Informal

Designing an unconventional public space using sound

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Content

Abstract

This thesis questions how we design public spaces. Looking at how people use cliffs in the archipelago or large parks, a more flexible, less hierarchical usage pattern emerges. People use the place as they see fit. Can these qualities be brought into the city center? By altering public spaces, can we encourage dialogue about what our cities should do for us?

These topics are investigated in a design proposal for the square Gustav Adolfs Torg, the center of Gothenburg's political power since the 1600's. The architecture is classicist and imposing. There used to be public punishments here. But nowadays Gustav Adolfs Torg emerges as one of few truly public places in central Gothenburg. People demonstrate here. You don't have to buy coffee to be allowed to exist here. Still, the square is surprisingly unused, suitable only to large scale gatherings. The square has potential for a design that negotiates the needs of one person with the needs of a demonstration.

The thesis aims to transgress readings of existing relations on site, preconceived ideas about what the square should be and compositional rules. To accomplish this, a generative process using sound has been used to find a new form for the square. By mapping parameters from sounds and musical rhythms to geometric parameters, forms are created. When the forms are inserted on site, new spaces, flows and relations appear. These are developed into a design proposal.

The result is a landscape, a diversity of possible ways of being on a square. It changes a very formal place into a very informal one. A place that people can use as they see fit.

In conclusion, this thesis points to the merits of a design method where you analyze a site and a design task by inserting foreign elements into the design. Working in this way can unlock potentials that would be hard to design from a blank slate.

Keywords: Generative design; urban design; public space; computational design; sound

Site and program

Introduction

Short description

This master thesis investigates combining public space issues with generative design. A design for an unconventional public space is accomplished, by using a computational design tools for turning sound into geometries. This method of working is demonstrated in a design proposal for the square Gustav Adolfs Torg in central Gothenburg.

The master thesis begins with an outlining of the kind of public space the project aimed for. The site in it's present state is explained, and case studies of three public space projects are shown. The findings are outlined and used as a basis for a program for an informal, less hierarchical public space.

Moving on, it is explained how music and sound can be used as concept models for creating unconventional public spaces. It is outlined how this was turned into a computational design workflow.

The workflow is demonstrated by showing the development of the geometries that formed the basis for the design proposal, and then by showing the actual design proposal. The thesis is concluded by a discussion and some reflective notes on different aspects of the work.

Background

This thesis was developed as an answer to my interest in public spaces. I'm fascinated by how people use, for example, cliffs in the archipelago or large parks. Flexible spaces that lets people appropriate them for their needs, with little hierarchy involved. Informal spaces, with comparably loose norms about what you can and can't do there. This quality, this idea of an informal public space, is a quality that I find incredibly relevant in designing inclusive spaces. People should be able to use their public spaces as they see fit. The design proposal part of this thesis is an attempt at taking this quality and transfer it into a context where it, as I see it, is severely lacking: Gothenburg's city center.

The way I've chosen to accomplish this is by attempting to detach the design both from existing relations on site, and from my own preconceptions of what a public space is and how it should look. I did this by developing computational tools for generating geometries from sound. Music and sound was used both as concept models and actual working tools.

These tools let me disregard compositional rules and transgress my preconceptions about what is good and bad for the site (or even worse, what is "best" for the site). Instead the focus could be shifted to more open, less judgmental questions. I could look at a multitude of generated geometries and ask what relations, flows and spaces these create. I could learn from them, about the design and the site. These foreign elements show possibilities I would have had a hard time conceptualizing or designing from a blank slate.

My thesis points to a general method of designing, and of studying a place. You insert something foreign into the design. Anything that provides you with starting points, anything you can insert to study the effects of. For me, this method of working had a liberating effect. It really helped me transgress my readings of the site, my preconceptions of what a public space should be.

In summary

Goal of design project

A design for an informal public space.

Purpose of thesis

- Find a method of designing public space, that allows for transgression of preconceptions of what a public space should be, of existing relations on site and of compositional rules.
- Explore methods of sketching using generative processes and sound.

Site

Gustav Adolfs Torg is situated in central Gothenburg, connected to the public transport hub Brunnsparken and the mall Nordstan. While it sees a large number of people passing every day, it's still surprisingly unused. The square has historically been the center of political power in Gothenburg: the city hall has been here since the 1700s, and the courthouse was here from 1672 until 2010. The architecture is classicist and imposing. It works strongly with monumentality, composition and hierarchy, from the large stone grid that covers the whole square down to the chains blocking off the only possible seating on the square. That seating is the podium of a statue of an old king. The military used to parade here. There used to be public punishments here.

But nowadays, when dominating power structures to a higher degree is driven by capital instead of state, Gustav Adolfs Torg is one of few places in central Gothenburg that remains truly public. While the rest of the city center has been thoroughly commercialized, this square remains a place where you don't have to buy coffee to be allowed to exist. The generic flat surface works for large gatherings. People demonstrate here. Sometimes there's concerts.

But when there's no large gathering, the square mostly lies empty. People criss-cross it, rush past to get somewhere else. Since you're so exposed you don't want to stay on the square anyway. If it's lunchtime and sunny, perhaps a food truck stands in a corner. People wait for the bus along the southern border. It's hard to know what to do with the square.

The square could have another form, one that allows for a wider range of uses. A form that mirrors and strengthens the development of the place from a formal place for display of power, to an informal place that people can inhabit.

Gustav Adolfs Torg, SWOT analysis, present situation

Strengths
- Location
- Flexibility
- History - has been a public place since the 1600s.
- Lejontrappan nearby is an established public place
- Part of official plans to have more people move along the canal towards Stenpiren.

Weaknesses
- Unclear programmatic content.
- Lack of possibility for programmatic diversity.
- Expression (car blocks, chains etc.) makes the square seem more forbidding and closed off than it actually is.
- Few people identify with the place, it's almost "too public". Very little sense of ownership.

Opportunities
- Piggyback on the immense flows of people in Brunnsparken and Nordstan.
- Precedents show a thirst for non-commercialized places in the area.

Threats
- (Total) commercialization of surrounding area.
- Negotiation between different user groups.
- Unclear need for programmatic content.
- Gothenburg's discrepancy between mental image and reality regarding public places (see Heden for the clearest example).
- Difficulties convincing people that this is a place worth appropriating / giving sense of ownership.
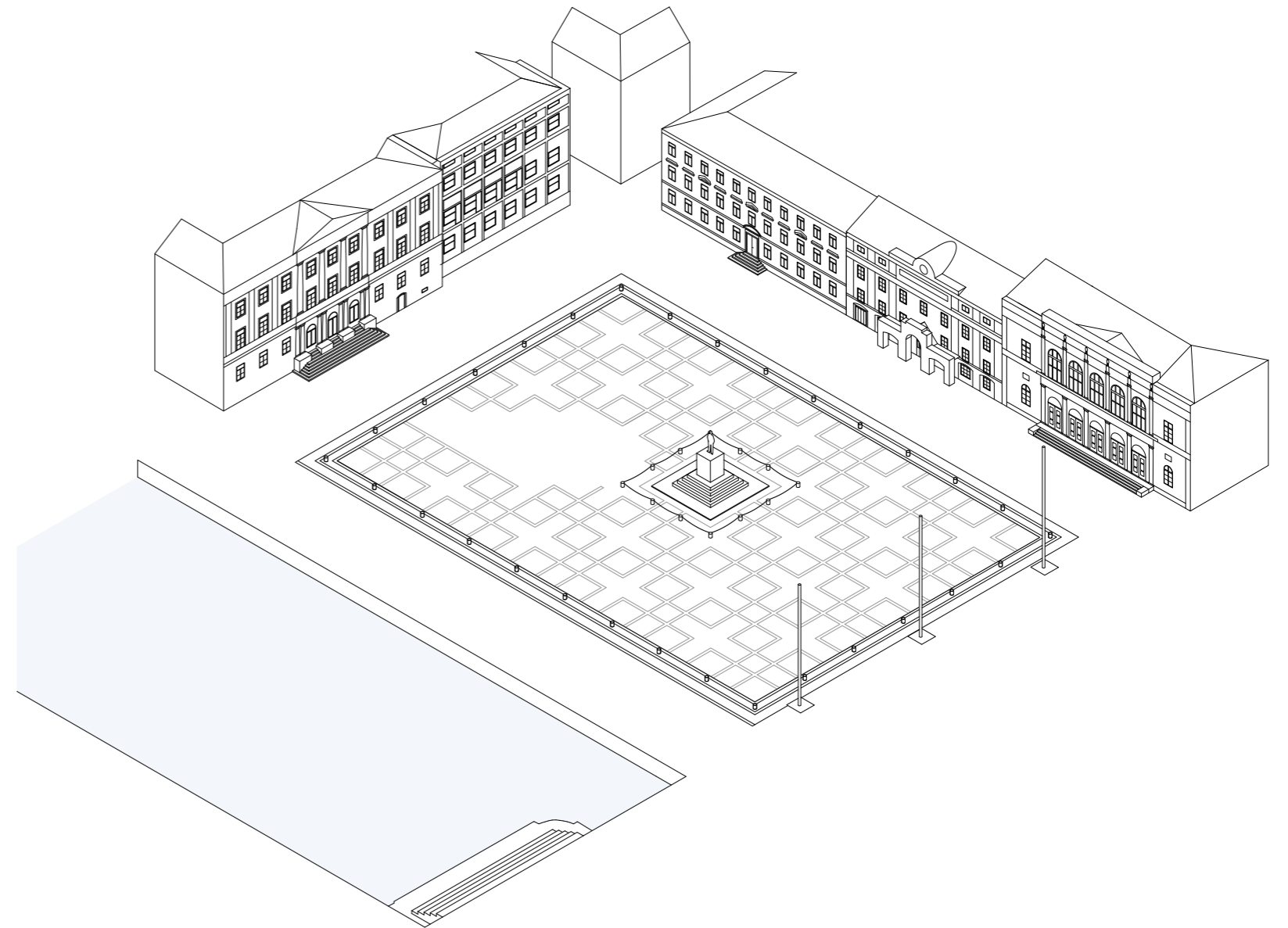
The Högvakten Block
Old quarter from the 17- and 1800s. Gothenburg's city hall until 2013, former exchange house and various offices. Currently undergoing renovations.

Nordstan
Huge shopping mall. Hyper-commercialized, obviously. At the same time, I've heard city planners describe Nordstan as Gothenburg's least segregated place. Everyone goes here at some point.

Gothenburg C
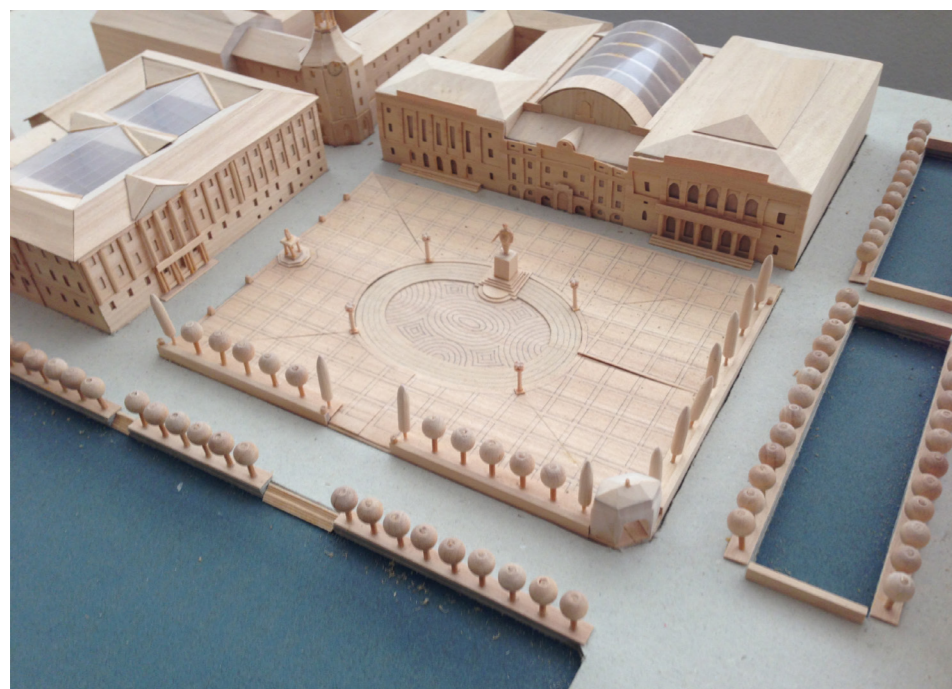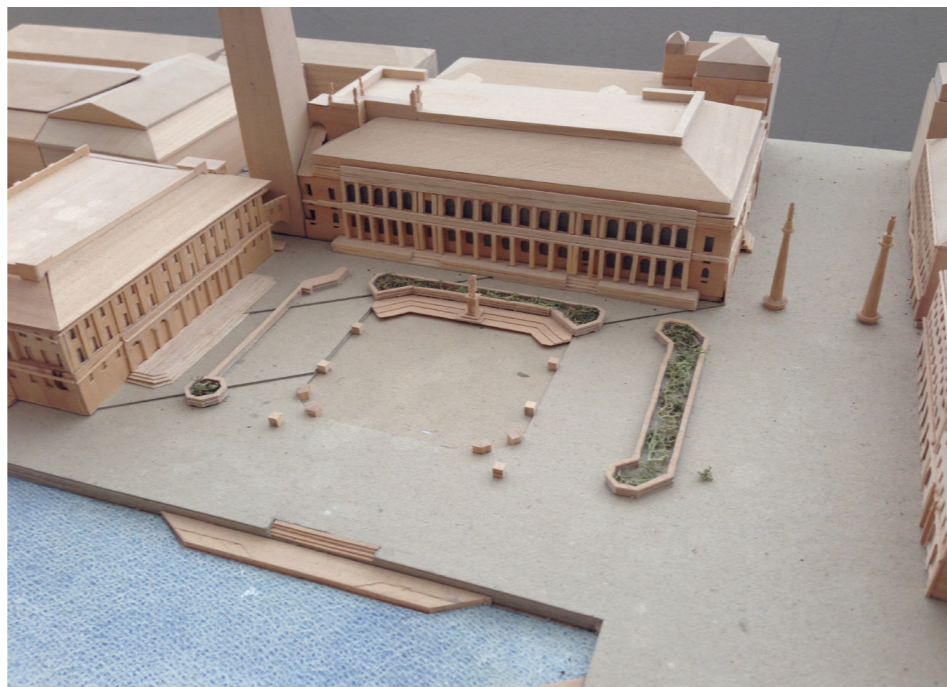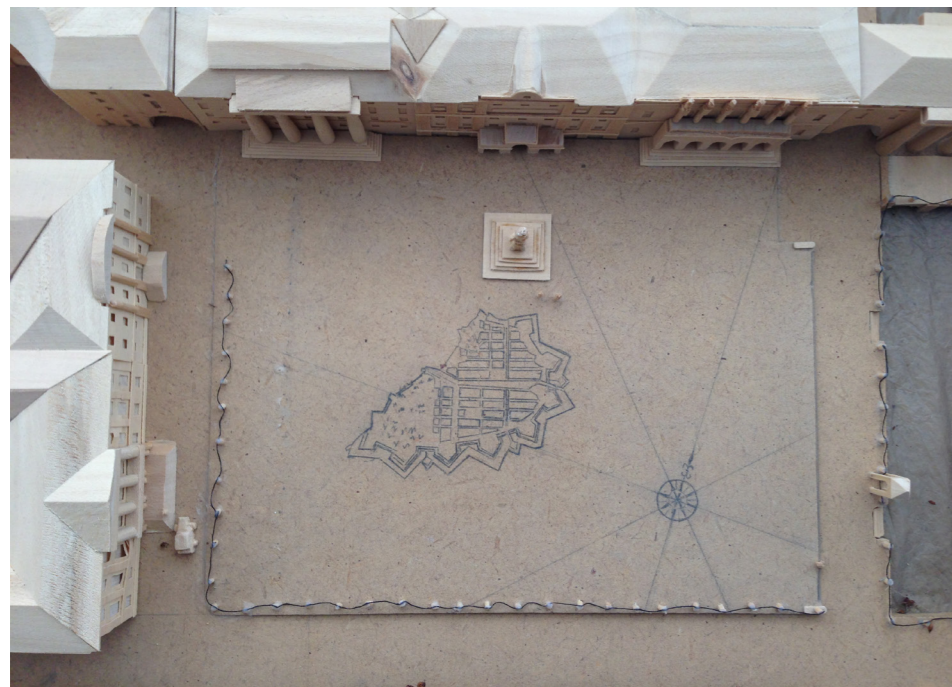The central station for trains and buses.
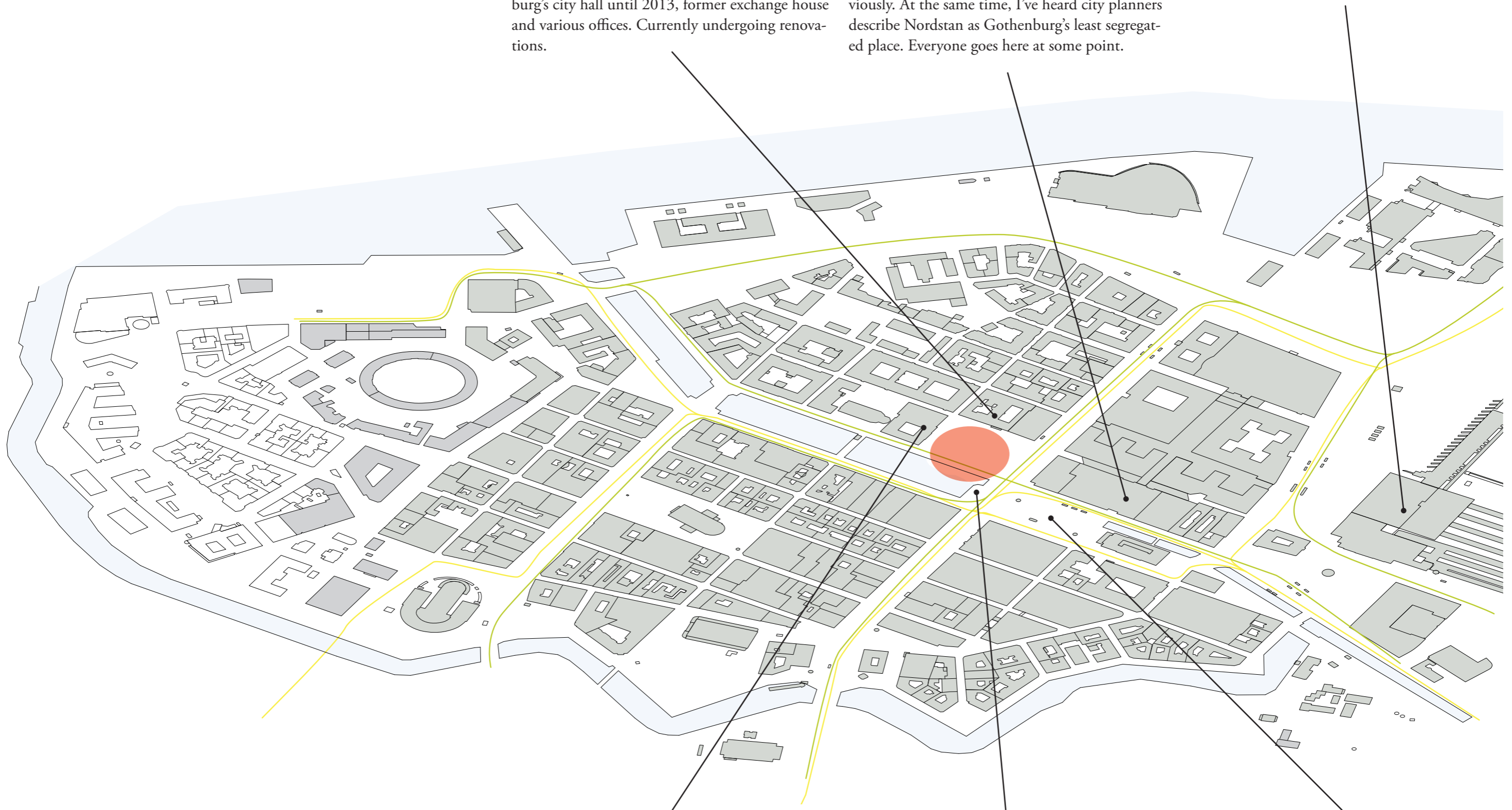
Courthouse
Gothenburg's courthouse from 1672 - 2010. Since 2013 the city hall of Gothenburg, and the seat of it's political power.

Lejontrappan
Part of Brunnsparken toward canal, popular public space when the weather's nice.

Brunnsparken
Gothenburg's main public transport hub. 120 trams and 130 buses/hour in rush hour.

Proposals, architectural competition for Gustav Adolfs Torg, 1913

The roots of today's square

While the square has existed since the 1600s, the present design of it is relatively new. The roots of the present design are from an architectural competition, that was held in 1913 and won by Gunnar Asplund. To show the values embedded into the square's present design, models depicting the different proposals for the redesign of the square are shown above.

Colored by the time they were created in, the proposals work with neo-classicist, national romanticist themes. They are carefully composed according to classical rules of hierarchy and symmetry. It could be questioned if this constructed monumentality is representative of what we want a public place, or Gothenburg, to be today. It can also be questioned is it ever was representative of Gothenburg, or just of what the elite once wanted Gothenburg to be.

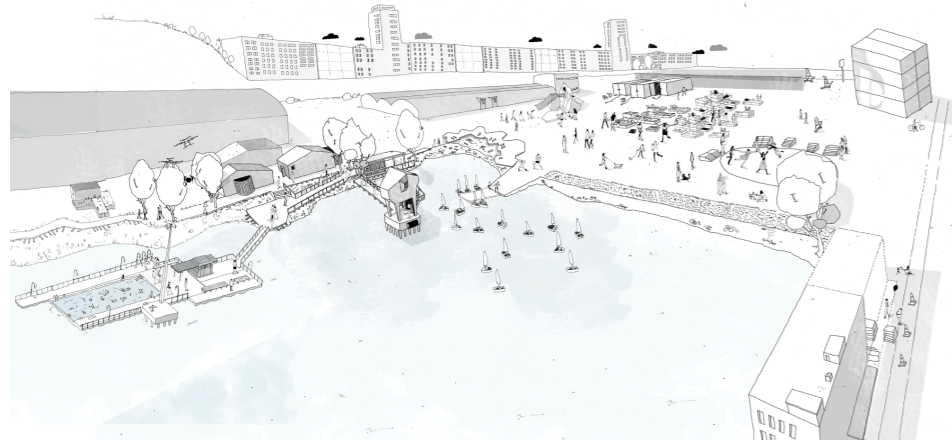*Gustav Adolfs Torg, view from former city hall, looking south.*

Gustav Adolfs Torg, view from middle of square, looking north.

Case studies

Frihamnen (2014-)
Gothenburg
Raumlabor, MYCKET

Formerly a disused asphalt desert in the harbor, Frihamnen is one of Gothenburg's primary development areas. To activate the area before building there, a part of the area is planned to become a park, a development that started early in the planning process. I studied two aspects of the process surrounding this park: Raumlabor's sauna and dynamic masterplanning, and MYCKET's norm critical investigation of the site, that was commissioned by the city of Gothenburg as a part of the preparations for the project.

Both parts of the project is based on the city of Gothenburg's civic dialogue, where people expressed a strong wish to come closer to the water. Raumlabor proposed a public sauna, a swimming pool and strategies for developing Frihamnspiren further. The sauna and swimming pool becomes focal points, drawing interest to the other activities in Frihamnen, showing the public new possibilities for what a public space can be.

An interesting part of Raumlabor's proposal are the *Potential map* and the *Desire map*. The potential map is focused on the site, mapping and visualising layers of information not present on a regular plan: subjective findings, existing qualities, potential players for Frihamnen. If frequently updated, it can become a tool for communication, participation, negotiation. The desire map focuses more on people's dreams for the site. It is a map that identifies and locates the diverse wishes of different actors with a relation to Friham-

nen, without concern for feasibility. By projecting these onto maps of the site, these dreams become concrete, readable and possible to discuss. When updated often, it could show the diversity of voices and how the image of what is possible in the city expands.

MYCKET's investigation focused on how to include marginalized groups in the proposed area for bathing in the park, and in a wider perspective how to create inclusive public spaces. The result is a strategy where the city of Gothenburg actively works with activities for marginalized groups in Frihamnen, in a way giving them more right to the space than norm groups. The long term aim is that marginalized groups should also feel welcome later, when the area has been turned into a housing and office area. Norm groups will feel welcome then anyway.

