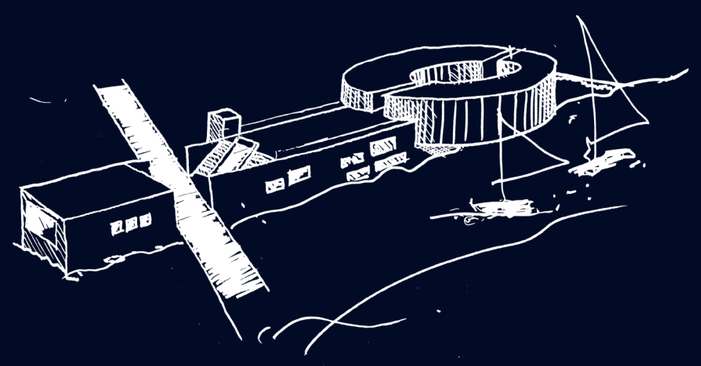
ARCHITECTURE AND TOURISM IN OUTSKIRT AREAS

LOFOTEN SEA CULTURE CENTRE + THE BLACK TOWER IN HIRTSHALS

Randi Elisabeth Knudsen and Stina Holm Jensen | ma4-ark41 | Aalborg University | 2011-2012

PART 2



ARCHITECTURE AND TOURISM IN OUTSKIRT AREAS

LOFOTEN SEA CULTURE CENTRE + THE BLACK TOWER IN HIRTSHALS

long thesis by Randi Elisabeth Knudsen and Stina Holm Jensen
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Drawing folder

CONTENTS **PART 2**

Introduction part 2

The report in your hand is part 2 of the thesis project Architecture and tourism in outskirt areas. As a continuation of the broad theoretical study of architecture and tourism in outskirt areas and site analysis' of the two projects sites found in the part 1 booklet, this report contains design proposals for both the more theoretical project Lofoten Sea Culture Centre in Å in Lofoten, Norway, and the more realistic Black Tower in Hirtshals, Denmark.

The preceding design process is illustrated hereafter. It has been a long and interesting process, touching upon the very essence of the project – how do we as architects make tourism architecture in these often 'untouched' outskirt places without disrupting the life and inherent aesthetic qualities of the place, at the same time as making architectural interventions with a high degree of contemporaneity and the appropriate amount of 'spectacular attractiveness'?

In the concluding chapter reflections on project themes, proposals and processes are put forward. One thing is for sure – the discussion of how architectural interventions can help stimulate tourism in outskirt areas is inevitable in the years to come if the development shall be successful in the long run.

It has been a truly rewarding journey to reach the end of this thesis project, no less the journey of our studies, and we give our kindest thanks to those who have taken interest in our work – professionals and non-professionals alike.

▲
1. Lofoten Sea Culture Centre seen from the seaside.

PRESENTATION

Presentation :
Lofoten Sea Culture Centre

Proposal for a new information centre in Å in Lofoten

The design content of the project at hand is based on an interest in current discussions on development issues in outskirt areas and how tourism help stimulate prosperity and welfare in remote and deprioritised areas, elaborated in theory in part 1.

Å in Lofoten is a small fishing village characterised by an intense tourist summer season, a pronounced lack of life in off season, depletion of functions and decreasing population figures.

From an analysis of Å as an outskirt place in Northern Norway the programme for this project called Lofoten Sea Culture Centre steps forward with multifaceted content. It is part of a future development strategy where a new identity based on potential resources of the sea is suggested - stemming from the observation that Å holds a special potential in its closeness to strong sea currents.

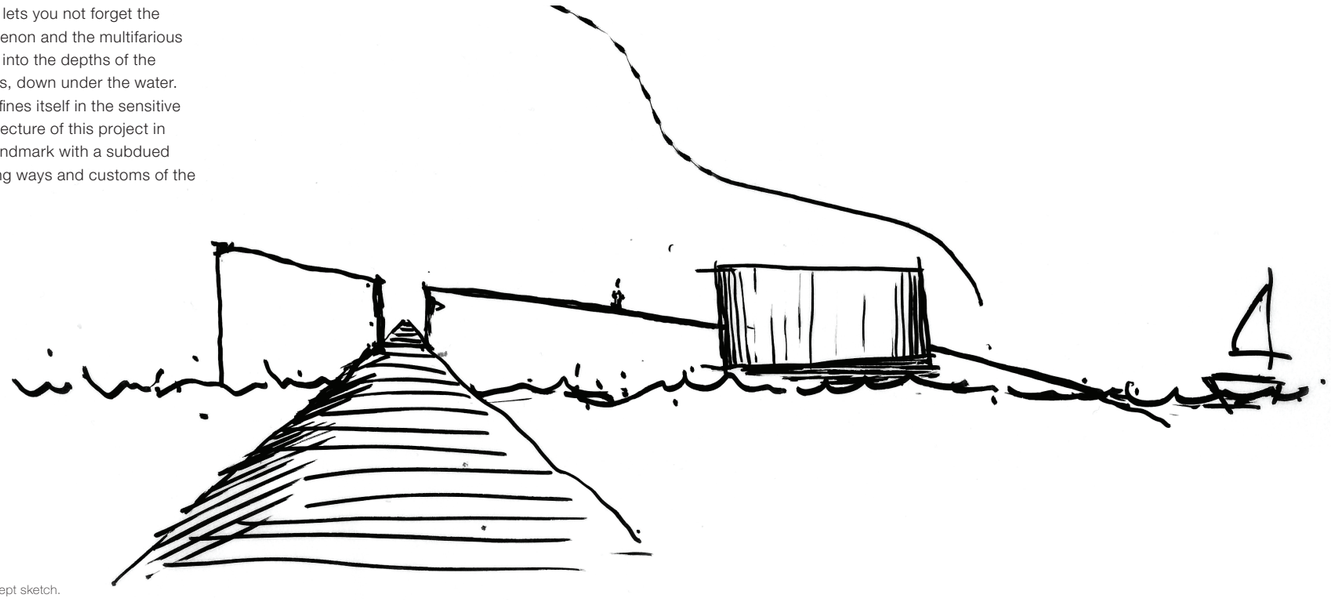
The centre is first and foremost an information centre for tourists, mediating various aspects of scientific research phenomena related to the sea. Content of mediation is supported by the in-house research activity, as the centre comprises a range of research facilities – a business which in turn will be able to generate a turn-over and life in the village all-year round. Further, the building facilitates spaces for activities of more social character, creating a platform for locals and visitors to meet informally, and spaces for promotion and sales of unique local food products.

It is to be a house with flows of people with differing interest; from the tourist, be it a family with young children or a group of retirees on round-trip looking for entertainment, knowledge and the spectacular authentic experience; researchers working in close professional relations with other researchers or visiting researchers coming to absorb the newest knowledge; or locals seeking to have a moment to themselves or wishes to engage in activities with others.

ARCHITECTURAL CONCEPT

The architectural concept is constituted by two main geometries; a tight rectangular stone volume breaking through the surface of the sea upon which a light oval volume in wood sits over the edge of the water. The stone volume provides the anchoring, protective and firm base from where the world of the sea can be observed. In a contrasting spatial experience the oval volume is that of fragility and exposure to the fiery temper of the climate. It is a story in two parts of the existential tension that exudes the placeness in Å in Lofoten.

The ever-present water surface, be it the actual visual connection or reflections of light on the surface of the water, lets you not forget the reason for visiting the centre: the sea phenomenon and the multifarious resources it holds. The sloping roof takes you into the depths of the phenomenon, through the whirling oval spaces, down under the water. It is a strong shape with a form that clearly defines itself in the sensitive context. It is, however, believed that the architecture of this project in itself will be an attraction to visit - a modest landmark with a subdued presence, in materials and detailing interpreting ways and customs of the place.



► 2. Architectural concept sketch.

▲
3. View towards sea.

SITEPLAN

The building is situated right in the passage where the sea flows into the lake at high and withdraws at low tide. The elongated building form follows the directions of nature's crooked lines from lake to sea and engages in a contrasted play with the surrounding rock islands. The location in water strengthens the character of the building as a place where water, especially tidal currents, evidently is a part of the story. A story of the exact potential found in this specific place where energy can be harvested directly from the givens of nature – a story of the powers and resources of the water that flows through the village of Å.

The proposal seeks to create a natural connection between to detached parts of Å – the southern centre in Å with its many restored historical buildings and the area to the north where the well-attended Norwegians Fishing Village Museum and parking facilities are located.

As an architectural element found in all of Lofoten's coastal settlements, the wooden footbridge is here the connecting element using the building as a stepping stone halfway. Where the bridge 'cuts through' the stone volume a courtyard space opens up and allows for casual insight and invitation to the activities at the centre. It has been of great importance that the building has a certain public image. A building which will not stand as an idle 'ghost' building closed off for any activity outside normal opening hours, that is. The transverse bridge helps demystify the contents of the edifice as informal passing is encouraged. It is further underlined by the possibility of accessing the roof at any time. From the open courtyard space staircases lead to the rooftop where a sloping promenade towards the waterline can be enjoyed with views to the sea and village. On the way you must walk through another defined courtyard space that creates protected comfort for stay or gazing at exhibited artifacts related to current exhibition themes before you reach the building-wide staircase extending into the water.

Moor your boat or dive in for a swim the crystal clear water on a sunny day. Or hear and feel the staggering waves of cold water lapping against the stone in the joyful snow-covered winter. It is an architectural intervention that returns the occupied terrain by giving a unique experience of an otherwise unreachable place back to locals and visitors.

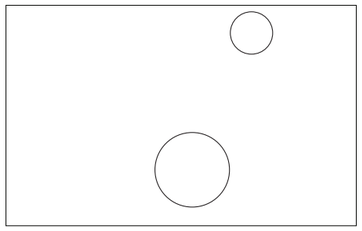
KEY FIGURES

Lofoten Sea Culture Centre has a total gross floor area of xx m2. Net floor areas of main functions are listed in figure 11, and the initial room program is re-printed from the site analysis in appendix 1 for comparison.

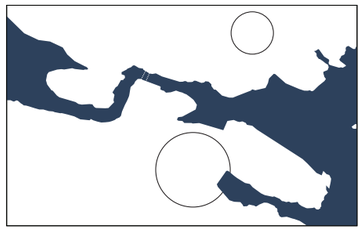
Calculations made in BE10 (energy consumption) has been made to establish that the building adheres to the energy frame outlined in Danish Building regulations, BR10. Results show that it is reasonable to assume that the energy consumption of the building for heating, domestic hot water, ventilation and lighting, on the assumption that the building was situated in Denmark under Danish regulations, reaches well below the current energy frame (2010). For elaborate explanation please refer to appendix 2 for calculation basis (construction and installations) and reflections on the impact from a more northern climate in Lofoten.

AREA:		
Gross floor area	2540 m2	
Main net floor areas		
Mediation	321 m2	
Office facilities	205 m2	- 16 researchers, study carrels, quiet room
Laboratories	941 m2	- incl. 168 m2 water tank, 35 m2 storrage
Café	74 m2	- 44 guests
Auditorium	119 m2	- 84 people seated
ENERGY:		
Allowed energy frame (2010)	71,9 kWh/m2 year	
Total energy requirement	48,8 kWh/m2 year	

▲
11. Existing situation : Two activity zones.

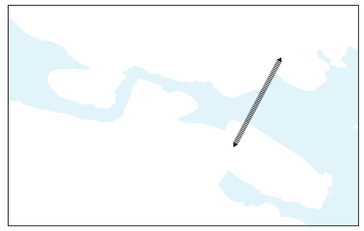


▲
4. Existing situation : Two activity zones.

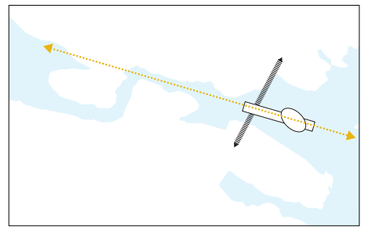


▲
5. Existing situation : Transition zone from sea to lake in between.

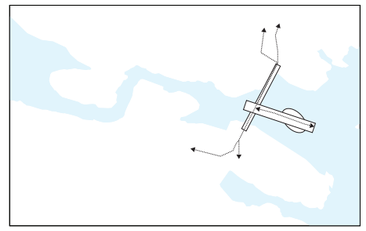
▲
6. Existing situation : Flow from two parking areas cut off by water



▲
7. Future situation : new foot bridge connection between areas.

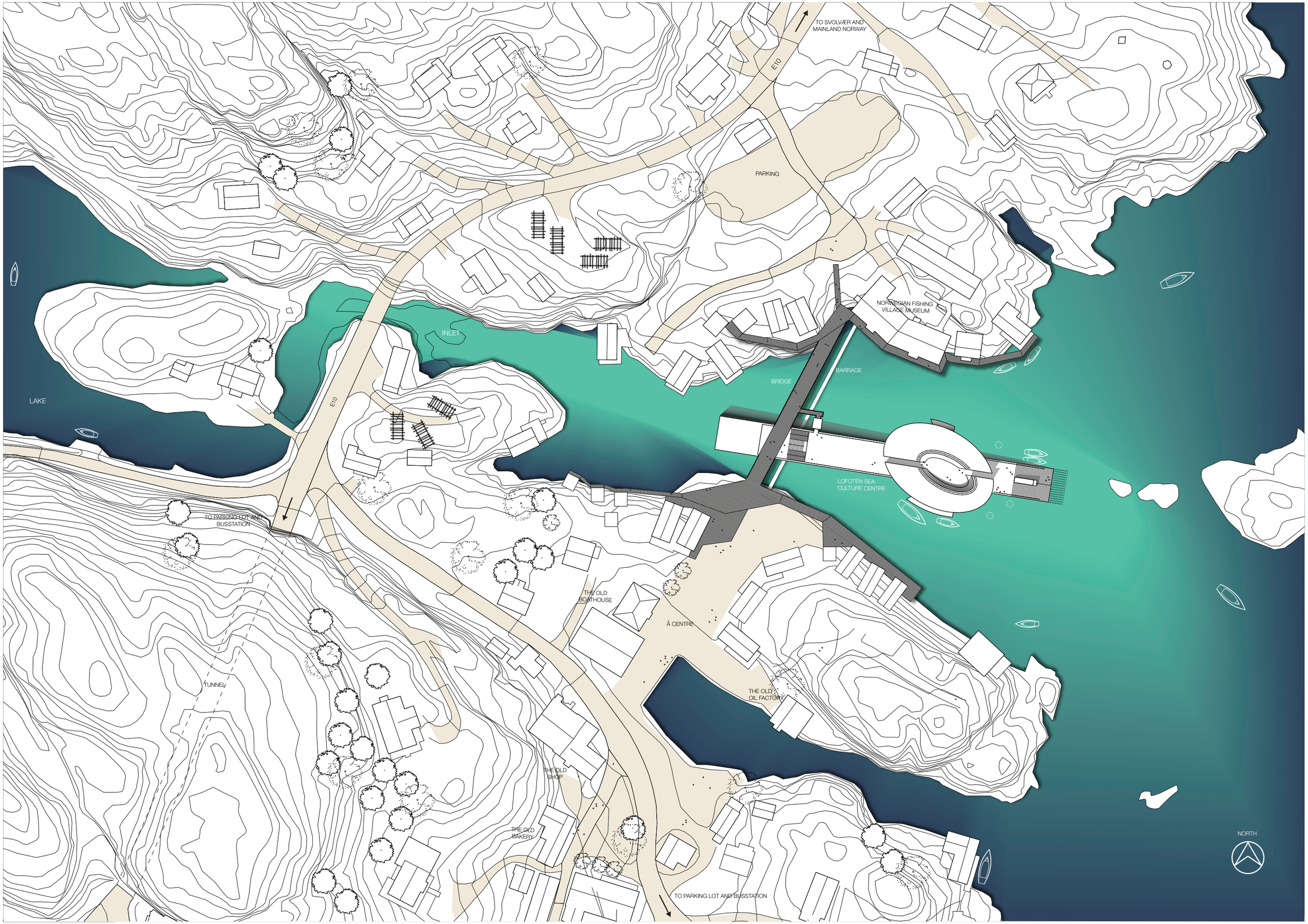


▲
8. Future situation : Lofoten Sea Culture Centre underlines the directions in the landscape and intersects with the bridge.



▲
9. Future flow situation - the building can be used as promenade.

►
10. Site plan, scale 1:1000.

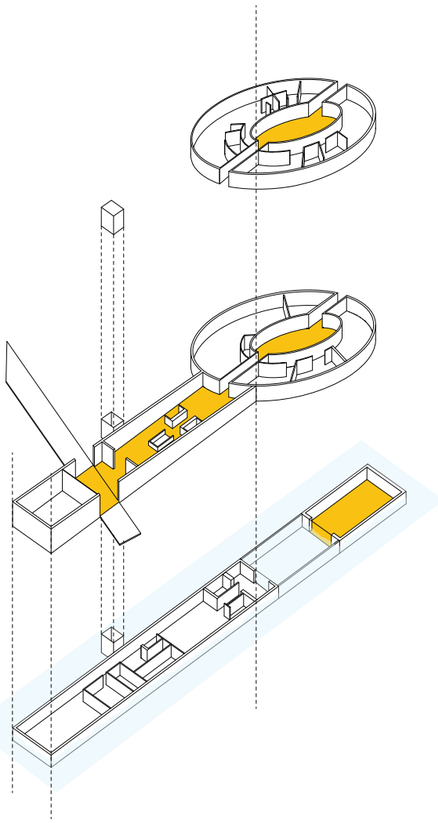

TO SVOLVÆR AND
MAINLAND NORWAY
E10
PARKING
NORWEGIAN FISHING
VILLAGE MUSEUM
INLET
BARRAGE
BRIDGE
LAKE
E10
LOFOTEN SEA
CULTURE CENTRE
TO PARKING LOT AND
BUSSTATION
THE OLD
BOATHOUSE
Å CENTRE
TUNNEL
THE OLD
OIL FACTORY
THE OLD
SHOP
THE OLD
BAKERY
TO PARKING LOT AND BUSSTATION
NORTH

SPATIAL ORGANISATION

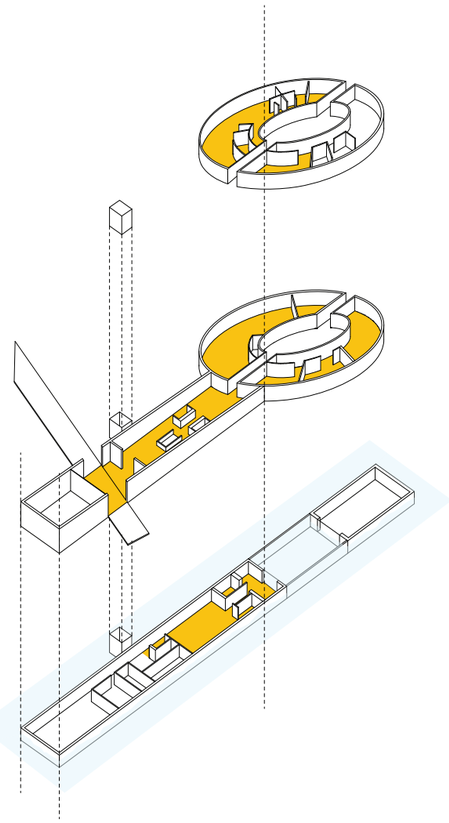
Lofoten Sea Culture Centre is primarily an information centre conveying information on sea currents and other sea phenomena. There is, however, a range of other functions and users who have interest and requirements to the functional planning.

In the spatial organisation of the different functions informal and casual meetings are deliberately insisted. There is no strict division between the three main functions (mediation, research and social facilities), as this is considered to contribute positively to a down-to-earth feeling of the building. Some functions are closed off to the public, yet the connections from these to related functions often takes you through spaces intended for other purposes. E.g. offices' are set apart from the flow of people in order to give space for concentrated immersion, researcher must however mingle with other people in the building when moving to e.g. labs, café, toilets etc.

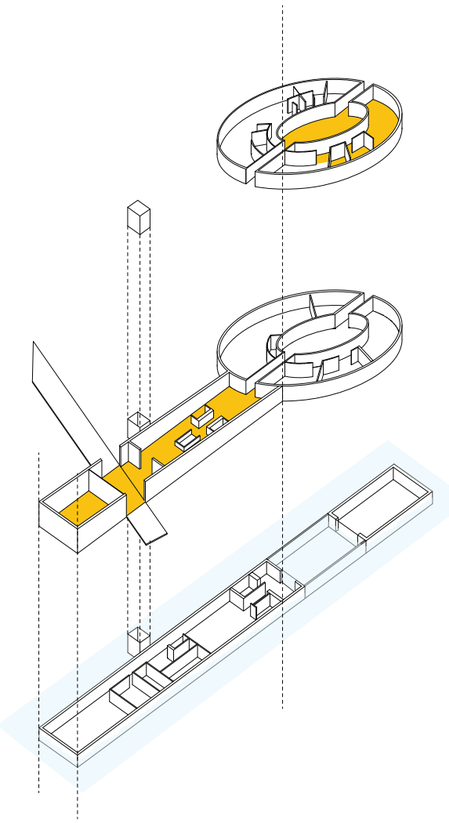
Most parts of the building can be accessed without entrance fees. Upon arrival a multifunctional foyer space accommodate a range of different function, e.g. display and sales of local products, tourist information, free exhibition, lounge area for relaxation etc., free of use. Mono-functional spaces for mediation can however be entered only with tickets.



▲
12. Primary areas of use : people visiting mediation.



▲
13. Primary areas of use : researchers



▲
14. Primary areas of use : people visiting on an informal basis.

▲
15. Interior view in café area.

MAIN LEVEL - FOYER AND DISTRIBUTION

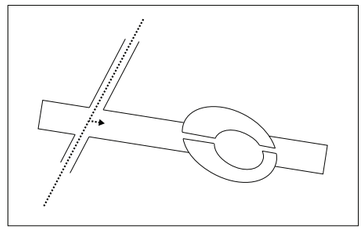
The elongated building volume is accessed via the crossing footbridge. From the external courtyard two options appear; on the one hand the auditorium is revealed behind large windows, on the other five steps takes you down to the main level of the building. Through the glass entrance the arrival point, the administrations desk, can be seen. It is a pivotal point in the running of the centre as the employees may manage tasks from serving people buying products and tickets, advising tourists to attractions in Å, booking holiday accommodation and administrating the centre as a wide-ranging business.

A staircase from the entrance area leads down to toilets, further a capacious external elevator service both upper, lower and roof level to be used by disabled persons and as goods lift. Wardrobes can be found both on the main level, and as lockers on the lower level.

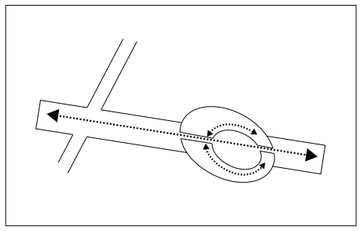
As the ceiling slopes downward the slender clear-cut stretches out into the horizon, framed through the central walking path, displays with cloudberry sirup, clipfish and chocolate from the island of Røst greets you with the diversity of the region. Perhaps a freshly baked cinnamon bun from The Old Bakery and a good cup of coffee accompanies you for a relaxed moment in the arranged seating lounge.

The room is furnished with two compartments which can be shut off in need of enclosed spaces, be it for workshops, meetings, sleeping arrangements etc. The lounge area is composed by lightweight furniture in order to keep this space flexible in use. The area is further detailed to convey some of the core qualities of the project; through a conscious tectonic detailing the ‘earth-bound’, the observing laid-back attitude, the embracing tactility is brought forward, telling the coherence to the quiet, simple life in the fishing village. Detailed drawings and descriptions of materials and details is presented on pages 34-47.

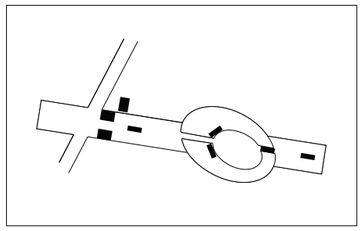
The multi-purpose auditorium to the west has beautiful views to the mountain valley surrounding the lake. The space ads on to the public walking path, as such stepping forward as a present gathering space in the village. Activities of more leasurely character could be cinema-nights, dancing or bigger parties, while the space can be as conference facilities, possible attracting visitors outside season as well.



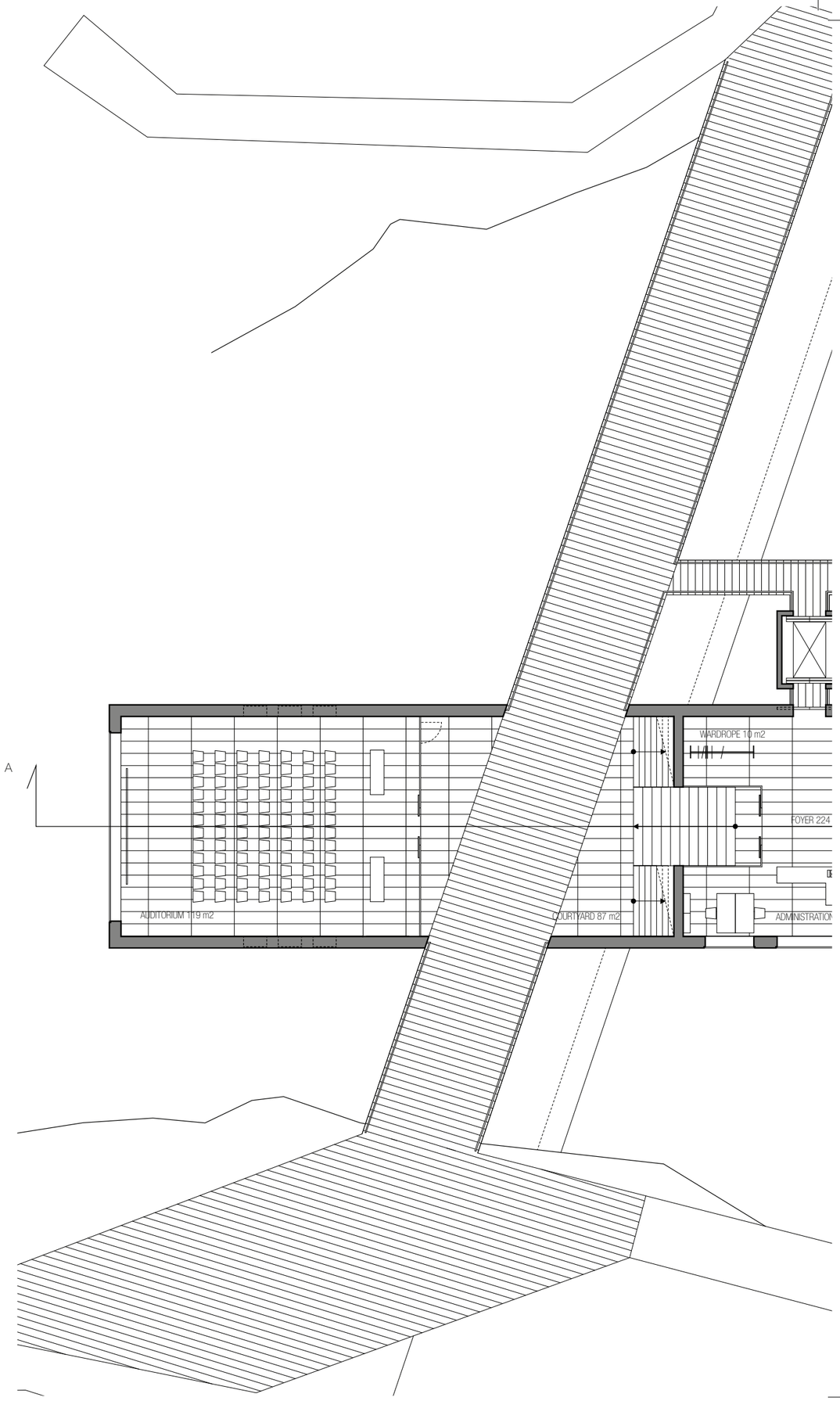
▲
16. The building has one main entrance.



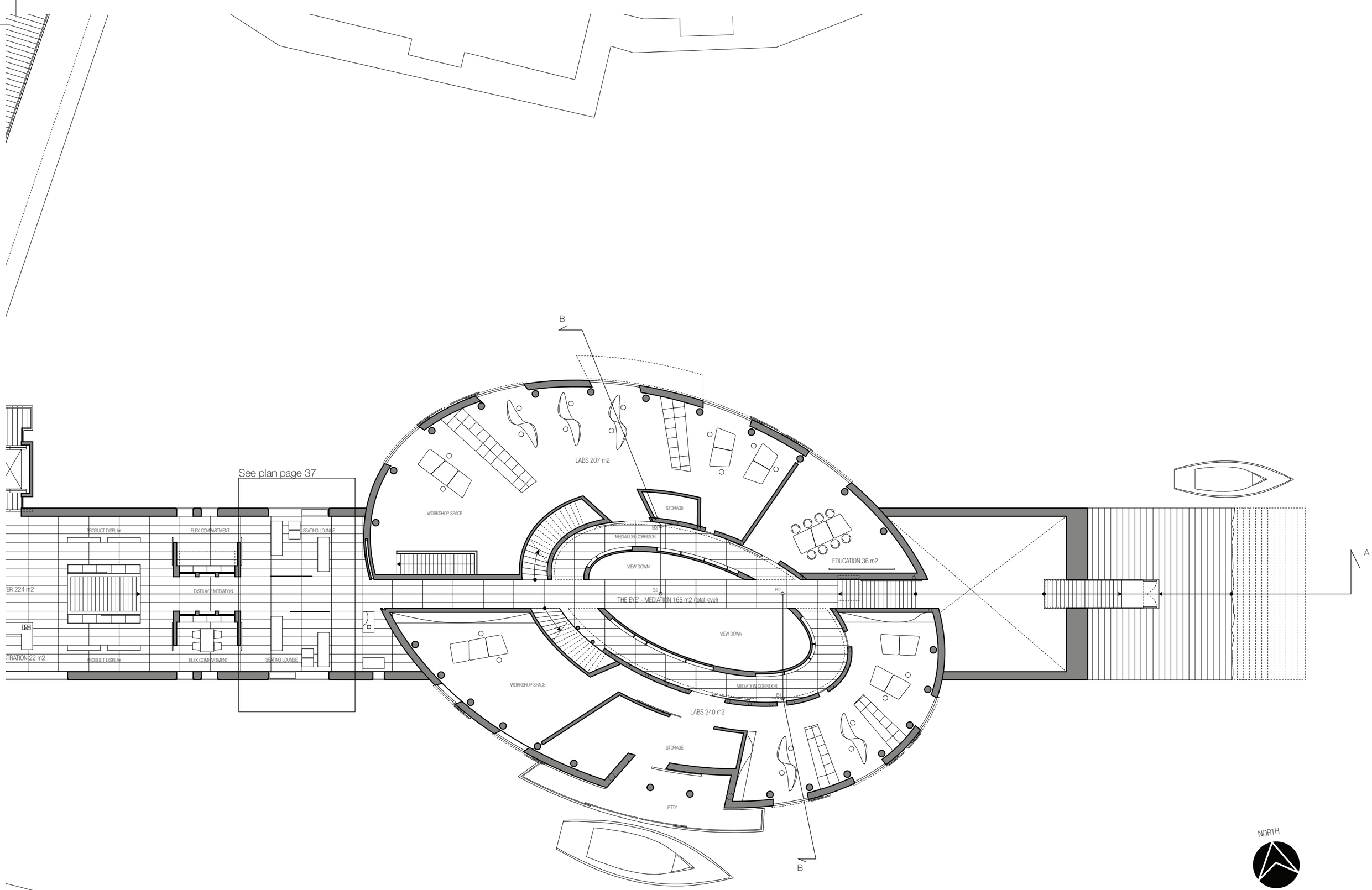
▲
17. Flow directions follow the geometrical form of the building elements.



▲
18. Vertical transportation, internally staircases serve vertical movement, externally a lift serving all levels, including roof is installed.



▶
19. Main level plan, scale 1:200


B
LABS 207 m2
See plan page 37
WORKSHOP SPACE
STORAGE
MEDIATION CORRIDOR
VIEW DOWN
EDUCATION 36 m2
A
PRODUCT DISPLAY
FLEX COMPARTMENT
SEATING LOUNGE
DISPLAY / MEDIATION
B2
'THE EYE' - MEDIATION 165 m2 (total level)
VIEW DOWN
WORKSHOP SPACE
MEDIATION CORRIDOR
B1
LABS 240 m2
STORAGE
JETTY
B
NORTH

SPACES FOR MEDIATION

It is intended that the content of exhibitions at Lofoten Sea Culture Centre is supported by the knowledge produced on site, i.e. the subject matters explored by the working researches using the laboratory facilities in Å. It is a form of mediation which uses a certain 'behind-the-scenes'-atmosphere as a draw to tourists.

The centre is designed with spaces for delivering palpable and entertaining information in exhibition settings and designed with a range of different ways of interacting with water, seeking to heighten the understanding of the phenomena, here especially the evident tidal changes.

As the visitor reaches the perimeter of the oval a narrow corridor takes you past staircases leading to the offices and café/labs on the upper level, into the oval mediation space, 'the eye', on the main level (fig. 19). The walls are here used as projection backgrounds for animated information, whilst water is reflected from the lower level water tank through the glass floor, keeping the actual phenomenon in mind.
A mediation corridor runs along the outer edge, where the concave wall is furnished with storage for archive material, partly made accessible for the public by e.g. digital media. The convex perimeter of the whirling course lets you peek into the authentic research environments through windows or perhaps you are even invited into the labs to a talk about current work. The wall can further be used for interactive exhibition niches.
A staircase leads to a spacious exhibition space on the lower level characterised by the ever-present water.

Mediating natural phenomena

The building has been designed with a range of interaction-levels to highten tourist's understanding of natural phenomena, here especially the evident tidal changes.

