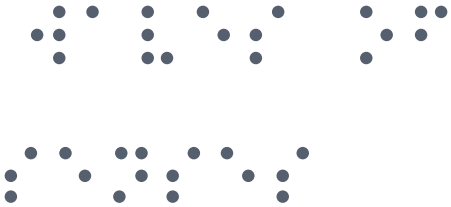

# Waves of senses

*A focus on enjoyful outdoor bathing experiences tailored to individuals with a visual impairment*

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Master thesis | Spring 2024

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## Abstract

Vision is the most dominant of our senses and not only shapes our learning but also influences our orientation and social interactions in society. However, architecture has long been dominated by visual aesthetics, neglecting the potential of other senses in shaping our environments. Pallasamaa (2012) urges architects to transcend the emphasis on vision and look beyond the privileged sense.

In alignment with these perspectives, this thesis will investigate how multisensory design can promote greater experiences in architecture. It seeks to investigate whether incorporating senses beyond vision—such as touch, sound, and smell—into the design process can foster a deeper understanding of spaces.

Drawing from personal experiences, including memories of outdoor swimming with my grandmother, whose sight during later years has increasingly gotten worse and limited her everyday life. Engaging in activities she used to love, for example, going for a swim, is a challenge today due to fear of falling or being unable to enter or exit the water. I believe this is not just a concern for my grandmother but for others as well, young and old with a visual impairment. Everyone should have the same rights and possibilities to enjoy our public spaces. Therefore, this thesis has investigated how an outdoor bathing area in the Gothenburg archipelago could be developed tailored to individuals with varying degrees of visual impairments.

The thesis has had a combination of research for design methods where the process has been influenced by a norm-creative perspective process. The design has resulted in an enriched sensory experience and provided an outdoor bathing area accessible and enjoyable for the target group and those beyond.



Key words: *Visual impairment, Multisensory design, Outdoor swimming*

# Tabel of content

# Introduction



## Major subject

The topic of this master thesis is inspired by the project Havfruefløjterne, or the English name The Mermaid Flutes, an outdoor bathing facility designed to meet various needs and especially the needs of people with a visual impairment. The design aimed to provide an outcome that could support individuals with a sight disability to have their own free bathing experience (Personal communication, January 23, 2024). The project made me further interested in understanding how I, an architect, can develop better living environments for people with a visual impairment.

This topic has continued to influence me throughout my education and I have been reminded of this question due to my grandmother's vision loss. During later years her sight has increasingly gotten worse which is limiting her in her everyday life. Doing an activity that she loves, for example going for a swim outdoors, in nature, is now a more significant challenge for her. This is partly due to her sight disability and blurry vision that creates fear of falling. The lack of support in the design of outdoor swimming areas affects her possibility of being able to enter and exit the water independently (Personal communication, March 9, 2024). I believe the needs of people with visual impairment, not only my grandmothers, are often forgotten when designing our public spaces.

### Problem statement

It is believed that our public spaces meet everyone's needs. However, all different groups in society do not feel welcomed or included in our spatial environment (Tengbom n.d.).

In Agenda 2030 *Goal 10: Reduce inequalities* within and among countries, is based on the principle of everyone having the same rights regardless of gender, ethnicity, religion or disability. *Goal 11: Sustainable cities and Communities* endeavor to make cities inclusive, safe, resilient and sustainable. Promoting the importance of sustainable urban development, considering all human needs in planning for housing, public space, transport etc. (Regeringskansliet n.d.). (Regeringskansliet n.d.). When developing new public areas in today's society it is by chapter 8, §9–12 (SFS 2010:900) in the *Planning and Building Act* obligated to design for every individual. I believe it is critically important to improve and work for more inclusive living environments. Everyone should have the same rights to be able to use and transport themself in a public space. Up to the present, our living environment is not being developed or redeveloped according to everyone's needs and I believe, especially people with a visual impairment.

Vision is the most dominant of our five senses and affects how we orient, learn, read, walk and participate in social activities (WHO 2023). In the book *The Eyes of the Skin – Architecture and senses* the author Juhani Pallasmaa (2012) argues that we experience architecture more visually than ever.

For more than half a century architecture has appeared as more retinal art where visual images of buildings and space between have helped to influence and advertise architectural work. The author continues to question and criticize the role of vision. Pallasamaa (2012) argues the importance of architects looking beyond the privileged senses and continues to argue that in creative work the designer should design for the existential experience, a deeper outcome, and not objectify the process. Instead experience our surroundings with other senses (Pallasamaa, 2012).

In line with these perspectives, this thesis will investigate how multisensory design can lead to greater inclusivity and accessibility in architecture. Could the incorporation of other senses: touch, sound and smell, into the design process lead to a more immersive understanding of a space for those who inhabit them?

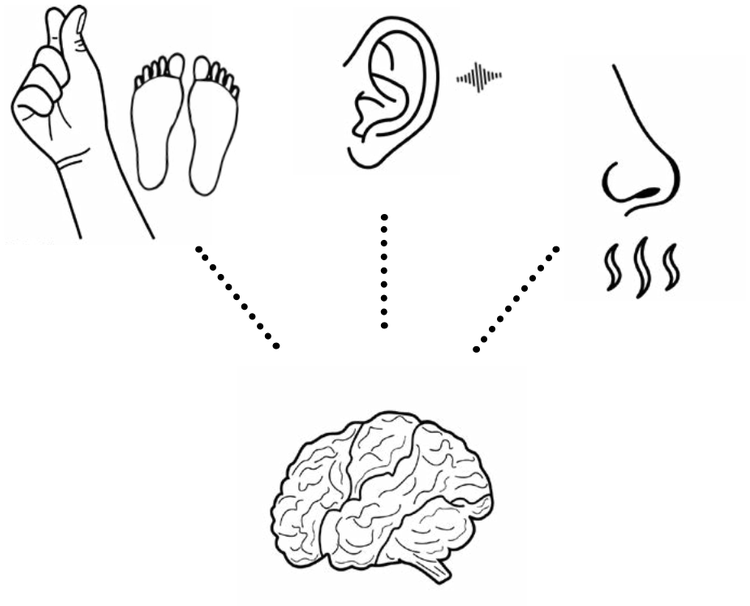


*Figure 1: Illustration of senses present in this thesis*



## Goal

The goal of this master's thesis is to enable individuals with visual impairments to experience enhanced accessibility and navigation, fostering a sense of enjoyment and well-being during visits to outdoor bathing areas.

## Aim

The aim of this master's thesis is to investigate how individuals with a visual impairment can access outdoor bathing areas. The thesis will aim to understand the target groups bathing habits and potential obstacles or challenges that may arise in relation to the activity. A central focus revolves around exploring how enhanced access can be realized through the incorporation of design that engages senses beyond the visual perception. The analysis of the empirical material will be translated into a design program and implemented in the design on the geographical location at the shoreline of Gothenburg archipelago. The design will provide a enriched and positive sensory experience and provided an outdoor bathing area accessible and enjoyable for the target group and those beyond.

## Research questions

### Main research question

*How can multisensory design principles be implemented in landscape and contribute to an enjoyable outdoor bathing experience for individuals with a visual impairment?*

### Sub-research questions

- How do the target groups experience and navigate in outdoor public spaces and what are the current challenges faced in relation to these areas?

- What design solutions are needed to be implemented on an outdoor bathing area to ensure accessibility for the target group?

## Delimitations

In this master thesis the target group will be individuals with visual impairment. The research will not have a focus on other disabilities. However, the design seeks to provide an design outcome that can be utilized by individuals beyond those with visual impairment.

In this thesis the sensory experience related to the sense taste have been left out. This because taste is often associated to food experiences and a challenge to translate into architecture in this project. In the thesis, the sense of sight will be considered and designed with, but it will not be given as much prominence as it typically does in a conventional approach.

## Methods and process

The thesis is based on research for design methods. Literature studies, reference projects and site analysis have been used to gather information and give a base of knowledge for the project. The second layer examines the sensory experiences within the site´s geographical context. The methods aim to provide an understanding of the senses present on-site, and to identify opportunities for enhancing and emphasizing these senses in the design proposal. The thesis's third layer consists of semi-structured Interviews to gain deeper insights into the target group's current conditions and needs.

The findings from the literature studies, site analysis, sensory analysis and interviews have been analyzed and translated into a program with design strategies, shaping the design proposal. The discussion reflects on whether the theoretical framework have contributed to a well-founded design and if it answer the thesis research questions.





## Terminology

**Multisensory design**
Design that considers multiple senses (such as sight, hearing, touch, etc.) in creating an environment or product to enhance user experience and accessibility.

**Recreation**
Refers to the pursuit of activities or experiences that individuals engage in for the purpose of enjoyment, relaxation, or leisure. These activities often provide both physical and mental stimulation, contributing to well-being.

**Spatial environment**
The physical surroundings or context in which an individual exists.

**Visual impairment**
Visual impairment is a state characterized by a significant reduction in vision, spanning from partial sight loss to complete blindness.

# Background

## Visual impairment

Visually impaired individuals have varying degrees of visual impairment. Impaired vision can range from minor visual impairment, poor vision and to blindness. Individuals who have a visual acuity of 0.3 or worse, or who have a visual field of less than 20 degrees are defined as having a visual impairment (Kunskapsguiden, 2022). Vision loss can happen to anyone and all ages but most of the people with a visual impairment are 50 years or older (WHO 2023).

A person with a visual impairment is characterized by challenges in reading or orienting themselves, relying on assistance from their sight. Some individuals see good in the dark while others are sensitive to light, or vice versa. Others can see easily straight and others have difficulties interpreting what they see, due to damage on the sight nerve in the brain (Synskadadesriksförbund n.d.). Children having a visual impairment often get it due to damage to the sight nerve, a condition called Cerebral visual impairment. In this condition, the child's eye can have a normal function but the brain cannot interpret what they see. How well a person sees also depends on how much one has seen before, If the condition is congenital or a condition acquired over the course of life. It is also very individual on how a person is used to relying on their vision and how one deals with difficulties that arise in not seeing fully. Overall, visual impairment and how much or how well you see is very individual, but in general, it affects the person's daily life (Parasport, 2022).

**Statistics worldwide**

According to the World Health Organization (WHO, 2023) approximately 2,2 billion people in the world are living with a visual impairment, 1,1 billion of these people's sight could have been prevented or remedied. Globally the leading causes of visual impairment and blindness are reflective errors, cataracts, diabetic retinopathy, glaucoma and age-related macular degeneration. The incidence of these vision conditions varies between and within countries due to the availability to eye care services, affordability and education among the population regarding of these eye conditions (WHO, 2023).

### Statistics in Sweden

According to The Swedish Association of the Visually impaired, SRF, (2022) there is no specific number on how many people have a visual impairment in Sweden. Approximately 100 000 people are enrolled at a vision centre, 3000 are children or teenagers. More than 30 000 of these people have a severe visual impairment (Synskadades riksförbund 2022). In Gothenburg, SRF, which includes: Göteborg, Härryda, Mölndal, Partille och Öckerö, has 900 members of different ages (SRF n.d-a).

No specific number were found for how many people in Sweden have a visual impairment and another disability. According to Funka (N.d.) 36% of the Swedish population have some type of disability and 11% of this group has two or more disabilities.

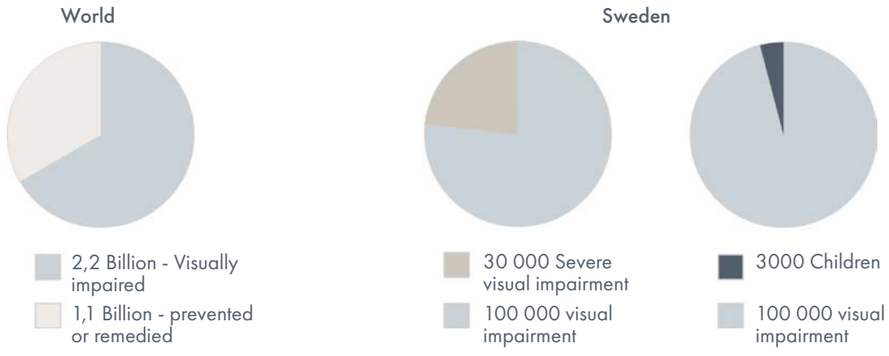



*Figure 2: Diagram of visual impairment in a world and Swedish context.*

## Rules and regulations in Swedish planning

This part describes Swedish planning rules in PBL and principles from SRF on accessibility in our spatial environments.

### Accessibility

In Sweden accessibility for build environments is regulated in the Planning and Building Act PBL (SFS 2010:900) and the Planning and Building Ordinance (SFS 2011:338). In PBL chapter 8, §9–12 (SFS 2010:900) refers to accessibility in public environments for people with a disability. Individuals with impaired mobility or orientation abilities should have access to use public spaces as any other individual. Any obstacle to accessibility or usability in a public space shall always be remedied if the obstacle is easily remediable, considering practical and economic conditions (PBL 2022).





