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plateaus

a tectonic alteration

Anders Bochardt Hansen
Lars Tønnes Petersen

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Anders Bochardt Hansen

Lars Tønnes Petersen

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ABSTRACT

The project Plateaus deals with the subject of reusing existing buildings as part of a new development. The project is built around two main premises: working with a collaborator on an intended development and creating a theoretical method of approach.
The intended project is regarding to industrial buildings located in the area known as ‘Eternitten’, which are meant to be made into housing complexes in 2016. As a way of learning how to approach existing buildings a theoretical method called ‘Tectonic Alteration’ has been developed. The essence of this method is to uncover tectonic potentials in the existing building, and then develop and incorporate it into the new design, in order to create an added value in the finish result.
The design is based on a concept of plateaus, inspired by the typography of the area and the terraced architecture of the surrounding buildings. By looking at the structural system of the old buildings, a new system has been developed to join with the old and create a coherency in the overall expression. This is done with a subtle contrast in materials and joints, to differentiate new and old. A new structure is built upon the old, and by the use of concrete decks plateaus have been made. These are then used for recreational green areas, access via stairs going from one to the other, in a vertical transition. Dwellings are then placed in accordance with the structural system, adjacent to the green areas, accessed by a gallery. In order to provide private areas in relation to the public, each apartment is fitted with a porch in from, creating a buffer to the gallery, and given the residents a space of their own. The apartments are shaped by the construction, and work a principle of transition from the entrance to the opposite facade. On the porch there is a great view of the city and in the living room there is a focus on light. There is a line of sight going through the apartment showing this transition, and it is emphasized by a window with seating on the opposite side, a space where the resident can sit and enjoy the sunlight.

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PREFACE

This report marks the final chapter of our time studying Architecture and Design at Aalborg University, an education that explores the interrelation between the architect and the engineer - the aesthetic and technical. This aspect of duality is a clear representation of the fact that creating good architecture is a multidisciplinary practice that must utilise the knowledge of many fields, in order to make a building work on all levels.

Creating good architecture from tabula rasa is a challenge all architects must face and often times it is the primary focus when being taught at school. However creating good architecture out of something existing, is an entirely different challenge, one that is not always taught. Working with existing buildings as part of a project, challenges the design process and requires different approach.

With a desire to do something different, to challenge ourselves and learn something new, we chose to try working with existing buildings as the basis for this project. The opportunity arose when INBO Holding Aalborg ApS contacted Architecture & Design proposing a collaboration, looking for inspiration on how to reuse two industrial buildings, turning them into a housing complex. We accepted the challenge and are pleased with the feedback and sparring that INBO has given us, and for that we are thankful.

The project itself turned out to be very challenging in many ways, perhaps more than expected, and it required a great effort on our part to gather and handle a lot of new information, but in return it also gave a completely different view on what architecture is and can be. For this we are grateful.

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INTRODUCTION

"All prognoses predict that 75 pct. of the future architectural assignments will be regarding restoration and transformation of the existing building stock, thus there is an immense need of scholars equipped with knowledge of and methods to handle our architectural heritage.… as said by Mogens A. Morgen, who recently started as professor in architectural heritage at Aarhus Architecture school" (Sørensen, 2015).

It is perhaps fair to assume, that most architects rejoice at the thought of designing a new building, one that is to be unique and iconic, appreciated by generations to come - the architect's mind and soul embodied in the building. The reality, however, is slightly different and good architecture should aim to accommodate the needs of the users, rather than focus on just being iconic and unique.
In addition to this, most architectural projects will to some extent include existing buildings that needs to be managed, which is somewhat due to the fact that more and more people move into the cities. The amount of undeveloped areas in the cities are slim, so we look to areas that are already in use, which then needs to be renewed or changed to suit the growing demands.
Gaining knowledge and developing methods on how to approach old buildings will be the key to creating good architecture from existing buildings.

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RESEARCH

A lot of attention in the architectural community is given to new buildings, when trying to assess the overall progress of the field and it is evident when looking at magazines, publications and architectural prizes. Rarely is the same amount of attention given to the reuse of old buildings and breathing new life into them, potentially creating an entirely new building which will serve the users for many years to come.

Taking into account that working with existing buildings is the more frequent assignment, makes it all the more important to know how to approach the task. This is why reusing existing buildings as part of new development, is the main premise for this project.

Since the main focus of architecture has been directed towards new buildings and developing new methods for these, only few have been made for reusing old building, and it is hard to find one method that is generally accepted. The methods that have been developed are quite different and many focus on the fields of restoration and renovation, and not so much on making the building something entirely new.

Therefore the research in the project will focus on developing a method/ approach to creating a new building from an existing, focusing on addressing specific issues which can then be tested in praxis and concluded upon.

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Etymology

The architectural theory of reusing a building is difficult in respect to terminology, as pointed out through the book 'Transformations' (Keiding et al., 2011), which probably in effect of the many possible outcomes. Some words are essential to clarify as the translation, as well as their synonyms, interrelate with one another. It should be noted that this project does not intend to give final answers, nor to define the words for others, but merely to explain and discuss the understanding of terms in relation to this project.

"The word Transformation is vague, and indeed, many consider it a buzzword" (Keiding et al., 2011: 11).

Restoration, renovation and transformation seem to dominate the field of reusing buildings, so the discussion will start with clarifying their definitions as described in the Oxford dictionary.

Restoration: the work of repairing and cleaning an old building, a painting, etc. so that its condition is as good as it originally was.
Latin - *restaurare* - 'restore'
Synonym - Renovation, Renewal, Rebuilding.

Renovation: to repair and paint an old building, a piece of furniture, etc. so that it is in good condition again.
Latin - *renovat* - 'made new again'
Synonym - Restoration, Refurbish

Transformation: a complete change of something.
Latin - *transformare* - 'to change the form of'
Synonym - Change, alteration

From the dictionary descriptions we can derive, that the art of restoration is the process of returning something to its original state and therefore not to renovate it, as often seen with historical buildings such as churches etc. In relation renovation is when 'made new again', but not necessarily in the image of the original vision, but merely to improve or fix, this could e.g. be when fixing a leaky roof by replacing it, or changing a facade to

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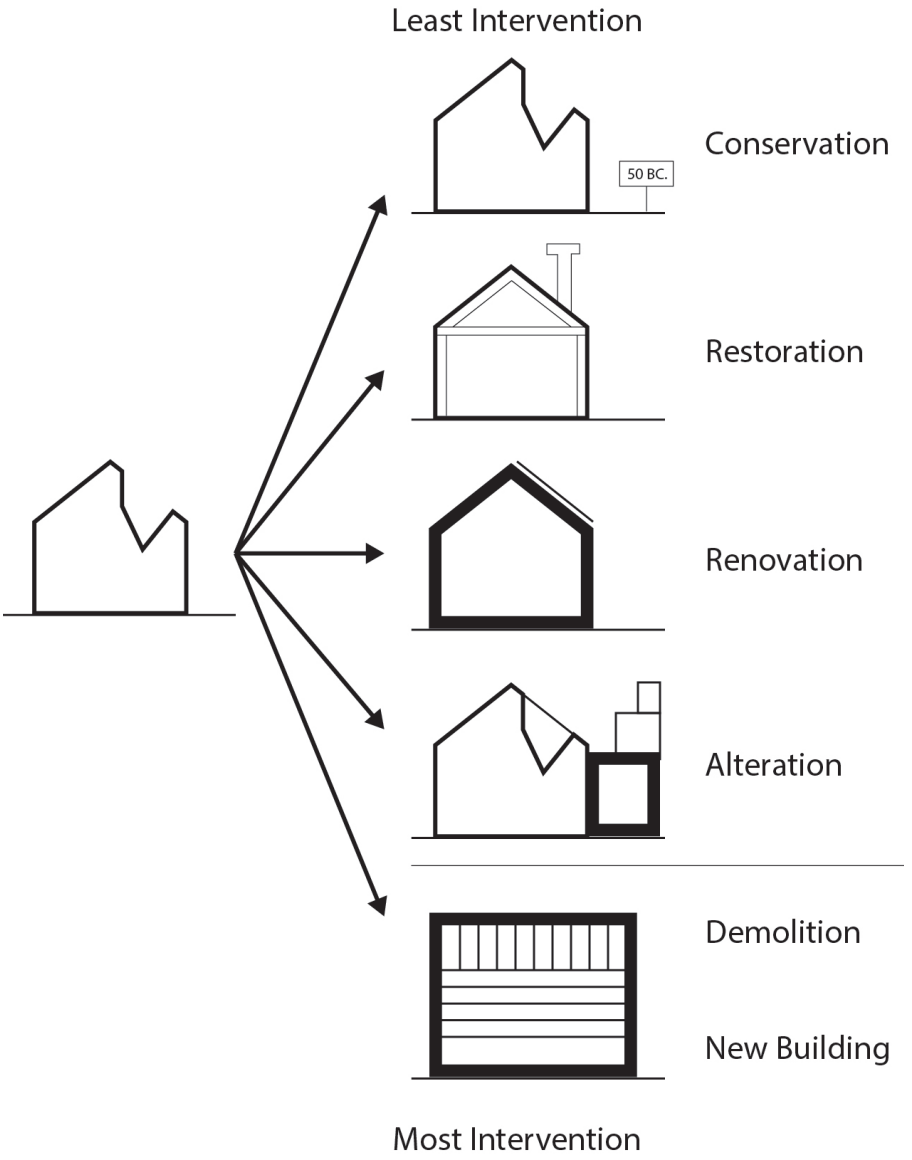

Types of intervention - 01

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improve energy efficiency etc. Even though this describes the two as quite specific purposes, one has to remember that the words are synonyms for each other, giving cause for confusion and discussion.

The discussion is by now quite old and it has been a dispute back to John Ruskin and Eugene Viollet-le-Duc, who represented two different schools so to speak. Ruskin's view on restoration as it would be, is best described by himself, in this quote from 'The Seven Lamps of Architecture':

"Neither by the public nor by those who have care of public monuments, is the true meaning of the word restoration understood. It means the most total destruction which a building can suffer: a destruction out of which no remnants can be gathered: a destruction accompanied with false description of the thing destroyed. Do not let us deceive ourselves in this important matter; it is impossible, as impossible as to raise the dead, to restore anything that has ever been great or beautiful in architecture" (Scott, 2008: 45).

The opposing view of Viollet-le-Duc as written in 'Dictionnaire raisonne de l'Architecture':

"To restore a building, it isn't to maintain it, to repair or rebuild it. it is to recover a perfection that may have never existed at any given time" (Scott, 2008: 45).

The above quotes emphasize the loose nature of the etymology when used in architecture and the debate that this can entail. This also shows the need for specifics when describing the work of a project. If the goal is to create something new out of something existing, then restoration or renovation does not seem to suffice. An interesting example of this can be seen in Amalienborg Palace, which has a high preservation value, but in order to house the King it needed to adapt to functional needs. This could indeed be categorized as a transformation despite the overwhelming amount of restoration. The very open definition allows for many interpretations and it is not fully defined within the architectural community as correct terminology, but it is used nonetheless.

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"In English, this field is now called 'conservation and transformation', where conservation refers to the processes that restores a building to its original technical and aesthetic state, while transformation refers to the processes that move a building forward with a certain amount of renewed technical and aesthetic content" (Keiding et al., 2011: 18).

Aarhus architecture school has a Department of Transformation, started in the end 1990's by Johannes Exner and later Copenhagen Royal institute of fine arts followed (Keiding et al., 2011). The transformation thus refers to any process that changes the building other than to its original state, leaving a grey area in relation to restoration in relation to Ruskin's understanding.

Although transformation is the preferred word for changing a building, it is perhaps not the best word if the direct meaning of the word is considered - a complete change of something. Maybe a project does not entail the complete change of a building but perhaps only a slight change as with Amalienborg Palace, where the building was only changed to suit new needs.

Fred Scott discusses the subject of changing a building, but he uses the word alteration, which is synonymous with transformation. For him the word alteration represents an alternative to the norm:

"The idea of alteration is to offer an alternative to preservation or demolition, a more general strategy to keep buildings extant beyond their time, that is to be inhabited, occupied. One may suppose that such undertakings will be simply expedient, and of course many such changes will be prompted by extraneous needs, but if one considers the survival of the original building, the host so to speak of the new works, then the activity assumes a wider scope. It becomes like an act of transition or translation, from the past into the present, with logically also a consideration for the future of the host building" (Scott, 2008:11).

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The definition of the word as given by the Oxford dictionary also suggests that alteration is the more precise description of a project where the building is changed, but not completely changed.

Alteration: a change to something that makes it different.
Latin - *alterare* - 'other'
Synonym - Change, transform, modify

With alteration the original building becomes an essential part of the new, which represents a symbiosis between new and old, something that is perhaps not achievable if the building undergoes a complete change.

Fred Scott also offers a deeper meaning to what an alteration can constitute, and if using his understanding of the problem we are left with three main approaches that covers the subject of reusing a building:

"All buildings, once handed over by the builders to the client, have three possible fates, namely to remain unchanged, to be altered or to be demolished. The price for remaining unchanged is eventual loss of occupation, the threat of alteration is the entropic skid, the promise of demolition is of a new building" (Scott, 2008: 1).

For the purpose of this project, the view of Fred Scott will be used as a way of simplifying the choice on how to categorize the different approaches to working with existing buildings. A building can either be conserved, altered or demolished.

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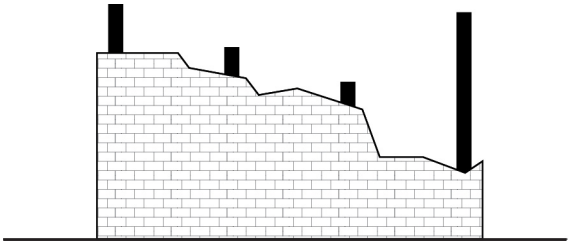
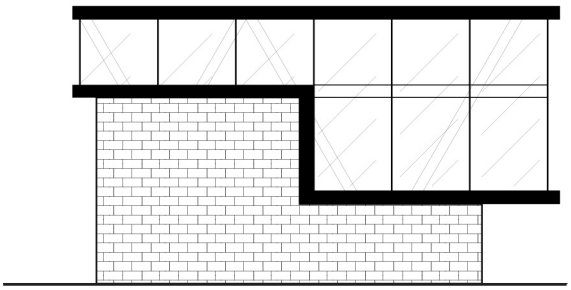
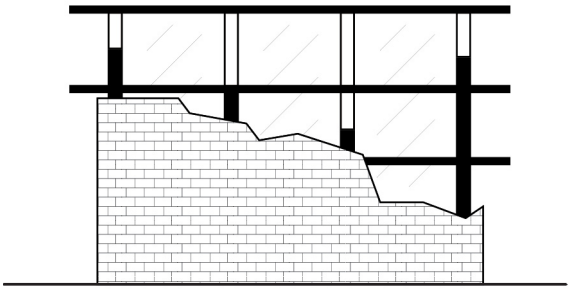


Existing building



Transformation



Alteration

Transformation and alteration difference diagram - 02

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Alteration

Alteration is based on the idea of reusing an old building and turning it into something new and different, but what fuels the desire to reuse the building in the first place and how does one approach the project? In an effort to understand this situation it is prudent to ask the question: Why reuse buildings?
For this there can be many reasons, such as historical and cultural aspects, as well as economical, but no matter what the reason, it can be boiled down to a set of value. So the reason for reusing buildings is founded in the desire to preserve certain values that the building possess, so that they can become a part of the new.

This understanding can be related to Johannes Exners view of the building as a historical being that goes through the process of life by birth, existing through its use and in the end the inevitable death (Andersen, 2015). Once altered this being changes character - and the amount is premised by its values and the architects ability to understand and work with these.

How to determine these values and understanding the merit that they have, requires a method which can be used for different projects, as with sustainable certifications for buildings using BREEAM, LEED and DGNB. There are also methods specific for the reuse of buildings, but they often focus on restoring rather than changing, making the method inadequate for an alteration project.

In Denmark the ministry of culture is referring to the SAVE (Survey of Architectural Values in the Environment) system which is directly looking towards certification of preservation worth at a point based grade. This system mainly focuses on the exterior visual value of the building and determines its architectural value from this (Harlang et al., 2015:152). Similar systems are used internationally, but they too focus on conservation value and not alteration potential.

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Even within the field of 'conservation and restoration' there are different approaches e.g. 'Embrace the resistance' by Johan Fogh (Keiding et al., 2011) which will be introduced later, but a method for alteration that is generally accepted within the architectural community does not yet exist. Perhaps the reason for this can be found in the broad variety of approaches that can be taken as well as the unique circumstances that each project encompasses, ranging from church to perhaps an old industrial building. The fact that there is no standard method of approach makes this discussion all the more relevant, and it also dictates the need for the development of a new approach, which is then to be tested.

The first step in this process of developing such an approach, is to map out the specific values that are to be used in the analysis of an existing building, to uncover its potential for reuse.
In order to simplify the discussion and make it easier to find and use these values, three categories are chosen: Social, architectural and economical values.

Social values
It is generally known that some buildings hold more value than others, such as historical and cultural, often due to a specific function, year of completion or significant event. Such buildings will potentially be appointed for World heritage (International), Listed building (State) or Worthy of preservation (municipal) (Keiding et al., 2011), and in that case, a whole new set of regulations apply, as it requires a scientific analysis before starting. However, if the building is not appointed for preservation but still possesses some historical or cultural value, there still might be an incentive to reuse the building in a new project. This is due to the fact, that in the eyes of the public, historical and cultural values might be more significant because of their social relation. Social values will generally be more significant to the public, because they affect them directly through identity.

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Architectural values
Another value that directly affects the public is the architectural expression of a building. Buildings with great architectural value can also be seen historical and cultural values, but the term architecture covers more than just the visual expression of a building.
This category also looks at urban qualities, buildings in relation to their context, spatial qualities, structural systems and materials. In general it will entail a complete architectural analysis, to find all the values within this category, since some will be hidden within the building.

Economical values
Economy is an essential part of any project, and finding elements that can affect the economy is also encouraged. If for example the structure of a building holds architectural value and can be reused, then this affects the economy of the project in a positive way, since fewer building materials will be needed. This in term can also be seen as a sustainable approach, since fewer materials equals fewer CO2 emission due to production. Choosing to reuse elements from an existing building, can turn out be an important factor for the economical success of a project, which can greatly affect the resulting architectural quality of the project.

This approach to reusing certain elements of a building is also represented in the book 'How Buildings Learn' by Stewart Brand, where he defines the concept of 6 s's. This concept tries to explain the difference between the elements in a building and how often they are changed. The 6 s's stand for: The place(Site), The loadbearing construction(Structure), Exterior surfaces(Skin), Technical installation(Services), Interior floor plans(Space plan) and furniture(Stuff). The six elements are sorted by lifespan, and from this it can be deduced that site and structure are the two most resilient elements and in that sense more likely to be worth keeping (Brand, 1994).

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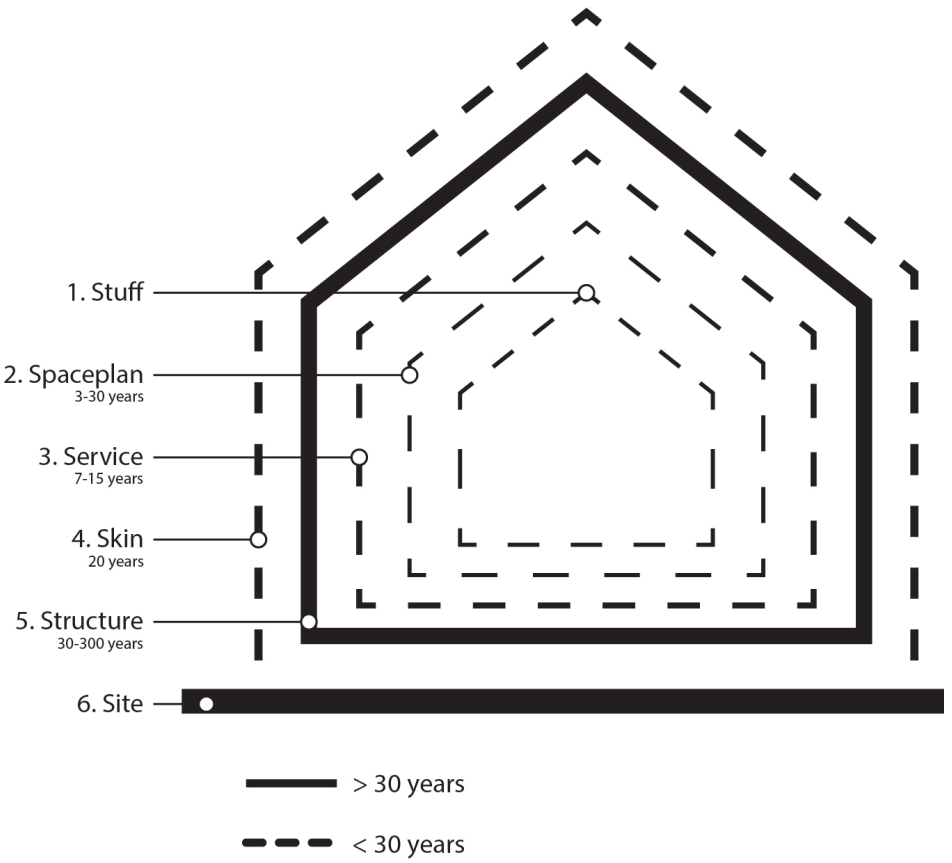

Stewart Brands concept of 6 s's - 03

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The last value to be mentioned is the function of a building, since it can be crucial as to how the project is developed. A function that is deeply rooted within the community or the area might be impossible to remove and therefore overshadowing other key values. This makes the building less susceptible to change and a strong function negates the innate need for alteration. The buildings function will therefore not be used as a value worth preserving.

The above mentioned gives a picture of what potentially is to gain when reusing a building. The specific value(s) being preserved, represents the prospect of creating a project which posses added value, something that is not achievable through a new building.