MYCKET's investigation touches on both practical matters (the need for separate bathing, providing possibility for disabled people to roll into the water without help etc.) and more abstract ideas about how to design inclusive public spaces. An idea they argument for, that influenced me a lot, is that a public space's goal is not necessarily that people should meet each other. For a space to include many different groups, it can be more inclusive to simply aim for people to be there at the same time, be exposed to each other. Or even, that a lot of different people can use it, but not at the same time.

Brända Tomten (2012-2013)
Gothenburg
Gothenburg's planning office, various actors

Brända Tomten, or "the Burned Plot", was a semi-temporary public space placed in Brunnsparken, close to my project site. I know one of the main actors in the project, and hung around at this place a lot at the time it was active. At it's best days, it was very vibrant, but not for the reasons the initiators had planned.

The majority of this case study is derived from an interview I did with Ellis Holmberg, a friend of mine who ran a coffee wagon at Brända Tomten. Since she was there all the time, she soon got the role of an impromptu (unpaid...) booking agent and project manager of the place. It reflects her opinions and view of the project. With that said, it was illuminating to study how these kind of spaces can work.

Brända Tomten was conceptualized by a politician as a low-key "speaker's corner" for the local city festival. Gothenburg's planning office, eager to try and tap into the immense flows of people in Brunnsparken, expanded the project and put effort into engaging outside actors (such as Ellis coffee wagon, urban farmers Stadsjord, a bee farmer etc.).

The initial, municipality-supported activity, the speaker's corner, raised interest among the public, but was a clear failure. Instead the project and physical structures were used as a platform for other actors to arrange outdoor cinema, concerts etc, and for the public to just hang around in.

The project relied on "semi-external" and very engaged actors that were not given that much help, but were not stopped either. By taking in these actors, the place got people who were there a lot and cared about it from the start. The downside of this model was that the maintenance of the place got complicated. For example, the municipal budget for Brända Tomten was for doing events at the place, which made it unclear who should pay when a water pipe broke.

Reflecting this, the project's temporary nature made it possible from the start. It made the distance between having an idea for, for example, a concert and arranging that actual concert at Brända Tomten very short. For a time, this made the place very dynamic. This turned into a problem when approaching more established actors: the city library were not comfortable with planning activities on a stage that might no longer exist when the event would take place.

The architecture of Brända Tomten also contributed to it's relative success. Brunnsparken is an intense place, but Brända Tomten, located just around the corner from the tram stop, managed to feel sheltered, protected and almost a bit secret. With the main architectural element being a large stack of various scaffolding platforms, it made finding one's own spot possible.

New Addington Central Parade (2012)
London
Assemble Studio
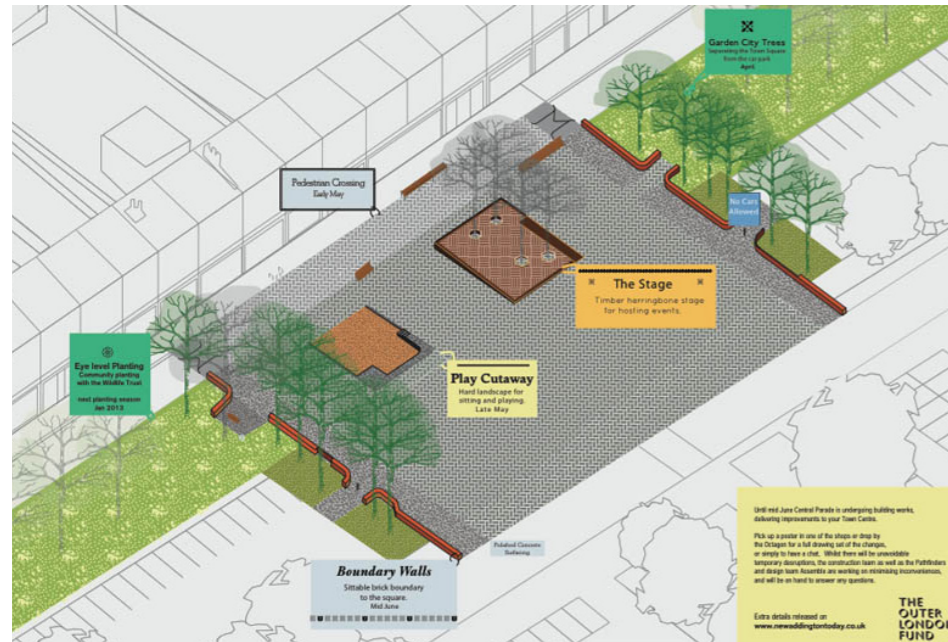
Project with the goal of reviving a public space in New Addington, a suburb of Croydon in south London. Assemble engaged a wide variety of local actors, spent three months on location and made a survey of local activities, groups and assets. This understanding of the site was used in an interesting way: the facts and ideas Assemble uncovered were materialized in full-scale prototypes on site. To test the prototypes, they staged community events using the prototypes, involving different local groups. After reviewing the outcome of these events, a series of more permanent proposals were made.

The result is a series of toned down pieces: a stage, a piece of landscaping for play and skateboarding, some trees to shield the parking lot and some walls to define the square. Assemble also proposed small changes in traffic flows, up-valuing pedestrians, and changed the market layout, forming a relation to existing shops.

According to Assemble themselves the plaza is still not very used, and they view it as a failure to an extent. They attribute this to that they should have worked harder in giving the local residents a sense of ownership over the structures that were built.

Case studies, conclusion

Architecture as a process
The examples shows architecture viewed as something ongoing. You continuously evaluate the design, in sketch stage, during construction and post-occupancy, to see how it can be developed further, or even go away to make place for something else.

Make the potential understandable
Communicate findings and potential designs clearly to the public. The public can then imagine further uses for the proposal, that you in turn can respond to. A nice feedback loop is created.

Add something
A way of starting this kind of process is to add something tangible. For example, Raumlabor's addition of a sauna in Frihamnen is a very interesting addition programmatically, a response to a desire people had but didn't dare to hope for (swimming in Göta älv). It creates a question: If that is possible, what more can happen?

Total freedom does not necessarily lead to use
I had this idea that the most liberating thing for a public space would be to give the public complete control of it. My initial research very soon showed that this was a, if not a false assumption, then one that hasn't been that thoroughly tested. Projects I read as these free-form, do-what-you-like things turned out to be very carefully orchestrated. The case studies point to that it can be more fruitful to make considered interventions, so that people's imagination has somewhere to start.

In summary, what was I aiming for?

A less hierarchical public space

At present, the site is hard to use for something else than large scale activities. This could be seen as a waste of both space and potential. Looking at how people use cliffs in the archipelago or large parks, a more flexible, less hierarchical usage pattern emerges. People use the place as they see fit. Can these qualities be brought into the city center? By altering public spaces, can we encourage dialogue about what our cities should do for us?

By inserting platforms for new ways to be on a square, the proposal should try to negotiate the needs of one person waiting for the bus with the needs of a demonstration.

Transgress the existing

The thesis aims to transgress readings of existing relations on site and preconceived ideas about what the square should be. The expression, and process of creating it, aims for a more field-like, less composed space. A major point for the continued work is to find a method that allows for new spaces, flows and relations to appear. This could provide other ways of viewing both the square and the task of redesigning it.

Question composition

The square's current design was developed throughout the 1910s and 20s, with influences from neoclassicism and national romanticism. Is this kind of carefully composed monumentality what a public space in Gothenburg should be about today? Does it reflect what Gothenburg is? Or just what it once wanted to be?

To find a radically different form for the square, the project needs a design method that makes sure that I'm not replacing the existing composed and hierarchical place with another, still composed and hierarchical place.
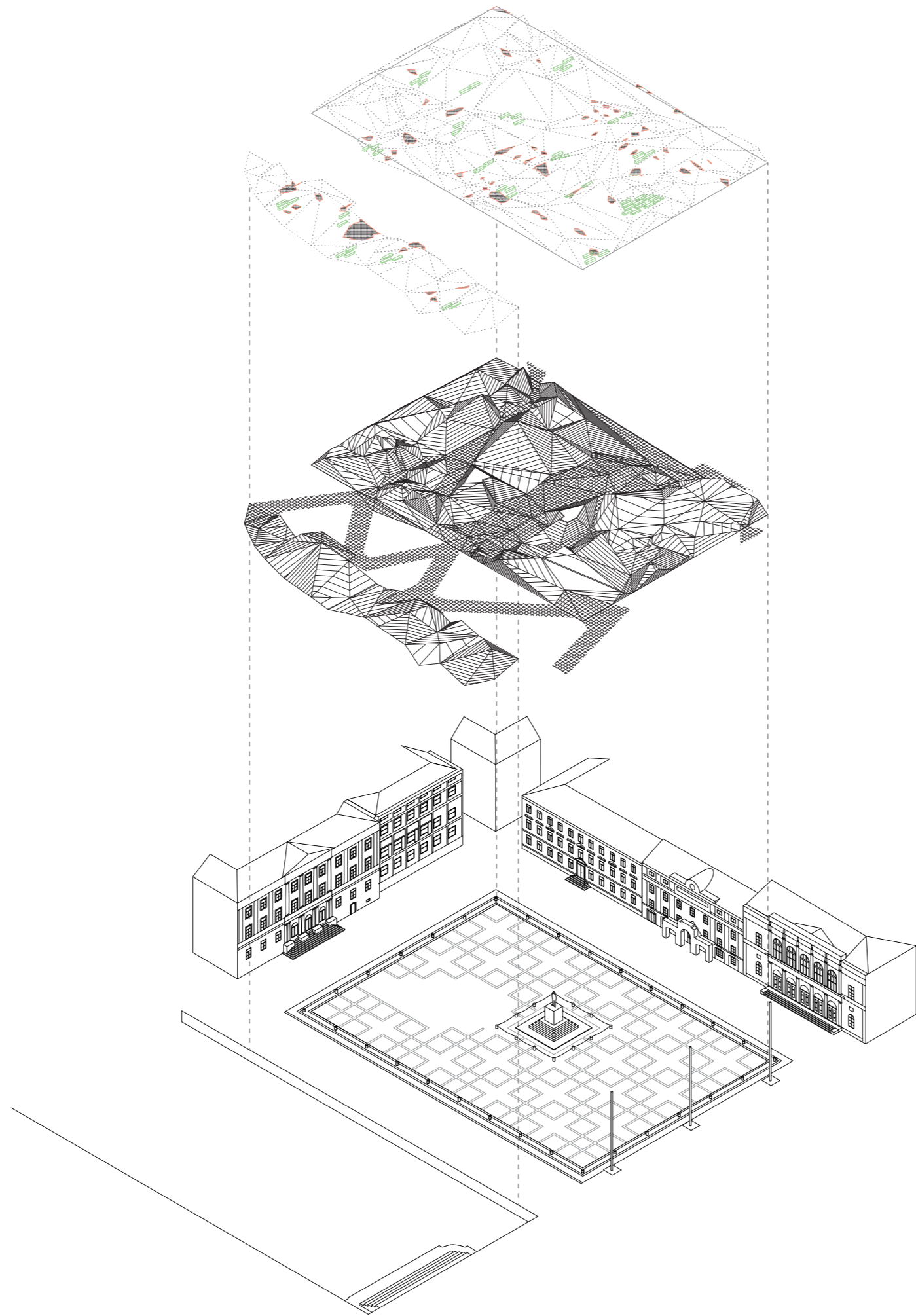
Method and process

Designing with sound

Sound as a tool

Sound as a factor in the thesis entered early, as an exponent of my lifelong love for the medium. I saw a chance of both deepening my understanding of sound and make use of my already existing knowledge around it. By combining issues regarding urban space with sound, I saw a potential of exploring both fields in a way that could be novel and exciting.

My initial sketches focused on working with urban acoustics and using actual sounds on site. This helped form the base concept of a diversity of spaces with different properties on the square: the soundscape on site is monotonous, and I imagined an acoustical journey across the square. But when analyzing the sketches further, their form was found too conservative to make a real change in usage and experience of the square. To find the radically different form I strived for, I turned to other ways of using sound. Exploring how to get away from composition was the starting point.

Music as a concept model

John Cage

In music, breaking with compositional rules such as melody, harmony and rhythm is commonplace. The primary source for ideas used in this thesis revolve around John Cage (1912-1992). Cage tried loads of different ways of breaking down the very idea of a composition. Chance procedures and formalized processes were used to try and remove both the composer's and performer's likes and dislikes from the music. For some pieces, a lot of expressive power was put into the hands of the performer instead of his notation. Other pieces used ideas from Chinese philosophy to guide compositional choices. He wanted to place value on the sound that was heard by the audience in a specific moment, and get them away from the idea that this sound was Cage's composition.

His arguably most famous work, *4.33* (1952), doesn't contain a single played note. It starts with a piano player getting on stage and folding up the piano lid. The performer then sits silent for 4 minutes and 33 seconds, before folding down the lid again and walking off stage. During this time, the audience, expecting a piano performance, listens carefully. Hopefully they then get the point of the work: the music consists of any sound heard in the venue. Any sound is music.

This critical mindset was the starting point of the process. If John Cage could make a piece of music by actually not composing at all, I should be able to create a piece of architecture by suspending my ideas about composition, and finding other ways of producing architecture.

Developing concepts

To create concepts for the continued work, I looked at musical developments following Cage. For example, ambient and noise music removes harmonic content and focus on texture instead, which could have made for an interesting project.

The direction I chose to explore further was a concept that is common in minimalist music from the 1970s, but also for example in techno and various forms of folk music (prominently in sub-Saharan African folk music, for example). By over-layering loops of different lengths and rhythm patterns, you create a complex whole out of relatively simple material. This creates an (arguably simple but still) generative technique where it's hard to predict the results before you've actually tried playing it. Examples of this approach can be Steve Reich's *Music for 18 Musicians*, or Brian Eno's *Music for Airports*.

The music is constantly shifting, but still coherent. Here, I saw parallels to the qualities an informal public space could have, what it could be. This idea of a shifting, messy coherence defined the qualities I set out to search for.

Tool development

Sound and generative design

Development

After defining this concept of creating a messy coherence by over-layering different factors (for example, sounds), I had to translate it into a method for designing. This method should also help me suspend my personal biases. I turned to computational design tools, because of their possibilities of setting up processes that creates non-predictable output from predictable input.

By doing open ended investigations into generative processes driven by sounds, I was soon creating forms that felt genuinely novel to me. By using different sounds and pieces of music for different aspects of the design, I could influence the output. The totality of the geometries I created depended on several factors, which made it hard to predict the results.

The tools I built are blunt, which I saw as positive in this context. They are good for getting the general idea of what kind of environment you strive for, but lack in precision. This makes sure you can't get too particular in controlling it.

Noise and randomness

An aspect I find interesting about my specific tools is the incorporation of "real world" noise and imperfections (in some cases literally, since I'm using actual field recordings of the site for a smaller portion of the work). This opens up for a conceptually interesting type of semi-randomness. The individual inputs are controlled. The result of combining these are to a large extent unpredictable, but repeatable. This is an important note: The result is unpredictable, but not random. Since the results are repeateble, it is possible to iterate the design very fast, try different options and explore what happens when input parameters (for example, sounds) are changed.

Technical description

Max/MSP	→	Open Sound Control	→	Grasshopper	→	Rhino
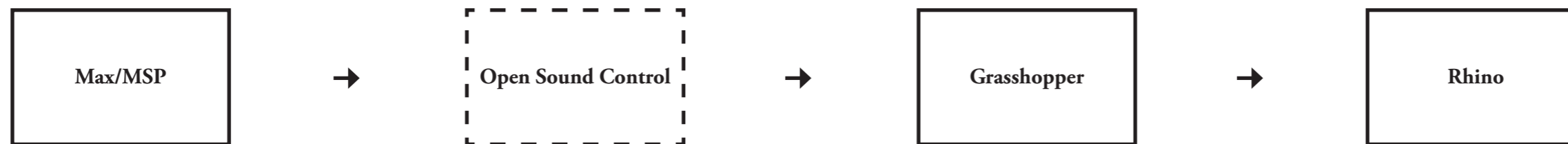
Sound

For the sound part of the process, the computer program Max/MSP is used. It can be described as a kind of Grasshopper for music, a visual programming language with good support for time based media. In the process discussed, Max/MSP is used primarily to analyze the amplitude of a set of sounds at a given time. The results of this analysis is output as a number.

Communication

To connect the different programs OSC, Open Sound Control, is used. It has similarities to MIDI, a language that can be used to have different synths playing in sync, decide which notes to play etc. OSC consists of strings of numbers, that the Grasshopper plug-in Firefly can decode.

Data recording

The numbers from Max/MSP come in a steady stream into Grasshopper, via the plug-in Firefly. The number stream is picked apart and assigned to different parameters in Grasshopper. By using the components *Data Dam* and *Record*, the numbers can be recorded and synchronized over time. When the numbers are recorded, they can be used to create geometries, for example by using the methods described in the following sections.

Geometry manipulation

When the geometries has been created, they are imported to Rhino, where they can be manipulated in different ways. Now a more "traditional" design process begins, where one can look at what kinds of spaces, flows and relations the geometries create on site, adapting them to the site and program etc.
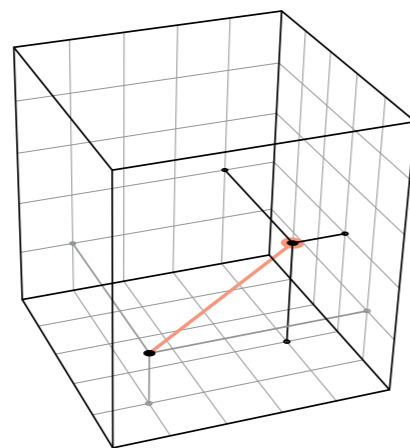
Sound controlled etch-a-sketch

Process

1. Have the amplitude of three different sounds control X, Y and Z value of a point, one value each.

2. Play the sounds.

3. Every 20 milliseconds, record the position of the point, and add this to a list of points.
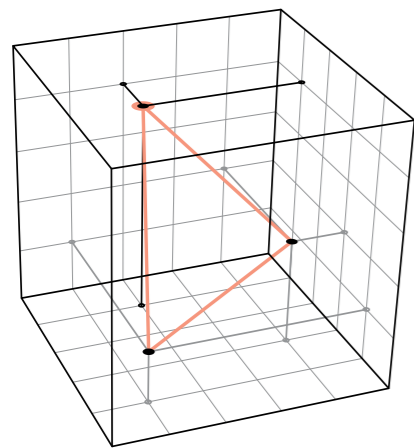
4. Triangulate the created cloud of points.

This becomes a way of "sketching with sound". A large number of different surfaces can quickly be created and evaluated. The surfaces are impacted by sound choice, pitch, addition of different sound sources etc.
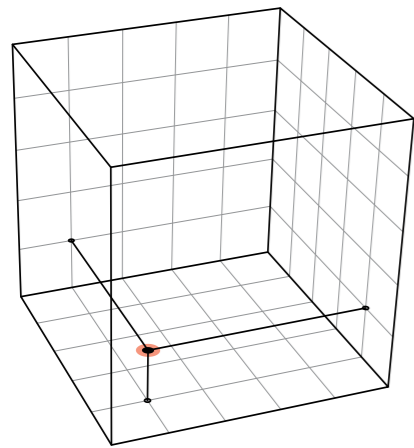
1.   t = 20 ms
       X=1
       Y=1
       Z=1

2.   t = 40 ms
       X=4
       Y=2
       Z=2

3.   t = 60 ms
       X=2
       Y=4
       Z=4
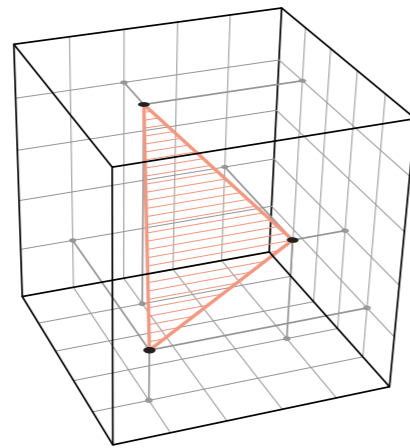
4.   Triangulate.
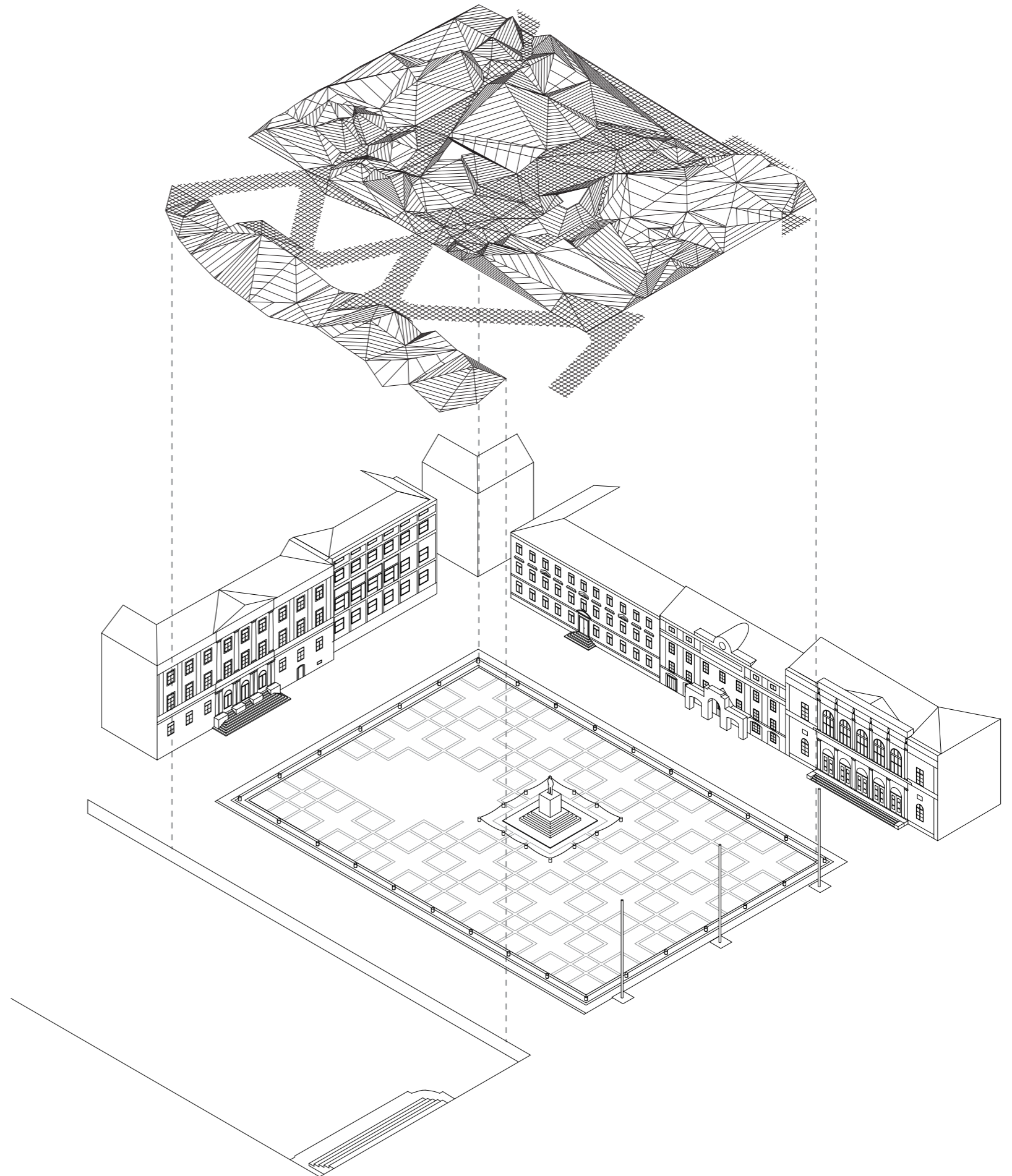
Sound controlled etch-a-sketch - usage

Sound choice

Square geometry - sound choice
X: Mainly a hip hop rhythm, with big round bass drums driving the point across the surface. Added ambience in the beginning, to drive point density and create variation.
Y: Skippy UK garage-style beat driving "time", creating semi-regular spread of points.
Z: Calm song, ocean wave-like dynamics. Impacting the hilly, rolling character of the landscape.

Jetty geometry - sound choice
Uses the same sounds as the geometry for the square, but with some changes in the Y sound. This results in a larger flatter space in the middle.

Alterations

Square geometry - alterations
- Trimmed along the borders to fit on site.
- Added bottom surfaces in deep "valleys", to ease movement.
- Changed and added surfaces along the borders, to make it possible to move onto the geometry from the surroundings .
- A couple of the peaks have been "cut off", to create another type of space to inhabit.
- Various minor changes to ease internal movement.

