 0



reception / lobby

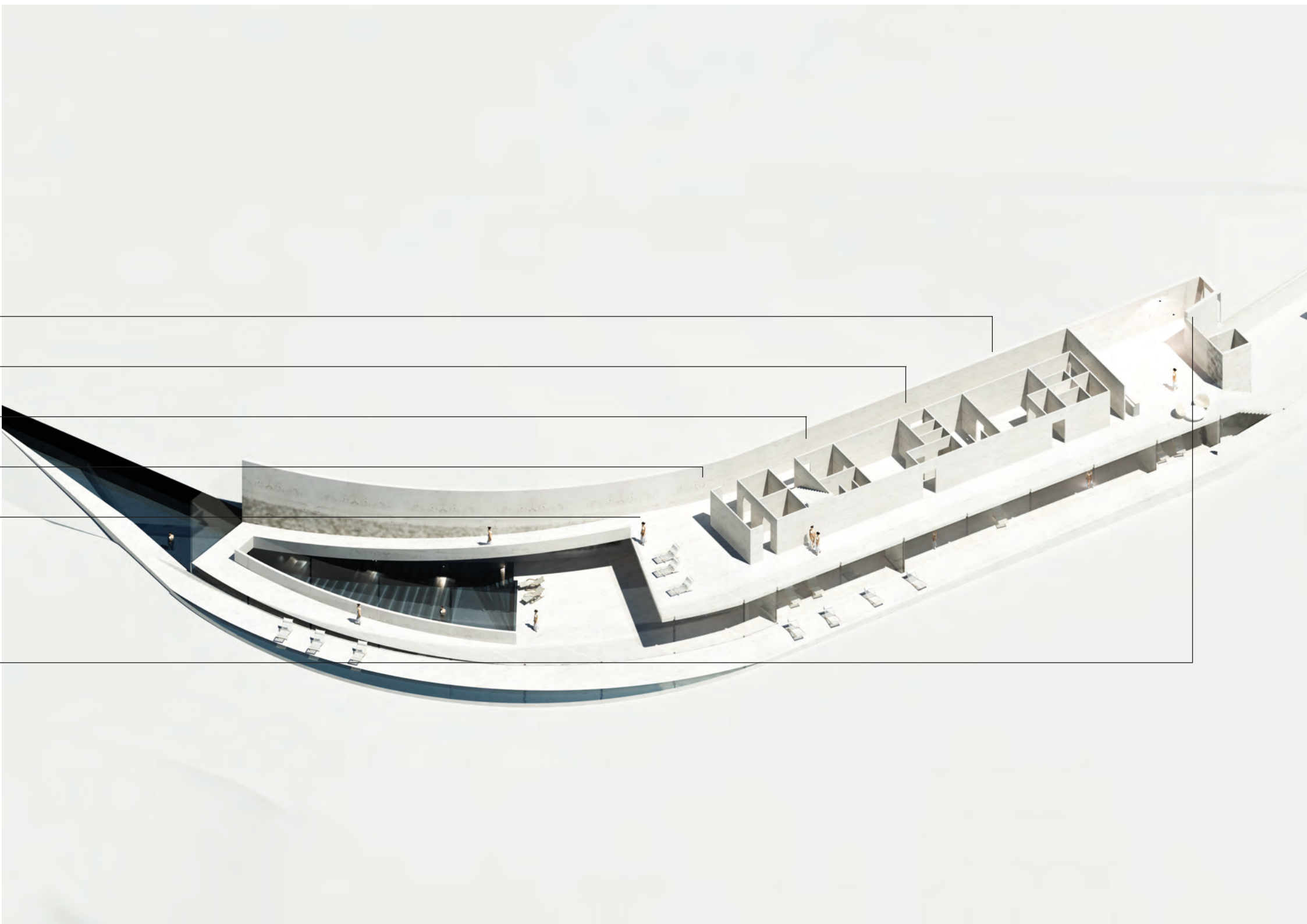
garderobe women

garderobe men

sauna

relax area

staff area



Level -1



therapy rooms

massage rooms

thermal baths

sauna

