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Alternative Architectural Practices

Examining Volu-te as a Dormitory Model in the Context of Existenzminimum Principles

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I am excited and proud of completing my master's thesis, which I have prepared with intense effort and devotion. I would like to thank the individuals and institutions who have supported me throughout this process. I am really grateful to my dear Thesis Advisor (Assist. Prof. Dr. Ozan Avcı) and Thesis Co-Advisor (Assoc. Prof. Dr. Ayşe Hilal Uğurlu), for their valuable guidance, reviews and recommendations. I would like to thank Zeynep Ulusoy and my dear other Master teammates at MEF University, for whom I had the opportunity to experience the alternative design and production process together. I would like to thank my Studio Instructor Oral Göktaş for the valuable ideas he contributed to my thesis. I would like to thank Istanbul Technical University Scholarships and Dormitories Coordinatorship for the opportunities and assistance they provided me during the research. My dear family, who have always been by my side and supported me throughout my education life; I would like to thank my sister Setenay Oğuz, my brother Efe oğuz, my mother Vildan Dadasınlıoğlu and my father Recep Baydemir. Lastly, I would like to thank the Karayılan family, especially my fiancé Gökberk Karayılan, who gave me hope and endless support even in the most difficult moments throughout the process.

Abstract

Today's living conditions and changing world order, the period we live in (2021) remains uncertain. Health problems arising from global warming and population growth constitute this period of uncertainty. As part of this period, students have to meet their accommodation needs within unclear timeframes. When the number of students and dormitory capacities are compared; insufficient capacities and pricing that low-income families cannot reach. In order to determine the dormitory problems, an analysis of the dormitories in Istanbul and a detailed analysis of Istanbul Technical University state-owned dormitories were made. Dormitory rooms should be areas where maximum efficiency should be achieved in the minimum area that provides the minimum living conditions. The Volu-te Project, which was designed on the concept of "Small Scale", constitutes one of the main examples of the thesis. "Volu-te Project" is a micro accommodation unit proposal for individuals in need of temporary accommodation. It is the end product of a collective research-design process by MEF University students[1] and studio instructor[2]. Volu-te aims to reveal the potentials of surplus areas created in dense and complex city planning in mega cities such as Istanbul. In this direction, it was determined that the dormitory problems were similar to the problems that were effective in the formation of the "Existenzminimum" concept, and a parallel reading was made. The 5 panel topics[3] discussed in CIAM II were determined as Existenzminimum design principles. Alternative dormitory projects were examined with reference to Existenzminimum design principles. "Volu-te" as an alternative dormitory was discussed in line with these principles. As a result of the dormitory and minimum life review, the Volu-te project is presented to Istanbul Technical University as a dormitory proposal. The situations that we may encounter in the future scenarios and the advantages of alternative projects on the other hand are discussed.

Keywords: Existenzminimum, CIAM II, MinToMax, Minimum Dwelling, Dormitories Living Standards, Istanbul Technical University Dormitories, Alternative Dormitory Designs, Volu-te, Micro Living Unit

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Özet

Günümüz yaşam koşulları ve değişen dünya düzeni ile içinde bulunduğumuz dönem(2021) belirsizliğini korumaktadır. Küresel ısınma ve nüfus artışı ile ortaya çıkan sağlık sorunları bu belirsizlik dönemini oluşturmaktadır. Öğrenciler bu döneminin bir parçası olarak net olmayan süre zarfları içerisinde konaklama ihtiyaçlarını karşılamak durumundadır. Öğrenci sayıları ile yurt kapasiteleri karşılaştırıldığında; yetersiz kapasiteler ve düşük gelirli ailelerin erişemediği fiyatlandırmalarla karşılaşılmıştır. Yurt sorunlarını saptamak amacıyla; İstanbuldaki yurtların analizi ve detaylı olarak İstanbul Teknik Üniversitesi devlet yurtları incelemesi yapılmıştır. Yurt odaları asgari yaşam koşullarını sağlayan minimum alanda maksimum verim elde edilmesi gereken alanlar olmalıdır. ''Küçük Ölçek'' kavramı üzerinden tasarlanmış olan Volute Projesi tezin ana örneklerinden birini oluşturmaktadır. "Volu-te" geçici konaklama ihtiyacı olan bireyler için mikro barınma ünitesi önerisidir. MEF Üniversitesi öğrencileri[4] ve stüdyo yürütücüsü[5] tarafından kolektif ilerleyen bir araştırma-tasarım sürecinin son ürünüdür. Volu-te, İstanbul gibi mega kentlerde yoğun ve karmaşık şehir planlamasında oluşan artık alanların potansiyellerini ortaya çıkarmayı hedeflemektedir. Bu doğrultuda yurt problemlerinin, "Existenzminimum" konseptinin oluşmasında etkili olan problemlerle benzerlik gösterdiği tespit edilerek paralel bir okuma yapılmıştır. CIAM II de tartışılan 5 panel[6] konusu, Existenzminimum tasarım ilkeleri olarak belirlendi. Existenzminimum tasarım prensipleri referans alınarak alternatif yurt projeleri incelenmiştir. Alternatif bir yurt olarak "Volu-te" bu prensipler doğrultusunda tartışılmıştır. Yurtlar ve minimum yaşam incelemesi sonucunda Volu-te projesi İstanbul Teknik Üniversitesine bir yurt önerisi olarak sunulmaktadır. Gelecek senaryolar da karşımıza çıkabilecek durumlar ve alternatif projelerin buna karşın sağlayacağı avantajlar tartışılmıştır.

Anahtar Kelimeler: Existenzminimum, CIAM II, MinToMax, Minimum Konut, Yurtların Yaşam Standartları, İstanbul Teknik Üniversitesi Yurtları, Alternatif Yurt Tasarımları, Volu-te, Mikro Yaşam Birimi

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6. [''(1) İnşaatta Yenilikçilik ve Maliyet-Etkinliği, (2) Asgari Kalite Standartları, (3) Ev Düzeninin Yeniden Tasarlanması, (4) Mimarlık ve Şehir İlişkisi, (5) Toplum İnşası ve Sosyal Endişe'']

Table of Contents

List of Figures

Introduction

In this study, Volute, end product of a collaborative research and design process that was developed in the 2019 - 2020 AAP Alternative Architecture Practices Graduate Program at MEF University, based on research on minimum living conditions and the concept of Existenzminimum, is considered as an dormitory model. In this research, the use of Volute as an alternative dormitory model was carried out with a placement plan in Istanbul Technical University state-owned dormitories. The aim of this study is to investigate the future potentials of Volu-te, which is an add-on modular system, together with the existing dormitories, rather than finding the absolute solution to the dormitory needs in ITU.

The 2020s, which started with the global pandemic, can be defined as a period of uncertainty. Decisions and plans which are made during this period are variable. Adults who are seeking new ways and a change, constitute the population of the most affected by the uncertainties of the period. Some of this population is students who come to Istanbul from different provinces for education. Before the pandemic; students stayed in dormitories, shared houses, or relatives' homes during their education. However; in the course of the quarantine, they had to return to their homes due to dormitory policies. For exams, when they had to briefly return to school, they sought out new accommodation solutions. This uncertainty has brought along a big accommodation problem. Volu-te sees the search for temporary accommodation of the adults in transition who live the busy city life; as a potential. The project is not the only solution to all these problems. It proposes an alternative life in temporary micro-housing only for megacities. It creates a unity and defines a network in the city by settling individually in the existing spaces in populated cities such as Istanbul. The idea of the urban network combines the efficiency of being small with the power of coming together. It aims to occupy as little space as possible on the limited and valuable lands in the city. Volu-te is a compact micro-living unit with a diameter of 2.4 meters and a height of 6 meters, where basic functions such as sleeping, feeding, resting, and cleaning can be performed. The adjective "micro" does not only describe the dimensions of the space it describes the effort to be minimal in every content.

7. Sara Brysch, Reinterpreting Existenzminimum in Contemporary Affordable Housing Solutions, 4

Being minimal includes the arrangement of the space to the materials to be used, the energy it consumes to the effort to build. “Volu-te” was designed for Istanbul. It is a proposal for a dormitory model with ecological, sustainable, economical, and innovative production potentials.

Alternative projects such as the Volu-te project, designed in line with the current dormitory problems, and the investigation of the potentials that these projects will provide in future scenarios constitute the main idea of the thesis. The research started with the examination of dormitories and dormitory principles. Istanbul Technical University state-owned dormitories have been examined in detail. In this section, the existing dormitories were examined and the living conditions in the dormitories were investigated. The effects of dormitory principles on designs were investigated, current problems and their reasons were resolved. Basically, it is necessary to achieve maximum efficiency in minimum space in dorm rooms. In this direction, minimum living conditions were investigated in order to determine the necessary accommodation comfort for students.

In the second part, the concept of MintoMax, which was the subject of discussion in 1920s Germany, was examined. The theme of the 2nd CIAM(International Congress of Modern Architecture) held in Frankfurt in 1929 was the concept of Existenzminimum. One of the main topics of the Existenzminimum concept is the Min Max concept. Research has progressed through minimum dwelling design. It is aimed to achieve maximum efficiency in the minimum area of the dwelling. The report published in CIAM II was examined under 5 headings[7]. ‘’(1) Innovation and Cost-Effectiveness in Construction, (2) Minimum Quality Standards, (3) Redesign of Domestic Layout, (4) Relationship between Architecture and the City, (5) Community Building and Social Concern’’ are determined as Existenzminimum design principles. Under these headings, discussions were evaluated by leading architects, and examples were discussed in the context of these principles.

In the third chapter, the relations of Existenzminimum with dormitories are defined. While the concept of Existenzminimum aims to achieve maximum efficiency in the minimum area, as in dormitory projects, designs are made for low-income families. Since it is a periodic discussion topic and the subject progresses through housing, the concept of Existenzminimum has been associated with dormitories and a reading has been made by adhering to today’s conditions.The reasons and alternative solutions in the creation of the concept of “Existenzminimum”, have been investigated.

The aspects that are effective in the formation of the concept of "Existenzminimum" correspond to dormitory problems in Istanbul. For this reason, Existenzminimum and dormitory standards were evaluated together. It has been determined that the dormitory projects have a design strategy in line with Existenzminimum housing designs.

Dormitory projects that propose alternatives are examined in the fourth chapter. Dormitory projects are researched by examining the principles determined in the Existenzminimum design. Volu-te and alternative dormitory projects are examined under 5 headings based on Existenzminimum design principles.(Volu-te project constitutes the main dormitory example of the thesis since it is a design shaped by the limits of minimum living standards. Therefore, under each design principle, the alternative offered by the Volu-te project in relation to that section is examined.

In the fifth chapter, a proposal is presented in which Volu-te is positioned as a dormitory model in universities in future scenarios. The necessary site conditions for the situations in which it is located in universities are defined. Single positioning, Dual placements and multi-layout rules are explained. After this section, the priorities and obligations required for the selection of the Volu-te project area are stated. At the end of the chapter, the Volu-te project was proposed as an alternative dormitory example for two areas in the Istanbul Technical University Ayazağa Campus, based on the settlement rules, and the potential of shared living spaces between each other and the dormitories were investigated.

Dormitories and dormitory policies in Istanbul

01

In the research, current student accommodation and dormitory problems in Istanbul were analyzed. According to the data of 2021; in Istanbul, there are 1 million 834 thousand university students[8] and the capacity of state-owned dormitories (KYK) is 26.725[9]. Dormitory numbers and student numbers do not overlap each other. This disproportion has directed many students to seek alternative accommodation models. Different dormitory projects were examined to identify dormitory problems. The research begins with the determination of current state-owned dormitory standards and private dormitory standards. Apart from these two dormitory models, there is also a university dormitory. To deepen the research, the student dormitories of Istanbul Technical University were selected and examined through examples. The reasons for the insufficient capacity in the dormitories were investigated by examining the plans and pictures. The dormitory needs and expectations that emerged with the changing generations and user profiles were investigated. These differ according to the efficiency of the dormitory departments of ITU (Istanbul Technical University) and changing generations.

'1.1. Regulations for different dormitory types'

"In Istanbul, there are 60 universities in total, 13 state universities,3 foundation vocational schools and 44 foundation universities[10]. In addition to these, there are Air and Naval Military Schools. "The total number of university students in İstanbul studying is 1 million 834 thousand. 553 thousand 203 students study at state universities, 440 thousand 586 students at private universities, and 8 thousand 45 students at foundation vocational higher schools."[11]

According to the academic calendar, students usually stay in dormitories from September to January and from February to June. Many dormitories remain vacant during the summer.

8. Republic of Turkey Government of Istanbul, The City of Universities; Istanbul, August 2019, accessed February 2021; http://en.istanbul.gov.tr/the-city-of-universities-istanbul

9. MEB (Ministry of National Education), National education statistics (2020-2021), pg.236, accessed December 2021; https://sgb.meb.gov.tr/meb_iys_dosyalar/2020_09/04144812_meb_istatistikleri_orgun_egitim_2019_2020.pdf

10. YOK (Council Higher Education), Universities in Istanbul, accessed December 2021; https://www.yok.gov.tr/universiteler/universitelerimiz

11. Republic of Turkey Government of Istanbul, The City of Universities; Istanbul, August 2019, accessed February 2021; http://en.istanbul.gov.tr/the-city-of-universities-is-

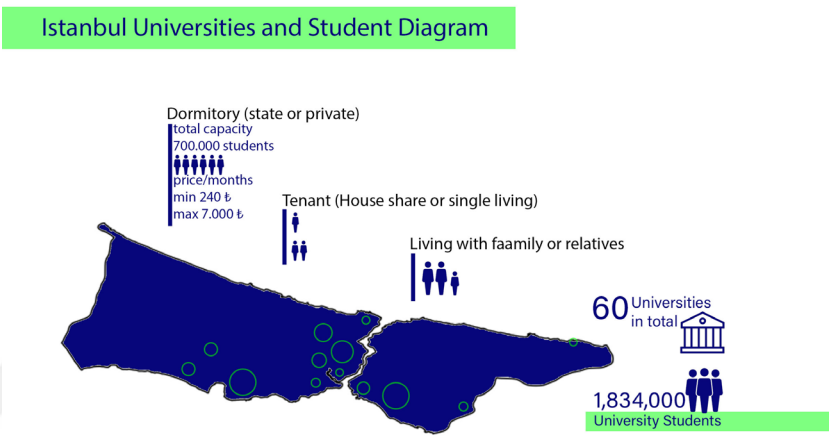


Figure 1: Universities and students accommodation diagram(2021)

According to the statement made by Minister Kasapoğlu in 2021; The number of students applying to KYK dormitories is approximately 624 thousand, but the number of students who can settle in is approximately 430 thousand. It is seen that 70 percent of the students have accommodation in state-owned dormitories. 30 percent of students can not find a dormitory.[12]

Considering the university dormitory capacities; according to the average of the last 5 years of ITU Dormitories, 800 of 1800 applications can be accepted. 500 vacant students are placed in the middle of the semester (May 31) according to the changing student status. The remaining 400 people are included in the list for the next year.[13]

The capacity of dormitories is insufficient compared to the number of students. As stated above, approximately 2 million students live in Istanbul. For this reason, students who cannot find a place in dormitories start looking for alternative accommodations such as sharing houses with other students, single living, and living with their families or relatives.

There are 24 KYK dormitories in Istanbul. [14] Although the dormitories have similar spatial organization schemes, there are also new KYK dormitories with better spatial organizations. KYK dormitory standards can be defined as the provision of spatial requirements, sleeping area, storage space, and proper hygiene requirements. Besides, with the innovations in interior design, more efficient space has been obtained. At the same time, shared areas were personalized with the use of different materials and colors. Therefore, it offers private areas for users.

12. Dormitory Capacity, Hürriyet News, Agenda News, accessed December 2021; accessed December 2021; https://www.hurriyet.com.tr/gundem/son-da-kika-bakan-kasapoglu-yurt-tartismasina-yanit-ver-di-yuzde-70e-yakini-yerlesti-41906198

13. Istanbul Technical University Scholarships and Dormitories Coordinatorship, accessed May 2022; https://yurtburs.itu.edu.tr/iletisim

14. General Directorate of Loans and Dormitories, accessed February 2021; https://kygm.gsb.gov.tr/Yurt-Mudurlukleri

According to the data of the Ministry of Youth and Sports, the monthly fee of KYK dormitories in the 2020-2021 academic year varies between 230 TL and 390 TL.[15] Recently built KYK dormitories such as 1453 Girls' Dormitories' price is 200TL more than the others due to different interior design with the use of color in the dormitory rooms, it is ensured that the personal areas in a common space are limited without a specific closure. As seen in Figure 2; The furniture used is specially designed according to the dormitory plans.