Jetty geometry - alterations
- Deleted surfaces, to create basic shape of jetty.
- Trimmed along the quay border, to fit on site.
- Altered along the quay border, to make it possible to move onto the jetty from the surroundings.

Connecting
To connect the two parts, a zigzag of paths were drawn between them. The directions are derived from the generated geometries.
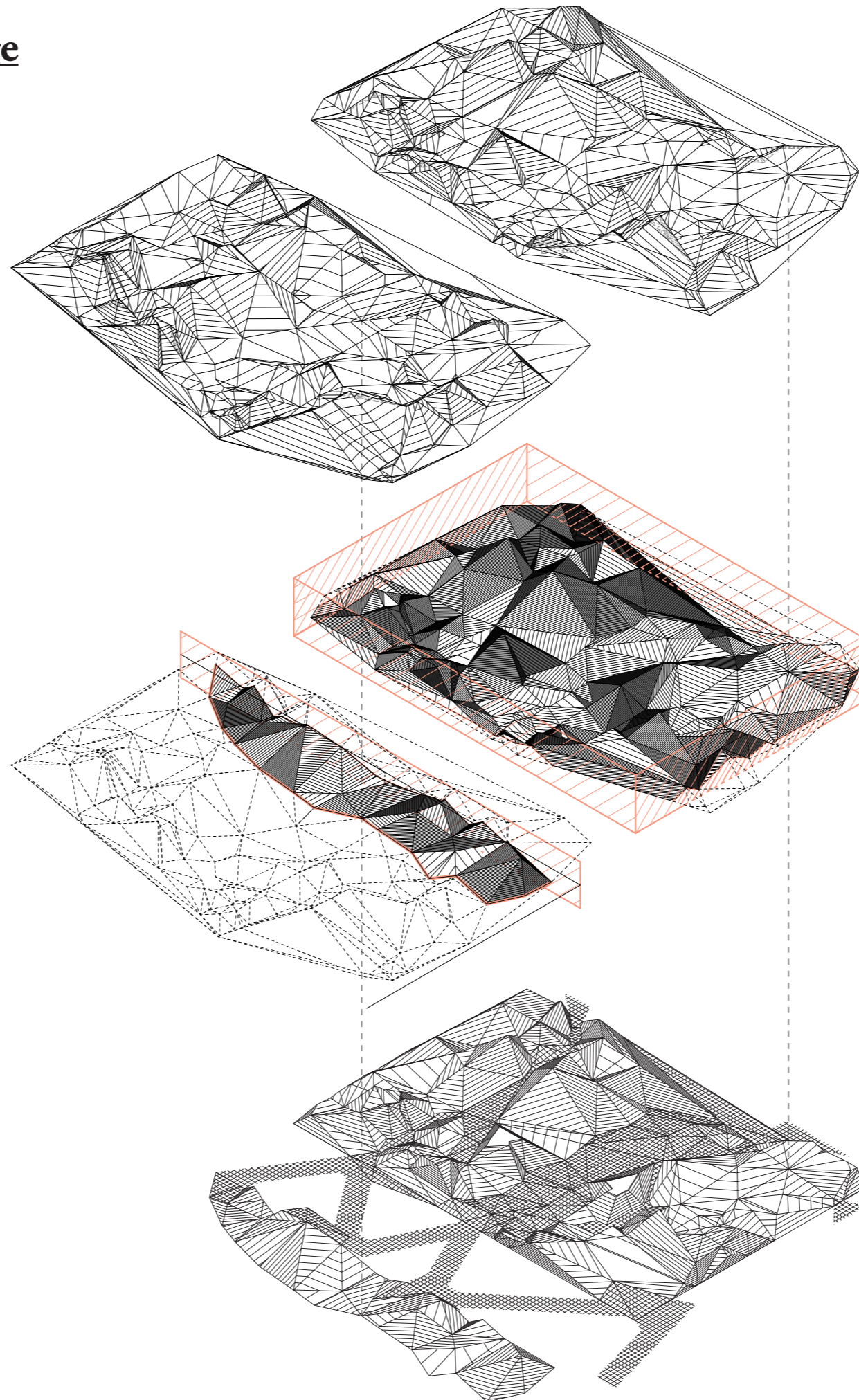
Sound controlled etch-a-sketch - development

First attempts
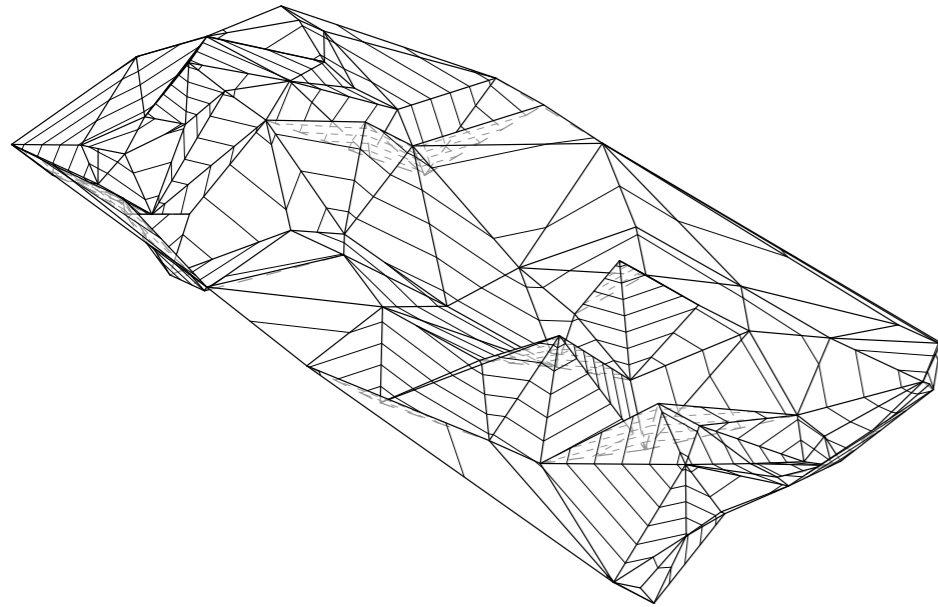
Sound choice
X: Ramp/reverse sawtooth wave
Y: Sine wave
Z: "Noisy" triangle wave (almost random)

Comment
This is the first surface I made, a proof of concept. I started out using synth waveforms, since they are quite easy to handle in Max/MSP. They also produce a more predictable result: if you look closely and know what to look for, you see the points making a sine wave.
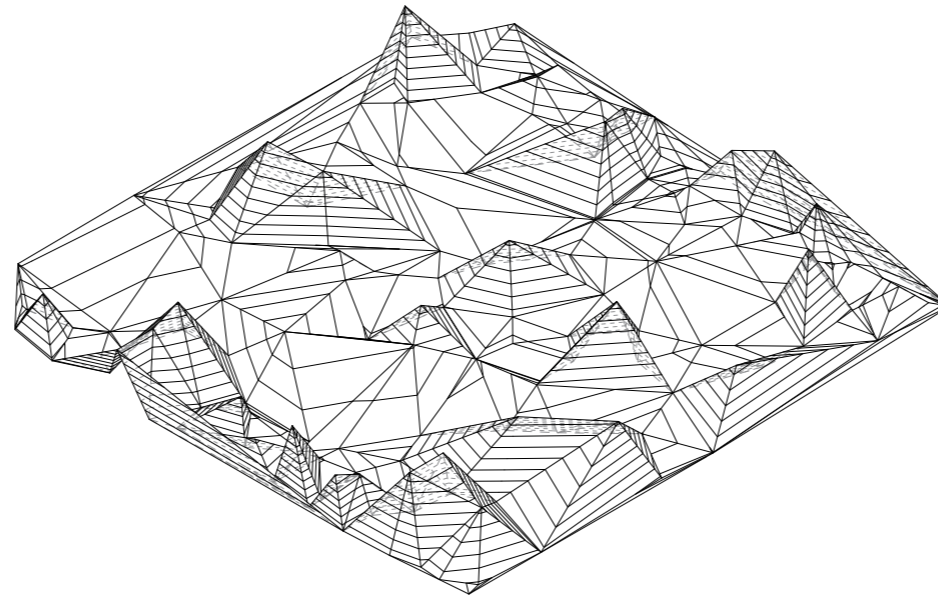
Sound choice
X: Ramp/reverse sawtooth wave
Y: Sine wave
Z: "Noisy" triangle wave (almost random, lots of silence)

Comment
The first surface that I liked. This is made by running lots of passes with a random waveform with a lot of silence in Z direction. Therefore most of it is almost flat, slightly tilting, with a few peaks at irregular placements. This slight tilting of the ground felt interesting.

Judgment criteria

Purpose
The initial surfaces I produced were very open-ended investigations. When I had created these, I felt confident that the process I imagined would work, and could produce interesting results. Now I could start exploring how to create surfaces that answered to aspects that I strived for, while simultaneously challenging my preconceptions of what a public space should be.

I defined the aspects to strive for as:

A variety of spaces
The created surfaces should support different ways of being on the square, by providing different places to inhabit and move in.

Messy coherence
The surfaces should have an expression that, by being irregular but have an overall coherence, can support various alterations to it. This makes it easier to adapt the surfaces for different purposes, adapting to the site etc.

Interesting movement patterns
The surfaces should create new movements by connecting to the surrounding city, and provide interesting internal movements and connections.

Directions
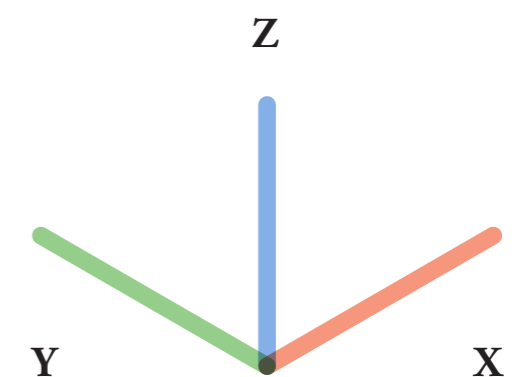
Trying out basic typologies
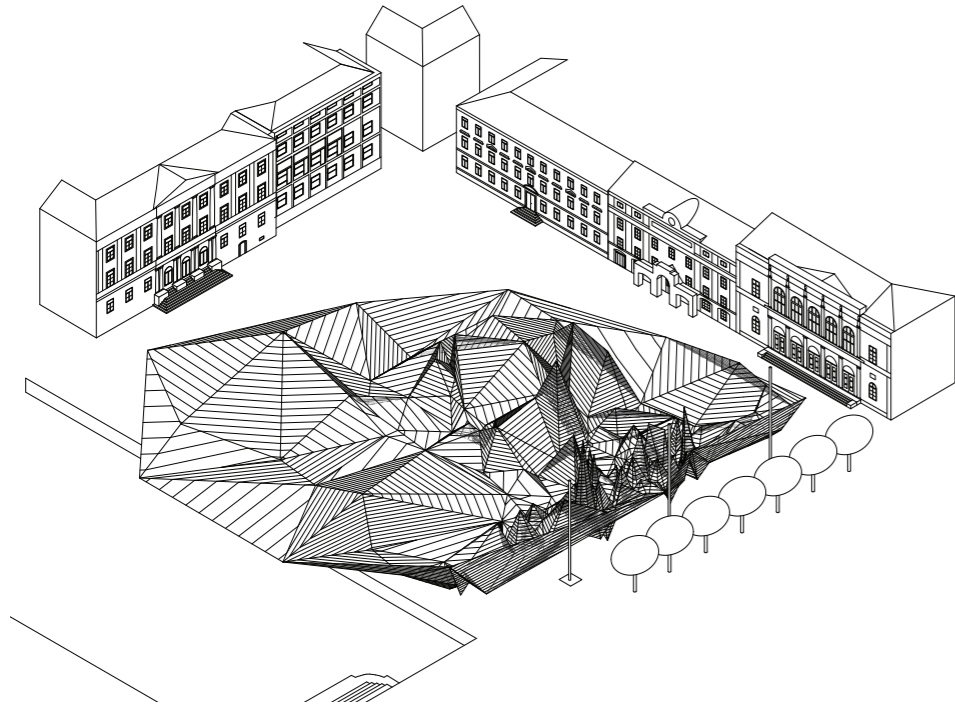
Sound choice
X: Pop song with steady rhythm
Y: Skippy UK garage beat
Z: Field recording from a square

Comment
A massive gesture, swelling out over every border. The focus along the eastern border (towards the trees) comes from a lot of silence in the skippy beat driving the Y direction. This surface becomes a bit inwards-focusing, cutting off views from Brunnsparken and the tram. The north-eastern part of the square gets more value, by being the only flat surface left. If I were to rework my proposal, I would look a bit more on this kind of seamless, total solution.
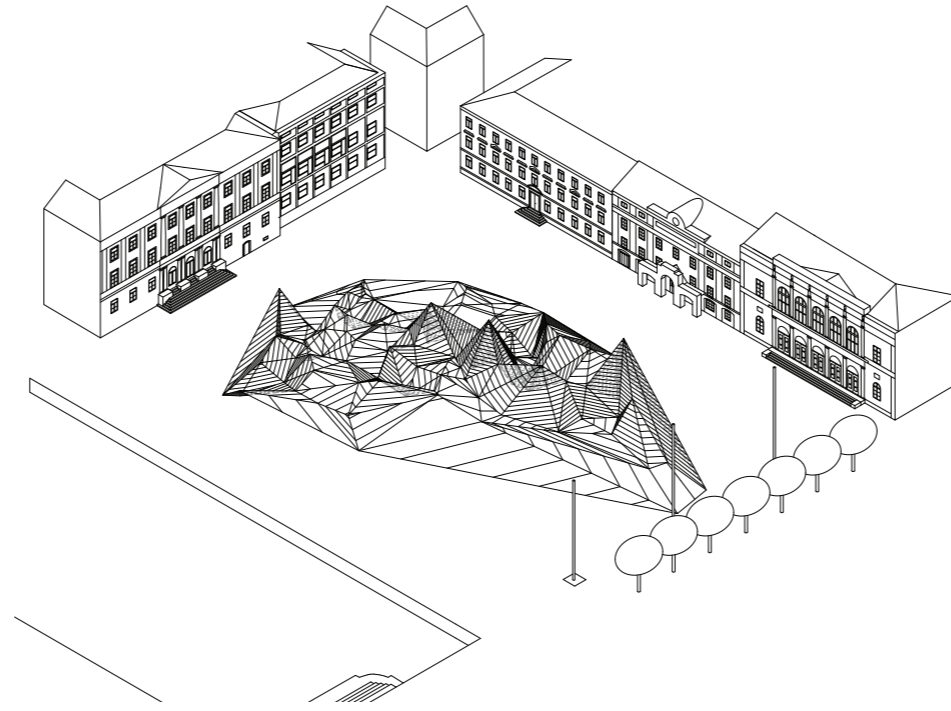
Sound choice
X: Solo piano
Y: Song with slow, wave-like dynamics
Z: Ambient track

Comment
In an attempt at getting away from the spikiness of my early proposals, I tried using three different very calm sounds. Creates a kind of seamlessness, a lack of hierarchy and rhythm that I find attractive. But it becomes too much of an object on a square, you're very much either on it or outside it. More sculpture, less landscape.
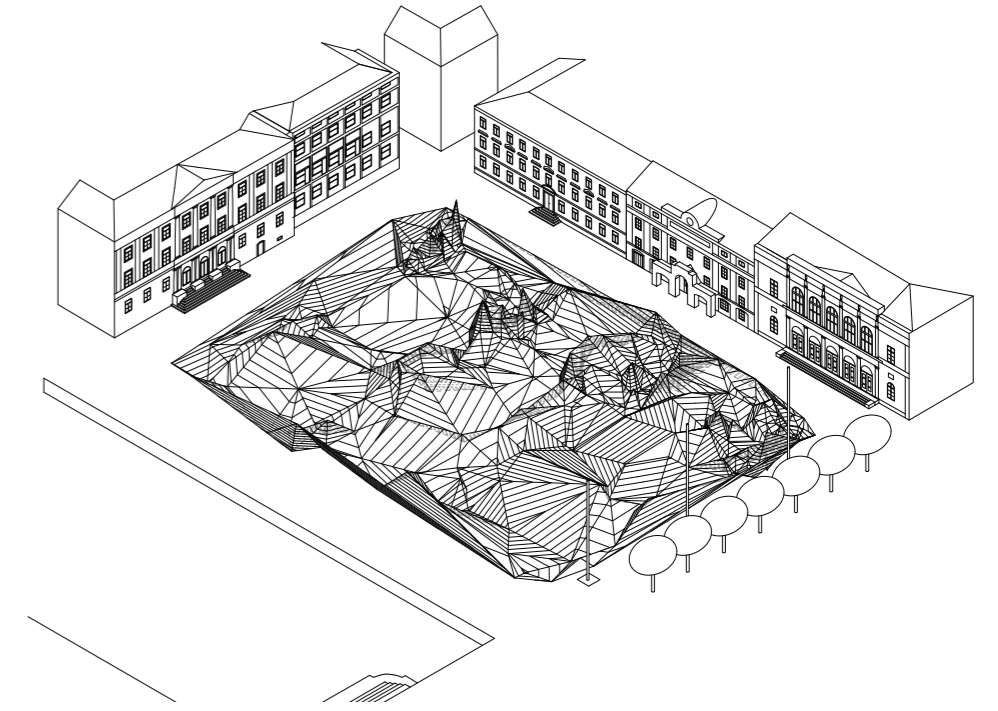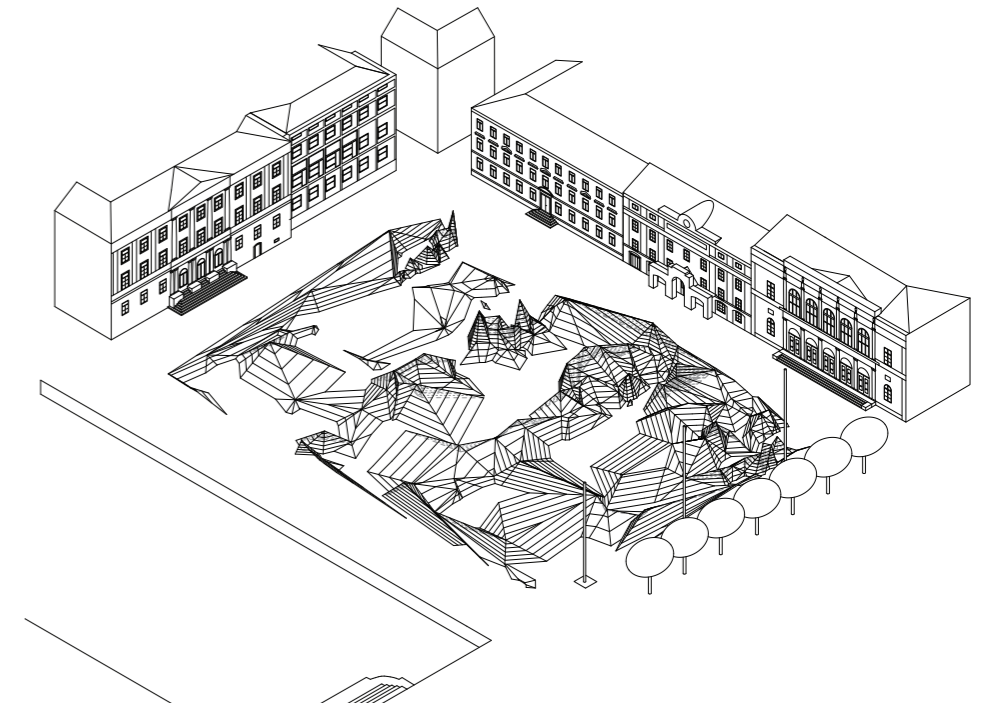
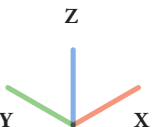**Sound choice**
X: Hip hop beat
Y: Ramp wave controlled by skippy UK garage beat
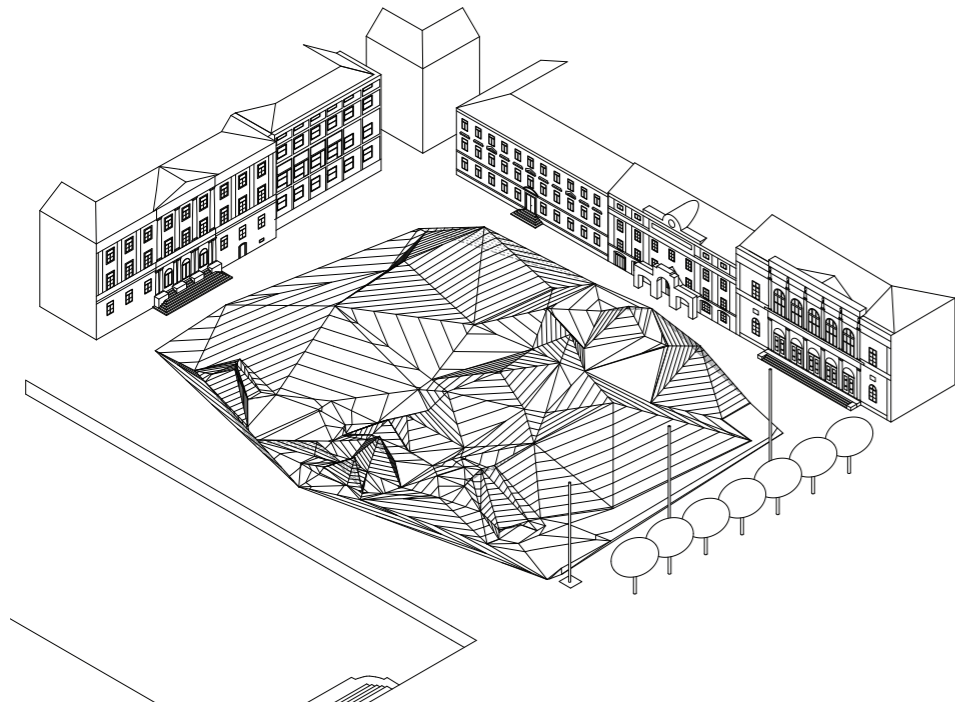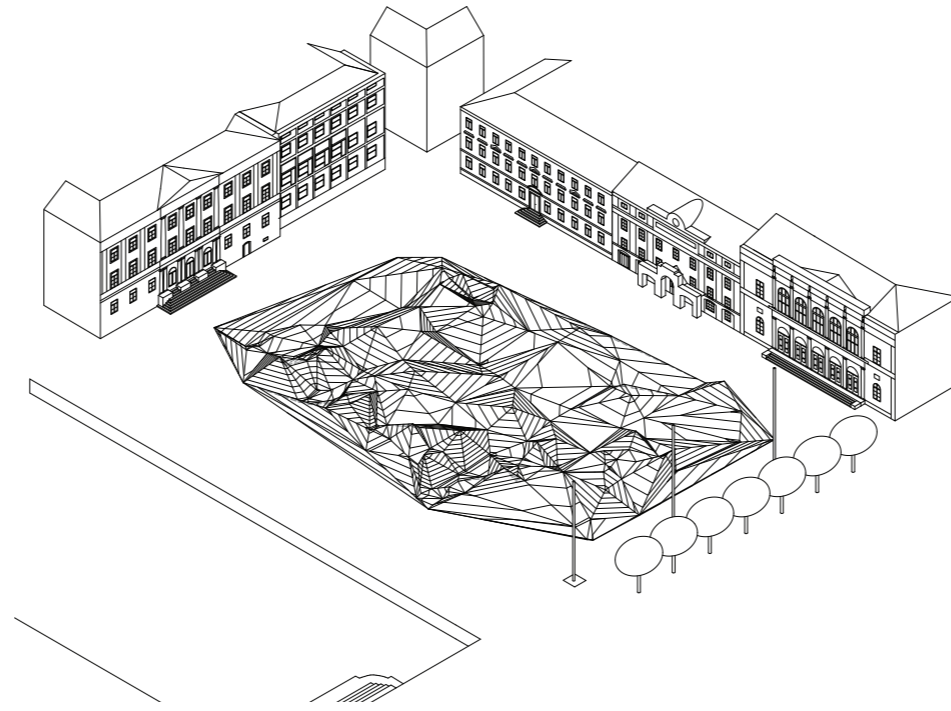*Z: Song with slow, wave-like dynamics*

Comment
To create a more gradual, landscape-like expression, I experimented with ways of filling the whole square. The main way of doing this is to let the Y axis become a timeline, where you can read a progression from start to finish. I started to gain some control over the result. Still too random, but the general expression of main movements, with a lot of smaller rooms inside, answered to my judgment criteria best so far.

