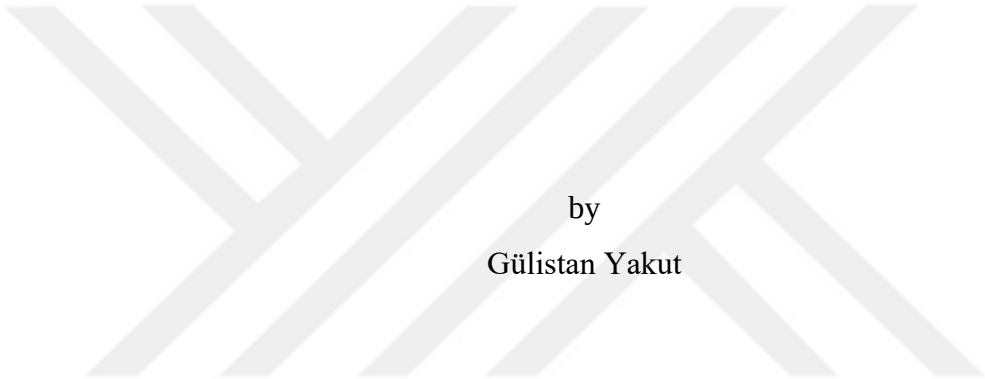


INVESTIGATION ON THE TRANSFORMATION OF HOCHBUNKERS BUILT IN
GERMANY IN THE 20TH CENTURY



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INVESTIGATION ON THE TRANSFORMATION OF HOCHBUNKERS BUILT IN
GERMANY IN THE 20TH CENTURY

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ABSTRACT

THE INVESTIGATION ON THE TRANSFORMATION OF HOCHBUNKERS BUILT IN GERMANY IN THE 20TH CENTURY

The thesis aims to examine the transformations of the Hochbunker designed and built-in Germany during the Second World War. Human beings have produced tools and areas to meet their needs for defense and protection against threats. The design of the defense and protection areas has been changed, and improved, or they have been redesigned in line with the improved technology, materials, and tools. Those shelter areas have been called using various terms, while the most commonly used term has been “bunker”. The bunkers may be built aboveground or underground. The designed protection and defense areas can be located inside or outside the city; moreover, they can be camouflaged. The wars in the 20th Century pioneered innovations in the redesign and development of bunkers. Especially towards the end of the First World War, the increase in weapon power and the armament of aircraft and the fact that airstrikes took place over large areas ensured increased the durability of bunker designs according to conditions. After that, the outbreak of the Second World War necessitated the creation of strong defense and shelter structures for all countries. Under Adolf Hitler's direction, a large and high bunker was designed and built in Germany in line with its national, monumental architectural style. This type of bunker was called “Hochbunker” in Germany. Hochbunkers were often transformed after the Second World War, and they were used for various functions. Reuse and transformation of Hochbunkers have been discussed frequently, depending on the collective memory about them. Sometimes, the structures were ignored and tried to be demolished in response to social memory. The changes to be made in a Hochbunker should be performed carefully after determining the scope to be protected in detail depending on the heritage feature of the building. The research investigates the historical process of Hochbunker, design criteria and types. In addition, the impact and reaction of the war-affected society in the transformation of the Hochbunkers will be detailed within the scope of collective memory. All this research scope will be exemplified by the transformation projects.

ÖZET

20. YÜZYILDA ALMANYA'DA İNŞA EDİLEN HOCHBUNKER'LERİN DÖNÜŞÜMÜ ÜZERİNE ARAŞTIRMA

Tez, İkinci Dünya Savaşı sırasında Almanya'da tasarlanan ve inşa edilen Hochbunker'in dönüşümlerini incelemeyi amaçlamaktadır. İnsanoğlu, tehditlere karşı savunma ve korunma ihtiyacını karşılayacak araçlar ve alanlar üretmiştir. Savunma ve koruma alanı tasarımı, gelişen teknoloji, malzemeler ve araçlarla değiştirilmiş, iyileştirilmiş veya yeniden tasarlanmıştır. Bu sığınma alanlarının ifade etmek için çeşitli kelimeler kullanılabilir, en yaygın kullanılan isimlerinden biri Bunker'dir. Bunkerler yer üstünde veya yer altında bulunabilmektedir. Tasarlanan koruma ve savunma alanları şehrin içinde veya dışında yer alabilir ve kamuflajlı olabilmektedir. 20. yüzyılın savaşları, sığınakların yeniden tasarlanması ve geliştirilmesinde yeniliklere öncülük etmiştir. Özellikle Birinci Dünya Savaşı'nın sonlarına doğru silah gücünün ve uçakların silahlanmasının artması ve hava saldırılarının geniş alanlara yapılması bunker tasarımlarının şartlara göre dayanıklılığının artmasını sağlamıştır. Bundan sonra İkinci Dünya Savaşı'nın patlak vermesi, tüm ülkeler için güçlü savunma ve barınak yapılarının oluşturulmasını zorunlu kılmıştır. Adolf Hitler'in yönetiminde, onun ulusal, anıtsal mimari tarzına uygun olarak büyük ve yüksek sığınak tasarlanmış ve inşa edilmiştir. Bu tip bunkerlere Almanya'da Hochbunker denmektedir. Hochbunker'ler genellikle İkinci Dünya Savaşı'ndan sonra dönüşmüş ve farklı işlevlerde kullanılmıştır. Hochbunker'lerin yeniden kullanımı ve dönüşümü, içerdiği kolektif hafızaya bağlı olarak sık sık tartışılmıştır. Bazen yapılar sosyal belleğe bağlı tepki olarak görmezden gelinmiş ve yıkılmaya çalışılmıştır. Ancak Hochbunkers, tarih, mimari ve hafıza bağlamında mirastır. Hochbunker de yapılacak olan değişimler yapının miras niteliğine bağlı olarak korunması gereken kapsamın detaylı belirlenmesi sonucu dikkatle yapılmalıdır. Araştırma, Hochbunker'in tarihsel süreci, tasarım kriterleri ve türleri hakkındadır. Ayrıca Hochbunker'lerin dönüşümünde savaştan etkilenen toplumun etkisi ve tepkisi de kolektif hafıza kapsamında detaylandırılacaktır. Tüm bu araştırma kapsamı, dönüşüm projeleri ile örneklendirilmektedir.

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LIST OF SYMBOLS/ABBREVIATIONS

BC	Before Christ
Kg	Kilogram
NASA	National Aviation and Space Administration
Nazi Party	National Socialist German workers' party
OT	Organization Todt
RAF	Royal Air Force
USA	United States of America
US	United State
WWI	First World War
WWII	Second World War

1. INTRODUCTION

Humankind has always felt the need for a safe place to shelter and to protect themselves from external factors. These shelters were created to protect against weather conditions, wild animals, natural disasters, wars, etc. Then, over time, individuals built spaces using the materials they found or produced. In this way, they were able to take shelter in their safe zones rather than fleeing unsafe in the face of threat. The designs of the shelter area have changed and evolved depending on threats. These changes and developments in the shelter areas could be observed in the military defense in the most tangible context. Underground cities, castles, ramparts, ditches, underground or aboveground shelter areas were all produced and developed in this process. With the development of technology and weapons, defense systems and locations have also changed. Recent changes in the new field of defense production and development were made in the 20th Century. Especially with the air attacks developed after the First World War, attacks on a wide area were possible. Since the existing shelters do not design according to the new war conditions, the administration strengthened existing shelters or built them with materials and designs suitable for the needs. In the basic planning of each designed shelter area, was to meet the minimum vital need by providing a protected area against life-threatening situations. Various words and terms can be used to describe the shelter areas. One of these words expressing the shelter area is the bunker. The root of the word "bunker" comes from the Swedish word "bunke". The word bunker was first used by the Meyers Großes Konversations-Lexikon dictionary to it as "the name given to the places found for the protection and storage of coal, weapons, or cargo of different sizes in steam-powered warships" [1], [2]. The most proper definition of the bunker, which has been used in the sense of defense and shelter area today, is stated in the book "Bunker Archeology" by Paul Virilio, who conducted detailed research on this subject. According to Paul Virilio's definition, bunkers are the shelter structures that ensure the protection and survival of individuals during possible attacks and natural disasters. The plan types in the design of the bunker vary based on the area and geographical features. Bunkers used as long as the potential threat continues. After the end of the wars, the bunkers built for military purposes have become dysfunctional. According to this, if shelter areas did not continue military use, generally, they were built temporarily. However, under the policies of certain ruler such as Hitler, many permanent bunkers were built during and after the Second World

War. During the Hitler era, reinforced concrete large-scale high bunkers were built above ground in Germany for permanent use. Particularly, the term “Hochbunker” was used for these bunkers. The Hochbunkers have been dysfunctional and transformed many times after the war. Some of the Hochbunkers, which became useless in military function after the Second World War, were demolished or demilitarized, while some were sealed and locked out of use while, some of them were transformed to offer new functions according to the environmental requirements and the needs of the period. Some of them were transformed into several buildings such as warehouses, commercial areas, and production areas based on the needs of the settlement area, while some bunkers that could be used for military purposes were determined and converted back to this function during the Cold War period rather than building new ones. Some transformations can damage the memory interfering with the historical process. In this context, the areas to be protected in the transformation should be determined and implemented correctly.

1.1. AIM

This thesis aims to investigate the transformation of Hochbunkers, which were designed and built during the Second World War in Germany, and their transformation process after being dysfunctional after the post-war. Literature review on the subject includes history and design criteria. Subsequently, transformation studies on Hochbunkers continue. Thesis was aimed to analyses the transformation processes and solutions for similar types of structures by examining some selected projects of Hochbunkers transformation. The main scope of the study covers the Hochbunkers in Germany. This thesis also includes the collective memory link to examine the social impact and response in the transformation of such places that contain different memory, representation, and identity, such as traumatic and painful memory.

1.2. SCOPE

The scope of the thesis covers the transformation of the Hochbunkers in Germany after losing their military functions, including the history, design criteria, types, infrastructure, use and disuse of these structures during the war, the transformation process, to be

monumentalized in the historical context and whether they are considered a cultural heritage or not. In addition, the study examines the effects and reactions of society in the transformation process in the context of collective memory. Within the scope of this research, the projects for the transformation of Hochbunkers in Germany were also examined. Structures with different functions selected in the transformation projects were examined. Relevant resource access, reliability of sources, and suitability were considered while sifting through structures with similar functions in the project selection. Many studies and sources on them in the literature were determined and sorted out. In general, English references were used in this thesis. Moreover, primary sources in German were also referenced.

1.3. METHODOLOGY

The research process for the dissertation covers elaboration on the stages leading to the transformation of the Hochbunkers. First, the research investigates the historical process, and examines the construction and design process. Then, under the subheadings, the transformation of the Hochbunkers after the war is mentioned in the context of the design criteria. In addition, also under the subheadings, possible situations that occur in the absence of transformation revealed. The whole topic integrated with the literature review. To elaborate and exemplify the research, particular transformation projects presented as a reference, and the Hochbunker transformation projects in Germany, which is the focus of thesis scope, analysed. In the project research, the architectural offices that carried out the transformation for the designated designs were contacted. Information was retrieved about some projects at architectural offices. The research includes the post-war disuse and transformation of Hochbunkers that were built during the Second World War. It covers the period from the Hitler period, when the Hochbunker design started, until now when the transformation works still continue. In addition, the effect of society in the transformation was revealed by associating it with collective memory. Thus, within the scope of the thesis, the historical process analysed, its connection with transformation in the architectural scope examined, methods used for interpreting the data collected, and that compared with other projects.

The first chapter of the thesis includes the purpose of the research, the specified scope, and the methods used.

In the second chapter, the defense and shelter structures used until the First World War, the administration in Germany after the First World War, and the architectural situations are stated. Then, the historical procedures of the Hitler administration are explained. The design of the building and the post-Atlantic Wall process are emphasized.

In the third chapter, the design criteria of the Hochbunkers discussed. The subheading includes the materials used in the construction of the Hochbunkers, their infrastructural system, camouflage of the structure, the distribution of tasks within the building, and the living conditions. In addition, the function-dependent types of Hochbunkers are also explained under separate subheading.

The fourth chapter contains the transformation of the Hochbunkers. Taking the decision of demolishing or disusing if conversion does not occur explained under the subheading. How the buildings with historical value were decided to be monumentalized or not in the context of heritage during the decision-making process was briefly mentioned. How these Hochbunkers have been preserved is discussed depending on this detail under the subheading. Disturbing inheritance and incompatible heritage situations where the Hochbunkers were qualified as heritage elements are also stated. Various views on representation and identities before and after the transformation in society examined within the scope of collective memory, and the support of the literature review. Community influence and response to the transformation of the Hochbunker includes with the interpretation of the data based on references. At the end of this part, some of the studies and projects on this subject are mentioned.

In the fifth chapter, the process of the transformation of the Hochbunkers, eight projects selected according to the types of functions given after transform of the Hochbunkers in Germany were studied.

The sixth chapter, covers the results of the transformation process of the Hochbunkers in Germany, examining them within the scope of the literature review. This section contains data generated by the author at the end of the investigation on the transformation of Hochbunkers in Germany in the 20th Century.

2. DEFENSIVE ARCHITECTURE IN GERMANY IN THE 20TH CENTURY

The production of shelter areas first started being designed when individuals needed protection against possible threats. In this context to need protection, one should first have an idea of the threats. If the threat to be encountered is known, defense plans and designs can be created against it. The designs of shelter areas can be applied to different locations in various sizes, plans, and materials, depending on the severity of the threat. Moreover, shelter areas are not solely designed for the protection of individuals. While historical records or representations of precious inheritances that are important for the culture and the future of the society may be placed under protection, this situation has taken the shape of the preservation of scientific findings thanks to today's technologies. As a result, the values sought to be passed down to future generations are protected in the shelter zones.

The shelter areas haven't got a specific standard typology. From the beginning to the present, the shelter area has always been viewed as a more advanced version of the previous one in terms of design and materials. In this context, caves were the first primitive areas used as shelters to consider the development of the known periodical shelter areas. Even in the case of the use of caves as shelter areas, the existing threat must be known and understood. There must be pre-design regarding that why that location selection as a sheltered area. In the following years, humans started living in large communities, and with the formation of cities, underground cities constructed to ensure protection. Underground cities are the first examples of shelter area infrastructures entirely built below the ground (Figure 2.1., 2.2.). Afterward, defense zones took the shape of saferooms in the form of thick-walled secret compartments built under residential areas. With the shelter areas constructed during the Roman period, the concept of bunker slowly started to emerge. In the shelter areas built in this period, a defense-based design adopted, and construction practices organized to offer sufficient resources and infrastructure for individuals taking shelter. Thus, the concept of taking shelter in secure locations instead of fleeing when faced with possible attacks became more predominant starting with this period [2].

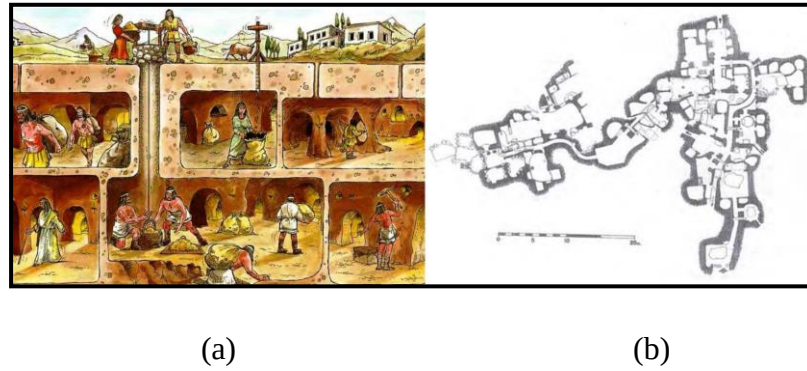


Figure 2.1. (a) The underground cities visual, photo by Ömer Demir [3]. (b) The plan of Kaymaklı¹, one of the examples at underground cities built in BC, by Luciano Giovanini [3].

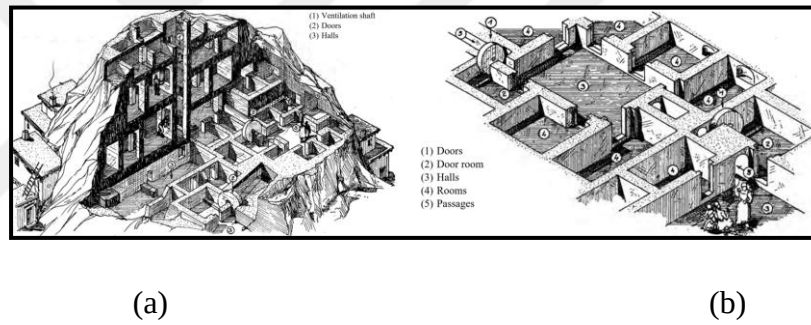


Figure 2.2. (a) Some of the part of Kaymaklı underground city section drawing, by H. Gürçay and M. Akok [3]. (b) Some of the part of Kaymaklı underground city general view drawing, by H. Gürçay and M. Akok [3]. (c) Photos from the inside of Kaymaklı underground city, by İbrahim Demirtaş [3].

¹ Underground cities are areas designed by individuals for defense and shelter purposes. Many different rooms and sections were built in these cities according to the needs of the individual. Cappadocia, which is in the Central Anatolia Region of Turkey, includes the ancient settlement areas. In addition to having many underground cities in the region, one of them is Kaymaklı Underground City [3].

Apart from the shelter area, defense areas and structures have also been designed such as towers, fortresses, ramparts (Figure 2.3., 2.4.). Fortresses, observation and defense towers were built at strategically important positions in the cities surrounded by ramparts. These designs have been revised constantly according to the changing of materials and life conditions. For an example of changes in fortress design, the positioning of the weapons developed change according to structure design. The transformation of weapon types into the artillery system in the 19th Century increased the damage. In response to these attacks, the design of the castles and the use of materials have been updated according to the conditions of the age. While ramparts were improved and used during the period between the 19th Century and the First World War, due to the insufficient transformations in the field of defense, remarkable transformations changes were made in the 20th Century [4], [5].



Figure 2.3. Example of Fortress; Aleppo Castle² was built by the Ayyubils in the 12th-13th Centuries [6], [7].



Figure 2.4. Example of Fortress at Europe; Cochem Castle³, Cochem, Germany [8], [9].

² Aleppo is one of the oldest cities in the world, containing more than four thousand years of Near Eastern historical remains. Aleppo Castle was built by the Ayyubils in the 12th-13th Centuries. Castle is designed on natural limestone and has a large-scale design. The states in the area have preserved these and many similar structures. In recent excavations, the remains of a Bronze Age neo-Hittite temple have been found before Christ. The building, which was protected within the scope of the Aleppo Ancient City, which was on the UNESCO World Heritage List in 1986, was damaged in the 2011 war conflicts. It has been opened to the public again since 2017 and its repair continues [6].

Even though the design, construction methods and materials in the shelter areas served as a model until the early 1900s and were applied to the Ancient Greek, Roman and Medieval defense infrastructures, this situation showed the need for a radical transformation in the defense areas due to the lack of the competence with the First World War. Although fortress defenses were adapted to the needs of the period until the First World War, the changes and improvements in weapons technology have demonstrated the deficiencies in this design system. That has affected the way the military defense and resistance. Fortresses and ancient defenses do not conform in their construction to standards and the war has shown that a remodelling of the construction must take place with marked innovations. Following the First World War, the fact that new weapons could be used became abundantly clear, especially in the late stages of the war. Thus, studies regarding providing bunkers with new materials, designs, and infrastructures were commenced before the start of a new war [11].

As a sample of the underground shelters used in the First World War, generally built with brick material by the public, do not exceed one floor above the ground, were aimed to provide the necessary protection. However, these structures could not fully protect people from air raids. Unless the bomb directly hits the shelter area, it can safeguard with not so much damage as the rubble coming to the structure or the damage caused by the bomb to the environment. Increased bomb strength has shown that these structures will be insufficient [11]. After the first experiences against airstrikes in the First World War, materials such as stone and brick in military defense areas could not provide the necessary defense. Accordingly, instead of using those materials, defense areas have been directed to use reinforced concrete [12]. The root cause behind these radical changes in shelter areas is that, in the final stages of the First World War, better field observations of airstrikes were performed, which in turn enabled attacks on larger scales [2]. In this context, reinforced concrete bunkers were constructed during Second World War, which are considerably stronger against more powerful attacks. The rapid production of protected areas and the development of monolithic reinforced concrete designs are the reasons why the bunkers constructed during Second World War vary from those defensive areas previously. There

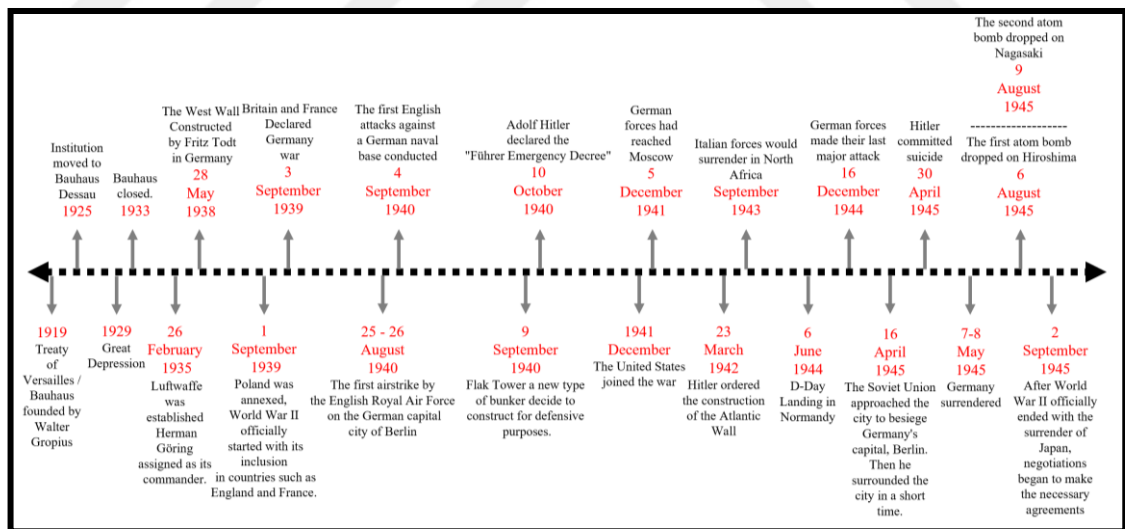
³ “Cochem Castle was built around the year 1000 by the palatinate count Ezzo, son and successor to palatinate count Hermann Pusilius. The castle was first mentioned in a document in 1051 when Richeza, Ezzo’s oldest daughter and former Queen of Poland, gave the castle to her nephew palatine count Henry I.” Even though the castle was exposed to many attacks, it has survived until today with reconstruction and repairs [10].

is still no definite plan or design specification in place for the bunkers. Bunkers may vary by country and region in which they will be constructed. While developing technology and used weapons make a change at the material, according to their attack strategies were made for differences in design [4]. According to this, bunkers have definite standards however some changes in architectural designs according to the developing conditions. The following chapters will explain bunker types changing in the Second World War and the Cold War in Germany and the design process of the Hochbunker type.

2.1. GERMANY FOLLOWING THE FIRST WORLD WAR

Overview of the historical process present as a timeline (Table 2.1.). Thus, the Historical can generally view scope within a single framework. In this section, the situation in Germany before Hitler and what happened during the Hitler period will be discussed.

Table 2.1. The historical period between in Treaty of Versailles 1919 and End of World War Two 2 September 1945, created by author.



Briefly look at the process leading up to the Hitler government, Germany was governed as the Weimar Republic after the First World War. The Weimar Republic is a political government that adopts the republican form of government, trying to reintroduce the German national identity after the First World War. In the post-war period, in many areas, changes were made, such as social, political, and economic. Activities that provide social

development such as art, science, and philosophy happened [13]. Thus, in the 1920s, the Weimar Republic promoted architectural, artistic, and cultural studies. Within the scope of the architectural field, the Bauhaus emerged. The steps have been taken in modern architecture. The Weimar government provided support to initiatives such as the Bauhaus, art centers, schools [14].

2.1.1. The Bauhaus

The institutions reveal a new trend in 20th-Century architecture designs, and arts that emerged during the Weimar Republic period. The Bauhaus was founded by Walter Gropius in 1919 in Weimar, Germany, by the merger of the Weimar Academy of Fine Arts and the Weimar School of Applied Arts. According to Walter Gropius opinion in his book “The New Architecture and The Bauhaus”, the reason for the opening of the Bauhaus is: “Thus, the Bauhaus was inaugurated with the specific object of realizing a modern architectonic art, which, like human nature, should be all-embracing in its scope.” Distinguished individuals have been trained by giving in-house training by experts in their fields. Institutions have opened in different regions connected to the institution. For example, the institution moved to Bauhaus Dessau in 1925. It effectively developed the more functionalist, economic, and permanent structure understanding that emerged with the First World War. Standardizations have been tried to be achieved within the program. Thus, that can create cost-effective, fast, and practical solutions. There have also been studies about creating rational designs. Therefore, by using the most suitable working conditions, materials, and technology, an orientation in which the function is at the forefront, including the design and construction stages in architecture. An environment and education have provided creative individuals in terms of architecture and can reveal their styles. The curriculum includes different disciplines such as theatre, handicrafts and craftsmanship, architecture, furniture, and object design. Before Second World War and the repressive actions of the Hitler administration, many architects within the institution went out of the country. The approach and effects of the Bauhaus style are known to be observed today [5], [15], [16]. Modern and contemporary architecture has caught an innovative and permanent trend in the fields of art [17].

2.1.2. End of the Weimer Republic

The Weimar Republic made positive changes; however, the post-World War I situations and economic crises had reinforced the problems. Especially, Germany was faced with severe sanctions enforced by the Entente States due to its defeat in the First World War [18]. A significant one of these sanctions was the Treaty of Versailles, which was signed in 1919. With this treaty, the German state was forced to give up large swathes of land, its army was restricted to a maximum of one hundred thousand soldiers, and it was required to pay a large sum of war reparations [19]. Another important provision of the Treaty of Versailles is that Germany was prohibited from undertaking any air force-related activities [20]. The heavy expenses during the war and the reparations that followed started to impoverish Germany. In the post-war period, Germany attempted to borrow from other nations since it was unable to procure the necessary monetary sources to pay off the reparations and ended up paying the war reparations using the money lent from the United States and British banks. However, this situation was not a solution for Germany. With the emergence of the Great Depression in 1929 throughout the world, civil unrest began to emerge in many countries due to a lack of sufficient financial resources. To prevent these civil unrests and to make their way out of this economic depression, statesmen from all over the world sought new financial resources [5]. In particular, the United States withdrew the loans it had provided to other countries to resolve the economic downturn it experienced following the Great Depression, which compounded the economic troubles weighing down the state of Germany, as it was requested to pay back the loans it had borrowed. With many European countries already facing economic difficulties due to the effects of the Great Depression, Germany was unable to borrow from other countries [18]. The difficulties faced by the German people during this period eroded their trust in their government. As a result of all of these problems, Germans who believe that a new government should emerge will elect a new party and leader. With a new hope that he had given to the people and the new ideology that he has created, Hitler would come to power in Germany [5]. With the coming to power of the Nazi party and Hitler, all sanctions against their ideological scope ended. In this context, the Bauhaus also came to an end in Germany in 1933 [13].

2.2. GERMANY UNDER ADOLF HITLER

Adolf Hitler served in the German army on the front lines during World War I. Hitler, who held opposing views to many German troops, backed Germany's continue in World War I. The German citizens, however, were exhausted by the war and demanded an end to it. Following the First War, Adolf Hitler joined the National Socialist German Workers Party. The shortened name of this political party is Nazi. Although Hitler stated that his goal of joining the political party was to establish the big and prosperous German state, his real purpose was to spread the ideology he had created, in addition to the creation of an Aryan German race and a strike against the Soviet Union following the capture of most of the European countries.⁴ As a result of the speeches he gave at his rallies, all eyes were drawn to Hitler [21]. With the death of Paul von Hindenburg, who was the President of Germany, in 1934, Adolf Hitler became the Chancellor of Germany and was declared the Führer [22]. Nazi Party became the most powerful political party in Germany. Following his rise to power, Hitler acted as the leader of the German state for five years until the start of Second World War. His leadership continued until the end of World War II in 1945. During his leadership, he was the proponent of the idea that the German government should rule other European states. Thus, he started preparations for a new war [5]. The first steps towards this war were taken in March 1935 with Hitler's refusal to abide by the terms of the Treaty of Versailles.

In the early 1900s, aircrafts became actively usable. The aircrafts were used as tools of war for the first time in the First World War. With the airstrike method, powerful attacks could be made from a distance to wider areas. Many countries, including Germany, became aware of this fact with the First World War and speculated that airstrikes would play a part in future conflicts. Therefore, they have started producing weapons and defense systems against such attacks. Following his rise to power, Hitler placed great emphasis on protective measures against airstrikes [11]. In this context, Germany was divided into three regions in 1934 into aerial defense zones [23]. On 26 February 1935, Luftwaffe⁵, was

⁴ Referring to the statement made based on the historical research by Ali Çimen and Gökür Göğebakan in their book titled "Tarihi Değiştiren Savaşlar" (p. 326), the ideologies Hitler wanted to establish are briefly discussed.

⁵ At the beginning of World War II, due to the probability of receiving aerial attacks, the first air defense regulations were issued in 1932 by the "Police Technology and Transportation Institute" affiliated with the Reich Aviation Ministry. In 1933, at the German Construction Association, Reich Aviation Minister Goering

established to defend and protect against airstrikes and Herman Göring was assigned as its commander. In the Luftwaffe, studies have been carried out primarily on armament within the scope of the subject of defense [24].

In his plan to annex European territories into German lands, Hitler aimed to start with German-speaking states of German origin. The Treaty of Versailles divided Hungary and Austria, causing both states to crumble, and become targets in the process of reorganizing their state structures. As he believed that Austria is a part of Germany within the scope of his dream of a Greater Germany, Hitler declared in March 1938 that Austria would be annexed into Germany. Austrian people, who were faced with internal strife and many difficulties during the post-war period, decided to support Hitler. Germany and Italy allied and committed themselves to mutual assistance in meeting any military needs in the run up to Second World War. Although this did not attract the attention of other European States at first, the number of soldiers in the German army started increasing day by day. The number of soldiers of the German army should be less than one hundred thousand as per the limitations imposed by the Treaty of Versailles, but the number of soldiers in the German army reached approximately one million by 1938 [18]. During the planning and war preparation time, Germany began developing Hochbunker designs for protection and defense against air attacks in 1938. Especially during the first stages of the war, most of these works focused on the production areas that require to be used and defense areas [24].

While the Second World War had not yet begun, Hitler as planned after annexing Austria, conquered Czechoslovakia. Czechoslovakia created defensive structures and lines against light and heavy attacks. Ramparts were constructed in 1936, and in 1937, new defence types and designs were selected instead of fortress-type defence systems. However, even these new defence systems failed to stop Czechoslovakia from being annexed [26]. The Maginot Line is a defensive line that was constructed along the eastern and northern borders of France from 1929-1938 to defend against the Germans. According to Maginot Line, Germany built a West Wall for protection and defense opposite carried out by Fritz

ordered the "Reich Air Defense Building Committee" to be founded. Then, in 1935, this institution was transformed into Luftwaffe [20]. Luftwaffe was founded in Germany against air attacks in World War II, but it was dissolved after the war without becoming a permanent institution. The institution founded by West Germany with a similar name in 1956 against air attacks and became permanent after the unification of German states still operates as the German Air Force today. Although it is partly similar to Royal Air Force (RAF) in terms of function and intraorganizational mentality, it followed different strategies from the American and British Air Forces [25].

Todt on May 28, 1938. The West Wall is also called "The Siegfried Line". The Maginot Line served as a source of inspiration in terms of design and strategy for the German state in constructing the West Wall and Atlantic Wall (Figure 2.5.) [11].



Figure 2.5. Map of the boundaries of the Maginot line, West Wall, and Atlantic Wall on the same map, author's arrangement based on references [27], [28], [29], [30].

Afterward, Poland was annexed on 1 September 1939, World War II officially started. The war's continuation and the German army's unrelenting march across Europe posed a threat, so Britain and France proclaimed Germany an enemy and declared war on Hitler on 3 September. Thus, the war had reached full steam in September 1939. With the declaration of war, airstrikes were commenced against Germany [20]. Hitler enacted new ordinances one after the other with the commencement of these aerial attacks, the first of these ordinances was about nightly blackouts in German cities due to the increasing continuation of airstrikes [24]. Then, in 1939, with the order he gave to concentrate on the construction of bunkers for defense and protection, it was decided to stop and postpone the construction of all building projects, except for those built for war. Only buildings that had started construction were allowed to be completed to form a frame and shell during this period [4]. While all this was happening, Canada, Australia, New Zealand, and India also participate in the war against Germany. Britain, France, and Great Britain's allies faced Germany and their allies Italy and Japan. The United States did not participate in this conflict during its early stages. However, it provided arms and ammunition to Great Britain. Many United

States citizens were against the ammunition assistance that their government was providing and their country joining this war.⁶ Although the United States did not initially take part in the war, it was prepared for the possible attacks from Japan [18].

With the start of Second World War, Germany entered a period of accumulating power. With its land, air, and naval military power, it was able to annex many countries. Many European countries, including Austria, Czechoslovakia, Poland, Luxembourg, Norway, Serbia, and Greece, were among the states occupied by Germany. Before the United States entered into the war, Germany first invaded Denmark, then invaded France by passing through the Netherlands and Belgium. Following France, he wanted to conquer the territories of England and Great Britain, but after that, he intended to invade the Soviet Union and gain supremacy over all of the world's nations [21]. The German plan for invading England involved the destruction of British ships via the use of submarines and warships, which would render the English state unarmed and on the path to starvation. In response to Germany's naval attacks, the British Royal Air Force (RAF) counter-attacked by conducting airstrikes. As a result of the British airstrikes, RAF and the German Air Force, Luftwaffe, clashed for two months [18]. Thus, these airstrikes, which began in 1940 August, continued intensely for a while, including the month of September. Although Germany's attacks on the lands of England were carried out according to plan, England performed strong reprisal in terms of defense. The first airstrike by the English Royal Air Force on the German capital city of Berlin was executed on the night between 25 and 26 August 1940 and the first English attacks against a German naval base were conducted on 4 September 1940. The RAF mainly carried out airstrikes during the day. In the later periods of the war, these attacks began to be carried out at night. The strong defense displayed by England made Hitler postpone his plans to invade. In addition, due to the increasing number of such airborne attacks, with the decision taken on 9 September 1940, to construct the Flak Tower, a type of Hochbunker, for defensive purposes. Six Flak Towers initially to be constructed in Berlin. A Flak Tower is a type of bunker that is constructed for defensive purposes. While they were mainly used anti-air turrets, certain Flak Towers also acted as bunkers for civilians and soldiers [24].

⁶ In this section Bauer, S. W. "Dünya Tarihi: 4. Cilt: Yakınçağ: Victoria Çağından SSCB'nin Dağılışına" regarding the book was written.

2.2.1. Flak Towers (Flaktürme)

Flak Tower's design and construction program were initiated with the decision published by Hitler on 9 September 1940, based on the airstrikes. Some of the sketch designs for these Flak Towers were drawn by Hitler personally, and their implementation and arrangement would be carried out by Albert Speer, the Minister of Armaments and War Production, and Fritz Todt, both of whom were responsible for their architectural design and construction (Figure 2.6.). On October 1, 1940, this work was assigned to Friedrich Tamms, who was also an employee of the organization company of Fritz Todt. He would be tasked with the development and control of Flak Tower designs (Figure 2.7.) [31].

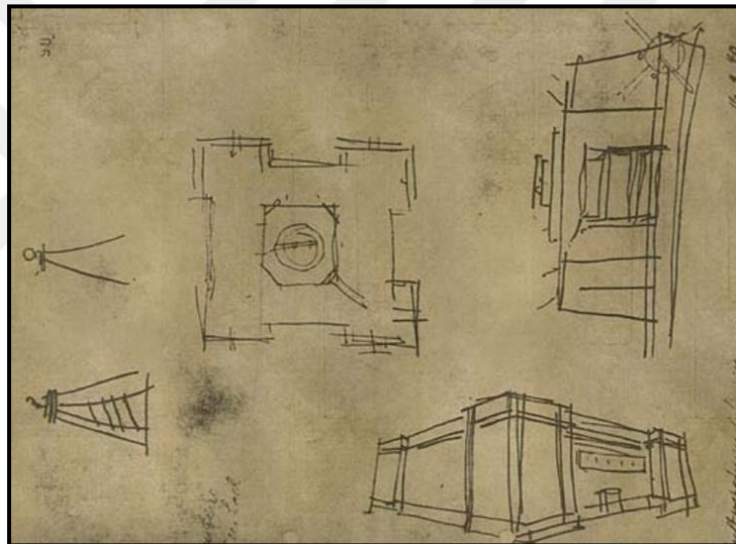


Figure 2.6. Hitler's drawings at Flak Towers for Berlin [32].



Figure 2.7. Photos of Hitler examining building model with Albert Speer [33].

In October 1940, the pre-planning, pre-modelling, and pre-design phase complete. Then the completion of the detailed drawings in March 1941, the designs were submitted to Hitler for approval. After approval grant, the construction of the towers commenced. Flak Towers included in the guides in the 1930s were designed to be built quickly with easy-to-find materials and simple designs. More details were added to these structures in the 1940s. With more durable construction materials, large-scale and comprehensive plans were made. Six months after the approval, the Zoo Tower, the first Flak Tower, was completed in April 1941 (Figure 2.8.). Following the Zoo Tower, the construction of the Friedrichshain Tower was completed in October 1941, which took approximately six months. After the construction of the Friedrichshain Tower, the Humboldthain Tower was constructed in the six months between October 1941 and April 1942 (Figure 2.9.) [32].

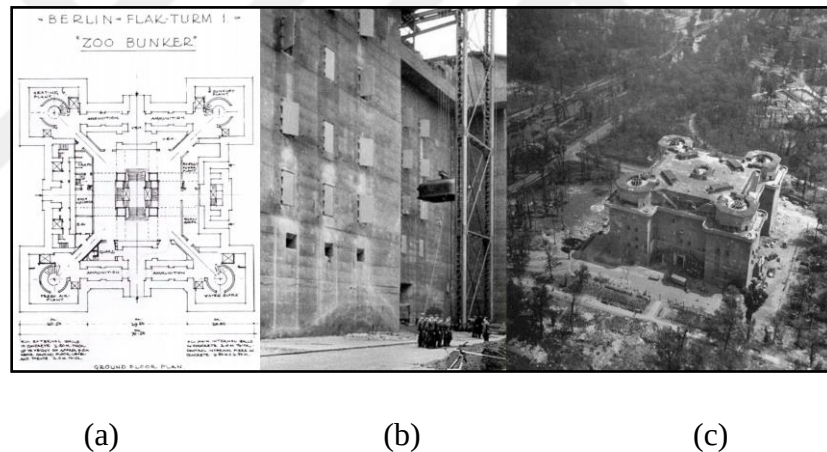


Figure 2.8. (a) Zoo Tower ground floor plan [34]. (b) Zoo Tower construction photo [32].
(c) Zoo Tower general view, by William Vandivert [35].

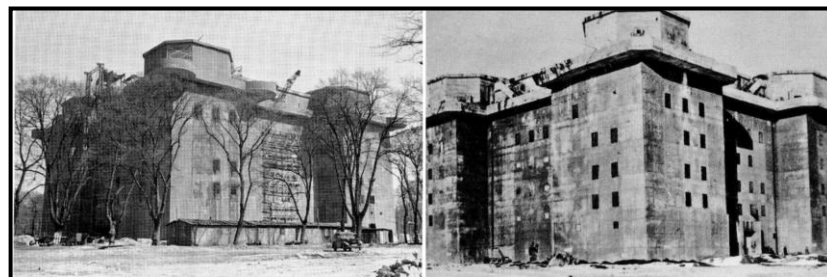


Figure 2.9. (a) Photo of Friedrichshain Tower and (b) Humboldthain Tower [36].

While the construction of the Flak Towers was still underway, Tamm's design team completed the construction of the first Bauart 2 (Type 2) Flak Tower in Hamburg in the October of 1942. The defensive and protective capabilities of Flak Towers were increased five-fold during the period between September 1939 and February 1944 [24]. With the conclusion of Second World War, allied forces started processes to dismantle and destroy these bunkers. However, due to the large number of individuals who needed housing area, these bunkers and shelter areas were demilitarized and opened for civilian use. However, with the advent of the Cold War (1946-1991), the Flak Towers left open for use were fortified against nuclear weapons. With the end of the Cold War, many of these bunkers lost their functionality again [20].

2.2.2. The Announcement and Operation of the Emergency Program- Hochbunker Construction

In the context of the Flak Towers, the construction of bunkers was not sufficient for defensive purposes on their own. The lives of many civilians were endangered as a result of airstrikes in German cities. For this reason, it has become necessary to build certain types of bunkers, especially to protect civilians. Due to this necessity, Adolf Hitler declared the "Emergency Program" to protect of urban zones against airstrikes with the "Führer Emergency Decree" dated October 10, 1940. Thus, the shelter construction program was initiated [23]. This Emergency Program was one of the most ambitious construction projects in history. During the Cold War, many countries tried to imitate program similar to the emergency program [24]. After the declaration of the Emergency Program, the Ministry of Aviation of the Reich published a program in addition to the emergency program, which included plans to establish defense lines for the transportation lines. For example, warning systems, tunnels, and bunkers were built in commonly used railroad transportation areas. Most of these bunkers were shelters that could only hold a single individual [20]. Following the announcement of the programs and the start of construction, Hitler took a detour to strike his other target, the Soviet Union [18].

Second World War, air raids were where the most damage was done, and civilians were harmed and had difficulty protecting them. During the 1940s months of August and September, the English Royal Air Force started conducting airstrikes in German cities,

Berlin. Following these airstrikes, the "Emergency Program" was commenced on 10 October 1940 with an order issued by Adolf Hitler (Figure 2.10.) [4]. The Emergency Program included four years within its scope, and it was designed by Hermann Göring, the Minister of Aviation for the Reich and the Commander in Chief of the Luftwaffe. Under the direction of Fritz Todt and Albert Speer, the "Organization Todt" and the "Speer Construction Team" were established to carry out this program's construction and architectural design. With the death of Fritz Todt in 1942, Albert Speer became the head of this program. Todt was one of the leaders heading the bunker program and he frequently provided Hitler with reports on the progress of the "Emergency Program" [20].

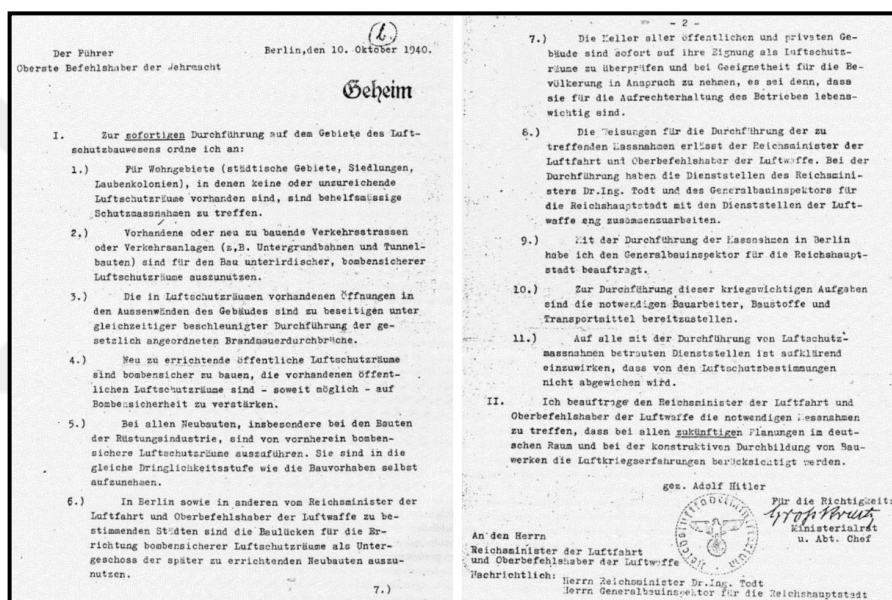


Figure 2.10. Decree published on the scope of the emergency program of 10 October 1940 [20].

With the declaration of the emergency, any building development other than that for military purposes was prohibited. Although design guides were published within the program's scope, actual designs usually did not follow these guides to the letter, and there were changes in regional bunker designs [4]. Moreover, strategically important locations that required priority protection were determined and bunkers were constructed according to these plans. Accordingly, it was planned to construct 6,000 airstrike-resistant bunkers to protect 92 cities and 35 million civilians. There are approximately 70 cities in Germany, some districts were considered to be cities. Ninety-two cities that meet this criterion have

been declared "the first-degree air protection areas". The program is divided into three parts with the selection city in the country and the construction process into two phases. According to strategic goals, and construction and design work began with the cities' determination. After completing of these two phases, one more phase was added as the results were found to be lacking [24]. Within the program, the priority of construction was granted to the northern part of Germany. Many of the bunkers constructed within this context are located in the northern part of today's Germany [37].

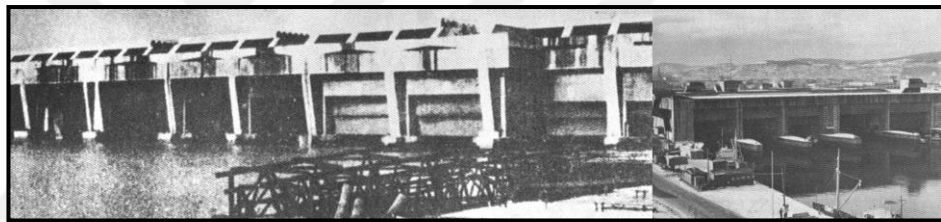
According to the opinions of the director of the air attack protection office in Bremen, Georg Assman, which were included in Michael Foedrowitz's *Bunkerwelten* and which demonstrate the difficulties regarding the bunker design, the related planning processes, and the calculations that reveal the near impossibility of completing the constructions, the following conclusion was reached:

The fact that this is a task that will take decades according to the program of the Führer leads to the anticipation that the required services will have enormous scope. If one assumes that residents of the urban areas, which are areas that face airstrikes the most often in all of the lands held by the Reich, are to be protected with shelters, then it could be assumed in turn that 50,000,000 people are in need of protection, with the requirement of approximately four cubic meters of concrete and building materials per person. A total of 200,000,000 cubic meters of protective concrete is made, according to the calculations. And this amounts approximately to twenty years of unceasing usage of the entirety of the construction industry of the Reich [20].

This wide-scoped program, which was planned according to the aforementioned fact, clearly demonstrates that it is the largest-scale construction program in history [20].

The start date of the first phase of the Emergency Program was determined as of November 1940, and it was foreseen completed in one year. The first phase of the construction program is called "Sofort" and covers 31 cities directed by Dr. Kurt Knipfer. Construction inspections were also made by Organization Todt (OT). Afterward, the Ministry of Aviation of the Reich declared that 61 more cities would be prioritized in the fortifications against airstrikes. The designs produced in the Sofort stage are usually lacking a general standard [24]. In selecting priority cities for the Emergency Program, the primary condition was determined to be the cities having more than 100,000 residents. In addition, certain cities under the threat of airstrikes that were of strategic priority were also included in this category [20]. During the first phase of the program, the aim was to design

and build bomb-proof bunkers for about five percent of the population of the identified priority cities. For the rest of the population in the city, bunkers designated as Splittersichere, which are resistant to fragmentation of less powerful bombs, were planned to be built. Additionally, the construction of U-boat bunkers was commenced in 1941 (Figure 2.11.) [24]. Improvements in Hochbunker designs continued after the completion of the first construction phase. Consequently, Hochbunker designs implemented in the first construction phase had thinner walls and ceilings. The design and type of the Hochbunker have changed according to the size of the area where it will be built, the population, and the materials of the surrounding buildings. Accordingly, bunkers and shelter areas wall and ceiling would be made thicker in the later designs. Camouflage was used in the bunker construction of all residential areas, which is in keeping with the architectural design features of the city (Figure 2.12.) [4].



(a)

(b)

Figure 2.11. (a) U- Boat design; Brest pen, Bordeaux, France [11]. (b) U- Boat design; Submarine pen, Dora1 bunker, Norway (German design) [11].

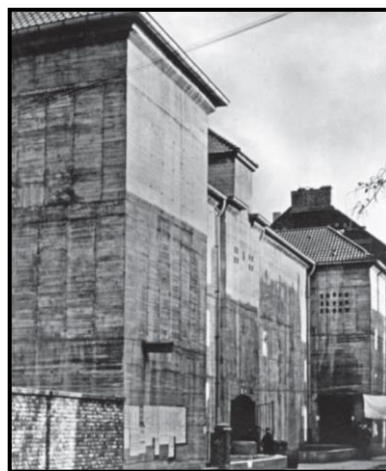


Figure 2.12. In Kernerstrasse Köln, camouflage has been applied to the residential area and suitable for the surrounding buildings. Architect; Hans Schuhmacher [24].

The first phase of the construction was initiated in November 1940, was delayed as a result of the Soviet Union's attack and invasion attempts and could only be completed in the summer of 1941. The first wave of construction saw the construction of 839 bunkers, which could shelter 400,000 individuals. However, the original plans included more bunkers to be constructed. The number of cities identified for the first phase was decreased to 31 and in Hochbunker the constructions were continued [20]. After the commencement of the bunker construction projects in 1940 and the continuation of the second construction phase in the summer of 1941, 1,215 bunkers were ready to be used by the start of 1942. The program continued with 515 bunkers that were under construction until the end of the year. Approximately 4 million cubic meters of concrete were used for the construction of bunkers until 1942 [24].

The shortage of workers for the construction program was an issue that had existed right from the outset. Initially, this problem was resolved by having the prisoners of war and internment camp prisoners work as construction workers. There were also difficulties in procuring construction materials towards the middle of 1942. Subsequently, changes in the scope of the construction program required an increase in labour demand. However, a sufficient number of construction workers could hardly be procured at the commencement of the program and Germany's fighting strength showed showing a tendency to dwindle. Thus, it became necessary to implement delays and cancellations in the bunker construction program and many workers labouring under the bunker construction project were transferred to the production of weapons and ammunition [37]. Bunkerwelten work of Micheal Foedrowitz show that, almost 3,000 number of the bunker construction were completed in 1943. According to the data from May 1943, the amount of concrete used had reached 6 million cubic meters. The increasing number of airstrikes conducted by English and American forces augmented the need for bunkers. Although the German government was having difficulties in procuring materials and workers, it could implement an expansion to the emergency program. This additional program is also called the third phase of the bunker program. In addition to bunkers, air attack shelter tunnels have also been built. When the number of shelter areas built for defensive military purposes such as bunkers, and shelters and the figure hospital bunker, factories, and industrial bunkers were added to the research figures, this number exceeded 6,000 [20]. Ultimately, the Emergency Program, which could be considered as the forefather of bunker designs, was conducted

with an innovative approach to design, planning, construction, and materials employed during its implementation. Thanks to their resilience, these bunkers were used during the Cold War period after being reinforced against nuclear attacks and many countries started implementing programs by imitating them [4].