Other affordable KYK dormitories have a traditional plan scheme and furniture of the dimensions specified in the dormitory regulations. Dormitory Regulations[16] require ; a nightstand (50x50 cm), a desk (65x80 cm), a chair (50x50 cm), a wardrobe (50x50 cm), , abed (90x190 cm), and a shoe rack (50x50 cm) for each student and a one 60cm x 60cm mini refrigerator (60x60 cm) for common use. According to the same regulations, a minimum 60 cm space should be left for the circulation between furnitures. The majority of the dormitories consist of triple and quadruple rooms. The total usage areas in standard rooms are 29 m² in a triple room and 30 m² in a quadruple room. Room size changes only 1 m2 for an added person.

Dormitories are providing accommodation in the city center in such a crowded city like Istanbul. However; there are a high number of students staying in the rooms, the fact that while studying a 4-year department, there is a requirement to leave the dormitories of the school.

There are 3 types of room schemes such as dormitories, apartments, and studio apartments. "In the dormitories, quotas are determined in a way that a minimum volume of 10 m³ is provided for each student. Single rooms in student dormitories and pensions cannot be smaller than 8 m². When the Dormitory area is calculated for each person, bathroom areas are not included. The student quota for an apartment varies between 1, 3, and 6 students.

In student apartments, a minimum area of 8 m² is determined for a student. The studio flat can accommodate 1 to 3 students. A Student studio flat includes at least 20 m² areas for a student and it has at least 40 m² areas for 3 students."

Private student dormitory prices vary; however, they are always higher than state-owned dormitory prices. While the annual average fees of state-owned dormitories are around 3,000 TL, private dormitories reach 40,000 TL. According to the regulations for private student dormitories.[17]

15. Republic of Turkey Ministry of Youth and Sports, accessed February 2021; https://kygm.gsb.gov.tr/

16. T.R. Ministry of Youth and Sports General Directorate of Higher Education Credit and Hostels Institution, Pre-Protocol, 2015, 6.

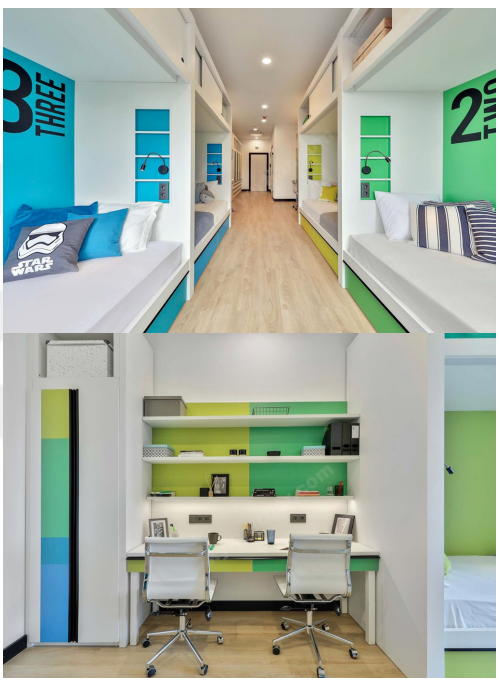


Figure 2: 1453 Girls' Dormitory, Esenyurt, İstanbul (Source: 1453 Girls' Dormitory photos, accessed February 2021; https://www.kykyurtlar.com/1453-ogrenci-yurdu-54676-kyk-yurdu/

17. Directive on Standards of Private Student Accommodation Service Institutions and Working Procedures and Principles, 5. , accessed February 2021;https://ookgm.meb.gov.tr/meb_iys_dosyalar/2018_04/11120321_Yzel_YYrenci_BarYnma_Hizmeti_KurumlarYnYn_StandartlarY_ile_YalYYma_Usul_ve_EsaslarY_HakkYnda_YYnerge.pdf

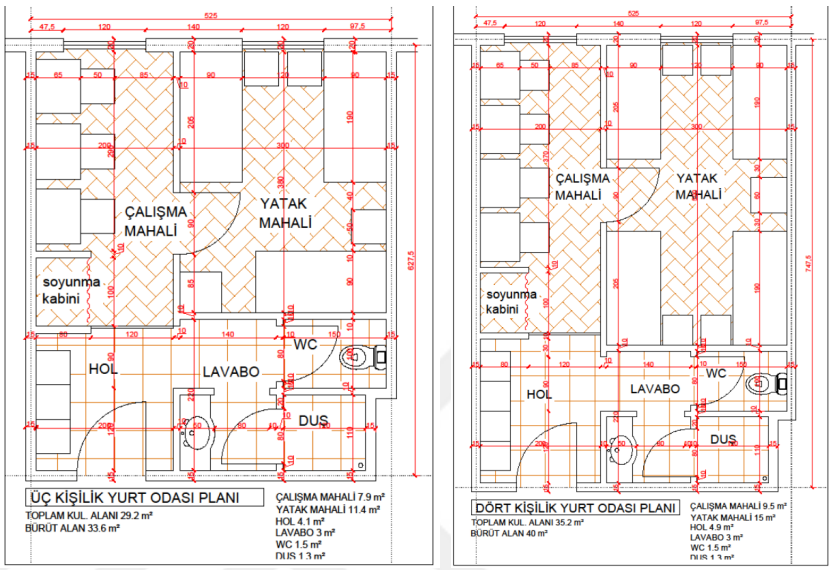


Figure 3: Dormitory Regulations, Plan Scheme (Source: T.R. Ministry of Youth and Sports General Directorate of Higher Education Credit and Hostels Institution, Pre-Protocol, 2015, 21-22. , accessed February 2021

Despite their high prices; private dormitories have a larger square meter area than state-owned dormitories and an interior designed according to the usage needs of the student. Due to the limited quota of state-owned dormitories, many students cannot find a place for them. For this reason, students prefer private ones. Private dormitory prices are too high for low-income families to afford. Many students have to find alternative accommodation solutions because the fees are not suitable and the quota is limited. It is important that the accommodation chosen meets student requirements and is economically accessible. Apart from state-owned and private, there are also university dormitories. At this point, Istanbul Technical University Dormitories are examined in detail.

‘1.2. Istanbul Technical University dormitories‘

In the facilities of Istanbul Technical University, there are 15 dormitories[18] available. Students’ basic requirements include dining halls, toilets, sleeping areas, working areas; and social areas are also located in dormitories. Dormitories offer different accommodation standards to the users. These standards range from minimum level to higher standards. The standards offered in male dormitories vary on a wide scale. Girls’ dormitories are less in number than boys’ dormitories. However, accommodation standards in girls’ dormitories are similar. It is a great advantage that accommodation standards vary on a wide scale. User profiles with different income levels can find dormitories in the segment they are looking for.

University dormitories appear to be more affordable than private ones, although they are not as affordable as state-owned ones. Generally, dormitory fees vary in a wide range, between 480 TL and 1680 TL per month for dormitories[19]. When university dormitories are compared with others, it is seen that they have similar standards with state-owned dormitories.

However, pricing is higher than state-owned dormitories. As stated above, KYK dormitories(2021) vary between 200-340 TL on average, while ITU dormitories are between 480 TL and 1680 TL per month. It is stated that the reason behind the increase in ITU dormitory prices is the cost and that the cost includes electricity, natural gas, and dormitory duty fees.[20] Along with high pricing, there are some expectations of the user. Apart from extra and special expectations, all dormitories are designed to provide basic living conditions.

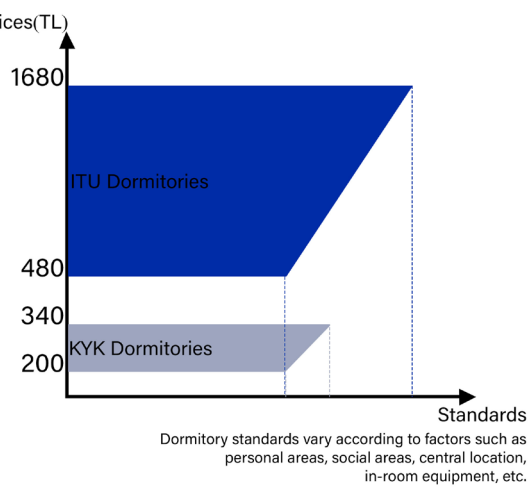


Figure 4: ITU and KYK Dormitories, prices comparison diagram

18. “These are; Ali İhsan Aldoğan Girls’ Dormitory (A-Block), Altan Edige Girls’ Dormitory, Arıoğlu Girls’ Dormitory, Ayazağa Girls’ Dormitory, Ayşe Birkan Girls’ Dormitory, Ferhunde Birkan Girls’ Dormitory, Gök Student Dormitory, Gölet Student Dormitory, Gümüşsuyu Male Student Dormitory, Gümüşsuyu Girls’ Dormitory, İMKB Male Student Site(Vadi Yurtları), Verda Üründül Girls’ Dormitory, Zeynep Birkan Girls’ Dormitory, Mezunlar Male Student Dormitory, Binali Yıldırım Male Student Dormitory.”

19. ITU Scholarships and Dormitories Coordinator, ITU Student Dormitories, 2019-2020, accessed February 2021; https://yurtburs.itu.edu.tr/haberler/2019/08/23/2019-2020-yurt-fiyatlar%C4%B1

20. Gökçe Sezgin, Selis Bayman, Arı24 youtube channel, accessed February 2021; https://youtu.be/jMI_CL-QFtM

In large and crowded cities like Istanbul, a lot of time can be lost in transportation. The fact that university dormitories are located on the campus eliminates transportation problems. In this way, students can easily arrive at their schools without spending time on transportation in crowded city life. It is very expensive and difficult to find a dormitory in the city center for students studying at universities that do not have dormitories. Considering the dormitory locations of state universities such as ITU, it provides a great advantage. While a dorm is supposed to be the only place where individuals can be alone in their room, sharing this area with a few people makes this difficult. In the Vadi dormitory, a separator was built between the beds to protect privacy in triple rooms. If privacy is evaluated through the isolation of the senses; the screen is 1 meter wide and therefore half of the body is visible. Although some of the privacy of the individuals lying side by side is preserved, their other senses such as sound, smell, and touch are not isolated.

ITU Gümüşsuyu male dormitory is used inefficiently with regards to the interior design and arrangement of the dormitory. One of the reasons is the furniture is not selected according to the size of the room plans.In ITU Vadi dormitory as seen in Figure 5, the range of motion of the chair is limited between the lying area and the work area. Table preferences and placement positions are large for the size of the room and it prevents comfortable use of the space. Instead of furniture designed appropriately for the space, existing furniture was used due to budget constraints.

Figure 5: Vadi Dormitory / ITU Dormitories promotional brochure (source: ITU Dormitories promotional brochure, . 20.)

In social areas; there is only one television for all the students and furniture are study tables which are not comfortable to sit and watch tv on. For this reason, students unable to find space for resting and socializing.

Figure 6: Gümüşsuyu Male Dormitory (Source: ITU Dormitories promotional brochure, 16.

Another issue that needs to be discussed is the effects of the changing life routine in dormitories. In time,the dormitory needs are changing with new generations and new cultures. Students' expectations from living places are also shaped accordingly. Changing living conditions and technological developments affect dormitory life. Every student has their own laptop or cellphone, they are studying and socializing online. Consequently the use of social areas is getting lower every year. According to Detection and Analysis of Socio-Cultural Features of University Students in Turkey, the average age of the students who continue their education at the university is 21.7[21]. Accordingly, the majority of students staying in dormitories range between 18-25 years old. We can say that the students who continue their education in 2021 coincide with this generation. The expectations of this generation from housing are different compared to other generations. With the technological developments brought by contemporary advances, physical activities leave their place to virtual tours. However, dormitory building plans and internal regulations do not change. In this direction, unproductive areas emerge with the changing dormitory life routine. As a result, it can be said that not all ITU Dormitories are used with high efficiency.

As stated above, the capacity of the both state-owned and University dormitories is insufficient compared to the number of students. When the dormitory examples are examined, it is concluded that this insufficient capacity is not due to the m² limitations but irregular planning. Due to the planning schemes and independent design of the furniture, the area was used inefficiently. Existing capacity can be used more efficiently in state-owned and University dormitories.

21. Mehmet Karakuyu, Selin Güzelgül Yöndem, Detection and Analysis of Socio-Cultural Features of University Students in Turkey (Istanbul instance), Marmara Coğrafya Dergisi, Issue:27, OCAK- 2013, 175.

Apart from the dormitory rooms, the capacity can be increased with changes in decoration and planning in the social study areas. With these changes, the interior spaces of the dormitory buildings will provide higher efficiency and the capacity will be increased. In addition to alternative and newly built examples, existing dormitory buildings in Istanbul have an inflexible plan scheme. The furniture used in interior spaces creates inefficient and inflexible use in the area. The restrictive plan scheme can not be adapted to the other user's profiles and accommodation needs. That is the reason, some activity places lost their former usage frequency in ITU Dormitories.

The dormitory rooms are planned to meet the living requirements in the minimum area depending on the square meter. The main concern in the dormitories should be to achieve maximum efficiency in the minimum area. Upon increasing the scope of the research, the concept of Min-Max, which was a subject of discussion in 1920s Germany, was examined. The Min-Max concept is one of the main concerns of the Existenzminimum design principle[22]. The aim is to achieve maximum efficiency in the minimum area. The concept of minimum doesn't only imply minimum square meter, but a minimum in every sense, from the use of space to the costs of building production techniques.

22. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 33.

Examination of the Existenzminimum concept

02

After the first World War , with the housing crisis in Germany during the Weimar Republic period, discussions on the concept of minimum housing took a start. Housing crisis; It has been the subject of debate for a long time in Germany. Poverty and housing problems spread to every layer of society, affecting the majority.[23] According to J. David Hulchanski, who has a study on affordability of housing(2015), if a household pays more than a certain percentage of its income for housing, this could be considered a problem of affordable housing[24]. Karel Teige, who is a modernist avant-garde artist and an active participant in CIAM[25] in the 1920s and '30s, is the author of The Minimum Dwelling, and he handles the housing crisis and poverty in his book.

The number of people looking for housing is more than the number of available houses.This shortage continues to increase due to the unhealthy, inadequate and poor quality of existing housing. According to statistics; rents correspond to more than half of the income level of 3 out of 4 people[26]. In this period, apart from the problems such as the housing crisis and unaffordable rents, there are also deficiencies in the spatial requirements of the existing houses. "Le Corbusier, drew attention to the biological nature of housing, the poverty and inadequacy of traditional technique and the need for standardization, industrialization, and Taylorization"[27]. All this research and studies on the housing crisis have been a step in the formation of the concept of Existenzminimum.[28]

Existenzminimum is a concept that defines minimum accommodation that provides minimum living standards. Although the Existenzminimum approach is thought to be on the agenda in the 1920s, the basis of the concept dates back to the 19th century. It was discussed by communist philosophers who reflected on the low housing conditions and the housing problem. The concept of Existenzminimum was discussed by avant-garde architects of the period for the first time in 1929. "The results were presented at the CIAM II (International Modern Architecture Congress II) held in Frankfurt. In 1930, the proceedings were published by the International Congress of Modern

23. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 1.

24. J. David Hulchanski (1995): The Concept of Housing Affordability:Six Contemporary Uses of the HousingExpenditure-to-income Ratio,Housing Studies, Vol. 10, No. 4, 1995, 471.

25. "In 1928, leading architects united in La Sarraz, Switzerland, and the International Congress of Modern Architecture (CIAM) was established. CIAM's first statement was published by 24 architects from 8 countries and European countries. Sigfried Giedion (secretary-general of the Congrès International d'Architecture Moderne) said that they aim to formulate the contemporary program of architecture, to defend the general ideas of modern architecture, to announce these ideas to technical, economic, and social circles, to see solutions to architectural problems."

26. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 2.

27. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960, "Revista Bitácora Urbano Territorial", December 2007, 98.

28. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 2.

29.1928-1960, Massachusetts Institute of Technology, 2002, 30.

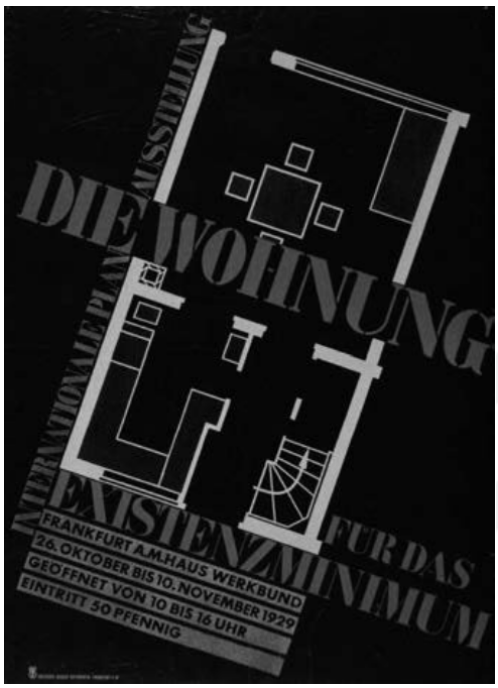


Figure 7: Poster of the exhibition "Die Wohnung für das Existenzminimum (Source: Yannis Zavoleas)

30. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960, "Revista Bitácora Urbano Territorial", December 2007, .97.

