



TALES OF MOVEMENT

The exploration of the correlation between human movement and the built environment through the development of a design methodology



CHALMERS

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Tales of movement

*The exploration of the correlation between human movement and the built environment
through the development of a design methodology*
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For me this thesis is an exploration of how we can stay curious in architecture. Curiosity is my driving force, together with the belief that we can create a fairer, more sustainable, as well as beautiful, world if we sometimes take time to challenge the way things always have been done.

Education

- 2021 Master of Architecture,
Architecture and urban design,
120 ECTS
Chalmers University of Technology
- 2019 Bachelor's degree in Architecture,
180 ECTS
Chalmers University of Technology
- 2014 Bachelor's degree in Global Studies,
180 ECTS
Gothenburg University

Relevant experience

- 2020 Internship at the city planning office
in Gothenburg, Strategic division
Gothenburg municipality
- 2017 Research assistant, Architecture and
2018 Civil Engineering
Chalmers University of Technology
- 2011 Garden designer & foundation works
-2016 SMAB Design, Gothenburg

Competitions

- 2018 Prasad Färg
Second Place team
- 2017 Wallenstam's tower building contest
Winning team

abstract

This thesis is an exploration of strategies and methods of designing with movement as the focal point. Four different ways of analysing and designing with motion in mind are tested and discussed within the delimitations of the thesis. The aim of the final design is to test the four strategies but also to investigate the potential that exists in movement between time and space in order to give a place new meaning.

As a method, movement was broken down in parts to be analysed as existing in a field of tension between time and space. Therefore several studies of different character were carried out with the aim of coming up with concrete design strategies that could be tested in the final design.

The first study analyse how one can move within different spatial configurations, how our perception of a space and movement within it is related to each other. The study develops into a sketch method that generates spatial designs and functions from certain kinds of movement. For the second study, the video game *Zelda: Breath of the Wild* was the subject because of how it uses two design strategies to create effortless movement in the game for the player. These two strategies are replicated and altered to fit in a real-life urban context and studies how one can direct movement by using attraction points and obscuring objective. The third study superimpose seven layers of the chosen site, Kanaltorget in Gothenburg, in order to reveal how motion of the past can affect the way we move in the present.

Drawing from Japanese culture, this thesis started out as an exploration of what lies in-between space and time and how it is expressed architecturally. But as the process itself started to move and grow into the unknown, it transformed to strategies, new elements with new morphologies are mixed with old ones as an organizational strategy. Instead of trying to control the chaotic nature of the city, this thesis is an exploration of how to create a different urban choreography that celebrates movement, the controllable as well as the uncontrollable, rather than resisting it.

Keywords : movement, elemental design, design strategy

Bibliography

Aim..... 11

1. Background.....12

2. Theory..... 16

3. Methodology.....18



4. Analysis of motion

- Sketching technique..... 22



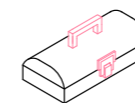
5. Designing for motion

- Method study..... 42



6. Place in motion

- Overlay mapping..... 50



7. Design proposal

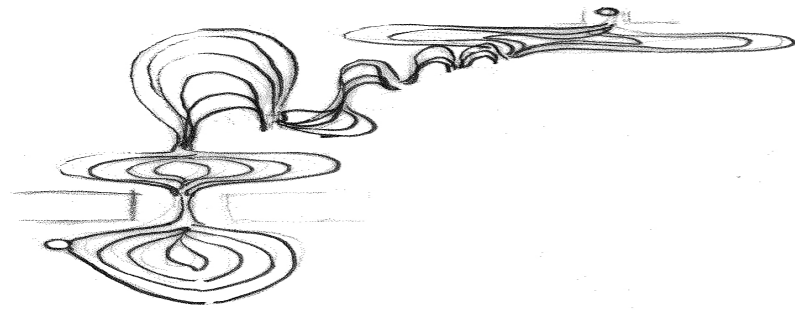
- Telling tales of movement. 56

Reference list..... 82

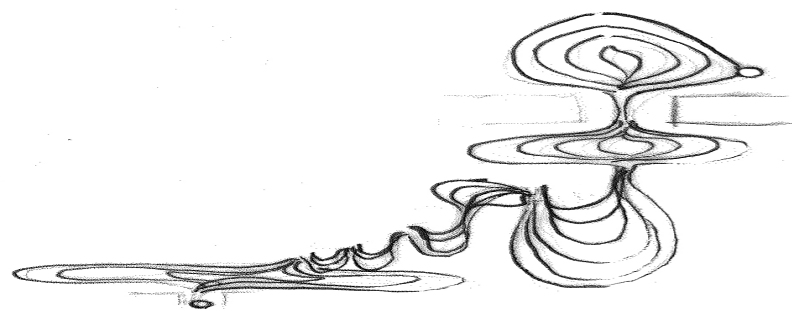
Appendix..... 84

aim

To explore the correlation between human movement and the built environment, develop a design methodology and apply it to an existing urban environment in order to create new meaning that highlight and influence human movement.



1. background



”Movement and change has always been
part of our inheritance;
static architecture has always been
connected by kinetic passage
- a duality echoed by life itself.”

- Lawrence Halprin, Freeways, 1966, p.23

The world and global cultural discourse we live in today move in a fast pace. Never before have such movement en-masse been recorded of one species. Humans move over the globe, but also constantly in their daily lives. Many move great distances in and out of our cities over the course of a day to get to work and back home, distances that would be utterly unrealistic just 100 years ago. We also move rapidly in our mind, changing our focus from one screen to the other as we simultaneously juggle several conversations, read the news, think about what to make for dinner, write notes to remember birthdays, never turning off our electronical gadgets that enable us to be in constant movement. One might even say we move, rather than live, today. As the cities are a reflection of our time, they also move as they rapidly transform to fit the present needs. Some quicker, such as Tokyo or Mumbai, some slower, such as Rome or Gothenburg. As the initial quote of Halprin states, movement and change is linked. Change is an inevitable consequence of movement.

One might draw the conclusion that if movement and change is linked and the world is spinning faster than ever, then we might want to stop it because it is bad. It feels bad, because with change comes the unknown. We feel like we have lost control and we dig our heels in and try to hold on to anything that makes it feel like the same as before. But we do not have control. As a species, we do have some control, but we are not one mind but billions of individual ones, all with the capacity to believe in common causes or ideas. If we could accept change, then we might have a fighting chance to steer it. Change is not strange or unwelcome in an environment that has it as a primary component. Furthermore, change is in fact required because of the quick alterations in travelling, living, producing, and consuming brought by globalisation, urbanisation, and the information society we live in.

It is relevant to discuss the general mindset to movement in cultures. An example of a culture that to a higher extent embrace change is found in Japan. Japanese societies are often misunderstood as a consequence of commercialism and technology, when

in fact it is a combination of tradition and technology (Shelton, 1999, p.14). Yin and yang are symbols of the completion of the opposites, with the small circles of white and black within each field representing what they call in Buddhism the third element. This third element has fascinated the Japanese, as can be seen in art, poetry, theatre, and architecture among others, where they try to make it visible in order to showcase this natural tension. The third element is the foundation of this thesis. Fridh mentions in her book *Japanska Rum* (2004), that in Eastern metaphysics, the dichotomic divide between black and white does not exist – the third element in between reconciles the two. This goes directly against the Western traditions where already Aristoteles phrased “Tertium non datur”, translated as “No third [possibility] is given”. This is in logics generally known as the Law of excluded middle and means that for any proposition, either the proposition is true, or its negation is true (Nationalencyklopedin).

Over time this dichotomic outlook on life may have created a mindset that also became black or white, since Westerners are trained to not see gradients between dichotomies, eliminating all other possibilities but two. In Japan there is a higher resilience in the built environment than in the West when it comes to flexibility. Barrie Shelton states in his book *Learning from the Japanese city* that to the Westerner, “Japanese cities remain cluttered, garish, unfathomable and, seemingly, without trace of urban planning. At best, there is a delight in the vibrancy and intensity of city life but unease and distaste with the form.” (2004, p.7). However, Fumihiko Maki argues that the future of city building is more likely seen in Japan than in the West. He means that cities in the West are static in their predetermined programming, like little urban universes with Newtonian regularity. He compares this to a clock. He argues that modern cities are more like Japanese cities, like clouds! Japanese cities are unstable worlds of Chaos where the behaviour system is so complex that it might as well be random (Maki, 1988, p. 8-10).

Change is seen in the gradients between opposites. A movement between the two. So, it becomes essential to understand movement in architecture, both physical and mental. Is it possible to start a design with movement as its primal focus? What can we learn from that? Drawing from Japanese culture, this thesis started out as an exploration of what lies in-between space and time, the movement and change, and how it is expressed architecturally. But as the process itself started to move and grow into the unknown, it transformed to strategies of how to create spaces not only accepting, but also celebrating movement. This thesis studies how, and if, in-depth knowledge of movement of different kinds, such as perceived, directed, or historic can help us develop tools for how to design with motion in mind.

Figure 1. Yin & Yang

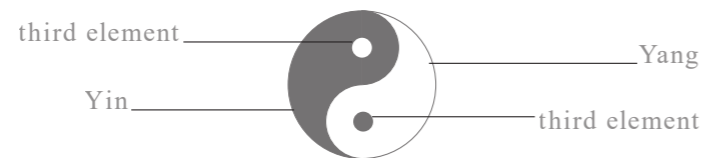
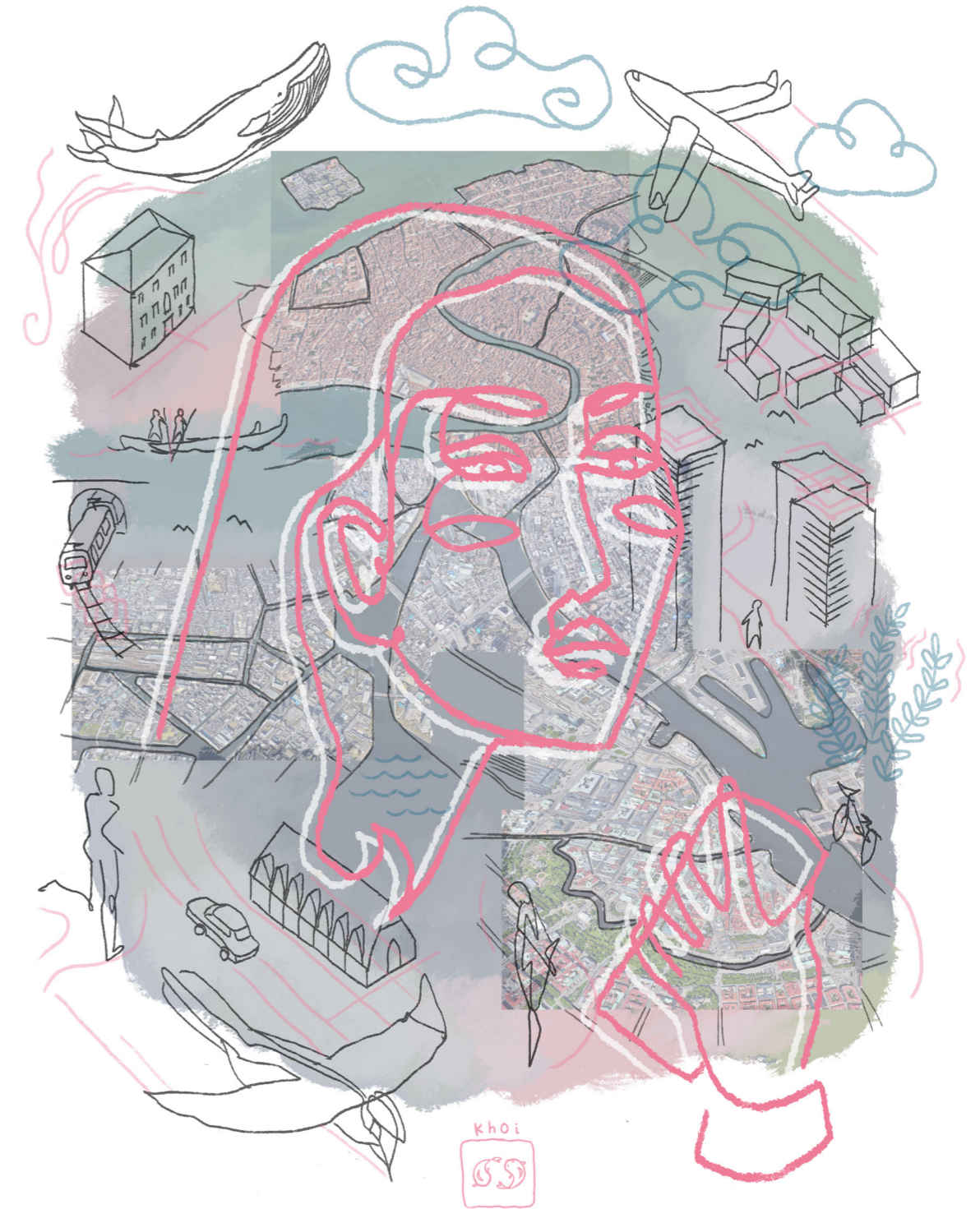


Figure 2. *Fast-paced life*, 2021, own illustration.



2. theory

”Form matters, but not so much the form of things as the form between things.”

- Stan Allen, From Object to Field, 1999, p.24

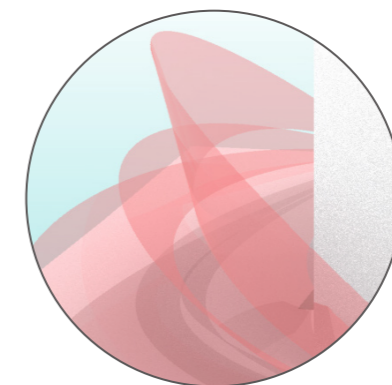
This thesis explores movement in relation to time and space. The theoretical tool needed for this is primarily the language of how to define design studies and discuss the results from them. Arne Branzells book *On the Bubble: A sketch-book on experienced space* (2013) discusses the perceived spatiality, which is similar to how this thesis also discusses perceived motion. The language of how he explores spaces through sketching and observing the spaces as potential of how one can perceive a space rather than what the space physically is, is relevant in a discussion of the fundamentals of movement.

When discussing the flexibility of the future in a city it is important to bring in a language that not only discusses the abstraction of movement on a concrete level, but also a language that let us discuss the playing field on which we build. Stan Allen argues that the school of architecture was historically associated with technical rationality and the production of legible functional relationships. Since then architects have come to replace this with a need to exercise control, to compensate for their actual power being diminished by bureaucracy. This attempt to exert control in architecture and planning can be seen as a desperate attempt to survive in a chaotic world, where the choices would stand between either top-down planned cities or uncontrolled growth (1999, p.30). This trail of thought rings true to a Swedish context, where architects have gradually, but glaringly evident, lost power over the course of the last century. In addition to bureaucracy and a growing distrust from expanding construction companies, architects in Sweden were also blamed for the perceived failings of the Million Programme built in the 1960's, leaving them with tied hands the coming decades (källa).

Even though it may be understandable why one would want to control a city, Allen argues similarly to Fumihiko Maki (see Background) that it is futile to try to control the uncontrollable and that it unmistakably turns into a zero-sum thinking for the architects. In his text *From Object to Field* he explores the issues architects have facing urban complexities. He does this by discussing schools within art and architecture, including Islamic and Christian architecture, Cubism, Post-Minimalism, up to the

beginning of exploration of artificial life (e.g. flocking behaviour) (ibid, passim). Allen expands on the subject as he thinks that we need to recognize the limits of an architect's ability to order a city and also learn from the complex self-regulatory processes that takes place within the city. He phrases the term "logistics of context", as a loosely defined working framework. It implies that one should shift the attention to service and supply, a logic of flow and vectors, with properties such as permeable boundaries, flexible internal relationships, multiple pathways and fluid hierarchies. It reasserts the whole by being only provisionally stable and always open to time. This offers a provisional and experimental approach to urban context where the architect gives up a portion of its control to recognise that the whole of the city is not given at once and that change is an inescapable part of life (1999, p.26).

Allen proposes to embrace the chaos by introducing the term "field conditions" (1999, p.24). A field condition can be any spatial or formal matrix with the capacity to unify diverse elements while respecting the identity of each. Field conditions acknowledges the messiness and unpredictability of life and works with the site, creating opportunities out of boundaries. They are loosely bounded aggregations characterised by porosity and local interconnectivity where the internal regulations of the parts are decisive and the overall shape and extent are highly fluid. Searching for these intricate local connections makes field conditions a bottom-up perspective. "What is proposed here is not simply a return to the mystification of construction and the phenomenology of the material. Rather, it is an attempt to go beyond the conventional opposition of construction and form-making." (Allen, 1999, p.27), meaning that if one understands construction as a sequence of events, it becomes possible to envision an architecture that can respond fluidly and sensitively to local difference while maintaining overall stability.



3. Methodology

delimitations

To be able to extract an answer to the hypotheses stated, some delimitations must be applied to keep the work focused. This means I sacrifice a broader view and favour getting a more in-depth knowledge of movement by delving deeper into some of the aspects of it before trying them out as design strategies.

- This thesis is a discussion and exploration of how one can generate design with movement as the foundation. It is *not* an all-inclusive method or strategy of how movement can or *should* be included in all designs.
- The work is based on an underlying literature study, where the focus of how the third elements affect us lies in spatial composition and the potential of flexibility (see more in Appendix about the literature study). The study led to choosing the subject movement for the thesis but is not included as a way to delimit the discussion.
- For the final design, focus lies only on one site in Gothenburg, Kanaltorget, and the following discussion centres around the result of that.
- Field studies to be executed spring 2021 was planned to study the Japanese architecture first hand. Due to covid-19, traveling was not an option and other media sources were used instead to gather similar knowledge, such as Google maps, Youtube and books. It can be argued that looking at pictures and videos in addition to reading texts can not be proficient to evaluate major parts of another cultures architectural legacy. This is true, however, my aim is to examine some selected parts in relation to movement and evaluate those to see how a different mindset when creating spaces change our own local experiences of architecture.

work flow

In chronological order:

Phase 1 - 2 weeks long

- Literature study of Japanese art, poetry and architecture completed.
- Quantitative collection of data starting from the focal point of spatial composition.
- Categorisation of chosen data into opposites and consequently, the gradients that bridge the gap. Choosing gradient movement.

Phase 2 - 7 weeks long

- Deconstruction of real references where movement as an aspect is actively used in order to create design.
- Carry out design studies.
- Analyse the results of design studies and start creation of a toolbox.

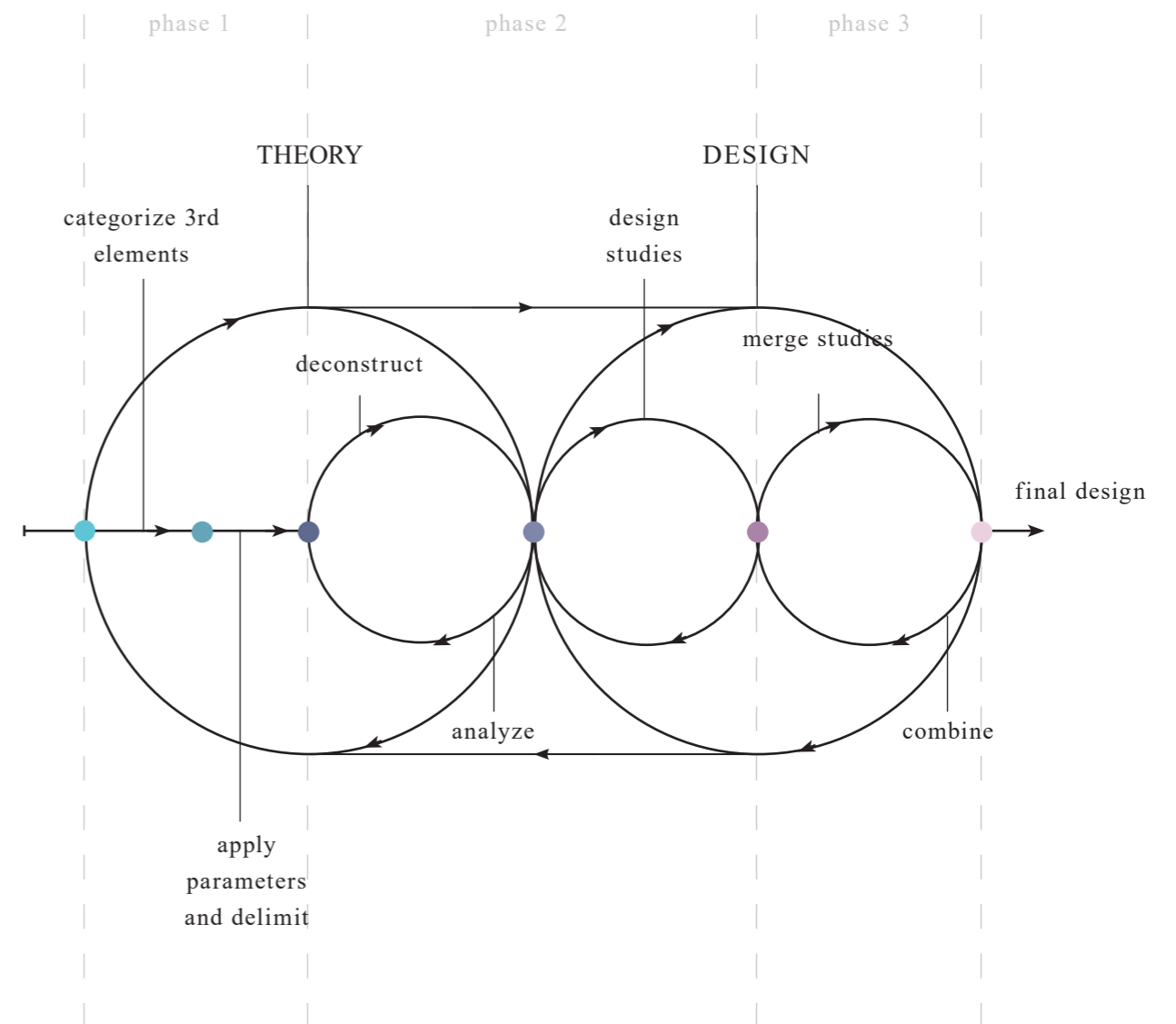
Phase 3 - 5 weeks long

- Finalize toolbox and start design in a local context in Gothenburg.
- Choose site.
- Design phase, iterate applications for toolbox.
- Evaluate if the design support the aim and implications on site.

technique

- Readings for movement and literature studies: Books, articles, art, interviews and architecture.
- Performing case studies: Mixed media, Rhino 6, Sketchup Make and Autocad.
- Illustrating case studies and final design: Adobe Photoshop, Autocad and Adobe Illustrator.
- Performing final design: Adobe Photoshop, Rhino 6 and Twinmotion.
- Designing booklet: Adobe Indesign.

process



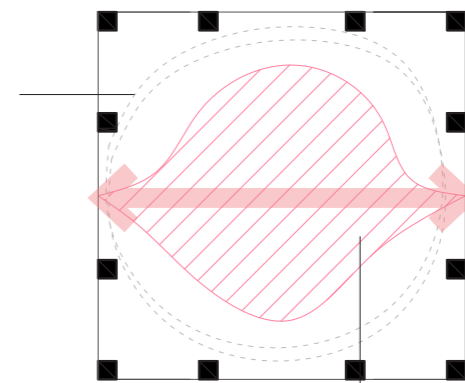
expressing movement

How can we measure movement when sketching?