Choosing the right path

Sorting out the approaches that address the reuse of buildings, was the first step towards defining the main approach - alteration. Mapping out the potential values of such a project, came second and this leaves the third step, which is to choose the appropriate course of action.
Relating to the terms set forth by Fred Scott specified earlier in the discussion, concludes the following outcomes for a project involving existing buildings: Conservation, alteration or demolition.

Based on those three terms, it is possible to relate certain values to each scenario. The sorting will be somewhat rough due to the many factors that come into play, but this is meant as a tool to help ease the decision-making process. Besides looking at the possible gain from values, it is also important to consider the potential losses. The added economical pressure of reusing a building, will logically make the project more difficult, and this might be difficult to predict from the start when considering the path to take. Reflecting and comparing the added values, guides the quality of the alteration, and will be the main premise for using the values as a system/analysis. From this the easiest way of progressing with the decision, is to set up two main questions.

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Reuse or demolish
This question of reuse or demolish can be answered by looking at the values of the existing building, and comparing it to the potential gains from values promised by making a new building.

If the existing building holds close to no values, then it will not be perceived as a loss if the building is removed. Here the obvious course of action will be to demolish and create a new building. If the building does hold value, but also negative impacts to the project, then it is a matter of balancing them against each other. For example a building with high architectural value, but with a structure that needs extensive repairs, could become more costly than the developer is willing to accept, which might lead to demolition. On the other hand, if the architectural quality is truly unique, then the developer might see a gain in the project and reuse the building despite added costs.

So the answer to the first question, is to set up the values and losses, and weigh them against each other. The one with the most prospect, will be the better choice.

Conserve or alter
If it is decided that the building should be reused, the next question arises: Should the building be conserved or altered?
This question relies solely on the values of the building and whether or not it is possible to improve upon those values or if it is better to preserve them as is. It can be fairly difficult to answer this question and the answer will undoubtedly be subjective to some degree. The values used to measure the building will be unique to any given place, and something that might be considered a value in one place, might not be in another.

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The dilemma of whether to conserve or alter can be explained through the use of a church. Churches are often quite old which gives them a historical value and they can also possess social values when part of e.g. a religious community. In such a case the function of the church might be so rooted in the community, that the very thought of changing it would be heresy. Place the same church in an area where people are not religious and do not use the church, then changing the function might actually add value to the building and in extension the community. As seen with a 13th century gothic church in Maastricht in Holland, where and old church stopped functioning as a religious building, became a warehouse and later an archive. Now it is made into a popular bookstore and cafe, where visitors can admire the old architecture and the atmosphere, while relaxing with a cup of coffee and a book (Architectureweek, 2009).

So in order to truly understand what the best course of action is, requires a thorough examination of the existing values and the potentially added values.

As mentioned in the introduction we are facing a future where the building stock is to be altered in one way or another and in the light of this fact one might understand that the vast amount of building typologies can encompass a wide array of values however one that is common for all is the structure that constitutes the building, which correlates well with Brands concept of lifespan. This combined with the notion that an alteration is suited once the function is no longer needed and the building becomes obsolete guides us towards a tectonic approach as this takes its point of departure in the structure and function rather than a specific style or direct interpretation of what architecture should look like.

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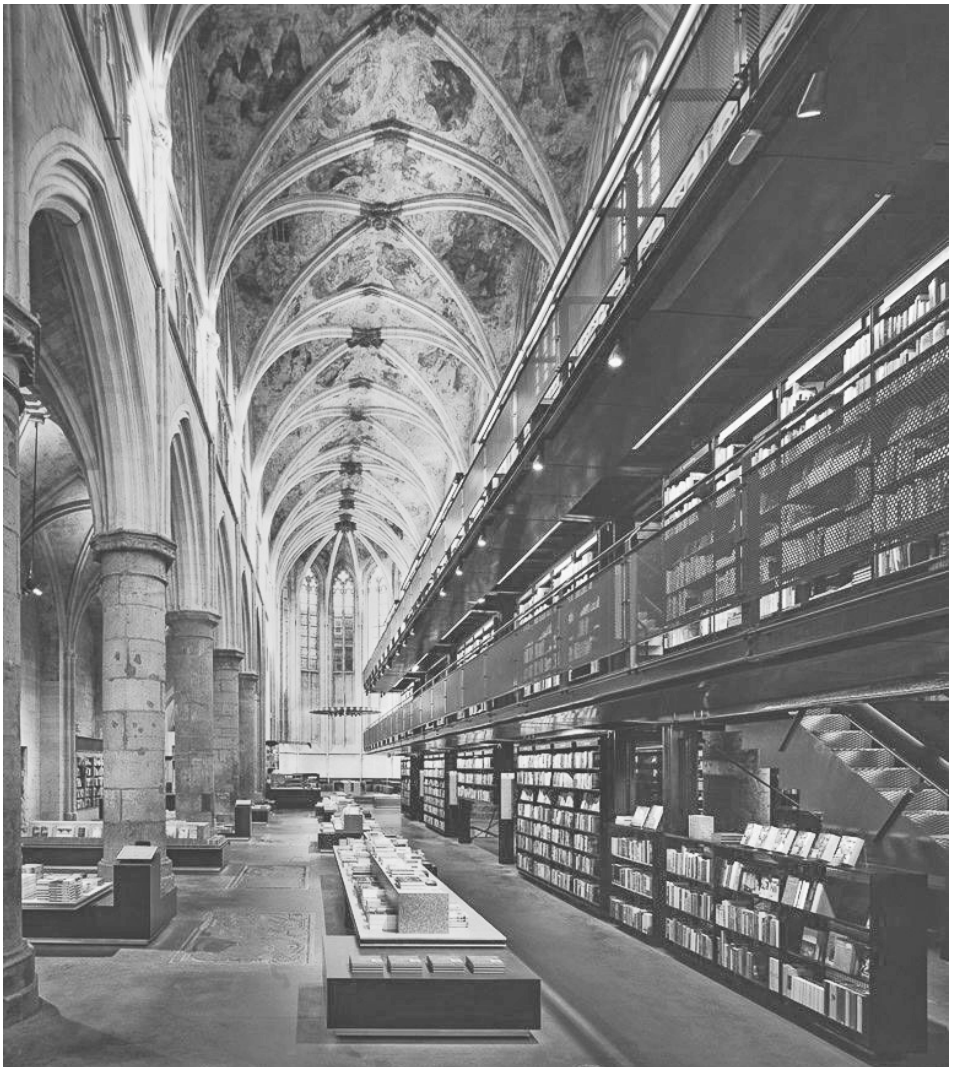

Church turned into bookstore - Selexyz Dominicanen by Merkx+Girod - 04

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Tectonics

Understanding the overall concept of how to approach an alteration project is one thing, but having the knowledge of how to analyse and develop the project is something else. Looking for values in a building can to some degree be easy, especially if the building holds a lot of social value within the local community, but seeing a creative potential in the structure or the materials used, might be more difficult. As a way of artistically managing the reuse of a building and exploring its potential, tectonic thinking is introduced. The term must be discussed before the use can be elaborated.

Traditionally buildings are derived from shelters and have essentially been used for people to control their environment, protecting them from the elements. Over time buildings have evolved from serving purely pragmatic aspects, to serving a wide variety of functions. Our environments have become more and more man made and there are buildings made to suit all kinds of needs - homes, offices, factories, schools, shops, hospitals, museums, theatres etc. The amount of time spent in and around buildings is far more than with the ancient shelters, so there is an incentive for well built environments for people to live in. This built environment is truly embodied by the people using it, particularly when speaking of dwellings, thus it should be worthy of such an important and delicate task. Today much architecture is following a dangerous path of a purely visual stimulation as it is the easiest medium to communicate the unbuild, however it can also undermine the core objective of the building, as Juhanni Pallasmaa points out:

"Tabet af kontinuitet og tradition er sammen med vore dages overdrevne fokus på det unikke og det nye, med til at udhule den dybere mening i arkitekturen, med det resultat, at bygningskunsten ender som en tom æstetisering" (Harlang et al., 2015: 15).

A building has a much more important task to fulfil than purely stimulating our need for sensation and visual expressivity. Unlike many other man made object buildings are passed down from generation to generation standing as a proof of the collective human capacity to understand the physical realm, the local environment as well understanding how to

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accommodate and improve the life of human beings through our common existential premise

The embodied image, as Juhanni refers to it in his book of the same title (Pallasmaa, 2011), of the building is indeed where the tectonic quality of a building is expressed. It is where the material that constitutes the building communicates the intention of the architect through its structure. It has the power to touch our thoughts, feelings and actions in various degrees through stimulation of our senses - including the visual.

"Greek in origin, the term tectonic derives from the word tekton, signifying carpenter or builder. […]The poetic connotation of the term first appears in Sappho, where the tekton, the carpenter, assumes the role of the poet[…] Needless to say, the role of the tekton leads eventually to the emergence of the master builder or architekton" (Frampton, 1995: 3).

There are different theories on what can be considered tectonic and some ideas are more closely related than others. Despite the lack of consensus regarding the word tectonic, theorists still tend to address some of the same aspects; the structure of a building, the elements that form it and how it is joined. It is generally perceived that honest buildings, founded in a rational constructions and good craftsmanship are tectonically correct. However, the more specific elements that creates a tectonic building, differs from theorist to theorist.

"we may return instead to the structural unit as the irreducible essence of architectural form. Needless to say, we are not alluding here to mechanical revelation of construction but rather to a potentially poetic manifestation of structure in the original Greek sense of poesis as an act of making and revealing" (Frampton, 1991: 21).

Kenneth Frampton talks about the poetics of structure, which is something that echoes through the field, and tectonic architecture is somewhat a poetic understanding of construction and craftsmanship, expressed in the structural whole. Gottfried Semper also viewed the structure as a part of the tectonic expression, but for him the essence was in the joint:

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"Semper's emphasis on the joint implies that fundamental syntactical transition may be expressed as one passes from the stereotomic base to the tectonic frame, and that such transitions constitute the very essence of architecture" (Frampton, 1990: 24).

For Semper the joint became the most significant basic tectonic element, since it represented the meeting between elements and materials (Frampton, 1996). Semper was not alone in this fascination with the joint as the logical meeting point for the elements of a structure, Marco Frascari describes the joint as art.

"Architecture is an art because it is interested not only in the original need for shelter but also in putting together spaces and materials, in the meaningful manner" (Frampton, 1990: 29).

From the above mentioned theorists there is a consideration to the honesty of the construction and an attention to details and materials, which will be key elements in the development in this project. The use of a logical structure that is understood through its joining of elements and spatial qualities, will help create a collective whole.

This regard to creating a collective whole through an honest structure, fits well with the ideals of the engineer, who seeks to create buildings that are rational and functional. Combining this with the architect who seeks to create buildings that are not only functional but also pleasurable to use, fits ideally with the tectonic approach.
This interrelation between the engineer and the architect represents the teachings at Architecture & Design, where the symbiosis between technical and aesthetic is the ultimate goal when designing a building. This meeting is beautifully described by Le Corbusier:

"Du bruger sten, træ og beton, og med disse materialer bygger du huse og paladser. Det er konstruktionen. Ingeniørens arbejde i praksis. Men pludselig rører du mit hjerte, du gør mig godt, jeg er glad og jeg siger: 'Dette er smukt.' Det er arkitektur. Kunsten har vist sig" (Harlang et al., 2015: 42).

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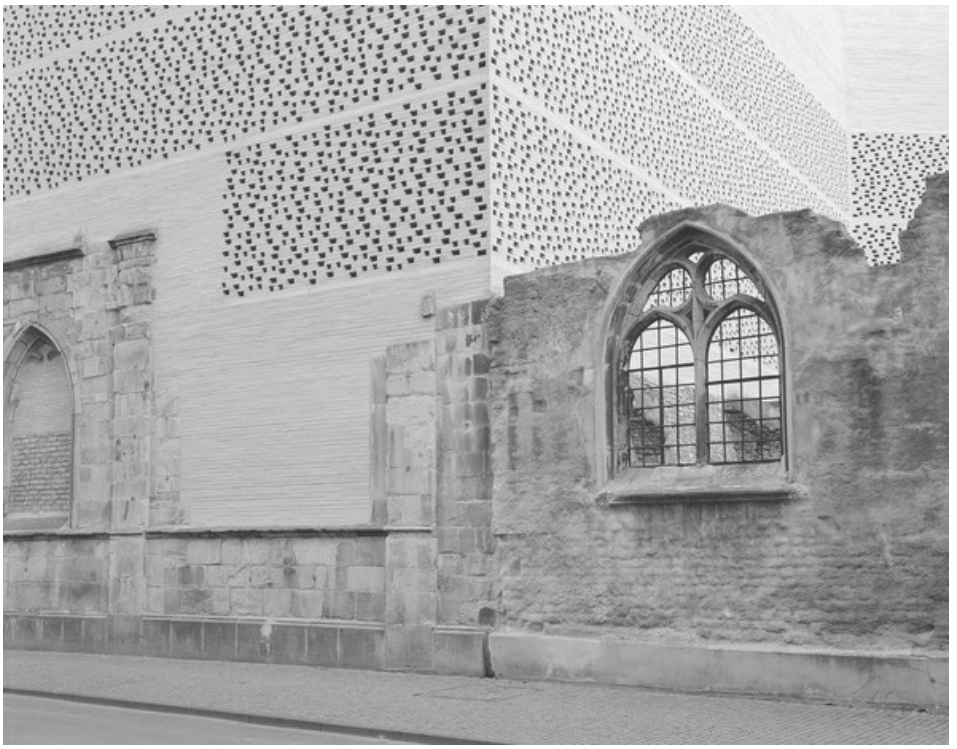

New and old materials interplay - Kolumba Museum by Peter Zumpthor - 05

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Tectonic alteration

The reuse of buildings is founded in the notion that there is something worth preserving, a specific value that the building possess, which potentially offers the prospect of added value to the finished result - 1+1>2 as Christoffer Harlang puts it (Keiding et al., 2011). But what is the right approach to take, what is important when considering how and what to alter and how does it manifest in the interplay between old and new once executed.

A common dogma within the field of historical buildings can be traced back to the Venice Charter of 1964 that states:

"Replacement of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence" (Harlang et al., 2015:35).

This point is ever so valid IF the history or authenticity is a value worth prioritizing. The relation between old and new is rather important and can be handled in many ways however it might lead to a lack of focus if the design is premised by a great contrast between these.

"Man kan påstå, at skillelinjen ikke går mellem nyt og gammelt, men mellem godt og dårligt. Hvis det ikke handler om at at få bygningen til at fremtræde så tro mod det oprindelige udgangspunkt som muligt, og ikke er et spørgsmål om at være historisk korrekt, er transformationsarkitekten ikke blot en fortolker af et historisk objekt eller en anden arkitekts væk, men en aktiv (med)skaber af en ny helhed. Transformation bliver på den måde et spørgsmål om bygningskunst" (Harlang et al., 2015:38).

In general the relation between old and new, is unique parameter of time which is not possible to achieve with 'Pure architecture' (tabula rasa) as Fred Scott refers to it. From a tectonic point of view the honesty in communicating the structure is of great importance, however it cannot be equated to the innate purpose of the structure which is to service the users however that might be intended.

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It is our thesis that determining whether a building has any value in relation to tectonic thoughts, could be made easier when having a profile based in technical understanding. Spotting the true tectonic potential in a construction is more related to the understanding of how the elements work together in a static system, than imagining a potential form arising. Being able to work with the existing elements while introducing new elements, resulting in a symbiosis or interrelation, is the true potential and challenge. The form and atmosphere then springs from the structure and details of the building.

Semper discusses the transition from something old, to something new, both in relation to what it becomes, and preserving the memory of what it was.

"When an artistic motive undergoes any kind of material treatment, its original type will be modified; it will receive, so to speak, a specific coloring. The type is no longer in its primary stage of development but has undergone a more or less pronounced metamorphosis. If the motive undergoes a new change of material [Stoffwechsel] as a result of this secondary or even multiple transformation, the resulting new form will be a composite, one that expresses the primeval type and all the stages preceding the latest form. If development has proceeded correctly, the order of the intermediate links that join the primitively expressed artistic idea with the various derivations will be discernible" (Semper, 2004: 250).

The embodiment of the previous in the current, while still creating something that is perceived as coherent, is a challenge worth noting. This also comes into play during the design of the building and not just in the analysis, where the potential of the existing is documented. Being aware of the relation between old and new, is a factor that will be present throughout the duration of the project.

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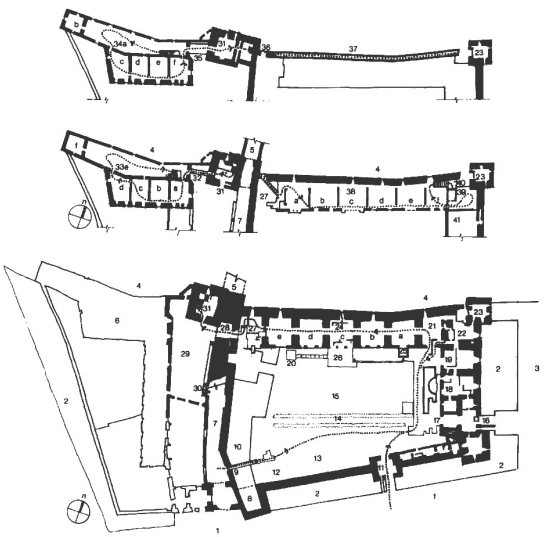
Castelvecchio

Although not having the chance to see and experience this project first hand, we have chosen to include this case to discuss a rather radical aspect of alteration. This project by Carlo Scarpa can be said to be ahead of its time and the circumstances are indeed very unique in almost every possible aspect.

The first encounter is the one discussing the matter of interest by Fred Scott and he refers to this project as *"The one great work of interventions"* (Scott, 2008: 210).

Castelvecchio is a museum alteration of a medieval castle in Verona in the north of italy and was in the end of the 1950's and start 1960's commissioned to be refurbished by Scarpa (Unwin, 2014). Scarpa chose a rather radical and somewhat bold approach to solving this task as this particular project carried a lot of historical value and would otherwise have been considered a restoration or conservation project - Scarpa made an alteration.

He also stated his disagreement with the approach of Ruskin beforehand



Plans of Castelvecchio by Carlo Scarpa - 06

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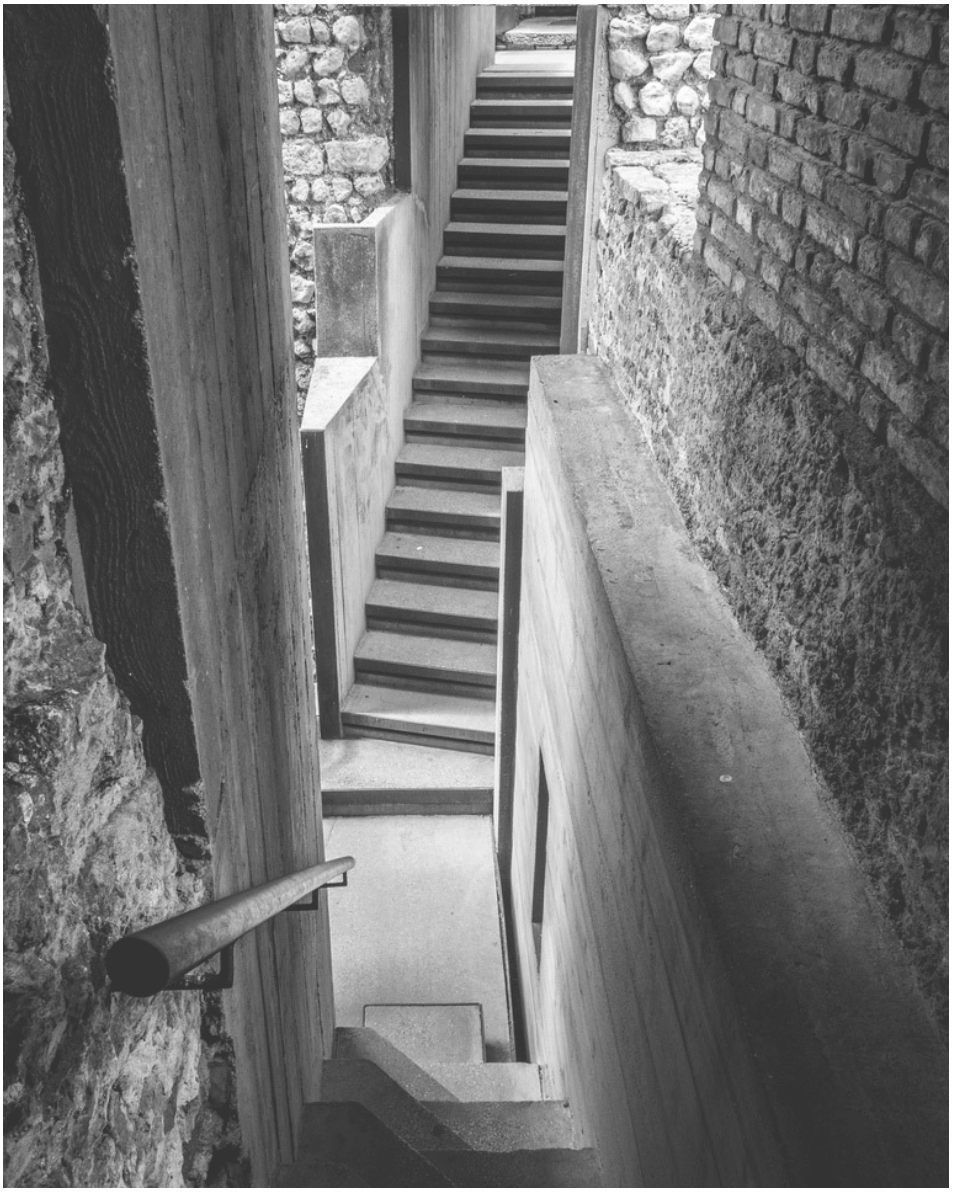

New materials and details piercing thougth the existing building - 07

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(M.A. Crippa, 1986) and chose to alter the project in such a way, that the alteration carries as much identity as the original building, if not more.