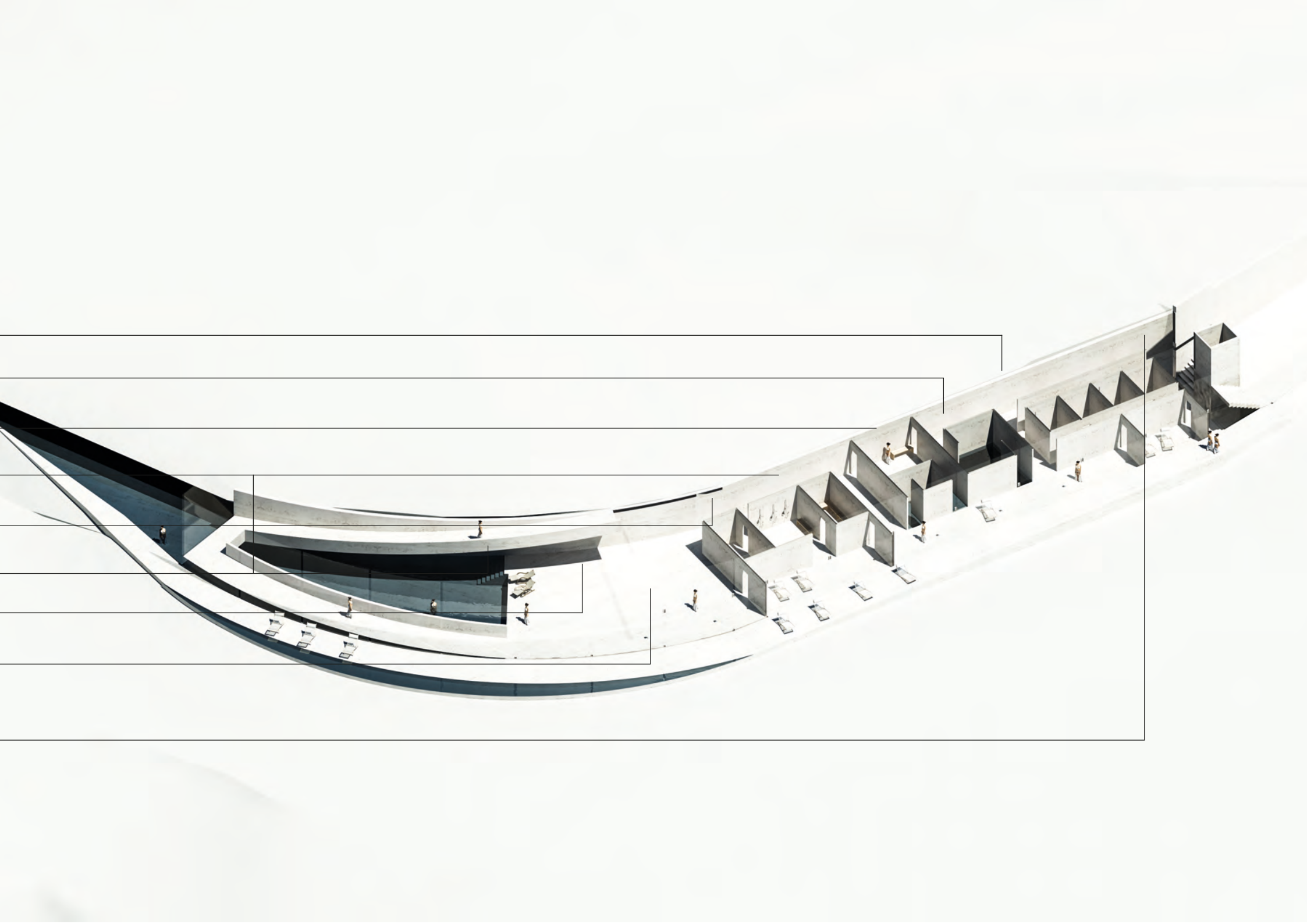
steam

swimming pool

relax area

sundeck

laundry



Level -2

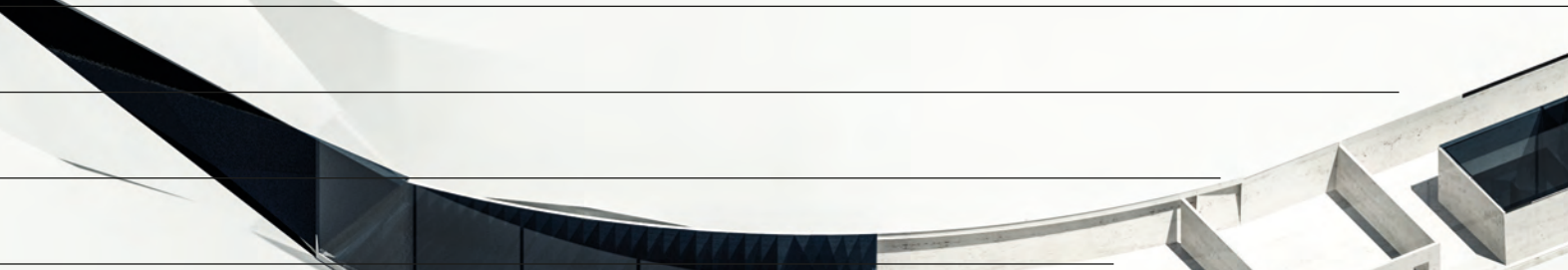
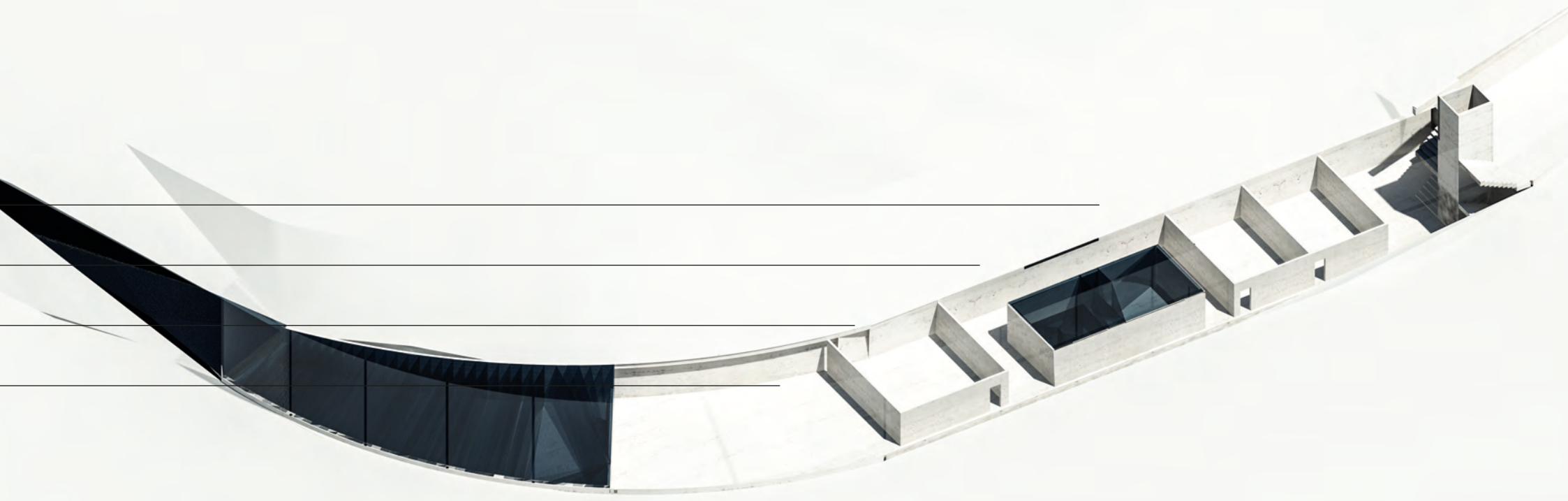