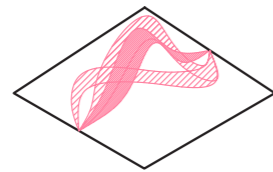
Visualizing movement can be done quite straightforward with numbers and figures as long as you have statistics from reality to back it up with. Things get more complex when you try to visualize the movement in a theoretical space as an architect often must do. You have the parameters that are objective to a certain degree, like inclination, sound, illumination and size of obstructions and clearings. Then you have parameters that are affected more by culture and personal preferences, like colours, texture and tactility. I have therefore tried to break it down to the fundamentals in my design studies of movement and focused on the composition of elements in relation each other.

Arne Branzell makes a statement in his book, *On the bubble*, on when people meet objects, "Your movement in a room may often confirm the message of its architectural space. A little drama, tension arises when spaces around persons and objects do not coalesce, when a gesture or movement is opposed by the messages of the object" (p.18, 2013). The first design study, Travelling Threads, explores this notion of what message the architecture sends to the visitor by merely existing as extrusions and clearings. It is possible to analyse different rooms according to our experience of the design. What kind of movement are generated by certain spaces? And reversely, what kind of spaces can be generated from certain movement? The study develops into a sketching method based on analytical perceptions of a space, with the aim of creating a tool that can have the designer/s start with the question, *What kind of movement do I want at this specific place?*

Perceptions of one space as illustrated by Branzells "room bubbles"



Perceived movement through a room, affected by extrusions and clearings

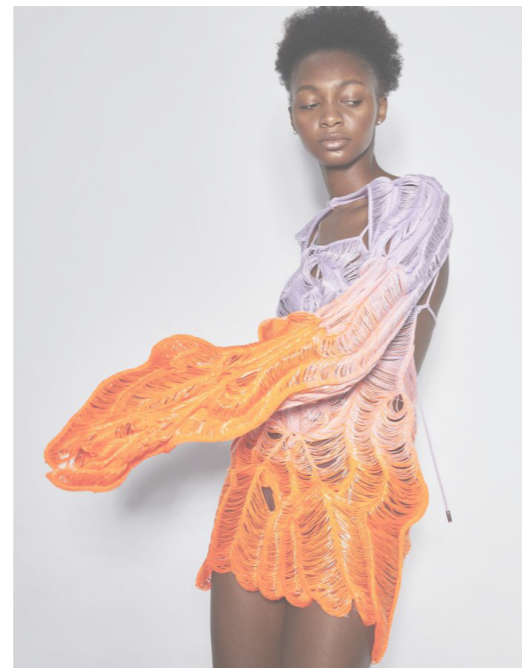


4. Analysis of motion - sketching technique

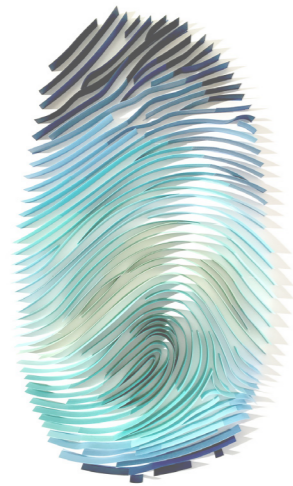
case study: expression



Corn, Taylor Mazer, 2013.



Floats, Emma K. Gudmundson, 2020.



Paper thumbprint, Luke Bugbee, 2015.

analysis

travelling threads

Travelling threads imply exploring the spatial composition of spaces and how they create movement, both physical and mental. By drawing lines that each represent a unique journey through the space, the journey is affected by how the architecture draws on the visitor's attention (see parameters previously listed on page 23). In the example used, Tokyo War Dead Memorial park drawn by Takefumi Aida in 1988, there is an emphasis on the tension between extrusions and clearings that create an effortless flow throughout the space. The second court is elevated, concealed from view when entering the site. Despite the discontinuity, there is a stillness in the middle of it because of the verticality of the extrusions.

The physical red shapes of movement can both represent actual movement as well as possible movement. I interpret the movement as flowing through time and space. Like how the threads are all one path taken beside each other in parallel universes, but with different choices being made at each crossing. Hence you end up with a higher flow in certain spaces when overlaying the possible routes. The more colourful the threads are, the more you are coerced to move in a certain direction because of the built environment. The thinner they are the higher freedom you have to move however.



Tokyo war dead memorial park, 1988. Views overlooking the entrance of the museum (left) and the upper courtyard (right) (Aida Doi architects).

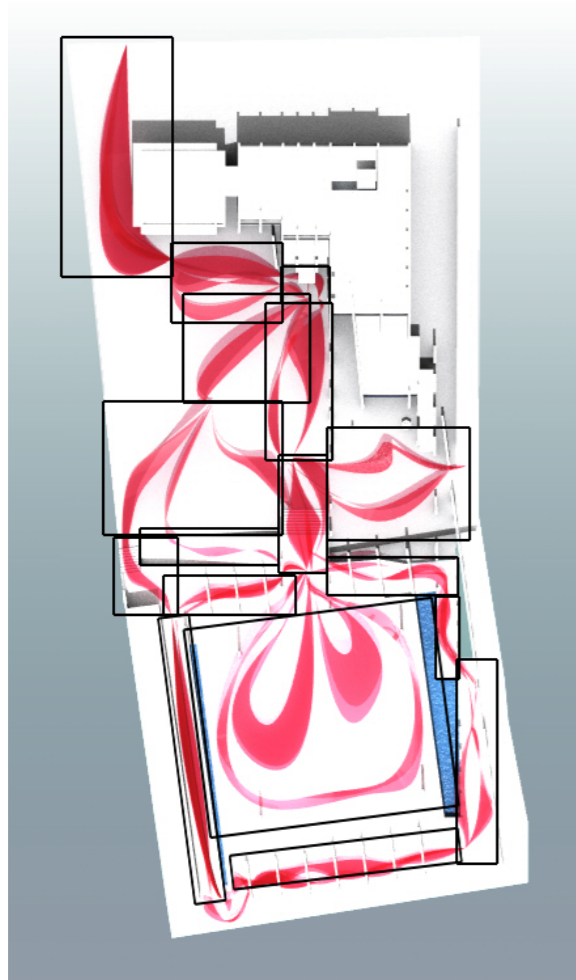
The subjective, analytical, interpretation of the site can be summarized in formulas for movement:

L = Length of thread in plan – shows *length of motion* before a turn. Is affected by the size of the space.

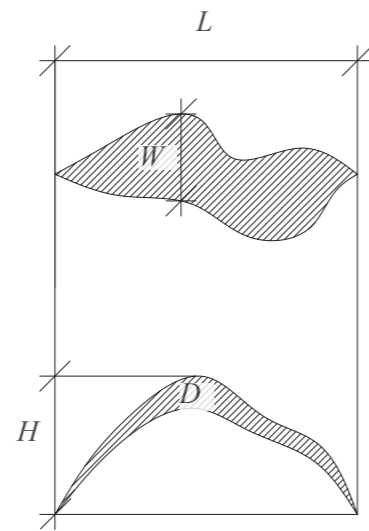
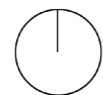
H = Height of thread in section – shows *verticality of perceived movement*. Is affected by how closed off a space is, by how close and high surrounding extrusions are.

D = Density of the colour of the thread in plan – shows *strength of flow*. Is affected by openings and extrusions.

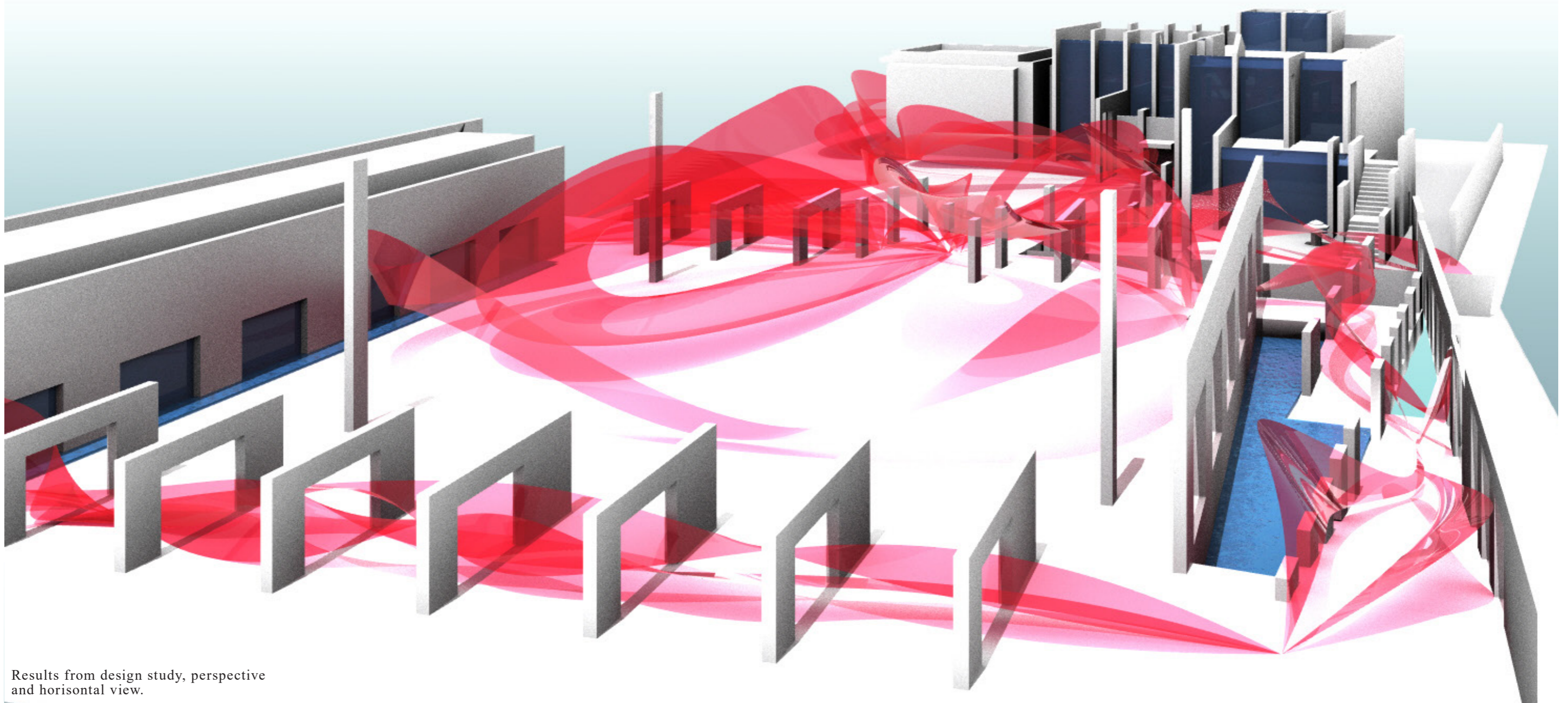
W = Width of thread in plan – shows *freedom of movement horizontally*. Is affected by openness of space.



Results from design study, plan with divided space.



Results from design study, plan.



Results from design study, perspective and horizontal view.



Observed correlations in design study

W^{high} → D^{low}

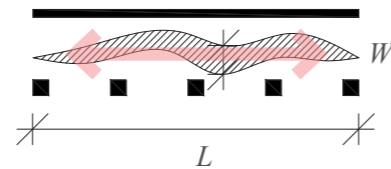
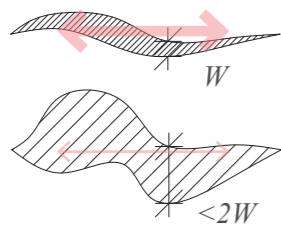
A space with a broader thread usually inherits a higher freedom of movement but instead has less flow of movement.

W^{low} → D^{high}

Or:

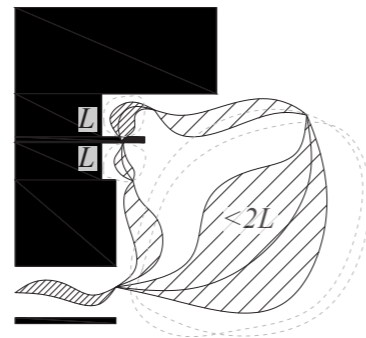
L < 1/10W → D^{high}

A space with a thinner thread usually inherits a lower freedom of movement but can instead have a stronger flow of movement. If a thread's width is 1/10 or less than the total length of the thread, the space is often longer, thinner and with restrictive extrusions surrounding it.



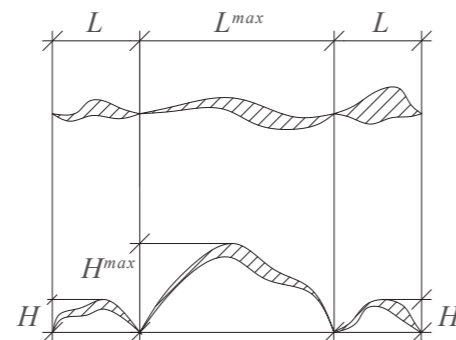
L^{low} → often enclosed space

A shorter thread often comes with more well-defined spaces.



L^{max} = H^{max}

The longest thread usually comes with the highest perceived verticality of movement.



Quick chart - Qualities of threads

	<i>Thread qualities</i>	<i>Spatial qualities</i>	<i>Movement qualities</i>
B/S	<i>Big</i>	A bigger space	Long coherent motion before sharp turn
	<i>Small</i>	A smaller space	Short coherent motion before sharp turn
W/T	<i>Wide</i>	Open space	Freedom of movement
	<i>Thin</i>	Narrow space	Restricted movement
H/L	<i>High</i>	Tall space	Sense of upward motion
	<i>Low</i>	Enclosed space	Low sense of vertical motion
D/S	<i>Dense</i>	Space with direction	High flow horizontally
	<i>Sheer</i>	Directionless space	Low flow horizontally

S/B - WLD

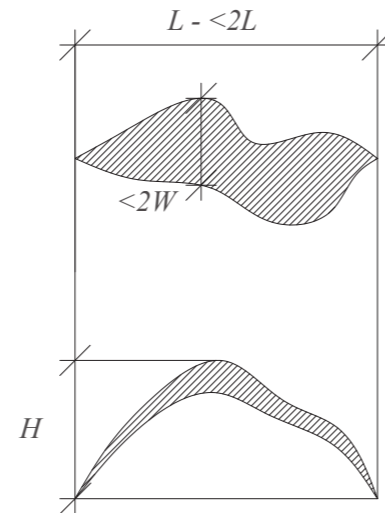
small/big - wide low dense

Spatially → An open space, somewhat enclosed with a horizontal direction.

Movement → A spacious movement with a low vertical motion but with a higher flow horizontally.

Examples of functions:

Entrance, smaller park, high-end store, pergola.



S/B - WLS

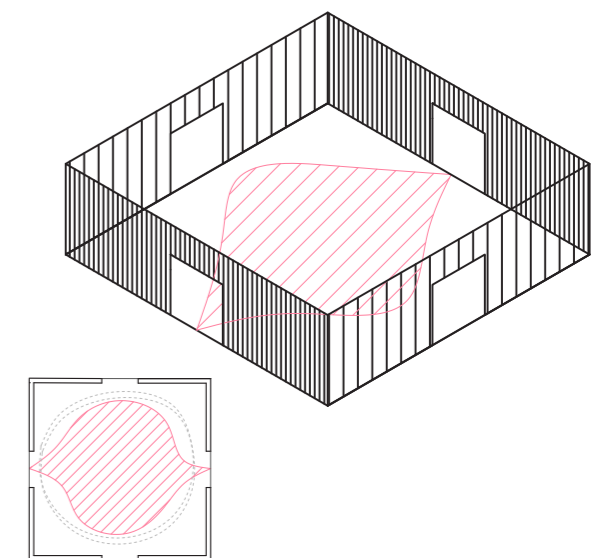
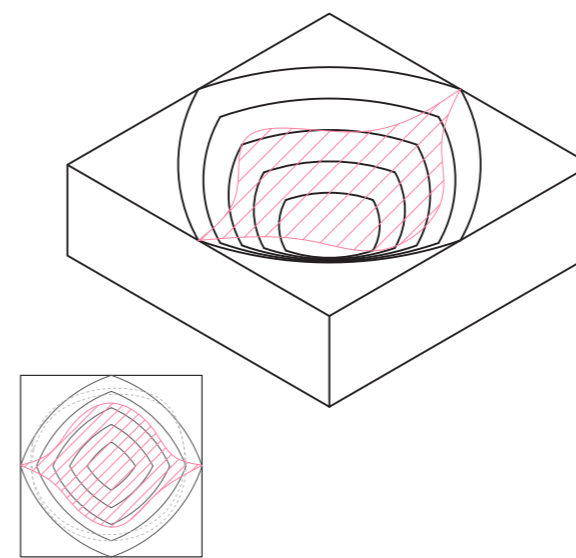
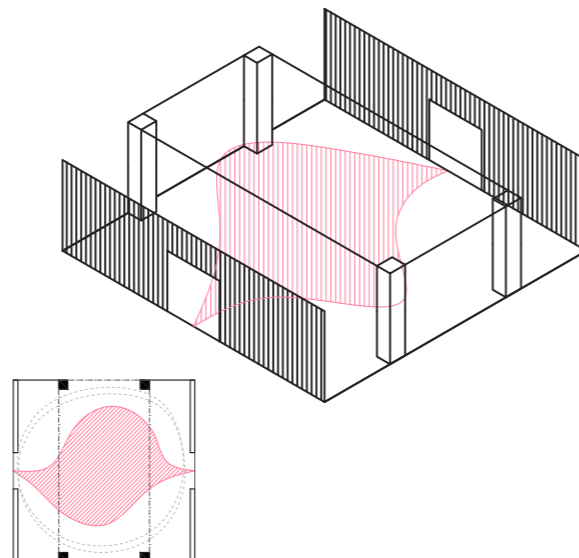
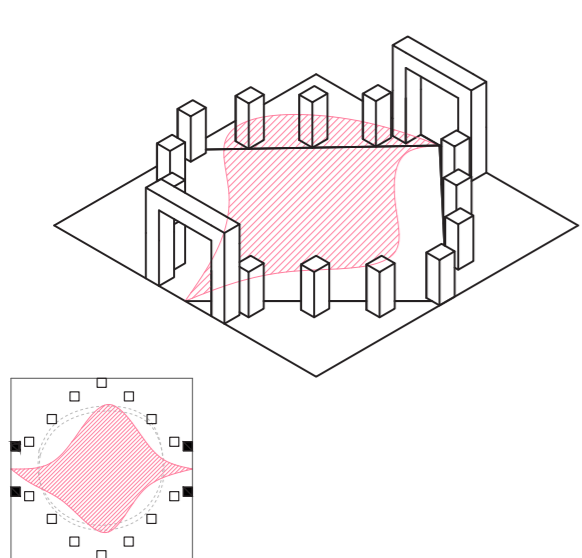
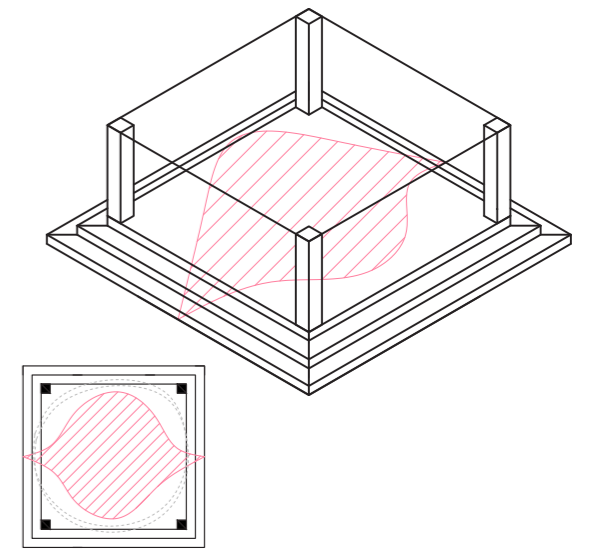
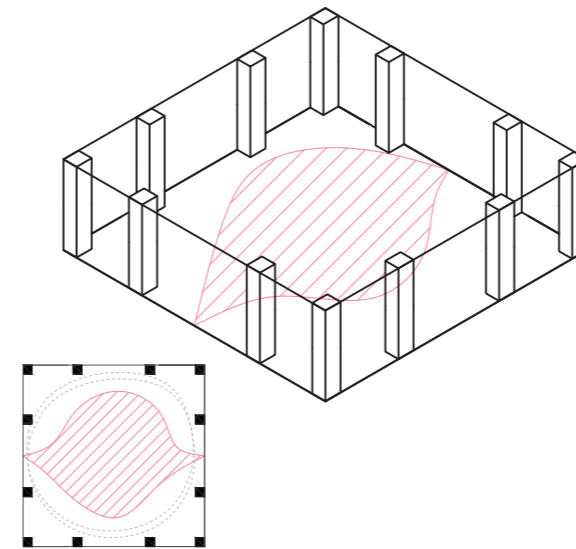
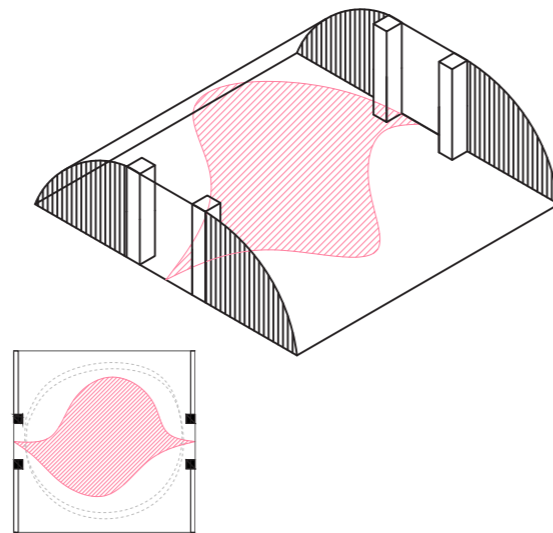
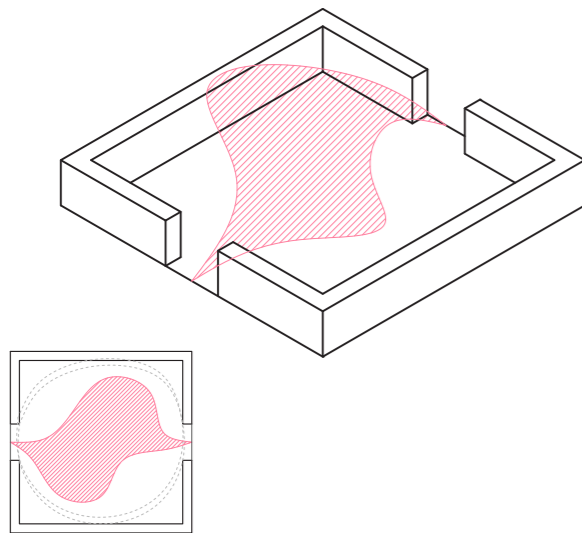
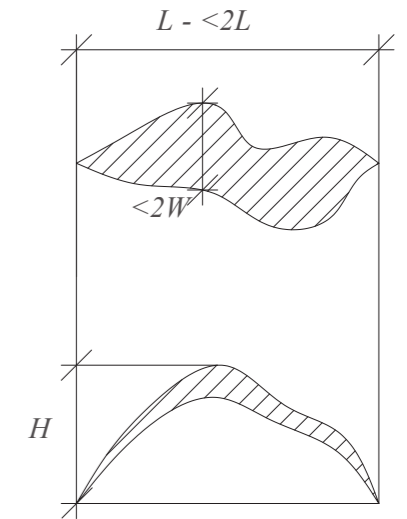
small/big - wide low sheer

Spatially → An open space, somewhat enclosed with little horizontal direction.