Failing by applying too much force
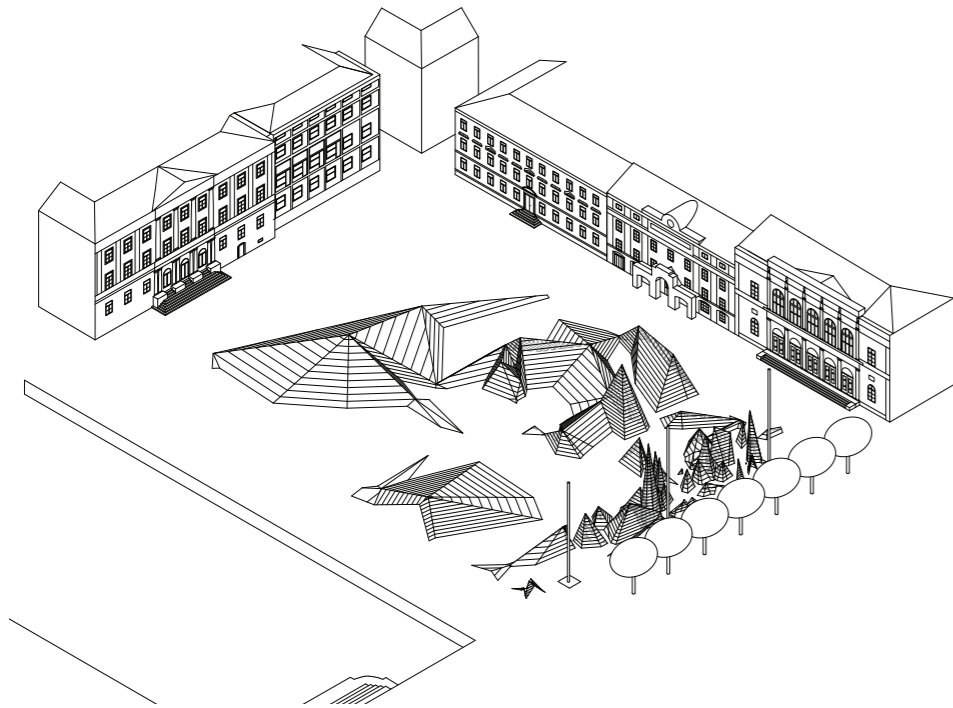
Sound choice
X: Pop song with steady rhythm
Y: Skippy UK garage beat
Z: Field recording from a square

Sunken and trimmed.

Comment
To control the surfaces, one way I tried was to sink them into the square. The idea behind this was to create clear ways for movement. At first I liked it, since it made the created spaces more readable. But, when I've went through all the trouble of making these shifting grounds, is it really interesting to remove those qualities? It also decreases the number of usable spaces. The overall expression becomes more of a sculpture and less of a landscape.
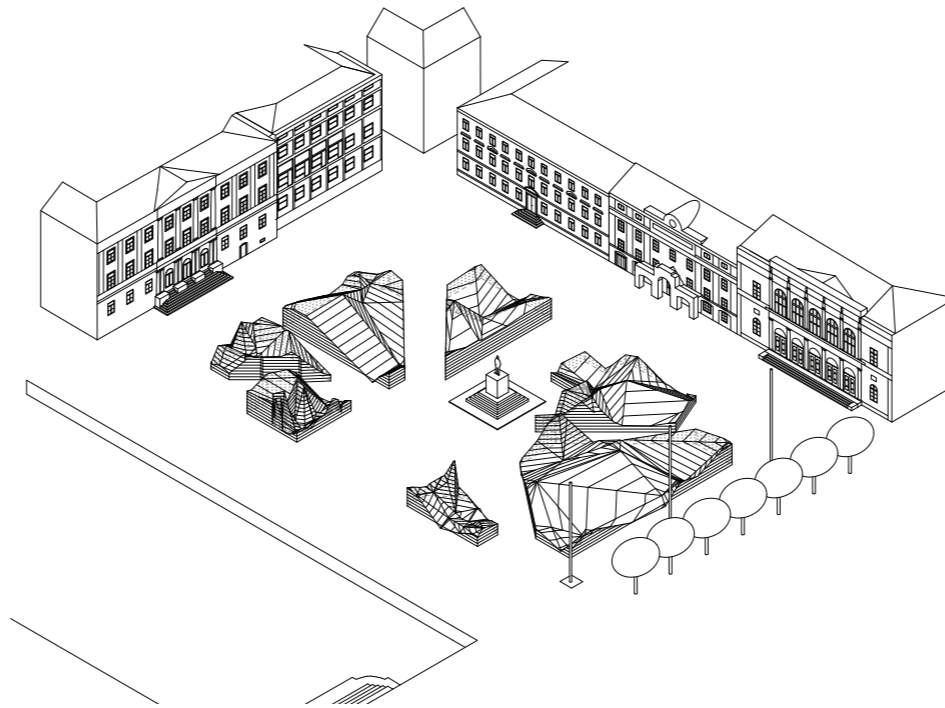
Sound choice
X: Hip hop beat
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics

Sliced and trimmed.

Comment
Another method of control I tried was to slice back existing movements into the created surface. But this reduces the surface to some kind of slightly more fun roof design. And, more importantly, it makes the square harder to use for a lot of activities, while not adding that many possibilities for others.

Sound choice
X: Hip hop beat
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics

Sunken and trimmed.

Comment
Here, I tried sinking and trimming a surface that contains a lot of different elements and movements. This turned out better. The rhythm of the square feels nice now, making me even more sure that these components are worth using. But there's still something both boring and conceptually untrue about making these undulating surfaces, and then trimming away a lot of information from them.

Working with the tools

Sound choice

X: Hip hop beat
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics

Comment

After realizing that the approach "make something fancy and then force it onto the site" wasn't working, I put in a lot of work into learning to control my tools better. The goal was to create something suiting the site from the start instead. This one is too homogeneous: there are many rooms, but they are similar.
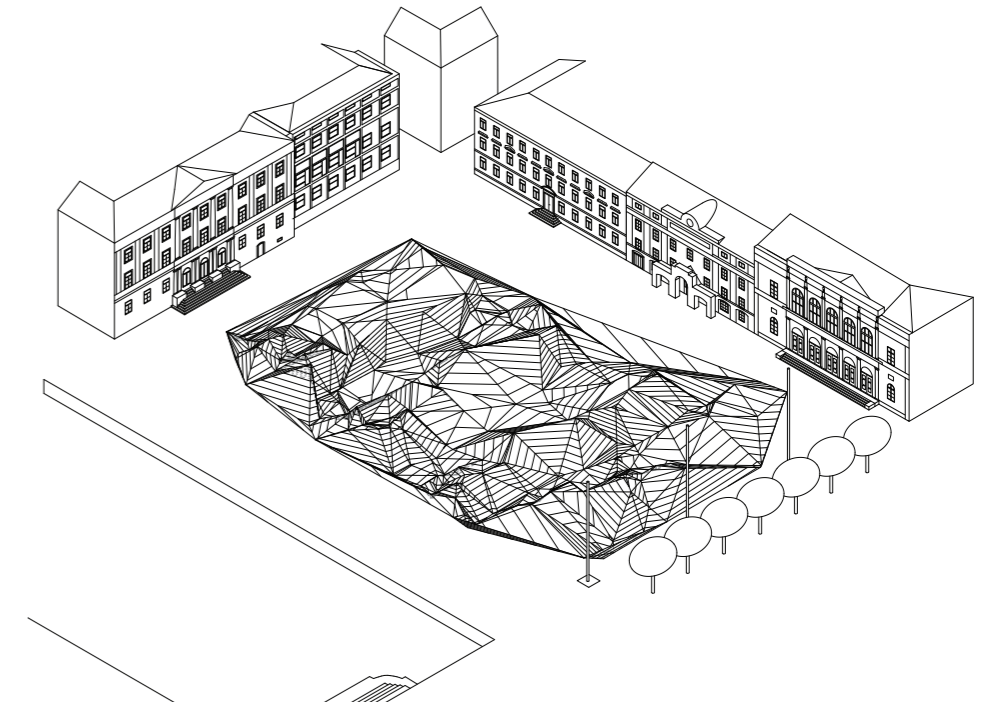
Sound choice

X: Hip hop beat + added chords
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics, severely pitched up.

Comment

To spread out events across the surface, I added a sound to the movement in X direction. This is seen most clearly in the north-western part of the square, towards the old exchange house. Here, the point density is way higher than in earlier proposals. The points now move through the square more in a zigzag direction. To create more events in Z-direction (essentially more hills and pyramids), I speeded up the Z sound. This creates these arrays of lots of smaller pyramids. The surface is promising, but still too homogeneous.

Sound choice

X: Hip hop beat + added chords
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics

Comment

This one's getting quite close to the setup I used for the final geometries. Still too homogeneous - the changes in Y direction doesn't hit hard enough, creating a clear (too) rhythmic expression. The final geometries were created by using this setup, but tweaking the sounds driving the Y direction.

Sound controlled etch-a-sketch, used geometries

Final geometry, square
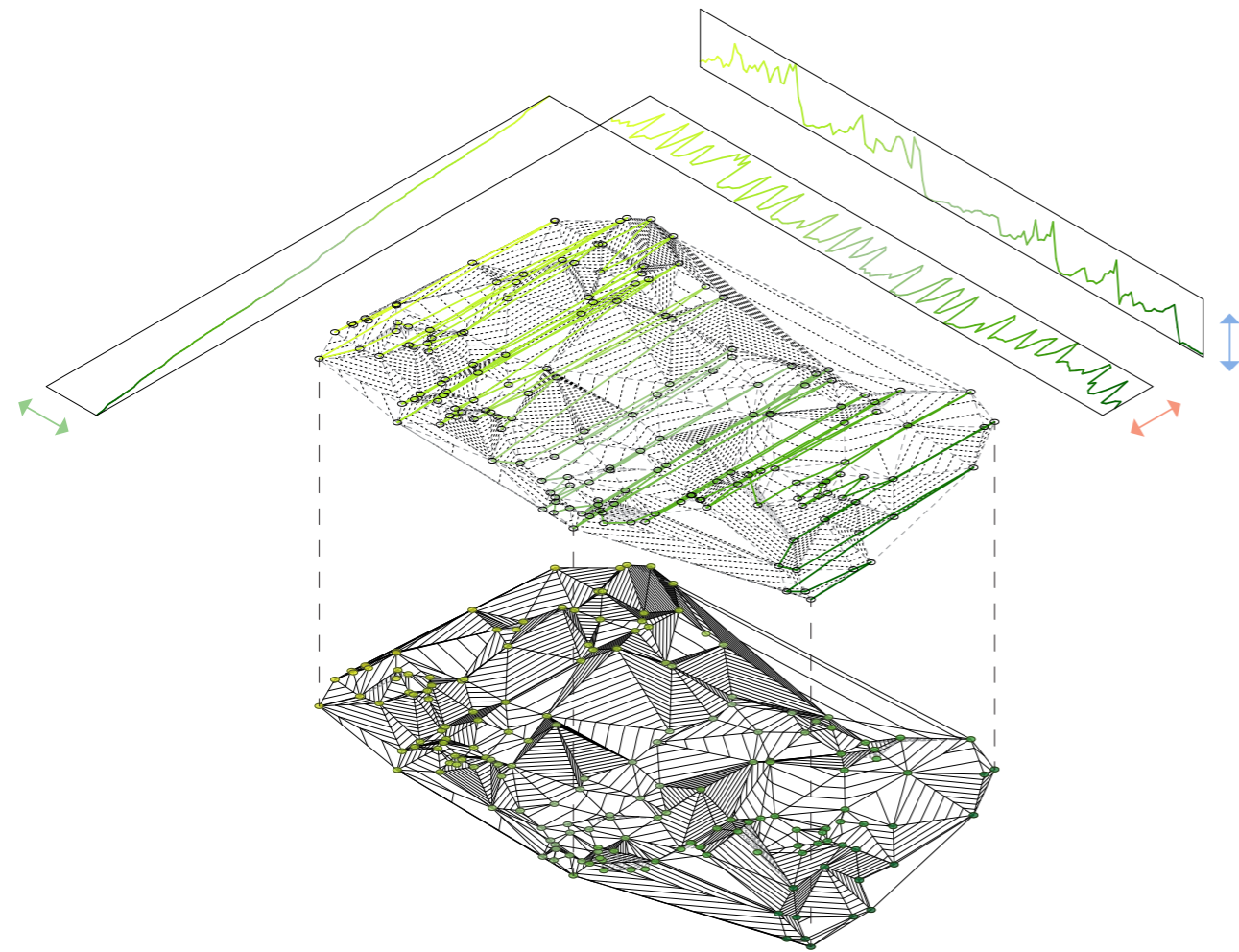
Final geometry, jetty

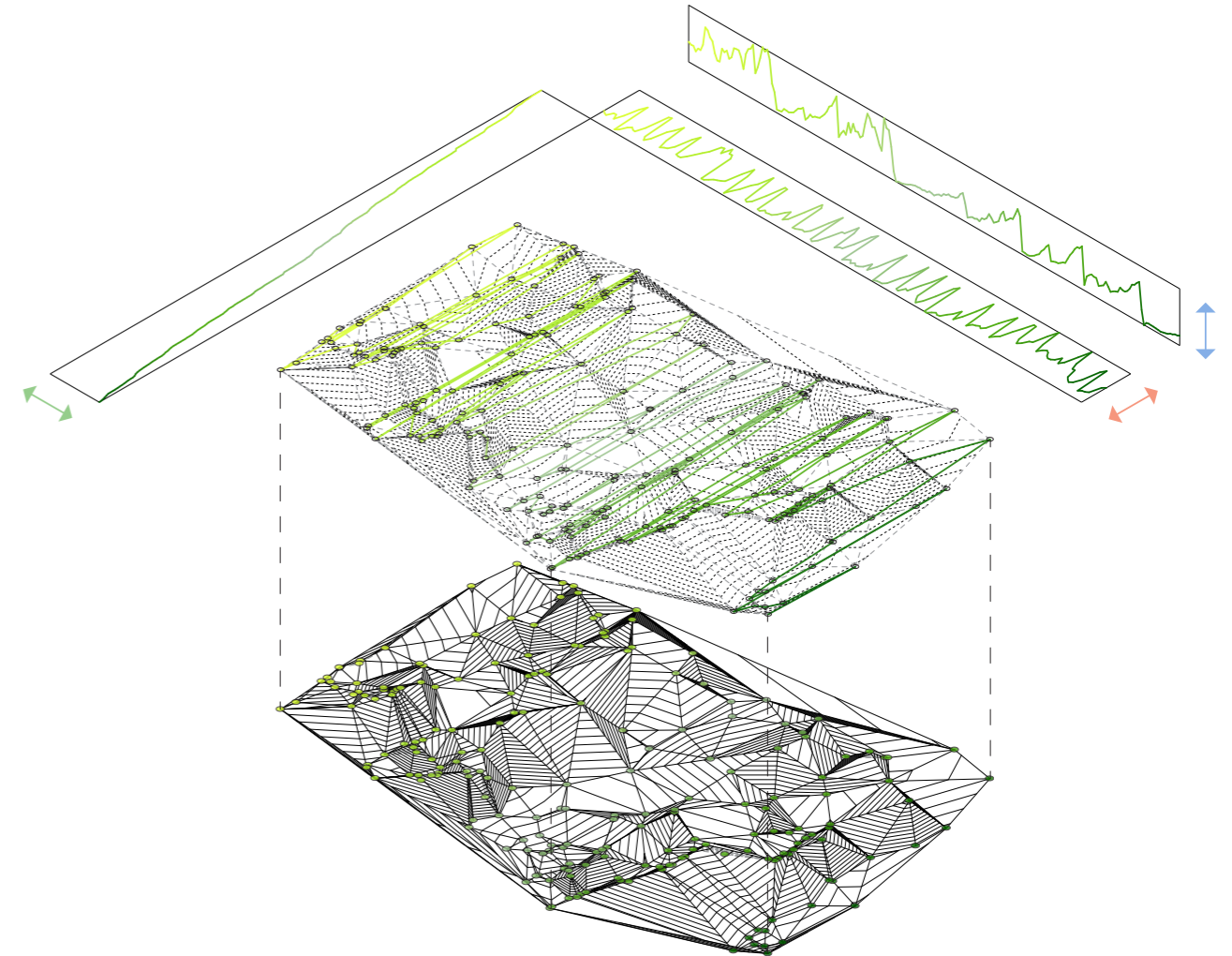
Sound choice

X: Hip hop beat + added sounds
Y: Ramp wave controlled by skippy UK garage beat
Z: Song with slow, wave-like dynamics

Comment

For the final geometry, I increased the impact of the complex but rhythmic beat driving the "time-line" in Y direction. This creates more variation, but also more readability. One clear example of this is the larger, flatter "plaza" in the middle.

Sound choice

X: Hip hop beat + added sounds
Y: Ramp wave controlled by skippy UK garage beat, tweaked for more impact
Z: Song with slow, wave-like dynamics

Comment

The geometry used for creating the jetty is similar to the surface used for the square, but modified to create an even larger open place in the middle. This is made by increasing the impact of a bass drum hit in the beat driving the Y direction, causing the point cloud to "jump" faster, creating less points in that area. This is combined with an almost total silence in the song used for steering the z-direction (height).
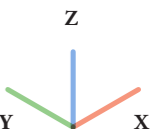
Amplitude grid

Process
1. Record the amplitude curve of two sounds.
2. Split both curves into points.
3. Make a matrix of comparisons, by multiplying points from the two curves with each other.
4. Map matrix of comparisons to Z position of points in a grid.
5. Create a surface based on point grid.

This creates a surface that shows the relation between the two sounds at every point of the way. Has a sense of rhythm, since it's based on a grid.

Example
In the figure below we have two different amplitude curves. At t = 4, both the curves have the value of 2. The created point thus gets Z value 4, since 2 x 2 = 4. Recreate for every t value, to create a point grid to base a surface on.

ty

tx
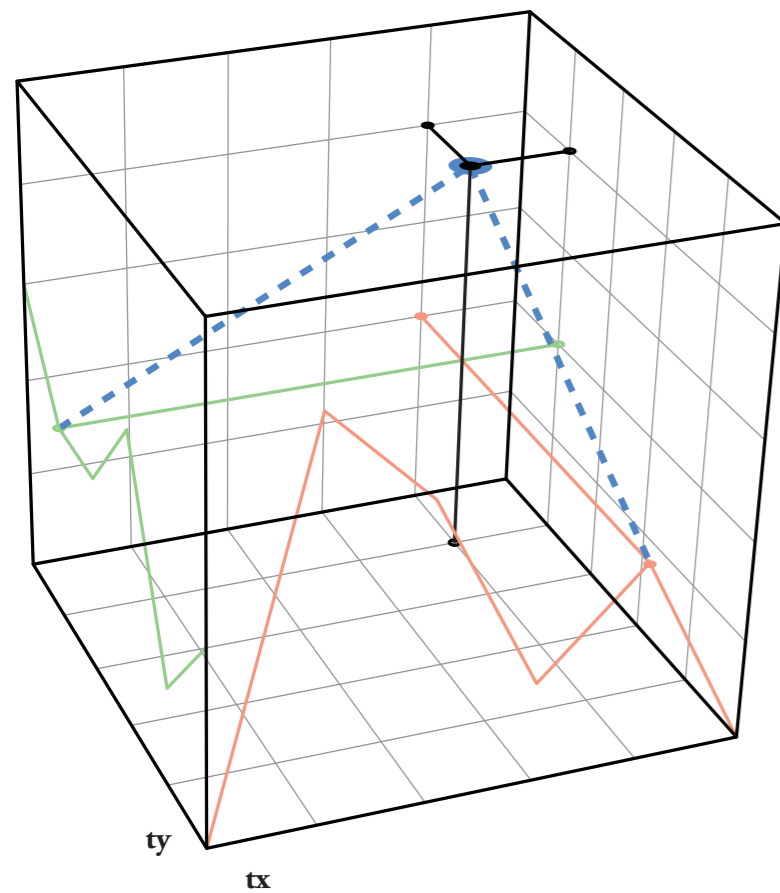
Amplitude grid, example.
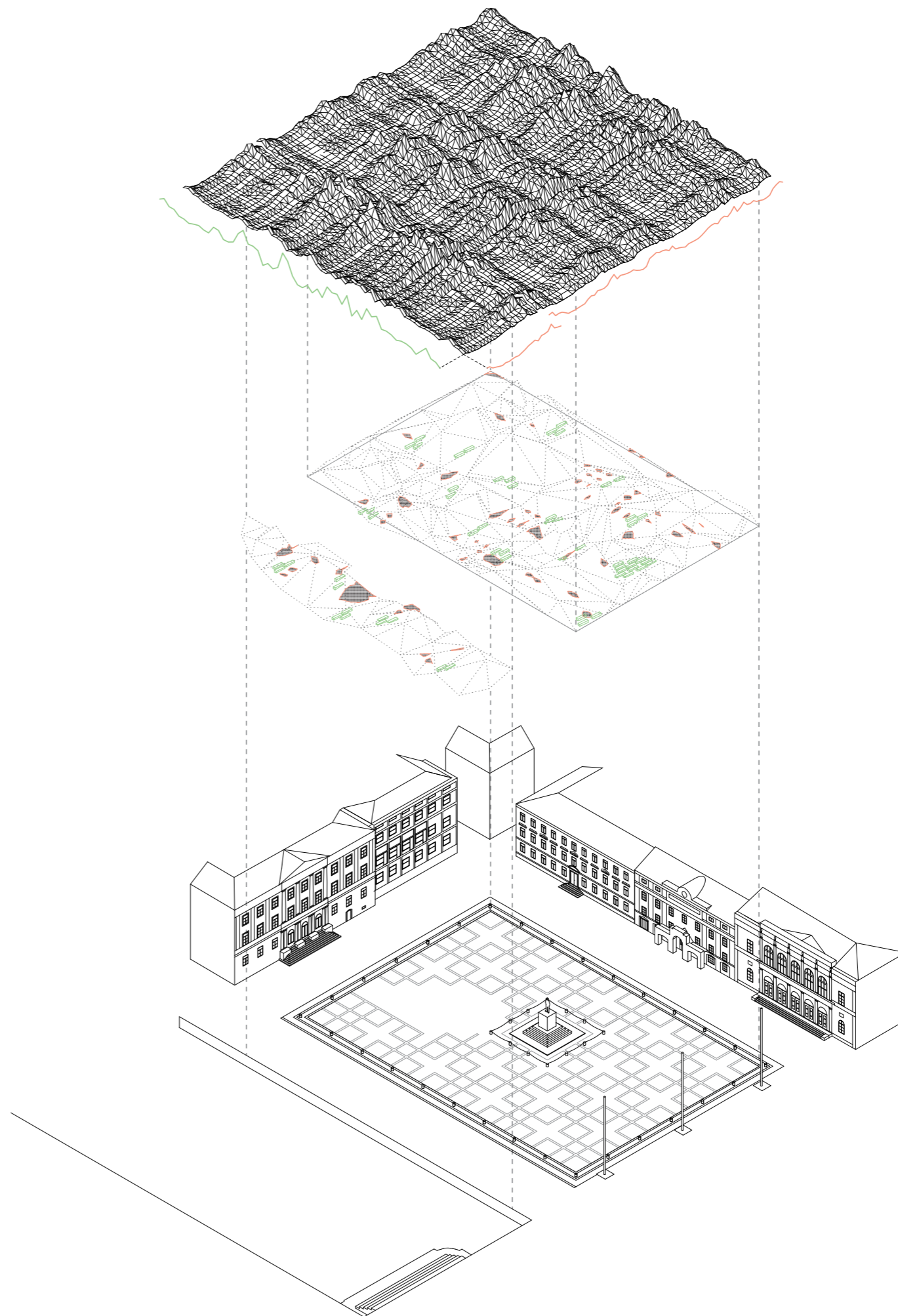
Amplitude grid - usage

Greenery curves
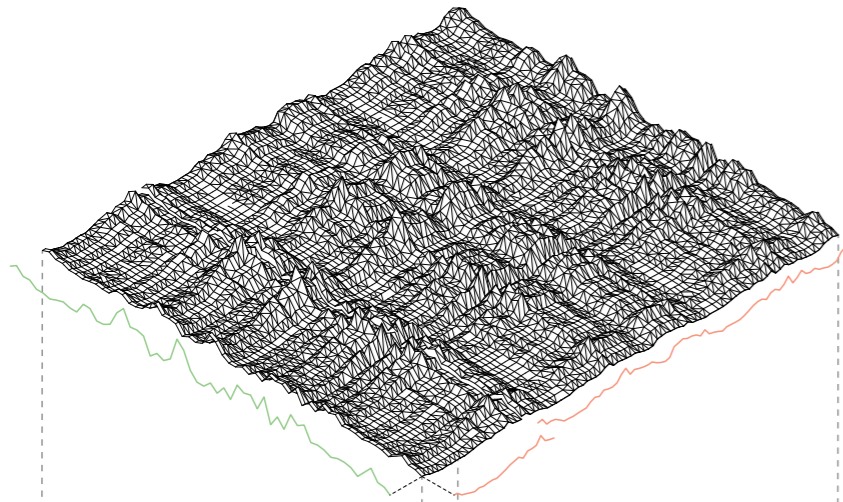
Amplitude grid
X / red: Field recordings from the site
*Y / green: Ocean waves*

Intersection
To find placement for greenery in the design proposal, an amplitude grid was intersected with the main geometry at various positions.
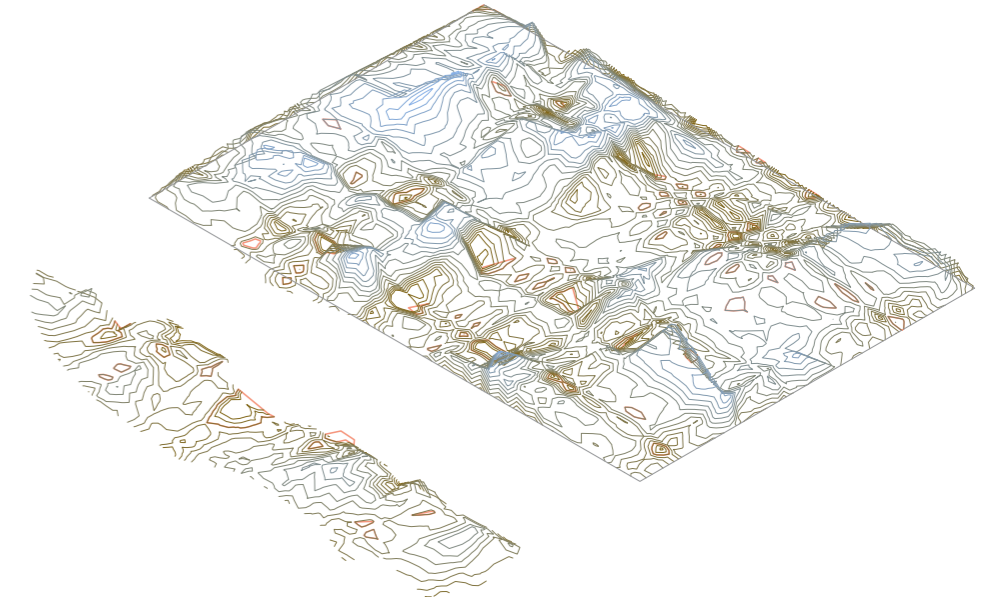

Unpredictable topography
By repeating the intersection at intervals of 0.5 meters in Z direction, an unpredictable kind of landscape contours were formed. Some interesting curves were selected to act as greenery curves.