Although *"rescued by archaeological and historical discoveries"* (Scott, 2008: 210), Scarpa chose to demolish otherwise complete parts of the building in order to create an experience. This added a new depth to a otherwise architecturally silent project, but clearly marked the interventions in terms of material, shape and detail in line with the dogma of differentiating between new and old.

The interventions are different from place to place but all are made in order to enhance the function as a museum, guiding the guest through the building "setting the scene" so to speak, framing particular views. This alteration has left the building in a more "broken" condition than when he started thus resulting in the perception of an unfinished project, challenging the question between authenticity and narrativity.

From this project, although listing more than half a page of works to state his case, Scott concludes:

"Incompletion is the clear aim of the alteration because of two prime purposes: it is only such means that the allusion to the ideal, or paradigm can be made; and it allows the building to become an element of continuity" (Scott, 2008: 212).

This idea of playing with the authenticity and reality is a rather delicate matter however as Scarpa discovered through his consequent determination, it can be done. Particularly this approach seems interesting if a building does not carry much historical value. The approach might be the right one to bring forth a completely unique vision, that through understanding, takes a respectful but maybe not humble approach to altering a building - a way to bring a timeless story to the alteration. It should be kept in mind that he spent somewhat 17 years before it was "incomplete", but despite the circumstances this project shows a very interesting approach to alteration.

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"Unfinished" part of the new building with the existing in the background - 08

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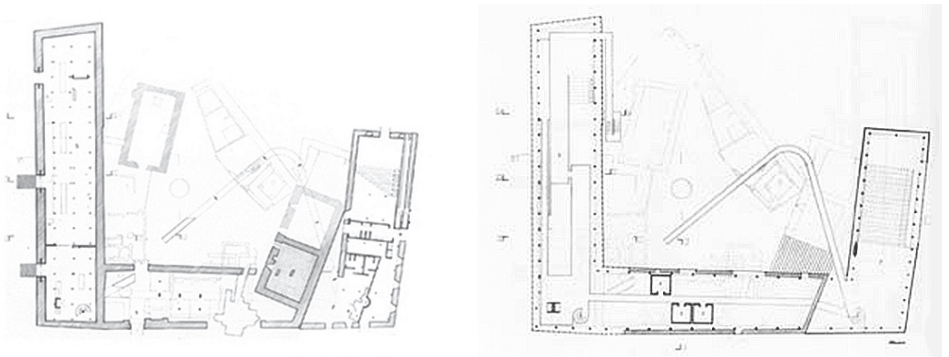
Bispegaard Museum
Opposite to the approach of great intervention seen in Castelvecchio, Bispegaard museum stands in strong contrast making minimal changes the remains of the build. The project was in the 1960's the ruins of the old cathedral located in Hamar in Norway. The reflections of the architect were as follows:

"In architectonic terms, we are the eternal passers-by. We walk in and out of buildings and towns, impressed by edifices and squares, but ourselves making no impression. [...] confronted with nothing but an old barn and a few medieval ruins, one has to reconsider. How to make such a place yields its secrets, how to create a visible record of 1000 years of history" (Fehn, 1992).

Many materials are in play in the building but each fulfilling their purpose. The intention with the alteration was that it should not interfere with further archeological investigations. The intervention shows a very controlled use of materials in respect to what was left. The new wood construction is gently carrying facade and roof tiles, in strong contrast to the old walls. In situ cast concrete is used as base throughout most of the building connected by a long path flowing through the space guiding the visitor from the different parts of the building.



Plans of Bispegaard Museum by Sverre Fehn - 09

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The new elements are gently lifted above the old to show clear separation - 10

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The concrete and old boulders are two types of earthwork making a clear distinction between times of construction. Important to the design is minimalist detailing, opposite to Castelvecchio, all kept very simple allows visitors to imagine the history of the building, not taking focus from what was there before. Exterior mounted glass panels and infill brick is used in the wall gaps and window openings of the ruins controlling the light intake along with transparent roof tiles.

Both cases show a profound understanding of tectonic alteration but with very different approaches. The common tectonic quality of these projects is the ability to communicate history through the construction. The consistent detailing and execution at castelvecchio shows a strong idea of creating a completely new experience based on the historical remains, while the subtle approach taken at Bispegaard allows the user to focus on the actual remains in a more honest and humble manner.

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What is tectonic alteration

In conclusion to all that has been presented and discussed in relation to the theory of tectonic alteration it is found, that for the purpose of this project the meaning of the term is understood as follows:

Performing a tectonic alteration is about uncovering tectonic potentials in an existing building and then making that potential a part of a new design, in order to create an added value.

How the potentials should be managed in the design, will vary from case to case, since it is dependent on the type of value and the subjective nature of tectonics. This difference in approach to reusing a building, is quite clear when comparing Scarpa's Castelvecchio and Sverre Fehn's Bispegaard museum. Fehn works around the historical remnants in order to tell a story about it and Scarpa directly alters the old building to tell a new story though it.

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Method

In order to approach the practical part of the project it has been necessary to develop a method which can incorporate both the qualities of the host building as well as the new building, founded in tectonic understanding. As a basis for developing the method, the Integrated Design Process (IDP) is used. The core of the method seems to be applicable for a variety of building typologies, as the method mainly describes the phases of a design process and a "simplified relation" between these phases and iterations (Knudstrup, 2004). The IDP seems to recognize the complexity and the unfolding that emerges during the process of a building design, as the path often times results in an intangible, iterative process.

"… one enters into a prospect in which one happens upon an "original formulation" through an empirical, circular process of design that is not rational in any linear, causal sense" (Frampton, 1995: 392).

An important point to start with is the fact that the process constantly will be referring to, and to a great extent guided by, the host building. As the problem unfolds through the phases, they adjusts and configure accordingly through loops, e.g. the first analysis is most likely to introduce knowledge that might reformulate the Problem. The design process will constantly change how the iterations relate, however the diagram in image 11 explains the main iterations.

In order to use this method for an alteration, it is necessary to elaborate on the IDP, and introduce new steps as a way of acquiring a more in depth understanding of the host building. This will help improve the possibility of uncovering the true potential of the project.

The method will take inspiration from 'Embrace the resistance' introduced in the book 'Transformation' (Keiding et al., 2011), which is a method to approach alteration and conservation of complex buildings with high preservation value. The guidelines presents a rather linear and straightforward approach of 6 stages.

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It contains three stages of analysis; ‘Charting the buildings layers’, ‘Values test’ and ‘visual zones’, this is followed by the design process of choosing ‘Restoration method’, as well as the reflections ‘Extent and character of intervention’ and ‘Holistic afterthoughts’. All steps are elaborated on in the book Transformation, but only the first three steps will be used in this project.

Charting the layers is regarding the historical dissection of the building. In this method it is the process of gathering information and dissecting the building historically, phenomenologically as well as technically which is directly relatable to the 6 s’s when combined with the value test.

Value test is a matter of understanding the “layers” in order to get an overview of what is worth keeping. The values will for this method be directed towards buildings without high preservation value, as concluded earlier in the research.

Visual zones is part of understanding the relation between the spaces in order to choose an appropriate course of action as Johan Fogh explains *“[...] our own early experience suggested that it might be appropriate, in a single assignment, to apply one restoration approach in one room and another in the next room”* (Keiding et al., 2011: 91).

These three analysis tools will frame the initial iteration of the design process which seem to correlate well with Fred Scott’s concept, explained best by himself:
“Stripping back in its extended manifestation is the process by which the interventional designer acquires an understanding of the host building with which she or he is engaged. It is to the end of developing a structured affinity, as a preparation for the correspondence between their work and the existing. The host building needs to be understood intrinsically and in terms of its setting, and to be looked at in terms of actualities and provenance. This is an enquiry that will have both architectural and socio-economic aspects. It is proposed here as the foundation for all consecutive procedures. Stripping back is the process of delineation of the qualities of the host building, an analysis of the given” (Scott, 2008: 108).

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Initially this will be carried out fully before entering the design process of reaching an actual synthesis, however it is chosen to return briefly after a sketch phase in order to uncover potentials that can help define the concept and scope.

"In Heidegger's sense, we should act as responders to the historically given, alternating between listening and answering in a conversation" - Christoffer Harlang (Keiding et al., 2011: 17).

From this point the more traditional iterations of IDP will take over and the project will use the synthesis phase as a stop to evaluate upon the solution in terms of tectonic qualities, or as Fogh calls it - strategic afterthoughts.

The first analysis will be carried out in extension to the traditional context analysis by taking the host buildings into account. First it will be based on understanding the building in order to get a base to work from including a charting of the layers. This part will result in a vision for the project. Afterwards a sketch-analysis phase combining value test and visual zones, results in a stripping back as part of the final concept, in order to uncover potentials to help start the synthesis.

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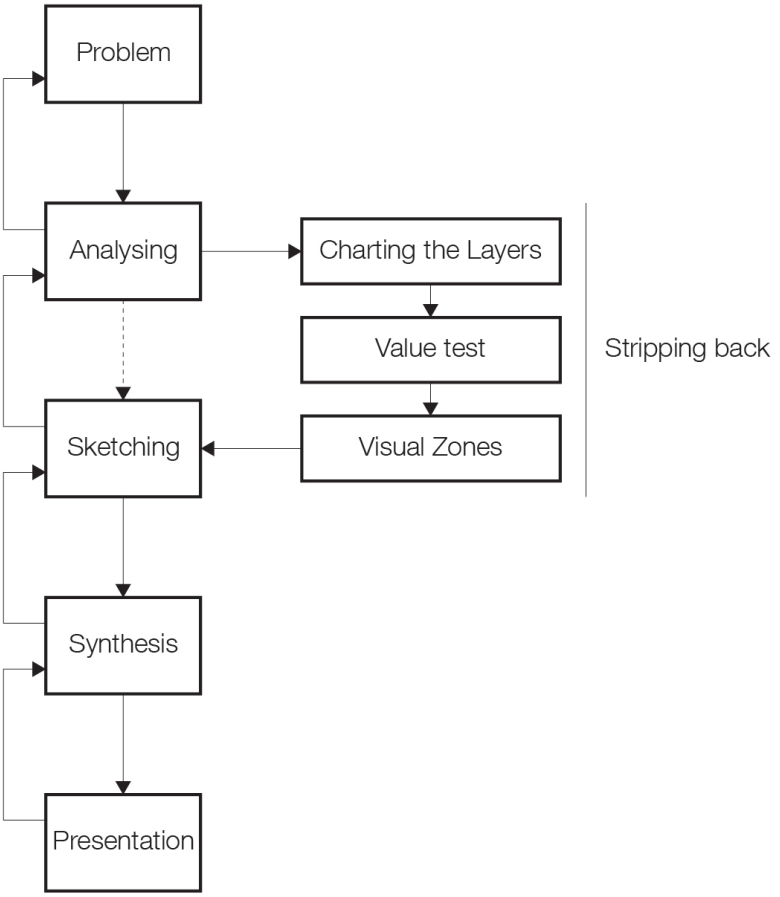

Adapted IDP diagram - 11

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PROBLEM

By using the method of tectonic alteration as presented in the research phase, is it possible to analyse an existing building and uncover tectonic potentials that can be explored as part of an alteration of the building, providing an added value to the altered whole? Can the tectonic potential of the building then be sufficiently utilized by the use of tectonic alteration? Does the method provide the necessary means to merge new and old, bringing forth tectonic qualities?
Testing the method in praxis will provide knowledge on how the tectonic alteration works, and help answer the questions above. Whether or not the questions can be answered, will determine if certain aspects of the method needs to be rethought.

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ANALYSIS

The previous chapter dove into the subject of reusing buildings in regards to existing values and tectonic qualities, in an effort to develop a method for analysing a building. This chapter then focuses on the application of that method, by trying to uncover the potential of a building, resulting in a set of design parameters/criteria which will constitute the basis for a design process. The targets of inquiry are two industrial buildings located in the city of Aalborg in the former industrial district known as 'Eternitten' and the assignment is given by the company INBO. This analysis will look to sum up the contextual aspects as well as explore the buildings based on site surveys and documentation from the city archives.

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A city in transformation

Aalborg is an old industrial city and therefore there is, or has been, a lot of industrial buildings throughout the entire city. Some still exist but have either been condemned or altered, as the industry has migrated to new facilities elsewhere. The most iconic buildings have been renovated or altered for new functions, preserving the architectural identity while accommodating new needs. This is done to ensure the cultural heritage of the city, portraying the once industrial cityscape of Aalborg e.g. 'Nordkraft' and the harbour front which is a great example of the potential in alteration.

Nordkraft has been altered from a power plant to a cultural powerhouse and it is the embodiment of how the city has changed over the years. The architecture of the buildings is interesting and displays a mix between new and old, sometimes with a clear contrast and other times less clear. This inconsistency in the architectural expression is somewhat confusing and it makes the intentions of the architects unclear. This however, does not undermine the success of the building.

The main driving force behind the transformation of Aalborg is due to the shift in primary occupation of the city's residents. Aalborg used to house a variety of big companies that employed a lot of its citizens. Among the more pronounced companies were 'Aalborg Portland', 'Dansk Andels Cement', 'Dansk Eternit', 'C.W. Obel', 'Aalborg Værft' and 'De Danske Spritfabrikker' (Jensen & Bøcker, 2011).

In the 1950's the central harbour could no longer sustain the companies using it, because of increased demands and the industrial harbour expanded towards the east, reducing pressure on the old harbour. The establishment of Aalborg University in 1974 marked a new era in the city's history, and the university now employs more than 45.000 students out of the 205.000 residents in Aalborg (www.studyaalborg.dk).

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Nordkraft by Cubo - 12

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As visual examples of the immense transformation taking place in Aalborg, the harbour front and the freight rail area can be mentioned. The case of the harbour front is especially interesting since it has been under development for over a decade, from the office area west of the bridge, to the more public area to the east. The harbour front running east of the bridge is truly iconic in representing the step from industrial city to educational. A few decades ago the harbour was filled with activity tied to the companies who occupied the area, big machines driving around and commercial goods being dropped off and picked up. The most public event taking place was a few fishermen sitting on the bollards catching herring.

Today the image is quite different. The companies are almost all gone, and instead a variety of public spaces and cultural buildings have popped up along the waterfront, finally dedicating the scenic view of the fjord to the citizens. A small park on the harbour is so popular in the summertime, that nearly every inch of the grass is occupied by young people.
This shift from men working in industrial buildings to young people barbecuing, is the embodiment of the city's transformation. This transformation is slowly spreading along the harbour and throughout the city, and over the last 6 years eternitten, though disconnected from the rest, has been part of this transformation.

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Aalborg harbour front before transformation - 13

Aalborg harbour front after transformation - 14

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Eternitten

Eternitten is an industrial area dating back to the start of the 19th century. It is located 1,4 km from the harbour on the north-facing slope of 'Kridtbakken' which is a small part of Lerbjerg - the great lime bank which more or less constitutes the landscape of south east Aalborg.

'Dansk Eternit' was one of Aalborgs greatest industrial successes and at times occupying up 1600 workers and once the railway was established, the industry expanded rapidly buying more and more of the area. Øgadekvarteret on the east of the site was housing most of the workers and the impact on Aalborg, if not Denmark, is undeniably remarkable. It was truly a transformation, however it was favoring industrial development rather than the greater good of the citizens.

In 1968 the zeitgeist of the industrial development resulted in sacrificing one of the most beloved recreational areas of Aalborg at the time - Blegkildeparken - a public park and recreational area with dancing and cabaret pavilions, water channels from the natural spring and beautiful path systems surrounded by large trees - a true heaven. The park was in extension to the water board from 1854 which is still there to this day, now functioning as a museum (Cowi, 2009: 10).

Historical maps (1919 & 1968) - 15/16

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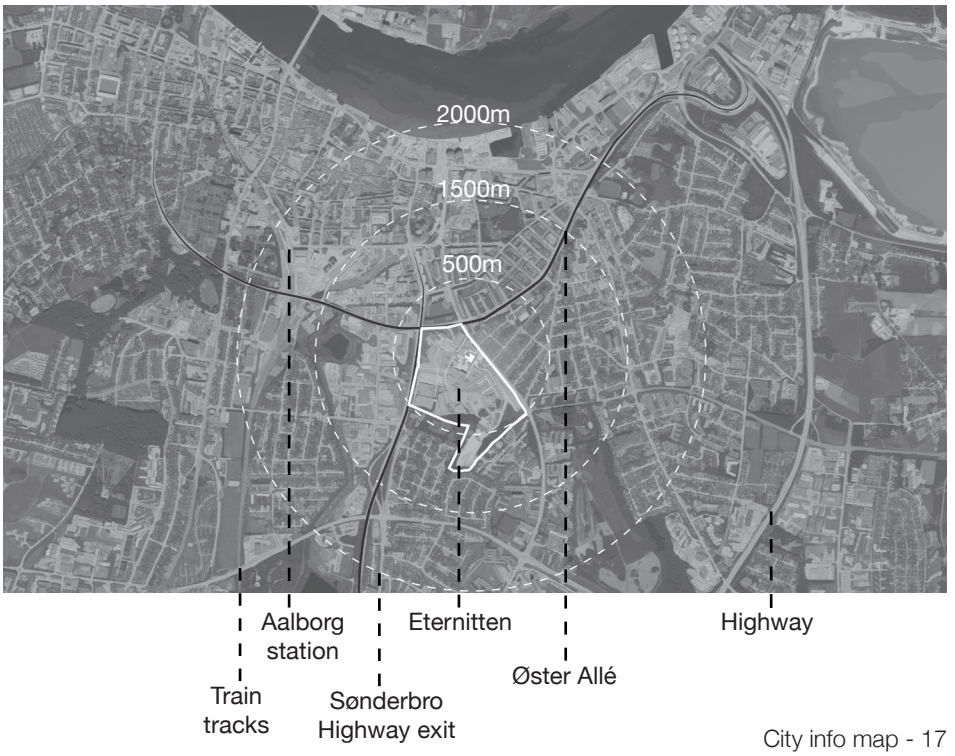

City info map - 17

Ariel of Eternitten during industrial period - 18

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The area is defined and separated by three well used traffic arteries of Aalborg; Sønderbro, Øster Allé and Sohngårdsholmsvej with easy access to the city as well as the freeway. As a result of the industrial excavation the area is now defined towards south by several plateaus and 'Kridtskrænten' - a bluff creating an enclosing boundary for the more secluded area of the site towards south. In this way the site reaches from the foot of the hill and is almost dug into its centre.

The transformation of Eternitten seen today is in its early stages and it is difficult to predict how the area will develop. Many industrial remains are still present from which only a few are marked as worthy of preservation, while the rest are condemned to demolition in order to make space for the new development. Several buildings have been erected, and new construction is taking place.

According to the vision from the quality program "Village 21", based on the the initial master plan of the area, it should be transformed from an industrial factory to a knowledge factory, with green paths flowing through the new district with recreational areas. The preserved or altered buildings are to be part of the identity of the area while the new constructions should play on the synergy, interplay and contrast between these (Aalborg Kommune, 2010: 10).

A walk in the area will reveal small parts which potentially will be able accommodate this vision, however this development is mainly taking place in the north-west area. The site, despite the excavations, have an amazing quality in terms of prospect. Atop the hill one will be taken by the view reaching all the way to Nørresundby across the fjord and the great panoramic view of the cityscape with key buildings of Aalborg peaking up between the rooftops. This view is also available from lower points around the hill, but the plateaus themselves are too low and blocked by the building mass.

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Map of Eternitten with views of the site - 19

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Charting the layers

The project buildings are located in the east part of the Eternitten and built into a 7m. tall bluff that almost dates back to some of the first excavation - “in the heart of the site” as described in the local plan. From this location the buildings are quite visible from the surround area, which can be seen in the images. The site is surrounded by both new and old buildings. It partially separates the commercial development, with offices and grocery stores in the north, from the housing development on the elevated plateaus in the south. Despite the visions put forth in the local plan, the newly erected buildings and outdoor spaces surrounding the plot are not exactly honouring the idea of green paths, recreational areas and slow paced movement.

Towards the commercial area the site is tucked in behind a square parking lot defined by the bluff and enclosed by the original cement factory and a single storey commercial building. An 8 storey student housing block of concrete elements becomes the center of the parking lot, which effectively turns the entire area in front of the project building into a cold and hard surfaced transit space, with few beds for planting along the perimeter. The space is only connecting the two plateaus by a small staircase along the bluff which forces bicycles and handicapped either to circumnavigate to Sohngårdsholmsvej or around the entire bluff by Alexander Foss Gade both quite circumstantial routes considering flow of the area. On top of the bluff towards east a newly erected 4 storey concrete block of apartments is erected separated only by the road and roundabout that handles car traffic to the dwelling area. The bluff itself is well vegetated with old trees and bushes and only affected by the staircase.

1st view to the site - Alexander Foss Gade - 20

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2nd view to the site - Kridtsløjfen - 21

3rd view to the site - Sohngårdsholmvej at Kamersvej - 22

4th view to the site - Sønderbro - 23

5th view to the site - Sohngårdsholmsvej - 24

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The buildings
The two industrial buildings are connected by an enclosed staircase that joins the buildings with the facade, however they are structurally separated and have served two different purposes. They were originally built by the 'Dansk Eternit Fabrik A/S' as part of the large franchise that was 'Eternitten'.
The main building was built in 1962 and was functioning as offices/ laboratories and a warehouse. The second storage building was built three years later in 1965, functioning as a storage facility for mechanical parts and housing an auto shop (Bygnings- og Boligregistret, 2015). The functions of the buildings have not changed over the years and the same goes for the construction, apart from minor renovation work on the main building in 1985.
The company who built and owned the buildings produced their own cement and supplied this material themselves, and they used a very high quality of the product, which means that the construction and the foundation are built to last, according to the owner of INBO. According to 'Kulturarvsstyrelsen' the buildings are not marked as having any special value, but in the local plan the main building was marked as valuable in relation to the history of the area. So in summation, the building is not officially marked, but may possess some preservation value.

