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THE TRANSFORMATION AND REINVENTION OF

STATSJK

MSc04 Architecture Grp. 10 Aalborg University 2022 Catrine Neddergaard Helleberg, Cecilie Brandt Nielsen and Lea Skov Andersen



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NIEDER MIT DEN KOMPROMISSEN!

THINK

III. 1, Berlin, Haus der Statistik





III. 2 Haus der Statistik today

READING GUIDE

This Thesis is structured into seven parts, prologue, a program which is subdivided into three chapters: Theory and thematic, analyses. The programme has a high level of literature presenting theoretical framework and analysis, creating the foundation for the second part of the report; the design phase. The design development outline different design propositions created by qualitative and quantitative examinations in an iterative process. Whereafter the final transformation of Haus der Statistik will be presented.

Throughout the thesis illustrations and subjects will be elaborated and discussed, creating a collection of literature, photographs, diagrams, drawings, and graphic material. All references in this thesis will be presented utilizing the Harvard reference method, in correspondence to that graphic material will be indicated with an illustration number.

ABSTRACT

This Master Thesis outlines the Transformation of Haus der Statistik a 6905,6m² complex building located in Berlin Mitte near Alexanderplatz. The main motivation behind developing this Thesis was to form a proposal based on the given competition material, published by Werkstatt, Haus der Statistik. The holistic approach in this Thesis has allowed creating architecture that pushes the boundaries within the traditional way of perceiving buildings, resulting in creating a City within the Building. Where Berlin's flow is extended into the building, acting as the foundation and backbone for the translation of the city. Furthermore, the Thesis addresses how Haus der Statistik was built by the GDR with aspirations to create a utopia, uniform architecture manifested an ideology that valued standardization. The re-invention and transformation of the concrete complex aim to showcase how the basis of structure can be perceived as the contemporary vision, hosting complexity, creativity, and enforcing the new diverse Berlin.

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III. 3, Berlin, Haus der Statistik

MOTIVATION

planes that allow humans to cross borders in a matter of answer is a building with the possibility for change, how hours, to the development of skyscrapers that dominate can this then be achieved? A well-known quote by the the urban environment in almost all cities. Technology Swiss architect Le Corbusier: "A machine for Living" (Le has resulted in a population increase in the cities with Coursier. 1986). A machine, something that constantwith its population of over 3 million people of different Modernist thinking was ahead of its time in relation to Business Location Center n.d.). A city with an urban combination with a program that houses society's comlandscape with buildings so big that they could be plex needs added with today's technologies is the new

"Cities in themselves"

Berlin's population and diversity entail increasing demands on the buildings' functions and service life. Furthermore, the living standards are growing. All this added has resulted in climate problems and overconsumption of CO2 emissions. Consequently, societies are constantly looking for opportunities, new ways of thinking, and solving today's problems whether it is a social or an environmental aspect. This Thesis' motivation is therefore making changeable architecture that can adapt and transform to people's needs, both today and in the future as there is a strong connection between the built environment, the social environment, and sustainable thinking (Dr. Maziar Asefi. 2012). The goal is to create a transformation and reinvention of Haus der Statistik, which is already a landmark, with a vision to

Technology has made many things possible, from air- become a social centre for the citizens of Berlin. If the enlarged social diversity, and Berlin is no exception 🛛 ly changes, a dynamic elem<u>ent (Dr. Maziar Asefi. 2012).</u> ethnicities and cultural backgrounds (Berlin Partner technology, but perhaps the thinking of that time in solution. The interplay between development and environment in the building world has been a discussed topic for many years, but still a new way of thinking and a necessary way, if we want to develop sustainable architecture. Architecture that can predict what might come next, is perhaps the solution, but by no means an easy task to solve (Dr. Maziar Asefi. 2012). When looking towards the past and study the modernistic building techniques composed by pillar beamed frames, a tight grid which was a characteristic mark for the industrialism, a structure with an idea of equality for the people, but also a structure that hold difficulties when one would articulate individuality within the mass. Perhaps the answer is in the flexible grid, and it is the grid that emphasize greater individualism. Allowing the grid to be reused, retransformed and maybe even be a part of a flexible solution. A structure there can contain the needs of the individual within the mass, maintain a melting pot, set the frame for a complex building program, and give the building the status of a landmark.



III. 4, Berlin, Stadtzentrum, Fernsehturm, Dom, Plattenbauten

BERLIN AS CONTEXT

Background 'Berlin-as-text remains first and foremost a historical text...'(Huyssen Andreas. 2022 p.60).

> Berlin is in significant ways different from other western European cities, considering Berlin has left behind a history of war, and was the midpoint during the Cold War in 1945-89, by that mean the war left a city with a written history ready to be rewritten. After the Cold War, Berlin struggled to reimagine itself as the new capital of the reunited nation, and the city became a pointer for issues, rather than being a city of possibilities. After the reunification in October 1990, Berlin became one of the most important cultural and political centres in Europe. The revolt after the Cold War led to contemporary urbanism and architecture, creating a new national identity and neglecting the historical memories (Huyssen. Andreas. 2022).

> Despite being a city with a strong history and an industrial midpoint, significantly marked by eastern and western parts, which developed independently of each other, the city is also famous for its diversity and over time the ability to embrace different cultures and minorities. Berlin is in a transitions phase, and in the border between creating a new identity but without forgetting the past. Architecture has always been invested in shaping national identities, and the idea of rebuilding and retransforming a city (Huyssen Andreas. 2022). Haus der Statistik located at Alexanderplatz facilitate the possibilities of creating architecture with historical memories and embracing the diversity of Berlin.

'Zusammenkunft'

COMPETITION

Haus der Statistik, an almost 11,000 square metre GDR Development building built from 1968-70 in Berlin-Mitte, near Alexanderplatz has been empty for more than a decade. Originally the transformation of the building was intended for private development e.g., retail and hotels. But as the house and rent pricing has increased over the past decade, the Berliners protested the private development, to secure a more communal, social and cultural plan for the district, funded by the municipality. Therefore, Haus der Statistik is now being developed as a long-term affordable place to live and work. A whole new district in central Berlin will connect new cultural Berlin with its heritage, by creating affordable housing, space for art, culture, food, education, social affairs and a new city hall for the Mitte district. Haus der Statistik is set to be completely transformed and reinvented into a social hub for the community and a high-rise landmark for the district, binding it together with the urban context of Alexanderplatz. Transforming this 50-year-old building with the district's needs as a focus will be the subject of this thesis (Haus der Statistik & Koop 5. 2019).

The following Thesis will explore the historical memories, social needs and thereby examine how to transform Haus der Statistic into a new form, fitting to the new needs of Berlin-Mitte and enabling further transformations in the future, as the needs of the city will change and develop according to time.

METHODOLOGY

The essence of The Integrated Design Process is to include both architectural and engineering knowledge. The methodology describes the iterative process, which the Thesis is going through in the search to develop and reach a fulfilled design proposal. This method is used to ensure a high level of aesthetic, functionality, and technical aspects, the method is composed of five phases, which constantly need to be explored, reviewed and reconstructed throughout the Thesis (Knudstrup. 2004).

'Integrated design process'

Problem

This phase sets the foundation for the Master Thesis. In this phase overall theoretical themes will be explored, such as historical background, the context of Haus der Statistik, transformation, flexibility and sustainability, in order to define the problem, and which tools there should be applied to solve it.

Analysis Phase

During the analysis phase, phenomenological and cartographical analysis will be used, in order to get a broader knowledge of the design aspect, these analyses will lead to design criteria and the vision for the entire Thesis.

Sketching phase

The knowledge from earlier stages in combination with integrated knowledge of engineering and architectural arts are used to design the building. This phase focal point will be on the quantitative and qualitative examinations. The tools that will be used in this phase will be both analogue, digital and physical modelling.

Synthesis phase

In this phase the accumulated knowledge, will be combined and the design proposal will be finalized. This phase also addresses the final building performances according to spatial quality and energy use, indoor climate et cetera.

Presentation phase

This element of the methodology will present the finished design proposal, ensuring that all qualities are shown. This will be done in, section, plan, facade, detail illustration, models, graphic material as well as key-figures within the engineering art.

This methodology will be utilized throughout the Thesis, to ensure coherency and substance within the final proposal, as well as the integration of both architectural and engineering knowledge.



TWO SIDES OF HISTORY

Post-war A considerable amount of the architecture surrounding us today were built during the post-war period, following 1945 – a time dominated by modernistic architecture, architecture that still stands today but are ideal for preservation, renovation and transformation (Van Der Hoorn 2015). Haus der Statistik is a significant example of this, in the following paragraph the Thesis will examine the history, framework and context of its architecture.

> The late eighteen hundreds where dominated by the power of industrialization and urbanization, entailing large capitalist investments and a momentous increasing consumption, as a reaction upon the new industrialized stylistic concept Art Nouveau was born - a style saturating the entirety of Europe with the power of consumption and abundance, searching to reinvent history by combining the new materials of the age with ornamentations of the past creating steel, glass and concrete architecture filled by adornment. The significant ornamentation and high focus upon economy created a true segregation between the social classes, by that mean objectifying and creating distinct status symbols magnifying the class distinction further (Anderson 2009).

> dissented the profuse usage of the ornament:

'I shall say that it would be greatly for our aesthetic good if we should refrain entirely from the use of ornament for a period of years, in order that our thought might concentrate acutely upon the production of buildings well-formed and comely in the nude' (Fazio, Moffet, and Wodehouse. 2014, p. 457), but it is first in 1910 that his opposing stance get the attention of other visionary architects (Fazio, Moffet, and Wodehouse. 2014). With the publication of his manifest 'Ornament and Crime' from 1913 it is truly declared that the ornamentation of Art Nouveau, Jugendstil and Arts & Crafts is the true sinner of the class distinction, and by minimizing or totally removing the usage of ornaments social differences would be equalized - by that Adolf Loos state that ornaments are crime which is said to be the start of the development of Modernism (Oeschlin. 2002). But the new developments are abruptly disturbed the beginning of World War One in 1913, causing trauma and stagnation through - the earlier so development full – Europe (Fazio, Moffet, and Wodehouse, 2014).

'In the wake of the horrors of World War One many young

architects shared a general disillusionment, indeed a Modernism sense that European culture had failed, and would have to be replaced by a transformed society' (Fazio, Moffet, and Wodehouse 2014, p. 455)

The interwar period was dominated by the development of Modernism, having its roots in the thought of being equal and removing the desecration between social classes. The Architects perceived modernism as a search to be revolutionary and as their function to reconstruct the society and solve the newly arising problematics after the depressing years (Anderson. 2009). The war ended and instant resource shortage across most fields became the dominant issue, in extension to this the need of housing where ascending. The main obstacle of architecture where how to build and re-built the society and fast as possible. As this development became the search of the modern design concept new schools got established: Bauhaus and De Stjil. Bauhaus being the core of what we call modernism today was established by Walther Gropius in 1919, establishing the fundamentals of the modern society and architecture should and would develop the following years (Fazio, Moffet, and Wodehouse. 2014). Notions from the late decade was revisited: standardization, rationalization Already in 1892, the Viennese architect Adolf Loos and mass production became the hot topic again, and architects created manifests as never before. In the search for revolutionary architecture Le Corbusier presents the ideal utopia in 1922; Ville Contemporaine, trying to break down boarders between public and private architectural spaces, by recreating the urban spaces and transforming the industrialized plans into parks as a reaction and rejection of the popularity within urban planning of this age: the garden city. The city should be crowned by central skyscrapers, creating and manifesting a new image of the city, contradicting the medieval cities crowned by a cathedral, the new cities should be crowned by skyscraper with a significant use, a vision that the architects of GDR sympathized, as the Haus der Statistik is the dominating administrative landmark for its district (Rabaca. 2016). In the following years of 1924 Le Corbusier composed an urban plan for the city of Paris: Ville Radiues – The Radiant City, using the terms of modernism to create a utopia for the people, disrupting social distinction and promoting communal living in a city for 3 million people where composed. With aim of standardization and supplying the inhabitants with an abundance of landscape and davlight. Le Corbusier was certain that he created the recipe for a healthier lifestyle and society (Montayon et al 2006)

Second World War The year is 1933 and the Nazis has officially taken over

Germany, and everything related to the new architecture were shut down, most importantly Bauhaus schools see its last days. The following years are dominated by the Second World War, where the development of architecture has been put on hold once again. During the war-time mass-production and the usage of concrete are dominating Europe, technics that will be used when the war is over to rebuilt. As the war ended and Germany were divided into two, splitting the power between the ideological opponents the United States and USSR, Berlin was divided as well, and the Cold War began (Fazio, Moffet, and Wodehouse. 2014). As the German Democratic Republic (GDR) where established in 1949 it launched the practice of architecture as an ideological weapon. The western part of Berlin, using the architecture to articulate the future and new building methods to comply with the time and display the opportunities given to the inhabitants of the west. Contradictory the Soviet followed the slogan:

'National in form, socialist in content'

to articulate their usage of socialist classicism and rejection of modernism. One of the first highly ideological projects where Stalinallee (today: Karl Marx Allee) showcasing architecture adorned with nationalist and socials ornaments to anchor them with the German identity. By that the communism celebrated the urban landscape as a tool to express the political ideology and the national spirit, using term as: equal rights and equal resources to promote their manifesto

The eastern Berlin was filled with architecture to promote socialism, where momentousness political buildings and landscaped created for marches and rallies where the dominating the cityscape. The differences of the eastern and western Berlin created a clear border between the two even before the wall were built. As Stalin dies in 1953 a new era has started with the new soviet leader Nikita Khrusitjov in the front. The Stalinist slogan are replaced by "socialist in form, socialist in content. Khrusjtjov does not disapprove of modernism like the former leader, and east Berlin are again being transformed, and the new ideology is stated by the new leader in 1954 as Khrusitiov states that there will be a shift from social classicism toward rationalism of construction and the adaption of functionalistic architecture GDR by saying "Building better, cheaper and faster". Both to showcase Soviets' bright future and socialist equality nationalist ornaments and symbols are being taken down throughout Berlin and replaced with the new 'plattenbau'. The final replacement of marching squares and demolitions of political buildings marks the beginning of the new nation after the built of the Berlin Wall in 1961 - a socialist cosmopolitan with the new slogan

'Cities make people'

is the mark of a new progressive country. As the whole of Europe is in a lack of resources and a significant housing shortage in the post-war years, creating housing is seen as a strong political weapon. The soviet aims to create most possible high quality housing utilization the prefabrication to secure easy assembly. save time and energy - highly inspired by the methods manifested by Le Corbusier. The soviets search for the perfect utopia let them to use the theories of Ville Contemporaine and Ville Radiuse as the inspiration for the rebuilt of Berlins future. Uniting the thought of functional division and Ville Radiuse created a city full of monofunctional housing districts made of high-rises articulating the concept of private and public spaces. In the development of East Berlin as a socialist city, the composition of the city plan was stated to be the important political weapon, as this will determine the architectural silbouette of the cosmopolitan As the non-hierarchical organization were linked with democratic believes, a clear structure and rationalization where key when rebuilding Berlin into "Haupstadt Germania", as where the modernistic thoughts of removing ornamentations to prove the break with history and the welcome to the new ahistorical style, supplying with a very visible paradigm shift. The utilization of new technologies as mass-production the architecture should express GDR's scientific capabilities and showcase the bright future, that are able to compete with the West. Both East and West Berlin built within the modernistic manifesto, but East Berlin built with the aim of was simply to supply the people with equality and empower the socialistic ideology. With the late 50s revolution within concrete, the construction of concrete slap architecture, plattenbau, became the zeitgeist of the dominant architectural style in socialist countries, especially within housing and institutional buildings (Dellenbaugh-Losse. 2019).

Karl Marx Allee As a part of the rejection of Stalinism,

'The first socialist street'

Stalinalleee, and Alexanderplatz where set to be transformed under the control of Khrusjtjov – firstly all Stalin monuments were silently removed and the name was that waiting lists quickly developed. As the Berlin Wall changed to Karl Marx Allee, in central part of the Allee hosting Alexanderplatz where being developed accordingly to the vision of Ville Contemporaine, building the headquarters of the most important economic sectors as the landmark of the city centre. The following houses were constructed to glorify the socialistic state and promote the politics; Haus de Lehres (House of Teachers), or the symbol of history (Dellenbaugh-Losse. 2019). Haus des Berliner Verlages (House of Berlin Publishers), Has der Elektroindustrie(House of electrical industry), The transformation of Haus der Statistik must reflect its Haus der Statistik (House of statistics) and Haus de Reisen (House of travels), all buildings that still stand today and are the characteristic of Alexanderplatz. In the aim of creating this social centrality and central district of the East, Alexanderplatz were planned around one grand visual axis to empower the state to comply with the axis they constructed the well-known landmark Fernsehturm in 1969 to advocate their technological advantages. While trying to legitimize the GDR the state was experiencing an extreme shortage of housing, nearly 60 pct. of all apartments occupied by workers lacked heating and bathrooms, by that mean and the socialist care for

the people over 100,000 apartments were built within one year using the constructivist and industrialized state of mind. The GDR believed that socialist high-rises would be an ideal tool to normalize the socialist ideology. To do so they believed that the high-rise would foster communal-living and socialist spirit, the reason why the large-scale housing flooding East Berlin has become the symbol of socialism. According to the worst financial crisis of its time, the need of housing where so crucial fell in 1989 and plattenbau became a symbol of darker times in correlation with a lack of maintenance over 1,000,000 GDR apartments are empty today. It is not just apartments that are empty, as the reunite of Berlin a lot of GDR-buildings, including Haus der Statistik, has been empty, one could ask if it is due to the lack of need

original architectural thought, without reflecting the history created by the war. The building shall reflect original approach that everyone should be equal and give people a place to live and provide people with spaciousness. As well as preserving the social thoughts behind the GDR, but without reflecting the war's history, and the communism mindset. Furthermore the building must reflect futuristic ideologies and social equality, just like it was meant to, but reinvented in the 21st century.

form, social-

- Josef Stalin & Nikita Khrusjtjov (Dellenbaugh-Losse 2019)

"national-in ist in content? "socialist in form, socialist in content"

17



Berlin, Erster Sold nach der Mobilmachung World War One

1961 Josef Stalin's embalmed body is barried **Berlin Wall is risen**

18

DOWN WITH THE WALL!