While all these programs were going on, they were going on in the Second World War. The United States joined the war in 1941, a year after Hitler turned to England after the invasion of France in 1940 and sided with the allied forces. Up until 1941, Hitler had conquered a majority of North Africa and Europe. After the invasion of France, Germany attacked England in 1940. However, this attempt ended with failure, and the idea of attacking England was postponed for another time. At this point, the German army turned to attack the Soviet Union via another route and invaded a series of countries including Lithuania, Latvia, and Estonia. By 5 December 1941, the German forces had reached Moscow. Although the Soviet Union sided with Germany during the early stages of the War, it switched sides following these acts of aggression by Germany and joined the allied forces. Finally, the United States participated in the war and supported the Soviet Union, siding with the allied powers. Thus, the war went down in history as the Second World War. In the east, the forces of British and the United States forces fought alongside China against Japan. In Europe and north of the Black Sea, Britain and other forces fought alongside Soviet troops against Germany and other allied forces [18]. By 1942, Germany was losing its edge in power, as well as its military discipline [5]. As a matter of fact, it would fail to procure a sufficient number of workers for its production efforts for bunkers and weapons. One of the reasons was Germany's lack of strength; the other was expanding the shelter program and crating new projects that required more workforce, while the number of existing workers was already insufficient. Directors of specific programs made requests to Hitler in regard to reducing the number of workers and bunkers. Although Hitler had no desire to back down from this matter, he was forced to take a step backward regarding construction of bunkers when he ordered the usage of workers and prisoners of war for manufacturing and shipping arms on 19 February 1942. Stabilizing and even strengthening military power was a matter of higher priority in comparison to the protection program. Even though the efforts to construct bunkers within the borders of Germany were abated, defense-related construction was still at full steam in regions under invasion. In addition to all these bunker programs, the construction of the Atlantic Wall, a

new bunker and shelter area program along the coastal border of the Atlantic, was commenced. Hitler ordered the construction of the Atlantic Wall on 23 March 1942. Both the continuation of attacks and the fact that many construction projects were being undertaken simultaneously had caused a general decrease in overall efficiency. With the increase in the bombs' firepower in airstrikes in 1943, German bunkers started having difficulties remaining resistance. Even the bunker that Germany had recently developed under the name of "Braunschweig Armour" did not meet the expectations against airstrikes [20]. The event that would make it clear for Germany that it had lost its former power is the defeats it would face at the hands of the Soviet Union. After being defeated at multiple battles in 1943, the fortune of Germany would start to reverse [21].

2.2.3. The Atlantic Wall

During Second World War, shelters, Hochbunkers and minefields were built along the Atlantic coast in response to Adolf Hitler's orders to construct a defensive line. The construction of this line began on 23 March 1942 and was completed in 1944 [38]. The construction of the Atlantic Wall was similar to the construction of other projects in Germany in many ways. The first stage of the building, which was to be completed in three stages, was continued in Denmark and Norway in the summer of 1940 in direct proportion to the occupation, especially the German line. Following the attacks on the French in the autumn of 1941, steps were taken to begin building on the French coasts, with the second phase taking place on the Dutch and Belgian coasts. Although a certain number of shelters and Hochbunkers were constructed on these shores, the official decree for the construction of the Atlantic Wall was given by Adolf Hitler on 23 March 1942. The final phase of construction started in November 1943 (Figure 2.13.) [37]. These bunkers and shelter areas had unique shore infrastructure systems, they were also planned to have dimensionally large, monumental, and detailed designs similar to the bunkers constructed in Germany. While the number of bunkers was planned to be 15,000, only approximately 12,000 shelters and Hochbunkers were adequately constructed. Also, the coasts of France and the Netherlands have the most bunkers, on the German coasts have the fewest. Within the scope of the Atlantic Wall, Hochbunkers and shelters were built for 6,000 kilometres along the Atlantic coasts of Europe. Only the shores of Portugal and Spain did not have any bunkers constructed upon them [38].



Figure 2.13. Examples of high bunker on the Atlantic Wall, photo by Paul Virilio [39].

This series of bunkers, built on the coast based on a certain border shape, was initially called "Neuer Westwall" because it included Germany, Denmark, and Norway. This name means "New Westwall" and it was included within the scope of the Westwall that was built on the borders of Germany. With the joining of the Netherlands, Belgium, and France to the borderline, the area encompassing these three countries was given the name "Atlantic Wall," and even though it was given two names, the more inclusive name "Atlantic Wall" was given to the border. As a result, the construction zone has been exposed as integrity that stretches from Norway to Southern France along the coast [37]. Approximately thirteen million cubic meters of concrete were used on the bunkers. The amount of concrete spent is about twice the amount of concrete spent in shelters built in German cities until 1943 [20]. According to their layout plan, the Hochbunkers and shelters would be constructed in an asymmetrical formation, and they would be placed at irregular intervals in a manner that presented a coastal border defense line. In addition to constructing to the coastal points, the areas and hills that will cover the coastal area were also carried out. (Figure 2.14.) [40].

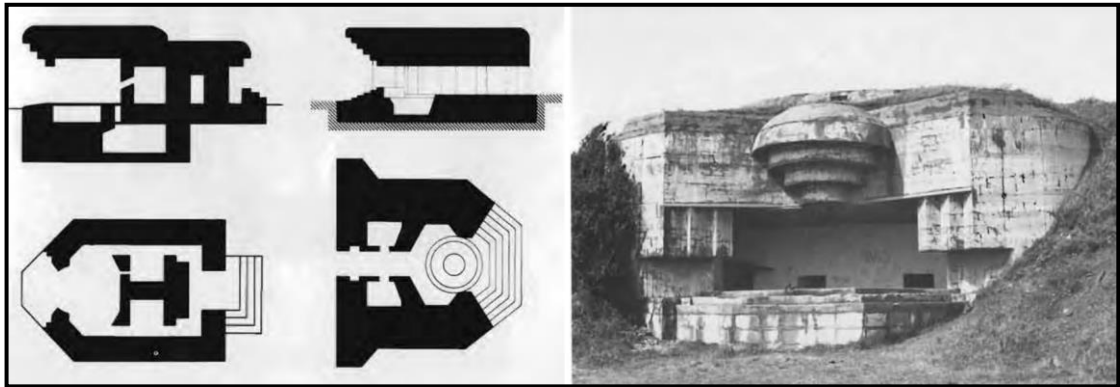


Figure 2.14. Atlantic wall high bunker sample plan, cross section view, photo by Paul Virilio [39].

Like the construction projects in Germany, the Atlantic Wall was also managed by the Todt Organization. Another common feature was those prisoners of war, captives, and forced laborers and volunteers would also work in this construction project. Although the bunkers constructed in Germany would be the basis for the designs of these defensive lines, their functions proved inadequate [41]. The fact that these bunkers would be insufficient was also reported by the director of the third phase, who ordered the construction of minefields to remedy this situation. More than 6,700,000 mines were laid by May 1944. Regardless, the insufficiency of the defensive strength of these shelters in protecting and defending would be demonstrated clearly by the assaults conducted by the allied forces in the June of 1944, which would ultimately result in Germany's defeat. Following the invasion by the allied forces, the war was ended in the spring of 1945 with the surrender of Germany. One of the primary reasons Germany was faced with this result is that it failed to transfer its power to the correct point. According to the statements in the book "A Reader in Uncomfortable Heritage and Dark Tourism": the fact that it concentrated its labour, military, and material power and spent large amounts of time on these bunker projects, while also refusing to make any compromises regarding their construction resulted in the decrease in its chances of being victorious. With the defeat of Germany and the conclusion of Second World War, certain countries took steps to render these defensive structures functionless. On the other hand, other countries decided to adopt these systems to their defensive systems. However, the fact that they could not achieve a

feasible amount of benefit from this adaptation caused these countries to abandon the bunkers in question [37].

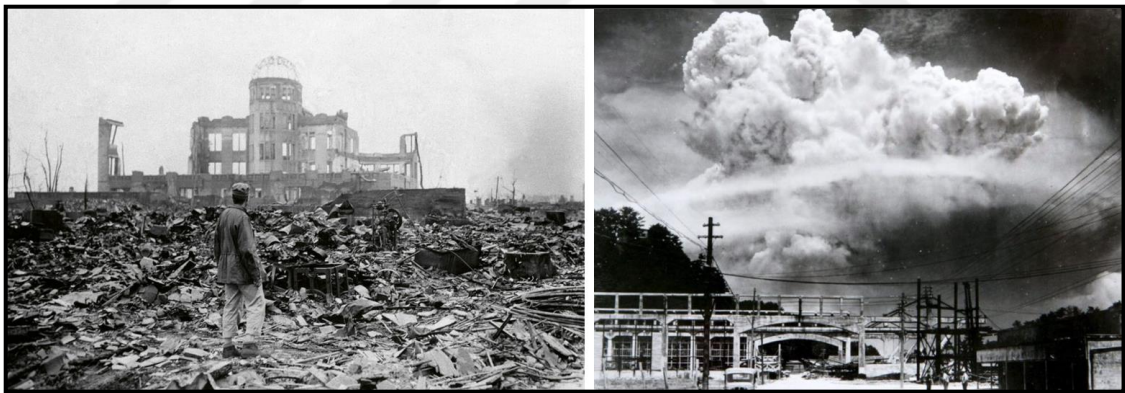
2.3. THE END OF THE WORLD WAR II

Although the war-weary Italian forces demanded withdrawal from this conflict more than once, they were long unable to do so because of German insistence. Ultimately, the Italian forces would surrender in North Africa in 1943. The Italian people, extremely wary of the successive conflicts of both the First and Second World War, found themselves in internal conflict because of government decisions and disagreements. While the council opposing Mussolini removed him from office, German forces would aid Mussolini in taking control of the northern areas of Italy, and Mussolini would continue to administer these regions. Thus, Italy was divided into two: Northern Italy under the control of Mussolini would continue to be on the side of Germany during the remainder of the conflict, while the rest of the Italian people and their government would oppose Germany. The continuation of the Italian Civil War was meant that Italy could no longer provide full support as before. Thus, Germany started to lose power and control of the war day by day [18]. This situation rendered Germany and Japan isolated, and although Japan continued to be dominant in the east, Germany was stuck in a difficult position in the Soviet front in 1944. With the strong defense presented by the Soviet Union against the German offensive, German forces were gradually forced to retreat, forsaking any territories it had conquered. British and United States soldiers also played a significant role in how the Soviet Union repelled German forces. In June 1942, British and US air forces increased the frequency of their attacks on Germany. Britain and the United States aided the Soviet Union on the eastern front twice, in 1942 and the spring of 1943. All these made it necessary for Germany to fight on multiple fronts, and the resulting decrease in military power prevented things from going smoothly for them. The allied powers created new plans to retake the areas conquered by Germany, and the plan with the largest scale in this context was the D-Day, which is considered one of the moves that ended the war. D-Day (Normandy Landing) is the name given to the amphibious landing attempt by the allied forces to take French shores to establish a beachhead to strike at Germany. The planned tactic for this attack was to distract Germany to focus on another point to decrease their defensive capabilities on the French shoreline, which was the real target of the offensive [21].

D-Day is considered the turning point of the war, and it turned the war against Germany. By launching airstrikes and conducting other deception operations before the primary assault of the D-Day on 6 June 1944, the allied states were able to hide their true target from the German forces. Then, on 6 June, the main assault of the allied forces was commenced. At first, Hitler believed that these assaults were also manoeuvres intended to deceive his forces. With the expected airstrikes, Germany was mainly interested in the allied powers' surprise operation, but Hitler soon realized that the main target was the coastal attack, and in the middle of June, he left for France. On June 23, 1944, later with the Soviet Union. These conflicts were exceedingly difficult, with many soldiers losing their lives. Thanks to the defense plan of the United States commander, French shores were retaken at the end of a long and difficult battle. Romania was liberated from the German invasion on 23 August, while Paris, which the Germans on 1 September 1939, was retaken on 25 August 1944. Likewise, Finland was freed on 2 September and Bulgaria on 9 September. As a result of these developments, Germany was forced to retreat from the shores of the Atlantic but continued to fight on its soil. The allied states and the Soviet Union marched towards Germany. The German forces launched a major, last resort counteroffensive on 16 December 1944. However, it fell short of achieving victory and this result forced them to retreat further. On April 16, 1945, the Soviet Union approached the city to besiege Germany's capital, Berlin. Then he surrounded the city in a short time. Thus, whatever strength left in Nazi forces started to disintegrate. Hitler committed suicide on April 30, 1945. The Führerbunker, where Hitler committed suicide, became a tourist destination in the following decades. Many individuals, including the allied leadership, visited this location, which came to represent an ideology, to try to understand what it meant in-situ. This location, which is quite essential in terms of the memory it represents, was partially destroyed by the Soviet Union in 1947. However, it was not completely destroyed and was sealed until 1988 [21], [22].

After 2 May, Berlin was invaded by the Soviet Union. Then, on 7-8 May, Germany surrendered. Although the war was over in Europe, it had left large-scale destruction in its wake. Despite the war being concluded in Europe on 8 May 1945, Japan refused to surrender and continued fighting for three more months. At the end of July 1945, the President of the United States, the Premier of the Soviet Union, and the Prime Minister of Great Britain offered Japan a choice: they would either surrender or be invaded by the

allied forces. The Japanese Empire refused to sign this peace offering. The war was still ongoing and the allied countries could not predict how long this war would continue. They had already lost thousands of soldiers and the continuation of war meant that many more soldiers would lose their lives. At this point, the United States proposed the usage of a newly developed weapon. During end of Second World War, the United States to pull Japan out of the war, planned to drop an atomic bomb. The first atomic bomb was dropped on Hiroshima on 6 August and the second atomic bomb on Nagasaki three days later 9 August. Japan, facing widespread destruction, agreed to surrender on 10 August (Figure 2.15.). There are still discussions about how the end of the war was brought by unethical means, as many civilians lost their lives in the two cities that were hit, and this bomb caused permanent damage. Negotiations have begun to make the necessary agreements after all that Second World War was officially concluded on 2 September 1945 [18]. Throughout Second World War, approximately two million tons of bombs were dropped on Germany through airstrikes. The most extensive air raids in history were conducted in Germany [24].



(a)

(b)

Figure 2.15. (a) Photo of Hiroshima after the atomic bomb [42]. (b) Photo of Nagasaki after the atomic bomb [43].

2.3.1. The Status of the Bunkers After World War II

With the conclusion of Second World War, many Hochbunkers and shelter areas, which were left without a function, were subject to looting. Although the local population dwelling in those areas sometimes tried to prevent the looters and preserve the

Hochbunkers, this was not always the case [44]. Along with all of this, the allies formed the Control Council. On December 6, 1945, the council voted for the demilitarization of Germany. Then occupying forces planned to destroy all elements and representations of the previous regime [45]. In the context of this decision, the objects reflecting the Nazi ideology found in the German government structures were removed, military sites and areas were shut down and many of them were destroyed to decommission them (Figure 2.16.) [46]. Although many states abandoned their demolition decision, the Soviet Union continued to enforce this decision on the destruction of these sites unchanged. In many cases, this decision was not implemented in many cases due to the negotiations between local governments and occupying states [20].



Figure 2.16. Nazi building in Germany before photo and after photo of the end of the war in 1945 [32].

The destruction decision has been welcomed by some communities. The need to erase signs of occupation, such as Hochbunkers, is a society-accepted phenomenon focused on the idea that bunkers "keep unhappy memories alive." However, this sanction enacted by the society, or the state is a matter that affects the future and destroys historical heritage. Necessary work should be done to prevent the damage done by the citizens of the states other than the war destruction in the bunkers. Despite this, the fact that war materials were thrown into the sea, tunnels were sealed, and materials were destroyed by society equates to the erasure of the traces of the past in the context of these bunkers, as well as their history. In many of the shelter areas that suffered damage, it was noted that steel portions were removed for scrap, their interiors were emptied of their contents or filled with

concrete, or they were left partially buried underground. As a result, many Hochbunkers and shelter areas were left as empty shells. Moreover, some of them were destroyed and dismantled by the invading forces with explosives. However, these acts of destruction and pillaging did not last for a long period. Many of the bunkers were constructed using reinforced concrete in areas close to residential zones. In this context, it was determined that blasting a reinforced concrete building with thicknesses reaching up to several meters would be extremely difficult and costly. Therefore, only Hochbunkers not located in appropriate areas away from residential zones were destroyed (Figure 2.17., 2.18.) [44].



Figure 2.17. The building came in 1945 after the Hochbunker was shot with artillery by the British in Bremen [20].



(a)

(b)

Figure 2.18. (a) Humboldthain L Tower 1947 and (b) Humboldthain G Tower 1948 destruction, Photo by Landsarchiv Berlin [32].

In addition, individuals left homeless during the war needed space to dwell, constituting a problem that required resolving (Figure 2.19.). Due to these reasons and many others, allied forces decided not to fully implement the destruction decision [47]. Since it would be quite difficult to construct new structures for dozens of individuals, the de-militarization

and utilization of bunkers and shelter areas were allowed by the allied forces in 1948. The use of the bunkers as residences met the spatial need of individuals, however, living there was psychologically challenging for them [46]. Although the civilians were granted the right to use the bunkers, certain allied states still went ahead with their destruction. At this point, it is necessary to use of explosives to destroy the bunkers due they are very resistant. However, since this method of destruction caused harm to the environment and the nearby structures, all allied states ceased their attempts at destroying them in 1950 (Figure 2.20.) [45].



Figure 2.19. Intact Hochbunker and damaged settlements in Bremen, December 20, 1943 [20].



Figure 2.20. Hochbunker exploding near Kiel residential areas in 1950s [20].

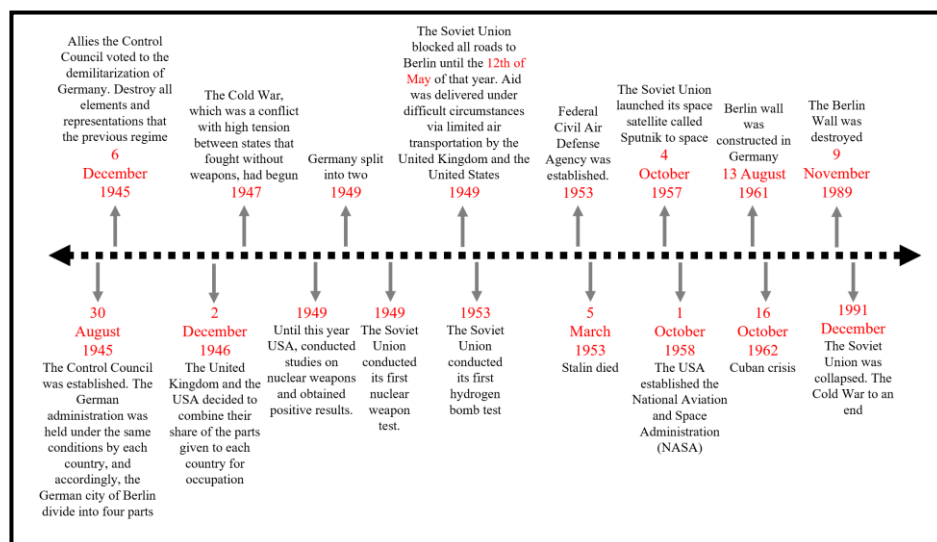
Nevertheless, to take measures to prevent any military-related usage of these bunkers, holes were drilled in the walls of the bunkers, and certain other applications were made to render them unfit for military usage, while also following the civilianization prerequisite prescribed by the Allies [28]. While all of these decisions were being taken in regards to

the shelter areas, Germany was split into two in 1949. With the increased threat imposed by the Cold War, the German Federal government took a different decision in regards to the bunkers and shelter areas and started endeavours to restore those bunkers that were still suitable for military usage. This decision was taken because the construction of new bunkers and shelter areas would take a long time. Thus, it was decided that it would be more suitable to use the shelters by reinforcing them against nuclear threats. Since bunkers that were unsuitable for military purposes were left functionless and empty, it was also decided to repair them and render them usable for non-military purposes [45].

2.4. GERMANY DURING AND AFTER THE COLD WAR

After the treaty signed after World War II, Germany began to be administered by four countries: the United States, Britain, France, and the USSR. Then four countries Control Council was established on 30 August 1945 to ensure that the German administration was held under equal conditions by each country, and accordingly, the German city of Berlin was divided into four parts. An agreement was made for planning the occupation and the administration of the city: western and north western areas were assigned to England, the northern areas to France, the southern areas to the USA, and the eastern areas to the Soviet Union. One year later, on 2 December 1946, the United Kingdom and the USA decided to combine their share of the parts given to each country for occupation (Table 2.2.) [48].

Table 2.2. Historical period between in 30 August 1945 and End of the Cold War December 1991, created by author.



Based on the belief that having power over Berlin is important in demonstrating military and administrative power, the Soviet Union tried to erase the Nazi traces in Berlin and attempted to drive its European allies away from West Germany through strategic methods. Despite these attempts, however, Great Britain, the United States, and France worked not to lose their grip on their allocated portions of Germany and continued their rule there. As a result of the failure of these attempts, the Soviet Union decided to leave the Allies Control Council. By the year 1947, the Cold War, which was a conflict with high tension between states that fought without weapons, had begun. The Cold War can be defined as the breakdown of the relationship between the United States and the Soviet Union with the end of Second World War, during which these two superpowers formed their alliances and conducted geopolitical, ideological, and economic wars against one other [19].

Various developments occurred for many countries during the Cold War. Until 1949, the USA conducted studies on nuclear weapons and obtained positive results. To briefly sum up the developments of the year 1949; the Soviet Union conducted its first nuclear weapon test. Germany was divided into two states as the Federal Republic of Germany in the west and the German Democratic Republic in the east. The Soviet Union blocked all roads to Berlin until the 12th of May of that year and aid was delivered under difficult circumstances via limited air transportation by the United Kingdom and the United States [38], [49]. In 1953, the Soviet Union conducted its first hydrogen bomb test, shelter areas, and air defense were once more brought to the agenda in Germany due to the Cold War, and Federal Civil Air Defense Agency was founded in 1953 in this context. With Stalin's death on 5 March 1953, although the Soviet Union assumed a more reconciliatory attitude towards Western Europe, problems with the USA continued. In the same year, as a result of the economic problems in East Berlin, a migration towards West Berlin began. That will have resulted in the construction of the Berlin Wall in the forthcoming years [19], [49].

The major factor in the decision regarding the reuse of shelter areas is that it was believed it would more beneficial and practical to reinforce the existing shelters rather than constructing new ones, as it would be more applicable and less costly in terms of finances and time. In this context, approximately at Germany 600 bunkers built in the past were repaired and strengthened [46]. Since the construction of a bunker is a time-consuming ordeal, as aforementioned, certain countries decided to reinforce and reuse existing

bunkers and shelter areas. During this period, some countries such as Albania and the Soviet Union preferred the prefabricated method and built bunkers. Again, the preferred material in the construction of the bunkers was reinforced concrete. Thus, pressure-resistant bunkers were constructed [49]. Although the shelter areas were made suitable for resisting nuclear strikes, the number of needed shelters was still not reached. In this context, it was attempted to shelter many individuals in these areas that exceeded their capacity. However, these shelter areas can only house a certain number of individuals and unfortunately, the difference between the number of bunkers in Germany and the number of individuals who would take shelter in them was quite significant during the Cold War. Explaining the situation in Berlin as an example will make it easier to understand the topic. Considering the Hochbunker sizes and the population of the Cold War era, that can show Hochbunkers in Berlin covered less than one percent of the population. In addition, the number of people that a Hochbunker can host cannot be exceeded, because the infrastructure, ventilation, food and basic needs and the areas where they will stay are planned according to a certain number of people. If more people are hosted in a Hochbunker than the planned number of people, the resources stored in the bunker will be depleted earlier and the number of days those seeking shelter there can stay in the bunker will decrease [50], [51]. Since there was not enough space for this, the administrations decided to provide incentives for the production of underground shelters. In addition to the use of bunkers during the Cold War, underground shelter areas connected to the households, which were designed to protect a closer range, were also started to be used during this period. Since it is vital to get to safety quickly during a nuclear attack, the only alternative is to build underground shelters near their homes if they do not remain in bunkers constructed for long periods (Figure 2.21.) [52].

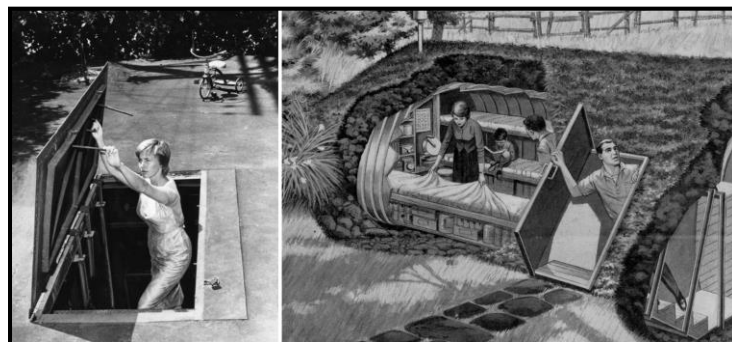


Figure 2.21. Entering shelter photo 1961 and illustration of shelter from the Cold War era [53].

In this context, due to the insufficient number of bunkers, if the underground shelter area is built by the individual in this settlement area, it is supported by the state. Thus, this incentive was effective in closing the production deficiencies in shelter areas. In the same year, emergency studies were carried out on the reuse of bunkers in Germany for military defense and the protection of civilians. The Air Protection Law was issued based on these studies, which allowed the use of the shelters and protected areas with their old military purposes once again. After the research, Hochbunkers and shelter areas that could be used against nuclear attacks were determined and inspected. These areas started utilization during the Cold War. Accordingly, studies on the transformation of those shelters that cannot be used for military purposes were commenced during this period to allow them to be reused for protective purposes [23]. There have been certain crises that escalated the tension between the USA and the Soviet Union during the Cold War, one of them was the space race. While the Soviet Union continued its efforts after the launch of its space satellite called Sputnik to space on 4 October 1957, the USA established the National Aviation and Space Administration (NASA) on 1 October 1958. The United States got the upper hand against the Soviet Union in the space race when the first man was sent to the moon. The next point in the crisis was the internal conflict of Cuba, and although the internal conflict seemed to be between the United States and Cuba, the Soviet Union was in fact one of the sides of this conflict [18]. The arms sent by the Soviet Union to Cuba were photographed by the US spy planes in October 1962, and the nuclear weapons provided by the Soviet Union were recorded with visuals. In order not to turn the crisis into a war, on 29 October, it reached an agreement with the Soviet Union on the condition that the United State did not invade Cuba. At the same time, another crisis has begun to be experienced in Europe. Berlin Wall separates Germany on two sides on 13 August 1961 (Figure 2.22.). After this step was taken to prevent migration, permission was required for crossings from east to west. Strict rules, controls, and regulations regarding the wall made it more difficult to cross the wall without permission, and those who attempted to cross the wall without permission were faced with the death penalty [18], [48]. After the difficulties at the end of the 1980s, the deterioration of the economic status of East Germany and administrative issues it was facing caused the fall of the Eastern administration, which lead to the steps taken towards unification. The periods of dissolution of states under communist rule began with the fall of the Berlin Wall on 9 November 1989 (Figure 2.23.). Despite being destroyed, the Berlin Wall still stands as a landmark in history. With the

signature of the Unification Treaty on 3 October 1990, Germany again united under one administration, like in the past [37]. The Berlin Wall was a tangible indication of the partition function and this situation was like same as the represented expressed in abstract terms.



Figure 2.22. Berlin Wall construction 1961 [54], [55].

Just like Hochbunker is the symbol of World War II, the Berlin Wall is the symbol of the Cold War. Although it is considered that the destruction of an icon that symbolizes the Cold War-like the Berlin Wall demolished the social division it damaged the legacy and historical memory and failed to demolish the mental traumas. Despite society's desire to eliminate the disturbing legacies from their surroundings, it shouldn't be forgotten that destruction and radical transformation are an intervention to history and memory [37], [56]. Although the Berlin Wall was destroyed, the bunkers, which bear the traces of the Cold War, still exist. These not only represented the events that had occurred during the Cold War era but also represent the truth as it is, as they were never used since the feared nuclear war never came to pass [57]. Following the destruction of the Berlin Wall, the number of civilian programs that focused on the construction of bunkers decreased significantly. In this context, not only new bunkers no longer being constructed, but the existing bunkers were being abandoned. Although the bunkers had been under state supervision for some time, the state had left some unused and undemolished bunkers because of their large number and cost and had taken steps to privatize them [51].



Figure 2.23. Berlin Wall demolition 1989 [58].

2.4.1. The End of the Cold War

Missile Crisis, and the Vietnam War continued within the scope of the Cold War. However, the Cold War was on the path to ending by the 1980s and the collapse of the Soviet Union in December 1991 brought the Cold War to a complete end [18], [19]. With the start of the 1990s, the reuse, and transformation of the bunkers, which were left without a function after the Cold War, became a subject of studies by the experts in the field, who sought to protect the heritage they represented [57].

2.5. CONCLUSION OF THE CHAPTER

In this section, the historical process briefly mention. After the First World War, brief information given about Germany's Weimar Republic administration, the conditions during the period, and the Bauhaus, which pioneered architectural movements. Then, the transition to the Hitler era and the historical situation in the Hitler era examine. The historical processes of the Hochbunker, Flak Tower, and Atlantic Wall, designed and built during the Hitler period, were examined. Then, the conditions of these structures after the Second World War explain in the sub-title. In the following sections, the narrative of the historical process with the Cold War period was continued. Within the scope of this research, the design and construction process of Hochbunkers presents support from literature sources. The next section presents design details, Hochbunker forms, and infrastructures in the Hochbunker design criteria mention and research resources on Hochbunker species.

3. HOCHBUNKER DESIGN

General information about production, design criteria and materials related to civilian building types can be accessed up to date. However, data on military defense and shelter structures can only be accessed after demilitarization, as they are confidential in the context of national security and strategy. Military architectures are constructed using practical means during a war in a limited time and their functionality is the primary focus. Moreover, since military buildings are covered by secrecy, they have remained in the background compared to civil architecture. Studies and applications related to the design of shelter and defense areas have been continuing for centuries. The most intensive practices and studies in these areas were realized with the airstrikes that started at the end of the First World War. During and after the Second World War, many European states, including Germany, tried to introduce new and advanced designs. The production number of these areas increased considerably with the Cold War that took place afterwards. Despite demilitarized military structures are discussed, the examination of many defense and shelter structures produced in the 20th Century has only begun in recent times. There are also studies in the scope of architectural teachings that are being conducted as special studies and while certain studies can be presented to the public, others are considered to be within the purview of military strategy and are thus being kept confidential due to national security concerns [11].

As mentioned earlier, despite there being no shelter and defense zones that can be considered as "one-size-fits-all solution" in terms of all conditions and terrain, the primary and basic characteristic of all of these zones is that they function to provide safe housing. Within the scope of all these, with the effect of changing weapons and construction technology, the standards and guides created in the bunker architecture, design, material, plan, and space layout should be revised against the threats that are constantly anticipated. In this context, there are some changes according to the conditions. Therefore, the general specific design criteria and materials of the shelter areas cannot be mentioned. However, shelter areas can be detailed under special headings according to their types, and design criteria and standards for each of these titles can be discussed. The scope of the term "Hochbunker" includes high structured defense and shelter zones that are classified as large and medium-sized buildings. There are still no standard type classifications regarding

them [4]. In particular, general standards of design criteria included the title of Hochbunker size and construction and its subtitle, details of Hochbunker design and infrastructure, construction and usage circumstances of the Hochbunkers. In addition, details specific to the types will be included in the subtitle of that type.

3.1. HOCHBUNKER SIZE AND CONSTRUCTION

A proper defense and protection plan means saving lives during the war. For this plan to be realized, it is crucial to design shelter areas, select where such shelters will be placed, ensure a rapid construction schedule, and implement suitable procedures. Design and construction in this field will continue as long as individuals need defense and protection in any subject [56]. A high level of financial investment and time is necessary for the construction of defense and shelter areas. As the development and strength of weapons technology continue to increase, it has become necessary to ensure that the plans are under revisions. When designing, attention should be paid to renewal and strengthening. If developments are not considered according to the conditions, revision processes in design are carried out with increasing costs. In this context, possible threats and the conditions that may arise should be taken into consideration while creating the plan [11]. As discussed under the section regarding history, shelter areas that are resistant to bombs and airstrikes began to be planned following World War I and were implemented during World War II. Their constructions continued until as late as the 1990s. These areas are built both underground and aboveground. Underground shelter areas are based on very old history, in this process, also the application and design of the aboveground areas with similar purpose have been made. Hochbunkers of Germany, which were specifically built aboveground, are implemented as high, resistance, and multi-floored shelter areas that are built of reinforced concrete, and the word itself means "High Bunker" (Figure 3.1.). Hochbunkers which were preferred to be built aboveground due to many aspects such as resistance to pressure created by developing bomb power, as well as access, and engineering, are among the most remarkable and unique military designs of the 20th Century. These areas were built near residential areas or around cities if the design was being implemented to protect and shelter civilians. In addition to being inspired by certain defense and shelter structures, the Hochbunker design was also a result of the circumstances that took centuries to develop [4].

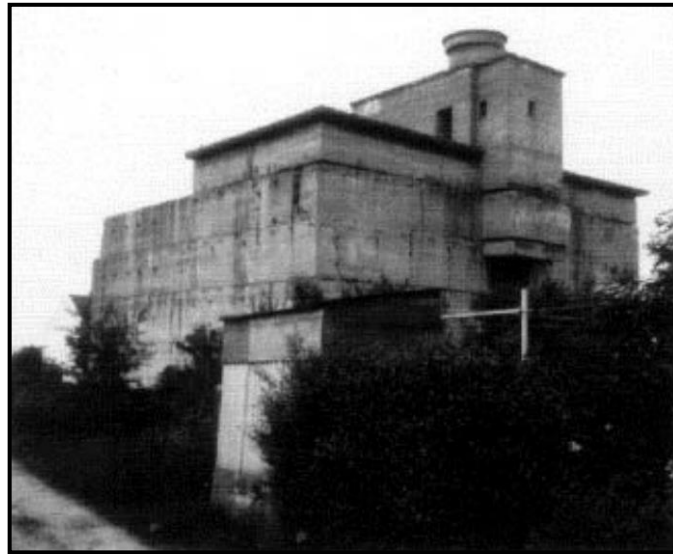


Figure 3.1. Example of Hochbunker; four - floor Hochbunker in Hollmannstrasse in Kiel [20].

Starting with the 1920s in Germany, volunteer groups were formed to carry out endeavors to protect the people against airstrikes and raise awareness regarding the dangers they posed. These endeavours included first and foremost the production of things that required craftsmanship, such as gas masks, well as the construction of bunkers, and the manufacture of necessary materials. Afterward, these volunteer-based endeavours were transformed into official undertakings with Hitler's administration coming into power in 1933. Before detailing the Hochbunker design, briefly giving information about Nazi Architecture and printing the design details will help understand the designs of the Hochbunkers built in the same period.

3.1.1. Nazi Architecture

Nazi architecture covers the years 1933-1945. The facade designs are in the form of marble, heavy stones and have a symmetrical, monumental neoclassical style [15]. With the designs of Nazi buildings, it aims to present Hitler and the Nazi party ideology to society. Accordingly, an architectural style representing the administration was created, inspired by different architectural styles, especially Neoclassicism. A traditional, nationalist, and monumental style tried to be revealed. Built structures deemed necessary

by the introduction planned to be remembered by the political parties. It was designed by making it large and solid in terms of dimensions, and a magnificent and superior representation tried to be put forward. In this period, the construction and design of buildings that did not reflect the Nazi administration's thinking and ideology were prevented. In Nazi structures, items representing the party's ideology, such as eagles and swastikas, were placed on the fronts. The most important reason for the creation of Nazi architecture was to accelerate the spread of ideology [13]. The architectural style created is an example of a totalitarian regime [58].

When turn to main topic, the Hochbunkers constructed during World War II had certain political, economic, and strategic reasons behind them. If the program is viewed from an economic perspective, then it could be stated that constructing Hochbunkers based on the studies undertaken by the Ministry and design teams made this endeavour more cost-efficient. An example, it has been proven via previous studies that, while approximately 3 to 4 cubic meters of concrete per capita is needed to construct a Hochbunker that can house 500 individuals, however, 2 to 3 cubic meters of concrete per capita is needed to construct a bunker that can house 4,000 individuals. As for strategic reasons, certain factors such as being close to residential areas, ease of transportation, and accessibility can be cited, in addition to the matter of camouflage [24]. Adolf Hitler sought to reflect and engender the power, authority, and ideology of the Nazi administration in all territories held or annexed, starting with Germany. For this reason, a method of creating a building to make that are tangible and visible was preferred. In particular, constructing monumental structures that are constructed with a Neoclassical approach, was aimed to ensure that societies remembered the marks left by the Nazis. In this context, while political endeavours to spread the ideology of the Nazi party was undertaken by Hitler, the necessity of creating a national and monumental architecture was also advocated with the design approach. This approach, supported by Hitler, was aimed to be achieved in connection with the dream of pure-race society by combining the essence of this race with the architectural design, that are specific to the German nation.⁷ The first step he took for this was the official approval of the style he created in 1933 as the National German Architecture as the regime began to change (Figure 3.2.). While keeping functionality at the forefront of the architectural style he determined ornaments, were avoided, dimensionally large and high constructions were

⁷ This section is written with reference to Foedrowitz, M. "Waffen- Arsenal Waffen und Fahrzeuge der Heere und Luftstreitkräfte- Die Flaking in Berlin, Hamburg und Wien 1940-1950".

preferred, and large-scale design elements were chosen accordingly in his designs (such as the application of high and large columns, windows, and doors), keeping the facade lean and applying only emblems and elements reflecting his ideology [31].

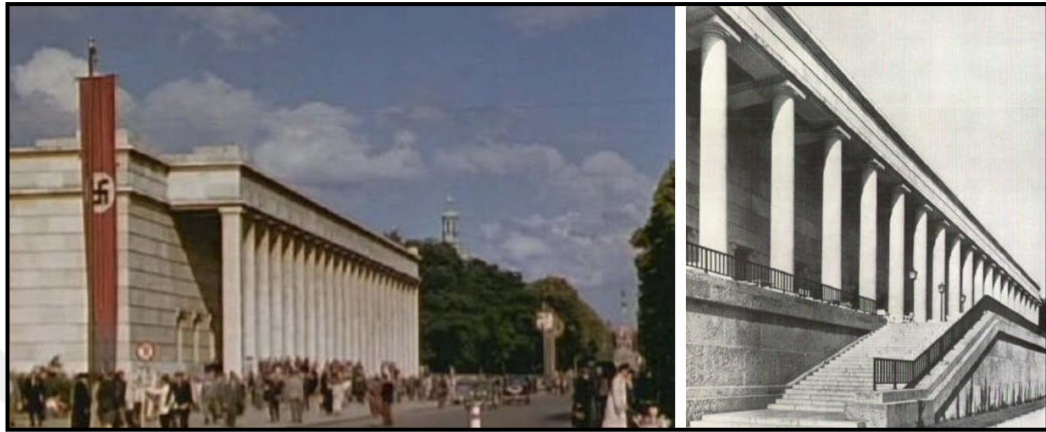


Figure 3.2. National German Architecture building example, German Art Museum Munich [59].

After Hitler appointed Hermann Göring in June 1933, the National Air Attack Protection Union was established. Thus, the matter of defense was linked to a certain system with the establishment of this institution and while endeavours for informing the public against airstrikes officially continued, the institution carried out activities such as defense, inspection, and protection. This working system has been advanced by the appointment of Nazi party members from the top administrations to the lower administrations, including the country, regional, provincial, and district administrations [24]. Then, the "Germania" plan was announced by Hitler in 1936 and all domestic designs and applications, including those in the capital, were carried out by architects selected by him, such as Fritz Todt and Albert Speer [31].

3.1.2. Germania Project

The Germania project began to be designed in 1937 by the orders given by Hitler. The Germania project presented the designed plans to the public on January 28, 1938 [60]. The Germania project is a plan that has never been fully realized. The created project aimed to survive for years with its robustness, and the power of Hitler and the Nazi administration

sought to be revealed. The structures that were designed, built, and to be built were arranged in a monumental nature. The designs show various representations such as power, continuity, and order of the administration [13]. The project was intended to be put forward with a realistic application approach. In this context, for Germania project planners made calculations from an economic point of view, and the supply of human resources was considered. The basic understanding of architecture and urbanism has been monumental approaches developed by basing the language of form on classicism [60].

In addition to there being Hitler's hand-drawn designs and plans for Hochbunker types, he also intervened often in planned architectural designs, such as emergency exits and room types, and received reports regarding the implementations. He also sought to direct the public with political, ideological, and manipulative designs (Figure 3.3.) [20].

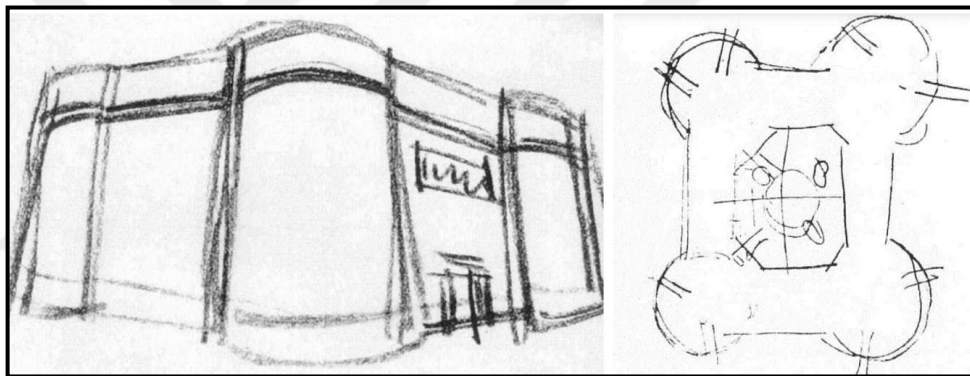


Figure 3.3. Hitler's drawings at Flak Towers for Berlin [34].

The Hochbunkers were designed by government under Hitler with a massively large scale to demonstrate the power of the administration, and it was aimed to make the society adopt the perception that the buildings were sheltered, durable and safe. It was sought to leave an impression on the society that would enable them to take shelter in these areas without fear, he did not consider the effect that covers only the period with the architectural designs [4]. A large majority of defense and shelter structures were built for temporary purposes, and they were only made permanent if it is to be used in military functionality. However, it was demonstrated by Hitler that the constructed structures were not temporary by ordering the construction of large-scale and high-reinforced concrete structures. By building permanent Hochbunkers, it was intended for these bunkers to turn into monuments after the war and pass them on to the next generations [32]. To this end, the

facades of the Hochbunkers did not have any identification marks or representations other than certain details that reflected the ideology of the Hitler's party. It was his aim to cover the facades of these structures at the end of the war with certain materials, such as marble, to transform them into magnificent monuments (Figure 3.4.) [26].

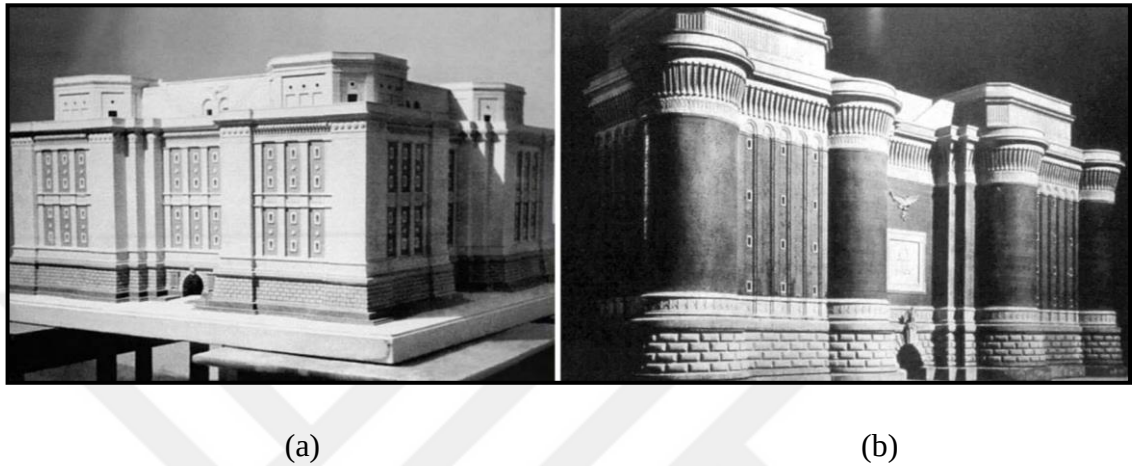


Figure 3.4. Possible models of Hochbunker transformations intended by Hitler. (a) Possible model of Hamburg Tower after war, at Landesarchiv Berlin [32]. (b) Possible model of Zoo Tower, by architect Tamm in 1943 [34].

However, this transformation would only become realized if Hitler and his party achieved their aims at the end of the war. Although the transformations Hitler desired never took place since he was defeated, a majority of these structures that still exist due to their permanent and resistant nature are reminiscent of the Nazi administration, and they are still being used via transformations that render them suitable for other functions. Thus, it can be stated that Hitler reached his goal of creating permanent architectural monuments, although not fully, in a certain way about with transformation goals happen. In the following chapter on Hochbunker Transformation, the conservation and re-use of the Hochbunkers, also the situation that these structures were ignored for a long time by society will be discussed in relation to their reflection of the ideology of the Nazi period. Moreover, the road to transformation will be discussed in terms of whether these transformations were able to happen and how they took place [32].

Defense and shelter areas built during the war are applied to certain lines to create order within chaos [61]. Although land-based attacks can often be predicted, airstrikes are almost

impossible to foresee, and the bombs used during such attacks can cause severe devastation [12]. The Hochbunker construction in Germany is determined according to the priorities of city selection and programmed in to three stages. In addition, priority groups were determined and included in the planning. Firstly, the design and implementation of areas such as Hochbunkers, Flak Towers, and factory bunkers that were used by military for war preparations and defense were commenced (Figure 3.5.). Afterward, a simultaneous program was arranged for the construction of shelter areas for civilians who could not defend themselves against the increasing number of airstrikes. Although there were certain disruptions in the construction program, an effective program was developed to protect individuals in the end [23].

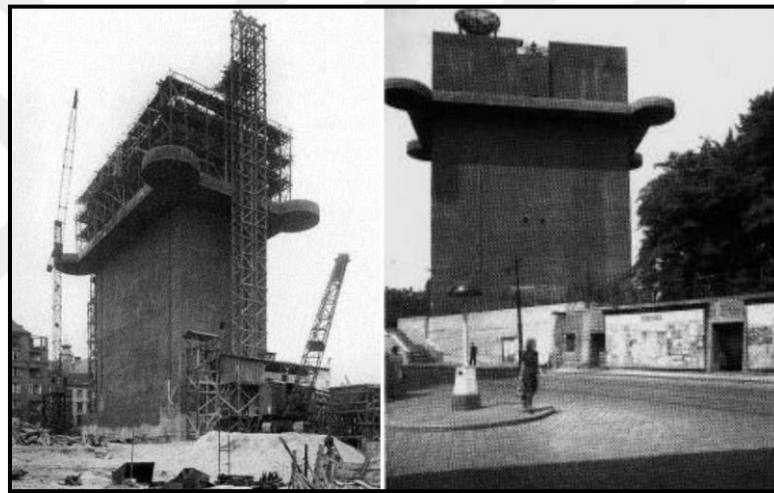


Figure 3.5. Flak Tower construction [62].

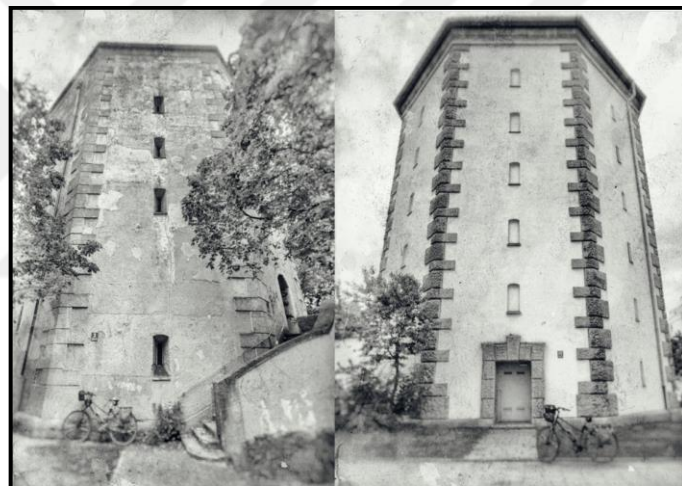
Based on this matter, a series of decrees was issued by Hitler as a precaution for protection and defense. Citizens' service to the state has been made compulsory within the scope of the airstrike program with the Air Defence Law dated 1935. The basic policy of the decree to be issued in 1940 was formed with the regulation published on 4 May 1937 [20]. Two decrees were issued in 1940, with one on September 9 to determine the Flak Tower design and city priorities in the context of defense areas and the other on October 10 to declare an emergency program. These bunker programs designed in Germany were so comprehensive and large-scale that there are no programs similar to them in any other country [45]. The priority decision determined within the scope of the emergency program prescribed the construction of shelter areas and bunkers external to the structure [20]. It was aimed to

protect five percent of the city's population with the planned amount of bunkers and it was planned to construct Hochbunkers and shelter areas to ensure the protection of military and industrial facilities and government buildings. The exact number of the Hochbunkers constructed during World War II is unknown [45]. On November 2, 1940, the Air Defence Construction Department was established to ensure that design, planning, and implementation processes follow a certain plan and order [20]. A technical course was held to explain the Hochbunker designs created by Fritz Todt, and presentations were made to 400 mayors and senior municipal administrators in Berlin during the same year. After the meeting, the municipalities were asked to create and submit plans for the estimated initial list of materials and the required labor force that would be necessary for the construction. Then, technical manuals and directives regarding the construction of Hochbunkers were published and summarized with two conferences held in Berlin. Thus, designs were initiated with the announced regulations and established teams. The typology and standard development of the Hochbunkers continued from 1940 to 1944. The meetings held by the Reich Ministry of Aviation made amendments and regulations to the standards following the developments and changing conditions, and the regulations were constantly updated in this context [4]. During this process, there were debates regarding why the constructions of Hochbunkers were being made aboveground. In response, many advantageous points such as Hochbunkers; allowing easier escape, accommodating more people, having better infrastructure, providing savings by using one-sixth less amount of materials compared to underground shelter areas were reported and indicated by research. During the spring of 1941, conferences were held regarding the inspection, ventilation and heating systems of the buildings. Reports including general information on the progress of the constructions and the status of the structures were transmitted to the headquarters in Berlin and Chief Representative Todt every 14 days, who in turn submitted them to Hitler. In July 1941, the specification titled "Special Provisions Regarding the Construction of LS Bunkers" was published by the Chief Inspectorate of Air Defence of the Ministry of Aviation of Reich, which was divided into booklets according to its subjects and included within its scope the Hochbunkers that were constructed primarily for defense and secondarily for shelter. The published manuals determined certain principles and standards regarding the size, materials, armaments, planning, and construction of the bunkers, and separate evaluations were made in various booklets according to the types of infrastructure. For example, a variety of booklets were prepared, which included general design criteria and floor plans

for ventilation, water installation, and heating systems and they included different designs for different functions, such as hospitals and factories [20]. Thus, the contents of these manuals, which included national construction standards, provided a detailed content regarding general and specific types [24]. As a result of the published guidelines, regulations and specifications were prepared design teams, and aimed to speed up the constructions by establishing standards. There are many design criteria in these specifications, which will be discussed in further detail in the following sections. To provide an example of one of these criteria, it was determined that bunkers and shelter areas built to protect government buildings from airstrikes must withstand at least 1,000 kilograms of bombs [20]. Moreover, it was requested by Hitler that the necessary reinforcements were provided to make the bunkers more resistance than the previous ones since the level of destruction was increasing constantly. Therefore, indestructible concrete shells were produced for this purpose[12]. The final iteration of the design changes was made on May 26, 1944 [4].