Furniture placement

Re-using the grid
To strengthen the impact of the amplitude grid on the design, the basic grid, without sound mapped to it, was used to pick furniture placing.
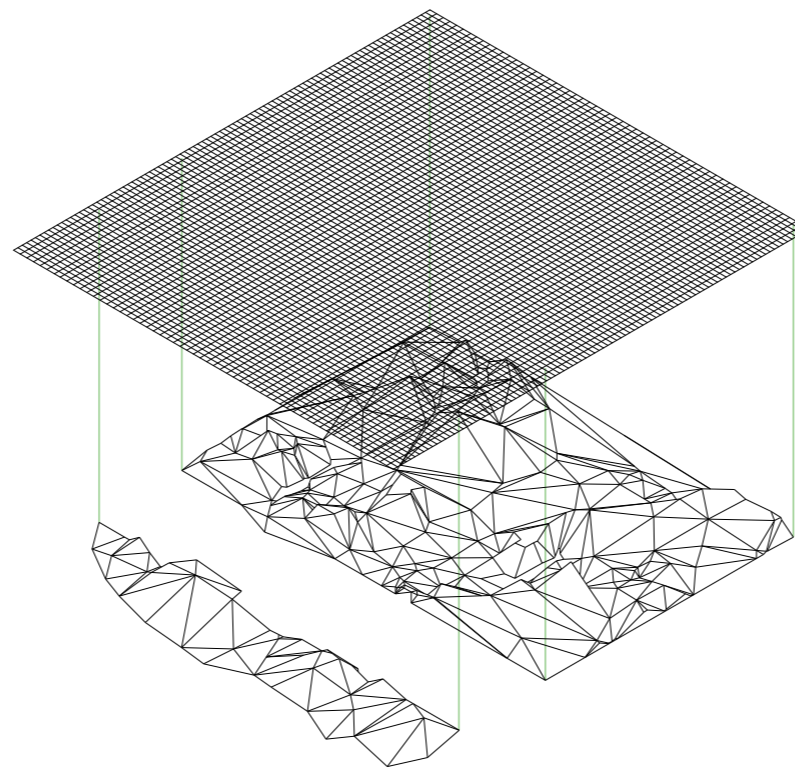
Projecting the grid
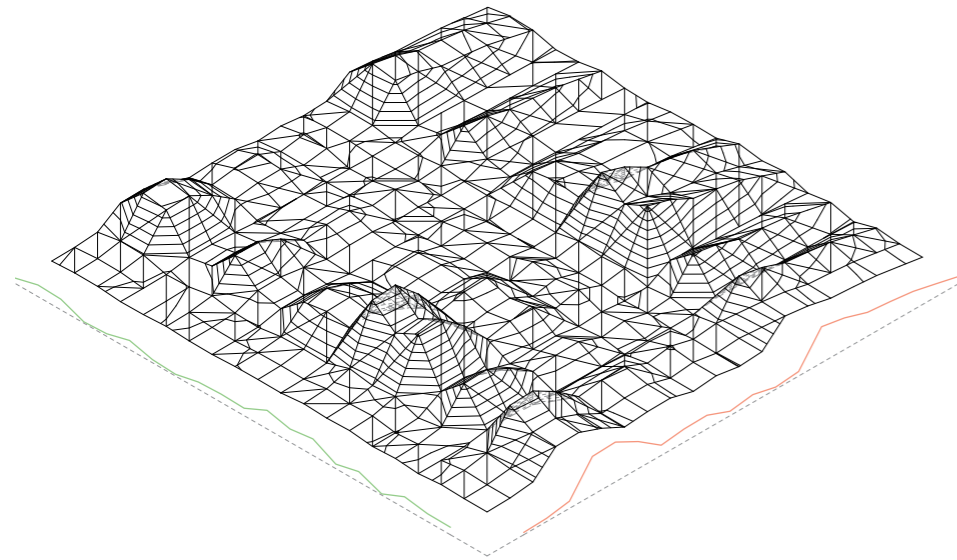The grid is projected onto the main geometry.
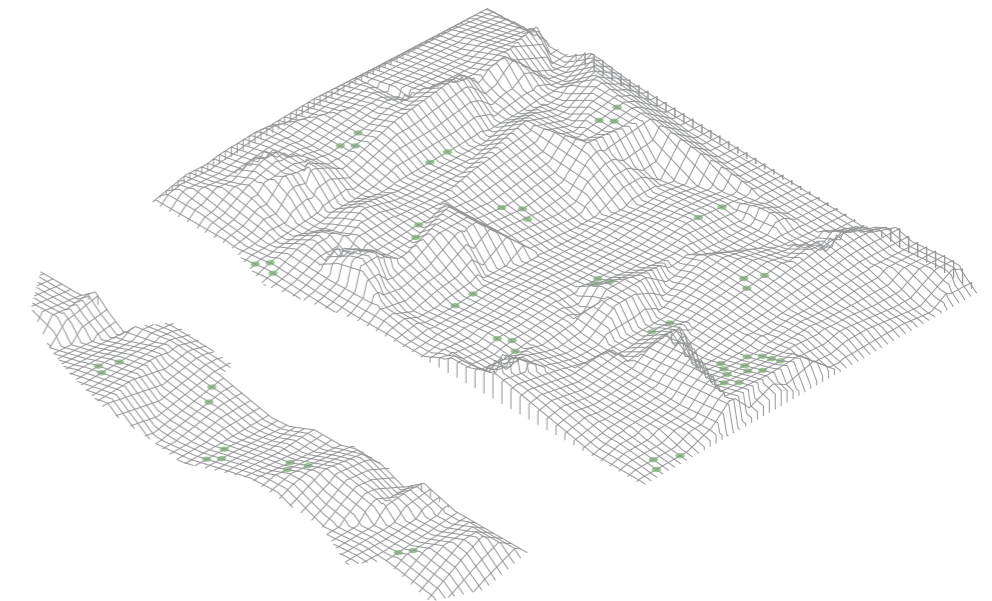
Placing furniture
Creating groups and forming places, by selecting different positions for furniture within the grid.

Amplitude grid - development

First attempt
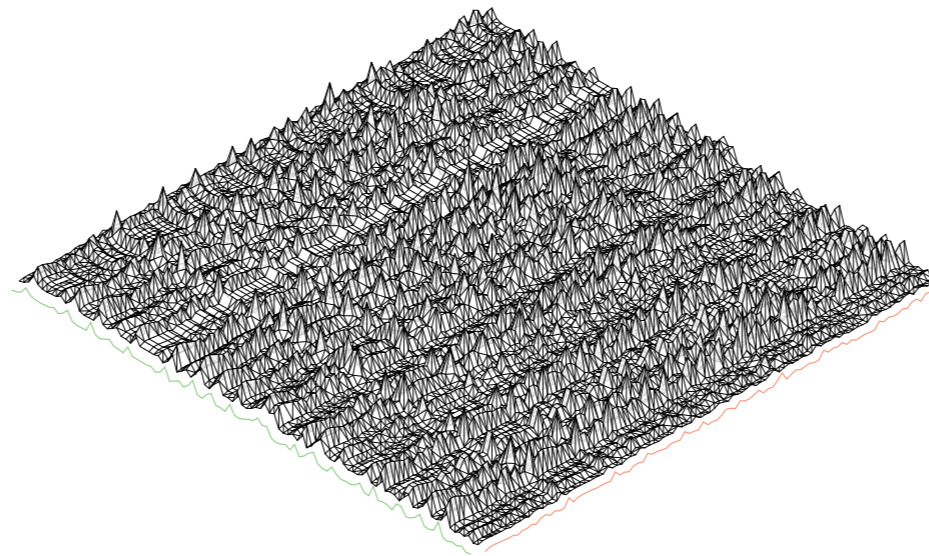

Sound choice
X / red: Drum loop
Y / green: Field recording from a square
Surface: X + Y grid, Z multiplied amplitude of curves

Comment
To create surfaces that has a more concrete relation to sound, I developed the amplitude grid method. This is the first amplitude grid I made. The peaks on the red curve are two bass drum hits. The field recordings on the green curve create a fun varying expression.

## Rhythmic

Sound choice
X / red: Drum n' bass
Y / green: Hip hop beat
Surface: X + Y grid, Z multiplied amplitude of curves.

Comment
I thought that blending drum n' bass with minimal hip hop would yield something fun, seeing that both are dominated by strong but very different rhythms. But all those drum hits create loads of peaks, all in straight lines. To me this is too homogeneous.

On site
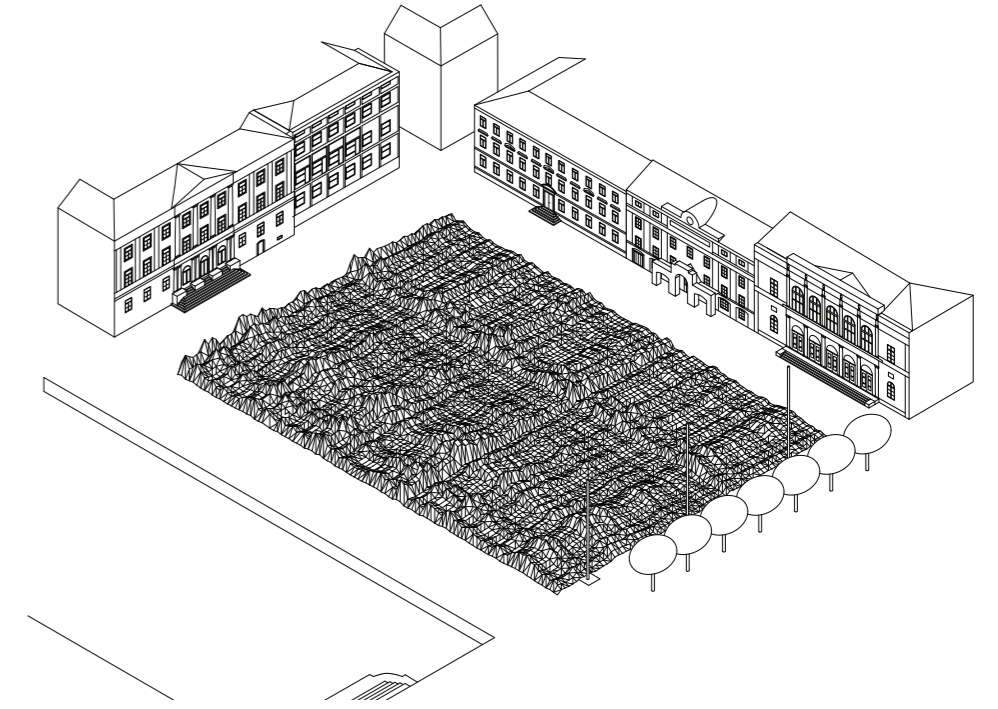
Sound choice
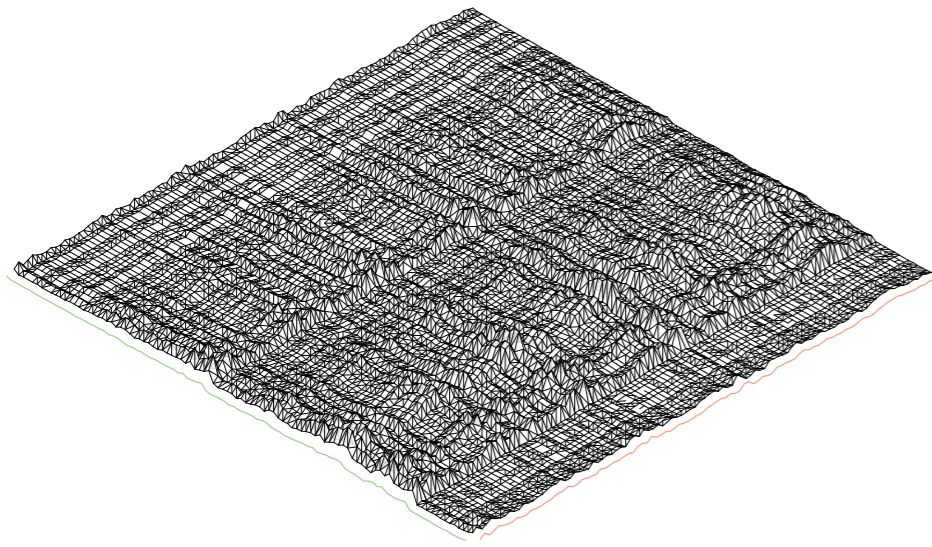*X: Repetitive minimalist composition*
Y: Solo piano
Surface: X + Y grid, Z multiplied amplitude of curves.

Trimmed for site.

Comment
As an experiment, I tried inserting an amplitude grid straight onto the site. For me, this creates a kind of weird monumentality, not at all what I was after. The translation from sound to geometry becomes too direct: it's a materialization of sound that becomes sculptural and representative. In addition to my intuitive reaction that this way of dealing with sound and geometry was "too easy", it fails at all my judgment criteria.

Amplitude grid, used geometry

Fluid motion

Amplitude grid used for the final design proposal

Sound choice

X / red: Repetitive minimalist composition
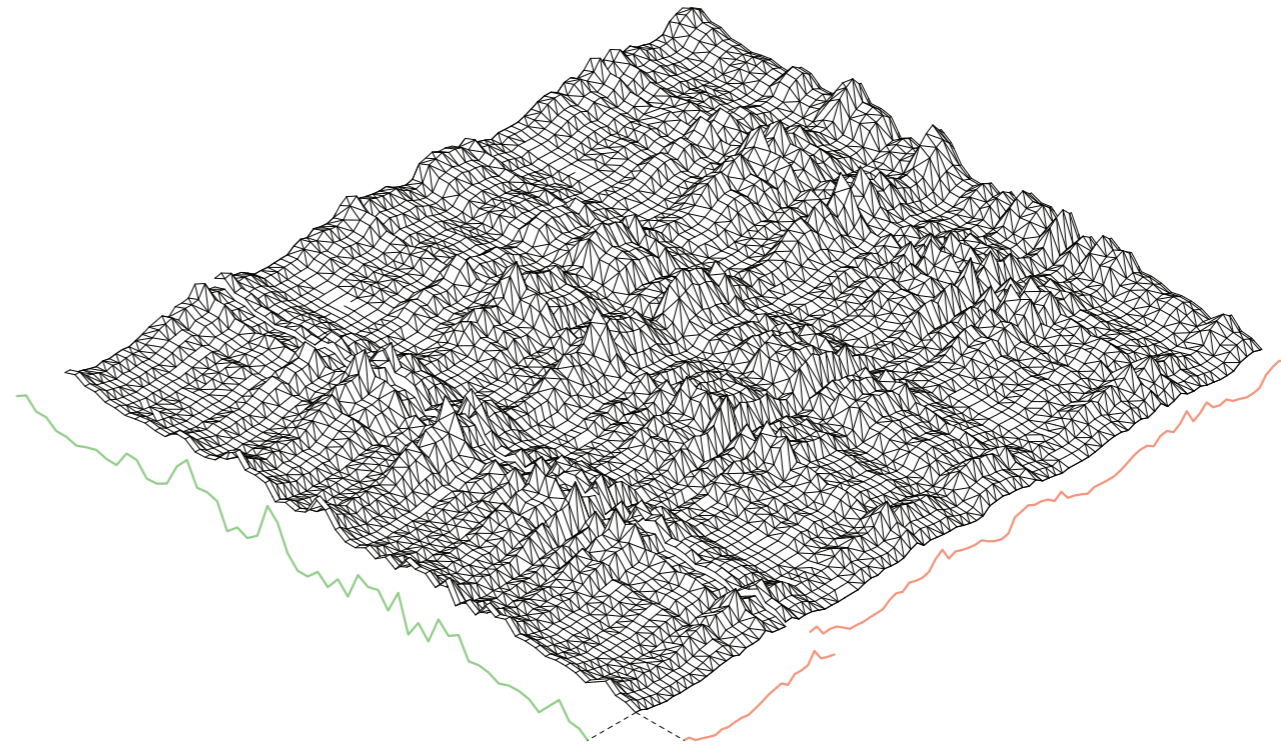*Y / green: Solo piano*
Surface: X + Y grid, Z multiplied amplitude of curves.

Comment

A solo piano, a one single element with fluid timing, combined with a vaguely repetitive minimalist classic, creates a dynamic landscape. This setup showed the way for the sounds I used for the final amplitude grid.

Sound choice

X / red: Ocean waves
Y / green: Field recordings from Gustav Adolfs Torg
Surface: X + Y grid, Z multiplied amplitude of curves.

Grid rescaled to suit desired rhythm of proposal.

Comment

The final amplitude grid was used in several ways. The greenery was placed by intersecting the surface with the main geometry, and the grid size was used for furniture placement. Since this amplitude grid wasn't directly materialized in my final proposal, it gave a freedom to be conceptual with the sound choices. I ended up using field recordings from the site. It becomes a fun way of incorporating the existing site. The field recording was combined with the sound of ocean waves. This sound choice is a play on a public dialogue the city of Gothenburg conducted, where the citizens expressed a desire to get closer to the ocean.
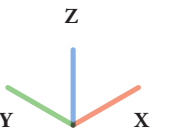
Physical models

Sound controlled etch-a-sketch, sunken and trimmed

Sound controlled etch-a-sketch, final surface with manual cuts

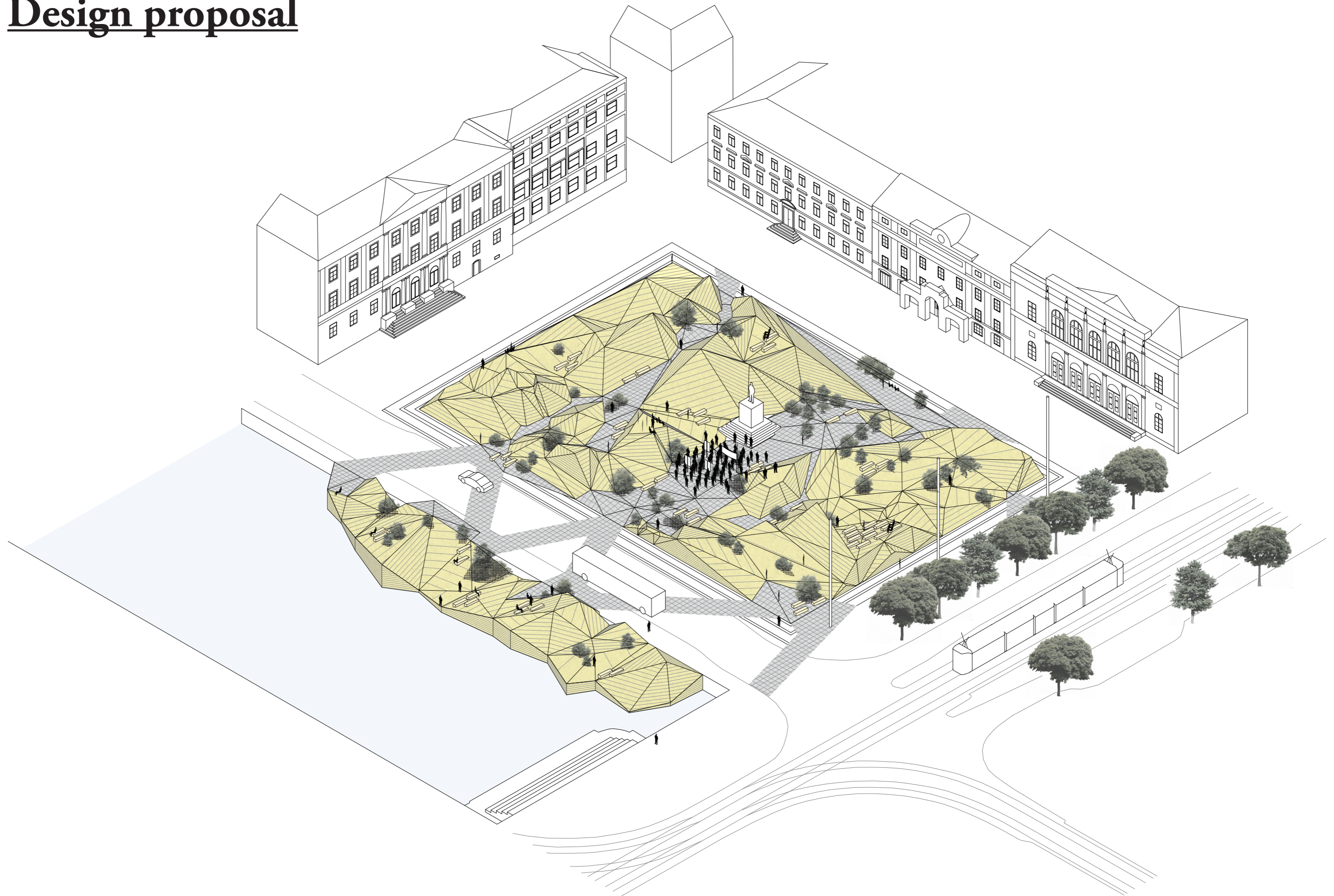*Sound controlled etch-a-sketch, initial sketch*


*Amplitude grid*

Design proposal

Description

With the goal of informality, of creating a public space with less hierarchies, the square Gustav Adolfs torg in central Gothenburg is transformed into an artificial landscape. This creates a diversity of possible ways of being on a square. In order to transgress readings of existing relations on site and preconceived ideas about what the square should be, generative processes using sound has been used to get other views on the square and what a public space could be.