Alexanderplatz As the Berlin Wall was demolished Alexanderplatz and and live, hosting facilities as luxury apartments, offices, A new need a new usage. In the beginning of 1990, the Ger- consumption. But the new plans were not taken well by man authorities took over some parts of the buildings the proactive youth of Berlin, in 2012, before Haus der for administrative use, but as time went the authorities Statistik were demolished, demonstrations, social and decided to host an architectural competition in 1993, for the Haus de Statistik Quarter (Haus der Statistik. 2019). When GDR planned Alexanderplatz it was with Le new social and embracing environment managed by Corbusier Ville Contemporaine and Radiuese in mind, searching to develop the new utopia to present the futuristic advantages of the Soviet Union. They aimed to substitute the classic centre of a town; the cathedral with a new symbol of the cosmopolitan; large skyscrapers representing the ideology of the city. As the GDR's prime target was to promote social- and communism they decided to fill the dominating skyscraper with administrative and political use, displaying the wealth and a new city centre with the goal of creating affordable knowledge of the Soviet (Dellenbaugh-Losse. 2019). To spaces for displayed groups in the city centre. While reject and forget the history of East Berlin the winner of the architectural competition of '93 decided that they needed to demolish all buildings in the Haus der Statistik Quarter to once again follow the intention of Le Corbusier by establishing 13 skyscrapers to signalize the new East Berlin, filling them up with commercial use (Haus der Statistik. 2019). In the years after the Second der Statistik and surrounding neighbourhood should World War, during the Cold War the population of Berlin promote the social, cultural and embracing ideology were shrunken significantly since the progressing 20s of the quarter. The new plan host facilities as city hall, - showcasing a shrinkage from 4.3 million to 2.8 million apartments and their own term "zu-sammen-kunft" ex-(Statistik Berlin Brandenburg. 2022). To reinvent Berlin plaining the importance of a future together embracing and increase the population again these 13 skyscrapers the support and help between people across borders. were set to show the new ideology of the city. But due to economic reasons the proposal was not fulfilled, and the authorities kept the building until 2008 (Haus der Statistik. 2019). The next year a new competition was composed, the Berlin-based architectural firm Augustin & Frank won, and they made a proposal that emphasized with the plan of 1993. As the time before the financial crises were filled will overconsumption, the architectural measure of the new proposal reflected this. Augustin & Frank said that they wanted to utilize the identity-forming address to create the entrance to the "Mitte Distikt", by creating a new post-modern neighbourhood to work

all the surrounding administrative centre points would hotels, fitness and retail, reflecting the new zeitgeist: environmental politics filled the old complex (Jürgens. 2010). Pioneers took over the complex and created a volunteers. The worn-out buildings now facilitate the embracing spirit of Berlin encompassing a range of diversities, helping the homeless and immigrants, empowering all genders and sexualities, creating spaces for small business and environmentally friendly projects. giving art, culture and education more space. During the 2015 Art Week of Berlin groups of artists, architects and fonds demonstrated against the demolishment and for still being the new "Mitte Distrikt" that illustrates a space for culture, art, education and social affairs. In 2016 it was decided that the Haus der Statistik Quarter should be preserved, and in 2017 it was finalized and bought by the municipality with the aim of being "re-municipalized". There by it can be conducted that the Haus

> The Haus der Statistik should be transformed into a social hub as a flagship and symbol of the new neighbourhood corresponding to the idea of Le Corbusier and the recent paradigm shift by differentiating from the plans of '93 and '09. The transformation of Haus der Statistik should also consider the importance of being a part of a new neighbourhood, therefore the following paragraph will examine how to build a flagship and how to be a part of a functioning neighbourhood (Haus der Statistik, 2019).



III. 7 Berlin, June 1958, discussion about the model of the Stalinallee



III. 8. Zusammenkunft

Average rent price of residential property in Berlin from 2012 to 2nd quarter 2021 (in euros per square meter)

AFFORDABLE HOUSING

In many European cities the housing prices are rising, to the rising property rents by switching off fundamenbut nowhere as fast as in Berlin, which today has the tal market economy mechanisms. The implementation fastest-rising property prices in the world. The popula- of a rent freeze determines a maximum rent price per tion of Berlin is fast-growing, and more and more people square meter. (Hand m. fl. 2021). Implementing rent conare living alone today, which arises a pressing lack of af- trols has a long tradition in Germany, dating back to 1919 fordable housing to keep up with the demand (State of and has since been in use in extraordinary times, that Berlin. n.d). The rent is rising, while the income has failed has included both World Wars and during the global to keep up with the property market, which has led to it economic crisis caused by the Covid-19 in 2020. The has become more difficult for ordinary people, to find goal of the housing policy in Berlin is to keep rents in an affordable place to live. Although Berlin apartments the city affordable and to provide adequate living space are cheap compared with other European cities, the city for households whose income falls behind the general is increasingly facing an affordable housing crisis with a income trend (Hand m. fl. 2021). To preserve the diverlack of 310,000 affordable apartments (The local. 2018). sity and character of individual neighbourhoods and

One of the reasons for the need for affordable housing in Berlin is the lack of jobs to offer. Normally cities grow up around industry, finance and services, but because of the division of Berlin during the Cold War. This meant that the larger companies left Berlin and went to Western Germany. These Factors explain the relative low GDP (Gross domestic product) per capita compared to larger cities in Germany such as Hamburg, Munich and Frankfurt (Baléo. 2019). Hence the lack of affordable housing, Berlin got a more radical control policy in Feb- freeze, had the attended aim or a more radical solution ruary 2020, a so-called rent freeze. A policy that reacts on have we live today must be changed.

12.5



22 Chapter 02 | Theory and thematics

strengthen the typical "Berlin mixture" diversity of people by people with different income levels, social and cultural backgrounds to continue living together in the residentials quarters.

According to a graph by Statista is seen that after the implementation of the rent freeze, that the general asking rent has shortly lowered at the beginning of 2020 but is now again raising (Statista. 2022). It can therefore be questioned whether the implication of the rent



Lack of

A way to create more affordable housing for the many Furthermore, the increase of social interaction and New way alternatives could be co-living, a subject which was discussed and utilized during the post-war era as well. The lack of alternative households has led to further exacerbation of Berlin's housing problem as ageing and shrinking households encounter an empty housing market. The number of single households in work is increasing. Even more, people are living alone, but that does not necessarily mean they want to, where too many ends up living with flat mates in homes that aren't designed for it. Social interactions and relationship are vital for having a healthy, happy, and meaningful life where the feeling of social connectedness is positively influenced by social activities (Seemann, Jahed, and Lindenmeier. 2019). Living in a co-living household are social activities natural implemented in shared-living spaces, and still prioritizing people's individual privacy.

Communal living refers to a housing model where the individual occupants have a private housing space, but with access to several communal facilities such as shared kitchen and dining space, laundry facilities, gyms, workspace and gardens. The shared facilities allow the individual to rent or buy smaller in turn of getting more affordable homes. Having access to communal laundry facilities or shared kitchen space for example reduces social make-up as wished and demands for the future the need to have a washing machine and a larger kitch- occupants. en within the living space being rented out or bought. Facilities that might be beyond their financial means if they lived alone.

shared resources within the building could foster a of thinking greater sense of belonging, and a general mora healthier and happier life (Space10 & Urgen.Agency. 2018). Why Co-living could be an attractive way to live in Berlin, as it enables more affordable housing through a better use of space and sharing living cost and along brings with it a number of benefits beyond the lower purchase of costs as encouraging people to interact with each other and reduce the problems associated with loneliness. As the larger cities struggles to provide adequate and affordable housing caused by the urbanizing and growing population. The way of living is in radically need change of our future homes to get used to be living with other people and enable people to be a part of a community.

The rising need for affordable housing in Germany, and especially Berlin, has over the past years led to cooperating and collaborative housing initiatives as Baugruppen. Baugruppen is a profit-driven housing develop company that emerge in the German housing market in response to the growing need for urban housing with the increased focus on affordable housing. Every project is made in collaboration between architect and clients, where to ever project differs in its expression,



III. 10 Berlin, Demostration against rising rent prices. Photo: Peoples Dispatch





12. R50 Cohousing / ifau und Jesko Fezer and Heide &

R50 BY IFAU UND JESKO FEZER + HEIDE & VON BECKERATH, BERLIN 2013

An example of the work of Baugruppen in Berlin is the R50 by Ifau and Jesko Fezer + Heide & von Beckerath, a building venture project for low-cost and affordable housing offering capacity for adaptation and flexibility throughout its lifetime and is made in close cooperation between architects and residents. Consisting of three blocks with 19 apartments, a studio and various shared space facilities. The building complex is located in an area of a 1960s post-war period residential neighbourhood. To meet the owners and residents' aspiration for collective and affordable living, the architectural concept is based on a compact concrete skeleton structure with one access and two service cores, a timber façade, and suppended steel construction for the all-around going

To meet the owners and residents' aspiration for collective and affordable living, the architectural concept is based on a compact concrete skeleton structure with one access and two service cores, a timber façade, and suspended steel construction for the all-around going balconies connecting the apartments on each floor. Every apartment and additional community spaces was developed by an intensive process in cooperation with the users and architects. The sizes of the apartments are based on the structural framework and individual requirements for the floor plans accommodated. Further on was a common standard for fixtures and fittings developed and defined, resulting in a collective approach to the interior fittings. The structure and yet open design process has allowed for wide participation, self-directed design and led to mutual agreement on type, location, size and design of spaces shared by the residents. Facilities including urban garden, an access ramp leading to a covered area, a workshop, a laundry room, and a

n Beckerath

Functions





BIGNESS

Haus der Statistik is not a typical skyscraper, it is rather skyscraper can be compared with the grid lines of Mana large building block that has to be perceived with bighattan, each square within the grid is developed individually with no relation to the other squares, the only thing ness in mind. Beyond a certain scale buildings become big buildings, where the mass is so exaggerated that that relates the two are the gridlines and the circulation there will be a clear division between core and crust, of roads and streets between them. The architecture filling out the odd shape created by the circulation, the architectural gesture will no longer be able to imply what happens behind the crust, hence the honest designing the paths and functionalities of the building architecture gets a new meaning in the large scale. The separately, is key when building big. A building such as big building will not be able to be controlled by single Haus der Statistik, constructed upon a strict grid, should Urbanistic be developed as Manhattan with individual squares form gestures anymore, even several gestures will struggle to create an impact on the building. The architecture containing the functionalities of the city, and the grid or will be perceived as so grand that it is no longer just a backbone of the building should act as the circulation building but a "City within the City" (Koolhaas. 1994 p. system of the city operating as roads and paths within 89). By that mean the architecture must be planned by the urbanistic building. To complete the true urbanistic separating the exterior and interior. The interior must form of the large building, it must be a landmark, and to handle the program, iconographic and instability, while do so it must adopt a form that resist from easy classifiplanning the urbanistic form of the core, should be done cation, combining the art and efficiency, one could say as an urban planner developing the urban scape of a that it must adapt into the big cities skyline to both fit in city. The exterior works as an agent of disinformation, to and stand out, being the architecture that flow on the facilitate and apparent stability of an object, that aim to border between existing and coexisting to achieve the Large scale recreate and reinvent maximum possibility of the bigform of a sign for new urban complexity. As proclaimed ness. Architecture and bigness acts as opposites, one latter, the crust is the only true aspect that can act as a that reveals the core and one that perplexes, as it no landmark, as the core is too complex to interact visually longer just summarizes the city, but it combines the urand complete with the surrounding city. ban mysteries, as the large building is no longer "what By that the core must be executed as a complete you see it what you get" (Koolhaas 1995. p. 501). Bigness three-dimensional city, facilitating broad multifunctionis the new architecture that disassociates from modernalities, meeting point and thoroughfares plugged into a meticulous grid aiding the possibilities creativity as the ism by the accumulation of the city's functionalities. The large scale is so grand that it is no longer a part of the fixed form allow individual liberty for the architecture to cityscape, but it is an urbanistic form that coexist within develop within. The transformation of Haus der Statistik the city, it acts as neighbourhood or an urban area of should be developed by dividing crust and core and the itself, thereby the large architecture must be planned two should be connected by a continuous circulation system, this with aim to succeed the design of bigness and programmed how one would program a new neighwithin an even bigger city. bourhood or a new part of the city. The sharp lines of a

CENTRE GEORGES POMPIDOU BY RENZO PIANO AND RICHARD ROGERS, PARIS 1971-1977

a landmark for the centre of Berlin, a case study enabled the building despite its obvious construchas been conducted, Pompidue is seen as a land- tional limitations to stay relevant for the past 40 mark located in one of Europe's most famous cities years (Crook. 2019). Paris. Therefore will the following section analyse Pompidous core values, and architectural quality, By placing the escalators floating crossing the so some of these qualities can be incubated in the façade dialogue forces the visitors to travel from project.

high-tech architecture pioneers, Renzo Piano and come to percept other humans as well as to expe-Richard Rogers in the centre of Paris, acts as a rience art, why when designing they had an intenmultifunctional cultural landmark of Paris with its tion to practice the building as a theatre. Further expressive and flexible design.

an array of different functions like, museums, exhi- the building where Parisians and tourists cross bitions, theatre, library, and a cinema. By its radical paths by enabling a natural flow between the two design the building almost looks like a spaceship spaces. The building with is extraordinary design that landed unexpectedly in the middle of Paris, and cultural functionality has become one of Paris' showcasing its flexibility and transparency of con- more important landmarks of the city (The Centre temporary of the building. The exposed structure Pompidou. n.d). enables the internal spaces can be rearranged and allows each floor plan to be totally flexible and open for change of needs of the programs the The Centre Georges Pompidou is a fine example building must host. The extreme range of flexibility of how to create a flexible and ever changeable is made possible by having massive floors with no design, that can be changed and transformed as vertical interruption, placing colour-coded build- the use and needs of the building change over ing services, corridors, and people's movement on time and stay contemporary, but where the buildthe outside exterior, where you theoretically can ing still remains a landmark of a big city.

Since Haus der Statistik has the vision to become do anything, you want with the floor plans. This has

the ground level up along the facade to external corridors and creates a dynamic ever-changing The Centre Georges Pompidou designed by the façade. The Centre Pompidou is a place people on the building is placed on the side of the piazza to create a place for people to meet, stroll or rest Acting as multifunctional building, Pompidou hosts and serves as a strong link between the city and

"The one thing we knew about this age is it's all about change, if there's one constant, it's change,"

- Richard Rogers



III. 14, Centre George Pompidou, west elevation

III. 15, Centre George Pompidou, east elevation

TRANSFORMATION RATHER THAN DEMOLITION

because it means "changing into a new form, occu- architectural features, thus ensuring that buildings and pying a different position, and changing what one is." towns are not destroyed but that their contributions to (Durmus Ozturk Serap 2017. p. 25). The need for change society are preserved (Andersen, Nicolai Bo. 2015). is increasingly relevant for societies around the world where over-consumption and increasing living demands Haus der Statistik threaten the sustainability of resources. The most sustainable option when building is to use materials that are first generation of industrialized buildings. It is generally already on site or in the construction (Jäger, Frank Pe- characterized by brutalist building practices, which have ter. 2010 P. 11). Furthermore, globalization has compelled left Haus der Statistik with a static construction but with architects to rethink sustainable environments and a dynamic life within and around the house. It was insustainable developments within multicultural societies spired by modernistic ideas resulting in pure forms, (Durmus Ozturk Serap. 2017). The transformation rather straight lines, and functionality; The construction was than demolition of buildings can result in site-specific thought to symbolize progress, equality, and democracy. and contemporary architectural forms while addressing the need for sustainability and resource efficiency (An- In the 1910s Le Corbusier defines a building as "A madersen, Nicolai. 2015).

The contextuality of transformations

pre-existing givens of the site. An urban context, the equality did not account for individuality. Nonetheless, historicity of a place or building, or an existing construction the Haus der Statistik can be reinterpreted from a contion that might be worthy of preservation because of its temporary perspective and thereby, coincidentally, by aesthetic or cultural significance. Thus, the architectural using contemporary methods transformation, invigorate work becomes a matter of finding, changing, adjusting, the ideal of movability in the machine as it was intended developing, and bringing forth old ideas and invigorat- to be. Transformation is about realizing the value in the ing them with new life or sometimes preserving them. A existing building and thereby combining old and new. transformation can change a given technical, historical, Finding the values behind the international style and and phenomenal situation into a contemporary, archi-building on top of the existing history. tectural whole (Andersen. Nicolai. 2015).

tion, reconstruction, repair, transformation, and addition Nicolai Bo Andersen's theory about the ability of transreconstructed and something new is designed. An inte-precisely 'the structures' ability to morph and accomgral part of transformation is the preservation of cultural modate a variety of individual preferences or usages. heritage as well as site-specific and material recycling. The study of the properties of used materials, the his- The next paragraph proposes a method for transformatory of architecture, existing architectural culture, and tion.