Generally, a majority of large and medium-scale above-ground high shelter areas are considered to be within the scope of the concept of Hochbunkers, and such shelters were used as civilian shelter areas unless their function was not specified explicitly. The type of the shelter area changes according to the terrain and circumstances, and they can be constructed above or below the ground. In this context, some Hochbunkers are linked to underground shelters and tunnels [24]. If there are no Hochbunkers that are present nearby, shelter areas should be supplementary under the residence. Also, public buildings, schools, museums, and cultural assets used by the community should be expanded and durable bunkers should be added [20]. Even if the area where the bunker construction is made is private property, such areas are rapidly publicized by the state to implement the construction practices. Since the Ministry did not make arrangements on the land, some problems were in the land purchase and sale process. However, proper procedures were established with the legal regulation of 1941. With the Reichs Leistungs Gesetz (utilization permit for Reich duties), the land was either directly purchased via expropriation or rented from the owner of the land, depending on the law. Although the transactions in this context appeared to be a legal process, the civilians did not have the right to object, intervene or disobey the expropriation by the state [12].

Hochbunkers are massive structures constructed using reinforced concrete in a symmetrical manner with a monolithic shell, and they were produced to meet the protection, defense, and shelter needs of the society, which are among their most basic needs. The monolithic and massive nature of these structures demonstrates their function clearly, as their inclination was devoid of any aesthetical concerns [26]. The facades of these structures did not have any adornments or windows and they were generally colored grey. They were designed to be as simple as possible, with their defensive functions being the primary focus [56]. It was made mandatory to include certain figures and symbols, such as an eagle or a swastika, on the facades to reflect the ideology of the Nazi party and the purpose of these emblems was to render these ideas permanent by carrying out all kinds of endeavours to ensure that the public adopted this ideology (Figure 3.6.) [37].



(a)

(b)

Figure 3.6. Hochbunker examples; (a) Hochbunker, Anhalter Platz 1941, Munich, by Karl Meitinger [63]. (b) Hochbunker, Schleissheimer Strasse 281 1942, Munich, by Karl Meitinger [63].

Certain Hochbunkers constructed close to residential areas that functioned as civilian defense structures were adorned and altered using materials similar to civilian structures to camouflage them [20]. In this context, the changes in the design of the facades were altered from region to region concerning the surrounding buildings. Due to the lack of materials and workers towards the end of the war, the facade arrangement suitable for the surrounding buildings was terminated, and the facades were left as plain, flat reinforced

concrete surfaces. Hochbunkers with this type of facade are generally more common in Germany (Figure 3.7.) [11]. The fact that the design is monolithic is related to the protection perspectives of the shelter and defense areas in the past. If caves, which were the first protection and shelter areas against environmental elements, are examined, it can be seen that they are places covered by thick, tough, and durable outer shells with deep interiors and no other openings other than the entrance, and they receive light only from a single point. Looking at the details, similar basic design principles are present in both shelters and Hochbunkers [26].



Figure 3.7. Hochbunker camouflage, similar facade and type with surrounding structures, bunker at Lübeck in Schwartauer Allee [20].

The concept of Hochbunkers was introduced by Hitler as a result of examining the defense structures of other countries, and the points deemed necessary were adapted and customized according to national architectural styles. The design inspirations of Hitler included the architectural designs of the Roman Period, medieval castles, and even the defense structures he saw in Japan during World War I [31]. Hochbunkers can be built depending on the country border or residential areas or can be built-in independent areas. The function of Hochbunkers is one of the characteristics that determine where the building will be built. If the Hochbunker is designed for a military function, it is a built-in line with military strategies, and if it has functioned within the scope of civil protection, it is built by camouflaging close to civilian residential areas [26]. Moreover, in addition to

having a variety of designs and plans, Hochbunkers were also named according to their type. While it is possible to construct bunkers that can shelter only a single individual, some Hochbunkers can accommodate more than a thousand people [20]. The constructions were carried out by prisoners of war, prisoners, forced and voluntary workers, as well as members of the Nazi party, and besides manpower, the necessary tools, cranes, and machinery were used to hasten the constructions. In general, one Hochbunker construction approximately took 7 to 11 months [31]. Certain institutions cooperated with the Reich Ministry of Aviation in creating and developing the design of the Hochbunker. After being approved by the Ministry, samples representing the Hochbunker designs that were developed as a result of this cooperation were constructed in regions distant from residential areas and were subjected to reinforced concrete durability test. The construction of the bunker was approved after documents that demonstrate that the bomb strength test in the specified range (in kilograms) has been passed were obtained and conformity has been achieved. The bombs used until 1940 an explosive force that is had between 230 to 450 kilograms. This value increased over time, and by 1941, it became necessary to take precautions against 1,000 kilograms of explosive force [20]. Accordingly, the regulation dated 1940 stipulated that to be protected against 250 kg of bomb power, at minimum, roofs and walls should be 1.4 and 1.1 meters thick, respectively, and that steel-reinforced concrete should be used in a manner that ensures that all walls are covered by a roof. During the same year, these thicknesses which were used to defend against 500 kilograms of explosive force were, increased to 2 meters, and it changed to 2.5 meters in 1941 to be protective against an explosive force of 1,000 kilograms. After the revisions, it was announced that a ceiling thickness of three meters can be applied to provide protection against a possible maximum of 2,000 kilograms of explosive force [11]. In the regulation, the latest 1,000 kg bomb power was standardized, and high strength reinforced concrete flooring and wall thicknesses became obligatory to be three to two and a half meters thick, but it was decided that two meters would be sufficient in July 1941 because many municipalities did not comply with this standard. The reason behind this decision was that the force of the attacks generally did not reach 1,000 kilograms and that the reduced cubic meters of concrete used for the reduced thickness would be beneficial in the context of a shortage of materials. Moreover, it would also provide positive results regarding time, cost and materials used (Figure 3.8.) [4]. Although similar non-conformities regarding design criteria took place alongside the changes in regional standards, the view that all regional

changes would provide positive outcomes is incorrect. Indeed, the design criteria are the results of certain studies and tests, and not conforming to these standards means endangering the lives of individuals who have taken shelter in that area. Just as shelter areas constructed under the criteria can protect individuals against bombs, incorrectly constructed shelters can become graves for the individuals. Although not conforming with the general design criteria may cause major problems, changes made to adapt to the residential area and the terrain such as regional camouflage and used materials are not included in this scope [64].

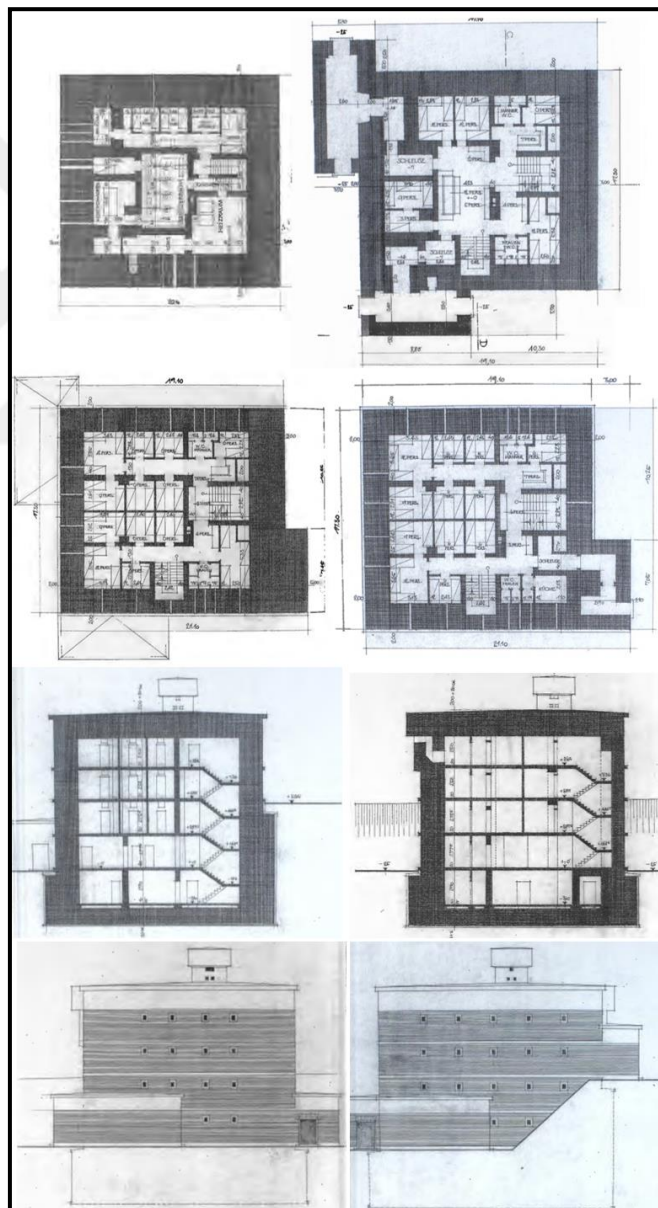


Figure 3.8. Example for basement, ground and other floors plan, section and facade drawing for Hochbunker, Essen Kettwig Hochbunker 1943 [4].

The ceiling thicknesses of Hochbunkers constructed before the 1940s varied between 2.70 and 2.90 meters. Later, this thickness would be standardized to be 2.30 meters for the height of the shaft and 2.90 meters for general height. Additionally, ground floors would be constructed to have higher ceiling heights in comparison to other floors. The height between the ground and the other floors is designed to be in proportion [45]. The general floor plan of the Hochbunker can be understood by examining the plans of the ground floor. The number of entrances on the ground floor and their positions show how many exits the other floors have. The lines of the main core can be understood according to this setup. The sections that the Hochbunker is divided into, and the ground plan setup allow the understand of whether the bunker has a cellar or not [4]. White arrows were painted at the entrances of the Hochbunkers, which were used to shelter civilians in residential areas, due to the blackouts carried out to protect against air attacks during the war. They also allowed individuals to notice the entrances more clearly in the dark [24]. Additionally, while the manuals published in 1940 included a list of materials to be used, the amendments to the manual in 1941 described ratios to be used. The ratio of concrete to be used described in particular. Many other similar matters were detailed according to terrain, the required type of shelter, and military defense and protection strategies.

As Hochbunkers creation of the standards was delayed due to constant revisions, they were created at the end, and the materials, molds, and equipment regarding the standard plans determined by Todt, who was heading the architecture and construction team, where requested [20]. In addition to the production of molds for the Hochbunkers with similar features and scales, prefabricated products for certain bunker sections were also manufactured. For example, the roof beams were prefabricated and were applied directly during the construction. After achieving the prefabricated production, any needed alterations, reinforcements, and height adjustments could be made with a simple assembly process to any desired point [11]. Although standards were developed and the production of bunkers that were similar in certain ways was commenced, there were also changes in the plans according to the type of the shelter area. The standard spaces that are included in every Hochbunker plan are toilets, kitchens, machine rooms, storage, ventilation and sanitary rooms, spaces suitable for the duties of bunker employees, and management and meeting areas [20]. The design details have changed according to the planned Hochbunkers, and there have been differences in the interior arrangements as well as the

outer lines and the infrastructure. For example, as mentioned in “Architectural of Aggression” book: “while there were a limited number of beds in factory bunkers, the bed number capacity for Hochbunkers constructed within civilian defense areas was implemented in a manner that covered ninety percent of the whole bunker design capacity” (Figure 3.9.) [11].



Figure 3.9. Interior view of the Hochbunker, bunk beds, Hochbunker at Kaiserstrasse in Krefeld 1944-45 (Bunk beds had to be removed later for more people to take shelter in the Hochbunker.) [24].

The Hochbunker rooms had bunk beds with three beds each and they had protective covers installed on the top to protect against diseases or pests. However, these rooms were made more luxurious with the alteration made during the earlier stages of the war and such protective covers were not included in later stages. Individuals were even asked to bring their blankets to the rooms, and some rooms had folding chairs and tables. At the same time, such extra furniture items were also removed or not added at all due to the course of the war taking a turn for the worse and the large number of people entering the Hochbunkers. Hochbunkers were planned to have one toilet for every 25 people. For the clean water supply, a bunker has been designed depending on the tank, an internal wall, or city water. Since not all the bunkers had wastewater drains, small treatment facilities were installed in the basements. Communication rooms were established by installing communication devices in shelters with more than 300 people. Additionally, it was made

mandatory to include medical emergency rooms, medicine rooms, and relevant personnel in all bunkers. While basic medical procedures can be carried out in all bunkers, referrals were made to hospital shelters for procedures other than basic operations. Apart from all these, the duties of the officers who were assigned to the Hochbunker, the documents containing the precautions to be taken for protection, and the plan of each floor were hung in common areas, such as corridors, where everyone could see them. While the emergency bunker construction program continued without slowing down, the material shortage became more evident in 1943 [20]. The execution of many different shelter programs at the same time also caused disruptions in their construction. The declaration and implementation of the Emergency Program while the Flak Tower construction program was still ongoing, followed by the Atlantic Wall construction program and the construction of factory shelters created the need for more and more labour force, material supply, and time [24]. Despite this, the second phase of the Hochbunker program was continued. The construction was carried forward to take steps towards the commencement of phase three of the program. Although standards were established with the guidelines, an implementation plan for the Hochbunker would become necessary for the completion of the design phase and the commencement of the construction stage. Bunkers should have a suitable location and should be in harmony with the environment in terms of being able to be camouflaged. After the selection and purchase of the area where the bunker will be built, many other details, should be planned and implemented such as demolishing any structures and elements that need to be demolished, removing any rubble that has resulted from this process, selecting, and procuring materials that are going to be necessary, and determining the number of workers and providing them with suitable living conditions [20]. The Hochbunker constructions were not met positively by society at the beginning, and although they were used in emergencies, they were not used for a long-term accommodation during the earlier stages of the war. However, since the increasing number of airstrikes created the need for long-term shelter, certain necessary and important items were purchased, and individuals continued their lives inside the Hochbunkers. The increase in airstrikes during the war increased the number of individuals taking refuge in the Hochbunkers, and due to shelter areas being insufficient, more individuals than planned were forced to take shelter in them [31].



Figure 3.10. Photo of the crowd in front of the Flak Tower, at Landesarchiv Berlin [32].

Thus, towards the end of the war, the bunkers were started to be used by three to four times the number of people than they were originally planned to accommodate. Although the bunker program had reached the planned number of bunkers as a result of the changes made in 1944, this number was still insufficient. Moreover, even though the presence of many people in the shelter area made the individuals staying there feel safe, this situation actually endangered people's lives in other ways, as it caused service disruption and insufficient infrastructure [11]. In addition, starting with 1944, the Emergency Program was transformed into the "Mindest Bau Programm", that is the Minimal Construction Program, due to a lack of materials and workers, and it was attempted to continue the construction of defense areas despite the hardships [24].

3.1.3. Size of Hochbunkers

Fundamental design criteria were established with the published guidelines and these criteria were detailed by the architectural management units to adapt them to the location where the constructions will be taking place. Establishing standards is very important for the mass construction of bunkers. Although additional regional details were added to these

criteria, the addition of regional criteria and standards did not disrupt the mass production endeavours. On the contrary, their addition was a positive contribution in this regard. The formation of standards has resulted in the emergence of typologies. In the bunker design, the "Baustufe", that is the construction stage, was classified into three types as A, B, and C based on the number of individuals and design dimensions. According to these types, specific changes occurred in the construction design criteria, which affected the design details such as wall and roof thicknesses and the size of the bunker. Type A (Baustufe A) bunkers are large-scale bunkers with a capacity of 1,500-3,000 people, Type B (Baustufe B) bunkers are medium-sized bunkers with a capacity of 1,500-500 people, and Type C (Baustufe C) bunkers are small-sized bunkers with a capacity of 300 people. Apart from the dimensional type of distinction of the number of people it contains, Hochbunker designs may differ according to the regions. To show the regional design changes made in addition to the standards to indicate that the bunker is a city-specific design, the first letter of the city used, followed by the roman numeral for the design type of the bunker, and the number of bunker floors was written one after the other to create an abbreviation to name the bunker. This abbreviation wrote on the entrance to indicate Hochbunker type. For example, a second type bunker with six floors located in Berlin should indicate "B, II, 6" [24].

3.1.3.1. *Small-Scale Bunkers*

Small-scale bunkers were not preferred often due to Hitler's ideas regarding monumental designs. Nevertheless, small-scale bunkers were constructed rather than large or medium-sized bunkers in regions with an insufficient number of shelter areas, as well as a low number of individuals requiring shelter. The design of such bunkers does not exceed 300 (1-300 people) individuals and volume approximately 1,000 cubic meters. Thanks to their small scale, serial and rapid production can be achieved, and prefabricated types can be applied to areas after they are produced in factories. As they can be produced and constructed easily, they can be implemented anywhere in the country. Although certain features in the design criteria, such as emergency exit, are similar to medium and large-scale bunker designs, the core, ventilation, and infrastructure systems are different due to their limited housing capacity. Most small-scale bunkers were constructed using reinforced concrete [20].



Figure 3.11. Small size bunker, "Einmannbunker" Bonn in Maarstrasse [65].

Small size bunker can be given as an example of "Einmannbunker". Einmannbunkers, which can be translated as "one-person bunkers", are shelter areas that were produced during the war especially by private companies. They are categorized as small-scale bunkers and they were available for a limited number of uses. During the 1930s, they were first produced to protect the security officers of factories. Afterward, they were also built to protect firemen assigned to prevent the fires caused by airstrikes. The construction of Einmannbunkers used the Fire Brigade officers close to the shelters ensured that the officers were in close proximity so that they could immediately direct the civilians to the shelters in the event of an attack, which is another duty of the organization to take quick measures against the fire. These bunkers have been used by civilians, fire brigades, and factory security workers as well as other security guards such as police, soldiers, and railway guards. The small size of the bunker made it easier to build compared to large and medium-sized bunkers and shelter areas. That allowed them to be implemented outside of Germany, particularly in other European countries that were occupied. In general, those that were constructed in countries other than Germany were used as patrol posts. Additionally, they were used to defend against attacks on Germany in the final stages of the war. The first plans and designs of these bunkers used steel as the primary material, but due to the shortage of steel in the later periods, materials were changed, or the number of materials used was reduced [24].

The word "Hochbunker" means a high shelter area, they are considered to be within the scope of medium and large-scale shelter areas and are examined within that subgroup. The following explanations about Medium and High scale sizes are the evaluation in the dimensioning within the scope of Hochbunker.

3.1.3.2. *Medium-Scale Bunkers*

Medium-sized bunkers were designed and built in Germany based on the population in most of the regions. Although designs were updated constantly due to changes and developments occurring often during the war, the establishment of certain criteria has enabled changes to be made based on general standards. The construction of medium-scale bunkers often established clear standards. That, in turn, enabled quick and large-scale productions with up-to-date standards. Thus, medium-sized bunkers were preferred to be built more often than other bunkers. Medium-scale bunkers were designed with multiple-floors and concrete-based, and the design included two exits in opposite locations. The reason why the plans included two exits in opposite locations is that, if any of the exits become damaged enough to be unusable during an attack, then the exits could be directed to the other one. Additionally, two different sets of stairs and core systems were also applied to the design based on the same principles. Although there were no window openings in standard designs, some bunkers had limited window openings at certain points. With the changes in height and size according to the designs, the dimensions of the designs increased between 1941 and 1945. Additionally, since the thickness of the outer wall shells of medium-scale bunkers were constructed to be thick during certain periods or thin during others, it varies between 1 meter and 2.5 meters [46].

3.1.3.3. *Large-Scale Bunkers*

Starting with the 1940s, large-scale bunkers started to be constructed with the published guidelines. Since many of the defense and shelter areas constructed by Hitler, such as the Hochbunker and the Flak Tower, had dimensions that could be considered monumental from a design perspective, the construction of large-scale bunkers was preferred often in Germany, much like the medium-scale bunkers. In addition to having the capacity to house more than 1,500 people, these bunkers are multi-floored reinforced concrete designs with a volume of approximately 12,000 cubic meters. As will be explained by the calculations

included in the later sections of this study, the large-scale shelter design is, in fact, more economical in terms of material consumption than small-scale designs [3]. Not only these bunkers could not be constructed everywhere due to their large dimensions, but they were also very conspicuous due to the same reason. As such, they needed to be camouflaged properly. The design criteria included exits on opposite sides and two core systems similar to medium-scale bunkers [46].

3.1.4. Details of Hochbunker Design and Infrastructure

The design criteria and the infrastructures of the Hochbunkers, which were explained in general terms above, will discuss under subheadings.

3.1.4.1. Form

The design and the material of the shelter area forms vary according to certain factors, such as the land on which it will be built, the socio-political status of the society, the type of threat that the area will be facing, and the circumstances [51]. The form of the Hochbunker can either be in a rectangular or square-based cubic form or a circular plan with a cylindrical form. Additionally, there also existed variations in different sub-plan bases, such as the L-shape, rectangular prism, combinations that combine circular form with rectangular form, and types with domes connected with cubic forms [4]. Towers formed at the corners of rectangular or cubic forms (the forms of these towers can be polygonal, cylindric, cubic, etc.) can also be used as observation areas, where the weapon placement process can take place. By rounding the corners of the rectangular forms, it was attempted to decrease the accuracy rates of the attacks, which in turn reduced the possible damages on the bunker [26]. Additionally, the practice called explosive plates was applied on rectangular bunkers, which added air, sand, or soil pockets between the installed plate and the shell of the structure to create an area that reduced, deflected, or absorbed the incoming force of the bombs, thus protecting the structure by preventing the explosion from reaching the structure. The process, which rounded the corners of the rectangular form was used especially in the bunkers of the Atlantic Wall. Moreover, designs that possess a flowing form that is integrated with the soil can also be observed in the bunkers constructed within the scope of the Atlantic Wall. Additionally, the corners of certain bunkers were cut into

45-degree shapes instead of being rounded [11]. Due to issues in procuring materials, financial problems, and the shortage of workers, the rectangular form was preferred more often during the later stages of the war, as it required a lesser amount of materials in comparison to the cylindric form (Figure 3.12.) [20].

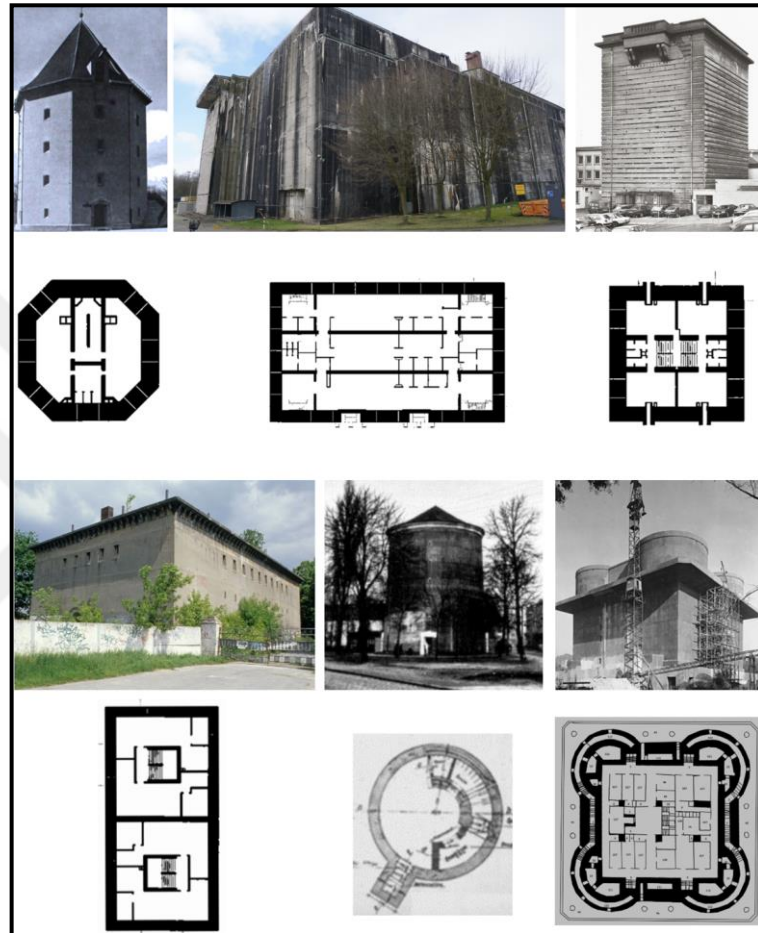


Figure 3.12. Hochbunker plans and forms examples [4], [20], [65], [66], [67], [68], [69], [70], [71].

3.1.4.2. *The Core System*

Since Hochbunkers are high and multi-floored shelter areas, it is imperative to plan the core system correctly to allow the passage between floors. In this context, two opposite ladder and core systems should be created since a partial collapse of the bunker may occur due to possible attacks. The sizes of these stairs were varied, but narrow stair designs were common [39]. Although small-scale bunkers did not require things such as stairs or

not have any other openings. In this context, it is not easy to exhaust the gasses that might penetrate the bunker, and the ventilation systems are sometimes not able to exhaust these dense gasses. Thus, a precaution is taken against such occurrences at the very beginning with a gas lock [4]. In addition, a lengthy water hose should be located close to the entrance to dissipate toxins, smoke, and gas. Other than the steel door, it was included in the standards that protective doors that were installed to contain gasses should be 30 centimetres thick to reinforce them against a bending that might occur as a result of high-temperature fires or other similar circumstances [20].



Figure 3.14. Example of openings at Hochbunker; entrance and small window openings [72].

3.1.4.4. Technical Equipment

There are many important details for technical equipment's, the matter of infrastructure is of particular importance, especially for the construction of a proper shelter area. Care should be taken to install the correct ventilation systems and proper sanitary systems [4]. However, the shortage of materials caused a shortage of technical equipment in turn, and as a result, there were disruptions in certain systems [23]. The designs should include both powered and unpowered devices, as there might be power outages due to the war, and if

possible, they should also include generators. Power connections should be made from two opposite sides to provide redundancy against any damages that may be inflicted on the bunker. There should be no interruptions in common areas and defense areas. In this context, it is mandatory to have an additional generator in the Hochbunkers that house more than 300 people, as stated in the design guides. Apart from these, water tanks, waste expenditures, and material storage areas should also be included in the bunker plans [20].

3.1.4.5. Ventilation System

As there are no window openings to provide a connection with exterior areas, the ventilation systems must be made correctly in all constructed shelters, as they are the sole sources of the fresh airflow. These systems create their own microclimates in the Hochbunker [30]. In addition, ventilation systems have a central filter and are located in the basement of bunkers like the sanitary systems. Although the calculations may vary according to the number of users, at least 300 liters of clean air per minute must be provided with the ventilation system. 30 liters of clean air per person per minute is provided, and harmful gases are filtered out with the ventilation filter. These systems also enable the adjustment of temperature, moisture, and pressure within the bunkers, and they also include settings that provide clean air circulation under emergency circumstances [20]. While the Hochbunkers are designed for a certain capacity, it may not be possible to stop additional people from entering the bunker during an attack. At this stage, even if the fresh air capacity for the body count is calculated; in the case of housing more people than expected, such conditions should be considered at the planning stage to ensure the required fresh air intake and flow, and to prevent infrastructure problems. In addition, the ventilation system in the Hochbunker must regulate the air pressure and keep it at the specified level. Moreover, this system should be inspected out at specified times, and it should be repaired, cleaned, and maintained regularly. Thus, the life of the filter that is in the system is extended, allowing it to be used for longer periods. There have been certain changes in the ventilation systems of the Hochbunkers that were used again during the Cold War period. Since nuclear attacks became a possibility during this period, the exhaust port that was in the outer shell was closed and attempts were made to improve the filtering system of the bunker [4].

3.1.4.6. Water Storage and Communications

If the Hochbunker design contains 300 or more people, it provides a bunker connected to a water supply wells. If the required water supply cannot be provided, this requirement is met with the water tank. Additionally, private rooms for the bunker personnel as well as communication rooms to provide general communication should be included [4].

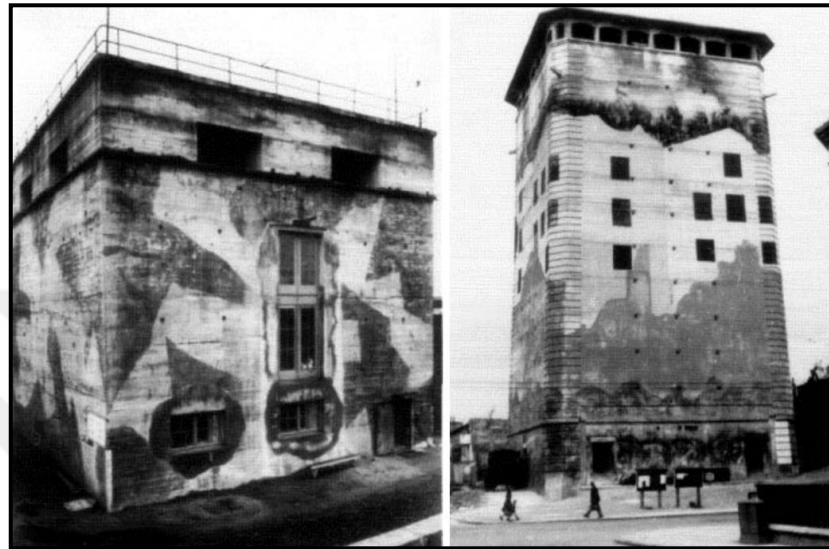


Figure 3.15. Hot water storage in Hochbunker 1943, at Bundesarchiv [73].

3.1.4.7. Camouflage

For Hochbunkers to fulfil their defense and protection functions in areas that are close or distant to residential areas without attracting attention, they must be camouflaged. The camouflage should have a natural appearance suitable for the structures in the residential area where the Hochbunker will be built [61]. In this context, the Hochbunkers near residential areas were camouflaged by applying facade and roof designs similar to the nearby structures in order not to attract attention. For example, the facades of the Hochbunkers with regular concrete constructions were covered with materials such as timber, stone, or bricks following the structures in the residential area to provide them with camouflage [57]. Especially in the context of airstrikes, ensuring that the bunkers are not recognized when viewed from the air is of particular importance. For this reason, the

number of applied roof camouflage is higher. The roofs of the Hochbunkers built close to residential areas were designed to be similar to the roofs of the surrounding buildings. Thus, make them indistinguishable when viewed from the air. The surroundings of certain bunkers were covered with soil to decrease how visible they are (Figure 3.17.) [26].



(a)

(b)

Figure 3.16. (a) Vacuum Öl AG Factory Hochbunker with speckled camouflage paint, Bremen [20]. (b) Pappelweg Hochbunker camouflage of painted burning house and rundown silhouettes facades, Bremen [20].



Figure 3.17. Camouflage Hochbunkers example, similar roofs of the surrounding buildings. (1942-45) [24], [74].

During the following period, applying camouflage to the Hochbunker facades was abandoned due to the shortage of materials and the belief that the facade did not have any effect regarding airstrikes. No further applications were made to the facades, leaving them simply as reinforced concrete. However, rooftop camouflage applications continued. For example, triangular roofs covered with tiles were added to Hochbunkers to make them undistinguishable when viewed from the air. Camouflaged roofs serve to prevent discrimination from other structures rather than their protective features. Combat aircraft's bomb targeted points. In this regard, since Hochbunkers were visually integrated into the residential areas, they ceased being targets as houses were not being targeted individually. Although the destruction of buildings in residential areas during the war, Hochbunkers can continue due to being sturdy. Since the materials and roof designs used in the facade in Hochbunker camouflage are similar to the surrounding buildings, even after the demolition in the area, it is possible to have an idea about the facade and roof designs of the surrounding buildings (Figure 3.18.) [4].



Figure 3.18. Hochbunker is sturdy, surrounding structures are demolished. Hochbunker, facade and roof similarities with the adjacent structure, 1942 Cologne [24].

The camouflage method is not limited to facade and roof material designs. Since certain structures such as religious buildings, civilian structures, and hospitals are dedicated to civilian use, it is not ethical to attack them. Many countries chose to protect Hochbunkers or other shelter areas by making them visually similar to such civilian structures as a

method of camouflage. Some of the bunker designs included stairway towers that can be seen annexed to churches and in some cities, there are camouflage styles that resemble designs such as water towers, warehouses, and grain stores [20]. In addition, some bunkers had fake windows were painted on the facades and there are methods of camouflaging the facade to make it appear as though it was bombed or was burned in a fire (Figure 3.16.) [11]. Moreover, certain Hochbunkers were painted using a color similar to the surrounding buildings to camouflage them. Although the goal of this action was to hide the structure, the performance of the painting process had created problems, especially on the roofs. If any amount of light was reflected from such surfaces, they would become immediately distinguishable. In this context, it is especially important to carefully consider the camouflage methods and materials while planning. In 1942, it was proposed to hide bunkers by covering them with soil and vegetation within the scope of the forestation program. It was understood later that this was an inefficient method [20].

3.1.4.8. Material

The expenditures that states spend on military defense are indisputable. It became necessary to always develop and keep up to date the materials and construction techniques that were used in the production of defense and protection areas, with the increase in firepower as a result of technological developments. The development of materials used in architecture gives direction to military architectural designs as well as civil architecture [11]. While new shelter areas can be designed during war periods, the designs in existing areas can also be renewed and the materials used in their construction can be developed or changed. In this context, each shelter area that is being revised still carries similarities in design, materials, or function to its predecessor due to the process of revision [45]. Brick was the favoured material before reinforced concrete and the countries that have built such areas have decided, due to increases in firepower, to continue using the same spaces with the renovation and retrofitting in order not to spend too much cost and time. However, since these implementations are not based on monolithic concrete and are instead brick constructions with concrete reinforcement, they were insufficient in terms of mitigating danger. The fact that bricks were inefficient against the pressure caused by bombs also hastened the transition to reinforced concrete [11]. Under the rule of Hitler, it was desired to build durable bunkers and shelter areas, and for this reason, materials that strengthen

structures were chosen to construct such areas. In this context, there are many reasons why concrete was selected as the material. Concrete that is produced with proper adjustments and reinforcements can absorb the force produced by a bomb and mitigate the effects of an attack. Additionally, constructions that use concrete can be carried out faster in comparison to other materials. Furthermore, to requiring time for assembly, construction with materials such as stones or bricks also requires time to be completed without any gaps. Construction with concrete creates a more monolithic structure. For this reason, such buildings are more resistance against partial damage, and an integrated durability is ensured [39]. Since there were no material shortages during earlier periods, all required materials and equipment were used in the construction. Many tools and products such as the concrete mixers for the concrete, aggregates, transport vehicles, bulldozers, digging tools, foundation piles, steel, and molds were procured without deficiencies, and were used in the earlier stages of the war. In this context, the material shortages that had arisen in the later stages demonstrate once again why Hochbunkers were preferred. The materials spent for the underground shelter are six times as much as the Hochbunker and these expenses were excessive in the process when the material was not available, so it was intended to concentrate on the construction of the Hochbunker. These expenditures were found to be too high during the period of material shortage. For this reason, it was sought to prioritize the construction of Hochbunkers. Although the underground shelters were not constructed often, airstrike protection tunnels were built frequently during the war, staying out of this group. Standardization was made and specifications were published to hasten the construction of Hochbunkers. Accordingly, there were standardizations in many materials used for this purpose, and the amounts of concrete to be used per person was specified based on the occupancy rate calculation. The rate of materials used per person in the bunker decreases as the Hochbunker increases in volume. Although there were no material problems for a certain period, material and worker shortages started to emerge due to multiple construction programs being undertaken, the commencement of the constructions, and the conditions of the war. While the supply of some materials took a long time, the supply of some did not occur at all. Towards the end of 1930s, cement shortages were remedied with the attack on Poland and the takeover of the Polish cement factories, as well as reducing the number of materials that were being used. Thus, the available materials were sufficient until the summer of 1941 [20].

The increasing amounts of steel that were used due to the usage of the standard construction method, which involves pouring concrete in molds that hold steel reinforcement beams, had become one of the points that increased the costs of the construction. In this context, spiral wire meshes, a new technique to reduce the use of steel that had emerged in the late 1940s, was tried first. Later, it was attempted to employ the Brunswick style reinforcements to reduce the amount of steel used from 300 kilograms per cubic meter to one-tenth of this value [64]. In addition to reinforced cover in ceilings, the walls were also designed following published guidelines using reinforced concrete [4]. Although a large structure with thick walls and ceilings was the result, the rooms in the interior had low ceilings. In this context, a higher and wider area could be obtained if the thickness of walls and ceilings could be thinned down [12]. By 1941, there were problems in steel supply, and the desired amount of steel could not be used in defense and protection structures. There were even problems in supplying ventilation systems. Moreover, a decree was published on September 30, 1944, due to the problems in supplying wood and it was made mandatory for civilians to gather wood that is necessary for the production of bunkers and military areas. Because of all these reasons, material shortages could not be avoided, things like those constructions could be suspended or postponed was remain on the agenda. Due to material shortages, the inspections were not carried out properly or the deficiencies were tolerated. A construction and inspection company were commissioned by Fritz Todt himself to supervise and cooperate with local municipalities in order to intervene in the failure of the inspections, and to ensure the realization of solid reinforced concrete Hochbunker constructions. Particular attention was paid to the use of concrete in compliance with the rules and standards. If there is a problem in concrete, the resulting product is less likely to be resistant to the pressure created by a bomb. In this context, the heaviest penalties were imposed on the builders who did not obey the rules, and to the inspectors who took bribes and ignored the deficiencies. However, even though Hochbunker constructions following standards were attempted to be carried out, the planned number of bunkers could not be reached due to the shortage of materials. For this reason, municipalities were penalized for their non-compliance with the program. A definitive analysis of the subject has not be fully made. In order to remedy this situation, the material type was changed, and the number of workers was reduced. Additionally, the existing manpower and materials were directed to the production of military weapons and

offensive war strategy endeavours by making reductions in construction projects, thereby emphasizing the military [20].

3.1.4.9. Reinforced Concrete

Preference towards constructing Hochbunkers using reinforced concrete arose with the airstrikes that began to increase during the later stages of World War I. After trying various metals and screw nails inside for finding the right combination of materials for making reinforced concrete construction, a steel bar reinforcement was selected [11]. The steel used in the construction of the Hochbunker was made durable with various concrete reinforcements and the resulting material was used where available [24]. This material was approved after performing tests regarding the endurance of the steel reinforced concrete Hochbunkers with the dynamite force test [41]. The thick walls of the Hochbunkers are in the form of a compact reinforced concrete with no joints and are cast seamlessly with concrete. In addition to having the capability to protect individuals due to their resistant structure, the bunkers are also able to remain standing for long periods due to this structure [51]. Hochbunkers were constructed using reinforced concrete because this material can resist and absorb the energies of bombs, is resistant to fire, allows the production of monolithic surfaces, can stand for 30 to 50 years if it is not subjected to conditions that may cause damage on it, and can be reinforced using reinforcements. The fact that these structures are still standing proves that materials were selected and applied correctly [4]. The concrete used in Hochbunkers during the Nazi period is called a blue concrete today. The reason it is called so is that the concrete reacts as it begins to solidify and gets a blue color. The blue concrete includes a high rate of fine cement. The blue concrete was preferred because it provides high endurance from the moment it is cast, and its strength increases with each passing year. The increase in the hardening and strength of concrete ends in approximately 30 to 50 years [45].

Although the wall thickness for the Hochbunker construction increased in parallel to the power of the bombs, the increases in the thickness were insufficient in terms of protection. In this context, there have been studies on the concrete types that are being used, and reinforcements were made using a variety of materials to carry out tests on the resulting materials. In addition to all of these, the materials of the shelters and the protection structures were examined by Germans in areas that they had invaded in Europe. These

developments were incorporated to their studies. In 1939, they produced a resistance material called Braunschweig, which was made by combining concrete and aggregates, and started to be used. The advantage of using Braunschweig is that despite the lack of steel, thanks to this reinforcement uses a third of the steel, which is determined for general use, can be used with this regard, which provided great benefits due to the steel shortage. Thus, it has been suggested to use Braunschweig as of the summer of 1941. However, later studies and examinations have revealed that it was not used in every bunker [20]. In the Führerbunker, which was built for Hitler, more materials and concrete were used compared to other Nazi, military defence, and shelter structures of the period (Figure 3.19.) [4]. While the many advantages that come with the usage of reinforced concrete have been discussed, certain disadvantages remain to be discussed. Although Hochbunkers that were built using reinforced concrete did not get damaged from airstrikes, the resulting firestorms caused increased temperatures to penetrate the Hochbunkers. This caused individuals taking shelter to come in contact with these high temperatures and being burned as a consequence [51].

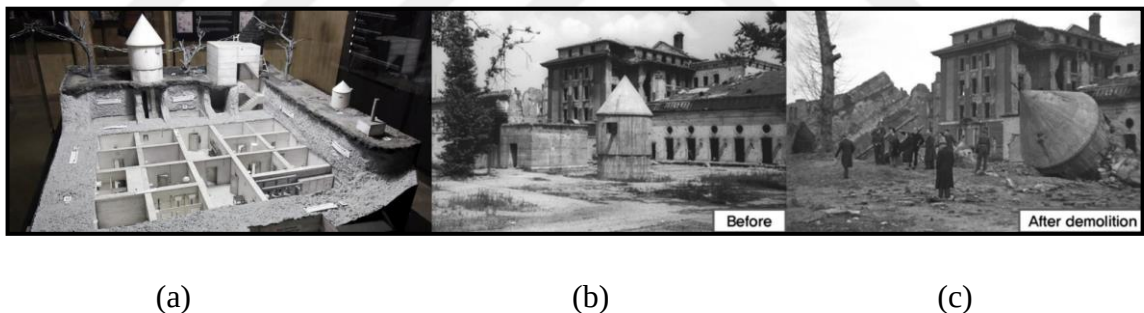


Figure 3.19. (a) Photo of Führerbunker model, (b) before look Führerbunker and (c) photo of after demolition look of Führerbunker [75], [76].

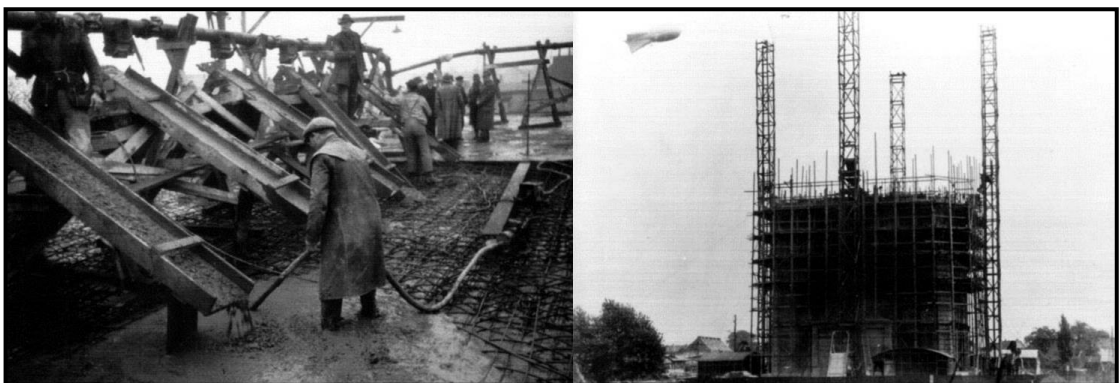
Besides the effects these fires had on the reinforced steel structure, they also caused surrounding forests to burn. It was caused a variety of gasses to enter the Hochbunker in addition to the increased temperatures. There are also statements made by the Reich Aviation Ministry in the context of taking measures against this situation. These statements stipulated that, in case of a fire that has occurred as a result of an airstrike, all openings should be closed, and ventilation systems should be turned on to protect against smoke. Alternatively, ventilation systems should be turned off if the temperatures are increasing. The amount of air that is inside the structure will be enough for the health of the

individuals within. Another situation that was stated in this context was that, although there are many cases where temperatures were able to penetrate the Hochbunker, this was not the case in every bunker, and it is about the slow transfer of heat with the correct application of reinforced concrete [20].

3.1.5. Construction and Usage Circumstances of the Hochbunkers

3.1.5.1. Shortage of Workers

Many brands that existed during World War II that continue to exist today produced materials for the construction of Hochbunkers. For example, electrical systems and electric motors for the Hochbunkers were produced by brands such as Siemens and Halske. Drägerwerk in Lübeck contributed to ventilation areas and breathing apparatus. Within the scope of the program, many companies, including competitors, took part in the works. Although many companies were included in the emergency program, the fact that the assistance of these companies was insufficient for the construction of the planned number of Hochbunkers was not changed. In addition to shortages of materials and production, the number of workers remained insufficient within the implementation of the construction programs planned throughout the country, despite the number of workers in the armament industry exceeding one million.



(a)

(b)

Figure 3.20. (a) Photo of workers casting concrete, (b) Hochbunker construction [20].

As a solution to this situation, Fritz Todt made it necessary for workers operating in the areas where the construction was made to perform additional tasks in different works when

needed. However, since each unit should have a certain number of laborers, the assignment of new duties created problems in terms of the coordination of laborers. When the coordination and the number of workers could not be achieved, construction projects were reduced as a solution. Moreover, there have also been deficiencies in officials who were assigned to the Hochbunkers. There were problems with cleaning, and the general order of the bunkers. The dirty areas could not be cleaned due to the lack of staffing and the civilians living inside did not provide any assistance in this context. The disruptions regarding the cleaning of the bunkers were partially caused by the fact that the number of people inside the Hochbunker was more than the planned numbers. These cleaning-related problems in turn caused infectious diseases to emerge inside the bunkers. Individuals suffering from infectious diseases were not allowed to enter Hochbunkers or they were given isolated rooms in cases where they were allowed to enter. However, due to the war continuing without cessation, it became impossible after a certain point to make such distinctions or to limit the number of individuals taking shelter. For this reason, infectious diseases started to spread rapidly in shelter areas, especially since 1943. These situations have come to light today with the reports given by the officers in the Hochbunker and the letters they sent (Figure 3.20.) [20].

3.1.5.2. Hochbunker Staff

There are many departments and assignments within a Hochbunker. At this point, it is imperative to establish a management system to keep things running properly. Each bunker had sub-units with dedicated managers and staff for specific tasks. The staff of a Hochbunker included administrators, assistant administrators, personnel of the departments of the Hochbunker, guards, cleaning personnel, doctors, nurses, defense forces, and observers. Most of these officials were selected from among Nazi party members. Apart from all these, inspection and protection duties in some bunkers were carried out by both the management and the police. Necessary training was provided before management and assignments were made within the Hochbunker. Additionally, reports were filed as a result of the daily inspections and the bunker administrators submitted primary reports to their higher-ups regarding the status of the bunker [20].

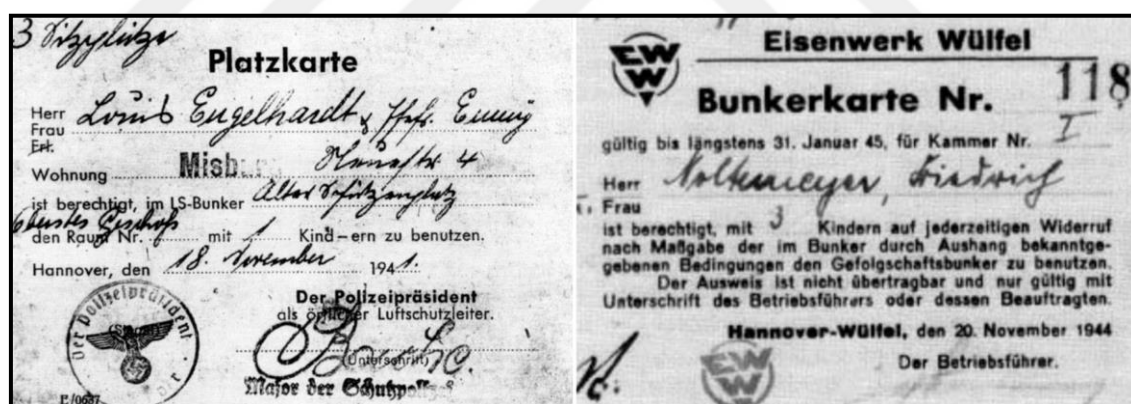
3.1.5.3. *Entry to Hochbunkers*

In the beginning, individuals' access to Hochbunkers was based on the function of the building. For example, only factory workers were allowed to enter factory bunkers, and only hospital staff, the sick and the wounded, and a limited number of their attendants were allowed to enter hospital bunkers. Likewise, only soldiers were allowed to enter Flak Towers. Although the construction of Hochbunkers was accelerated, their number was still not sufficient to cover the entire population, and with the increase in the severity of the war and the need for long periods for producing the planned number of bunkers, the policy regarding the allowance for entry to the Hochbunkers was changed constantly. In 1940, it was ordered by Hitler that all children younger than 14 years of the age were sent to areas where attacks took place less often to decrease the increasing demand for shelter areas. Hence, both the security of a certain segment of the population was ensured and the number of individuals that could be allowed inside bunkers was increased. In particular, the civilians who were allowed to reside in Hochbunkers included mothers, children, women assigned to work in any field, the elderly, the disabled, and the sick. In certain regions, specific bunkers, such as "Mother and Child" Hochbunkers, were constructed. In regions without mother and child bunkers, special areas and rooms inside the Hochbunkers were assigned for them. As men between the ages of 16 and 60 were considered to be workers or soldiers, they were not allowed to enter the Hochbunkers. They were put to work in certain areas, such as bunker constructions, factories, or military endeavors [20].



Figure 3.21. Photo while people going to the Hochbunkers, strollers left outside, at Bundesarchiv [73].

Sirens have been installed in the residential areas where bunkers are located to provide warnings in case of emergencies. The acoustic isolation of the thick bunkers was so effective that even the sounds of bombings were hardly heard inside of them [32]. In addition, Hochbunkers, whose constructions have not yet been completed, were used in case of emergencies due to the insufficient number of shelter areas. Many accidents have occurred due to this reason [37]. In the earlier days of 1941, there were many debates regarding who would be allowed to enter the Hochbunkers, with the increasing number of airstrikes. Although it was initially attempted to resolve this issue by increasing the number of bunkers, the right to enter shelters was given only to those civilians and soldiers who were Nazi party members with proper identification cards as it was impossible to construct enough bunkers to cover the entire population [25]. Thus, ideological classifications and discriminations have come into question in the use of Hochbunkers that were built for civilians. Identification checks were carried out in Hochbunker entrances, and it was made mandatory to wear identification cards in a manner that is visible to the users (Figure 3.22.) [23].