Building 1
Building footprint: 1529 m2
Gross floor area (GFA): 2729 m2
Plot ratio: 40,25 %

Building 2
Building footprint: 432 m2
Gross floor area (GFA): 1728 m2
Plot ratio: 25,5 %

The Plot
Total area of the plot: 6780 m2
Total building footprint: 1961 m2
Total GFA: 4457 m2
Total plot ratio: 65,75 %

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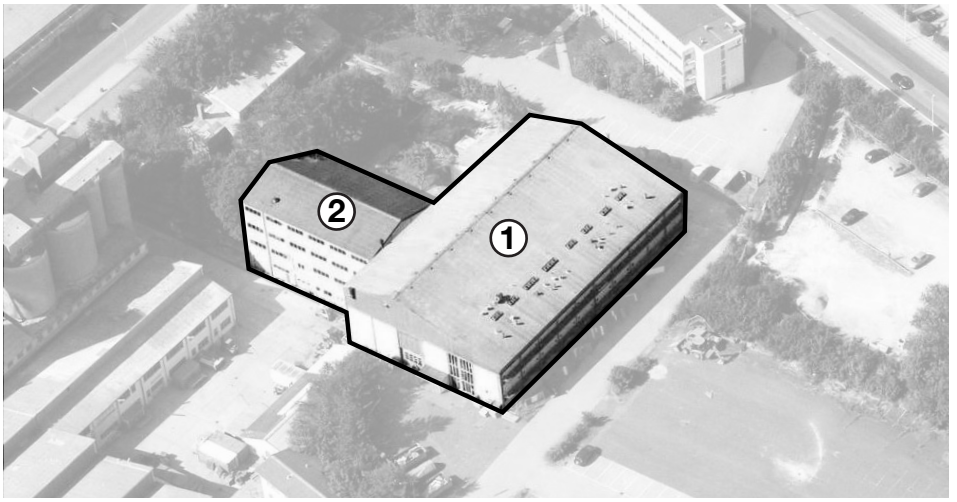

Ariel of the two buildings - 25

Exterior of storage building and warehouse - 26/27

Interior of storage building and warehouse - 28/29

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The main building has access at each gable to both the offices through a staircase and the warehouse through doors and gates. The storage building has full access along the ground floor south facade both with doors and gate, while the second floor has a gate and door in the north facade.
The first and third only has access through the joining staircase and two small fire escape on the west gable. Both buildings fulfil the current fire regulations, but they don't have handicap access.

The way the buildings handle loads and how it is portrayed in their construction, helps define the architectural style of the buildings as mainly functional/practical.
The buildings, as mentioned, sit atop a very undulating terrain considering the geographical location of Aalborg, due to the excavations that have been conducted in the area, which has also forced the design in a practical direction. It is apparent that the buildings were made to be functional and durable, aesthetics were therefore not the driving force in the design. It is evident that choice of materials was a result of the company's production of cement and concrete, which would have lowered costs for the construction of the buildings.
Even the details in the buildings are made to be simple and functional, probably to reduce labour and production cost, but to some extent this could be perceived as tectonic as its simplicity gives an almost brutal yet elegant structural whole.
Louis Henry Sullivan's concept of 'Form Follows Function' is easily related to the pragmatic approach that the designers have used for these buildings, albeit direct visual beauty may have been left out of the equation. The buildings were designed by the Office Poulsen & Blegvad owned by the royal building inspector and renowned architect Jacob Blegvad.

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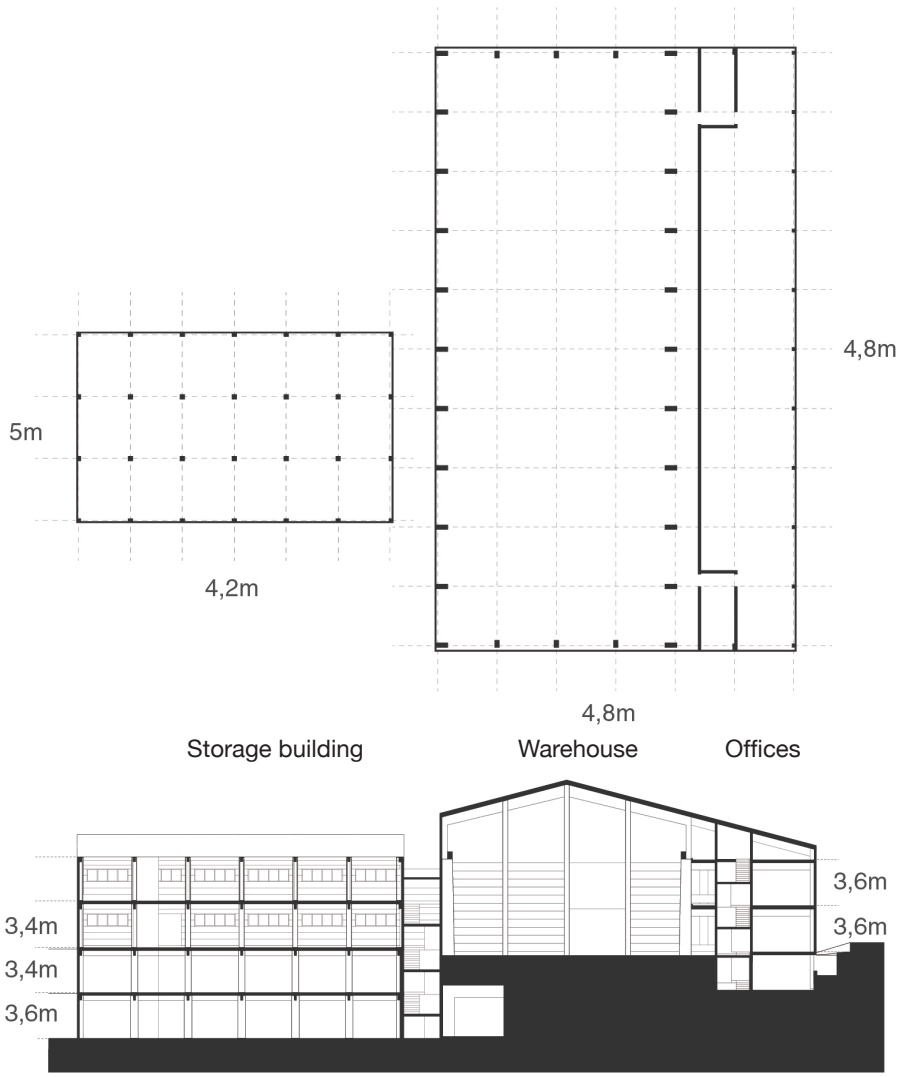

Plan and section of the existing buildings - 30/31

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The two buildings have different structural systems following their respective functions. The main building consists of in situ cast floor with columns founded below the deck and spaced in a grid from which pre-cast elements are constituting the roof construction as well as Siporex element deck carrying the offices.
The office decks are connected to a in situ cast staircase core in each end taking the lateral forces that may occur. The columns vary greatly from the warehouse to the offices as the warehouse columns are made to carry an overhead crane suspended across the hall by two sets of column rows, with a small inclination showing its ability to handle the eccentric loads caused by the crane. The pre-cast elements lifting the roof are fixed with bolts and can easily be disassembled.

The storage building is also in situ cast concrete but with no pre-cast elements and consist of a columns grid space connected by beams to support the deck. The column dimensions vary on each floor corresponding to the above load. This system should in itself be statically stable but the building furthermore has a perimeter wall towards the bluff on the first two floors. The main weakness of the structure is the columns and rafters on the top floor as these are dimensioned to carry the roof explicitly, where the columns below are dimensioned to carry the heavy duty decks.

The facade of both buildings are furthermore stabilized by a siporex facade and roof elements bolted with a concrete element onto the facade columns, working as a stabilizing disc. This facade results in a easily readable facade, where the heavy mass is partly dissolved by the horizontal lines of the elements. However the dimensions of the elements and the building results in a very massive facade, not suiting the human scale when approaching. The elements are relatively porous and time has not improved their appearance, however they are as the rest of the elements, relatively easy to disassemble from the structure.

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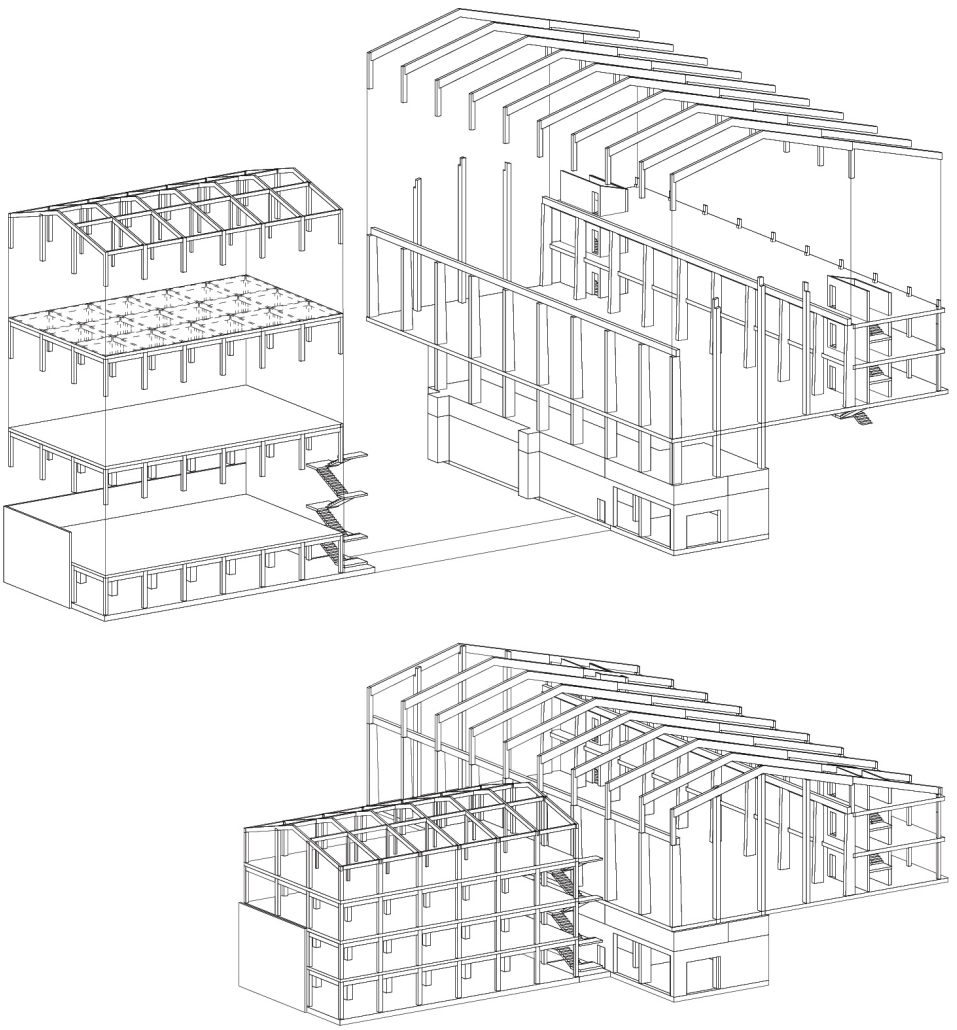

Explosion of structure - 32/33

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Climate
The climatic conditions surrounding the site are important to be aware of when working with the buildings, since it will help define basic premises for what can be done to the different spaces. This is in regards to light, wind, rain and so on.

Rain has become an important factor over the last few decades due to heavy rainfall, which has become more frequent and it can sometimes cripple the local infrastructure (Cappelen og Scharling, 2010). As a way of countering this, management of water can be incorporated in the design. The site is generally sloping and the lowest point is 7 m. above sea level, so there is no immediate danger, however the management of rainwater could be considered nonetheless.

Wind is another predominant factor, especially in a city like Aalborg, which is known by its residents as being a windy city, due to the strong winds blowing in from the North Sea along the fjord. The almost constant wind has an immense impact on the comfort of outdoor areas, both urban spaces and spaces in connection with buildings. Spaces meant for recreational purposes are supposed to be pleasant to be in and wind is a key factor in this, among others. The area of the site sits atop a slope and is therefore raised considerably compared to its surrounds, especially towards the west, which is also the dominant wind direction - west /southwest.

To determine the impact of the surrounding buildings in terms of shadow cast, a sun analysis is taken at equinox and summer solstice at different times of the day. Winter solstice is not taken into consideration as the low sun angle undoubtedly will leave most of the area in shadow.
The analysis reveals a potential complication with the collegium building as the shadows cast shades most of the lower floors of building 2, but only from 14 to 17. Besides that the spacing of surrounding buildings allow for the sun to reach the building for the most part thus fairly good condition to work from.

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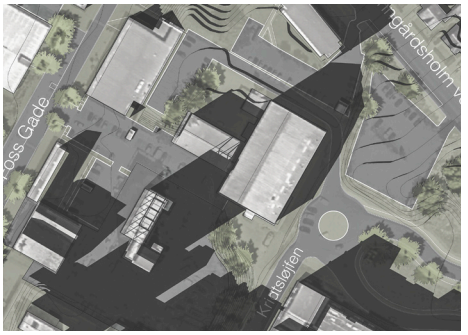

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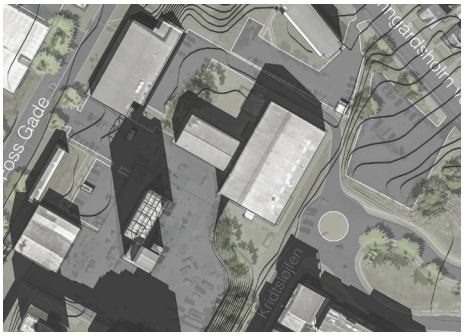

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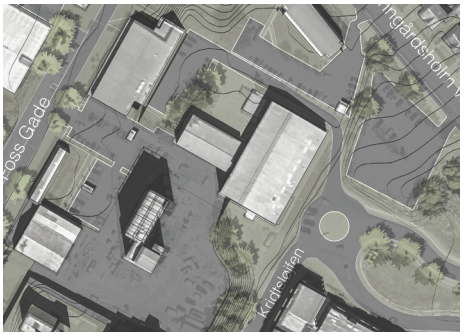

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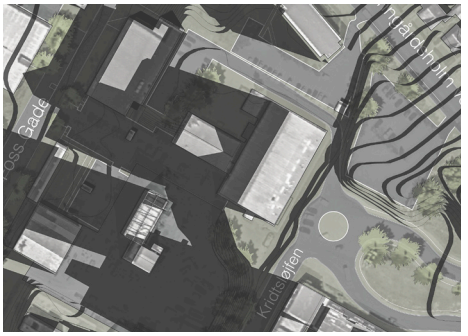

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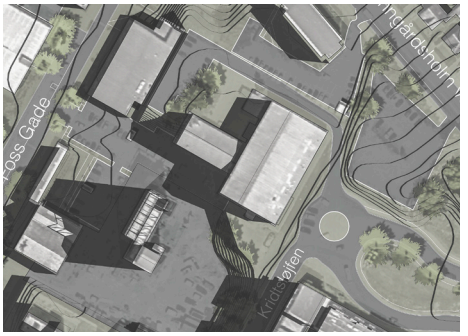

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Equinox and summer shadows - 34/39

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Sub conclusion

From the analysis it is taken that the building definitely has several values. Exclusive social values are non existing, however the building gets its merits from mere existence and history to the area much like Nordkraft as recognized by the local plan. A building which has always been visible to the people passing the area but never revealing the inner beauty of the industrial structure, as it truly is a well executed example of industrial building heritage.
The simplicity of its design and its lasting build quality, creates a good base for developing a tectonic design, where the aesthetics are linked to the structural system and construction-related detailing. However the upper floor of the storage building and the pre-cast elements, as well as the facades, creates many weak and unwanted parts when considering further development. Economically speaking there is also a potential gain from using the strong in situ cast structure considering the price and energy it would take to demolish.

The transformation that Eternitten is undergoing is part of a larger city-transformation and the historical roots of the site, gives a potential to transform into a prosperous community with a strong identity as the only large scale industry in the immediate context. The project buildings are propitiously located in the site however the immediate context is of utmost concern in order for the area to develop in-line with vision set forth in the municipal plan. Only few vegetated areas around the plot are offered and most with poor light conditions as well as spatial quality.

So in summation there are many values in the buildings worth pursuing, and the basis for an alteration project it therefore set, however the full potential and extent of the project cannot be known, until the sketching phase begins to uncover design aspects.

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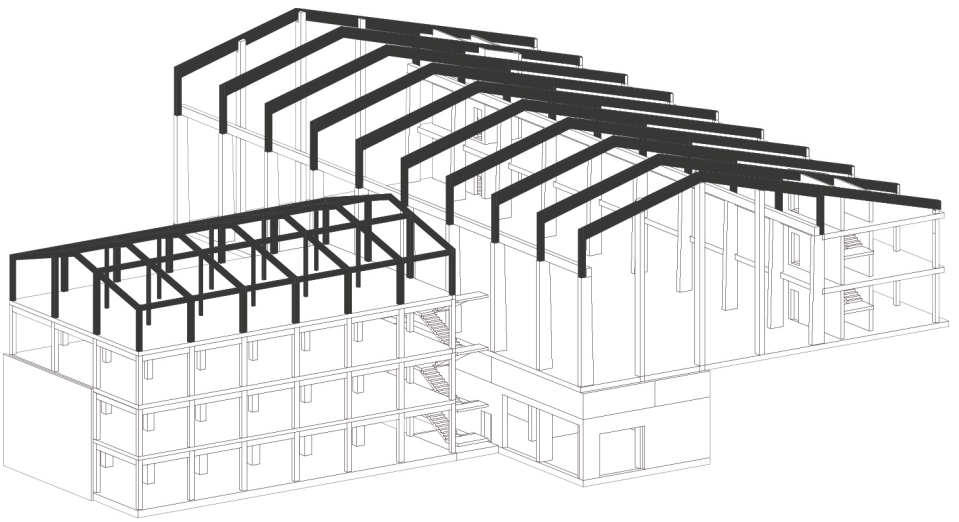

Weak parts of the structure - 40

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VISION

The aim of this project is to create a new design for two existing buildings through the method of tectonic alteration. The new design should aim to develop the tectonic potentials of the old to create a building that has a unique value, one that cannot be reproduced in a new building, because it is an inherent part of what once was. The new design should fuse new and old in a way so that it becomes coherent, but with a distinction between then and now. The new building should relate to its environment and context, becoming a part of the industrial story of Eternitten, while aiming for future needs.

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SKETCHING

The sketch phase works as an extension to the analysis, but instead of being based on observations it is based on sketching investigations. This is done to explore potential concepts, gain a deeper knowledge and value test the host buildings.

One of the initial agreements that were made with INBO, was that the design should consist of, or incorporate, a large quantity of dwellings in the range of 65-90m2. Whether or not other functions should be included in the project, was not a key issue and should be done according to evaluated circumstances.
This became the point of departure in relation to concept development and a number of studies then followed to explore the potentials of creating dwellings in the existing buildings.
There were several steps of reflecting upon the development during the sketching phase which resulted in dismissed solutions. This would bring the project back to an earlier stage, to alter the premises as prescribed in IDP, in order to find solutions that would fit with the main concept.

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Exploring potentials

As a way of starting out it was decided to work with the building in relation to regulations of the local plan, and try to max out the number of apartments. This was done to explore the extreme and relate to the context, which is predominantly tall buildings. As given by the local plan:

- New buildings must be built in 1-4 stories, with the possibility of reaching 7 stories in specific spots.
- The maximum building height is set to 14m and up to 25m in specific spots.
- New and existing buildings can differ from one another in relation to architectural expression, material choice, colors and more (Aalborg Kommune, 2010).

The footprints of the buildings are relatively large compared to the rather small size of the plot, so it was decided to not change the footprint, but only add square meters within this area - only the plot ratio would increase.

The proportions of the second building well suited for dwellings, but the two lower floors are built into the hillside which limits light to enter the building from one side. These levels face a parking area, which is publicly used and there is a considerable amount of shading from the neighbouring buildings, as seen in the sun studies. All of this argues for a different function than dwelling, and with the level access to parking and location right next to the main street(Alexander Foss Gade), the space is reserved for retail. The floors above the bottom two, have access from the area behind the building, and therefore have a more private view facing the city. There is less shading from other buildings and light can enter from both sides. This space can therefore be designated for dwellings.

In the main building there is the warehouse and the offices, and here the conditions are a bit different. The offices have similar proportions to the storage building, and could house small apartments, but it could be used for student housing, due to the layout of the spaces.
Despite this, the need for student housing is questionable, due to the neighbouring student housing. Its location next to the roundabout also

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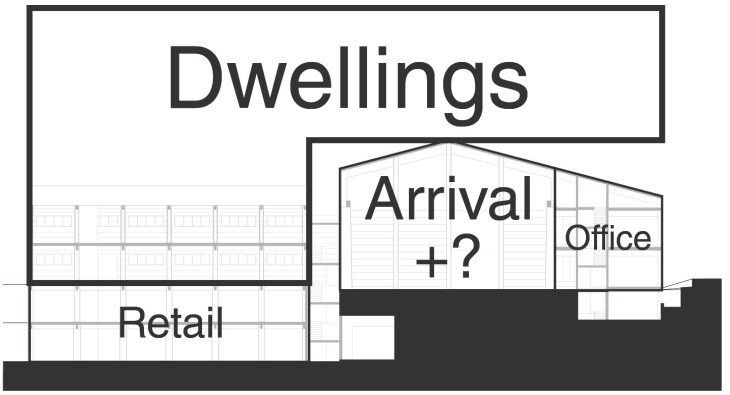
makes the view and noise level less than ideal for housing, however it could potentially be of value to offices in terms of public exposure and thus it is chosen to preserve the function of offices in these spaces, since it is proven to work up until now.