Movement → A spacious movement with a low vertical motion as well as a low flow horizontally.

Examples of functions:

Restaurant, pit/valley, parking garage, arena, big park, atrium.



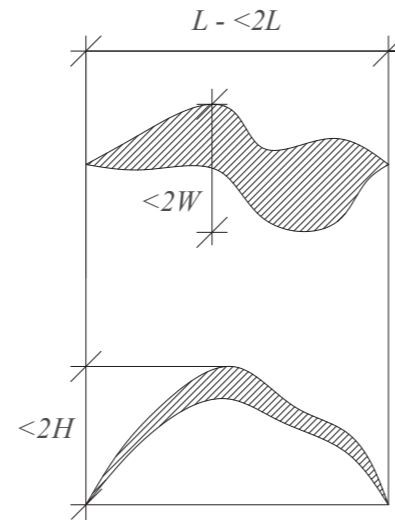
S/B - WHD

small/big - wide high dense

Spatially → An open space, with a sense of upward and horizontal direction.

Movement → A spacious movement with a high vertical motion as well as a horizontal flow.

Examples of functions:
Public transport station, airport, mall, grand foajé, beach, pier, church.



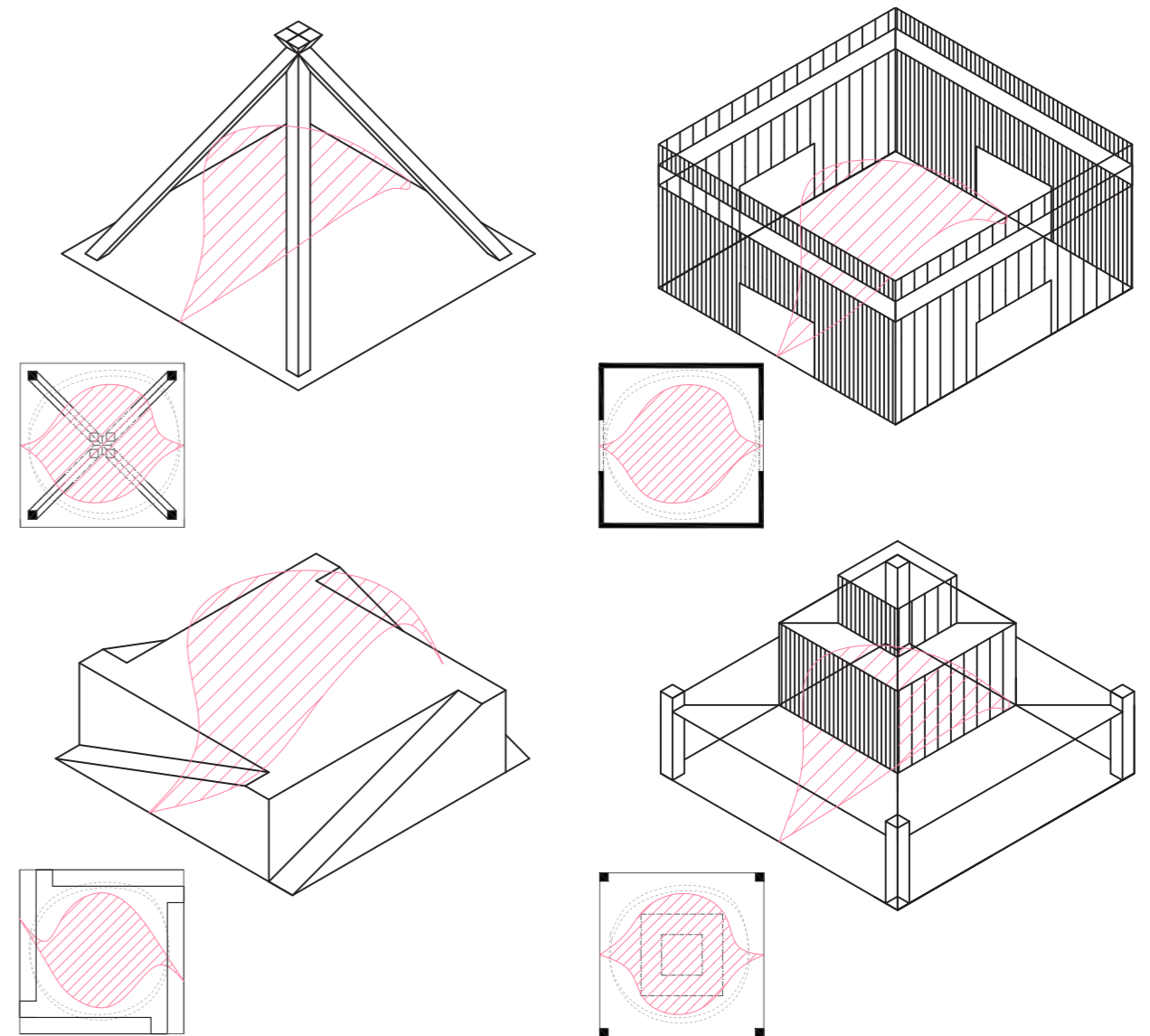
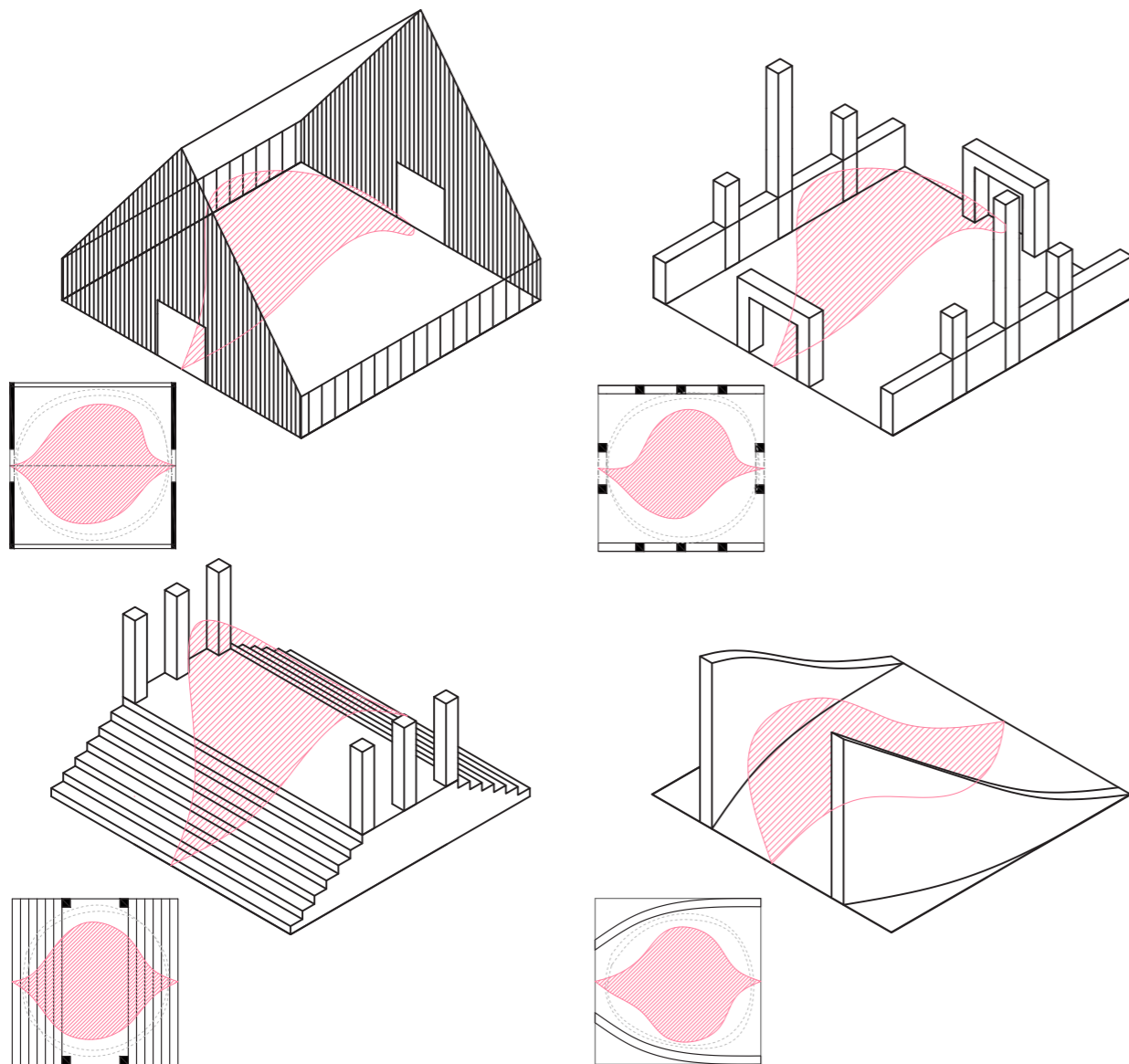
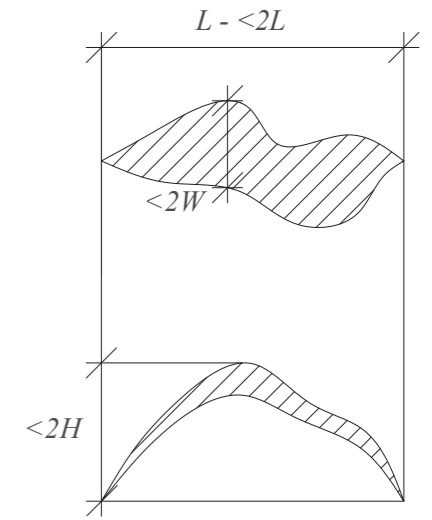
S/B - WHS

small/big - wide high sheer

Spatially → An open space, with a sense of upward direction but with little horizontal direction.

Movement → A spacious movement with a high vertical motion but a low horizontal flow.

Examples of functions:
Square, open water, meadow, hill.



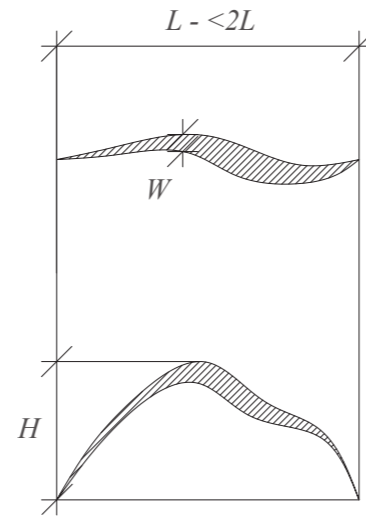
S/B - TLD

small/big - thin low dense

Spatially → A tight space, somewhat enclosed with a horizontal direction.

Movement → Restricted with a low vertical motion but with a higher flow horizontally.

Examples of functions:
Confined path, tunnel, junction, urban street, market, museum, low-end store.



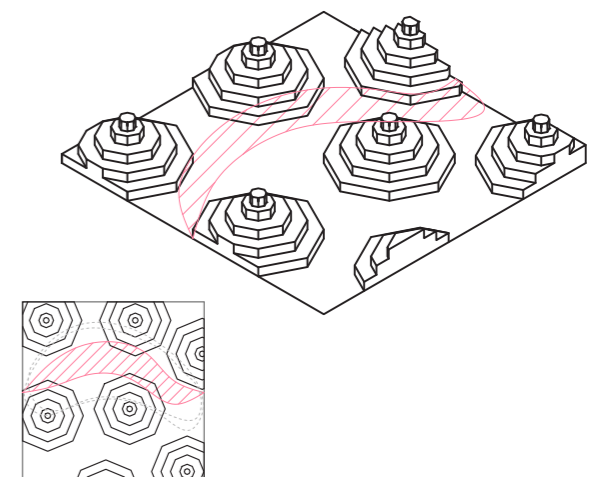
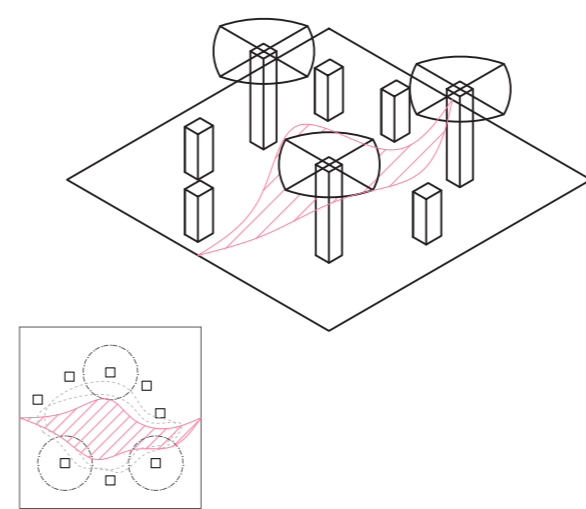
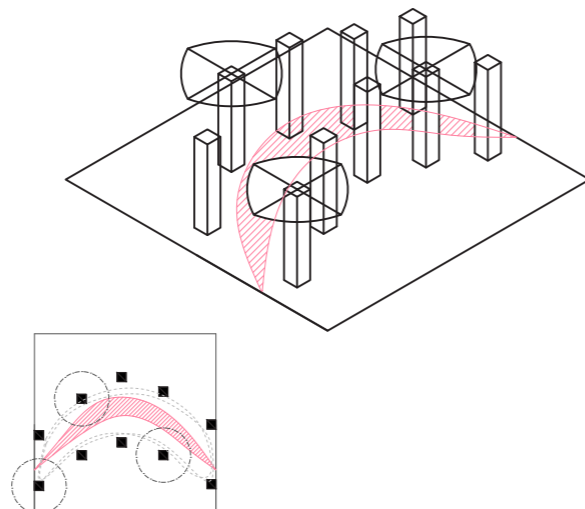
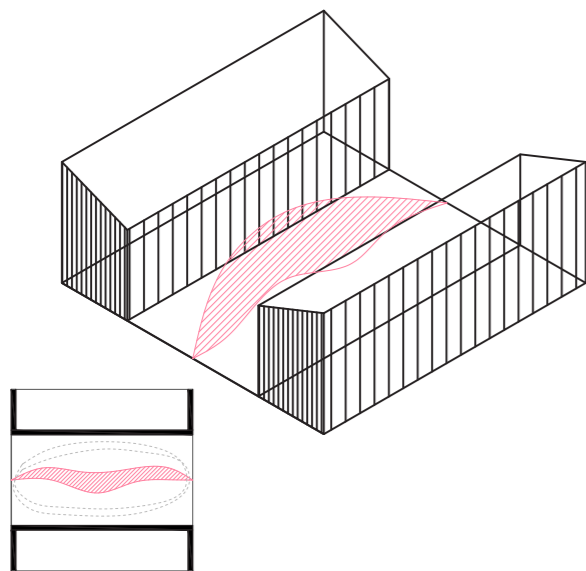
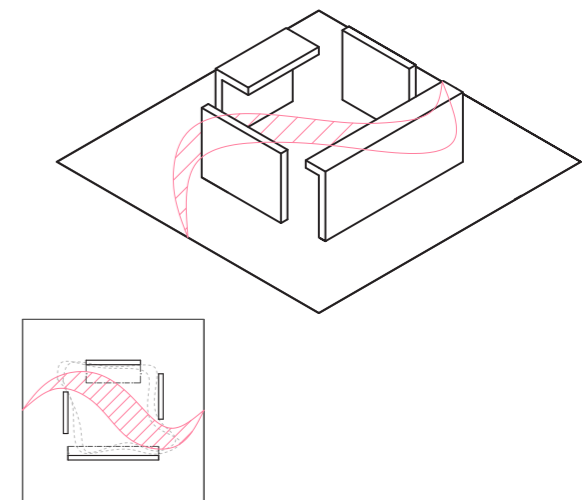
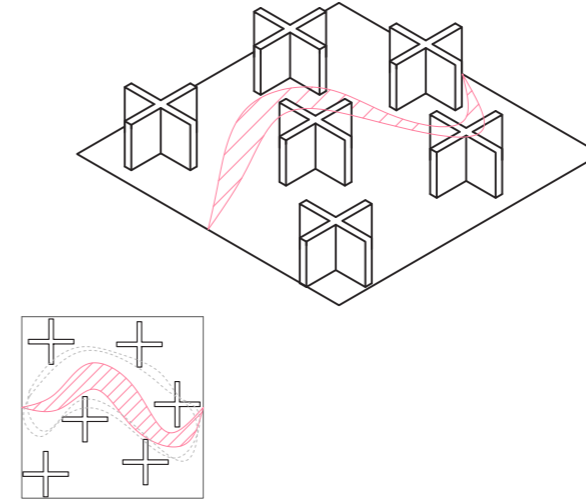
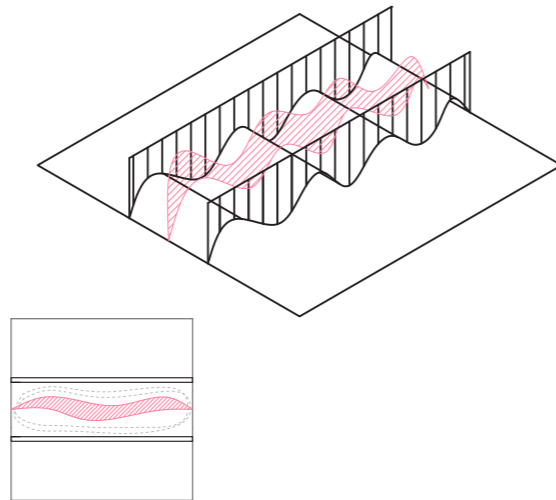
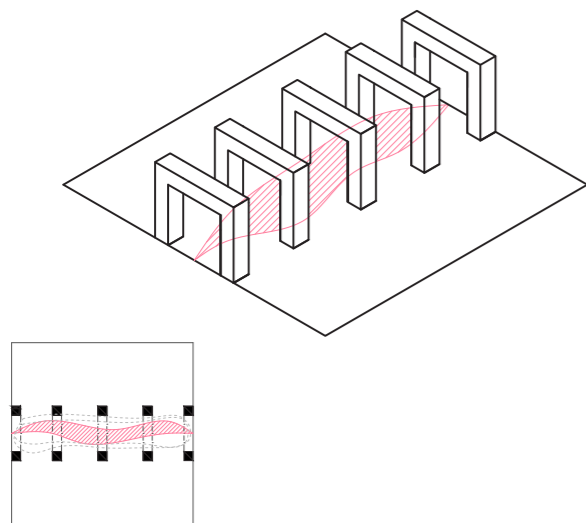
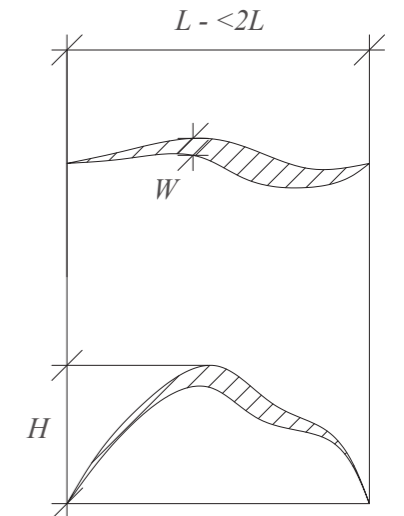
S/B - TLS

small/big - thin low sheer

Spatially → A tight space, somewhat enclosed with no horizontal direction.

Movement → Restricted with a low vertical motion as well as a low flow horizontally.

Examples of functions:
Restin area, maze, exhibition floor, lounge area, garden, open-air cafe.



S/B - THD

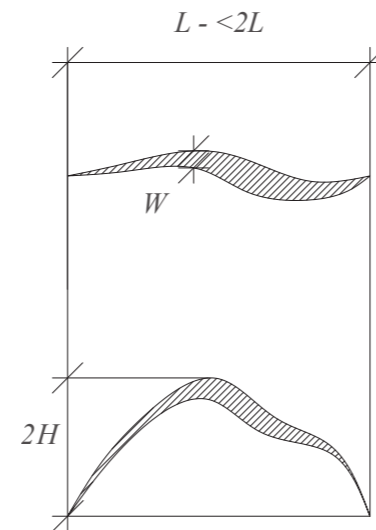
small/big - thin high dense

Spatially → A tight space, with a sense of upward and horizontal direction.

Movement → Restricted with a high vertical motion as well as a horizontal flow.

Examples of functions:

Forest path, city street, canyon, stair, alley way, bridge.