storage rooms

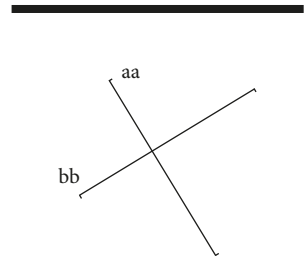
technical area

technical area

technical area



Sections



+3,30 m

+2,80 m

+0,00 m

-0,30 m

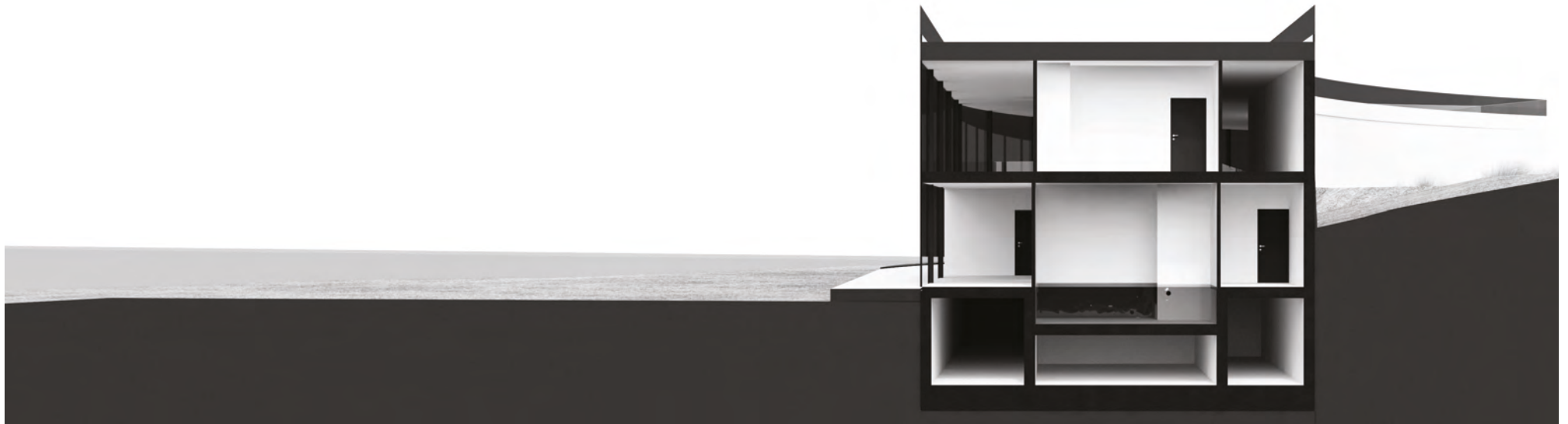
-3,10 m

-3,40 m

-5,80 m

-6,50 m









section bb 1:200

Facades



Elevation East



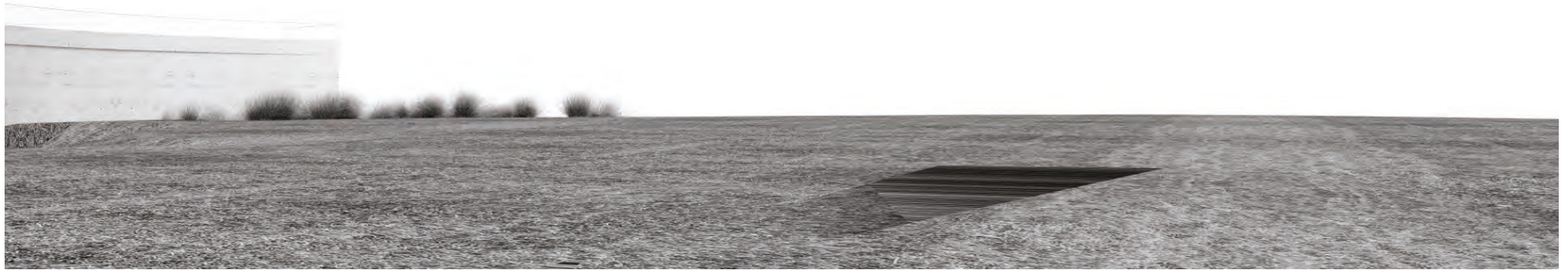


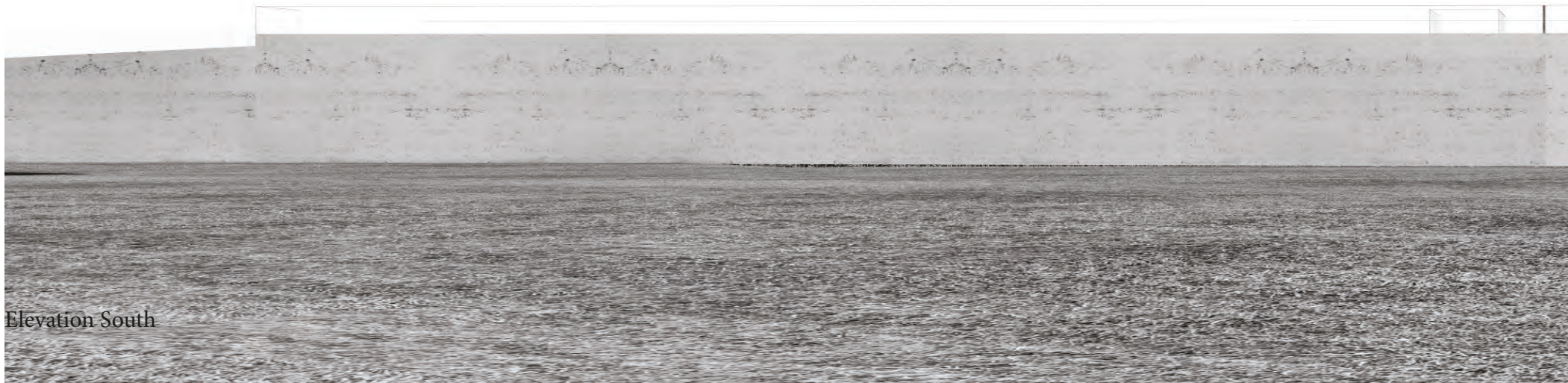
Elevation North





Elevation West





Elevation South



Visualization





Conclusion

The Recreation Center in Nin is a solution for the need of a public wellness institute for the visiting tourists, the local people of Nin and also for the patients of the region's health institutes. The recreation center can also give an answer for the small town's seasonal issues: usually the town is only an attraction for people in the summer months, but with the spa, it can be a destination for all visitors also in the winter months.

Due to its gentle lines and forms, the building can create a connection between the town's center and the natural area which provides a unique experience for the people, which highlights the area's natural, and built heritage.

Detailing

Materials

Structural system

Details

Landscape

Area calculation

Model photos

Materials

Regarding the materials, the dominant elements are limestone and wood, which are typical building materials in the Dalmatian region. Using these elements, the building reflects on both the traditional and the modern houses of the area.

For the structure and construction concrete, steel and glass are the main materials.



Limestone



Concrete



Wood

Structural system

reinforced concrete
roof construction

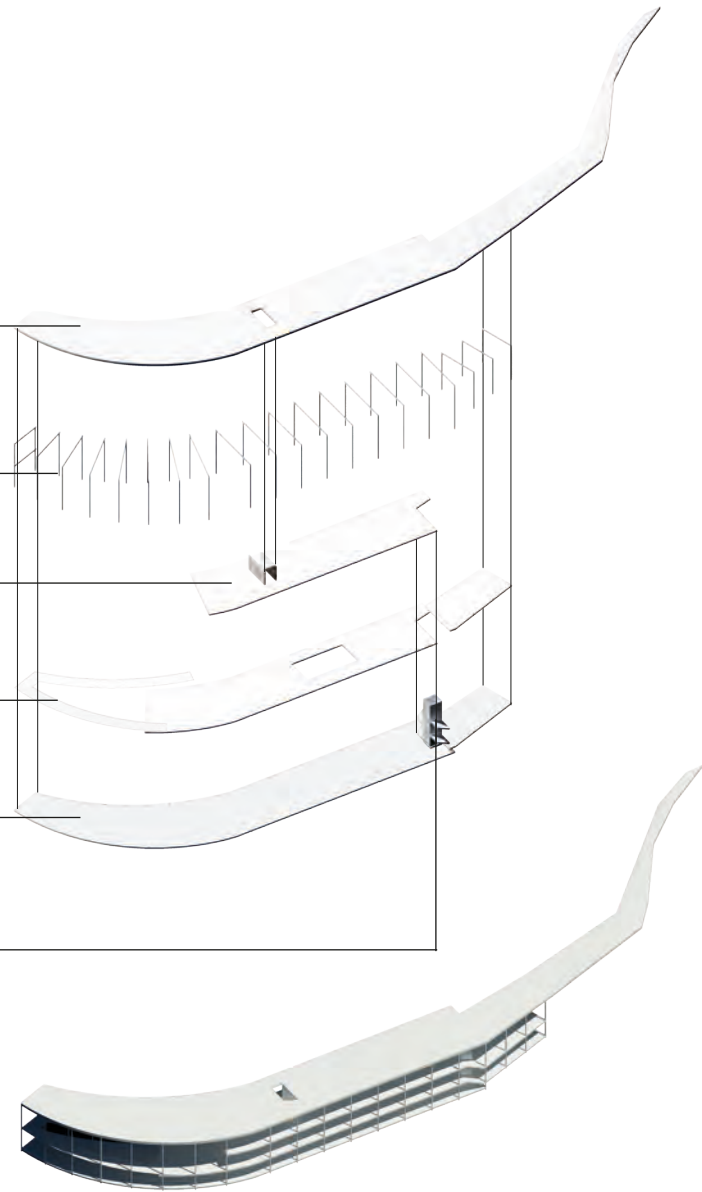
steel columns
(15x15 cm)