The warehouse is a large open space of 20x50m and these proportions are not optimal for dwellings, especially with the offices taking up a lot of the sunlight entering the building. A large open office space could have been placed here, but it would require the use of skylight in order to illuminate the room and that would limit the possibility of building on top of it.
For now the warehouse is left open, to be further discussed later on.
There is not a lot of space for dwellings in the existing buildings, so it is chosen to place them on top of the existing buildings, showing a contrast between new and old, while tying the buildings together. All of the above results in a mixed use building, that will create a diverse user group and time of use, and it will help to better utilize the spaces within the buildings.



Initial function diagram - 41

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Practical investigations
As the plot of this project only includes the private staircase between the buildings, this is seen as a potential access point to the building as well as for two levels for both users and the public. The bluff could be developed as a grand south facing staircase making a better access between the two plateaus in order to create flow in front of the warehouse. Furthermore a staircase at the west gable of the second building could be possible in order to create flow on both sides of the building, but it is outside the plot and the project scope.

In terms of flow and access it is seen best to keep the slow paced movement on the south of the building and car access on the north as the road is enclosing this part as well as it is bordering a privately owned parking lot. Though it is used by many as a short cut to access the site, it is not seen as a favourable pedestrian access. INBO currently has a long term lease with the municipality regarding 26 parking spaces west of the building - however more might be necessary and particularly handicap spaces close to elevators. The possibility to use the northern part of the warehouse for parking was tested but the columns location and dimensions of the space made it difficult to efficiently use the area in terms of manoeuvring. However it made a good dimension for handicap parking along the perimeter, particularly for minibuses, as the column spacing fits a drop off space required by the building regulations. Due to lack of sunlight in the outdoor area between the two buildings to the north, it is chosen that this space would suit the need for added parking.

The access to the dwellings above could possibly be done by extending the current staircases creating a good access to the building. In light of the view towards north another solutions could be to locate stairs and elevators in the north corner where the buildings meet or inside the warehouse.

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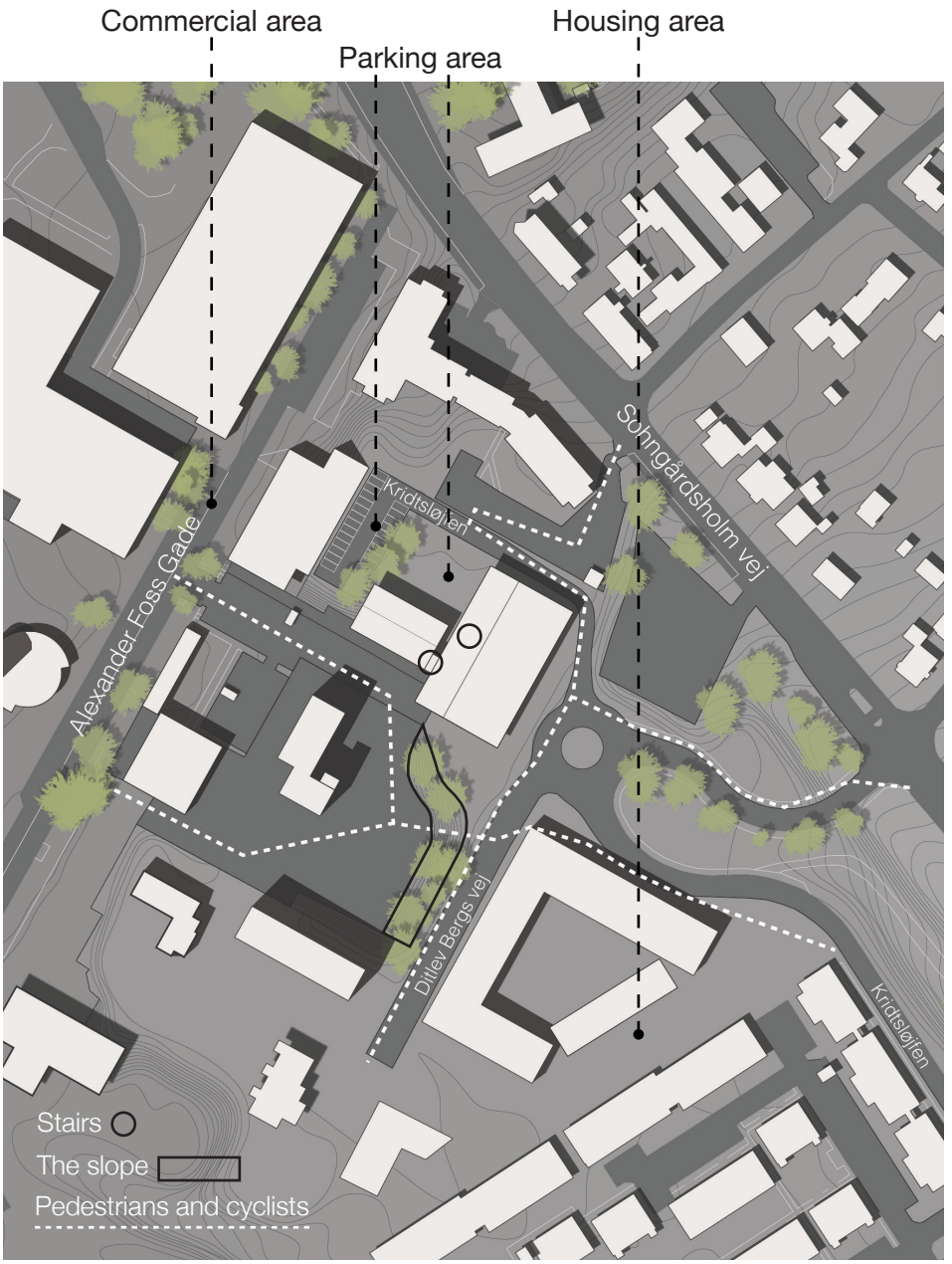

Access in the area and parking - 42

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Volume studies
In order to get an understanding of the impact on the surrounding context a mass study was conducted. The mass study was at the same time looking at the potential qualities that were to be generated from different configurations. Through several iterations many aspects were considered based on subtracting mass from the maximum allowed building height.

A key factor was the perception and massivity of the building when seen from its surroundings - particularly from main street and the housing area to the south. Inspired by the contours of the terraced topography a mass concept of stepping in height from northeast to southwest, would seem less invasive.
From Alexander Foss Gade it is only possible to see the continuous facade of the storage building, being the lower, while the mass atop the warehouse would be pulled back and break the otherwise vertical facade. By pulling back the mass from the offices and locating the main volume above the warehouse, breaks up the facade and continues a stepping from all angles. In effect the building also relates to the context buildings in terms of terraced roof lines, but still differentiating itself by stepping in several directions.

A general problem was self shadowing on the north facades caused by the building physique however this was seen potentially as two different qualities where the south facade and the roof spaces created would have great light condition whereas the north facade could offer the panoramic view above the city where the stepping would minimize the blocking of view as well as evening sun.

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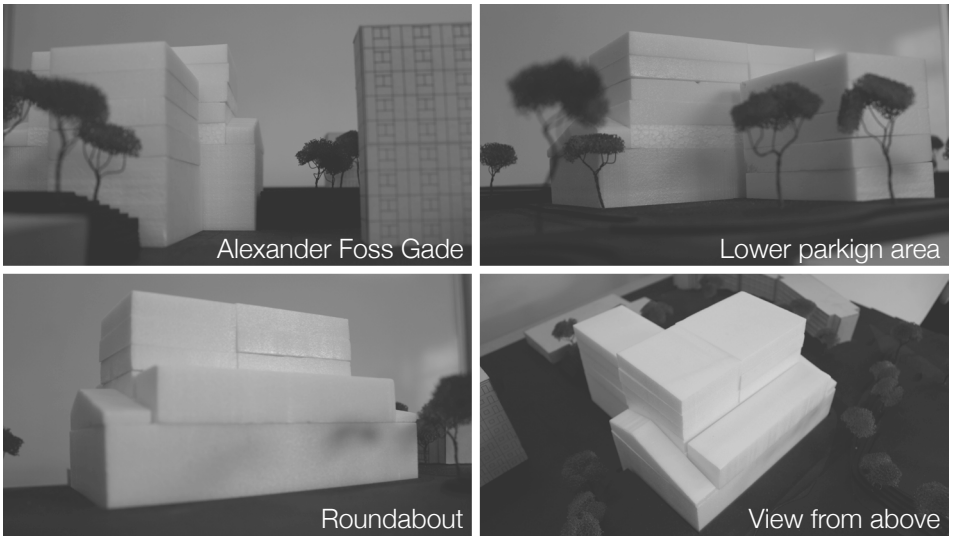
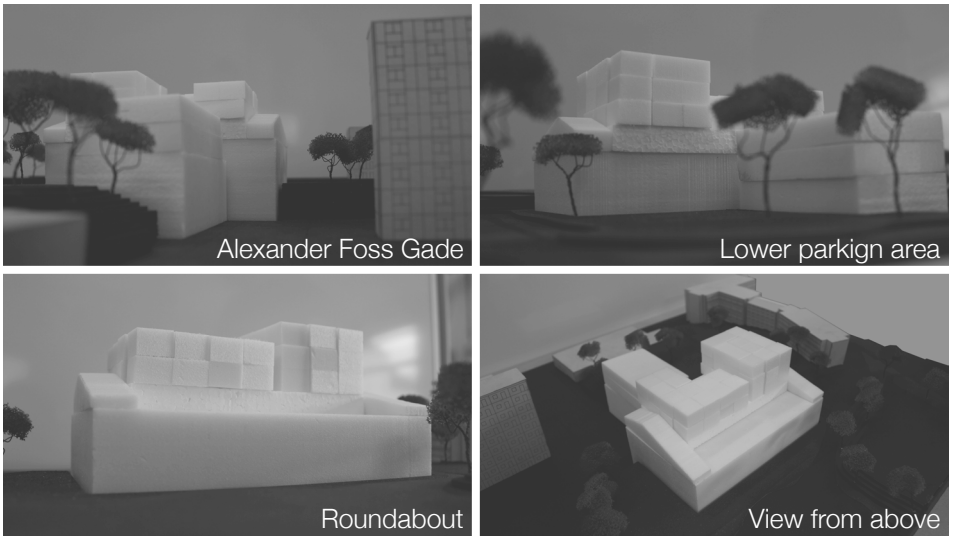


Volume studies with full building mass (7 stories) - 43/46



Volume studies with terraced mass - 47/50

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Developing potentials

The first part of the sketching phase focused on developing an overall understanding of the buildings in relation to their context and how that would fit with a new volume representing the dwellings. Finding an overall concept through volume studies when working with alteration is rather difficult, because a more in depth understanding of the building is needed, and the union of new and old is not easily managed through form alone.
This leads to the next part of the sketch phase, which is stripping back and reaching the core of what is worth preserving, in order to develop the concept from within. Truly understanding how the existing buildings work, and what qualities/values they possess, is necessary to develop a design that ties everything together.

The strong industrial structures of the warehouse and storage building are chosen to make the structural base of the new construction and the program is laid out a bit more specifically.
During the volume studies there was a certain amount of hesitation in regards to removing parts of the old buildings. It was concluded in the analysis that the main value of the buildings lay in the structure and in order to utilize the structure, some elements had to be removed.
The retail of the lower part of the storage building is turned into a restaurant to utilize its location and the space, and the two upper floors are removed due to lacking strength in the construction, and the same is done with the roof of the warehouse.

In the main building the two office floors are preserved and an extra space is created by extending the decks of the first floor into the warehouse and thereby subdividing the otherwise very large space. Nothing is built on top of the offices, since the construction is not dimensioned for it, and it helps break down the massiveness of the building as found in the volume studies. The warehouse becomes the main entrance for the building, and the space will be shaped during the design phase. The apartments are placed on top of the old buildings and are thereby separated from the ground, which can be argued for with a number of reasons.

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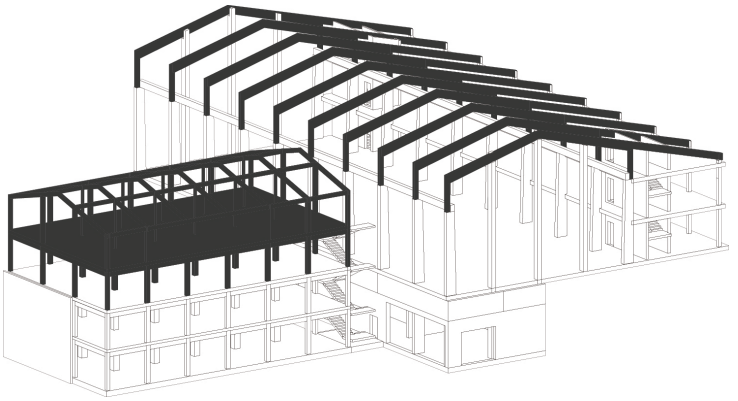
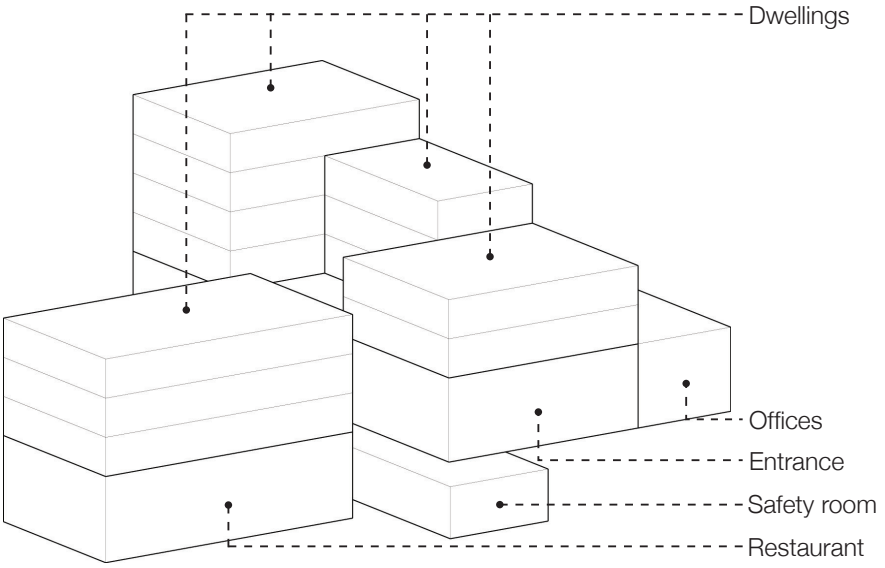


Parts of the conctruction that are being removed - 51



Final layout of functions with initial shape of building - 52

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Raising the buildings helps define a differentiation between existing and new, but the elevation also changes the building's surroundings. Raising the building only a few stories reveals the fantastic view of the city and increases the amount of sunlight in and around the apartments. Working with the idea of elevating the apartments, requires a development of vertical access.
The volume studies showed, that working with a terraced layout for the building would break down the mass and create plateaus on top of the building. Since there is a lack of quality outdoor areas on and around the plot, it seems ideal to utilize the plateaus for recreational green spaces for the residents, but also for people in the neighbourhood. There is an idea of vertical transition in the building, going from the very public functions at the bottom, to the private functions at the top. In order to emphasize this vertical transition for all users, the main access is placed in the middle of the building within the warehouse, as suggested earlier. When the user slowly ascends the levels of the building there is a change in light and view, which is accompanied by a change in functions and spaces. This marks the gradual shift from public to private.

Panoramic view from above the neighbouring building - 53

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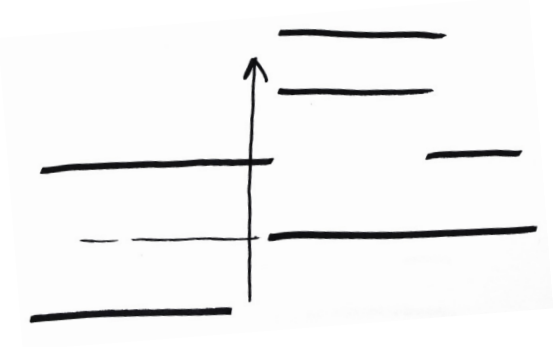
Concept

The knowledge gained from the analysis and the sketching, is formed into a concept that becomes the basis for a design process. The main element of the concept is the idea of creating plateaus inspired by the site - elevated decks that are raised above the old buildings, which can be used for outdoor areas. Although the new addition is to be raised above the old buildings as a play on contrasts, there should still be coherency in the overall structure of the new design.

The change in light and view when ascending the building will be part of a vertical transition, that gives the residents an experience contrasts. This experience should be enhanced by the atmospheres of the outdoor areas that are placed on the plateaus around the building. The vertical transition also represents a change in the character of the outdoor areas, going from public to private upwards.
These open spaces are meant to be quality recreational areas for the apartments and they should display a wide variety of vegetation, matching the atmospheres.



Concept diagram - 54

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SYNTHESIS

In relation to the program laid out in the sketch phase, it is chosen to place a restaurant in the bottom of the storage building and offices where the old offices were. The furnishing of these spaces can be seen in the drawings folder, but they are not included in the design iterations. They are only included through their relation to the rest of the building and the overall spatial composition. The safety room next to the restaurant will not be dealt with in order to keep discourse.

The primary focus of the project lays with the structure, the outdoor spaces, the dwellings and the relation between them. The synthesis seeks to simplify the many steps in developing a design, and pointing out key aspects that have driven the project forward. This will help map the process and outline the final result, which will then be presented in the Presentation folder.

There has been technical considerations throughout the design phase, and they have influenced the development of the design, but only certain elements have been discussed.

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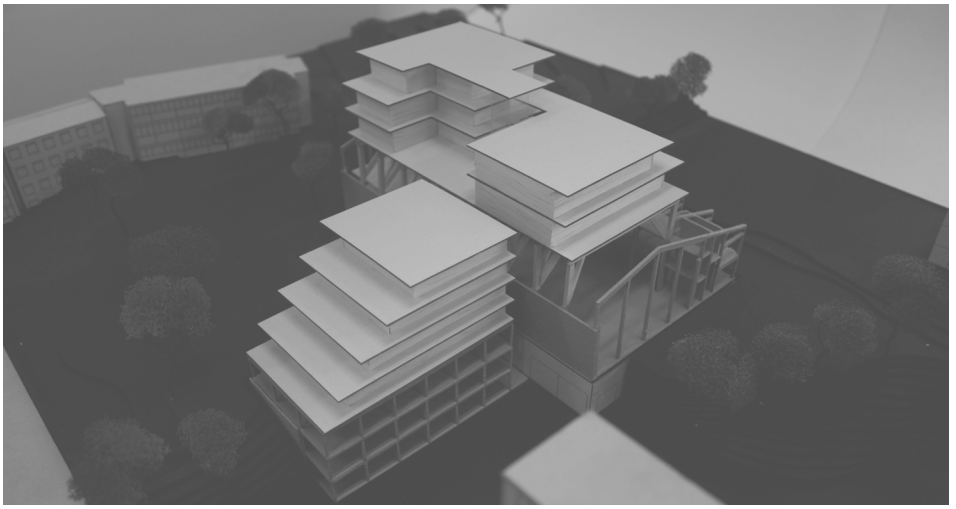
Iteration 1

Structure

The first iteration of the design tries to built upon the concept laid out in the sketch phase, and especially upon the idea of creating a strong contrast between old and new. The interpretation of this was discussed thoroughly and ended up being taken very literally. The new part of the project was perceived as being an entirely separate structure, that should rest upon the old and thereby create a visual statement, that it was something different from the existing. This artistic approach was also inspired by the findings of the volume studies, which mainly looked at a mass being placed on top of the old buildings. A base or platform was then made to mark the beginning of the dwellings. This way of approaching the design was perhaps desirable because it created a base that would represent the foundation for a somewhat free design.

Creating this base/platform then became the first task in this iteration. The new structure was designed to rest upon the old, utilize the strength of it and emphasize the separation between them. This play on contrasts meant, for a brief period of time, the use of wood construction on top of the concrete, but that quickly changed in regards to fire safety and strength.



Midterm review model - initial stages of the plateau design - 55

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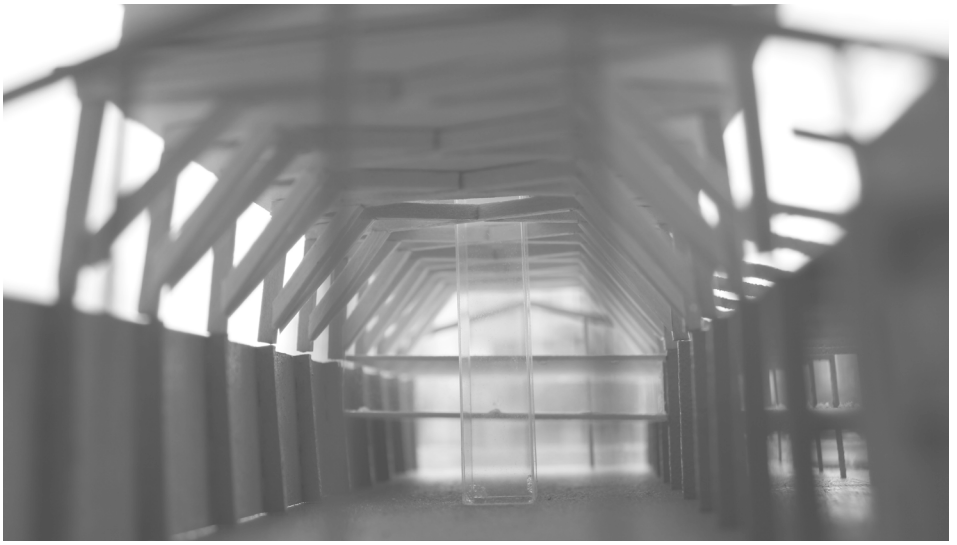
The structural system for lifting the new building became a space truss that could span the length of the warehouse and rest on top of the columns. The structural system of the new building was completely separate from the design of the old, which mainly implemented the use of in situ cast columns and beams. The dwellings were at this point mostly perceived as being made with prefabricated elements that would be stacked to create the floors needed.
This division between the two structural types meant, that the static system was difficult to solve and the space truss would have to handle the lateral force impacted on the dwellings. The problem was not with the old construction, since the columns could handle a lot of load and moments, but the connection between the wood and the concrete would be a weak spot.
The idea of the space truss was a short lived endeavor and was quickly replaced by other concepts, but the idea of a platform resting on the old structure, symbolising the beginning of the new, became a design feature to be elaborated upon.