(a)

(b)

Figure 3.22. (a) Hochbunker Entrance card, Alter Schützenplatz Hochbunker in Hannover 18 November 1941 [20]. (b) Hochbunker Entry card valid from 20 November 1944 to 31 January 1945 Eisenwerke Wulfel Hochbunker in Hannover [20].

In 1943, the practice of entering the Hochbunker with an ID was discontinued. As the war continued unabated, the public's demand for protection increased due to increased air raids. Chaos emerged in regions where this request was not met and there were even attacks against bunker officials by certain communities. As a result, more than the planned amount

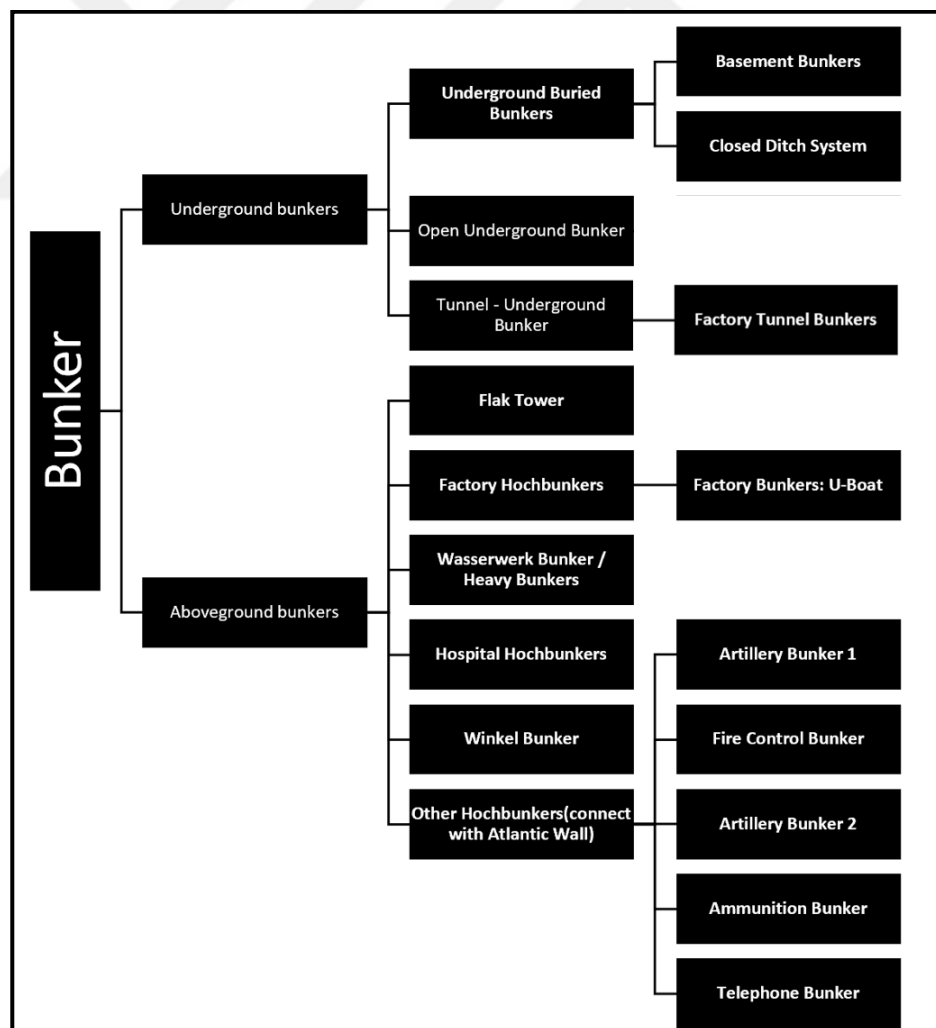
of individuals began to dwell in the bunkers [20]. During this period where order could not be achieved, people in need of defense such as children and their mothers, disabled people, women, and the elderly were given priority in allowing entry to Hochbunkers. However, there were still certain discriminations regarding the individuals who are to be allowed to enter the bunkers. For example, prisoners of war who are being forced to work in construction and prisoners of internment camps were not allowed to enter bunkers [37].

3.2. HOCHBUNKER TAXONOMY

The first typology studies in the field of architecture were commenced during the 18th Century. Architectural classification is carried out by assessing the features of the building or area such as scale, form, the materials employed, structure, function, production technique, and categorizing objects that hold similar characteristics into groups. In this context, the creation of common groups is also important in terms of standardization [4]. There is no definite typology of Hochbunkers. Since typology can make different distinctions according to size, function, or material, classifying them according to their types would be a more accurate approach for this study. As there are many identified and unidentified shelter areas within the scope of military strategy, this section will only examine some types of Hochbunker identified military defense and shelter areas in Germany. Since military defense and shelter areas are special and strategic state-linked structures, they are studied, designed, and constructed by national defense councils. The variety of the designed and constructed areas changes following the firepower available during the period, technological developments, the materials that can be used in the construction during the period, and the needs that such structures are required to meet. It is almost impossible to build a single defense and refuge suitable for everywhere and the situation. Determining, classifying and types of similar characteristics is especially necessary for the creation of standards [51]. In this context, documents that present the design and construction details of the building and the area are needed first. In architectural literature, the creation of information and documents regarding the military defense and shelter areas is achieved by examinations and studies that can only be carried out after such documents are declassified, or after the areas are civilianized, as they require classification due to their function. Since designs that were suitable with their respective systems were created and adapted by each state for their territories, it is possible to carry out regional

standardizations. However, it is still quite difficult to create a monotype standard [61]. Although bunker types are mentioned in many studies, the typological classification is selected and developed as a table in Joachim Schulze's work titled "The study on the potential of transforming old military bunkers into energy storage facilities" as a result of the examination of the resources [46]. In this study, while underground bunkers generally divide into three subgroups, aboveground bunkers are divided into appropriate sub-units in the context of the thesis, covering only Hochbunker types (not including other military defense and shelter structures). The table prepared in this context is open to development, and different Hochbunker types can add.

Table 3.1. Table was developed based on the classification in the Joachim Schulze study and Hochbunkers are included in the aboveground bunkers subtitle in the table, created by author using the references [46].



According to the data provided by Andrea Heinemann in her research book titled "Bunker Update" 40 percent of the shelter areas provided to the society by the state in Germany are built above ground, 23 percent are partially aboveground, and 37 percent are completely underground [45]. First of all, under this heading, the types of Hochbunkers located aboveground will be examined. Since there are Hochbunkers connected with underground bunkers, the underground bunker types will be briefly mentioned at the end. At the same time, since some of these underground bunkers relate to Hochbunkers, the related types will be detailed under the subject headings.

3.2.1. Hochbunker Types Connected to Aboveground Bunkers

There are many types of Hochbunker among the aboveground bunkers according to their functions. Some of these structure designs and plans serve a variety of functions, such as Military Defence Hochbunkers such as Flak Tower, Civil Protection Hochbunkers, telecommunications bunkers, Mother and Child Hochbunkers, Hospital Hochbunkers, Industrial Hochbunkers, Factory Hochbunkers, railway bunkers and tunnel bunkers connect with Hochbunker [20].

3.2.1.1. Flak Tower (*Flaktürme*)

It was decided that Military Defense Hochbunkers would be constructed in the first phase of the Emergency Program, and it was attempted to run carry out this endeavor by combining it with the Flak Tower project, which was commenced at an earlier date. Military bunkers are constructed for either defensive purposes or for fulfilling both defensive and protective functions. Additionally, they are also implemented to act as factories to produce weapons and vehicles. The most commonly encountered type of Hochbunker is the antiaircraft towers that are known as "Flak Towers" [24]. With the declaration published by Hitler on September 9, 1940, in response to the serial airstrikes carried out by the British Royal Airforce in August 1940, the construction of anti-aircraft towers, which are of the high bunker type, was ordered to achieve defensive purposes. These anti-air towers are known as Flak Towers. The first Flak Tower sketches were drawn by Hitler [31]. The Flak Tower design drawn by Hitler is not a design that is completely specific to Germany. While designing the Flak Tower, the concepts of the

defense structures was taken by Hitler based on the concepts he had seen in Japan before World War II. Additionally, the visuals and plans of medieval towers and castle was applied by Hitler as well, through the alteration and the adaptation of these concepts with his design perspective, which included an approach that is larger, symmetrical, monumental, and Neoclassical in style, to make them unique. Afterward, an architectural and engineering group was established for the defense areas to be constructed, and their endeavours were carried out in cooperation with the Nazi soldiers. After the plans were edited by the architect Tamms, they were inspected by Albert Speer and Fritz Todt and submitted to Adolf Hitler [32].

After the planning stage to do the Flak Towers cities were determined by the strategic military priorities. In this context, it was decided to carry out the first phase of the construction in the city of Berlin, as airstrikes were becoming commonplace there. The first three Flak Towers built in the center of Berlin are positioned to form triangles based on the strategic planning. The Zoo Tower in the southwest, Friedrichshain in the southeast, and the Humboldthain tower in the northwest were built during the period from October 1940 to April 1942 (Figure 3.23.) [20].

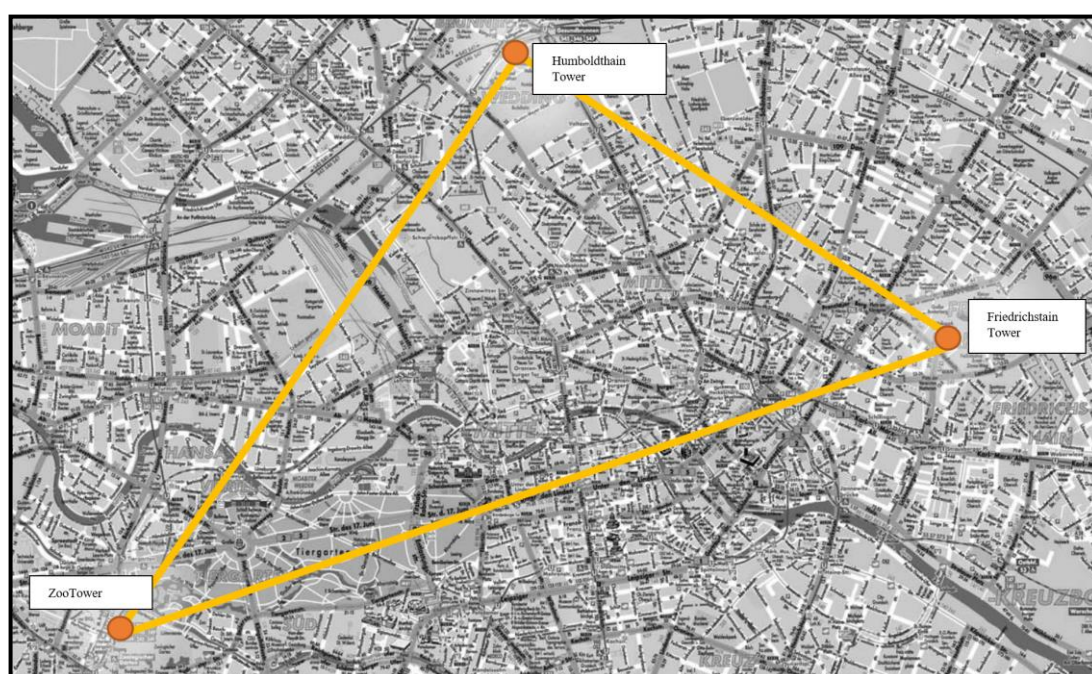


Figure 3.23. Zoo Tower, Friedrichshain Tower, Humboldthain Tower locations on the map, Editing by Author [77].

The large size of the construction resulted in the use of many materials. In this context, high expenditures have been made in construction. While the money spent on the Zoo Tower alone was approximately 45 million Reichsmarks, the construction was concluded using 100,000 cubic meters of concrete and 10,000 tons of steel material. The Zoo Tower, which was planned to serve 8,000 people during the war, accommodated approximately 30,000 individuals during airstrike emergencies, due to the need for a sheltered area in emergencies during airstrikes and the lack of sufficient shelter areas in the immediate environment. Since the Zoo Tower, Friedrichshain, and Humboldthain Towers are the first Flak Towers built, they are identified with Roman numerals as I, II, and III according to their construction order. A similar numbering scheme was in effect for all later Flak Towers. Additionally, all towers were different from one another in terms of design while all of them were dimensionally large (Figure 3.24., 3.25.) [32].

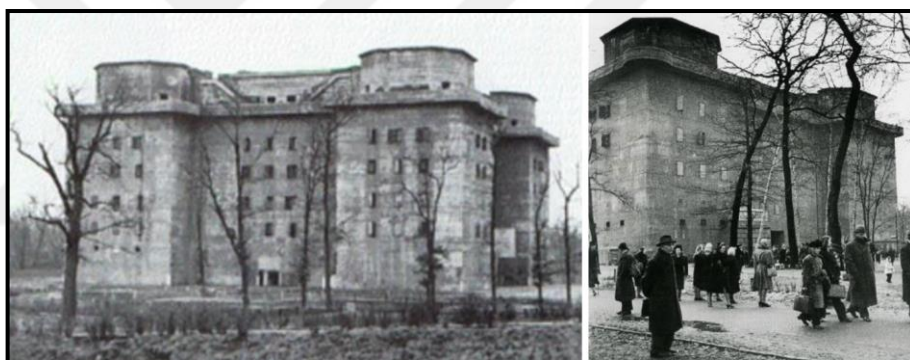
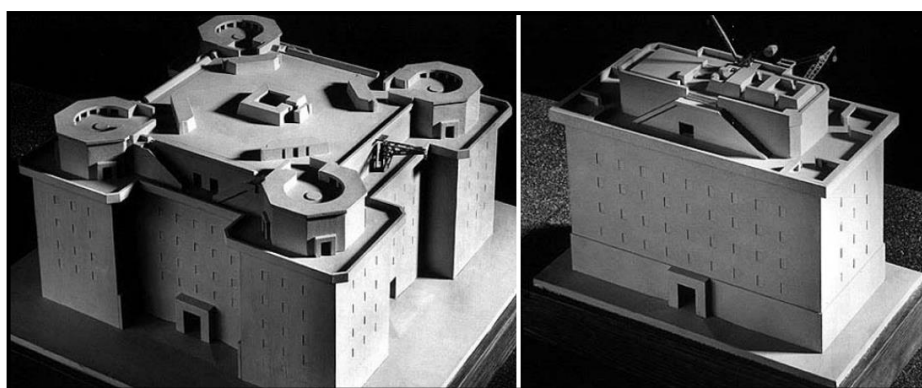


Figure 3.24. Photo of Zoo Tower, Flak Tower in Berlin [78].



(a)

(b)

Figure 3.25. (a) Model of G Tower Humboldthain and (b) L Tower Humboldthain, at Landesarchiv Berlin [32].

All the Flak Towers were built for providing military defense and shelter against aircraft attacks. In this context, although they were not allowed for civilian usage due to the purpose of their construction, more sections were added to them in certain regions due to the need for civilian shelter areas, and additionally, depots, which housed valuable documents and products, were added to the plans [24]. Arsenal sections were added to the lower floors of Flak Tower plans against possible attacks. Medical emergency rooms were also added to the lower floors to provide medical assistance in cases of injuries [11]. Freight elevators have been added to the designs to accelerate the transportation between floors of the tower. The towers have their dedicated infrastructure in many areas such as ventilation systems, electricity supply, and infrastructure installations. In addition, sections such as medical aid departments, laboratories, and research rooms, material and weapon equipment areas were included in the tower plans (Figure 3.26.) [32].

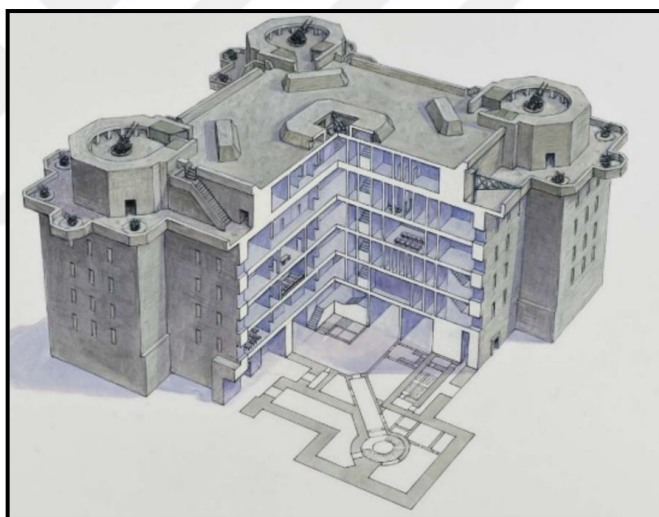


Figure 3.26. Flak Tower illustration example [24].

Two bunker models were created in the scope of Flak Towers. One of these models, the Gefechtsturm (G-Tower), is a basic anti-aircraft model and was constructed to protect the city and to respond to possible air attacks. The Gefechtsturm designs initially included circular base plans, but a transition was made to a rectangular base due to changing and developing plan types and observation towers were added to the corners of the structure. The other bunker model is the Leitturm (L-Tower) tower, which played a supporting role with its radar installations. Leitturm towers were designed to be smaller and narrower than

Gefechtturm towers (Figure 3.27.). However, the heights of both of these towers were kept similar, and some L and G-towers reached 39 meters in height. The function of the L-Tower was to provide communications and to notify the G-Tower of any detected attacks with spotlights. Friedrichshain and Humboldthain towers built in Berlin are Gefechtturm model Flak Towers. After the completion of the constructions in Berlin, Flak Tower constructions of similar designs were commenced in Hamburg. During the Flak Tower constructions, the tower titled Bauart 2 (Type 2), which was smaller than the Flak Tower in scale and had a simpler design, was constructed by Tamm's design team for trial purposes in Hamburg, in October 1942. Also 1942, many Flak Tower types were installed on the shores of the Netherlands and Belgium within the scope of the Hochbunker construction of the Atlantic Wall on the border shores of Europe. Similar to the other Hochbunkers, many of them were left without a function, or were destroyed after World War II. Especially the Zoo Tower and Friedrichshain which were constructed in Berlin were destroyed. The Humboldthain tower was partially destroyed. Its remaining sections were transformed after the end of all wars and put into use. The removal of the rubble resulting from the destruction of the Zoo Tower took until 1962 as removing all of the rubble was a costly task and the transportation of the rubble had to be arranged. High amounts of rubble resulted from the destruction of many bunkers, and the matter of what to do with this rubble was debated (Figure 3.28.) [24].

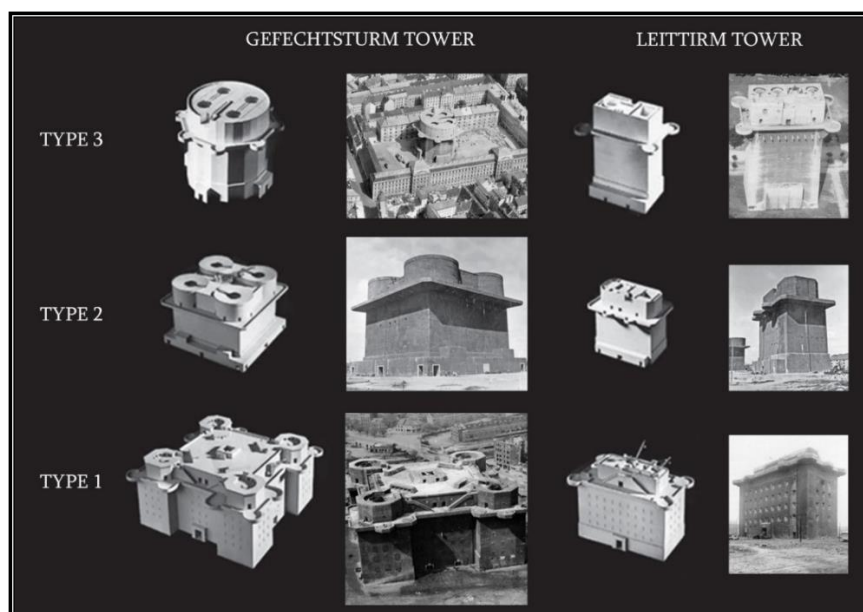
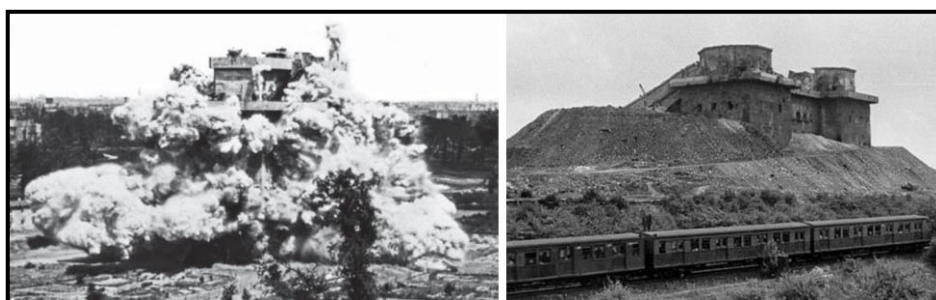


Figure 3.27. Flak Tower, Gefechtturm and Leitturm Tower design and types of model and built photo, editing by Author [24], [36].



(a)

(b)

Figure 3.28. (a) Photo of Zoo Tower demolition moment [24]. (b) Humboldtthain Tower remains from the demolition [79].

Flak Towers were put into use to meet the need for shelter with an emergency use order, as most of the buildings where civilians were sheltered were destroyed after not being used for a certain period. With the beginning of the Cold War after this period, the matter of reintroducing these Hochbunkers to military use became a point of discussion. During the Cold War, some Flak Towers were reinforced and started to be used by many states, including the Soviet Union, since the construction of new bunkers would take too much time. With the end of the Cold War, the Hochbunkers were left without a function once again, and the issue of what would happen to the buildings became a topic for debate. Nonetheless, it was decided to demolish or transform them. These decisions will be discussed further under the chapter on transformation [11].

3.2.1.2. *Factory Hochbunkers*

The first designs of the factory Hochbunkers and shelters were carried out following the 1937 regulations. In general, these regulations mostly determined the necessary materials, infrastructure details, and ventilation systems of underground shelter areas, but, with the increase in the severity of war by the 1940s and the increasing amount of airstrikes carried out by Allies, there were certain alterations in the specifications and certain revisions were made via new decrees. Attacks on industrial areas made it necessary to protect the manufactured products [20]. With this decree, it was made mandatory to construct shelter areas near factories and large commercial areas to protect industrial zones against airstrikes. Within the scope of this decree, shelters started to be constructed by the

Werkluftschutz industrial defense service in regions with insufficient defense areas, particularly those industrial zones with inadequate defense areas, as of the end of the 1930s. Bomb-resistant shelters were established by Werkluftschutz in many regions, especially in ports that were vulnerable before the war. Reichsgruppe Industrie was established to oversee Werkluftschutz and incentivize the construction of the shelter areas. Accommodation areas similar to the arrangements for establishing shelter areas in industrial zones were created in public and private buildings with the Selbstschutz ("Self-defence service") and in this context, incentives were provided for the construction of shelter areas near these places. All these endeavours were steps taken at the beginning of World War II. Large-scale shelters built to defend against airstrikes were constructed at the beginning of the war (Figure 3.29.) [24].



Figure 3.29. Valentin Hochbunker⁸ submarine and ship factory 1943-1945 present state, Bremen [80].

Industrial bunkers were often designed and built by engineering companies. Many factories performed different production functions. While certain factories processed materials and prepared the necessary materials for the construction of bunkers, others developed arms and vehicles for the war. By carrying out airstrikes against soldiers and civilians, as well as

⁸ The construction of the Valentin Hochbunker has not been finished [80].

the resource production centres that met defense and protection needs, it was aimed by entente powers to cause disruptions. In this context, Factory Hochbunkers and shelters were constructed to protect and defend industrial buildings, which acted as production areas, as well as providing tools and materials, and inhabiting workers [20]. To implement gas-proof doors and air filters in all bunkers, they began to be mass-produced in Factory bunkers. There are many kinds of Factory bunkers. That was described one of these bunkers under the section on underground tunnel bunkers. Regarding the matter of aboveground factory bunkers, a type of bunker that is different in design and construction will be discussed, as many factory production areas include many different branches of production, such as the production of construction resources, naval, land, and air defenses, and national needs that are not related to war. Thus, since the designs are carried out on different terrains and the number of workers varies according to the changing factory type, proper conditions are determined based on the three aforementioned scales, and designs are created and implemented [24]. The term Factory Hochbunker is a general, function-based name given to bunkers that vary according to the factory type they include. Because many different types of bunkers such as single-person bunkers, underground tunnel bunkers, other Hochbunkers, and U-Boats for marine shipyards were constructed depending on the type of the factory and usually, these shelters were directly connected to the factories.



Figure 3.30. Factory Hochbunker, U-Boat Bunker Hamburg [81].

Submarine factories some types of U-Boat is exemplary of Factory Hochbunkers. Factory Hochbunkers were not constructed only on land. Shipyards called U-Boats that are

connected to the coastal areas were also produced. U-Boat shipyards were implemented before and during World War I, and they were continued to be built by Organization Todt during World War II. They were implemented by changing and altering their weapon and design features according to the needs of the period. For example, they were strengthened with thick reinforced concrete ceilings. U-Boats were also built in the ports of the occupied regions. Apart from Germany, U-Boat bunkers can also be found on the coasts of France, Norway, and Belgium. These were targets for airstrikes by allied forces as they produced weapons and vessels that would increase naval power during the war (Figure 3.30.) [24].

3.2.1.3. *Wasserwerk Bunker / Heavy Bunkers*

The heavy bunkers were designed against airstrikes in 1943 under the name of "Wasserwerk bunker" without their actual function being indicated. While the constructions of some of them were fully completed, the others were only partially completed. Apart from the brief information regarding the bunker design and the required sections provided to Todt Organization employees who designed and constructed the Wasserwerk bunker, there were no statements regarding what the bunker would be used for [24]. This situation caused difficulties for designers in terms of creating effective designs. Wasserwerk bunkers were used for functions such as producing and storing weapons or aircraft development facilities and they are in the category of factory bunkers. Since airstrikes inhibited the construction stage of bunkers, the "Verbunkerung" method was used in the constructions. With this method, walls and ceiling prepared before excavating and creating the area, then soil in the area between walls emptied. The rooms created one by one. In the construct order, to build four walls, dug two parallel ditches with two walls and after to these ditches added steel reinforcement beams, placed a steel-reinforced frame. Then, concrete was cast into the bunker walls. After the concrete was cast into the sidewalls, a steel shutter was placed for constructing the roof and steel bars were placed upon it to form the roof, and concrete was cast on the resulting structure [82]. The heavy bunkers were fitted with five meters of reinforced concrete ceilings. Additionally, due to the lack of sufficient protection against airstrikes, studies were carried out on new construction methods and materials, including the application of the method called "Erdschalung" ("earth formwork") on the ceilings of heavy bunkers, to achieve increased protection (Figure 3.31.) [24].



Figure 3.31. Photo of Wasserwerk Bunker [83].

After all the above mentioned processes are completed, the soil in the central part of the bunker is excavated via the openings left in certain other parts of the bunker. The rooms of the bunker are constructed using this method. Regarding the construction of Wasserwerk bunker-type shelter areas in general, it was observed that while the constructions of smaller-scale ones were completed, the constructions of larger-scale ones were incomplete. In this context, the Wasserwerk bunker in the village of Siracourt can be cited as an example of a sheltered area whose construction could not be fully completed. The Wasserwerk bunker is generally constructed with a length of more than 200 meters, a width of approximately 35 meters, and a height of 10 meters. The dimensions of the primary rooms were designed to be 15 meters in width, 190 meters in length, and 5 meters in height. As a design detail, many of these bunkers were constructed using the "Verbunkerung" method, which involves the construction of rooms separately and the construction of a single roof at once to cover the entire structure. The Wasserwerk bunker in Siracourt was also designed and constructed according to these dimensions. The large scale of this bunker created problems in terms of camouflage, and this rendered the structure an open target for the Allies, whose airstrike capabilities were stronger. In addition, a lot of material and workers are needed for the construction of a bunker of such dimensions. This in turn caused problems during that period, where the war had taken a turn for the worse and there were shortages in materials and workers. In these spaces where the flow of weapons was ensured thanks to the presence of weaponry and bomb depots, it took nearly thirty minutes for a stored bomb to be transported to the location where they

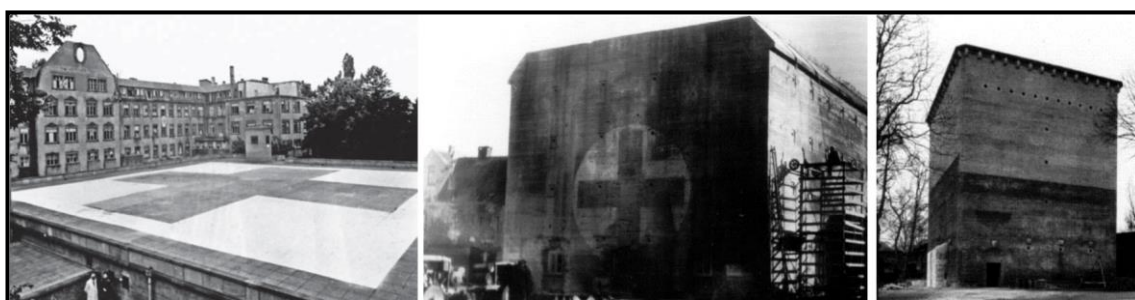
will be used. However, there were also certain problems, which were caused by breakdowns that occurred often, such as the bombs exploding during transportation. After these events were discussed in meetings, it was decided via a decree of the Führer to continue certain parts of the constructions to use the bunkers as decoys for entente airstrikes. Since the details were not certain due to the destruction of the documents of the designed bunkers and the complete status of many of these bunkers, entente forces were not able to predict what this bunker type would be used for, and they created sketch drawings regarding what their designs might be by making use of local sources. The entente forces were only able to determine that these bunkers were used as decoys after World War II. Afterward, as a part of their designs for the destruction of bunkers and shelter areas, an attempt to destroy the Wasserwerk bunker located in the village of Siracourt was made by using explosives. However, this attempt did not cause high amounts of damage to the structure of the bunker and only caused it to be decommissioned, while the explosives used in this context heavily damaged the surrounding terrain and demolished a large portion of the village of Siracourt. This example was provided to demonstrate the destruction caused by the attempts at demolishing bunkers in similar circumstances. Due to the environmental damage that was caused, this and other similar destruction attempts were banned later, and certain arrangements that limited the use of bunkers to non-military purposes were commenced (Figure 3.32.) [82].



Figure 3.32. Photo taken from above of part of the land, after the bomb was dropped on the village of Siracourt, 30,000 bombs were dropped on Siracourt [84].

3.2.1.4. *Hospital Hochbunkers*

According to the course of the war, bunkers were constructed by the Reich Ministry of Aviation with designs suitable for the function in the area needed. The Hospital Hochbunkers were designed to provide medical care for any injuries that might take place during the war and specially to provide care and medical assistance to those civilians and soldiers who were hurt due to airstrikes. With hospitals becoming targets and the commencement of airstrikes as of 1940, the construction of hospital bunkers, which have sheltered structures, was emphasized to prevent individuals from being exposed to worse conditions during treatment and to provide the required medical services (Figure 3.33.). Additionally, many existing bunkers were connected to hospitals. If it is impossible to construct a Hospital Hochbunker or to establish a connection to a nearby hospital, the security of individuals was ensured by constructing underground basement bunkers underneath hospital structures. The design plans of the hospital bunker included patient rooms, operating rooms, patient and doctor preparation rooms, x-ray rooms, sterilization rooms, post-operative intensive care, and restrooms, and exit units for moving those who have passed away outside the bunker. Besides, it was made mandatory to include elevators within hospitals and ramps in passage areas to facilitate transfers. In certain bunker designs, there was the problem of the corridors being too narrow.



(a)

(b)

(c)

Figure 3.33. (a) Photo of the largest Hospital bunkers in Frankfurt, (b) Hospital Hochbunker in Emden, (c) Operationsbunker in Hamburg Eppendorf [20], [24].

According to the plans, there were different sections within the bunker for different types of treatments. For example, there were sections dedicated to the treatment of infectious diseases, which were isolated at a distant point to prevent infections. Furthermore, there

were also delivery rooms. The hospitals included different sections for women, men, and children. Although it is necessary to design the ventilation systems of the hospital bunkers with filters and infrastructures that allow the flow of clean air to prevent the spread of diseases, the lack of sufficient air ventilation and the shortage of filters were other deficiencies that increased the risk of disease and infections. The guideline published in December 1941 determined the number of people to be allowed inside Hospital Hochbunkers and information about the size and planning of the bunker was published in 1942. According to the guideline, the Hospital Hochbunker should have enough beds for at least half of the number of people for the maximum patient capacity of 1000, one nurse for every five beds, and five personnel for each operating room unit. Regarding bunkers constructed beneath hospitals, it was made mandatory to include at least two operating rooms and the necessary medical equipment, a maintenance and repair room, and an elevator to facilitate the transportation between the floors of the bunker. As a result of the bunker constructions falling behind schedule, even a call for hastening the constructions was issued by the officials in 1942 (Figure 3.34.). In emergencies, hospital Hochbunkers were delivered in an incomplete state in some regions, and for this reason, there were deficiencies in ventilation, electricity, and water infrastructure. Since the hospital bunkers fell short due to the severity of the war, it was made mandatory in February 1942 to establish medical rooms in bunkers with 1,000 people capacities. However, while there were enough nurses, there were not enough doctors. Even medical students were assigned to bunkers due to this deficiency [20].



Figure 3.34. Hospital Hochbunker interior photos, the initial photo is general hospital layout, the bunk bed layout in the middle, the photo of the order passed as a result of the increase in the number of injured and patients coming to the hospital, Operation room photo [20].

3.2.1.5. *Winkel Bunker*

A cylindrical, conical lead- like Hochbunker design was made by Leo Winkel. The reason for the pointed design is that it is difficult to be hit by a bomb. These durable bunkers were only shaken if a bomb hit its vicinity [20]. Its futuristic design aimed to deflect bombs and approximately 200 bunkers were constructed using this pattern (Figure 3.35.) [24].

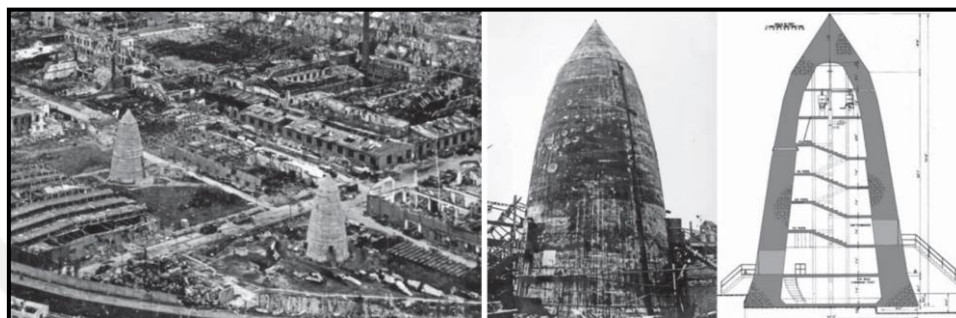


Figure 3.35. Winkel Bunker in the residential area photos and cross section [24].

The Hochbunker types used in the Atlantic Wall are included below. In addition, these types of bunkers built by Hitler's team were also implemented in occupied areas, especially Germany.

3.2.1.6. *Other Hochbunkers (Types found on the Atlantic Wall)*

Artillery Bunker, these high bunkers constructed within the scope of the Atlantic Wall were located on the shores. These bunkers had another function in addition to providing defense, as, during World War II, the 17 cm caliber guns placed inside the bunkers were used to attack allied ships (Figure 3.36.) [85].



Figure 3.36. Photos of Artillery Bunker [39], [85].

Fire Control Bunker, these bunkers had two observation openings placed on top of one other. These openings were used to identify the enemy. The optical distance measurement tools were also used in this context. In addition, it was aimed to monitor atmospheric phenomena such as wind speed, direction, and atmospheric humidity with the devices located in the basement (Figure 3.37.) [85].



Figure 3.37. Photos of Fire Control Bunker [39], [85].

Another type of Artillery Bunker, a defensive type of bunker with an opening in the front. Additionally, an open-air depot was placed on its front side (Figure 3.38.) [85].



Figure 3.38. Photos of Artillery Bunker [39], [85].

Ammunition Bunker, these are closed ditches where weapons were hidden. They are bunkers that serve as storage, and they are constructed without any openings (Figure 3.39.) [85].



Figure 3.39. Photo of Ammunition Bunker [85].

Telephone Bunker, this was a bunker with a critical function, which is the establishment of communications (Figure 3.40.) [85].



Figure 3.40. Photo of Telephone Bunker [39], [85].

3.2.2. Underground Bunkers Connection with Hochbunker

The fundamental design principles of underground shelter areas are determined based on the characteristics of the terrain that it will be constructed upon. The material selection, plan, design, and implementation processes are also made under these characteristics. Accordingly, the underground shelter areas will be divided into subheadings following the

design types of these areas. The reason why the types were classified in this manner is that the general design features of such shelters are similar in many regions [61]. The underground shelter types used during the World War I were developed and continued to be used during the World War II. In this context, the Führerbunker, which housed Hitler during the later stages of the war, is perhaps the most well-known underground bunker. The Führerbunker was constructed in 1936 and deeper expansions were added to it due to airstrikes carried out by the RAF in 1943. Thus, while the bunker was known previously as the Vorbunker, first the newly added sections, then the entirety of the bunker came to be known as the Führerbunker. Although the Führerbunker was a well-protected underground bunker, the same durability and the complete design were not offered by the bunker or shelter area. In addition to being destroyed, certain bunkers constructed near docks or on terrains with high water content experienced problems due to non-conformities with proper design principles. If an underground bunker or a shelter area is to be constructed in areas where groundwater levels are high, it is necessary to add systems that constantly exhaust the water [24]. It is highly important to survey the terrain and design the bunker according to the characteristics of the terrain. The studies regarding underground bunkers have divided such structures into three categories: buried, open and tunnel. Each of these types will be briefly described and discussed under this section. Of the described types, those associated with Hochbunkers will also be detailed.

3.2.2.1. *Underground Buried Bunkers*

Bunker-type shelter areas that are buried underground were used prior to, during, and after World War II. Before the construction of high bunkers in the mid-1930s, the opinion that the use of bunkers buried underground is safer and that it is easier for the individual to access the bunkers that are close to residential areas during an attack was stated by the Ministry of Civilian Defence. The difficulty in accessing a sheltered area may cause individuals to be harmed due to exposures to gas or fire, or cause weapon-related injuries, as well as causing trauma if one witness other people being injured or killed during an attack. Since designs and constructions regarding defense against airstrikes were not yet carried out since such attacks were only just beginning to become a reality during this period, it became necessary to use the improved versions of the existing designs. Accordingly, it appears to be more advantageous to use buried bunkers that are connected

to residential areas [24]. Bunker-type shelter areas that are buried underground by design were constructed with one or two floors, and multi-floored construction designs were avoided in this context. Additionally, they were implemented in a manner that integrated to the basement floor of a structure to facilitate the access of civilians. Such shelters were divided into multiple rooms that are connected using narrow corridors to accommodate more people in a limited amount of space. The structures to which they were integrated were selected from among public buildings to prevent them from becoming targets during an attack. Although shelters buried underground were produced during World War II, this type of bunkers was produced the most often during the Cold War. That type of bunker was built in many European countries, including Germany, in the face of the possibility of nuclear attacks in the Cold War. The design was developed and implemented within the scope of the covered shelter type. If the changes in the design of the buried bunkers constructed in Germany are examined in this context, it may be observed that while the walls and ceilings of this type of bunker were designed to be thick during World War II, these thicknesses were reduced during the Cold War due to the necessity of linking the bunkers with aboveground structures while also increasing the thickness of the ceiling plate that is closer to the surface [46]. This bunker type was left functionless after the end of the war and many of them were transformed into museums. However, if the details required for transformation are not addressed, making changes is difficult and costly due to insufficiencies such as infrastructure, ventilation, and lighting [45].

Underground Buried Bunkers is the most commonly constructed type of Basement Bunkers. Among the bunkers buried underground, basement bunkers were built frequently in Germany and were preferred by the public. These bunkers, which are difficult to destroy without a direct hit from a bomb, provide a resistant area for taking shelter. Considering that Hochbunkers can accommodate 500 individuals at minimum, these bunkers can only house one-fifth of that number. Generally, basement bunkers are constructed in the cellars of aboveground buildings in an integrated manner. Basement bunkers are also included in the planning within the scope of the underground floors of the Hochbunker. One of the problems caused by this situation is that many structures had window openings in their basement levels constructed beforehand. Since these openings provided air circulation with other points such as passages and doorways, they allow the gasses resulting from bombs and fires to flow inside the shelter. The precautions taken in this context included closing

the window openings, changing doors to include gas locks and filters, and closing off the passages. The design details of the gas locks in these doors included adding two protective doors with a narrow corridor between them. The important matter here was to prevent the effect of gasses and decontaminating individuals and objects possibly contaminated by chemical materials by washing them before allowing them to enter inside [24]. Additionally, armoured steel doors should be used and the frame of the door should be embedded within the structure. If the door rusts, the entrance door that is already heavy would become very hard to move [39]. Openings in basement bunkers are bunker entrances and emergency exits. In addition to closing all possible openings to prevent the effect of gasses, firewalls were built around the structure when the bunker was constructed, or they were added later to not be affected by fires caused by bombings. Although firewalls provided advantages in preventing the effect of fires and gasses, they might prove to be disadvantageous in case of emergencies where exits are unusable, causing individuals to be stuck inside since they are nearly indestructible and have no openings or passages whatsoever. For this reason, passage areas were designed using fire barrier walls at certain points of the firewall and these were used if exit points were unable to be used. Apart from all these measures, although there are collapses in the connected structure at the time of the airstrike, a possible collapse in the bunker is prevented because the ceiling of the bunker connected to the surface is reinforced with steel girders [24].

Another type within the scope of Underground Buried Bunkers is the Closed Ditch System. While the Closed Ditch system was used until the end of World War I, it was not preferred by the state during World War II for a certain period within the scope of Germany's emergency program. Despite this, the public continued to produce such shelters, as they were able to build a closed ditch system using a small amount of materials. Thus, the closed ditch system was one of the most common shelter areas that were constructed in Germany both before and after the war [24]. To ensure the safety regarding a design created for a closed ditch system, the ditch must be completely buried. Although the exits were transformed into metal since closing them with wood does not provide protection, the desired level of protection was still not achieved. There were difficulties in procuring materials for the use of metal doors due to material shortages and it was attempted to develop new solutions. Since the designs were constructed using reinforced steel, the thicknesses of the outer walls were determined to be two meters [11]. Closed ditches were

built in factories that did not have shelter areas and they were quickly produced with a simple infrastructure in a way that allows an easy access. For constructions that were carried out in this context, the prefabricated concrete sections were recommended by the Organization Todt. Moreover, five different size standards for closed ditch systems, which could accommodate 15, 50, 100, 150, and 200, people respectively, was indicated in the guidelines published by the Organization Todt. However, two plan types were applied in the constructions to accommodate 100 to 500 people. According to the most common plan's layout, it was designed as a combination of several sections, with a single section having enough space to accommodate 50 individuals. Additionally, those closed ditch bunkers that are designed and constructed using a circular cast of concrete were called Röhrenbunkers, which means "tube bunkers". Towards 1944, due to the lack of sufficient materials for bunker construction, the fact that the course of the war started to change negatively in the direction of Germany and the shelter areas had to be increased, step was taken by the state to construct closed trenches, which used fewer materials and were costly [24].

3.2.2.2. *Open Underground Bunkers*

Open underground bunkers are one of the underground bunker types that can be found in Germany, and they were especially common during the Cold War period. Their sizes can be compared to a medium-sized aboveground bunker. The outer wall shell was designed to be approximately three meters. These bunkers usually acted as control centres. In this context, they generally included central communication offices, which warned the population before an attack and carried out notification and orientation activities during and after attacks, as well as areas that ensured the implementation of security measures [46].

3.2.2.3. *Tunnels-Underground Bunkers*

Tunnel-type underground bunkers are shelter areas that were designed and implemented in different periods. During World War II, these bunkers were constructed by the state as secret bunkers with special purposes within the scope of the third phase of the German

Emergency Program, and they were not made available for the use of the public [46]. Although there was a shortage of materials and workers by 1944, the tunnel-type bunkers were one of the few bunkers that did not have any problems in the construction program because the rate of materials spent during their construction was less than other underground bunkers and shelter areas. Additionally, the lower amount of spent materials meant that more bunkers and shelter areas could be constructed. Apart from the standard design criteria and general construction information, the amount of information available for this secret shelter area type is quite limited. The characteristics determined for the design of the tunnel bunkers are as follows: hard soil was deemed to be suitable for their construction and if the bunker is being constructed upon rock soil, it should be constructed six meters deep at minimum, which can be varied to nine meters deep depending on the characteristics of the terrain. There are links between some tunnel type underground shelters and Hochbunkers. For soft soil such as sand, gravel, clay, the construction should be planned to not exceed twelve to fifteen meters of cover. Groundwater level requires as much consideration as the type of soil upon which the bunker will be constructed. The width of the tunnel should not exceed 1.65 meters for single tunnels and 2.30 meters for double tunnels. The designed tunnel plan should include entrances, gathering areas, toilets, and machinery rooms. Although bunker designs constructed aboveground should include at least two exits, this number should be at least six for defense systems that are built below the ground, including the emergency exits. If the tunnel bunker has multiple floors, then it should have stairs and ramps. The ventilation system of the underground shelter areas should be constructed properly, as these structures do not include other air intake systems. Ventilation systems could not be built properly during the period when there was a shortage of materials [20].

There is Factory Tunnel Bunkers type in Tunnels-Underground Bunkers. Many attacks were carried out by the entente powers to put Germany's factories out of commission, and many of these achieved their goals. Aircraft and naval vessel production facilities and weapon factories were left defenseless since they could not be placed under full protection, rendering them open for attacks. At first, the factories were camouflaged to remedy this situation, and traps were set around factories to provide defense against attacks. However, these measures proved to be insufficient and in 1941. It was decided by Albert Speer to disperse the primary factories and the dispersal processes and endeavours were

commenced fully in 1942 according to the strategic plans created by the Ministry of Air Defence. According to these plans, factories would be dispersed to certain regions and bunkers would be constructed near the newly established facilities. However, the implementation of this plan was delayed until February 1944 due to the occurrence of certain problems. According to the data available in this context, around 27 aircraft production facilities were divided into smaller facilities and moved to 249 regions with approximately 729 facilities at different locations and 59 factories. Due to the occurrence of attacks, the dispersal plan was transformed once again according to the course of the war, and new methods were created for aircraft factories. The first option was to establish smaller factories in woodland areas to camouflage them, similar to how they are implemented in Europe. While using caves, mines, and railroad tunnels as factories were available as an alternative option, it was ultimately decided to establish specialized underground factories. The design of tunnels and underground factories included design criteria similar to the underground and tunnel bunkers. Although the excavation process was very time-consuming, these constructed factory bunkers were quite resistance against bombings. Just as it was in other bunkers, the construction process was carried out by prisoners, forced laborers, prisoners of war, and volunteering Nazi party workers. Since tunnels and caves allowed factories to be sheltered and production areas to be camouflaged, which in turn allowed them to operate properly, it was even decided by Speer to establish an office to carry out studies in this regard. In essence, the establishment of underground factories and shelters is quite similar to ancient underground cities [24].

3.3. CONCLUSION OF THE CHAPTER

As weapons evolved and changed, bunker designs had to evolve and change as well. In the context of the military strategy, there are many other types of bunkers that cannot be included here due to the principle of confidentiality. Hochbunker types and design criteria discussed under this section are not limited solely to the areas used during World War II. Although their designs and constructions were commenced during World War II, many of these bunkers were revised to be defensible against newly developed bombs and were reused. In this context, the design criteria and the general types that emerged after their design and production during World War II discussed without making any period-based distinctions. Since there are certain types of Hochbunkers here, a study that is open to

improvement has been tried to be developed, including the Table 3.1 prepared. Finally, this section examined the underground shelter areas within the scope of their connection with Hochbunkers. Pressure calculations of underground and aboveground areas change according to the pressure created by the bombs during airstrikes. For bomb proof resistance the walls of aboveground bunkers are designed to be thicker. Therefore, like a wall thickness of the underground and aboveground bunkers, there are some differences in design criteria. Underground bunkers can be designed as freestanding, such as aboveground bunkers, as well as in underground spaces connected to aboveground bunkers. Avoiding the problems in the evacuation of individuals and the increased amount of destruction caused by airstrike bombs that become embedded in the ground, which explode more violently than those bombs that explode in the air, are other advantages that come with the selection of the construction of aboveground shelter areas [4]. However, the aboveground shelters also come with certain disadvantages in addition to their advantages. Perhaps the most severe disadvantage in this context is the subject of camouflage. The implementation of a proper camouflage was detailed under the design section [46]. Hochbunkers are considered to be in the special real estate category and many of them still exist in various cities. These structures have created different spatial memories in society as a result of past events. In the next chapter, that will be discussing the transformation of Hochbunkers based on the design criteria and types that have examined here, while also addressing the impact of collective memory, which is linked to spatial memory.

4. HOCHBUNKER TRANSFORMATION

The beginning of the awareness of conservation and transformation of buildings dates back to ancient times. In the Early Middle Ages, when there was a need for new buildings due to economic problems, it was possible to adapt the out-of-use structures according to the required functions. In this context, the use of the existing building has been realized with different transformation understandings. It has come to the fore to create criteria and make appropriate transformations in order to protect historically important structures. The first conscious steps in the protection of structures were taken in Europe. In this context, the Ancient Monuments Preservation Act was enacted in 1882. The fact that historic buildings were put under preservation and made public after the restoration process and that items were declared and owned as part of the national heritage was carefully applied in many continents and countries, including the United States, after Europe. Especially after the destructions in the Second World War, basic decisions were taken in the protection of buildings and works, and national and international regulations were made. National and international protection laws were enacted for the preservation of structures by establishing non-governmental organizations. Certain contracts exist for the repair and maintenance of culturally and historically important buildings. Two of these important conventions are specifically the Athens Charter of 1931 and the Venice Charter of 1964. During the period in which these two statutes were put forward, many more various conventions and international treaties were created. The first protocol of the Hague⁹ Convention was signed in 1954 (2nd Protocol, 1999) The Blue Shield Committee was also established and controls were carried out to ensure compliance with the convention. The International Council of Monuments and Sites called ICOMOS was established within the United Nations in 1965. In another important convention, the year 1972 is the UNESCO World Cultural and Natural Heritage Convention. There are studies carried out to prevent the destruction of structures and elements with similar historical and cultural values. These are just a few of those studies that are fundamentally important. Thus, more organized studies were carried out to realize the preservation criteria and procedures thanks to these similar institutions. The concept of preservation may develop from the effect of historic spatial memory of buildings on collective memory. Preservation, transformation, or destruction decisions can

⁹ The Hague Convention is a convention made to intervene against damage to cultural assets and deliberate destruction in armed conflicts. The Convention also describes any deliberate behavior as a crime.

be determined depending on national history and social memory, as well as cultural values. Demolition decisions should not be made easier as not all structures need to be preserved or transformed. These decisions should be applied according to the appropriate conditions and criteria determined by subject matter experts and designated institutions [86], [87].