One person could read a book in a small crevice. A demonstration or a concert could use the plazas, people could sit and watch in the surrounding landscape. There are walls to protect you from the wind and weather. Have your lunch by the water, or in that small crevice again. You could meet people here. Or not. Just existing alongside each other, being exposed to each other, is a very valid way of being in public. The square can

support that with it's wealth of different places to inhabit and move in. Gustav Adolfs torg becomes an open-ended place that lets you do what you want with it.

In line with the goal of informality, the landscape is a quite simple construction: flat planes made out of wood, scaffolding style steel tubes and concrete pavers. The square's form creates a messy coherence allowing for radical changes with the basic expression intact. From actual physical changes such as moving, adding or deleting elements of the landscape to people's own interventions. Paint everywhere. Bring your stuff. The proposal can take it. This place could be repaired, changed or even taken away, if it suits the needs of the public better. A very formal place, a thoroughly composed, neo-classicist square, is changed into a very informal one. A place that people can use as they see fit.
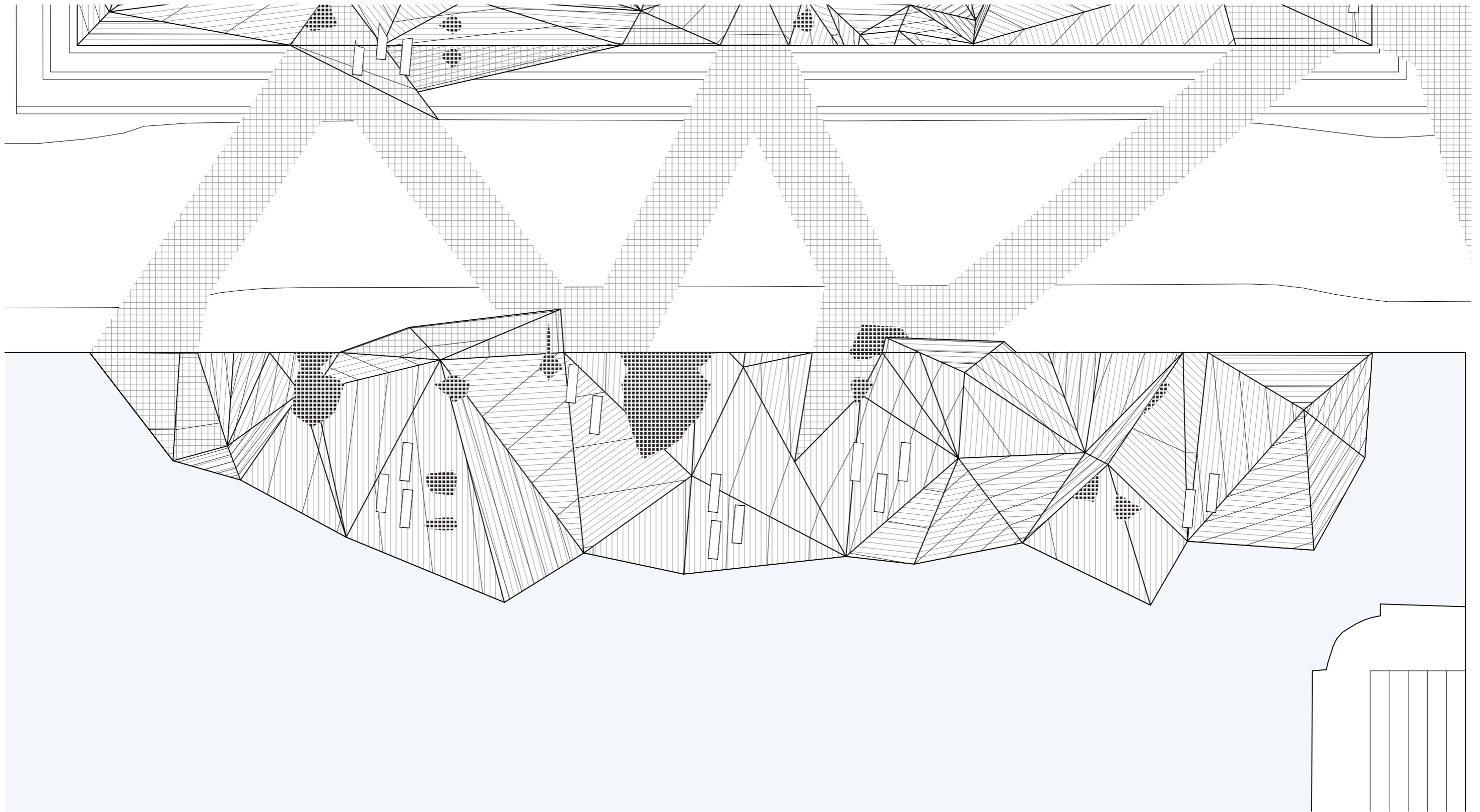
Site plan, 1:400

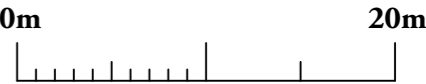B←

A←

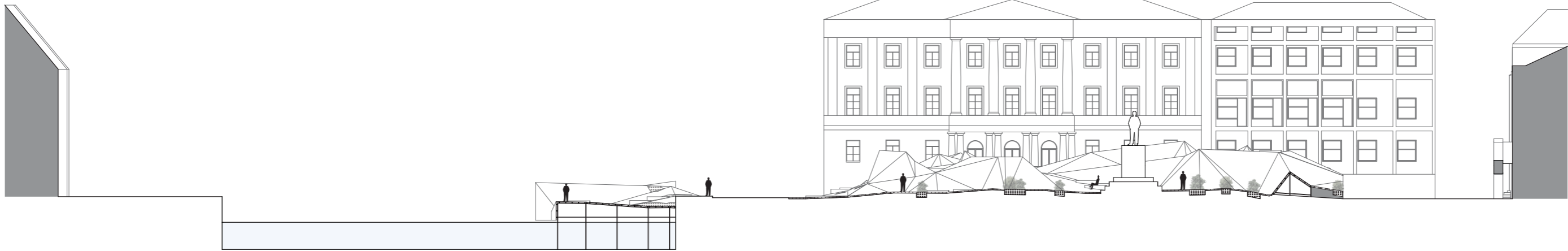A←

A←

B←
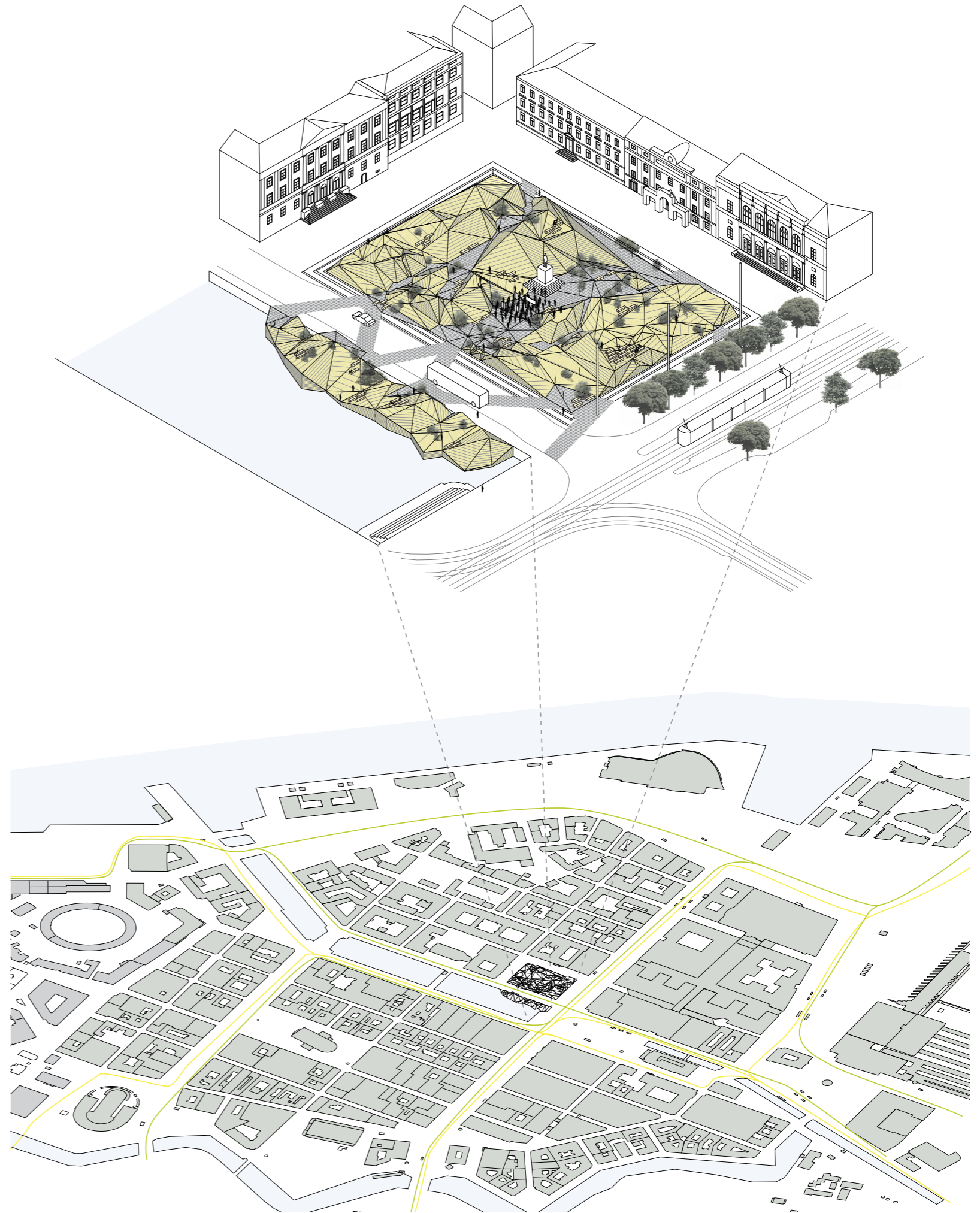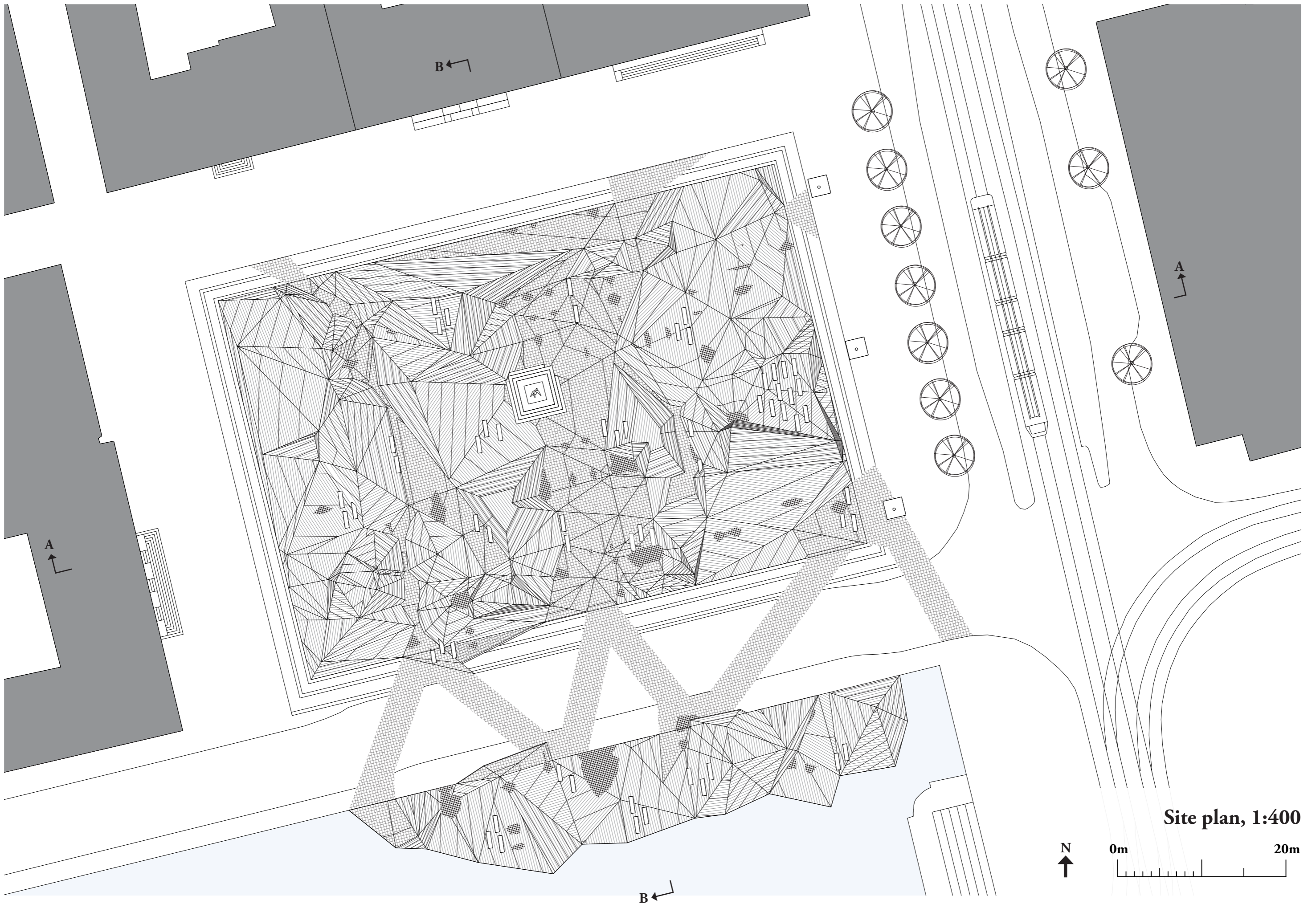
N

0m   20m
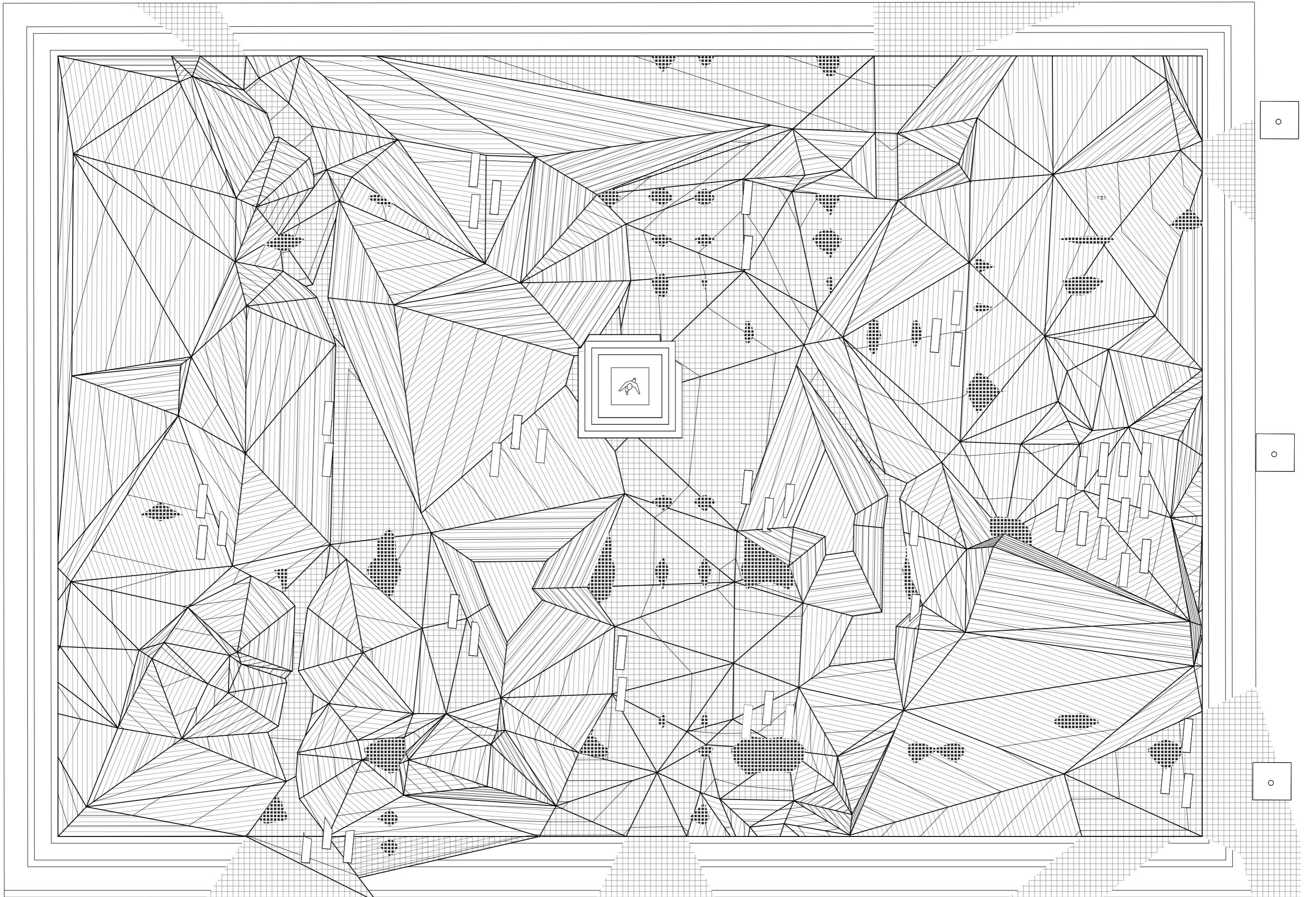
This page: plan, jetty, 1:200

To the left: plan, square, 1:200

N

0m   10m

Section A-A 1:400

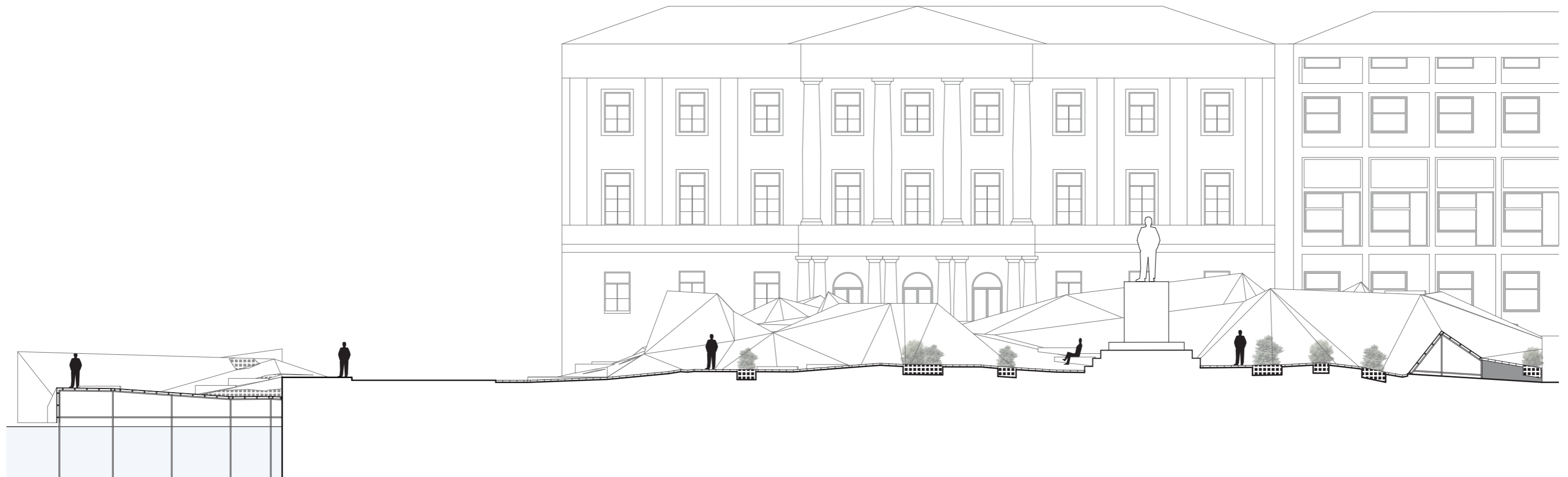**Section B-B 1:400**

0m   20m

Section A-A zoomed in, 1:200
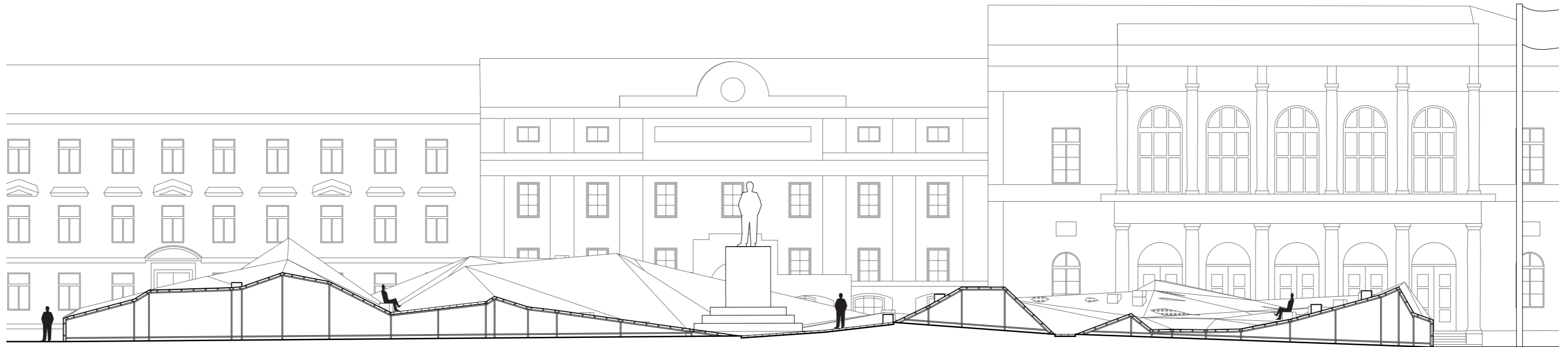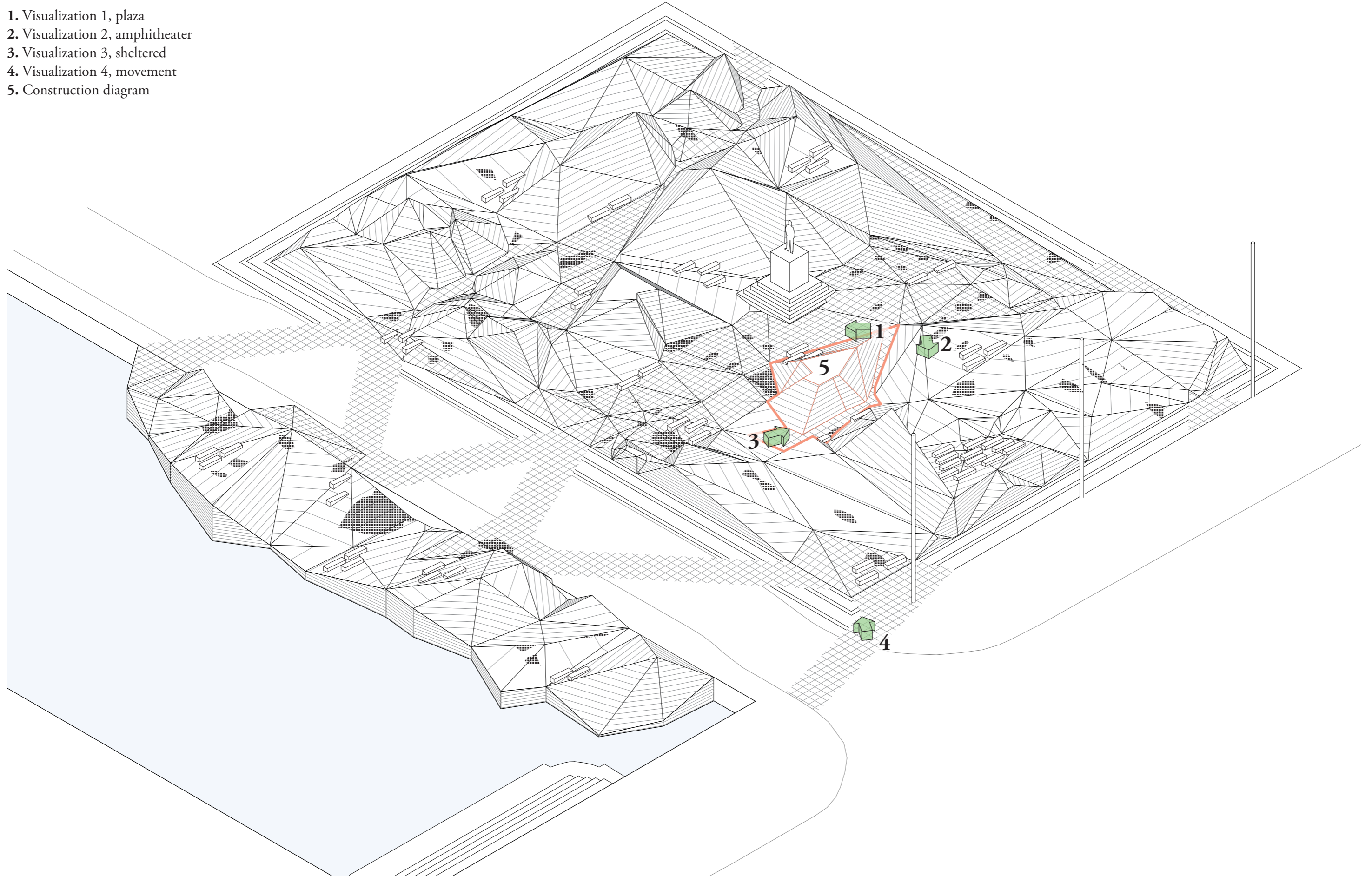

Section B-B zoomed in, 1:200

0m   10m

Orientation

1. Visualization 1, plaza
2. Visualization 2, amphitheater
3. Visualization 3, sheltered
4. Visualization 4, movement
**5.** Construction diagram

Construction and materials

Informal construction

The choice of materials and construction echoes the goal of informality. The inspiration comes from jetties in fishing villages: the jetties are tools for working, but can be appropriated for a wide variety of activities. The materials are easy to build with, repairable and comparably cheap. The basic expression, with flat planes, simplifies construction. The materials invite to appropriation, helping to create this informal place that people can use as they see fit.