Space truss in the warehouse - 56

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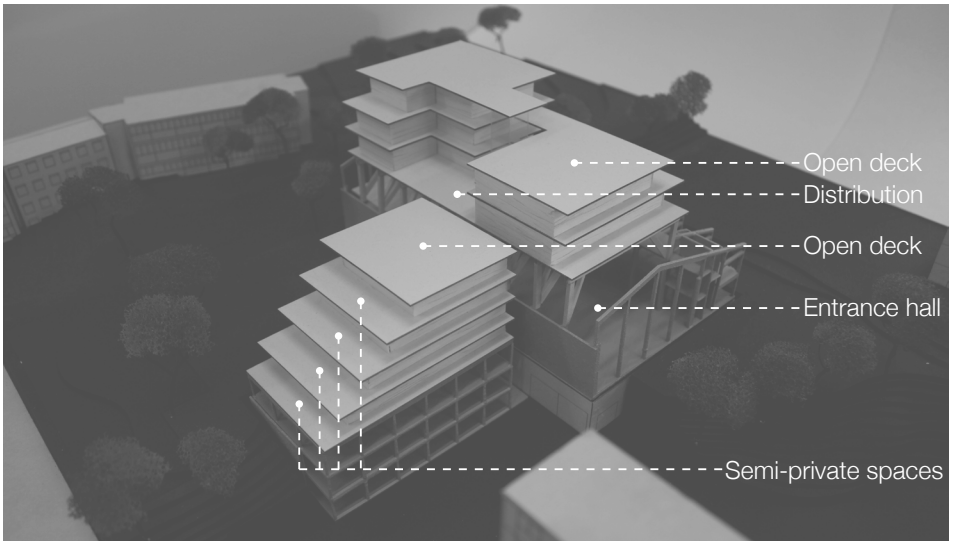
Outdoor areas

The space truss left the warehouse very open and massive, and it was hard to apply a function to it and stood empty for a while, but it did give birth to the notion of a grand entrance for the building. Stripping back the facade elements, leaving the construction bare and the warehouse open, presented the opportunity of inviting the vegetation of the slope into the building, blurring the boundaries between inside and outside. The warehouse then quickly became a covered outdoor space, that would help define the concept of inviting the public into the building, without being invasive to the privacy of the residents, since the dwellings were raised on top of the warehouse.

The base of the new building becomes a plateau which is raised above the landscape and creates an ideal vantage point in terms of recreational spaces with light and view. Every time the new building steps down as a part of the terraced expression, new plateaus are created and in extension outdoor areas. These become very important to the design early on, but they are not articulated until later, they are however evaluated in regards to positioning, function and access.



Midterm review model - initial stages of the plateau design - 57

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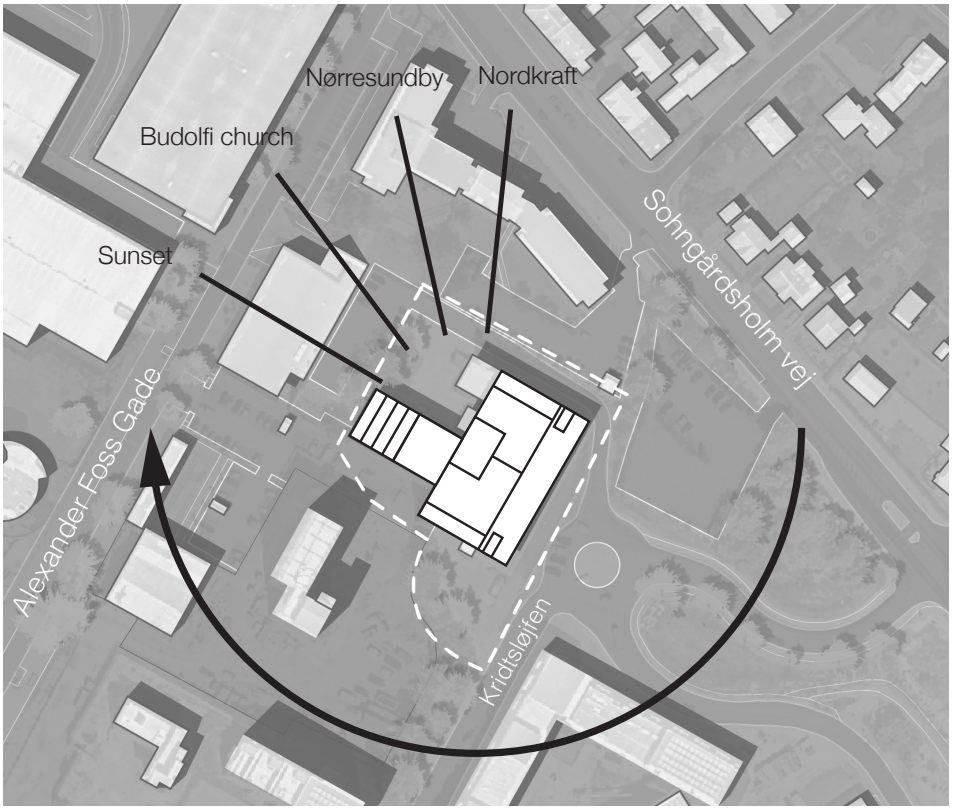
Working with the notion that the users should have access to quality outdoor areas in all parts of the building, started the idea of placing the plateaus at the perimeter of the building and at different levels. In that way it would be possible to have one space facing south-east, receiving the morning sun, and another space facing the city and enjoying the evening sun. Doing this would fulfil the wish for spaces that could be used at various times during the day and by various users.



Path of the equinox sun, orientation of the building and views - 58

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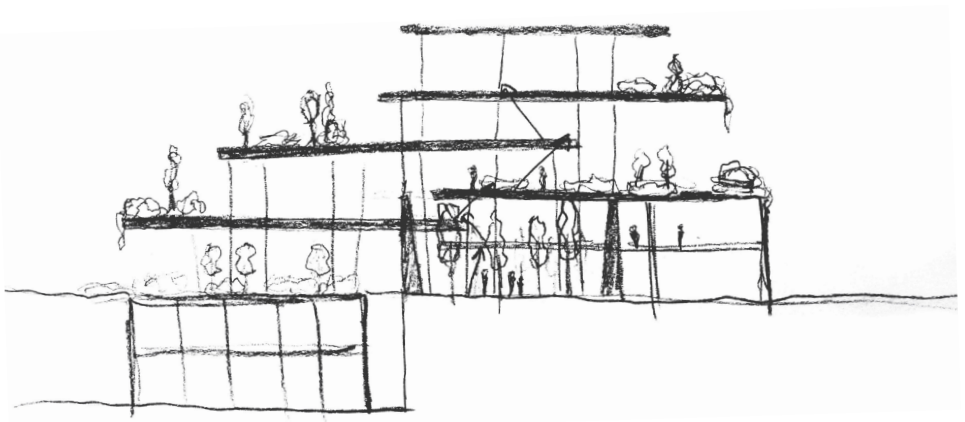
A vertical transition was introduced as way of experiencing the change in light and view when ascending the building, and this would then be linked to the outdoor areas. Each area would have a different function and level of publicness/privacy, which would be driven by level in the building and orientation. For example the space atop the offices receives morning to midday sun, which fits with the period of time where the workers use it, and the upper plateaus face the opposite direction receiving light when the residents are home.
Just as the functions in the building go from public to private in a vertical transition, so should the outdoor areas reflect this.
The spaces were however in this first iteration, laid out in a way so that they would be accessible at the end of a deck, so one would have to walk down an access gallery to reach them. This made the spaces unpurposely exclusive to that floor and not generally accessible for all residents, which was a drawback to the concept. It also created unwanted transit on the access galleries, past the apartments.



Concept sketch of plateaus and outdoor areas - 59

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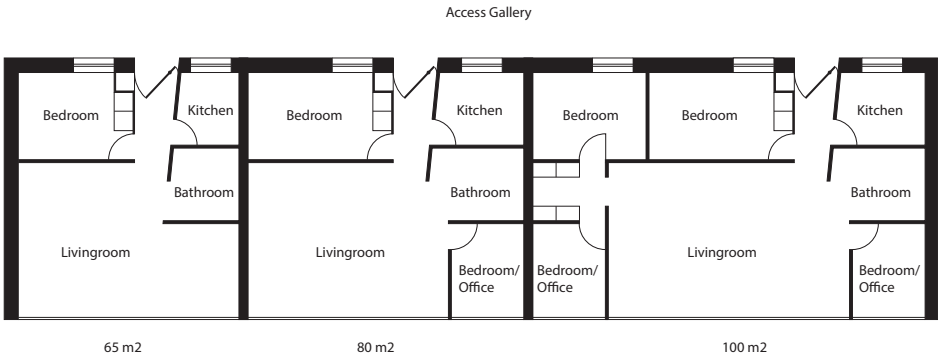
Dwellings

The new building was as mentioned earlier laid out on top of the old, stepping down as part of a terraced expression, thus creating outdoor spaces. The apartments were then arranged as to fit within this overall space and create rows of dwellings accessed by galleries.

The apartments themselves work with a principle of load bearing discs formed in a u-shape, opening up towards the exterior of the building. Introducing large glazed facades creates a strong contrast to the darker entrance of the apartment, and the spaces within should be placed to emphasize this quality. The apartments play on transition from dark to light, prospect and refuge.

On the facade facing outward the idea is to have the option of opening up to the outside and having the living room becoming a balcony. This however creates less incentive for the residents to use the outdoor areas, the facades face away from the view of the city and the access galleries lack character and seem uninviting.



Layout of apartments and u-shaped load bearing walls - 60

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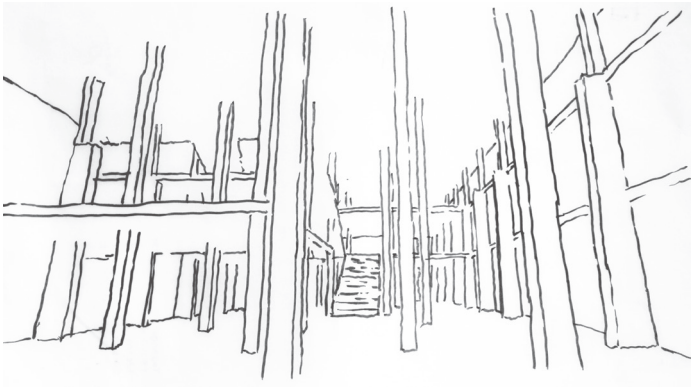
Iteration 2

Structure

In this second iteration it was found that the concept of a space truss would create too big a separation between new and old, and another construction might be better at handling the loads coming down through the building. Taking a note from the existing buildings it was chosen to work with columns as the structural principle, introducing more of a connection to the existing building.

As an artistic reference to describe the structure and as a way of articulating the space in the warehouse, the term “forest of columns” is used. Opening up the warehouse to the outside and letting vegetation from the bluff in, combined with the forest of columns, sets the stage for a very unique way of entering and experiencing the building. In order to fully explore the concept of forest, the columns are placed irregularly. This creates different experiences depending on where in the room it is viewed, and it maintains a level of contrast to the more regular existing structure.

The columns start at the base of the warehouse and storage building, and runs up to the main deck where the dwellings begin. This part of the building is still supported by a separate structural system consisting of discs. The main deck of the new construction is connected to the office staircases to ensure lateral stability. As a way of differentiating new from old structure, when concrete is used in both cases, the new will be a light colour to create a subtle contrast.



Forest of columns rough sketch - 61

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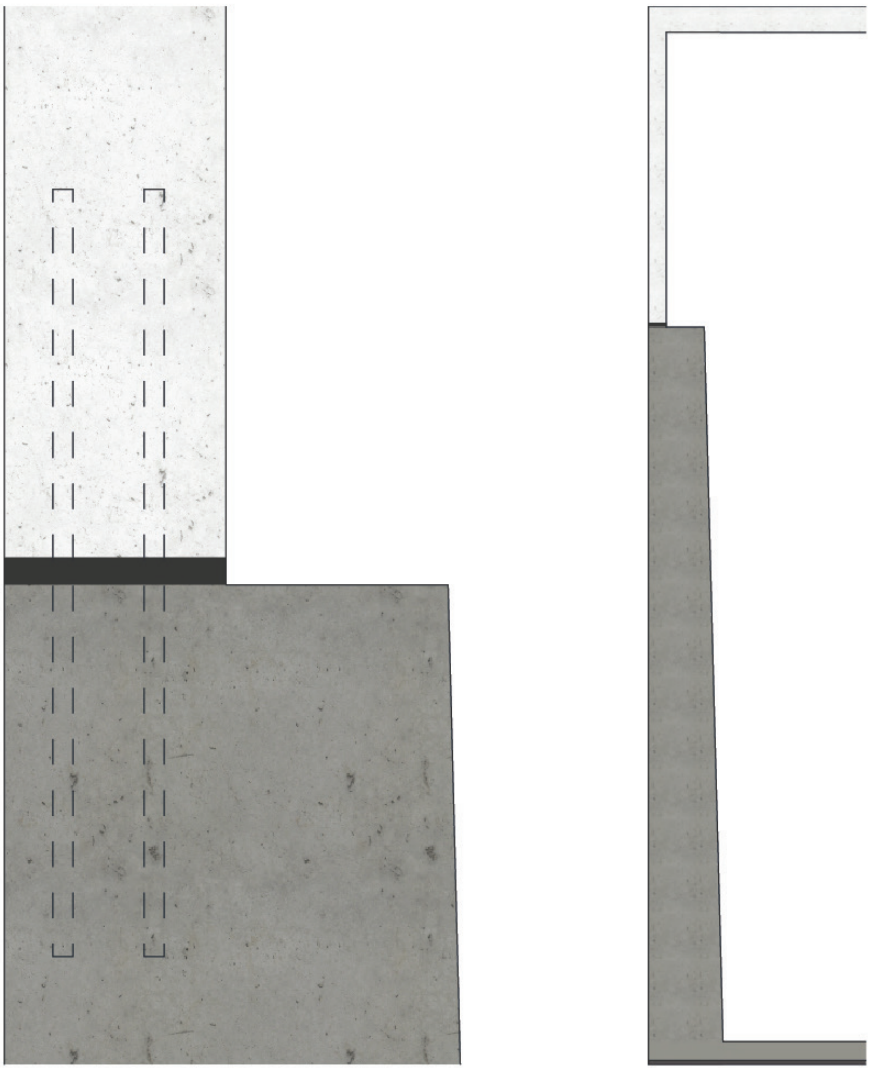

The joining of old and new columns with a column shoe - 62

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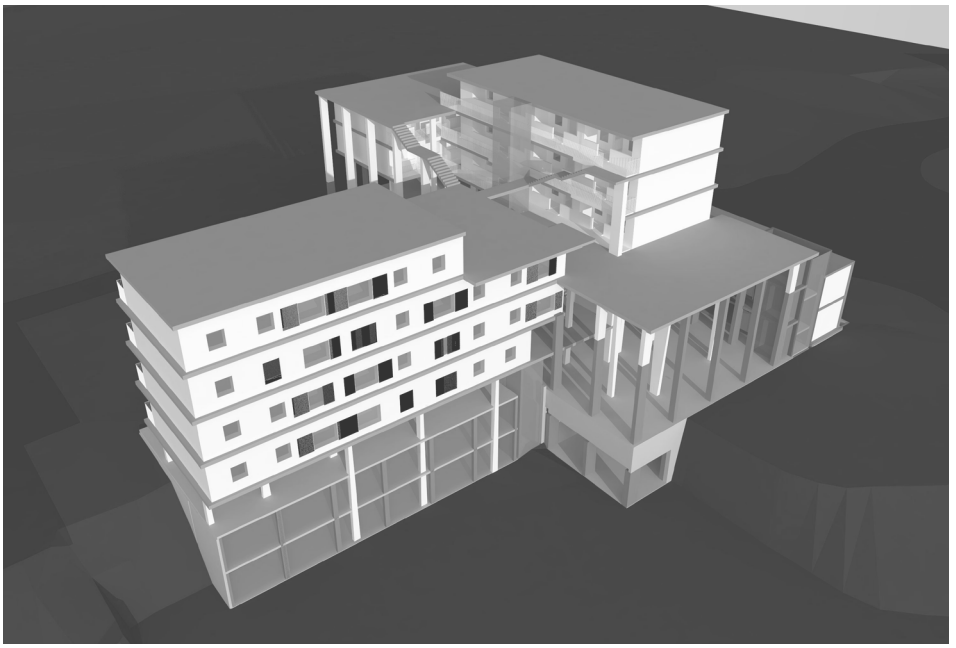
Outdoor areas

The idea behind the outdoor spaces somewhat stayed the same for this iteration, but the location of the spaces were changed. Instead of having the outdoor areas at the perimeter of the building, they were instead gathered around the centre of the building but still orientated towards different directions.

In order to truly emphasize the experience of transition, access in the building is focused around the centre and the stairs are made as a path instead of a traditional staircase. The stairs start at the base of the warehouse, moving upwards and stretching from plateau to plateau, forcing the users to partially move through the outdoor areas an experience the change in atmosphere and pace up through the building. The outdoor areas changes from high pace public space to recreational low pace private space.



3D model of iteration 2 showing the open plateaus on the building - 63

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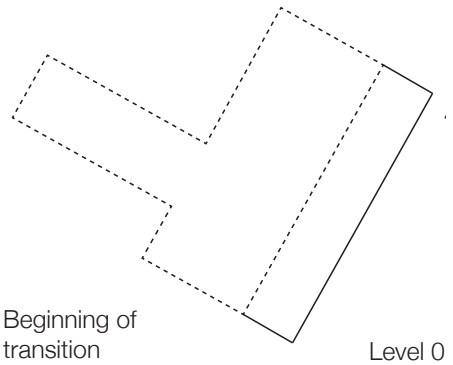
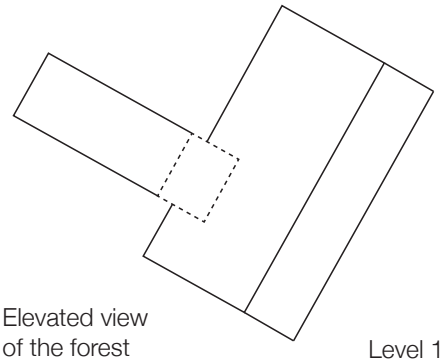


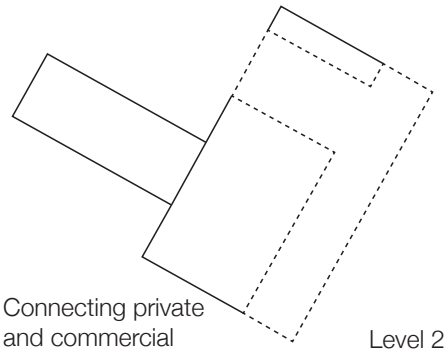
Beginning of transition

Level 0



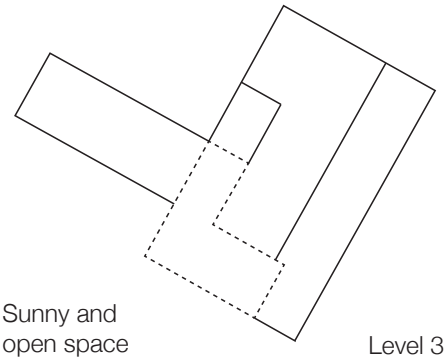
Elevated view of the forest

Level 1



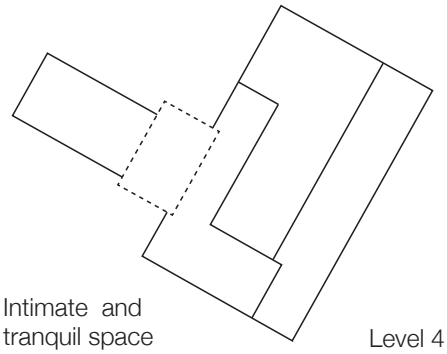
Connecting private and commercial

Level 2



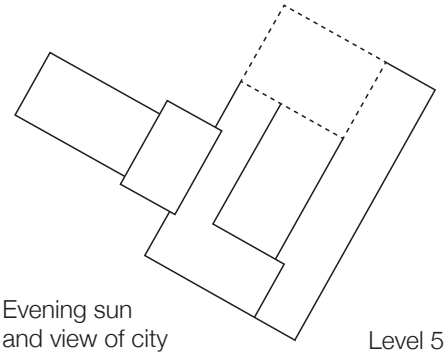
Sunny and open space

Level 3



Intimate and tranquil space

Level 4



Evening sun and view of city

Level 5

Level and location of each plateau - 64

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Dwellings
When climbing each floor and entering a new outdoor area, access to the apartments is done via the open space and onto an access gallery. Having the shared spaces before the apartments allows for more privacy in front of each dwelling because of reduced transit. The incentive to use the shared spaces is also bigger when not placed at the end of a corridor, forcing people to walk past a row of apartments.

The reduced amount of transit past the dwellings gives the possibility of using the access galleries as a place for staying. In the first iteration the dwellings played on a contrast of light and dark, but in this iteration the transition is changed to light and view. The idea of having an open facade which allows for light to enter is still in effect, but the front of the apartment is now dedicated to a space that mostly resembles a porch or veranda. This space has a great view of the city and is covered by a cantilevered walkway, so that it can be used during bad weather as well as good.

Having this space in front of each home, resembles more the character of a row house than that of an apartment, which to some extent makes it a new typology. Making this typology is intended to affect the target user, since the combination of a row house and quality shared green spaces, appeals to the needs of a family.

So instead of becoming yet another apartment complex, the building becomes a place for suburban type living in the city. It is not hard to imagine a family living in one of the dwellings, using the porch for relaxing, having dinner or simply letting the baby sleep in its carrier, and then using the plateaus for recreational time - playing in the park, walking in a garden or enjoying an evening on a terrace.