- Barrage

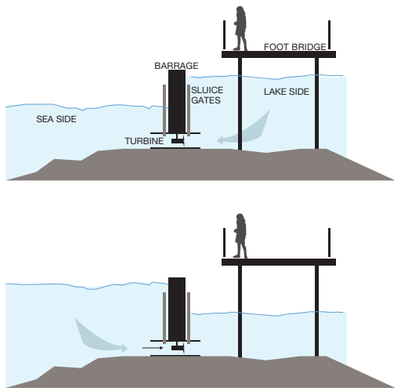
To the immediate east of the arrival bridge and aligned to it, one finds a barrage as part of the building design. Based on the principle in figure 20 it is here potentially possible to harvest energy from the changing tides by use of circulation turbines and sluises; taking advantage of the natural narrowing passage which exists in the transition from lake to sea.

- Prototypes on seabed

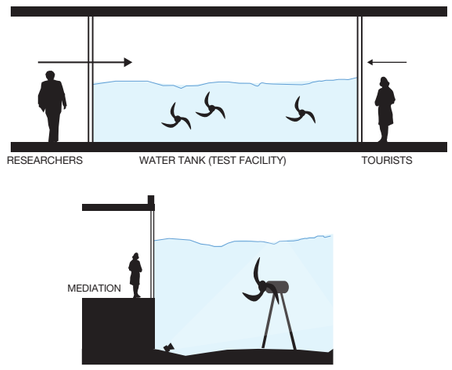
Large windows are used to exhibit prototypes or scale models of e.g. tidal turbines placed externally on the seabed (fig. 22). Through clear water the otherwise inaccessible infrastructures comes to the fore as something tangible acting in its actual element.

- Water tank

A water tank test facility occupies space underneath the oval (fig. 21). Here the sea water flows in from the sea, it can be regulated by controllable shutters if lower water level is desirable for research experiments. From the mediation space windows allow visitors to look at the activities. When not I use for research one can image models of test equipment being lowered into the water for visitor entertainment and education.

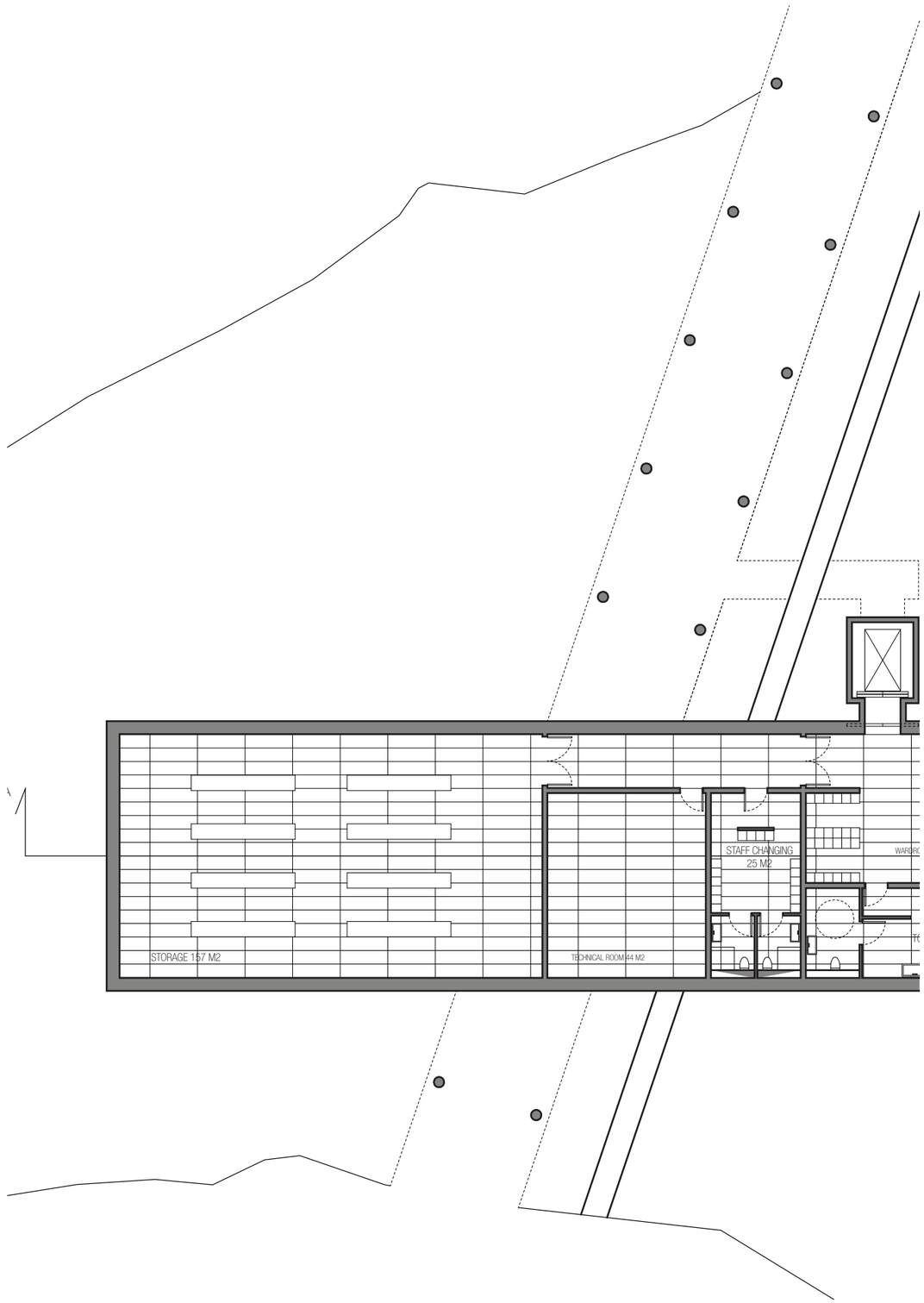


▲
20. Diagram in two parts showing the principle of the barrage with water turbines. At low tide (top) water flows from the lake to the sea. At high tide (bottom) the opposite situation occurs.

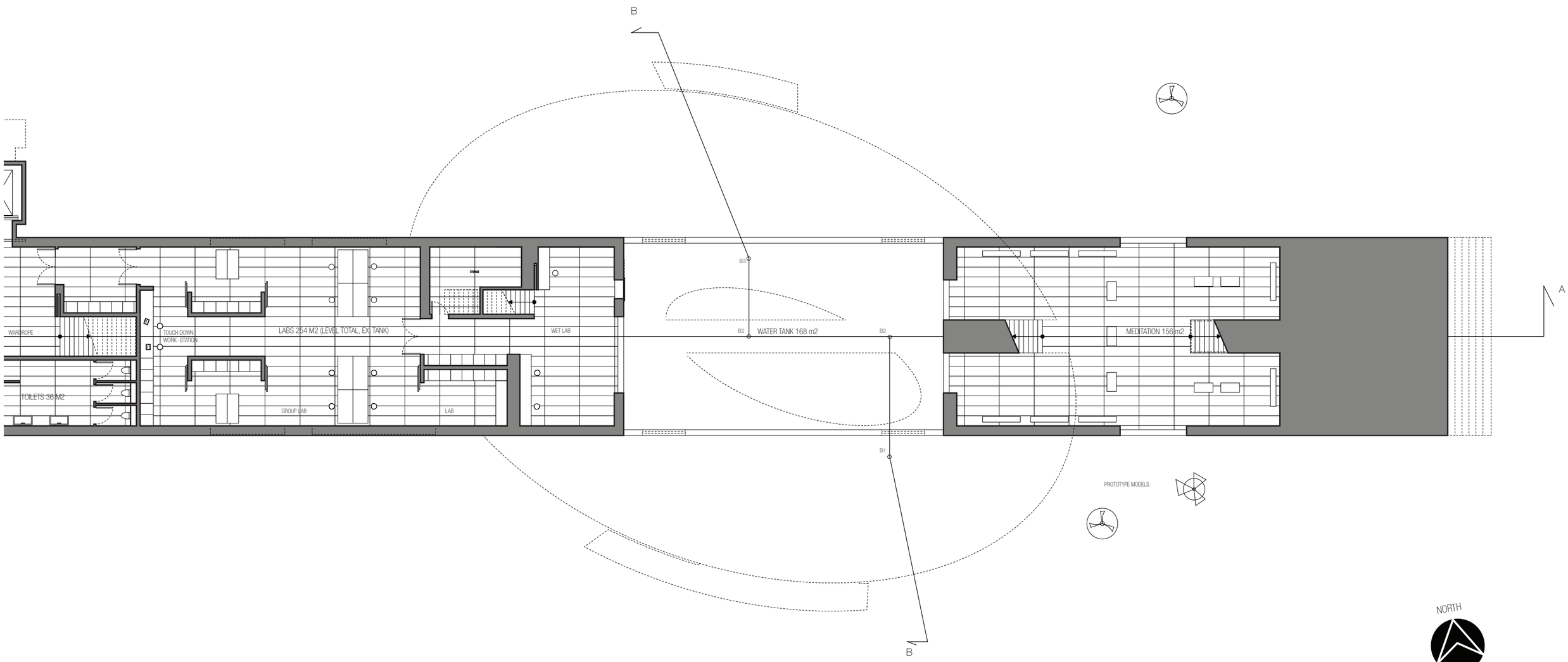


▲
21. Water tank mediation principle. Access for researcher from one side, view to test facility from mediation space.

▲
22. Through windows in the mediation space prototypes mounted on the sea bed can be observed.



►
23. Lower level plan, scale 1:200


B
B3
B2
WATER TANK 168 m2
B2
B1
A
B
WARDROPE
TOUCH DOWN
WORK -STATION
LABS 254 M2 (LEVEL TOTAL, EX TANK)
STORAGE
WET LAB
MEDITATION 156 m2
TOILETS 36 M2
GROUP LAB
LAB
PROTOTYPE MODELS
NORTH

RESEARCH FACILITIES

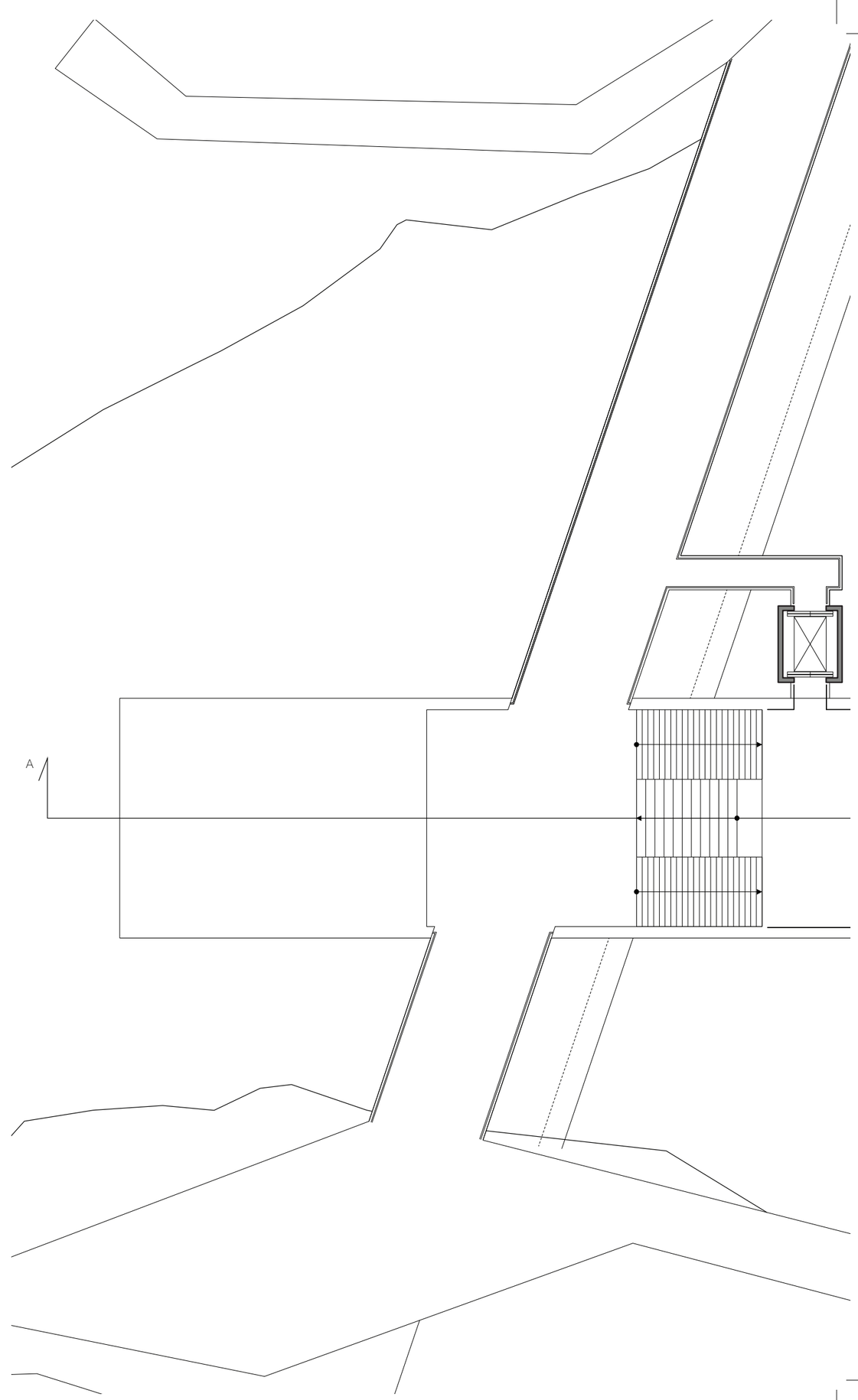
From the studies of good research and office environments carried out in the site analysis chapter we learned that well-functioning contemporary knowledge environments should be supported by a variety of workplace options in the physical environment. Hence, the proposal for research facilities comprises a range of different ways of being in the environment. As a permanent base to the alternating works in laboratories, an office on the upper level of the oval volume is organised with an individual workspace for each researcher in an open-plan solution (some in individual offices), study carrels for uninterrupted work and a quiet room for longer phone calls. The copy room is situated where the room depth is largest, allowing for permanent workspaces to be placed closest to the floor to northern floor-to-ceiling windows for good daylight conditions. The chosen structural system (see page 48) allows for flexible interior organisation, the open office could be divided into smaller research units by glass partitions if desirable. Meeting facilities can be found several places within the building; as regular meeting rooms, educational space, as compartments in the foyer space, the informal seating lounge or bigger assembly in the auditorium space.

The 900 m2 lab-spaces are suggested to be furnished also with variety in work situations. Again, the load-bearing structure allows for a relatively free organization of the spaces to the needs put forward by the research units in question, be it smaller compartments with tables and storage, bigger collaborative study groups or bigger workshop spaces for making of physical objects. From main level labs it is possible for the researchers to moor boats to a jetty in direct contact with labs. On the lower level, lab space connects to the water tank where wave-experiments can be performed and analysed.

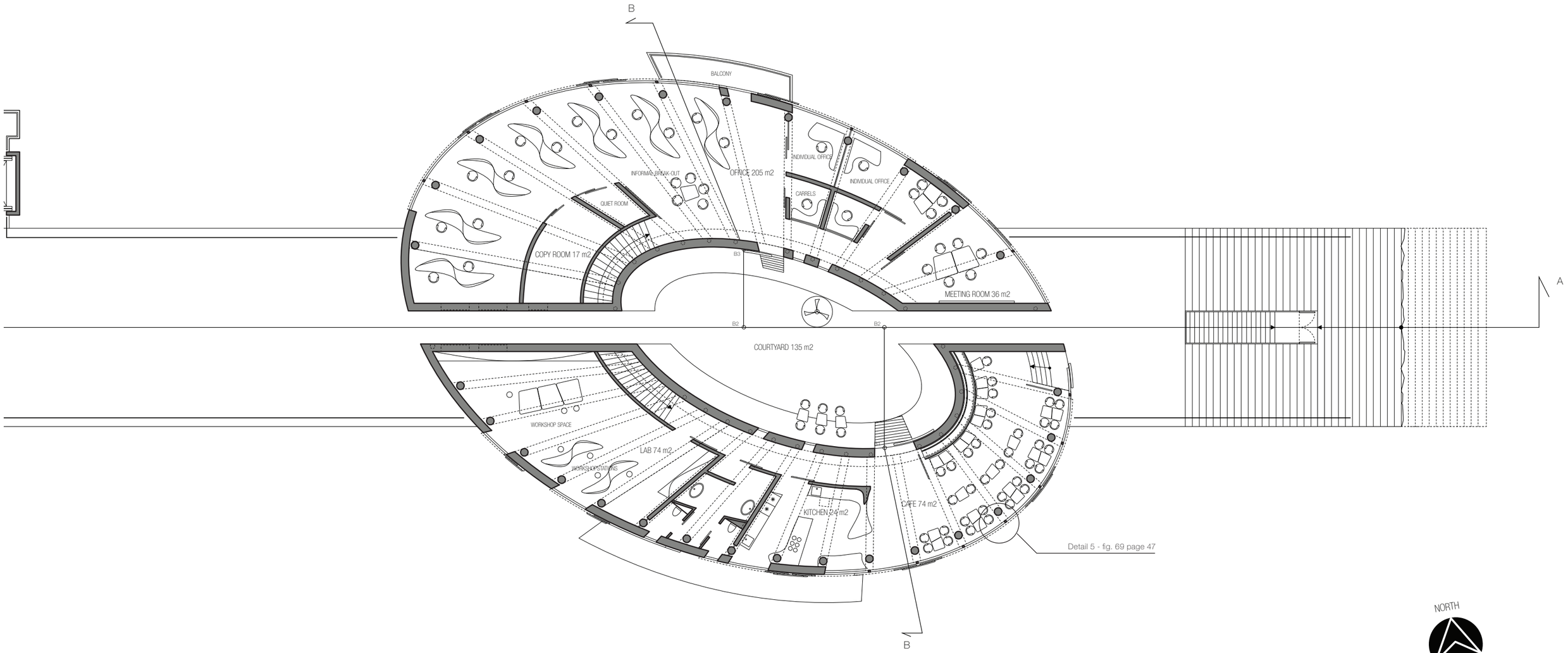
SOCIAL PLATFORM

Besides being an information centre for tourists and a workplace for researchers the centre is, as earlier mentioned, a house where people can come and stay on a more informal basis. You have several possibilities; a panoramic meal experience with a view over the boundless sea, shopping quality foods and products in the foyer, participating in local event etc. While foyer space and auditorium offers themselves immediately to passers-by, the café is located further away – where the unique location makes the walk worthwhile (fig. 24).

The café is reached in two ways - either a walk through the interior of the stone volume or a promenade on the roof of the building and entering from the oval courtyard. The convex shape of the oval volume gives the possibility of creating panoramic views to the picturesque surroundings, dramatically cantilevered over the water. The café seats 34 people, can be used for other gatherings and works as eating lounge for the employees of the centre. Activities related to the café can be moved out into the protected courtyard, where also artifacts can be exhibited and workshops arranged, or out onto the roof to the east of the oval.



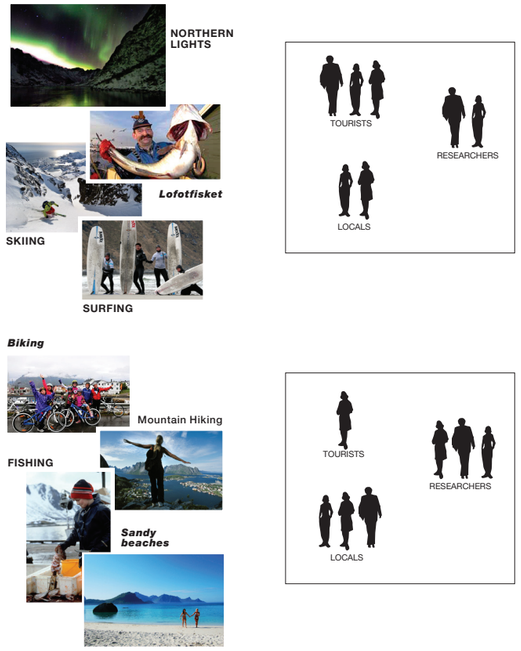
► 24. Upper level plan, scale 1:200


B
BALCONY
INDIVIDUAL OFFICE
INFORMAL BREAK-OUT
OFFICE 205 m2
INDIVIDUAL OFFICE
CARRELS
QUIET ROOM
COPY ROOM 17 m2
B3
MEETING ROOM 36 m2
B2
B2
A
COURTYARD 135 m2
WORKSHOP SPACE
LAB 74 m2
WORKSTATIONS
KITCHEN 24 m2
CAFE 74 m2
Detail 5 - fig. 69 page 47
B
NORTH

SEASONAL SCENARIOS

It must be made clear that this centre is not considered to be a sole driving force for an increased tourism and growth in the outskirt settlement Å. Neither is it considered a realistic aim to think of a constant level of tourism over the year. The architectural intervention does not in itself 'save' the future survival of this place, but rather it becomes a part of a bigger process influences by economy, politics etc. It could however be a place to start – an architectural project which could put Å on the map and generate profit outside of season as well. The diverse profile of the centre further allows for some full-year administrative employees in Å.

Seen in the perspective of Lofoten as a subarctic destination, seasonal scenarios for the two extremes weighing the intensity of interaction by the main user groups with the centre over the year are put forward (fig. 25). Indications ranging from one to three people are used to show the level of interactions supported by illustrations of tourist's additional interests is holidaying in Lofoten.



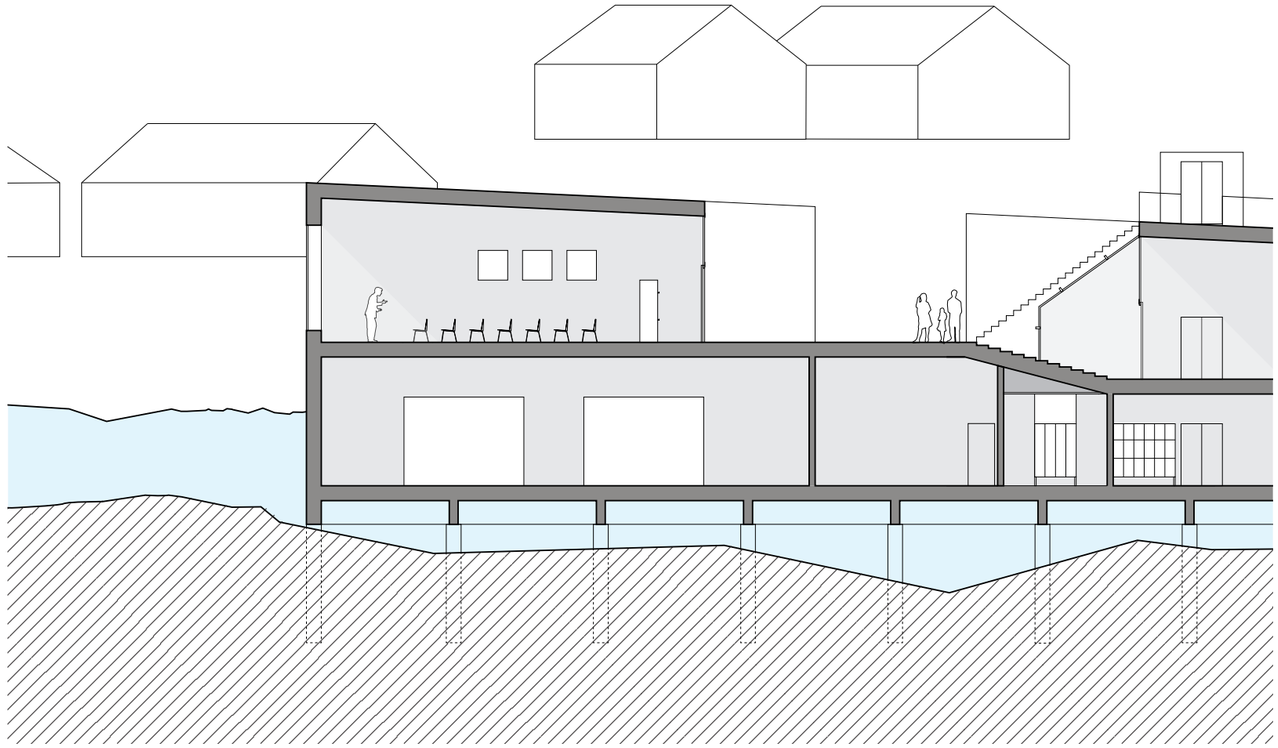
Summer:

It is peak season and tourists flock around the jettys, visit stunning remote beaches, go on fishing boat trips or for a hike in the beautiful nature at Lofotodden – and spend a day visiting the exhibitions and participating in social activities at Lofoten Sea Culture Centre.
Research and related business activities at a reduced level in this season as business holidays approach and common spaces in Lofoten Sea Culture Centre to a higher degree is used for facilitating more social and touristic event purposes.

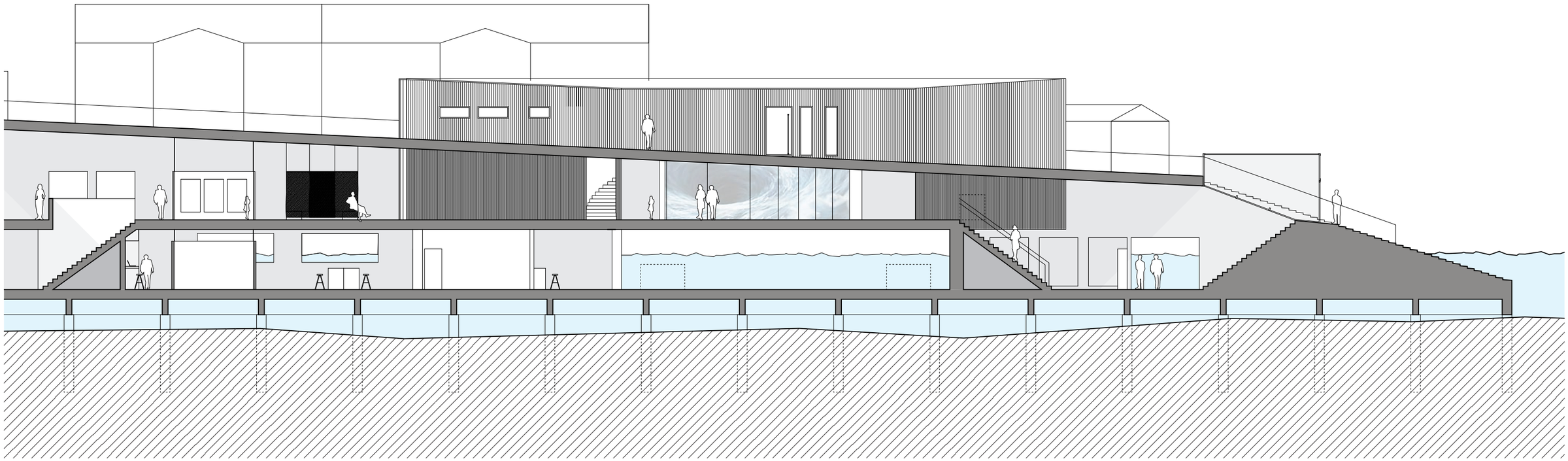
Winter and intervening periods:

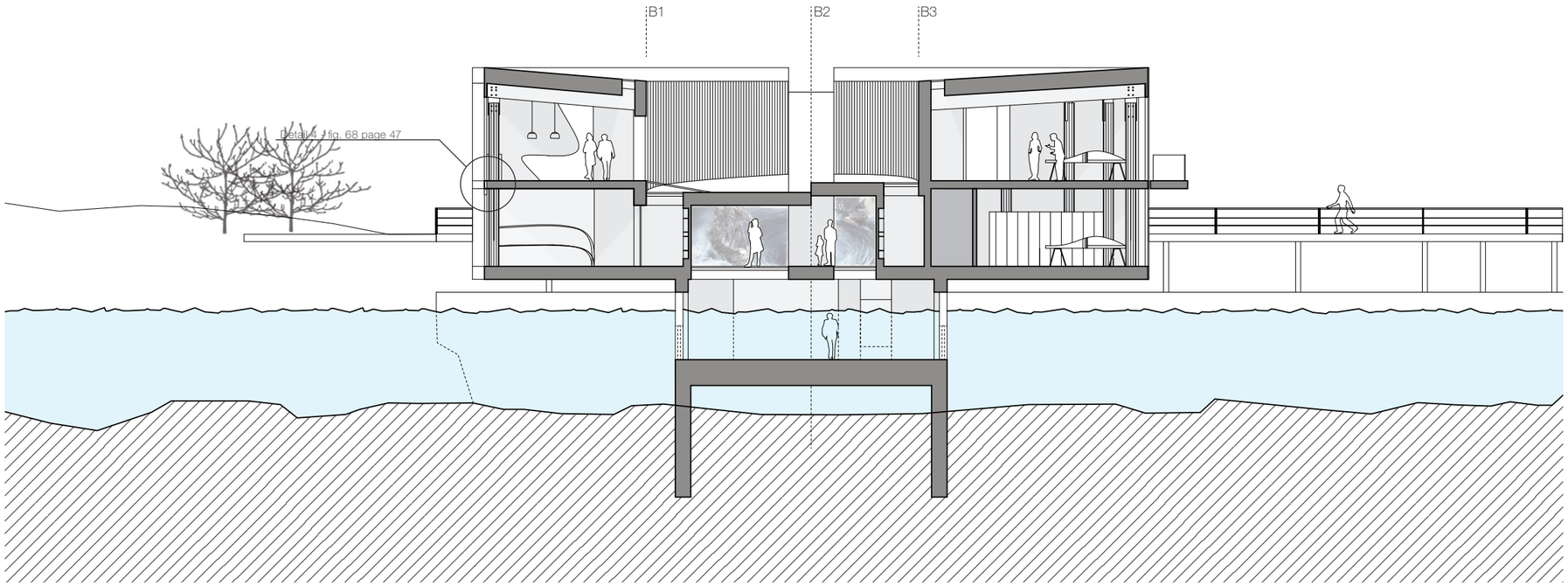
In the dark winter tourist arrive in Lofoten to watch the amazing northern lights and perhaps taking part in the developing skiing business. In the intervening periods fishing, especially in fall where worlds biggest cod fishing events draws some extra tourists.
Research and conference activities are intensified creating more life in Å, perhaps marketing northern lights and place-specific knowledge as a conference package out of the ordinary.
Locals gathers at the centre to a higher degree, activating the space and in between the buildings in this darker period as sense of belonging to a community is increased and everyday life given the opportunity of informal social alternations.

▲
25. Seasonal scenarios showing level of use by the three user groups and the attraction in general Lofoten in the given season.