Changing into Transformation is conceptually connected to change existing structure can provide insight into significant

chine for living in" (Le Corbusier. 1989). A machine includes functionality, efficiency, and moveability, which can be integrated with the values of art in transformable When transforming a building, one must consider the buildings (Dr. Maziar Asefi. 2012). Le Corbusier's vision of

In this paragraph, we have explained how transforma-According to Nicolai Bo Andersen, we can intervene on tions can help address the problem of overconsumption an existing building with the following methods. Subtrac- of resources when building. Additionally, we referred to describe different methods that can be used on an ex- formations to preserve existing ideas or features in a isting building structure. The architectural intervention building. The Haus der Statistik was inspired by a vision consists of subtracting materials, then the materials are of equality, which in turn today may be reinterpreted as

III. 16, Berlin, Haus der Statistik

CONSTRUCTION

Transformation Taking a closer look as renovating constructions pro- can make the architect afraid of changing the building, gram shall now provide some background information. vation of constructions and or renovations of buildings more generally and then the project will address the status of the Haus der Statistik as a landmark *(Jäger, Frank* Peter, 2010).

> New buildings may be expensive, so an investor may decide they are not worth it.

> Buildings with landmark status may not be demolished but could be incorporated into new development.

> An existing structure may already be there adding the price of demolition to the already high cost.

> The area of the existing building may no longer be permitted for new buildings.

The political symbolism of a building may be a reason to work with an existing building instead of demolishing the old one (Jäger, Frank Peter. 2010).

For a long time, the act of transforming an existing building was seen as an act of mercy from the architect. However, the actual reason that the architect wanted to integrate parts of an old building into a new could just as well be to preserve the atmosphere of the landmark. Also, the architect may have hoped that the new building would profit from the functional strengths, the historical background, the characteristic style, and the ideas from past architect.

As we mentioned previously, before the transformation begins the architect will recognize and analyse the background information of the transformation. Le. learn what kind of building is transformed. The architect may pose questions such as what characterizes this building? What about this building should be emphasized? Are there elements that would be worthwhile to restore? What will the existing fabrication of the building enable? (Jäger, Frank Peter. 2010).

Changing landmarks

Haus der Statistik is becoming a landmark for the new guarter. Often people care about their landmarks which

but architecture embraces the living space, and a land-First, referring to Jäger & Frank Peter the project must mark should be no exception, it can be transformed if present some reasons that may motivate the preser- done properly. Our goal in this regard is that Haus der Statistik remains a landmark that continues its importance and remains a part of the neighbourhood. In the 1950s and 1970s, Germany experienced a post-war construction boom, and factory production was used to create a structural frame system that these many buildings contained. Unfortunately, several of these buildings later turned out to be energy-inefficient because the industrialization of the construction process at the time had not been fully developed. Buildings from that time are now approaching the end of their lifespans as they fail to live up to current standards. This problem along with the changing needs of the people living in them, and requirements for buildings services, makes it necessary to modernize these buildings and remove some building materials.

> The following section will therefore examine how Haus der Statistik construction can be transformed from a technical perspective. The first section will explore how to transform the façade of the building. Then, analytical considerations when transforming the structure will be addressed.

Facade

The facade of a building shows the overall architectural expression and identity of the building. But in addition to the aesthetic significance of the façade, it is equally important for the building's energy consumption and indoor climate. Therefore, the facade is a crucial part of a transformation

When transforming a building it is important to distinguish between buildings with landmark preservation and those without. Therefore, it will be a priority with a historic building as Haus der Statistik to keep this Landmark status in mind in the transforming phase. Haus der Statistik was constructed in the late 1960s, and it lacks behind today's energy standards; therefore, the façade must undergo a major change. Since the project will be working with a historical building, the challenge will be to retain the original style while modifying it and satisfying contemporary energy requirements. Frank Peter Jäger highlights three ways of transforming a facade when working with buildings that have landmark status and these are mentioned below (Jäger, Frank Peter. 2010).

Retaining the existing facade, In this case only the construction elements are modified while preserving the original appearance. This method requires repairing profiles, reconstructing the old profiles, or replacing the original glazing. This improvement only achieved a minor reduction in energy.

> Supplementing the existing facade, In this case is the existing façade retained as outer layer, installing and additional interior glazing or insolation or an additional exterior option. This method can help meet current standards

> Replacing the existing façade construction, This measure makes it possible to recreate the original appearance. Meanwhile, this method makes it possible to satisfy the energy demands and give the façade a new story (Jäger, Frank Peter. 2010).

Windows

Another important element in the building façade is the windows. Not only for the overall expression but also because windows are the building's weakest link with regards to energy efficiency. Buildings from 1960s are known for their large glazing elements and Haus der Statistik is no exception with its 33% glazing part. The overglazing results in overheating during the summer and heat loss during winter. The modernist was not concerned about the energy consumption at that time. In 1950s and 1960s windows changed from single-glazed to double-glazed windows in a single frame. The early aluminium construction of the 1960s also had thermal bridges at the connection point and insufficient thermal insulation, which led to moisture problems.

Ventilation problems

In buildings from 1960s it is necessary to compensate for disadvantages such as overheating and heat loss resulting from the high percentages of glass area. Furthermore, the glazing was fixed which resulted in the inhabitants not being able to create airflow by manually opening the windows and since the modernist style had no ornaments, the façade had no exterior solar screening system. The solution to the above-mentioned disadvantages was to implement air conditioning for interior spaces. Although new air technology was used to compensate for the heat the solution led to an increase in energy consumption and discomfort for the user. It was first in 1990s that the holistic assessment of energy efficiency was introduced (Jäger, Frank Peter. 2010).

It is argued that transformations are generally cheaper than new buildings and are the better solution for Haus der Statistik. However, some considerations when transforming Haus der Statistik are discussed and some are elaborated upon. In brief, the building is a landmark, so it is important to the neighbourhood but only by transforming the building will it have new life and continue to bring significance. Furthermore, different measurements highlight what is possible to modernize and upgrade buildings from the 1960s to a standard that approximates contemporary building requirements. However, because this is working with an existing building some defects and faults will emerge even with new insulation, change of heat-transmitting areas, energy upgrades of windows and changes to the roof to reduce the risk of water damage on the roof.

FLEXIBILITY

changes

Respond to In today's society, there is a tendency to use more re- apartment sizes, and thereby create either joint or sepsources than what is essential, therefor change is inevitable. Either the way of life must be changed, or the way can be provided with new spaces. Allowing the user to we build, otherwise these changes will be forced upon the society (Norberg, Kaj. 2019). Haus der Statistik is located in a district which is becoming a new public, social and cultural centre of Berlin-Mitte. Haus der Statistik has an ambition to become a multifunctional building, with the ability to adapt to different functions within a sustainable agenda (Haus der Statistik, Koop5. 2019). Architecture should respond to the frequent changes in life through transformable space. Therefore, this Master Thesis will examine how flexibility can create architecture in a future-proof way, with different social use, without the risk of overconsumption. Flexible buildings can be a new way of thinking and solving the overconsumption in today's society. By using flexibility principles as a tool, it can create a foundation for a sustainable solution with minimal energy and material waste, and thereby award a society that decides to be more sustainable (Norberg, Kaj. 2019).

> This paragraph aims to define different levels of flexibility, and thereby design a building that can adapt to the pre-emptive changes. With the intention to create a building there can be convertible rather than be torn down. Different spatial principles and logics produce flexibility in their own manner. There are several ways in which a building can be made flexible and categorized into different focuses and scales (Norberg, Kaj. 2019). In collaborate with Kaj Norberg theory a diagram showcasing the flexibility strategies has been conducted.

'Flexibility

in scale'

Small scale

Flexible architecture can be found in small-scale: room and plan level, within the building structure. The spaces Spaciousness can be subdivided into separate rooms, they can be left open, or they can be a combination of both (Jyrki, Tarpio. 2016).

> Left open: A large open space offers advantages in terms of flexibility. In this kind of space, it is possible to occupy areas of a desired size intended for different functions without being restricted by dividing walls. It is easy to change the size simply by moving the furniture. This example requires a services core, leaving the space free (Jyrki, Tarpio. 2016).

> Separate rooms: Non-hierarchical spaces, creating rooms a similar size, with non- defined corridors, allowing the user to change the function, but still with the possibility to have separate rooms, and route variations (Norberg, Kaj. 2019).

> Partitioning walls: A plan with, with soft sections, partitioning walls, and thoughtful placement of services (kitchen and bathroom), can make it possible to change

arated rooms. By using movable or sliding walls, the user quickly add an extra room (Norberg, Kaj. 2019).

Combination of both (shared room): With a shared room, between two apartments or functions creates the opportunity for adding or removing a room, because the shared room can be swapped between two different units (Norberg, Kaj. 2019).

Medium scale

Medium scale will mainly focus on the construction. Construction is equally important as the plan. It can be sub-divided in different elements, to make a clear un- Construction derstanding of the different elements.

Frame: A load-bearing frame makes it possible to implement infill in different ways. The frame will in this case act as the bearing and stabilizing element, which either could be construction or a bearing core, the construction will allow a freely plan and functions.

Disassembly: Easy Disassembly & exchangeability can also be a way of designing flexible. Using screws and nuts rather than nails makes It easier to separate later and by minimal damage to materials. By creating visible joints can it be easier to disassemble the construction.

Clear spans: By creating clear spans, and thereby make non-loadbearing internal elements, allowing for the interior to move freely. Non load bearing partitions, will make this possible.

Roof construction: The roof construction can also define the level of flexibility, it is an important element when it comes to vertical additions, flat roofs are easier to add to than pitched. By implementing over-capacity to a construction one can ensure that the building can withstand addition in the future (Norberg, Kaj. 2019).

Big scale

Big scale is when the entire building can be flexible, a building can expand horizontal or vertical. This requires Building that extensions are included into the planning, allowing for add-ons on top of the roof, or extensions to the side, front and back.

Furthermore can there be created slack space. Slack space is a way of constructing that leaves a certain amount of the building volume empty, allowing for the inhabitant to fill it out over time (Norberg, Kaj. 2019).

This Master Thesis will strive to incorporate flexibility in medium scale, and small scale in some extend. The focus will be on creating open spaces and use the construction to create flexible rooms which can accommodate various functions.

III. 17, flexibility diagram inspired of Kaj Norberg

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SKIN. MEAT AND BONE

The central metaphor

The method "Skin meat and bone" promotes the understanding of the building as a tectonic principal in a ho- A feature of this method is that it allows one to underlistic manner. The central metaphor is that the skin is the stand that a building is always constructed by different building façade, the meat is the space, and the bones systems, each with individual lifetimes. According to are the construction itself. We shall briefly elaborate on Steward Brand (1938) the buildings' skin (façade) has a the "Skin meat and bone" metaphor in the following (An- normal lifespan of 20 years, whereas the meat service dersen, Nicolai Bo. 2015).

On a body, skin is the organ that separates the outside from the inside, and the first thing that another organism sees. Likewise, the aesthetic impression of the façade shows the building as the architect want to present it. The contextual aspects of the building are considered skin-aspects as well because they affect the aesthetic impression.

façade. The rooms of the building and their interrelations are meat-aspects of the building within the "Meat, skin and bone" perspective. Thus, a plan of the building would be considered a meat-aspect.

The bones are the construction itself. They may be crucial characteristics of a building as they can create spaciousness and atmosphere to the building, i.e., the bones are the frame of the meat. However, the construction can be more neutral and consist of a barring façade and inner walls. Bone is often shown in sections where one can see the construction detail and how the load is transmitted through the various load-bearing parts of

the building (Andersen, Nicolai Bo. 2015). Sustainable design

and interior often require changes after 7-15 years. The bones (Main construction) only need chances every 30-300 years depending on the quality. By consulting the method early in the projecting face, one can consider the lifespan of each element and thereby making the design more sustainable. For instance, the bones might not need transformation if the quality is sufficiently high. Consequently, we argue that according to the "Skin, meat and bone" method the existing construction in Haus der Statistik can be preserved and reused. Fur-The meat is the spaciousness of the building behind the thermore, a flexible solution on the inside may help to extend the lifespan of the meat. The method is therefore used as an analytic way to relate to the Haus der Statistik. Further on in the design process this method will be utilized as a design tool as well (Andersen, Nicolai Bo. 2015).

SKIN The membrane Lifespan of 20 years

BONE The construction Lifespan of 30-300 years

THE SOCIAL HUB OF HAUS DER STATISTIK

Social sustainability In the search to define social sustainability one must first define sustainability. A term that became distinguish after the publishing of the Brundtland Report in 1987, defining sustainability and 'The Common Future' as the search of enhancing global well-being, health and life with justice and peace. As by that sentence it is clear that the perception of sustainability has changed quite significant over the years, as sustainable and 'environmentally friendly' architecture in the beginning meant that the architecture was sensitive to the environment and the nature (Renoldner. 2013). This has changed to a more holistic approach where several criteria must be fulfilled to be labelled 'sustainable', from macro to micro scale considering topics as environmental, economic, social, global and regional effects (Stender and Walter. 2019). To navigate within the sustainable building industry several 'Green Building Certificate Systems' has been developed, containing systems as LEED, BREE-AM, DGNB et cetera. But DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) has been acclaimed to be the most adequate when considering the social sustainable aspect. By that mean this system will help to define the rather undefinable term of social sustainability (Stender. 2018). As social sustainability can contain everything from a good indoor climate, life quality, and equal possibilities to gentrification or well-being it will take a holistic approach to understand the versatile methodology, which does not have a general scientific definition. With the use of a framework composed by Marie Stender in collaboration with Leierbo in 2018 social sustainability has been divided into three categories: Accessibility, Social cohesion and Participation process (Stender. 2018). The three categories aim to include the "softer" aspects of social sustainability, as earlier has been rather countable criteria dominating social sustainability, such as indoor climate, daylight, and meeting points. Criteria that can be winged off before a project has been erected, but social aspects should not only be planned before a project, but it should also be evaluated and replanned throughout the process and revaluated when the build is finished and once again when buildings 'real' life has begun. To comply and attempt to promote the social sustainable forms, the current conditions must be mapped beforehand (Stender, 2018).

Haus der Statistik and the social hub there is today began during the Art Week of Berlin where and group of artists attached a large sign to the side of the building, to start the discussion of why this building filled with socialness, culture, diversity and art should be demolished in aid of commercial trades. The 'haus' developed from pioneers, artists, architects and volunteering foundations occupying a building with no focus on economic exploration, but only on the social functions and the community (Haus der Statistik Vol. 3. 2019). Letting the premises be what the people want and what the districts need, a 11,000+ square meter building complex was transformed by function and became inhabited and needed again, without any transformation done to the built body. When transforming Haus der Statistik into "a quarter oriented towards the common good with a special variety of uses" (Haus der Statistik Vol. 1 2019 p. 25) the social activities within the building, and thereby the identity and soul of building, must be preserved and respected to complete a successful social sustainable piece of architecture. As a matter of that pioneers and the current users has been involved from the beginning and throughout the process, as the developers of Haus der Statistik state that the users must be able to use the house during the development and be a part of what is happening, as it is their facilities and there is a joint responsibility to obtain the wanted success (Haus der Statistik Vol. 1. 2019)

I collaboration with the theory of Lejerbo and the statements of Haus der Statistik a diagram showcasing the social strategies of the latter has been composed, as shown on the corresponding page, on the following spread the current functionalities that should be preserved has been mapped out by a photographic analvsis.

This paragraph define how social sustainability can be understood in many ways, and how a project should be analysed before, under and after to make sure that the social thoughts behind the project are kept. The transformation of Haus der Statistik must therefore preserve some of the social activities within the building, to preserve the identity and soul of the building. This must be a clear element in the building and function program.

CIPATORY

SOCIAL COHESION

ACCESSIBILITY

work

III. 20, zero waste showroom

l. 23. bike

TEXTIL WERKSTATT / textile workshop FAHRRAD WERKSTATT / bike workshop

OF MATERIALS SHOWROOM

Showroom with different items to buy and reuse, both by the public and the pioneers.

III. 25, zero waste storage

ZERO WASTE BAU- UND KREATIVMARKT zero wastemarket that sell items that should had been thrown out, such as wood, fabrics, furniture and decorative items

SONNEN BEET / mushroom growing workshop

HOLZ WERKSTATT / wood workshop

I. 27. KO-markt

GÜTERMARX TRIFFT **O-MARKT**

Thrift market, with homemade and used items as well as produce

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Existing Functions

Room

Co-cooking

Educational cooking

Mushroom farm

Aquaponics farm

Fish farming

Crop plants

Distribute reserved food

Bicycle workshop

Metal workshop

Wood workshop

Educational offers

Room Theater District Canteen (Kiezkantine) Cinema halls Dance and music events Communal gardening (Sonnenbeet) Neighbourhood events Choir de Statistik Participation and intersectionality War work Fermentation(Sour dough, butter, miso) Refugees Homelessness Selling organic local produce from farmers Solidarity sewing Alternative approach to production of textiles, products building materials, household, furniture Jugend aktionsraum Soup kitchen Non-profit organizations Neighbourhood-counsil

Open workshop, e.g. sewing

Well sorted material warehouse

Political summer schools

Upcycling

Kunst und Klima

Graffitti lobby

Juggling workshop

Print workshop

Publishing

Art exhibitions

Culture

and

stage

Offer space for diverse and marginalised groups

Offer spacce for arab and north-african people

Short-term distribution of food and hygiene

Contact point for street work

Organize demonstrations

Free Radio

'Car free Berlin'

Neighbourhood and Civil society

Existing Functions

As Haus der Statistik Quarter consist of 50,000 square metres (Haus der Statistik Vol. 1. 2019) and the current Haus A is only 20 percentage of that, this paragraph aims to display all the current functionalities of the guarter, as not all these functions are able to be a part of the new building program, as it is limited by square meters. As stated in the previous paragraph it is key to preserve a great part of the social activities within the building both to ensure a socially sustainable building program, but also to preserve the new identity and soul of the quarter as a mixing bowl between cultures, ages and social rank. To fulfil this, current functions should be selected with carefulness to protect the high level of mixing, implicating that the new program should not only be planned for the homeless, the youth, or refugees. It can thereby be conducted that the new program should consist of functions from each of the five categories displayed on the subtending page. And to ensure that there are functionalities that represent both the daily users, the neighbours, the tourist, and the people who work or live within the built form.