**"Plattform för tillgänglig och användbar fysisk miljö" Translation: " Platform for accessible and usable physical environment"**
**- The Swedish Association of the Visually Impaired (SRF)**

The document provides a comprehensive overview of how SRF believes the spatial environment should be designed for individuals with visual impairments. The document has been compiled by multiple stakeholders within the field and aims to be used as a tool for architects, planners, designers, and others working on various projects within society (Synskadades riksförbund, SRF, 2016).

## To live with a visual impairment

### Daily life

According to SRF (2017) a person with a visual impairment is living the daily life almost as everyone else but the daily tasks are sometimes done in different ways or with different helping tools. The eyes are replaced by the hands, memory and organizational solutions. Organizing the home so each item has a designated place or is logically positioned can make daily tasks easier. A principle is to sort items according to the right-left principle. Marking the food products, with a rubber band or color markers already in the store is helpful when unpacking at home for example. There are also other helping tools to make daily life easy, for example, magnifying glasses or mobile apps to record sound or read out navigation. Braille readers connected to computers or tablets are another helping tool (Synskadades riksförbund, 2017).

### Exercise

Different strategies and helping tools are also used when exercising. When visiting a swimming hall members of the staff can explain the facility. When in water it is safer to swim in a lane with lines on both sides, to avoid swimming into people or elements in the water. Orienting in a swimming hall can be challenging if the noise level is too high. When swimming outdoors a leading beacon can be used as a point for reference to the nearest ladder, pier or beach towel. For those who partly see a blanket or towel in a bright color or close to a landmark can help with orientation (Synskadades riksförbund, 2017).

Walking or running can be carried out with help from a guide, either to hold on to or the guide and the visually impaired can have a shorter string between them to hold onto. Downhill skinning or cross-country skiing is done individually with guidance from a guide who can explain the terrain or instructions can be received through a walkie-talkie (Synskadades riksförbund, 2017).

## Different eye conditions

In this part, different eye conditions are described to create an understanding of what types of eye conditions there are, how a person with a specific condition is affected and if the condition can be treated or not.

### Blindness

Blindness is defined as a lack of vision and cannot be corrected with medical treatment, glasses or contact. Leading causes of blindness are primarily due to age-related eye diseases, for example, macular degeneration, cataract, diabetic retinopathy and glaucoma. Blindness is also a condition a person can have from birth (Doktorn n.d.).

*Figure 3: Image illustrates the eye condition of blindness.*

### Cataracts

Is a prevalent eye condition and develops as you age. The ocular condition creates a blurry area in the lens of the eye. A person suffering from the condition experience difficulties in seeing in the dark. The eye also gets sensitive to light for example sunlight or lights from lamps. A person with cataracts can also suffer from double vision. The condition gradually gets worse over time, however, the condition can have an effective surgical treatment (NIH 2023a).

*Figure 4: Image illustrates the eye condition of Cataracts.*

### Retinitis pigmentosa

A group of rare eye diseases caused by changes in the genes in the nerve system. People with the disease are born with it and the symptoms often start in early childhood. The disease causes loss of night vision and side vision and eventually narrows down until only the central vision is left. People with Retinitis Pigmentosa often have other eye diseases, for example, reflective errors or cataracts. There is no cure for the disease but there are training programs to help to make the most of the affected person's vision (NIH 2023b).

*Figure 5: Image illustrates the eye condition of Retinitis pigmentosa.*



*Figure 6: Image illustrates the eye condition of Macula of retina, AMS.*

*Figure 7: Image illustrates the eye condition of Glaucoma.*

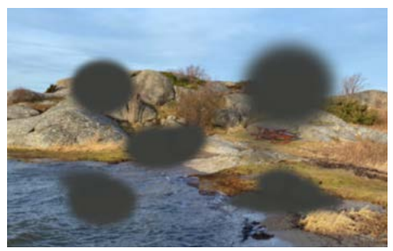


*Figure 8: Image illustrates the eye condition of Diabetic retinopathy.*

### Macula of retina, AMS

Is an age-related disease and is a very common vision loss for older adults and occurs very slowly. The condition also called AMD or yellow spot, causes damage to the retina and blurs the central vision, causing difficulties in seeing details or straight ahead. The eye condition has two types: Dry and wet AMD, both of the diseased causes vision loss but in different ways. The conditions can be treated with dietary supplements or photodynamic therapy for example injections and laser treatment (NIH 2021).

### Glaucoma

Is a group of eye diseases that causes vision loss, blind spots or blindness. The condition is affected by a damaging nerve called the optic nerve and research shows patients with high pressure in the eye often suffer from glaucoma. The condition has very slow symptoms and therefore many people do not know they have glaucoma. There is no cure for the disease, but early treatment like medicine, laser treatment or surgery can slow down the damage to the eye (NIH 2023c).

### Diabetic retinopathy

People with diabetes can get diabetic retinopathy, this condition can cause both vision loss and blindness. In the early stages, the disease can come and go. What causes the disease is that blood vessels in the retina start to bleed in the back of your eye. This causes a gel fluid that fills your eye and creates dark floating spots on the eye that increase the sight area. This can be treated with injections to slow down the process, laser treatment or eye surgery (NIH 2023d).

### Conclusion:

Eye diseases have varying timelines and affect individuals' vision in different ways. What is common for the majority of these diseases is that they cannot be cured, which can lead to significant difficulties for individuals in interacting with society.

## Assistance tools

There are different needs for a person with limited vision compared to a person completely without vision when navigating in public spaces (WHO, 2023). According to the SRF (n.d-b) a person with a visual impairment generally does not face challenges navigating and moving around in familiar environments, however, when exploring unfamiliar areas finding their way becomes more challenging. Several tools can help a person better move around in our public environments and participate in activities: Assistance, special transport service and guiding dogs (SRF n.d-c).

Assistance implies a person, a guide, guiding the visually impaired to different social activities, for example to the grocery store, the gym, a restaurant or a concert. The act of support is supported by the law on Functional impairments (LSS) and the Social Service Act (SOL) and is being applied to the municipality. Special transport services can be used as a complement to regular public transport and can also be applied to the municipality. Guiding dogs are specially trained dogs that can be used as a help for guidance (SRF n.d-c).

Another tool that individuals, often those who are blind or have a severe visual impairment use is a cane (Synskadades riksförbund Stockholm Gotland, n.d.). The cane helps the visually impaired to orient in different environments and also indicates to other road users to show consideration to the person with vision loss. There are different canes, for example, technique cane which is mostly used as an orienting tool and protection against obstacles. The other is a marking cane and a smaller cane that aims to indicate to the surrounding people that the user has low vision. The third cane is called the white or the red cane and indicates that the person has a combined vision and hearing loss (Synskadades riksförbund Stockholm Gotland, n.d.).

Tactile writing, in other words called Braille which is a complete reading and writing language that is read by touch with help from the fingers. The language facilitates the daily life of visually impaired individuals. The braille system is composed of six dots, forming a braille cell with different combinations for every letter. Braille can be seen in many public environments, on some grocery products, medications and can be used for phone numbers or to read books. The system is essentially the same worldwide, with some minor variations (SRF, n.d-d).



## The human senses

We as humans are constantly using our senses to understand our surroundings. The senses are adapted to us moving at 5 km/h. It is possible to train the senses, which may become necessary if one of the senses has a malfunction or is injured (Bodin, A. et al.).

[H] **Hearing**

Sound waves propagate through example wind and water. Adults perceive sound in the frequency range of 20-20 000 Hz, small children and animals can perceive higher frequencies. In a 7 meter distance the ear works for conversations and in 35 meters for a lecture or a question. At 1km loud sound, for example, airplanes can be heard (Bodin, A. et al.).

[T] **Touch**

Touch has a significant impact on our physical health. Touch is perceived with pressure on the skin, through our body sensation or by feeling with fingers or toes. A trained finger can for example detect a bump of 0.0005 cm (Bodin, A. et al.).

[S] **Smell**

Smell is perceived and registered by various substances in the air. In 1 meter a subtle smell of a person can be detected and perfume can be sensed at 2-3 meters. Stronger smells can be felt at a greater distance (Bodin, A. et al.)

[V] **Vision**

Vision has the longest range, much longer than hearing and smell. At 1-2km people can be seen, social events like skiers in a slope can be seen at 100 meters. Facial expression at 30 meters, details in a conversation on 1-3 meters and emotions such as love or anger can be perceived at 0-50 cm (Bodin, A. et al.).

[B] **Balance**

Balance involves several senses and different body parts and is experienced through our position, the accelerations and gravitations in relation to the vertical line. The choice of materials, light settings and other interventions can enhance the balance and provide security. If there is a structure that provides a positive outcome for the balance the ability to orient can be facilitated (Bodin, A. et al.).

## Outdoor bathing as recreation

Access to recreation that provides opportunities for physical activity, rest, and recovery is beneficial for public health. By spending time in natural environments, the body's stress levels decrease, cognitive abilities strengthen, and physical health improves (Naturvårdsverket 2023).

Being in the water can involve various activities such as play, a dip, swimming, or even cold baths. Water play encourages different forms of interaction, both by children and adults. For children, water play can be an important part of their development, contributing to physical, social, and cognitive skills. Opportunities for water play also invite joy and well-being (CadoAqua n.d.). A dip can set the mood. By immersing oneself in the surroundings and being present in the moment, it can help to reduce stress levels in the body (Jakobsson 2023). Swimming as a form of exercise has numerous health benefits, not only improving fitness and strength but also enhancing heart health, lowering blood pressure, and thereby reducing the risk of several common diseases (Svenska simförbundet 2022). Cold bathing is also seen to contribute to positive health effects, although it is debated among researchers. During cold bathing, levels of adrenaline, endorphins, and dopamine rise, making us more alert and contributing to feelings of happiness (Min Doctor 2024).

*Fig 9: Illustration as a symbol for bathing as recreation.*



*Intentionally white page.*

# Theory



## To be applied through design principles

Bellow are gathered information from SRF:s document *"Plattform för tillgänglig och användbar fysik miljö"*(2017). The chapter highlights the important principles of how to design public spaces for individuals with a visaul impairment. Each heading has a legend that refers to which sense it aims to.

### Color and contrast [V]

A person with a visual impairment often has difficulties distinguishing between small contrast differences. For example, a light grey door against a light-yellow house façade or when the walls and floor in a room have a similar color. The examples mentioned can negatively affect the person's perception of the form and size of the room, creating confusion and difficulties when navigating a space. Creating contrast in material and consideration of daylight can positively affect how a space is perceived (SRF 2016).

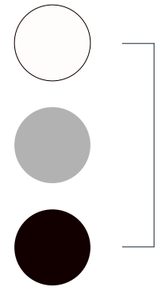


*Figure 10: Middel dot in color contrast 0,4 unit, from white to black.*

According to SRF (2016) there are no optimal colors or color combinations recommended. A principle is to use a combination of dark versus bright colors or materials. The contrast should not be less than 0,4 units according to the Natural Color Service, NCS. This creates a high difference in contrast and enhances safety and orientability (SRF, 2016).

### Tactile paving or tactile surfaces [T] [B]

Tactile paving and tactile surfaces are elements in our spatial environment that help a person with a visual impairment to orient in the surrounding environment. For individuals with mild vision loss high-contrast stripes can be used as a helping tool to navigate, meanwhile, a person with severe visual impairment or blindness needs help from tactile paving or tactile surfaces. By using a white cane or feeling tactile element with the feet, spaces can be navigated (SRF, 2016).

Tactile paving can be divided into natural and artificial tactile paving. Natural tactile paving can for example be defined as a street curb, railing or a wall, an element that might have a different surface and contrast. A natural tactile can also be the transition between asphalt and gravel or the transition between asphalt to grass (SRF, 2016).

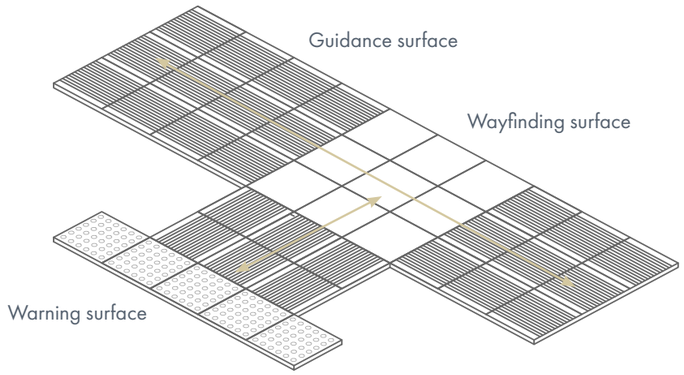



*Figure 11: The image depicts the appearance of guiding, wayfinding, and warning surfaces, as well as the utilization of paving stones.*

Artificial tactile paving is divided into three categories: Guidance surface, wayfinding surface and warning surface. A guiding paving stone has a wavy surface along the direction the paving stone aims to indicate. A wayfinding surface is defined with a flat paving stone surface and alerts the user that there is a possibility to choose different directions. A warning surface has buds and aims to warn the user that the road or environment is changing. For example, indicating the next part contains stairs, a pedestrian crossing or a driveway (SRF, 2016).