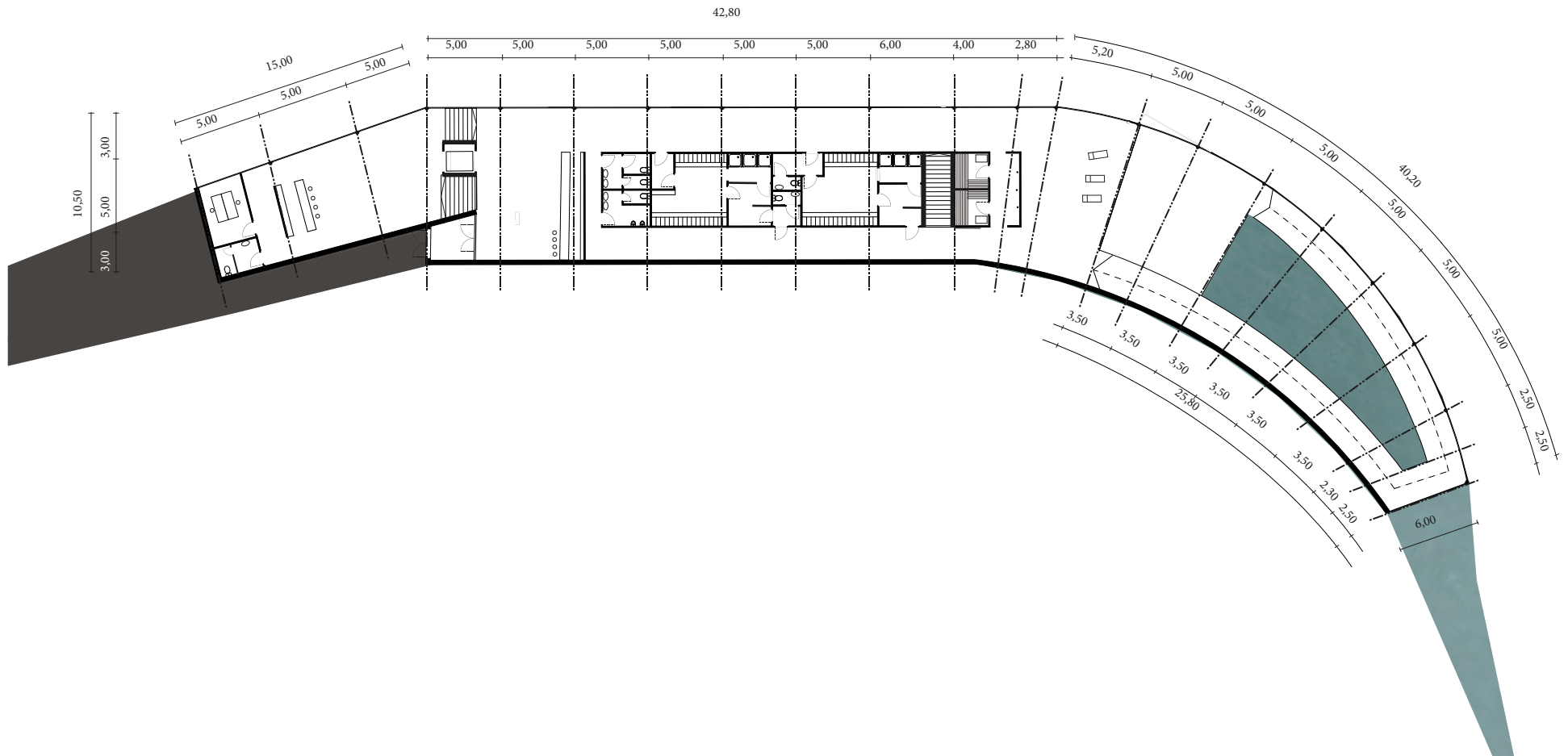
reinforced concrete
slab

ramp

reinforced concrete
slab

vertical transportation

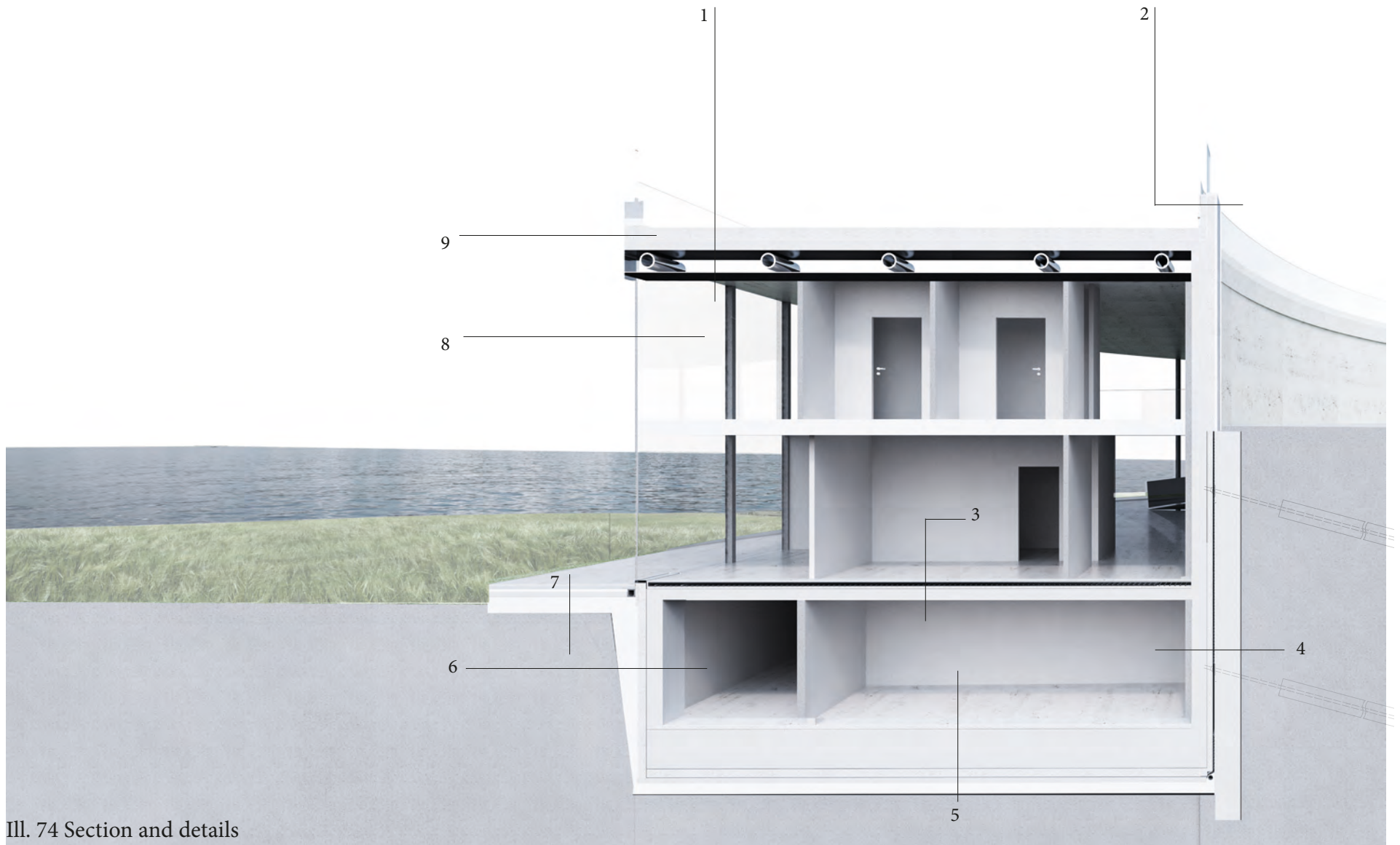




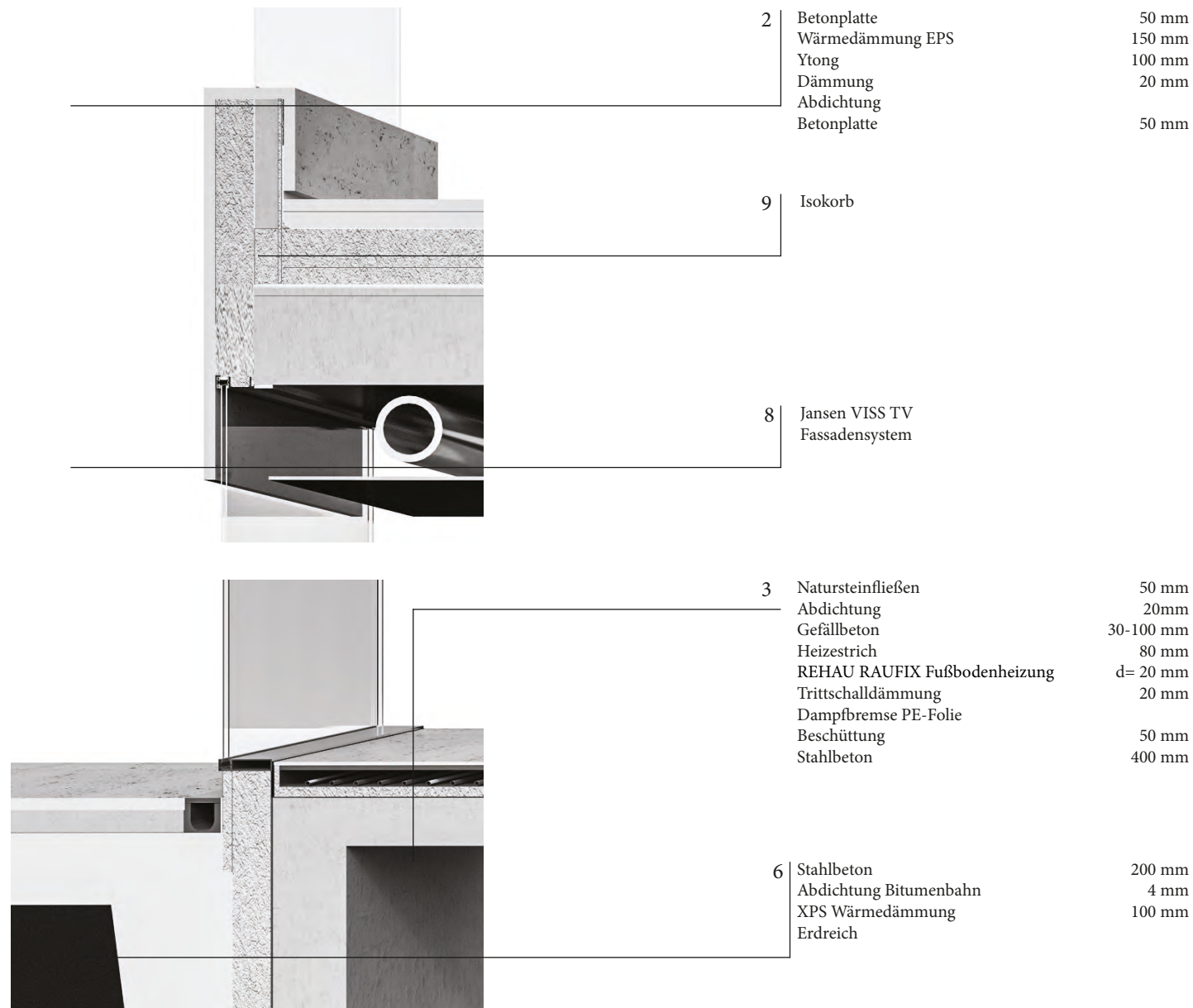
Ill. 73 Structural system

Details

1	Betonplatte	60 mm	4	Stahlbeton	600 mm
	Kiesschüttung	50 mm		XPS Wärmedämmung	100 mm
	Abdichtung Bitumen (zweilagig)	20 mm		Abdichtung Bitumenbahn	4 mm
	Wärmedämmung EPS	250 mm		Dichtschlämme	
	Abdichtung Bitumen	20 mm		Dränschicht DÖRKEN DELTA_MS 20	20 mm
	Dampfdruckausgleichsschicht			Stahlbeton Schlitzwand	500 mm
	Gefällbeton	30-100 mm	5	Versiegelung	
	Stahlbetonplatte	400 mm		Stahlbetonplatte	300 mm
	Installationsraum mit Abhängung	400 mm		Abdichtung Bitumen	
2	Betonplatte	50 mm		XPS Wärmedämmung	100 mm
	Wärmedämmung EPS	150 mm		Abdichtung Bitumen	
	Ytong	100 mm		Magerbeton	100 mm
	Dämmung	20 mm		Kiesschüttung	200 mm
	Abdichtung			Erdreich	
	Betonplatte	50 mm	6	Stahlbeton	200 mm
3	Natursteinfliesen	50 mm		Abdichtung Bitumenbahn	4 mm
	Abdichtung	20mm		XPS Wärmedämmung	100 mm
	Gefällbeton	30-100 mm		Erdreich	
	Heizestrich	80 mm	7	Natursteinbelag	50 mm
	REHAU RAUFIX Fußbodenheizung	d= 20 mm		Pflastersand	4 mm
	Trittschalldämmung	20 mm		Schotter	20 mm
	Dampfbremse PE-Folie			ACO Drain Rigol (15 x 15 cm)	
	Beschüttung	50 mm	8	Jansen VISS TV	
	Stahlbeton	400 mm		Fassadensystem	
			9	Isokorb	



Ill. 74 Section and details



Ill. 75-78 Details



1	Betonplatte	60 mm
	Kiesschüttung	50 mm
	Abdichtung Bitumen (zweilagig)	20 mm
	Wärmedämmung EPS	250 mm
	Abdichtung Bitumen	20 mm
	Dampfdruckausgleichsschicht	
	Gefällbeton	30-100 mm