Material and cycle (re-use and re-produce)

Arts and educations

LORENZO III. 28

USERS OF THE HOUSE

ple. A city rich in diversity but with large fluctuation in tures, ages, and social statuses and aims to produce a cultural understanding and needs. With the social goal community of support, creativity and learning from the of Haus der Statistik, a house with a structure there can users and pioneers that can lead to a more positive contain a melting pot it is very important to understand collaboration between people. The uses of pioneers the user of the house. Therefore, a user-oriented meth- are based on solidarity, community and correspond to ods like persona is implemented to create a greater sen- a vision of communal neighbourhood, where all memsibility towards user experiences. Following the social bers' different needs and interest are respected. With an sustainability paragraph, architecture should not only orientation towards the common good, the projects are be designed as a visual object but with a deeper under- characterized by cooperative synergies between the standing of humans' needs, emotions, and experiences. participants (Haus der Statistik. 2019). Today it is found difficult to translate research into a design, the translation can often be oversimplified, and The Haus der Statistic is a platform allowing growth in often a social design solution end in greenwashing rath- unity with people from all social layers. Those er than involving the user in the design phase (Doktor Olsen Tvedebrink, Tenna. 2020). By implementing persona- method in this Master Thesis will amplify how to transform empirical data into fictive characters and see the individual in the crowd (Doktor Olsen Tvedebrink, Tenna. 2020).

User-oriented Berlin is a diverse city full of history, culture, and peo-

Homeless person (Lorenzo 40+ year)

Lorenzo grew up in Romania like many others he lives on the streets of Berlin, and this means that no days are alike. Lorenzo is in his late forties with no close family, and his life is in a limbo between engaging with new people and being on his own. One of the highlights of his day is talking with the staff in the soup kitchen and getting temporary shelter in Haus der Statistik. Furthermore, he enjoys that the soup kitchen is easily accessible. The accessibility makes it easy for Lorenzo to visit the soup kitchen, as his lifestyle has caused a bad back and other minor injuries which makes it harder for him to walk around.

Key problems

- A place to seek temporary shelter, protection from the weather and society.

- The feeling of being a part of a solidarity and existence.

- Distribution of basic needs like food and hygiene facilities.

Student (Sarah 14 year)

Sarah is 14 and comes from a lower-class home struggling with family problems. Problems that often make her feel alone and lost. When things go too far at home, the Haus der Statistik Jugend Aktionsraum is a place she seeks comfort, and where she is able to talk with adults and other young peers struggling with the same difficulties. Being young and at-risk often leads to feeling forgotten and discarded by the society. The Jugend Aktionsraum creates a safe space for young people like her to escape.

Key problems

- A social and professional network. - Shelter from struggles at home. - A community for other young people struggling with the same problems.

Pioneer (Leoni 50+ years)

Leoni has always lived in Berlin and has been in close connection with the community. She has always liked to travel and understand different cultures and talk with new people. For the last couple of years she has worked as a teacher in the evening, leaving her days free. Besides that, she has a high interest in living a sustainable lifestyle and growing her own herbs and vegetables, an interest she would like to share and give to others as a pioneer at the Haus der Statistik quarter. Her teaching skills give her the opportunity to bring a wide range of experience in how to gather different people and expertise from earlier projects into Haus der Statistik as a pioneer. Leoni is excited to follow the vision of a communal neighbourhood in which all member's different needs are respected.

Key problems

- The need to develop and exert projects with high focus on sustainability.

- Meet new people with different cultural backgrounds.

Barastia (Felix 25 year)

Felix is 25 and just finished his education as a waiter. He works at a coffee shop located near Alexanderplatz and is always on the move. His work allows him to talk with different people both Germans and tourists. The salary as a waiter is minor, why Felix is in need of an affordable place to live. He is highly interested in new things and how the world is developing. In his spare time, he likes to be creative and make his own furniture, why he often comes to the workshops at Haus der Materialiserung i the in Haus der Statisitk quarter, even though the facilities are a bit shabby, it is a good place to meet people who share the same interest as him.

Key problems

A place to the act at developing and making the work a better place

Better workshop facilities.

An affordable home in co-living community.

PRINCIPLES FOUND IN THE NEIGHBOURHOOD

In order to understand how a neighbourhood function, and which elements one should implement to create a well-functioning neighbourhood within the city, eight principles have been outlined, according to propositions composed by David Sim in the book Soft City (Sim. 2019).

horisontal layering

Layering the building is key, opposite stacking, the layering of the building will merely place similar functions on top of each other. Horizontal layers will help the urban

walk straigt in/arcade

Complying with a walkable and living neighborhood passages and direct walk-in access should be applied on the ground floor and could be applied to other floors as well. Integrating arcades within or outside the building will extent the use of inside activities, sheltering from the weather and giving facilities the possibility to expand to

Ground floor should have a higher ceiling than the rest of the floors, to ensure a level of flexibility. And The walkin from the street in should be with no obstacles to en-

Transformation a high density building and reapplying the human scale, can be done by not complicating the building, keep a simple structure.

walk-able building To let the user, connect with the buildings and their important. It is said that the regular human does not see the first four floors as an obstacle, after that an elevator would be search for. It is there for important to create a characteristic stairway from street to roof level, but especially the first four level have a significant importance.

different ground floor facade The ground floor should have unique façade and ex-

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The building should have active frontages interacting with the sidewalk and the pedestrians around, ensuring a high level of communication with the neighbours.

III. 32

To ensure a living building diversity and flexibility in facilities should be applied combining the large-scale public life as school, sport and offices with small-scale private life as homes, gardens, launderette, workshop.

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III. 34, Southwest elevation of Haus der Statistik 1:500

Haus der Statistik is a building complex located in Berlin Mitte, on Otto-Braun-Strasse, adjacent to Karl-Marx-Allee. Haus der Statistik was established from 1968-70 and was a central statistical administration building for GDR. The building consists of 11 floors and has the dimensions of 20.6 \times 51 metres. The vision for the building has changed over the years. After GDR the German authorities owned the building, and it was left empty since 2008, until 2017 when the Republic of Germany wanted to demolish it and sell the area. However, the building complex was rescued as part of a financing agreement. Today the building is under a transformation in an architectural competition, and the building is seen as a landmark used for demonstration and as a political voice for the Berliners.

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Chapter 03 | Analysis

1:2000 AA Karl Marx Allee South West

1:2000 BB Otto-Braun-Strasse North West

1:2000 CC Otto-Braun-Strasse

FLAGSHIPS

The context The following paragraph will introduce the read about the area and its landmarks around Haus de Statistik Quarter and landmarks of Berlin. Furthermore, will this section briefly explain what value a Landmark brings to the city.

When transforming a large complex, the aim, beside preserving the building, to also preserve the density and by using the existing infrastructure more efficiently it will secure a better usage of resources. David Sim state that: 'true urban quality comes from accommodating density and diversity of building types and uses in the same place' (Sim 2019 pp. 17) The diversity and facilities will supply an urban framework with quality, as even users and facilities with opposing measure will improve when coexisting. Contradictory of the large complex the human scale courtyard built interact with the user in a human scale which ensure an attractive environment on ground level. The high density / low height building secures a large amount of building crust, this crust is what the both the neighbours and users of the building interact directly with. It could be said that such a large-scale building should embrace the human scale and try to develop the crust, so it interacts as much as possible with the users (Sim 2019).

The landmark of a city or district is the core of creating the composition of the district and its aesthetics. Differentiating from regular buildings the landmark will typically have another height, contrasting specifications or artistic characteristics. Setting the scene for the panorama of the city in line with other landmarks in the city composing coherency and hierarchy within different landmarks and between them and the regular buildings (Kosenkova et al. 2019). Haus der Statistik should be a landmark for its own quarter and a landmark within others at Alexanderplatz hosting other noticeable landmarks as the television tower, Rotes Rathaus and Haus des Lehres. Along with being noticeable it should also set the architectural style for the district, as it will be what the district is recognized for. As the aim of Haus der Statistik is to embrace culture, art, education and social affairs the façade of the landmark should be a reference to these, as the crust of the building should interact with the users and mirror the facilities within (Delanty and Jones 2002).

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2 // Rotes Rathaus

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4 // Haus der Statisitk

Unité d'Habitation // Le Corbusier

Alex Springer Building// OMA Cube Berlin // 3XN

Dutch Embassy // OMA

Henselman Lehres **SO** Herman Ō aus

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Neue Nationalgalerie // Mies van der Rohe

Motel One // Christoph Langhof

MAPPINGS

Haus der Statistik is in the city centre surrounded by bussing activity all day andaround the clock. A kindergarten provides day-care for families, a variety of shopping options invites the cosmopolitan, and two churches offering spaciousness is just a few to mention. Moreover, a cinema offers cultural experiences, a fitness studio offers community and health, following there is a conference centre where people can exchange ideas, as well as both S-Bahn and U-Bahn connecting the area to the central flow. The Fernsehturm attracts many tourists in the season which means that the area is very lively and at times packed with people. However, the Haus der Statistik lies across the road from the Fernsehturm and is somewhat more of a deliberate visit.

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TYPOGRAPHY

OF

BERLIN

III. 40. typography of Berli

THE DIVERSITIES OF BERLIN'S EXTERIOR

/ FACADES, SIGNS AND MATERIALY

STREETART ON FACADE / paintjob that symbalize the functions of the building

CORNERSHOPS / small independant business decorated to signafy the identity

GRAFITTI IN THE CORNERS / art in hidden and otherwise empty places

Chapter 03 | Analysis

Berlin welcomes you regardless of sexual orientation or identity, origin, skin color, age, disabled or differently abled. True diversity unifies and fosters a sense of community, which you will experience throughout the city. If you are looking for a place to feel free and at home, move here. (BecauseBerlin n.d.)

n.d.)

Business Location Center

and

45 years,

where 55% is under

a young population, where 55% ge age is 42,7 years (Berlin Partner

the average

has

Berlin

0

1

population,

5,9% (BecauseBerlin 2016)

amount of people identifying as LGBT,

european average of

an

against

itaining 7,4% s

COD

has the highest

many

Ger

Chapter 03 | Analysis

RUBEL.LIVE JOURN

68

VIKTORIA

21% Berlin has a large proportion of totage in the second of Turkey Berlin contain the largest turkish community outside of Turkey (Berlin Partner Business Location Center n.d.)

0

million Berlin is the largest city in Germany with 3.7 million inhabitants Location Center n.d.) Business (Berlin Partner

3.7

war refugees. At its larges 15,000 ukrainians arrived to Berlin each day after the conmore than 175.000 ukrainian refugees. most countries who take in the million syrians and Exiles n.d.). of Refugess and Europeans They have approximately taken 1 the began(European of one S lion Germany flict

private, meaning that ost 200,000 of Berlin's inhabitants are university students.(Statista n.d.) and more than 30 5 public universities contains 0.000 Berlin 20

500,000 by 2023. problem. It is estimated that Germany have 335.000 homeless and it will increase to holds at least 10,000 of homeless (HAARETZ n.d.) Homelessness is seen as an increasing Berlin |

5,7% of all newly registred civil partnerships amount of Berlin contain the highest • registred same sex-couples. Within the German borders,

in Berlin are same sex couples (BecauseBerlin 2016).

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ALEXA

PLATTENBAU AND ALEXANDERPLATZ

/ in the border territory between east and west Berlin

THE BORDER TERRITORY/ Alexanderplatz is where the mix between east and west happen

NEARBY PLATTENBAU

On the northern side of the Haus der Statistik Quarter, plattenbau housing is the dominant architectural style

Still life approaching the detail

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Landscape / still life / portrait

an analysis upon detailing



Landscape urban landscape towards the building

Landscape – still life – portrait

The purpose of the landscape - still life - portrait describes three genres of painting art and is in this case used as a method to ensure a nuanced and specific architectural engagement in the city and the existing building, and to hold on to an experience of connection and coherency, why it can be useful to have knowledge about the quality of the sites technical, historical and phenomenon on every scale. Corresponding to this, it and the building's tectonic joints. Features of materials can be desirable in the sketching phase to observe the and the individual construction technical context. As building's architectural qualities through different fo- the different painting genres address three different cus settings and to work with the different relations the questions and experiences within the three different building is a part of. According to the paragraph of Bigness, this will primarily entitle the crust of the building. Further on this method can help to observe an architectural engagement in a large landscape or city scale, on a middle scale and on close material, detail level.

The landscape focus relates to the large scale as the relation between the near and the distant. The building relation to the landscape and the city, for the larger

context and urban relation. The Still-life focus is on the middle scale. Not so much the individual elements, but rather the actual comparison, the middle room, and the relation between the individual elements. Still life has to do with the building scale, the building volume, the room and construction. The portrait describes the portraited posture and characteristic details. Tactile qualities distances, can a question about scale within architecture be important, not just in the experience, but also in the creation of architecture. How the building is experienced must be different depending on, which distance it is experienced from, as the building is a part of different relations on the large, middle and small scale. Landscape

Observing the building from a landscape perspective

Portrait Close up photography of smaller scale details



the building is massive and explosive in the context with no connection to its surrounding context. With its size and closed façade the building emphasises the high speed traffic as it is placed on the corner of heavily trafficked roads. With its lack of atmospheric feeling and uninviting facade the red front settles an aggressive statement for the building in the context, marking the building as a landmark in despite of the cold and boring GDR architecture. Still-life[.]

Getting closer to the building in the still-life perspective details on the building and of the construction appears. It is visible that the construction consists of a pillar/beam construction, making it advantageous to reconstruct the building interior. The building has been led empty for over a decade, which has left its marks on the strict façade of the building from 1968. It is in worn condition and detailed with graffiti drawings and old left posters.











Portrait

Close up the different tactility and qualities of the building are experienced. The façade is in worn condition and is consisting of white smooth concrete blocks, that today have flosses on the edges caused by the weathered condition, being left empty since 2008. Looking even closer to the façade smaller details and messages as doves of peace appears reflecting the use of the building today.

From a distance perspective, the old DDR building seems massive, uninviting and in a worn condition. But when getting closer and the details of the use of the building today appears. It is clearly that this is today a building with a message of change of the perspective for what the building was back in history meant to symbolize. The grid construction structure and strict façade in combination with concrete was in the post-war period a way to create affordable buildings symbolizing quality for the many.



FLOW

Flow analysis was performed to get an understanding of the movement in and around the site. The diagram shows traffic, bike, and human flow. This was made to ensure that the flow acts as a coherent movement through the building and not just stand-alone. The goal is to create a building that must be infiltrated and have a large change of people during the day, therefore is it important to understand the flow in advance, to understand if there is a "crowd" for this building, and what is the existing movement on the site. Furthermore most of the building imitate Berlin's flow, so it is integrated into the design --- Pedestrians Cyclist Main road



III. 46, noise diagram, (Mienert. 2017).

Noise

Haus der Statistik is located close to a highly trafficked road in Berlin, both in relation to public transport, cars, and human flow, therefore an overview of the noise distribution was composed near and around the site. The area is heavily affected by traffic, which the diagram also shows. Even though the diagram shows a big flow which gives the arguments for many functions, one must also consider the future occupants of the building and move the apartment section up and away from the main road, so the apartments face the courtyard or at least are sheltered from the noise. The Noise near the site and on it, must be considered in the design phase as well as in the final design (Mienert. 2017).

≤ 55 dB
> 55 - 60 dB
> 60 - 65 dB
> 65 - 70 dB
> 70 - 75 dB
> 75 dB

MICROCLIMATE



Sun

Haus der Statisk is located in a dense urban environment, with high-rise buildings that block the sunlight on each other. Which can cause an impact on the spatial experience inside the building. Therefore, a solar analysis was performed, to provide an understanding of the solar conditions on the site, and in different seasons. The diagram shows the lower winter sun, and the high summer sun. Furthermore, the most critical sun conditions should be kept in mind through the design phase, as the project is working with a 20-meter-deep building, it must be explored how the building can be penetrated with natural light, where it is needed.

III. 47, sun diagram



III. 48, wind diagram, (Betti, Tartarini, and Nguyen. 2021)

Wind

A wind rose of Berlin was made to get an understanding of what direction the wind will be most dominant. The diagram shows that wind is coming from all directions, but mainly from West. Furthermore, the diagram shows how the wind is blocked from other buildings near the site. Even though some of the wind is blocked it still often seen that the tall building can push the wind and thereby cause wind tunnels as in some cases the wind will simply be pushed out to the side of the large buildings and accelerate on the open areas. This information should be implemented as the building will have a large flow of people and the main entrance should therefore not be located to the West. Furthermore, the analysis can be used for strategic location of openings in the building (Betti, Tartarini, and Nguyen. 2021).