S/B - THS

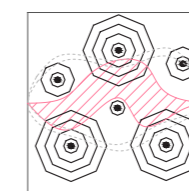
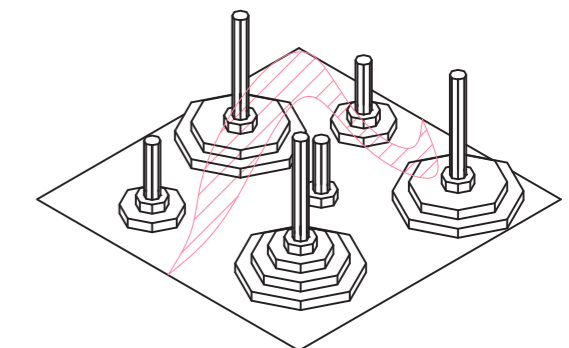
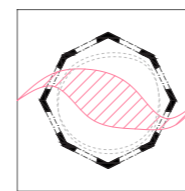
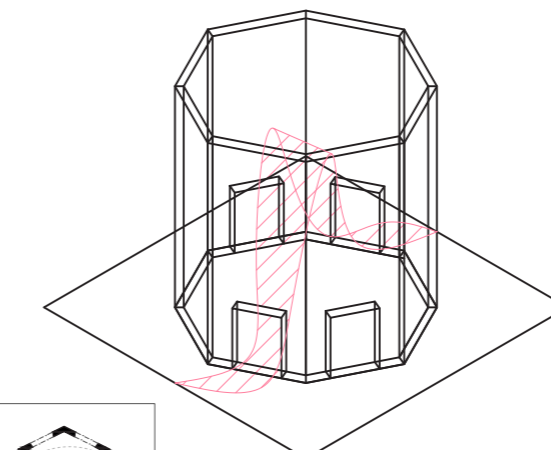
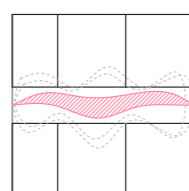
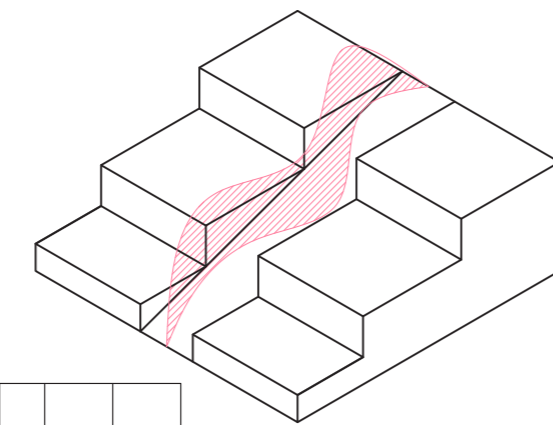
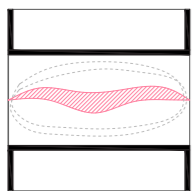
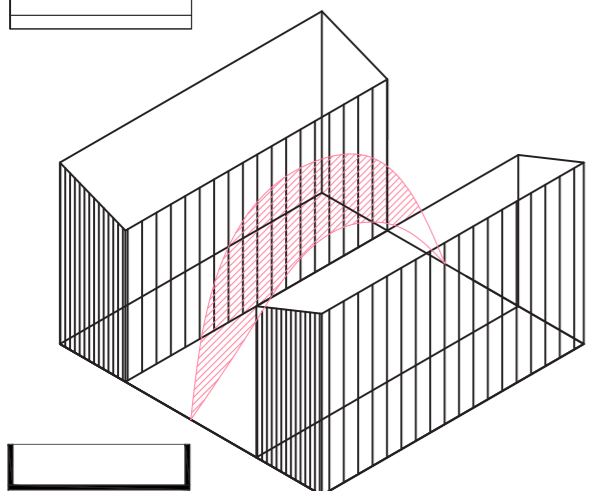
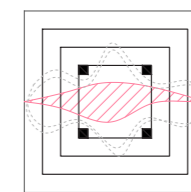
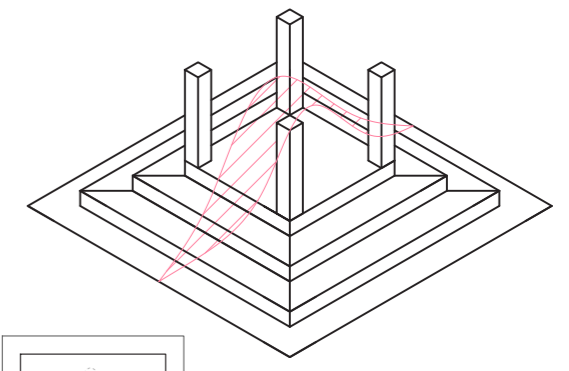
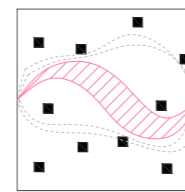
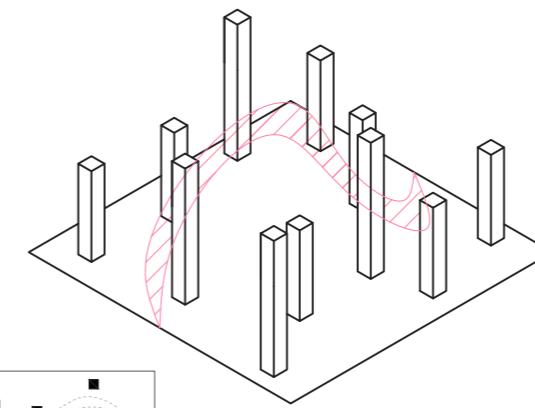
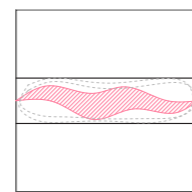
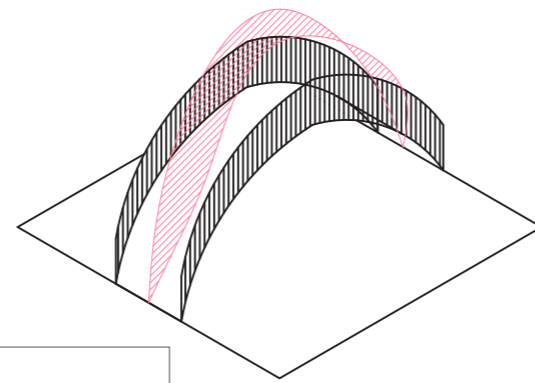
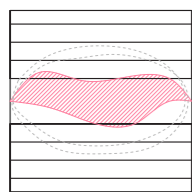
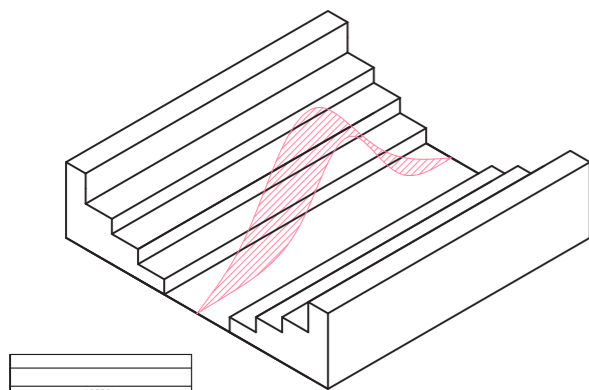
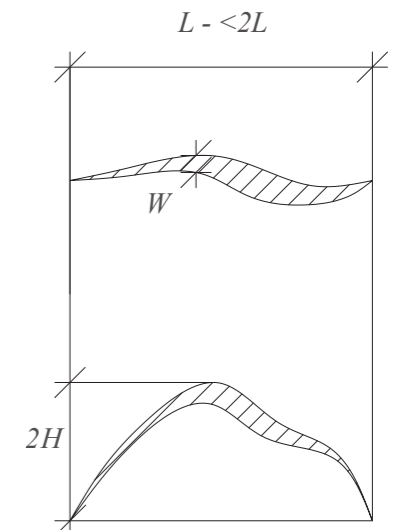
small/big - thin high sheer

Spatially → A tight space, with a sense of upward direction but no horizontal direction.

Movement → Restricted with a high vertical motion but a low horizontal flow.

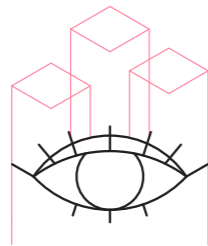
Examples of functions:

Forest, playground, temple, public scene, vista.

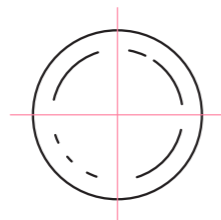


directing movement

Alluring Shapes, also disregards to a large extent the various parameters discussed in the former chapter. The study looks closer at how two specific design strategies in a certain video game can direct movement. It focuses on how different sized extrusions and clearings interact with attraction points, so called objectives, that hold different gravity to the visitors and furthermore, how this interplay affects and directs the movement.



5. Designing for motion - method study



The cover to Zelda: Breath of the Wild with Link looking out over Hyrule (Zelda).



case study 2

Zelda: Breath of the Wild was released in 2017 to Nintendo's console Switch. It is an open world game where the player can go wherever they want within the vast kingdom of Hyrule merely minutes after starting a new game, creating a thrilling sensation of exploration for the player. What this game excels at is telling a somewhat linear story without it ever feeling forced or too guided. However, in late testing the game developers found out that the players did not move as freely as expected (CEDEC 2017), but rather similar to each other and along specific paths, as can be seen in figure x. It turned out the players felt the game was too linear, they were too guided and if they walked astray from the paths they felt lost, in a bad way.

The developers decided after further testing to go with two design strategies to counteract the issues that had come up. They used the same terminology as Joe Allen in *From Object to Field* (1999), to describe their design theories, field design. The first design strategy they came up with they called the *triangle rule*. The landscape is shaped in different sized triangles, objects that extrude the field. They carry two objectives, choice and obstruction. As a player you can choose to either go around or over the triangle (figure x). It also serves to obscure, or partially obscure, what is behind the triangle, creating a sense of curiosity for the player who will gradually reveal the objective as it moves around it (CEDEC 2017).

Different sized triangles hold different meaning. The biggest triangles are mountains that serve as visual markers mainly. The medium ones can be bigger hills or strange rock formations that serve to obstruct players view and hide objectives or fiend camps. The smallest triangles are not much bigger than the players character and mainly serve to change the rhythm of the play, making it more dynamic and utilizing the different ways you can choose to move in (CEDEC 2017).

The other design strategy is called *gravity*, implying that the attraction of different objectives in the game pull at the player with varying force. Before testing, they had more or less put the objectives after each other, creating a line. Instead, they categorized the different objectives with different gravity and scattered them over the map but made sure that you always could orientate yourself with the help of other objectives or triangles (see figure x). In addition to creating a feeling of being lost, this time in a good way, it opened up for players with different playing style to enjoy the game. The result of the implemented design strategies shows to the right in figure x, where the movement of the players is much more diluted and depends on the individual's preferences of playing (CEDEC 2017).



A map of Hyrule. The developers used a heat mapping technique to track the movement of the players. The left map shows the movement before implementation of design strategies and the right shows the movement after (CEDEC 2017).

Link looking out over the landscape, highlighted shapes shows the design

landscape, highlighted strategy (CEDEC 2017).

How the game developers changed the way the objectives relate to each other instead of placing them in a straight line (CEDEC 2017).

method adaptation

alluring shapes

What makes the design strategies used in *Zelda: Breath of the Wild* interesting for this thesis is in the way the developers successfully create movement in an open world without ever making the player feel forced to move a set path. Albeit real life is not a video game, it is interesting to consider how similar successful architecture in our world also direct the visitor by using light, extrusions and objectives. Versions of the design strategies in *Zelda: Breath of the Wild* are therefore iterated and applied to a real-life example.

Shokin-tei Tea House lies in the garden of the Imperial Villa Katsura in Kyoto and is the subject of analysis. Like the strategies in game, the way you obscure and reveal objectives as you move along a path is similar to how you would approach a sacred place in a traditional Japanese context. Tea houses are good examples of where the journey is crucial for the experience. You move along a directed path from the outside world in to a sacred place. The emphasis is put on the transition between opposites which in this case is the tension field between inside and outside.

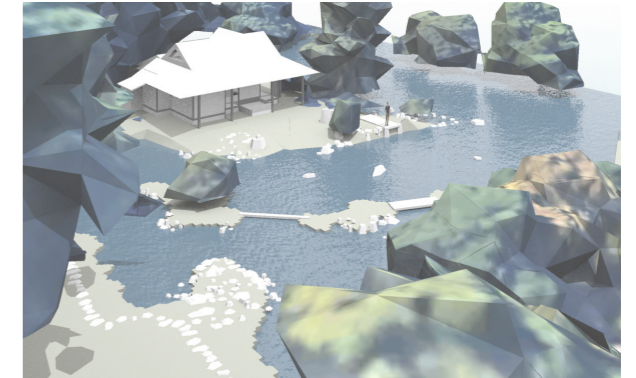
To adapt to real-life I have changed the *triangle rule* to *shape rule* since we reduce the scale from a vast landscape to an urban setting, where not all shapes of interest is triangles. The different sized objects/extrusions are still categorized as big, medium and small however, and serve the same purposes. Big shapes are visual markers, medium shapes obscures and the small shapes changes the rhythm. Since the scale is changed, it makes sense that the small objects/extrusions also carry visible properties of tactility that further changes the experience and motion.

In game, *gravity* was used in connection to objectives. In real life, the objectives are seldom the same or as direct as in a game. Therefore, I have done three new categorisations for how the objectives attract the visitor. *Intention* is the most straightforward. It is often an interactive element of sorts with a function in close proximity. This can be a vending machine, a door or tram stop. The other I call *Legibility*, where you can only understand an object fully within a certain radius, inclining the visitor to come closer. This can include signs, asymmetrical artworks or plants. The final one I call *Sensory*, which is where an object/extrusion have such strong tactility that it draws in the visitor who wants to touch it or study it closer.

Figure 3 & 4. 2 versions of one house



Contemporary picture of the the tea house showing the east facade (source?)



Deconstructed and in the process of rebuilding (own illustration).

knowledge gained

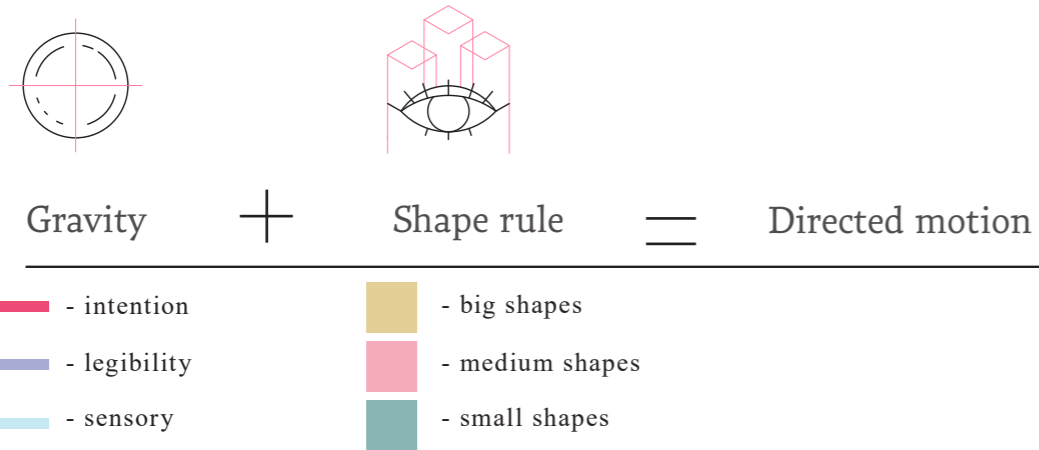
In the illustrations on the next page the results can be studied. In the illustration of the Shokin Tei tea House in a birds view the different objectives of the sites are outlined around the objects as possessing different gravity. The right illustration shows the site from where visitors start their journey, here gravity is combined with the shape rule.

In contrast to the first study, the environment surrounding the studied architecture in question becomes much more important here. The greenery functions both as guiding walls and as shapes that obscure the final objective on the journey. The tea house has the gravity of intention (cherry-coloured line), a clear objective from the get-go as a visitor starts her or his journey, but it is also categorised as a big shape (bright yellow) that helps you orient yourself in the surroundings as you progress towards the house.

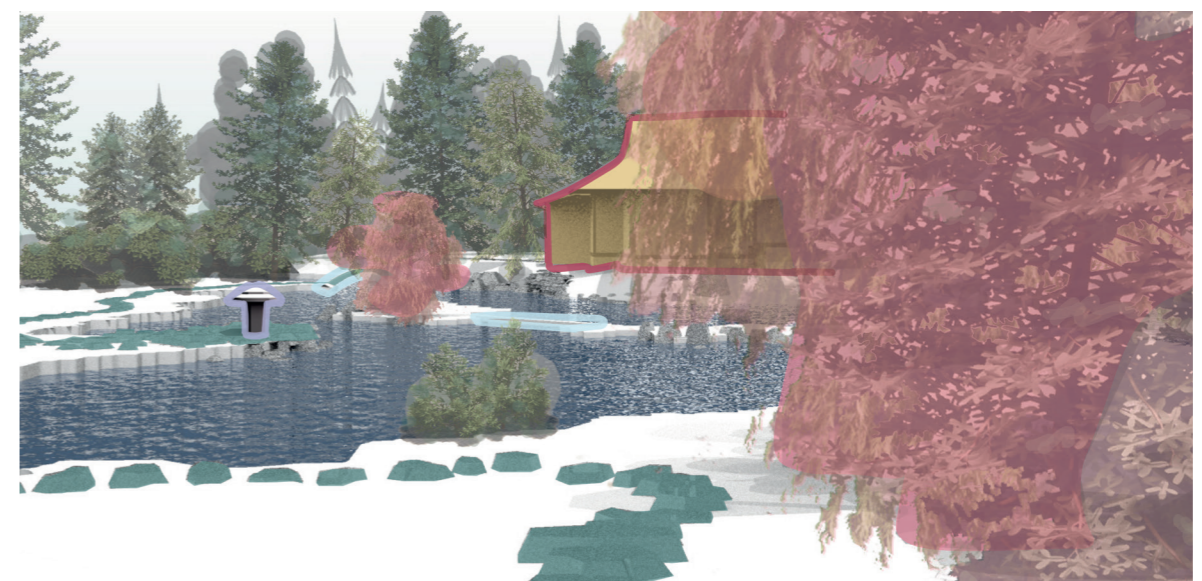
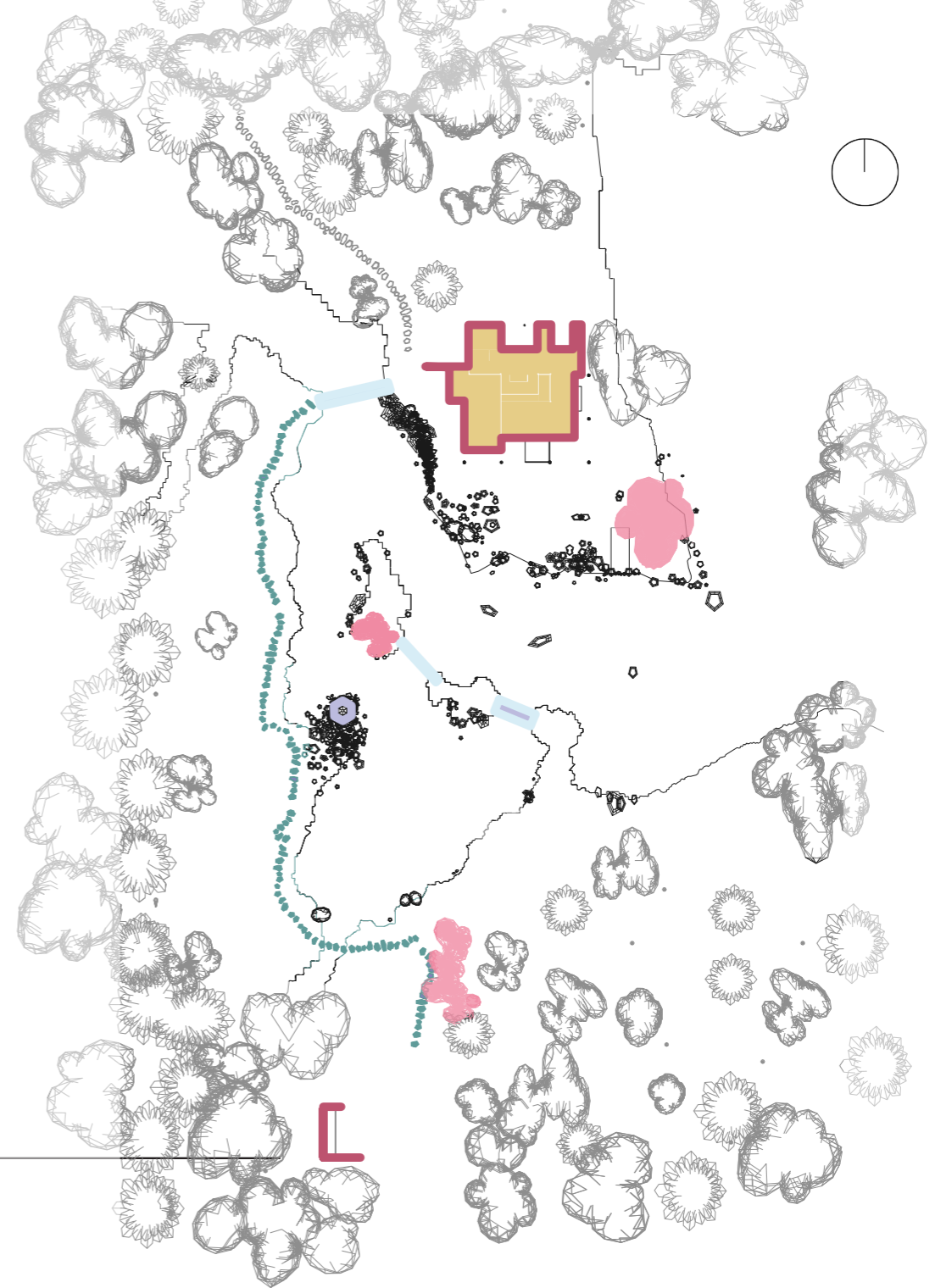
If we would imagine the path just following the edge of the water instead, with no objects of gravity or shapes of interest, we would with certain make less 'mental snapshots' of the journey. The intention of placement of stones in a traditional Japanese garden with varying distances is to make you stop and look up (to read more about this, see appendix). Maybe with curiosity behind the medium sized bush, or when diverting from your path momentarily to look closer at the shrine on the rock bed, several perceived sequences of spaces are created in roughly the same amount of time as if you would have followed the edge of the water in an emptier

space. This is not to say that one is better than the other, simply that the architects have used movement as a bridge between time and space to design the real world with the intent of creating different perceptions of the spaces designed.