	Stahlbetonplatte	400 mm
	Installationsraum mit Abhängung	400 mm



4	Stahlbeton	600 mm
	XPS Wärmedämmung	100 mm
	Abdichtung Bitumenbahn	4 mm
	Dichtschlämme	
	Dränschicht DÖRKEN DELTA_MS 20	20 mm
	Stahlbeton Schlitzwand	500 mm

3	Natursteinfliesen	50 mm
	Abdichtung	20mm
	Gefällbeton	30-100 mm
	Heizestrich	80 mm
	REHAU RAUFIX Fußbodenheizung	d= 20 mm
	Trittschalldämmung	20 mm
	Dampfbremse PE-Folie	
	Beschüttung	50 mm
	Stahlbeton	400 mm

Landscape

The Rooftop Garden

The roof is the extension of the hiking trail through the national park. As it is part of the experience of hiking in the nature, and at the end having some time for relaxin in the nature, the rooftop garden offers a possibility for observing and enjoying the variety of the local plants. Plantboxes are arranged on several spots of the garden, creating a secondary path, where both the guests of the recreation center and the local hikers can study the unique plants.

On the western side of the roof, a gentle slope and stairs are creating a comfortable public area, from where the guests can enjoy a sunset.

On the eastern side an observation point provides unique view towards the lagoons and islands of the area.

In the middle of the roof a yoga deck can be found, whe occasionally yoga or training classes can be held.



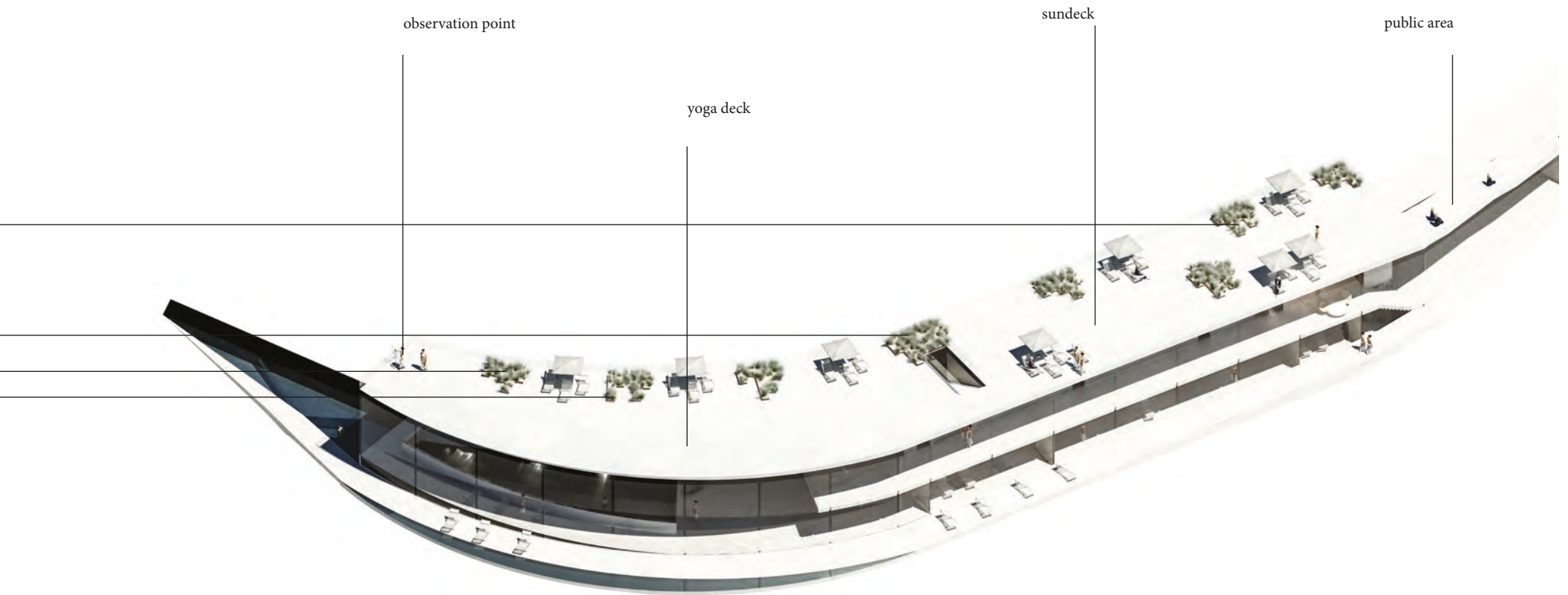
Saccharum ravennae, Hardy Pampas grass



Chouardia litardieri, Meadow squill



Elymus farctus, Sand couch



Ill. 82 Plants and Vegetation on the rooftop

The healing mud / Peloid

According to evidences found in the area, the mud of Nin was used since the Roman times.