The basic structure is a scaffolding construction made out of steel pipes. The structure is covered with a layer of wood planks. Parts close to the ground, but also some parts demarcating movement, are clad in concrete paving stones, resisting wear, tear and hundreds of people demonstrating.
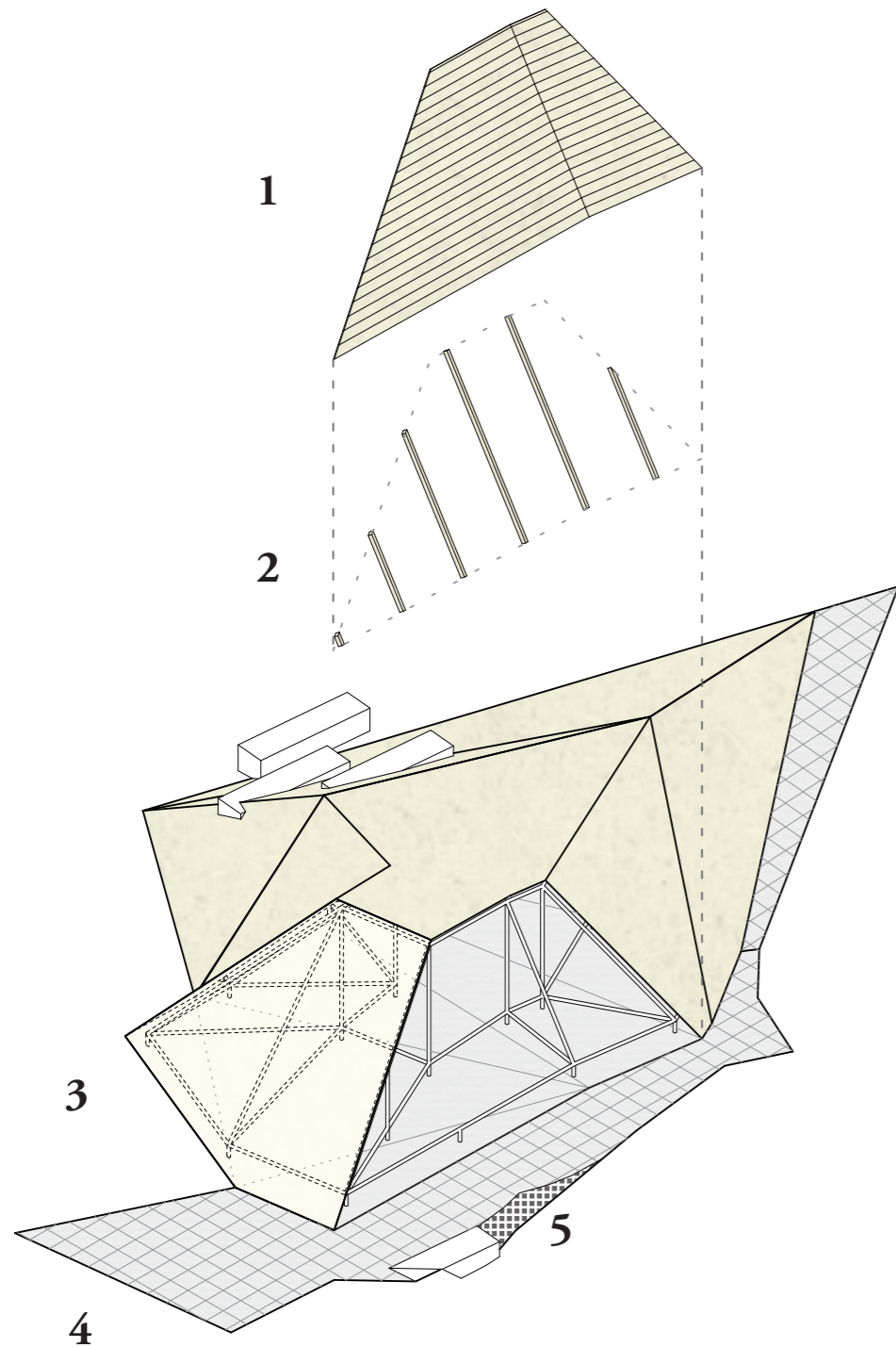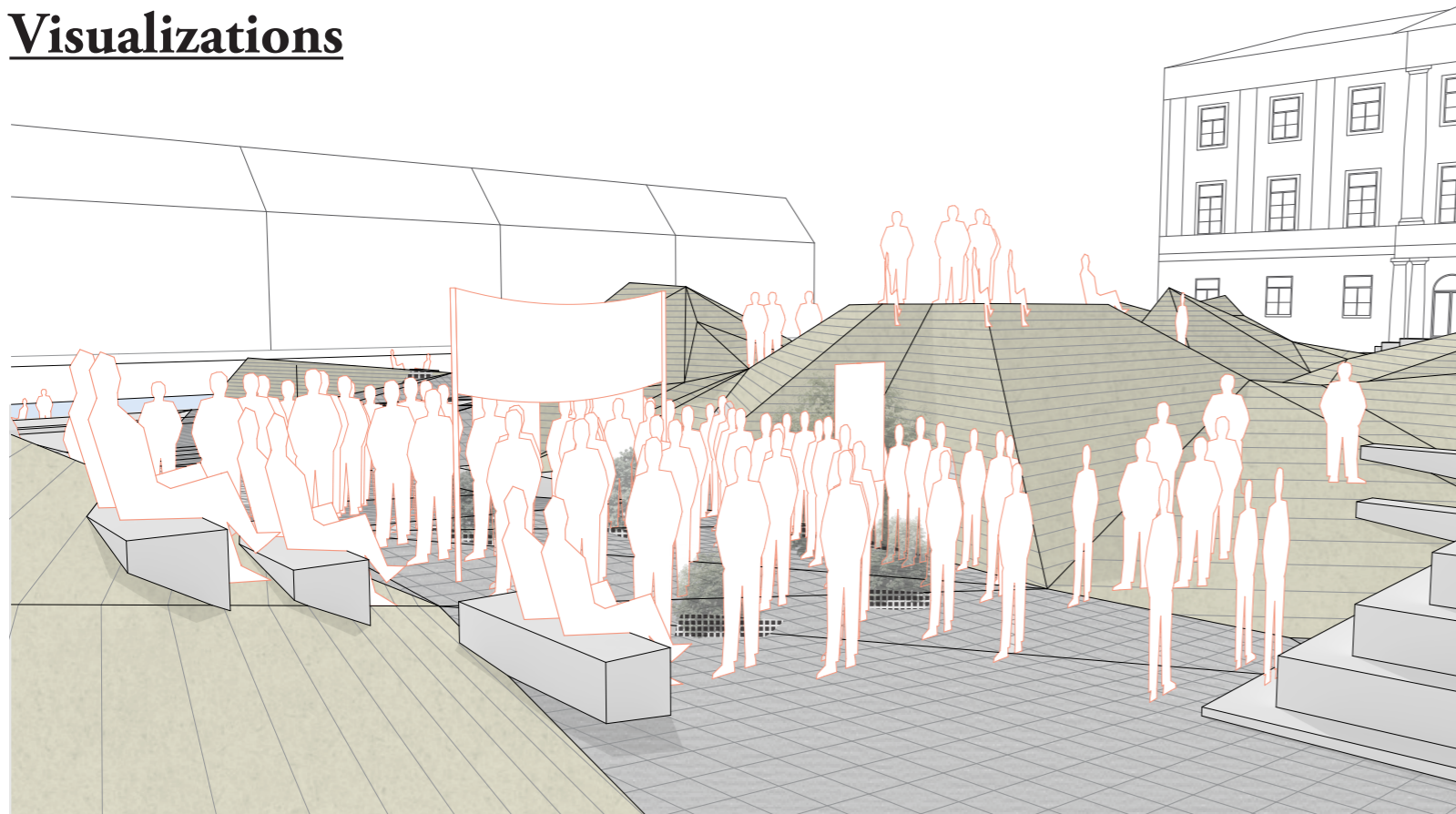
1. Wooden planks
2. Wooden beams
3. Steel structure
4. Concrete pavers
5. Exposed earth, for plants

Reference pictures, materiality and construction.
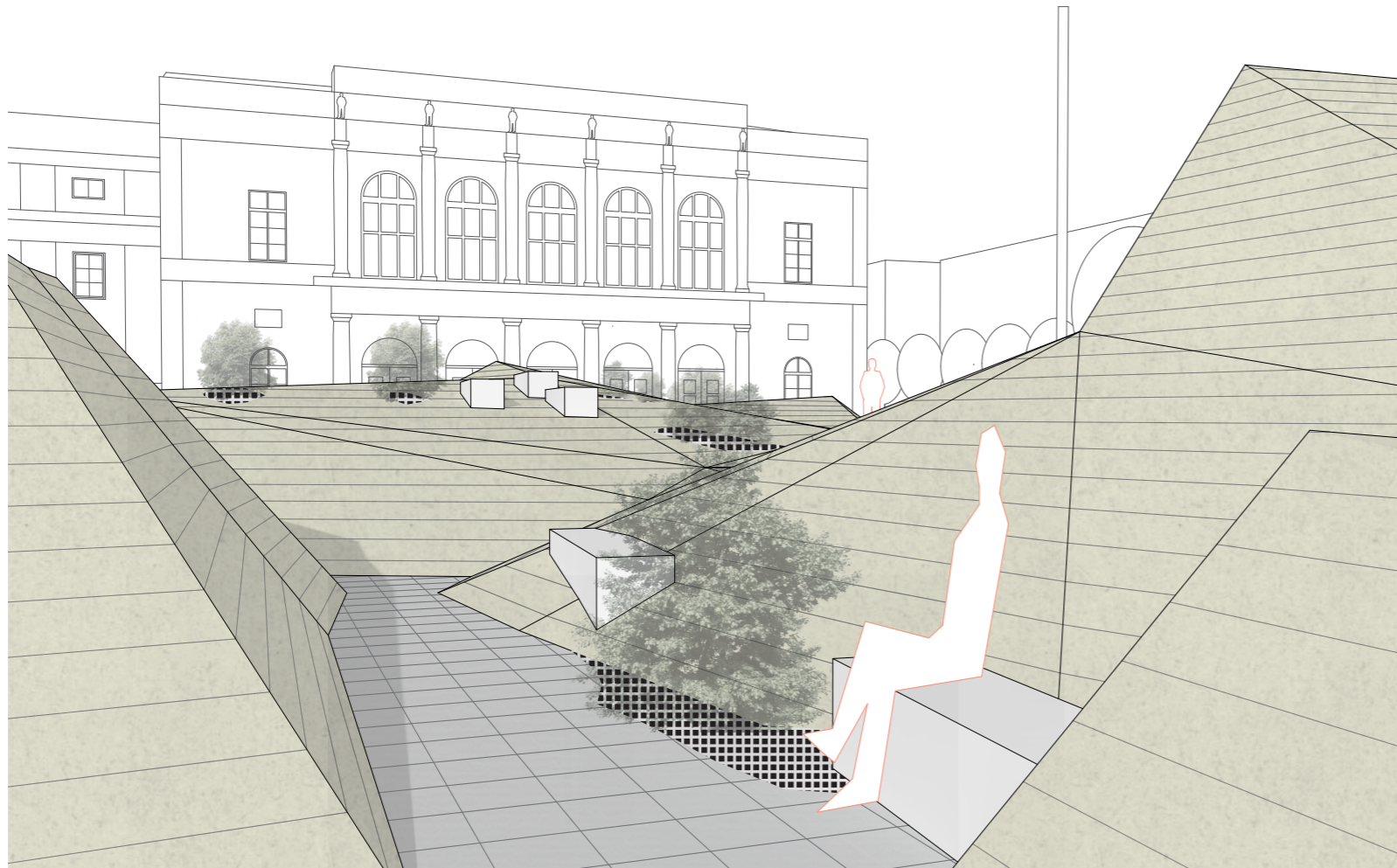
Visualizations

Visualization 1, plaza

A plaza is formed around the square's central navigation node, the statue. Here activities suitable for larger gatherings can take place, using only the plaza, or involving the surrounding hills as seating or stages. It becomes like the bottom of the valley, where people can gather around it to participate in the activities. People could sit and watch in the surrounding landscape. A kid could stand on a hill to see better. Or the other way around, hold your demonstration banners from the hill tops, exposing them to the politicians in the city hall, and to everyone passing Gothenburg's busiest public transport hub.
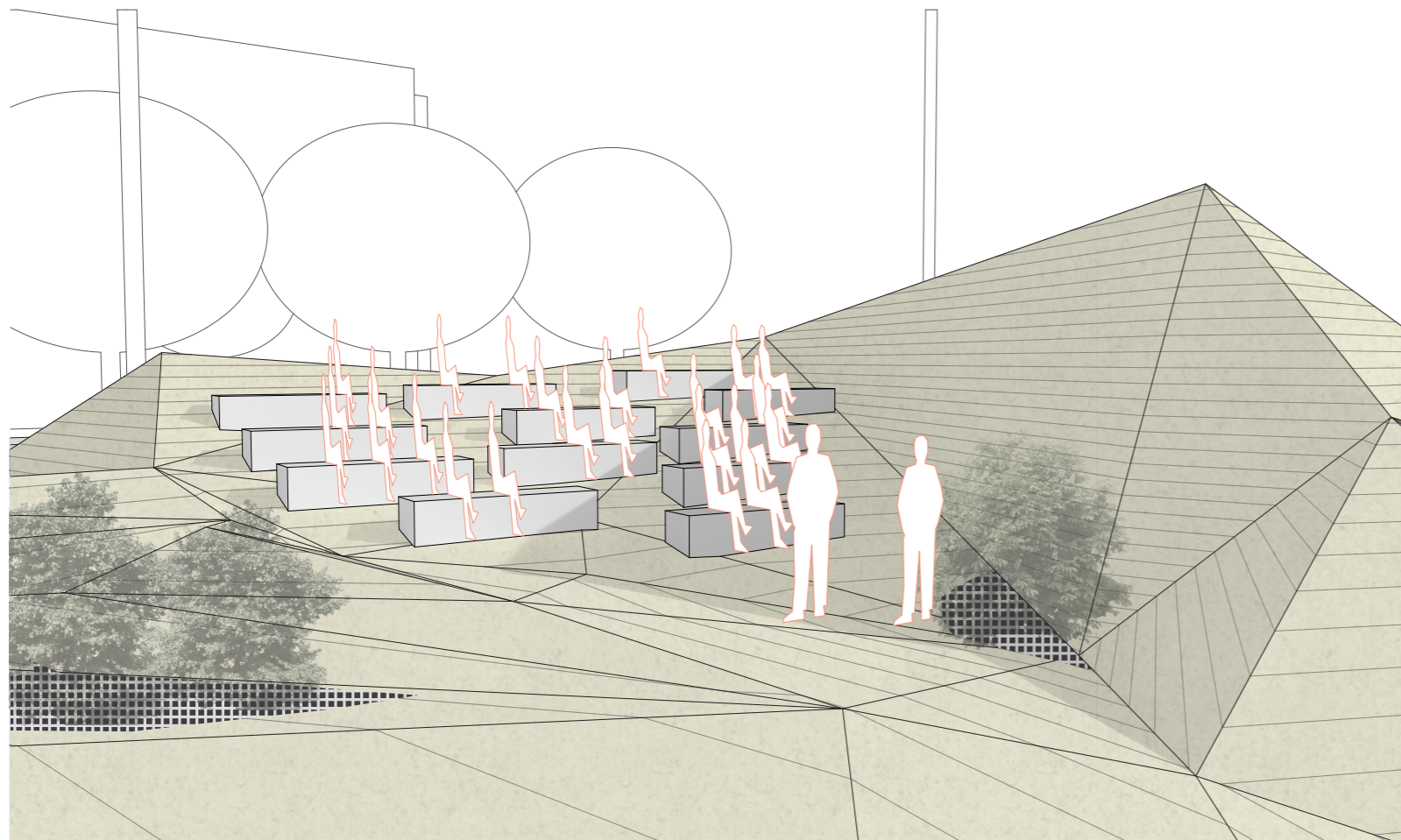

Visualization 2, amphitheater

The hills form a valley and a protection from wind and rain, which could be used to create an amphitheatre. The sound would bounce off the walls, creating acoustics suitable for concerts or lectures, poetry readings and debates. Project films on the walls for outdoor cinema or immersive installations.

Visualization 3, sheltered

In addition to being a public place for large gatherings, Gustav Adolfs Torg is a place where people wait. For people, for trams, for buses. Find spots for yourself in the landscape. The continuously modulating, changing landscape gives place for a wealth of different spaces, giving you the possibility to claim a small space for yourself if you want. Meet someone there, or just read a book by yourself in a small crevice. Have your lunch by the water, or in that small crevice again.
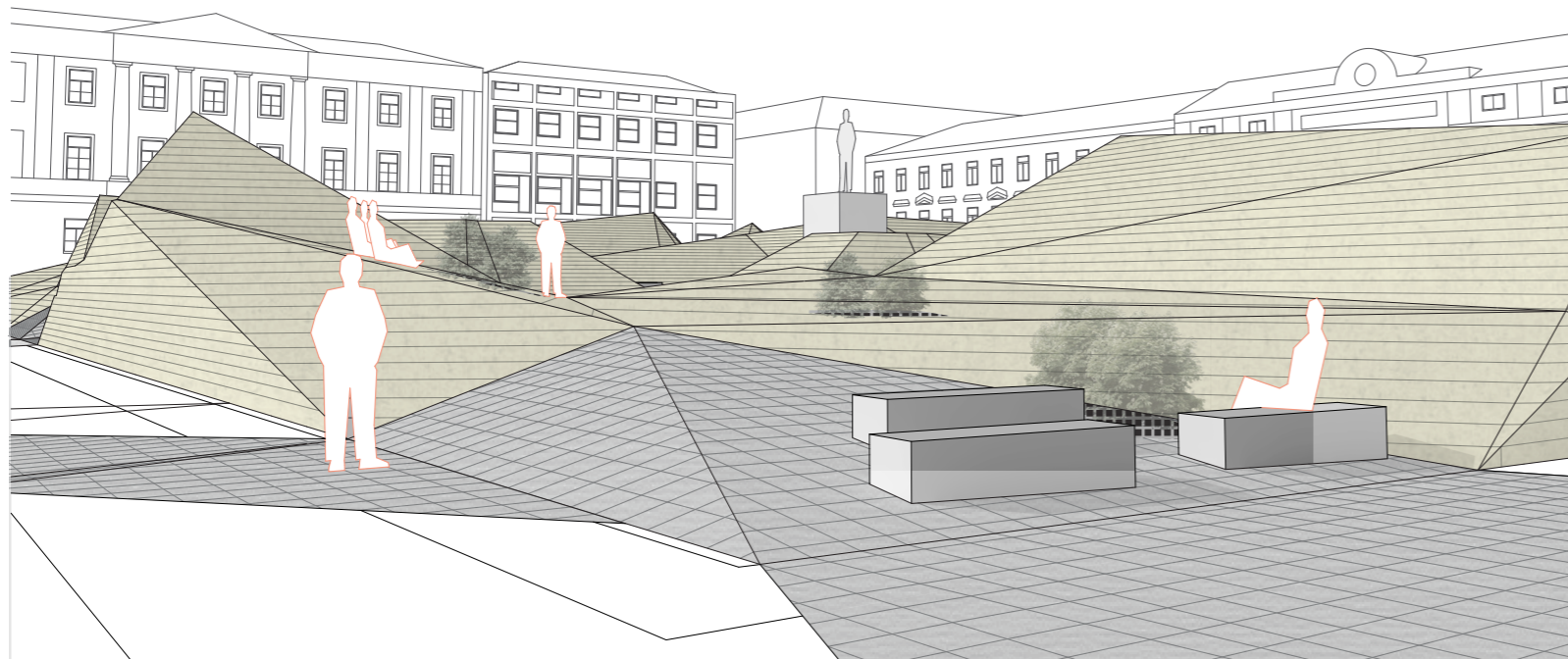
Visualization 4, movement

The scale of the hills is considered to allow for immersion in the landscape without getting lost. The landscape is altered to create a multitude of movement patterns, making it an experience to move over the square. The focussing of movement patterns in some nodes on the square creates meeting opportunities, but if you're not interested in that, that's okay too. Just existing alongside each other, being exposed to each other, is a very valid way of being in public.