The design strategy does however rely on that people have clear objectives and planned paths to take to get to the place where their objective is at. To be able to be distracted from one path, an original one must have been intended. Furthermore, an object or place that would have a very high attraction for one person might be completely uninteresting for another. This means that you would have to cater to *every* person's personal taste when planning a city is using this method. As a way to get around this issue of trying to satisfy all and ending up with satisfying none, there might be some merit in trying to group people in some more general categories, depending on the target group and the overarching goal of the design. For example, if the goal is to create awareness of biodiversity while also heightening the sense of security in a park, you might place a ballpark (intention for sports interested teenagers) beside a mural with art on the subject (legibility) as well as a lounge area with flowers that attract flowers and bees.



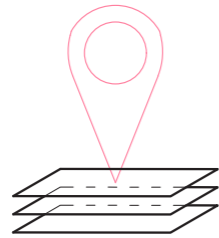
Results from design study 2, bird perspective.



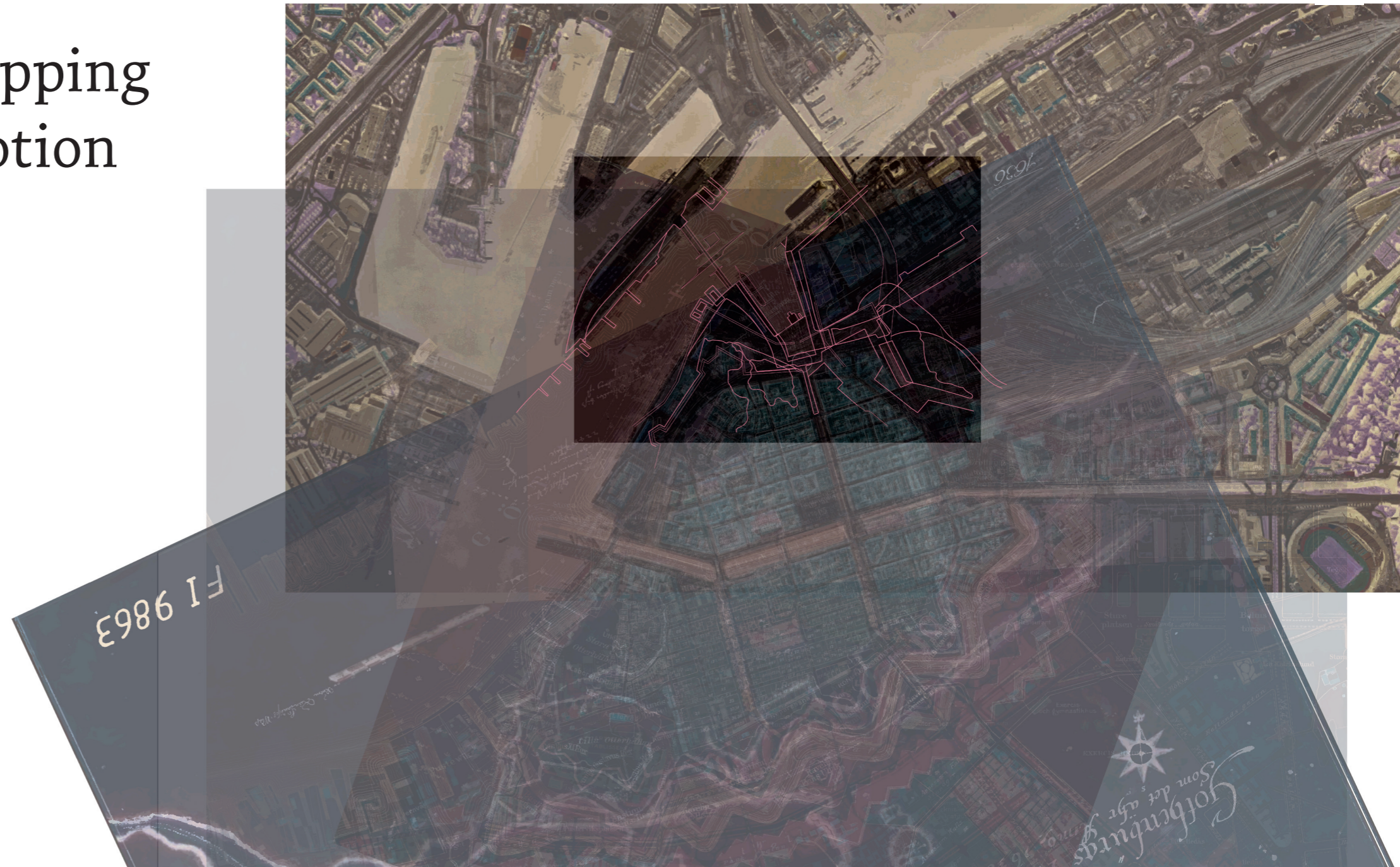
Results from design study 2, perspective.

through time and space

In the design studies movement was explored as an aspect of *time over space*: how can you move in a space, unrelated to a definite time, and how does the space change the perception of time for the visitor? This chapter continues the discussion of the design studies, but focuses on movement as an aspect of *space over time*, meaning how does the movement change a space through time?



6. Overlay mapping - place in motion



Kanaltorget

adapting through time

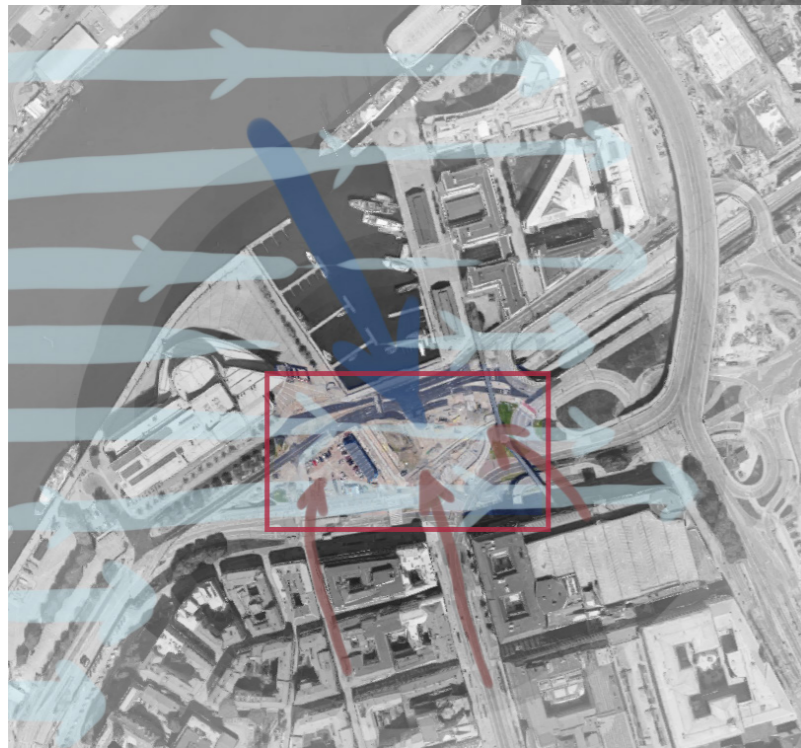
I have chosen to centre my project on Kanaltorget which is located in the area north of Nordstan and south of Operan and the river. Kanaltorget has been an actual square, but has also served as a street for connecting a footbridge over the river, a prison, a route for car traffic, a place for Göteborgshjulet to today be a construction site for Västlänken, see figures 5 & 6. One could say it is a place in constant motion, albeit slow motion, characterised by uncoordinated design interventions. In Älvstaden's future plans, Kanaltorget seems empty. Kanaltorget is a place between time and space that has continuously changed to become what it needs to be, a good candidate for a design intervention focusing on movement.

Figure 5 & 6. Photos of Kanaltorget with 150 m apart



Left: Photo of Kanaltorget with Läppstiftet in the background showing a building site in a city context (own illustration).
Right: Photo from the river that shows Kanaltorget from a marine context (own illustration).

Figure 7. Site analysis Kanaltorget

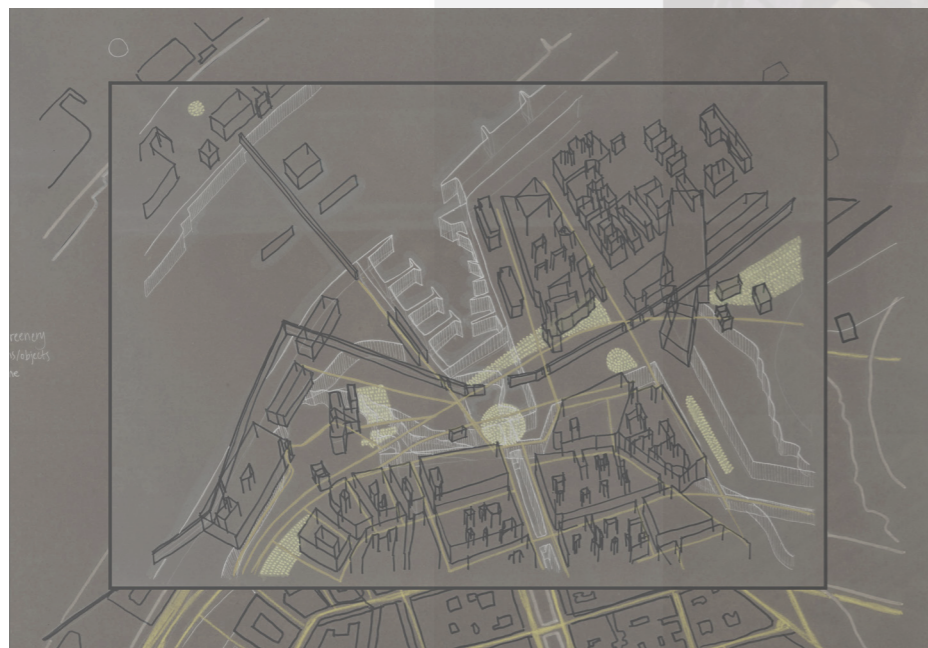


The initial contemporary site analysis of Kanaltorget that shows movement of wind (turquoise), water (blue) och humans (red) crossing and clashing (own illustration).

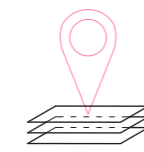
When Allen speaks of logistics of context in relation to sequence of events, how architects need to see to the logic of flow and vectors (see Theory), it is somewhat related to Lawrence Halprin. In *Freeways* he brings up ancient Egyptian culture and how life was viewed as a voyage. With the Nile at the core, the boats were symbols of movement and progression of events as humans both spiritually and physically moved down the river to visit the series of temples placed along it. For Gothenburg the river has always played a crucial role for the existence and livelihood of the city, as the river has changed, so has the city. Or maybe it is the other way around?

There are forces that moves which we cannot control, like the sun or the wind. Water is something in between, since we can quite easily lead it to where we want but never fully control it in the grand scheme of things. Water ebbs and flows, rushes or dries out, freeze or melt through time so profoundly that it shapes everything around it. It is quite similar to how the movement of people also cannot be controlled, but rather lead, and the way we also change our environment. The relation between the movement of water and the movement of people is what is explored with the help of historic maps of Gothenburg.

Maps from 1636, 1790, 1820, 1921, 1923, 1960 and 2020 are layered on top of each other to extract historic objects and fields (retrieved from Göteborgs Stad). In accordance with Travelling threads, the physical forms which are now since long gone, are handled simply as extrusions, indentations or clearings.



Sketch of first version of superimposition with a focus on illustrating extrusions (black) and the historic waterline (white), made with ink and sketch paper (own illustration).



knowledge gained

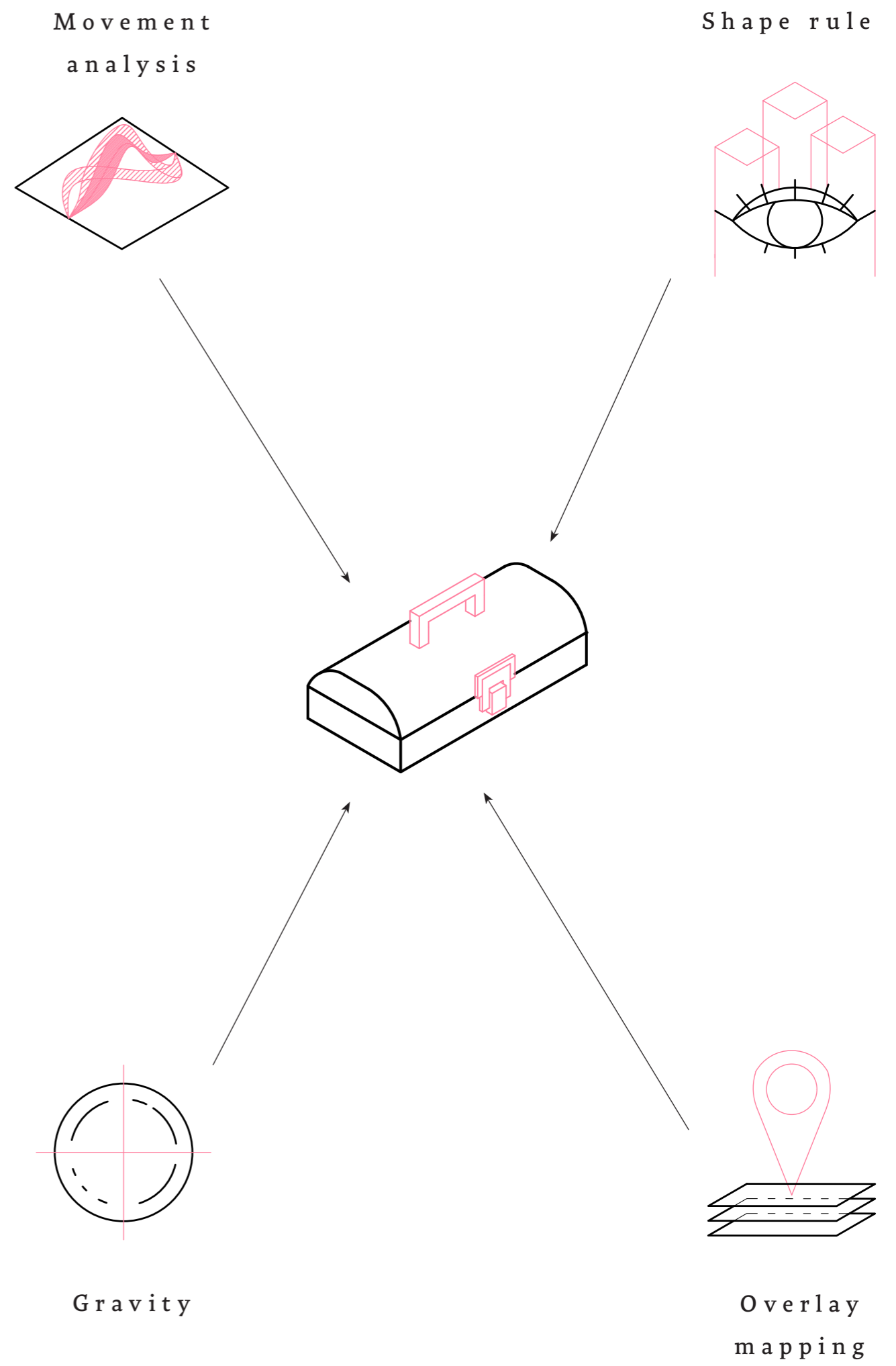
The superimposed maps can be a good method to show how landmasses near water have been shaped by humans through the centuries. At Kanaltorget the spaces have changed a lot so not all of the historic extrusions can be accounted for in the final design.

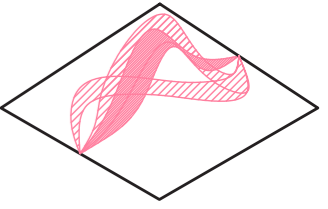
- historic extrusions
- contemporary extrusions & waterline

Illustration underneath shows the result of all the 7 maps superimposed and digitally traced.