31. Sara Brysch, Reinterpreting Existenzminimum in Contemporary Affordable Housing Solutions, 4.

32. Walter Gropius' "Sociological Premises for the Minimum Dwelling of Urban Industrial Populations"(1929),Translated from the German by Roger Banham,MacMillan Publishing Company. New York, NY: 1980, 101.

33. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 34.

34. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960, "Revista Bitácora Urbano Territorial", December 2007, 98.

35. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 32.

36. Le Corbusier, Pierre Jeanneret, Analysis of the fundamental elements of the "minimum house" issue, Paper presented at the CIAM II: Die Wohnung für das Existenzminimum, Frankfurt, 30.

Architecture under the title of "Die Wohnung für das Existenzminimum". At the end of the congress, the participants concluded that the minimum living unit is the "right solution" to solve the housing problem.[29]"

As a result of the studies involving Walter Gropius, Victor Bourgeois, Hans Schmidt, Alexander Klein, Ernst May, Le Corbusier, and Margarete Schütte-Lihotzky, a common decision was reached. Considering the papers of the International Modern Architecture Congress[30], 5 main design principles were emphasized.[31]

1. Innovation and Cost-Effectiveness in Construction
2. Minimum Quality Standards
3. Redesign of the Domestic Layout
4. Relationship between Architecture and the City
5. Community Building and Social Concern

Studies for affordable housing production; Compiled under the title of "Innovation and Cost Effectiveness in Construction". Walter Gropius stated that minimum housing units quickly became the standard housing unit to meet post-war needs. It was determined that household income should not be more than 25% for a house to be affordable.[32] Despite design initiatives for the working class with a minimal housing unit production approach, it was still inaccessible to many low-income and even middle-class families[33].

Architect Hans Schmidt, who was one of the founders of CIAM in 1928, highlighted the need to standardize and simplify building codes to produce cheaper housing solutions.[34] To support the Existenzminimum concept and to make designs suitable for minimum living standards, production costs in construction had to be reduced but quality should not be compromised[35] . It was aimed to design by taking advantage of fast and multiple productions at an affordable price provided by mass production. The production of industrial parts is facilitated by mass production. At the same time, it is thought that an organization in design is easier with the created part systems.

It has been stated that the designs consisting of the same parts that follow each other turn into a modular structure, increasing the flexibility in the design. In some of the decisions taken on this subject, it was argued that every element, from structural elements to fine workmanship, should be prepared in advance and then put together in its finished form. It is thought that an innovative and economical approach will be displayed in housing construction with the production made by utilizing technological and sectoral innovations[36].

After the production of affordable housing, one of the other important issues has been providing the vital needs of buildings. This subject has been examined under the title of “Minimum Quality Standards”. The Socialist premise of the period stated that housing needs were the same and equal for all people. This thought contributed to the development of a universal housing solution based on quality standards. 2 main factors have been determined the common spatial quality standards resulting from this. These are biological factors (accessibility of basic needs such as air, heat, light, etc.) and physical (spatial requirements; providing open space, creating maximum comfort in minimum space ... etc.) factors. Le Corbusier and Pierre Jeanneret define dwelling as a biological phenomenon[37]. The biological phenomena meant are the provision of minimum air, light, and social life required for human life.

The meaning of the “minimum” concept in minimum quality standards varies according to the local conditions, climate and landscape of the regions. It is stated that there should be a difference between a city center with a high density of buildings and a suburb with sparse buildings.[38] The concept of Min-Max housing means obtaining the maximum living for the minimum subsistence class, without falling below the minimum quality standards and the biological factors involved. The limit of the standards can be defined as having acceptable hygiene conditions that do not fall below valid sanitary fittings.

Maximum life in the minimum area is provided by access to the necessary light, fresh air, and sun exposure[39]. In CIAM II, the participating architect Alexander Klein unlike others- worked on mathematical and methodological approaches in the search for new accommodation standards. He developed a methodology and compared different housing typologies. The aim was to set the minimum space standards through the most comfortable and efficient projects. The main purpose was not to reduce the residential areas, but this optimization was made as a result of the studies. The living conditions of most of the 1930s housing stock were substandard and inadequate. Many projects designed based on minimum living standards were more comfortable and larger than most other existing housing projects.

The re-evaluation of the interior layout over the minimum area has been examined under the title of “Redesign of the Domestic Layout”. The culture of living (Wohnkultur), which was formed according to bourgeois traditions dating back to the prewar period, has transformed and changed for

37. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960, “Revista Bitácora Urbano Territorial”, December 2007, 98.

38. Walter Gropius’ “Sociological Premises for the Minimum Dwelling of Urban Industrial Populations”(1929),Translated from the German by Roger Banham,MacMillan Publishing Company. New York, NY: 1980, 98.

39. Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 33.

many reasons. The returns of the era have changed household habits and order. Many factors have changed the domestic order and brought new life routines. One of them, with the increase in the number of working mothers, has decreased the time allocated for cleaning. The woman's position at home has changed. With the low birth rate, the number of small houses has increased. The connection to the region comes to an end when the family houses are replaced by the rented apartments. [40] Walter Gropius stated that along with the developments in mobility infrastructure, "new nomadism of the individuals" [41] started. It has been concluded that the new house plans formed as a result of these factors should be shaped by the changing housing style and reflect experimentation and freedom.[42]

The primary purpose while designing; to ensure that the available space is used in the most efficient way. Studies have been carried out to increase the comfort of use at home. Alexander Klein has comparative spatial studies on this subject. Studies are about trying to increase spatial efficiency by comparing traditional housing planning and variants of room layouts which are arranged on the same plan.[43] Mothers, one of the user profiles that affect the change in housing culture; before the 1920s, they have determined the profile of childcare and housework, they have turned to the profile of working mothers in the later period. Therefore, the time spent by mothers in the kitchen had shortened. As seen in Figure 8; the design has been reorganized to make the limited time spent in the kitchen most efficient. Considering the working mother's profile, it is aimed to make the kitchen more compact by using redesigned technological and smart appliances. Frankfurter Küche (Frankfurt Kitchen), designed by Schütte-Lihotzky, was rearranged in the interior. Other studies have been done on the practical use of the kitchen with industrial materials, such as the Frankfurt Kitchen.

This design has been the standard for minimal housing. It is aimed at having a separate room for each user in the dwelling. As seen in figure 9 ın order to increase flexibility in the interior, and achieve a more efficient utilization of space, it reorganizes furniture items such as folding beds, movable furniture, sliding doors.

40. Walter Gropius' "Sociological Premises for the Minimum Dwelling of Urban Industrial Populations"(1929),Translated from the German by Roger Banham,MacMillan Publishing Company. New York, NY: 1980, 95.

41. Walter Gropius, "Ein Neues nomadentum der individuen", 1930, 16.

42. Montaner, J., & Muxí, Z. Arquitectura e política: Ensaios para mundos alternativos, 2014

43. Marco Giorgio Bevilacqua, Alexander Klein and the Existenzminimum: A 'Scientific' Approach to Design Techniques, Relationships Between Architecture and Mathematics, Porto, 2010

Figure 8: Steel kitchen, manufactured by the SAB Company (Source: Karel Teige, The Minimum Living, Massachusetts Institute of Technology, 2002, 243.

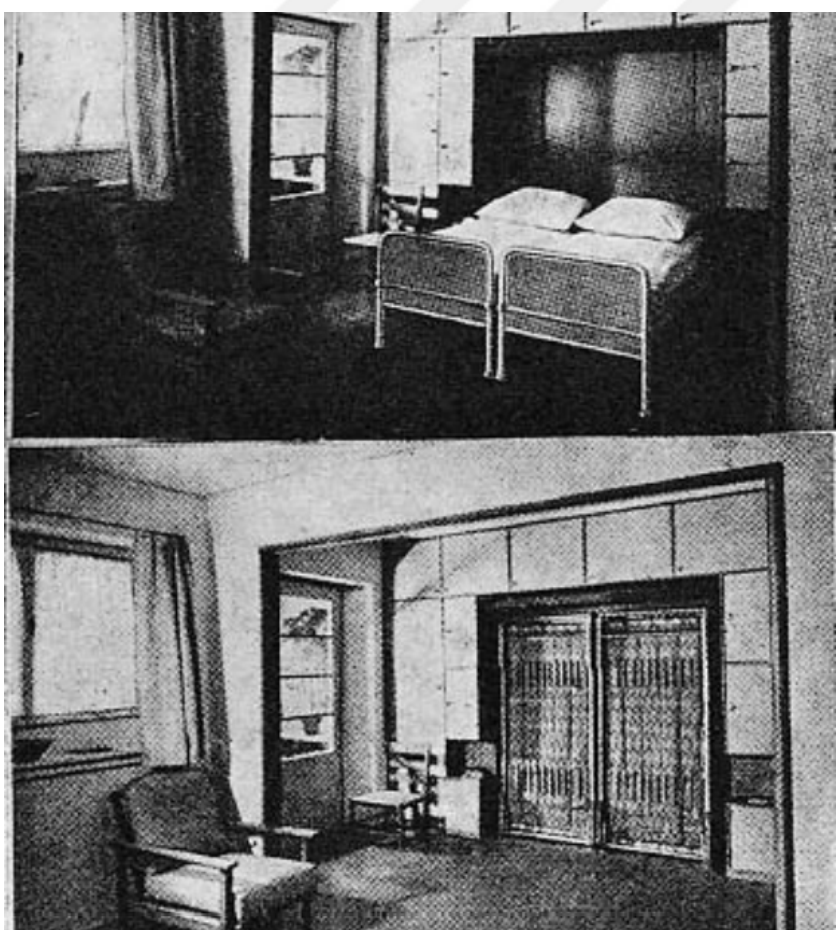


Figure 9: Folding bed & moveable furniture / E. May & E. Kaufmann (Source: Karel Teige, The Minimum Dwelling, Massachusetts Institute of Technology, 2002, 210.)

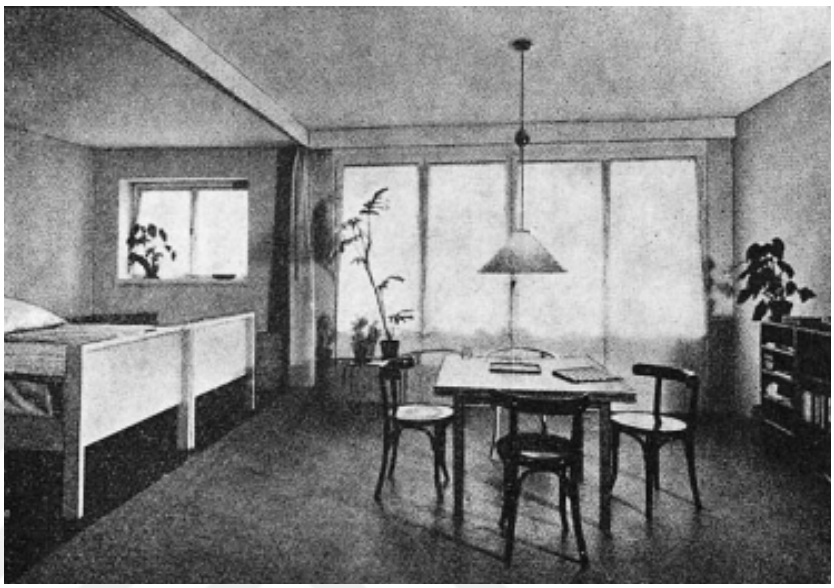


Figure 10: Figure 10: Brenner House's living room (Source: Karel Teige, The Minimum Dwelling, Massachusetts Institute of Technology, 2002, 211.)

The bedroom and dining room of the Brenner Housing complex in Frankfurt are separated by a curtain to allow free use of space in interior design. There have been some innovations in interior design caused by the removal of restrictive walls. More flexible spaces have been obtained. The borders of the sections such as the bedroom and living room are provided with different flooring preferences.

The evaluation of minimum housing designs on a larger scale is examined under the title of "Relationship between Architecture and the City". The relationship between Architecture and the City is one of the topics discussed in the second international modern architecture congress. In this congress, which is based on the relationship between residences and city planning, the access of residences to public spaces and transportation planning was discussed. Creating a self-sufficient community is considered important when viewed with the principles of garden cities. For this purpose, in addition to residential buildings, buildings including other public common areas were designed.[44] These are shops, markets, nurseries, churches, laundries, etc. Built with the concern of creating a self-sufficient community, cities like Praunheim and Römerstadt in Frankfurt were also called satellite cities.

As one of the significant principles of Existenzminimum, biological factors were also discussed in the context of the relationship established with the city. Issues such as ventilation and sunlight access in building biology are

44. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960 "Revista Bitácora Urbano Territorial", December 2007, 98.

discussed. The positions of the buildings and their planning schemes affect the building biology. For example, buildings positioned separately from each other will have greater exposure to daylight. Settlement directions of the buildings are effective in getting the right light. These factors were taken into account in the design.

Production has been facilitated by standardizing the housing typology. By applying the same system in building planning, it will facilitate the construction process. In building setup, standardization provides grouping and shaping block systems. As a result, different block typologies emerge. Some of these are Reihenhäuser ('row houses') and Mehrfamilienhäuser ('apartment buildings'). Others are formed block diagrams grouped around the stairs ('sectional dwelling'). Although the subject of the panel was the relationship between architecture and the city, architects did not take into account the relationship between residences and urban fabric in CIAM II. [45]

Studies on the planning of the common areas of the building were developed under the title of "Community Building and Social Concern". The new housing typology created with the concept of Existenzminimum has been effective in the formation of central collective usage areas in addition to individual housing.[46] One of the lessons studied under the concept of Existenzminimum was on the sociological foundations of the period. In this panel, the changing residential culture and the need to plan central houses were discussed. German architect Walter Gropius, who is made evaluations of minimum dwelling on an urban scale, said communities can consist of large-scale multi-story dwellings[47]. On the other hand, he argued in the 2000s to democratize housework with additions, and to minimize individual private areas by carrying out main activities in common areas[48]. The developments of the period (legal, pedagogical and domestic) show the socialization of family functions. For this reason, it has been revealed that the individualist age has left its place to the social age.[49]

One of the exemplary projects of the period for mass housing solutions is the apprentice school project in Bernau, near Berlin[50]. It exemplifies the communal life that replaces the individual age. As seen in Figure 11, The student dormitory is designed for temporary accommodation. There is a living space for two in the dormitory. It is envisaged that actions will be carried out jointly. For this reason, Hannes Meyer (1928-1930) designed it considering the comfort of two people living together. All furniture in the room has been placed with two people in mind.

45: Sara Brysch, Reinterpreting Existenzminimum in Contemporary Affordable Housing Solutions, September 2019, 5.

46: Karel Teige, The Minimum Dwelling, Massachusetts Institute of Technology, 2002, 5.

47: Walter Gropius' "Sociological Premises for the Minimum Dwelling of Urban Industrial Populations"(1929),Translated from the German by Roger Banham,MacMillan Publishing Company. New York, NY: 1980, 100.

48: Dick Urban Vestbro, (1992). From central kitchen to community co-operation. Development of collective housing in Sweden

49: Walter Gropius' "Sociological Premises for the Minimum Dwelling of Urban Industrial Populations"(1929),Translated from the German by Roger Banham,MacMillan Publishing Company. New York, NY: 1980, 95.

50. Karel Teige, The Minimum Dwelling, Massachusetts Institute of Technology, 2002, 259.

For this reason, two separate sinks were placed. There is also a table where individuals can spend time together. The large window has been placed so that the entire room can receive comfortable light.