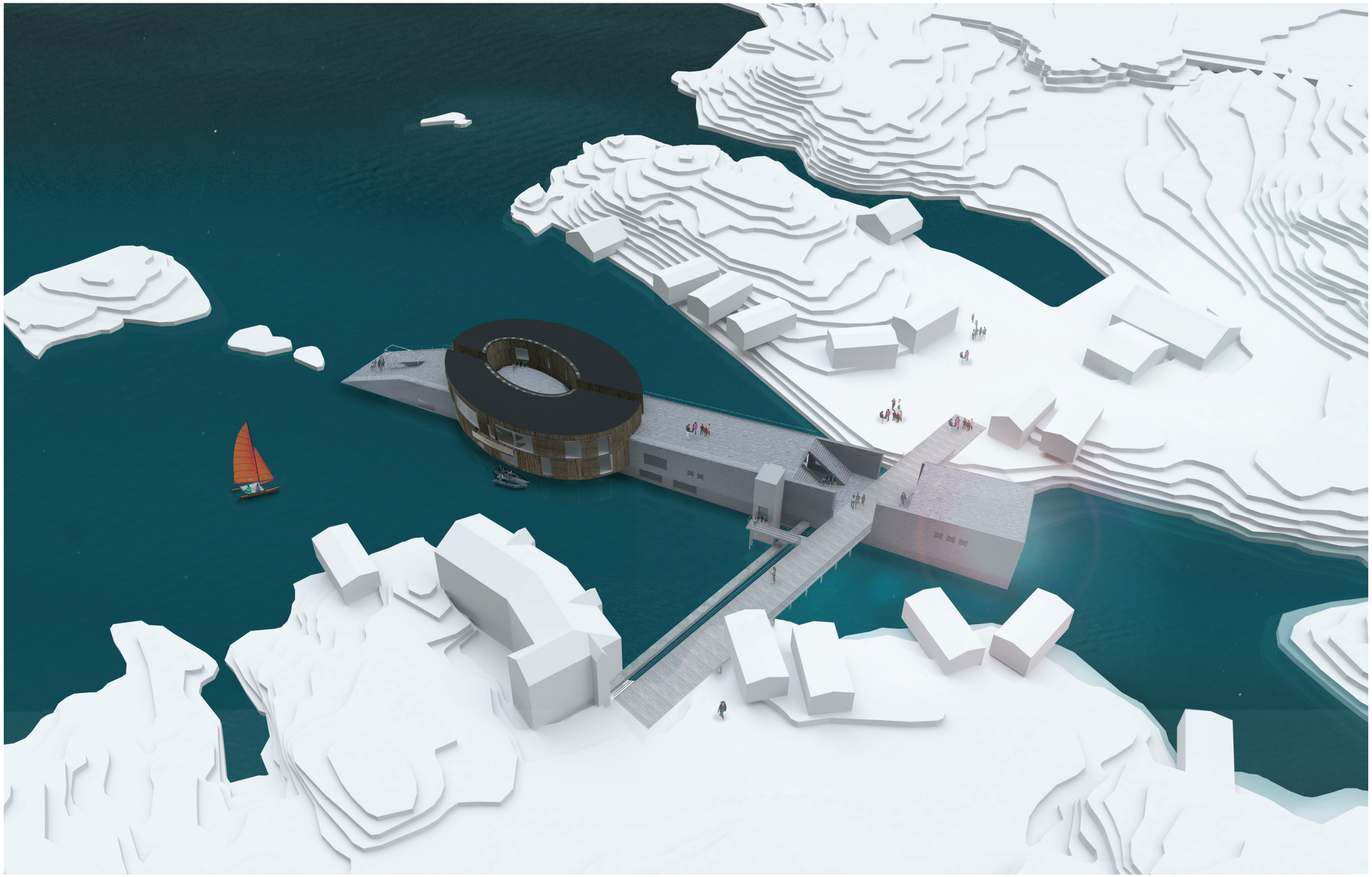


▲
26. Section A-A, scale 1:200

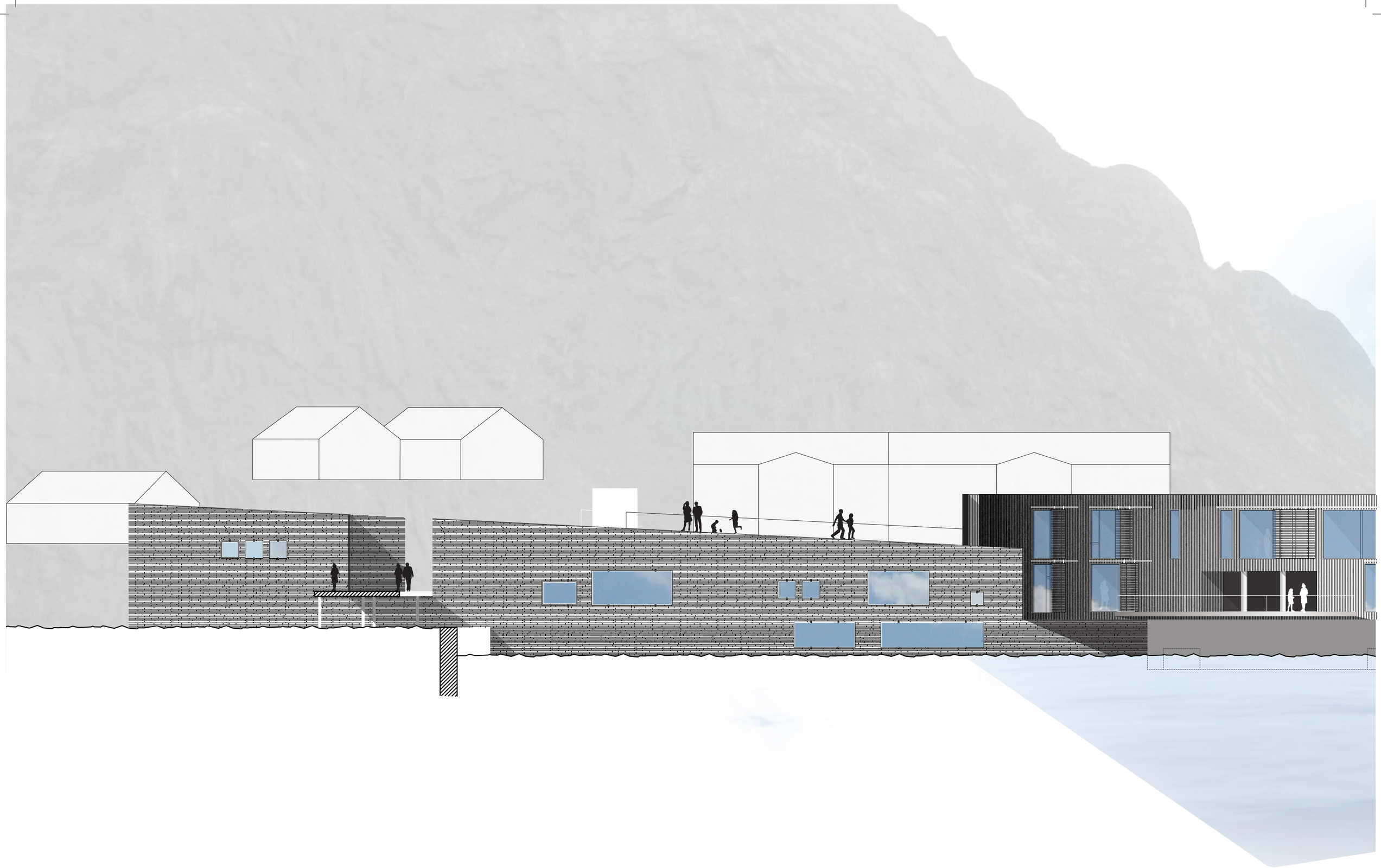




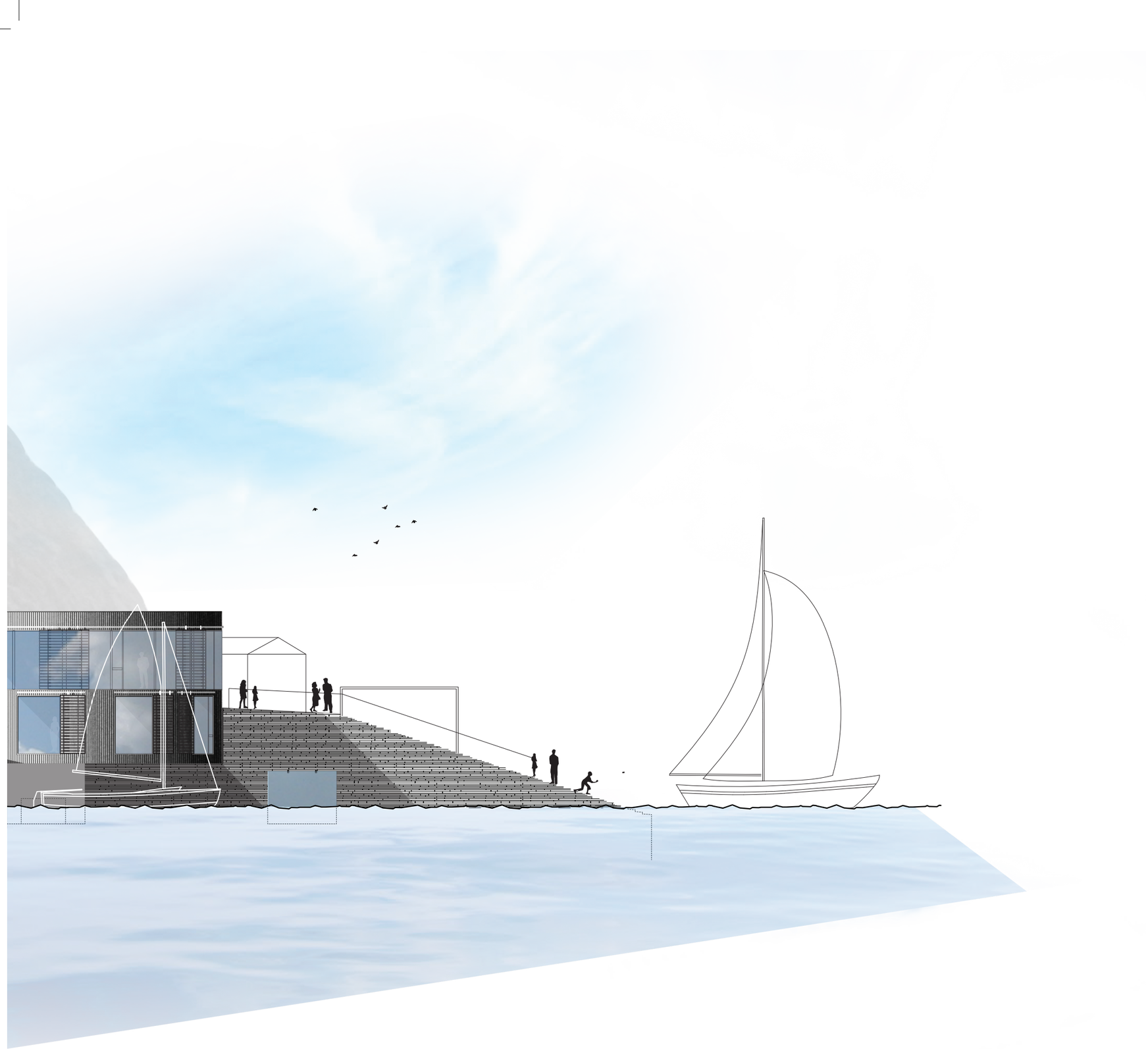
▲
27. Section B-B, scale 1:200

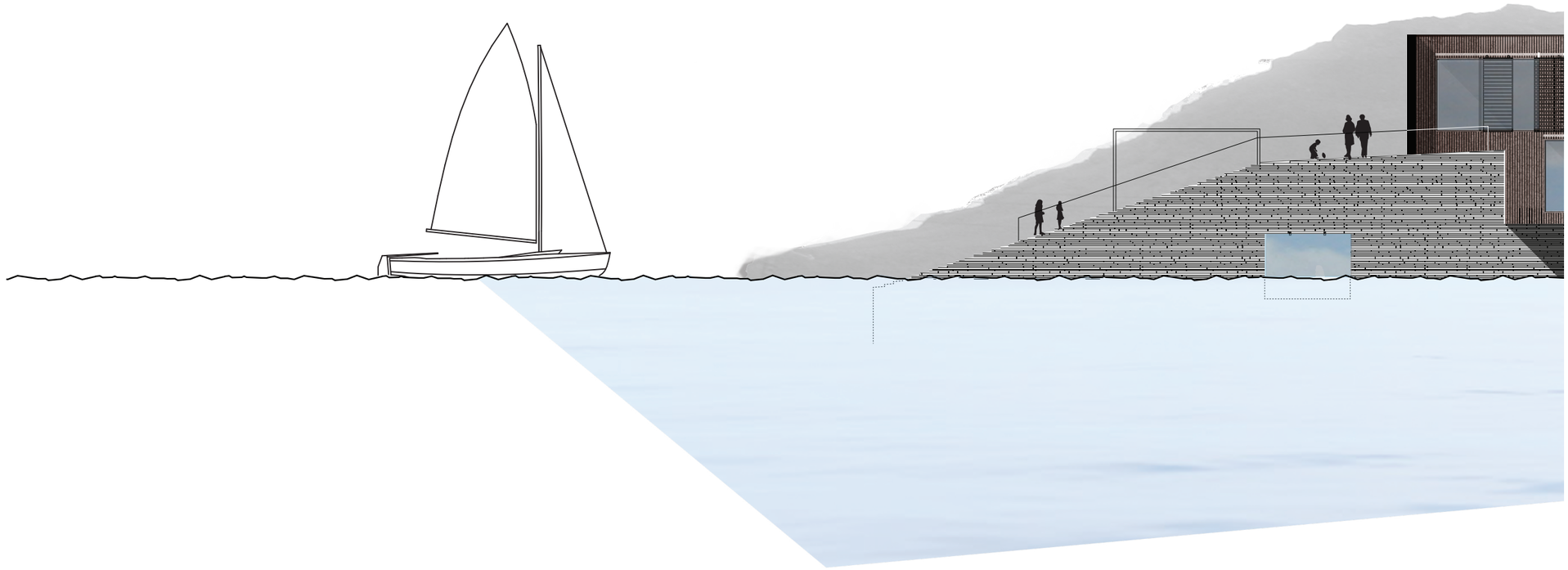


▲
28. View from above, Lofoten Sea Culture Centre

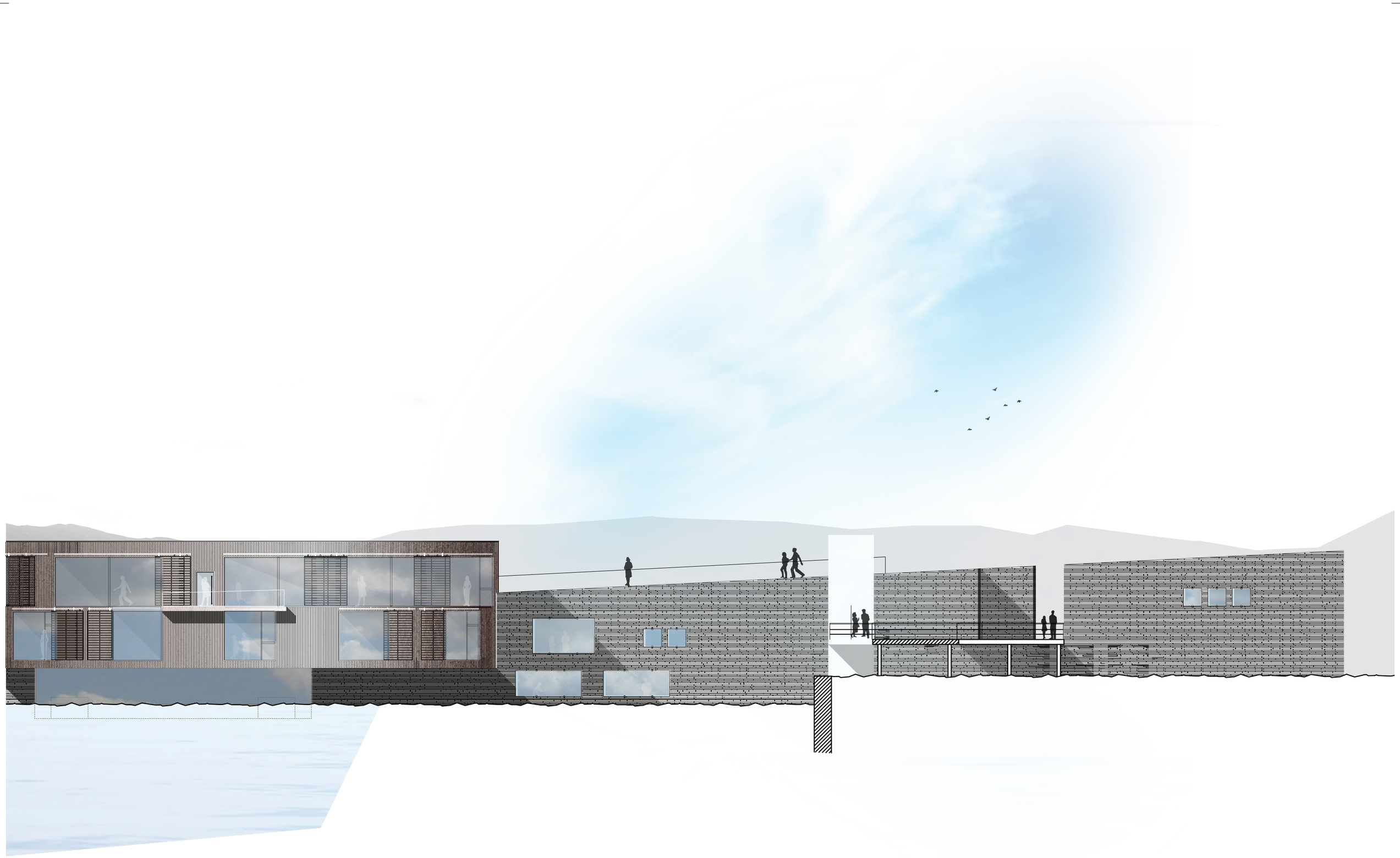


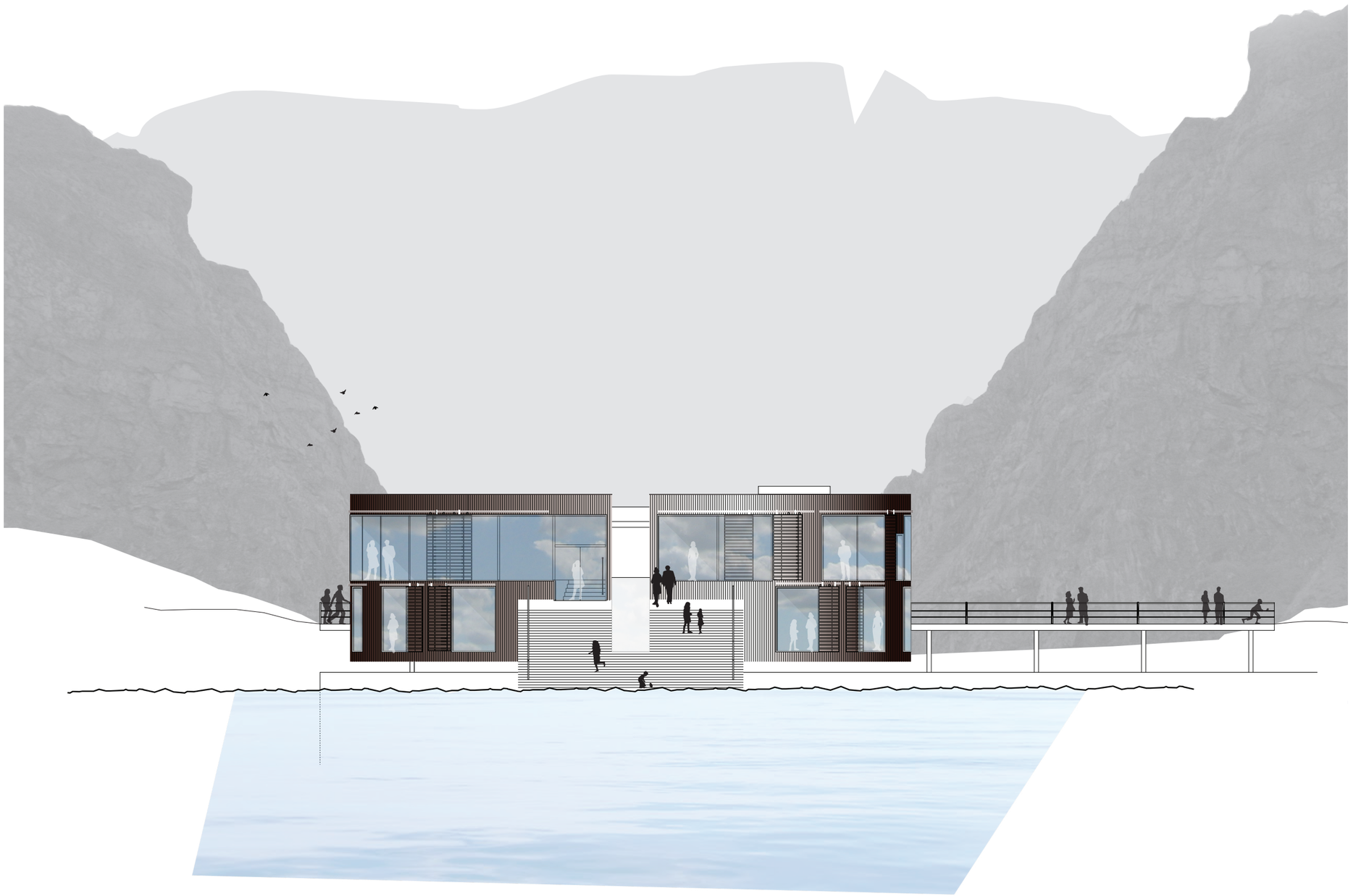
▲
29. South elevation, scale 1:200





▲
30. North elevation, scale 1:200





▲
31. East elevation, scale 1:200

▲
32. West elevation, scale 1:200

▲
33. Mediation space on lower level.

▲
34. Multi-purpose auditorium with views to the lake valley.

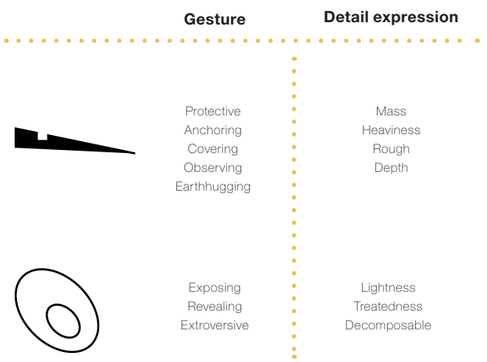
MATERIALITY

In the process of choosing materials it has been a priority to aim to infuse a ‘sense of materiality, hapticity, texture and weight” [Pallasmaa (2005):37] for the users of the building. The quotation by Pallasmaa is here interpreted as an aim to address the human body on more through more senses and in different scales;

In the exterior this is evident through the implementation of materials which reveal new layers of perception as one gets closer to the surfaces: be that the roughly cut stone which possesses a sense of depth or the visible grains of the wood - by addressing the visual as well as the haptic senses.

It has been a priority to use materials which have a rootedness to the building tradition of the place and through this adds to the tale of Å. In addition the natural materials underline an expression of the building as a “low tec” construction.

The materials for the interior have been chosen in order to substantiate the aimed spatial experiences; that of a heavy, earthhugging volume from where to observe the sea versus a lighter, more exposed expression in the oval volume (fig. 38).



▲
38. Diagram of gestures in the two geometries.

▲
35. Texture of wall slate, mounting of the slate in horisontal bands.

▲
36. Apperance of alta slate under two differing light conditions.

▲
37. Apperance of alta slate under two differing light conditions.

Exterior and Interior : Slate

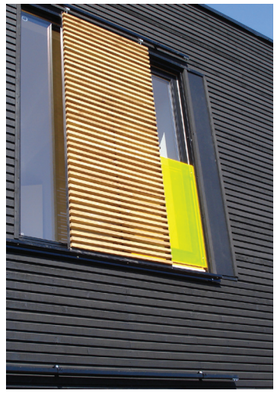
For the stone volume slate is chosen as the general material in order to underline a perception of heaviness and roughness. Slate was traditionally used for roof cladding in Lofoten and is as such considered part of the building tradition of the region. Today fewer slate quarries exist and as a consequence the nearest slate quarry is in Alta, 600 km from Lofoten. For this very reason granite has also been considered for its local availability. In the final design, however, Alta slate is chosen for its more brittle appearance. The material is continued on the roof, which is accessible, in order to form an impression of a monolithic, continuous element.
The surface of the slate is “natural” cut in order to ensure a sense of depth and roughness in the stone work.

Feature references

1

▲
39. Galvanised iron for exterior mountings.

2



▲
40. Solar screening.

3

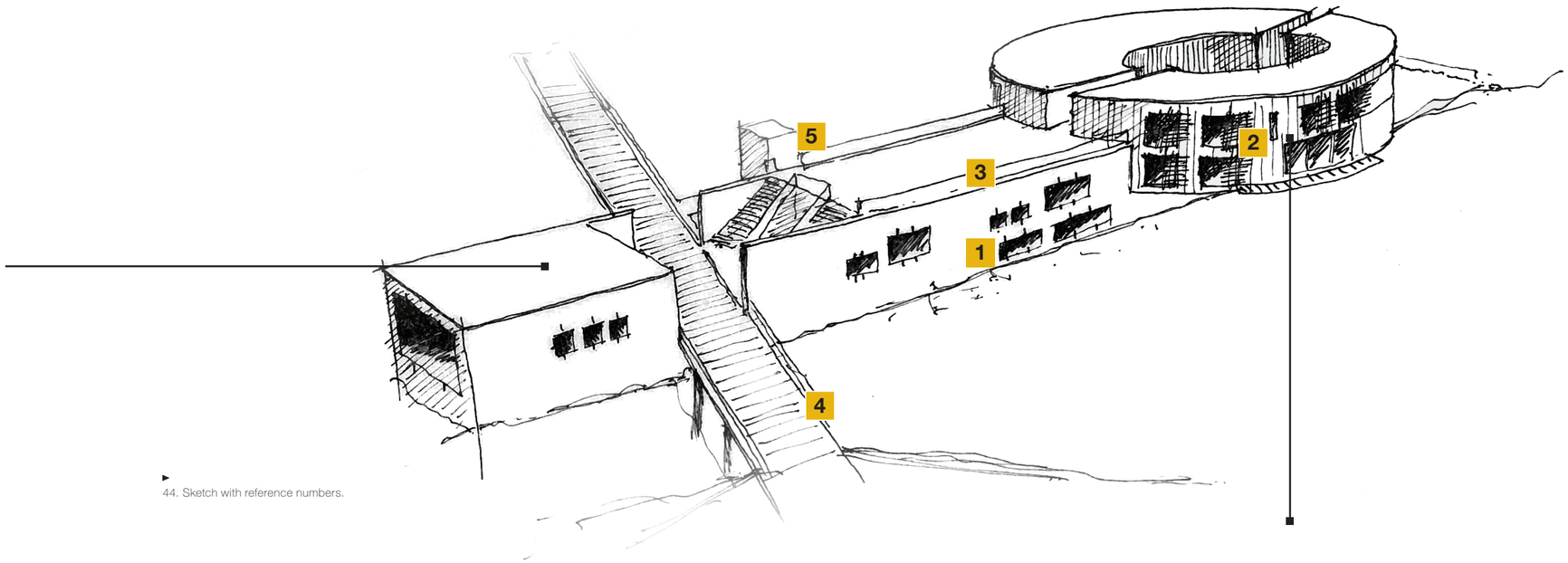
▲
41. Glass railings.

4

▲
42. Timber bridge.

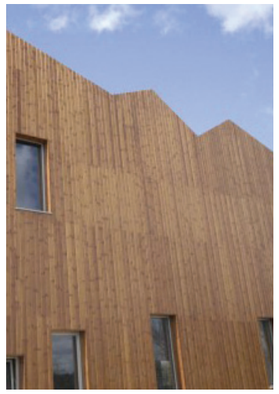
5

▲
43. Concrete elevator tower.



44. Sketch with reference numbers.

45. Apperance of new thermo wood, sample by Moelven.



46. Facade of thermo treated pine wood.

47. Mounting principle; vertical staves.

Exterior : Thermowood

Thermo treated Norwegian pine wood is chosen due to its brown-red appearance. A light brown glow is maintained over the years by applying natural oil every 2. year [web 4].

The choice of materials is believed to strengthen the perception of the structural principle; the main volume as the varying structure on which the cantilevered volume is anchored.

48. Visible construction with large window openings, Sletten Outdoor Centre by Aart Architects (2003).

49. White terrazzo flooring.

Interior materials

In the interior vertical staves of pine wood are used as wall cladding. In order to maintain a light color throughout the years, the wood is treated with a natural lacquer, e.g. Trip trap mat 10. (see p. x for studies of different surface treatments).
The timber construction is visible. Due to the strength of the wood, fir is the chosen material for the structural elements. These are treated with the same natural lacquer as the pine wood, however, there will exist a difference in appearance.

The ceilings are made from plaster boards and the flooring in light terrazzo in order to obtain continous, light surfaces. The floors are durable and functional applicability, also in the laboratories.

TECTONIC DETAILING

The theoretical part 1 of the project outlined the approach to designing architectural interventions for tourism in outskirt areas where tourism is used as a parameter of growth. The narrative of place is essential in this process and we have seen examples of how the tectonic detail carries meaning through to the experiencing human being – where the built form upholds poetic qualities. That is, where the detail serves to elevate the understanding of the context in which it resides, where it accentuates the architect's intended narrative of place.

A terminological method using defined gestures support the design of chosen detail expressions, please refer to page 63 for elaboration on the underlying concept behind the detailing. Detailing of chosen elements in the building has been carried out on two different levels and presented accordingly; what might be referred to as 'architectural details' focusing on the aimed visual and tactile qualities of the detail (pages 42-45) and 'construction details' clarifying the actual composition of the building elements if it was to be built (pages 46-47). Note that the constructional details are found in the drawing folder in scale 1:5.

Addressing the sensing human body

A focus has been placed on exemplifying main details in the building; details considered essential when trying to convey the narrative – a dual existential tension – through built form, both in choice of materials and in the concrete joining of building elements. Emphasis has been on appointing specific details in the overall built form to which the body can attend, i.e. details that address the sensory capacity of the human body.

Special attention has been given to small scale joints, articulated through a range of mountings. Inspired by Sverre Fehns work with elements of promenade, the building has elements of choreographed directions of movement, e.g. the approaching walk across the bridge to the building accompanied by the characteristic hollow sound of timber bridges, a sudden transition to the material solidity of the building volume with an embracing, protective courtyard greeting. On the roof, the sloping structure calls attention for the kinetic interaction between human body and built form. In the interior as well as exterior experience of built form the taste, sound and visual presence of water underlines the purpose of the building – the exploitation of the surrounding water.

Detail feel

Inspired by an experienced unrefined, rather rough and pragmatic attitude towards the constructions found in Å's built environment, the detail expressivity pursued in Lofoten Sea Culture Centre is likewise 'direct' in its constructions. There is a deliberate unpolished feel – a straightforwardness and promptitude in the joining of the elements. Generally simple iron mountings are used in the joining of elements.

DETAILED AREA

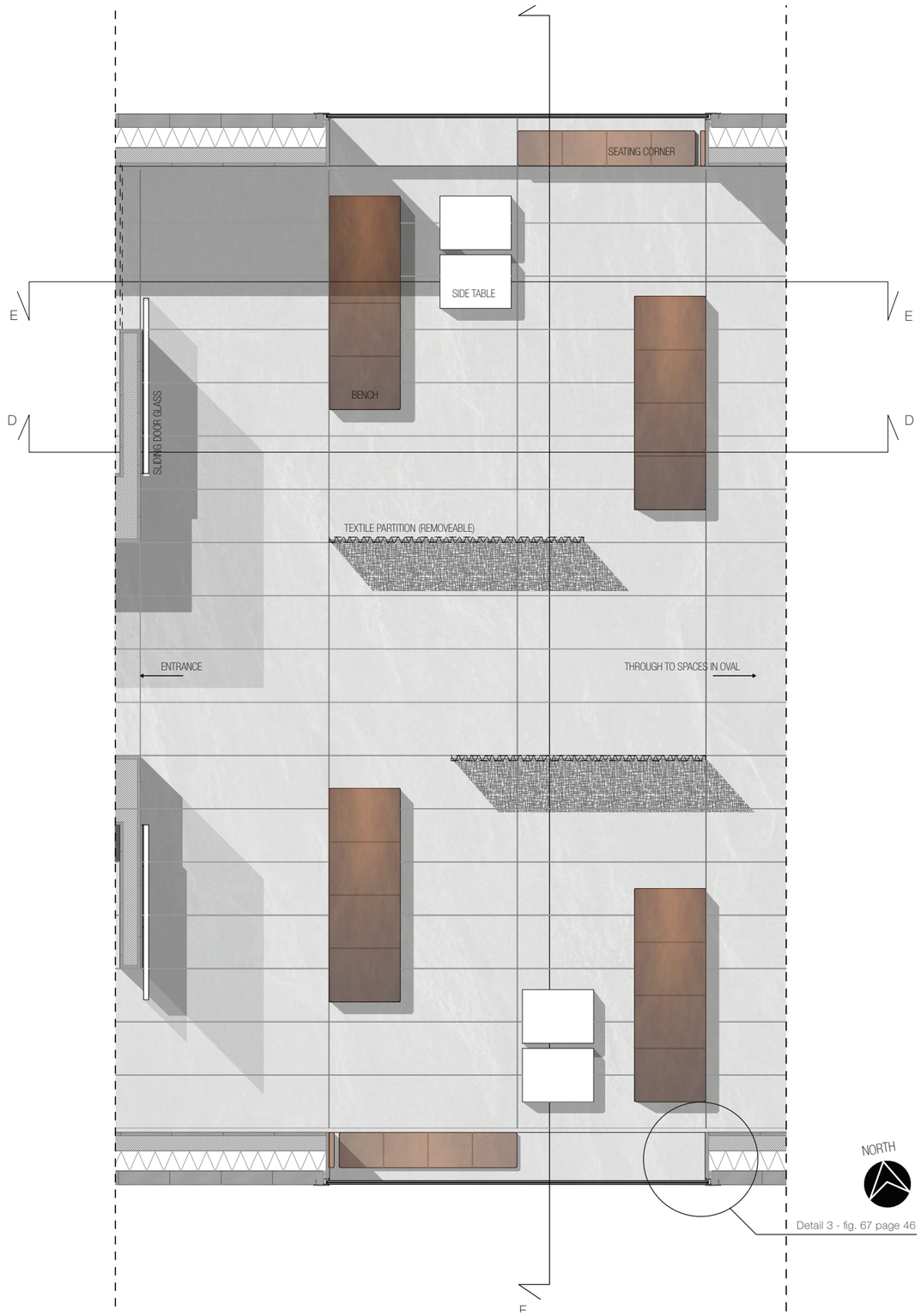
An area in the stone volume of the building is further detailed to scale 1:20 (fig.50). Here, the purpose is to present a deeper understanding of the tectonic details, both in the joining of elements and their materiality. The area is furnished with two seating spaces arranged with a view to the outside, divided by a central flow area with moveable textile partitions.

Window openings

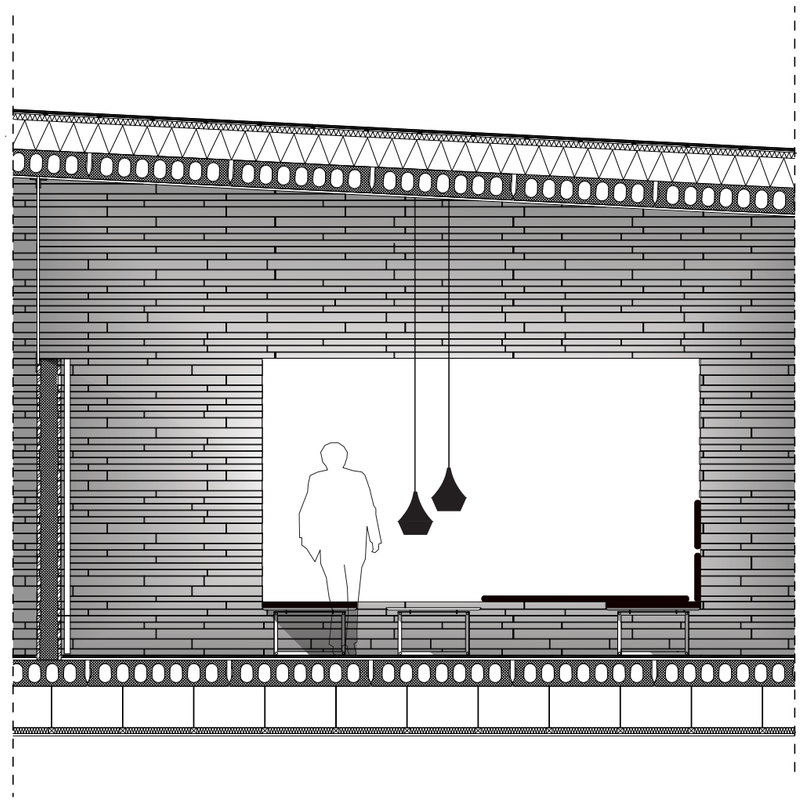
As earlier mentioned, the words protective, covering and observing are among the denominations for intended gestures in the stone volume of the building. In this effort detailing of the meeting between outside and inside is essential, hence special attention has been given to the design of window openings (see page 44 for drawings of mounting and page 63 for process). To attain a feeling of being protected from the environment, of a leaned back observation clear cut opening frames with an (seen from the interior) 'invisible' frame, as mounting occurs on the façade. It becomes a picture frame on the wall, with a furnished window sill.