The three different surfaces of the paving stones need to be at least 5mm, for the user to be attentive to the surroundings and to not diminish accessibility for an individual in a wheelchair. Both natural and artificial tactile surfaces need to be designed with logic and aim to provide clear guidance in the outdoor environment, both visually and tactile. The tactile surfaces can also be complemented with lights and sound via an sound beacon (SRF, 2016).

According to Boverkets building regulations (BFS 2013:9, HIN3) an artificial tactile surface should have a contrast that differs from the surrounding pavement by at least 0,40 units according to the Natural Color System (NCS). SRF (2016) considers natural tactile paving preferred to artificial tactile paving. This is because the artificial tactiles need a specific technique with the cane which minimizes the walking speed. However, they argue that artificial tactile paving is a good complement to natural tactile paving, especially in open public spaces, for example, a square (SRF, 2016).



**Ramps [B]**

Ramps is preferably the best alternative, compared to stairs, when designing environments with different height levels. A ramp need to be designed with a width of at least 1,3m and with an inclination not steeper than 1:12, an incline with 1:20 is to strive for. It is important that the ramp has a contrast line in the beginning and end of the ramp and railings in different levels on both sides starting 300 mm before the ramp and ends 300 mm after the ramp. The lowest railing needs to be 500-750 mm and the upper 850 mm - 1 meter. It is also important that the railing is in a contrasting color that differs from its surroundings. If a tactile surface is navigating the way to the stairs the tactile surface needs to end at the railing in order for the user to find the railing (SRF, 2016).

**Signs and information system [H] [T] [V]**

Signs and other information systems should be placed logically and be easy to understand, regardless of whether the person receiving the information is standing or sitting in a wheelchair. The text and size on a sign should be clear and on a reading distance between 100 - 300 mm. A sign could also contain relief or brails, or even spoken information (SRF 2016).

Spoken information and, in Sweden referred to Pratoarer, gathers information about the current surroundings and situation, for example, the departure of trains or information regarding the specific meeting place. Pratoarer often requires supplementation in tactile relief or braille and needs to be placed along a tactile surface and at the right height so the user can receive the information (SRF 2016).

**Sound Beacon [H]**

A mobilis sound beacon is a navigation tool that aim to guide, give a warning or locate a certain object for example an entrance to a building. The sound beacons work on an audible distance of 5-20 meters. The tool is operated without any internet connection and is activated with either a smartphone or a small pocket beacon activator, when not in use the beacons are silent. Some mobilis sound beacons are connected to other platforms that provide information, for example location description or directions to other nearby beacons (Mobilis n.d.).

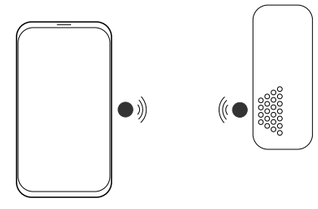


*Figure 12: Illustration of Mobile phone & Mobilis sound beacon.*

### Design principals in the home outdoor environment

SRF has also gathered another document on suggestions and ideas on enhancing the senses and aiding in the creation of an understanding of the space. In the document, Vardagstips (2017) are gathered suggestions describing how visually impaired individuals can enhance their senses in their own outdoor environmen for example a garden.

### Ground pavement [T] [V]:

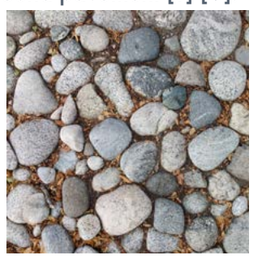


*Figure 13:. Stones in comfortable forms, for tactility.*

*Figure 14: Main path in lighter pavement tiles, for better visability.*

*Figure 15: Concrete tiles with white stone paving, for tactility.*

### Strengthening reference points [H] [V] [S]:

*Figure 16: Big stones.*

*Figure 17: Birdbaths.*

*Figure 18: Flowerbeds.*

### Natural aucustic beacons [H]:

*Figure 19: Wind chimes.*

*Figure 20: Fountains.*

*Figure 21: Trees.*



### Plants that can be identified with touch or smell [T] [S]:

*Figure 22: Herbs.*

*Figure 23: Lavendel.*

*Figure 24: Bamboo.*

*Figure 25: Musk grass.*

*Figure 26: Lamb ear.*

*Figure 27: Love herb.*

*Figure 28: Hedge.*

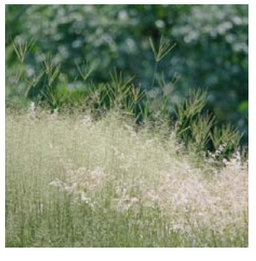


*Figure 29: Soft woodland grass.*

*Gathered images on page 28-29 are sourced © Creative Commons.*

## Architecture and Senses

### Sensory design

Sensory architecture can affect the user´s experience and transform the interaction between people and the built environment. Individuals with a sight or hearing disability use multiple senses and other areas of the brain that are usually devoted to sight or sound to process the impression of the surroundings. The senses are unique to every person and they trigger and amplify other senses, for example, we link taste to color, smell from seaweed to memories by the ocean. Materials with texture can convey a sense of warmth meanwhile concrete can create a feeling of coldness (Cooper Hewitt, 2018).

Alistair Somerville (2016) is teaching about Sensory design and describes it as a human centred design. The design questions how a certain group of people will be experiencing the end product. This requires research on the users' actions, feelings, thoughts, and surrounding environment. It can be described as how we understand or make meaning through our senses and emotions. Alistair (2016) claims, ,

*"If you look at how the brain and your consciousness makes sense of the world, sight isn't the key sense. The brain works round the problem by imagining everything you've seen. Which means that when people are designing for sight they have a habit of thinking the experience people will have is the experience they design. And in a huge number of cases that's not going to be true because the person will see what they think they should see, and that creates a certain problem for the truth and the meaning of design, which a lot of people aren't quite willing to understand.*

*The sense that the body really pays attention to is hearing because it's very rapid to process and to a certain extent, compared to sight, it is the most truthful of the senses."*

(Alistair, 2016)

Victor Delaqua also argues in the ArchDaily (2023) that space is more than just its visual appearance and that sensory architecture can create a deeper meaning between the people and the built environment. Architecture itself can provide music and add sensation to a space. Sculptures can with wind create music and elements by a shoreline can create sound from waves. Incorporating scents into the design can help the user to navigate and remember the space. Scents can also bring back other emotional memories and transport the user to another place. Touch is perceived with the skin where the surface of walls, furniture and temperature can create an experience. Different materials can be warm or cold depending on the weather. Malleable materials that create an interaction with the user and improve the relationship between the body and the built environment (ArchDaily, 2023).

I agree that we as architects design with a thought of how a place should be used and experienced. Sometimes a place and its function are already described in detail on render pictures and illustrations at the beginning of a planned project. This creates a frame of how the space should be used and look like, but I believe we can never know exactly how a person uses, experiences or what feelings are created in a certain space. I agree with Delaqua as well, that architecture can have a deeper meaning. Architects should explore even further how we can make the senses more present in what we design. There are multiple approaches to accomplishing this, for this study a norm-creative perspective have been used to questionen ingrained design patterns.

## Norm-creative perspective in architecture

In a collaboration between Tengbom and KTH a guide on how to design from a norm-critical perspective has been developed. The authors Karin Manberg et. Al.(2021) explains norms as unwritten rules that everyone relates to. The norms help us humans in our everyday life, to live alongside each other, for example, the simple norm of forming a queue. Norms like the previous example can be beneficial, but norms can also negatively affect us and can create restrictions and obstacles and causing our society to become more unequal. Designing from a norm-critical perspective is questioning the norms and can be described as follows according to Manberg et al.(2021):

*"Att arbeta normkritiskt handlar om att ifrågasätta invanda tankar, beteenden, förhållningssätt och fördomar hos dig själv, i din gestaltningsprocess samt hos slutanvändaren du gestaltar för – i syfte att skapa mer inkluderande miljöer, formgivning och arkitektur."*

Translated to English:

*"To work norm-critically involves questioning ingrained thoughts, behaviors, attitudes and prejudices within yourself, in your design process and among the end-users you design for – aiming to create more inclusive environments, design and architecture."*

(Manberg, et al., 2021).

In detail described as a process where the designer starts finding out one´s own norms, beliefs and presumptions. In the next phase, knowledge regarding social structures and/or information about target group should be gathered and comprehend. When the prior

knowledge has been aquiered, there should be a base for the user´s needs that can be used to create guidelines, goals and strategies for the designprocess. The next part of the process is to develop the ideas with awerness to the norm-critical perspective. The proposal is then visualized for the target group or customer. The next part is about reflecting over the end-design and question if the design aims back to the norm-critics guidelines, goals and strategies set for the project (Manberg, et al., 2021).

As previously mentioned, it has become a norm to design our environments primarily focusing on the sense of sight. Therefore, the norm-creative perspective is introduced to challenge this mindset and through the study, create a more inclusive design.





Theory

*Intentionally white page.*

## Reference projects

**Havsfruefløjtern**
Architects: *Fredericia municipality*
Where: *Østerstrand in Fredericia, Denmark*
Time of establishment: *2017*

Havsfruefløjtern or the "Mermaid flutes" is an outdoor bathing installation as part of a larger municipal-led renovation of Fredericia's most popular beach Østerstrand. The design is based on the needs of individuals who cannot see and aims to help the target group to have their own free bathing experience. According to The Blue Flag organization, the installation is unique in its kind (Personal communication, January 23, 2024).

The installation is located on a quieter part of the beach. A wish from the target group, who expressed loss in orientation in the water, due to loud noise from other guests at the beach. When starting the project, the municipality feared lots of requirements for parking spaces and guidelines in road and path paving, but the target group expressed that the majority of the visually impaired are not 100% without site, but have approximately 2-5% vision left which they expressed was enough to find the way to the bathing facility. It was also pointed out that those who are completely blind arrive with a companion and that, regardless of disability or not, a person should never go into the water alone (Personal communication, January 23, 2024).

The design was inspired by land art, an installation when not in use is an aesthetic piece to the landscape. The installation has the shape of a snail's house, creating a space with frames that supports a safe experience at the beach. The pillars are connected with a rope that allows the user to move easily from pillar to pillar. Creating a line that the user can follow into the circle and back to the shore and allows the user to swim inside the space without drifting out on the ocean (Personal communication, January 23, 2024).

Today the installation is used by both those with a visual impairment and other beachgoers, since it provides a good sense of security (Personal communication, January 23, 2024).

*Figure 30: Photo showing Havsfruefløjtern from a far distance.*

*Figure 31: Photo showing the facility from above and its snail-shaped design.*

*Figure 32: Photo showing the facility up close and the corten steel material on the pillars.*

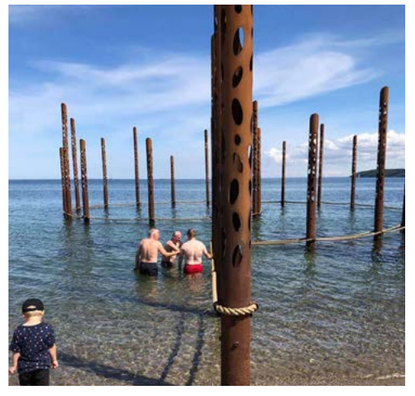


*Figure 33 Photo of bathers using the facility.*

*Photos received from Fredericia municipality.*

**School for blind and visually impaired children in Gandhinagar**
Architects: *SEALAB*
Where: *Gandhinagar, India*
Time of establishment: *2021*

Designed for children from remote villages and towns in Gujarat and aims to be a center that provides them with a better education and opportunities in society. The school is designed with a building typology that allows the students to create a mental map of the space. In the design process and finished design, models were used for the students to train their memory and understand the building before using it (SEALAB n.d.).

The floorplan is designed for the user to never get lost, there are no dead-ends. Wherever you are located in the building you can find your way back to the same start and end point (SEALAB n.d.).

In the center of the building, a courtyard is located, surrounded by corridors and classrooms where each space is designed with various forms, volumes, textures and light. In the courtyard aromatic plants and trees help the students to navigate within the building. Texture in different varieties on the walls also help the students to identify their location in the building (SEALAB n.d.).