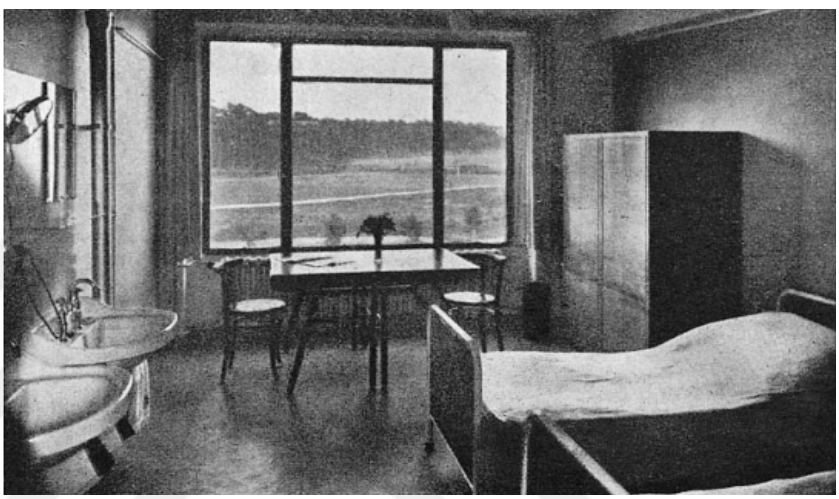


Figure 11: Dormitory of Apprentice School Photography is by W. Peterhans.

In addition, the designs have been shaped according to the central common areas. In Gropius's narrative, it was emphasized that with the entry of women into the labor force, dining rooms, nurseries, and recreation facilities required "central houses" where each individual can access at least one housing unit within a large common structure [51]. In the 1920s, "Central Kitchen Buildings" emerged in the European capital and this approach was applied in alternative housing projects like this one. With the Central Kitchen Buildings, housework will be rationalized since the meals will be cooked by the staff in the kitchen, and the plan was to shrink the house [52].

51. Eric Mumford Traducción: León Darío Espinosa Restrepo, El discurso del CIAM sobre el urbanismo, 1928-1960 "Revista Bitácora Urbano Territorial", December 2007, 98.

52. Dick Urban Vestbro, (1992). From central kitchen to community co-operation. Development of collective housing in Sweden, 1.

Dormitory examples in the context of Existenzminimum principles

03

As a result of the dormitory analysis in Istanbul, it is observed that most of the dormitories do not supply all minimum living conditions. While dormitories should have affordable accommodation opportunities for students, they are rented at prices that most students can not afford. Dormitory projects, which seem more affordable than others, have deficiencies in basic requirements for living. In this context, the factors that led to the formation of the factors that led to the formation of the Existenzminimum concept, which strived to meet the housing needs of low-income families in the 1920s, were analyzed. The conditions that created and determined the existenzminimum in Germany coincides with the situation with dormitories. Therefore, dormitories are analyzed based on these criteria. The factors that are effective in the formation of the concept are similar to the dormitory problems.
These are;

1) Low-income users cannot afford dormitory prices.
2) The existing dormitories are insufficient compared to the number of students.
3) Failure to ensure all biological (air, light, hygiene, etc.) needs inside the building.
4) The unplanned interior layout creates inefficient and insufficient usage areas.
5) Changing users' demands contribute to inefficiency of the areas.

The design principles determined in CIAM II (International Congress of Modern Architecture II) are the decisions taken in 1920. Today, many factors are changing compared to 1920. Therefore, without the aim of giving the absolutely correct conclusions of these principles, research will be advanced as follows: keeping references to establish a baseline. Also, When dormitory buildings are discussed based on spatial quality standards in housing projects,

Although the minimal housing design emerged in the 1920s, it still maintains its current (2021) and is the subject of symposiums in certain periods. Architects seeking solutions to similar crises organized a symposium called “Min to Max” in 2011 to adapt the Existenzminimum concept to current situations [53].

In the following parts of the research, the projects designed by putting similar crises in the center were examined. These projects developed designs based on dormitory problems. While some of the dormitory examples offer alternatives to several principles, some of them are examples of a single principle. In Figure 12, you can see the comparison of the sample projects and the design principles they offer alternatives.

As seen in Figure 16: Texts shown in green; describe Existenzminimum design principles. The ones indicated in blue; represent alternative dormitory examples. The dormitory examples were examined in relation to the design principles. Alternatives can be presented to different situations at the same time, without the examples corresponding to a single principle. A diagram has been made to visualize these relations and document the connections they are in. The Volu-te project is an example that offers alternatives in all 5 titles.

53. Ilka & Andreas Ruby, International architecture symposium, Min to Max, Domus962, October 2012, 144 pages, accessed May 2021; https://ruby-press.com/projects/domus-962-min-to-max/

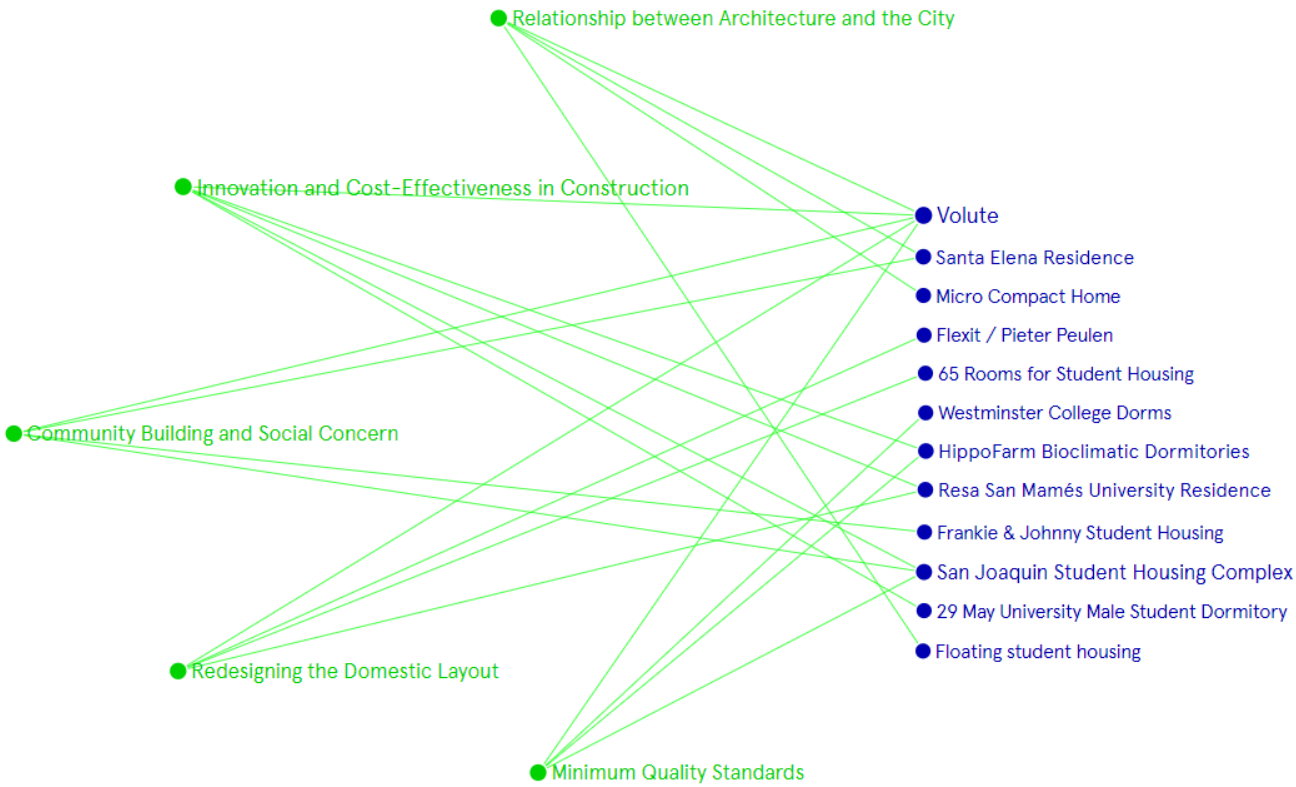


Figure 12: Dormitory examples in the context of existenzminimum principles

‘3.1 Innovation and cost-effectiveness in construction’

Examining the innovations in building production, it is seen that although dormitory buildings are short-term accommodation units, their building production techniques are not economic and innovative. Most low-income and middle-class families cannot afford the dormitory fee for short-term accommodation. Accommodation fees are reduced with dormitory projects that are produced with mass production. It reduces the construction process and costs. Exemplary projects that innovate in the construction techniques of dormitory buildings and design with the concern of producing affordable housing in cost-effectiveness are examined. 29 Mayıs University Elmalıkent Male Student Dormitory has been analyzed as an alternative housing production example. As a result of the research, it has been released that the limited bed capacity of the state-owned dormitories require additional capacity. As seen in Figure 13, a dormitory was built using pre-existing containers to meet male dormitory requirements at 29 Mayıs University[54]. The use of existing material allowed for faster and cheaper construction. It also contributes to recycling. This manufacturing technique also provided positive returns in design. The use of ready-made containers has shortened the time spent on the construction site and this has reduced the workforce needed.

Figure 13: 29 Mayıs University Elmalıkent Male Student Dormitory (Source: Arkitera)

54. Özüm İtez, 29 May University Elmalıkent Male Student Dormitory, Arkitera,accessed February 2021; https://www.arkitera.com/proje/29-mayis-universitesi-elmalikent-erkek-ogrenci-yurdu/

Another project that aims to reduce the cost by making differences in the production technique is the San Joaquin Student Housing complex , seen in figure 14. Designed by LOHA (Lorcan O'Herlihy Architects), this student complex preferred affordable and easy-to-produce materials during the construction process. Corrugated metal, which is an economical and durable material, is preferred for the circulation structure that is desired to be formed outside the existing structure. These corrugated metals visually resemble containers. It is an affordable material with fast and practical assembly and can be easily changed outdoors.

Figure 14: San Joaquin Student Housing complex/ Photography is by Bruce Damonte

Industrial cable networks are used in the completion of the stairs. According to the LOHA team, the use of industrial materials is not only economical, but also extremely durable, long-lasting and can be replaced when needed[55]. In addition, there are study rooms, dining halls, and dormitory rooms in the interior. Spaces have been ordered within each other. Regularized layouts and off-the-shelf materials has ensured an economical, efficient, easy-to-integrate, long-lasting, and changeable design.

Another method to reduce costs in construction is to use local materials. Local materials are those found in the area and are low-budget materials of that region. T3 ARCHITECTS states that reusing existing materials is part of the frugal approach to do more with less[56].

55. Jenna McKnight, San Joaquin Student Housing complex by LOHA (Lorcan O'Herlihy Architects), Dezeen architecture and design magazine, 6 May 2019, accessed April 2021; https://www.dezeen.com/2019/05/16/ucsb-san-joaquin-student-housing-loha-california/

56. T3 Architects, Hippo Farm Dormitories in Binh Hoa,Hospitality/ Residential, 2020, accessed April 2021; https://www.t3architects.com/tcportfolio/hippo-farm-bioclimatic-dormitories/

In the design of HippoFarm Bioclimatic dormitories(Figure 15), local materials were preferred. In order to prevent insects, Vietnam bulk rice husk mixed with diatomaceous earth was used on the roof. One of the characteristics of Vietnamese bulk rice crust is that it is filled with silicate. It is a material resistant to high humidity in tropical climates. Osb is preferred as a material in the toilets and ceilings. It is an affordable material choice among OSB wood types. Solid wood and bamboo weaving are used together on the doors and windows. The use of local materials reduces the cost of the building and increases the sense of belonging to the place.

Figure 15: HippoFarm Bioclimatic Dormitories / Photography is by ALISA Production

Another design office that aims to find creative solutions while making a low-budget project is Masquespacio. The design of the Resa San Mamés University Residence Project is one of the examples representing this point of view. These constraints shaped the design approach. The low budget has been achieved with simple solutions in interior design. At the same time, new space experiences created by these constraints in the design are obtained. The architects did not cover the view of the interior pipes. It left the concrete and brick open to avoid additional material installation. The open use of materials has shortened the construction time and with it the amount of workforce needed. Although there is no coating on basic materials such as concrete and brick, integrity has been achieved with the use of color.

At the same time, the combination of the industrial look created by the uncoated materials used in the interior and the contemporary appearance added by the use of color offers the user a different experience[57].

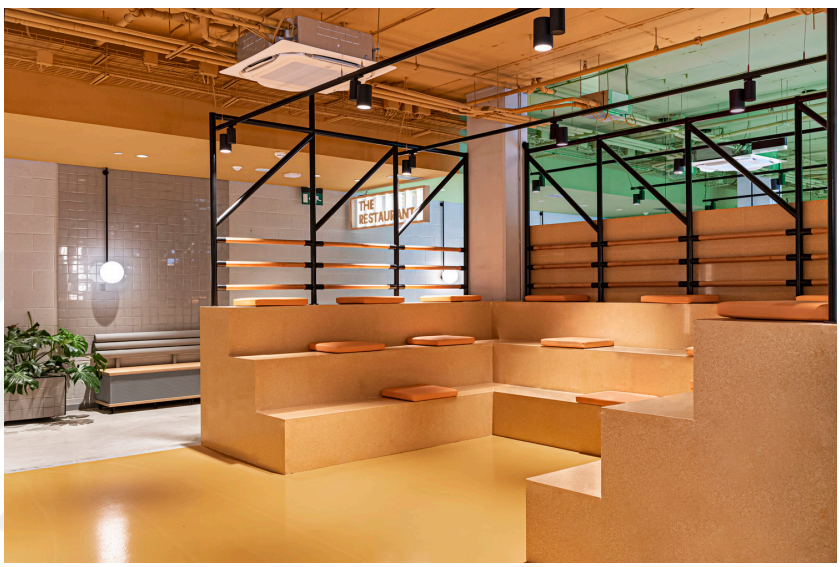


Figure 16: Resa San Mamés University Residence (Source: Photography is by Cortesía de Masquespacio)

Since the development of mass production technologies, more affordable productions have been made. One of the projects developed for this purpose is the Volu-te project. If we evaluate the use of the Volu-te project as a dormitory; it is a prefabricated building project is one of the projects that aim to build affordable housing with mass production. In addition to being affordable, it also had effects on rapid production and reducing the workforce. With the preference of mass production, the designers envisage the production of housing at an affordable price by reducing the cost. With mass production, 2 different types of building systems were designed as prefabricated and box systems.

In the prefabricated system, the parts of the unit are delivered to the user in small packages after they leave the factory with mass production, and the user is expected to assemble his/her house by combining these parts.In a system similar to furniture assembly, users assemble their homes. It reduces costs for the user to self-assemble their home without the need for labor.

57. Clara Ott, Resa San Mamés University Residence / Masquespacio, 2020, accessed April 2021; https://www.archdaily.com/956506/resa-san-mames-university-residence-masquespacio?ad_source=search&ad_medium=-search_result_projects

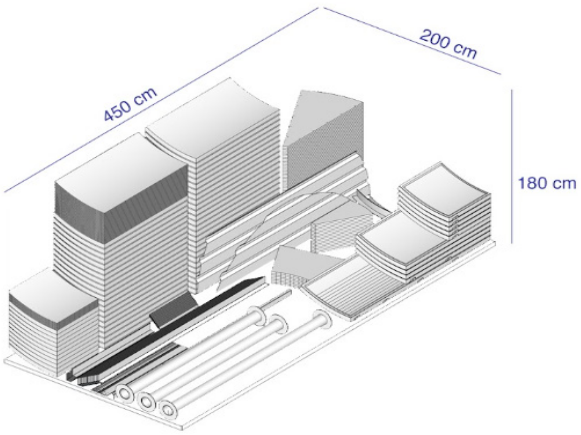


Figure 17: Volu-te/ Flat-pack storage for One pod (Source: Alternative Architectural Practices Volu-te Design book, pg. 86 Available at: https://www.yumpu.com/en/document/read/65263933/aap-volute)

At the same time, the user has the opportunity to build his/her own unit. Another designed building system is the box system. In this system, the structure can be produced in one piece at a time and used directly as it leaves the factory. The advantage of this system is that the house is placed directly on the land you want, without the construction site period. The size of the structure is designed to fit in the container. This shows that the building can be easily moved to the desired location. The minimum effort of Volu-te, which is a micro-living unit, has been designed effectively in every context from material selection to production technique and construction effort.

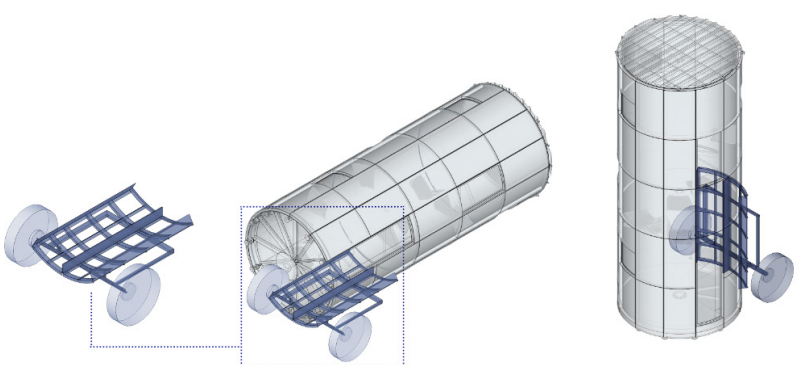


Figure 18: Volu-te/ Box system (Source: Figure was produced by the Volu-te Team during the Project development process.)