Discussions about the material and moral damages caused by the subject of destruction and the concept of protection have been on the agenda again with the damage experienced by the First World War. Attacks were carried out on more comprehensive areas with the use of aircrafts in the war towards the end of World War I, and new types of designs were revealed in this context by carrying out studies for the development of areas of refuge towards World War II according to the defense technology and designs changing with the wars experienced in the 20th Century. The protection powers of the areas of refuge were also increased as the destructive powers of the weapons increased [39]. According to the examination of the previous parts of Hochbunkers' History and Design criteria, under this topic, the selection and stages of the Hochbunkers, which were started to be built in the Second World War and then reused until today, including the Cold War, are evaluated. Hochbunkers can be destroyed, transformed, or keep continuing to be out of service when they lost their military function after the war. As per our subject, at the end of the chapter, the effect of collective memory on the Hochbunker will be mentioned to specify the society's effect and reaction on the transformation besides the state decisions in all these choices.

4.1. HOCHBUNKER TRANSFORMATION FROM WWII TO THE END OF THE COLD WAR

The Hitler Government maintained a large construction program throughout the country and over a million people worked on these constructions, and incredible material and substantial expenditures were made in the occupied areas during the war [11]. Military defense structures, which are generally temporary, are designed permanently if military use is to be continued. It was understood that Hochbunkers were permanent designs considering their large size and the materials used (Figure 4.1). The structure was too solid to be dismantled or demolished, and accordingly, it was understood that Hitler, who designed it, had different goals about these structures. Briefly, Hochbunkers have plain

designs with clean facades and partial window openings in some of them as that mentioned in the design criteria. The fact that the facades are like this is linked to Hitler's Hochbunker transformation plan. After the war, Hitler aimed to cover the facades with black marble and to make the buildings monumental and turn them into symbols of war. Similarly, steel windows that were not necessary for the design were added to bunker towers according to the goal of transforming some bunkers into houses after the war (Figure 4.2.) [32].



Figure 4.1. Left photo example of temporary military structure; right photo example of Hochbunker [11] [74].

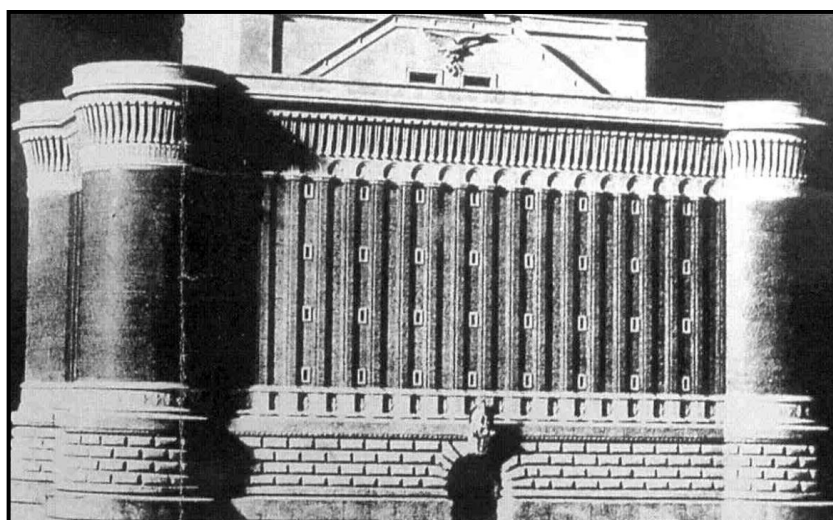


Figure 4.2. Zoo Tower possible transformation model at Hitler period [34].

The realization of this goal was prevented by the defeat of Hitler's front. Nevertheless, the transformation of Hochbunkers took place in the future in line with the needs. Hochbunkers, built to protect and defend from air attacks, protected the population as much as possible. Despite all the protection efforts, countless life and structures were lost. Severe damage occurred during the war, leaving one-third of the population homeless (Figure 4.3.) [11].

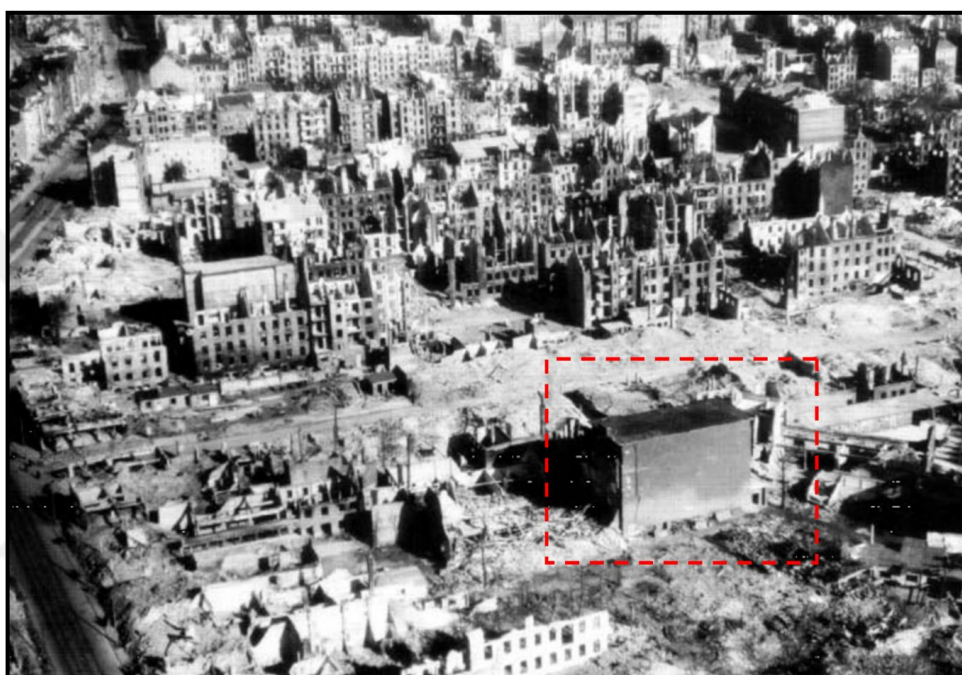


Figure 4.3. Photo of the bomb-destroyed area and the slightly damaged Hochbunker, Holtenauer strasse and Gerhardstrasse in Kiel [7].

The military areas of refuge lost their function and became out of service at the end of the war. Accordingly, the suggestion of opening the Hochbunkers to the emergency use after the need for shelter and the damage of the buildings was presented to the allied states by the local governments. However, the allied states did not approve of this view and even imposed a “ban on the use of military buildings” in Germany on April 10, 1946. Thus, there was no choice but to demolish or leave the Hochbunkers [4]. In addition, dozens of refugees other than the local government people had to solve the problem of shelter and need; therefore, a refugee control centre was established in 1946 in this context. The local people living with refugees in the arranged temporary settlements were not very happy with the situation, but they had to live as planned by the government until a certain order

was established [20]. Upon the inadequacy of the temporary accommodation areas, the local governments continued their demands for the civilization and use of the areas for the Hochbunkers, which the allied states decided to demolish due to the reflection of the ideology [11]. The majority of allied states allowed Hochbunkers to serve as refugee camps and emergency areas after civilizing them on July 21, 1948 (Figure 4.4.) [4].



Figure 4.4. The Hochbunker, which was transformed into a residential building and used in 1950, Störtebeckerstrasse in Wilhelmshaven [20].



Figure 4.5. Hochbunker demolition, Emden [88].

The decision was not supported by some allied state members and the demolition of the Hochbunkers was continued for a certain period, it was deemed appropriate by these members to civilize and use these areas due to reasons such as damage to the environment in demolitions with explosives and being costly and difficult in manual demolition (Figure 4.5.) [37]. By drilling holes in the ceilings and walls of Hochbunkers, some local governments, with this permanent method, tried to show to the allied states that the structures became vulnerable to bombs, to prevent objections about civilizing them [20]. Approximately 300,000 people had to survive in difficult conditions in Hochbunkers in West Germany alone according to the data registered in the 1950s [37]. Although the Hochbunkers from the war period were maintained, problems such as ventilation and infrastructure were tried to be improved and turned into living spaces, conditions in many Hochbunkers could not be corrected as desired. Therefore, evacuations took place to protect the health of individuals. Many people were living in the same place in the form of dormitory rooms in the bunker, but this problem was solved by transforming these spaces into single rooms in the bunker after the 1950s. The housing demands for Hochbunkers decreased and they began to be closed as the order started to be established in the mid-1950s [20]. The Federal Republic of Germany prepared a maintenance program for the military use of Hochbunkers again with the construction of the Berlin Wall in 1961 and the Cold War raging with the Cuban crisis in 1962 [4]. Studies were initiated for the transformation of Hochbunkers and areas of refuge suitable for use into nuclear shelters by strengthening them after the necessary research was carried out [37]. In Germany, which is divided into two as East and West, two different views have emerged regarding the use of Hochbunker. Although it contains traumatic memories about Nazi structures and Hochbunkers, the Eastern administration has taken steps to open it for service. There were specific reasons for the opening of Hochbunkers. There were approximately 13 million homeless individuals in need of housing. Another reason was to protect the buildings under certain conditions instead of demolishing them due to their historical location. The Western administration, on the other hand, did not look favourably on reusing these structures. Instead, they viewed the construction of new structures more positively. New structures construction could be disconnected from the old administration and new dates and memories could be created in the places in this way. Despite everything, the two

administrations used Nazi-era structures to quickly solve the need for residential areas. The Hochbunkers were purified from elements reminiscent of the Nazi period and military function and were civilized before they were reused. Similar transformation operations took place in government offices. The most familiar of these is that the Reichsbank structure was used for the Ministry of Finance¹⁰ in East Berlin in 1949 (Figure 4.6.). The fact that they had visuals and plans reminiscent of the Nazi period did not change the reminder in the structures even though operations such as removing ornaments to erase Nazi traces were carried out in the transformations. The structure reflects its history, identity, and memories with its appearance unless a radical change made [32].



Figure 4.6. The Ministry of Finance Building in East Berlin [89].

The emergency shelter process continued in some bunkers because there were still individuals whose residential needs could not be met even though most Hochbunkers were evacuated towards 1962. However, the Federal government made it mandatory to evacuate the bunkers with certainty with the Cold War, and there were attempts by the Housing Bureau to evacuate the Hochbunkers during the same period. The President of the Housing Bureau had to resign on October 22, 1962, upon the opposing views after the evacuation of the individuals living in the Hochbunker from the compulsory area without arranging new residential areas. A civil protection program was implemented from 1962 to 1970, and civilians were able to continue to use Hochbunkers for a certain period due to this situation [20]. In short, two types of transformation took place during the Cold War period, they

¹⁰ The building was built as an extension in the late 1930s. It has been frequently transformed and opened for use. It was used by the central committee of the East German Communist Party for a certain period. The building was used after the Second World War in the form of the Ministry of Finance. [89]

were either transformed into accommodation areas or strengthened if they were allowed for use in the military function. Accordingly, bunker programs continued with economic regulations in 1977. The transformations made against nuclear attacks in Hochbunkers, which continued to be used in the military function, were the addition and replacement of areas such as missile protection rooms, water treatment plants, ventilation areas, common rooms [4]. Housing transformation processes continued by making certain expenditures to meet the housing need in Hochbunkers used as accommodation areas. A large number of apartments were obtained, and the areas were converted into permanent residences or temporary accommodation areas as hotels in this way. Problems such as moisture holding, lighting, heating, infrastructure, and ventilation were still not been fully solved despite the transformation, and improvements were continued. The Federal Government's obligation to allocate certain funds for the preservation, maintenance, repair, and additional interventions of Hochbunkers became legal under the Article created in 1965 under the Protective Building Act adopted in 1962. Reduction of the scope of the fund and cancellation of the majority of it took place until 1992 [20]. Civil protection and maintenance programs also ended with the end of the Cold War. Thus, areas of refuge and Hochbunkers were completely out of service since there was no threat. These structures have now begun to attract attention by the people in the historical context, and spatial memory revealed a negative representation as the areas reminded the Nazi administration. This caused the areas to be abandoned and neglected by society even before the transformation of the structures came to the agenda [4]. The Hochbunker transformation was again on the agenda with the increase in the need for housing in the 1990s, and certain segments of the society reacted negatively to the transformation after the 1990s; however, some reacted positively. Some groups in society want them to be demolished, some want them to be transformed and reused, and some demand Hochbunkers to be out of service. In particular, many different opinions may arise in society and the government about the transformation of such structures. To illustrate the difference of opinion of the society with what happened in 1968, the idea of a place to commemorate the Nazi party, which is an impossible transformation request for the areas where the transformation of the bunkers was discussed again in the aforementioned period, and even the emergence of such an issue as traumatic memories occurred in most individuals in terms of collective memory, was an unacceptable attitude by the majority of the society and propaganda against it occurred [20].

4.2. CRITERIA IN HOCHBUNKER TRANSFORMATION

4.2.1. Hochbunker Assessment Phase

Most of the documents and plans of the bunker and refuge area designs, which were produced on a functional basis without aesthetic concerns during the Second World War, disappeared towards the end of the war. This made it difficult to reuse the structures with the revision process to be made in this context, due to the decrease in the resources about the purpose of producing and designing the structures [4]. As a matter of fact, only the design and functional information of the military areas of refuges and bunkers can be accessed after the building is out of service and civilized due to a lack of documents and state strategy, as mentioned in the design criteria chapter. The fact that information exists regarding the design, infrastructure, plan, and material of the building enables the making of more accurate choices in the transformation processes [61]. The bunkers are intertwined with the structures in the residential areas due to the proximity of the Hochbunkers to the residential areas and the expansion of the areas with the construction within the scope of the building need. Thus, the buildings were reused according to the environmental needs since the bunkers started to take place in the city view. In addition, new regulations can also be used as a reference to regional structures with the Hochbunkers remaining intact for a long time due to the collapse of many environmental structures during the war [4]. They should be evaluated according to their degree of importance by conducting detailed research and classifications including their historical value in making decisions such as preserving, re-functioning, or demolishing the structure and implementing the correct interventions in this context. The whole process needs to be considered and evaluated, including the Cold War not to misevaluate the Hochbunker which were built in the Nazi Administration period. It is necessary to evaluate within the framework of objectivity because inappropriate interventions may occur in the structure if decisions are made with emotional memory, and since the intervention cannot be reversed, memory and history are damaged. Opinions of different branches or project consultants related to the field should be obtained for the evaluation process. Thus, correct interventions can be made in structures that are not included in the preservation list while the list of structures to be protected can be determined more accurately. First, information about the historical process should be obtained, the plan of the building should be drawn up, and the

intervention should be decided when its historical location is determined according to the building status in the stages of preservation or transformation of the bunker. Afterward, it is determined within which framework and scales the interventions to be made will be positioned. Appropriate addition and removal operations are added to the design and material selection is made, then carefully transformed, and made ready for use again. If the building is unsound and risky, the first process is strengthening; if this is insufficient, the demolition can be decided because the building will be dangerous for the environment. In addition, not every structure may be worth protecting because of the evaluations [57].

4.2.2. Hochbunker Conversion Decisions

Building construct or transformation of existing structures takes place depending on the needs of residential areas and the emergence of functional deficiencies [87]. Transformation decision is still a difficult decision in many countries because places contain ideology, representation, identity, history, and collective memory and each decision is an intervention to society with history. There is a possibility that the decision that is considered right today will change tomorrow since the process is variable with new results [44]. It has been easy to make a transformation decision about Hochbunkers due to many different opinions and factors. Primarily, the government was unable to make a clear decision on the preservation or demolition of structures due to the high number of bunkers [61]. After the Cold War, there was frequent debate about what would happen to Hochbunkers, which would no longer be used in military functions. These discussions were made to make the right decision in the context of various views, such as whether the Hochbunker should be preserved or not, or whether it should be considered a monument or not [37]. It was decided by the authorities to protect the areas of refuge, especially Hochbunkers, but the preservation cost of these numerous areas, was not ensured and different solutions were directed after a certain period. At this point, some the Hochbunkers continued to be protected as monuments under certain rules of the state. The maintenance costs of the remaining shelters were suspended, within the scope of privatization to be reused by Federal Real Estate Agencies. It has been decided to sell the Hochbunkers. Even if privatization is carried out, the institution that took the demolition decision still needs to get permission from the state. Why are Hochbunkers bought from real estate offices? Increased building stock has enabled the expansion of residential areas

and Hochbunkers to be located at attractive points of the city. Areas are purchased due to the detection of intact bunkers that have lost their function. Moreover, the field surveys conducted on this matter suggest that the land can be purchased more easily. Due to the need for new buildings and functional deficiencies, the purchase and construction of the area were achieved at a lower cost than normal. Transforming and using the place, which is especially ready to be processed as a shell, also saves rough construction costs. Transformations of Hochbunkers with partial additions and removals indicate that it is a more advantageous decision since it increases the cost in cases such as excessive debris during the process other than a complete building demolition. Since Hochbunkers have historical importance and it is cheaper to transform them rather than constructing a new building, the transformation is preferred [4]. The important point is to investigate the whole history, representation, and identity of the structure and to determine the points to be preserved well even if radical transformations are carried out. Changes made without research lead to the loss of identity and history while also leading to a decrease in cultural values [45].

The Hochbunkers were fully given to the Federal Real Estate Agency in 2007 and left the Federal Department of Civil Protection and Disaster Relief. After the bunkers lose their military defense and shelter functions, the demilitarization process takes place. After the demilitarization process, Hochbunker can allocate to state or private institutions. In this context, its transformation or destruction was carried out by the designated institution [4]. There are many reasons for the transformation decision of Hochbunkers, the increase in rapid production and consumption in the globalizing world may be one of the reasons. The rapid construction enables the formation of a new place and place needs. However, the evaluation of possible open spaces comes to the forefront since there is not enough new area discovery in the environment after a certain period. It should not be forgotten that they still exist as an architectural area and can be revived with a new function even though the bunkers lose their function during the war [51]. The fact that the building is used does not necessitate its use at all times. It is necessary to examine the structure, environmental structures, and the connection and history with the society in deciding on transformation and reuse. Its deficiencies can be completed, and it can be opened to service, portable or other sections can be preserved and additional structures and sections can be added to the structure and adaptations can be made even if it is decided to preserve the building.

Decisions should be also examined in economic aspects. Preservation of the building is a cost, but demolition and subsequent construction of a new building also constitute separate cost. It should be noted that the structure should be evaluated consciously, and the decisions made are the choices that need to be made in the long term and that it will not be easy to change them later. Correct evaluation should be made by considering the time that the structure will exist after the transformation, and it should be taken into consideration that the developments will always continue and adaptation should be made in a way that will adapt to the conditions in this direction [87].

4.2.3. Interventions in Hochbunker

Functionality is at the forefront in the fields of military defense and areas of refuge compared to civil architecture, and adaptive systems open to transformation due to current changes need to be designed [11]. In the transformation of Hochbunkers, apart from the identity, representation, memory, cultural and historical positions, technical problems are also encountered besides theoretical issues and the solution process is challenging. The design of the bunker with the reinforced concrete shell seems different and incompatible with the city structures. There are certain problems such as wall thicknesses, lack of insulation, and openings even though changes can be made easily on an uninterrupted clean front [39]. Isolation problems may occur due to the outer wall layer and the distances between them. It is necessary to consume excess energy in the heating and heat preservation process since the insulation cannot be fully provided in the bunker. Creating openings on the façade is not a problem for functional building types that do not need natural lighting and air. In such cases, attention should be paid to the planning of ventilation and infrastructure systems. However, natural lighting and ventilation need in their transformation into living spaces such as residences. In this context, an intervention also requires on the exterior. At this point, problems with the outer wall thickness should be resolved [45]. An area of about 7 to 9 meters can be illuminated in natural lighting according to the openings in the structure with standard wall thicknesses in today's conditions. However, at Hochbunker the level of light may not fully illuminate the living area with a standard window to be applied. Accordingly, appropriate openings should be provided by determining the need according to the type of structure rather than applying normal standard openings since the outer wall thickness of the Hochbunkers is about 2

meters. In addition, the interior of the structure is removed and only the exterior wall is left as a frame and the window openings are adjusted to the exterior wall and the structure is placed in the frame in some Hochbunker transformation (Figure 4.7., 4.8.) [4].



(a)

(b)

Figure 4.7. Create an opening by removing a piece of concrete from the Hochbunker, (a) Hannover, Ricklinger Strasse and (b) Bremen Roonstrasse [4], [90].



(a)

(b)

Figure 4.8. Create an opening at Hochbunker, (a) 1987 Wilhelmshaven Hochbunker and (b) 1988 Hannaover Hochbunker [74].

Hochbunker wall thickness also provides an advantage in sound insulation despite its disadvantages. One of the reasons for the formation of openings in the outer wall and the difficult demolition processes is that the strength of the blue concrete used in the Hochbunkers increases over time and becomes durable. It is necessary to agree with expert companies and take security measures for the demolition process, which is challenging, in

this context. A costly process takes place since the strong concrete causes different tools to be used in demolition and additions in the transformation [37]. For example, one of the tools used to open the opening in the bunkers is the diamond wire saw. The timing and planning of the operations need to be calculated correctly since the tools and materials used are costly even though technology enables the development of tools that help solve the problems in construction processes today. Otherwise, financial problems may arise during transformation operations. A good plan preparation indicates the right timing and transformation. In addition, the use of materials, as well as the use of tools, is ensured at the right rate and material consumption can be prevented. The selection of experienced individuals for the procedure reduces the margin of error and provides access to good results when all these plans are made. In addition, that need to be pay attention to the environment in demolition, construction, and transformation processes. Measures and permissions have to be taken against noise that may occur during the operations performed without damaging the area. The necessary tools for water supply should be ready during the process by performing a watering process to keep the dust from the area while ensuring the safe removal of debris from the area in demolition and cutting works (Figure 4.9.) [49].

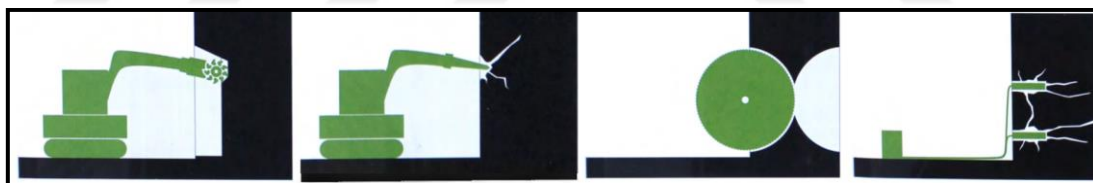


Figure 4.9. The interventions that can be made to the Hochbunkers with some machines as shown in the illustration in order; Milling, Drilling, Local removal by sawing, Blasting / Pressing, illustration at Bunker Beleben [4].

The required area for the infrastructure installation can be created and the existing floor height can be increased, if necessary, applications are made to the ground in the transformation of the Hochbunkers since the floor thickness is more than the floor thickness of today's structures (for example, today 10-15cm ground thickness is least 2 meters thick at the Hochbunker) and this affects the floor height (Figure 4.10.). The connection of the floor to the outer shell is designed and applied in such a way as to lighten and provide internal support while transmitting bomb power and to reduce the destructive effect. Accordingly, interventions should be made with caution without forgetting that

certain points on the interior wall carry the structural load even though the interior wall and ceiling arrangement is relatively independent of the shell. In addition, the elements of the structure should be evaluated separately in these intervention procedures due to the lack of type static of the Hochbunkers. Since the Hochbunker has its autonomous systems such as water, electricity, ventilation, and elevators, they can also be developed and used in transformation processes [45].

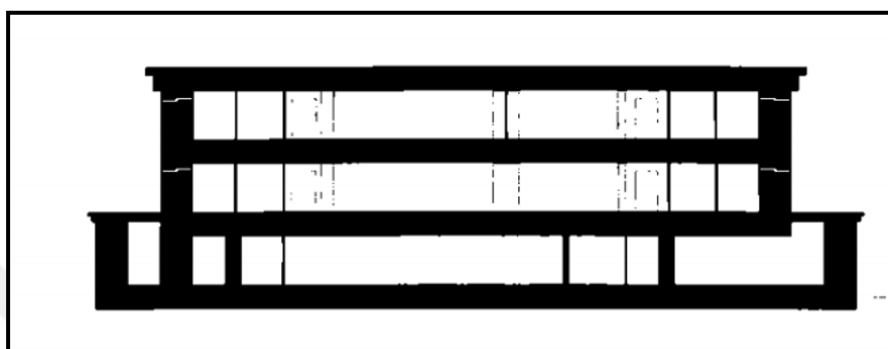


Figure 4.10. Herne Hochbunker section for show to floor thickness [4].

These transformations can be made in line with the demands of the customer during the transformation process whereas all these transformations can be made on company or individual requests [37]. Finally, there are no standard transformation rules due to the change in the plans and practices of the Hochbunkers according to the region and types, as well as the difference in the functions to be given. The title deed and all existing documents should be examined carefully by the institutions that make the structural transformation since it is in the special structure category [4].

4.2.4. Functioning in Hochbunker Transformation

Hochbunkers were built to be used in many functions such as shelter, defense, and warehouse in war. They also lose their function when the war or any possible threat ends. The structures will be out of service for a certain period for a possible threat, and then it will become clear that they will not be used in the military defense and shelter function, resulting in decommissioning, destruction, and transformation options for the areas if they are not used again their function. The building must first be civilized by decommissioning

its military function. The transformation is carried out in all types of areas of refuge regardless of surface and underground. Less space is required in the transformation of underground shelters. Transformations such as exhibition space, museum for underground areas of refuge are re-functions that require little change and cost (Figure 4.11.) [37].

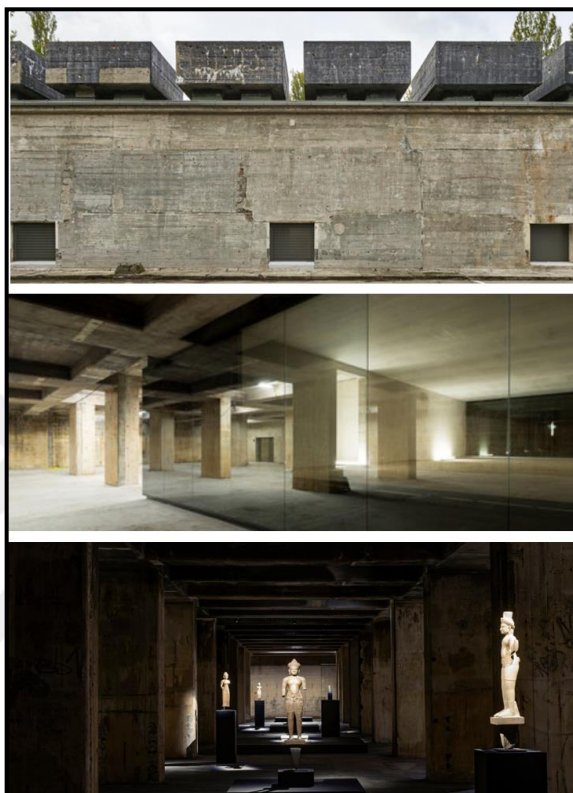


Figure 4.11. Hochbunker inner and outside photo, The Feuerle Collection¹¹, Realarchitektur, Berlin [91], [92], [93].

The positive aspect of the transformation is the re-functioning of the structure under the environmental need. The humanitarian problems that occurred after the war and the emergence of new construction needs have enabled the Hochbunkers to be re-used within the scope of emergency shelter. Permanent transformations other than the temporary use of bunkers were not preferred after the war. One of the reasons for this is that the individual's memory of the place is fresh, and the bunker keeps it alive by recalling traumatic events with the memory of war. In addition, the demolition of all those buildings during the war has created suitable construction areas for new needs, and priority has been given to

¹¹ Hochbunker built year 1943 and transform year 2012-2016 Museum [92].

building constructions in this context. However, the decrease in the areas with the increasing construction status that developed afterward has enabled the bunkers to be evaluated in terms of reuse. The reuse of the Hochbunkers was realized more easily after a certain period passed due to the areas that could be accepted by the societies [51]. 'A Reader in Uncomfortable Heritage and Dark Tourism' book gives specific parts of Heinemann, Andrea and Zieher, and Heike's work on bunkers. Accordingly, their 'Bunker Update' book referenced in the book and according to the data specified within the scope of the research, the areas of refuge built in Germany today remain intact despite taking 70 percent of certain damages. In this context, most of these structures, which are found in large numbers, can perform transformations suitable for the necessary functions within the scope of reuse if demolition is not carried out due to their proximity to urban and residential areas [37]. Hochbunkers and areas of refuge are used in many functions. Such as custody, archives, workshops, aquariums, warehouses, nightclubs, hotels, residences, commercial areas, movie theatres, restaurants, and cafés, etc [20]. Hochbunkers can be planned with their ground floor as commercial, upper floors as residential, or fully commercial. Cultural or public space can be opened to service or these structures can be transformed in special use [4]. In addition, like the Kegel Hochbunker in Berlin was converted into a climbing wall, some bunkers also additions were made, and it was opened to service. This architectural structure, where the climbing activity is carried out, has turned the war memory aside into an area to play and perform sports and the areas have become usable without the prejudice of individuals. Past traumas were overcome, and new memories were created with the transformation (Figure 4.12.) [94].



Figure 4.12. Kegel Hochbunker climbing wall in Berlin [94].

Many of the sold Hochbunkers have been converted into residences. Also, one of the most popular transformations is the functionalization of spaces as museums. The transformation and functioning of the Hochbunkers frequently took place during the process in which the structures remained dysfunctional. Transformations of Hochbunker were made to meet the needs. For example, the Hochbunker transformations made in the 1980s were the renting of spaces by artists. Bunkers were used as rehearsal rooms by sound artists, especially for reasons such as thick walls not transmitting sound from outside to inside and from inside to outside and renting at an affordable price [37]. The designed structure may not be able to perform the same function continuously, and the time elapsed and changing conditions cause changes in the function of the structure. The important condition is to maintain its usability by ensuring the continuity of the structure. There are always developments in the function-based structure and the area needs to remain up-to-date even though Hochbunkers continue to be permanent as a structure. This building was built with a military defense function, then it was transformed into an emergency shelter area to meet the shelter needs of individuals after a certain period of inactivity, and then it was functionalized both as a shelter and a military defense area in the Cold War period. These structures, which remained dysfunctional again, were re-functionalized and put into use after the decision of transformation with the end of the Cold War. Hochbunkers have been continuously circulated for approximately 50-60 years with their robust structure and been open to service in the necessary functions and the structure has been maintained and currently in use at the same time [4]. Currently, they make design and useful field transformations and studies on Hochbunkers opened to the use of research groups and artists [20]. However, not every structure is worth protecting, and it is not suitable for making a transformation decision, and the structures that set out certain criteria should be improved and put into use after transformation. There are communities opposed to transformation as well as communities in favour of transformation. The important point is that it can reveal what Hochbunker means. Accordingly, the transformation is fully and accurately achieved. Bunkers can be used by transforming them in terms of tourism since they contain history, but this can result in “dark tourism¹²”. It can also provide continuity as a representation of the ideology for certain groups in the community since it creates this dark tourism concept

¹² Dark tourism takes place through visits by the society to places containing historical events involving tragic events such as war where people lose their lives. Individuals tend to make use of the spatial memory in the place and to inform about the area emotionally and mentally even though those who go to these tourism areas do not experience historical events. The use of war shelters as museums is a frequent transformation and re-functioning to create a spatial memory that reminds of history in this context. [37].

in Hochbunkers even though the traumatic memory experienced with war is a remarkable point; in this case, it can cause political social turmoil and problems. The transformation is sensitive, and the research needs to be done carefully in connection with the environment in which the area is located since Hochbunkers have a war-related history at this point [95].

4.3. INTERVENTIONS BY HOCHBUNKERS OUT OF CONVERSION

In this section, Hochbunker is evaluated in the context of heritage and monument. In addition, reviews will be presented regarding its decommissioning and destruction. Those mentioned within the scope of heritage and monuments were evaluated within the scope of Hochbunker. Heritage and monuments are a wide range of topics that can be addressed outside of Hochbunker.

4.3.1. The Hochbunker as Heritage

Heritage consists of “the buildings, paintings, customs, etc., that are important in a culture or society because they have existed for a long time.” at the Cambridge Dictionary [96]. Preservation areas and the elements to be transferred to the future are determined accordingly whereas the values of individuals are formed as a result of positive or negative factors. History, trauma, and memories clearly expressed or not expressed by society in structures such as Hochbunkers can become a disturbing heritage for individuals. The bond between collective memory and place is as strong as the individual and the interaction between the individuals. The inheritances that disturb individuals stem from their sensitive memories. It is not possible to erase memories from collective memory as long as the transfer of representations to future generations continues. What memory and history represent and how they create value for individuals are determined by the past situation and provide continuity to the future. The existence of conflicting narratives about the place or element in which memory is represented can transform it into incompatible heritage due to different groups expressing that representation. Incompatible memories and opinions may cause problems in inheritance evaluation. The message given by incompatible heritage can be perceived differently in this context. Evaluations for the transformation may not be done correctly if there is no common memory in the evaluation made during

the transformation of structures. Traumas are memories that should not be examined one-way, and events need to be examined in many ways. In this context, the heritage can be interpreted differently if the items, which are called disturbing heritage, are considered from different perspectives instead of them being considered from a certain point of view. The emergence of non-compliance is since there are different opinions about the inheritance and taking a critical view of events may reduce the non-compliance [37]. What Hochbunkers represent as inheritance varies according to the perspectives in society and what they will represent and express with transformation causes controversy. This heritage became disturbing negative representations for society with the view that Nazi ideology would reappear with the opening of bunkers with Nazi-era structure. The fact that the Hochbunker has different representations and disagreements about transformation leads the structure towards being an incompatible inheritance. By adding more representation and identity to the Hochbunkers after transformations, the absence of a complete expression in the structure ensures that the structure is incompatible with inheritance. The issue of what kind of heritage the structure is and what it will represent with transformation is a fine line since areas from another point of view can also be transformed into a representation that enables the commemoration of those who had difficulties during the war or some ideology or can just represent what they turn of now [41]. Transformation allows disturbing memories to diminish and a fresher structure to come to the fore allowing it to be reused rather than being perceived as a disturbing heritage [37].

Since there are countless Hochbunkers, how the Hochbunker is evaluated within the legacy is briefly mentioned. In this context, it is an important distinction whether the Hochbunker will be considered as a monument or not, apart from its heritage. The individual needs to be committed to a point as their purpose of life. This connection can be points such as a historical moment, the memory of a place or an item, the sharing of common memory with society, or other individuals. Monuments and heritage structures can be traces in individual memory that provide connection in this context [38]. History and design should be preserved together with the originality of the structure in the monumentalization process. The basic elements should not be contrasted as much as possible, and the structure and its history should be shown as much as possible even though there are certain changes and adaptations to the conditions as a result of the monumentalization process after the transformation. It is not possible to monumentalize all of them even though all

Hochbunkers contain historical memory and are represented by certain groups [37], [61]. Since the end of 1970, many Hochbunkers have been evaluated due to the monumental debates, bunkers that have gained monumental status after detailed research have been started to be preserved and the maintenance cost has been covered within the scope of monument preservation laws determined by the state; bunkers that have not gained monumental status have been privatized by the Federal Real Estate Office or public institutions for transformation, and a decision has been made to demolish them if they do not meet the criteria. The financial calculation needs to be done correctly for maintenance, and the fact that the cost of maintenance of these numerous structures, is not covered, is one of the reasons for its privatization. The fact that the bunkers are in the public interest and contain historical facts is one of the factors of monumentalization. Monument evaluation is challenging, especially since all Hochbunkers contain spatial memory that includes the World War II and the Cold War. However, this monument separation is important for the transformation. Thus, the bunkers that are not included in the list within the scope of the monument can be easily intervened and transformation or destruction decisions can be made [4]. In addition, bunker structures were designed in a monumental direction as planned by Hitler. It makes sense to defend the claim for preservation in many segments in this context. The reason why the bunker is monumental is its content, memory, and history, as well as region-specific design features. Hochbunkers do not only reflect World War II and the Nazi period. These structures became a shelter for many people who were homeless after World War II and then used again in the Cold War, that is, they contain many historical memories even though such an impression was made due to their construction and design. They experienced changes for periodic interventions and reuse. It is not right to evaluate whether the structure continued after the Cold War by focusing only on the design and construction period in this context [23]. The decision made by the Hamburg Heritage Preservation Bureau in 1991 on this issue can be exemplary. The Heritage Preservation Bureau of Hamburg recognized the bunker structure as a monument and stated that it was a monument representing the terrible events experienced by war, fascism, and civilians [37]. In addition to using and protecting the building as a monument in its current state, it is also possible to transform it into a monument museum. For example, a memorial museum was established in Bremen for those forced to work and lost their lives in the war [24]. It reminds the destruction of the war by representing the structures as a symbolic indicator to remind the society of what happened as a monument,

positive or negative [4]. Society may react to what happened, they may want to demolish the structure, dismantle the monuments with anger because of all that happened (as in the Berlin Wall...), but the decision here should be made by people who can look objectively and give consent in the longer term. What happened is not a structure-related situation. However, memory is identified with the structure. Every missing structure is like pieces of a puzzle lost in the analysis of history for the future. The whole of the events is not seen when the parts cannot be put together in this context. In short, the interpretation is given as a monument, that is, the phenomenon it represents is important. In addition, the monumentalized phenomenon can also manipulate information about the past into the future. Attention should be paid to the information transmitted and the designated representation in this context. The most important public duty for the society is to convey the information and communication between periods that it carries to the future even though monuments with cultural values also create the impression that they do not have a function in use for the public interest. Monumentalization in Hochbunkers enables the individual or society to form bonds at points such as history, collective memories, and social culture, which are common grounds through the place [37].

4.3.2. Out of use Hochbunker

After the Second World War, the Hochbunkers were simply out of use without even maintenance. Afterward, it was opened to the settlement of civilians within the scope of the emergency shelter plan for a certain period, and strengthening operations were carried out and it started to be used in military function again while it continued to be used as a shelter for civilians with the Cold War. With the end of all these processes and the creation of areas for civilians to shelter, Hochbunkers were again put out of use in the 1990s. The use of bunkers was not needed initially due to the construction of a new structure and then it was not used by individuals because it reminded the traumas during the difficult times of the war. Another reason why it is out of service is that it is costly to demolish and maintain and it is one of the cheapest ways to ignore structures by being left out of maintenance [20]. Many of Hochbunkers have still become unnoticeable due to the fact that they have only been painted, their surroundings have been green, and they have become unnoticeable due to the camouflaging elements in the shadow of the structures while a certain number of them have been opened to service today in this context. The structure takes up a place in

the city even though it cannot be perceived. It has not been generally questioned that structures such as bunkers may exist in the city within the knowledge that military structures or industrial structures are generally located in residential areas and away from the city. Accordingly, with the perception that the refuge area may be far from the residential areas, the shelter areas close to the residential areas or within the city were ignored. Nevertheless, although Hochbunker and similar shelter areas have been introduced as an empty shell that is useless from the moment, they become dysfunctional, they are areas that provide protection against the possibility of adverse events and maintain this function despite all kinds of disasters [50], [61]. There are some procedures applied for the unused areas, the first one is to return the land where the shelter area is located to the original owners, and the other options are like giving the buildings for the use of local governments and putting the shelter area on sale. Other choices within the scope of what can be done for the area is destruction if there is no protocol providing state control if the land is returned to its original owners or the area of refuge is put on the market. Priority should be given to the preservation of areas while it should not be forgotten that all these structures reveal the history and social memory. In addition, it should be known that there are areas in military structures that are unknown and forgotten, involuntarily out-of-service, and it is possible to investigate and reveal these areas even though it is an option to decommission them [57].

4.3.3. Destruction of Hochbunkers

The lands formed after the destructions in the war became suitable for use. In addition to this, with the decision that damaged structures found in many fields are not suitable for use, the demolition of the buildings took place. Sometimes, a demolition decision is made after it is taken out of service even though there is no damage to the structure. Detailed research should be done when deciding on the demolition of buildings [56]. The effect of traces such as fear, pain, and violence deep in the individual's memory causes them to remove and isolate the elements reminiscent of that moment from the visible points even if the Hochbunkers, which are a disturbing heritage for some segments, are not demolished [38]. Besides the location of each of the Hochbunkers is not known, the fact that there are people who do not have detailed information and experience about the structure due to generation change, causes the buildings to be ignored and not to intervene when deciding

on demolition. Many existing Hochbunkers and areas of refuge of the period have been left empty after civilizing unless their use in military function continues or is transformed. The high number of Hochbunkers caused the state to exhibit an attitude that prevents the preservation or demolition of all areas. The structures were often abandoned and directed to different options even though periodic demolition decisions were made since it was not an easy process. The decision of destruction or transformation is left to the institutions within the scope of obtaining the necessary permissions from the state in this context whereas many other Hochbunkers within the historical scope or monuments are protected by the state. It is necessary to spend long hours with powerful explosives or tools for manual demolition to demolish a bunker. Necessary safety precautions must be taken during demolition as strong explosives and uncontrolled demolitions can damage the surrounding structures (Figure 4.13.) [4].

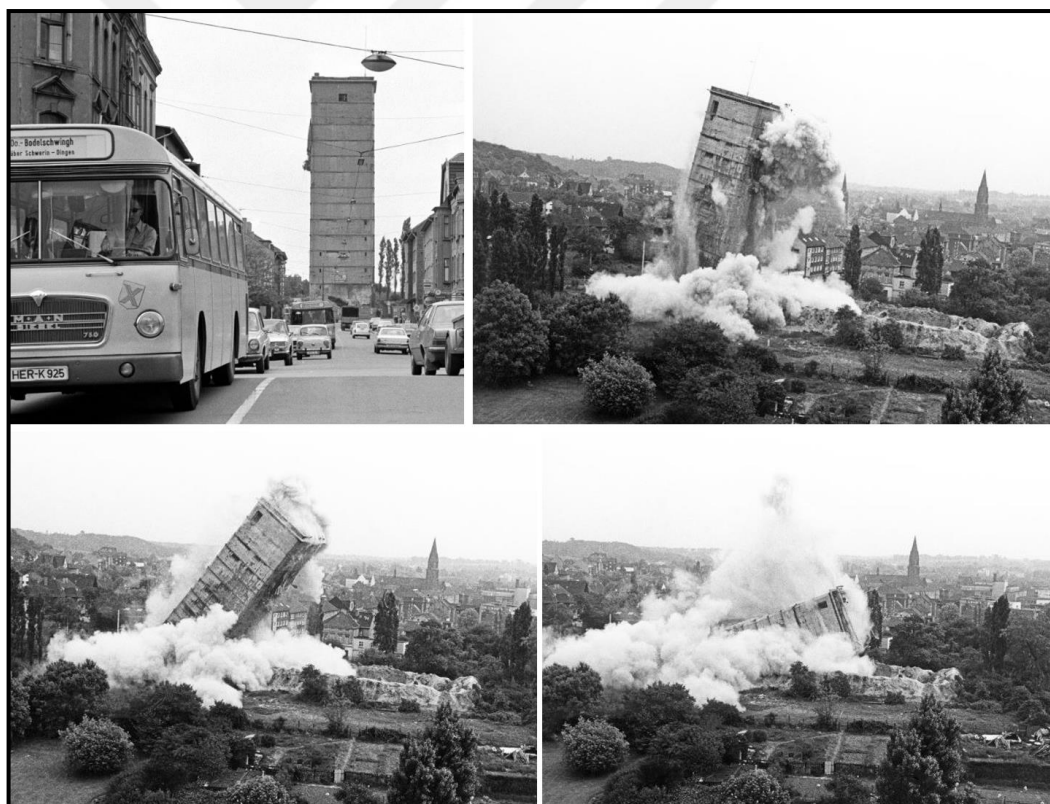


Figure 4.13. Hochbunker demolition on 1975 in Westphalia [97].

In addition, there are a large number of Hochbunkers that are too large to be demolished, and close to residential areas. Area of refuge produced in the 20th Century are resistant and

concrete structures were built against air attacks and powerful bombs. So, explosives to be detonated must be strong enough. This means that the damage to the environment will be too much. High-power bombs are costly at the same time [47]. For these unused, unsuitable, severely damaged bunkers, there is no other choice but destruction [45]. In short, the demolition decision should not be made politically or by sudden decisions as a result of the collision of negative collective memories since there is no return from this decision. Afterward, it may have been the decision made to establish the belief that the preservation of the structure would be more useful for the history or memory of the society [37]. As a matter of fact, the trace of Nazi structures was tried to be erased by the transformation made in the Hochbunkers, but the traces of the period such as the Reich Chancellery, the first large Nazi building built in Berlin, could not be erased in some symbolic structures and the structures were deliberately destroyed because Nazi representations still exist. Although there are reservations such as the re-spread of ideology and the continuity of representation, yet every intervention made is made to history [32].

4.4. THE IMPACT OF COLLECTIVE MEMORY AND SOCIETY IN THE HOCHBUNKER TRANSFORMATION

4.4.1. Collective Memory

The definition of memory is “the ability to remember information, experiences, and people” according to the Cambridge dictionary [98]. Studies on memory have been carried out for centuries and the scope of research has been developed and there has been an interest and orientation towards sub-branches of memory such as collective memory as a result of traumatic events (such as world wars, genocides, increasing crime, and city after economic crises, disruption of the social order, epidemics, etc.) in the 20th Century [99], [100]. Studies on memory are multidisciplinary and carry out studies and research integrated with many departments such as sociology, history, psychology, philosophy, and political science. Detailed studies have been carried out in the field of architecture, especially in the context of spatial memory [100]. The most important studies and definitions about collective memory were started to be made by Maurice Halbwachs, a student of Emile Durkheim, in the 1920s and Halbwachs first summarized his studies on

this subject in his book 'La Mémoire Collective' in addition to the studies of many researchers on collective memory [101]. Collective memory can be explained in terms of creating a group identity by sharing the memory of a certain community or group members based on common representations of the incident after the moments experienced in the context of the definition made by Maurice Halbwachs. The concept of collective memory is in small or large social groups and can take the form of ensuring the continuity of identity and memory after various identity formations [100]. Mainly the relationship between place and memory and the effect of collective memory after mentioning memory and collective memory will be examined under this topic. Memory is divided into two as individual and collective memory. Individual memory develops depending on the social environment and external factors, and the first point of impact is with the family, which is the smallest collective memory unit of the society even though individual memory can be stated as moments occurring in the mind of the individual as connected self, as Maurice Halbwachs stated [102]. Halbwachs predict that a single person's memory will not occur. At this point, memory is shaped according to what individuals experience depending on certain environments [class (bourgeoisie) communities, groups, traditions, religion, family, friend, business life and environment, the environment one lives in]]. The representation that one has not experienced is unlikely to revive in memory [103]. Collective memory and individual memory are intertwined and are factors dependent on someone who has something in common. Memory always belongs to the individual in the mind, but memories that one sees as personal memories have been formed as a result of certain teachings and experiences; in fact, they are always associated with external factors and social circles. The individual remembers through common communication, learning, and sharing in the environment and society in which their live; memories begin to be forgotten and lost if this stop. Therefore, the memories formed depending on the social environment are multi-layered [104]. The individuals need to learn and experience the representations of the moments that should live to create a memory. The individual cannot visualize and remember a representation without learning it. It cannot be explained what the remembered item is even if it is possible. There are no unidentified memories, but there are memories in the mind that cannot be positioned. It is necessary to reveal how the memory is positioned and with which memories it is connected at this point [103]. The positioning of the moment may be achieved by associating it with a representation or by transferring it to any element. The individual first makes some coding to make the memory a place in their mind

for memory transfer. This coding takes place in the mind with certain images. A mental image is the representation of the outside world in one's mind, and these representations are the codes that reveal the memory. The events come to mind as soon as the corresponding representations of these codes are seen [100]. Representing means re-presenting (again show something). In other words, it is necessary to create a representation, to present a phenomenon again, and to continue to present it. It allows the moment of representation to be positioned both in the mind and in the element. War structures, religious places, even houses are all elements that express identities that depend on the representations that collective memory creates in society [103]. It is not possible to keep in mind every representation and memory is determined since the mind is selective. It is necessary to remember some memories and to extract them from the mind by forgetting some for the memory to make room for new memories. It allows the formation of collective memory and identity by forgetting as much as remembering [101]. Certain memories are inevitably remembered or ignored even though remembering depends on many factors such as age and mental status. There is a possibility of abuse and manipulation of memory that cannot be remembered in detail [99]. It can be imagined and perceived as real in the mind in a memory that does not exist whereas there may be additions made by the mind to the deficiencies in memories that are not remembered [100]. Representations of certain ideological ideas were created in the political context and the memories of communities were manipulated in many periods. Political administrations try to remove society from the collective memories about the regime of its predecessor and to make the memories forgotten. The forces that try to ensure these changes, especially totalitarian regime states, want to make environmental and social changes that will affect social memory and lead to oblivion and collective amnesia. Messages given by representations can lead to manipulations and distortion of the mind; memory in this context can be included as the starting point of research, rather than as evidence about the moments experienced. It is already one of the important differences compared to history in this case [102].

The memory, chronological time, and place design need to be framed to be fully perceived and remembered. For the memory to be revealed as a whole because memory transforms, undergoes additions. The existing memory flow should be regulated according to the changes in its continuity [103]. Memory helps history as history helps memory in this

context. History is objective and evidence-based, it is also a summary, represents the whole, presents a moment by concentrating. The new results that will emerge often prevent this situation even though manipulations try to be realized on a political basis in history. From generation to generation, collective memory formation continues on a common denominator with the transfers of individuals in the community on a phenomenon that depends on certain representations of society. History cannot be changed until new evidence emerges. The individual may belong to more than one collective memory. History is a verified memory and can reveal a forgotten memory by referring to evidence and witnesses [102], [104]. Places are elements that can be evidence in witnessing history at this point. The place is the link between memory and history. The memory experienced in history occurs in a place. The presence of place keeps memory and history alive in this context [105]. Users begin to personalize the place and leave their traces thereafter starting to use the place due to its function. Individuals may encounter different traces and memories such as individual memories, collective memories, or the past they experience with the use of place. Memories and history become a concrete concept with the representations like places while they are an abstract concept [101]. The reason individuals hold on to memories or a place is that they want to feel that they belong to a place where they can reconcile the past. When to a place that one had been to years ago is revisited in memory, the positive or negative memories experienced there were remembered first, before any changes that the place has undergone examined [105]. The memories that occur after the event are unique to individuals while an event in the same place can be experienced by many people. The event is the same while the memory generated in the individual is different from that of other individuals in this context. They experience the same or similar event and can meet on a common denominator and bring themselves together in collective memory. Similarly, the event is not exactly as described in the mind of the other individual, but the memory changes when the moment of the individual is transferred to another individual. Accordingly, a situation similar to the formation of more than one memory in the same place applies to collective memory. Different collective memories may occur on a representation. Individual and societal disagreements are experienced a lot especially in places and representations where traumatic memory is present. Trauma occurs as a result of the profound effect of the emotion and memory experienced. Society and the individual do not want to remember because traumatic memory is painful; they either try to disrupt the reminder representations or ignore them in

this context [103]. Especially the events in World War II were such traumatic moments that they disabled the collective forgetting mechanism of society and individuals and many structures representing the period gained a disturbing heritage [101]. Society tried to ignore and forget these memories after a while [32].