Physical model
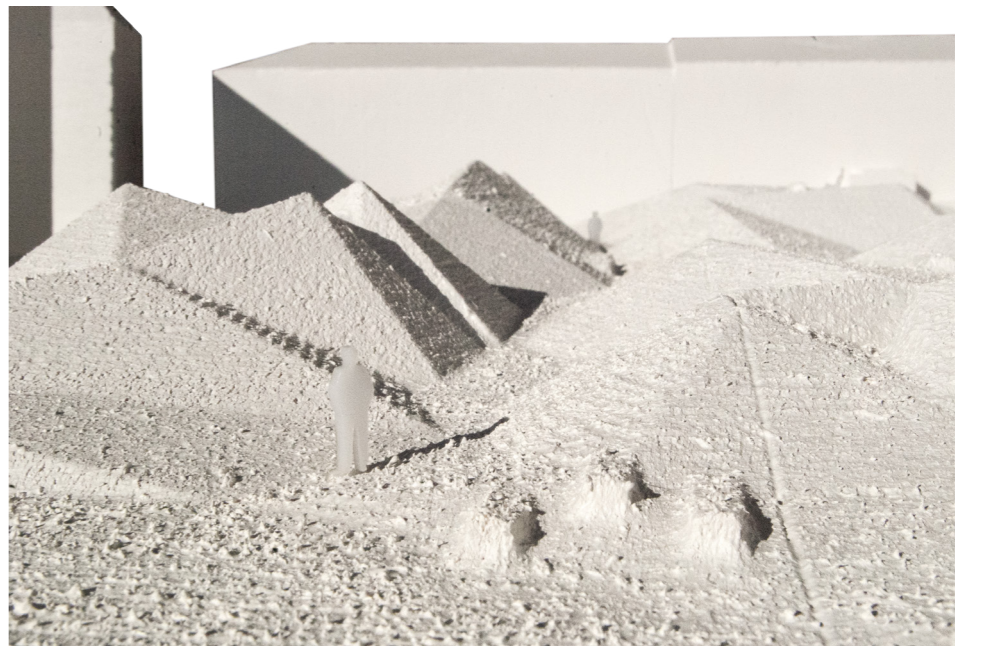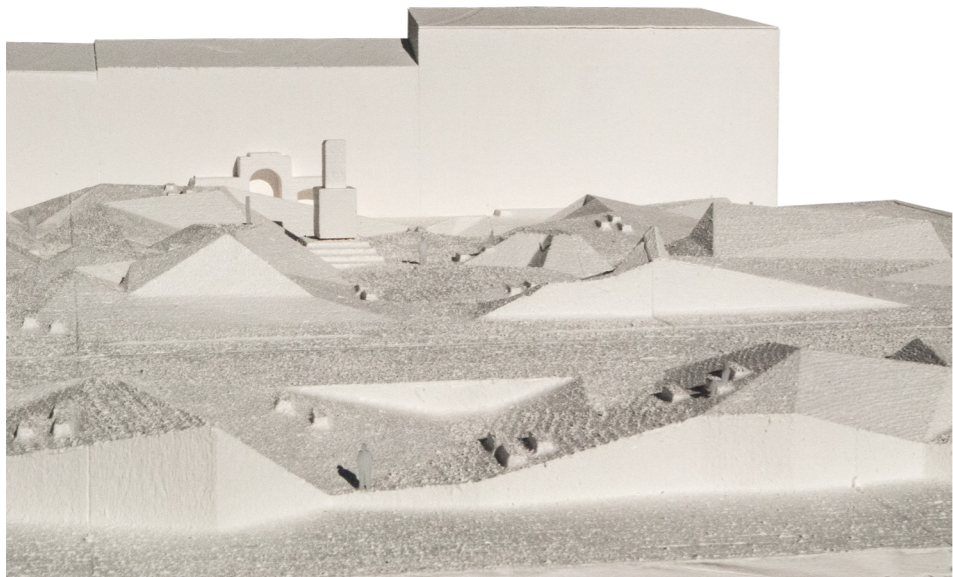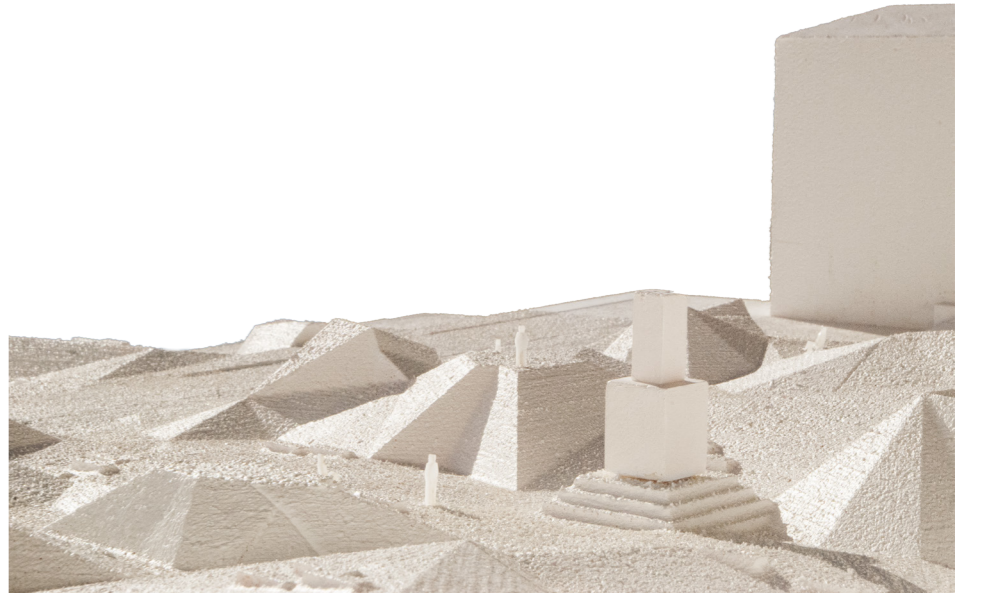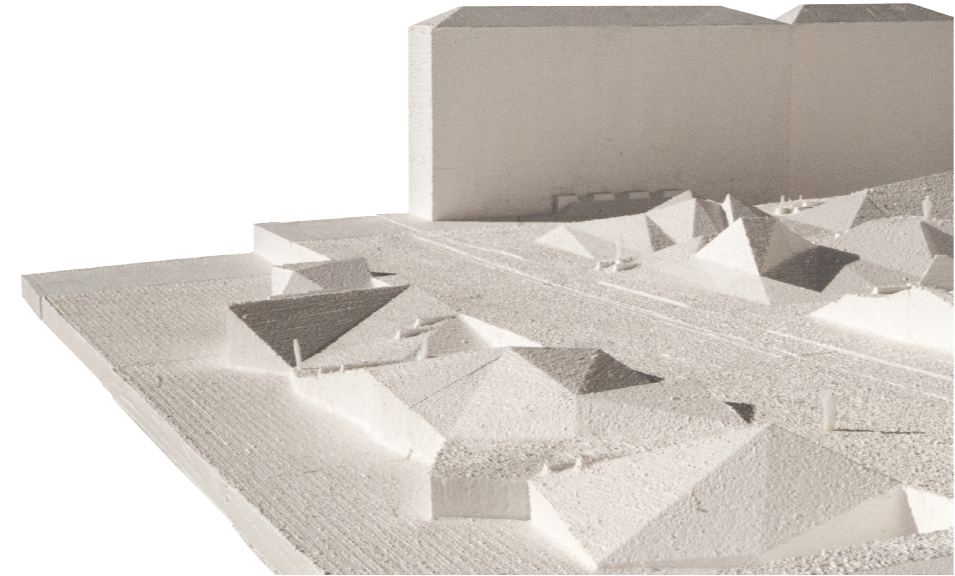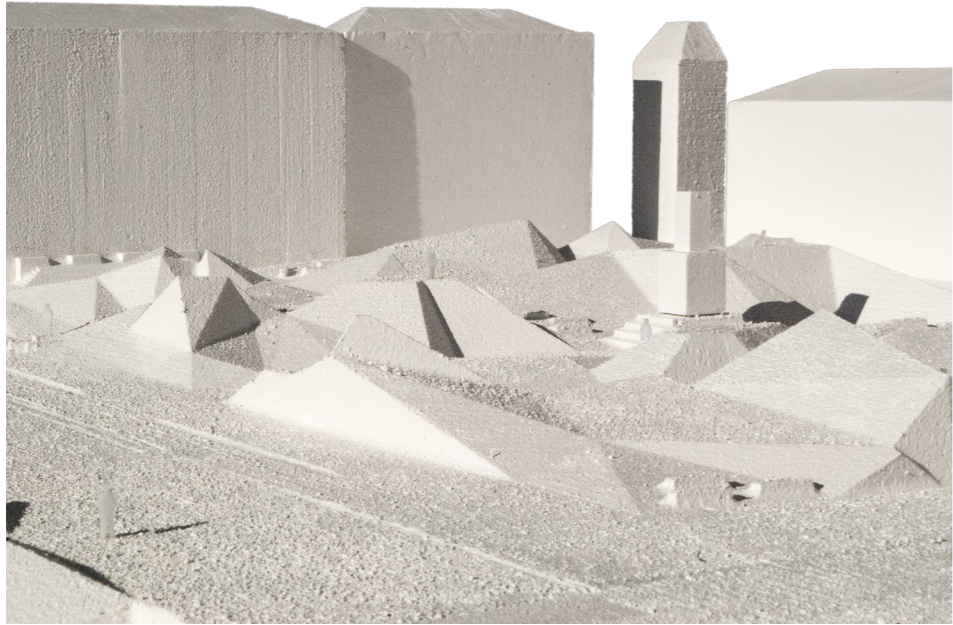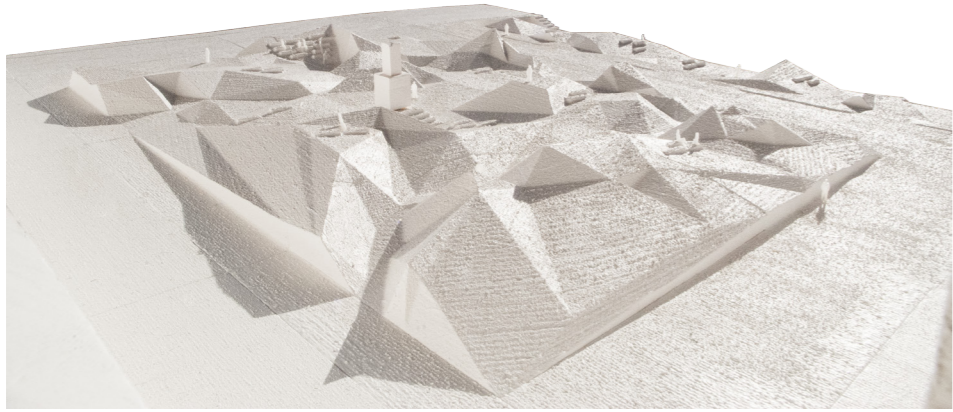
Sketch models
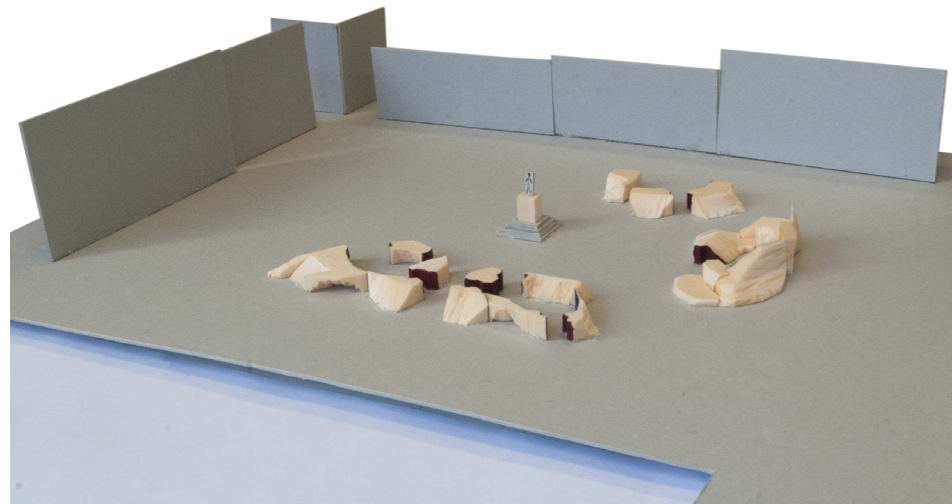
Model for mid-term critique.
Programmatic sketch, made before I started using generative methods.

First successful result of generative methods.
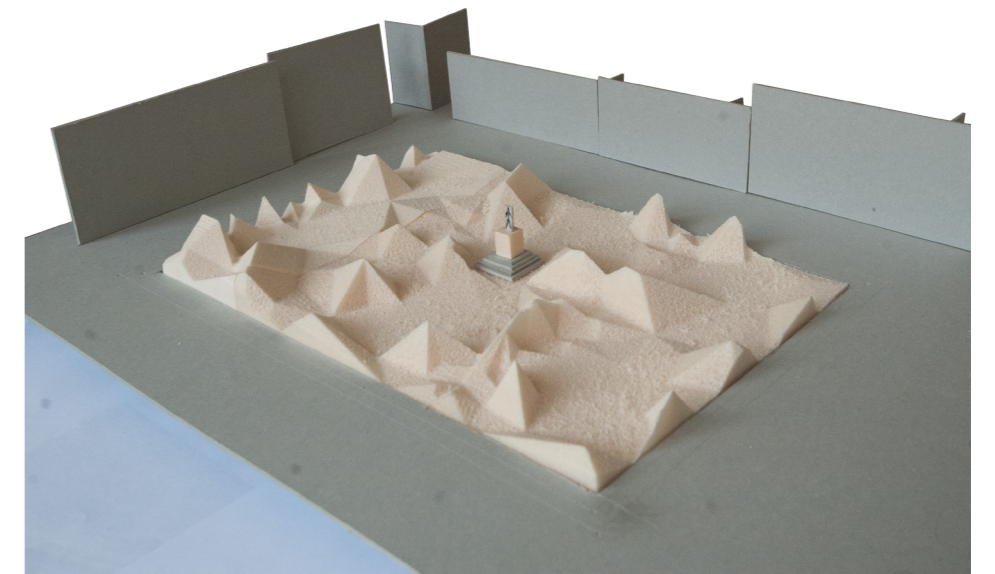
Early test, spiky result with lots of layers of input overlaid.
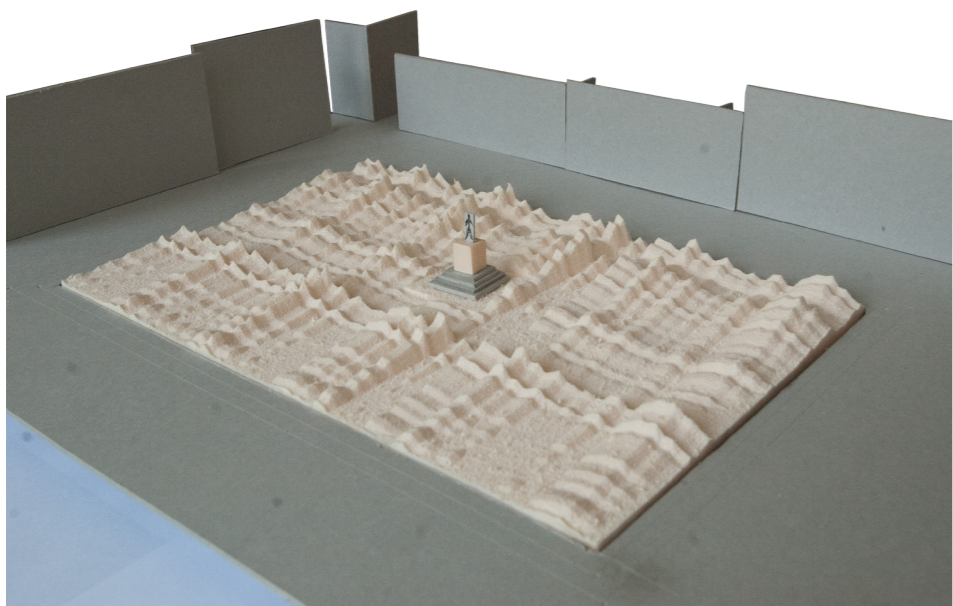
Testing an amplitude grid on site.
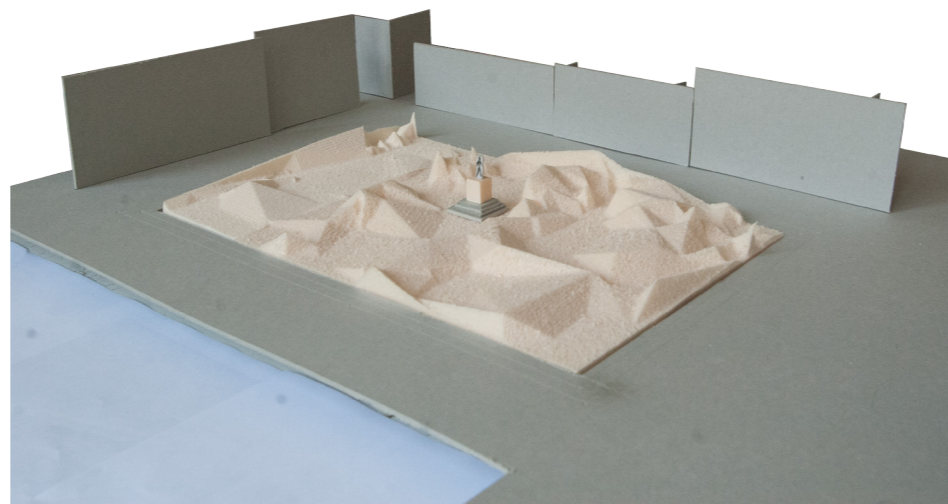
Sound controlled etch-a-sketch, sunken and trimmed.
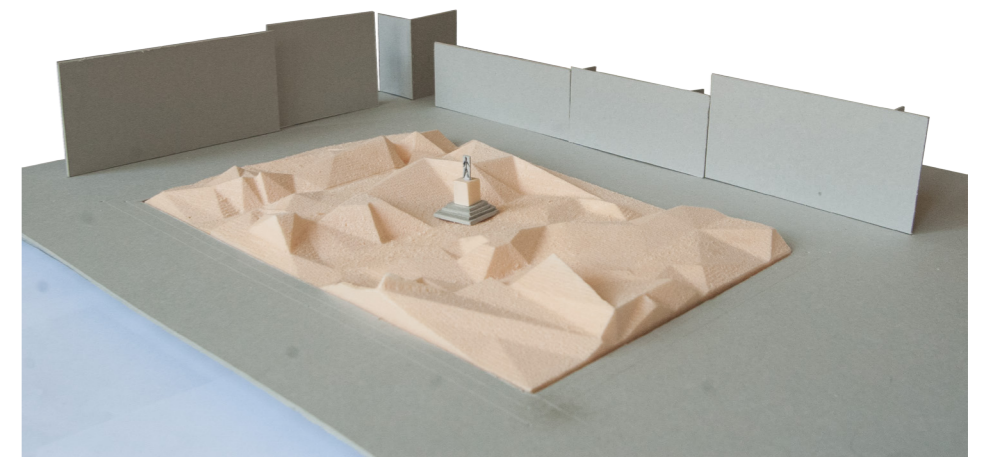
Sound controlled etch-a-sketch, used base geometry with manual cuts.

Discussion

A quick recap

Goal of design project
A design for an informal public space.

Purpose of thesis
- Find a method of designing public space, that allows for transgression of preconceptions of what a public space should be, of existing relations on site and of compositional rules.
- Explore methods of sketching using generative processes and sound.

Introduction

This thesis has demonstrated developing and using generative tools as a method for designing public space. This method is used in order to transgress preconceptions of what a public space should be, of existing relations on site and of compositional rules. On the following pages some different implications of this work will be discussed. The main focus is on evaluating the method of designing, but I will also devote a section to evaluating the resulting design proposal.

Why did I use this method?

The first part of the thesis semester was mainly spent establishing a program for a transformation of Gustav Adolfs Torg. This was done by conducting case studies and by sketching. At this stage, I had the idea of working with sound in a more traditional way, such as acoustics and urban sound planning, in combination with ideas about a more informal, less hierarchical public space.

This approach didn't yield results that lived up to my aims. I had established a radical idea of a kind of informal public space, but the form I manifested it in was essentially quite conservative. I was constricted by my own preconceptions of what public spaces look like, and by what was existing on site. In my analysis of the site, I read the careful composition of the square as a problem, limiting possible interventions and new usages for the square. My answer to that was basically to make my own careful composition. If I were to aim for a form that could be as radical as my ideas about an informal public space, I needed to take other approaches.

As an answer to this, I chose to refocus my thesis. The focus shifted towards design method, in order to find a form that better could answer to my goals.

Tool development

Doing open investigations in ways of using sound, the approach turned from sound as a consideration for the design (i.e. "nice acoustics", "interesting soundscape"), to sound as a direct generator of form using computational design. This allowed me to use music and sound both as concept models and actual working tools.

It took a very short time between conceptualizing the idea of generating geometries from sound, to having designs I could actually judge. After initial development of the tools, I could make loads of vague sketches fast. This gave a general direction for the design. I could then quickly make different variations using similar input parameters, to gain further understanding of the design task.

The iteration speed increased when I developed the tools further, with more intuitive interfaces and more functions. The most important development was implementing a "sync" button, a simple switch that made sure that the different sounds I used started at the same time every time. This might seem trivial, but the implication it had was immense: the results I got were suddenly easily repeatable. If I ran the tool twice with the same set of input parameters, the resulting geometries were almost identical (the slight differences had to do with technical reasons, mostly limitations in how fast my computer programs could communicate with each other). This was not the case from the start, and had a large impact on the iteration speed.

I think this is important for understanding my tool as it was used in the final design proposal. The results of the processes I set up (i.e. the generated geometries) looked unpredicable, but the actual input parameters (i.e. sounds) were not random. They were possible to tweak for an intended effect.

It was still a blunt tool, but that was positive in this case. A certain lack of precision made sure I couldn't control the design in detail. Therefore it made what I wanted: it allowed for transgression of preconceptions of what a public space should be, of existing relations on site and of compositional rules.

Was the method successful?

During the course of the project, my role changed. The overall process was to generate lots of information and make sense of that, instead of composing the design from the bottom up. I had the role of interpreting, curating and seeing opportunities, rather than intuitively creating.

I ended up using massive gestures, generating geometries covering the whole square. This let me take my focus from individual objects composed on a surface. Instead I could move into examining the square as a continuous field that could be modulated, looking at how it connects to the surrounding city. In my opinion this was a more fruitful approach than my earlier attempts at transforming the square. The generated geometries were a valuable way of analyzing the space. I think this method of analysis has a lot of potential for use in other projects.

So, the design method I ended up using worked as a way of transgressing my readings of the site, my preconceptions of what a public space should be and compositional rules. In this way, it was successful.

One could criticize my implementation of the tool into the design proposal. I used my tools to output the literal form of the proposal. Then I changed the form by brute force (cutting out roads in the landscape, placing benches etc). One could raise the criticism that it is a heavy handed and conceptually unsound method. It makes the resulting project look disjointed in parts. Therefore, I propose two other ways I could have developed the project in:

1. I could have treated the generated geometries more as concept models, a basis for the design rather than the literal form of the proposal. The concept models could influence created spaces, movements, materials etc.

2. I could have gone further into tool making, and introduced generative logic on more levels. For example: instead of cutting out the roads or placing benches by hand, I could have scripted them. By introducing local conditions in different ways, I could have generated more of the design as output directly from the tool.

Making your own tools

In the autumn of 2014 I did an exchange semester at Aarhus School of Architecture in Denmark. One of my teachers there had previously studied at CAAD at ETH Zürich, one of the world's leading places for computational design research. He told me that his supervisors at ETH refused to use commercial software. They built all their programs themselves, from scratch, in code. I never really understood why they would do that until the final stages of this thesis.

Making your own tools can be a way of making a process more efficient, a means to an end. One example of this could be jigs you make for woodworking, when you want to drill a hundred holes at the exact same distance without measuring all the time. Another would be those introductory Grasshopper exercises, where you make a hundred changeable columns with just a few mouse clicks.

It can also be a design task in itself, a way of generating ideas. There is no ready-made "make landscape from sound" command in Rhino. I had to make it myself, and then I had to tweak it, and then tweak it some more until I could use it to accomplish my goals. During the process of creating the tool, my goals changed. The process of creating the tool, it's possibilities and limitations, had an impact on both the design and the program. It made me understand the design task better.

Actively engaging with design and creation of a tool, and then using it to accomplish various goals, has been an immensely rewarding and educational experience. Seeing that toolmaking helped me make something very concrete and readable out of an abstract concept, and then being able to apply that to help me solve a real world design task, has expanded my views on what is possible in architecture.

Evaluating the design proposal

The goal for the design proposal part of the thesis was to create the design for an informal public space. A space with a wealth of different spaces, lack of hierarchy and few dictates about what people should and shouldn't do. To a degree I think I have succeeded.

The folded, complex geometry of the proposal invites to appropriation: there is really a lot of different spaces to claim for yourself. There is support for a wealth of different activities. The rugged materials and construction invite to appropriation: the proposal can take whatever you want to do with it.

Rooted in it's concern for public space, the proposal has a degree of realism. This aspect anchors the proposal in the real world, even though it is designed with unconventional methods and rightfully can be criticized for being abstracted and diagrammatic. This degree of believability helps when discussing both the proposal and the methods used to design it.

In retrospect I think my program for an informal public space would have won a lot on more clear delimitations. A space where everyone should be able to do anything can end up being a space where no-one does anything.

There is this idea that a flat square is the most flexible, most functional surface there is. This is based on normative ideas about what flexibility/functionality is, what activities and people are included in the notions of flexibility and functionality. If you easily can drive a car onto the square it's flexible. That you cannot sit anywhere isn't relevant for this judgment. To see an example one could look at Gustav Adolfs Torg in it's present, "real-world" state. It's a flat, paved surface, perfect according to norms about flexibility and functionality. Yet it isn't used.

The proposal begins to address these issues, by embracing sloping surfaces and less convenient, but potentially more interesting movement patterns. It could have made for a more radical proposal by also engaging more in what activities the proposal would be good for, and a corresponding, more complex material engagement (concrete is nice for skateboards, grass is nice for a picnic etc.).

Another aspect that could have been developed is to project the design in time. How can this place change and evolve? This would have been a valuable addition in order to make the project believable and understandable.

Conclusion

This thesis touches on a lot of different issues: public space design, generaive and computational design, the role of architects, what a functional or flexible surface looks like, the making of your own tools and so on. The thesis would have benefited from more clear delimitations, and could be said to cover the different areas unevenly. But it is successful in it's primary purpose: it demonstrates a method for designing public space, that allows for transgression of preconceptions of what a public space should be, of existing relations on site and of compositional rules.

The thesis points to a general method of designing, and of studying a place. You insert something foreign into the design. Anything that provides you with starting points, anything you can insert to study the effects of. Different kinds of generative techniques would be one way of doing it, but you could use also use, for example, collage techniques to graft foreign things into the design.

For me, this method of working had a liberating effect. It really helped me transgress my readings of the site, my preconceptions of what a public space should be and compositional rules. In this, my design proposal became more interesting and radical, demonstrating the potential of the discussed design method.

Appendices

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