‘3.2 Minimum quality standards’

In addition to access to heat, air, and light, which are specified for biological factors that form the basis of minimum quality standards, sound insulation is important for dormitories. Students spend most of their stay in dormitory rooms studying. In a living space where several people share the same room, the comfort for each individual should be kept at the maximum.

Westminster College is an example of a dormitory that meets students’ spatial needs in a sustainable way[58]. Students are accommodated in small mobile homes within the school’s land. Small houses are also referred to as Tiny houses. In addition to being small-scale in design, it is a lifestyle that aims for minimum consumption in principle. One of the important aspects of the project is that the students build the houses themselves they stay in.

Building their own houses; supports minimum consumption and minimizes the labor force. Living in a minimum space provides a new experience to the user. It is aimed at designing maximum living conditions in the minimum area. Students can stay in tiny houses during their university years. Living in a minimal space leads users to create a new life routine. Having their own tiny houses and not sharing the room with another person; also eliminates the problem of sound insulation. It is thought that individuals will adopt these ways of living in this process. It is predicted that they will be individuals who have gained a minimum consumption habit after they leave the tiny houses.

Another project that aims to meet vital needs through natural methods is the Hippo Farm Bioclimatic Dormitory Project designed by T3 Architects.In order to get the maximum benefit from the natural air flow, attention was paid to the direction of the sun and wind. The T3 team proposes a bioclimatic[59] design that can be used both in the dry season and in the rainy season. According to figure 22 the slope of the roof faces south. With this layout, maximum efficiency is obtained from the solar panels used on the roof. Solar panels heat the water indoors. Openings under the sloping roof create air flow and provide natural ventilation (Figure 21).This is bioclimatic support in the materials used in the building. It supports natural ventilation with solid wood and bamboo webbing used on doors and windows[60].

58. Westminster College, Tiny House Giant Journey, accessed February 2021; https://www.youtube.com/watch?v=aAAJOWnXZGU&vl=en

Figure 19: Tiny House Giant Journey (Source: YouTube)

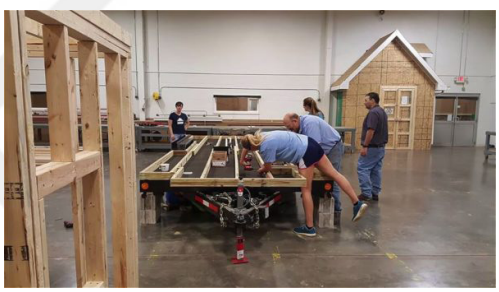
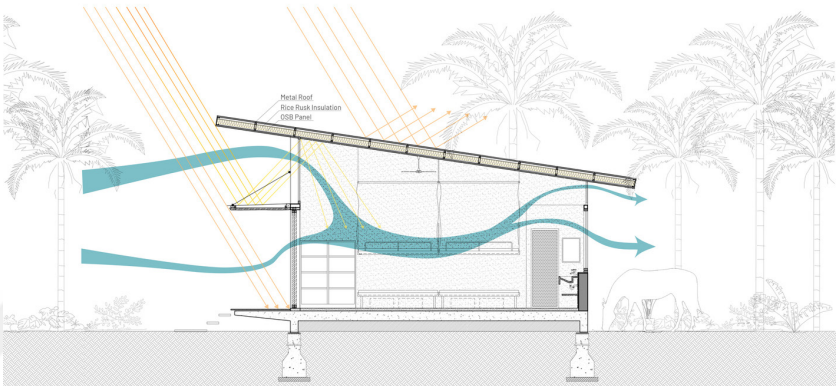


Figure 20: Westminster College Design Build Process

59. “Bioclimatic architecture; It is the use of climate and environmental conditions in the design to provide optimum indoor comfort with minimum energy use.”

60. T3 Architects, Hippo Farm Dormitories in Binh Hoa,Hospitality/ Residential, 2020, accessed April 2021; https://www.t3architects.com/tcportfolio/hippo-farm-bioclimatic-dormitories



INSULATION, NATURAL LIGHT AND VENTILATION DIAGRAM

Figure 21: HippoFarm Bioclimatic Dormitories / Photography is by ALISA Production

Importance is given to minimum consumption and sustainability as well as minimizing the material cost. The aim of the project is to minimize the use of water. Reducing water consumption adds great value both economically and ecologically. In this direction, dry toilets (Figure 22) were preferred in order to eliminate water expenses. In addition, in order to facilitate the operation of the personnel, an inox bucket was preferred on the façade. The dormitory is built on a field in a Hippo farm. Waste from dry toilets is used as fertilizer on the farm. Pressed faucet systems are preferred to reduce water consumption by children.

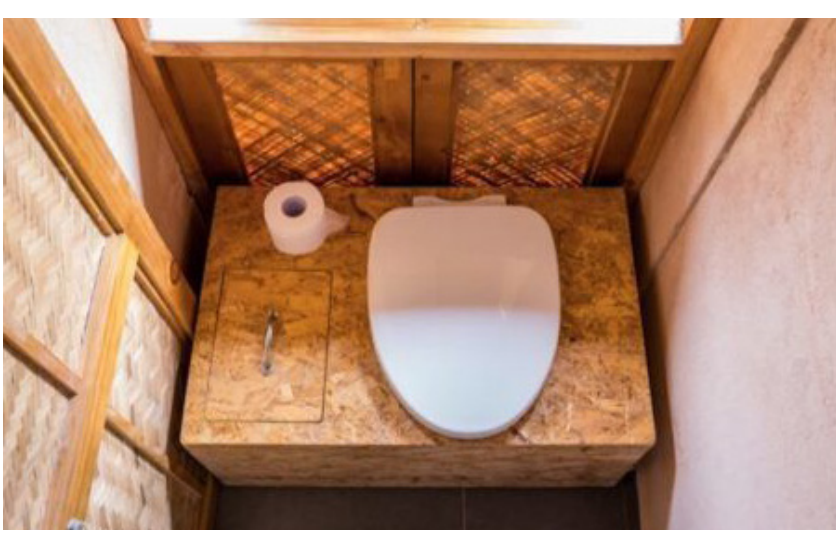


Figure 22: HippoFarm Bioclimatic Dormitories / Photography is by ALISA Production

61. "There are systems [BREEAM (Building Research Establishment Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design), IISBE (International Initiative for Sustainable Built Environment),Greenstar, CASBEE (Comprehensive Assessment for Building Environmental Efficiency) ve DGNB (Deutsche Gesellschaft fur Nachhaltiges Bauen)] that certified green buildings in order to support, disseminate and promote sustainable structures by rating them. (Eco-Friendly Green Buildings,Green Building Evaluation Systems, ÇEDBİK 2017, accessed February 2021; https://cedbik.org/en/-7-pg/-8-pg)

Developed by the USGBC (United States Green Building Council), LEED (Leadership in Energy and Environmental Design) is a system that rates green buildings. The aim of the certificate is to develop and disseminate environmentally friendly design, application and operating standards at building and city scale. It also determines that the buildings and interiors are designed according to environmentally friendly and sustainability criteria. There are LEED certificates representing 4 different levels such as Certified, Silver, Gold, and Platinum. The level with the highest score in this system is the LEED Platinum certificate.(USGBC (United States Green Building Council), LEED-certified, accessed April 2021; https://www.usgbc.org/help/what-leed)"

Another project that aims to achieve maximum efficiency by achieving minimum consumption is the San Joaquin Student Housing complex. With passive design strategies, San Joaquin Housing Complex Project has obtained LEED[61] Platinum certification. Solar water heating is used in buildings to increase energy efficiency. In addition, energy-saving mechanical systems have been preferred to minimize energy consumption.

The LOHA team stated that passive design strategies and innovative material choices are significantly more efficient and beneficial projects than standard new construction (Figure 23). According to the team, it will continue to reduce the ecological and economic impact for years and decades to come[62]. White painted metals are preferred in the structure. One of the main reasons for this is to use the climate of California correctly and to protect it from the sun. It is aimed to block the sun with the aluminum parts used. At the same time, open gardens are designed with the thought that they will help reduce the urban heat island effect. This also supports other climatic protection thinking.

Figure 23: San Joaquin Student Housing complex/ Photography is by Bruce Damonte

Volu-te has been studied as another example that sustainably provides the maximum standard of living in the minimum space. As per the spatial quality standards; spatial requirements determine factors such as heat, light, sound, and hygiene. Volu-te is a living unit that covers the requirements of minimum living standards.

62. Jenna McKnight, San Joaquin Student Housing complex by LOHA (Lorcan O'Herlihy Architects), Dezeen architecture and design magazine, 6 May 2019, accessed April 2021; https://www.dezeen.com/2019/05/16/ucsb-san-joaquin-student-housing-loha-california/

There are areas in the Micro living unit where basic functions such as sleep, nutrition, rest and cleaning can be performed. Spatial fiction in Volute, which is designed as a single person living unit, is designed to support minimum life. It is designed as a vertical cylinder of height 6 meters with a diameter of 2.4. All spatial functions are distributed to levels in a vertical setup. It is designed over the functions shaped depending on the spiral staircase. There is a working area for students. You can access the work area after a few steps from the ladder. Using the advantages of being micro, it has been considered to use the elements with a single function in several actions. In this way, the ladder can also be used as a sitting area and a storage area.The fact that the building is for a single person eliminates the sound and insulation problems that are important in dormitories. Access to each floor is provided with the ladder, which is the advantage of the vertical design. This access enabled a window to be opened at each level. The fact that the structure is cylindrical together with the windows supports meeting the 360-degree heat light requirement. Vertical design is effective in providing natural ventilation. The small area covered by the floor minimizes the internal heating energy of the space. Electricity can be operated with 2 different systems; connected to the grid or with solar panels independent from the grid. If it is used in a rural area independent of the network, a water and waste tank is installed. At the same time, rain water is collected on the roof and transformed into clean water. Designed with the concern of being minimum at every stage, Volu-te aims to consume minimum water by connecting the drain of tap water to the siphon.

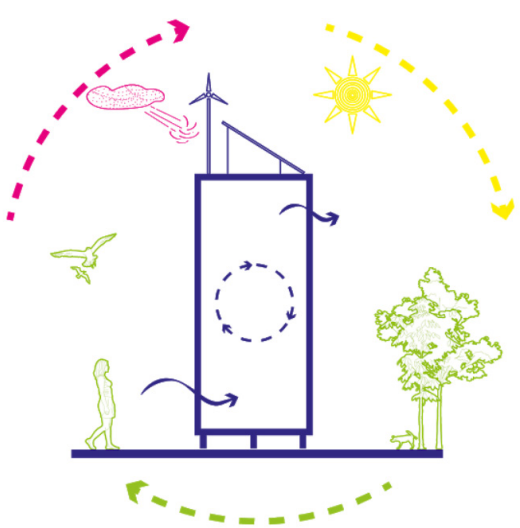


Figure 24: Volu-te Cycles (Source: Volu-te Design book, 48.)

‘3.3 Redesign of domestic Layout’

The plan schemes of dormitory buildings in Istanbul are not flexible and variable and consist of fixed furniture. Flexible designs that are open to new expectations and changes provide advantages in terms of efficiency. Frequency of use of dormitory sections; varies by users. Students; they spend their days in social areas, sleeping areas and work areas. This routine may vary depending on different factors. For example; The pandemic, which is today’s most important factor, is one of the reasons for reshaping the routine of the dormitory.

As a result of the examination of dormitory projects in Istanbul, indoors; Inefficient areas arise due to irregular and inflexible plan schemes. There are alternative projects that work on increasing flexibility. Pieter Peulen’s design is one of the projects that creates a free plan scheme with a more variable construction in the interior.

Pieter Peulen developed the “Flexit” design based on his experiences in his dorm life. It consists of two horizontal and vertical parts and contains functions such as bed, storage area, mirror, coffee table, sitting area, work area. This design can be disassembled in a room and used separately or together. Separated parts can be combined in the desired variation.“This creates endless possibilities so you can use and take Flexit with you your whole life. [63]” Movable designs such as Flexit design can offer practical solutions to the problems in the interior design of the dormitories. In this rapidly changing and transforming period, making a permanent design somewhere can be an obstacle to keep up with change. The interior setup is changed practically with moving designs.

63. Pieter Peulen,Flexit, Archello, accessed February 2021; https://archello.com/product/flexit#product-description

64. Clara Ott, Resa San Mamés University Residence / Masquespacio, 2020, accessed April 2021; https://www.archdaily.com/956506/resa-san-mames-university-residence-masquespacio?ad_source=search&ad_medium=search_result_projects

Figure 25: Pieter Peulen, Flexit (Source: Archello)

In the example(Figure 26) of Resa San Mamés University Residence, the design was developed over the common areas in the interior. According to the research of Christophe Penasse, one of the partners of Masquespacio, it is important to increase the opportunities for students to share their experiences as a "community" in this new field[64]. Use of common space for students; They are important areas for sharing and socializing. At the same time, it was designed considering that the working areas will also be in this section. Different sections are transparently coexisting in the design. In the interior designed on an open plan system, some parts have been covered by taking advantage of the material properties. Flexible glass systems are used to provide sound insulation in the work areas when necessary. Visual insulation with movable curtains around the tables can be closed at the user's request. Color is used to create zoning between sections in the interior. Different colors are used in the design of many areas such as social areas, dining halls, work areas, and sitting areas. With the use of color, spatial segmentation is provided clearly without any physical separation in the space. At the same time, the color has created a strong effect in the interior. The colors used to maintain this effect were continued on the flooring, walls, furniture and terraces.

Figure 26: Resa San Mamés University Residence / Photography is by Cortesía de Masquespacio

Another example that offers an alternative interior space to dormitory projects is “MINO” designed by Antonio Ravalli (Figure 27). In this design, the architect redesigned an old factory in Italy to accommodate students. Instead of building permanent walls, he created temporary partitions using fabric. In this way, the space consists of dorm rooms with a more free and organic design.

Fabrics used by stretching with steel ropes in a large area create a permanent-temporary space perception. In addition to the social lives of the students, a project with the potential of private life was designed in a crowded area by giving importance to their privacy [65].

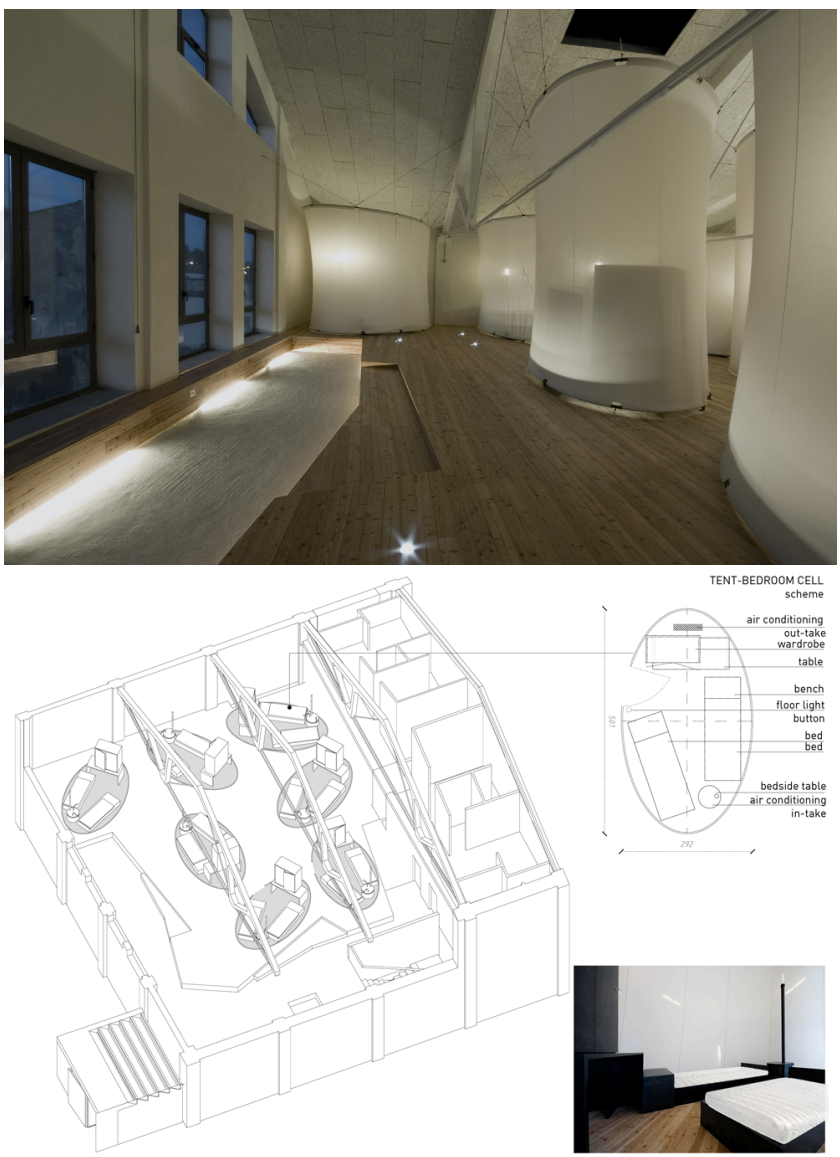


Figure 27: MINO / Photography And Design are by Antonio Ravalli

65. MİNO by Antonio Ravalli Architetti, accessed April 2022; https://www.dezeen.com/2010/12/12/mino-by-antonio-ravalli-architetti/

Volu-te(Figure 28) is one of the alternative projects that has shaped interior design according to today's changing needs. Based on the existing dormitory plans in Istanbul, although the floor area is sufficient, unproductive usage areas occur due to the problems in the interior design. In the dormitory buildings, designs are arranged by spreading to the floor area, except for bunk beds. In this design principle, m is not used very efficiently. Volu-te has advanced the design based on m^3. By spreading to m^3 in vertical setup and solving functions through actions performed on elevations, very little space per m2 was wasted. In this design principle, the actions and their positions in the space are determined by emphasizing the minimum space required. Actions are positioned without zoning. No space-limiting materials such as wall doors were used in the space. The lack of zoning in the interior setting caused the actions to be superposed from time to time. In this way, 5 separate actions were solved in 2 points rather than in 5 different places. For example, the stairs turn into a chair that is not used only to go up, but a sitting element for the work area, a floor to stand on while washing hands, and a closet to see to the need for storage. The interweaving of the actions allows actions to be carried out within a minimum of space in the interior.