TECHNICAL DESIGN PARAMETERS

Another aim with the transformation of Haus der Statistik or any other built environment is to provide thermal comfort for humans. Thermal comfort is a condition of mind where the human heat balance is satisfied, and people don't feel too warm or too cold. In this Master Thesis integrated indoor climate will be an implemented part of the report, as the project has a high level of social sustainability as a focal point, as well as the integration of human diversity. In order to simplify the amount of data and the results, some focus will be highlighted regarding the indoor climate where the calculations will be made on room level, likewise, some elements will be on building level, to analyse the energy demands for the whole building. All the technical design parameters will take a leap in Danish Standards, European Standards, or the Danish building regulation.

This paragraph will therefore go deeper in the technical design parameters and therefore a good indoor climate is crucial for the well-being and health of the people, and how that can provide value and quality to the architecture in the long run.

Technical design parameters

Energy demands for the building: As Haus der Statisitk is part of a transformation and not a new building construction, this Master Thesis will strive to achieve renovation class 2, according to the Danish building regulation 2018. This will be done by using a calculation tool called Be18 which calculations are based on SBi guideline 213 Energy needs of buildings. By using the program, it will be simple to conduct results and see if the project can manage to activate the new energy demands (Bolig- og plan styrelsen (A). 2018).

Thermal comfort: For thermal indoor climate, the building regulation will be used as a guideline, and not the standard il DS / EN ISO 7730 Ergonomics in thermal environment. This is a deliberate choice to limit the task, furthermore, it can be conducted that since the building regulation is achieved, one can assume that the indoor

Subject	Standarts & sources
Energy	§289-282 Renoveringsklasser for eksi bygninger. (§289-282 "Renovation cl existing buildings")
Thermal comfort	Bygningsreglement BR18 Termisk ind installationer til varme- og køleanlæg ("building regulation BR18 thermal ind mate and installations for heat- and r tion systems (§384)")
Ventilation	DS/EN16798-1:2019 p. 54 table B.9
Daylight	DS/En 17037:2018 table A.3 p. 14

climate is satisficing for the user. Therefore, functions other than housing must maximum have 100 hours above 26 ° C and 25 hours above 27 ° C, and for housing the project will strive to achieve a maximum of 100 hours per. years, where room temperature exceeds 27 ° C and 25 hours per. year where the room temperature exceeds 28 ° C (Bolig- og Planstyrelsen(B). 2018).

Ventilation: The design of the ventilation system will be on a conceptual level, for the calculation DS/EN16798-1:2019 will be used to evaluate and as a tool to conclude the results from the simulation program, BSim. The project will strive to maintain category 2 and the ventilation system will be dimensioned according to that requirement. Here table B.9 p. 52 will be used to analyse the CO_2 emission level. Regarding natural ventilatio(Bn, this will be done on a building scale, and on a conceptual level, work will be done to implement an atrium in the building. (Danish Standards Foundation. 2019).

Daylight: Daylight will also be a design parameter, as this element is important for the architectural quality of the building, and visibility is required for workplaces, moreover, a daylight simulation will be used to determine if the glass amount is sufficient. This element will have an impact both on the spatial quality and on the landmark and facade expression, in this case, DS/EN 17037:2018 (Danish Standards Foundation. 2018) table A.3 will be used to conduct the results. Furthermore, these studies will be conducted in the dynamic simulation program; Velux Visualizer 3 (Danish Standards Foundation. 2018).

By delimiting the technical specification in the project it can increase the quality of the execution. In addition, there is a broader time spectre to go in-depth with the various elements. Furthermore, the selected topics are seen as the most important for this transformation with social sustainability in focus, and these parameters can be a guideline for the architectural qualities and overall expression of the final design.



ANALYTICAL CONCLUSION

Conducting analysis and, obtaining an understanding of Berlins as context for this Master Thesis it created a foundation for the design process, and how to begin the transformation process of Haus der Statistik. Furthermore, a deeper understanding of the concept of the building was established, as the characteristics of Berlin was explored. Zooming out and looking at Haus der Statitisk, which is constructed upon a grid, it should be designed with individual boxes containing the functionalities of the city, and the flow of Berlins should act as the circulation system for the city operating as roads and paths within the urbanistic building. Furthermore, the theoretical and thermotic studies underline how Berlin is a city rich in diversity, which makes the city welcoming for anyone who want to explore the city and its many different cultural experiences. Berlin's many different expressions, and colourful attitudes awakens people's curiosity, and the same should be done in the transformation and final design of Haus der Statistik. The analytical studies indicate that Berlins is a city of opportunity's, allowing the architect to be creative and interpret the different dimensions in the city and incorporate them into a design solution for the user of the building.

PROGRAMME DELIMITATION

The following delimitation present the reader with a problem statement as a conduction of the former paragraph upon analysis, subsequent a set of design principle are stated to be utilized as guidance when answering the problem statement and generating the final design proposal.



PROBLEMSTATEMENT

How to make a platform and landmark for sociality and culture that seeks to provide a community in unity for all social layers, cultures and backgrounds. That allows them to exist equally and in dialogue with one another, as well as a creating a forging identity for the new Quater?

How to construct a three-dimensional city that emphasises Berlin and its diversity within a structure that holds the equalising thoughts applied by the GDR? As well as creating architecture that allow for adaptability within a changeable future, to secure that the architecture will be the moderator for constant relevance? Haus der Statistik is a building located along Karl Marx Alle, which is bordering East and West Berlin. Especially East Berlin has been transformed from systematic thinking and one-size-fits-all standards to a complex that can encompass creativity, diversity, and the dynamic needs of human beings. The vision of this Master Thesis is to transform Haus der Statistik to encompass the transformation of Berlin and embrace the city's development as mentioned earlier.

The project shall demonstrate the ability of a rational structure to be a canvas, whereas the architects of GDR envisioned that structure are able to provide similarity and order. Today, the very same structure can facilitate opportunities and be a framework instead. Thus, carrying out the vision will showcase the duplicity of logic and understanding contained within the building and this transformation should emphasize the understanding and appreciation of individuality and diversity that is valued in contemporary Berlin. The boundary between the city and the Haus der Statistik should be as fluent as possible and the building should resemble a three-dimensional city as a constructural framework.





1. The road system is extruded into a form

2. Roads are translatede into paths and placed throughtout the building structure



3. Functions of the city is mapped out, and extruded into boxes

4. The boxed functions are interlining with the already placed road structure within the building Whenever a city is planned or developed the infrastructure will always become the first element and the starting point for the city. Therefore, the infrastructure in Berlin is the foundation for the concept, and how the flow will be extended into the building. The flow is creating the foundation for the three-dimensional city within the grid structure. Afterwards, different functions in the city will be transposed or translated into the building creating a multifunctional building rich in diversity.

CITY WITHIN A BUILDING

rate with the neighbourhood principles, and applying new. The variety of usage is intended to reflect the dithose to the Haus der Statistik are crucial elements in versity of the city where the mixture of organization and understanding and supporting the integration of the unpredictability in city life gives a sense of opportunity. flow and pulse of Berlin into the Haus der Statistik. Furthermore, they help ensuring that the urban energy and Transitions from one function to another should create atmosphere is translated into the building.

transportation system, while also having many unofficial tion to create a gesture for the users. meeting places and paths, represents the notion of lev- The concept of the city in the building is possible beexplored further.

However, smaller more private flows emanate also. Like ability in city life gives a sense of opportunity. any major city, Berlin offers rich opportunities to get lost in something that catches the eye, in the façade of a Moreover, transitions from one function to another building.

because of the scale of Haus der Statistik. One can get now been anchored into the culture. Therefore, shops or lost in the city and experience a new kind of activity one initiatives in the city have sometimes modified the spacwould not ordinarily expect to enjoy. Likewise, some vis- es around their function to create a gestus for users. itors will participate in a specific experience such as the art gallery and others might regularly attend a workshop,

Developing design parameters from Berlin in Collabo- but they may have the possibility to explore something

the spaciousness and possibility of an unofficial meeting point. The role of such unofficial meeting points in Berlin contains a myriad of functions and spans widely creating the atmosphere in Berlin is quite substantial. geographically, yet the city is well integrated by the public transportation system. U and S-Bahn are frequently modified to accommodate a new purpose for historical used by the city's visitors as well as its locals. Moreover, reasons and this approach has been influential on the an array of smaller, narrower, unofficial paths offers a "Rough" style in Berlin that has now been anchored into shortcut to the local, or an adventure to the explorative the culture. Therefore, shops or initiatives in the city tourist. The fact that Berlin is integrated by a public have sometimes modified the spaces around their func-

els or the idea that there are details that can always be cause of the scale of Haus der Statistik. One can get lost in the city and see a new kind of activity one would not ordinarily expect to enjoy. Meanwhile some visitors Similarly, the design parameters of Haus der Statistik re- would go to have a specific experience such as the art flect these characteristic features of Berlin. The elevator gallery. Others might regularly attend a workshop. The is acting as the U-Bahn, being a central common chan-variety of usage is intended to reflect the diversity of the nel of movability, and major flows originate from them. city where the mixture of organization and unpredict-

boutique or a street performance, a sculpture, or a gim- should create the spaciousness and possibility of an unmick somewhere. Therefore, the visible access to differ- official meeting point. The role of such unofficial meetent parts of Haus der Statistik is emphasized, to enable ing points in creating the atmosphere in Berlin is quite discovery and to bring the life and flow of berlin into the substantial, because the city has been rebuilt or structures have simply been modified to accommodate a new purpose for historical reasons and this approach has The concept of the city within the building is possible been influential on the "Rough" style in Berlin that has





The vertical U-Bahn



Berlins flow



Haus der Statistik flow



A centerpiece



A sculpture for meeting



View point



The meeting point



The unofficical meeting point



The city park



Winter garden



Pedestrian window shopping



Sidewalk



The loopholde - arcade



The connection

SOCIAL AFFAIRS



DISTRIBUTION OF ESSENTIALS **Size:** 50 m² Light: no demand Optical axis: no demand

Road connection: pedestrian

City functions: Loophole, viewpoint



4

SOUP KITCHEN Size: 100 m²

Light: 3% daylight and view **Optical axis:** no demand √ Road connection: bikeway **Connection to technical core:**

City functions: Loophole, Viewpoint

REFUGEE MEETING POINT Size: 100 m²

Light: 3% daylight and view Optical axis: √ Road connection: bikeway

City functions: Viewpoint,

4



JUGEND AKTIONSRAUM **Size:** 100 m²

Light: 3% daylight and view Optical axis: no demand Road connection: bikeway Connection to technical core: \checkmark

City functions:

Loophole, Viewpoint

STREETWORK POINT

Size: 50 m² Light: no demand Optical axis: no demand Road connection: pedestrian

City functions:

Loophole, Viewpoint, The unofficial meeting point

CULTURE









ART GALLERY **Size:** 500+ m² Light: no demand Optical axis: √ Road connection: main road

Citv functions: Sidewalk, Viewpoint, U-Bahn connection

MARKET HALL **Size:** 500+ m² Light: 3% daylight and view Optical axis: √ Road connection: main road Connection to technical core: \checkmark

City functions: Viewpoint, U-Bahn connection, The unofficial meeting point, Sidewalk

PRODUCTION KITCHEN

Size: 100 m² Light: 3% daylight and view Optical axis: no demand Road connection: pedestrian Connection to technical core: \checkmark

City functions: Viewpoint

COMMUNAL CANTEEN

Size: 500+ m² Light: 3% daylight and view Optical axis:√ Road connection: main road Connection to technical core: \checkmark

City functions: Viewpoint, U-Bahn connection The unofficial meeting point, Centerpiece, Sidewalk

CRAFTS



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4

WORKSHOP x 5

Size: 100 m² Light: 3% daylight and view Optical axis: √ Road connection: main road Connection to technical core: \checkmark

City functions: Loophole(1-2pcs.), Viewpoint, U-Bahn connection

UPCYCLE/STORAGE

Size: 300 m² Light: no demand Optical axis: no demand Road connection: main road

City functions: U-bahn connection, sidewalk

FARMING/GARDENING

Size: 300 m² Light: Penetrating daylight (+3%) Optical axis: $\sqrt{}$ Road connection: bikeway Connection to technical core: \checkmark

City functions: Meeting point, Viewpoint, Sidewalk

EDUCATION (COOKING, LANGUAGE, MUSIC)

Size: 100 m² Light: 3% daylight and view Optical axis: $\sqrt{}$ Road connection: bikeway Connection to technical core: \checkmark

City functions: Viewpoint, The unofficial meeting point

ADDITIONAL







HOSTEL x 3

Size: 300 m² Light: 3% daylight and view Optical axis: √ **Road connection:** main road/bikeway Connection to technical core: \checkmark

City functions: Viewpoint, U-Bahn connection, The unofficial meeting point

HOUSING x 8 **Size:** 50 m² Light: 3% daylight and view Optical axis: $\sqrt{}$ Road connection: pedestrian Connection to technical core: \checkmark

City functions: The unofficial meeting point

Office **Size:** 300 m² Light: 3% daylight and view Optical axis:√ Road connection: pedestrian Connection to technical core: \checkmark

City functions Viewpoint

III. 51, Room programme

DESIGN PRINCIPLES

As the roof should be used for accommodation and public facilities, the roof top should be sheltered from wind.

The design must reflect flexibility in a medium scale by applying large open spaces to ensure an adaptable and changeable architecture in the future.

> Utilization of the flow to bind the urban context of Haus der Statistik together with Alexanderplatz.

Haus der Statistik should be transformed into a social hub, symbolizing the "new neighbourhood" Preserve current activities as these are proven to work, and are social sustainable.

> The existing grid structure must be act as a clean sheet which provide space for creativity, as a reinterpretation of GDRs perception of the structured architecture.

To ensure site-specific and present architecture with an enhancement of its cultural heritage, the transformation must acknowledge the history, urban context and architectural characteristics of the building.

> Due to the housing crisis co-living apartments must be implemented to achieve affordable housing and creating a social community for the residents.

> > Haus der Statistik must set the architectural style of the quarter by reflecting the aim of embracing culture, art, education, and social affairs in its expression and stand out as a landmark.



Architecture must be used as an ideology, promoting Berlin's future, diversity and social equality.

DESIGN DEVELOPMENT

According to Rem Robinaas theoretical perception of the large building, and how it can be processed and analysed separately the following-process will be composed according to this. By organizing the design process into four steps it is possible to examine Haus der Statistik systematically. First, the need for a measure is assessed based on the quality of the construction using calculations and engineering knowledge about the existing building. When planning a city, one would start with the grid and later fill in the function. Therefore, the infrastructure is designed first in the building. Thereby, the skin-meat-bone methodology is used to organize the transformation.

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The first paragraph explores the expansion of Berlins flow by transforming the construction of the building. The second paragraph explores the transposition of the functions of the city into the building. Finally, the third paragraph examines the transformation of the skin focusing on the creation of a landmark in a city abundant with landmarks. Furthermore, the city's façades reflect different functions, and the façade of Haus der Statistik should also attempt to reflect such differences.



5







Outdoor staircase



III. 52, Alexanderplatz

III. 53, Haus der Statistik

PRELIMINARY SKETCHES AND STUDY TRIP

out a specific goal, based on the captured knowledge from desk studies, theoretical knowledge, and a study ing the materiality, the scale of the building, and the atbetter understanding of the scope of the project. Vis- more focused start-up of the design. iting the site also provided a better understanding of the spirit and zeitgeist of Berlin, as well as the contex- In addition, during the trip, the DNA of the project formed, tual composition of this Thesis. A crucial element for this and this allowed a rough outline of concepts to be con-Thesis was learning how to build in a context differentiating from Denmark, in a major city with different cultural practices and norms. Berlin has massive buildings that Furthermore, there was a focus on the inclusion of Berlin hitherto have been unknown to the writers of this Thesis. as a context and how the urban environment needed to

analysed thoroughly to understand the architectur- elements. The conducted research from the studies al context and how to create a landmark in a city with and the preliminary concept ideas became the starting many landmarks. Being physically present on the site allowed a more detailed understanding of the building

Preliminary sketches were developed unfocused with- in its environment than the theoretical sections were able to. Studying the building up close, and experienctrip to the project site. This trip was vital to achieving a mosphere around and inside the building, allowing for a

ducted. These concepts helped create an overview of how a transformation could be handled and understood. be crossroads for this transformation. Finally, there was The context of both Berlin and Alexanderplatz were a focus on the meeting between old and new building point for the rest of the design process and structure.

Atrium utilising the principles og nature



Glassbox



City in the building



Changeable patchwork facade



Changeable boxes

REPAIR VS. TRANSFORM

Be18 is used on building level to figure out if the building only should be repaired or if it needs to be transformed fully to archive the aim of renovation class 2. Renovation class 2, states that when the total need for added energy for heating, ventilation, cooling hot water, and lighting per. m² heated floor area does not exceed 95 kWh / m² per. year added 2,2000 kWh per. years divided by the heated floor area, this class will be achieved (Boligog plan styrelsen (A). 2018).

According to the Danish building regulation, the energy demands include delivered energy to the building for heating, ventilation, hot water, cooling, and lighting, multiplied by energy factor for each energy carrier. In renovations there is no specific energy demand, therefore will this project strive to achieve §282 renovation requirements for offices, schools, institutions, and other buildings, due to it being a multifunctional building (Bolig- og plan styrelsen (A). 2018).

The following graphs show the results from the calculation program Be18 and the energy demand for the building. The study presents four models: original, repair, replace, and transform, the study shows that in order to achieve renovation class 2, the building must undergo a transformation (Bolig- og plan styrelsen (A). 2018) Additional key figures can be found in Appendix 2.