Fleksibilitet

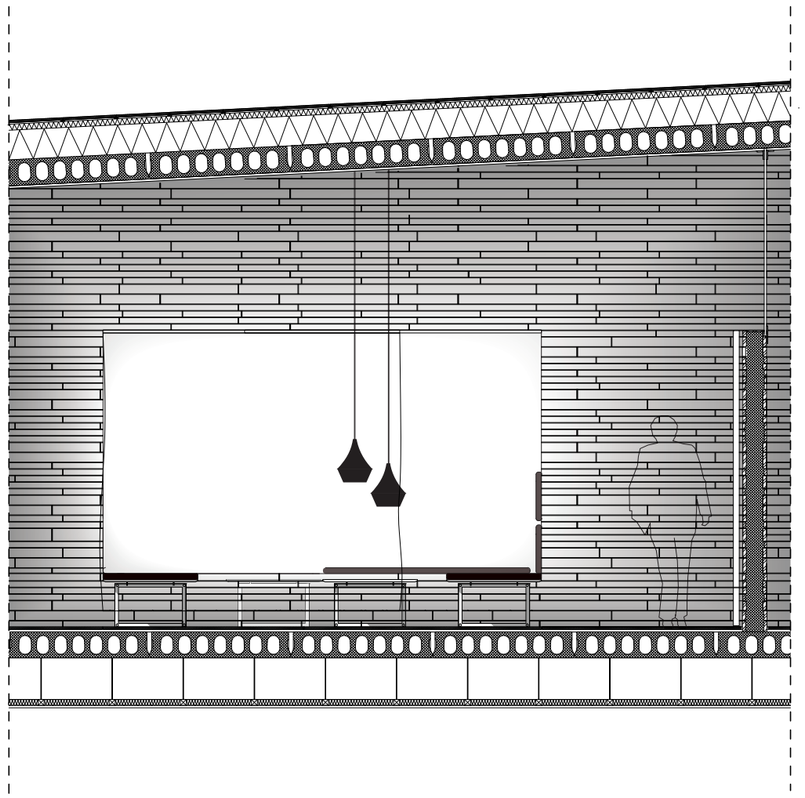
Intensions of a high level of flexibility in use have informed the design of furnishings. The arrangement as it occurs on the plan is therefore one of many possibilities. Furniture is suggested to be easily moveable; benches with a light frame, small tables, 'plug-and-light'- lamps and a removable textile partitions can all be stored away in the small compartments nearby, leaving the area available of other functions, e.g. receptions, workshops etc. A system of built in suspension attachments enables alternative partitioning of space with suspended woolen textiles.



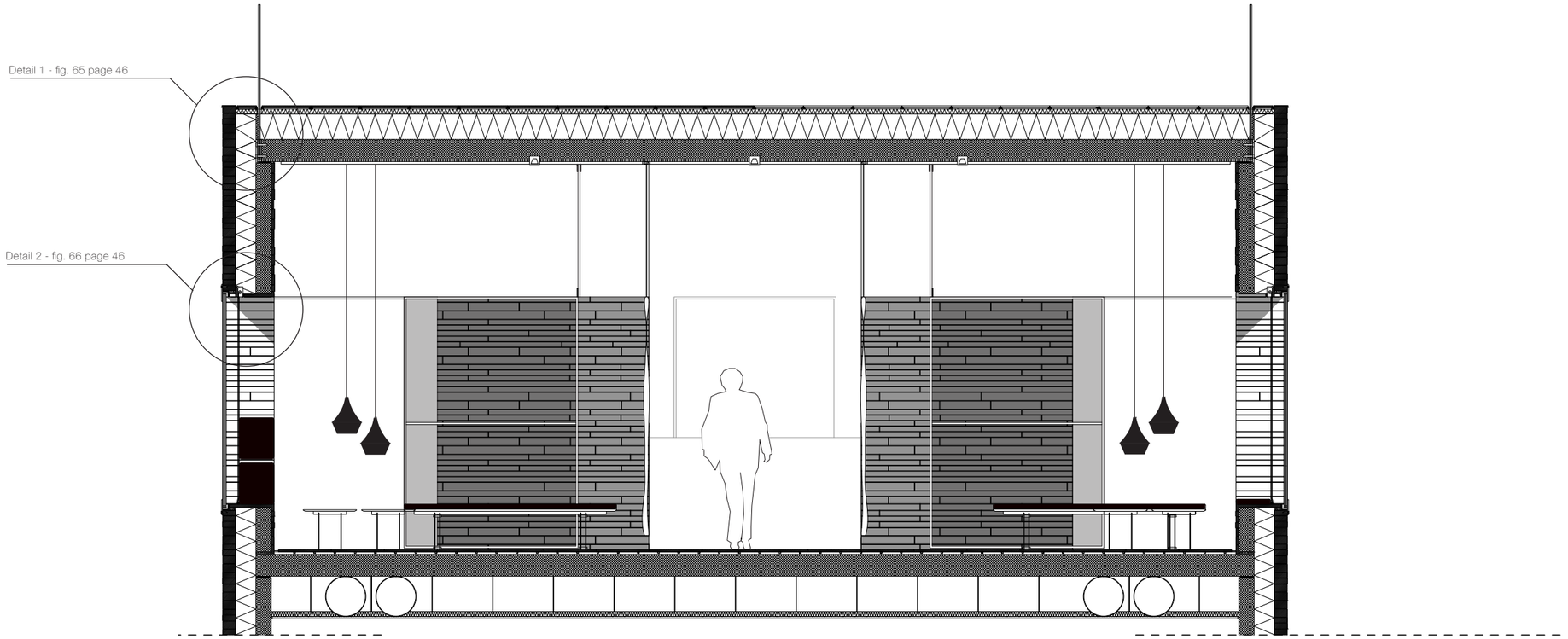
▲
50. Plan, detailed area, scale 1:50



51. Section D-D, scale 1:50



52. Section E-E, scale 1:50



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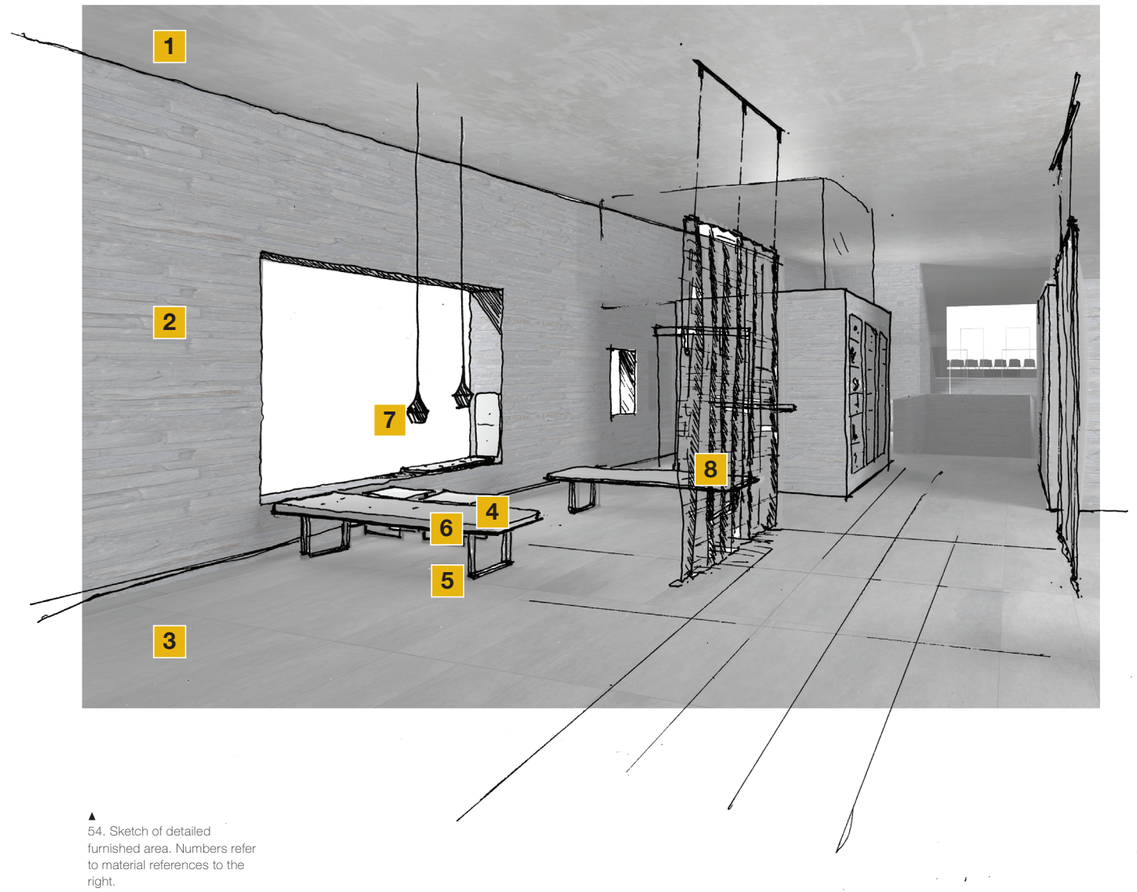
53. Section F-F, scale 1:50



▲
54. Sketch of detailed furnished area. Numbers refer to material references to the right.

1

Suspended concrete plates, polished, light concrete.

Qualities:
- a 'anonomous', yet refined look.
- depth and marbling effect
- creation of reflections of the life beneath the ceiling
- high strength for bigger spans.

▲
55. Polished concrete plates for ceilings.

2

Slate blocks of varying thickness, in a random bond.

Qualities:
- regional material
- mass properties - can be 'intervowen' for the perception of a whole
- strong natural tactility in depth, especially emphasised by light
- resistance to tear and wear

▲
56. Slate for walls

3

Slate tiles in longitudinal cut.

Qualities:
- continuation of wall material
- resistant
- treated, yet rough
- light-cathing surface (hacked)

▲
57. Slate for floors

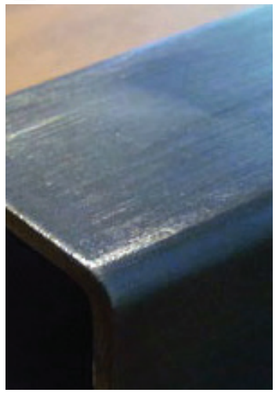
4

Slate tiles in longitudinal cut.

Qualities:
- absorbs the human body
- beatiful patina (traces of human use)
- durability, easy to maintain
- uniqueness in surface marks (origin, organic touch)
- provides contrasting smoothness to rough stone materials

▲
58. Cognac colored leather.

5



Iron with transparent surface treatment.

Qualities:
- a sense of the 'pragmatic'
- an untreated feel

▲
59. Mat lacqued (transparent) steel for bench frame and fittings

6

Spruce wood used as intermediate material in bench construction, smoothed.

Qualities:
- pleasurely tangible
- provides a 'platform for 'for human occupancy
- organic touch

▲
60. Spruce wood, mat laquered for bench bedplate between iron and leather.

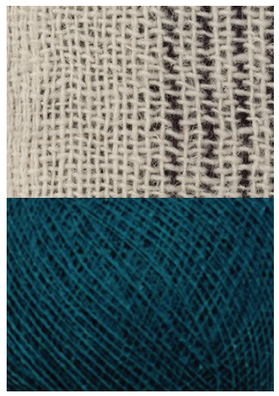
7

Handbeaten brass lamp with black mat coating.

Qualities:
- provides a soft, feminin touch
- focused warm downward light to seating zone
- in simplicity contrasting the hacked depth of the slate

▲
61. Lamp by Tom Dixon, beaten brass.

8



Woven wool fabric with gradient in masking size, white with threads of blue.

Qualities:
- softness warmness
- 'a human material'
- gradient transparency
- acoustical intimations

▲
62. Weaved wool fabric like this by Danish weaver Paula Trock - intervoven with threads of blue.

ARCHITECTURAL DETAILS

The following three pages each show a collection of sketches of three selected detail. Two belong to the stone volume – the bench in the detailed area (fig. 63) and a window fitting (fig. 64) – and the third belongs to the construction of the oval volume – the joining of roof beam and column (fig. 65).

Detail: Window metal fittings

As stated earlier, protective and observing gestures are intended for the building envelope of the stone volume. In detailing of the window the 'invisible' window seen from the inside is advanced by placing sheets of glass in a countersink on the façade (please refer to constructional drawings, fig. 67). To add a human scale to the exterior expression of the volume, a certain downscaling of the mass element, small roughly-cut fittings holds back the window which are set flush with the façade.
The fitting consist of a crude galvanized iron plate, mounted with a screw and washer in the same material.

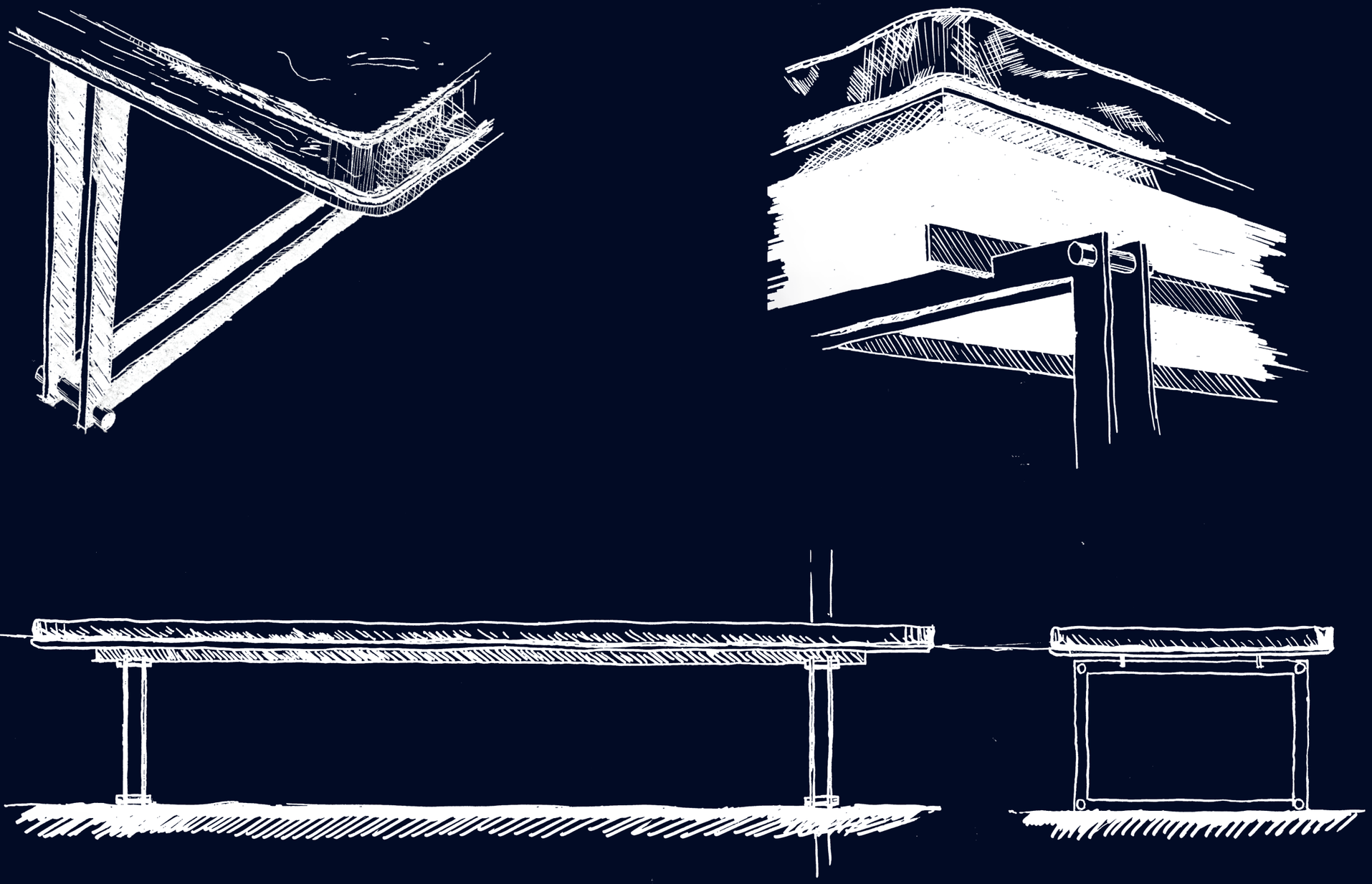
Detail: Bench

Moving inside the stone volume, sketches on the design proposal for a bench are put forward. With a similar roughness in detailing of the iron frame, each element is joined to the next in an easily understood manner. This seating arrangement deals with the meeting between human body and construction – a meeting between a rough metal frame with uncompromised joinings and a softer, relaxed seating space. It is a minimalistic design where a smoothed spruce wood creates the intermediate element between the hard frame and a soft leather cushion.
Benches are arranged with a textile backdrop, directing the attention towards the framed views to the exterior.

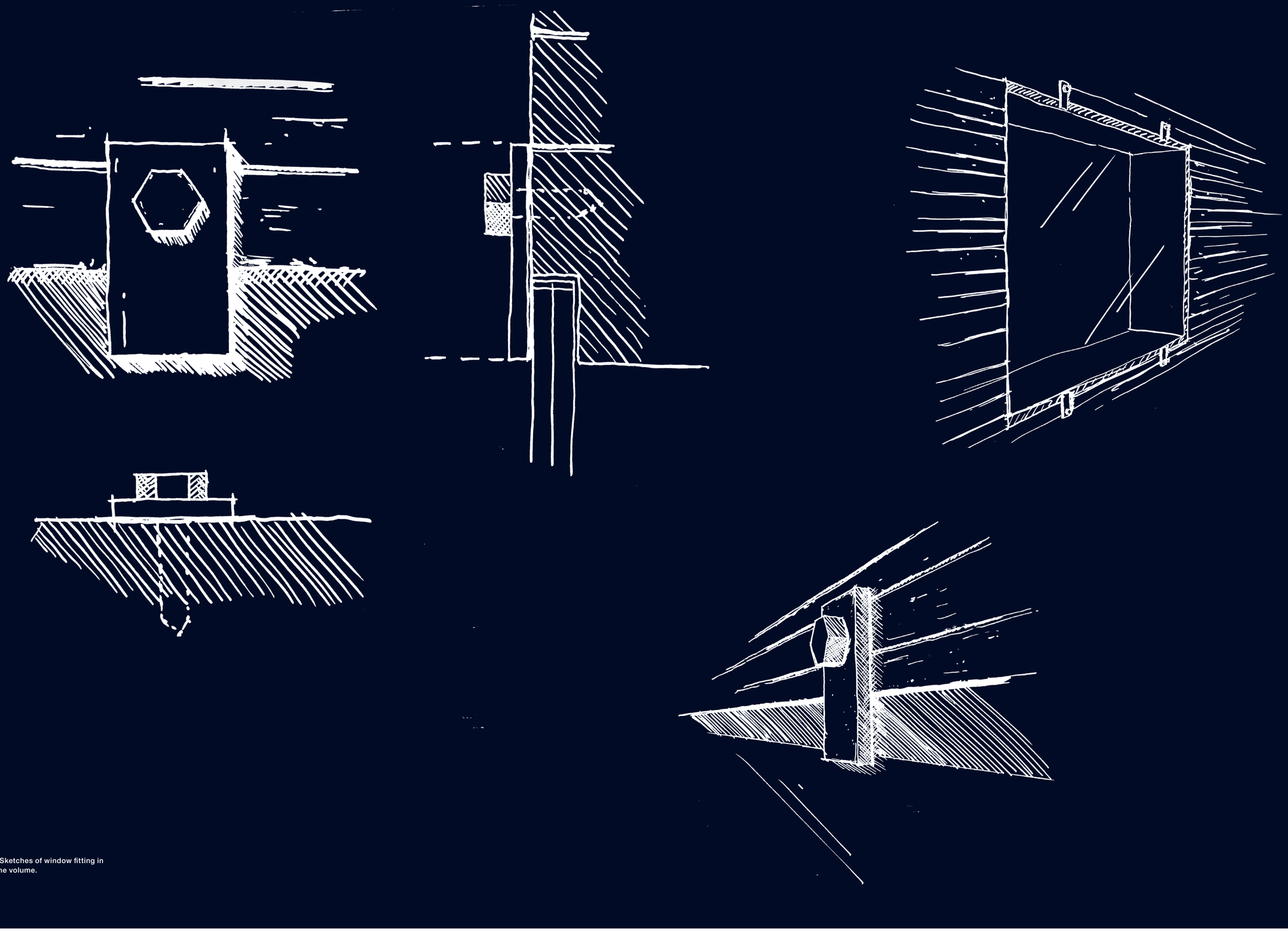
Detail: Beam and column

A significant tectonic detail in Lofoten Sea Culture Centre is the joint between the circular timber column and horizontal timber beam with rectangular profile in the oval volume. A detail expression of the meeting between column and beam is described by words like fragmentation and fragility, due to a more exposed gesture of the built form.

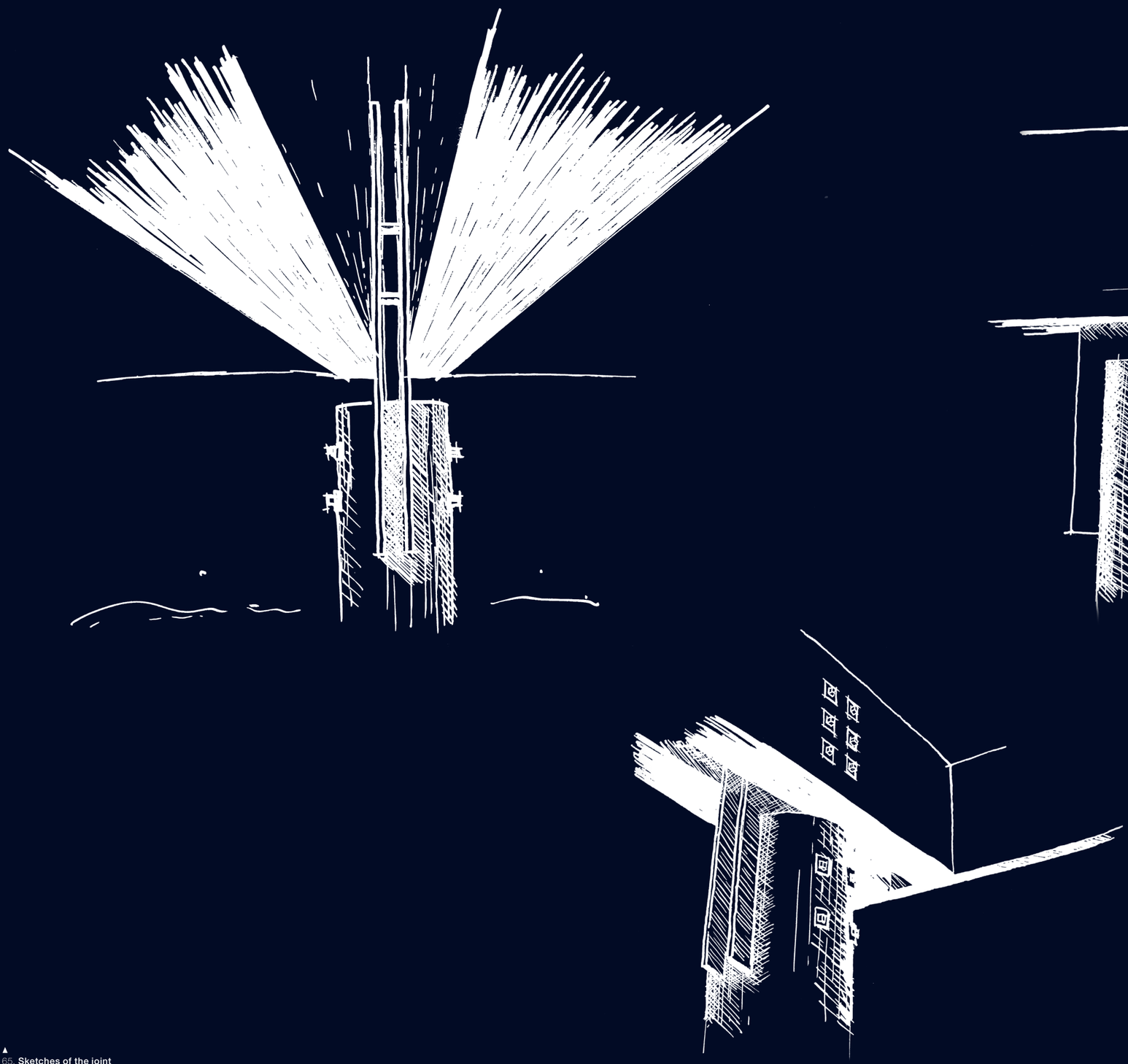
An obvious 'seamfullness' of joint of each structural member is intended, hence the sketched detail in figure # is composed by distinct building components; column, beam and intermediate metal joining fixtures, again treated in an unsentimental, immediate and rough articulation.
The timber beam is split in two to make the construction appear lighter, each beam bolted with washer to an iron gusset plate fixed vertically in the column.



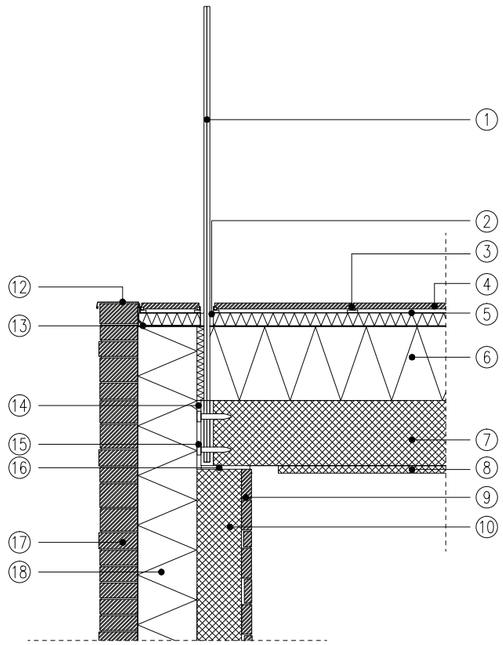
▲
63. **Sketches of proposal for bench seating in the detailed area in stone volume.**



▲
64. **Sketches of window fitting in stone volume.**

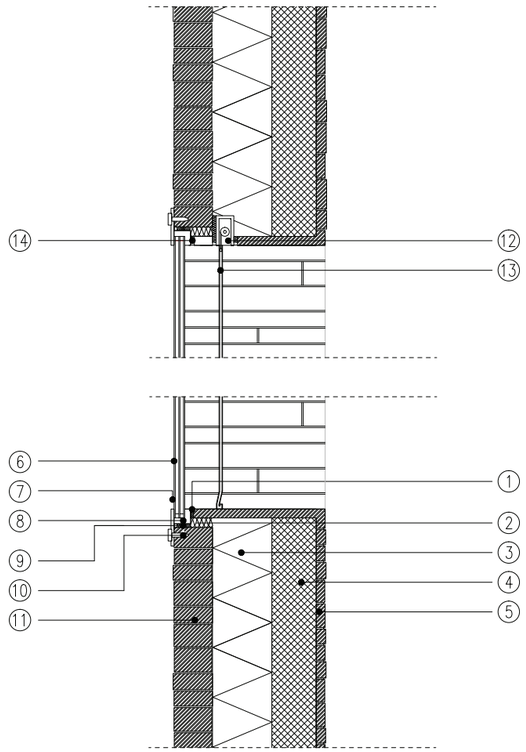


▲
65. **Sketches of the joint between column and beam in oval volume.**



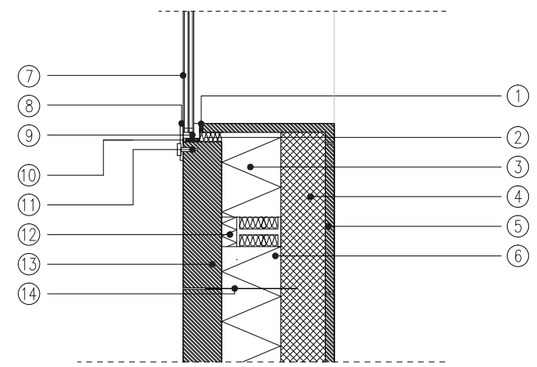
► 66. Detail 1 - Vertical section through building envelope in stone volume, roof detail, scale 1:20. In general, please refer to the drawing folder for references.

① Safety glass 2x10mm railing
② Joint 12mm to secure tightness where the membranes are interrupted
③ Norwegian alta slate 20x600x200mm 1:20 inclination
④ Tile mounting system placed for each 500mm
⑤ Water proof layer (eg. Icopal combi cloth)
⑥ PUR (Polyurethan) insulation 250mm (unventilated)
⑦ Concrete 220mm (hollow core slabs)
⑧ Joint 12mm
⑨ Norwegian alta slate 50/80x500x30mm
⑩ Concrete 115mm
⑫ Zinc flashing
⑬ 2 x membrane
⑭ Steel bracket
⑮ Steel bolts
⑯ Joint 12mm
⑰ Norwegian alta slate 50/80x500x130mm
⑱ PUR (Polyurethan) insulation 200mm



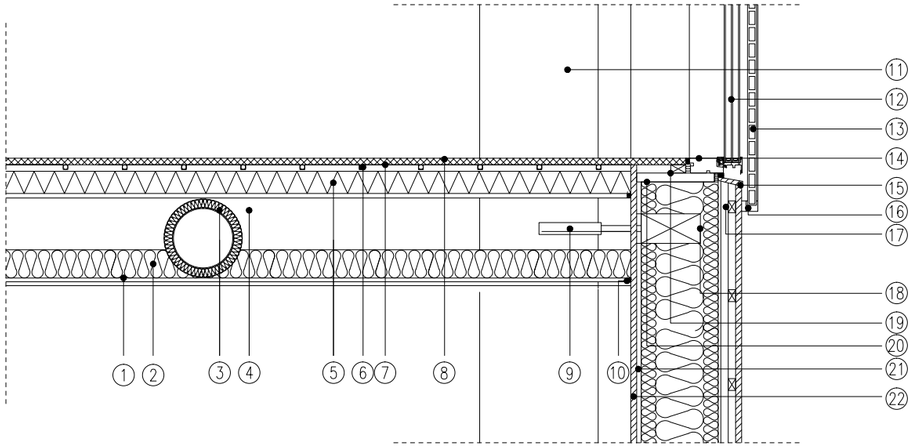
► 67. Detail 2 - Vertical section through building envelope in stone volume, including window, scale 1:20

① Rubber joint and edge insulation 12mm
② Insulation 30mm
③ PUR (Polyurethan) insulation 250mm (unventilated)
④ Concrete 150mm
⑤ Norwegian alta slate 50/80x500x30mm
⑥ Three layered window
⑦ Steel mount 150x60x10mm
⑧ Angle iron bar 20mm
⑨ Rubber joint and edge insulation 12mm
⑩ Steel bolt
⑪ Norwegian alta slate 50/80x500x130mm
⑫ Manually operated roller blinds mounted on each side of the window
⑬ Metal track for the roller blinds mounted with screws
⑭ Edge insulation and joint 12mm



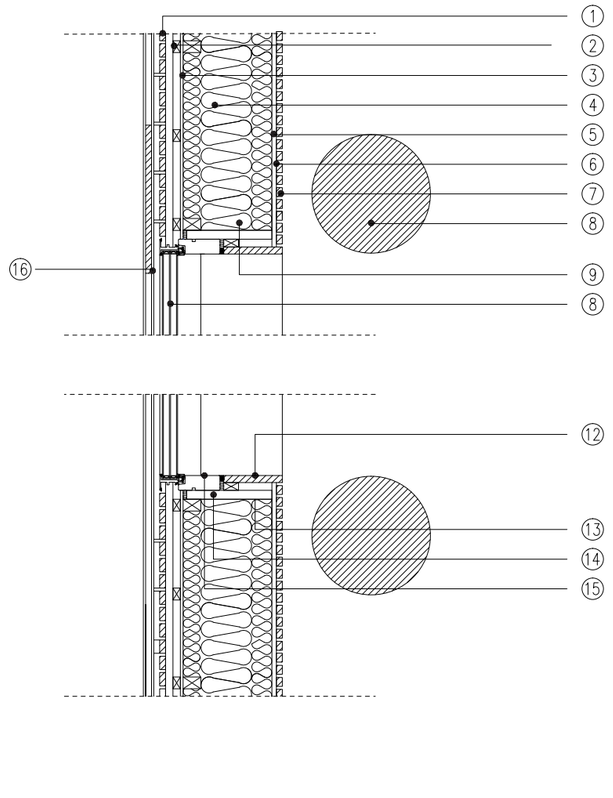
▲ 68. Detail 3 - Horisontal section through building envelope in stone volume, including window, scale 1:20

① Rubber joint and edge insulation 12mm
② Insulation 30mm
③ PUR (Polyurethan) insulation 250mm (unventilated)
④ Concrete 150mm
⑤ Norwegian alta slate 50/80x500x30mm
⑥ I-profile with insulation
⑦ Three layered window, example which cannot be opened
⑧ Steel mount 125x70x10mm
⑨ Angle iron bar 20mm
⑩ Rubber joint and edge insulation 12mm
⑪ Steel bolt
⑫ Pressure resistant insulation 50mm
⑬ Norwegian alta slate 50/80x500x130mm
⑭ Wall tie, steel, c/c 300mm



1 Plaster board 2x13mm, white
2 Rock wool insulation 95mm, fastened with wires
3 Sound insulated ventilation pipe – estimated ø200mm
4 Glue-laminate fir beams 200x300mm
5 PUR (Polyurethan) Insulation 75mm
6 Floor heating system including heat pipes 22mm, heat pipes ø16 placed with a distance of 200mm Heat distributing plates (0.5x190x1150mm)
7 Felt cloth
8 Terrazzo flooring – white, 25mm
9 Steel mounting fixating the building envelope to the structural columns
10 Rubber joint
11 Glue-laminated structural column, fir, ø400mm
12 3 layered window (e.g. Velfac helo – interior: wood, exterior: dark painted aluminium)
13 Shading: horisontal thermo-threated fir elements
14 Insulation and rubber joint 12mm
15 Window sill, thermo-treated fir wood
16 Galvanised steel track for sun shading mounted with bolts
17 Timber battens 2x25x40mm
18 Horisontal timber elements 100x200mm
19 Air tight purenit frame mounted on interior wall, supported vinkelprofiler.
20 Tape for securing tightness around the window and purenit frame
21 Vapour barrier 15mm (OSB)
22 Thermo-treated fir cladding, vertical staves, 20x45mm

► 69. Detail 4 - Vertical section through floor deck and building envelope in oval volume. It is assumed that the construction meets the requirements for impact sound, Ln,w, and airborne sound, Rw. Scale 1:20



1 Thermowood treated fir strip cladding 20x45mm
2 Air gap with cross-going wood elements 2x25mm
3 Windtight layer
4 Insulation, mineral wool, 300 mm
5 Vapour barrier 15mm (OSB)
6 Acoustic textile
7 Spruce cladding, horisontal elements 20x30mm
8 Glue-laminated timber column ø400mm
9 Vertical wood elements 40x230mm
10 3-layered window (e.g. Velfac Helo)

12 Window frame, spruce board, 25mm
13 Tape for securing tightness around the window and purenit frame
14 Air tight purenit frame mounted on interior wall, supported angled iron bars.
15 Insulation and rubber joint 12mm
16 Sun shading, horisontal wood staves mounted on skinner

► 70. Detail 6- Horisontal section through building envelope in oval volume, including window. Please note that the actual construction curves in plan view. For simplification, however, the detail drawing does not show this curve.