Figure 28: Volu-te/ Vertical Design (Source: Volu-te Design book)

‘3.4 Relationship between architecture and the city’

Transportation problems, especially in megacities such as Istanbul, creates a vital problem for residents as well as students. The dormitory buildings in large campuses provide an advantage for students to easily access the school and social areas. Students staying in the dormitory buildings on the campus are more comfortable reaching the school than other students. Due to population density, more schools are being built in megacities. Most of these schools are located in city centers. School buildings with large campuses are built on the periphery due to the dense urban texture. The density of the urban fabric does not allow large campuses. For this reason, dormitory buildings of schools are organized independently from schools. Dormitory buildings are constructed by choosing the most common location possible where access to more than one school may be available. Due to the limited quotas in dormitory buildings and high pricing in private dormitories, students lose the opportunity to stay in the dormitories closest to their schools. The dense and crowded urban texture, the limited number of accommodation places close to the school, causes many dormitories to be built in places far from the school.

Floating student housing in Copenhagen harbor is one of the designs based on student housing in the city center. A dormitory located on the sea with a floating platform for students was designed by the firm of Bjarke Ingels. Floating platforms and containers were used in the design of the dormitory, so it is anticipated that the cost will be low-budget and it will be a suitable accommodation opportunity for students. At the same time, considering floods in Copenhagen; it is claimed that it is a safer alternative than many buildings in this region. (“In terms of sea-level rise ... it’s the only building type that will never flood,” wrote BIG partner Kai-Uwe Bergmann)

Although it is a floating house, a common area has been created in the middle of the platform. Copenhagen harbor was seen as an opportunity for students who were staying in places far from their schools to stay in the center of the city. “By introducing a building typology optimized for harbor cities we can introduce a housing solution that will keep students at the heart of the city.” [66]

66. BIG, Floating student housing, Dezeen, accessed February 2021; https://www.dezeen.com/2016/09/22/big-bjarke-ingels-shipping-containers-floating-student-

Figure 29: Floating student housing, Photograph by Laurent de Carniere

Another project that emerged to reduce the difficulties of students' access to school is the "Santa Elena Residence" project. It is located in a rural area (Centro Poblado Santa Elena) in the central forest of Peru. Access to 16 neighboring communities is allowed due to its location. After the construction of the secondary school, the number of students increased. For the school, which is located in an area far from living areas, students need to walk for about 2 to 5 hours. Roads are long and unsafe. For this reason, a dormitory project has been planned to temporarily solve the problems. In the project, the goal is to accommodate students and teachers in ways that will provide the minimum necessary hygiene and living conditions. The project consists of 3 main parts. These are school, housing and open spaces.

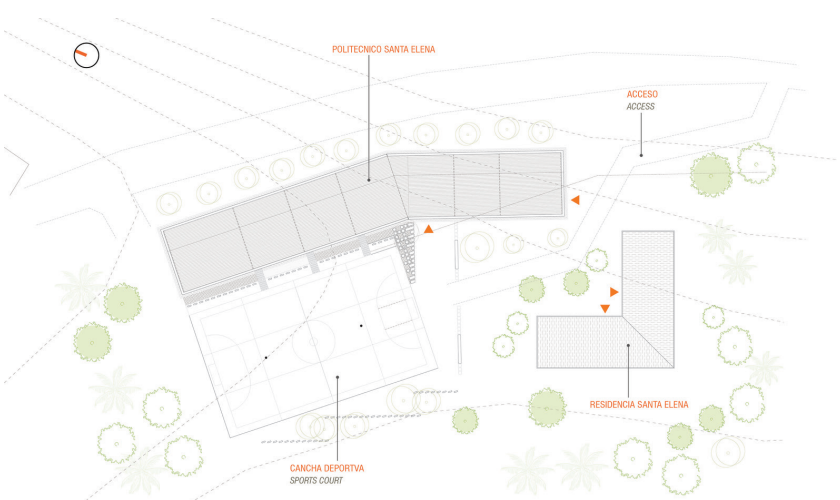


Figure 30: Santa Elena Residence / Photography is by Eleazar Cuadros, Marilisa Galisai

Another example designed as an alternative life proposal to crowded urban life is the Micro compact home project. In a 2.6 m wide cube (such as sleeping, eating, hygiene and working) all the basic necessities are included. Made of an aluminum frame, the design is quite light to carry around. It is placed in the area in about five minutes. With its dimensions and light weight, it can easily settle anywhere in the city. Since its design is micro, it is included in the existing pattern without changing the urban texture. It can be easily camouflaged in the area where it is placed. The Technical University of Munich has created a student village consisting of 7 micro compact homes.[67]

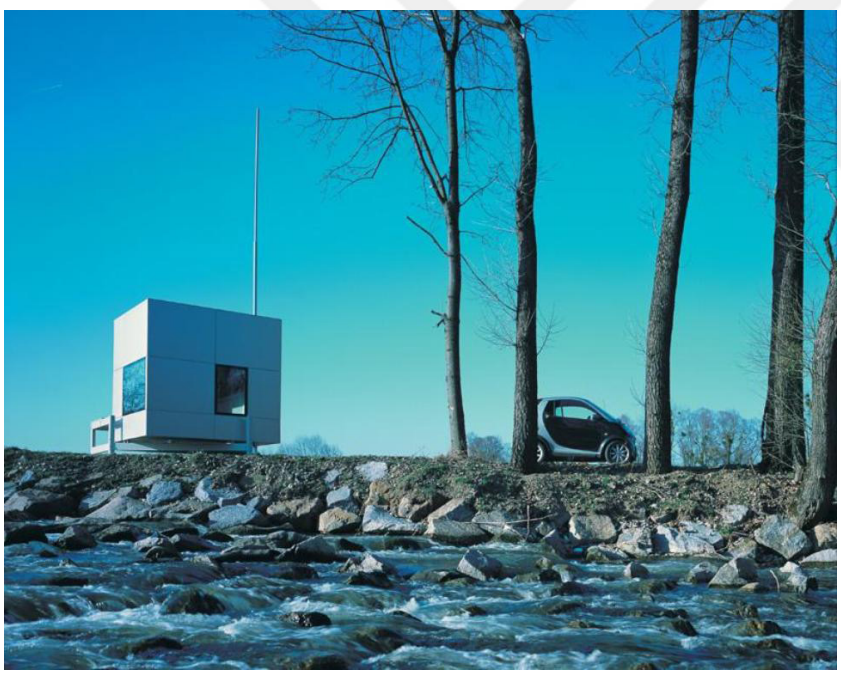


Figure 31: Micro Compact Home (Source: Richard Horden)

In Istanbul; As a result of the examination of housing policies from the proclamation of the republic to the present, a system to meet the housing needs of low-income citizens could not be provided. Housing policy has turned into a business of consumption and income for the middle class and high-income individuals. After the Second World War, with the Marshall Plan, the place of laborers in the agricultural sector decreased and with the start of migration from rural to urban, vertical and lateral structuring in Istanbul increased[68]. The rent problems that came with the parceled empty lands have turned into the capital to stimulate the economy.

67. Richard Horden, Micro Compact Home, accessed February 2021; http://www.microcompacthome.com/index.php

68. Aykut Namık Çoban, Cumhuriyetin İlanından Günümüze Konut Politikası, SBF Magazine, 2012, accessed February 2021; https://dergipark.org.tr/tr/

It is not economically possible to purchase an empty land and build a house to meet the housing needs of low-income individuals by ensuring minimum living standards in the concept of Existenzminimum. Although the housing market is intended to meet the housing needs of the low-income class, it is in a place that even middle-class families cannot afford due to general inflation. Unidentified empty spaces emerge as a result of unplanned urbanization and irregular parceling. Low-income individuals have tried to settle in these gaps by their means. These settlements, which were later legalized, remained below the minimum living standards.

In the Volu-te project, which is fundamentally based on the potential of undefined gaps within the city and providing minimum living standards for people, housing production has been studied. The dormitories to be built in the periphery make it difficult for students to access universities in the center and their social venues. Unidentified empty spaces emerge as a result of unplanned urbanization and irregular parceling. Inter-building spaces, urban waste areas, unpreferable car parks, empty spaces on roofs… etc. areas constitute potential. Volu-te acknowledges the potential of the residual areas in the city and plans to place the micro-living areas at these points. Students can have the chance to stay in the city center. The floor area of Volu-te is 5 m², two Volu-tes can fit in 1 parking space. Thus, it can easily find a place in many parts of the city. Apart from the potential of the urban spaces envisioned in the Volu-te design, the situation of interference or the ability to add to existing structures has also been studied. It is placed in a university's vacant lot in the same way as campus dormitories. It is also placed in existing spaces such as roofs, terraces, parking lots, and gardens of universities with smaller amounts of land available. It can be placed as additional capacity to increase the capacity of existing dormitories.

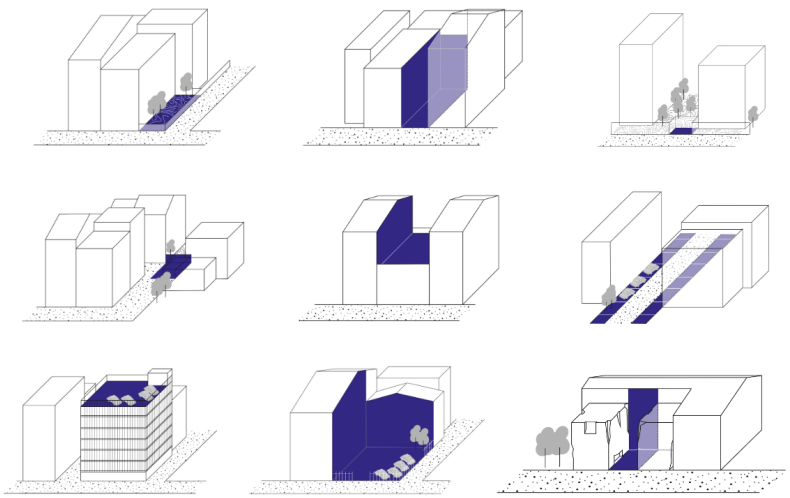


Figure 32: Volu-te/ Left Over Spaces In The City

‘3.5 Community building and social concern’

The majority of dormitory projects involve the use of the central social area shaped by existenzminimum. In a large building, individuals’ personal spaces have shrunk, while social areas (common kitchens, sitting areas, sports areas, TV rooms ... etc.) have been centralized and enlarged. In this way, instead of living individually, the spirit of community was created with the regulations in the housing typology. One of the biggest purposes of this use is to accommodate more students in the same area. If we compare it with another planning scheme, it means that in a scheme where students have a kitchen and social areas in each room, as many social spaces as the number of students will be added. This corresponds to the decrease in the number of students within the limited m^2.

Architects working on the concept of Existenzminimum in Germany in 1920 proposed a new collective life. In addition to the advantages that emerged as a result of this, the decrease in social areas and the lack of urban integration in design created a periodical discussion topic. As there are criticisms about the centralization in housing, there are some problems with this use in dormitory buildings. One of the problems is that an area shared by too many students had hygiene problems and students could not get efficiency from this area. Having the opportunity to be isolated is as important as socializing and creating community building. It is not possible to be isolated with the compulsory common use areas and reduced personal areas formed with this planning system.

In dormitory projects, apart from the common areas, there are projects of social areas that serve a small number of students. When we examine Frankie and Johnny Student House, we can see that the project’s social space creation and community concern continues. Unlike the dormitory projects where the whole building is connected to the central common system, in this project, social areas have been obtained in smaller groups by using the building construction. This design ensured that students maintain their social lives while at the same time protecting their personal space. In the Frankie & Johnny student housing project, containers were used in the construction of dormitory rooms. It was desired to increase the variations of the interior design in container use and to create social common areas.

For this purpose, several containers were turned into a single mass by opening gaps in the middle of the containers. As we can see in the plan chart, these combinations have created common social areas. Variable usage scenarios have arisen with different combination variations (double or triple combined containers)[69].

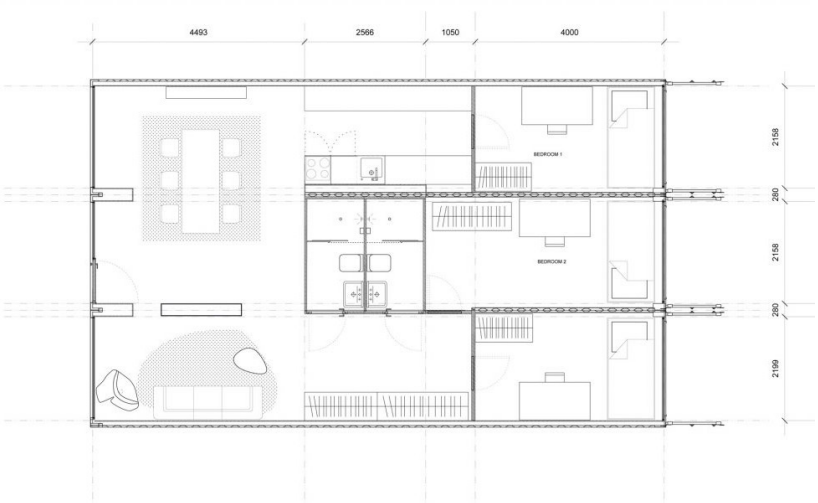


Figure 33: Frankie & Johnny Student Housing Plan

In San Joaquin Student Dormitory Design, the aim was to create social areas with a common courtyard. While creating this common area, it was designed outdoors by using the coastal climate of the region. It consists of two clusters of buildings, one with three and the other four structures in an area of 95,000 square feet (8,826 square meters). Dormitory planning was made by bringing 3 different building groups side by side. The positions of the buildings are located peripherally in a U and square shape. This settlement provides the formation of common courtyards spontaneously. External circulation is designed to integrate blocks that are independent from each other. In this circulation, dormitory rooms were made accessible by bicycle. Using circulation areas; A vertical social space has been constructed. The social area formed in the open courtyard has no defined boundaries.

In this way, it is provided to continue from the open court to the dormitory room without restricting the common areas. At the same time, comfortable circulation is provided between all buildings. This has reduced the isolation of life between different blocks.

69. Holzer Kobler Architekturen, Frankie & Johnny student Housing, Archello, accessed February 2021; https://archello.com/project/student-dormitory-planterwald-frankie-and-johnny

The studio said in the project description that LOHA designed a reductive exterior edge with an open, lively interior courtyard containing the entire building circulation, and it promotes movement throughout the complex by inverting this circulation scheme[70].