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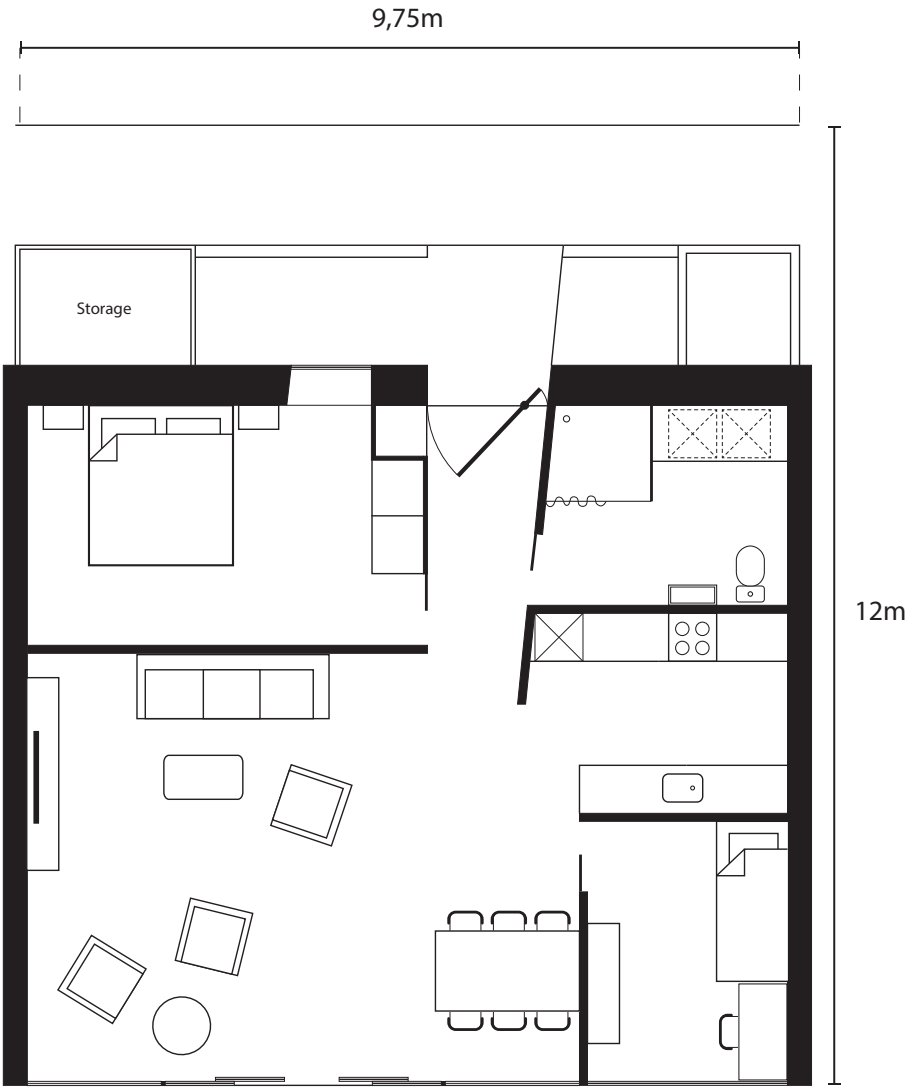

Floorplan of apartment in iteration 2 showing the porch in front - 65

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Despite the many good qualities acquired in this iteration, there is still a lack of coherency in the building which must be addressed. The structural system of irregular columns is laid out in such a way that they support in strategic places, compared to the load from the apartments. But even after some analysis it shows, that it very difficult to properly reduce the amount of moments in the decks and all the columns become eccentrically loaded which can create problems in terms of buckling.
It was determined through Robot studies that it was possible to place the columns strategically to reduce the moments in the deck, but trying to handle loads and moment logically while pursuing an irregular structure is a conflicting matter. An alternative was therefore tried in the next iteration.

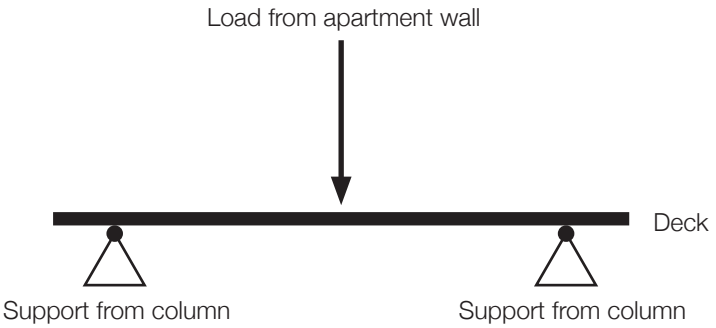

Diagram showing the load from the apartment offset from the columns - 66

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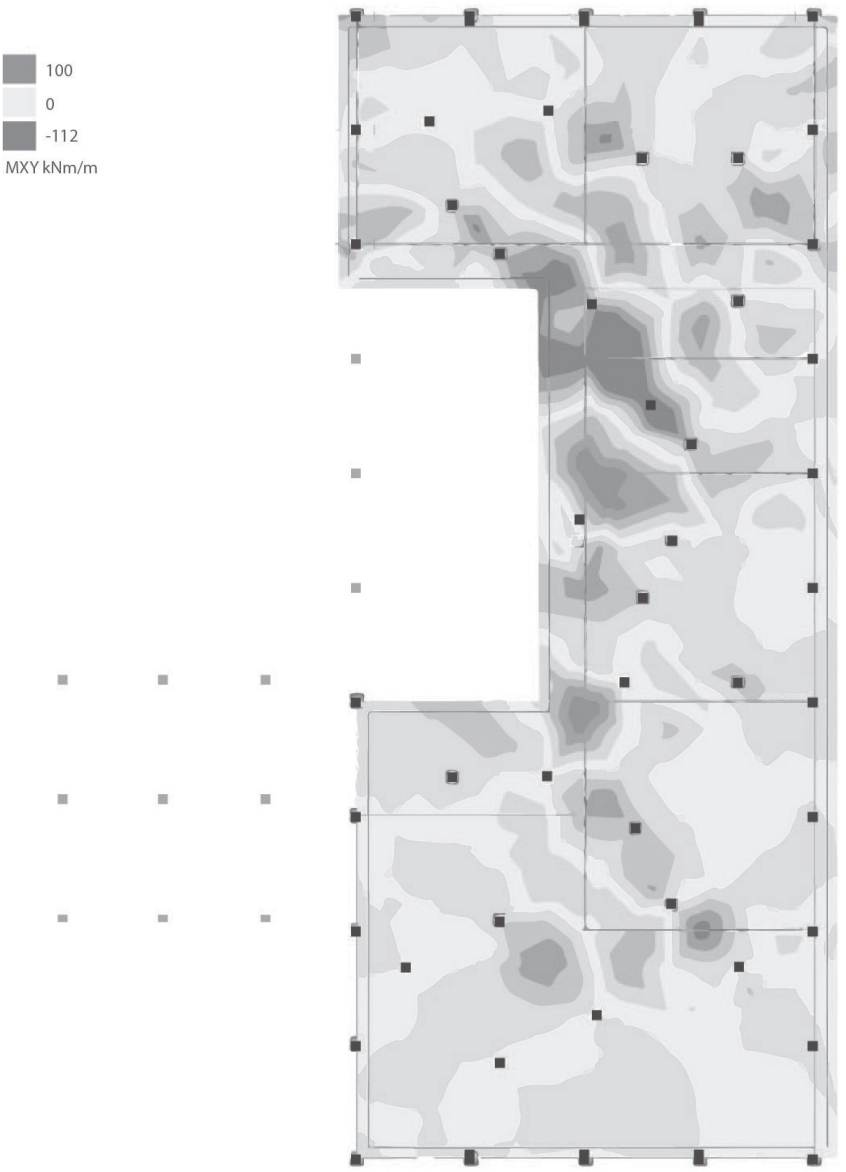

Robot analysis showing the critical points in the deck with large moments - 67

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Iteration 3

Structure

In regards to the problems with the columns in the second iteration, finding a structural system that ties the building together and joins new and old, instead of separate it, will be the main challenge in this iteration. Although coming very far in the last iteration and trying to make the irregular forest of columns work, it turned out to be too difficult and it created unnecessary problems. The solution to this was to take a step back, look at the existing buildings one more time and then simplify the structure. Taking inspiration from the columns of the old building yet again, resulted in a grid pattern that dictated the location of all the new columns. Instead of having the columns stop at the first deck as before, they are now forced all the way up through the building, transferring loads directly down and they somewhat dictate an overall layout for the dwellings. This changes some aspects in regards to the apartment floor plans which will be explored later. Letting the columns extend all the way up, adds a level of coherency to the building that the previous iterations were lacking, this also tones down the play on contrast, but that term may have been used too excessively anyways. The tall vertical lines of the columns, penetrated by the horizontal lines of the plateaus still creates an interesting contrast to the design and helps define the new part of the building and emphasize the open areas. Making the structure statically stable and space defining at the same time, is done by adding discs to the system, discs that are fixed between the columns. These help to stabilize the structure in relation to lateral forces, while creating smaller spaces between the columns. Placing these discs from an architectural and technical standpoint is rather difficult and would require a longer investigation, but a proposal is tried in the design.

The columns are at the beginning all dimensioned at 400x400mm, inspired by some of the existing columns. As the apartments are laid out in the grid this fits with and redesigned to fit these new dimensions it is possible to calculate the load combination above a certain column and then dimension the columns according to this load. This should give a uniqueness to the columns which is visible in the warehouse and for the trained eye, it will be possible to interpret the columns and see where the concentration of loads is highest - portraying structural honesty and creating irregularity in the warehouse.

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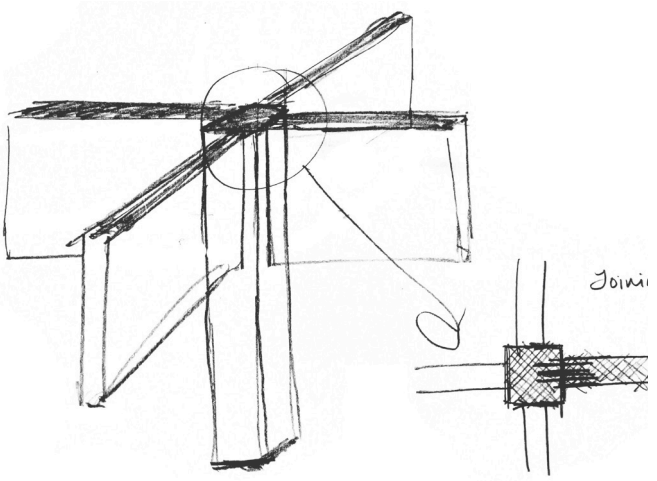

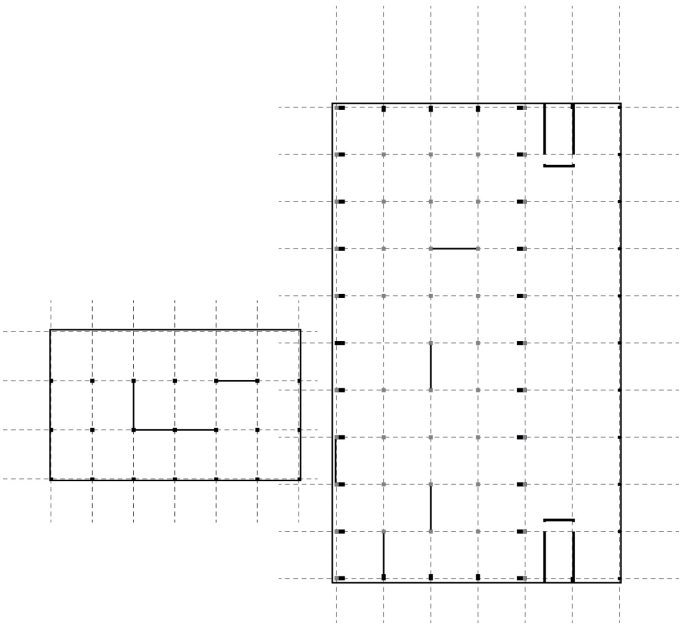

Rough sketch of the new construction principle and column grid - 68

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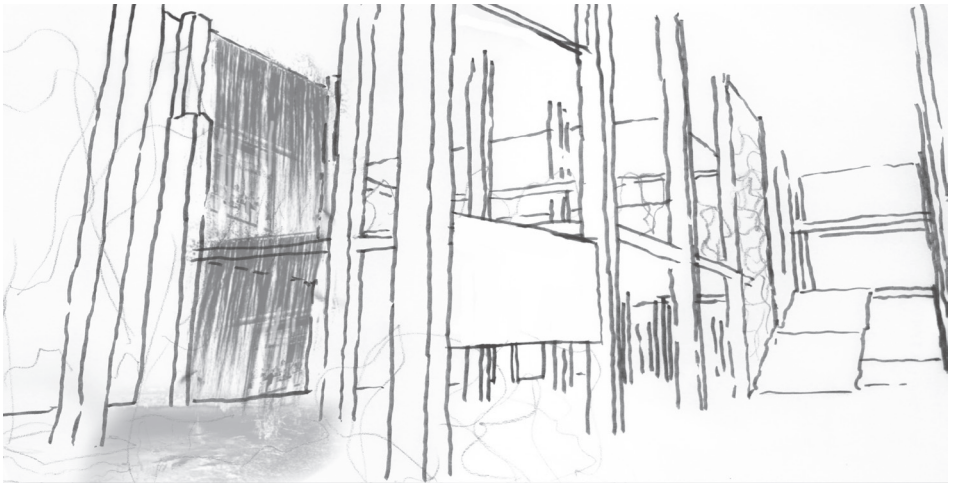
Outdoor areas

The new arrangement of columns changes the character of the warehouse and introduces a certain amount of order to the space. Still wanting to explore the concept, forest of columns and spatial diversity, the discs come into play along with nature. The discs provide the means to stabilize the structure in strategic places, but also the opportunity to create smaller and more intimate spaces, which can have a gesture of revealing or embracing. The discs can also help guide the users or block particular views. Nature then becomes the contrast to this regular grid layout and represents the uncontrolled and irregular, giving the building an ever changing expression, emphasizing that alteration is a continuous process and not a result.

Allowing the nature around the building to enter the lower levels while introducing new vegetation on the upper levels, will over time make the building an inherent part of its surroundings. The approach to vegetation is taken from principles of permaculture though it is only kept on a conceptual level enabling the users to take advantage of the layout.



Rough sketch showing forest of columns and added discs - 69

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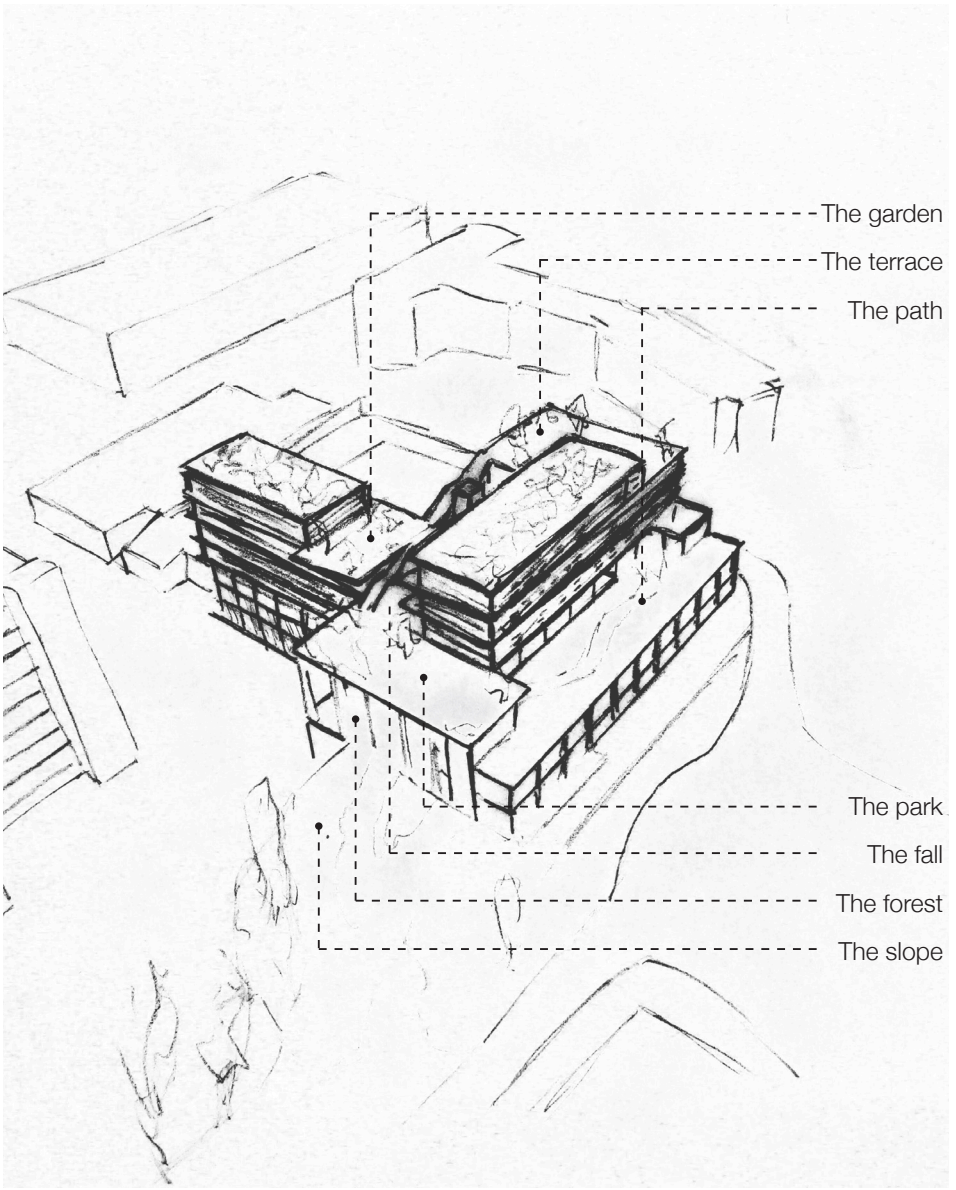

Placing and name of each plateau - 70

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The core of the concept for the outdoor areas have not changed during this iteration, but the spaces have been further developed and become more specific. Naming each space helps define them in terms of privacy, function and character. Planting is used throughout, in order to breake the wind and create spaces, though only on a conceptual level.
The main entrance in the warehouse has become a forest of columns overtaken by low-maintanance vegetation of trees and bushes and has therefore been dubbed “the forest”. Here the vegetation continues from the slope outside and takes over, growing around and on the construction, creating a forest of trees and columns. This is done by breaking the concrete floor in certain areas, with a gradient from south to north as the direct sunlight reaches one third of the space. In the darker areas ivy plants with less need of light is used to crawl on the columns and discs. As the rainwater is gathered at the bottom of the building, it flows through the forest and small paths run through the water.

Path running across a collection of rainwater - 71

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Vegeration stands tall in the warehouse and water is collected around it - 72

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Ascending the building to the first floor the users pass through a smaller space with water running over the edge in rainy weather, this space is called “the fall” dedicated to view the forest but particularly for rainy weather when the water is flowing and it offers shelter. A public space for prospect and refuge.
Above the offices there is an elongated space called “the path”. In extension to a common space it is the place to have a relaxing walk for example as part of the lunch break, just enjoying the morning sun or as a break from the party in the evening. This deck is also the mediation between office and dwelling.

A combination of path and seating in an elongated space - 73

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A winding path framed by vegetation - 74

Water falling from a ledge as concept for “the fall” - 75

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The open space on the main deck above the warehouse is called “the park” since it is meant as a place for both recreation and play, this is an ideal space for the families if the kids want to run around and play while the parents catch a break among the greenery. This area mainly receives sun during midday and it has a nice view of the surrounding areas, and it is visible from the neighbouring buildings. This is meant to be an incentive for people living in the area to approach the building, and in extension interact with the residents in the building. The main plateau is generally visible from the ground and is meant for public use, but moving further up the building, the spaces begin to be more private. This space is defined by small hills with dense bushes and few trees as windbreak from the west, supported by columns and discs continuing through the deck.