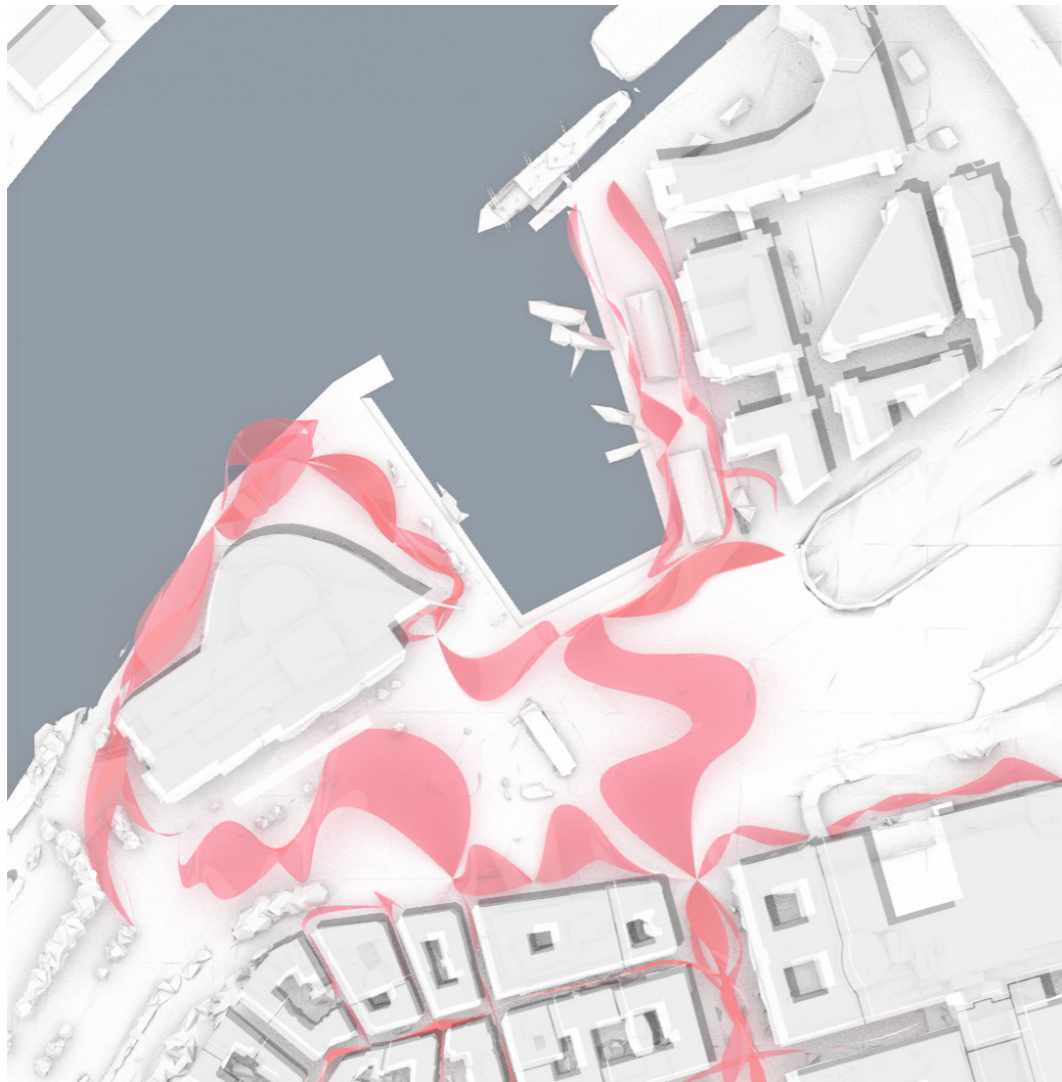


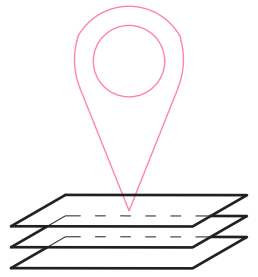
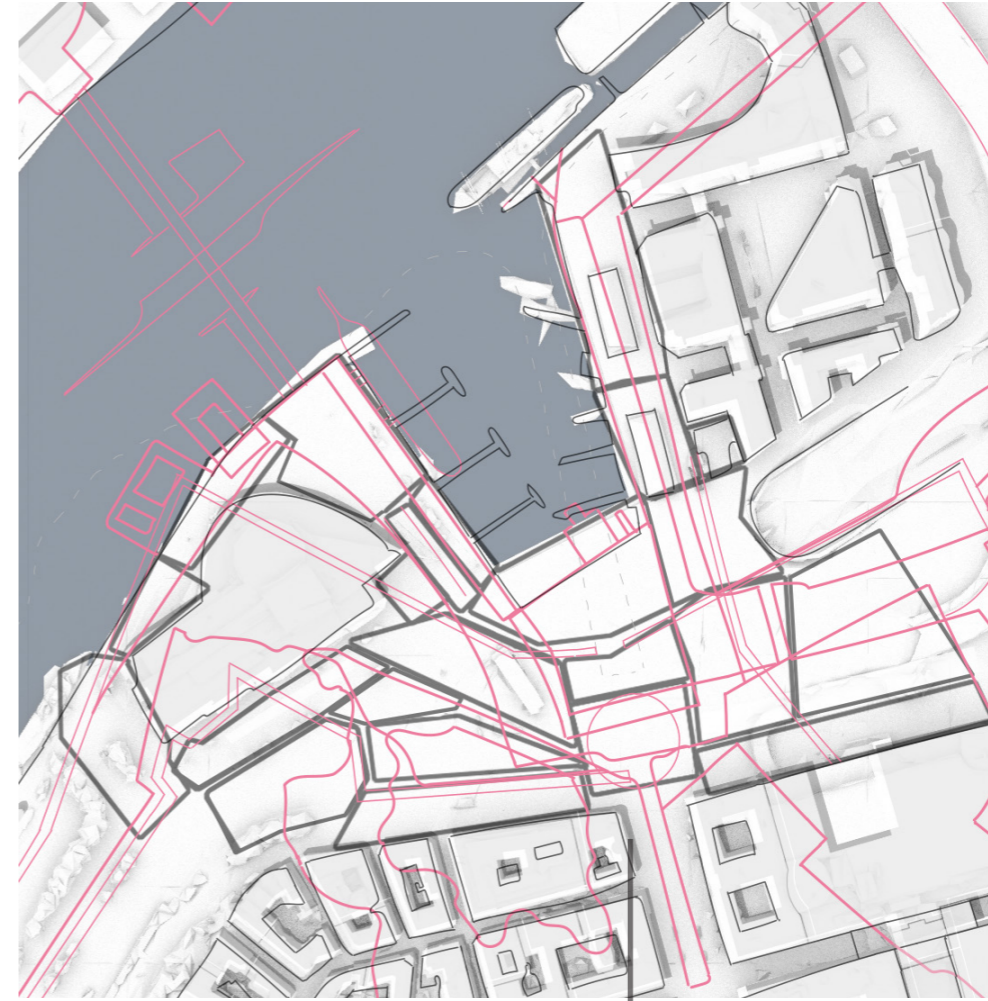
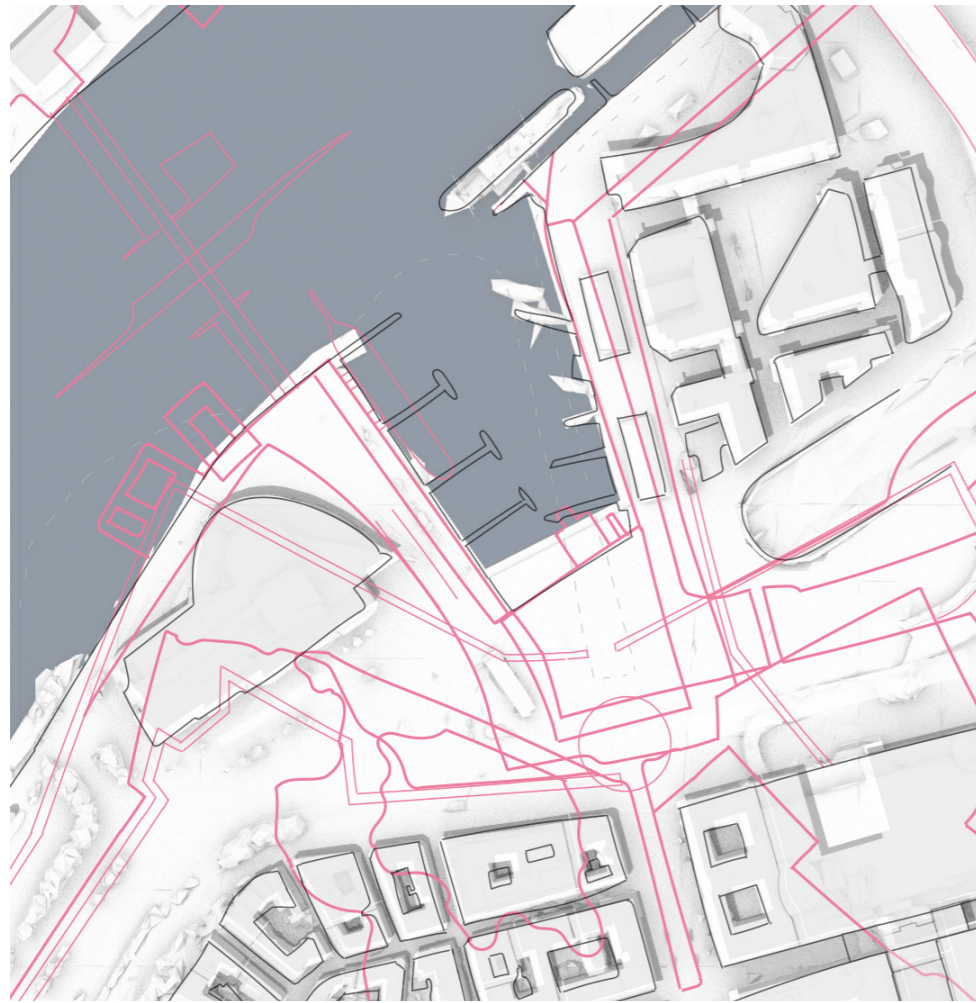
7. Design proposal - telling tales of movement





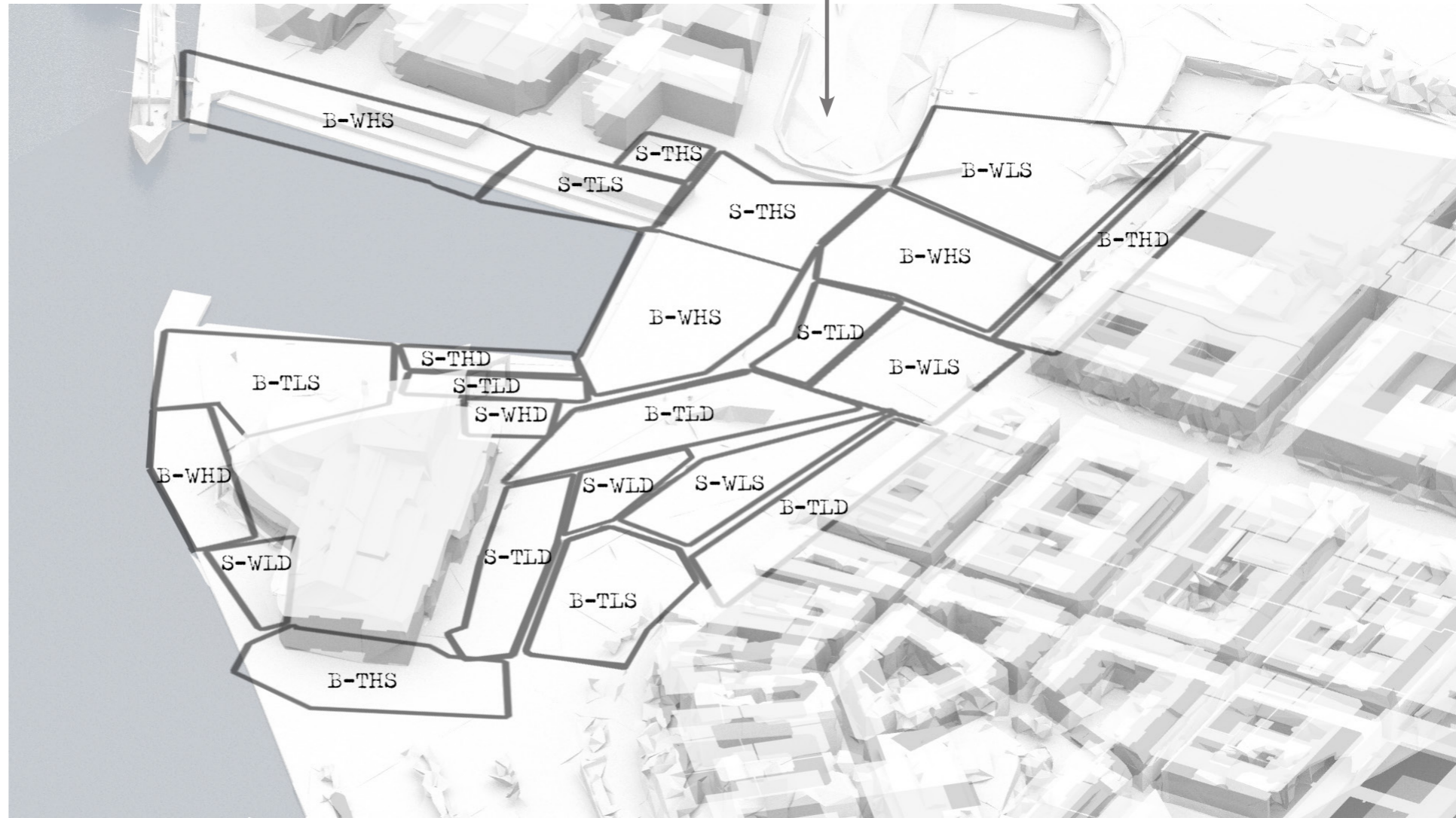
The illustration shows the existing public spaces at Kanaltorget and an analysis of movement. The threads indicate that there exists a majority of bigger open spaces of the same kind with a low flow horizontally.

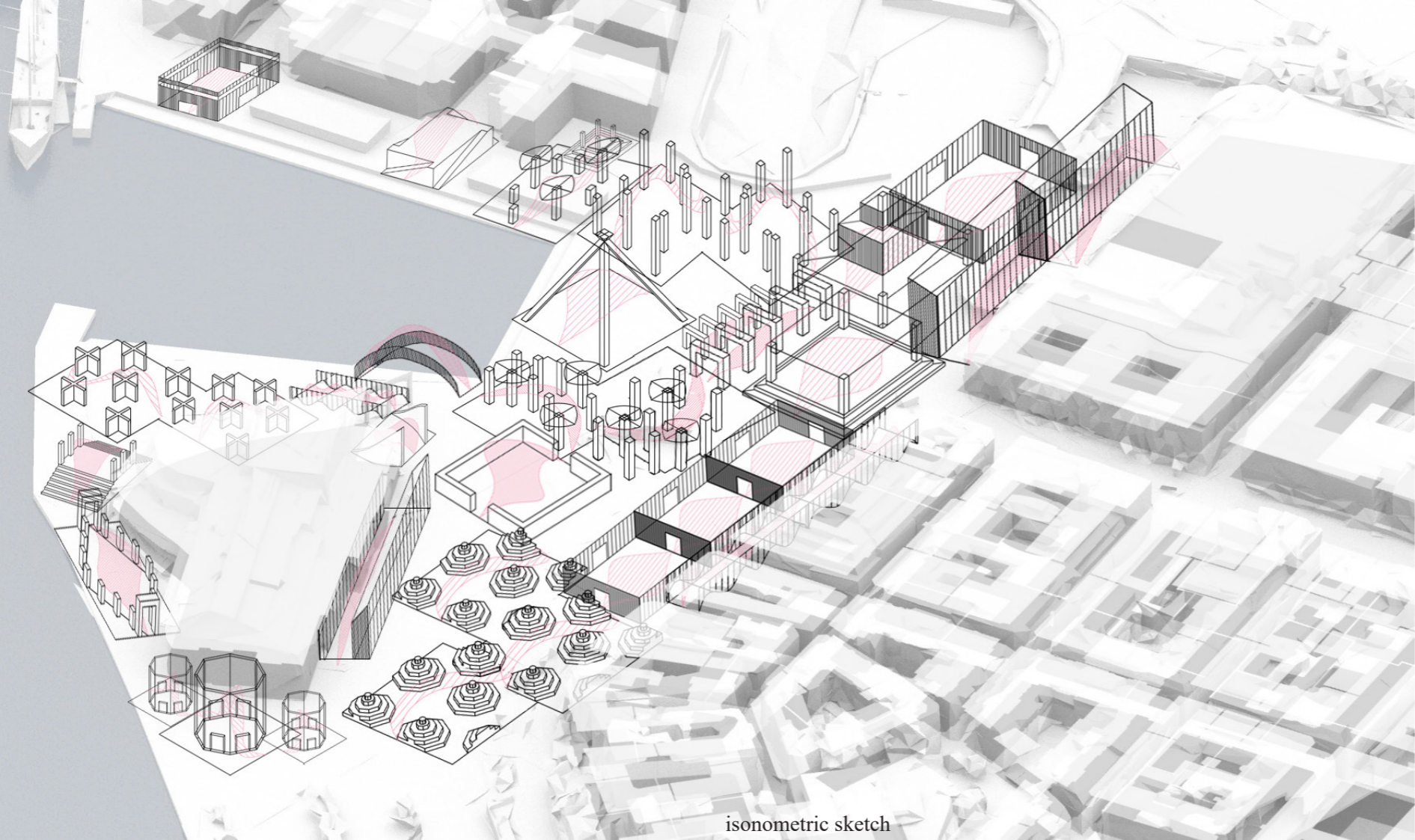




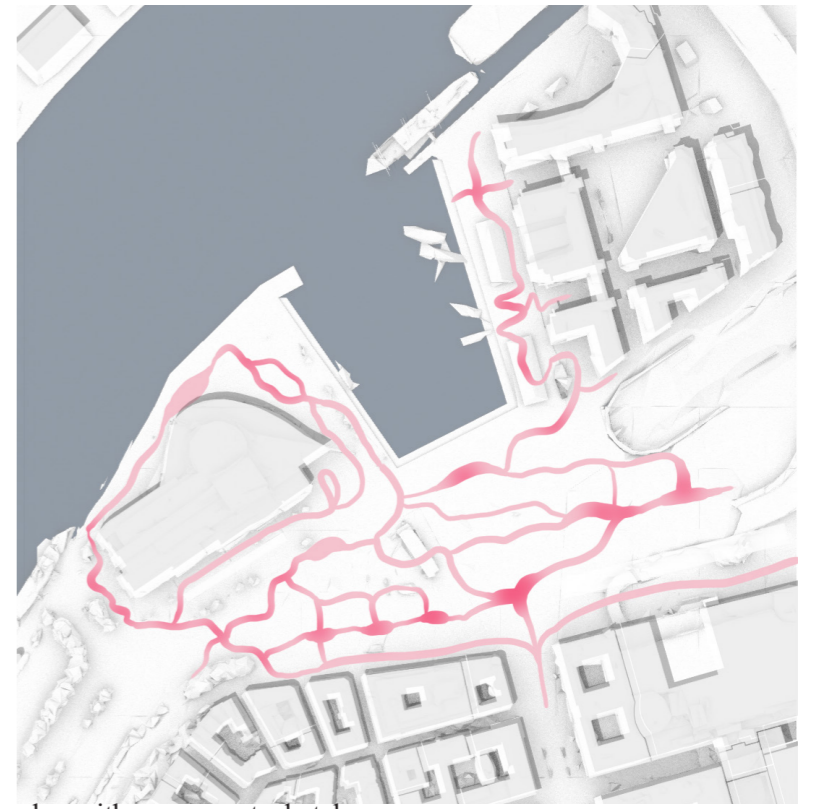
Looking at the result of the layers of the historic motion on site, the pink lines are imagined as potential extrusions and clearings, which helps us to divide the spaces in smaller shapes for a first draft.

In this first design the main aim is to test the toolbox and create a variety of spaces in order to see what different kinds of movement generates on site and where there might arise problems. The coded spaces were placed haphazardly, only following the parameters of representing all the different variations of spaces, as well as if it is a big or small space and thin or wide?





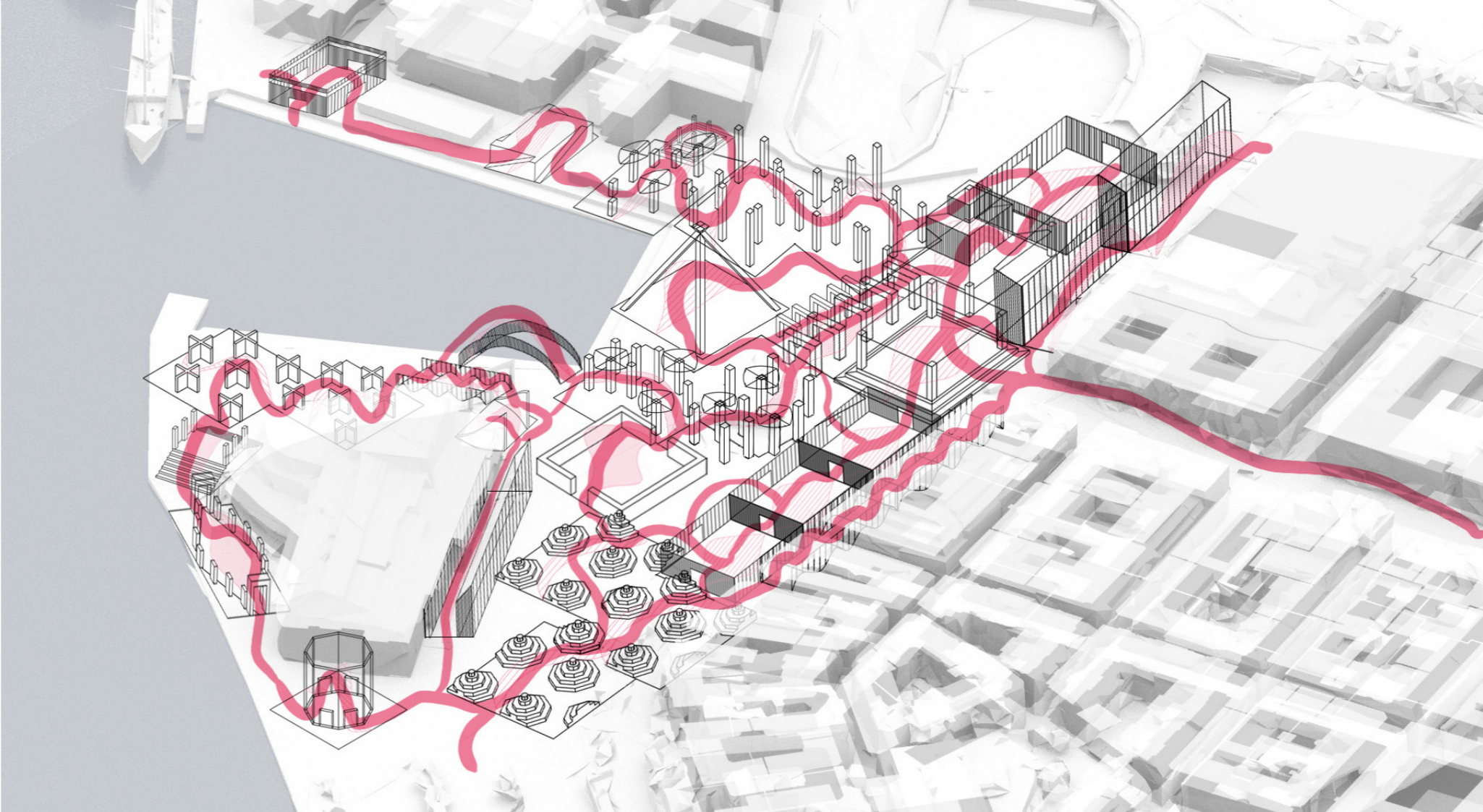
isometric sketch



plan with movement, sketch.



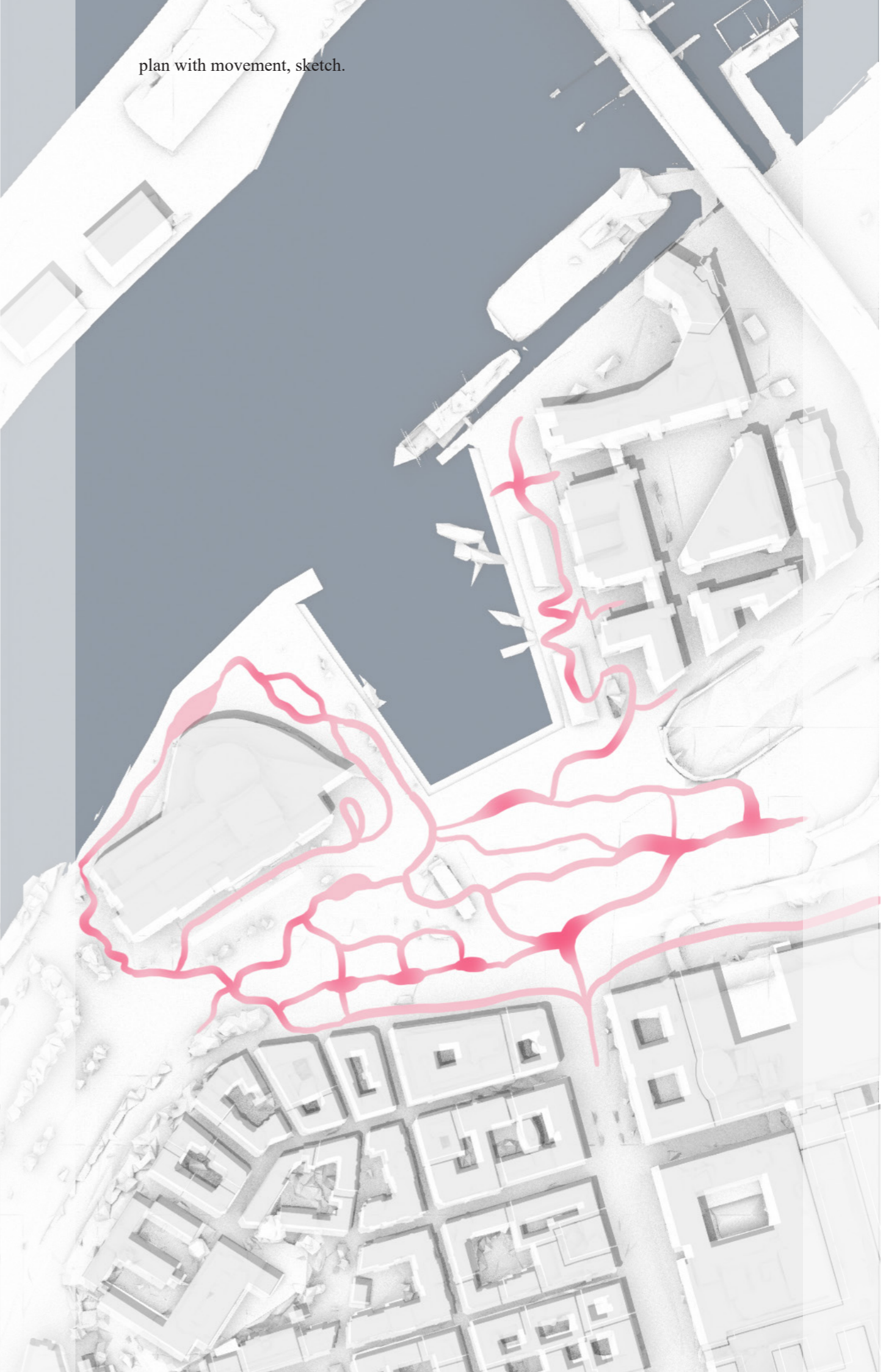
plan, sketch



plan, sketch

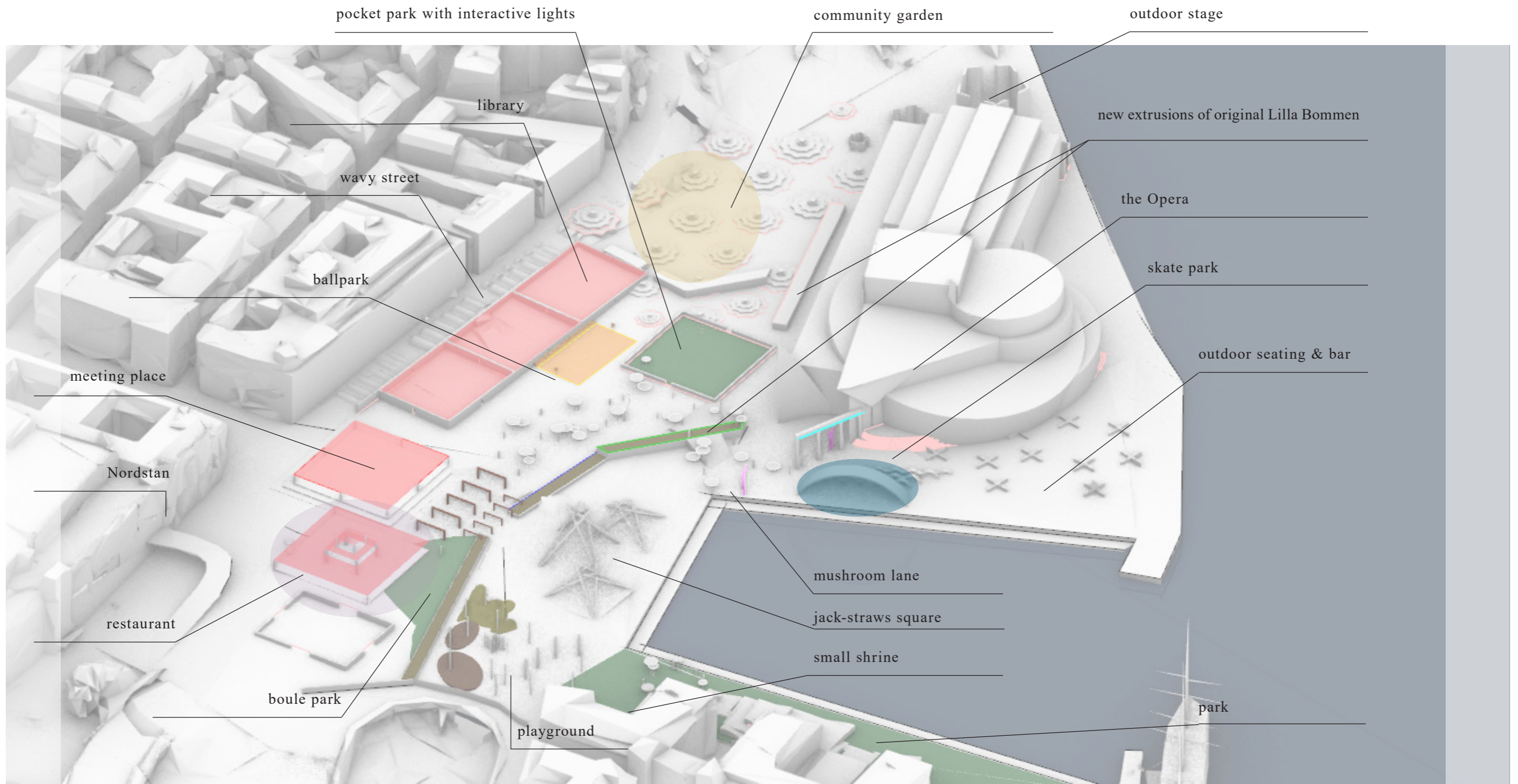


plan with movement, sketch.