Figure 34: San Joaquin Student Housing complex's courtyard / Photography is by Bruce Damonte

Another alternative dormitory project designed with community building and social concerns is the Santa Elena Residence project. The school consists of 3 main parts: social areas and accommodation areas[71]. In order to encourage socialization, spaces between areas are designed as transitional. Rather than defined zones, we can see common areas designed through actions (such as resting area, hand washing area, eating area ... etc.). Dormitory rooms are designed with social areas. Tables and chairs are placed in the corridors outside rooms. This is effective in designing workspaces as extensions of rooms. There is a cultivation area and a sports area in the open area. It is aimed to encourage social and gathering areas by combining school and dormitory rooms. A modular and expandable architectural design is seen with the aim of future growth.

70. Jenna McKnight, San Joaquin Student Housing complex by LOHA (Lorcan O'Herlihy Architects), Dezeen architecture and design magazine, 6 May 2019, accessed April 2021; https://www.dezeen.com/2019/05/16/ucsb-san-joaquin-student-housing-loha-california/

71. Clara Ott, Santa Elena Residence / Semillas, 2019, accessed April 2021; https://www.archdaily.com/939553/santa-elena-residence-semillas?ad_source=search&ad_medium=search_result_projects

Figure 35: Santa Elena Residence / Photography is by Eleazar Cuadros, Marilisa Galisai

In the Volu-te project, social usage areas were designed with a different perspective. Another Project that offers a different alternative to social usage areas is Volu-te. With the new technological developments and changing daily routines, social activities of students change from the actual to the virtual. The generation most involved in this situation is today's new generation who stands out in the use of smartphones[72]. It can be called the group who is currently studying in University.

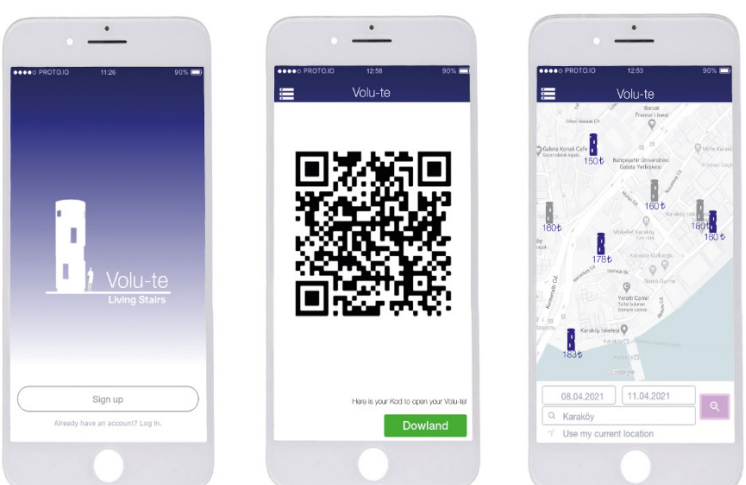


Figure 36: Volu-te/ Application Interface

72. Amod Choudhary, Smartphones and their impact on net income per employee for selected U.S. Firms, Review of Business and Finance Studies, 2014, 10.

Considering this situation in the Volu-te project, social areas that require physical participation have been adapted to a system operating in a virtual environment. In addition to the Volu-te offering micro individual life, potential social areas are foreseen in the joint areas in collective use. It is possible to create common areas by combining several Volu-tes. Apart from the actual social usage areas, Volu-te offers a strong virtual social space. At the same time; It has the potential to turn the surrounding public spaces into short-term socializing spaces. For example; four friends staying in four separate volu-te; they can use a park close to all of them as a socializing area for a certain period of time. In today's world where we are provided many services via mobile applications, Volu-te is also a part of this system. It has the potential to be easily accessible with the mobile application and to create a network in the city. While Volu-te can be used as a dormitory, it can also be an alternative temporary accommodation unit for other users (tourists, one nighters...etc.) during the semester holiday. Volu-te aims to offer the user an original and innovative alternative for temporary accommodation with its mobile application. The user finds the closest module on the mobile application. Then, it unlocks the module with the help of the QR code defined on the application; Thus, it tries to be a solution to the instant accommodation needs of the requesting person without dealing with any procedure or reservation.

With the mobile network system, product usage examples are available today. "Martı" is a mobile vehicle application, which is one of the examples of this system. Volu-te and Martı; is a system that young adults can easily adapt to with a similar network system[73]. It aims to be a part of the sharing economy like shared transportation applications. Considering that purchasing rates are decreasing gradually today, it emphasizes the importance of sharing in living space. Volu-te sets an example in the field of housing for the newly developing digital cities. Volu-te has been analyzed under 5 separate topics

73. Martı, accessed February 2021; https://www.marti.tech/en.html

Proposal for Istanbul Technical University: Volu-te as a dormitory model

04

Specific rules have been defined for the placement of Volu-te in universities. The relationship between the use of Volu-te as a dormitory model and the site settlement and the zoning rules are explained in detail.

‘4.1 Singular unit’

The building’s ability to receive sufficient heat and light for minimum living conditions, its distance from the surrounding structures, its distance from the surrounding access roads, its relationship with trees and the planning of the building entrance are important factors in determining the rules. In the area where Volu-te is positioned, it seems ideal to determine an area by offsetting another 1.5m apart from its own diameter(2.5m).

Minimum 1.5 meters is required for the building to receive sufficient heat and light for living conditions. It is important that there is no adjacent construction in order to get enough heat and light and not to block the view angle at the same time. The fact that the surrounding access roads are at a certain distance from the building provides a more defined area in terms of security by removing the building from circulation. In order not to have a negative impact on the surrounding green areas, there must be a definite distance between the building and the trees, which varies according to the situations.

This distance has been determined as a representative considering the average tree size of 6 meters. Before planning, studies should be carried out according to tree sizes and root lengths in areas where there are larger trees which should be placed with precision.

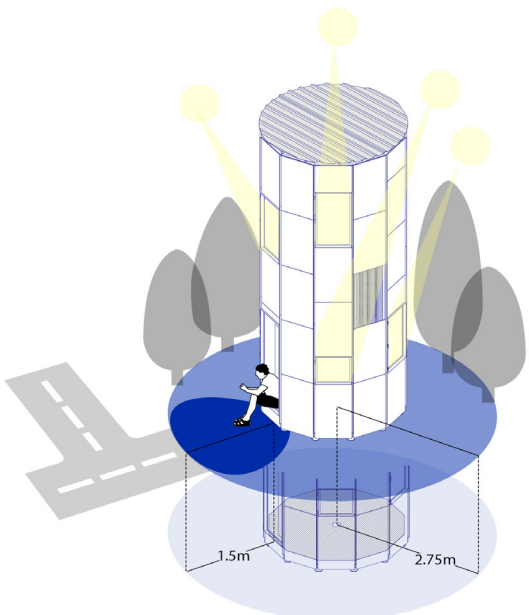


Figure 37: Volu-te's settlement conditions

'4.2 Multiple unit'

The field relationship in cases where volu-te is positioned alone has been explained above. Different situations may arise in close settlements with other Volu-te's. More than one building can be built on a parcel, provided that the following conditions are defined. If the building directions are placed parallel to each other as in Figure 38, the structures should be positioned to maintain distances. The entrance of the building coincides with the inner garden area of the other, so there should be a minimum of 3 m space between the two buildings.

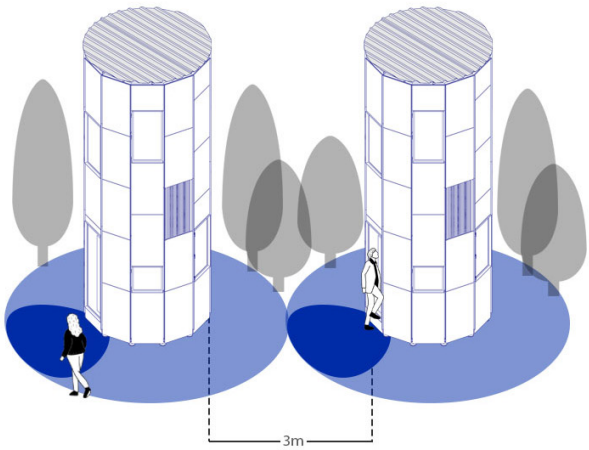


Figure 38: Parallel layout of Volu-te

If the entrances of the buildings are planned to be opposite each other as in Figure 39, the inner garden between the two buildings may intersect and 1.5 meters is considered sufficient for the space between them.

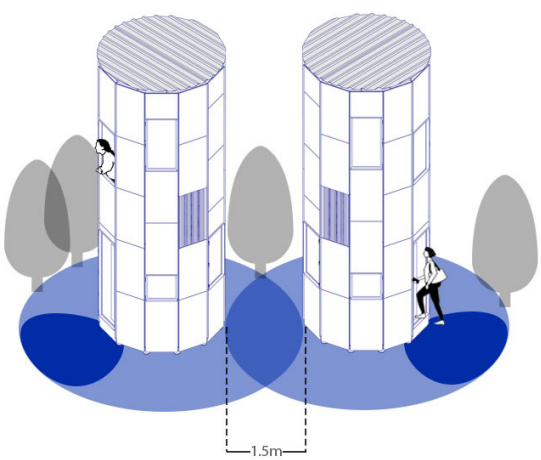


Figure39: Extrovert layout of Volu-te

If the entrances of the buildings are planned and positioned against each other as in Figure 40, then a 3-meter gap should be between the buildings in order to protect the entrances. In Figure 41, we see vertical placement as a different situation from the others. In this case, the Volu-tes are connected to each other from their non-opening facades. For this reason, there is no distance between two structures in this type of junction, the total required area is 8 meters.

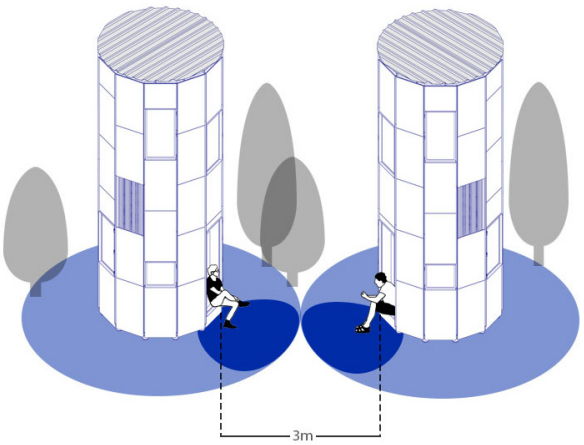


Figure 40: Introvert layout of Volu-te

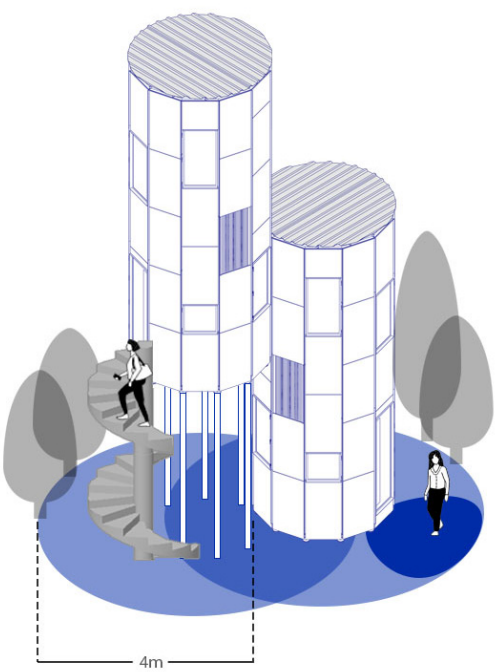


Figure 41: Adjacent layout of Volu-te

‘4.3 Area layout’

The variations of using more than one Volu-te together are visualized in figure 42. There are 3 different options for collective use. The collective use planning is designed depending on the regional possibilities. Sloping areas, deaf façades and large areas are the factors that determine these variations. Depending on the types of communities used, different common spaces are formed. Option 1 creates a vertically rising common area. Option 2 creates more private common areas with dual plots. Option 3, enables common squares of scattered Volu-tes by using the advantages of large areas.

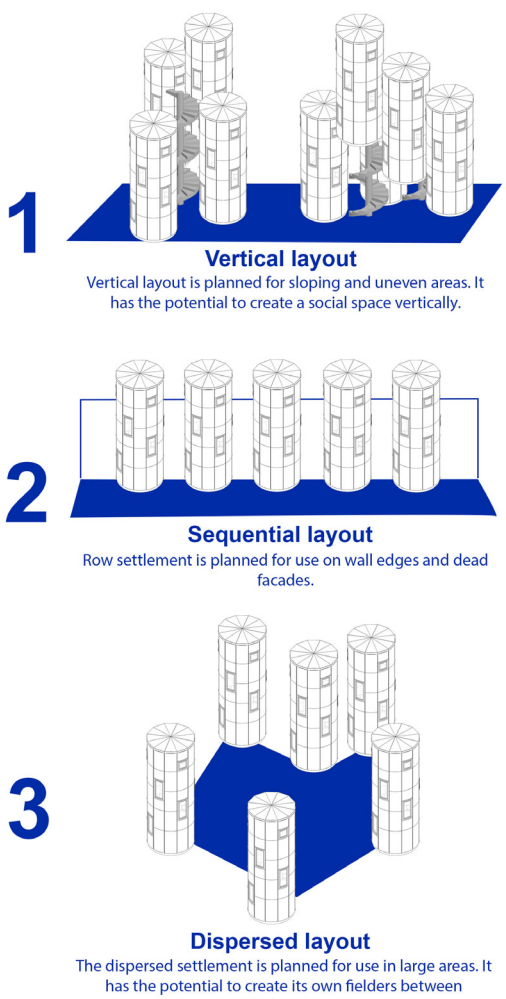


Figure 42: Volu-te’s Combination Variations

‘4.4 Placement of Volu-te’

There are 3 main conditions to consider when choosing a site for volu-te placement. The fact that the building is close to the central areas, that it is accessible and that the ground on which it will be placed is ready constitute these conditions. A minimum of 2 conditions must be met in order for Volu-te to be placed. In Volu-te settlement conditions; singular-multiple settlement, volu-te combinations and area relations are indicated. Depending on the methods and site conditions available in the zoning rules, they can be placed in universities. For example; Istanbul Technical University Ayazaga campus was selected and the Volu-te project was proposed.

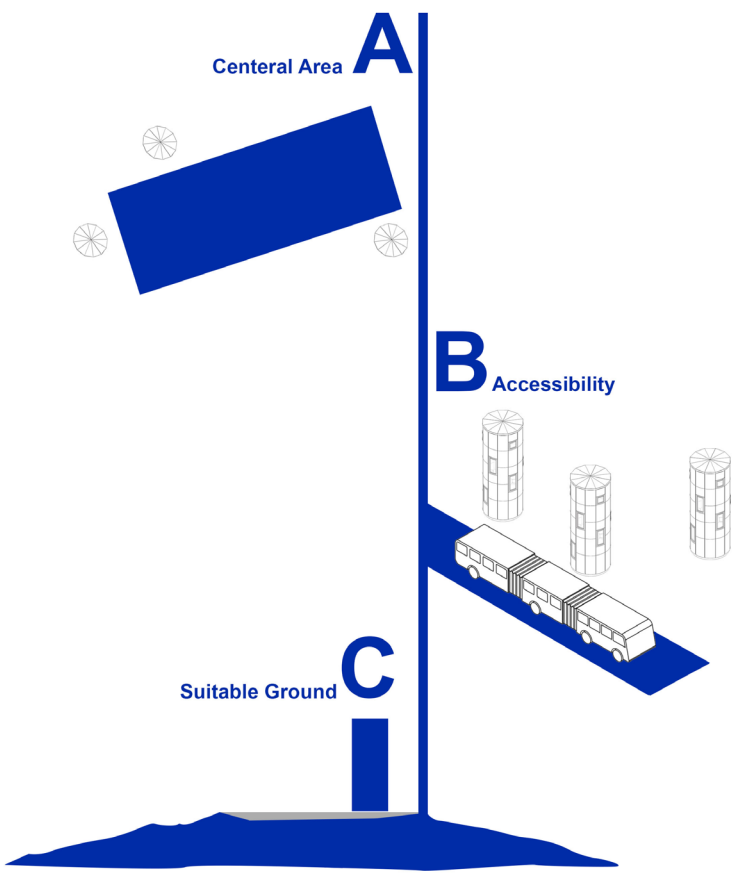


Figure 43: Placement Scheme

‘4.5 Proposal for Istanbul Technical University’

“Volu-te settlement rules” into potential areas were determined in Istanbul Technical University Ayazağa Campus. While determining the area, the proximity to the central areas, accessibility and the areas with ready ground were investigated and the potential areas(Figure 44) were marked on the map in this direction.