Heritage includes the history of society and can be a tool for representing collective memory. Changes may occur in the interpretation of that heritage and the behavioural orientations of individuals depending on the heritage since different representations and social memories may occur on the heritage. It is important in this context that the representation of heritage is accurate because memory is selective and the representation desired to be expressed can be transferred and used in different directions [37]. Accordingly, monumentalization of memory may become a ritual, cause destructive effects, or undergo transformation by memorizing memories like structures. The relationship between monuments and memories is based on place. The creation of monuments and the realization of ceremonies are carried out to ensure memory continuity by remembering the representations and to preserve cultural and historical memory by society and states to create identity losses prevent [102]. Collective memories are important because of the common denominator that shows the views and stances of specific segments of society. There is a reminder code quality in monuments. However, it should not be forgotten that reliance on the monument and making memories with ceremonies once a year can lead to cultural and collective amnesia; monuments that are points of intergenerational transmission and communication should not be ignored in daily life until the day comes when they will be remembered [99]. Particular heritage objects or structures can provide a stimulating function for memory. However, over time, some of these heritages' continuity may not be ensured. Destruction is necessary in order to make room for new moments in memory and to create new representations and identities. Otherwise, the mind cannot perform its task of selectivity and loses its distinction. That will be attention should be paid to the destruction to be made. Representations and identities may mean that individuals become alienated from their environment because of the disappearance of every destroyed element or phenomenon. Accordingly, memory and history are also damaged [104], [105], [106]. The main purpose is to ensure the continuity of the memory of the important points for society and the individual even though demolitions occur. The basis of continuity in memory is common memory, the values of

society, information, the bonds of individuals, and the effects of experience in this context. To ensure the continuity of memory, these foundations need to be repeated so that they do not disappear and continue to exist [104]. Transformation in every sense ensures the continuity of the representations existing for the individual and society while it allows the formation of new representations, identities, and memories at this point. The scope of collective memory explained here will explain the effect and reaction of collective memory to transformation by exemplifying it through Hochbunker in the next section.

4.4.2. Spatial Relationship of Collective Memory and the Effects on Hochbunkers

A relationship between place and memory occurs from the moment individuals start to live in a place. Accordingly, there is a diversification of experiences and social environment and identities and representations after individuals start to live in the place even though the identity is assigned to the structure according to the function by designing and implementing the structure [95]. One of the sources of this diversity is collective memories that occur in places. A place may represent more than one collective memory. Hochbunkers can express more than one representation to individuals in society even though they are areas that express strong representations in many contexts such as Nazi administration, traumatic memory experienced in the individual, or forced labor. Individuals can remember what is happening in the fields and also react to ideology in this context. This may lead to individuals not looking objectively at the decision of transformation, destruction, decommissioning, or radical transformation demands that will harm history or collective memory [4], [87], [95]. Accordingly, the effect of representations on the respective transformation needs to be considered objectively. The past that has not been seen or ignored before can be revealed, or if not considered objectively, the existing traumatic past and the actual history can be eliminated in this way, with transformation. New orders are created with changes depending on the current needs of the society, but their existing past should not be hindered. In addition, memory can be variable. Although the effect of community memory should be looked at in the transformation since memory can be manipulated, the impact of community memory should be examined within the scope of research by paying attention to such situations during the decision stage of the transformation processes. The individual's memory may not be able to remember everything, and it tends to ignore traumatic points [37]. There are

still groups that do not favour the opening of the structure, including transformation, due to the disturbing heritage of bunkers by society even though most Hochbunkers have lost their military function [94]. Areas of refuge psychologically remind individuals of the struggle to live as well as death. It is one of the rare architectural areas where two opposite emotions occur. It also contains memory that disturbs those who do not want to remember what happened due to the fact that they have memory places that reveal the experiences of war. The transformation is done depending on the memory to erase or not to remind the war scars since Hochbunkers are also in the residential areas in this context [39]. Transformations such as museums directly reflect the history of the war period and the fact that the fields contain elements that reflect memories enables individuals to experience their memories in the place [37]. By establishing a bond between the individual and the object in the space, memory transfers based on representation can be realized. Although the historical event has not been experienced in person, the interaction of space, object and individual provides memory transfer. Similar bonds exist between place and the individual. The transformation of the Hochbunkers as a museum and its positioning as a reminder centre both prevents the destruction of memory and maintains spatial memory and reveals the order of events in social memory by combining historical pieces [38]. Some sections argued for the necessity of the demolition with the view that the buildings carry and will sustain the Nazi ideology due to their construction during the Nazi period even though transformation means the continuity of the structure by preserving it in a way because all bunkers have war history and collective memory. However, the opinion of another group also argued that the buildings reflect the period and that they should be protected since they bear witness to history and that the memory of place and the memory of society are integrated except for the ideological aspect of the structures [23]. Areas of refuge are also represented as areas where they remember that they love their individuals. It is visited by the relatives of the people who died during the construction and attack and reflects spatial memory experiences and collective memory. In addition, the generation change allows individuals who do not witness the events to change their views on the Hochbunkers to respond positively to the transformations and not to approach the structure with prejudice as much as those who experience the events, even if they have historical information. The fact that individuals disconnect from the place and avoid using the place again depends on the fact that the forced conditions are not wanted to be remembered again as a result of the strong traumatic memories of the society due to the spatial memory in the Hochbunkers. It

should not be forgotten that views may change with the transformation even though this situation needs to be comprehended [37]. It was suggested in the 1970s by some art school students, academics, and artists in Wilhelmshaven that the facades of the bunker be painted because the reuse of disturbing heritage can change the ideas in society. The aim is to erase the memory of war, trauma, and its representation from memory and to reveal the historical position of the structure, and to try to eliminate the hatred of the society for representation. Bunker painting was applied without any discussion and this artistic endeavour was politically used and therefore caused protests even though it was intended to achieve the desired results, in some cities [20]. Hochbunkers become visual representations that remind the event and transformation also causes disagreements and reactions in transformation decisions due to the loading of symbolic expressions to the structure in this context since Hochbunkers are carriers of collective memories. Hochbunkers, the memories they contain, must be revealed. Even if it contains a disturbing memory, the representation must persist, revealing how the disturbing traumatic events occurred and what caused them. Even though the heritages disturb society's memories, the historical incident must be exhibited in detail and accurately [37]. It is necessary to consider trauma in two ways. What happens in war always covers traumatic events. There are casualties in both groups participating in the war. These traumatic moments create loss-related traumas for those who lose the war whereas they turn into heroism for the society that wins the war. Therefore, an area representing a trauma for a segment can express the opposite emotion and representation for another segment [103]. The bond between the individual and history cannot be broken, and the strength of the bond between place, memory, and the individual cannot be ignored. The transformation has often been easier to opt-out of the structure and tries to ignore the past since the events do not want to be remembered by the society and sometimes are not preferred for political reasons since transformation has brought history back to the agenda. However, ignoring history by decommissioning the structure should be prevented with transformations, and cultural memories should be supported by keeping collective memories up-to-date and reminding them [37].

As a result, the society may not want the destruction of the places they are accustomed to seeing in the environment within the scope of the settlement or living space, or the loss of the old, current state by changing with transformation. In addition, the use of areas where traumatic moments containing disturbing memories are experienced with transformation

creates the idea that memories will be revived. Even though the field has undergone a transformation and has a different shape, the old representation will continue in the continuity of the structure and may remind similar feelings and memories. In this context, transformation may not be desired. However, it is also important to ensure the continuity of the places for memory and history transfers to take place. Not all structures are transformed but all place like this contain memory and history [105]. Likewise, selections are made according to the criteria of the bunkers that will be transformed or considered as heritage even though Hochbunkers have strong history and memories. The demolition process is performed on bunkers that do not meet any criteria and whose existence does not make sense beyond the shell. Architects identify specific axes, areas, and frameworks when designing places or making changes to specific existing places. They interfere with certain limits. Therefore, the architect needs to consider adaptation to the environment outside the specified limit in these changes. Place change is not limited only to individuals who will be limited to the place or who will live in the place in this context [99]. It is important to make changes that ensure continuity in the long term in this age of rapid consumption. Otherwise, the area in consumption remains dysfunctional, and rapid identity production is tried to be provided [107]. In concluding this section, a part of Leland M. Roth's explanation of the transformation and memory in *Understanding Architecture* briefly included;

On a deep psychological level, our architecture is our built memory; it is a legacy, both the acclaimed architecture and the anonymous building. When we remove any element, we erase part of that memory, performing an incremental cultural lobotomy. In every period of human history, new buildings to accommodate prevailing needs replaced what had been built before [87].

It should not be forgotten that one also intervenes in the existing memories in the field and makes choices at this point while opening up space for new memories by meeting the need for a new building, whether with demolition, a new construction, or a transformation method [87].

4.5. PROJECTS ON HOCHBUNKERS

Under the title 'Projects on Hochbunker', studies and projects on various Hochbunker and bunker transformations were included. There is a striking history as well as war

representation, collective memory, and spatial memory in attracting attention by researching or transforming the Hochbunkers. The Hochbunkers and areas of refuge have been evaluated in terms of their reuse by architects, artists, researchers, and academics in recent years. Today, a multidisciplinary study is being conducted in addition to increasing interdisciplinary interest in the transformation of such structures [61], [51].

The most well-known of these studies is Paul Virilio's studies on bunkers, especially the Atlantic Wall, in the early 1960s. It is surprising that a study similar to Virilio's attentive study had not yet been done or had not been internationally influential though done. This study was the starting point for other studies. This and similar works constitute a resource for finding shelters, documenting them, and reopening them [57], [108]. A similar study was conducted by historian Michael Foedrowitz to present the research on the history of Hochbunkers and areas of refuge in Germany within the scope of bunker history in the form of a book first [4]. Graffiti, visual or certain painting operations were carried out on Hochbunkers in the late 1970s. This process is called “Kunst-am-Bau”, the art program on the structure. Images with two different tendencies were made on the grey, unprocessed, and flat facades. The visual construction process was to ensure that the surface of the shelter was painted in the form of a specific subject, event, or advertisement or to ensure that the surface of the shelter was hidden between the buildings following the surrounding structures (Figure 4.14.) [4], [37].



Figure 4.14. Hochbunker Painting [109], [110].

One of the transformation projects is Konjic's tunnel nuclear bunker built for a possible nuclear attack during the Cold War in Yugoslavia. This area of refuge was made ‘D-O

ARK Project Biennial' in 2011. Biennial took place in the 'NO NETWORK' theme. Inter-design communication can be provided, and one can chat via the network established by the design in an isolated area despite the difficulty of areas of refuge to connect with any communication technology. An adaptive design and communication platform were established with this Biennial (Figure 4.15.) [94].

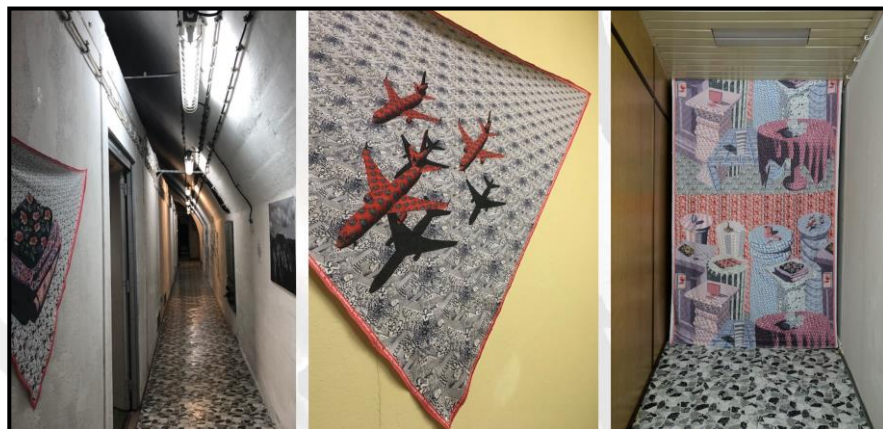


Figure 4.15. 'D-O ARK Project Biennial' [111].

Strong bunkers with traces of the Atlantic Wall are still located on the coasts of European countries. On the other hand, these bunkers, which remained intact not only in Germany but also in some countries, were transformed and put into use with many different functions [37]. For example, bunkers built within the scope of the Atlantic Wall in Norway have also transformed; they have been re-used with functions such as barns, vegetable warehouses, tool and vehicle warehouses, and playhouses [44]. Bunker 599, which was built within the scope of the Atlantic Wall border and had monumental status in the Netherlands in 1949, was divided into two in 2010 and a road was built into it, allowing the passage inside the building and its usable limited area transformation process was carried out by Atelier Lyon, RAAAF. A path with wooden piles and roads as well as stairs towards the dock where the natural water reserve is located has been established within the boundaries of the bunker located in a visible area and a limited area for use has been arranged inside the bunker. Ronald Rietveld of the RAAAF said about the project: "Our aim in the project was to question monument-related policies by making this intervention" [112], [113], [114]. This bunker is within the scope of bunkers built during the Atlantic Wall Nazi Period. There have been many people who visited the bunker to experience that

feeling because the areas in the context of dark tourism with tourism-intended transformation are found interesting by some individuals even though this bunker is within the scope of the disturbing heritage that the people try to ignore [37]. It is the continuation of its military areas with an arrangement that allows experiencing both the present and the history with its transformation and certain constants within the scope of dark tourism. Most bunkers are built-in landscapes overlooking nature in remote areas or on coastal sides, but the areas purchased by martial arts and historic enthusiasts are opened to service with the transformations to be made. Dark tourism is the fact that the areas are visited and opened to service because they remind of the war and the traumatic moments are interesting [61].

The Humboldthain Flak Tower, which was built in the Second World War, was to be demolished like the Zoo Tower in the nearby settlement. However, the demolition of Humboldthain Flak Tower was abandoned. Since the Humboldthain Flak Tower is located in the park where the arrangement will be made, it has participated in the renovation process of the park. The park area together with the Hochbunker was renovated as a monumental garden by Landscape Architect Gustav Meyer. Hills were formed from the Humboldthain Flak Tower observation tower and the collapsed section integrated into the park (Figure 4.16.) [115].

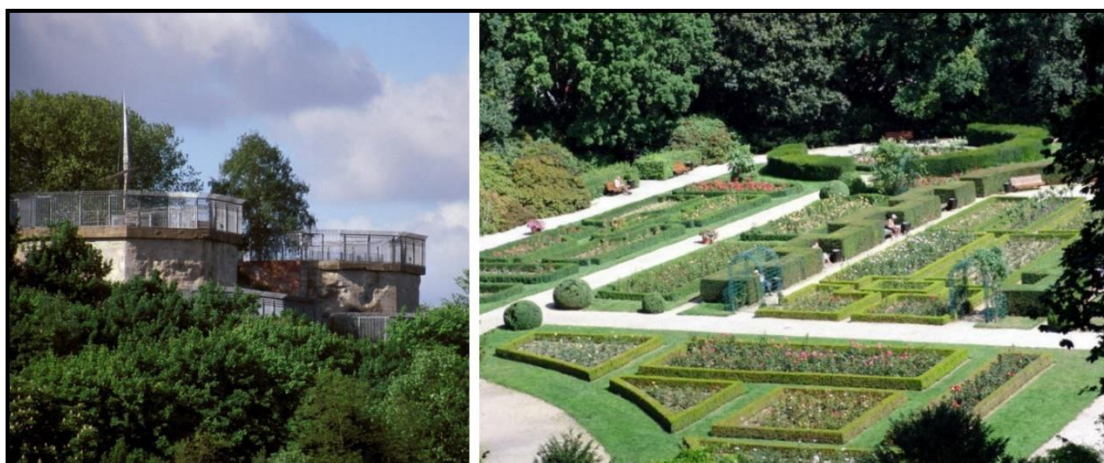


Figure 4.16. Volkspark Humboldthain, by Landscape Architect Gustav Meyer [116], [117].

Finally, Hochbunker transformations also vary according to the region and bunker sizes according to the needs of the society. The changes according to the region can be listed as follows: those close to the shelter areas were generally transformed into warehouses;

Hochbunker transformed those close to the grazing areas, and agricultural area of the animals into shelters and agricultural warehouses; those in tourist areas were renovated and transformed into cafés, bars, restaurants and open to service. In addition, some are used as pension hotel rooms in living areas where there is a landscape. Another purpose of these transformations is to carry out studies aimed at forgetting the fears and political memories that impact society and individuals. The people tried to revive the bunkers that could not be demolished with colouring and graffiti. Re-functioned bunkers have a new function to improve the areas where they have been transformed. Bunkers met the needs of the local people and met the needs of passengers and tourists in the transformation for the benefit of society. In addition, these transformations add value in terms of culture and tourism. Hochbunkers have been a positive step because of the attraction of the attention of the people of different countries and the fact that the transformations have a stimulating effect on tourism while people who are not close to transformation are trying to obtain income due to economic crises. However, it should be noted that there may be negative aspects as well as positive tourism effects.

4.6. CONCLUSION OF THE CHAPTER

As a result, Hochbunkers have been out of service many times, re-functioning needs have emerged, accordingly, transformation operations have taken place or they have been demolished to use the areas following the needs. The important thing here is that if a demolition decision is to be made first, it is necessary to make an informed evaluation of why. Technical problems need to be solved by researching by experts if transformation is the case. The financial dimension of the work should be adjusted correctly whether a demolition or transformation decision is made. However, it is a more appropriate way to maintain and revive the structure for the construction history even though the fact that it is out of service seems financially appropriate compared to all these. However, there is no possibility that every structure will be transformed. It should not be forgotten that Hochbunkers have important historical values and contain collective memories as cultural heritage. In this context re-functioning should not be commercialized solely based on dark tourism and consumption. Designs should also be considered with aesthetic concerns, and attention should be paid to long-term use, not to continuous consumption. Many transformations have been made in Hochbunkers depending on the need, some of which

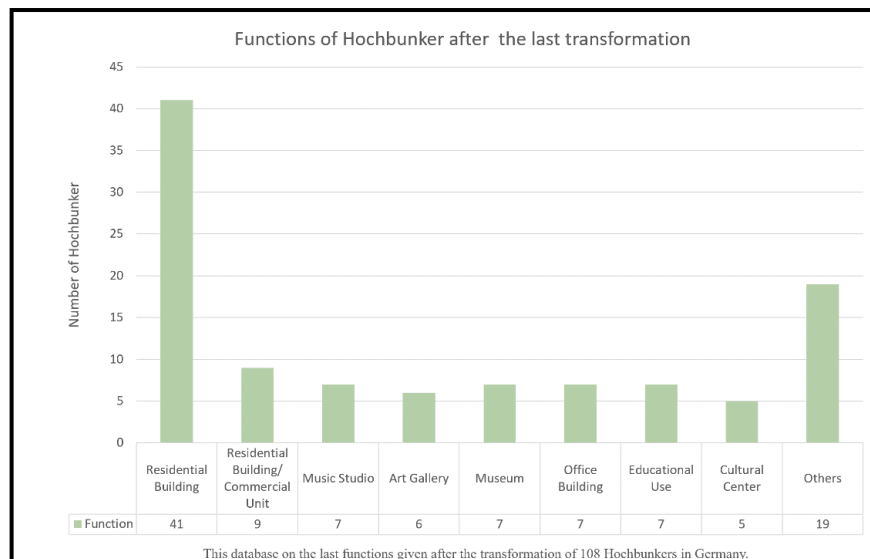
are monuments, military museums, commercial areas, hotels and restaurants, cafés, places containing cultural and tourism activities, art centres, and workshops by artists. The important thing is to ensure the permanence of the areas that are sources of community memory and history by deciding to transform them with permanent or temporary solutions. The history of the building belongs to the whole society. It is not possible for everyone who thinks differently to have a similar opinion on this issue when a certain segment of society is disturbed. All that needs to be done is to be able to consider things objectively.



5. TRANSFORMATION PROJECTS AT HOCHBUNKERS IN GERMANY

Until this section, the historical process of the design and construction of the Hochbunker, the design criteria, typology, and basic lines of the transformation have been specified supporting by the references from the literature. Eight projects were selected and analyzed within the scope of the criteria determined in this section. During the project selection process, first, the Hochbunkers transformed in Germany were researched and the criteria were explained. After the research, 108 Hochbunkers were found to be transformed in Germany. A total of 108 transformed Hochbunkers were included in Table A.1 in Appendix A. A.1. The new function part in the table contains the function of the structure selected as Hochbunker in the last transformation. (Hochbunkers may have undergone multiple changes during their existence and included various functions over time.) In addition, the conversion years include the last transformation year of the Hochbunker. Accordingly, all of the projects examined in this section show the function of the Hochbunkers after the last transformation. The project selection was performed considering these 108 transformed Hochbunkers. The next step in the project selection was to group the 108 projects in the same group after the transformation, with those with similar functions.

Table 5.1. Graphical representation of those with similar functions in the same group according to the last functions of 108 projects, prepared by author based on data presented in Appendix A.



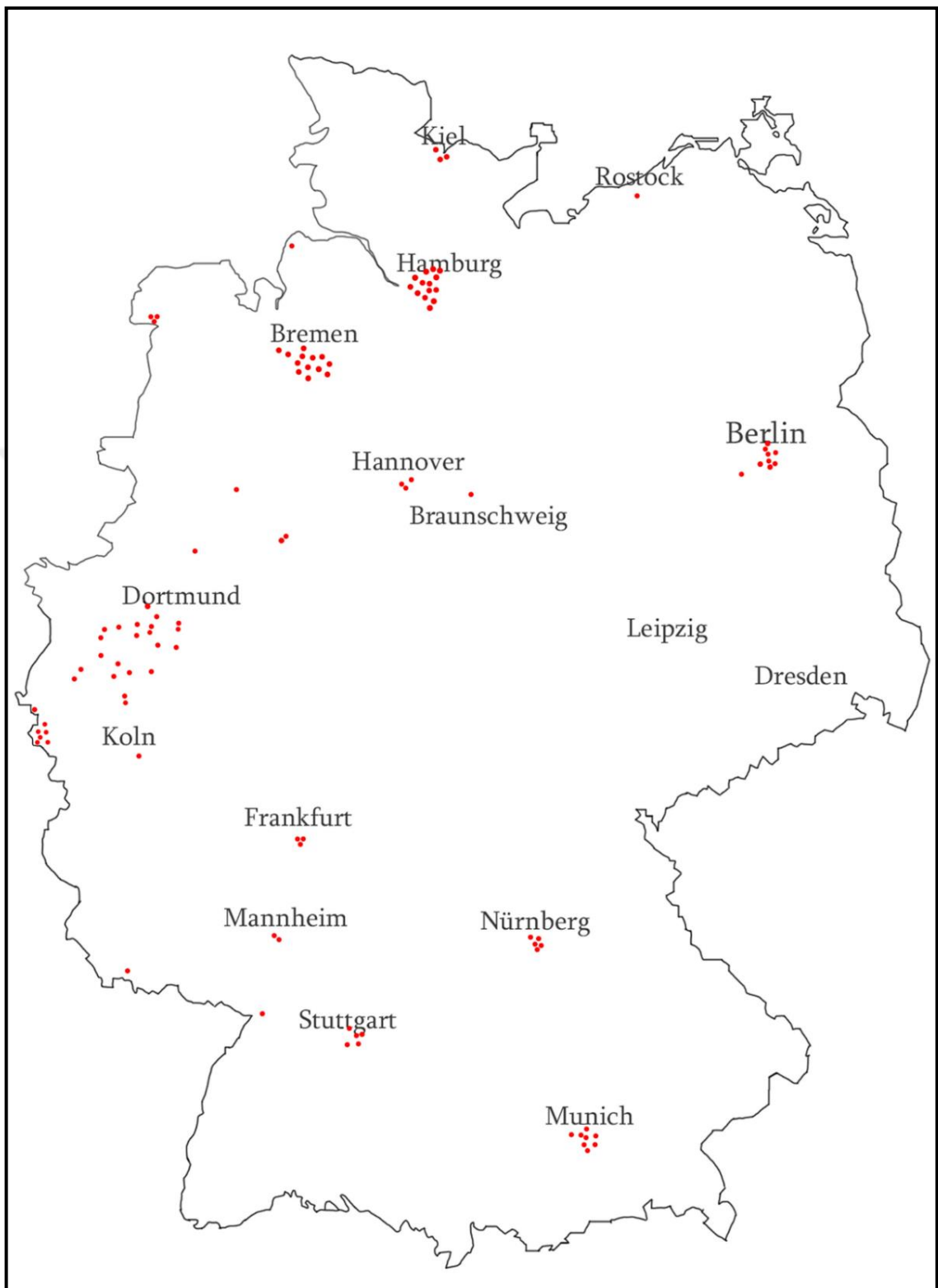
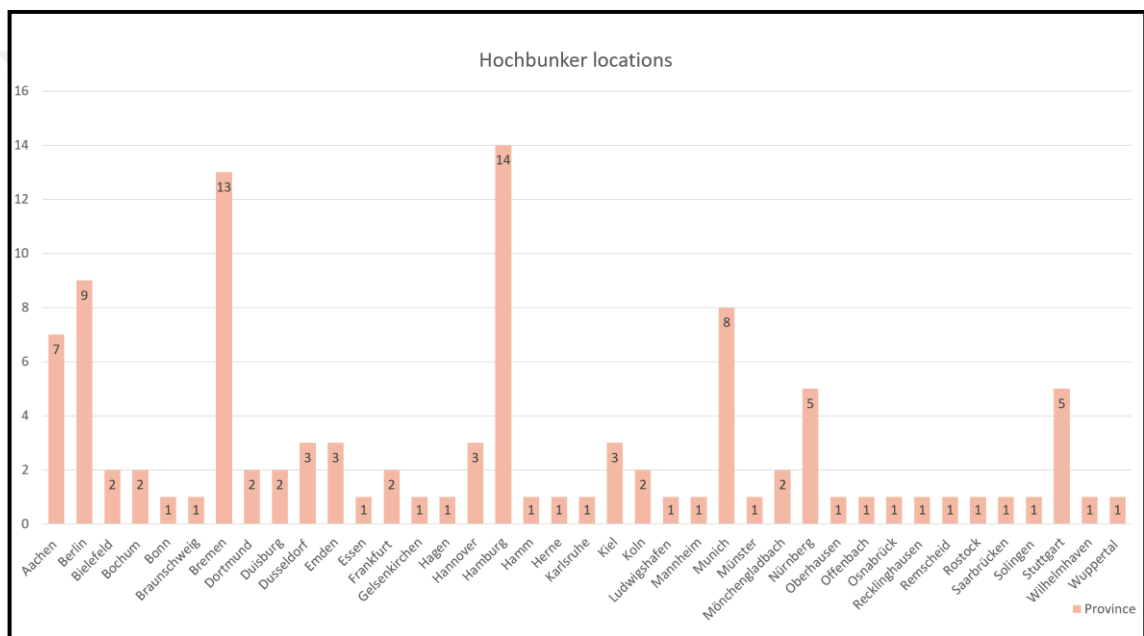


Figure 5.1. Locations of 108 projects on the map, prepared by author based on data presented in Appendix A.

This map contains 108 Hochbunker project's location according to Table A.1 in Appendix A. A.1. Each project shows a red dot, and each point represents a project. Considering the map, it can be observed that there are more defensive structures in strategically important locations. However, there is a plan for the areas where the Hochbunkers were built according to their regional internal order; considering the scope of 108 projects, a more spread, dispersed distribution is observed rather than a linear order. (Figure 5.1.)

Table 5.2. Cities where Hochbunker transformation took place, according to 108 projects reviewed, prepared by author based on data presented in Appendix A.



Among the 108 projects examined, the top three cities where the transformation took place the most were Hamburg, Bremen, and Berlin, respectively. Considering the historical process, Hamburg and Berlin are the cities where the Hochbunker were first constructed. In addition, due to frequent attacks on these cities, many Hochbunkers were built within the scope of military strategic.

Eight of the transformation projects with different functions were selected by paying attention to the grouping in Table 5.1. The project selection has been chosen to be limited to 8 functions depending on these 8 different types. When the 108 projects were examined, the function given in the transformation was Residential Buildings. Accordingly, a housing project and a mass housing project were selected. Subsequently, the selected projects were

office building, archive, art galleries, power plant, cultural centres, and hotels. In all selected projects, attention has been paid to the selection of projects that have visible changes, additions, or deletions in the structure, and can demonstrate the transformation in the most appropriate way. Moreover, in the selection of 8 projects, priority was given to the projects that could easily access the sources and get detailed information about them.

5.1. PALLASEUM, JÜRGEN SAWADE, BERLIN, GERMANY (1974-1977)

The Pallaseum was built on the Pallasstraße street of Schöneberg in Berlin's Tempelhof-Schöneberg, Germany. This housing estate, also known as Sozialpalast, was designed by Jürgen Sawade, Dieter Frowein, Dietmar Grötzebach, and Günter Plessow, and the southern part of the building was built as Sportpalast Hochbunker with a capacity of over the 4,800-persons capacity, this structure was built using Soviet forced laborers between 1943-1945 (Figure 5.3.) [118].

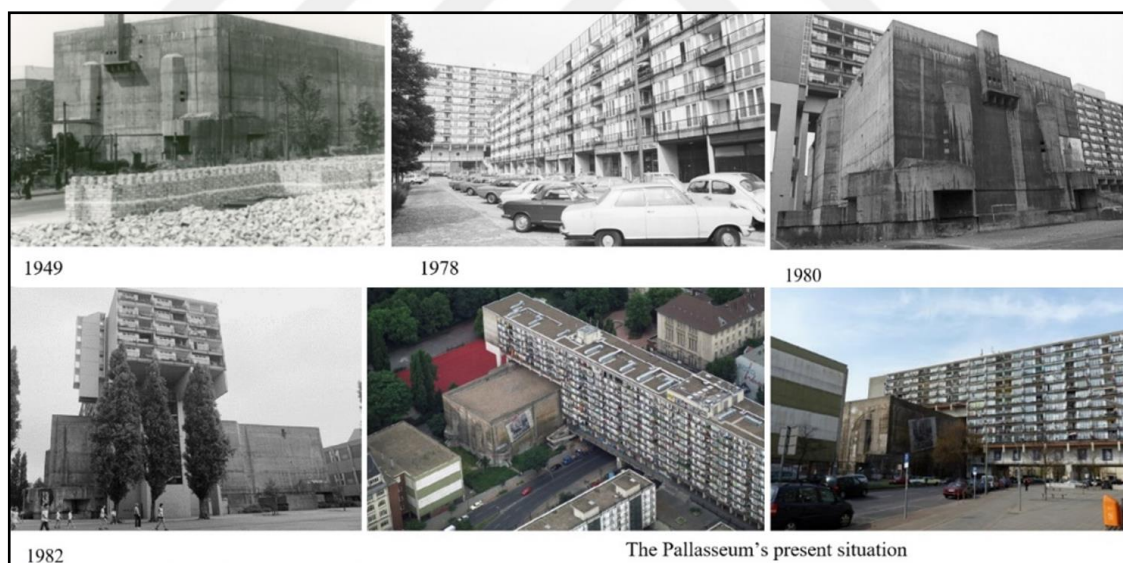


Figure 5.2. Transformation stages by years of the Pallaseum, 1949 [119], 1978 and 1980 Photo by Jürgen Hensche [120], [121], 1982 Photo by Peter Hebler, Present Situation [122].



(a)

(b)

Figure 5.3. (a) Map of location at the Pallasseum Hochbunker [119]. (b) Photo of Pallasseum building area, by Robert Grahn [123].

The Sportpalast Hochbunker is one of the types of shelters with 400 similar Reichspost telephone exchange systems located in Berlin. Although it could not be used during the Second World War, most of the Hochbunkers were demilitarized as a result of the agreement of the local municipalities with the allied Forces. In this context, the Sportpalast Hochbunker was opened for civilian use and used as a storage area for emergency items. If the demilitarized Hochbunkers were suitable for military use during the Cold War, they were evaluated for reuse for this purpose. In this context, the Allies used the interior of the venue as a food preparation warehouse [118], [124]. While the American soldiers wanted to demolish the bunker after the war, the presence of a large number of civilian buildings in the area prevented the destruction of the building using explosives. Since other demolition works were costly, it was deemed appropriate to leave the Hochbunker not operational for a period (Figure 5.4.) [119].

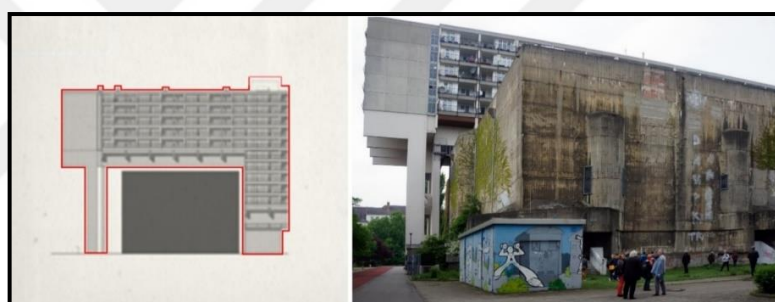


(a)

(b)

Figure 5.4. (a) Photo for Pallasseum building placed on Hochbunker. (b) Photo of mass housing [118], [125].

With the increase in the need for new housing in the 1970s, field research was started, Berlin Sports Palace, which was within the scope of the area where Pallasseum is located, was demolished on November 13, 1973, and the place was used for housing construction in the area. Accordingly, a solution has been made by continuing the design of the mass housing on the Hochbunker to make an adequate housing design (Figure 5.5.) [124]. The building, which was built entirely in reinforced concrete between 1974 and 1977, was designed with twelve floors with a height of 39-meter, and 514 apartments. Considering about four people lived in each house in the apartment block, about 2,000 people lived in the area as well as a series of small buildings and courtyards connected with the area and the structure. Pallasseum is similar to Le Corbusier's utopian 'city within a building' mentality with its systematic and functional structure, while there are less-storey residences in the area (Figure 5.2, 5.6.) [118], [126].



(a)

(b)

Figure 5.5. (a) Section of Pallasseum Hochbunker [127]. (b) Intersection of the structure on the Hochbunker [128].

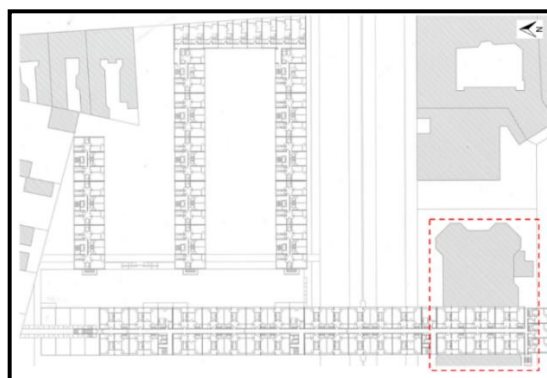


Figure 5.6. Pallasseum Floor Plan sample, the top view of the Hochbunker is in a red frame. [129].

Between 1974 and 1977, the building became the target of vandalism after it was converted into a collective dwelling, and inter-individual problems began to occur in the area. Although the destruction of the building was considered primarily by the local administration in the settlement area, it was decided to improve the common areas between 1986 and 1989 by redesigning the area such as house entrances, additional areas such as parks and cafes, and it was tried to improve the quality of life. After this renovation, the building was renamed Sozialpalast Pallasseum [118], [130].



Figure 5.7. Pallasseum and Gert and Daniel Neuhaus paint work, photo by Thilo Rückers [131], [132].

It was organized and opened in 2002 as a memorial place for forced laborers employed in a certain part of the Hochbunker and their families. In addition, exhibitions were held in the field. The Hochbunker was evacuated in 2010, and the building has been preserved as a historical building since 2011 [118], [119]. Since 2017, the whole complex has been preserved as a monument. Residential use continues. In the same year, the painting of the "walls have eyes" on the bridge of the housing estate by Gert and Daniel Neuhaus, the painters of the Berlin Wall, was an issue that brought the building back to the agenda (Figure 5.7.) [124].

5.2. HOCHBUNKER, LUCZAK ARCHITECTS, COLOGNE, GERMANY (2004)

Hochbunkers demolishing was costly or difficult due to their proximity to residential areas. In this context, the most appropriate decision was often ensuring the transformation of these structures. The Hochbunker, which was built in 1942 for the workers of the railway repair shop and their families, on the Werkstattstraße in the Nippes area, at Cologne,

Germany, was transformed (Figure 5.8.). The building, which was not used after the end of the Second World War, became a living space for refugees for a certain period. Until the 1960s, Hochbunker stood unused in the inner courtyard of a new residential block of flats (Figure 5.9.) [133], [134].



(a)

(b)

Figure 5.8. (a) Map of the location at Hochbunker and (b) top view of the Hochbunker [134], [135].



Figure 5.9. Photo of the Hochbunker before transformation, photo by M. Wenke [135].

Hochbunker purchased in 2002 was transformed into a new living space. Luczak Architects' concept design was accepted, and modifications were made in the Hochbunker, and a project was done to place the houses in these openings breaking the monolithic

appearance of the building. In addition, the architectural office obtained the necessary permits and, depending on the conversion process, added a new building in width, which is compatible with the structure in the residential area adjacent to the Hochbunker. No matter how harmonious the design is, the details of the facade, window, and roof shape different from the buildings in the area have been tried to be made. One of the most interesting details is that the roof is in the form of a barrel (Figure 5.10., 5.11.) [128], [136].



Figure 5.10. Rooftop of Hochbunker before transformation, photo by M. Wenke [135].



Figure 5.11. Rooftop after transformation at Hochbunker, photo by Constantin Meyer [137].

This Hochbunker in Cologne is not preserved. In this context, the design changes related to housing could be made more flexible. The Hochbunker has a height of 7.5 meters, length of 45 meters, and width of 15 meters. While the wall thickness is between 1.10 and 1.80 meters and the ceiling thickness is 1.40 meters. In the transformation process, areas that could be intervened except the ceiling and walls, which serve as bearers, have been

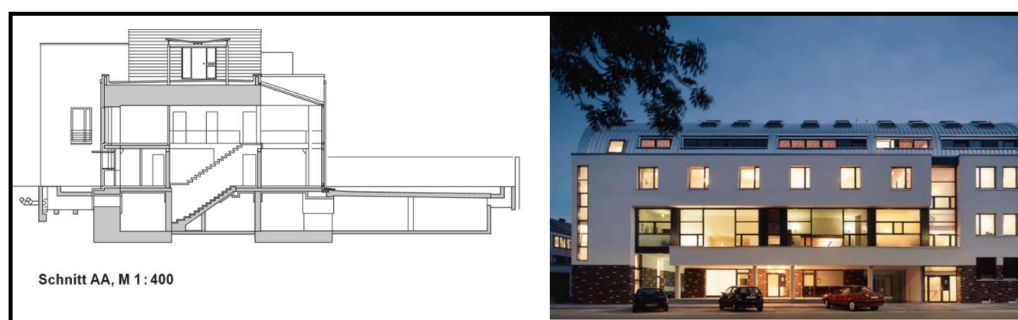
determined. A diamond saw was used to create 12 openings measuring 40 cubic meters for the new residence [133]. The process of constructing new openings to the bunkers using machines was costly, particularly, constructing large openings caused a reasonable cost even diamond saw was used (Figure 5. 12.) [138].



Figure 5.12. The left photo at the top shows the openings at construction. The right photo of the top is a cross-section. Photo of under side show the after look to transformation at the Hochbunker, by Thomas Luczak and Constantin Meyer [137].



Figure 5.13. Plan and section of Hochbunker after transformation [135].



(a)

(b)

Figure 5.14. (a) Section of Hochbunker and (b) facade of Hochbunker [135], [136].

While arranging the new area, 5,000 tons of concrete was removed from the area. Steel supports were built for the house, and new areas were built and connections were provided. A total of 2,085 square meters of usable space were created throughout the building and 17 flats with an area ranging between 71 and 234 square meters were created. In addition, an indoor parking area was built under the residence [133]. Each flat in the Hochbunker is a two-storey building with a depth of 14 meters, with a penthouse with gallery spaces and underground car parks. Openings have been constructed on the roofs so that they could receive sunlight from the gallery spaces. These ceiling openings were created to provide access to a dwelling depth of approximately 12-14 meters. In addition to gardens on the western side of the building, next to it, the building, has common usage areas, has gardens and wide terrace openings in connection with the interior spaces (Figure 5.13., 5.14., 5.15.) [134], [138], [139].



Figure 5.15. Interior of Hochbunker before transformation, photo by M. Wenke [135].



Figure 5.16. Construction of Hochbunker between 2002-2003, photo by M. Wenke [135].

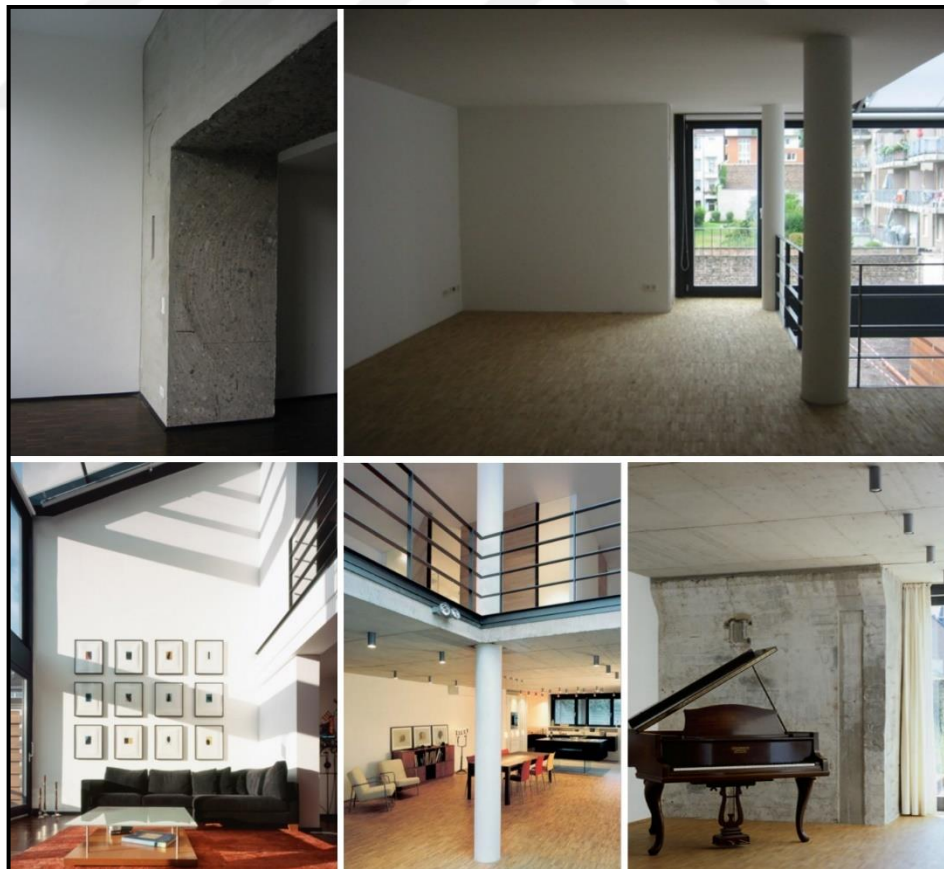


Figure 5.17. Sample interior layout after transformation, concrete walls at the old building, gallery space, photo by Thomas Luczak and Constantin Meyer [137], [140].

In the study titled ‘Spürbare Schwere Umbau eines Bunkers in Köln’ on housing transformation, Christoph, a user of Hochbunker, stated his opinions on building insulation. He stated that the internal temperature of the building was lowered by natural ventilation during summer, and the ambient temperature rises rapidly when the openings were closed, and the heat insulation in the building was not easy due to the thick massive concrete [136]. In the interior, oak flooring, concrete look, and wood are used on the walls, and the kitchens and bathrooms are covered with tiles [134]. Particular attention has been paid to achieve a comfortable and preferable design after the transformation of the building. It was desired to draw attention to the design without being trusted to the history of the building. Since the history of the Hochbunker was based on traumatic war memory, it was not easy to adopt and use such structures for certain segments of society (Figure 5.16., 5.17., 5.18.) [136].

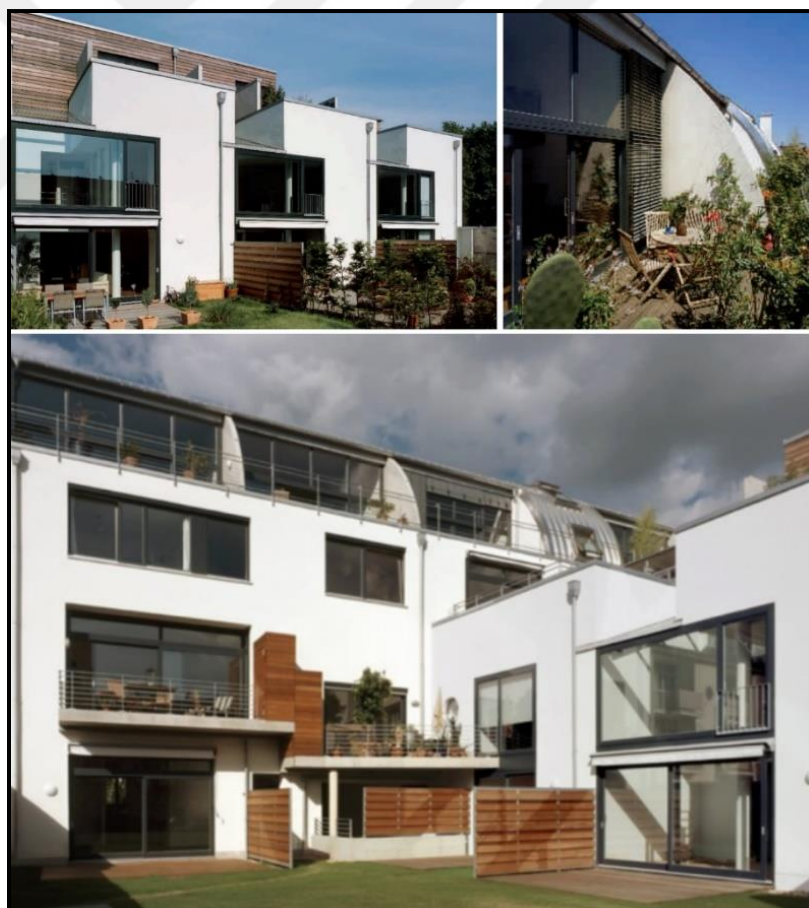


Figure 5.18. General and courtyard photo of the Hochbunker, photo by Thomas Luczak and Constantin Meyer [137].

Within the scope of the subject, Thomas Luczak from Luczak Architects, the designer of the transformation, was contacted and his views were taken in the context of the Hochbunker transformation and the reaction of the society. The correspondence was carried out via e-mail in German. Below are the questions and answers translated into English. The interview in the original language is available in Appendix B.

Question: Which factors determine whether the Hochbunker (defense areas) should be transformed or demolished? As a result, did you get any reaction from society while conducting the project of transforming the Hochbunker? Did the community agree with or against you on the transformation project?

Thomas Luczak answers: On the investor side in the transformation, economic issues were the focus. The change of use created an exciting atmosphere for some people. The transformation received great approval from both neighbours and the expert public. There was a consensus.

Question: During the bunker transformation, did you encounter technical problems arising from the adaptation and new functional processes, such as the existing construction site, the thickness of the walls, thermal insulation, lack of openings, and ventilation? If so, how did you solve them?

Thomas Luczak answers: All technical issues faced are valid for the transformation of all bunkers. Necessary interventions in the bunker are at least as expensive as a new building, and those who make the transformation must add demolition costs to this. Demolition / new construction is in demand only in high-end locations. A bunker transformation is unlikely without aesthetic and/or historical interest.

Question: Hochbunkers have an important place in history. Do you think that, the environment and city identity or spatial memory will change with the transformation? Who is responsible when it comes to its transformation: society, architect, state, ...?

Thomas Luczak answers: If the structure and characteristics of the building did not reflect correctly, it may easily lose its identity. The meaning of the refuge is ambiguous; it is also protective for the victims who are the perpetrators of the event.

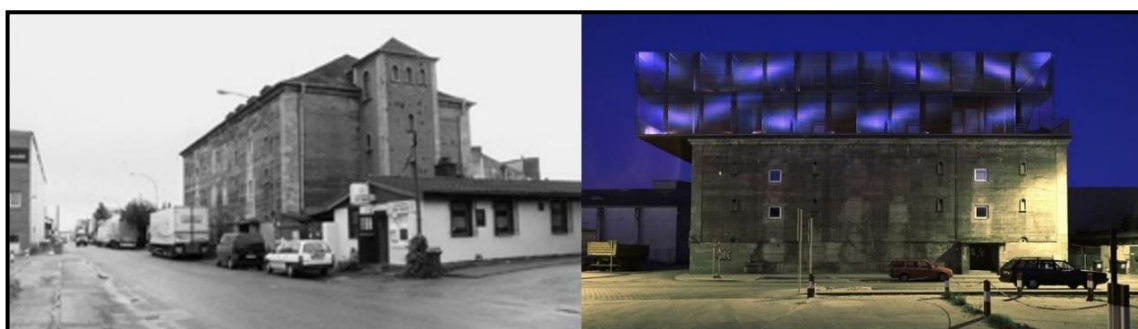
Question: According to my research, the community did not want the continuity of the Hochbunker. Also, the elements that evoked memories of the period were a problem for

society. What was the impact of society during the concept development and design? Was there any reaction of continuity the transformation idea by the community? By the way, what did you pay attention to in the transformation? What was the reaction before and after the project?

Thomas Luczak answers: There was no pressure for transformation, the Hochbunker's use period was long over, civil defense facilities were decommissioned, and there was general approval for transformation before and after.

5.3. KULTURBUNKER, INDEX ARCHITEKTEN, FRANKFURT, GERMANY (2004)

In the early 1990s, a program was initiated to create spaces containing studios and classrooms within the scope of art schools and the Frankfurt Municipality's culture and art works. In this context, it was decided to buy and transform some of the Hochbunkers in to Federal entity to ensure compliance with construction and land costs [141]. Accordingly, one of the institutions that carried out the transformation process is the Institute of New Media, which was established by the University of Fine Arts of Stadelshule State University in 1989. In line with this trend, the Institute of New Media, in agreement with Index Architekten, collaborated to transform the Hochbunker, which was built in 1940 in the eastern part of Frankfurt, into a cultural and art center, and completed the transformation in 2004 (Figure 5.19.) [142], [143], [144], [145].