*Figure 34.*

*Figure 35.*

*Figure 36.*

*Photos © SEALAB*
*Three examples showing different wall structures used in the building. The texture help the user to navigate.*



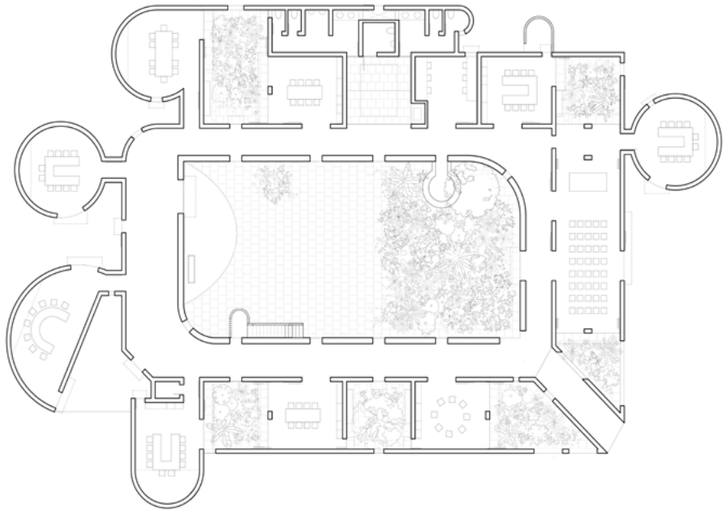


*Figure 37. Floorplan of the School in Gandhinagar (SEALAB n.d.)*

*Figure 38.*

*Figure 39.*

*Photos © SEALAB*
*Two photos showing a 3d model used in the design process. The model have help students and teachers to get familier and understand the building before hand.*

**Askimsbadet**
Architects: *MANOFACTORY*
Where: *Askim, Göteborg*
Time of establishment: *2014*

The 260 meter-long pier, made of concreate, is designed to create a structure of an artificial landscape and offer spaces for sunbathing, swimming, resting or walking. The pier is designed to be accessible for everyone and has long ramps integrated along the pier to provide accessibility to the water (Divisare n.d.).

When visiting Askimsbadet I noticed that the concrete had different textures. The sides of the pier were smoother while the walkway had more of an arch-like shape. I found it to be an interesting way to create boundaries between the pier and the water. I also noticed the ramps along the pier had colour differences that created a better understanding of the edge of the ramp.

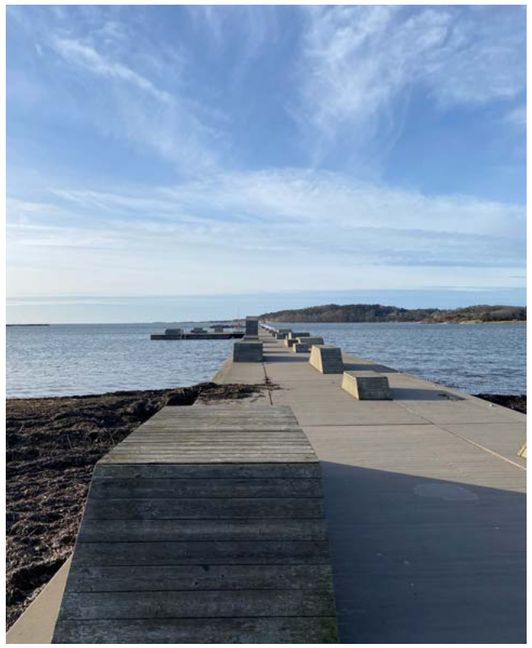


*Figure 40: Photo showing the artifical landscape in the pier.*



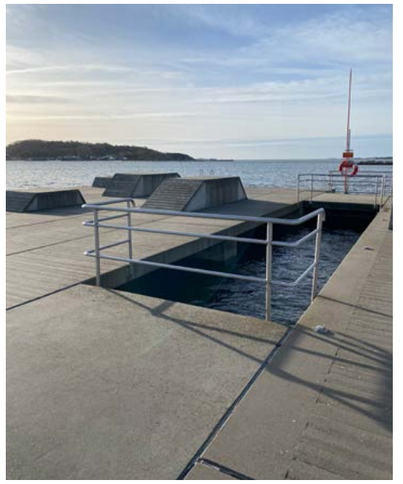


*Figure 41: Photo nr. 2 of the artificial landscape.*

*Figure 42: Photo of the pier´s material. Undulating concrete texture can be discerned.*

*Figure 43: Photo of ramp.*

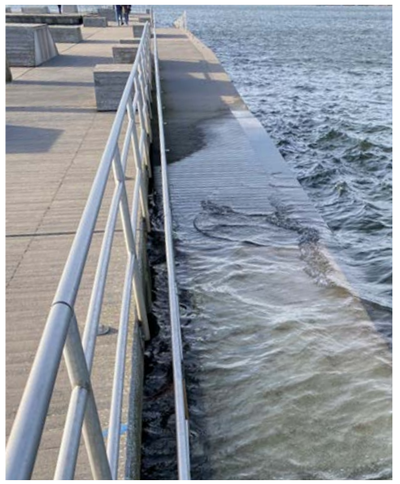


*Figure 44: Photo nr. 2 of ramp, partly in water. Can distinguish contrast in color of the ramp bellow water level.*

# Context

## Sjöbacken

The site is located between Fiskebäck och Önnered and is a larger green area and often used to promenade, walk the dog, kite flying, picnics and go swimming (Sjobacken n.d.).

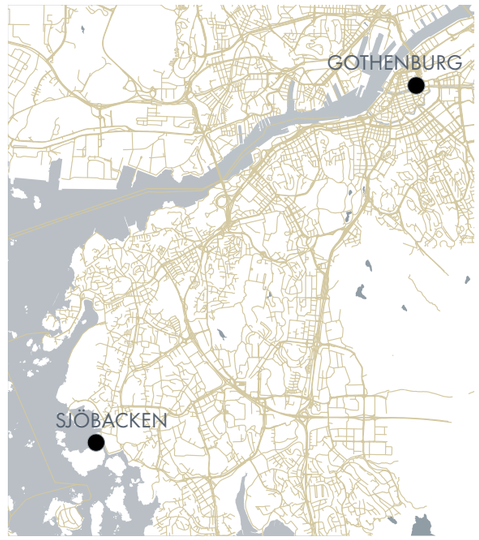


*Figure 45: Location map.*

Sjöbacken was a shallow sea bay until 1966 when Gothenburg city started to deposit demolition of Haga and excavated materials from the building of Frölunda square to fill the bay. The original plan was to fill the bay but a fisherman named Eskil´s canal. A fairway between Önnered Boat association and Fiskebäck harbour (Sjobacken n.d.). The deposition in the bay carried on till 1977 and after that Sjöbacken hence the nickname “Tippen”.

Until the year 2000, no sea life was found in the canal. Today it has bottom vegetation, fish and mussels. The area is maintained and monitored by the municipality of Gothenburg (Sjobacken n.d.).

Sjöbacken and the site can be reached by either car or public transport unless you live in Fiskebäck or in closeness, if so walking or bicycling is possible. In the north part of Sjöbacken, there is a parking lot, after observation enabling parking for almost 60-80 cars. Walking from the parking lot to the site takes more or less about 5 minutes. From the bus station to the site there is a walking distance of approximately 500m, taking 7-10 minutes walking. With public transport, from Gothenburg Central or Mölndal Central, the transport time is approximately 45 minutes both ways, with one transit in Frölunda Torg where the connecting bus to Fiskebäck exits. The site could also be reached from the south part, from Önnered boat association, but there is no public parking lot or public transport in the closeness of the direction.

## Site analysis of local context


*Figure 46: Base map © Lantmäteriet. Map of current access & ransport nodes.*

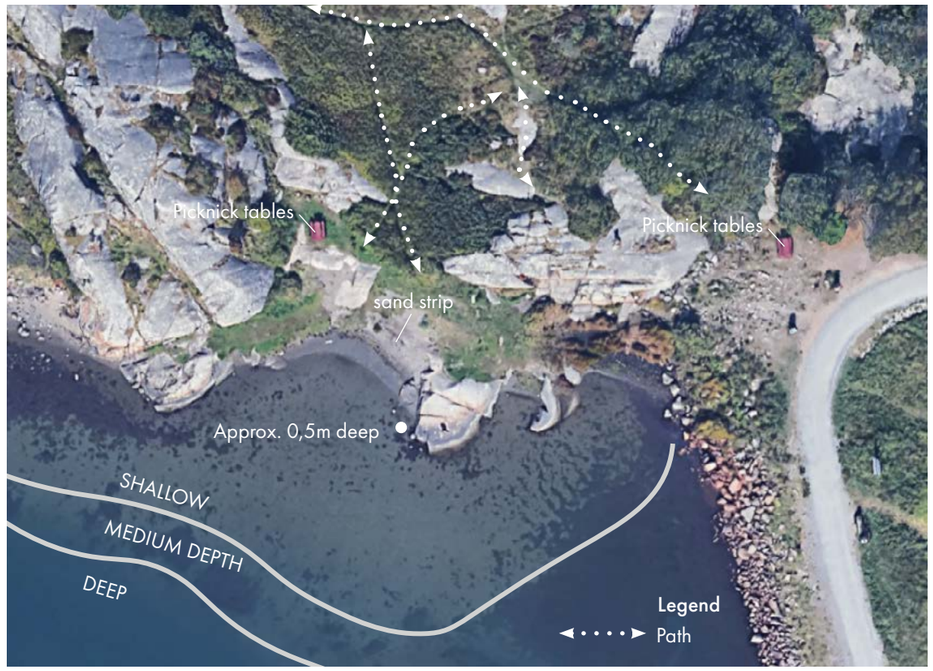



*Figure 47: Base map © Google earth. Mapping of water depth, urban furnitures, paths. Analysis of site during visits in February and April.*

### Analysis of site location

The site is located at the north end of Eskil´s canal. The terrain on the site is undulating and nature consists of both cliffs, parts of areas with grass, some trees, bushes and a small beach strip.

Although the location is secluded, during site visits, at various times of the day and on weekdays, the site has always been in use by humans. Either as a space to take a pause or to pass to get further out on the headland.

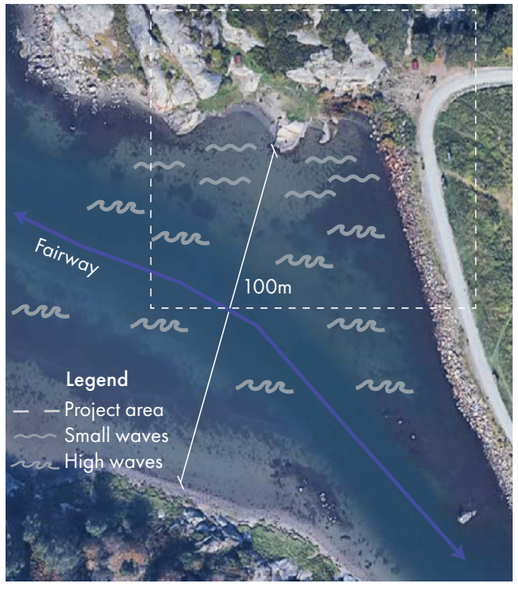



*Figure 48: Base map © Google earth. Mapping of wind conditions, fairway and relation to the island Stora Rösö. Analysis of site during visits in February and April.*

## Site photos

*Figure 49: Photo from east. Photo shows the site´s entrance. On the left consisting of greenery and picknick tabels. To the right the main walking and a glimpes of the sea in the background.*

*Figure 50: Photo from the east. The second part of the entrance. The picture shows a grassy area with stones and a smaller cliff on the left. To the right the sea can be seen.*

*Figure 51: Photo from east. Shows views out to sea. The cliffs on the right can be seen as a barrier to stop the site from receiving strong wind.*

*Figure 52: Photo from east. Photo show a more centered view of the cliffs. Also see is a picnic table and the small sand strip that gives the place valuable qualities and charm.*

*Figure 53: Photo from west. The photo shows the small bay and the entrance to the site. To the left you can see a larger cliff. The cliff has been analyzed into a potential wall where the design can be integrated.*

*Figure 54: Photo from north-west. Photographed from the higher cliff which gives a wider view of the place and the Eskils canal.*



## Physical conditions

When analysing the site physical conditions, marine life, tide, water quality, wind and sun opportunities have been investigated. As mentioned Eskil´s canal has a marine life consisting of both benthic flora, fish and mussels. Another factor to take into account is the jellyfish. On the Swedish west coast, 4 sorts of jellyfish can be seen. Red lion´s mane is the jellyfish that sting and that us humans need to be observant of (nationalencykopedin n.d.).

The site is affected of tide, even if the tide on the west coast is only a couple of decimetres (Havet 2023). Wind is also changing the site, eroding the surface as well as creating waves in the water. From observations during the site visits the site is not affected by high ways compared to the middle and south sides of the canal. A thought is this may depend on the shape of the canal, direction of the wind is also a obvious factor. The left part of the headland consists of higher cliffs which also may stop strong winds from reaching the site.

The site is facing towards the south and giving the space sun throughout the day. The diagram below illustrates how the sunlight moves at the location in a day in July.