Small hill to make space for a tree/Plant boxes creates space and seating - 76/77

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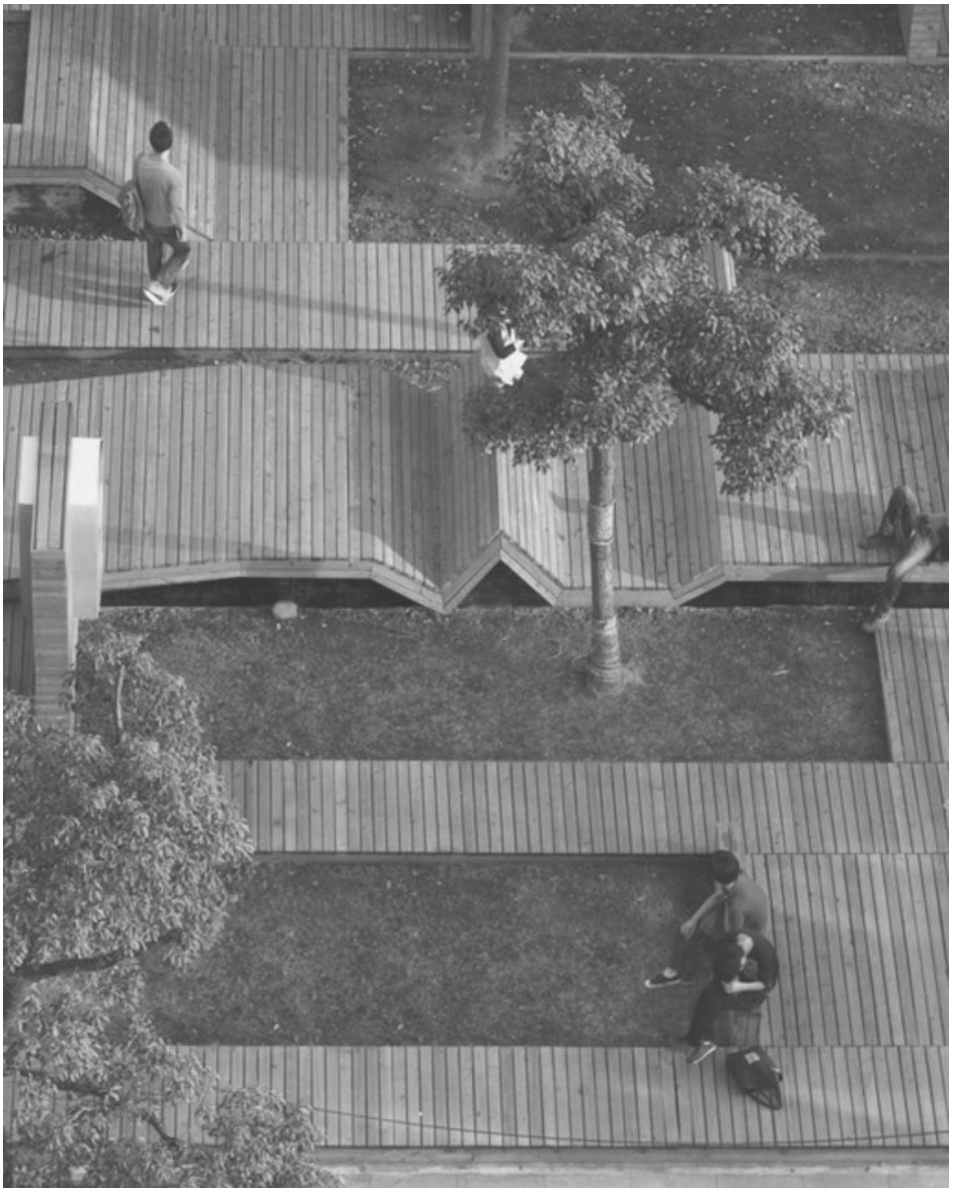

Undulating built terrain to suit both play and stay, with vegetation in between - 78

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The next plateau is a smaller space called “the garden” and it is meant for low pace, recreation and kitchen garden. It is divided by several planting boxes of different soil depths accommodating planting planting such as berry bushes to take wind but in general controlled by the dwellers. Against the wall of the apartments should be a winter garden for plants not suited danish weather as well as a tranquil space for reading a book or enjoying the morning coffee. The back of the space is reserved for compost where the residents can drop organic waste to use for nutrients later on as well as a watertank to collect rainwater for dry periods. Here the residents can be a part of the greenery and manage a small patch of garden, enjoying the afternoon sun after a hard day’s work. The garden is compact and intimate, which helps define the more private nature of its function.

Roof garden for growing herbs and vegetables as a recreational hobby - 79

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Cozy space with plant, from which to enjoy the garden - 80

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The next and final plateau is “the terrace”, located at the top floor, with a perfect view of the city and sun from the dusk till dawn, only with minor shadow cast in the usable season. This is meant to be a space for relaxed socialization, a place where the residents can enjoy a summer barbecue and socialise with their neighbours while taking in the scenic view if the party is to big for the apartment. The deck of the dwellings extents out and creates a covered outdoor kitchen space covered from the west wind. Placed at the top of the building it becomes the more private of the plateaus and is meant for the residents, but it is nonetheless accessible to non residents if they dare.

That is the general idea of the building and the vertical transition, even though a certain level of privacy is insinuated on each floor, it is still possible for outsiders to ascend the building and enjoy the experiences of the different spaces. It is a way of giving a little piece of the old park back, which was drowned out by industry.

As mentioned earlier nature becomes an irregular element to contrast the regularity of the structure. This irregularity has then become a formgiving factor in the designing of the outdoor spaces. The buildings are laid out according to their surroundings, which is at an 30 degree angle from north, so as a way of expressing a contrast and utilizing the orientation towards north and the city, the outdoor spaces are aligned north to south. This also breaks the square platoes giving a direction to and from the staircases. Using this orientation and character of each space, has helped design each of them in relation to function, atmosphere, light and view. This can be seen in the plans in the presentation folder.

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Different levels of decks and plants creates smaller spaces - 81/82

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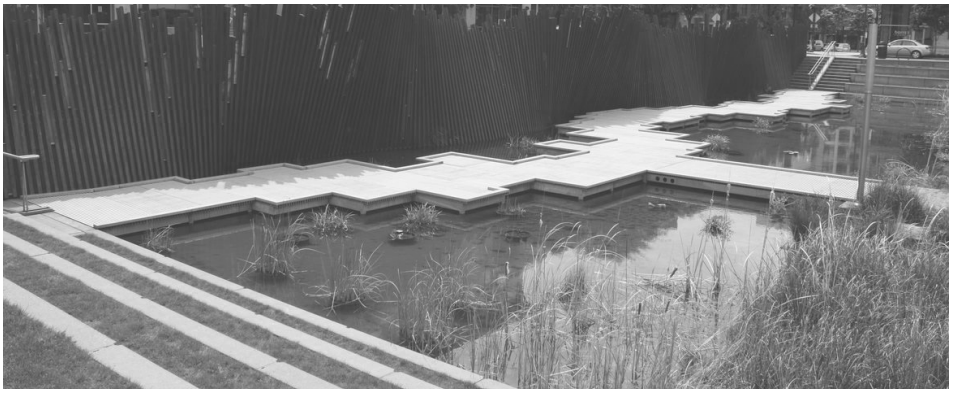
From both a practical and phenomenological standpoint, rainwater is an interesting design element. As it was mentioned in the analysis, it is important to be aware of how rainwater is handled and being able to incorporate it in the design of a building, can help prevent unwanted complications in relation to infrastructure. Water as an element in general can be very tranquil and stimulating, and using the "problem" of rainwater as a sensory element adds a quality to the plateaus letting people enjoy the otherwise discomforting weather. Collecting rainwater from the roofs, access galleries and open spaces, and then leading it down the building through the different spaces, joins the outdoor areas together. The water becomes an element that creates a living link between the plateaus, emerging only at certain points in time. Light reflecting on the surface of the water ponds, will animate the surface of the static space inside the darker areas of the forest. On the plateau called "the fall", water from above is collected and then runs of the deck, falling down in a waterhole at the bottom, which can be experienced visually and through sound. All of the rainwater from building is gathered at the entrance to "the forest" and then flows down the slope's 7m. drop as a cascade of water, becoming a sensory experience for people walking past the site. As an additional element to this cascade of water, the slope could be turned into a staircase, instead of the steel one that is there now. This area is however just outside the project scope, and is therefore not articulated in the design.



Rainwater collected to create a small pond with a path running through - 83

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Water being visually lead to a collection point - 84

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Dwelling

The new structural principle that was introduced in this iteration, is explored in relation to how the apartments become part of the collective whole, a crucial aspects that was lacking in the previous iterations. Until now the apartments implemented their own structural system, but now that the columns penetrate each plateau and in extension each apartment, the structure appears more coherent and speaks the same language. The stabilizing discs becomes a spatial element in the dwellings, separating the apartments and subdividing each unit internally. In some rooms the discs become a wall and in other it becomes a beam, if the space requires it. This gives the discs a level of flexibility, in terms of arranging the different spaces in the apartments when designing the full complex.
Only one column is visible in the center of the apartment, the rest are placed in the facades due to technical circumstances regarding cold bridges. Discs and beams are fixed to this central columns, stabilizing the apartment while defining and insinuating spaces. The facade on the front of the apartment is pushed back from the columns and discs, to create the aforementioned porch. The space is covered in warm larch laths to make it more inviting, creating a contrast to the hard surface of the concrete construction that insinuates a transition from semi public to semi private. Using wood creates a more pleasant surface, and furnishing the space to create a small nook, gives it a pleasant and inviting character. Planting boxes runs along the edge of the porch, creating a subtle distance to the gallery, where the inhabitants can control the amount of privacy by growth. It also allows for growth of herbs and alike near the kitchen.

The porch was also a part of the last iteration, but in that design there was a separation between the outside and inside, which meant that the potential of the space was not fully explored. In this iteration the kitchen is placed adjacent to the garden, in order to establish a connection between inside and outside. Being able to open the window between the kitchen and the garden an important feature, when making the space more inviting.

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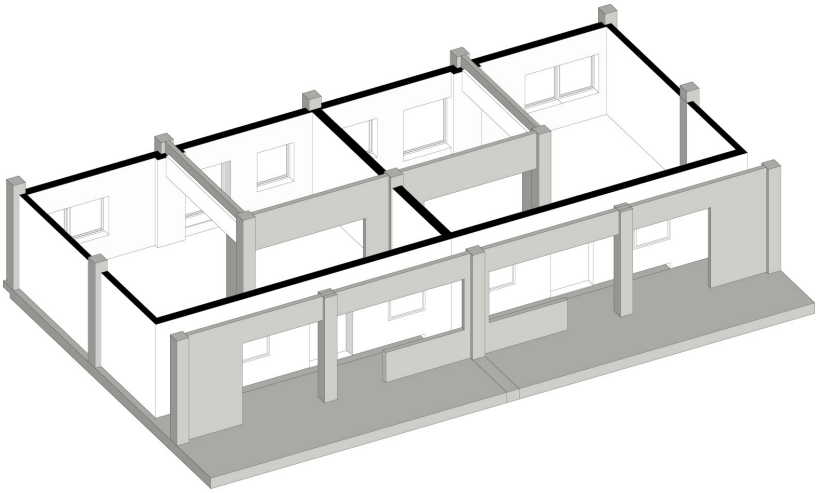

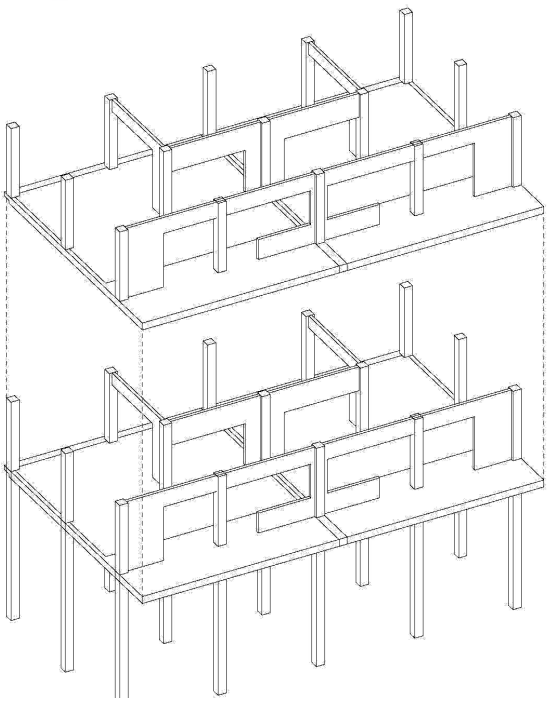

Sketch showing the columns and discs in the apartments - 85

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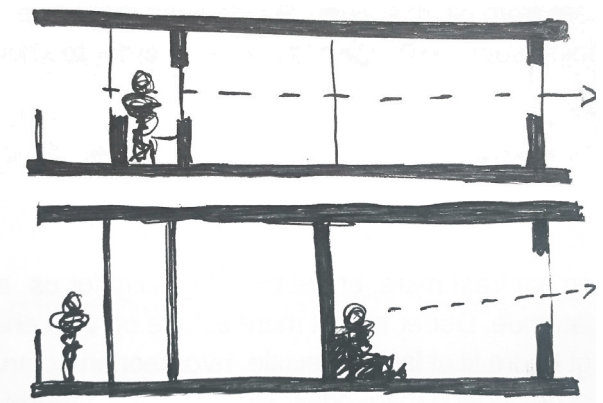
As a practical element in the design, when using the outdoor areas and if having kids, the bathroom is placed close to the entrance. The entrance to the apartment is marked by polished concrete flooring that flows into the apartment and becomes the kitchen and bathroom floor, as an area that is connected to the outside with a high activity level with easy maintanince and high durability.
The rest of the apartment has hardwood floors which makes the rooms lighter and plays on the idea of having the view on one side and light on the other. The walls are primarily white to emphasize the lightness of the apartment, with the concrete appearing in certain places to create a contrast. This also helps to show the heaviness of the construction, compared to the non load bearing walls.
Connecting the kitchen directly to the porch while maintaining a visual connection to the living and dining room was an important factor in the design, since it would create a relation between the two sides. When sitting in the nook infront of the kitchen it offers a view to a window in the livingroom with a low sil made for seating in colder seasons. This line of sight is going through the plan made possible by angling one of the walls according to it, and thus creating a funnelling effect directed towards the window in the living room. When entering the apartment through the front door, the line of sight goes straight and not angled, but the view is still aimed at the window.



Line of sight through the apartment and refuge behind the concrete disc - 86

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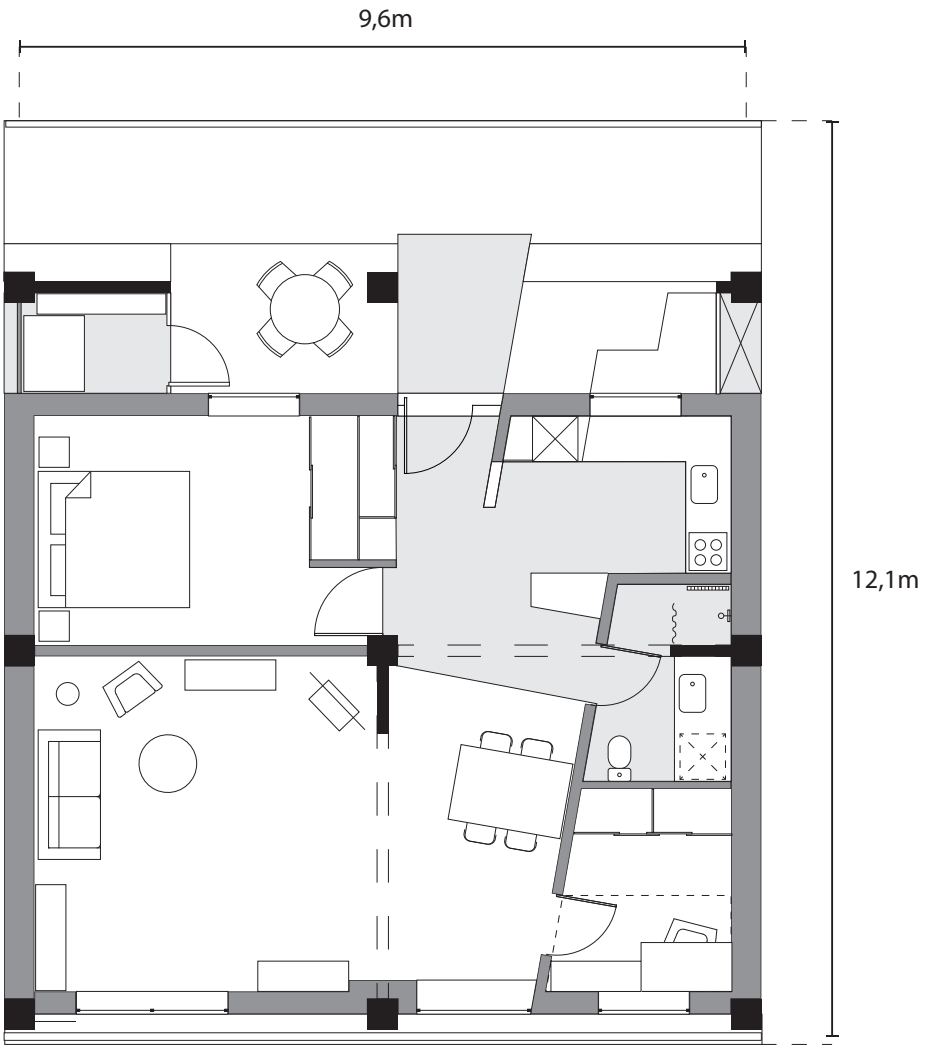

Floorplan of the apartment in iteration 3 - 87

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CONCLUSION

The method of tectonic alteration has been tested through the development of two industrial buildings, turning them into a mixed use building complex with retail, offices, dwellings and public spaces. The tectonic potential developed from the buildings relate to the history of the site by re-establishing functions and spaces of a public park, beloved by the citizens prior to the industrial establishment. This has been done through a development of structural systems, with a focus on coherency relating to the host building.
The old structure has been changed from supporting industrial functions to elevate human habitation, which can service both the public as well as residents. This gives the building an architectural and social value that a new building most likely would have been unable to offer. In terms of economy, the building would perhaps reduce some cost due to the reused structure, but the new in situ structure might counter the reduction in costs - this has however not been estimated upon. By supplying the neighbourhood with quality outdoor spaces, which the area is in desperate need of, the value of the building might be considered larger from a socioeconomic perspective.

In relation to sustainability it is important that a building has the potential to stand for a long time, and binding the function of the building to the local community, is one way of ensuring a longer lifespan. In this way the goal of exploring a tectonic alteration that fulfills the equation of 1+1>2 has been reached.

The final solution is taking many aspects into consideration, however the project is lacking a level of detail as time fell short due to the unanticipated comprehensiveness of the project and several things were cut away in the final proposal.

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The method of tectonic alteration did in general give us an understanding of how to approach the old buildings and show us what to look for in terms of potentials, but the extend of the task came as a surprise. In order to really understand the building one is working with requires a lot of time and dedication, and it is in this time and dedication that the potentials reveal themselves. So the length of our analysis and sketching became much more time consuming, despite careful planning.

Knowledge also emerged during this process, partly from studying the buildings but also from reading more literature, which made us go back and change the starting point, so the process became very iterative.
Given more time it would have been possible to fine tune the method in accordance with the findings of the practical work, and the resulting design could have been more detailed. Working with alteration it turns out, is a more comprehensive process than working from tabula rasa. But despite the difficulties in the project, this has most definitely been both interesting and educational. Our knowledge of reusing buildings might not be complete, but at least it's a start.

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REFLECTION

Working with existing buildings in relation to a collaboration with a company, was immediately intriguing since it is something that has eluded us during our time at the university. The prospect of learning to reuse a building while sparring with the owner, was a unique opportunity that we had to accept, even though we knew that it was an entirely new field of work.

Reading on the subject started an appetite and we soon learned that there was a lot to work with, but all very fragmented. There were a lot of good notions in the different literature, but all lacking an approach to the subject, particularly one that would incorporate tectonic values as part of the design premise, and when we did not find a method we decided to make one. This approach turned out to be very giving and it made us question the subject of reusing buildings and it forced us to look at, what potentials there could be in doing so. The notion of added value quickly came into play, and existing buildings became a source of unused tectonic potential.

Developing these thoughts into something concrete and usable, was a difficult and time consuming task, and we ended up rewriting the theory up until the very end. This was also due to new literature being published during the project, adding new knowledge on the subject.

Testing out the theory was an entirely different ordeal, and even though we knew that the analysis would have to be more thorough than usual because of the existing buildings, we were surprised. It took a long time to really understand the building as we have not been taught in building survays, and the initial phases kept revealing more and more of the buildings to us, in extension changing the main premise for the project development. Every time we tested a new design idea, it would have to be measured against the host building, and often it would reveal unforeseen issues. This truly made the design process iterative and everything slowly evolved. Despite always moving forward it was sometimes hard to go back, because it meant starting over and dismissing solutions as time was short early on. Going back and forth also meant integrating newly spotted issues, and finding technical solutions to these. This makes the architecture fuse with the technical aspect, which works well with our profile as architectural engineers and the subject of tectonics.

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At the end of the project, the design started to come together and fulfil the concept, the vision and the main premise of tectonic alteration.
The structural system was changing until the end of the design due to implications and the apartments as well as plateaus were only adjusted to the structure. Its full potential can only be conceived if both are informed by the structure carrying it. The final structural concept of columns and discs brought coherency and added value to the building with the structure as a spatial element, but the complexity of solving it would require another iteration. Throughout the project is was deemed essential to create good outdoor areas on each plateau, but our shortcomings in landscape design made this difficult and very time consuming. The spaces did however slowly take shape, working with the transition from public to private and utilizing the orientation around the building, made them an essential part of the overall concept and design.All of these solutions appeared so late in the process, that the project had to be concluded and wrapped up, despite unresolved issues. Ultimately it all boils down to lack of time, as it was hard to make the concept work without a holistic understanding - perhaps a better focus could have solved it, however we were not capable of spotting this in time.
We feel l that the project would have been better suited for a long master thesis. The sheer amount of literature and theory would be argument enough, but also the scope of the project in practical terms was more than anticipated. We looked to tectonic alteration as a way of solving an equation, showing us how to design the building. But during the project we learned that it is a way of thinking, more than a way of working. We tried to “listen too much” if you will. We did set up some specific steps on how to work with the building, but how to actually utilize the tectonic potential of a building, can be done in multiple ways. This became apparent through the cases of Castelvecchio and Bispegaard Museum, where the approaches were very different and still successful in their own way.
To sum up, tectonic alteration for us was a success, but the practical testing of it was a difficult but informative process. It would have been nice to develop the theory and explore the design further, but everything must come to an end, however our thirst for knowledge in the field of reusing buildings has been sparked and it will undoubtedly continue.

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ILLUSTRATION LIST

Image 01-03	Own illustration
Image 04	http://www.architectureweek.com/2009/0916/index.html. [Accessed 23/5/15].
Image 05	http://architecturalmoleskine.blogspot.dk/2012/04/peter-zumthor-kolumba-museum-cologne.html. [Accessed 23/5/15].
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Image 10	https://www.flickr.com/photos/53521870@N06/4970197411. [Accessed 23/5/15].
Image 11	Own illustration
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Image 18	http://www.kulturstyrelsen.dk/kulturarv/kommune-og-turisme/industrikultur/industrihistoriens-danmarkskort/dansk-eternit-fabrik/. [Accessed 23/5/15].
Image 19	Own illustration
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Image 71	http://tradgardsform.se/inspiritation/. [Accessed 24/5/15].
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Image 85-87	Own illustration

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