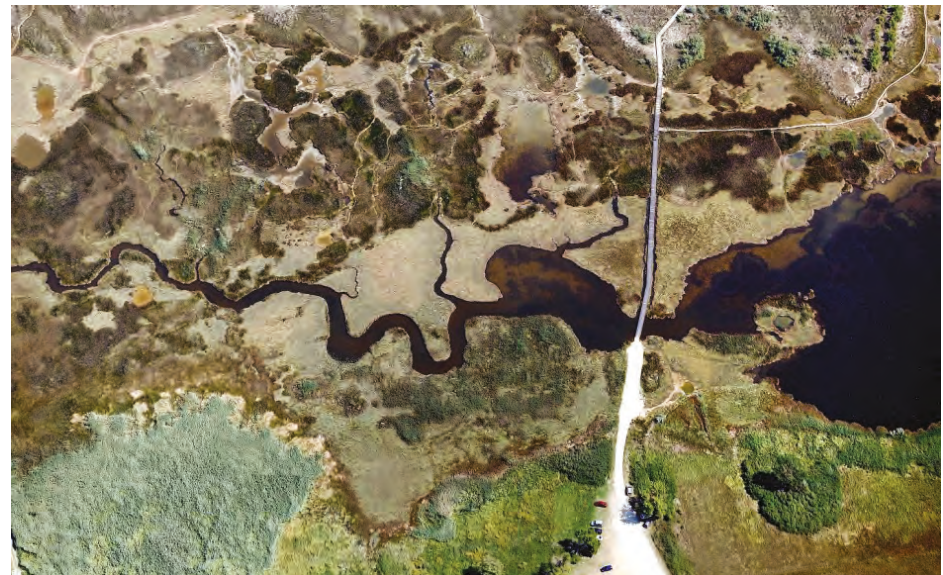
The effectiveness of the peloid has been tested and supervised by the Zadar Health Institution. This unique natural treatment can cure several diseases such as rheumatic diseases, spinal deformities, muscular and skeletal system problems, female infertility and various skin diseases.

The healing mud therapy:
(based on clinical researches)

- treatment against rheumatic disorders, arthritis, sciatica, skin diseases, infertility of women
- the therapy requires a consultation with a medically qualified person

Schedule of the therapy:

- min. 5 max. 20 days in a row
- max. 2 times / a day
- process:
 1. covering the problematic skin area with a thin layer of mud
 2. soaking it for max. 35 minutes on the sun
 3. wash it with the salty seawater of Nin (rich in minerals)



Ill. 83 Aerial view of the protected area, Queen's Beach

Flora and Fauna in Nin

The characteristic elements of the area: the shallow water, low, muddy, sandy and rocky shores, grasslands and high salt concentration results a unique environment, a habitat for several rare and endangered species. The area is under the protection of NATURA 2000.

List of endemic, rare and thraetened species:

Allium telmatum, swamp/marsh garlic (endemic)

Chouardia litardieri, Meadow squill (endemic and with Annexe to Directive EU)

Armeria canescens ssp. *Dalmatica*, Dalmatian Sea Pink (endemic)

Peucedanum coriaceum ssp. *Pospichali*, Leathery (endemic)

Dianthus ferrugineus ssp. *Liburnicus*, Liburnian carnation (endemic)

Cyperus capitatus, Savoy galingale (CR)

Elymus farctus, Sand couch (CR)

Saccharum ravennae, Hardy Pampas grass (CR)

Triglochin bulbosa ssp. *Barrelieri*, Lesser arrowgrass (CR)

Carex extensa, Long-bracted Sedge (EN)

Haynardia cylindrical, Barbgrass (VU)

Hordeum marinum, Sea barley (VU)

Suaeda maritima, Herbaceous Seepweed (VU)

Salsola soda, Prickly Saltwart (VU)

Trifolium resupinatum, Persian clover (VU)

(CR = critically endangered, EN = endangered, VU = vulnerable)

Ill. 84 - 91 rare and endemic species of the Queen's Beach



Allium telmatum, swamp/marsh garlic



Saccharum ravennae, Hardy Pampas grass

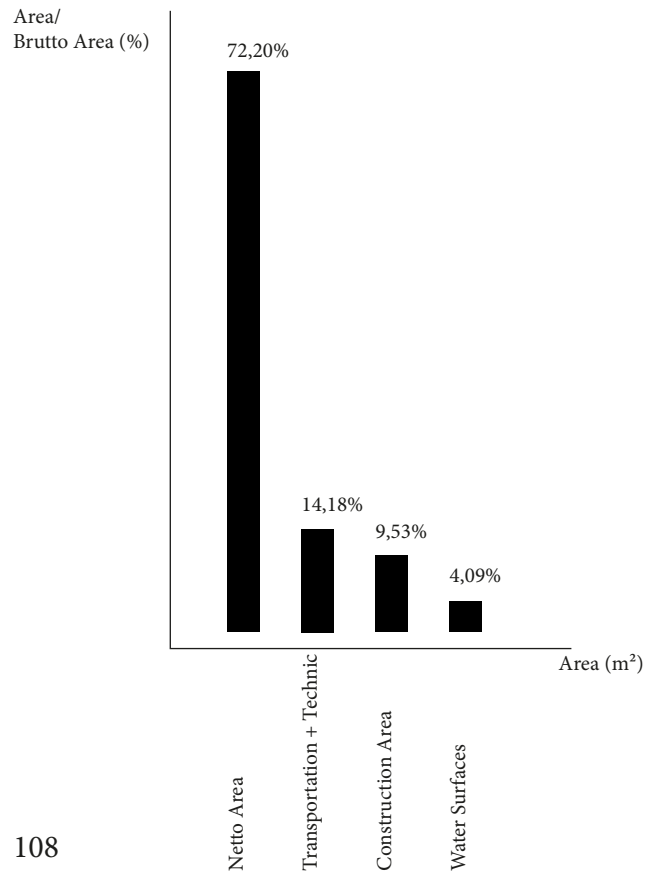


Chouardia litardieri, Meadow squill

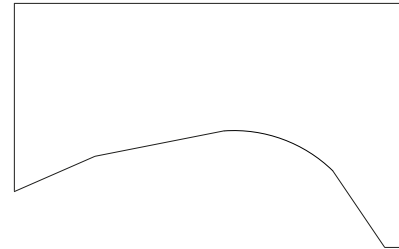


Dianthus ferrugineus ssp. *Liburnicus*, Liburnian carnation

Area calculation

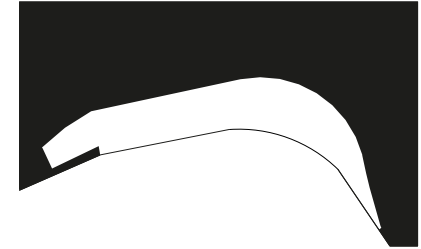


Parcel



5546,36 m²

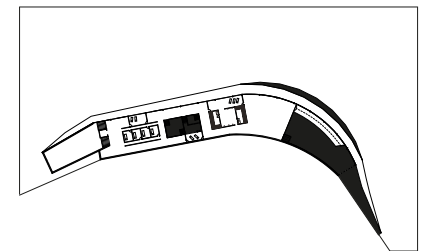
Open Space



4268,50 m²

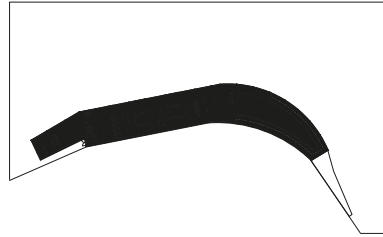
Brutto Area: 3627,21 m²
 Netto Area: 2618,82 m²
 Transportation + Technic: 514,49 m²
 Construction Area: 148,56 m²
 Water Surfaces: 345,34 m²