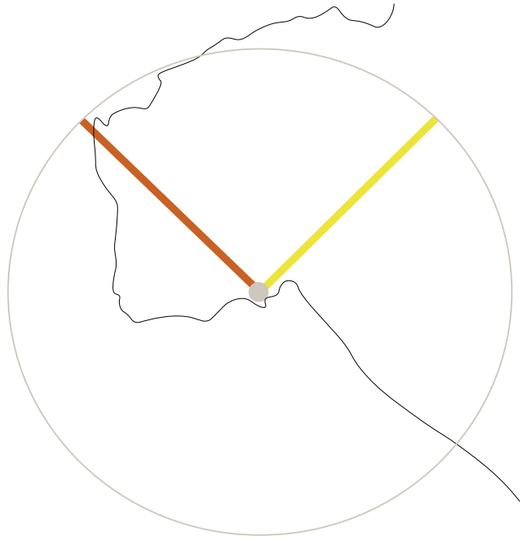



*Figure 55. Solar diagram based on the 16th of July.*

### Ocean depth and water currents

In a subsequent study, it would been interesting to document the ocean depths and ocean currents at the site's geographical location. An analysis of these physical conditions would provide a broader understanding of the users' aquatic experience. However, in this study, the information was not accessible due to the current international circumstances.

# Sensory analysis



## Sensory analysis 1:Blindwalk

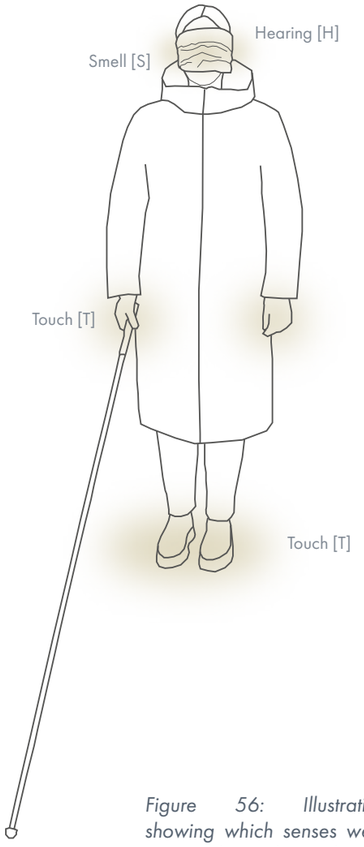



*Figure 56: Illustration showing which senses were present during the analysis.*

To be given a better understanding of how a person with blindness could experience the way to the site I executed a blind walk. I borrowed a white cane from SRF to understand how it is used as a helping tool and understand how different surfaces felt.

With me to assist I had a friend who guided me and helped me to take notes of which sense I experienced. The first analysis started at the parking lot and ended at the site location. The second analysis had its starting point at the bus stop and ended where the path from the bus stop and the parking lot meet. At first the plan was to investigate the site completely blind as well. But arriving at the site location a big cliff created a barrier and therefore it became difficult to navigate and the analysis was stopped upon the arrival at the site.

**Aim**

The analysis aimed to get an experience of what senses: sound, touch and smell a blind person uses when navigating in public spaces and what senses were more tangible. The blind walk also aimed to investigate what barriers there are along the way to the site, and which elements felt safe or unsafe.




## Reflection

The first analysis took 15 minutes to execute and the second took 19 minutes. During the analyses, I stopped several times to express to my guide what senses were present.

On both of the walks, I was walking by myself with help from the cane. During the first walk, it felt safer to walk by myself than on the second. The ground from the parking lot to the site location felt softer and therefore I felt more secure in case I tripped and fall. The sound of the traffic was also heard from a distance and I understood it was not in closeness and therefore did not have to bother about paying attention to cars and other vehicles that could harm me. This was experiencing the opposite during the second analysis, the walk from the bus stop. Several times the sound from the traffic appeared suddenly and beside me. I knew I was safe because I could hold on to my guide and trust I was not walking on the road, but it was still an experience that felt unsafe.

Several other elements along the second walk made me feel unsafe. For example, there were level differences that surprised me and street curbs that I almost tripped over. At one point along the path a cyclist bicycled passed me. The sound from the bike appeared and went away fast and I had to stop to understand what was happening beside me. It also felt odd that the person on the bike did not use the bell to signal that he or she was about to pass by.

I acknowledge that my perception of feeling unsafe may not entirely align with how a blind person would experience the same route. They may have developed other senses, particularly their hearing and touch, allowing them to detect unsafe elements long before I would visually perceive them. It is also important to point out that I lack experience in how to use the white cane the correct way. Therefore, an assumption is that the walk from the different starting points could take less time for a person who does not lack that experience.

Another interesting outcome, I had previously visited the site location and walked from the parking lot to the site, conducting a visual inspection of the area. Despite the previous visit, I did not experience the last turn before reaching the site. When we arrived at the endpoint, I mistakenly believed we were only halfway. A reflection that indicated that during the test, I did not perceive the surroundings that well.

Lastly, after the analysis, I concluded that I had not registered any smell, despite the proximity to the oceans. It might not have smelled seaweed or oil from boats during the day of the analysis, or my brain simply focused on the sounds and the touch and therefore forgot to register the smell of the area.

## Sensory analysis 2: Recording of soundscapes

This analysis took place from the location of the potential pavilion, to investigate sounds that could be heard from the location. The sounds were recorded with a mobile phone.

**Aim:**
The soundscape analysis aimed to examine what sounds were audible at the location. Did the sound create a positive or a negative sensory experience, and how did the sounds emphasize the location?

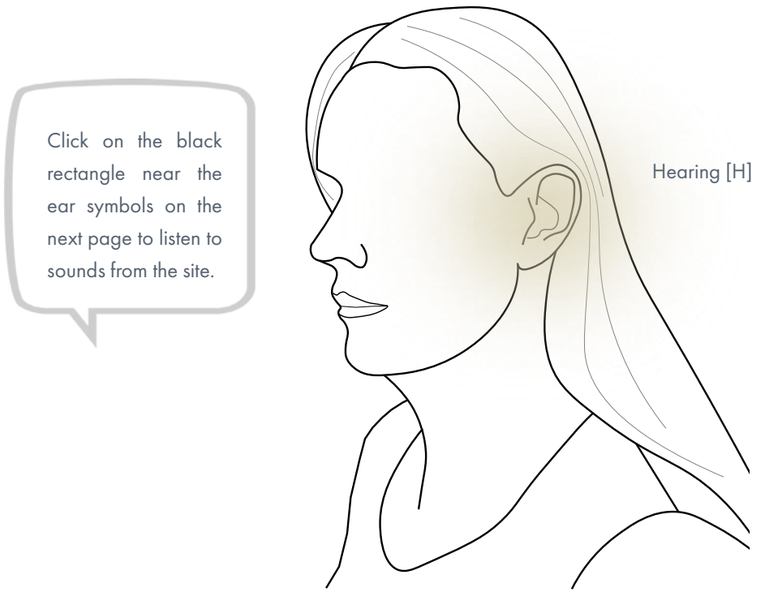



*Figure 57: Illustration showing which senses were manly used during the analysis.*


*Figure 58. Base map © Google maps.*

**Reflection**
From the location sounds from birds and waves could be heard. There were also sound from motorboats going through Eskil´s canal.

During the analysis listening to sound, I experienced a sense of calmness and a sense also present after leaving the site. This illustrates the good quality of the site and is in the design important to preserve.

## Sensory analysis 3: Documentation of touch

The sensory analysis looked into the physical conditions at Sjöbacken using my feet. The investigation was documented with pictures.

**Aim:**
This investigation aimed to examine the textures experienced on-site and reflect on the sensory experience encountered. The investigation also aimed to understand the boundaries between different textures, and temperatures and how the senses affect balance and movement – the bodily experience.


*Figure 59: Illustration showing which senses were manly used during the analysis.*

**Reflection:**
During the analysis I experienced the body awareness increasing as surfaces were slippery and the terrain uneven and therefore became more aware of how the different surfaces and textures affected my body position and balance. Several different surfaces on site experienced unpleasant, for example, the wet and cold surfaces. However, the warmth from the cliffs became noticeable and interesting to incorporate into the design.

Lastly, the analysis was conducted at the end of March and could have been experienced differently during another season and therefore get a different outcome.



*Figure 60: Perceived sensation: Sand & grass felt cold and damp.*

*Figure 61: Perceived sensation: The grass felt ticklish and cold.*

*Figure 62: Perceived sensation: The sand & sea felt cold & smooth.*

*Figure 63: Perceived sensation: The cliff felt warm & dry.*

*Figure 64: Perceived sensation: The cliff felt cold, slippery & uneven.*

*Figure 65: Perceived sensation:The grass & seaweed & other felt cold, uneven & sharp.*

*Figure 66: Perceived sensation: The water felt cold, the bottom sand felt cold & soft.*

*Figure 67: Perceived sensation: The cliff felt warm, but the mussels and oysters shells felt sharp and uneven.*

*Figure 68: Perceived sensation: The cliff felt warm while the moss felt damp & slippery.*

# Interviews



## Interviews

Two people were interviewed, both with different sight disabilities. The interviews were semi-structured, conducted one-on-one.

**Aim:**
The interviews aimed to enhance a better understanding of how it is to live with a sight disability. The question asked intended to create knowledge of what obstacles there are when navigating in public areas. Questions were asked about the interviewee's experiences related to swimming and if they had examples of how design could contribute to making their experience on land and in water even better.

**Interview person 1:**
*Age: 80+*
*Eye condition: Cataract for approximately 15 years*
*Seeing level (10-0): 7*

**Navigating in public areas**
Interview person one expressed a hesitance to visit places outside of the home, due to the visual condition which instills a fear of falling and getting injured. When at home, the person senses security in knowing that everything has its place, making it easy to navigate. Interview person one experiences the visual impairment evokes a similar feeling of depression and that visits outside of the home exacerbate that feeling and understanding of that life has become more restricted due to the sight condition. The interviewee also expressed that age and pain in the body are factors affecting the feeling of being restricted. Nevertheless, the interviewee stated that navigating outside of the home, despite age-related ailments, would feel safer and easier if the vision was better (Personal communication, March 9, 2024).

**Swimming outdoors**
The interviewee has always loved to swim outdoors but today does it rarely. The interviewee´s last swimming experience was during last summer, when she swam in a lake, accessing the water from a private property. She got assistance from her partner to get to the property's pier. When getting in the water a cane was used as a tool to assist, and later the pier to hold on to. The bottom was explored using the sensation from the feet. When it was deep enough the person could fall into the water and swim freely. The interviewee expressed that the water is the one place where she does not feel limited. In the water, having a visual impairment does not matter, as lakes or seas are usually large enough for the person not to swim into objects the interviewee stated (Personal communication, March 9, 2024).

### Design ideas

When asking about a design that could create better possibilities for the person's swimming experience a few things were expressed. The interviewee expressed that she has a better experience when the sea becomes deeper more quickly, the alternative would be to have a longer pier to hold on to when entering and exiting the water. Regarding a design on land, the interviewee said there is no need for a specific design on land and stated, the experience is about the feeling of being in the water (Personal communication, March 9, 2024).

### Interview person 2:

*Age: 60+*
*Eye condition: Blind (Since the age of 27)*
*Seeing level (10-0): 0*

### Navigating public spaces

The interviewee shared he is an old elite athlete and has always appreciated spending time in nature. Today, time is spent in nature alone or together with others. The interviewed person is involved in the organization Active Blind in the Stockholm region. The organization organizes various types of activities and often hikes in natural surroundings. The excursion group meets up and then goes out to a designated location. The interviewee does not have a guide or guide dog, he only uses a cane and navigates by listening for sounds. The interviewee describes how it is easier to locate oneself in the city and the forest than out at sea. In the city or the forest, sound shadows are created from buildings, cars and trees, among other things, which make it easy to relate to one's surroundings (Personal communication, March 13, 2024).

### Swimming outdoor

When visiting an outdoor swimming area, the interviewee highlighted the importance of having a pier, providing a reference point and a potential diving spot. Furthermore, the interviewee expressed the importance of not ever bathing alone, sighted or not. He also expresses that he thinks it is not common for blind individuals to go swimming by themselves if it is not in an indoor pool (Personal communication, March 13, 2024).

The interviewee emphasized the usefulness of sound beacons. Not only for navigation to a specific location but also for orientating oneself in the water and back to the pier, beach or one´s towel. Sound beacons can be installed on-site or accessed from an app on the mobile phone. The interviewee expressed that he would never swim completely by himself without a beacon, this because he finds it more difficult to locate the sounds in the water compared to on land (Personal communication, March 13, 2024).





### Design ideas

Regarding design, the interviewee did not express any specific wishes for an outdoor swimming area, other than, it should be easy to get in and out of the water. The interviewee expressed, that there is no need for artificial tactile paths to the bathing area. He explains that he usually navigates with help from elements in the surroundings, for example, a path or the wayside. Friends or family who are sighted can also be to help and navigate to the bathing area, if there are a lot of people, for example. When asking about the surroundings and quietness, the interviewee expressed it would have been appreciated if the swimming area was located in a more quiet and secluded place, but that it is not a necessity for him (Personal communication, March 13, 2024).