(a)

(b)

Figure 5.19. (a) Photo of before the transformation at Kulturbunker. (b) Photo of after the transformation of Kulturbunker [145], [146].

As mentioned in the design section, Hochbunker demolition and transformation processes are costly. According to this, during the period from 1940 to 2004, after the evacuation of the surrounding buildings, the destruction for the Hochbunker located in the east port was given up due to the planned cost. Then works on the transformation of the Hochbunker were started with the planned renovations for the area. However, the transformation was constantly postponed because the appropriate transformation plan could not be implemented. Ultimately, the Index Architekten architecture office, which offered the most suitable alternative for transformation, took 9 months for the construction of this project. Within the scope of the project, the significant design decision determined in the Hochbunker transformation was the change in the roof (Figure 5.20.) [145].

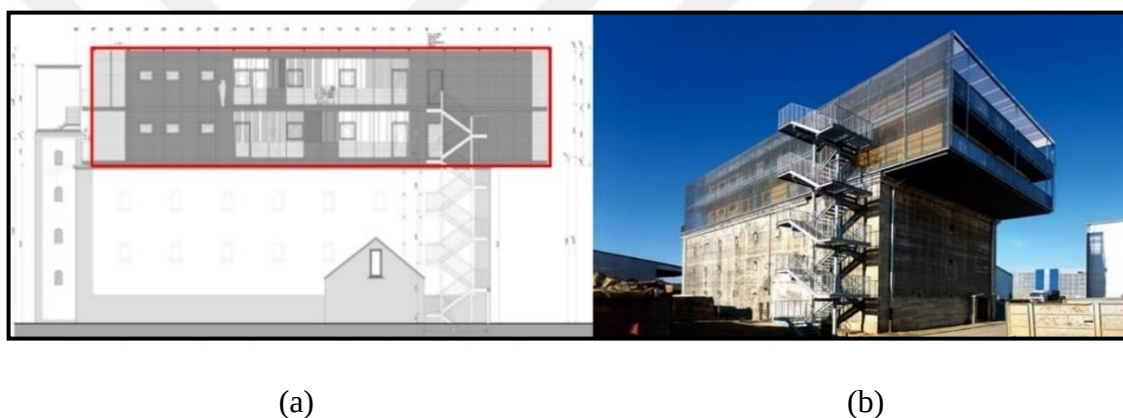
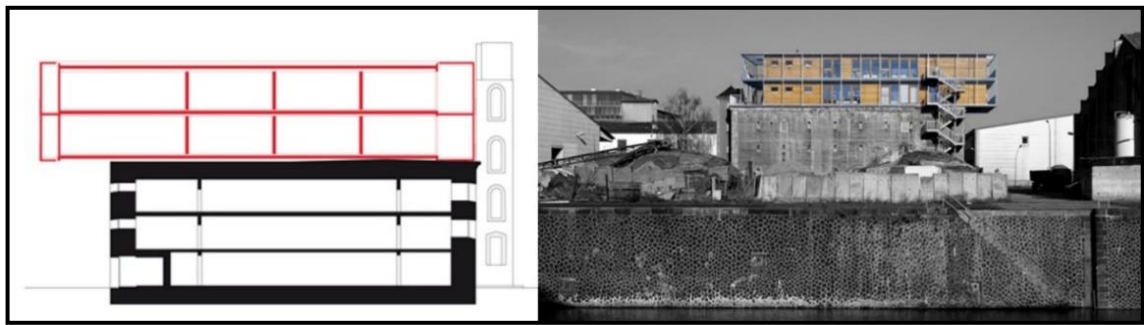


Figure 5.20. (a) Section of Kulturbunker. (b) Photo of west front of Kulturbunker after transformation [147], [148].

The tile roof, which was applied for camouflage in 1940 to resemble the surrounding structures, began to collapse towards the 2000s. Thus, it was decided that the repair process was costly. Regarding the subject, in line with the project decision instead of the roof repair, the roof was removed, and additional floors were built. Two floors of 6.40 meters were reached in the form of a wooden and glass construction console overhanging [149]. Prefabricated walls, floors and ceilings were applied, the construction in the form of a wooden frame, surrounded by a steel grid, was aligned with the outer wall of the Hochbunker. The planning of the glass and wooden wall space on the facade and the sunlight entering the building with steel grids were also arranged. While increasing the dynamics of the facade, the integration of the building with the surrounding buildings was ensured (Figure 5.21.) [150], [151].

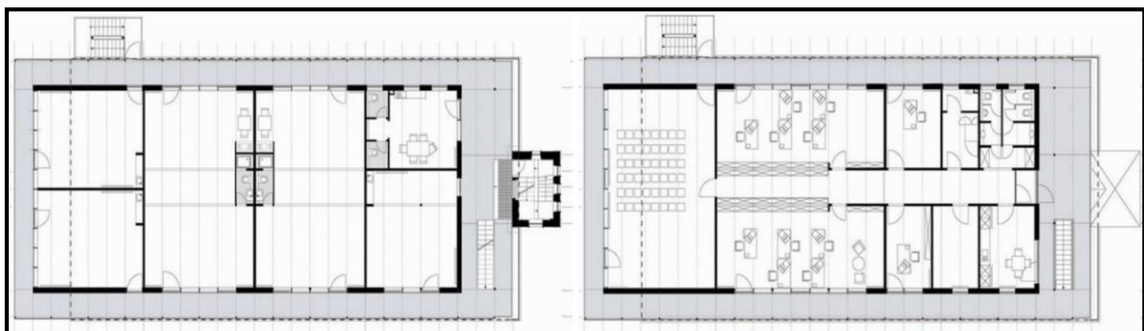


(a)

(b)

Figure 5.21. (a) East section of transformed Hochbunker. (b) Photo of west facade view [151].

These two floors have been turned into rehearsal rooms for musicians. In addition, the console structure connected to the Hochbunker was built on the east side of the 4-meter cantilever, and a 4-meter balcony area was created and opened for common use on the other side of the building (Figure 5.22.) [146]. The entire load of the two-storey structure added was supported by the about 2-meter-thick walls of the Hochbunker. The existing Hochbunker's floor area was 29.36 x 14.50 meters and about 9,000 houses could be built with the amount of concrete spent in its construction.



(a)

(b)

Figure 5.22. Plan of new added floors (a) 3rd Floor plan, (b) 4th Floor plan [145].



Figure 5.23. Conference at the presentation room in the Hochbunker and common use area on the cantilever on the 3rd floor [152].

As for the use of the space, there are two separate entrances to the Hochbunker from north and east. In addition, access from the ground to the roof is possible with the steel ladder attached to the western facade [145]. With the newly added floors, approximately 50 new studios and rooms have been created in the entire building. Apart from public areas, there were special rehearsal rooms to rent. According to the plan of the floor added later, the area is divided into 4 rooms and these rooms are arranged as a special area for artists, just like some rooms in the Hochbunker. Also, there are private and public offices, open study rooms, conference hall, meeting and seminar room, workshops and classrooms, event area for a minimum of 50 people, movie theater and photo production room, small concert areas, kitchen and toilets at the Hochbunker(Figure 5.23.) [149].



Figure 5.24. Photo of construction of two new floors [141].

After the construction of this whole area was ordered in January 2004, the prefabrications were prepared and added between March and July, the roof was demolished in May. The shell was formed in July, and everything was completed in October and the whole Hochbunker was opened for use in November. In this construction, which was planned and applied correctly, it has been possible to reduce the construction time and cost with the appropriate concept and material selection. After all, with the prefabricated installation, the cost was reduced to 645,000 Euros (Figure 5.24.) [153].

5.4. BOROS BUNKER, REALARCHITEKTUR, BERLIN (2008)

The Reichsbahnbunker was built in the street of Reichardtstrasse in Berlin, Germany. The transformation of the Hochbunker, which was built in 1942 with a height of 18 meters and 5 floors, which could accommodate almost 3,000 people, was carried out by Realarchitektur [154], [155]. The transformation of the building started in 2003. It has been transformed into an exhibition center that exhibits the Hochbunker contemporary art collection and the house of Christian Boros, who transformed the upper floor [154].



(a)

(b)

Figure 5.25. (a) Before the transformation to Boros bunkers', photo of Hochbunker when it use a night club and (b) photo of last transformation, that use like Boros bunkers' [155], [156].

Then, the pre-Boros bunker building was re-functionalization at the end of the Second World War, the Hochbunker was used as an area for prisoners of war by the state of the Soviet Union in 1945. Later, in 1949, the building was functionalized as a textile

production plant and warehouse, and it was used as a storage area for tropical fruits in 1957. The area, which was then used as a techno club in 1992, was closed in 1995 (Figure 5.25.). Also, there was a theater on the fourth floor of the Hochbunker in 1994. It was acquired by Nippon Development Corporation GmbH in 2001. The bunker, which was bought by Christian Boros in 2003, was used as an exhibition center in the last transformation (Figure 5.26.) [155], [157], [158].

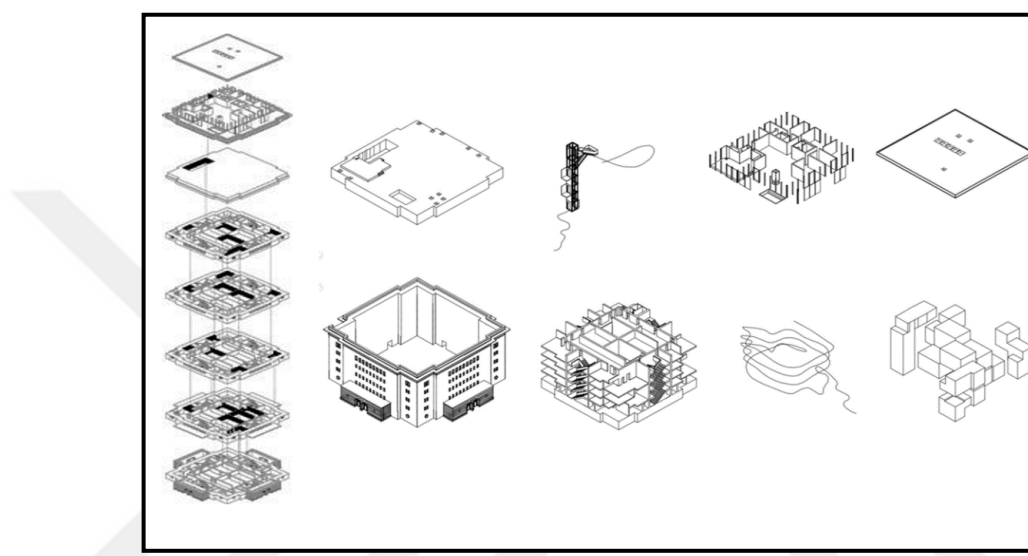


Figure 5.26. Exploded axonometric view and model of Boros Bunker [159], [160].



Figure 5.27. Cross-section of Boros Bunker [154].

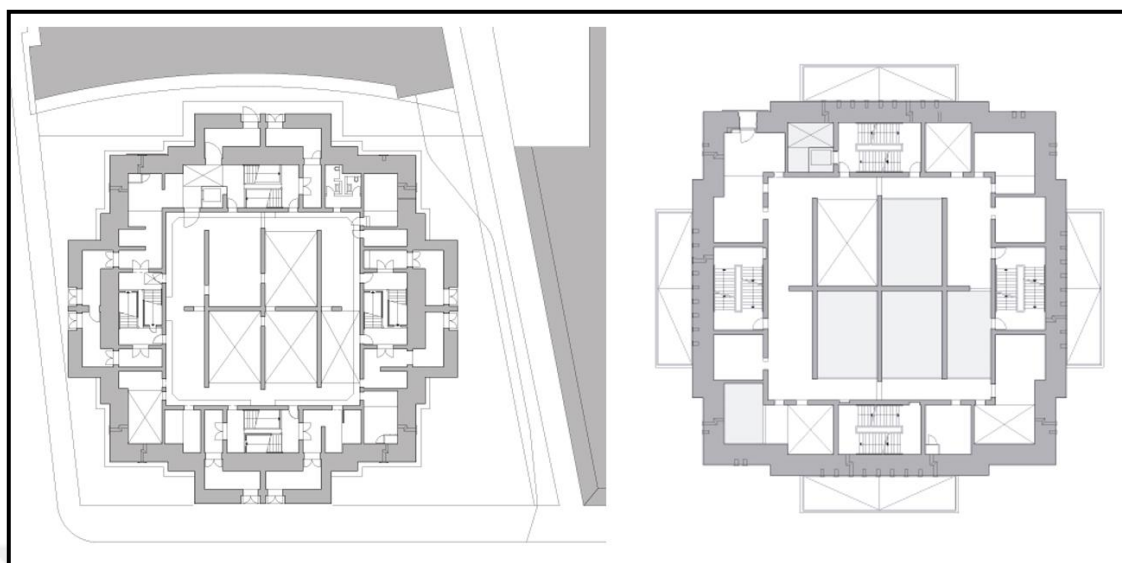


Figure 5.28. Sample plan of Boros Bunker gallery [154].

The Hochbunker, which is a reinforced concrete construction, has an outer wall of about 2 meters and a ceiling of 3 meters thickness. Its plan is designed in symmetrical order. In addition to the two entrances of the Hochbunker, intertwined double ladders are located at four points. The old building with five floors has a total of 120 rooms. The building is preserved as a cultural heritage. During the transformation process, the facade of the building was removed. Care was taken to show traces of the history of the Hochbunker (such as graffiti, bullet holes from previous use) as much as possible. The ceilings and walls that were considered suitable to remove were removed in the transformation process, thereby combining certain areas (Figure 5.28.). Currently, there are about 80 rooms in Boros Bunker. About 150 m³ of reinforced concrete was cut from the roof of the Hochbunker towards the ground to provide access to the living space created on the roof. Inside the created cavity he added a core system with a braided steel ladder and an internal open elevator (Figure 5.27., 5.29., 5.30.).

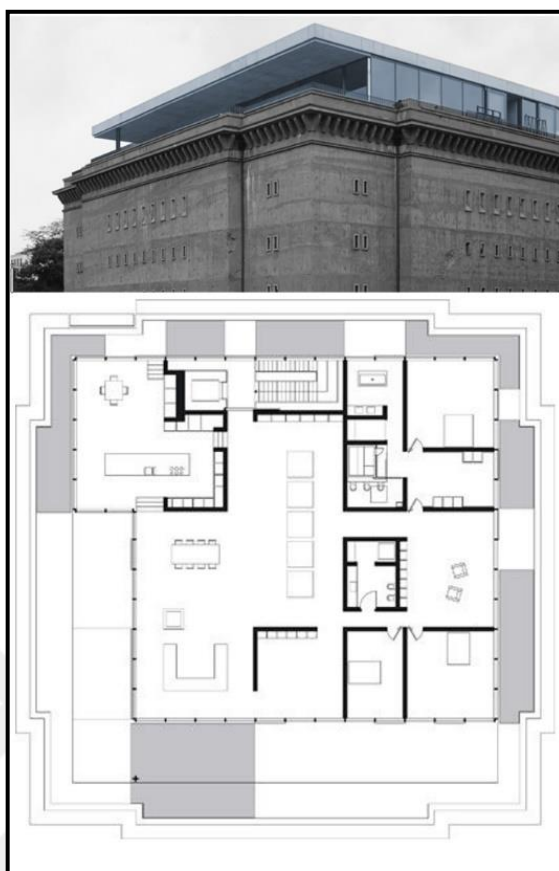


Figure 5.29. Christian Boros house plan [159].

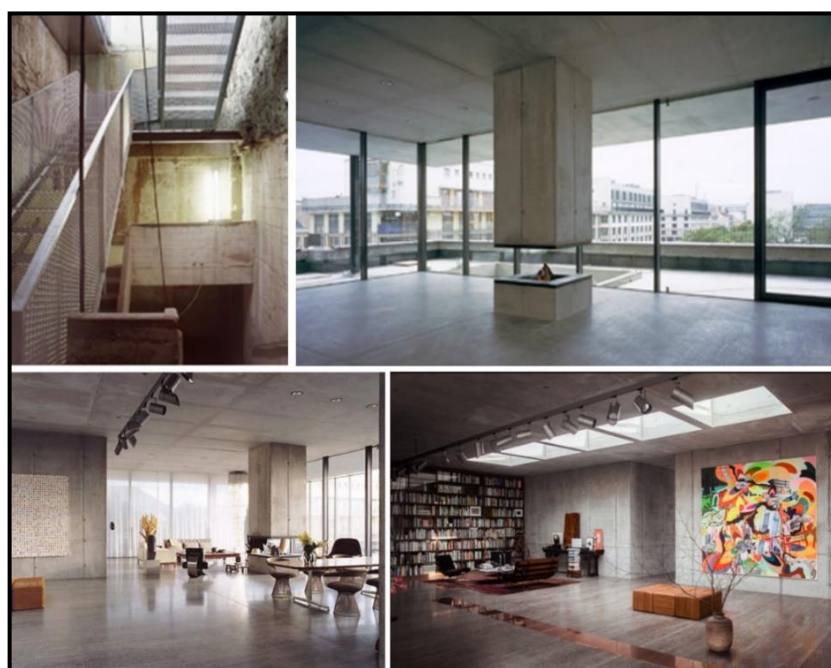


Figure 5.30. Christian Boros house interior [158], [161], [162].

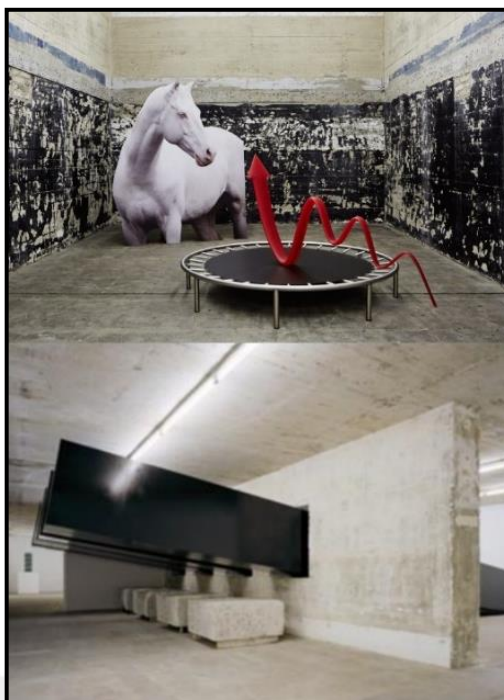


Figure 5.31. Interior of Boros Bunker gallery [155], [157].

The living area in the rooftop plan has an open plan of height 3.75 meters and there are a few columns that support the structure of the area. The art collection is connected to the gallery area in the centre of the loft plan. The facade of the section added to the roof is glass construction. The building has a 3,000m² exhibition area that is open to use after the transformation. The first exhibition was opened as a "temporary exhibition" in May 2018. The area of living area on the roof floor of Christian Boros is 500 m² (Figure 5.31.) [154], [161].

5.5. ENERGY BUNKER, HEGGER HEGGER SCHLEIFF ARCHITEKTEN, HAMBURG, GERMANY (2013)

The war memorial Gefechtsturm VI Hochbunker (G- Tower), transformed as Energy Bunker, was built by the Todt organization with a height of 42 meters in 1943 in Wilhelmsburg, Hamburg, Germany, using approximately 80,000 m³ of concrete (Figure 5.33., 5.34.). The building has a cubic form and there are protection towers in a cylindrical form on four corners. This Hochbunker was used actively from 1943 until 1945, the bunker

was not used only to protect against air attacks, and three floors of the building were reserved for civil protection (Figure 5.32.) [163].

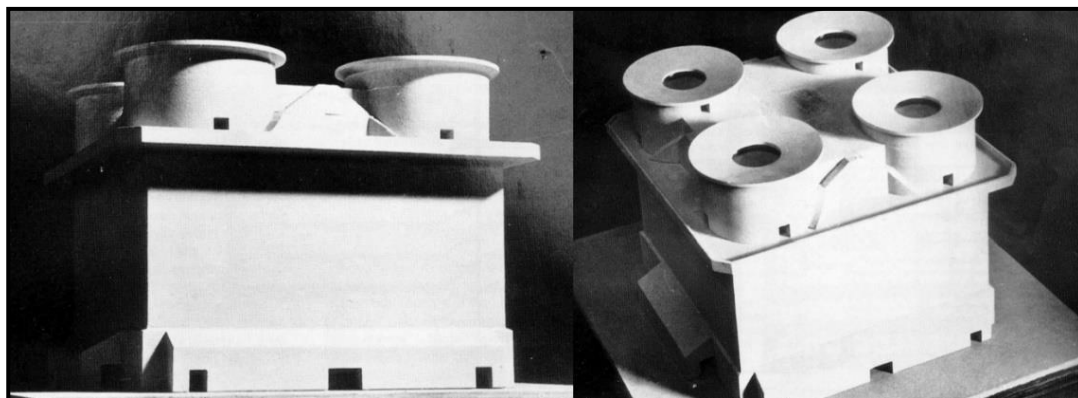


Figure 5.32. Gefechtsturm VI, Wilhelmsburg, Hamburg 15 October 1942 modeling according to drawings, by Samml. H. W. Tamms [36].

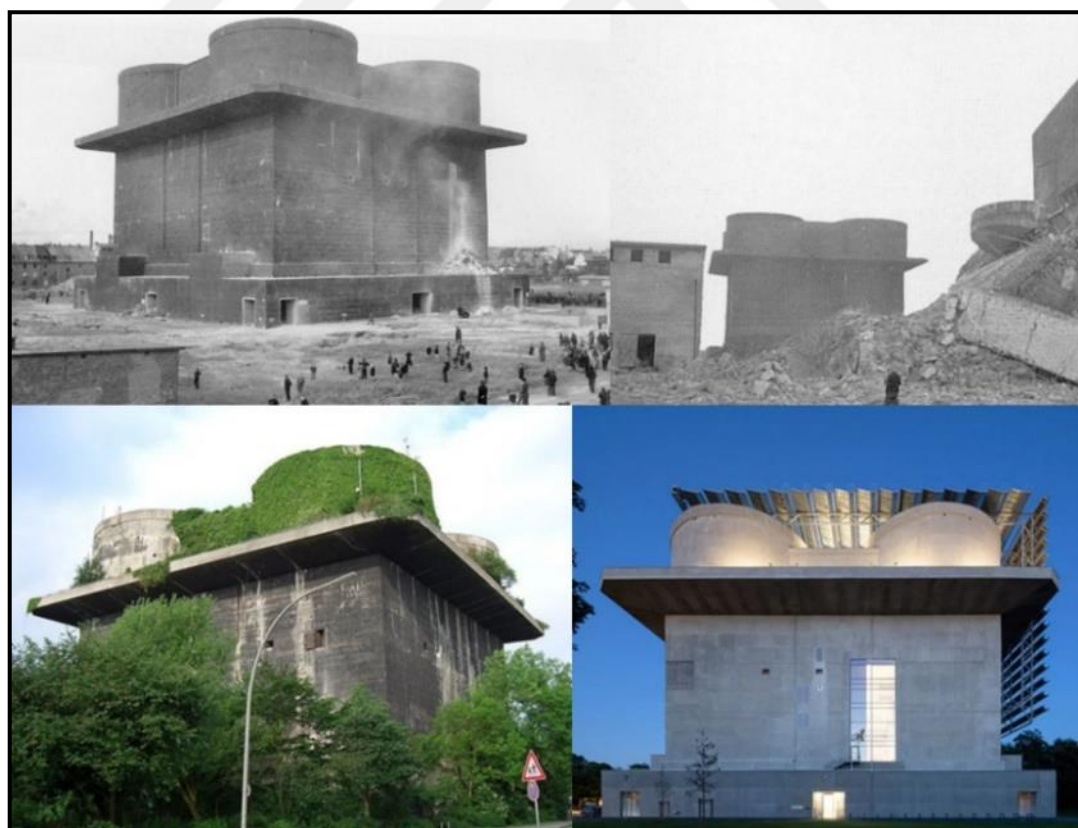


Figure 5.33. Transformation stages by years of the Energy Bunker 1943-2013 [34], [36], [164].

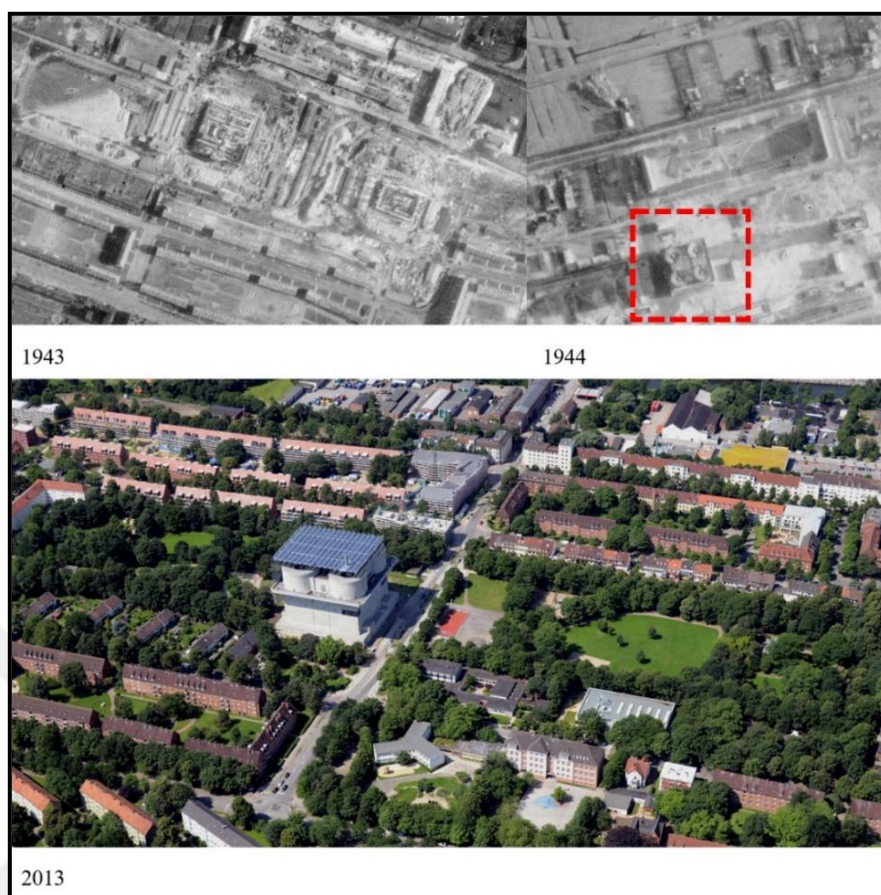


Figure 5.34. Satellite photograph of the 1943 construction site and the 1944 post-construction site by RAF aviation, Photo of the area after 2013 transformation by IBA [36], [165].

The height of the Flak Tower's ceiling is about four meters, and the thickness of its outer walls is about three meters, and it has a windowless and unadorned facade. The inner walls of the building were destroyed on 17 October 1947 by the attack of a British army's bomb of approximately 1,000 kg. Although the building was damaged, the outer walls remained intact, only the internal walls were demolished over time. Six floors of the eight-storey Flak Tower collapsed, and two floors survived, access to these floors posed a danger (Figure 5.35.) [166], [167]. Although most parts of the building became unusable after the building was damaged, a safe area on the ground floor was used as a commercial shop between 1954 to 2011. One of the reasons for the renovation of the building was the formation of cracks on the facade surface due to the greening and rotting of the facade. Accordingly, parts of the facade began to fall off in 2004 and the building was inspected.

According to the results of the static report issued after tests, a renovation process should be conducted to open the building for use in a required function by preventing the collapse of the building. In addition, the building was preserved as a monument in 2001, and it was revealed that the required interventions should be performed very carefully (Figure 5.36.) [168].



Figure 5.35. Gefechtsturm VI, Wilhelmsburg, inner walls destroyed on 17 October 1947 by the British army's [34].



Figure 5.36. The Hochbunker before look of transformation to Energy Bunker, greening facade of Flak Tower [169].

The concept phase of the transformation of the Hochbunker into the Energy Bunker was conducted place between 2006 and 2009. At this stage, the goals were to reinforce the building against collapse, preserve it and provide a usable function, and offer a renewable energy source to the residential area. In 2010, structural research and safety measures were

studied, debris removal works in the bunker were started in March 2011, and the facade restoration works were started in October; the construction for the center was completely started in the spring of 2012, and the operations for the entire building were completed in 2013 (Figure 5.37., 5.38., 5.39., 5.40.) [166], [167].

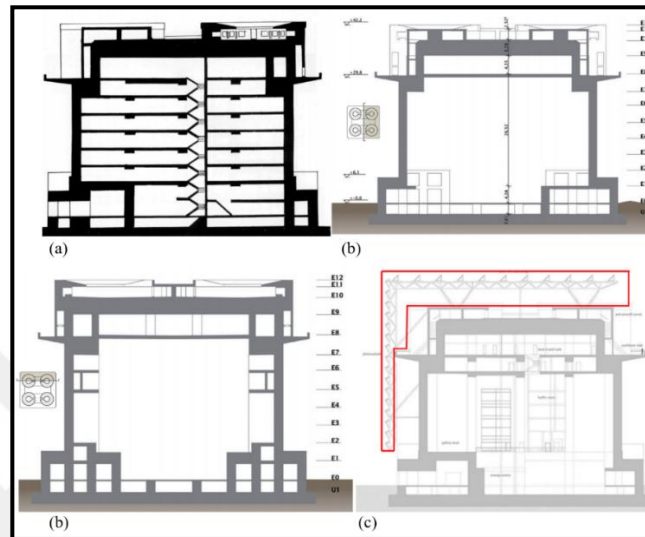


Figure 5.37. (a) Gefechtsturm VI, Wilhelmsburg, (b) after demolishing the inner wall and (c) Energy Bunker transformation cross section [36], [164], [165].

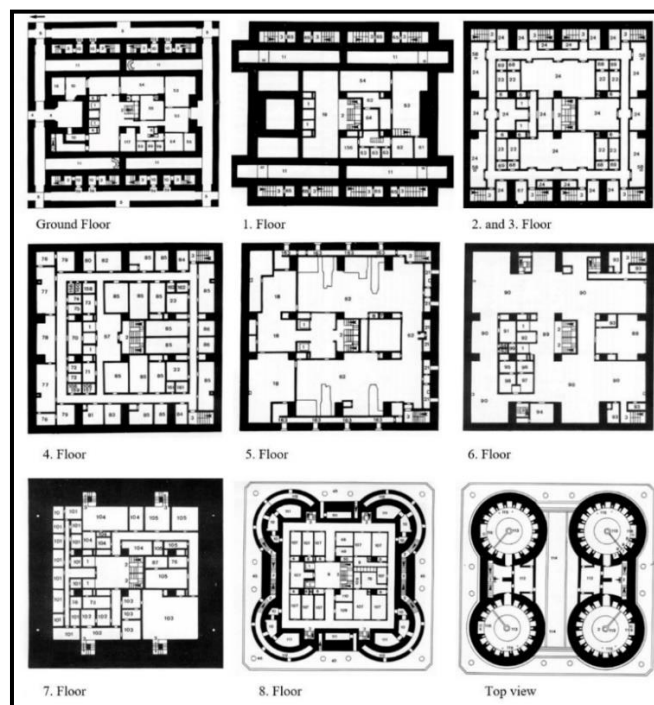


Figure 5.38. Gefechtsturm VI, Wilhelmsburg plan [36].

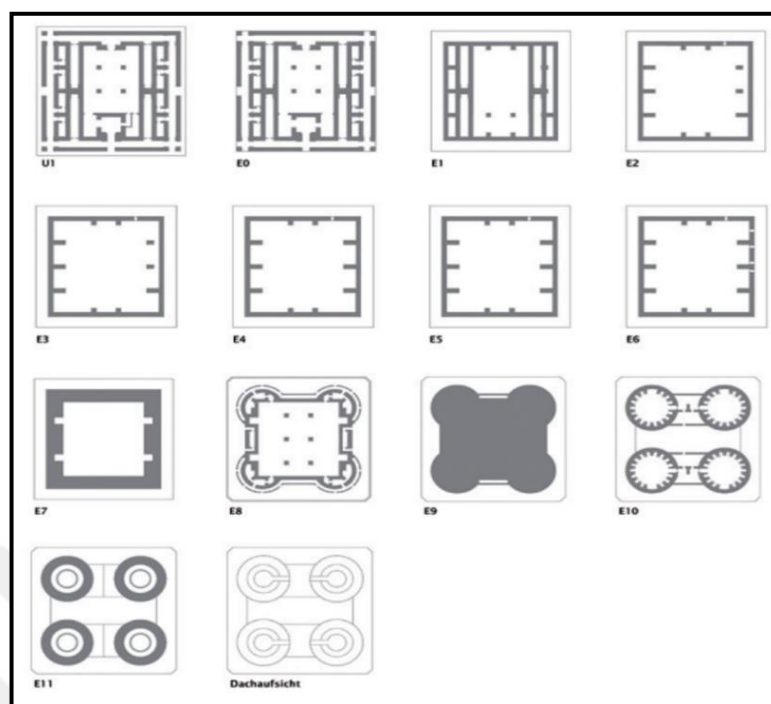


Figure 5.39. Gefechtsturm VI, Wilhelmsburg after demolishing the inner wall ground to top floor plans [165].

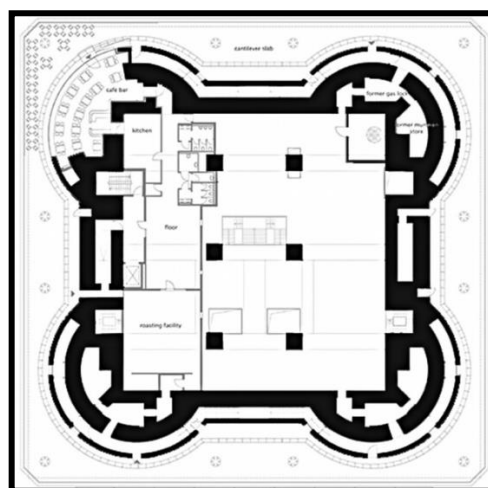


Figure 5.40. Energy Bunker Floor plan sample 8. Floor plan [164].

The Energy Bunker Transformation was requested by IBA Hamburg GmbH and carried out by the architecture office of Hegger Hegger Schleiff Architekten [165]. The total cost of the project is approximately € 27 million, of which approximately € 11.7 million was

spent on energy technology, excluding solar panels. During the transformation phase, 20,000 tons of war debris was removed from the Hochbunker, the columns carrying the load were repaired or rebuilt, and the facade was restored (Figure 5.41., 5.42.). The floor area is 57x 57 meters. While total 5,625 m² area is used for the energy centre, the area of the cafe is about 400 m² and with a terrace 100 m² which is open to use (Figure 5.43.) [166], [167].

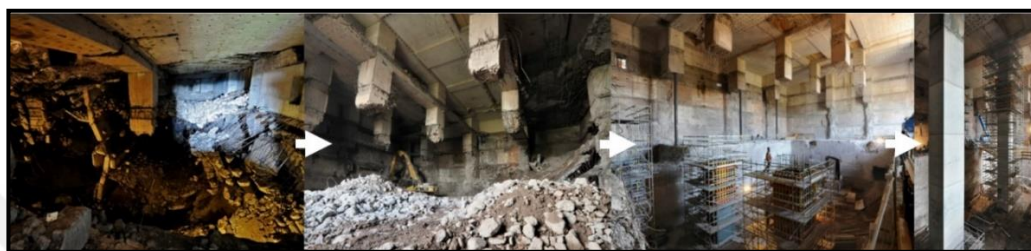


Figure 5.41. Cleaning the interior of the Hochbunker and regeneration of the columns at the transformation [165].

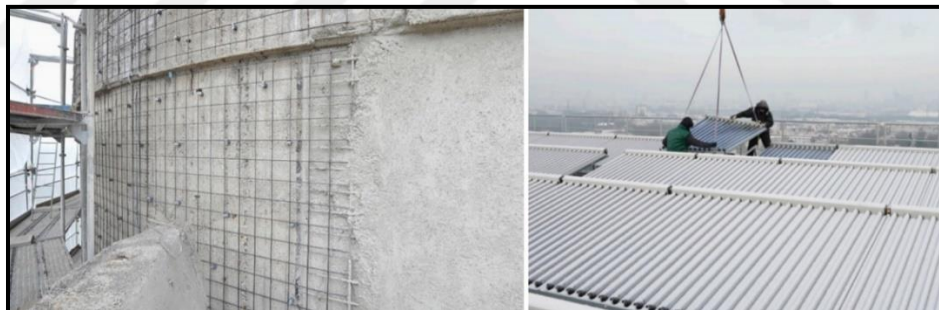


Figure 5.42. Repair of the facade on Hochbunker and installation of solar panels [165].

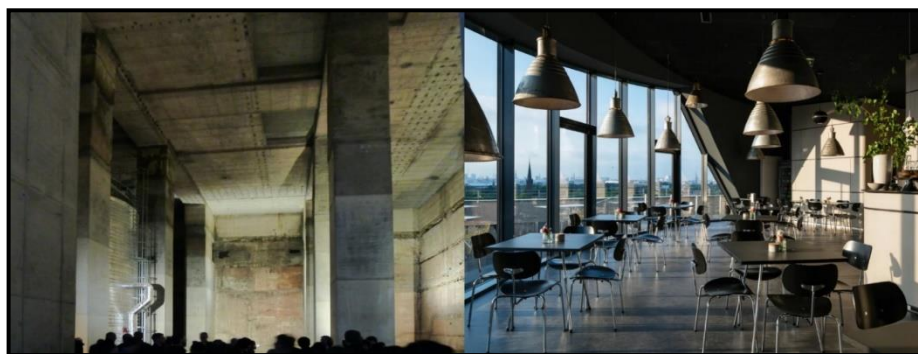


Figure 5.43. Energy Bunker interior and cafe image [170].

With the transformation of the bunker, a local power plant was constructed to generate renewable energy. The Energy Bunker also provides heat and renewable energy sources to the surrounding buildings, including the heat source of nearly 3,000 households and the building or electricity source for more than 1,000 households (Figure 5.44., 5.45.). With the removal of the debris in the interior area of the building and the ground arrangement, a new core system was created, and an elevator and stairs were added to the area. The area also offers a cultural centre with an exhibition hall and a rooftop café with 360-degree city views open to visitors. One of the arrangements made in the café is the addition of thermal insulation. It was intended to reflect the history by illuminating the building with white light without any intervention other than the additions to provide power production with solar panels on the photovoltaic panel on the south-facing wall on the facade and the steel frame system on the roof. The lightings are positioned in a way that does not damage the building. A similar transformation project with a similar function has not been done before, and it is the first example within the scope of the given this function in the Hochbunker transformation (Figure 5.46.) [163], [166], [170], [171].



Figure 5.44. Image showing the proximity of the Energy Bunker to residential areas [172].



Figure 5.45. Energy production of the Energy Bunker [173], [174].

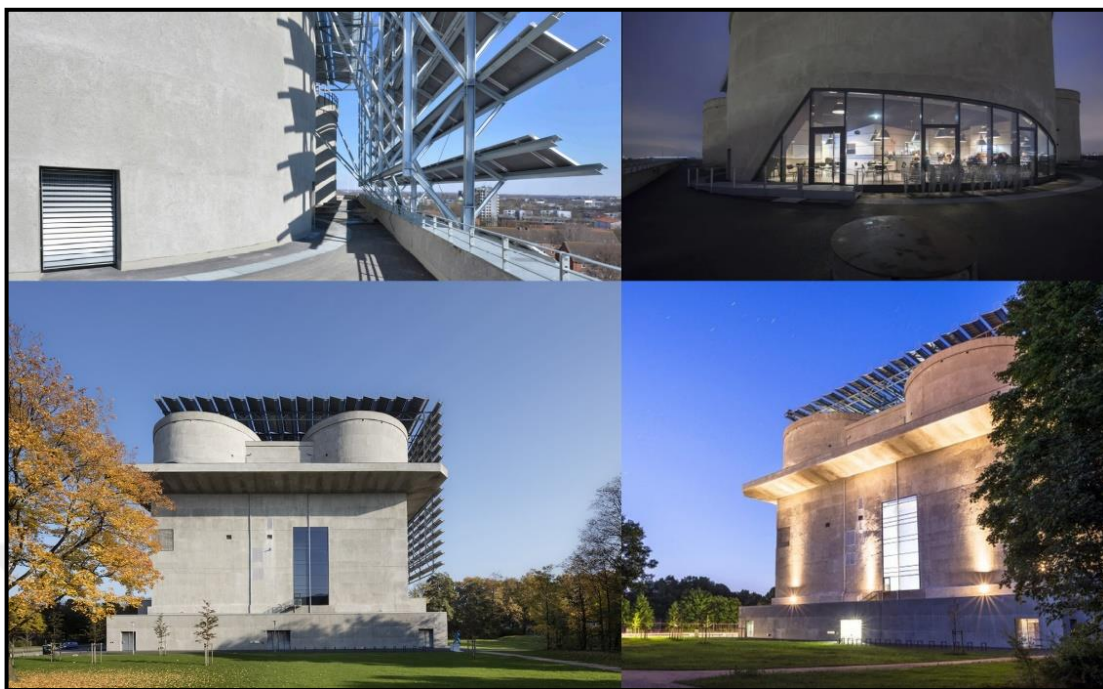


Figure 5.46. Energy Bunker, Solar panels, 360 degree viewing terrace, front view, facade lighting [165], [169].

Finally, within the scope of the project research, Hegger Hegger Schleiff Architekten office, which designed the Energy Bunker, was contacted. Guido Höfert who was architect of Hegger Hegger Schleiff Architekten office, answered the question about Energy Bunker interview. He answered the question about general information and the reactions of the society during the implementation and design stages of the project. Within the scope of the interview, the architect conveyed the contribution of Hochbunker as an energy source to residential areas and positive opinions of the society. The interview in the original language is available in Appendix B.

Question: Which factors determine whether the Hochbunker (defense areas) should be transformed or demolished? As a result, did you get any reaction from society while conducting the project to transforming the Hochbunkers? Did the community agree with or against you on the transformation project?

They shortened the question: At this point, what kind of contributions does the technical benefit make to the environment?

Architect Guido Höfert answer: The Hochbunker was an existing structure. Since the transformation was convenient, it did not need to be demolished. Energy bunker used the building fabric to implement an energy supply center for a district. Due to its design and the available space, the building could reduce the output of the entire heating center of the applied technology. Some power generation systems also work with renewable sources. In addition, solar energy is converted into heat and electricity by using waste heat from industry.

Continuation of the first question: What was the reaction during the transformation?

Architect Guido Höfert answer: The residents in the neighbourhood were relieved that the shelter would be protected, as they grew up with the building in the neighbourhood and thought that the bunker belonged to the community. They were concerned about emissions from heat generators. Positive reactions came as it opened to the public with areas such as cafes and viewing platforms. The dust and noise generated during the construction disturbed the residents nearby and caused anger.

Question: Did you encounter difficult situations during the construction phase?

Architect Guido Höfert answer: Always. The texture of the building was worse than expected. Renovation approaches should have been reconsidered for the Hochbunker. The program was confused due to unpredictability. Construction processes had to be constantly adapted.

5.6. EXZENTERHAUS, GERHARD SPANGERBERG, BOCHUM, GERMANY (2013)

The design of the transformation of the cylindrical Rundbunker located in today's Universitätsstraße, named Wiemelhauser Straße in 1942 in Bochum, was designed by Gerhardt Spangenberg and his architectural team [175]. The word 'Exzenterhaus' means an eccentric house which is an express off-centre house [176]. The Hochbunker was designed to accommodate approximately 500 people during the war, however, more than 3,000 people had to shelter in the building in the latter times of the war. More than planned people lived in the Hochbunker caused deficiencies in the infrastructure and ventilation systems; with that the beds placed to accommodate more people in the area were removed

from the structure [175]. The Hochbunker, like other military shelter and defense structures, lost its function after the war, and became useless, and it was attempted to use in different functions from time to time, however a permanent transformation could not be achieved until it was transformed into an office structure (Figure 5.47.) [177].

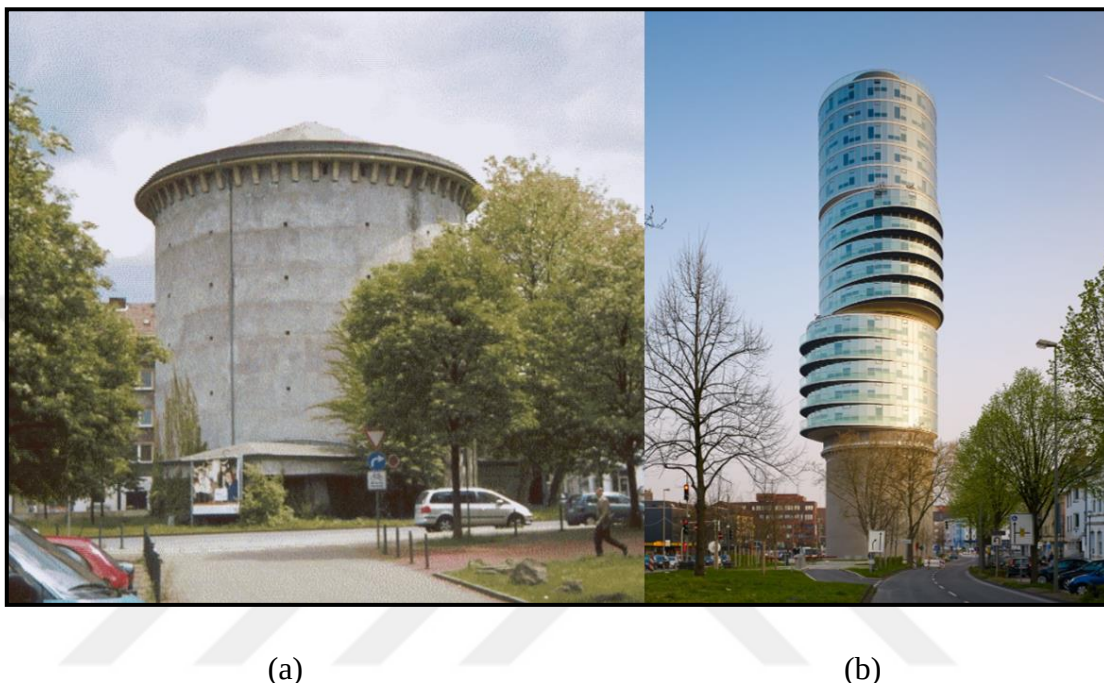


Figure 5.47. (a) Photo of Exzenterhaus before transformation. (b) After transformation of Hochbunker to Exzenterhaus [175], [178].

Before the last transformation began in 2004 at Rundbunker, the last change on the building was the painting of the facade of the Hochbunker by the artists. The Hochbunker facade painting trend continued between 1972 and 1979, and the first artists applied this trend at Bochum in the Ruhr area. In 1972, the Rundbunker was the first Hochbunker painted in that area. This was performed in collaboration with two artists from Bochum, Diethelm Koch and Bernd Figgemeier, and the students at the Dortmund University of Applied Sciences, the Folkwang School in Essen, and the Bochum School of Painting. The building was divided into sections and painted separately by the institutions or artists. This facade painting was preserved until 1990. Rundbunker was taken under protection in 2001. On the Open Memorial Day in 2003, the Hochbunker was opened to the public for the last time (Figure 5.48.) [179].



(a)

(b)

Figure 5.48. (a) Rundbunker photos to 1978 and 1990, (b) photo of after the facade painting process, photo by Michael Bömelburg 1978 and Stadt Bochum 1990 [179].

While there were efforts to re-function the Hochbunker towards the 2000s, the desired suitable function could not be found until the change in 2004; thus, the building remained dysfunctional. The only change made until that year was the painting of the facade. The decision of taking the bunker under protection in 2001, was welcomed by the local people with the formation of different perspectives after a long time. However, it cannot be stated that the community in the residential area showed the same positive attitude for the last transformation of Hochbunker. According to records kept by the complaints, the views of the community living in the surrounding area for construction were negative about the transformation to be made, and these problems have been tried to be resolved with the company. These complaints by the community were mainly about the fact that the design and planning team did not have historical awareness and they were transforming the historical building for their profit. Accordingly, it can be exemplified that inside of the Hochbunker is completely carved and left as a shell. In addition, that the park and car park areas located nearby would be used by the company during the transformation caused a negative reaction by the community, they also opposed the cutting of 25 of the 29 trees in the area. While there is already a parking problem, the planned parking area will be insufficient for the number of vehicles that would be required, as there would be more vehicles in the area with the renovated building and new offices. It has been stated that it would increase the traffic depending on this situation. Apart from the distance problem between buildings, another problem was the shadow of the high building that would fall on the surrounding buildings. The building, which would rise with the transformation, would

cast a shadow on the surrounding buildings especially in the summer, preventing the area from benefiting from natural light, and the reflection of the building lighting to the environment at night is another major problem. Although residents of the residential area have complaints about many issues, the transformation designed for Hochbunker was implemented following the plans of the architectural office (Figure 5.49.) [180].



Figure 5.49. (a) Map of Exzenterhaus location. (b) Photo of Exzenterhaus illustrating the shadow falling over residential areas [181].

Despite all the objections, design works started in 2004, and construction works started in 2008. The processes carried out for the transformation of the Hochbunker, was completed in 2013. The interior was completely disassembled and emptied, and its robust, bomb-proof 1.4-meter-thick ceiling was removed. The addition load of 15 floors was supported by the walls of the 2-meter thick Hochbunker. Due to the insufficiency of this support, additional supports have been added to the basement of the building. Since it was not possible to intervene from outside the Hochbunker for this process, a telescopic crane and a machine weighing 100 tons were placed inside the structure for the drilling pile foundation. The circulation, service area, core system, and shafts of the structure were positioned in the middle of the cylindrical center (Figure 5.50.) [177], [178].



Figure 5.50. Insertion of drill rig into Hochbunker with telescopic crane for pile foundation placement [177].



Figure 5.51. Construction stages of transformation of Rundbunker to Exzenterhaus 2008-2013 [182].

After the transformation, the total usable area of the Hochbunker was 5,000 m² [178]. The Hochbunker, which was built with a height of 22 meters and 7 floors with a diameter of about 19 meters, increased to a total height of 89 meters with the floor joints made after transformation and it became the highest office building in the city with 23 floors. The blocks are combined in every five floors and these five floor plans are standardized. Three mezzanines were added in every 5 floors in the form of 15 + 1 floors with a height of approximately 3.75 meters and 1.8 meters high connected to these 15 floors. Thus, a 1: 3 harmony was achieved between the old building and the new structure added on it, and the Hochbunker was upgraded with static planning to bear the weight [175], [177], [183]. The first two floors of the Hochbunker were arranged as a reception area and the remaining floors were used as archives and storage areas. The newly added floors function as a rental office (Figure 5.51., 5.52., 5.53.) [184].