Original building

Analysis of existing building



An Estimation is composed through detail drawings and pictures of the existing building.

kWh/m²

20

15

-10

March

- Built in 1968-70
- windows u-value: (Jäger, Frank Peter. 2010 p. 121)
- Reference windows from 1953: u-value: 3.6 kW/m²K
- Wall and roof u-value: calculated through detail drawings
- Thermal bridges and shadows: Calculated via a 3D model
- Mechanical ventilation: not added it was not implemented in the original building
- Natural ventilation: added with a high level of infiltration.

Energy demands: 255,8 kWh/m² year Overtemperature: 71,6 h

Repair

An attempt to achieve Renovation class 2 by repair the existing building



Repair is when a building component is renovated or rebuilt. For example, when a roof covering is changed. In that case, re-insulation must be carried out if it is profitable. This investigates an attempt to achieve Renovation class 2 by repairing the existing building (Bolig- og plan styrelsen (A). 2018). Further elaboration on the first model

- Adding a new building envelope

- U-value: from BR18 minimum requirements for building envelopes
- Roof = 0,12 kW/m²K
- External wall= 0,18 kW/m²K
- Windows: 0,53 kW/m²K and g-value: 0,8
 Ventilation: added and calculated in Appendix 1
- New lighting added

Energy demands: 169,6 kWh/m² year Overtemperature: 8,6 h



Haus der Statisitk

8

August June May

Replace



An attempt to achieve Renovation class 2 by remodelling the existing building. Further elaboration of the second model

- Adding an exterior glass "box" to the existing building
- Double façade
 Using the same u-values and ventilation as in model 2.

Energy demands: 168,6 kWh/m² year Overtemperature: 8,8 h

Transform

An attempt to achieve Renovation class 2 by replace the existing building



Transform is if the entire building parts are replaced. It can be, for example, an entire roof construction, insulation, and ceiling, or it can be components, such as windows. In transformation, the component must live up to the requirements of §279 and the installation items. The aim is still to achieve renovation class 2 (Bolig- og plan styrelsen (A). 2018). Further elaboration of the second model.

- The level of detail has increased as the design has been processed.
- New building envelope
- New floor slaps
- New windows: Reducing window area on the north façade and adding to the south facade
- Using the same ventilation values as in model 2

Energy demands: 100,9 kWh/m² year Overtemperature: 9,2 h

98

kWh/m²

Example 1.2



kWh/m²

20

Example 1.3





Construction and circulation

MAPPING OF BERLIN'S CIRCULATION



Statist

S GRIEFWALDER STRASSE 2,3 km

AN TON OPPOSE







Griefwalder Straise 1 mainroad 0 mainroad bend 16 bikeway connections 12 pedestrian sidewalks

Griefwalder Straße is one of the historic main roads of Berlin, dating back to the middle age.

Translation



Transformed from road structure to built structure





Weberwiese ⊖ 2 mainroads 1 mainroad bend 7 bikeway connections 4 pedestrian sidewalks

Karl Marx Allee was planned by GDR after The Second World War

Translation



Transformed from road structure to built structure



Hackescher Markt O

7 mainroad bends 15 bikeway connections 13 pedestrian sidewalks

Hackesher Markt was developed during the late 1800s as a part of central Berlin; 'Berlin Mitte'

Translation



Transformed from road structure to built structure



The circulation system in the building will act as the main road within the three-dimensional city. To investigate how a main road act, three heavily trafficked routes connecting Haus der Statistik with public transportation has been mapped out. The three different routes are sketched upon a map of Berlin, on the latter page – showcasing the routes: S-Bahn station Hackescher Markt, Griefwalder Strasse and U-Bahn station Weber Wiese all en route to the main entrance of Haus der Statistik. Each route symbolizes different eras of Berlins history of city planning, from the medieval times where Griefwalder was developed to the 1800s where Hackescher Markt was the city centre to the strict and broad roads planned during the GDR at Karl Marx Allee; Weber Wiese station.

The built structure that Hackescher Markt route encompasses will be the actor of form controlling the III. 58, The roads of Haus der Statistik

circulation system of the new Haus der Statistik. As the circulation system is perceived as a direct extension of the city's roads, it should be decided which kind of road typology should display the extension. To symbolize the elder part of Berlin, with a great part of sidewalks and bikeways, the roads connecting Hackescher Markt with Haus der Statistik have been chosen to be the object of inspiration, for this project's circulation system.

The following page features an illustration of the circulation system divided into three scales; pedestrian, bikeway and main road – exemplifying the scales of the city. Firstly, the main road of the Hackescher Markt route featuring its bends and connections was planned out as the main flow, following the bike and pedestrian pathways were planned out, echoing the flow.



III. 59, Exploration of stair- shape, function and gesture



THE IDENTIFYING COLOUR









Metal

III. 61, Staircase colour exploration









In Berlin infrastructure is colour coded. Bicycles are red, pedestrians yellow, the roads are black with white marks, the trains are green, and the subway is blue. The staircase should be the main connecting infrastructure in the Haus der Statistik. Choosing only one colour is a way to signify to the user that the building is one thing and that it stands apart from the rest of the city while adopting the practice of colour-coding. Moreover, using only one colour would signify equal access to all parts of the building. After conducting several analyses, the red colour was found to be superior because it symbolizes flow and movement. Furthermore, the red colour represents the red used upon the original building façade, outlining the 'Stop Wars' statement.



III. 62, Isometric of the U-Bahns



As the city has both roads, sidewalks, bike lanes and public transportation, it must all be implemented. Public transportation is viewed as a vertical U-Bahn connecting the larger squares of the three-dimensional building. The road system displayed on the preceding page is continuous vertically and horizontally throughout the structure, therefore the users are able to walk from top to bottom, but just like in the city the users can take the U-Bahn between squares to take a shortcut if they are in a hurry. The U-Bahn stops on all floors but have main stations on larger public squares to create meeting points between the external and internal users.



TYPES OF PROGRAMMING THE MEAT

When the original building was planned by the GDR, it was with the model of stacking. Designing in the plan, with similar floorplan throughout the building, similar typologies are also seen today both in housing and office buildings. Programming like this often causes non to no interaction between the floors and users, one could discuss that this is an extinct form of programming. The divided typology is well-known and often used in contemporary architecture. It is often seen in builds that emphasize with the pedestrians, where housing, shops and office are divided into separate places of the buildings, acting as the multifunctional building, but lacking contact between functions. Furthermore, it is often only the bottom functions that interact with the city. The last typology is mixed, which in some cases can appear as the divided as this showcase the social sustainable form of the 21st century. Allowing different users to meet and provide a high range of functions to both users and neighbours. The difficulty of the mixed is the programming, as it must be well planned to function as mixed, and not as the divided with no interaction between functions. Following it can be an obstacle to planning a well-arranged mixed building, as there is a risk of programming a too confusing building. In the following section the Thesis will attempt to program a mixed typology by using three regulations, to ensure the building is well planned with future users in mind. .



The divided







PROGRAMMING THE FUNCTIONALITIES





Internal connections







Solution 02

Scale of mixture

12

10

11

5



Scale of mixture

no mixture \bullet ----- \bullet fully mixed

Functions by number

1. Office	9. Distribution of essentials
2. Housing	10. Soup Kitchen
3. Upcycle/Storage	11. Production Kitchen
4. Education	12. Communal canteen
5. Workshop	13. Hostel
6. Jugend Aktionsraum	14. Art Gallery
7. Refugee Meeting Point	15. Winter garden
8 Market Hall	

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Chapter 05 | Design development, meat













Planing with three principles

The different solutions have been composed, beforehand three regulations were decided: Scale of mixing, internal connections and meeting points. As this Thesis aims to design the three-dimensional city, the scale of mixing aims to be as high as possible - as it would be in a metropolitan. Furthermore, the design wants to secure internal connections across all floors, both horizontal and vertical - ensuring that the user would want to travel between functions either via the roads or through the vertical U-Bahn. Furthermore, there should be meeting points acting as the squares of the city, to secure a liveable city, these must be throughout the building as spread out as possible and with as many natural connections. As a conclusion of this the high range of mixability in solution two will be used as the guideline for function placement for the final design. Solution one holds the best composition of meeting points and solution three has composed the broadest internal connections, these will thereby act as design regulations for the final design.

DYNAMIC SIMULATIONS

BSim has been used to gain an understanding of the thermal comfort in the building. To keep the examination simple and straightforward, the examinations will a broad span of users, corresponding to the program of only contain simple models in different dimensions, all the building. Therefore, the small box is assumed with a of which are located at the same height in the building maximum of five users, as this is smaller multifunctional and have the same orientation. On the opposite page, rooms. The medium box will often contain educational the projects four basic models are shown with the sizing: functions; therefore, it hosts a maximum of 30 users. The small, medium, large and extra-large, each of these have large box hosts 90 users, as this typically will be workbeen examined with differences such as building envelopes, window sizing and shading. Furthermore, the small box has been investigated in two different typologies: residential and multifunctional. In each study, only two facades are examined, although the extra-large boxes extend over three facades. Finally, the program has been used to dimensions window sizes in collaboration with the indoor climate and CO₂ levels. This information has then been implemented into the final plan solutions cooperant the concept of an easy-changeable facade and façade expression. These models have therefore been through an iterative process to see how big the windows could be and help provide an overall landmark expression on Haus der Statistik, without compromising the human wellbeing inside the building (Bolig- og Planstyrelsen (B). 2018). Simultaneously with the BSim simulations, ventilation channels and aggregates where dimensioned to investigate spaciousness (Appendix 1).

Residential (Small)

The residential small box comes in two formats a horizontal and vertical plan, both meant for residential use only, with a maximum of two users, most likely there would only be one user. Within the dwellings, it is possible to open the windows and create airflow.

Multifunctional (Small, Medium, Large and Extra-large) The different boxes dimensioned as multifunctional has shops or office space, similar the extra-large box hosts 100 users, as these spaces are public multifunctional spaces, as the canteen and the market hall.

The investigation will be shown on the following spread, and specifics can be found in Appendix 3.

As a conclusion, this project will utilize a light facade to and architecture, following, all models in the scheme have been utilized according to different functionalities. The original building holds 33% of windows on the façade, this has been reduced to 20% to be in line with indoor climatic demands. Utilizing shading on the windows allows a greater glass percentage on the facade, this is deselected when working with a building which should be a "lighthouse" and "landmark", thereby it should not seem closed during the day, or in the afternoon, when shading would be needed.



1

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Appendix 1

Users: 100+ persons Volume flow rate: 1400 l/s

Users: 50-100 persons Volume flow rate 910 l/s

Users: 10-30 persons Volume flow rate: 2801/s

Size: 50 m² Users: 1-5 persons Volume flow rate: 701/s



	Models in BSim	Dimensions[m ²]	Nr. of people	Window NW [m²]	Window SW [m²]	100h above 27 °C Average for a year	25h above 28 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level < 1000 PPM in %
	4. model	50	2	x	11,7	97	25	960	100%
Sm	5 model	50	2	12,5	x	56	17	618	100%
all h	6. model	50	2	9,5	9,5	80	23	609	100%
snot			Bo	ox with central locat	ion in building				
İng	7. model	50	2	x	10	83	20	901	100%
	8. model	50	2	x	10*	24	4	907	100%
			Bo	ox with two facades	towards the outsi	de			
	4. model	50	5	x	10,26	24	5	905	100%
	5. model	50	5	11	x	77	15	910,7	100%
Sm	6. model	50	5	6	6	17	0	903,4	100%
all				Box with central loc	ation in building				
	7. model	50	5	x	10*	82	22	900,1	100%
	8. model	50	5	x	7,5	81	21	900,9	100%
			Bo	ox with two facades	towards the outsi	de			
	4. model	100	30	x	19,17	89	23	1084,7	91%
	5. model	100	30	19	х	56	18	1237,4	97%
Med	6 model	100	30	13,6	13,6	81	19	1200,8	97%
ü	Box with central location in building								
	7. model	100	30	x	19,17*	55	9	1063,7	91%
	8.model	100	30	x	19,17	95	22	1063,7	91%
			Bo	ox with two facades	towards the outsi	de			
	4. model	300	90	x	47	75	22	1057,2	93%
	5.model	300	90	53	x	66	25	1010,6	97%
Lar	6. model	300	90	44	46	64	20	1022,6	94%
.ge			Bo	ox with central locat	ion in building				
	7. model	300	90	х	47	97	18	1004,9	98%
	8.model	300	90	x	47*	39	9	1004,9	98%
			Bo	ox with two facades	towards the outsi	de			
	4. model	500	150	х	74	70	22	1105,6	99%
	5. model	500	150	99	x	43	13	1099,3	98%
Ext	6. model	500	150	52	52	73	25	1144	99%
ra La			Bo	ox with central locat	ion in building				
rge	7. model	500	150	х	76*	77	10	1098,4	99%
	8.model	500	150	x	58	84	25	1098,4	99%

CITY PRINCIPLES

The "City within the Building" design parameters have been a crucial element in the overall transformation of Haus der Statistik, by developing design parameters from Berlin and classic neighbourhood principles – and then applying those to the building, supporting the integration of flow and pulsation of Berlin. This allows to incorporate an architectural quality as the main element through the building and make structured chaos in it the uniform grid. The elaboration has taken place in an iterative process as Haus der Statistik should maintain a high level of spatial quality. These parameters have been utilized in the design process as a translation from principle to spaciousness, showcasing that the loophole deducted from the arcade principle can be the giver of form when composing a plan solution. Small scale isometric sketches have been illustrated to highlight the spaciousness and create a design solution that can be implemented into the upcoming plan solutions. The "City within the Building" parameters will help the final design proposal to integrate features that create gestures towards the users, so that the building will be precepted as an actual three-dimensional city, and not just an ordinary multifunctional building. When the spectator walks through the building there must be gestures articulating the roads of berlin and the features one would meet when walking through a big city.







The loophole connection



III. 67, city principles



View point



Haus der Statistik flow



A centerpiece

Double height apartment: solution one 35,5 m²





Double height apartment: solution two 35,5 $\ensuremath{\text{m}}^2$



Regular apartment: solution three 52 m²





As this Thesis investigates how to compose adaptable architecture, different formats of housing within the small scale have been designed to showcase the flexibility within this specific box type. The first two solutions showcase the small 35,5 m² apartment for a single person, and the third solution emphasizes the larger more expensive typology. Thereby the grid gives the possibility of easily changing the form to the current need of the city. By the same mean if the housing crisis in Berlin is to continue the strict grid allows the building to establish additionally apartments, for example, a medium or large function could be exchanged for two or six more apartments of different formats, complying with the different needs of the future inhabitants. In this Thesis, the reinvention of Haus der Statistik, 12 small and two larger apartments will be incorporated into the final design, to emphasize the different needs and the current lack of affordable housing.

II. 68, Apartment design proce

Double height apartment: solution one



Chapter OF L Design







Glass





Channelglass



Green corrugated metal



Grey corrugated metal







To explore different types of materiality, eight collages with different materials were composed. Each only shows a part of Haus der Statistik, before forging a material analysis a broad branch of materials was explored to investigate how the differences would differ the appearance of the upcoming landmark.





III. 70, Channelglass, Hotel Far&Near Nanhao St. by Kooo Architects

Effekt

Through the project, various materials have been investigated in connection with the facade preparation. If one studies Berlin's details and materials, it is clear to see that the city's history has had a significant impact, and the reconstruction after the war has left the city with a raw expression and large amounts of concrete. The amount of concrete may also be due to the fact that Berlin is a big city dominated by an urban landscape, and it is therefore mainly characterized by concrete and glass materials. However, the city has a scale where a wide range of materials is to be found, which made it possible to add more materials to the final facade expression. The desire to create a landmark within the streets of Berlin led to the choice of transparent materials, which are able to show life inside the building, and let the building light up in the evening. In addition, it is an important part of the Thesis to add a material that was not transparent, to reflect private spaces, the different functions and emphasize a patchwork concept upon the facade. Furthermore, there is a wish to select lightweight facade materials that enable the lightness in alternating shifts over time, to preserve the idea of a changeable architecture.

Therefore, three proposals for facade materials have been selected for the project to be investigated. Polycarbonate, for the transparency, channel glass for the same intention, and metal, to preserve the raw expression that is to find in Berlin but still have a light expression.





III. 72, Grey metal, Dock building by Michael Green Architecture

Channel glass: Channel glass is a specialty glass, and can be used for exterior walls, with a high level of aesthetic, and can span across elevations, the glass is mounted on tracks and can be self-supporting. Furthermore, the glass allows daylight to penetrate and minimize glare. 15-25% of the glass is recycled glass, and the material leaves a low CO2 print, in the production of the material. Finally, the material exists with a low U-value allowing it to be used in renovations with a U-Value range = 0.49W/m2K to 0.15 W/m2K (Bendheim n.d.).

Polycarbonate: Polycarbonate is often known as a transparent material, polycarbonate is a plastic type with good optical properties, it can be used both indoors and outdoors. Polycarbonate transparency also allows daylight and the plastic ensure minimums glare. The material doesn't have u-values lower than 0.83W/m2K, which means that the material can't be used for renovation (Martin, Brett Plastic Sheets n.d.).

Grey Metal: Metal as a façade material allows an industrial expression and articulate that the building is not only a sculpture in the city, but also a building that may be used by anyone. The metal facade will consist of a traditional wall element, with insulation in the middle, metal as facade cladding, and a plaster wall as the interior. The construction allows a low u-value, which can be used in the renovation.

The first study is on apartment level, where to simulations is made.

1. The first study illustrates a light façade structure, with mounted window frames and glass

2. The second study has channel glass been used as facade material, and windows for the visual contact, and view.

The investigation shows how the Light Transmittance in Channel glass allows a higher daylight factor, than the standard façade.