The first design lands on site. One of the first things that needed to be accounted for was the sheer scale of the space. When developing the sketching method a smaller scale of the spaces that the models inhabit was imagined and it became clear that some of the models worked better than others in a bigger scale. For example, the octagon extrusions (highlighted in yellow), can easily be adapted to a space by the number of pyramids. The size can also vary depending on the function, for smaller octagons seating might fit, and bigger ones can be used for urban farming. But when looking at the bridge (highlighted in blue) or the restaurant (highlighted in purple) one can see that the objects become very big. The bridge is supposed create an upwards motion but will people make the effort to climb 10 meters when you could just walk next to it?

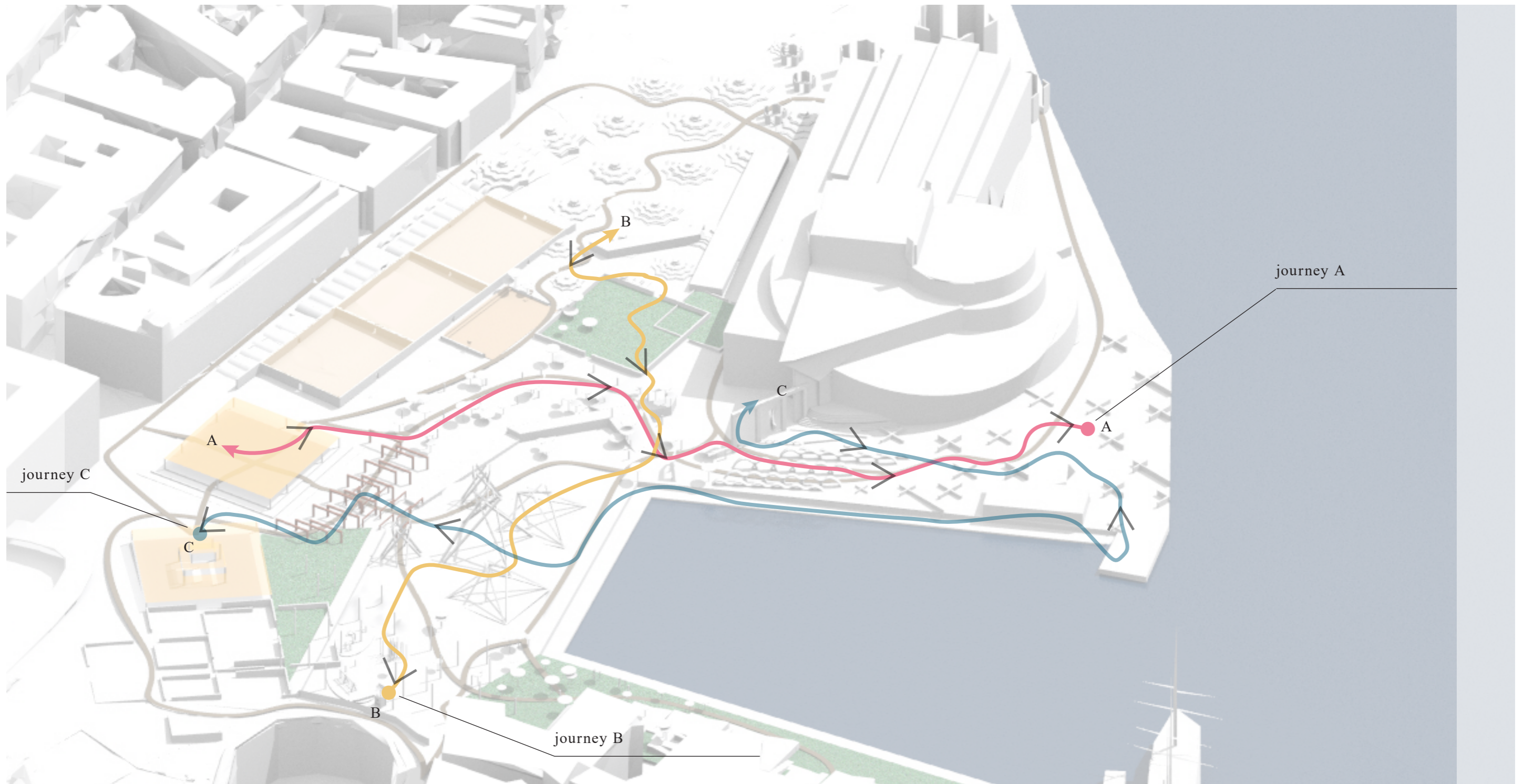
The blank spaces in-between the models will also need to be filled when recreating the patterns from the first sketch. The technique work when putting the models together, however many of the models from the sketching technique will need some more alterations in order to function with any other goal than creating different kinds of movement in those defined spaces, disregarding existing objects on site.



reworked

The sketch gets reworked. The models from the sketching technique are altered at some places and multiplied. This fills in the voids but also crashes sometimes with the existing objects on site. Since the first design was completely random, there are now more consideration of placement so that one can keep the intended movement but also use the space in a realistic way. In this design, there are some new goals.

Three intention points are made, objectives one might say, that will work gravitational towards specific audiences. This makes it more plausible to try out the methods in a smaller scale. Three journeys are traced to their respective objective. It should be easy and effortless to move in between the three points, so you should never feel lost in a bad way. But the opportunity to walk astray and be lost, in a good way, should be present at several points through the journeys.



the couple

journey A

The first journey we follow is a couple as they walk toward the tram stop after spending an afternoon at the bar that lies at the end of the pier. They live in the city so they know the way, but they're not in a hurry and stop by the open space where a food truck have parked.

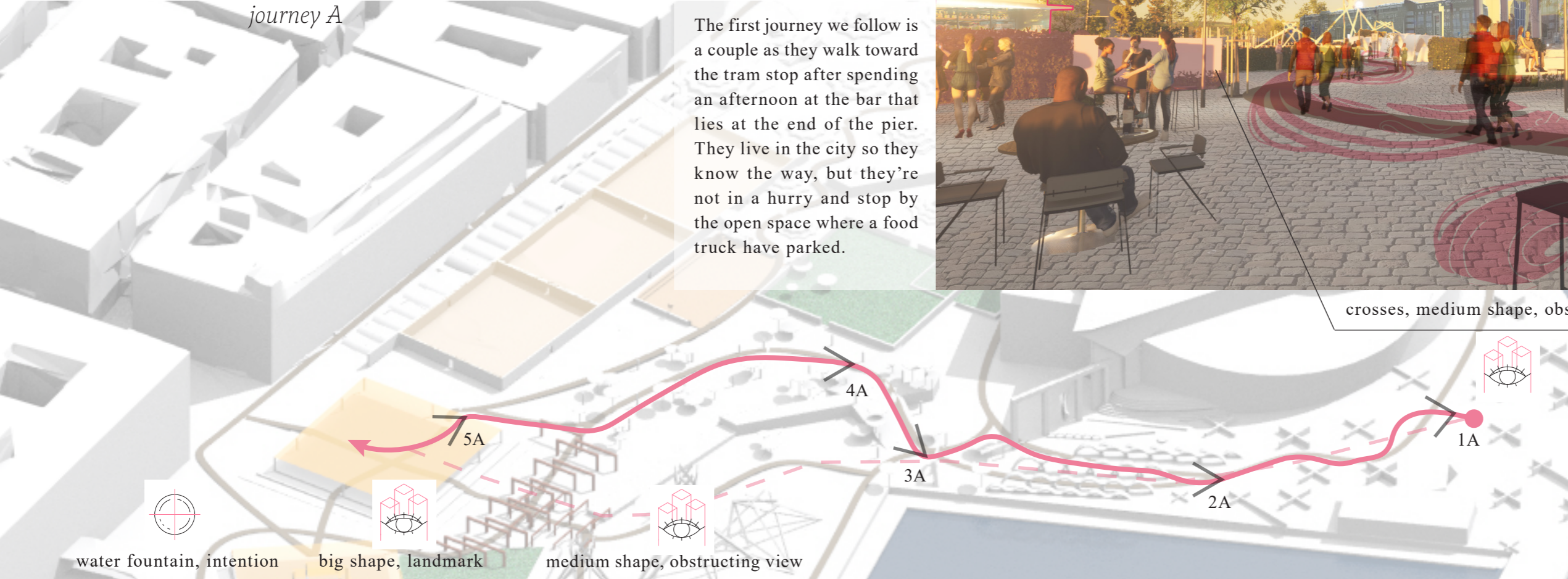
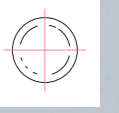


1A

bar, intention



crosses, medium shape, obstructing view foodtruck, intention



water fountain, intention

big shape, landmark

medium shape, obstructing view

Passing the wavy structures, they walk on one side each, still being able to catch glimpses of the other through the structure before meeting up on the other side at the crossroads.

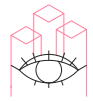


wavy structures, sensory



2A

The extrusion create a dynamic change of pace, as well as contributing to curiosity as it partially hides the mushroom structures on the other side so they chose this path.



medium shape, obstructing view



mushroom structures, sensory

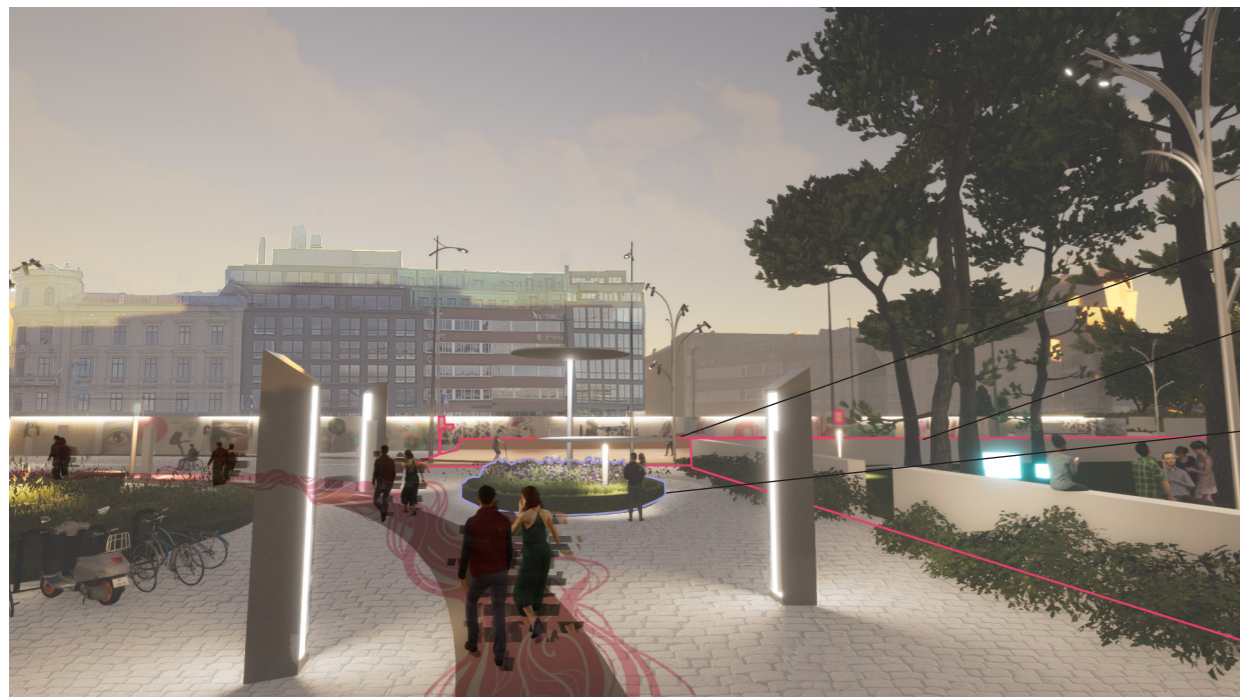


resting area, sensory



They pass the pocket park and ballpark to the right that are popular hangouts in the evening for adolescents.

3A



4A



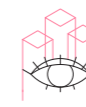
ballpark, intention

pocket park, intention

store, intention

flower bed, legibility

Their final stop is Kanaltorget heart, which lies at the official entry to the area, a sheltered meeting place with a convenience store and places to sit. It also has space for street artists when it rains.



medium shape, obstr. view



glass ceiling, sensory



resting area, sensory

5A



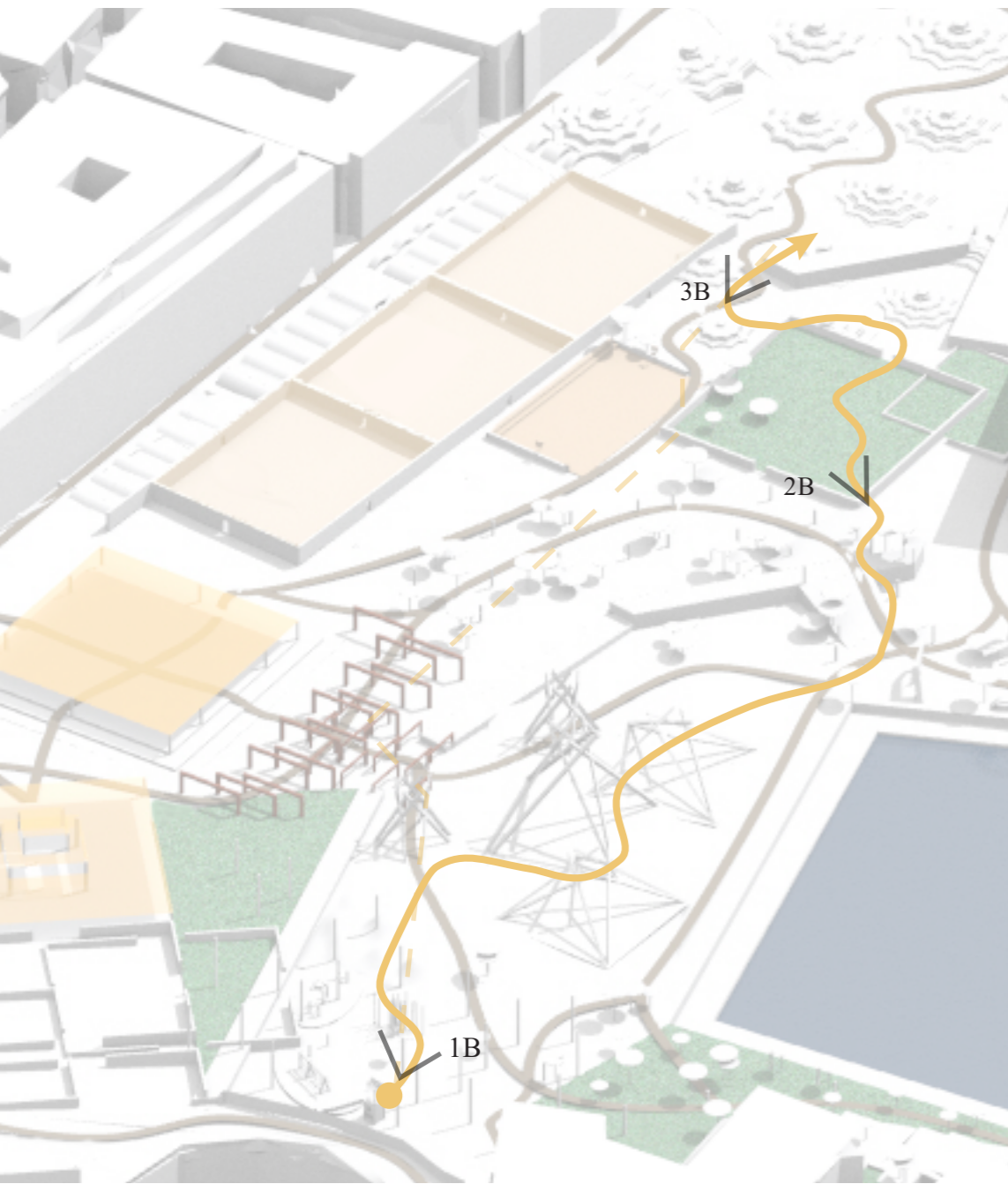
the kid

journey B

1B



playground, intention/sensory



butterfly hill, legibility



small shape, change rhythm



big shape, landmark



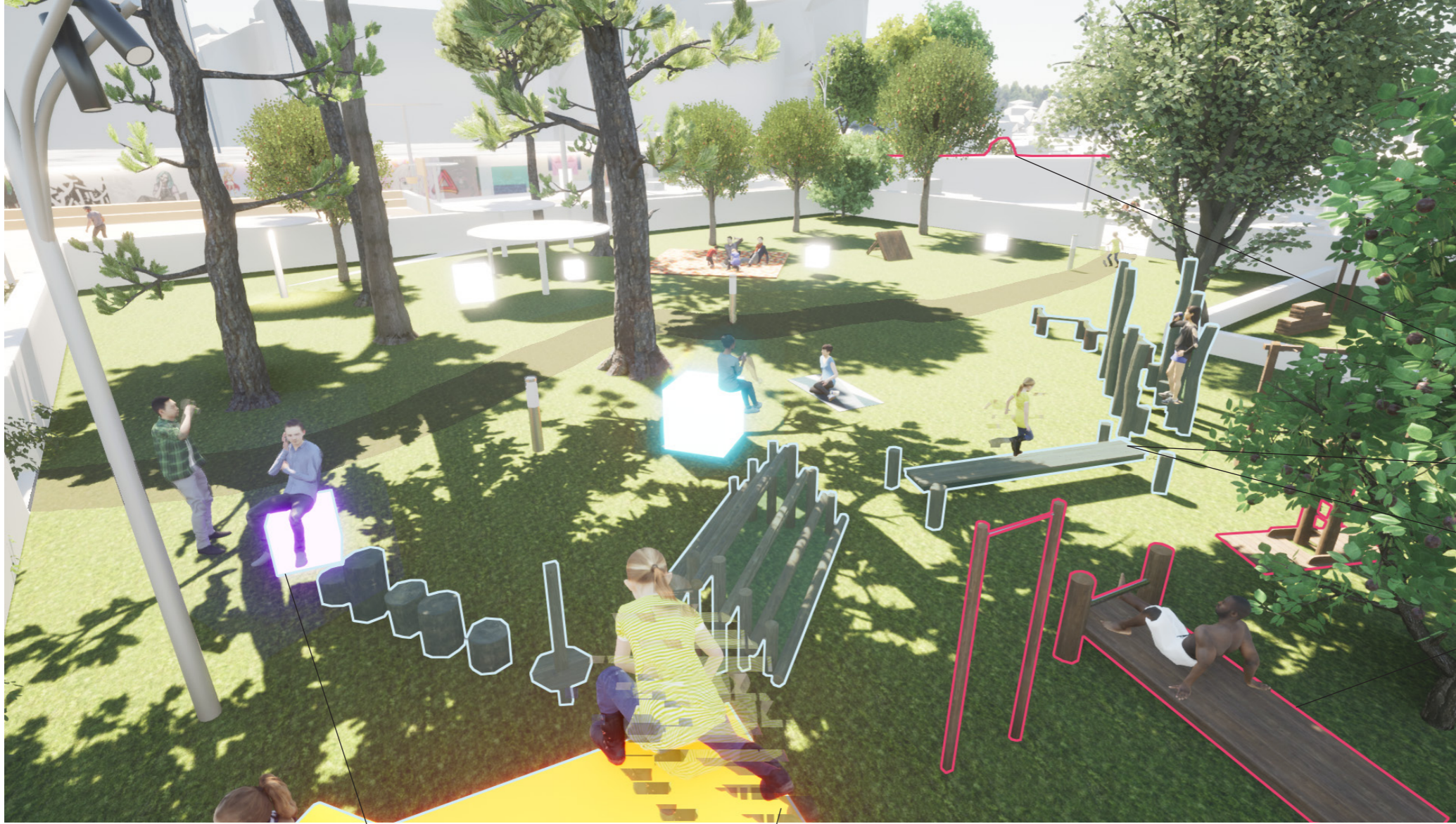
big shape, landmark



resting area, sensory



Our second journey is a child's who is going to meet with her mother at the community garden. She got directions to walk towards the opera and then pass through the pocket park. But there is much to explore on the way and she gets distracted in the playground and on butterfly hill before crossing the square!



interactive light installation, sensory



community garden, intention



small shape, changing rhythm



obstacle course, sensory



outdoor gym, intention



2B

After she pass Jack-straws square she climbs over the lower wall to get onto the glowing cubes that change colour when touched. She sees the greenery on the other side of the extrusions and head there. Instead of taking the ordinary path she chooses to go through the obstacle course.