### Result

Both of the interviewees have different experiences of navigating in public and outdoor environments. Interview person one is perceived as more afraid meanwhile interview person 2 is perceived as life does not have too many obstacles, even suggesting a pier to dive from which for many, seeing or not, might feel scary. Their different attitudes show how contrasting perspectives there are between the thesis target group and in conclusion a complex group to meet the needs for.

Both of the interviewees consider a pier as useful, both to hold on to when entering the water and as a reference point while in the water. Both of the interviewees also expressed they never go to a swimming area alone; they always have someone with them. Interview person 2 also said he does not believe many people go swimming outdoors alone.

The interviewees did not provide any specific examples of a design related to swimming and water, except the importance of being able to enter and exit the water smoothly. Interview person 1 expressed an appreciation of placing a design at a location where the water gets deep quickly, while interview person 2 preferred being at a pier and possibly where he could dive from. Two examples are interpreted as an appreciation of a swimming area not being located in a too shallow area.

# Program



## Design program

The thesis program is based on the theory and reflections from sensory analysis and interviews. The design should be simple and applicable to other places. This by working with the subtlety of the location and paying attention to already visible qualities as well as enhancing new ones. This to enable more people to experience enjoyment and well-being while visiting an outdoor bathing area. To achieve the goal the design needs to meet different criteria on land and in the water.

*Figure 69: Illustration connected to on land criteras*

*Figure 70: Illustration connected to in water criteras*

### On land

- The design on land should provide good navigability and accessibility. Tailored to the needs of the target group.
- The design should create attractiveness while being simple in its design to be applicable to other locations.
- The design and added element should aim to create an understanding on the environment. Enabling the visitors a positive sensory experience.
- The material being used for the design should be functioned in closeness to the water for an extended period.

### In Water

- The design should create a feeling of joyfulness and safeness where the visitor can freely swim, bathe or play in the water.
- The visitor should individually be able to enter and exit the water as well as navigate within the water.
- The design creates attractiveness while being simple in its design and applicable to other locations.

## Design principals

Following design principles are overarching guidelines that the design should adhere to in the design proposal. The principles are based on promoting enjoyment and navigation.

Ⓔ Enjoyment – The design proposal should aim to create positive sensory experiences that bring a feeling of enjoyment and well-being to the visitor.

Ⓝ Navigation – The design proposal should aim to have a multisensory design to enhance the visitor's experience and accessibility.

The principles are described here. The symbols "e" and "n" are placed on the principles that promote enjoyment (e) and navigation (n).






## Design strategies

The following design strategies should be implemented in the design proposal. These aim to achieve the Goal of the thesis.

[S]

**Smell**
Usages of plants and materials that strengthen the sensory experience and the visitors position within the space.

[H]

**Hearing**
Placement of an acoustic beacon that helps the visitor to navigate in the space or within the water. The beacon could be a technical acoustic solution or a natural beacon, an object that creates a sound in the space it is placed in. The choice of materials can also create sound depending on the weather conditions, this should be pleasant sounds supporting the space.

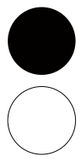
[T]

**Touch**
To enhance the visitors experience, implement level differences and create orientation by tactility differences. This can be strengthened by different materials and textures. Another aspect, ensure the accessibility to surrounding natural elements by integrating them into the design and fostering the relationship between the built environment and nature.

[B]

**Balance**
Creating awareness of the visitos plumb line and understanding of where the body is positioned within the space. This can be supported and strengthened by the choice of material and color setting.

[V]



**Contrast**
Contrast lines or implementing contrast in colour and material or colorful elements that can create a reference point. Create contrast by using material that differs from the surrounding or element in closeness.

# Design proposal



## The proposal

Through thoughtful design choices and selected materials and vegetation, the site at Sjöbacken has been given a new personality and engaging the senses, notably, - Smell, sound and touch. A new space has been formed, offering spaces to sit, stay and move, both on land and in the water. The new surfaces aim to create a space of enjoyment that entails well-being.

The illustration showcases a wooden deck and pier extending into the water. Within the water, the swimming trail is visible, along with the float where a person have swum to indulge in tranquility.

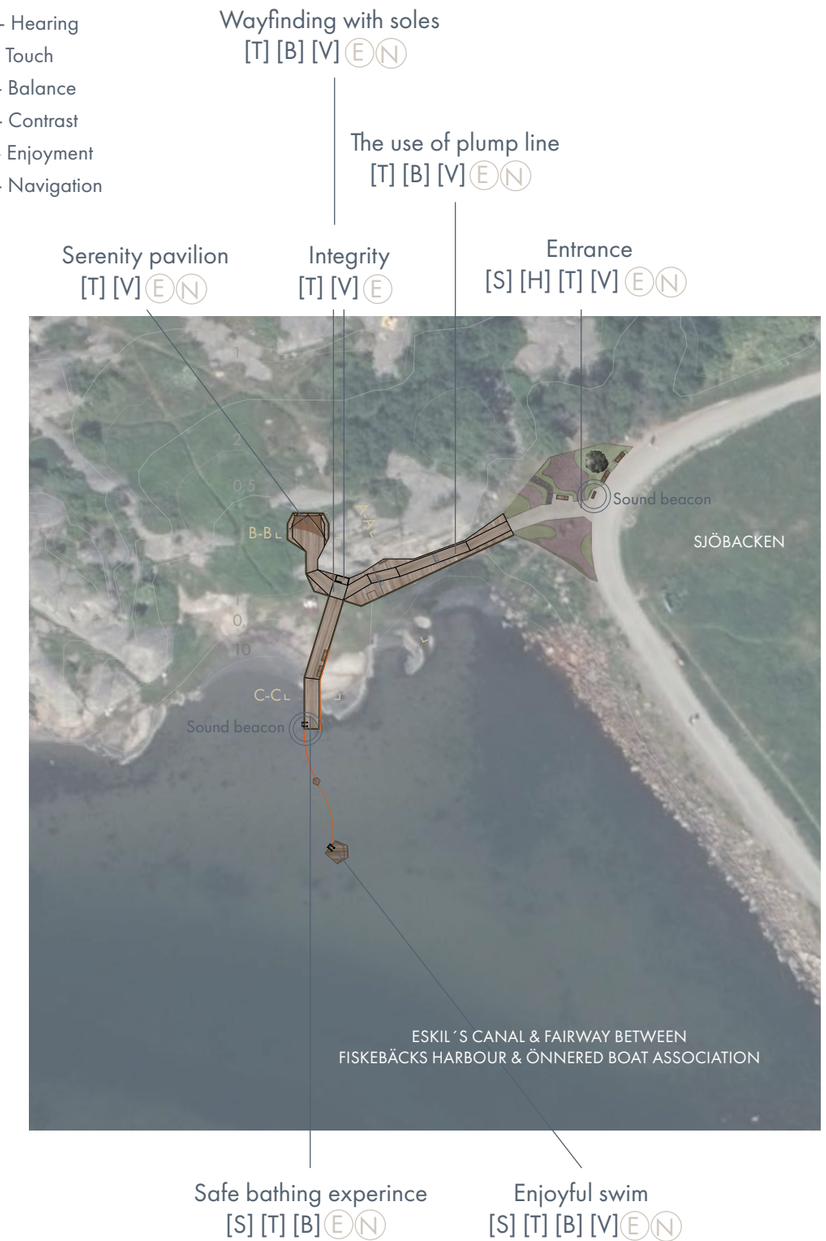
## Illustrative plan

Scale 1:800

**Legend**

*Detailed description and meaning of the different letters can be found under design principles and design strategies.*

[S] - Smell
[H] - Hearing
[T] - Touch
[B] - Balance
[V] - Contrast
(E) - Enjoyment
(N) - Navigation






# On land

The illustration showcases the entrance framed by lavender and soft grass before reaching the wooden deck. To the left in the illustration, the swimming trail is visible.

As visitors arrive at the site they are welcomed by a selection of vegetation, framing the entrance. This aim to, consciously or subconsciously, create an understanding the environment is changing. Either this is understood with only one sense or a combination.

The entrance is experienced through the gentle fragrance emanating from the blossoms or the sound from the leaves on the silver willow. With the help of vision, the visitor can distinguish a change in the environment through observing the ground material. The ground material has a darker color in comparison to the existing walking path, creating a contrast that aims to help the visitor to navigate.

The entrance´s previous areas of use have also been taken into consideration. Benches have been placed in more contact with the blossom and facing the field of Sjöbacken and Eskil´s canal. The former trail leading the visitor further onto the cliffs has been preserved. The trail is narrow and framed by vegetation, intentionally designed to distinguish the trail from the main walkway. The trail is paved with black and white stones, creating a visual contrast from the main walkway leading to the wooden deck. The stones on the trail also offer a different tactile experience compared to the gravel of the main walkway.

## Entrance
[S] [H] [T] [V] (E) (N)

Selection of vegetation

Lavendel for smell & color

Soft grass for touch

Silver willow for sound


Illustrative plan

1:200

0 1 5 10

Information sign

When arriving from the existing walking path the visitor is met by an tactile information sign, explaining the area to the visitor either by touch of the hands, visually or by information from a sound beacon. The sound beacon provides information about the location, other beacons and physical factors, for example, wind conditions, water quality and temperature.



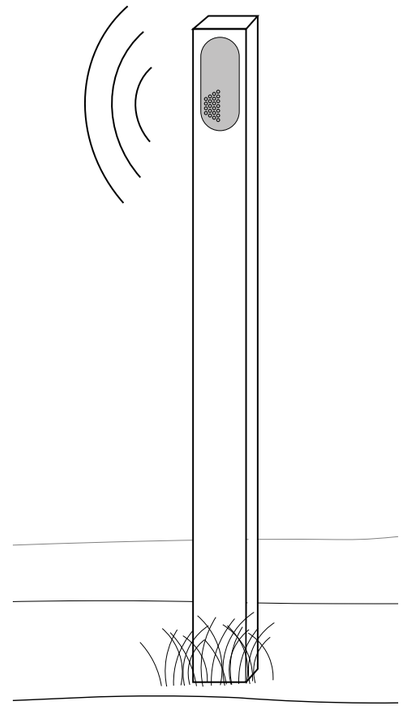
## Sound beacons - a navigation tool

In the design proposal, sound beacons have been used to enable the target groups possibility to individually get to the location. The sound beacons can be used by anyone but are designed as a helping tool for individuals with blindness. The sound beacons have a sound length on 5-20 meters, illustrated by the radius of the yellow circles (seen in the following pages). The beacons can be started by connecting trough a mobile phone and provide information on how to navigate to and on the site. When the beacons are not in use the device is quiet.

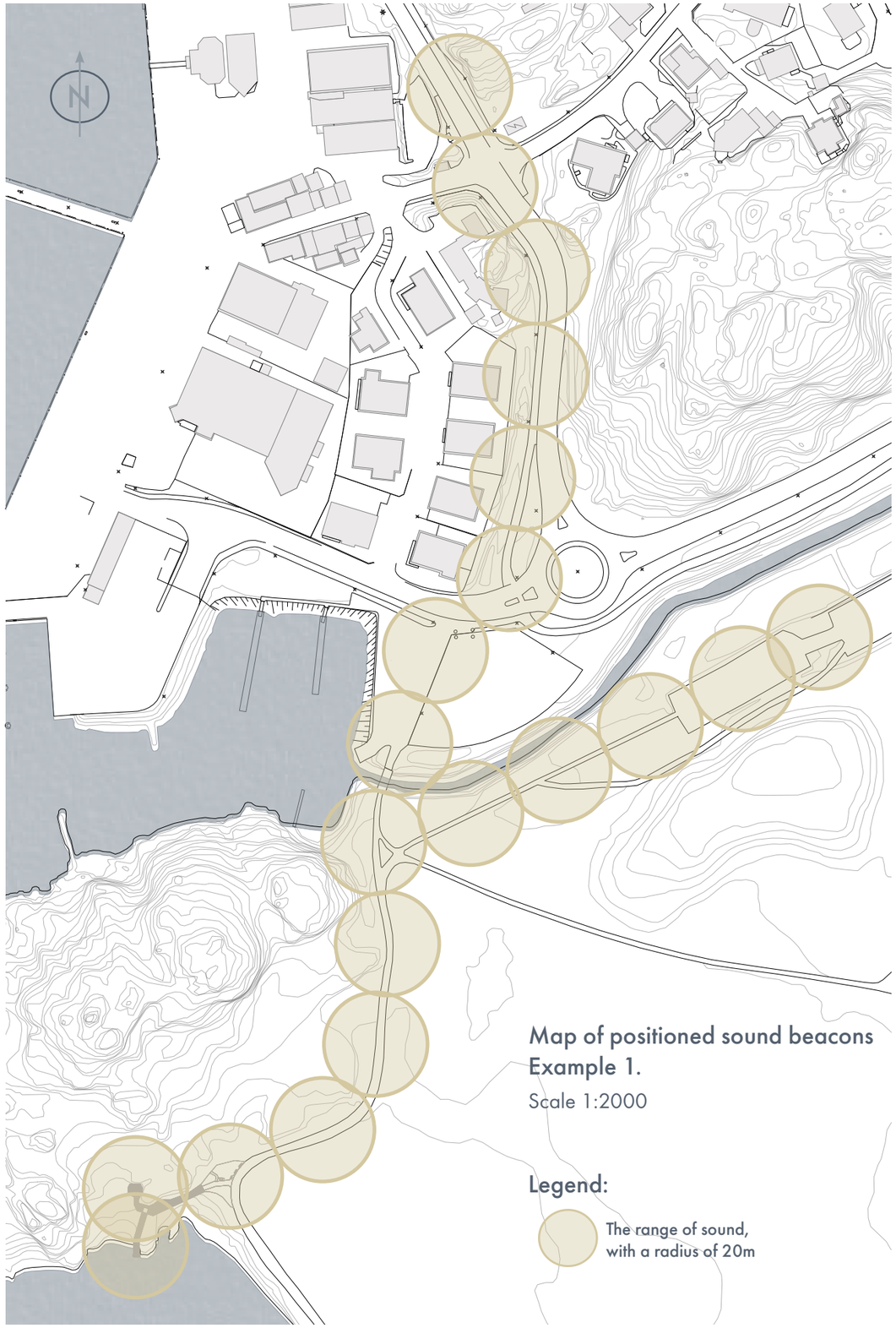
The situation plans on the following pages visualize two conceptual example of how the beacons could be placed.