STRUCTURAL SYSTEM

The intention behind the structural system has been to underline the main architectural concept, which prescribes a dualistic relationship between the stone and oval volumes. Further it has been the intention to make the structural principle comprehensible to the perceiver, where it enriches the architectural experience.

Stone volume

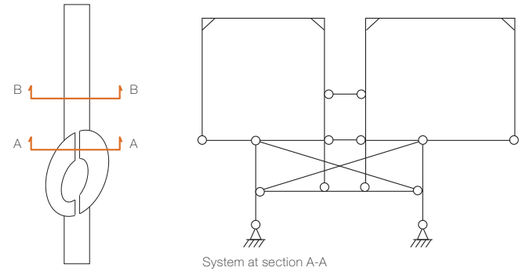
The load-bearing system of the stone volume is based on a system of bearing walls which function as shear plates in the east-west direction (fig. 74, bottom). Stability is secured in the north-south direction by implementation of fixed vertical steel elements (fig. 74, top).
The decks of in the building span the full width of the building (10 m) with few exeption in the lower level.
Vertical loads are distributed in the slabs and led further down the building in the exterior walls and steel profiles (fig. 76). The entirety of the structure is built on concrete pillars.

One might question the 'honesty' of 'cladding' the carrying concrete elements in stone in the interior. As written in the chapter about materials, slate is chosen as the general facade material and is further used in the interior in order to enhance the experience of a heavy, monolithic volume. In this connection considerations concerning whether stone should be the load bearing material have arisen. In Zumthor's Thermal Baths in Vals, stone is used as an architectural feature to create an experience of a solid stone volume. Yet, the load bearing structural system is a concrete 'skeleton'. We adopt this approach as the most feasible manner of building, however, articulate the meetings between slate staves around windows etc. to induce a sense of thickness (detail drawings, p 46.

Oval volume

The loadbbearing system of the oval is based on a system of connected visible, mainly wooden, frames (fig. 71). The columns in the inner periphery of the oval are not visible, but form part of a homogenously cladded "back". In order to strengthen the construction these columns are made of steel, interconnected to form a strong vierendeel system.
Shear plates located in the oval help stabilise the structure further as well as the two "halfs" are connected where the roof of the stone volume "cuts through" the oval (fig. 77).
Returning to the visible wooden elements, calculations have been carried out during the process in order to determine dimensions and spacing between the frames in accordance to the aimed expression (process, p. 68).

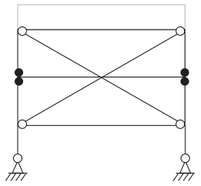
From the early sketching phase the structural relation between dual elements has been part of the aestetical considerations - that is, considerations on the hierachy; which part should form the 'carrying' or 'carried' part. Please refer to page 62 for considerations on the relation between the two volumes of the chosen concept. In the final design solution the 'heavy' stone volume serves as a foundation, in which the oval volume is attached by tension cables, serving to counteract the forces in the cantilevered structure (fig. 77-78).



System at section A-A

The oval halfs are constituted by frames, of which the inner periphery makes up a strong steel vierendeel system, which is anchored by means of tension cables to the stone volume.

▲
71. Structural system, stone and oval volume. Principle.

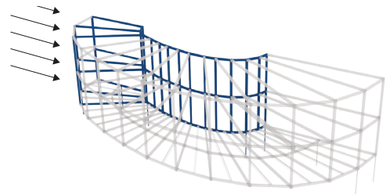


System at section B-B

Vertical steel profiles in the exterior walls help stabilise the structure.

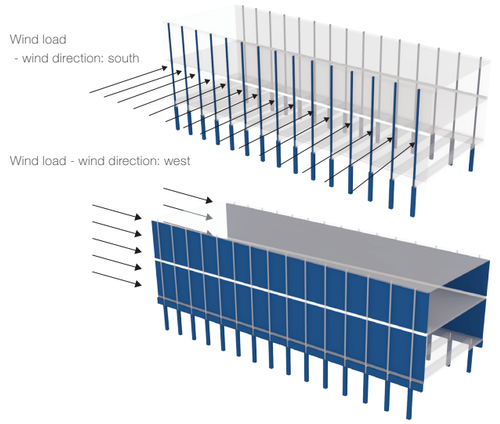
▲
72. Structural system, stone volume. Principle.

Example of wind load - wind direction: west.



Structural elements which serve to transfer the exemplified horisontal load.

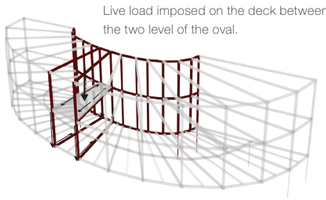
▲
73. Principle diagram showing the transfer of horisontal loads in the oval volume.



Structural elements which serve to transfer the exemplified horisontal load.

If the wind is perpendicular to the main direction of the stone volume (top), loads are transferred down the building through fixed steel elements in the exterior walls. If the wind direction is in the longitudial axis of the stone volume, loads are transferred in the concrete plates (bottom).

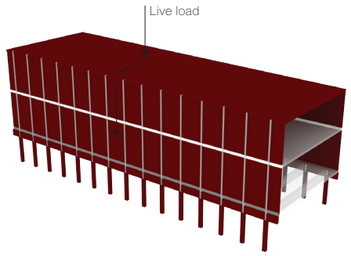
▲
74. Principle for transfer of horisontal loads in the stone volume from two different directions.



Structural elements which serve to transfer the exemplified vertical load.

The load is transferred through the frame system back to the vierendeel system and down through the anchoring cables.

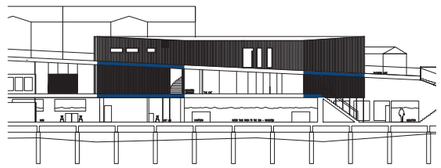
▲
75. Principle diagram showing the transfer of vertical loads in the oval volume. Example of live load on the upper level.



Structural elements which serve to transfer the exemplified vertical load.

The load is transferred out through the concrete slabs and down the carrying concrete plates and further down to the ground through concrete columns.

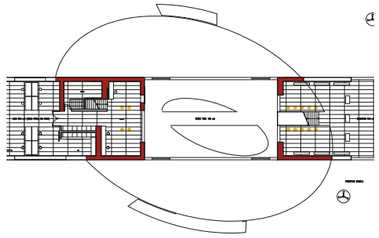
▲
76. Principle diagram showing the transfer of vertical loads in the stone volume. Example of live load on the roof.



Areas where the two "halfs" of the oval are connected.

The two 'halfs' of the oval are fixed to ech other where the slabs of the stone volume visually "cut through" (section, marked with blue).

▲
77. Principle diagram displaying possible areas in which the oval volume can be anchored by means of tension cables (section).



Areas where the oval can be anchored with cables in walls.

Visible tension cables.

The red areas signify areas in which cables are implemented in the walls, whereas yellow areas signify places in which the tension cables are visible to the perceiver.

▲
78. Principle diagram displaying possible areas in which the oval volume can be anchored by means of tension cables (plan).

FIRE RESQUE

The below overview of the fire escape strategy is based on the Norwegian regulations, TEK10. The TEK10 regulations have been supplemented with the Danish regulations, BR10.

Risk category

The Lofoten Sea Culture Centre is categorized as a “risk category 6” building, defined as a building where the use is expected to exceed sporadic stays and where people are not necessarily familiar with the fire escape system. The category includes buildings intended for overnight stays [TEK10, §11-2, web 6]. Even though overnight stays are not part of the program for the building, it should be taken into consideration in the planning of the building in order to secure flexibility of use, not least over time. This categorization forms the basis for meeting the fire regulations and ensuring the safety of the visitors and employees in case of a fire.
In the Danish regulations the “risk category 6” corresponds to “use category” 5 [SBi 230, 5.5.2, web 3].

Active fire protection

The building is equipped with a fire alarm system and a system for navigating personnel in accordance with the risk category [TEK10, §11-12, web 6]. The latter is integrated by introducing two thin strips of aluminum, defining a strip of self illuminating material - leveled with the floor surface to ensure a smooth articulation, e.g. “Low Location Lighting” [Smart Signs, web 2]. In addition the building is equipped with an automatic fire extinguishing system [TEK10, §11-12, web 6].

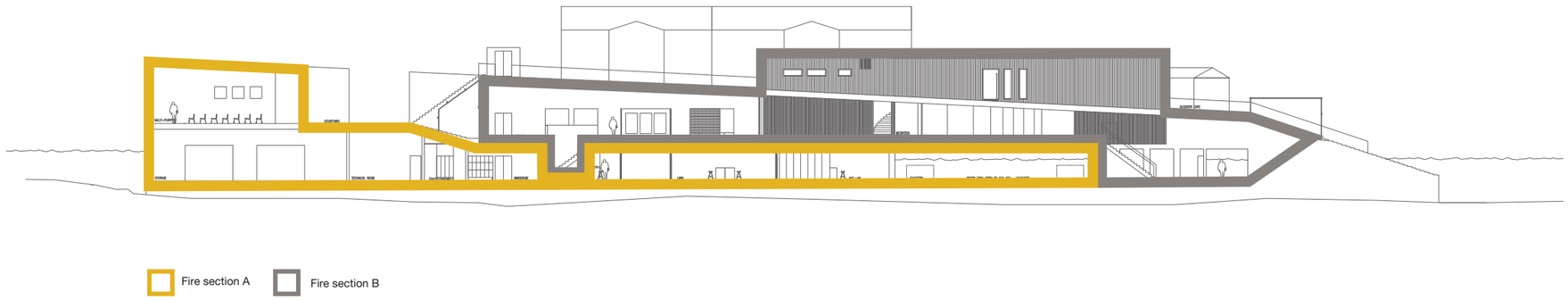
Passive fire protection

With a total gross area of 2500 m2 the building is divided into two fire sections (fig. 79) [TEK10, §11-7, web 6, and SBi 230, 5.5.2, web 3]. Each of the two sections are subdivided into fire cells [TEK10, §11-8, web 6], please refer to figure 80.
In accordance with the TEK10, each fire cell has minimum one exit to a fire escape route which has two alternative fire escape directions, each leading to independent fire escape routes or safe places understood as terrain or a safe place in the building, be that a different fire section or cell [TEK10, §11-13, web 6 and SBI 230, stk. 1, web 3]. The building is located in the water, with a bridge connecting to the mainland in two directions. The unique location, however, does not provide immediate access to terrain from all places in the building. In order to secure the safety in the case of fire, platforms are integrated in each of the oval parts as boat jetties and in the eastern part of the main volume where the main volume slopes towards the water. Escape routes are all minimum 1,3m wide [SBI 230, web 3].

Materials/doors

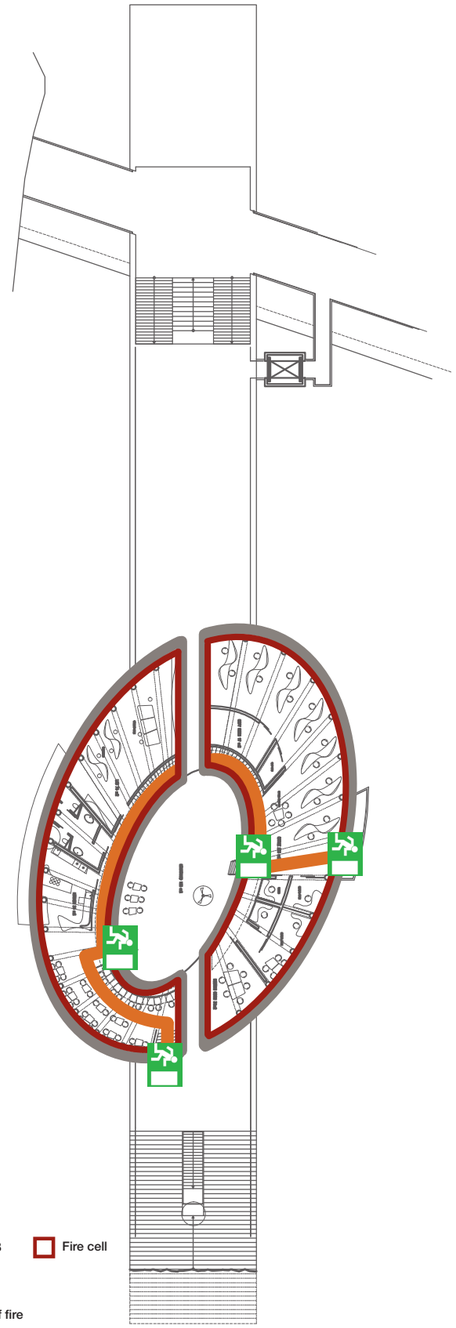
The fire sections are separated by building elements in fire category REI 60 A2-s1,d0 (structural elements) and EI 60 A2-s1,d0 (non structural elements). The sections are separated by the staircases by use of automatic doors, which close in case of fire.

The fire cells are separated by building elements in the fire category REI 60 (structural elements) and EI 60 (non structural elements).
The fire door separating the fire sections in the main level, also functions to prevent development of smoke in the elongated space [SBI 230, stk. 2, web 3].

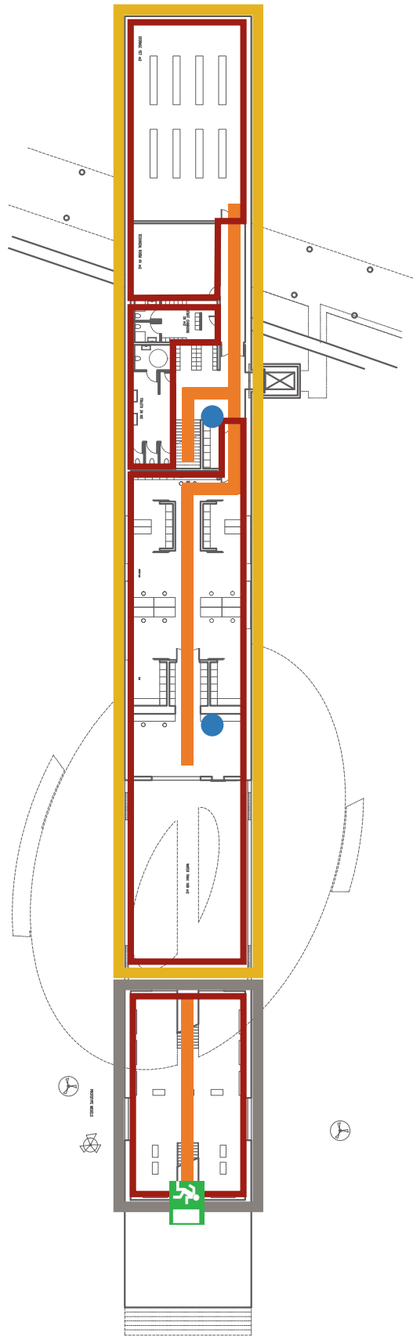


▲
79. Diagram shows the division of the building in two fire sections.

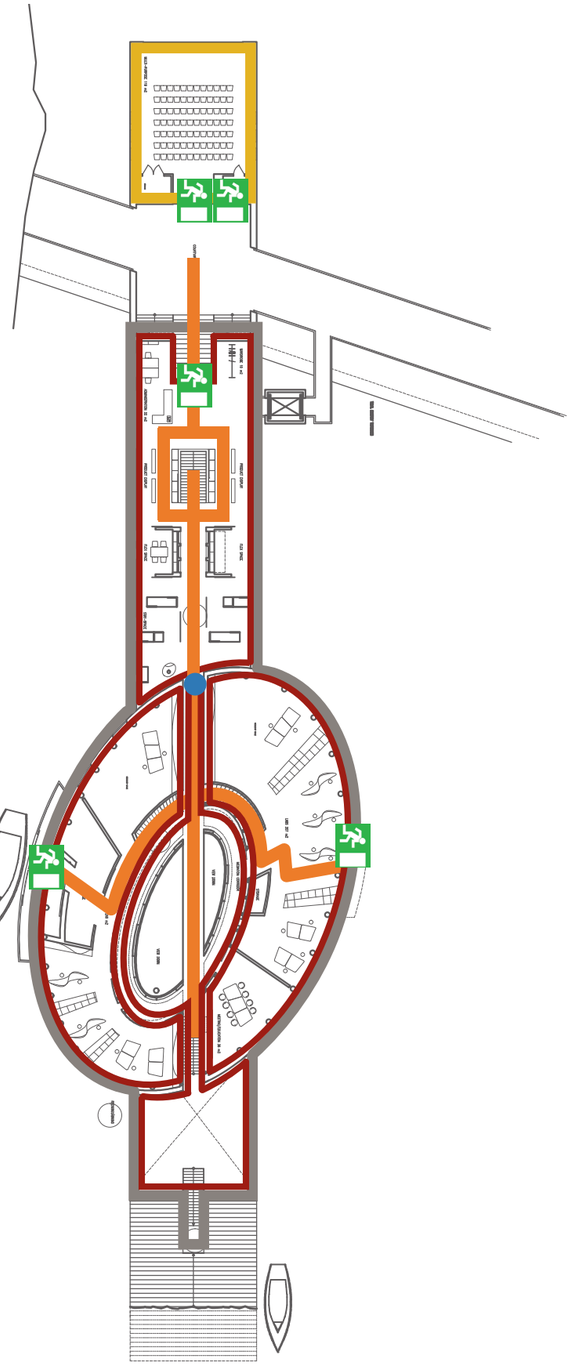
Upper level



Lower level



Main level



Fire section A
Fire section B
Fire cell
Fire escape route
Fire escape opening
Doors closing automatically in case of fire

▲
80. Diagram showing fire resque plans for each level of the building.

Presentation :
The Black Tower in Hirtshals

Temporary ‘black lobster’ tower on the harbour

In Hirtshals, the industrial harbour environment is a conspicuous characteristic – both in the physical environment and in the experienced mentality of the place. There is identified a need for attracting and keeping tourists in Hirtshals and observed an inaccessible potential found in the industrial, rough, direct, active and not least authentic harbour environment.

For the part of the project in Hirsthals, Denmark, a proposal for a temporary tower on the harbour – The Black Tower - has been designed. The nature of the project stems from an educative participation in the local network ‘The Gateway to the North Sea’ [Porten til Nordsøen] initiated by our external partner VisitNordjylland and the local tourist organisation where the idea for a view- and information tower as part of a strategic setup to make the harbour activities accessible and comprehensible to tourists as well as locals.

Interest have been given to the realisation of such a tower construction, and for this initiative the proposal at hand plays an introductory role; that is a temporary construction acting to summon attention for a future permanent tower and to promote tasty black lobsters from Hirtshals at the Fish Festival taking place in August 2012.

This scenographical architectural intervention offers a viewing platform and a lobster stall.

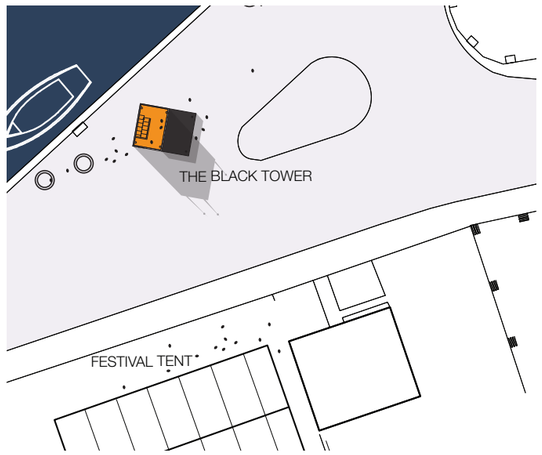
81. The Black Tower in Hirtshals.

ARCHITECTURAL CONCEPT

The architectural concept is constituted by a box volume with an intruded staircase, vertically extended with upward-aspiring timber poles. The staircase with alternating steps leads you with unusual awareness of your own movement to a viewing platform on the upper level. From here the diverse impressions of the surrounding harbour and festival activities can be overlooked. On ground level hinged panel can be opened up to reveal the bright orange interior of the box volume where a lobster food stall offers delicious black lobsters from Hirtshals.

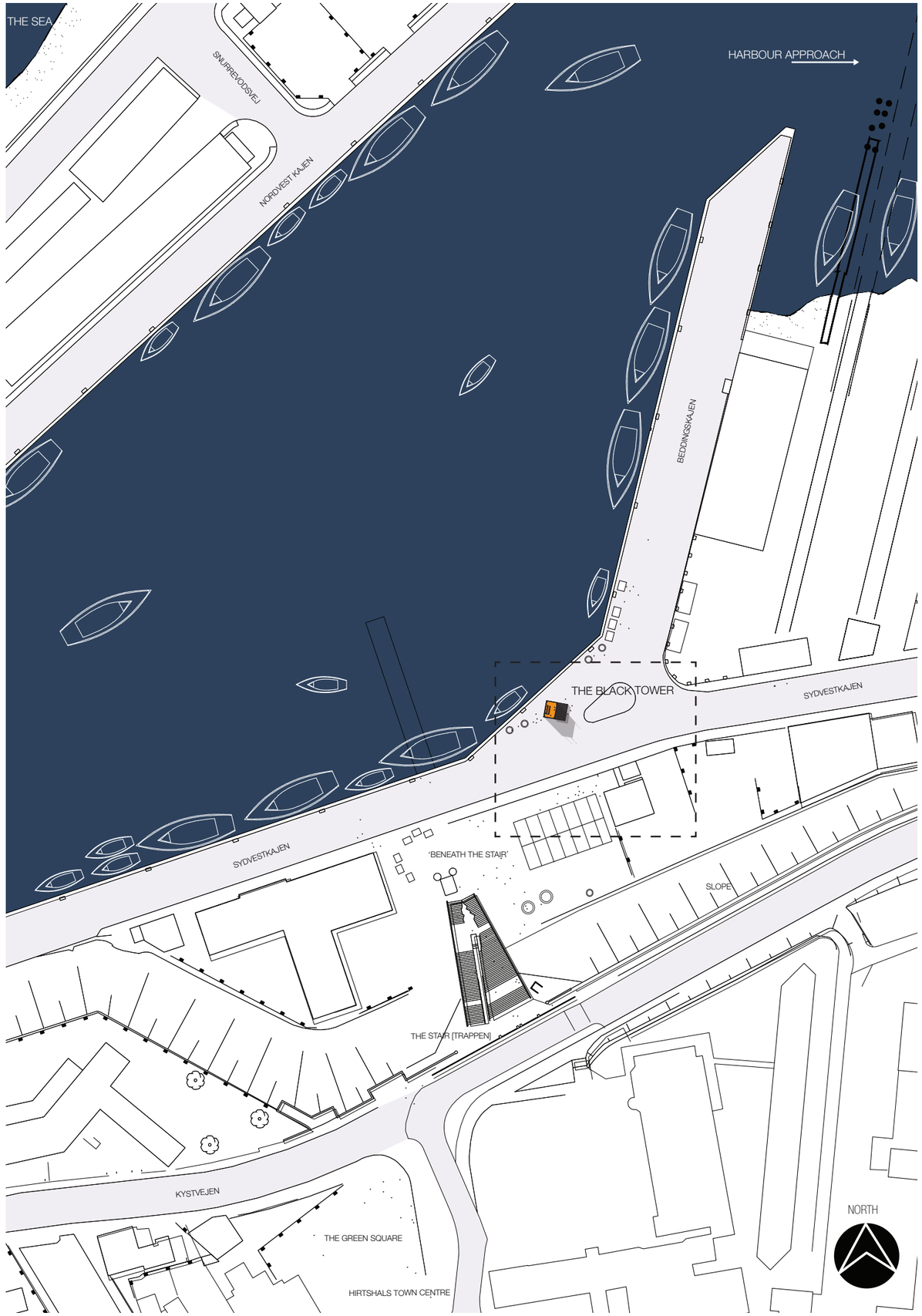
LOCATION PROPOSAL

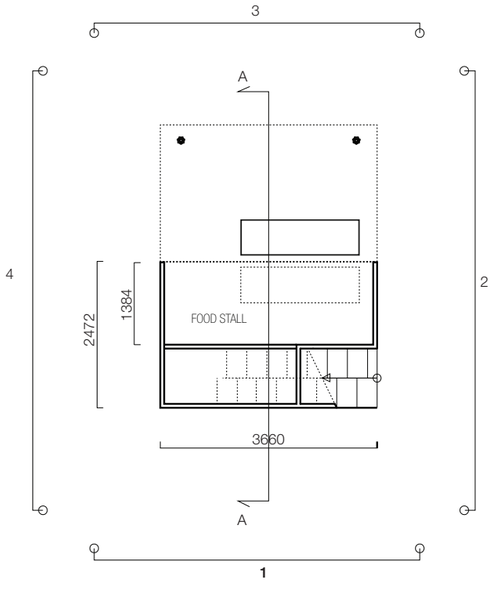
The site plan shows a proposal for location of the temporary Black Tower (fig. 83). The proposed location situates the tower on the bordering area between the elevated town area and the harbour basin with its many boats. From here one can get views of the west harbour basin [vest bassinet] and to the opposite side of Nordvestkajen where the vast North Sea appears. The much used 'stair' connects the two levels of the town and the public space 'beneath the stairs' is with the festival tent the centre of Hirtshals Fish Festival.



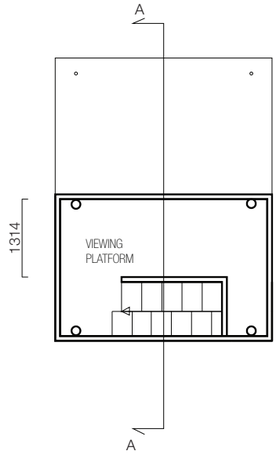
▲
82. Location during Hirtshals Fish Festival, siteplan, scale 1:500

►
83. Siteplan, scale 1:1000

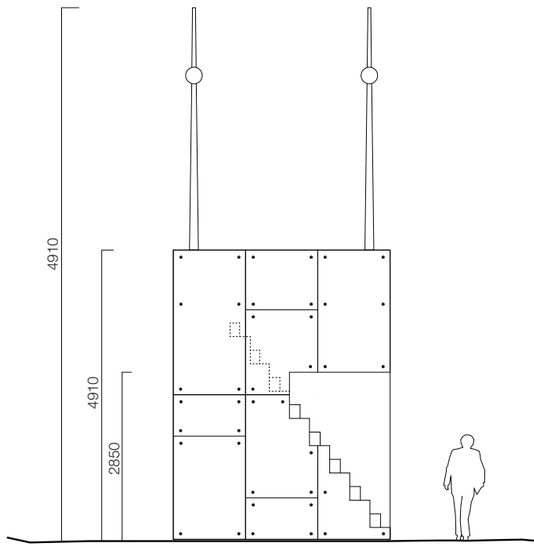




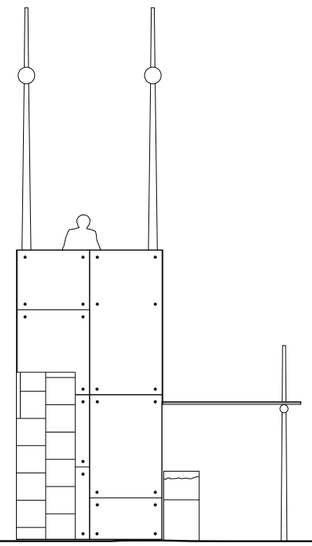
▲
84. Plan, ground floor, scale 1:100



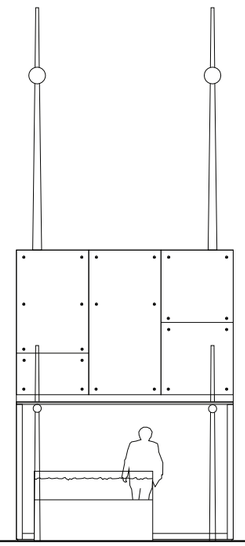
▲
85. Plan, upper platform, scale 1:100



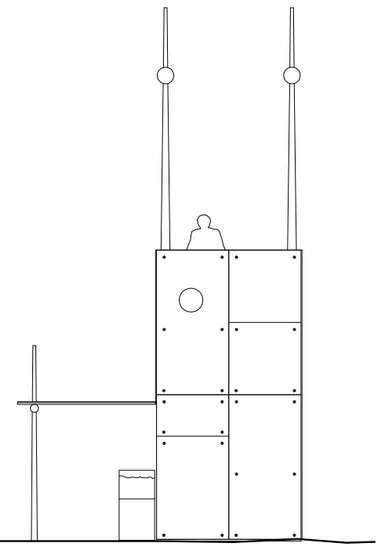
▲
86. Elevation 1, scale 1:100



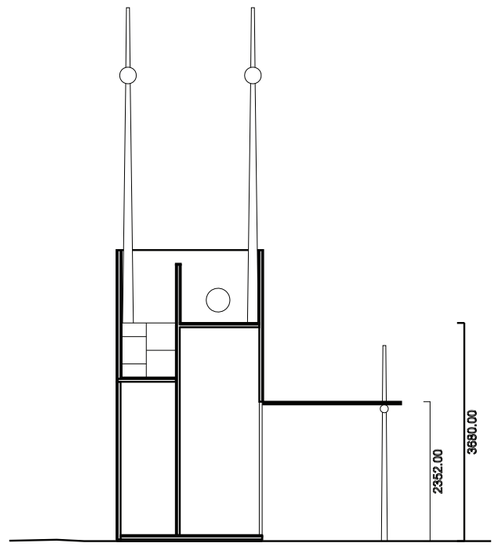
▲
87. Elevation 2, scale 1:100



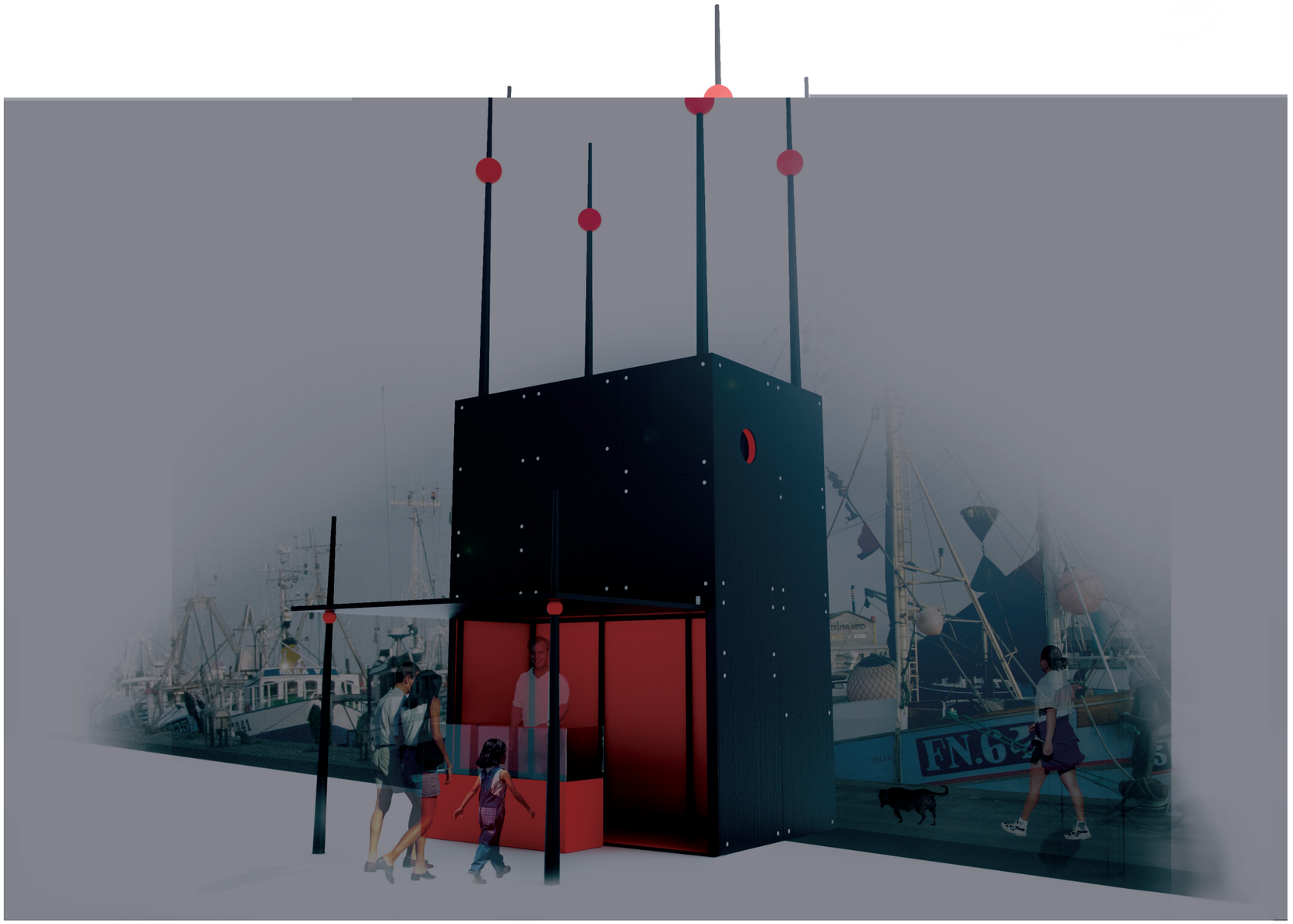
▲
88. Elevation 3, scale 1:100



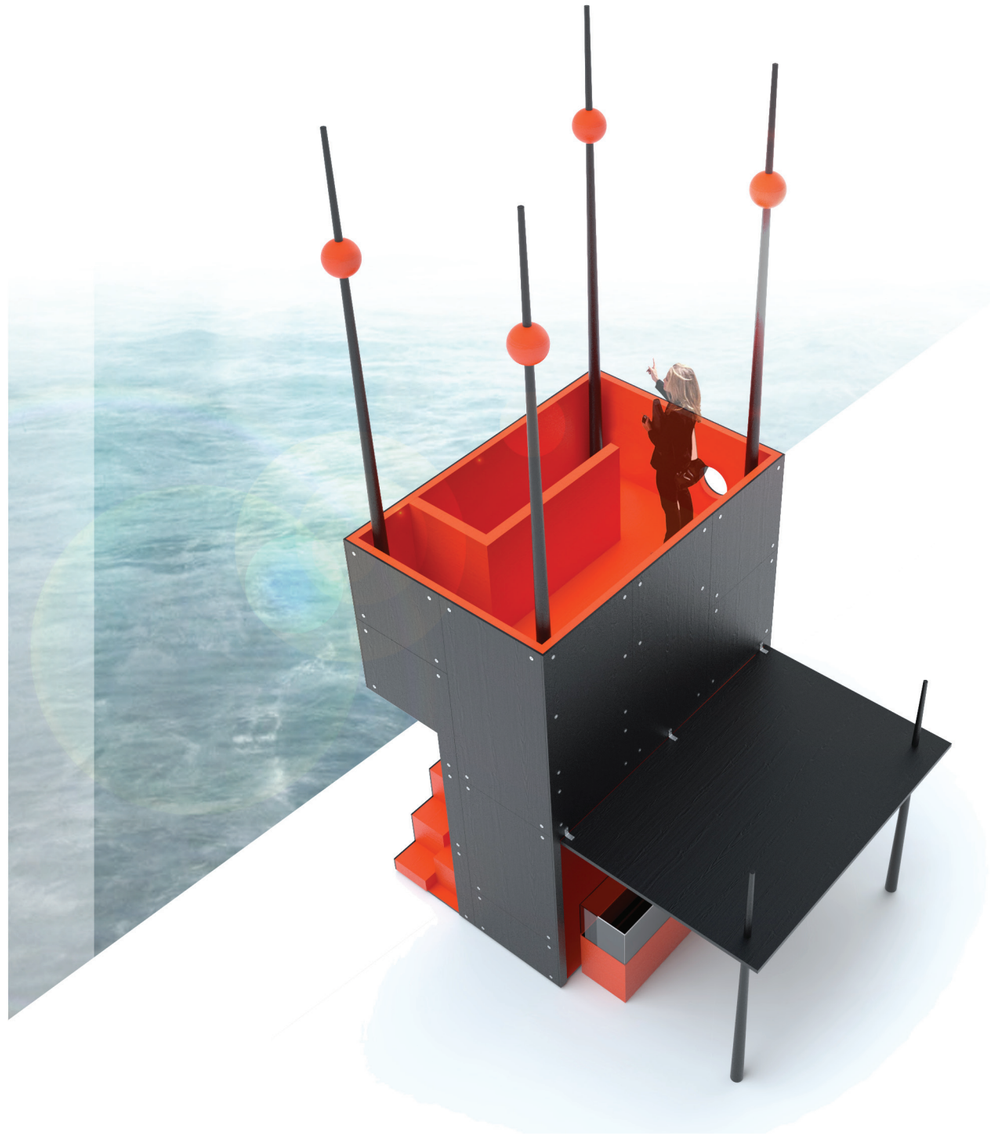
▲
89. Elevation 4, scale 1:100



▲
90. Section A-A, scale 1:100



▲
91. Lobster stall opens up from the orange interior.