Light façade stru	icture
Value	Daylight factor [%]
Mean	4,28
Maximum	31,90
Channel glass	
Value	Daylight factor [%]
Mean	6,81
Movimum	2210

The second study is on an apartment complex, since the centre in this case should preferably be used as a common area, it will be examined whether this is possible, or whether the plan needs to be redesigned.

1. The first study shows the apartment complex without wintergarden, where the common area must be aligned to the façade.

2. The second study illustrate the apartment complex with wintergarden, and how this element allows for the centre to be used and gives the residents a spatial quality in the wintergarden, as well as view towards the outside

This investigation shows that by implementing a wintergarden it is possible to have a common area in the centre of the building on 5. Floor.

Without Wintergarden

Value	Daylight factor [%]
Mean	4,60
Maximum	22,68
Wintergarden	

Value	Daylight factor [%]
Mean	5,51
Maximum	38,21

DAYLIGHT AND SPATIAL QUALITY

Daylight and architectural quality often go hand in hand pare the data with the requirements. According to DS/ as the light conditions in a room creates a spatial experi- EN17037:2018 a space is considered to provide the necence and quality. Since this Thesis is conceiving a trans-essary daylight if a target illuminance level is achieved formation of Haus der Statistik with a building length a reference plan within a space for at least half of the of 52 metres and a building depth of 20.6 metres it will daylight hours. Furthermore, DS/EN17037 provides the be an obstacle, to provide satisfactory daylight into the table A:3 recommendation for daylight minimum of 300 middle of the building, and it will therefore be advantageous to leave the centre of the building, to mainly be used for circulation, technical core and not for longer accommodation. In addition, work must be done with skylights and atriums and double heights, so that the light easier can penetrate the building.

According to The Building Regulation there must be lighting conditions that ensure that there is no risk to trate the building. The area in this part of the building people's safety and health. It must be ensured that there is sufficient daylight and visibility in the building, and the window area must be at least 10 % of the tool, which calculates exact daylight levels. The table floor area in a room, to get a better understanding of below shows the input data that has been implemented this DS/EN17037:2018 has been used to be able to com- in Velux.

lux converted to 2,2%, medium 500 lux converted to 3,6% and high 750 lux converted to 5,4%. Minimum 3 % daylight in living spaces or more will be the requirement for this master (Danish Standards Foundation. 2018).

Two studies have been conducted in collaboration with preliminary floor plans, a critical floor has been selected to investigate whether satisfactory daylight can penecontains an "apartment block" in the "city". The investigations have been carried out in Velux daylight a digital

Material	Light Transmittance [%]:	Reflection
Window:	81%	-
Velfac 200 Energy		
Facade:	-	0,4
Light facade e.g. wood/metal		
Transparant facade:	38%	-
Bendheim Channel glass		
Floor slap:	-	0,842
Light concrete		
Ceiling:	-	0,842
Light Concrete		



•

A 4







Wintergarden

WINDOW PRINCIPLES

Two facade principles have been developed with two different window dimensions, where the first example reflects a wide window with a width of 1.5 metres and the second example reflects a narrow window with a width of 0.8 metre. The two principles illustrate that by placing the windows in a grid, with a rhythm, the expression of the façade becomes commercial, almost like an office or a bank, and the facade seems uninviting. These facades do not reflect the diversity, functions, or the city in the building. Furthermore, the glass percentage shows the principles of how the narrow windows open for a more diverse facade, as it enables the patchwork, allowing a wide diversity in facade expression.







Traditional office expression with 20% glass Window: 0,8x3m

















1) Office

- 2) Housing
- 3) Workshop
- 4) Markethall
- 5) Communal Canteen
- 6) Art Gallery
- 7) Upcycling storage
- 8) Hostel

WINDOW TYPOLOGIES

In the design process, some window principles have been carried out, which reflect the functions behind, and how the spectator of the city also will be met with different facade expressions that reflect the metropolitan's functionalities. Therefore, a traditional office facade has been prepared, with rigid windows, and an art gallery with a large window area, which invite the guest in and arouse their curiosity. In the workshop random windows are selected as this function can occur in different rooms. The hostel is inspired by a hotel, with an open lounge and smaller windows in the sleeping areas. These principles have subsequently been transferred to the final design, so the building functions also are extended into the building. The following principles combines the principles of the city and neighbourhood with strict design regulations.













The upcycling storage

The apartment

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The hostel





The canteen



III. 77, Haus der Statistik before



III. 78, Haus der Statistik iteration

This chapter presents the final proposal for the transformation of Haus der Statistik. The presentation summarize material that has been con-ducted in the Master Thesis. The chapter aims to project the integrat-ed thoughts behind the design, the presentation will display content, visual material, calculations, diagrams and principles. The building will be presented from the outside in, with a clear advice thread that re-flects the thoughts behind the rational within the irrational, and the project interpretation on a multifunctional, flexible, dynamic building, with room for diversity and extended in the crowd.

ale.

27BM FRM

BM

SP-1







III. 80, Three-dimensional masterplan

The three-dimens nal master plan illustrates Berlin's intrastructure, the f foundation for the concept, and how the flow gets extended into the building, inviting Berlin's dynamic life and the diversity of the city inside. By extending Berlin's flow, and letting it become the spine for the building and the three-dimensional City, allows Haus der Statistik to be an integrated part of the city, a melting pot, and a landmark for Berlin



III. 81, Visualisation of Haus der Statistik from Otto-Braun-Straße

Approaching Haus der Statistik from Otto-Braun-Straße the reinvented landmark welcomes the pedestrians as well as the hard traffic. The channel glass light up the street, even during the day, and give the spectators a peek into the grand building – erasing the border between inside and outside. The red flow on the street is continued by a bright red staircase, symbolizing the new extension of the road system. Across the façade, the viewer is met by several neon and painted signs, these together with a shifting patchwork façade articulate the three-dimensional cities many functions and help the user to orientate, read and perceive the architecture.

HAUS DER STATISTIK


Haus der Statistik is focused upon pioneer usage, in correspondence with the vision of creating a sustainable and communal neighbourhood, where all needs and interests are respected, focusing on the well-being of the common good. Synergies between participants, external users and the neighbourhood is the focal point when wanting to supply the new quarter with a new social landmark, interacting with the broad majority. An overall vision when choosing functions to implement, where to establish spaces that are oriented to the public interest and promote the ecological use of materials and resources and supply the neighbourhood with new possibilities and social interactions.

Art Gallery

By implementing an art gallery at Haus der Statistik aim to be a venue for the city. A place that invites visitors into a world beyond the daily routine, providing space for the established artist as well as the upcoming artist using the house to create art and



These spaces provide room for system

support work, including distribution of food and hygiene products for the homeless, as well as a place to prepare and enjoy hot meals. Furthermore, it provides shelter and a place to take a shower and use the restroom



Communal canteen gether we eat better" is saying by the pioneers, as a statement of how food brings people together across culture and social rank. The communal canteen is a place within the three-dimensional city, as well as a part of the city of Berlin. Proving a grand public space open for all to engage with each other and enjoy gastronomy



Street work point Is a room dedicated to marginalized and diverse groups from the neighbourhood to find shelter and have a safe space. Following to have the possibility to host and plan fundraisings, events, exhibitions and network with the high mix of other users. By that mean trying to normalize and educate the public.



This is a place where young people who live on the street or have no fixed residence can get help and get the possibility to interact with the rest of the users and peers.

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	-	

Upcycling storage

The spaces for upcycling focus on reuse re-purpose and sharing within local supply circles, by that means the house will promote a more sustainable future and provide the neighbourhood with the opportunity to buy, reuse and upcycle used





Workshops The workshops take part of the overall aim of promoting sustainability, by creating spaces where circular economy can be experienced first-hand. Where local and re-used items can be re-produced as well as supplying the neighbours with tools and gear, they might not have access to at home.

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As the Hostel is placed near Alexanderplatz a place where many spheres and realities of life meet, the Hostel is an extension of this. Securing a regular flow of different person alities and cultures to meet and engage with the life within Haus der Statistik.





Education

There are placed a variety of educational rooms throughout the house, securing that both minorities and regular users have the possibility to learn and engage with each other and different cultures. Supplying rooms such as classic classrooms and room for cooking



Markethall

The build form gives spaces for produc tion and awareness of the ecological use of produce, therefore the market hall gives both the user of the house and local producers a place the sell their produce and products, as an ex tension of the existing KO-Markt.



Affordable housing

The slogan of Haus der Statistik is "An affordable place to work and live" thereby the house will be supporting the neighbourhood with affordable housing to provide shelter for a higher range of people within the centre of Berlin, by that mean trying to take part in solving the current housing crisis.



Farming

The communal gardening and farming spaces act as a supplier for testing new sustainable farming methods such as mushrooms farm and cultivation of crop plants. As well as a large number of raised beds, that can supply the community and pioneers with fresh

II. 83, Functions of Haus der Statistik


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1. Rooftop terrasse 2. Greenhouses



The pioneer users of Haus der Statistik have a public garden called 'Sonnenbeet' this has been reinvented and placed on the rooftop, with large plant beds surrounding a common greenhouse, creating an urban and public garden created for the pioneers and visitors of the new quarter, creating a new attraction and viewpoint towards Alexanderplatz and the Ferhnsehturm.



III. 116, visualisation of Kiez kantine, heart of the building







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III. 119, visualisation of the sewing workshop



III. 120, Facade elevation south west, 1:200







III. 121, Facade elevation south east, 1:500

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III. 123, visualisation of the staircase and public platform at level 7.



kWh/m² 25 -20. 15 10 0 -10 --15 -20 November October September June June June March Karch



III. 124, Facade elevation north west, 1:200



Sun gain now Sun gain old



Transmission old Transmission new

Month





Internal gains old Internal gains now



Ventilation old Ventilation new

Month

Energy consumption

In the final design, two graphs have been prepared, which present how the energy consumption has changed after the transformation. Furthermore, renovation class 2 has been achieved in the transformation of Haus der Statistik, with an energy demand of 83.5 kWh/m2 per year. It can therefore be concluded that by replacing the building envelope, implementing mechanical ventilation, renewing windows, and reducing the glass share in the transformation, the project has succeeded in achieving the desired de-181 sign parameter.



III. 125, cores of Haus der Statisitk

In the building, two emergency exits have been implemented to maintain the requirements for fire escape, both emergency exits are located toward the facades, where one can be found towards the Northeast facade up against an adjacent building, so the exits take a minimal view to the outdoor, the other emergency exit is on the Southeast orientated facade, by placing the emergency exits stacked, the requirements of a maximum of 25 metres to an emergency exit is maintained. Furthermore, two technical cores have been implemented, the cores are located strategically in relation to ventilation aggregate sizes, public toilets, and centrally so they don't take view against the façade. Implementation of the technical elements emphasizes the rationality of irrational thought and allows the building to function optimally.



III. 126, Thermal Buoyancy

In collaboration with the room programme and the functions of the building became complex, therefore is the atrium in the building not continuous throughout the building. The atrium is therefore located staggered, with a double-height room to connect them. By implementing thermal buoyancy, it has made it possible for the building to be operated with additional natural ventilation if this becomes necessary. Furthermore, the large open spaces add to the architectural quality, and have enabled the opportunity to implement visual contacts in the final design.





III. 127. Detail drawing connecttion between facade ande floorslaps, 1:25



III. 128, Visualisation of the art gallery

EPILOGUE

The following epilogue aim to close the Thesis, by collecting and underlining the essence of the project into a conclusion, followed by a reflection stating the thoughts and contemplation at the end of the Thesis. In extension, to these paragraphs, two spreads encompassing literature and illustrations are placed afterwards.



Bü

CONCLUSION

This Thesis manifests how the contemporary adaptable vision is the answer to complex social and sustainable issues, searching to compose a new typology and edition of metropolitan architecture: the City within the Building. The Thesis originates from the development of Eastern Berlin and the exploration of its history encompassing the Cold War and its segregation. Haus der Statistik was built by the GDR with aspirations to create the true soviet Utopia. Thus, one-size-fits-all architecture manifested an ideology that valued equality and standardization. The re-invention and transformation of the concrete complex aims to showcase how the basis of structure can be perceived as the contemporary vision, hosting complexity, noise, creativity and enforcing the agility needed in the new diverse Berlin. The Thesis demonstrates how the rational structure, which Haus der Statistik is built upon, can be a free and open form that contains both the logic of GDR and the new logic imposed by this Thesis. This proposal evolves within the scale of bigness, creating a new border where the distance between the metropolitan and the built form is erased, by conceptualizing the extension of the city directly into the architecture of the building. The extension, being the formgiver of the new Haus der Statistik's

facade, enables the facade to be a part of the building's internal dynamic, creating an honest piece of architecture - or crust, which is rarely executed at the scale of bigness. The dynamic and telling façade prevents the creation of a foreign Scandinavian typology within the diverse Alexanderplatz. Allowing the architectural gesture to both integrate and distinguish itself within the diverse context. One could argue that the architecture takes a juxtaposed position in a place where that is the architectural typology. However, it is be concluded by the completion of this transformation that the new Haus der Statistik is able to preserve the building's zeitgeist - old and new. When applying contemporary energy requirements and integrating the need for a social sustainably built environment that embraces all users, cultures and minorities without compromising upon the architecture. As social sustainability is a broad subject to embrace, this project's holistic approach aims to emphasize the user's needs beyond the construction and projecting phase and ensures good indoor qualities by applying small, medium, large and extra-large box principles that promote sustainability within the adaptable complexity of the future.

REFLECTION

Conducting a compatible problem to investigate in this ity of the project, various positions have been utilized Thesis was a crucial task and it has been of utmost im- to try to encompass the human within the large scale portance that this Thesis explores a real competition, and ensure that the built form is able to adapt and deproposed by the municipality of Berlin. velop equivalent to how a metropolitan grows and hosts a variety of users, therefore the subjects of adaptabil-Demonstrating the problems of transforming an existity and social sustainability will be reflected upon. This ing historical building of Berlin into a reinvention of how Master Thesis is the product of our curiosity about how architecture is perceived in the contemporary context. to document the valuable outcome of an adaptable This reflects how the rational form constructed by the building. The attempt to incorporate different aspects GDR is comprehended as a neutral giver of form, and of adaptation through an integrated approach was a how it can be inhabited by new users differentiating it new interpretation, and thereby led to difficulties. The from the original statisticians as habitants. Thesis generates a box principle, in an attempt to create a concept for ever-changeable architecture. However, The original building was formed to serve one specific adaptable architecture as a subject has always been function. As Thespianism emphasizes, the usage of a described as a fluid concept, strongly influenced by its high variety of social functions is expanded into a comcontext and Haus der Statistik was no exception in this plex and large-scale design proposal. The complexity of case. Berlin is a city rich in diversity, changes, and differ-Haus der Statistik has sometimes been an obstacle in ent cultures, and therefore the building should reflect that, to become a successful adaptation in the years to the design process, as the level of detail can be difficult to scale when working with a complex which hosts the come. Therefore, it can be argued if the box principle is contextual enough, or if it is too global and are able to scale of a three-dimensional city. When programming the three-dimensional city, it would have been optimal be implemented in any city. Furthermore the final transto establish and detail each function separately to enformation became a complex building, in an endeavour compass the small scale of the city's functionalities. We to embrace the social needs of Haus der Statistik but if have seen it as a necessity to use a degree of upscala design embraces everyone does it then embrace anying as a delimitation. It could be reflected upon how this one? It can be difficult to see the individual in the crowd, delimitation should have been executed and if the right but the scale of the building allowed for this to happen scale within the complex was chosen well. In the final in a new socially successful way. It could be argued that proposal, twelve thorough plans are shown, but should the building became too complex, and too unmanagethere have been conducted a more urban approach able for the individual. The key to an appropriate building design is an understanding of time, a preposition in order to create a grander connection between the structure of the building and the cityscape? The comtowards buildings in continuous flux rather than static plexity of this project fully explores how the Thesis spans lumps. It will always be difficult to measure if an archibetween the border of architectural and urban design, tectural proposal will be successful before it has been encompassing the structures of a metropolitan into a executed and lived in. Following what the needs of the design translation. When working within the complex- users will evolve into according to time.

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Appendix

Appendix

Department: Architecture, Design & Media Technology Semester: MScO4 Architecture Project period: 01.02.2022 - 25.05.2022 Group: 10 Number of Copies: 6 Number of Pages: 17

Energy calculations

with sizing the windows.

The following paragraph will begin by choosing a ventilation strategy, sizing the ventilation aggregates - ensuring that these fit into the building, dimensioning ventilation channel sizes. Then energy calculation will be composed upon building level in the program Be18 and lastly the dynamic simulation program BSim will be utilized to simulate overtemperature in collaboration

Appendix 1

Ventilation

Size

XL

3xL

7xS

м

S

Mixing ventilation is characterized by that the air supply is delivered by a high velocity, outside the occupation zone, usually from an outlet in the ceiling or in the wall, in this project it will be placed in the ceiling. Which means that fresh air is blown into the room to be mixed with room air and blown out again when it is fully mixed. The high velocity rate will entail that a large amount of the room air will be pulled mixed. It is important that the air velocity rate is kept on a level that ensure that the mixing is efficient, as it is the key that the mixing between inflow and room air happens above the occupations zone, so the air velocity is decreased when it hits the occupations zone. Commonly the occupation zone will be from floor to 1.8 meters, but it depends on the room functions and the configuration of the ventilation system (Hørup Sørensen, B. Stampe, and H. Ludvigsen. 2001.).