### Example 1.
The proposal shows an uninterrupted chain of beacons. This chain guide the visitor from either the parking lot or the bus stop to the site, providing information on how to navigate.

### Example 2.
This example is based on the reflections from the blind walk. The proposal shows a specific placement of the beacons. Placed where the visitor could be confused about the route to the site. The idea with the proposal is to only help the visitor when confusion may arise, the rest of the way to the location will be experienced with the help of the person´s senses.



Example of a sound beacon, set up by the side of the promenad at Sjöbacken.



Map of positioned sound beacons
Example 1.
Scale 1:2000

Legend:

The range of sound,
with a radius of 20m





Map of positioned sound beacons
Example 2.
Scale 1:2000

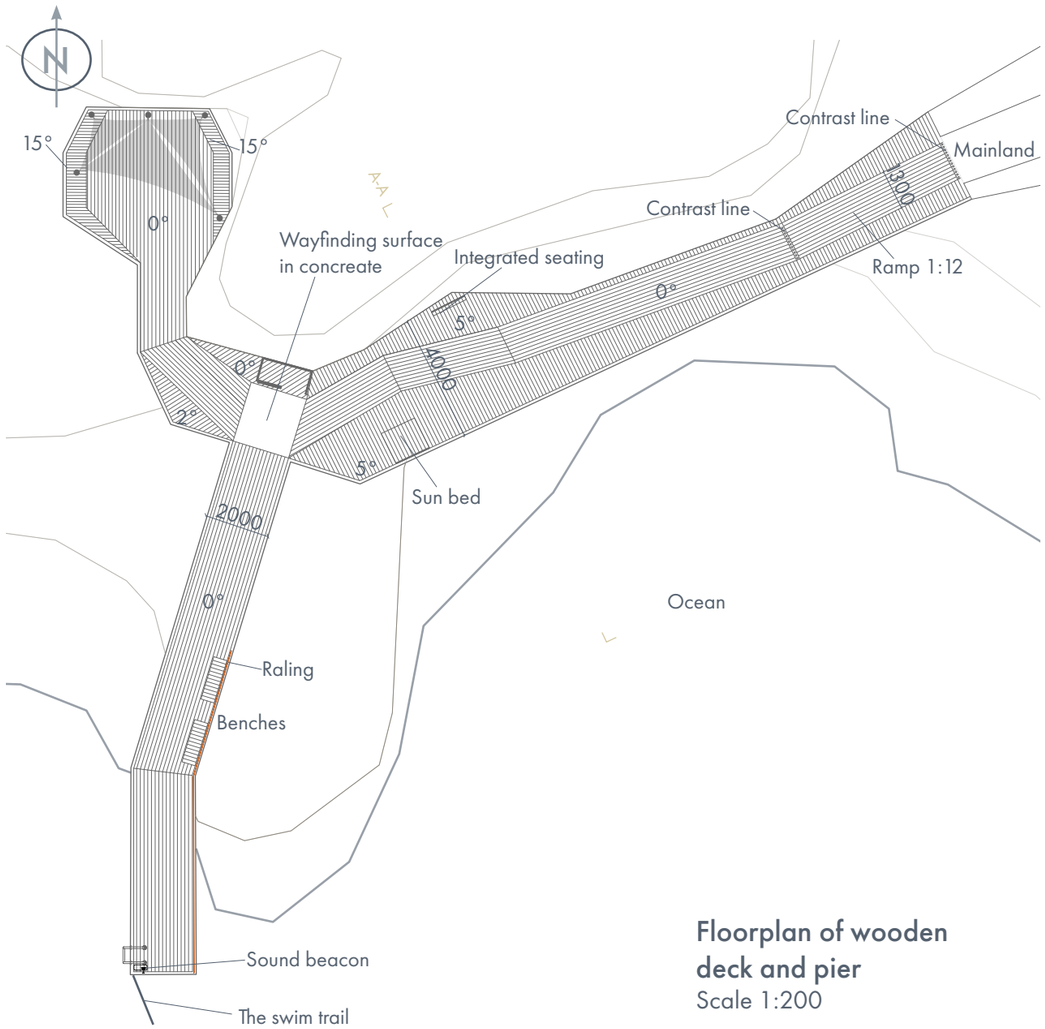
Legend:

The range of sound,
with a radius of 20m

## The use of plump line

[T] [B] [V] (E) (N)

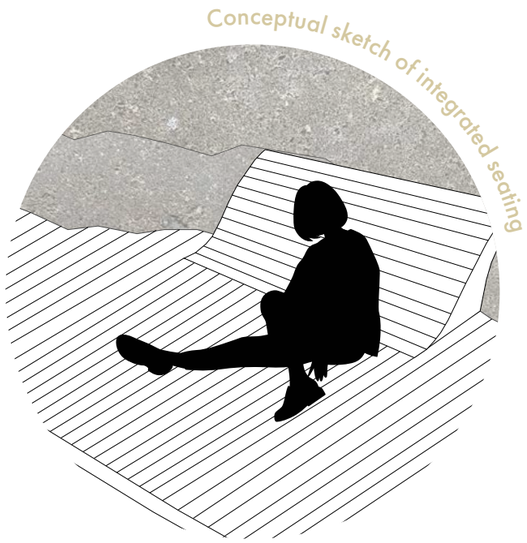
For the envisioned wooden deck tilting has been used as a design method to create an experience through the body´s position. This has contributed to the balance becoming a fundamental aspect of the sensory experience at the location. The incline serves as a guiding force, regulating movement and enhancing safety by delineating the area towards the water. Establishing a clear boundary, both through the body´s position and the sight, ensures a define between land and water. The deck is integrated with the cliffs and positioned alongside the shoreline to not diminish the good qualities already present at the location.



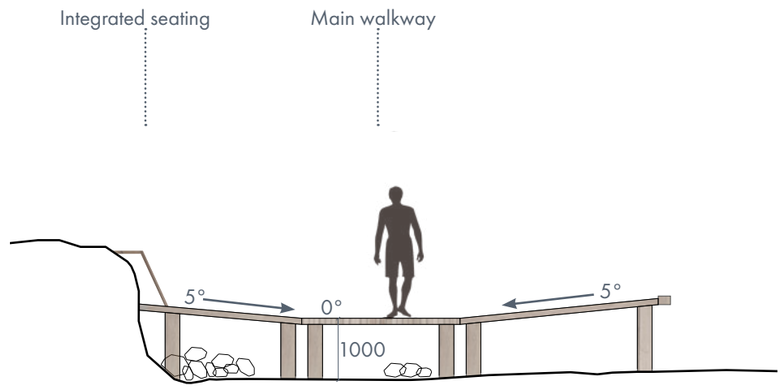

**Floorplan of wooden deck and pier**
Scale 1:200



The wood deck has been designed with sit and stay places that are obvious to the visitor, especially with sight. For example, a seating area has been integrated with the cliffs or a sun bed integrated with the incline of the pier. Although there are obvious surfaces the hope is that the deck will be explored and used according to the visitor's own needs.




Conceptual sketch of a visitor resting on the deck and illustrates a seating area integrated with the cliff.




**Section A-A**
Scale 1:50

The section showcase the incline, in this section a 5-degree incline on both sides.

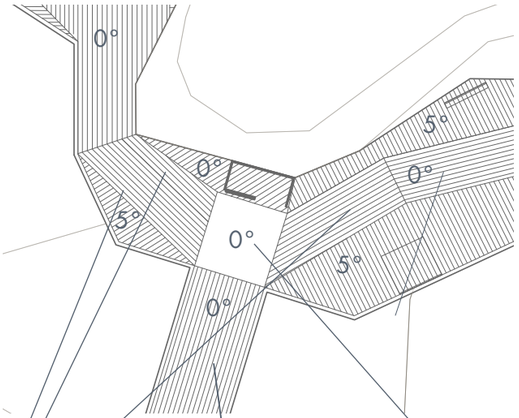
## Wayfinding with soles

[T] [B] [V] E N

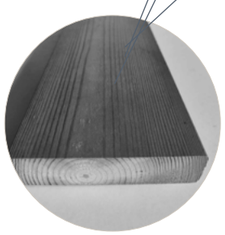
The guiding path is inspired by the artificial guiding method but implemented with natural materials. The part of the bridge, with zero incline, is designed as the main walkway. All planks follow the movement pattern of the walkway and meet at a flat concrete surface, the wayfinding point. When felt barefoot, a temperature difference can be sensed, indicating that the person has reached the wayfinding point and can choose a direction to navigate. The land section of the bridge consists of wooden planks with a flat surface, while the pier extending into the water has grooved planks, signalling a change in the environment and that the person is heading out into the water.

The implementation of different textures to create navigation in a space is inspired by the reference project in Gandhinagar.

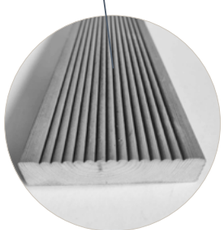
### Floorplan of wood deck



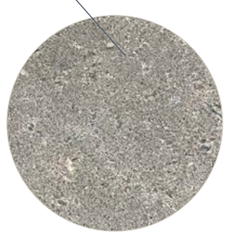

### Materials



Leading surface in impregnated wood with flat surface



Leading surface in impregnated wood with grooved surface



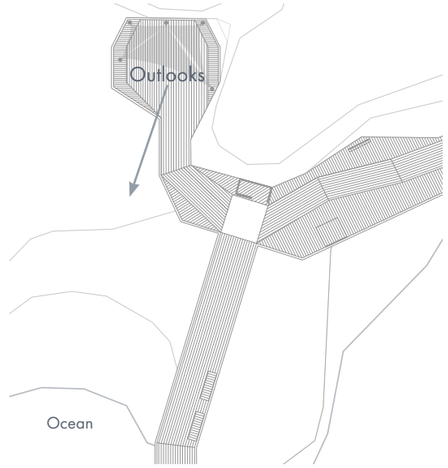
Wayfinding surface in concrete



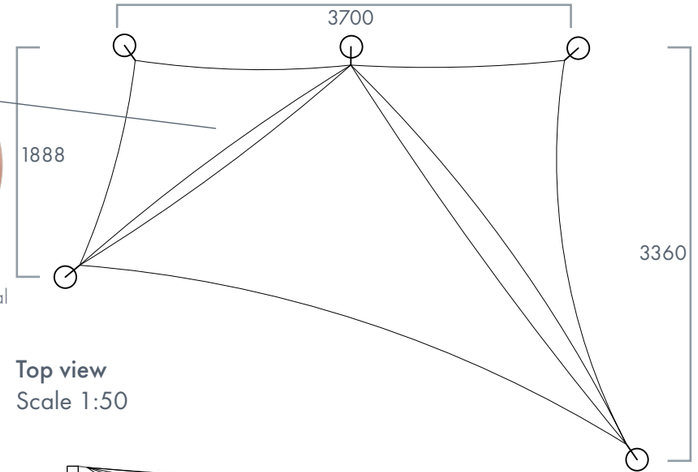
## Serenity pavilion

[T] [V] E N

A place to catch your breath and shield from sun or rain. The pavilion is placed between two cliffs and offers views of the sea and Eskil´s canal. The back part of the pavilion is in closeness to the cliffs and the sides of the pier are defined by incline, in order to create boundaries for the space. By this design, the visitor will understand the space of the pavilion being the end of the pier. The roof structure of the pavilion is in coorteen steel, if it would rain the material will create a sound setting even more serenity to the spot under the pavilion.