▲
92. The Black Tower from a seaguls view.

MATERIALITY AND CONSTRUCTION

The Black Tower is built with a construction clad in painted plywood. It is a leveled, close cladding in order to obtain a monolithic expression in which staircase and platform is ‘cut out’. Metal screws and washers for mounting are visible, with references to the industrial setting.
The exterior plywood panels are in black glossy paint with references to the black lobster and a historical black tower once erected on the harbour in Hirtshals (until 1970’s). Contrasting the blue of the water a bright orange adorn the interior ‘cut-out’ surfaces, further acting as a strong eye-catching element.

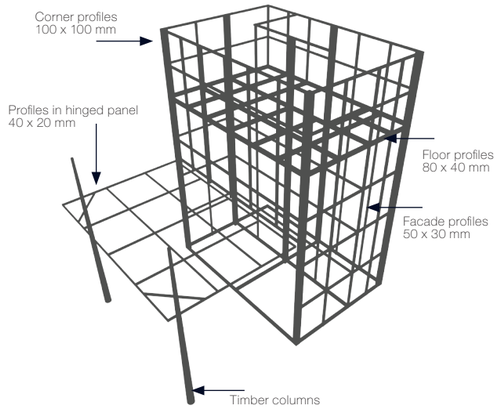
In connection with the Hirtshals project the dimensions of structural members have not been verified through calculation. This aspect will be treated after the submission of this project as part of the detailed planning of the pavillon. An issue which needs to be taken into consideration during this process, is to ensure that the construction does not “tip over” due to wind and person loads and a relatively high centre of mass.

Fig. 96 displays a rough concept for the construction, based on a skeleton of steel profiles. Each side is constructed (welded) separately and joint with hinges on-site.
Fig. 95 displays the mounting of plywood cladding to the steel skeleton. The mounting of plywood cladding is emphasised by visible bolts. This discloses that the pavilion can be dismantled and reerected for other purposes.

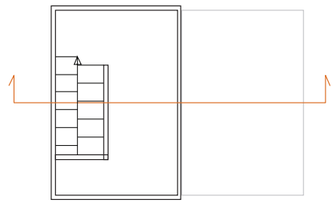
▲
93. Painted plywood sample, black

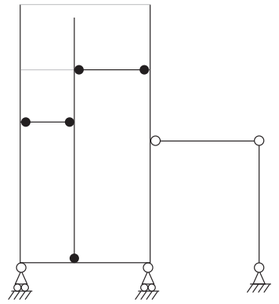
▲
94. Painted plywood sample, orange

▲
95. Detail, mounting of plywood cladding by use of schrew and washer.



▲
96. Concept for sceleton construction in steel profiles (timber columns to carry the hinged panel).





The welded and bolted profiles make up a fixed system; however, the necessity to anchor the construction on the site will be evaluated after the submission of this project. Two columns support the hinged panel when open.

▲
97. Proposed static system.

PROCESS

Process :
Lofoten Sea Culture Centre

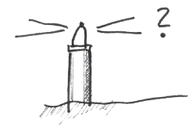
- introducing the new in a ‘sleeping’ village

In the following an overview of crucial steps in the design process is presented, with priority given to the process concerning the question of ‘fitting in’, i.e. working with the architectural concept, the tectonic detailing and its materiality. As the creative process rarely is a linear process with one answer leading to the next, this exposition features main pivotal discussions and choices of the process, not a continuous account.
The methods applied in the design process have been conceptual diagrams as well as extensive use of working models and sketches. Interacting with locals as well as experts on relevant topics has been an integrated part of the project.

In this exposition of process the sign ≫ appears to indicate chosen concepts.

ARCHITECTURAL CONCEPT

Through the initial process sketching and modelling has unfolded in two main directions with a range of experiments in the span between the two “extremes”; Defined volumes in their own right (e.g. fig. 99) versus more fragmented volumes, with reference to the existing village typology, more or less defined by an organising reference structure (fig. 102). This discussion was initiated by the rather ambitious intention to incorporate 2500 m2 in a sensitive area, signalling a future identity for Å, without compromising the existing natural and cultural qualities.

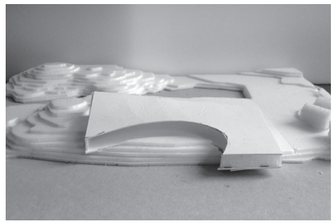


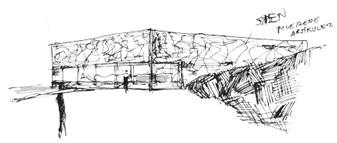
Level of expressivity/modesty - pursuing a “modest landmark” effekt.

Communicating a narrative of “dualism” in regards to the sea; implementing the keywords: “anchored”/”observing” vs. “exposed/ revealing”.

Directions: linking respectively to the village centre and the sea.

▲
98. Main points of interest in the initial sketching phase.



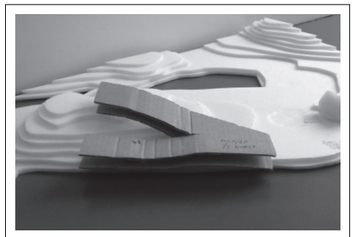


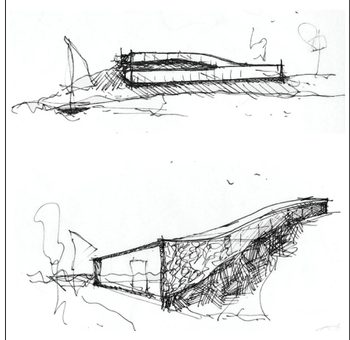
Level of expressivity:
- As one large volume the concept appears rather expressive.
- Does not appear natural in the topography.

Dualism:
- The building has a defined ‘back’, and opens up towards the sea, pointing out a direction to the open water.
- The spatial experience of being “exposed” to the drama of the sea does not appear articulated in the pointing ‘arms’.

Linking:
- The building directs people from the village in the ‘rear’ of the building towards the sea, pointing out a direction towards the sea.
- As a general issue in the three concepts on this page, there appears to be a distancing to the sea.

▲
99. ‘The one with the oval outdoor space’



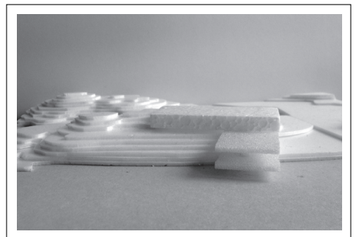


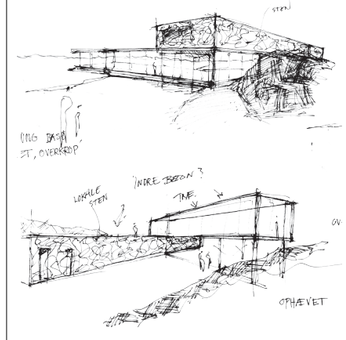
Level of expressivity:
- More ‘flexible’ in regards to the landscape, however still very expressive in language of form.
- Can be either more subdued as an immediate extrusion of the topography or emphasised as a ‘foreign body’.

Dualism:
- The 'legs' of the building offers respectively an overview from land (top leg) and proximity to the sea (lower leg).

Linking:
- As for the concept to the left, this concept continues a movement from the village.
- No clear enhancement of direction
- Provides a long façade with proximity to the shoreline.

▲
100. ‘The one with the split’



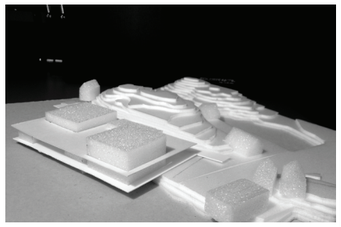


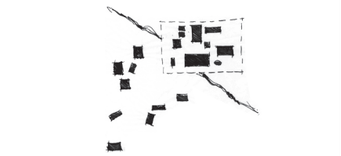
Level of expressivity:
- The concept appears more ‘modest’ in expression than the other concepts.

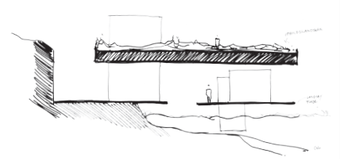
Dualism:
- A comprehensible expression of two volumes, enhanced through materiality.
- A light volume with proximity to the water and a heavy volume with secluded observation.

Linking:
- The concept continues a movement from the village
- No clear enhancement of direction

▲
101. ‘The one with the two volumes’







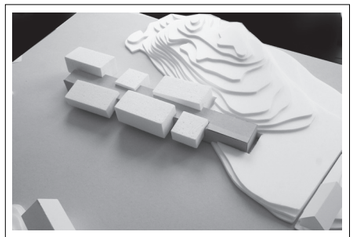
Expressivity:
- A continuation of the village 'lay-out'; pragmatic distribution of smaller volumes.
- The roof becomes an organizing element, however, also a clearly contemporary element.

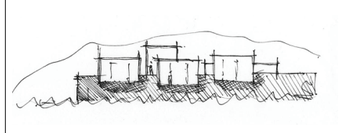
Dualism:
- The roof serves as a point of reference from where to observe the world.
- The spatial experience of being exposed to the elements is weak.

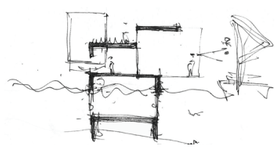
Linking:
- A cultivated continuation of the village typology. Cut wholes to the water and boxes continuing down the water are introduced in order to be exposed to the sea.

This concept introduces an issue in regards to snow drifting.

▲
102. 'The one with the small village under one roof.







Expressivity:
- In order to encompass the program, the boxes need a considerable area. This make them stand out as rather large and expressive.

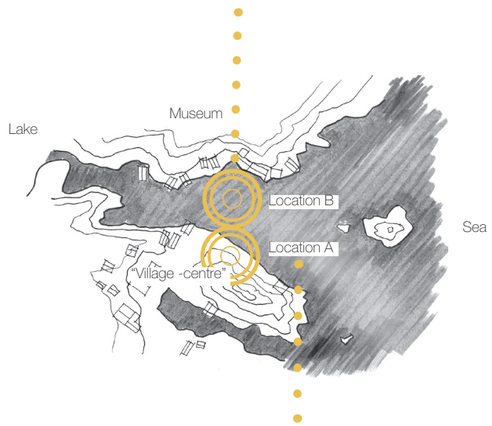
Dualism:
- The volumes and the spine form a dual relationship. The spine provides a base, from where to observe the sea, whereas cantilevered boxes offer a dramatic feel of exposure.

Linking:
- The concept continues the pragmatic typology of the village in a contemporary language of form.
- The concept is anchored to the shore in order to maintain a direct link to the village centre. However at this point in the process we gradually saw the potential of moving the building further out into the water.

▲
103. 'The one with the the spine and boxes'.

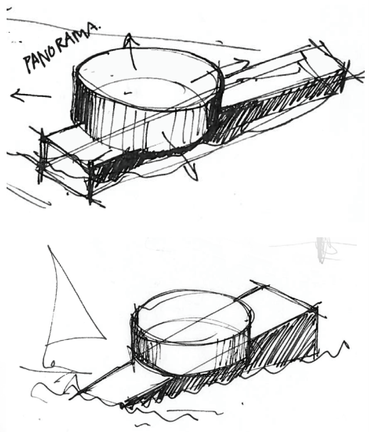
Where to add?

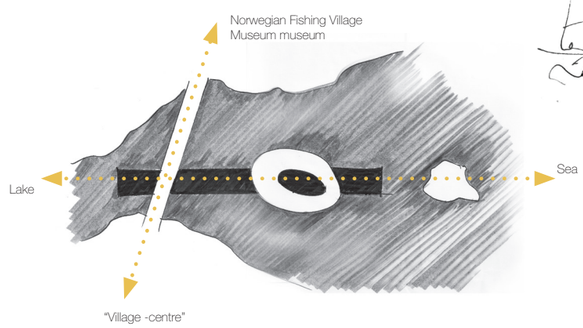
Location B : in the water. The building continues the axis from lake towards the sea. The location provides immediate interaction with water and underlines the potential direct harvesting of energy. Potential problem with blocking of the visual connection between centre and museum.



Location A : Near the existing closed-down fish factory. Building on the borderline between "fjell" and water as the original building typology suggests. Further a direct connection to the 'main square' in the centre of Å was considered important in order to act inviting for casual stay.

▲
104. Alternative locations for the new building. For a relatively long part of the process, the sketching was focused on location A, cf. the prior presented concepts.





CONCEPT : The steady rock with fragile panoramic oval

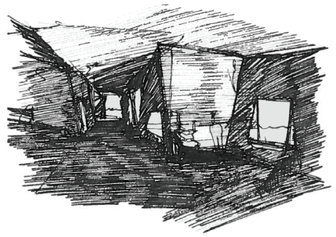
Chosen concept; the main volume is moved out into the water (transition area from sea to lake) connected to the mainland by a bridge which links two parts of the village. The building continues the axis form lake to sea - by its location the building initiates interaction with the sea as an implicit part of the experience of visiting the centre. In this concept, we found it possible to combine the duality present in figure 101, an increased directional awareness as found in figure 103 and a sense of subdued "drama" as seen in figure 99, however keeping the scale of the place and acting as a modest, inviting landmark. Compared to the early sketches, the chosen concept has the water as an omnipresent element, yet naturally connects parts of the village by means of the bridge element.

▲
105. Chosen concept

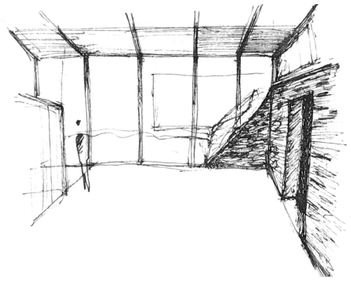
SPATIAL FEEL

Parallel to the development of the main architectural concept, the concept for the interior spaces took shape. Considerations have been given to defining openings and how the should offer opportunities to observe to sea from a safe distance versus with panoramic views, highly exposed to the surroundings .

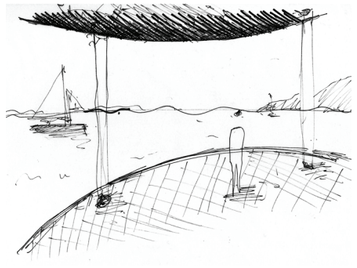
Figures 106-107 display two selected iterations in the process of working with such smaller spaces in the larger volume. The illustrations visualize how the interior has developed; from a “cave-like” setting, with walls as irregular, furnishing elements, to a more strict, flexible interior where the continuous building envelope contains lighter space-defining elements.



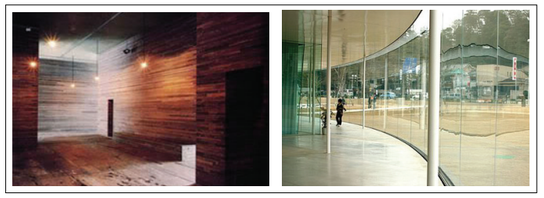
▲
106. “Condensed spaces” with defined openings towards the sea. Dim lighting, niches.



▲
107. “Exposed spaces” with obliterated boundare between exterior and interior. Light spaces, views.



▲
108. Concave geometry underlining panoramic view.



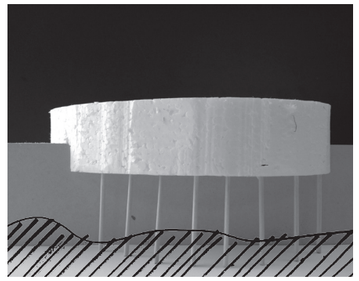
▲
109. Inspiration for the two interior dualing experiences: Thermal Vals by Peter Zumthor (left) and Art Museum in Kanazawa by SANAA (right)

STRUCTURAL RELATIONSHIP

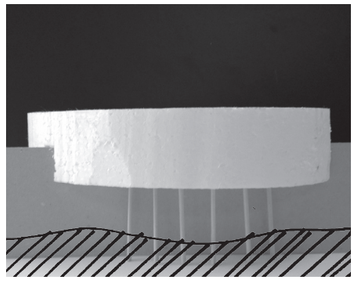
Parallel to the aesthetic and functional considerations, sketching relating to the static system of the building has been carried out.

The structural system of the oval

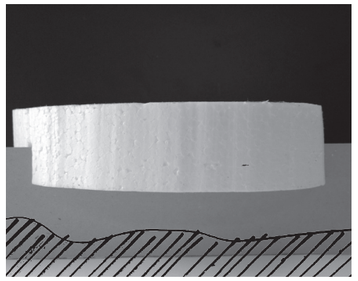
The architectural concept is based on a dual relationship between the longitudinal volume and oval volume. In this regard it becomes interesting to examine the structural relation between the two elements. Figure 110 displays potential solutions for the structural system, of which scenario 3 is chosen. This scenario is considered the optimal in terms of underlining a dual relationship between a “heavy” stone volume and “exposed” oval volume, which structurally depends on the stone volume.



Scenario 1: The columns continue the building tradition of the site, however, does not underline the dual relation between the “heavy” stone volume and “exposed” spaces in the oval.



Scenario 2: Columns recessed to give visual primacy to the oval geometry.

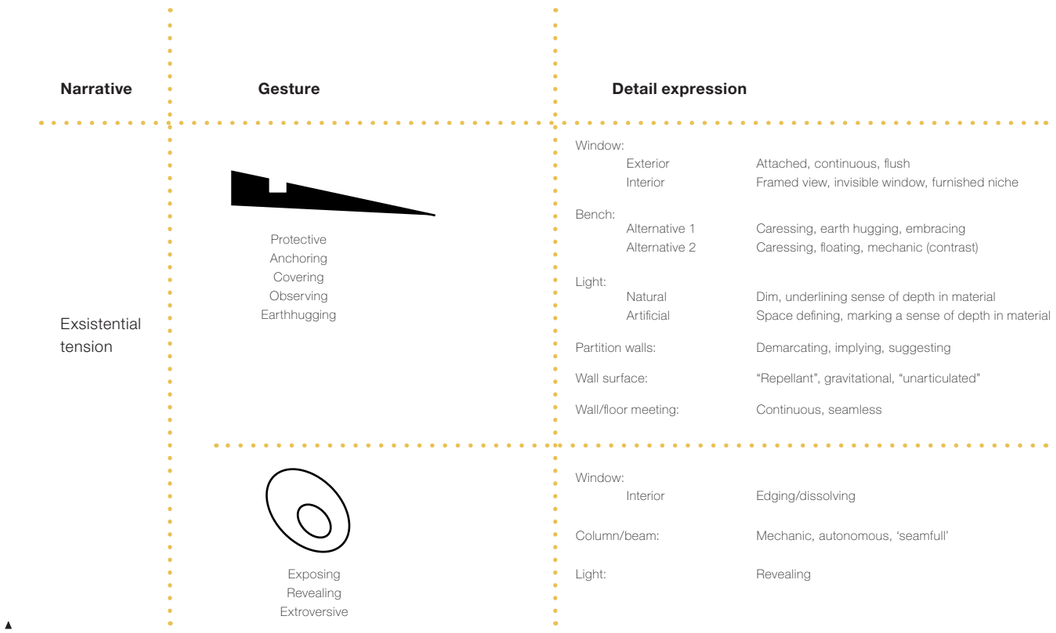


Scenario 3: The oval geometry is cantilevered from the stone volume. This solution introduces potential limitations in the interior organisation, however is considered optimal in terms of underlining the architectural main idea.

▲
110. Three scenarios showing potential solutions for the relation between the stone volume and oval volume.

ZOOMING IN

As it shows from the presentation of this project, the main focus in terms of detailing has been placed on a chosen section of the stone volume. However, in order to illustrate how the differing spatial experiences are sought strengthened through 'tectonic detailing', selected details in the oval volume are treated as well.
Adopting the framework for tectonic detailing as introduced in part 1 of the thesis project, the three dependent parameters for the actual construction of the detail are put forward in figure 111; that is the intended narrative, gesture and description of the tectonic language within the detail.
As described earlier in this chapter, the aimed gesture given from the stone volume is the protectiveness, anchoring base from where to observe the sea.
In the same way, the articulated detail expression in the oval volume concerns the gestures of the built constructions to be exposing, revealing and extroversive towards the external environment.



▲
111. Diagram showing the approach to detailing.

STONE VOLUME DETAILING

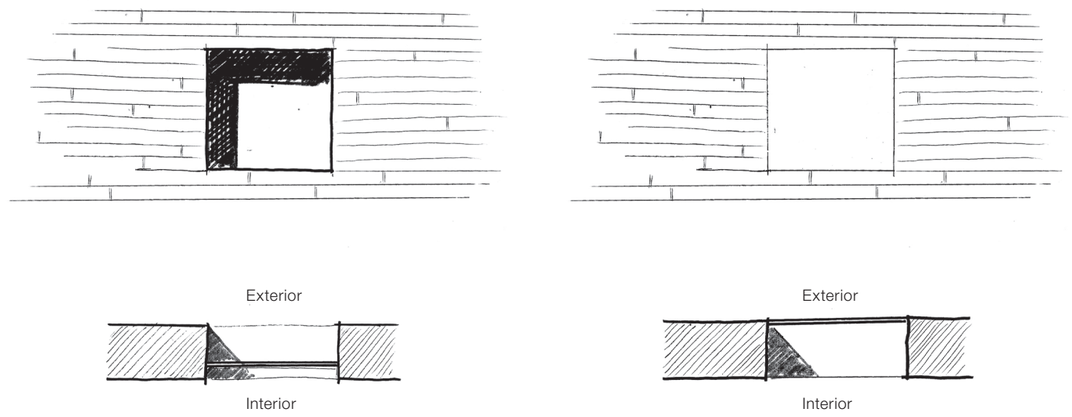
Window detail

Locaction of the window in the thickness of the wall: During the design process different window details have been examined, both in terms of facade expression and in terms of interior qualities. Figure 112 display two of the investigated alternatives for placing the window in the wall. A flush expression is pursued, allowing for furnishing of the window as well as strengthening the perception of a monolithic stone volume in the exterior.

Introducing fittings

With humble reference to Carlo Scarpa and Sverre Fehn we have persued an approach, where cuts or the joining of two elements/materials are clearly distinguished.
As an example fitting are introduced in connection with the windows, to fix these to the stone wall. Pragmatic solutions for fixing 'hjeller' to the rocks in Å have served as a reference for implementing a third material, iron, which functions as a joining element, and at the same time emphasizes a transition from one element/material to another. In our perception such small scale elements allow for "eye-contact" with the building; providing elements on which the eye can rest, and which introduce a human scale to the large scale building.

As seen in the case study of Sverre Fehn's work (theory part), he manages to obliterated the perception of the window from the interior. A similar effect is pursued in this project. How to obtain such effect with limited cold bridges as a resulting companion has been treated in the "constructional" detail drawings. Hence, we aim to introduce a counterweight to the almost "mechanic" detailing, by working deliberately with more seamless joinings in other parts of the volume, e.g. the window for the interior - or more 'pragmatic' elements, such as the railings on the roof of the stone volume or the interior shading in the stone volume (p. x).

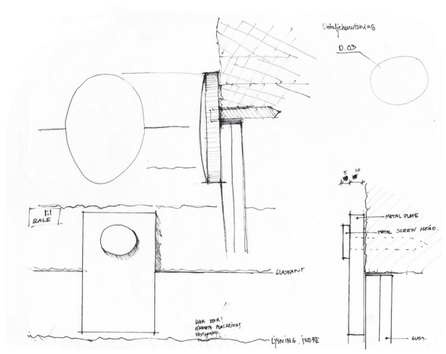


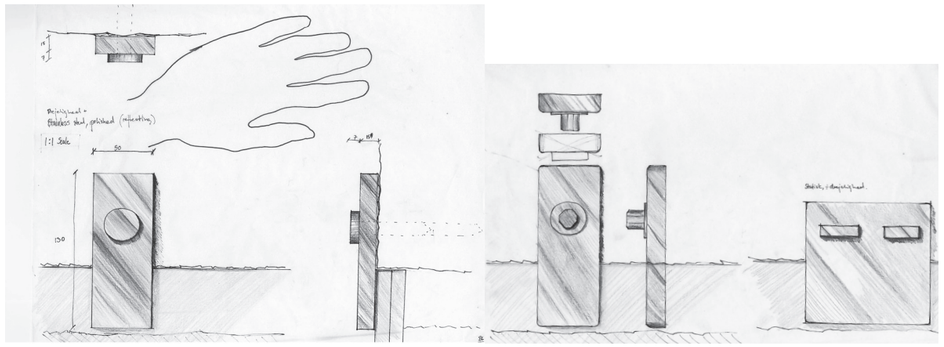
▲
112. Two opposite approaches to the placement of windows in the exterior wall.

This page shows a selection of sketches is displayed concerning the mount of windows in the stone volume. A main concern has been the level of articulation; whether to pursue a refined expression or a deliberate impression of coarse articulation. In the final design the latter has been the guiding principle.
Sketching has been carried out in 1:1 in order to fully grasp the scale of the elements, which become a general feature throughout th building - e.g. in the furniture and joints between structural elements.

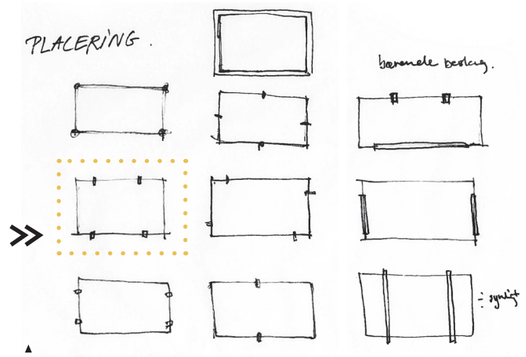
Please refer to page 64 for final drawings. In the final solution a less “polished” expression is pursued.

▲
113. Inspiration: Window detail, Hedmark Museum, Hamar, by Sverre Fehn. Interior view (top) and exterior views (middle) and project by Sigurd Lewerentz (bottom).





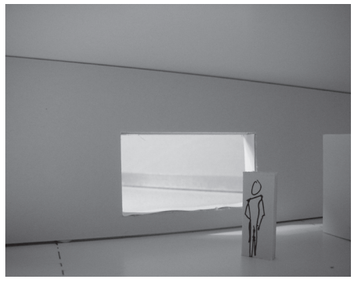
▲
114. Sketches of fittings for window mounting. Sketches show unopenable details, however modification should be made when need for opening.



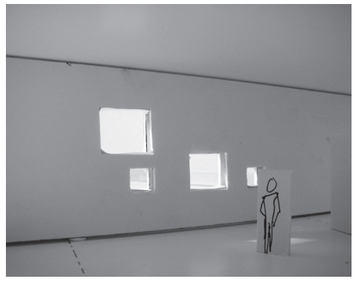
▲
115. Study of fitting placement.

Placing openings
The location and sizing of windows has been determined by the functions in the interior. Figure 116 shows three approaches to window dimensioning, whereof a combination of scenario 2 and 3 is pursued in the general layout of windows in the stone volume. Both scenarios allow for defined views, maintaining the defining corners of the monolithic volume. Scenario 2 allows for furnishing of the window frame - here one can sit and enjoy the view towards the sea.

Scenario 1: Floor to ceiling walls. The perception of the stone geometry as a monolithic, "heavy" shape is less pronounced.



Scenario 2: Large openings within the wall. Potential furnishing of the window frame.



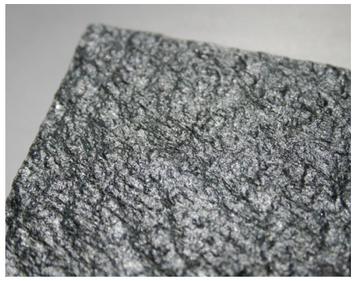
Scenario 3: Smaller defined openings. Potential framing of specific 'targets'.

▲
116. Study of window openings.

Wall surfaces
As described in the materiality chapter (page 34), stone has been chosen as the general material in the long volume for both exterior and interior cladding. This has initiated an interest in exploring potential surface properties of stone materials. Since granite is a locally available material, this stone was originally introduced in the project as a continuous material and has subsequently been part of material studies (fig. 119-121). During the process, slate has been introduced, but the studies of granite surfaces have helped determine that we looking for a coarse expression.