Aggergate 2

Soup kitchen

Prod. kitchen

Distribution of ess.

Jugend aktionsraum

Refugee meeting point

Upcycle/Storage

Workshop

Education

Market hall

Co-cooking

Workshop

Housing

Lounge

What aggregate is connected to the rooms

M

М

М

M

M

s

XL

м

м

XL

м

Ιм

8xS

Aggergate 1 Size

Canteen

Housing

Workshop

Street point

Art Gallery

Office

Hostel



Ventilation principle

Aggregate

In order to compose a preliminary estimation of the ventilation aggregate's size, the following calculation have been composed. Where it is assumed that the building is an office building with an air change of 4 times per hour.

The buildings square meters: $6805.8 m^2$ The building hight 2, 5 m estimation $6805.8 m^2 \cdot 2.5 m$

Air change 4 h^{-1} 17014.50.4

Divided into 2 aggregate 68058.00 2

$$34029.000 \frac{m^3}{h}$$

Aggregate 1

Size	Nr.	l/s	Size	Nr.	l/s
S	8	70	S	9	70
М	1	280	М	9	280
L	5	910	L	-	910
XL	1	1400	XL	2	1400
Total	-	6790	Total	-	5950

6790 l/s=24444 m³/h

To comply with the demands for the ventilation aggregate, the needed volume flow has been inserted to the program: SystemAire and the dimesions of a aggregate has been found. The size of this is: Width: 3,19 m Lenght: 5 m Height: 2,7 m and weight: 6290 kg

$$V_L = \frac{1}{C}$$

CO2									
Poomo								Polution in the room	Polution in the supply air
NOOTIIS		People	Area [m2]	Room height [m]	Volume [m3]	Activitylevel [met]	Polution per person[l/h]	[m3/m3]	[m3/m3]
S		5,00	50,00	2,79	139,50	1,20	20,40	0,001	0,00040
M		30,00	100,00	2,79	279,00	1,20	20,40	0,001	0,00040
L		100,00	300,00	5,58	1674,00	1,20	20,40	0,001	0,00040
XL		150,00	500,00	5,58	2790,00	1,20	20,40	0,001	0,00040
0,0	00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,00000
0,0	00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,00000
					automatic	fixed value	fixed value	fixed value	fixed value

196

 $17014.50 m^3$

68058.00

34029.00000

Aggregate 2

5950/s=21420 m3/h

Formula to calculate the volume flow rate used in the scheme below

$$\frac{q_{CO_2}}{(c_{outdoor} - c_{indoor})} * 3,6$$

Airflow [l/s]	Airchange [h-1]
47,22	1,22
283,33	3,66
944,44	2,03
1416,67	1,83
0,00	0,00
0,00	0,00
automatic	automatic

(Danish Standards Foundation 2019)

Dimensioning of ventilation channels

Each size of box(S,M,L and XL) is dimensioned seperatly according the channel sizes.



(Hørup Sørensen, B. Stampe, and H. Ludvigsen. 2001. p. 338)

Formula for calculating channel sizes



Explanatory scheme

Small

First the volume flow is calculated in p. xx, however the calculated volume flow is in I/s, convert from I/s to m³/h Information about the boxs: 5 people 50m² Room height on 3m 70 I/s (calculated p.196)

distribution channel



at 5 digits

converts from $m^2 til cm^2$

 $0.03500 \cdot 10^4$





at 5 digits

Conclusion

The ventilation channel in small box dimensions is 21.110 cm

$$\frac{7\,m^2\,s}{200\,h}$$

$$\frac{0.035000\,m^2\,s}{h}$$

350.00000

$$d = \frac{10\sqrt{14}}{\sqrt{\pi}}$$

d = 21.110

Medium

First the volume flow is calculated in p. xx, however the calculated volume flow is in I/s, convert from I/s to m³/h Information about the boxs: 20 people 100m² Room height on 3 m 280 l/s (calculated p. 196)

 $\frac{7 \, m^2 \, s}{75 \, h}$

 $0.093333 m^2 s$ h

933.0000

 $d = \frac{2\sqrt{933}}{\sqrt{\pi}}$

d=34.466

distribution channel



at 5 digits

converts from $m^2 til cm^2$

 $0.0933 \cdot 10^4$

Area of the canal



at 5 digits

Conclusion

The ventilation channel in medium box dimensions is 34.446 cm

Large

Information about the boxs: 100 people 300 m² Room height on 3 m 910 l/s (calculated p.196)



at 5 digits

converts from $m^2 til cm^2$

 $0.18200 \cdot 10^4$

Area of the canal

 $d = \sqrt{\frac{A \cdot 4}{\pi}}$ $d = \sqrt{\frac{1820 \cdot 4}{\pi}}$

at 5 digits

Conclusion

The ventilation channel in Large box dimensions is 48,136 cm

First the volume flow is calculated in p. xx, however the calculated volume flow is in I/s, convert from I/s to m³/h

$$\frac{91 \, m^2 \, s}{500 \, h}$$

$$\frac{0.18200 \, m^2 \, s}{h}$$

1820.00000

$$d = \frac{4\sqrt{455}}{\sqrt{\pi}}$$

d=48.136

Large



 $91 m^2 s$

300 h

 $0.30333 m^2 s$

h

3033.0000

 $d = \frac{6\sqrt{337}}{\sqrt{\pi}}$

d=62.142

at 5 digits

The channel dimensions: 62,142 cm

XL Large

First the volume flow is calculated in p. 196, however the Information about the boxs: 150 people 500 m² Room height on 3 m 1400 I/s (calculated p.196)



at 5 digits

converts from $m^2 til cm^2$

 $0.28000 \cdot 10^4$

Area of the canal

 $d = \sqrt{\frac{A \cdot 4}{\pi}}$ $d = \sqrt{\frac{2800 \cdot 4}{\pi}}$

at 5 digits

The channel dimensions: 59,708 cm

First the volume flow is calculated in p. 196, however the calculated volume flow is in I/s, converted from I/s to m³/h

 $7 m^2 s$ 25 h

$\frac{0.28000\,m^2\,s}{h}$

2800.00000

$$d = \frac{40\sqrt{7}}{\sqrt{\pi}}$$

d = 59.708

XL Large



d = 77.074

The channel dimensions: 77,074 cm

204



Final dimensions

た

150m²

77 cm

205

Simulation in Be18

Introduction

There have been developed 4 Be18 models: Original, Repair, Replace and Transform. All are supplied with ventilation, cooling, energy for heating, domestic hot water and lighting per square metre heated floor area. The goal is to get the knowledge of the original energy frame and examine how the best possible provide the transformation of Haus der Statistik with the new energy frame according to Renovation class 2. All models are calculated with an operating time of 168 hours – as it is assumed as office-hours. The heat capacity is assumed to 100, as the construction mainly consist of concrete.

Information about the building

Unit	Heated floor area m ²	Built area m ²	The heat capacity wh/km ²	
Original	1138,4	1083,2	100	
Repair	1138,4	1083, 2	100	
Replace double facade	1138,4	1083,2	100	
Transform	6905,5	1083,2	100	

Building envelope

The building envelope contains transmission coefficients that comply with the minimum requirements from (Bygningsreglementet, 2018). Following, the building holds sandwich elements calculated in UBAKUS (Plag n.d.). In Be18 the temperature factor: b-value is set to 1, unless the element is towards the grounds, then the b-value is: 0,7.

Building envelope

Unit	Area m ²	U w/m ² K Orginal	U w/m²K Repair	U W/m ² K Replace	U w/m2K Transform
wall south east	608,76	0,48	0,18	0,18	0,18
Wall south west	1247,1	0,48	0,18	0,18	0,18
wall north east	1208,29	0,48	0,18	0,18	0,18
wall north west	457,86	0,48	0,18	0,18	0,18
Roof	1081,5	2,1	0,12	0,12	0,12
slap	1081	2,1	2,1	2,1	2,1

Windows

In transform, repair and replace the Thesis uses the window: 'VELFAC 200 ENERGY', 3-layer-pane with a transmission coefficient of 0,79 W/m2K, a g-value of 0,35 and a glass area of 0,7. Mechanical ventilation

In the original building it is assumed that there is not implemented mechanical ventilation, in the Transform, Repair and Replace model there have been implemented mechanical ventilation accordingly to the ventilation calculation on page XX.

Orginal 33% glass

Unit	quantity m ²	orient	Area	U w/m²K	g-value
South West	424	SW	1,5	3,6	0,75
South East	45	SE	1,5	3,6	0,75
North East	336	NE	1,5	3,6	0,75
North West	150	NV	1,5	3,6	0,75
Ground floor Sout East	1	SE	26,518	3,6	0,75
Ground floor South West	3	SV	79,55	3,6	0,75
Ground floor North East	2	NE	53	3,6	0,75
Ground floor North vest	0	NV	0	0	0

Repair and Replace - model have the same U-Values as the transform, but the same size and glass amount of the original building.

Transformation 20% glass

<u> </u>										
Unit	quantity m ²	orient	Area	U w/m²K	g-value					
South 2,5 x 0,85 m	90	SW	2,125	0,8	0,9					
South 3 x 0,85 m	84	SW	2,55	0,8	0,9					
South 4,5 x 0,85 m	21	SW	3,825	0,8	0,9					
North 3 x 0,85 m	60	NE	2,55	0,8	0,9					
North 2,5 x 0,85 m	15	NE	2,125	0,8	0,9					
East 4 x 0,85 m	14	SE	3,4	0,8	0,9					
East 2,5 x 0,85 m	9	SE	2,125	0,8	0,9					
East 3 x 0,85 m	6	SE	2,55	0,8	0,9					
West 3 x 0,85 m	47	NW	2,55	0,8	0,9					
West 2,5 x 0,85 m	39	NW	2,125	0,8	0,9					

(Jäger, Frank Peter 2010)

Appendix 3

BSim

BSim

The following parameters have been applied to the dynamic simulation program BSim.

Systems

All models have 6 system. The systems are chosen based on thermal comfort and some of the elements there are included in the building's energy frame, which according to BR18 includes, ventilation, cooling, domestic hot water, and lighting. Therefor the following system in BSim is: Lighting, People, Ventilation, Venting, Infiltration and Ventilation: The ventilation system takes is point of de-Heating.

Heating

The model simulates a thermostatically controlled heatof the model is to determine how much power the radisetpoint temperature. The heating will begin when it is dards Foundation. 2019). colder than 18 degree and it will keep the room temperature on 22 degrees. Furthermore, the system is manly **Building elements:** The building elements; external activated in winter months.

pattern. Therefore, the operating system will not be man- the following values from Table 3 - Minimum requirelight is more than 3%, to save energy.

People: People is estimated according to the giving m²K] Roof=0,12 U-value [W/m²K] Floor/ partitions against (S) and Extra-Large (XL) has a standard activity level, be- g-value 0,53 (the requirements from BR20 for new winbecause these boxes contain functions with higher ac- styrelsen (A). 2018).

Residential (Small)

tivity level.

Venting: BSim define venting as all forms of natural ventilation, ie. intentional ventilation of the zone via valves, windows, or other openings to the open air. Venting is only activated in the summer months.

Infiltration: Describes unintentional or uncontrolled air supply through leaks in the building's envelope. In this case the input is standard from BR18 (0,1 I / s pr. m² at 50 Pa)

parture in a VAV system, and the air change is calculated in another sheet on p. 196 and will therefore change depending on the box size and the amount of people. The ing system, in this case; a radiator. The primary function air changes are dimensioned according to CO, category 2 Standard with 20% dissatisfaction. The ventilation are ator must emit to raise the temperature to the desired activated all year, and is CO₂ regulated (Danish Stan-

walls and floor decks, are first built and calculated via Lighting: The lighting is set to be 200 lux and automatic the website: ubakus.com. Furthermore, all construcbecause it is a multifunctional building, with a large user tional parts live up to the BR18 requirements, which is ual, furthermore the lighting is set to turn of when day- ments for the building envelope for conversions and other changes in the building (Wall = 0,18 U-value [W/ boxes size, and what function the box will contain. Small space =0,4 U-value [W/m²K]) new windows U-value 0,8 cause it is assumed that people are not active in these dows). Following this, the investigation are composed spaces, medium (M) and Large (L) has a medium activity by comparing a heavy and a light facade (Bolig- og plan

For dwellings where it is possible to open windows and create air flow, BR 18 emphasizes that, the provision can usually be regarded as complied with when it can be demonstrated through calculation that there is a maximum of 100 hours per, years of service life, where room temperature exceeds 27 ° C and 25 hours per, years where the room temperature exceeds 28 ° C.

Small	Dimensions [m²]	Material	window NW [m²]	window SW[m²]	Nr. of people	100h above 27 °C Average for a year	25h above 28 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level < 1000 PPM in %
1. model	50	Heavy facade	х	11,7	2	83	18	676	100%
2. model	50	Heavy facade	9	9	2	74	22	678	100%
3. model	50	Heavy facade	13,64	×	2	64	24	676	100%
4. model	50	Light facade	х	11,7	2	97	25	960	100%
5 model	50	Light facade	12,5	×	2	56	17	618	100%
6. model	50	Light facade	9,5	9,5	2	80	23	609	100%
7. model	50	Light facade	Х	10	2	83	20	901	100%
8. model	50	Light facade	х	10*	2	24	4	907	100%



Dimensions on the box 7,07 m x7,07 m Room height 3 m * shading May-July 12am-16pm Only one exterior facade SW

Multifunctional

For many types of buildings with a service life corresponding to office buildings, exceeding a maximum of 100 hours above 26 ° C and 25 hours above 27 ° C will normally comply with the provision.

Small	Dimensions [m²]	Material	window NW [m²]	window SW[m²]	Nr. of people	100h above 26 °C Average for a year	25h above 27 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level < 1000 PPM in %
1. model	50	Heavy facade	х	11	5	61	14	821,7	100%
2. model	50	Heavy facade	6	6	5	7	0	810,6	100%
3. model	50	Heavy facade	10,26		5	21	3	870,2	100%
4. model	50	Light facade	х	10,26	5	24	5	905	100%
5 model	50	Light facade	11	х	5	77	15	910,7	100%
6. model	50	Light facade	6	6	5	17	0	903,4	100%
7. model	50	Light fcade	Х	10*	5	82	22	900,1	100%
8. model	50	Light facade	х	7,5	5	81	24	900,9	100%



Medium	Dimensions [m²]	Material	window NW [m²]	window SW[m²]	Nr. of people	100h above 26 °C Average for a year	25h above 27 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level < 1000 PPM in %
1. model	100	Heavy facade	Х	19,17	30	84	17	1098,7	91%
2. model	100	Heavy facade	13,6	13,6	30	74	18	1200,6	97%
3. model	100	Heavy facade	19	х	30	55	17	1232,6	90%
4. model	100	Light facade	Х	19,17	30	89	23	1084,7	91%
5 model	100	Light facade	19	х	30	56	18	1237,4	97%
6. model	100	Light facade	13,6	13,6	30	81	19	1200,8	97%
7. model	100	Light facade	Х	19,17*	30	55	9	1063,7	91%
8. model	100	Light facade	Х	19,17	30	95	22	10637	91%



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Dimensions on the box 7,07 m x7,07 m Room height 3 m

* Shading May-July 12am-16pm

Only one exterior facade SW



Dimensions on the box 10 m x10 m Room height 3 m

*Shading May-July 12am-16pm Only one exterior facade SW

Multifunctional

Large	Dimensions [m²]	Material	window NW [m²]	window Sw[m²]	Nr. of people	100h above 26 °C Average for a year	25h above 27 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level [PPM] < 1000 in %
1. model	300	Heavy facade	×	51	90	89	25	1058,2	93%
2. model	300	Heavy facade	54	56	90	79	25	1023,8	94%
3. model	300	Heavy facade	59	х	90	64	23	1012,2	96%
4. model	300	Light facade	х	47	90	75	22	1057,2	93%
5 model	300	Light facade	53	Х	90	66	25	1010,6	97%
6. model	300	Light facade	44	46	90	64	20	1022,2	94%
7. model	300	Light facade	Х	47	90	97	18	1004,9	98%
8. mode	300	Light facade	х	47*	90	39	9	1004,9	98%





Dimensions on the box 17,32x17,32 [m] Room height 6 [m] *Shading May-July 12am-16pm Only one exterior facade SW

Extra Large	Dimensions [m²]	Material	window NW [m²]	window SW[m²]	Nr. of people	100h above 26 °C Average for a year	25h above 27 °C Average for a year	CO ₂ level [PPM] Average for a year max	CO ₂ level [PPM] < 100 in %
1. model	500	Heavy facade	х	78	150	74	24	1107,3	99 %
2. model	500	Heavy facade	55	55	150	76	25	1146	99 %
3. model	500	Heavy facade	99	х	150	46	12	1100,4	98 %
4. model	500	Light facade	х	74	150	70	22	1105,6	99 %
5 model	500	Light facade	99	х	150	47	13	1099,3	98 %
6. model	500	Light facade	52	52	150	73	25	1144	99 %
7. model	500	Light facade	Х	*76	150	77	10	1098,4	99%
8. model	500	Light facade	Х	58	150	84	25	1098,4	99%





Dimensions on the box 25 m x20 m Room height 5,4 m *Shading May-July 12am-16pm Only one exterior facade SW

Table B.9 — Default design CO₂ concentrations above outdoor concentration assuming a standard CO₂ emission of 20 L/(h per person)

Category	Corresponding CO ₂ concentration above outdoors in PPM for non- adapted persons				
I	550 (10)				
II	800 (7)				
III	1 350 (4)				
IV	1 350 (4)				

(Danish Standards Foundation 2019)