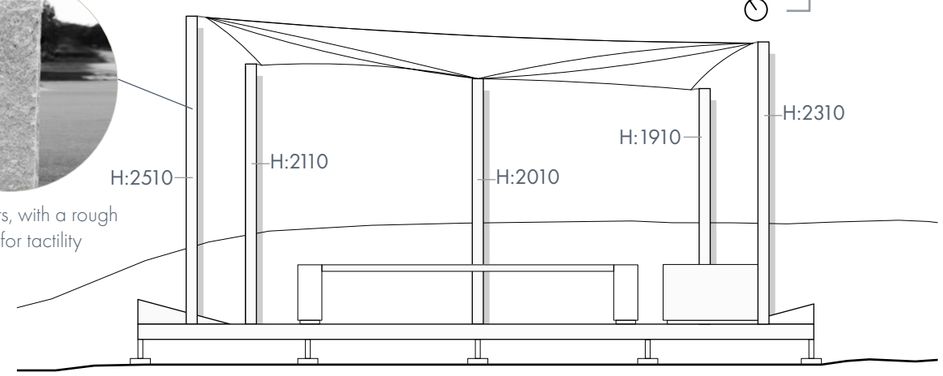



Corten steel as roof material




### Top view
Scale 1:50

Granite posts, with a rough surface for tactility




### Section B-B
Scale 1:50

### Integrity
[T] [V] (E)

Next to the wayfinding surface is a changing booth placed, strategically positioned for the convenience of all visitors. The idea of the changing room is an enclosed space where the visitor, without a guide or other help, individually can change into bathing attire.

The booth has a form of a rectangle with a sliding door mechanism where the visitor can sense by sight or touch that it is an enclosed space. Ensuring the individuals' privacy and a sense of freedom.

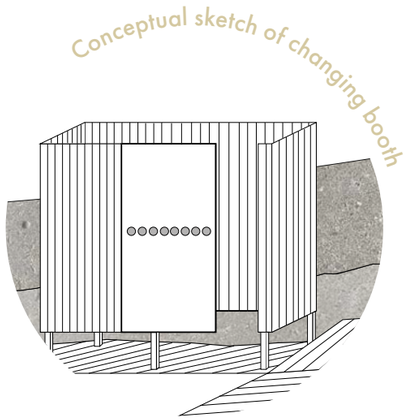
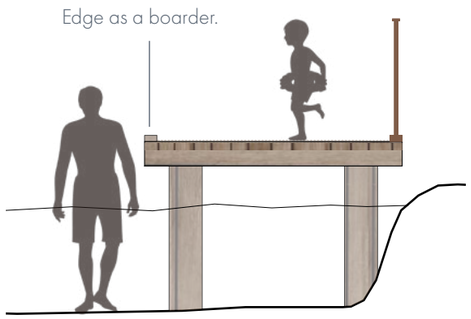



Illustration of changing booth, The wayfinding surface can be shown in the left corner.

## In water

### Safe bathing experince
[S] [T] [B] (E) (N)

The section of the pier extending into the water is intentionally resting on the cliff and partly in water, before extending fully into the water. This thoughtful placement ensures a supporting structure for the visitors transition from the shoreline to deeper waters. On the right side of the pier, a railing is designed to provide a safety barrier between the water and the cliffs.




**Section C-C**
Scale 1:50

The section visualizes the part of the pier that is submerged in the water. The bottom and the water level are an interpretation of a visual inspection during site visit. Water levels is consistently changing and may vary due to tide and different seasons of the year.

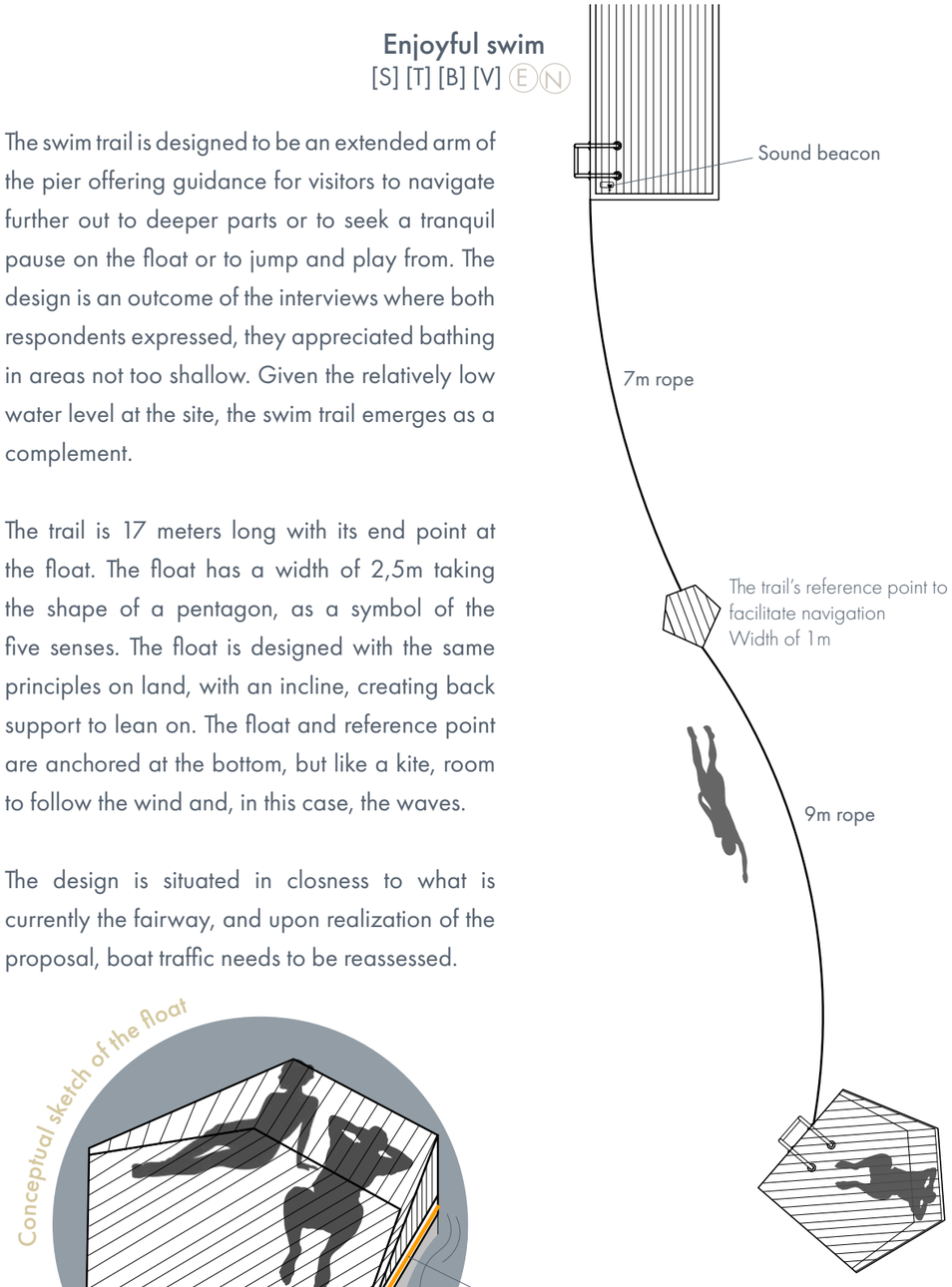


### Enjoyful swim
[S] [T] [B] [V] (E) (N)

The swim trail is designed to be an extended arm of the pier offering guidance for visitors to navigate further out to deeper parts or to seek a tranquil pause on the float or to jump and play from. The design is an outcome of the interviews where both respondents expressed, they appreciated bathing in areas not too shallow. Given the relatively low water level at the site, the swim trail emerges as a complement.

The trail is 17 meters long with its end point at the float. The float has a width of 2,5m taking the shape of a pentagon, as a symbol of the five senses. The float is designed with the same principles on land, with an incline, creating back support to lean on. The float and reference point are anchored at the bottom, but like a kite, room to follow the wind and, in this case, the waves.

The design is situated in closness to what is currently the fairway, and upon realization of the proposal, boat traffic needs to be reassessed.







**Top view**
Scale 1:200

# Discussion



## Discussion

The design proposal is an outcome of the study's different parts and the thesis's main research question:

> *How can sensory design principles be implemented in landscape and contribute to an enjoyable outdoor bathing experience for individuals with visual impairment?*

### Introduction

Every human being is unique, just as a person's visual impairment is unique. This study shows that visual impairments vary from person to person and that those living with visual impairments experience their surroundings differently. This means that planning for the needs of the target group can be challenging because each person has unique conditions and perceiving their environment differently.

### Design Proposal

Just as every human is unique, so is every place. In this design proposal, the design has been adapted to the size of the location, utilizing its unique qualities while aiming to enhance the place beyond the visual sense.

The location of the design is relatively secluded but with easy access to transportation, which has been important characteristics when choosing the site location. As mentioned in the context, the site is located 5 min from a parking lot and 7-10 min from public transport. This has ensured that the location is easily accessible to visitors. Meanwhile, the secluded location instills a sense of calm and quietness, allowing for the use of senses beyond sight.

Balance, affecting multiple senses, has been a fundamental part of the design on land and has been used as a tool to create direction when navigating the space. The inclination serves not only as an aesthetic detail marking the main path of the bridge but also as a protective barrier promoting accessibility and safety. The main path as the navigation path with different materials and textures is inspired by the reference project in Gandhinagar, where the architects worked with different textures to create orientation. Design also seen at Askims Badet (see Figure 43, page 39.). Similar principles have been used on the main path to help visitors navigate. Primarily designed for those who are severely visually impaired or blind but should also be helpful for other visitors, facilitating conscious or subconscious navigation.

To easily access the water, as a result of the interviews, the visitor can use the bathing ladder on the pier or use the pier as a support to go into the water. Regarding a design in water, the interviewees did not have any specific suggestions or wishes. What they both appreciated was the location of the bathing area not being placed where there is a low water level.

Why they did not make any specific suggestions or requests may be because they do not see the need for a design or they simply do not want one. This may also be an outcome of a research gap and the target groups needs not being met (Tengbom n.d.).

As mentioned, in the summary of the reference project the mermaid flutes, the bathing facility is unique in its kind. There are no other known bathing facilities for the visually impaired. For people not working as architects or professionals in design, a solution may be difficult to describe. Therefore, my role as an architect comes in, where I have the opportunity to fulfill requirements that the target group had not thought of.

The water level at the site is relatively low and the bottom conditions are shallow, as shown in (Figure 48 ). Taking into account, the interviewee's appreciation of a bathing area not being located where there is a low water level, the swimming trail came to mind.

The design of an extended arm of the pier creates support to navigate visitors further out to deeper parts or to enjoy a pause on the float. The trail and middle reference points create an accessible navigation route and support back to the pier and shoreline. Providing accessibility and safety and promoting a sense of enjoyment and well-being.

The design of an extended arm of the pier creates support to navigate visitors further out to deeper parts or to enjoy a pause on the float. The trail and middle reference points create an accessible navigation route and support back to the pier and shoreline. Providing accessibility and safety and promoting a sense of enjoyment and well-being.

### Methodology and Future Research

As mentioned, there is a research gap concerning visual impairment and outdoor bathing areas. This study also shows that there in general is a research gap regarding the target group. In the thesis, it has been difficult to find previous studies, tools, and frameworks for how architects should meet the needs of the group in architecture and spatial planning. The literature studies in the thesis are to the majority based on documents from SRF and have been of significant importance as they have provided the information needed. However, it also indicates that there is a lack of other sources. This may be because architecture primarily influences and is based on the visual, as Pallasmaa (2012) also claims. This research gap has therefore partly limited the study. On the other hand, the gap has been supported by the interviews, which have provided valuable information regarding experiences and navigating outdoor public spaces but as mentioned there is a gap regarding outdoor bathing. For future research, this could be further explored. In another study, it would be interesting to incorporate more perspectives. An idea would be to visit to the Mermaird flutes in Denmark and interview bathers at the facility and do further research.

For this study the next step, in the promotion of a norm-creative process, the design outcome should be discussed with individuals from the target group. For example, a deeper study of the sound beacons, what happens if the connection of the beacons does not work, and how navigation by sound could be applicate in another way?

### Final words

This design has ensured a more enjoyable bathing experience, enriched the location's sensory experiences, and provided an outdoor bathing area accessible for the target group and those beyond. Lastly, this thesis will help to fill the research and encourage others to experience architecture with multiple senses.

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CHALMERS
UNIVERSITY OF TECHNOLOGY

# Waves of senses

A focus on enjoyful outdoor bathing experiences tailored to individuals with a visual impairment

Master thesis | Spring 2024

Chalmers School of Architecture
Department of Architecture & Civil Engineering

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