Option 1 : Granite

▲
117. Granite from Løddingen Lofoten



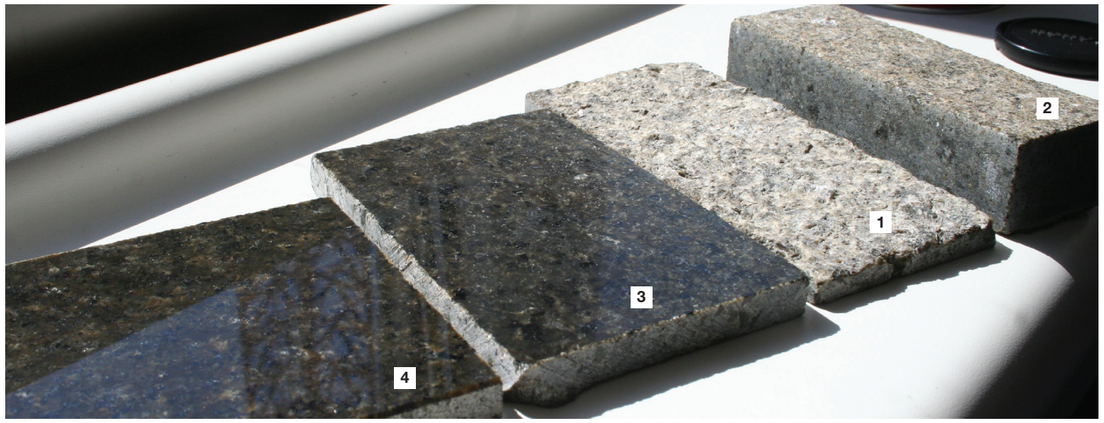
Option 1 : Slate

▲
118. Alta slate from Northern Norway

Granite Løddingen Quarry	Slate Alta Quarry
- Yellowish nuance - More matt texture - Regionally accessible.	- Reference to traditional roofing - The slate has a certain shine to it, which catches the light and has the potential to create an intriguing shadow play from the reflections of the water. - More refined texture

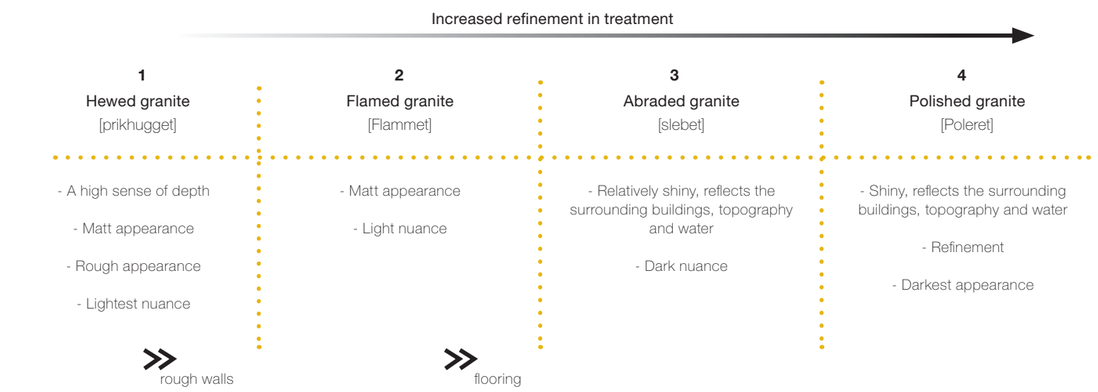
Mainly due to consideration on the nuance of the stone, the alta slate is preferred.

▲
119. Study of materiality qualities.



▲
120. Samples of stone surfaces, here granite from Lofoten. From left: polished, abraded, hewed and flamed.

Figure 121 displays as study of different treatments of stone. Here granite is used as a reference, even though slate has been chosen as the general material in the final proposal. The study has served to narrow down that a rough treatment is pursued. The chapter on materials in the presentation accounts for differentiation in floor and wall-surfaces, here marked with for association purposes.



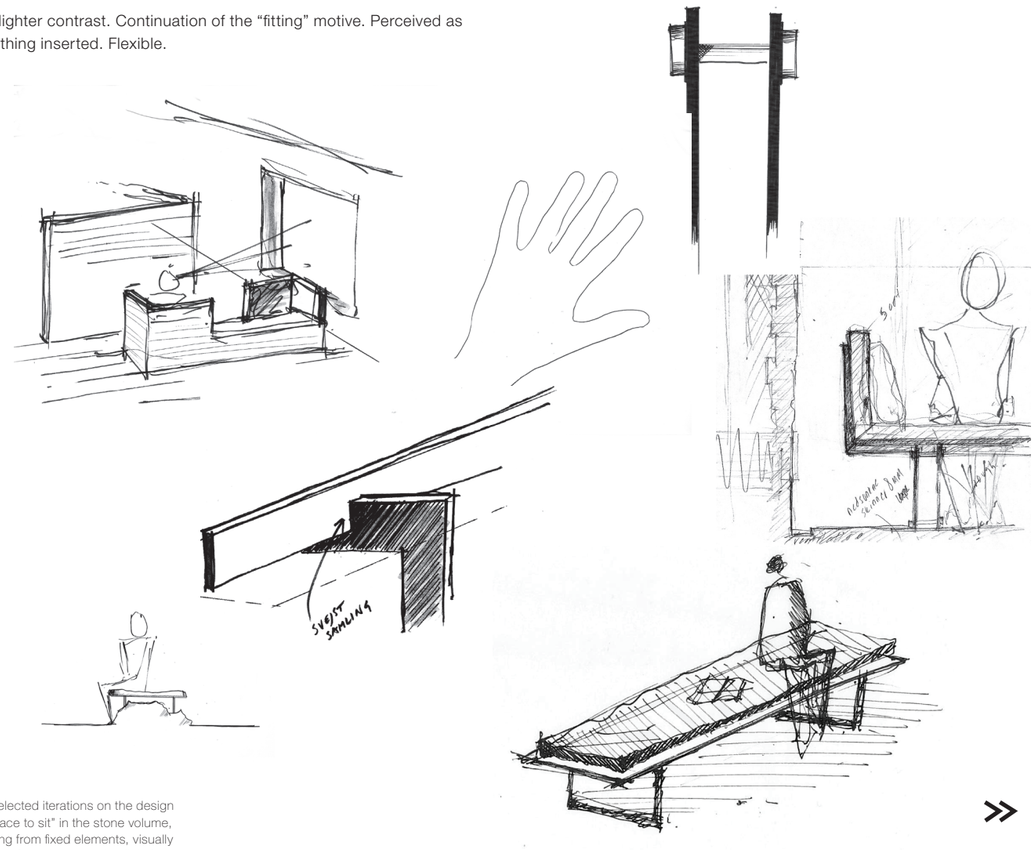
▲
121. Study of surface workings of stone, here granite is used for reference

Bench
Zooming in on the chosen section in the stone volume, we have been sketching on how to design a place for informal seating, which naturally interplays with the space in which it is located.

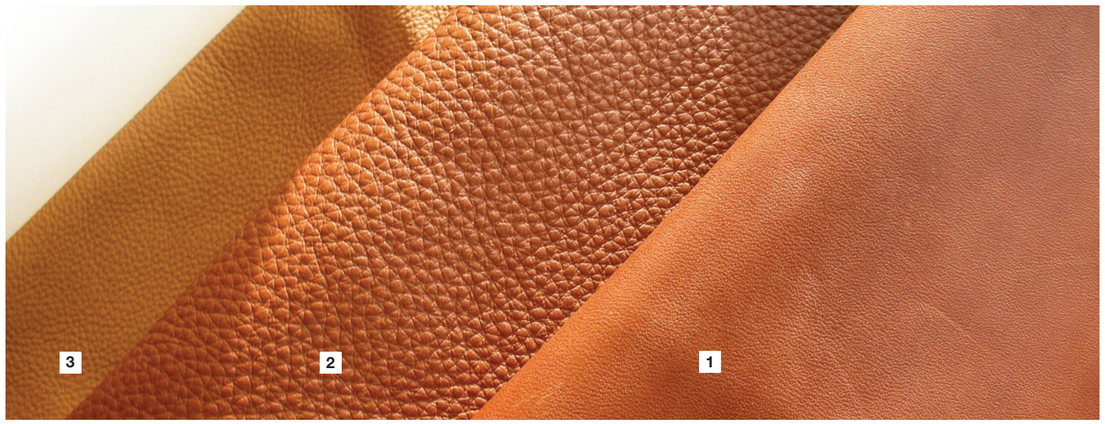
The sketching on this piece of furniture has been headed in two differing directions:

1. A continuation of the wall/floor surfaces, which induces a perception of massing. Embracing qualities. More or less fixed to the ground.

2. A lighter contrast. Continuation of the “fitting” motive. Perceived as something inserted. Flexible.



▲
122. Selected iterations on the design of a “place to sit” in the stone volume, spanning from fixed elements, visually emerging from the ground to light/ flexible elements which continues the mount-motive from the windows. The latter representing the chosen approach.



123. Comparing the visual and tactile experiences of different leather types/nuances for the benches in the stone volume. Leather 3 has been chosen.

Bench material : leather

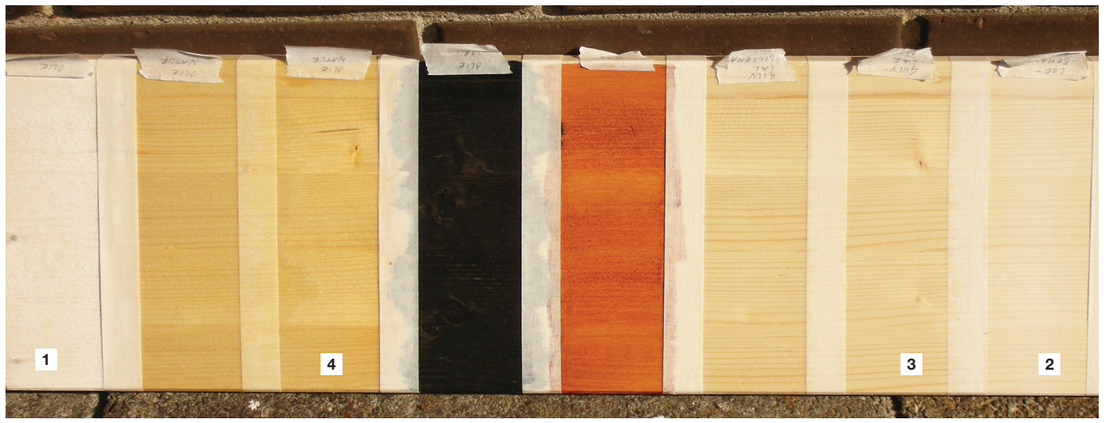
Figure 126 displays an evaluation of three different types of leather.
Due to the more 'natural', warm appearance and a more 'pleasing' patina, the cognac aniline leather type is chosen (reference 1). This type and colour is considered to exude a higher degree of 'informal exclusivity'.

124. Stitchings and fillings; kedder-joint [kedder-afslutning] and down core. This joining method is suggest in order to obtain a more "relaxed" expression together with the clear-cut iron elements of the frame.

125. Stitchings and fillings: doubble stitching and foam core.

1	2	3
Aniline leather Cognac coloured	Semi aniline Lighter cognac coloured	Semi aniline Beige coloured
- Made from high quality skins. - Less resistant to wear. However, the patina appears pleasing. - The natural surface structure if preserved. Due to this, the leather is 'breathable', adding Increased seating comfort.	- Fully coloured leather - Surface treatment to increase resistance. - Less 'natural' look.	- Fully coloured leather - Surface treatment to increase resistance. - Less 'natural' look. - The nuance is considered to light to play well together with the light wood underneath.

126. Study of materiality of three leather types and colours. Leather 3 has been chosen. [Kollerup, 2012 and Sørensen Leather, web 5].



127. Experiments with different wood surface treatment on spruce wood - respectively lye treatment, lacquer and oil.

Material : spruce wood

Spruce is the most common wood species used for interiors in Lofoten due to its natural light nuance and limited knots [Fauske (2011)]. A small scale experiment of a series of different wood treatments for interior use has been made (fig. 127), with respectively the interior cladding in the oval volume and furniture in the stone volume in mind.

It is pursued to maintain the light, warm expression of the spruce over the years and protect is from wear.
Four different light treatments are evaluated in figure 128 for the manner in which they affect the expression of the surface.

Reference 2, matt lacquer is chosen, since it appears to preserve the original nuances and tactility the best.

Lighter → Darker

1	2	3	3
Oil - white	Lye	Laquer - nature - matt	Oil - nature - matt
- The expression is more white than the 'original' nuance. - The grains are visible, but the expression is more 'coated'. - Feels glossy.	- The expression is more white than the 'original' nuance. - The grains are visible - Feels rough.	- The nuance is preserved with only a slightly darker appearance. - The grains are visible - Feels as the original surface.	- The nuance is darkened. - The grains are visible - Feels as the original surface.

128. Study of treatments for spruce wood used in the interior; bench bedplate and wall cladding in oval volume.

OVAL VOLUME DETAILING

Visual construction

The columns in the oval volume become important elements in the perception of the cafe space. A small study of the spacing between elements have been carried out and based here on it is decided to implement fewer, larger elements (fig. 129).
Using these considerations as a point of departure, the finite element program Autodesk Robot has been used in order to qualitatively determine the dimensions of respectively the beams and columns (appendix 3). The finite element program has been introduced due to the relatively complex nature of the cantilevered structure. The study has been based on initial sketches of a system of interconnected wooden frames anchored in the stone volume.

Different wooden cross sections have been investigated and based on the calculations the following guid dimensions have been put forward:

Beam: 300x800mm
Column: 200x450 mm (rectangular)

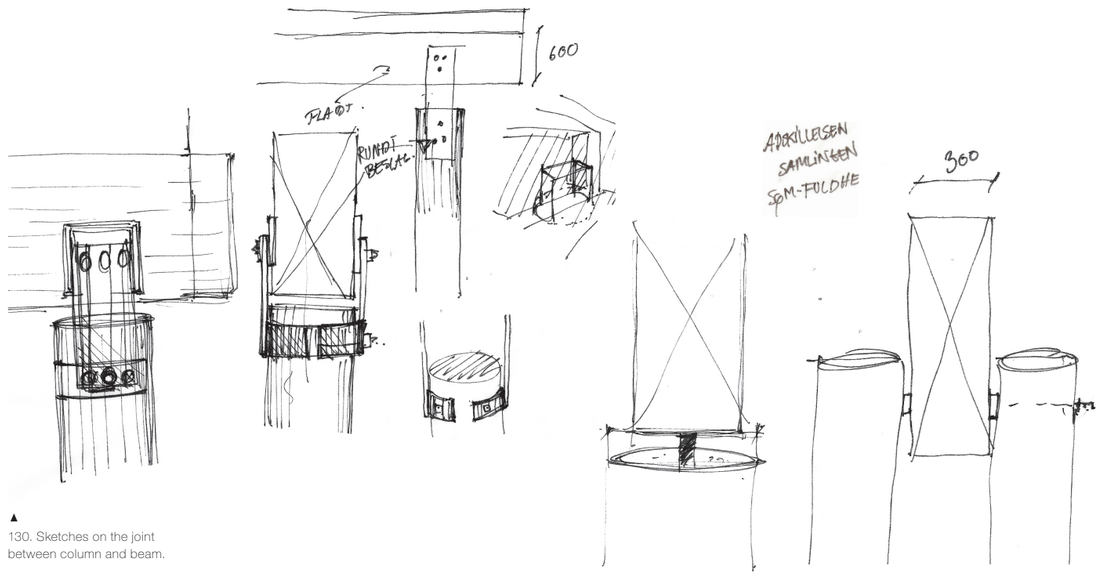
It shows that the construction is vulnerable at the supports. This calls for further initiatives which can serve to strengthen the construction. Consequently the elements in the inner periphery of the oval volume are changed to steel profiles forming a vierendeel system, incorporated in the wall. Cross-going shear plates are incoorporated in the permanent cross-going walls, such as and the floor is strengthened with additional elements.

In the following is shown a selection of sketches treating the joint between beam and columns in the frame system and, as a natural continuation, the more precise execution of the beam and column.

A crucial parameter in this regard has been to secure a fixed joining of the elements, in order to enable stability of the frames. Further the joint should express a visible, unsentimental coupling of elements - focusing on the properties of each element rather than the continuity which is evident in the use of stone in the other volume. The motive of fixings it continued from other places of the building as a general interpretation of the pragmatism evident in the local building tradition.

The meeting between the beam and the periphery of the oval has initiated thoughts on introducing a circular cross section. Subsequently the cross section found from the studies in Autodesk Robot have been used to find the needed corresponding circular cross section.

Column: 200x450 mm (rectangular) ≈ ø400 (circular)



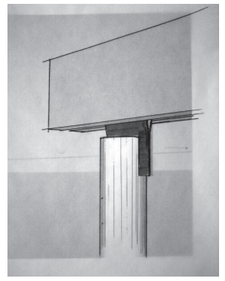
▲
130. Sketches on the joint between column and beam.

Relatively 'light' expression. However, the view of the horizon is interrupted. Columns with c/c 1m.

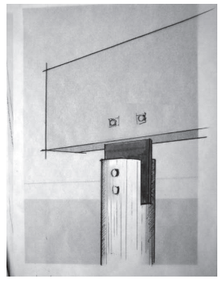
Heavier expression. However, the larger spacing allows for larger "openings" from where to get a "cantilevered experience" on the edge. Columns with spacing c/c 2,5m.

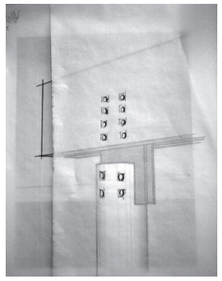
≫

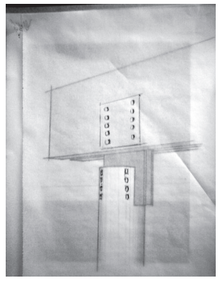
▲
129. Studies of the spatial experience of respectively a large number of smaller volumes or a smaller amount of relatively large columns. Please not that the beams are not taken into consideration in this study.

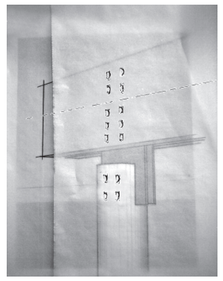


Initial proposals functions as a chanier joint - not stiff enough. The bolts should be located in the centre of mass in the beam.









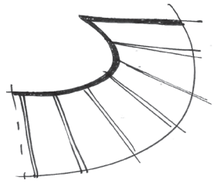
Chosen solution for the joint. The dashed line indicates from where the beam is "hidden" in the roof construction.

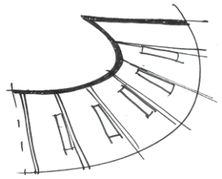
≫

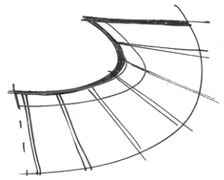
▲
131. Chosen selection of iterations leading to the final design of the joint. From here the main issues have been to centre bolts in the centre of mass and not to close to the edge (column).

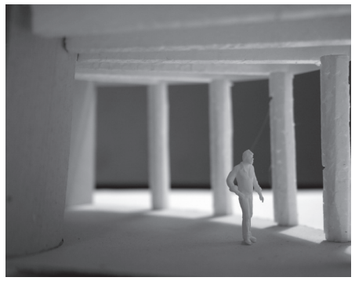
Skylights
Only few openings penetrate the inner periphery walls of the oval. This is the result of a deliberate aim to preserve the perception of a “backdrop” for panoramic views of the sea.

Skylights are introduced in order to bring daylight deep into the first-floor spaces and as means in setting the atmosphere of the spaces through the course of the day.
Figure 132 display two different scenarios for implementing skylights. In order to underline the geometry of the volume and create light effects on the cladded surface, a strip of window is introduced parallel to the inner periphery. Please note that the lux-level has not been verified and that the study has focused on qualitative aspects of the light.



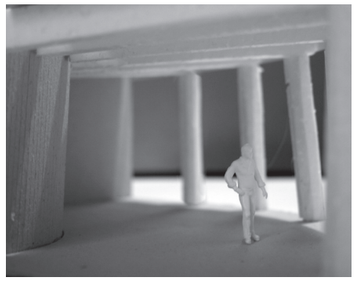






Reference image, no skylights.

A “strip” of skylight parallel to the inner periphery of the oval. Provides light deep in the building and highlights the texture of the wall cladding.



A “strip” of skylight parallel to the inner periphery of the oval. Provides light deep in the building and highlights the texture of the wall cladding.

▲
132. Three scenarios showing resepctively no skylight, strips of skylights perpendicular på the oval periphery and one strip of skylight folloring the curve of the inner periphery of the oval. The latter is the chosen scenario.

Choice of exterior material for oval
Considerations in relation to wood species and surface treatment in the oval volume are briefly described in the following.

Pine wood is the most commonly used wood species for constructions and exterior claddings in Lofoten [Fauske, 2011]. With this in mind, we have chosen pine wood as a point of departure for our material considerations in relation to the oval volume.
Untreated pine is considered not to patinate in a desirable even manner as we wish to maintain a warm, glowing expression of the facade. Figures 134-135 shows a comparison of a thermo treated pine wood facade and another considered alternative - a facade of untreated larch or thuja wood. Both options patinates more evenly. The thermo treated option is chosen due to its brown/red appearance, which does not ‘blend’ in with the gray of the stone volume. However, the staves of wood must be treated regularly to maintain a light brown glow - regularly meaning approximately every 3 year.

As a continuation of this small study interest have been given to the surface properties. Figure 136 shows two variations of processing - sawed and planed. The planed surface is chosen as it enhances the perception of a smoother finish in contrast to the rough processing of the stone facade.

Thermo-treated pine	Untreated larch or thuja
- Darker brown/red apperance. - A light brown glow is maintained over the years by applying natural oil every 3 year [web 4]. - The treatment is environmentally friendly (no chemicals are added during the process)	- Obtains a silver-gray patina if untreated (depended on origin) - The silver gray appearance is considered to blend too much in with the gray of the stone volume and as such, the dual expression is not substanciated.

▲
133. Considerations on exterior facade cladding in the oval volume.

▲
134. References for exterior material - Thermowood.

▲
135. Reference for exterior materials - untreated larch patinated to silvergray.

▲
136. Two examples of surface processing of thermo wood. Sawed [fintsavet] (left) and planed surface (right).

Process :
The Black Tower in Hirtshals

- creating architectural scenography for promotion

In Hirtshals we have been kindly invited by our external partners in VisitNordjylland to partake in a lcoal network, with the perspective to generate a concrete design proposal in relation to concepts developed in the forum.

In the following we shall present a brief overview of the process in the local network. Subsequently, a selection of sketces explaining crucial steps in the development of the design proposal is introdcued, focusing on phase 1; the temporary construction for Hirtshals Fish Festival.

PARTICIPATING IN A LOCAL NETWORK

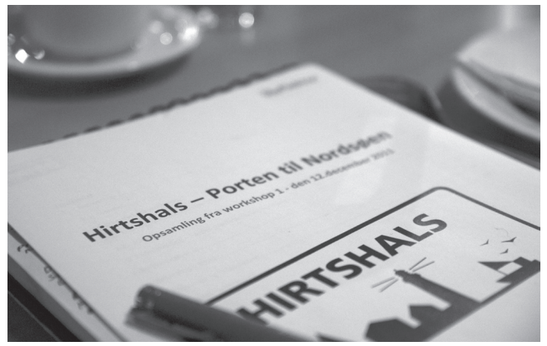
As written in the site analysis chapter, the network "Porten til Nordsøen" was initiated by VisitNordjylland and VisitHirtshals, with the aim to collectively strengthen Hirtshals' position as a tourist destination through a joint effort among players in related industries. The concrete objective has been to generate new holistic tourism concepts.

The endorsement for the initiative was extensive, with representatives from i.a. the harbour administration, tourism sector, as well as representatives from a municipal level.
The process was facilitated by the the consultancy company 'Reflektor'. We entered the network as observers, with the aim to gain knowledge about local processes in the development of tourism strategies in outskirt areas. Further our objective was to complement our initial observations with a local perspective, which could form the basis for defining a concrete design task with anchoring in the community.

Based on our initial studies of the place, we presented a concept for a view platform and seafood stall, from where to stage a new perspective on the harbour. This resonated with the idea, stemming form a place analysis of Hirtshals, to stage the harbour as an attraction. Further this resonated with historical references to a black-painted view-tower erected by the Germans during WW2. As a continuation of the discussion there was a mutual interest in pursuing the concept of a contemporary "Black Tower", as one of the new tourism concepts for Hirtshals.

Please note that during the period of the network meetings, the focus in regards to the "Black Tower" was on what we now refer to as 'phase 2' onwards (permanent construction). The possibility for erecting a temporary construction has emerged in the wake of this work, and the focus of the present thesis project has subsequently shifted in order to meet the time frame of the Hirtshals Fish Festival.

Figure 139 displays a diagrammatic visualization of the process, involving three meetings in the period December 2011 to February 2012. The immediate outcome of the network process has been the development of concrete 'plans of action' for a small number of concepts.



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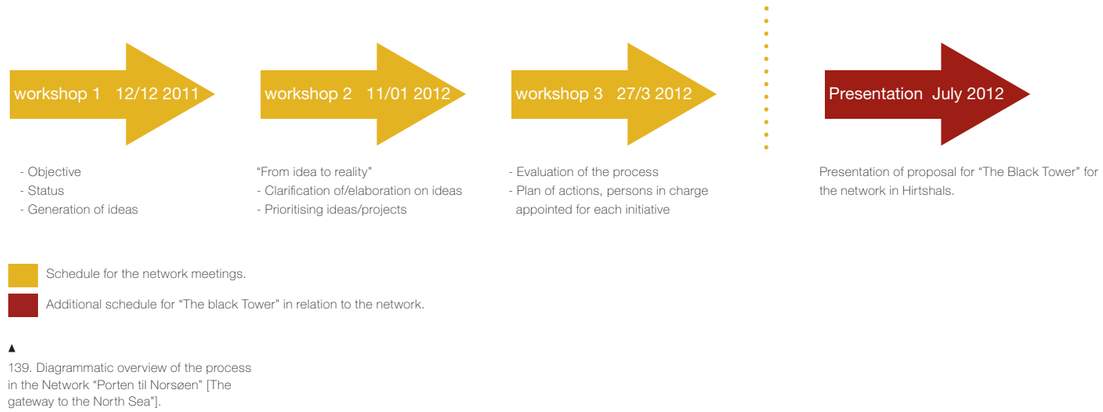
137. Image from network meeting in Hirtshals concerning the development of the local tourism sector, January 11th 2012.

▲
138. Network meeting.



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139. Diagrammatic overview of the process in the Network "Porten til Norsøen" [The gateway to the North Sea"].

DESIGNING THE “BLACK TOWER IN HIRTSHALS” - PHASE 1

In the following a selection of sketches is presented. Please note that we limit the description of the process in this report to encompass sketching related to phase 1; the temporary tower erected as part of the Hirsthals Fish Festival.
As the possibility for erecting a temporary construction developed, the process was targeted the differing program and a more limited financial framework.

The recapitulate the program of the tower (phase 1):

“Scale model”/mock up
- exposing the lack lobster and the potential to breed lobsters in Hirtshals.
- exposing the concept of a future view- and infotower on the harbour.

The tower is to be located “beneath the stairs” in the transition from town to harbour, in close proximity to the Fish Festival centre point.

The framework for the temporary construction demands focussed attention to minimising material- and construction costs and subsequently a relatively fixed scale has formed the basis for the sketching.

In our perception, the programme of the temporary construction further suggests more scenographical means in order to attract the attention of the participants in the festival.

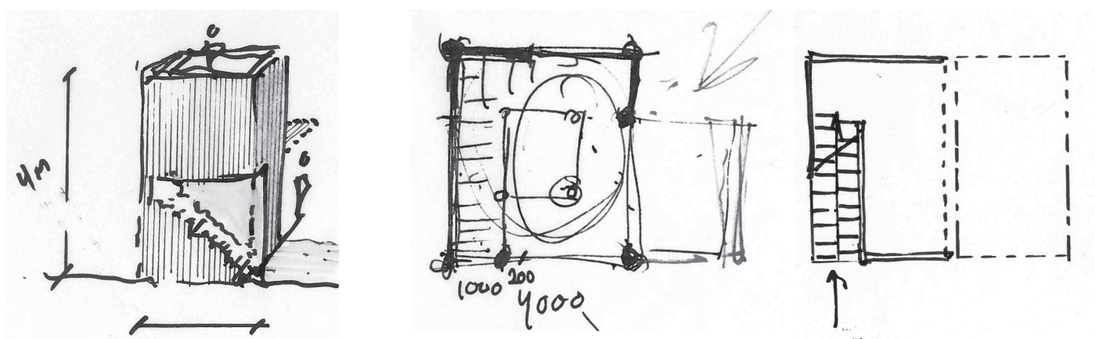
Figures 141-143 display chosen sketches from the concept development.

Main discussions

- Eye catcher
  A crucial parameter has been to establish an immediate “eye catcher”-effect in order to expose the Black Lobster in the varicoloured festival setting. This naturally links to the considerations on how to determine the tower in the height. Further a powerful colour scheme has been introduced with reference to the black lobster and the original black tower. The orange colour complements the blue of the sea and the fishing boats and is found in a number of fishing equipment in the harbour area.

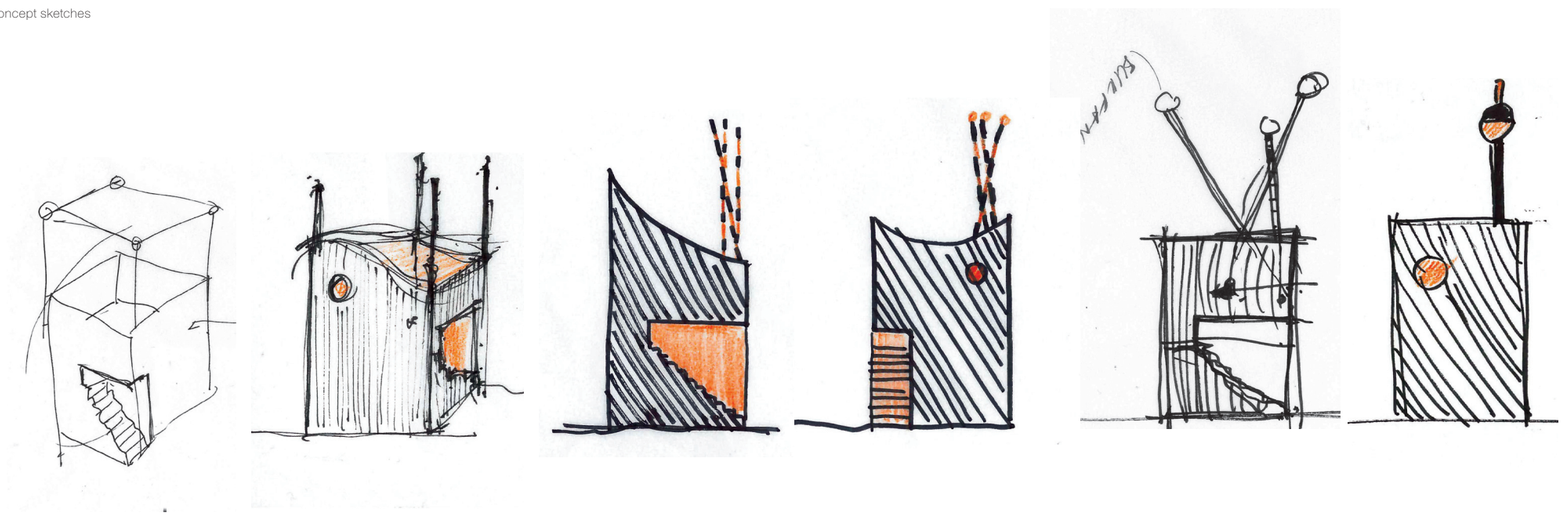
- Tower-effect
  In order to convey the concept of a future tower, we have worked with how to create a distinct vertical orientation with limited means, since the financial framework for the temporary pavilion does not allow for the construction to exceed app. 4 meters.
  Various terminations of the tower in the height has been examined in order to visually ‘extent’ the tower.
  Further the layout of the stair has been changed in order to allow for an increased rise and thus, less needed area. This with the aim to slim down the tower and emphasise a vertical direction.

▲
140. Inspirations - ‘Kolonihaven’ by Mario Botta (left), alternating stairs in projects by Carlo Scarpa, Verona (middle) and 70° Nord architects in Grunnfør, Lofoten.



Sketches showing concepts for a temporary tower; a lobster stall is established by opening a hinged panel in the monolithic volume. Above a viewing platform is estabilised. Alternative types of stairs have been investigated.

▲
141. Initial concept sketches

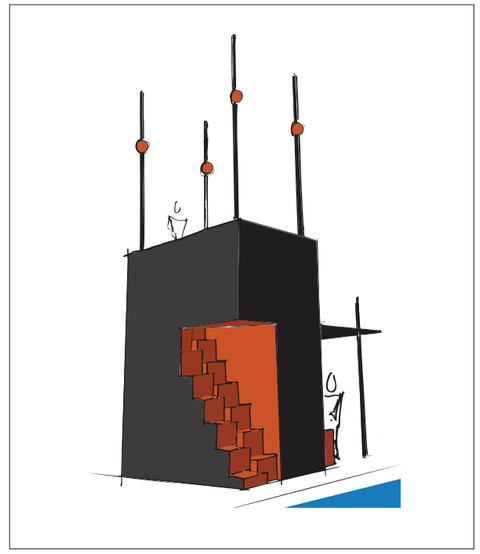


▲
142. How to terminate the construction in the height - increasing the perception of a tower and working with 'eye catcher'-effect.

NEXT STEP OF THE PROCESS

Next step in the process of planning the "Black Tower" in Hirtshals is to present the proposal for the harbour administration and local network group in preparation for applying for a planning permission.

In relation to the detailed design on the tower, next step is to dimension structural elements and ensure stability in the construction and to ask quotations in order to revise the initial budget for the tower.