Water Surfaces

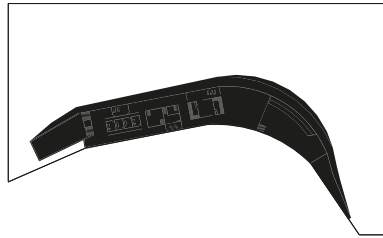


345,34 m²

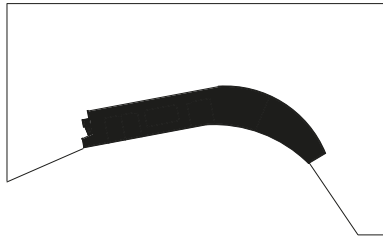
Brutto Area



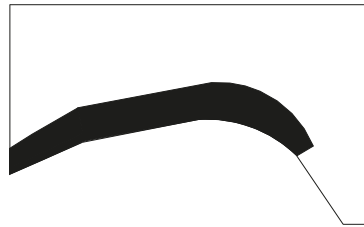
617,59 m²



1277,87 m²

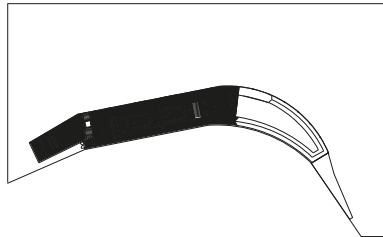


801,07 m²

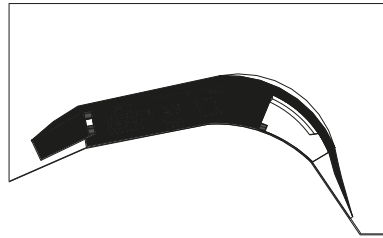


930,68 m²

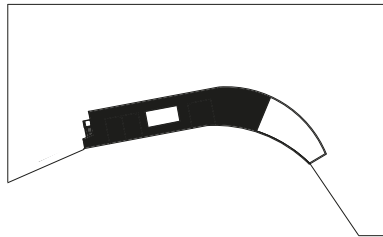
Netto Area



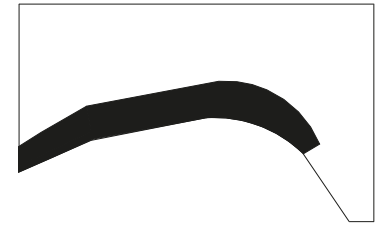
459,15 m²



843,8 m²

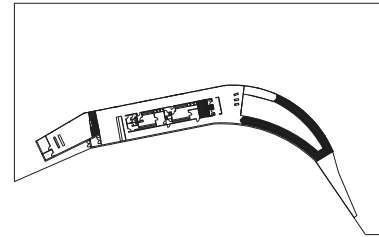


499,38 m²

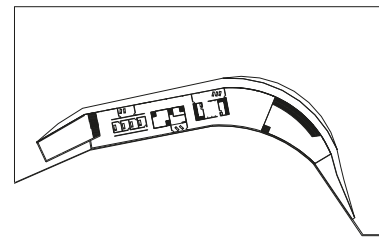


816,49 m²

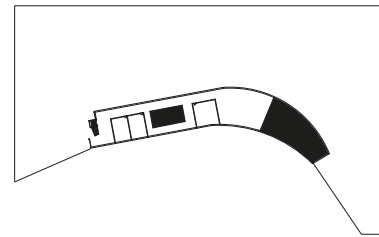
Transportation + Technic



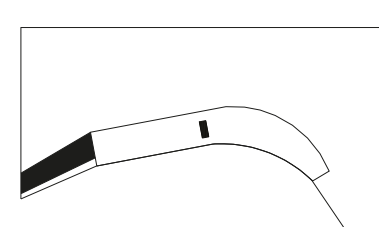
123,66 m²



39,87 m²

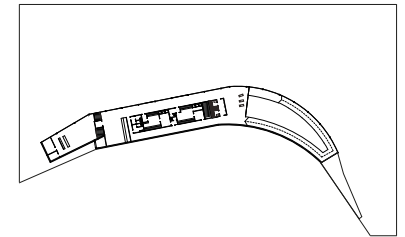


236,77 m²

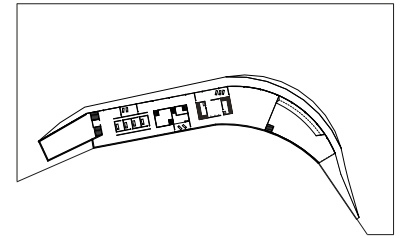


114,19 m²

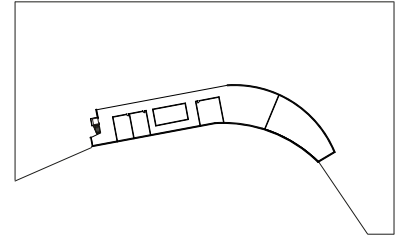
Construction Area



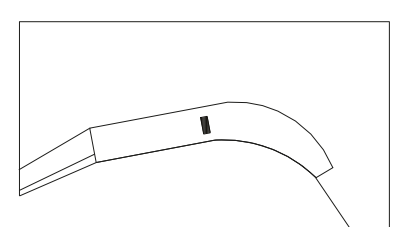
34,78 m²



48,86 m²



64,92 m²

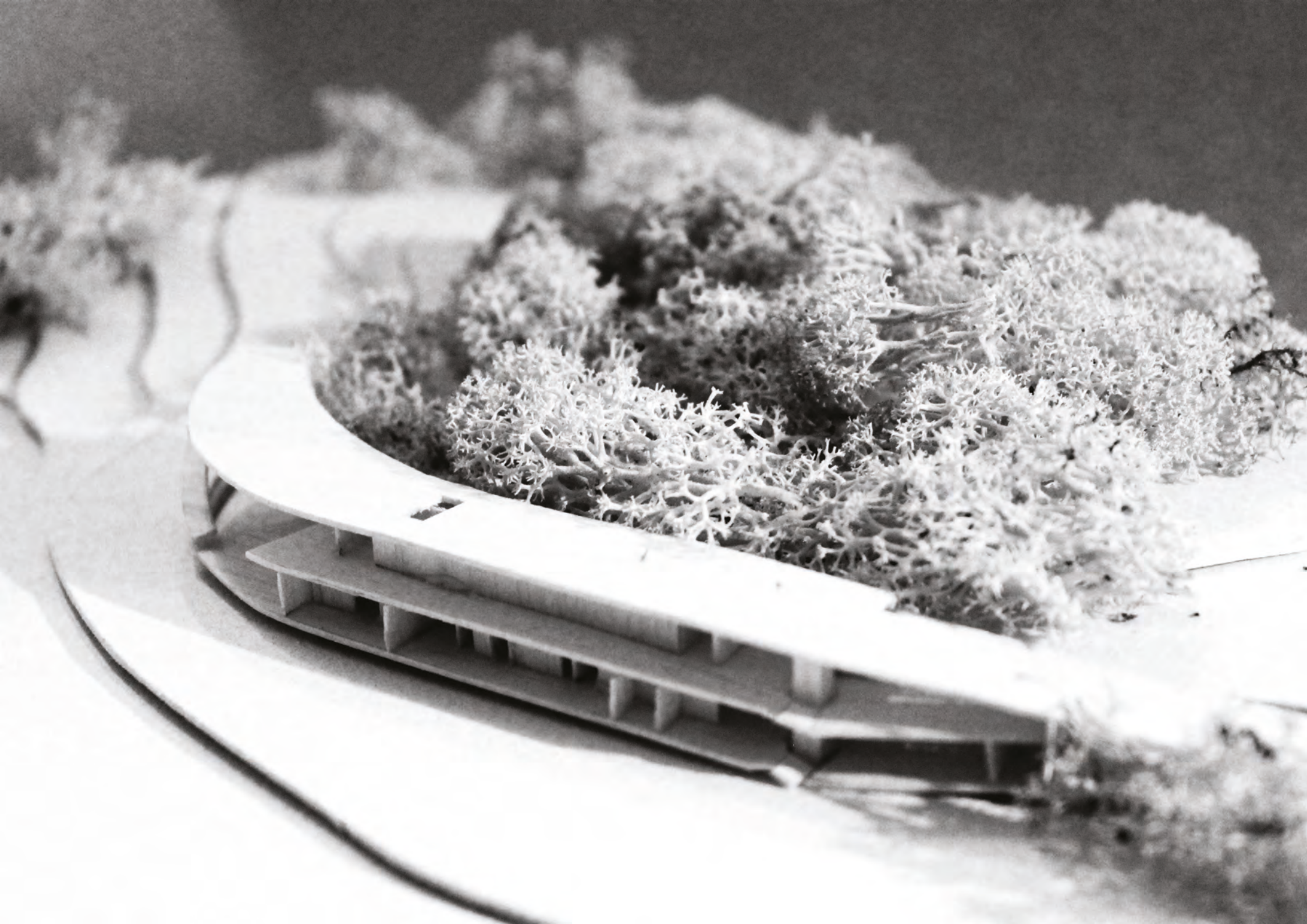


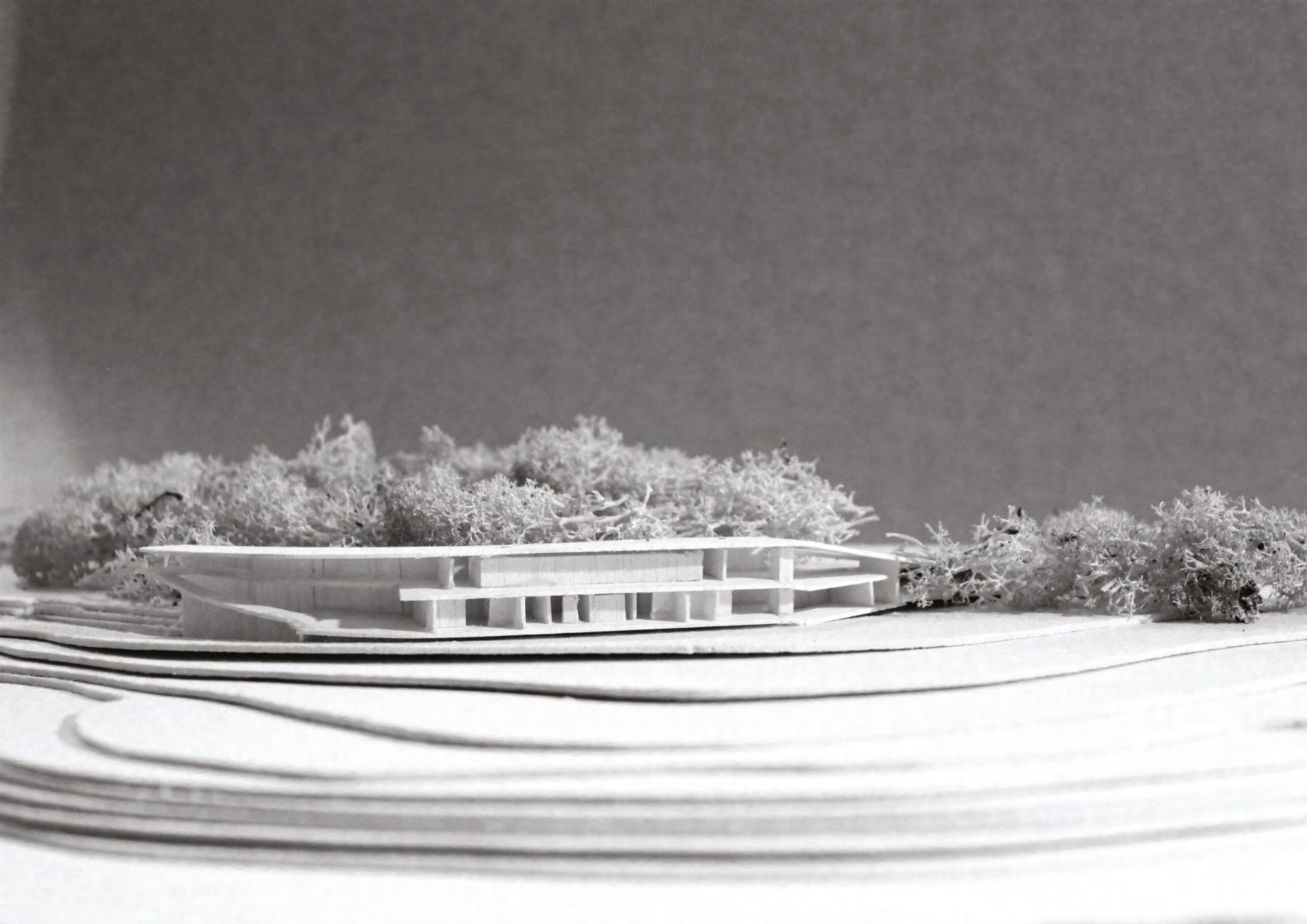
0 m²

109

Model photos











Appendix

References and sources

Illustrations

Acknowledgements

Curriculum Vitae

References and sources

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<https://www.oecd.org/els/health-systems/48723982.pdf>