Arriving at the community garden she sees her mom waving and runs straight ahead, ignoring the octagon-shaped ziggurats and the graffiti.

3B



street art, legibility



medium shape, obstr. view



urban farming, sensory

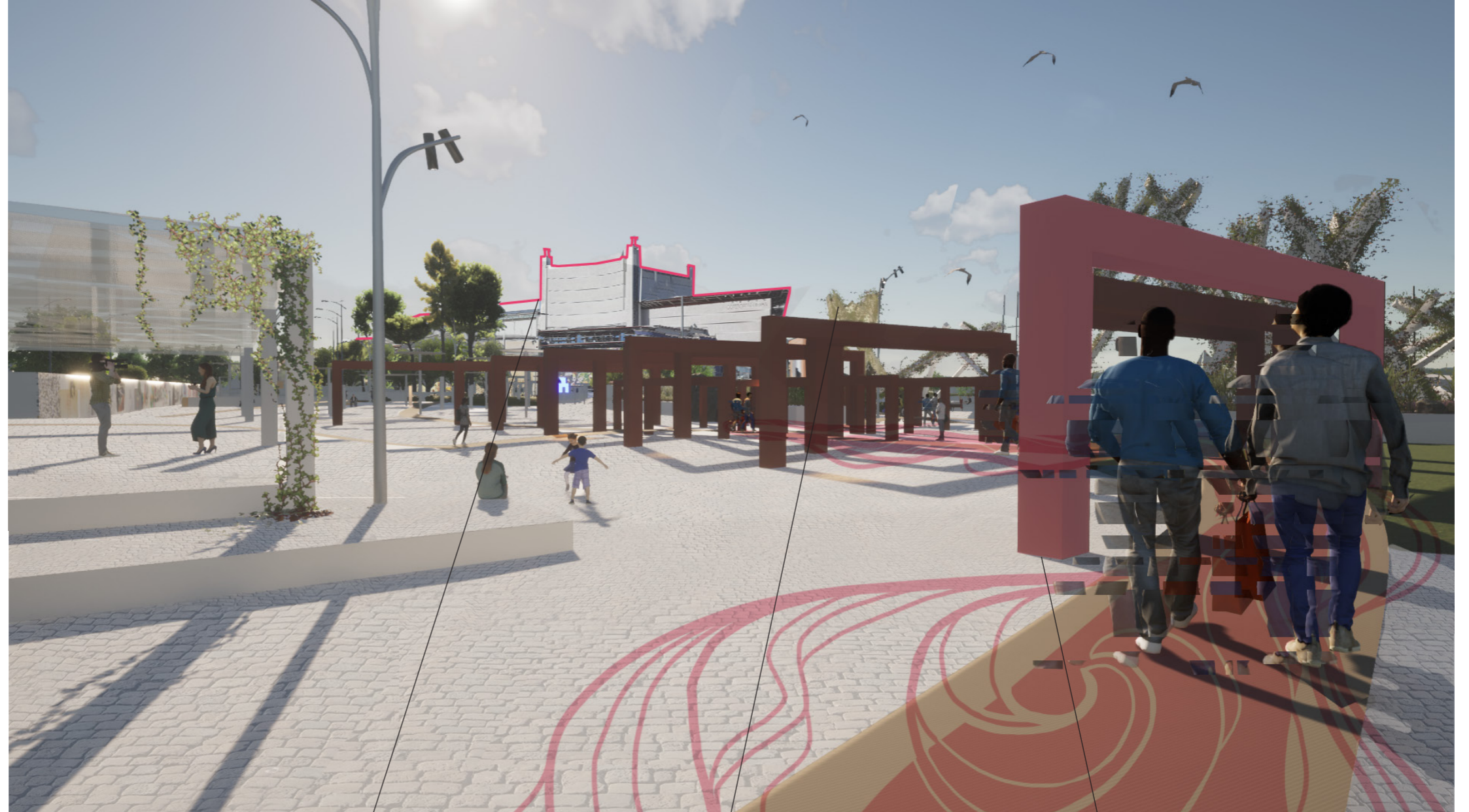


resting area, sensory

the tourists

journey C

Two tourists have spent an afternoon in the restaurant. They are heading towards the Opera but have plenty of time before the show starts. Compelled at the sight of the lush pyramids, they head right when faced at a crossroads under the portals.



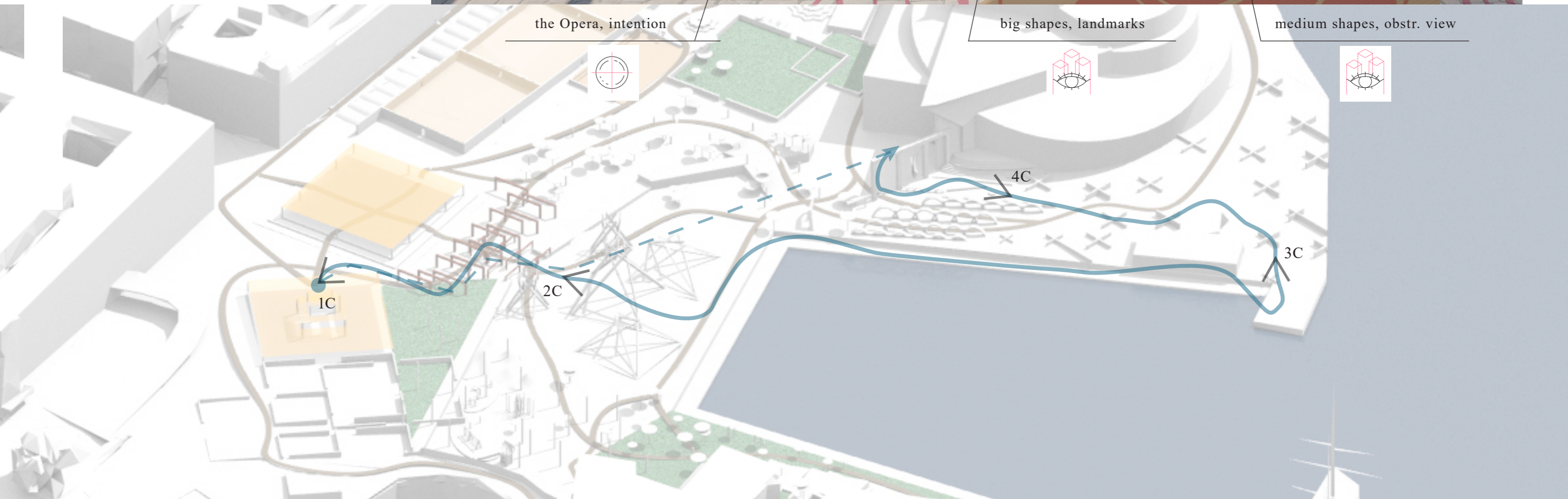
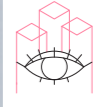
the Opera, intention



big shapes, landmarks



medium shapes, obstr. view



The Pyramids frame the harbour and they get an impulse to go underneath the big structures to the waterfront to get a better view of the harbour.



medium shape, obstructing view



pyramid structures, sensory



waterfront, sensory

They make their way out to the very edge of the pier before heading back towards to Opera. Compelled by the crowd of people at the outdoor seating area, they take the inner route back and stop by the statue of Evert Taube on the way.



3B



big shape, landmark



resting area, sensory

statue, legibility

Instead of walking between the wavy structures, they see a half-hidden skate park that is used during this time of the day. They walk there to enjoy a different kind of show than what they are going to experience at the Opera.

4B



wavy structures, sensory

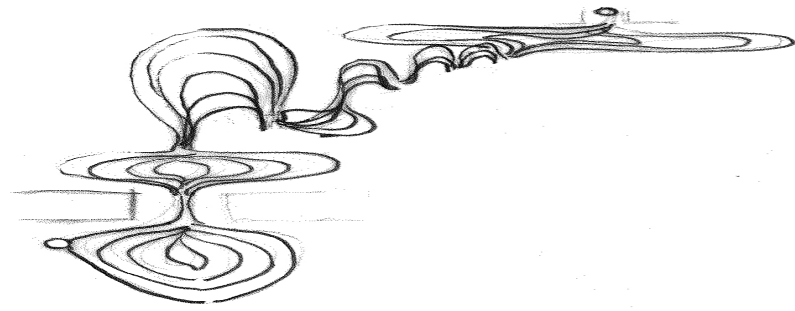


medium shape, obstr. view

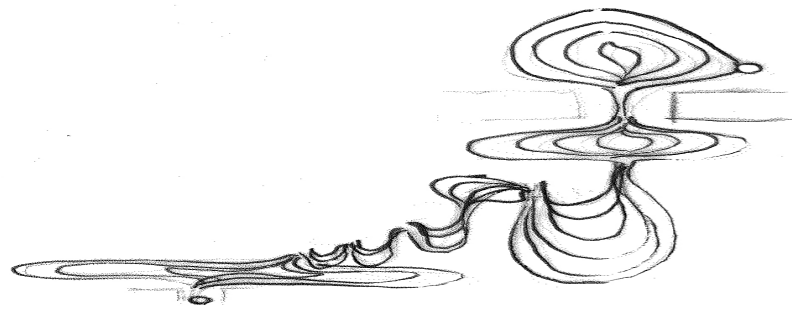


rest. area, sensory

2B



8. reflections



Overall, it worked well to apply the toolbox to the site. It created spaces with shapes that directs the movement in a non-coercive way, giving plenty of options to walk astray during your journey through Kanaltorget. However, the scale of Kanaltorget is too big, it would have been smoother to assess a smaller space for the final design, or maybe several smaller spaces.

The sketching technique can also benefit from adding more models that fit within the different kinds of movement, providing more choices when designing. The randomness of the design also came with it's own set of pros and cons. I believe it did create a design that would not have been thought of otherwise, as well as generating random qualities, like the wavy structure being used both as a space divider as well as seating or for climbing. The mushroom structures works both as lamps and as shelter, and depending on what material you use they can probably serve more uses.

Looking at the wider picture of applying the method more systematically there are some issues that pops up. As briefly discussed before, the tool gravity and shape rule can be problematic to apply on a bigger scale because there are so many possible objectives in a city. As is clear in the final design of Kanaltorget, there are many more routes and objectives than mentioned, imagine trying to analyse a city in this fashion. It would certainly come down to categorising many peoples taste and preferences in to a few groups. This comes with its own downsides but can still be usable to see where the city lacks gravity points for different groups of society, as well as where we can create more interacting and dynamic urban environments.

A dynamic city is a thriving city. It is a city that can adapt and change to the current circumstances. It is a city that not only accept the changes but might even celebrate some of them. And celebrating change somehow also means celebrating movement. This thesis shows that we can learn from how in-depth knowledge of movement of different kinds, such as perceived, directed or historic, can help us develop tools for how to design our cities with motion in mind. It generates design that create spaces as a result of movement rather than having movement be a result of spaces.

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Appendix

continuation of literature study

- the extension

The literature study was mainly conducted before the thesis started and used as a source for inspiration but also a foundation. In the study I saw a state of tension highlighted within Japanese architecture that I found no name for, so I decided to call it the 3rd element. In the beginning of the thesis work I studied where the 3rd element appeared in order to funnel down the focus. This chapter shows the extension of the literature study and how I chose movement as my main focus as a part of the process of the thesis.

I've conducted a list with the re-occurring third elements that I have identified in the Japanese architecture, poetry and art. The parameters applied to be able to choose between the seven I identified in the literature study is partly due to what extent it occurred in the Japanese architectural examples I studied, and partly in how feasible it was to analyse with the intended methods.

Based on a literature study, cherry-picked examples of where tension between opposites appear in Japanese architecture and art were analysed and categorized. In order to delimit the study movement was chosen to be studied further.

important terms

Movement (noun)

”1a: the act or process of moving

especially : change of place or position or posture [...]

4a: MOTION c: a distinct structural unit or division having its own key, rhythmic structure, and themes and forming part of an extended musical composition (Merriam-Webster Dictionary).

Gradient

Change in the value of a quantity (such as temperature, pressure, or concentration) with change in a given variable and especially per unit distance in a specified direction (Merriam-Webster dictionary).

the 3rd element

Nature plays a fundamental role in traditional Japanese architecture. Going back to the symbol of yin and yang, I argue that this originally Buddhist becomes something else when mixed with Shinto. The tension between the opposites are highlighted in Japanese architecture, similarly to how nordic nature creates a tension with a twilight or sunrise as it sways in between day and night, warm and cold, open or closed. One could call it a third element, however not all call it precisely that, I chose this term to be able to explain this aspect of architecture.

The 3rd element can be defined as the interplay between opposites, a visible disorder of the differences that heighten the tension of the two, or alternatively, a middle zone that can bridge opposites and create a harmony. Yin and yang are symbols of the completion of the opposites, with the small circles of white and black within each field representing the third element in Buddhism. This 3rd element have fascinated the Japanese, as we have seen in art, poetry, theatre, and architecture among others, where they try to make the third element visible in order to showcase this natural tension. An practical example of this is the Japanese word En, discussed by Nitschke as used in words for transitional spaces. One of those is En-gawa, meaning a porch stretching around traditional houses to create a passing between outside and inside (1993). A space that is neither inside nor outside but exists in the in-between. Fridh introduced the third element in yin and yang but I find it applicable to several gradients. It is also seen in the interplay of elements such as void and matter, silence and sound, activity and passivity, symmetry and asymmetry for example.

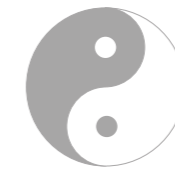
Figure 8. Kyoto garden view & analysis



Picture of Shiden-Ji Garden in Kyoto, showing view of mountain in the distance. The picture to the right shows how the irregular composition and play with inside and outside synergize to create a framed view.

The elements are often entangled with each other and synergize to create an atmosphere. For example, the method of shakkei, translated as 'borrowed scenery', is often used in traditional architecture. In figure 8, The irregularity of the bushes in the Kyoto garden seen in the foreground when viewing the mountain on the left side helps to balance the overall composition of the "frame". It draws the vista into the garden, hence blurring the conception of what is intentional inside or outside of the garden. To create this setting there needs to be an interplay of several elements, movement, clusters, wabi sabi and transparency.

The four 3rd elements that I found most data for was transience, movement, clusters and shadows (excluding yin and yang as they are a symbol and abstraction of the gradients). They are presented on one page each with pictures and text from various sources. I have chosen to further pursue only one of these 3rd elements, *movement*, which consequently is the subject for the following design studies.



manifestation/s of gradients

abstract	yin	3 rd element	yang
fourth dimension	decay	transcience	growth
	start	independent parts	end
	time	movement	space
third dimension	void	clusters	matter
	darkness	shadow	light
	symmetry	wabi sabi	irregularity
	inside	transparency	outside

Table of opposites with the gradients bridging the gap in-between.

void - clusters - matter

Theatre is a long ongoing tradition in Japan, Noh being one of the forms of the practice. Noh usually describes everyday life where the observers are introduced to a play that often does not have a real beginning or end as Westerners have come to know it. This reinforces the journey as the most important part. In Noh this takes expression as Phenomenal Noh and Phantasmal Noh. Phenomenal Noh has time pass chronologically for the actors and the real time of the observer matches the time of the actors, it often portrays realistic events in a normal life. Phantasmal Noh on the other hand, is a dreamlike state where the actors find a way to illuminate normal life from a perspective of madness (Fridh, 2004, p.71). I would in architectural terms understand it as defining a space, not by the physical matter, but instead describe it by the bouncing interplay between light and shadows.

To compare to theatre, we can look at paintings done by Sesshu in the 13th century (p.70). Fridh showcases one famous painting, Landscape in the Haboku technique (1495), where void shrouds part of the painting, showing only a tree and mountains in the background. In some part of the painting there is matter, and in some parts, there is a void where our imagination will have to fill in where Sesshu does not. This creates an interplay between void and matter, something that is common within traditional drawings, and that implies a hidden beauty. This also requires an active participation of the viewer.

Figure 9 & 10. Void & matter



Drawing of Sesshu to the left (Fridh, 2013) as well as a picture of an actor in a Noh performance to the right (Immoos, 1977, p.102).

decay - transience - growth

Nitschke wrote in 1966 that the Japanese room is vague in the sense that it is determined by an area that is defined by human activity and changes with the situational activities. This can be compared to our European townscapes that often is defined by elements in a certain composition, framed by buildings and walls. He brings up Champs-Élysée in Paris or St Peter's square in Rome as examples, where the spatial setting is more important than the activity in the process of space making (p. 126).

This puts much of what we learn about city building in the West on its head, since our cultures origin stems from two very different world views, Christianity, versus Buddhism paired up with Shinto. Shinto and Buddhism exercising peacefully side by side as the main religions in Japan, has over time come to influence the way the Japanese people think about life, death, nature and the spirit world (Fridh, 2004, p.56-57.)

The mentality is founded in the Buddhistic cosmos that has no real beginning or end. Buddhists strive to reach the ultimate tranquillity, Nirvana, through reincarnation where your actions in your past life decides your next. It creates a circular time loop in contrast to Westerners linear way of perceiving time, putting less stress on a definite beginning or end and instead focuses on the journey. This also creates a reverence for transience, in architecture this can for example be displayed as *kami*, a temporary space for spirits to dwell in order to order our world (Fridh, 2004)

Figure 11 & 12. Different types of transience



Kami, a temporary room set up for spirits to enter the natural realm (left) (Fridh, 2013), and a picture of funghi that lives by decomposing dead matter (Delorie, 2018).

light - shadow - darkness

Similarly to the discussion of the phantasmal Noh theatre and how a room can be understood by just light and shadow, one could argue that the interplay of opposites creates this tension between light and darkness in paintings and architecture, which I think makes the transition space thrilling and frankly, quite beautiful. Tanizaki further describes this,

The quality that we call beauty, however, must always grow from realities of life, and our ancestors, forced to live in dark rooms, presently came to discover beauty in shadows, ultimately to guide shadows toward beauty's ends.

And so it has come to be that beauty of a Japanese room depends on variation of shadows. Heavy shadows against light shadows - it has nothing else. Westerners are amazed at the simplicity of Japanese rooms, perceiving in them no more than ashen walls bereft of ornament. Their reaction is understandable, but it betrays a failure to comprehend the mystery of shadows.

- Tanizaki, In Praise of Shadows, p.29, 1991

Figure 13 & 14. Shadows in traditional houses



In traditional Japanese houses there are plenty of space to showcase the gradients of shadows without distractions, here is an example from Meigetsuin temple (Japan Magazine) .



Another example of the gradients of shadow in architecture is displayed in the en-gawa (porch) that follows the facade around the house (Aya's space design journal).

time - movement - space

Time-space is regarded differently in Japanese architecture. Fridh speaks about emptiness, or the void, symbolized in the poetry art form haiku or in Japanese gardens, where an important part of the additive processes constitutes of the pause, which creates a rhythm in in the movement. In Japanese gardens one can often find stones elevated from the ground that forms a path. When walking along the stone path, suddenly a seemingly arbitrary distance between some stones disrupts your pace, forcing you to the present to adjust your steps, and maybe you even look up to find yourself before a grand vista of a mountain in the distance. Nothing is however arbitrary about the placements of the stones; the design is intended and the varying distance between the stones manipulate the movement. When you stop and look up several perceived sequences of spaces are created instead of one. Consequently, this intention also manipulates time itself. When forced to halt, the increase of impressions you receive will extend the perceived amount of time passing in the same way a rich and diversified experience makes us experience a space as bigger (Fridh, 2004, p.50).

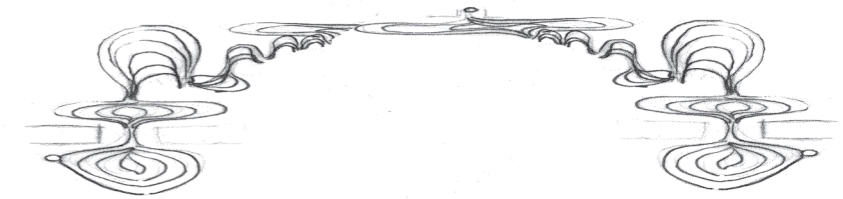
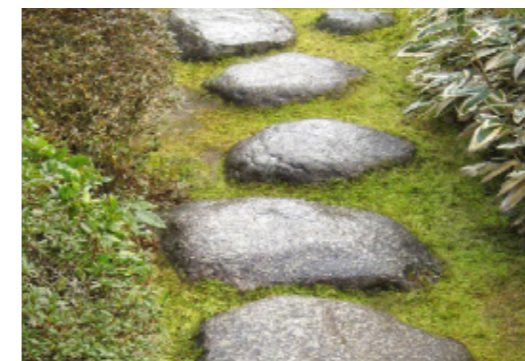


Figure 15 & 16. Physical & mental



Stepping stones in traditional garden in Japan (The Japanese Garden).



Picture of temple on Miyajima Island that highlights the transition area between inside and outside, as well as light and shadows, to frame the shrine in the background (Own work).

categorisation of examples

	1. Tokyo Memorial Park, Takefumi Aida	2. 54 windows, Kazuhiro Ishii	3. The church of light, Tadao Ando	4. Takatori church, Shigeru Ban	5. The S-house, Kazuyo Sejima	6. House in Tsumaya, Toru Murakami	7. Bou-Bou-an, Kan Izue	8. Ji-an, Gyo-an & So-an, Shigeru Uchida	9. Yusuhara Wooden Bridge Museum, Kengo Kuma	10. Kaze-no-oka Creamtorium, Fumihiko Maki
clusters	shaded	white	shaded	white	shaded	white	white	shaded	shaded	shaded
transcience	white	white	white	white	white	white	shaded	shaded	white	white
shadows	white	white	shaded	white	white	white	shaded	shaded	shaded	white
movement	dark red	white	white	dark red	dark red	white	white	white	dark red	dark red
independent parts	shaded	white	white	shaded	shaded	white	shaded	white	white	shaded
wabi sabi	white	shaded	white	white	white	shaded	white	shaded	white	white
transparency	white	white	shaded	shaded	shaded	shaded	white	shaded	shaded	white