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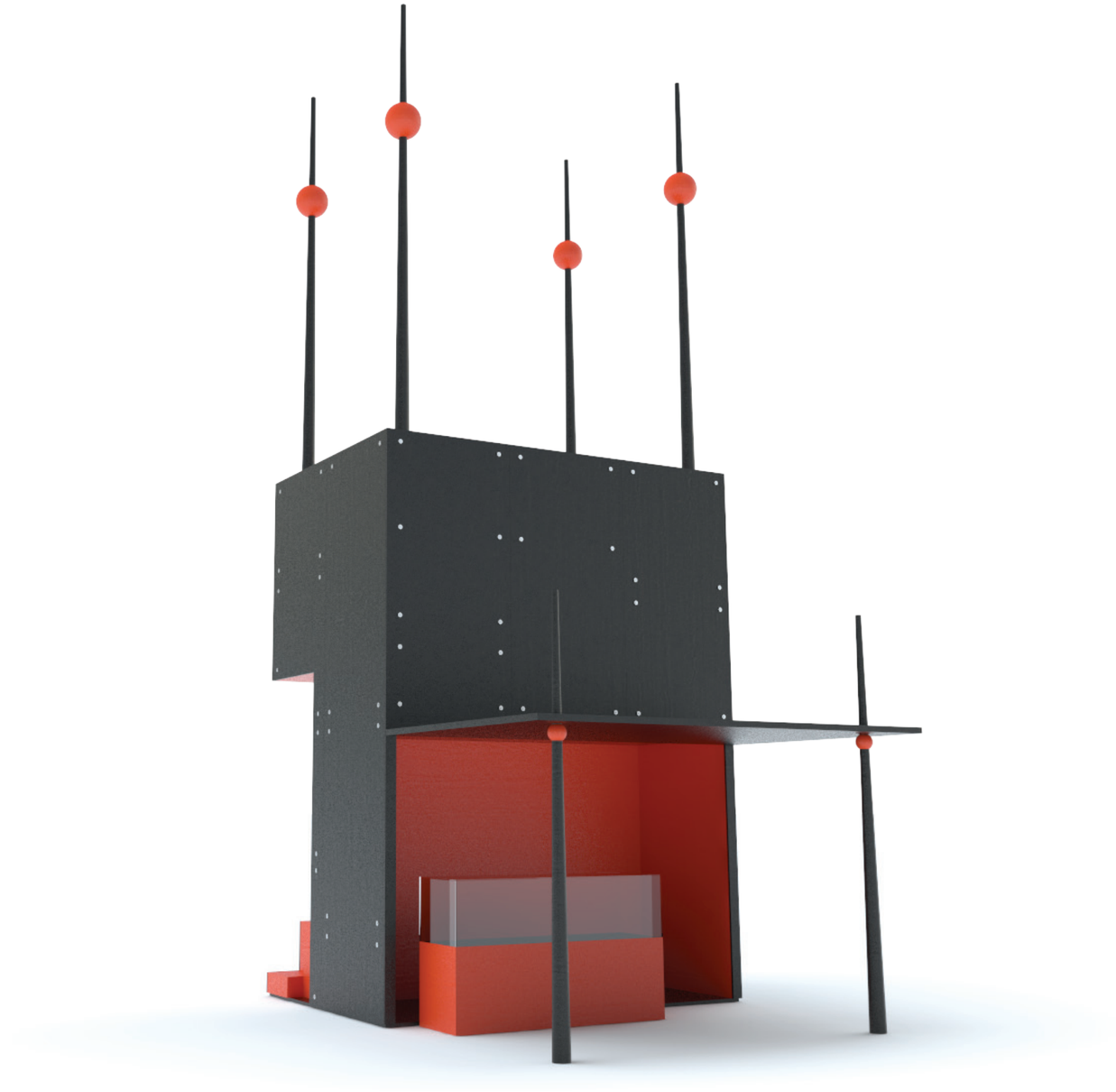
143. Architectural concept sketch for The Black Tower in Hirtshals



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144. Final rendering of proposal for the temporary Black Tower in Hirtshals.

Reflections

- CONCLUDING PERSPECTIVES ON THE PROJECT

CONCLUSIONS ON DESIGN PART

We both grew up in outskirt areas and this background has formed a personal desire to engage in “the outskirt issue” from an architectural point of view. The chosen entry point has been to investigate how we can affect tourism as a parameter of growth through architectural interventions.

The juxtaposition of architecture and tourism in relation to outskirt areas represents a relatively new agenda in a Nordic context. Subsequently we have reached outside the realm of architecture and architectural theory in order to gain an understanding of the mechanisms influencing the development of such areas and the driving forces within the tourism and experience industries.
From an architectural theoretical point of view we have examined the role of architecture in the process of staging authentic, sensuous touristic experiences in outskirt areas. We have established that the architectural profession holds a narrative potential, which is valuable when aiming to generate holistic tourist solutions.

This has formed an interdisciplinary backdrop for practically engaging in the issue in two chosen destinations; Å in Lofoten, Northern Norway and Hirtshals, Northern Jutland, Denmark. As a crucial first finding in the theoretical part, we have established that tourism (and the tourism related architecture) must originate from qualities found within the place if it is to positively affect the given outskirt area, and maintain its sense of authenticity. To use the slogan of the newest initiative from Realdania: “Place matters!”
In terms of process, this demands a high degree of anchoring in the local communities. In this connection we have profited greatly from the corporation with our two external partners, VisitNordjylland and NSW Sivilarkitekter respectively.
The result of the design part of the project is a 2500m2 information centre; “Lofoten Sea Culture Centre”, in Å in Lofoten, forming the main part of the project, and a 11m2 combined look out-post and food stall; “The Black Tower”, in Hirtshals.

The project in Hirtshals comprises the proposal for a temporary small scale tower to be placed on the harbor front during the Hirtshals Fiskefestival [Fish festival] in August 2012. The project forms phase one in a process of potentially erecting a more permanent construction on the outermost pier. The temporary construction is to stage the experience of the harbor environment and the fish, specifically the ‘black lobster’, as an attraction for inhabitants and tourists.
In Hirtshals we find a contradiction to the sensitive environment in Å – here the harbor environment is characterized by a profound roughness and large scale, and the signaling effect in architectural interventions becomes correspondingly valuable. The program of the small scale building prescribes a conspicuous stage for exposing the ‘black lobster’ and the concept of a permanent tower in the centre of the festivity and the project, thus, makes deliberate use of scenographic means to attract attention; it holds clear references to the archetypal tower motive and introduces bright orange coloring which complements the blue nuances of the sea. The ‘mock-up’-character of the temporary construction naturally limits the level of detailing, and we are aware of this fact relative to the theoretical investigations of tectonic detailing. This project is rather about communicating the concept of a tower and implying the kinetic qualities inherent in the typology in relation to staging the industrial harbor setting and local food and increasing the accessibility of both for the public.

The design proposal for Å comprises an information centre with combined mediation, research and assembly facilities. The centre forms part of a development strategy in which the traditional, phased-out, livelihood - fishing - is “substituted” with new commercial activities, based on the exploitation of the resources of the sea. The conditions for which are particularly favorable in the sea outside of Å. The project suggests a tourism based on mediation of exploitation of natural phenomena closely connected to the research topics within the centre and thereby forms a forward-looking alternative to the more culture-historical tourism in Å. The centre further facilitates ‘professional’ mediation, e.g. visiting researchers and conferences, based on a belief that growing digitalisation will enable an increased mobility and make it attractive to perform research in close proximity to state of the art research ‘infrastructure’ on-site. This hybrid solution can potentially serve to improve the seasonal fluctuation in Å.

The “Lofoten Sea Culture Centre” is located in the transition from lake to sea and thereby positions itself naturally where it is possible to demonstrate the exploitation of low and high tide, whilst forming a connection from the “village centre” to the museum on the opposite shore. Water becomes an omnipresent element. From the moment one approaches the building and is met by the visual and audio impact of the water as part of the kinetic experience of walking the bridge. Or as the framed motive for quiet observation in the stone volume, dramatic exposure on the edge of the cantilevered oval volume, or as an integral part when descending down into the mediation space and test tank in the ‘deep’ of the sea.

The building positions itself in the sensitive setting as a modest landmark; defined in its own right due to the clearly defined geometries, but anchored to its context in vertical extension and materiality. It communicates a narrative of existential tension in regards to the life giving and –taking sea; interpreted as dual expressions and spatial configurations in the stone and oval volumes. The narrative of the place is emphasized through attention to tectonic detailing. In the stone volume a sense of continuity is stressed, as the smaller slate staves are “woven” to form a homogenous whole, with reference to Gottfried Semper and the Thermal Baths in Vals. This is contrasted by a more pragmatic juxtaposition of separately defined elements in the visible construction in the oval volume, and in mounting throughout the building with reference to joints found on the site and in the coarse detailing of the Hedmark Museum. The details, thus, become minimal units of signification in the production of a coherent architectural narrative of the place, which address the visitor in a scale close to the body to form a deeper appreciation of the identity of the place.

the building positions itself in the sensitive setting as a modest landmark

DISCUSSION

In the following we shall initiate a discussion on key elements in the project.

Strategic set-up

Reflecting on the project in its entirety, it appears inevitable to critically consider the chosen strategic set-up in relation to the proposed projects in Å and Hirtshals; is it indeed plausible that the proposed architectural interventions can help stimulate tourism as a parameter of growth in these particular areas?

is it indeed plausible that the proposed architectural interventions can help stimulate tourism as parameter of growth in these particular areas ?

Hirtshals

The proposed design for the "Black Tower" in Hirtshals represents phase one in a process of potentially erecting a larger permanent construction. When we discuss the potential effect of this intervention, it should, thus, be considered in this strategic context, which is to brand 'the concept of' a view tower together with the black lobster. If we look at the perspective of a more permanent construction, the effect is dependent on it forming part of a collective effort in Hirtshals. Through our participation in the networking group in Hirtshals, we have seen that there exists a willingness to establish such a wider initiative in collaboration between the local tourist office, the harbor administration and other relevant partners, which could increase the accessibility to harbor activities. This could be in the shape of "hot spots", understood as defined areas bordering or within the industrialized area, in which the public can gain access to activities or information without compromising the place as an active work space.
As mentioned in the place analysis we have identified two superior focus areas in Hirtshals in regards to tourism. One is to further target the 'transit'-issue, referring to an unexploited potential represented by the large number of people driving through and out of Hirtshals to and from the ferries. From an architectural point of view this could involve revised planning of the road system, to not necessarily lead all passengers directly out of the town, but suggest alternative routes. As a second focus are we find a need to address the level of attraction in Hirtshals as a tourist destination; to make existing qualities related to the unsentimental, industrial harbor environment and fishing visible and accessible to visitors (and locals). The tower initiative forms part of the latter focus area.
If viewed independently the impact of a single tower-initiative can seem dubious on the stagnant situation in an outskirt location. But if viewed as part of this larger set-up we believe that even a small scale intervention has the potential to help generate a positive narrative about Hirtshals for visitors (and settlers).

Å

Å is a place in which tourism is already an important business during summertime. However, due to the short season, the issue is how to translate this short tourism season into permanent jobs and general growth [Fauske, 2011]. In order for tourism to affect a positive development in this area, it is crucial to target the seasonal fluctuation. In the design proposal we treat the issue by thinking 'mediation' in a wider sense rather than 'tourism'; targeting both professionals and laypeople. We implement facilities for temporary research stays, conferences etc. with the aim to attract a wider group of visitors than 'mere' holiday tourists, which could potentially require a place to stay, a place to shop etc. Å for us clearly shows that tourism does not necessarily represent the singlehanded "solution" to the issues at hand. And that the related architecture should be able to facilitate hybrid constellations between commercial interest, tourism and settlement as advocated by Tom Nielsen [Nielsen et al. (2006):50]. In the design proposal this is evident in that the building holds active functions independent of tourism; a research milieu and assembly facilities for the inhabitants in Å and adjoining villages.

In continuation of these reflections an obvious question comes to mind: Would anyone see a profitable potential in making such a project in outskirt Å? A cornerstone in the concept is the establishment of a research environment and as such, it is natural to reflect on whether it is plausible to attract institutions and/or companies engaged in the exploitation of the resources of the sea. In correspondence with vegar Johansen, head of research at Sintef, Trondheim, we have learned that in order to make it attractive for this organisation to establish de-centralised units in outskirt areas, the places must provide "technical infrastructure" (e.g. sea current generators) which could not be placed anywhere else, in order to the counterweight the potential disadvantages arising from a decentralized organisational structure. This is the case in e.g. Sintef's division in Hirtshals [Johansen, 2012]. As architects we shall not try to judge whether Å holds adequately good conditions for e.g. energy harvesting to be able to "compete" with more central regions in Norway. However, it does indicate a willingness in the industrial oriented institution to develop decentralized units in Å if profitable. Looking at e.g. Runde Miljøsenter [Runde Environmental Centre], Norway, shows an example of an existing research centre in an outskirt setting. Compared to Sintef, the research at Runde Miljøsenter is less demanding in terms of technical infrastructure. Here the place specific potential consists in rich biological conditions [Runde Miljøsenter, web 1], and by offering excellent research facilities for related areas of research, the group behind the center has managed to utilize an existing potential within the place. Å holds identified potentials both within energy harvesting from tidal currents [Sandgren, 2007], as part of the proposed Lofotodden Nasjonalpark [Lofotodden national park] [web 7] and as a centre for culture historical studies about the coastal culture. It is thus considered plausible that the establishment of a functioning research platform is not a far-sighted vision.

The design proposal presented in this report should not be considered a throughout layout. Rather it is meant to illustrate the flexibility within the building scheme to adapt to different needs and should necessarily be targeted the relevant type of research in order to offer more than a mere office community.
Another issue mentioned by Vegar Johansen, Sintef, is that it can be difficult to motivate employees to move to outlying areas [Johansen, 2012]. He here touches upon the subject of yet another of our main reflections. Should focus be shifted to settlement conditions? We have

approached the project in Å with an aim to address tourism, commercial interests and settlement collectively. However, even if housing and services for inhabitants form part of the development plan and building design, the main emphasis has been placed on establishing permanent businesses which can generate jobs and general growth to the area, and here through improve the conditions for settling.

Cathrine Lerche, owner at Lerche Architects, has concerned herself with what makes us want to stay, or move to, outlying areas in the project “blilyst” [“stay-wish”]. She claims that a crucial factor in securing a positive development in outskirt areas is the development of better dwellings in attractive settings. The increased digitalization and subsequent greater mobility, allow us to bring our work. From her perspective this means that if we really wish to live in a specific outskirt place, we today often have the possibility to do so, not least as a part time residence [Lerche, 2011].This naturally presupposes optimal infrastructure, both digitally and psysically. It is most definitely an interesting discussion, which clearly shows the importance of thinking holistically when developing strategies for the outskirt areas. Both the attractiveness of the place in terms of settlement and the commercial perspectives must be considered.

Landmark-effect

What level of expressivity should the building possess? Such considerations have been the subject of much consideration during the process. Compared to e.g. the National Tourist Routes project this project has treated how to implement a rather comprehensive program in a sensitive culture-historical setting. We have worked on a scale spanning from fragmented volumes, “clinging” to the topography, to more autonomous proposals. The issue has been how to find the balance between establishing a ‘symbol’ of a new identity for Å, based on exploitation of the sea, without compromising the existing qualities.
The resulting building can be said to place itself in the more ‘autonomous’ end of the scale due to its clear cut geometries, the cantilevered volume and the separate location in the water – and the legitimacy of such an approach can naturally be discussed. It is, however, our hope that the building can be viewed as a “modest landmark”, which communicates and abstract narrative of the relation between man and sea on a number of levels without ‘competing’ with the context. We fully acknowledge the value of recognizable architecture in relation to cementing a place in the consciousness of people, not least tourists. But rather than suggesting a spectacular construction, we wish to suggest a design which stages spectacular experiences (of the sea). A design which points out, or gives access to, experiences otherwise anonymous or inaccessible.
The building design proposes a distinctly different architectural language than the traditional typology of the area. The chosen approach has been to communicate an abstract narrative of the place, which is anchored through materiality and the approach to detailing rather than a continuation of the traditional formal grammar.
The level of expressivity appears to be a core issue in regards to tourism related architecture. Not least when introduced in an often sensitive outskirt setting. It is not possible to outline an unambiguous formal approach. The approach is exactly depended on the reading of the place and of the program. This is e.g. evident from the small scale initiative in Hirtshals, which due to its industrial setting and function as sort of temporary scenographical installation, demands a different formal approach.

Program

The mediation aspect of the Lofoten Sea Culture Centre has been the key element informing the layout of the plan. However, the centre makes up a relatively complex program in that it combines facilities for mediation, research, assembly and sale of local products. We shall here briefly reflect upon the juxtaposition of research and mediation to the public presented in the project. With the design proposal we have suggested that it can add quality to mediation-facilities to have a certain proximity to research facilities. However, one might ask how this affects the research environments. We shall here not try to answer thoroughly, but rather suggest potential issues which can arise in the intersection between the fields of interest. Most importantly we find it crucial that researchers are not ‘exhibited’ as an attraction in its own right. And from a more pragmatic perspective it is important to ensure confidentiality in relation to experiments, by e.g. being able to blind glass partitions. Further one cannot expect the researchers to produce the content for the mediation part. This necessarily involves staff committed to public mediation.
In the project it is suggested that ‘research topics’ are made comprehensible to the public through exemplification. That is, rather than making the researcher in the research lab the attraction, we suggest that elements are deduced for public mediation, and communicated through full scale models etc. However, in our perception it can add a sense of authenticity to the experience to get a glimpse of the research facilities, and to gain an understanding of the fact that this is where the newest knowledge on the subject is produced. If not through ‘live’ exemplification, then perhaps through videos exemplifying how the laboratories are used during experiments. This, in order to create a narrative linkage between the research facilities and the knowledge which is conveyed.

Approach

Our choice to work both theoretically and in practice in this thesis project has been based on a wish to engage critically in the societal issue of ‘the outskirt’. The theoretical absorption, case studies and not least communication with locals in the chosen locations have allowed us a backdrop for positioning ourselves in the debate; to form a foundation from where to approach the design part of the project with a stance.
This is not to claim that tourism, or architecture related to tourism, represents the solution to the issues faced by outskirt areas. Or that the proposed interventions alone can “turn the tide” in the given places. Rather, tourism based on qualities found within the place can form one plausible entry point, a part of the solution if introduced with caution.

Concluding our first years of engagement to architecture, we have renewed belief that architecture is more than a mere facilitating matter. That the architectural profession can help develop site specific potentials into authentic, sensuous tourist experiences anchored in the local community, by establishing coherent narratives of the given place. E.g. by framing specific views (or sound etc.) or through references to the tradition of the place in the actual built form, with careful attention to tectonic detailing. We humbly wish to implement this realisation in our future activities as architects.

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FIGURE CREDITS

All figures not listed are produced by the authors.

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Fig. 24 http://lofotfotografen.no/images/20110113152110__mg_1492.jpg (Northern lights)
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Fig. 34 http://highaltitudes.deviantart.com/art/Blue-Slate-Wall-181882366 (Slate wall)
Fig. 35 http://norskskifer.no/skifertype/alta/natur-156/ (Alta skifer dark)
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APPENDIX [PART 2]

APPENDIX 1 - ROOM PROGRAMME

	FUNCTION	m2	CAPACITY	ACCESS	LIGHT CONDITIONS	ATMOSPHERE
MEDIATION	**Foyer**	**50 m2**	**Info-point, distribution**	**Public**	**Natural/artificial**	**Welcoming, informal, casual**
	Exhibition space	**300 m2**	**50 people at one time, exhibitions of current research in Å**	**Public**	**Natural/artificial**	**Spectacular, a feeling of contact with the raging elements**
	'Back-stage' dissemination	**-**	**Spaces in connection with research facilities for public interest**	**Public**	**Natural/artificial**	**-**
	Archive	**50 m2**	**Library of records**	**Staff/ Public**	**Natural/artificial**	**-**
RESEARCH	**Educational spaces**	**60 m2**	**Flexible space for lecturing or groupwork, school classes**	**Public**	**Natural/artificial + blackout**	**-**
	Offices	**270 m2**	**15 researchers**	**Staff**	**Natural/artificial, visual connection to the outdoor, daylight factor min. 2% at work stations**	**Professional, 'being in' the field of research**
	Laboratories	**900 m2**	**Lab-spaces, allow min. 150 m2 for water test facilities, part open to public interests**	**Staff (public)**	**Natural/artificial**	**Active, outgoing, informative**
	Reception	**10 m2**	**Function: centre administration, orientation point**	**Staff/ Public**	**Natural/artificial**	**-**
	Meeting rooms	**60 m2**	**2-3 rooms**	**Staff**	**Natural/artificial**	**-**
	Copy room	**15 m2**	**-**	**Staff**	**Artificial**	**-**
	Eating lounge	**30 m2**	**15 people seated**	**Staff (public ok)**	**Natural/artificial**	**-**
	Staff changing	**20 m2**	**2 unisex toilets w/shower, personal storage**	**Staff**	**Artificial**	**-**
	Wardrobe	**10 m2**	**-**	**Staff**	**Artificial**	**-**
	Outdoor terrace	**20 m2**	**Views to the sea**	**Public**	**-**	**-**
SOCIAL PLATFORM	**Administation**	**40 m2**	**2 people. Functions: tourist information, sales.**	**Staff**	**Natural/artificial visual connection to the outdoor, daylight factor min. 2% at work stations**	**-**
	Cafe	**70 m2**	**30 people seated**	**Public**	**Natural/artificial**	**Intimate, relaxed, social**
	Sale of products	**70 m2**	**Display of local products**	**Public**	**Natural/artificial**	**-**
	Kitchen	**20 m2**	**2 staff**	**Staff**	**Natural/artificial, daylight factor min. 2% at work stations**	**-**
	Auditorium	**100 m2**	**60 people seated, AV-equipment**	**Public**	**Natural/artificial + blackout**	**-**
	Toilets	**20 m2**	**2 unisex, 1 disabled**	**Public**	**Artificial**	**-**
	Wardrobe	**5 m2**	**-**	**Public**	**Artificial**	**-**
	Staff toilet	**5 m2**	**1 unisex**	**Staff**	**Artificial**	**-**
	Outdoor terrace	**40 m2**	**Views to the sea**	**Public**	**-**	**-**
	Storage	**100 m2**	**-**	**Staff**	**Artificial**	**Intimate, relaxed, social**
	Technical room	**50 m2**	**(Approx. 5% of total)**	**Staff**	**Artificial**	**-**
		2215 m2				

APPENDIX 2 - BE10

ENERGY EFFICIENCY - BE10 CALCULATIONS

National energy efficiency regulations and calculation methods vary from country to country – thus so from Denmark, where we reside, to neighbouring Norway. Common to both regulations, Norwegian TEK10 and Danish BR10 respectively [TEK10 and BR10], is that energy efficiency demands are made to total energy consumption combined with a range of minimum requirements to building components. The energy frames can however not be compared directly due to different calculation methods. In this project BE10 calculations are made to verify that the building meets the requirements listed in the current Danish Building Regulations, BR10. As the program is normally used on buildings in a Danish context, we shall here share some reflections on the actual location's impact on the results in BE10. The BR 2010 requirement is (71,3 + 1650/A) kWh/m² pr. year, where A is the heated floor area (gross). Further comments on inputs to the program and the calculation file can be found on the enclosed CD.

Input: Building envelope and systems

The building is calculated under the consumption that all parts of the envelope face the outdoor air. The heat capacity of the water is considered to affect the result positively, as it in winter will have a higher temperature than the air and vice versa in summer where the water will contribute with a cooling effect.

The u-values of the construction reaches well below requirement set out in both BR10 and TEK10, to a high degree looking at constructions in low energy projects for references.

The general outset for choosing installation system has been to create a somewhat 'low-tech' building. It is observed that the pace and way of living in this place is rather simple. We are aware that todays energy efficient buildings often have a complete automatic regulation systems for controlling the indoor climate, however the 'manual feel' of place in our opinion calling for solutions with a high degree of 'non-automation', hence type and effects of systems have been balanced.
The ventilation strategy is to use natural ventilation in summer months (incl. night cooling) and mechanical ventilation in winter months.
Regarding lighting system a continuous regulation of artificial lighting relative to the daylight level has been chosen due to the varied activities in the house. In general manual shading solutions are suggested. In the oval volume external sliding shading panels with horizontal louvers can be operated from the interior by use of a simple manual device. In the stone volume internal roller blinds can be operated manually.

Results and reflections

From this guiding calculation it is reasonable to say that the building (under Danish conditions) reaches energy consumption well below the BR10 requirement (fig. 145) - and not far from BR2015 requirements.
In this manner the result can by no means be compared to Norwegian energy standards as the program does not allow further specifications in climatic conditions.

When comparing the climatic conditions in Denmark and Lofoten som distinct differences appear. As the climate in Lofoten is relatively mild, due to the warm Gulf Stream, temperatures are comparable between the two locations. However, significant differences in sun paths make the result questionable in its actual context. In Lofoten the sun reaches a lower altitude and does not rise above the horizon in winter. This implies lower solar heat gains in winter and subsequently increased energy used for heating and lighting in this time of year.

In Norway we expect a supply of electric heating. In the calculation a heat supply system is however not set to electrical heating as the Danish regulations implies primary energy factors; factors outlined in the calculation method to proportionally evaluate the type of supply regarding 'environmental impacts', e.i. how 'bad' the externally supplied energy is in the overall calculation. Instead it is set to 'central heating' as this is the common supply in a Danish context. Whether the evaluation methods in Norway implies such distinction in type of energy supply is unknown, however it is assumed that the electrical supply in Lofoten Sea Culture Centre comes from energy harvested in nearby sea currents and a small part from the on-site barrage turbines, acting positively to the result.

Key numbers, kWh/m² year

Energy frame in BR 2010

Without supplement	Supplement for special conditions	Total energy frame
71,9	0,0	71,9
Total energy requirement		48,8

Energy frame low energy buildings 2015

Without supplement	Supplement for special conditions	Total energy frame
41,4	0,0	41,4
Total energy requirement		44,3

Contribution to energy requirement	
Heat	22,4
El. for operation of bulding	10,6 *2,5
Excessive in rooms	0,0

Net requirement	
Room heating	16,9
Domestic hot water	5,5
Cooling	0,0

Selected electricity requirements	
Lighting	9,7
Heating of rooms	0,0
Heating of DHW	0,0
Heat pump	0,0
Ventilators	0,8
Pumps	0,0
Cooling	0,0
Total el. consumption	25,7

Heat loss from installations	
Room heating	0,0
Domestic hot water	0,2

Output from special sources	
Solar heat	0,0
Heat pump	0,0
Solar cells	0,0
Wind mills	0,0

▲
145. Key numbers from BE10 calculations.

References:

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APPENDIX 3 - AUTODESK ROBOT

DIMENSIONING OF STRUCTURAL ELEMENTS IN THE OVAL VOLUME

In the following a brief overview of the dimensioning of structural elements in the oval volume is presented. Please refer to the CD for a more throughout description and for access to the Finite Element file.

Aim

The aim of this operation has been to determine the dimensions of the beams and columns of the oval. The Finitie Element Program Autodesk Robot has been introduced due to the relatively complex cantilevered structure.
Loads and load combinations have been listed and the values subsequently applied to a geometry in the program resembling one 'half' of the oval volume (fig. 146).

Preconditions

In the study we have assumed that all elements are wooden.

Loads

Self load: automatically generated by the programme. For simplification, no additional permanent loads have been added.

Snow load: 4kN/m2
Since we are building in a subarctic climate, snow load becomes a crucial parameter to take into consideration [web 1].

Live load:
Ground floor: 2,5kN/m2
Level plus 1: 2,5kN/m2
Roof level: 2,5kN/m2

(Use category B (office areas)/C1 (areas with tables, etc. cafe)) [Jensen et. al. (2009): p143].

Wind load: 1kN/m2
Estimated value based on a circular building shape [supervision meeting, 20/4 2012].

Dominating snow load is assumed to represent the worst case scenario due to the climate of the site. Hence, the following load combinations have served as a point of departure for the study in Robot:

ULS:

$$1*K_{fi}*G+1,5*\psi\,0,1*K_{fi}*Q+1,5*K_{fi}*S+0,45*K_{fi}*W$$

[(snow load dominating) [Jensen et. al. (2009): p141].

SLS:

$$G+\psi_{0,i}*Q+S+\psi_{0,i}*W$$

[(snow load dominating) Jensen et. al. (2009): p140].

Criterias for evaluation

When evaluating the results we have looked at respectively the worst case scenario in terms of tensionsand compression in SLS and ULS state.

ULS:
In regards to ultimate limit state we have made initial use of Robot's value for maximum stresses in order to narrow down the dimensions (fig. 147). However, since we are using timber, we need to take into consideration the differing strength of the material in different axes by adding the stress-values in different axes relative to the respective value of strength.

SLS:
In regards to serviceability limit state we have set a criteria for max. deformation to length/400 based on existing guidelines [Jensen et. al (2009): p298].

Max. deformation = 21,25mm

Evaluation of results

Figures 148-149 displays respectively the critical areas in terms of stresses (ULS) and displacement (SLS).

As is shows from fig. 150 the maximum deformations in the structure do not exceed the accepted value.

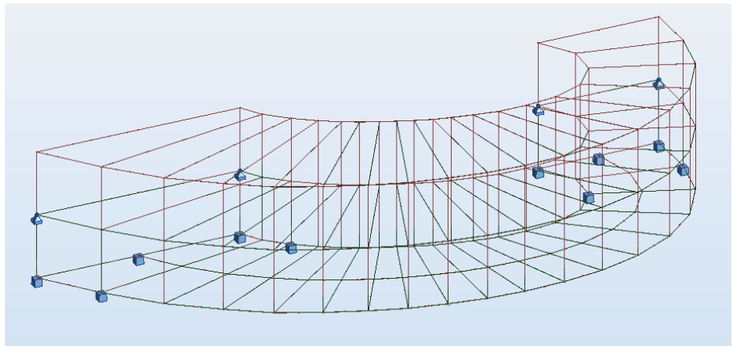
In terms of ULS it has shown that the construction does not meet the ULS criteria. However, it is evident that the critical values are limited to the areas in which supports are located (fig. 148). If built, the structure should be further strengthened in these areas in order to secure stiffness. Based on these considerations, we have accepted the current dimensions as guidelines in the further process.

Further adjustments

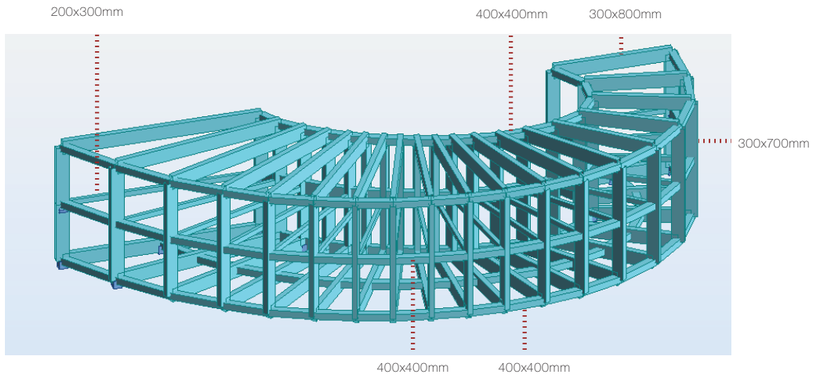
In order to strengthen the construction further, and thus reduce the tension in the critical areas, the following initiatives have been implemented in the structural system for the final design proposal:

- Changing the wooden columns of the inner peripheral wall to a steel vierendeel system, functioning as one strong beam. This wall forming a backdrop for the 'exposed' spatial experience of the water.
- Introducing shear plates in partition walls.

Other initiatives which could be taken in order to strengthen the construction:
- Making use of 'post-tightened' wood elements
- Considering the floor in the lowest level as a shear plate
- Revising the number and location of supports



▲
146. Overview of geometry in Autodesk Robot with supports.



▲
147. Overview of dimensions derived from the study in Autodesk Robot. please note that these dimensions have been subject to alterations in the continued process.

CHANGING OF COLUMN CROSS SECTIONS

During the process the spatial experience of the visual construction in the oval has been the subject of parallel aesthetical and technical considerations. As part of these considerations, the cross sections of the visual columns have been altered from rectangular to circular sections.

The dimensioning of the columns in the outer periphery of the oval is based mainly on considerations on the stiffness of the structure, in order to minimize displacement. However, when analysing the results from Robot we find that the maximum displacement in the overall structure is 5mm, where 25mm are accepted. If the structure is further stabilized as written above, we assume that smaller dimensions can be accepted. In this regard an estimation of 200X450mm is introduced.

In order to compare scenarios with different cross sections, we have calculated the moment of inertia in the relevant columns from Autodesk Robot and use this to determine a circular cross section with a similar moment of inertia:

Moment of inertia, rectangular cross section: $I = \frac{1}{12} * b * h^3$

Moment of inertia, circular cross section: $I = \frac{\pi}{64} * h^4$ => $d = \left(\frac{I}{\pi * 64}\right)^{1/4}$

Nessecary diameter, d: 419mm

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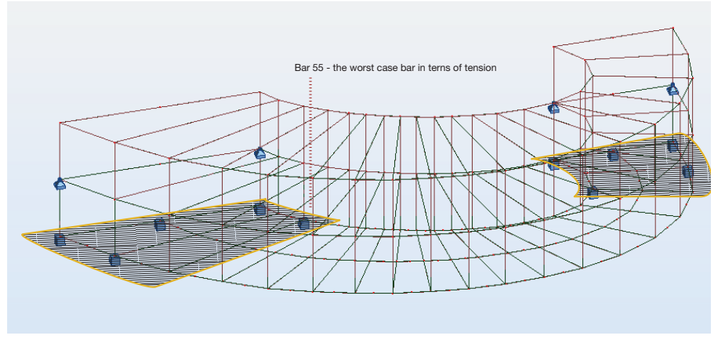
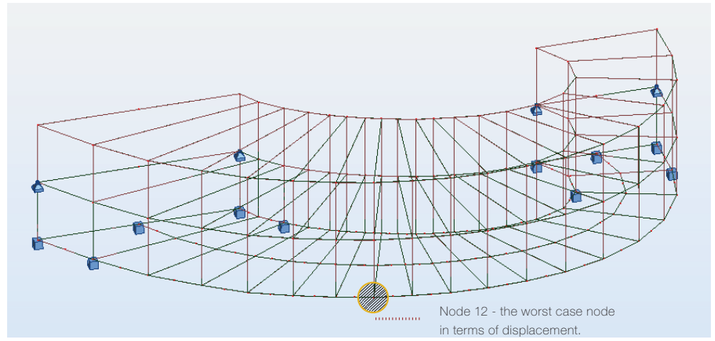


▲
148. Critical areas in terms of stresses (ULS). The most cirticle node in terms of stresses (tension) is marked with red.



▲
149. Critical area in terms of displacement (SLS). The most ciritical node has been highlighted.

	UX (cm)	UY (cm)	UZ (cm)	RX (Rad)	RY (Rad)	RZ (Rad)
MAX	0,4	0,5	0,0	0,009	0,004	0,003
Node	85	12	139	71	65	105
Case	5 (C)	5 (C)	5 (C)	5 (C)	5 (C)	5 (C)

▲
150. Criticle element in terms of displacement.