21.04.2017

Illustrations

Ill. 1 Fanni Breiner

Ill. 2 A Turkish bath. Engraving by M.J. Starling after T. Allom. www.wikimedia.org 04.25.2017

Ill. 3 credit:Polježičanin www.flickr.com 21.04.2017

Ill. 4 Fanni Breiner adapted from Ernst & Peter Neufert, Architectural Standard, 1936

Ill. 5-8 Fanni Breiner

Ill. 9 Blank political map Europe in 2006 WF www.wikimedia.org 20.01.2017

Ill.10 www.simplemaps.com 20.01.2017

Ill.11 <https://www.google.com/maps>

Ill.12 <https://www.google.com/maps>

Ill.13 Fanni Breiner adapted from <http://www.grad-nin.hr> 03.01.2017

Ill.14 <https://www.google.com/maps>

Ill.15 Fanni Breiner adapted from <http://www.grad-nin.hr> 03.01.2017

Ill.16 <https://www.google.com/maps>

Ill.17-19 Fanni Breiner adapted from

Ill.20-22 Fanni Breiner adapted from

Ill.23-26 Fanni Breiner adapted from www.weather-and-climate.com 27.04.2017

Ill.27-39 Fanni Breiner

Ill.40-44 www.textures.com 20.01.2017

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Ill.72-82 Fanni Breiner

Ill.83 www.nin.hr 20.01.2017

Ill.84-91 www.nin.hr 20.01.2017

Ill.92-96 Fanni Breiner

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