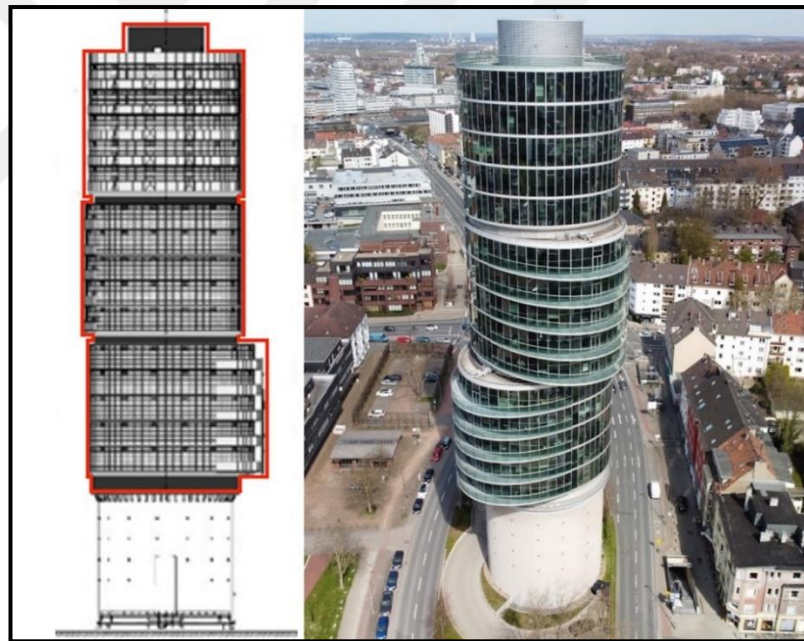


Figure 5.52. Exzenterhaus facade section and view [185], [186].

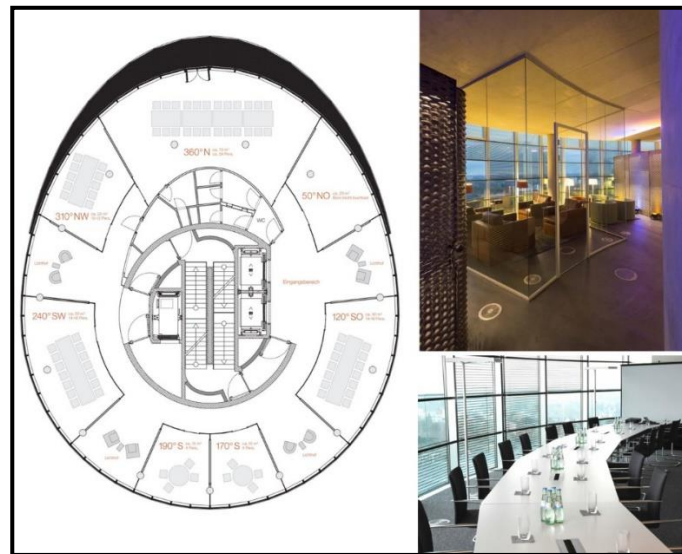


Figure 5.53. 19th Floor conference sample plan and office photos [178].



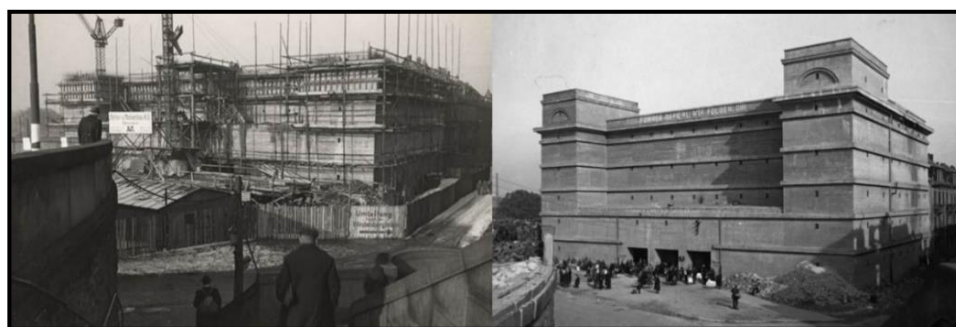
Figure 5.54. Floor section (Section by author reference with Gerhard Spangenberg official website) sample interior photo [178].

The oval facade surfaces of the floors added on the Hochbunker were covered with an aluminium glass construction, and energy-saving is aimed by using geothermal energy and smart facade technology. Thus, daylight could be used actively. In the Hochbunker design

divided into three parts, the first five floors were oriented south on the treetops of the green middle island of Magistrale, and the next middle five floors were positioned facing the large form of the university, which is three and a half kilometres away, and the oval part was oriented so that the last five floors could view the city center. Balconies were added as details to the oval protruding part of each floor. The building has a high-speed elevator as well as remote control and high-level security systems. The Hochbunker had a district heating area and the fresh air intake benefited from the entrance openings on the upper floor, while the ventilation rooms were in the basement. Fire safety is also provided under the high-rise building. It has a capacity of approximately 107 vehicles with a two-level parking area at the south entrance and a two-level parking area in the north of the building. In addition, the main train station is 600 m away from the area and easily accessible via the "Oskar-Hoffmann-Straße" subway station (Figure 5.54.) [175], [178], [182], [183].

5.7. MARCHIVUM, SCHMUCKER UND PARTNER, MANNHEIM, GERMANY (2018)

A total of fifty-six shelter areas were built in forty regions in Mannheim, Germany. 20 of these shelters are Hochbunkers, 32 of which are underground and 40 are partially aboveground with passages [187]. The Ochsenpferchbunker, which was built between 1940 and 1943, is one of the largest Hochbunkers located in Mannheim, Germany. The two defense towers of the structure resemble the medieval city walls. The Hochbunker, which has a floor area of 6,100 square meters, a wall of 1.10 meters, and a ceiling thickness of 1.40 meters, has four floors apart from the basement and ground floor. According to the plan, the Ochsenpferchbunker can take shelter for a total of 3,412 people. But the bed capacity is up to 1,000 people. In an emergency, a sheltered area can be provided for up to 7,500 people with in-field arrangements. The construction phase of the Hochbunker started with the basement excavation in 1940 and the rough construction was completed in April 1941, and the shell emerged, the bunker became usable in 1943 [188]. The Ochsenpferchbunker, which has two separate entrances, has its electricity and water infrastructures as well as internal health units (Figure 5.55.) [187].

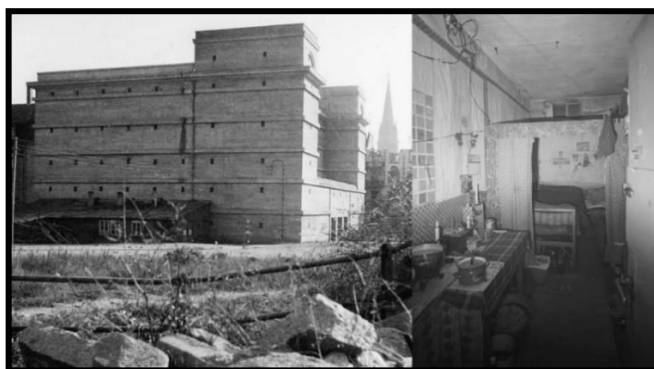


(a)

(b)

Figure 5.55. (a) Photo of Ochsenpferchbunker construction in 1942 and (b) Ochsenpferchbunker construction completed in 1944, photo by Stadt AMA – ISG [188].

The heaviest damage the Hochbunker suffered from the airstrikes during the war in the stairway tower in September 1943. Mannheim is an area where airstrikes are so frequent that only 1/6 of the residences in the area were not damaged at the end of the war. This means about 15,000 in approximately 87,000 houses. It was transformed into a Hochbunker prison camp after the Americans occupied the area in May 1946. Subsequently, the building became the living space of the German workers, and then the area where those returning from the war and evacuation lived was transformed. In November 1954, it started to move to newly built residences, and accordingly, relocations from Hochbunker started. However, people who still did not have a place to live continued to live in the bunker. The individuals continued to live in the Ochsenpferchbunker until 1966 (Figure 5.56.).



(a)

(b)

Figure 5.56. (a) Ochsenpferchbunker, 1949. (b) Interior photo of where the individual lives in Hochbunker, 1950 [189].

It was tried to transform, the Hochbunker, which was affiliated to the Federal Republic, into a nuclear shelter during the Cold War, however, this could not be realized until 1981. In this transformation, the cell walls were removed and the porch was added; which is still in the building today and extends to the second floor. After the Cold War, the Hochbunker was demilitarized and became useless. There have been frequent discussions about the transformation of the bunker. It was used as a data warehouse of companies until 2008, the local government decided to transform it in 2014, the last transformation was designed by Schmucker und Partner, and it was realized by starting the construction in 2016. Ochenpferchbunker has been put into use as a warehouse with the city archive and the history institute (Figure 5.57.) [188].



Figure 5.57. (a) Photo of Hochbunker in 1982, (b) photo of after transformation of Hochbunker and become a Marchivum in 2018 [189], [190].



Figure 5.58. (a) Photo of construction of Hochbunker at transformation, (b) photo of after add two floors in the Hochbunker [191], [192].

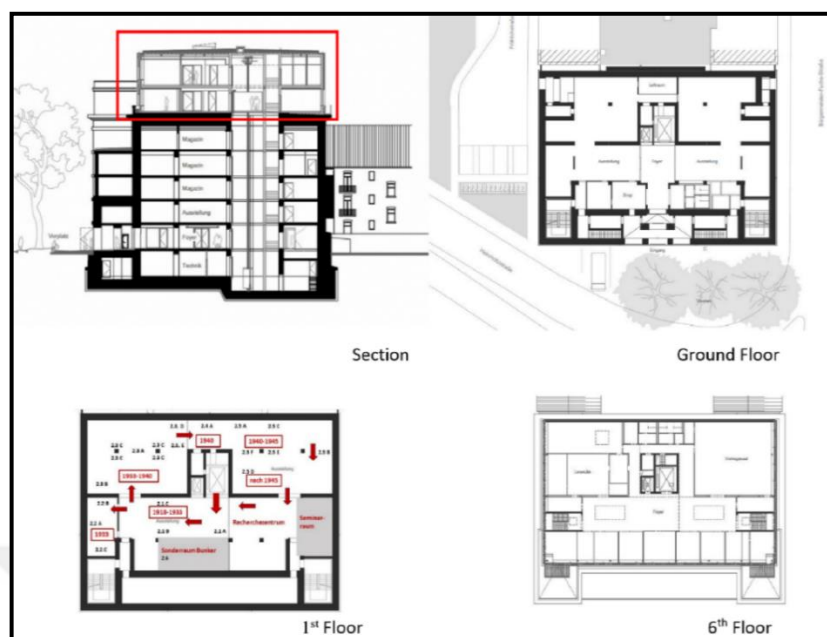


Figure 5.59. Section and plans for Marchivum by Schmucker und Partner [193].



Figure 5.60. Interior photo of Marchivum, photo by StadtA MA – ISG [188], [194].

After the transformation, two additional floors were added to the old six-storey building (Figure 5.58.). The interior space design organized like in three main lines of an archive, research, history center (especially city history), and education (Figure 5.59.). According to plans of the floors, there are basement, warehouse, and engine rooms of infrastructures such as electricity and heating system. There is a foyer area displaying the history of the

city on the ground floor, a documentation center on the first floor, a magazine area from the second to the fourth floor, an archive, offices on the fifth floor, and a reading room and amphitheatre on the sixth floor. The Ochsenpferchbunker continued preserved as a monument, although it has been used differently after the transformation (Figure 5.60.) [193].

5.8. HILLDEGARDEN, HAMBURG, GERMANY (2021 CONTINUE)

St. Pauli Hochbunker, also known as Feldstraße Bunker or Flak Tower IV, was built using more than 1,000 forced laborers in 300 days in the city of Hamburg in Germany, in 1942. It has been transformed into a luxury hotel under the name of Hillgarden (Figure 5.64.). Flak Tower, which was built for defense purpose, also provided civil protection. The wall thickness of the Hochbunker is 3.5 meters, the ceiling thickness is 5 meters, the height of the building is approximately 40 meters, and the floor area is 75x75 meters (Figure 5.61., 5.62., 5.63.) [195].

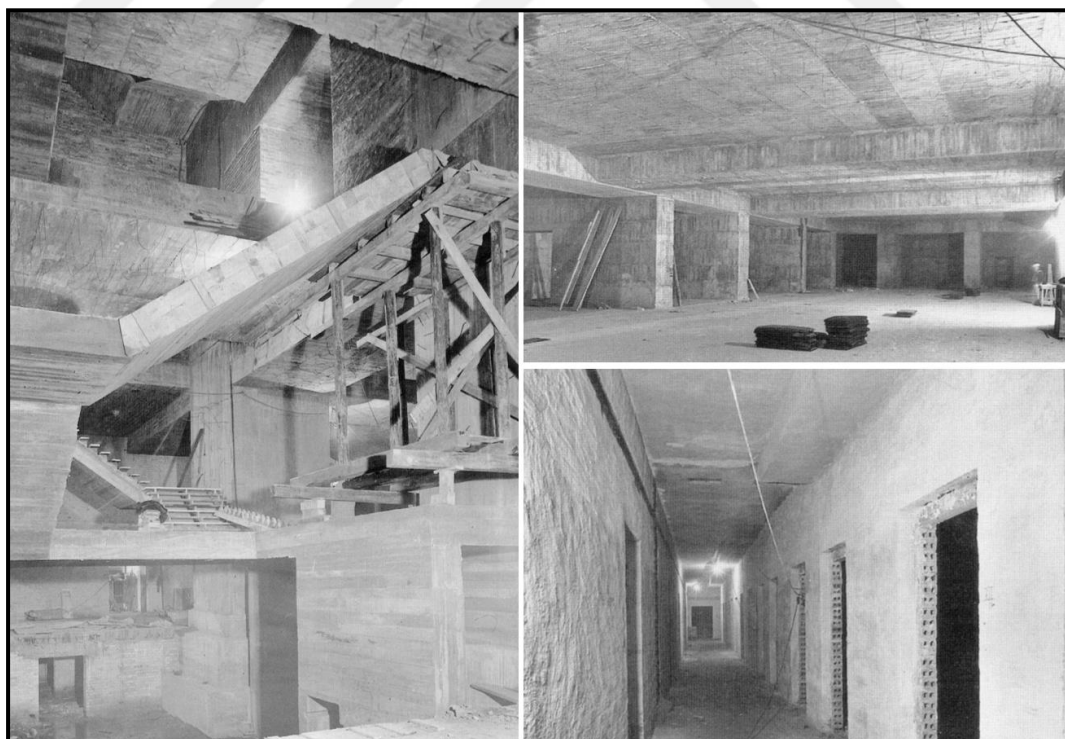


Figure 5.61. Construction of Feldstraße Bunker 1942 [36].



Figure 5.62. Construction of Feldstraße Bunker 1942 [36].

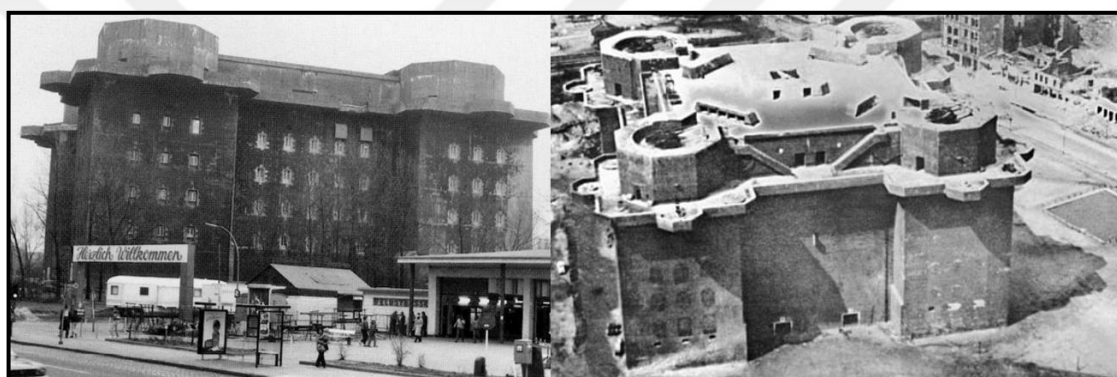


Figure 5.63. Feldstraße Bunker, 1942 and 1945 [36], [196].

It was built in 1943 to accommodate 18,000 people in total, not exceeding 25,000 people. Hochbunker, which was not destroyed due to its proximity to the residential area, was used as a living space for civilians for a while after the Second World War. Towards the 1950s, the building was used by a German Television channel. According to the data of the Hamburg official tourism website, the area housed nightclubs, radio stations and studios until the 1990s. Hochbunker is also known as a "media shelter", as it hosts more than 40 broadcasters [196].



Figure 5.64. Location of Flak Tower IV [197].

Before the Hochbunker final transformation, the north side of the building was used by a popular nightclub business, while one side of the building was used in multiple functions, housing a music school, an instrument store, as well as graphic agencies and a photography studio. With the transformation, it is planned to increase the height of the bunker from 40-meters up to 59 meters (Figure 5.65.) [198].



Figure 5.65. Photo of Flak Tower IV before transformation [198], [199].



Figure 5.66. Hochbunker construction photo by Georg Wendt [199], [200], [201].

The Hillgarden project was designed to offer a public area of about 8,250 m², a green road and greening on the building outside the roof of about 4,200 m², a roof park of about 1,500 m², and green ramp of about a 2,000 m². The project includes a hotel with 136 rooms, a fitness center, a restaurant, an event area, and a gym. It is planned to make a green roof for the added floors, and this roof is aimed to be the largest city garden of the city (Figure 5.66., 5.67.) [195], [198].

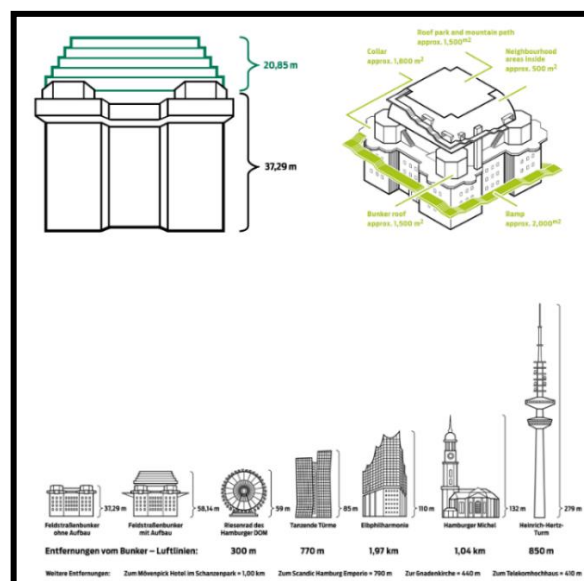


Figure 5.67. Hochbunker height and usage model [198].

It is planned to create a public park area and a memorial to the victims of the Nazi rule on the roof floor. The panorama view of the city can be seen from the roof garden of the Hochbunker, which is planned to add five floors [196]. The amphitheatre, artisan houses, and the monument were included in the project and a place for social use was opened. The ramp leading to the roof area is 300 meters long, 6 meters wide, and can also be used in emergency escape, and it has been planned to expand the ramp to 13 meters on the east and south sides and build a salvage road with a width of a 2.5-meter. The beginning of the ramp open to public use was determined as Feldstrasse Street. Barrier-free transportation aimed at the ramp. In addition, there are elevators at certain locations of the building for transportation (Figure 5.69., 5.70.) [198].

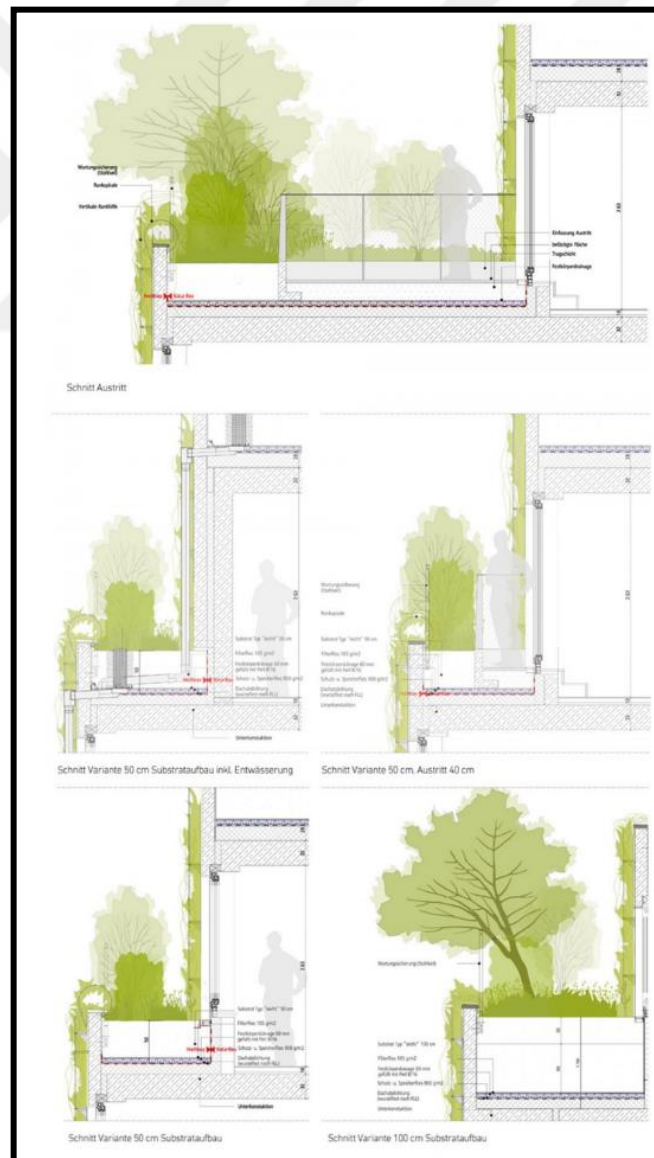


Figure 5.68. Greening detail on the Hochbunker [198].

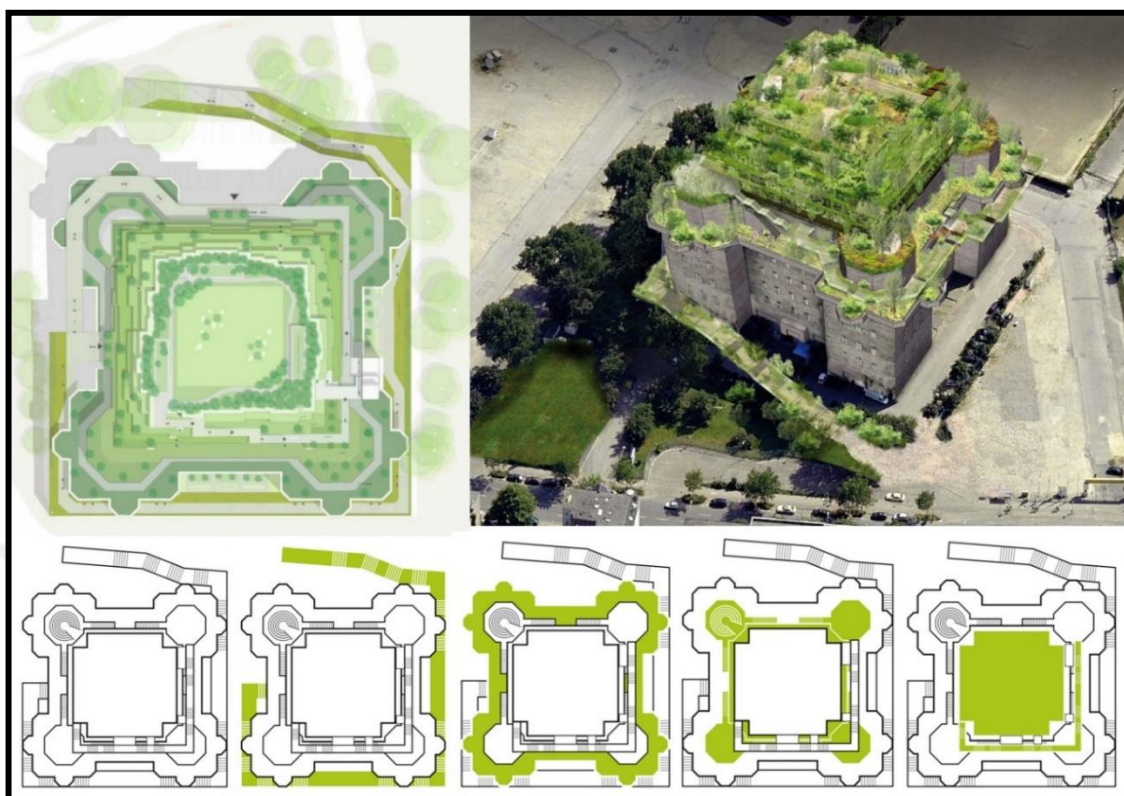


Figure 5.69. Ramp and greening detail on the Hochbunker [198], [202].



Figure 5.70. Ramp detail on the Hochbunker [198].

told CNN: "The conversion of this former Nazi bunker into a hotel is a sign of a difficult inheritance grant. In short, instead of destroying our places of pain and shame, that seen the functional aspects of the buildings as appropriate in commemorating their difficult past". In this context, the reuse of space for the society is difficult within the scope of the collective memory it reminds, but it can be desired to create multiple representations and identities after the transformation. Various identities and representations can develop from the perspective of society [196]. Although it was aimed to complete the transformation in 2017, several setbacks were experienced in the construction. Due to certain setbacks and unusual problems such as the Covid-19 pandemic, the construction works still continue in 2021 [198].

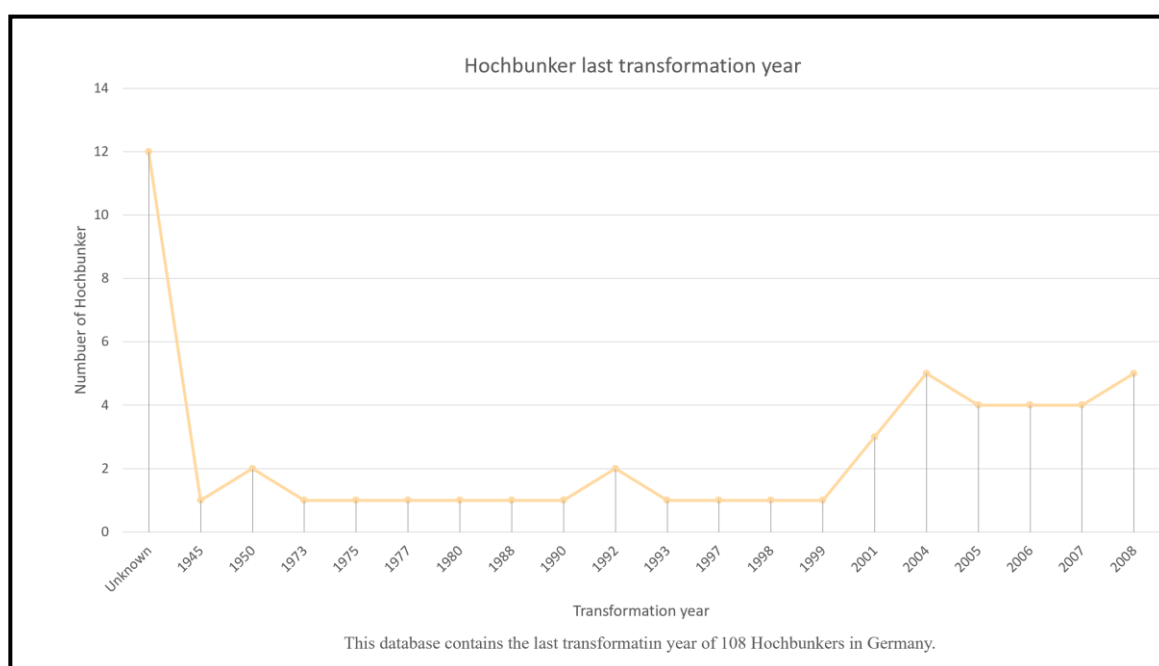


6. CONCLUSION

The historical process shows that Hochbunker structures are structures built in the recent past and have continuity. At the design stage, it was evident that such structures would become dysfunctional and out of use after eliminating their military functions due to their being built permanently. As mentioned in the history and transformation section, there was no plan for the Hochbunkers, designed and built during the Hitler period, as a temporary structure. If they had won the war, these structures would have been transformed and would have become representations reflecting the ideology. Although the transformation desired by the Hitler administration did not take place, these transformations were conducted since there were many Hochbunkers with permanent structures, and they were out of use after the war. While examining the transformation of the building, it is necessary to benefit from many different contexts. The Hochbunker transformation should be considered in terms of economic, social, and cultural aspects. In this respect, experts on the subject should collaborate while performing the transformation process. The Hochbunkers have certain economic, social, architectural, and cultural advantageous or disadvantageous conditions in their transformation. As mentioned in detail in the design and transformation sections, the facades in the Hochbunkers offer advantages and disadvantages in terms of architecture. Having a clean surface of the façade provides an advantage for possible interventions. However, the absence of openings on the façade and trying to apply applications to thick walls to create these openings is an intervention that complicates the work. Various examples are similar to this detail within the scope of the research. There are similar contrasts in economic and social conditions depending on the architectural part of the work. Although the Hochbunker transformation provides financial gain to a certain extent, costs can also increase in the transactions determined in the transformation due to its robust structure. Hochbunkers contain historical, cultural, and collective memories. Accordingly, transformations that depend only on expert opinions do not occur. The building was also evaluated within the scope of community memory. Mainly the Hochbunkers can express traumatic memory, or a representation based on the lived history of the society. Accordingly, the structure may be transformed, ignored, or become out of use within the scope of society's reaction. In this context, when the transformation of the structure is realized, it should examine different aspects such as representation, identity, society, and memory. To make the proper transformations and ensure continuity, it should

reveal the connections between community and structures and their collective memories. Within the scope of this thesis, the historical process of the Hochbunkers was described in detail in line with the literature review. In the context of the known Hochbunker examples, their design criteria were explained. Conditions that could be outside of the transformation of Hochbunker were specified. It was tried to specify the process of realizing the Hochbunker transformation, which was the scope of the study. Project transformations also indicate the practical situation of this whole theoretical part. In order to reveal the project transformation, 108 transformed Hochbunkers were examined, and eight of them were studied in detail. Certain graphics were created within the scope of 108 projects. One of them, as the graphic project based on the last function after the transformation, was included in the project section, and graphics showing the historical process of the cities in which the transformation took place and the years of the transformation were prepared depending on the 108 projects in this section.

Table 6.1. The Graph made based on the last transformation years realized within the last function given to 108 projects within the scope of Hochbunker transformation projects, prepared by author based on data presented in Appendix A.



As mentioned earlier, Hochbunker transformation can take place in private or public scope. Most of the 108 projects reviewed have been transformed in a special context.

Accordingly, there may be other projects with unknown architects or transformation processes. In this context, considering the transformation after 1945 as the basis, it can be observed that the transformations increase as these come to the present within 108 projects.

The list and graphics of 108 projects within the scope of the research and the studies in this thesis are open to development and can be detailed. Numerous wars have taken place from past to present. In this context, the designs of military architectural areas have developed and their construction will continue in the face of threat. As long as they are used in military architectural shelter areas, like every building used by the society, these areas will contain individual and collective memory. In the context of the community memory, these structures, which reflect history are worth preserving within the scope of the history and memory they contain. If the subject is touched on within the scope of the Hochbunker, should the Hochbunker be preserved, demolished, memorialized, or transformed? The Hochbunkers, considered as symbolic structures of the Second World War, should be maintained not to forget and to remind all the traces it has contained since it was designed. There are many numbers of Hochbunkers, and each Hochbunker cannot be a monument; not all of them can be preserved or transformed. However, they can enlighten society about tragic memory. It is important to ensure its continuity by considering the protection and transformation criteria within the scope of handing down these memories to the next generation. Decisions to be made can only be revealed as a result of accurate and detailed research and analysis, because each intervention to be made is also an intervention to the memory and history.

Especially during and after the war, many interventions such as destruction or transformation took place on the buildings. However, decisions for destruction and transformation, which are made without the considerations of the experts, can reveal deliberate damaging attitudes. That is why, as mentioned in the transformation section, instructions have been introduced to limit the interventions to be made and to make the right interventions. An approach that reminds the memory not to forget the past is also a sign of respect for the experiences of society. Because what happened in the Second World War is a period of destruction and serious damage that cannot be forgotten. In this context, the massive objects that enable us to present the experiences most concretely are the existing spaces. The preservation of space is a behaviour that reveals the continuity of social memory and history. Within the scope of this thesis, an attitude for the Hochbunker

transformation has been tried to be put forward including historical, design and social scopes. It has been tried to show the continuity of historical and social memory with the transformation of the Hochbunker.



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APPENDIX A: LIST OF HOCHBUNKER TRANSFORMATION PROJECTS AT GERMANY

Table 5.1 Graphical representation of those with similar functions in the same group according to the last functions of 108 projects and Table 6.1 Cities where Hochbunker transformation took place, according to 108 projects reviewed and Table 6.2 The graph covering the years in which the last transformation took place, the historical situation in the transformation depends on 108 projects based on the collected data presented in Table A.1.

Table A.1. Examination of the Hochbunker transformation projects was created by finding 108 projects.

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
1	Bunker Lütticher Straße	SchlunBaugrup- pe	Residential Building/ Commercial Unit	Aachen	WW2	2014
2	Kongressstraße Hochbunker	Gruhl & Partner Architects	Residential Building	Aachen	1940s	1992
3	Wittekindstraße Hochbunker	Local People Use	Residential Building/ Music Studio	Aachen	WW2	-
4	Goffartstraße Music Hochbunker	Local People Use	Music Studio/ Concert Hall	Aachen	1941	1992
5	Kasinostraße Music Hochbunker	Local People Use	Music Studio	Aachen	WW2	-
6	Rehmannstraß-e Music Bunker	-	Music Studio	Aachen	1943	-
7	Sandkaulpark Bunker	South African and German artists as part of the UNESCO supported Mural Globalprogram me	Wall Painting Attached to the Park	Aachen	1941	2001
8	Kegel Bunker	-	Climbing Wall	Berlin	1936	2005
9	Pallasseum	Jürgen Sawade	Social Housing	Berlin	1943- 1945	1974- 1977

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
10	Feuerle Collection	Realarchitektur	Art and Furniture Museum	Berlin	1943	2012- 2016
11	Boros Bunker	Realarchitektur	Art Gallery/ Rooftop House	Berlin	1942	2008
12	Fichtebunker museum	-	Museum	Berlin	WW2	-
13	Zwieseler Straße Bunker	Soviet Union	Storage	Berlin	1940s	Use between 1945- 1994
14	Heckeshorn Bunker	Berlin- Zehlendorf Hospital Company	Hospital	Berlin	1934	Use between 1973- 2006
15	Humboldthain Flak Tower	Gustav Meyer design the Park and area	Viewing Area Connected to the Park Landscape	Berlin	1941- 1942	1950s
16	Berlin Story Bunker	Private Institution	Museum	Berlin	1942	-
17	Bunker No 7 Bielefeld/ Neustadter Strasse	Hauer Architect	Residential Building/ Commercial Unit	Bielefeld	1942	2012
18	Sedanbunker	Poggenhans + Mühl Architects BDA	Gallery of Private Collection / Residential Building	Bielefeld	1942	2017
19	Exzenterhaus	Gerhard Spangerberg Architectural Office	Office Building	Bochum	1942	2013
20	Zentral Massiv	Thomas Stark	Educational Use	Bochum	1940	2013
21	Poppelsdorf Hochbunker	Rheininvest GmbH & Co KG	Residential Building	Bonn	1941	2006
22	Bunker Madamenweg	-	Residential Building	Braunsch- weig	1942	2013
23	Togostraße Diako-Bunker F81	Diako Hospital Company	Part of Hospital	Bremen	WW2	2012

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
24	Bunker Valentin	Group of Denkort Bunker Valentin	Museum	Bremen	1945	2011
25	Bunker F 56	Rainer Mielke und Claus Freudenberg	Residential Building	Bremen	WW2	2011
26	Bunker F42	Rainer Mielke und Claus Freudenberg	Residential Building	Bremen	WW2	2006
27	Galeria Bunker F38	Rainer Mielke und Claus Freudenberg	Residential Building/ Art and Music Gallery	Bremen	WW2	1999
28	Bunker F51	Rainer Mielke und Claus Freudenberg	Residential Building	Bremen	WW2	2008
29	Bunker B35	Rainer Mielke und Claus Freudenberg	Music Studio	Bremen	WW2	2009
30	Zoo- Bunker	-	Shop of Zoo Expert	Bremen	WW2	-
31	Bunker Moselstraße	Architektur Büro BDA	Residential Building	Bremen	WW2	2018
32	Sebaldsbrüker Bahnhof Bunker	Mike Wilshusen	Residential Building/ Commercial Unit	Bremen	WW2	2022
33	Hans-Böckler- Straße Bunker	WFB and Zucker e.V. Association	Club/ Cultural place	Bremen	WW2	Transfor ms begin 2021
34	Zwingli- Hochbunker	Colocation-IX GmbH	Data Center	Bremen	1944	2017
35	Bunker F76	-	Music Studio	Bremen	1945	2012
36	Haus S7	Schamp & Schmalöer Architektur und Stadtplanung Bda	Residential Building	Dortmund	WW2	2016
37	Leierweg Bunker	Architekten bertbielefeld&p artner Ruckbauunterne hmen	Residential Building	Dortmund	WW2	2015
38	Atroper Straße Rheinhausen Hochbunker	-	Residential Building	Duisburg	1943	2011
39	Rheinhausen Günterstrasse Hochbunker	-	Textile Factory	Duisburg	1941	1950

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
40	The Papillon In Dusseldorf Heerd	Thomas Luczak	Residential Building	Dusseldorf	WW2	2015
41	Kölner Landstraße Bunker	-	Used by Some Artists	Dusseldorf	1942	2013
42	Gerresheim Bunker	-	Residential Building	Dusseldorf	1944	-
43	Kulturbunker	-	Cultural Center	Emden	WW2	2005
44	Holzägerstraße Bunker	Bunkermuseum e.V. Company	Museum	Emden	1942	-
45	Borssum Bunker/ Emder Stadtarchiv	-	Archiv	Emden	WW2	2005
46	Essen-Hutrop Bunker	Martin Heimeier	Residential Building	Essen	1942	2009
47	Artist House	-	Artist House	Frankfurt	1943	2004
48	Culture Bunker	Index Architect	Music Institute	Frankfurt	1940	2004
49	Bunker Arminstrasse Gelsenkirchen	Josef Franke and Others	Residential Building/ Commercial Unit	Gelsenkir- chen	1941- 1944	1996- 1997
50	Bunkermuseum Hagen	Historical Centrum Hagen cooperation	Museum	Hagen	1940	2013
51	Ricklinger Strasse Hochbunker	AXIA Vermögensverw altungs und Beteiligungs GmbH Rückbauunterne hmen BBT Betonbohr- und Sagetechnik GmbH	Residential Building	Hannover	1940	2015
52	Bispinger Weg Bunker	B41-New Urban Living UG Rückbauunterne hmen J.&F. Schmitt GmbH & Co. Betonbohr- und Sagetechnik KG	Residential Building	Hannover	-	2015
53	Bunker BHT	Rainer Mielke und Claus Freudenberg	Residential Building	Hannover	-	2012

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
54	Institute Building Allende-Platz University	Tlb Architekten Ingenieure	Institute Building	Hamburg	1942	2007- 2008
55	Bunker 43	MRJ Architekten	Residential Building/ Commercial Unit	Hamburg	1943	2004
56	Regerstrasse Hochbunker	Architektur büro Solvie	Residential Building	Hamburg	-	2009
57	Marienthaler Strasse Hochbunker	Sven Miller	Dormitory	Hamburg	-	2011
58	Energy Bunker	Hegger Hegger Schleiff Architekten	Cafe/ Energy Santral/ Mix Use	Hamburg	1943- 1945	2013
59	Eilbeker Weg Hochbunker	Rainer Mielke und Claus Freudenberg	Residential Building	Hamburg	-	2014
60	Schellingstrasse Hochbunker	Sven Miller. BWH BAUWERK HAMBURG Planungs GmbH	Residential Building	Hamburg	-	2010
61	Turmbar	-	Bar and Entertainmen t venue	Hamburg	1939- 1941	-
62	Friedensallee Hochbunker	Frieda Ottensen	Residential Building	Hamburg	1942	2016- 2019
63	Wohn Ufo	Aman Properties Company	Residential Building	Hamburg	1943	2017
64	Allendeplatz Bunker University Institutes Headquarters	-	Educational Use	Hamburg	1941- 1942	2007- 2008
65	Rotherbaum University of Hamburg Faculty	-	Educational Use	Hamburg	WW2	1975
66	Tonistraße Hochbunker	-	Residential Building	Hamburg	WW2	-
67	Heussweg	Andreas Thomsen Architekten	Residential Building/ Commercial Unit	Hamburg	1942- 1943	2001
68	Rothebach Bunker	Michael Amort	Residential Building	Hamm	1942	2006- 2007

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
69	We-house Herne	ARCHY NOVA Projektentwickl ung GmbH	Residential Building	Herne	WW2	2018
70	Rheinhafenstraß e Bunker/ Bunker Appenmühle	-	Music Studio	Karlsruhe	1942- 1943	1980
71	Gaardener Ring Bunker	Schnitterger Architekten+ Partner	Office Building	Kiel	WW2	2024
72	University of Applied Sciences Computer Museum	Building management Schleswig- Holstein	Museum	Kiel	1941	2009- 2011
73	Kiel Bunker	-	Cultural Building	Kiel	1944	2007
74	Werkstattstrasse Bunker	Luczak Architekten	Residential Building	Koln	1942	2004
75	Herthastrasse Bunker	Architekten Karl Jankowski. Jankowski Architekten Stadtplaner Koln	Residential Building	Koln	-	2008
76	Ludwigshafen Mundenheim Bunker	A Private Investor	Residential Building	Ludwigsh afen	1941	2016
77	Marchivum	Schmucker und Partner	Archive	Mannhei m	1940- 1943	2018
78	Claude-Lorrain- Strasse Bunker	Binnberg+ Eberle	Residential Building	Munich	-	2005
79	Lautenschlagers trasse Bunker	Donata Eberle	Hotel	Munich	-	2014
80	Ungererstrasse Bunker	Ziegler Betonbohr & Betonbohrservic e GmbH	Office with exhibition space	Munich	1941	2013
81	Wohnen im Turm	Binnberg Architekten	Residential Building	Munich	WW2	2005- 2006
82	Sendlinger Bunker	-	Cultural and social use	Munich	WW2	2015
83	Bunker Quellenstrasse	-	Music and Theather School	Munich	1942	2015
84	Ungererstraße Bunker	Stefan F. Höglmaier	Office and Residential Building	Munich	1943	2012- 2014

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
85	Tumulka Art Bunker	-	Art Center	Munich	1942	1993
86	Schützenhofbun- ker	Kurscheid & Partner	Residential Building	Münster	-	2016
87	Bunker Güdderath	Private Property	House	Mönchen- gladbach	WW2	2019
88	Neuwerk Bunker	Rosin Haus GMBH	Residential Building	Mönchen- gladbach	WW2	-
89	Landgrabenstraß- e Hochbunker	Museum Industriekultur	Museum Warehouse	Nürnberg	1940	2011
90	Grübelstraße Hochbunker	-	Residential Building	Nürnberg	1941	1990
91	Bleiweiss Hochbunker	-	Educational Use	Nürnberg	1942	2018
92	Leyerstraße Hochbunker	-	Residential Building	Nürnberg	1940	-
93	Ziegelstein Hochbunker	-	Residential Building	Nürnberg	1941	-
94	Ruhrgebiet Bunkermuseum	-	Museum	Oberhaus- en	-	2001
95	Offenbach- Bürgel Hochbunker	Frank Andres Dipl.-Ing. Mimar BDB	Residential Building	Offenbac- h	WW2	2014- 2015
96	Buerschen Straße Hochbunker	-	Residential Building	Osnabrüc- k	1942	2014
97	Recklinghausen Art Gallery	FAJE+KEMPE R	Art Gallery	Recklingh- ausen	WW2	2012
98	Remscheid Hochbunker	Private Company	Furniture Warehouse	Remschei- d	1941	-
99	Bunker Rostock	Rostock e.V. Kulturkombinat Bunker Association	Cultural Combination Mix use Bunker/ Climbing/ Karaoke	Rostock	WW2	-
100	Bunker 1	Internett GmbH	Data Center	Saarbrück- en	WW2	2017
101	Hochbunker Solingen Ohligs	-	Office Building	Solingen	1942	2004
102	Bw131 Unterturkheim Sattelstrasse	-	Residential Building	Stuttgart	1941- 1942	2017
103	Badstrasse Bunker	-	Rehearsal Room	Stuttgart	1941- 1942	1998
104	Pragbunker	Bosch Company	Office Building	Stuttgart	1941- 1942	1988
105	Bunker Talstrasse 71	Bunker GMBH & Co. Kg	Residential Building	Stuttgart	1942	2019

No	Project Title	Architect/ Office	New Function	City	Constru- -ction Year	Transfor- -mation Year
106	SattelStrasse Hochbunker	Bavyera Grünwald Company	Residential Building	Stuttgart	-	2017
107	Trilateral Wadden Sea World Heritage Partnership Center	Dorte Mandrup	Office Building	Wilhelmh aven	WW2	2018
108	Schwelmer Straße 71 Hochbunker	-	Residential Building	Wupperta l	1941	2011



APPENDIX B: INTERVIEW OF THE PROJECTS

Interview with Thomas Luczak about the transformation of Hochbunker at Koln



T.C. YEDITEPE UNIVERSITY
Graduate School of Natural and Applied Sciences
ARCHITECTURE PROGRAM MSc Thesis

Date _____

Sehr geehrte Frau / Sehr geehrter Herr ...

mein Name ist Gülistan Yakut und studiere Architektur im letzten Mastersemester an der Yeditepe Universität in Istanbul, Türkei. Meine Thesis schreibe ich über die Transformation von Notunterkünften und dem kollektiven Gedächtnis in Deutschland, wobei ich von Assist. Prof. Moira Valeri betreut werde.

Auf der Suche nach Informationen bin ich auf Ihre Projekte aufmerksam geworden. Ihre interessanten Projekte weckten in mir den Willen auf ein Interview mit Ihnen in meine Abschlussarbeit hinzufügen. Für weitere Informationen können Sie jederzeit mit mir oder meiner Betreuerin Kontakt aufnehmen. Ich freue mich auf Ihre Antwort und danke Ihnen im Voraus, dass sie sich die Zeit genommen haben.

Mit freundlichen Grüßen,
Gülistan Yakut

Sie können diese Fragen nach Ihrem beliebigen auf Deutsch oder Englisch beantworten.

Fragen

1. Welche Faktoren bestimmen die Entscheidung, ob die Notunterkunft umgenutzt oder abgerissen werden soll? Haben Sie als Folge, Reaktionen der Gesellschaft für die Transformation dieser Unterkünfte erhalten, an der Sie gearbeitet haben? War die Gesellschaft diesbezüglich derselben Meinung wie Sie oder dagegen? *Seitens des Investors standen wirtschaftliche Fragen im Mittelpunkt. Die Umnutzung war atmosphärisch etwas besonderes, was für bestimmte Leute interessant ist. Der Umbau stieß auf große Zustimmung, sowohl der Nachbarn als auch der Fachöffentlichkeit. Es bestand Konsens.*
2. Sind Sie während eines Bunkerumbaus auf technische Probleme, wie zum Beispiel dem vorhandenen Baugrund, die Dicke der Wände, die Wärmedämmung, keine Öffnungen und die Belüftung, aufgrund des Anpassungs- und den neuen Funktionsprozesses gestoßen? Falls ja, wie haben Sie es gelöst? *Alle beschriebenen technischen Probleme ist bei allen Bunkerumbauten ein Thema. Die notwendigen Eingriffe in den Bunker sind mindestens so teuer wie ein Neubau, allerdings müssen die Abrisskosten hinzugerechnet werden. Abriss/Neubau ist nur in hochwertigen Lagen gefragt. Ohne ästhetisches und/oder historisches Interesse ist ein Bunkerumbau wenig wahrscheinlich.*
3. Die Bunker haben eine wichtige Rolle in der Geschichte. Denken Sie, dass während dessen Umwandlung die Identität, die sich in die Umgebung und der Stadt eingebettet hat und die räumliche Erinnerung, Risiken ausgesetzt ist? Wer hat das Sagen, wenn es um dessen Umnutzung geht? Die Gesellschaft, der Architekt, der Staat, ...? *Die Identität geht leicht*

verloren, wenn nicht wenigstens die Struktur und Besonderheit des Gebäudes reflektiert wird. Die Bedeutung der Bunker ist ambivalent, schützend für Opfer, die gleichzeitig Täter sind.

4. Projekt : Hochbunker transformation

Nach meinen Recherchen wollte die Umgebung keine Kontinuität des Notunterkurfes und auch keine Elemente, die Erinnerungen dazu hervorrufen. Gab es deshalb Druck oder andere Auswirkungen während der Konzeptfindung und dem Entwurf? Worauf haben Sie währenddessen geachtet? Wie war die Reaktion der Gesellschaft vor und nach dem Projekt? *Es gab keinen Druck, die Ära der Notunterkünfte war lange vorbei, die Nutzung für Zivilschutzeinrichtungen abgeschafft und es gab vor- und nachher eine allgemeine Bejahung der Umnutzung.*

Interview with architect Guido Höfert (Hegger Hegger Schleiff Architekten architecture office) about the transformation of Energy Bunker



T.C. YEDITEPE UNIVERSITY
Graduate School of Natural and Applied Sciences
ARCHITECTURE PROGRAM MSc Thesis

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Fragen

Welche Beiträge leistet der technische Nutzen an dieser Stelle zur Umwelt?

Der Bunker ist ein bestehendes Gebäude. Die Sanierung war insofern ein Beitrag, als dass das Gebäude nicht energieaufwendig abgerissen werden musste. Die Bausubstanz wurde genutzt, um eine Energieversorgungszentrale für ein Quartier umzusetzen. Durch die Konzeption der Technik und den zur Verfügung stehenden Raum konnte die Leistung der gesamten Wärmezentrale reduziert werden. Ein Teil der Energieerzeuger arbeitet zudem mit regenerativen Brennstoffen. Darüber hinaus wird Industrieabwärme verwertet und Sonnenenergie für Wärme und Strom umgewandelt.

Was war die Reaktion der Gesellschaft während des Umbaus?

Die Bewohner waren erleichtert, dass der Bunker erhalten wird, weil sie mit dem Gebäude im Quartier aufgewachsen sind und der Bunker zum Quartier gehört. Sorge hatten sie wegen der Emissionen durch die Wärmeerzeuger. Positive Resonanz gab es wegen der Öffnung für die Öffentlichkeit (Café, Aussichtsplattform). Staub und Lärm hat vor allem die Bewohner der unmittelbaren Umgebung belästigt und für Ärger gesorgt.

Sind Sie während der Bauphase auf schwierige Situationen gestoßen?

Dauernd. Die Bausubstanz war noch schlechter als angenommen. Sanierungsansätze mussten neu überdacht werden. Durch die Unwägbarkeiten geriet der Zeitplan durcheinander. Bauabläufe mussten ständig angepasst werden.