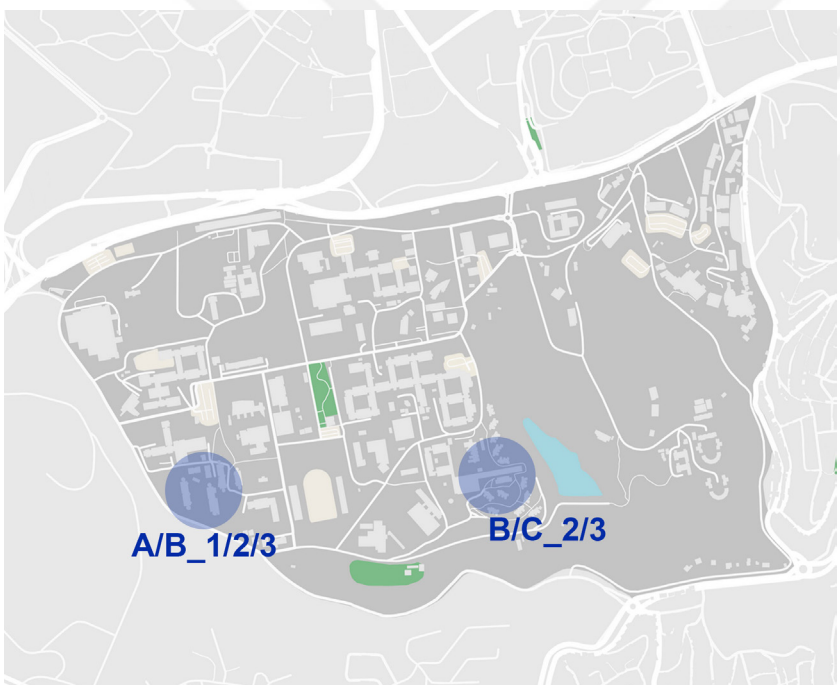


Figure 44: Istanbul Technical University Identified Volu-te Settlement Areas

As a result of the interviews with Istanbul Technical University, it was stated that the average annual dormitory application for the last 5 years (2018-2022 data) was 1800 people. With the dormitory capacity, 900 of this population is placed directly. 500 people from the remaining population are placed during mid period. The remaining 400 people are put on the waiting list for the following year. In line with these figures, it is aimed to initially place a total of 125 Volu-tes in Istanbul Technical University in order to offer an alternative to the accommodation problem for the remaining 400 people. Volu-te numbers may be increased in the following years depending on the accommodation needs. In the selection of the areas, attention was paid to accessibility, proximity to the central areas and usability of the existing floor.

For this reason, the areas were chosen close to the designated area service routes and other dormitories on the campus. Volutes to be located in the area will be placed according to a planned system. As seen in Figure 45, it is organized in groups of two and three.

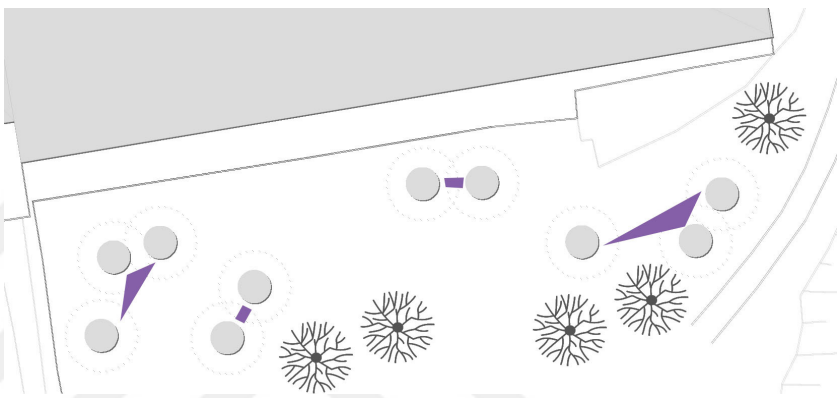


Figure 45: Volu-te Layout System

‘A/B_1/2/3 Zone’

For one of the potential areas; A region close to the three girls’ dormitories (Prof. Dr. Ali Aldoğan Girls’ Dormitory, Altan Edige Girls’ Dormitory and Ayşe Birkan Girls’ Dormitory) was chosen. Having an existing service route will provide an advantage in terms of access (B). It is a region close to the central areas (A). In this parcel(Figure46), collective volu-te settlements are planned over two different potential regions.

Figure 46: A/B_1/2/3 Zone Planning Scheme

The drainage walls in the first potential area were decisive in the selection of the Volu-te settlement type. The second layout type, Sequential Layouts, is recommended for the area with drainage walls. Potential area 2 is an area with larger and more trees than the first area. For this region, which does not allow more than one Volu-te to be placed side by side, the 3rd settlement type, dispersed settlement, is recommended. It is recommended to apply the number 1 (vertical layout) combination plan for inclined areas.

Figure 47: A/B_1/2/3 Potantional area #1

Figure 48: A/B_1/2/3 Potantional area #2

‘Localization of Volu-te’s on A/B_1/2/3 zone’

A total of 50 Volu-te are placed in the A/B_1/2/3 Zone area. A total of 50 Volu-te is seen as the ideal number for this field. In another scenario, an example was tried by increasing this number. As seen in Figure 50, in such a case, a great change in the building-environment balance appears. Densely placed Volutes disrupt the surrounding tissue. The design principle of Volu-te is to settle in the spaces in the city. Such a scenario is also inconsistent with the Volu-te design system. Therefore, the ideal number (50) has been placed in a way that is balanced with the building-environment. These Volu-te’s settlements have been planned considering their proximity to dormitories and main roads, and security.

Volu-tes placed for potential areas 1 and 2 are visualized from different perspectives. 25 Volu-te’s are placed in potential area 1 in Figure 49. It was seen in the field as the potential in the facility and used sequentially. It provides an advantage while gaining a defined area for the drainage array. To benefit from the main dormitory entrances from the entrances of those who are directed to the dormitory building. In Figure 50 there is an aspect of view from potential area 1 shows sequential layout of Volute’s which contributes to neighborly relations.

Figure 49: A/B_1/2/3 Zone Volu-te Planning Scheme

Figure 50: 1st Aspect of View Shown in Figure 49

There are a total of 21 volu-te in potential area 2(Figure52). The placement of Volutes in this area is planned in groups of two and three in order to create a common area. Volutes are spaced apart due to the tree density and rough terrain in the region.

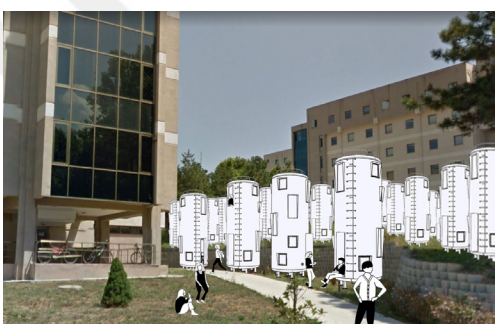


Figure 51: 1st Aspect of View Shown in Figure 49 / Dense settlement scenario

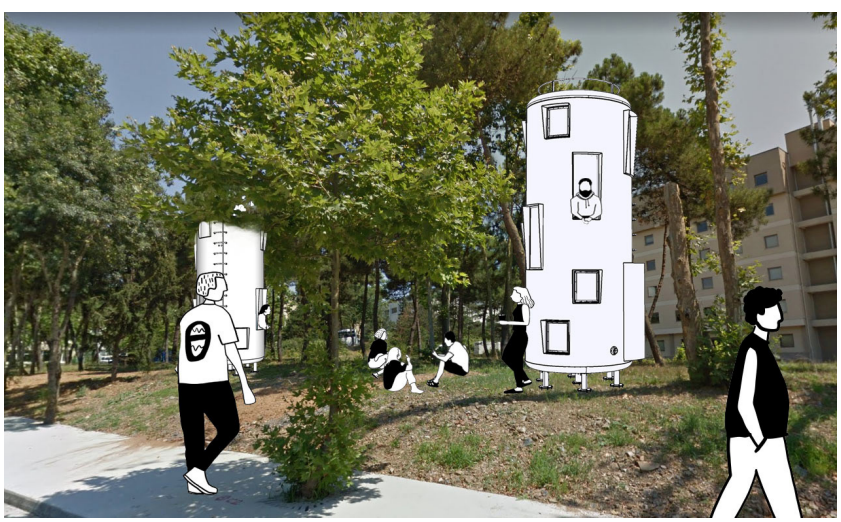


Figure 52: 2nd Aspect of View Shown in Figure 49

‘B/C_2/3 Zone’

The region where the Gölet Dormitories are located has been selected as the other potential area(Figure 53). Being a region with existing dormitories provides many advantages. Having a service route facilitates access (B). Many students currently reside in this region. For this reason, there are social areas built in the surrounding area. At the same time, the fact that the ground is suitable for construction provides an advantage for Volu-te settlement (C).

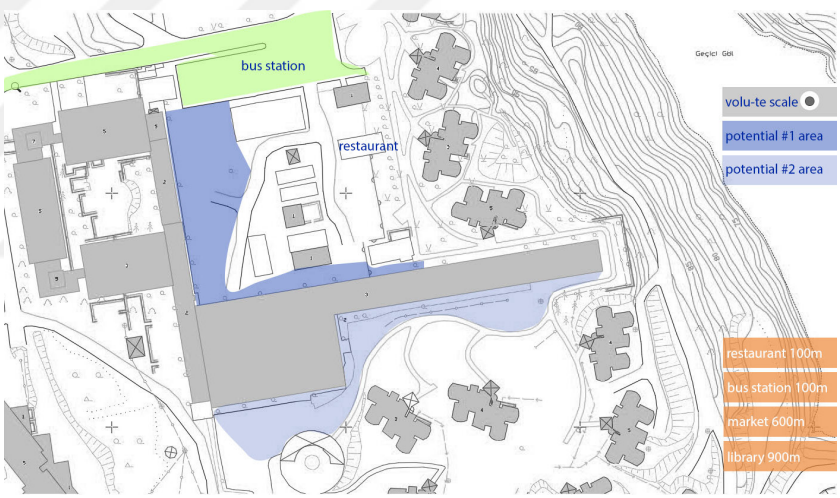


Figure 53: B/C_2/3 Zone Planning Scheme

This region consists of areas with two different types of settlement potential. Variation type No. 2 (Sequential Layout), which is predominantly a linear plan, is considered suitable for its placement in the first region(Figure 54). In the second part, the region has a wider and scattered plan. For this reason, the layout type No. 3 (dispersed layout) is seen as suitable. Apart from the selected settlement types, it is recommended to use other variation types in exceptionally certain areas.

Figure 54: B/C_2/3 Potantional Area #1

‘Localization of Volu-te’s on B/C_2/3 zone’

A total of 75 Volu-te have been positioned in the B/C_2/3 region (Figure 55). This region is close to the pond, relatively wooded areas are abundant in this region, and the Volu-te’s have been placed by taking into account that the green area texture will not be disturbed. The area is frequently preferred by the surrounding dormitories for social space and walking, so Volutes are placed in a way that will not disrupt this circulation

Figure 55: B/C_2/3 Zone Volu-te Planning Scheme

In Figure 56 settlement plan, 31 Volu-te’s were placed in the first settlement area where potential is seen. Apart from the Volu-te placed sequentially in this area, dispersed layout in certain places were also deemed appropriate. Figure 56 shows an aspect of view from the first settlement area. In this aspect sequentially positioned Volu-te’s are seen.The sitting area available in this area strengthens the relationship of Volutes with other dormitories in the common social area.

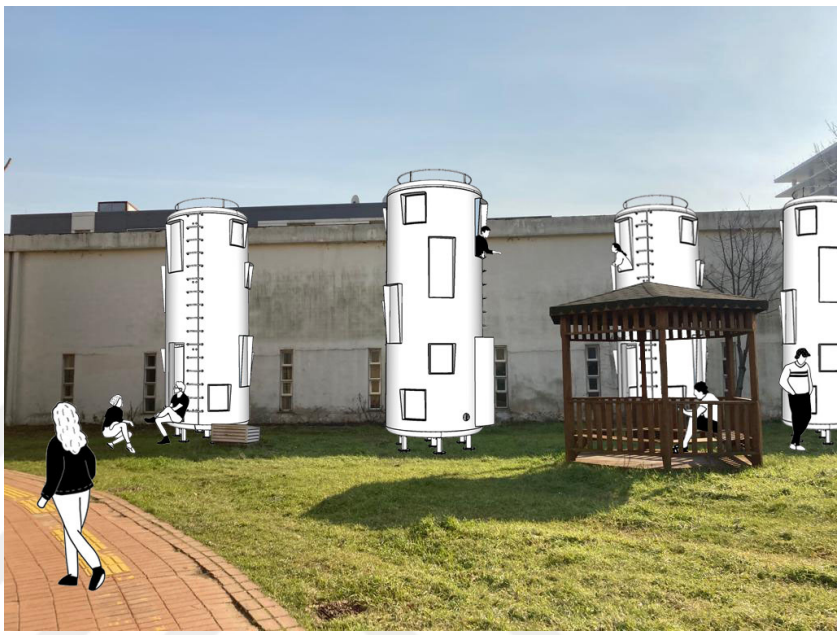


Figure 56: 3th Aspect of View Shown in Figure 53

As seen in Figure 57 Due to the potential area 2 being a hilly and wooded area, there are 44 Volu-te scatteredly positioned. Apart from single placement, Volu-te's were also placed in groups which create their own defined common areas.

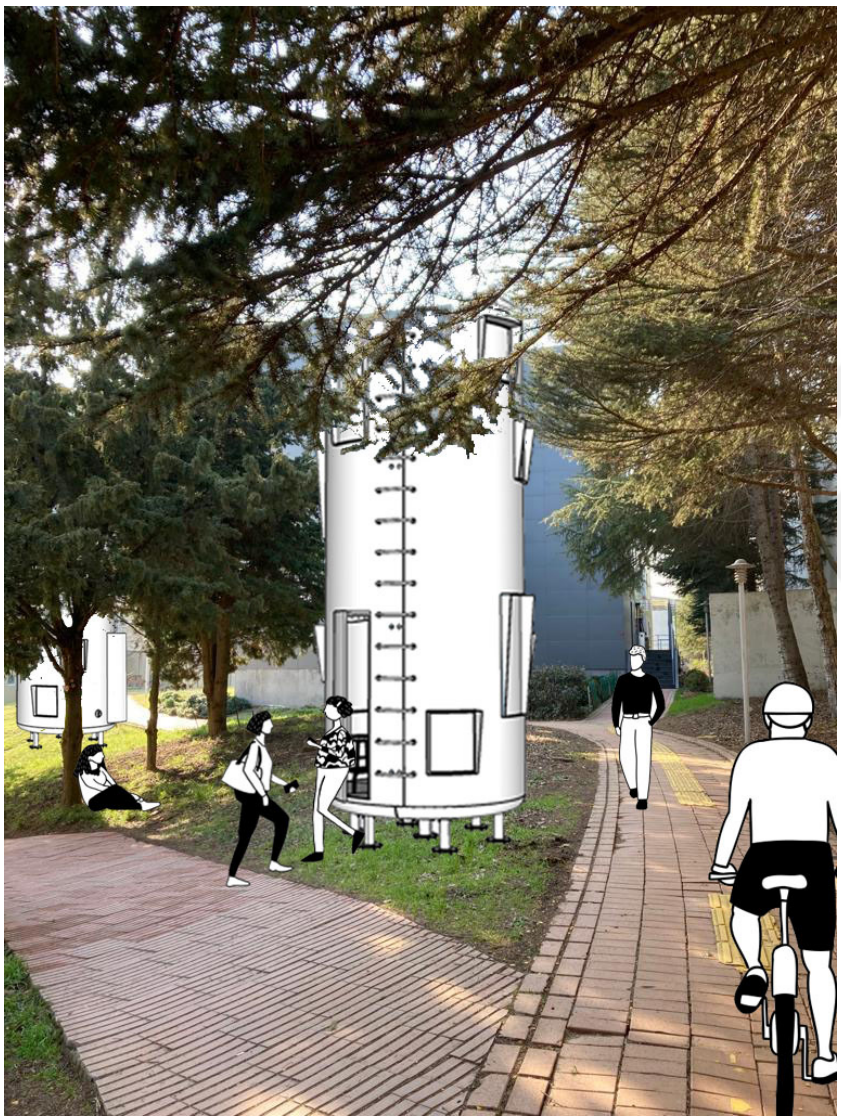


Figure 57: 4th Aspect of View Shown in Figure 53

125 Volu-te settlements are seen over the 2 areas determined in the first stage. As can be seen in Figure 58, the number of Volu-te can be approximately 530 with other potential areas selected in line with similar factors in the Ayazağa campus. This number has been determined based on the minimum level of settlement. In future scenarios, it is possible to increase the number according to demand and need.

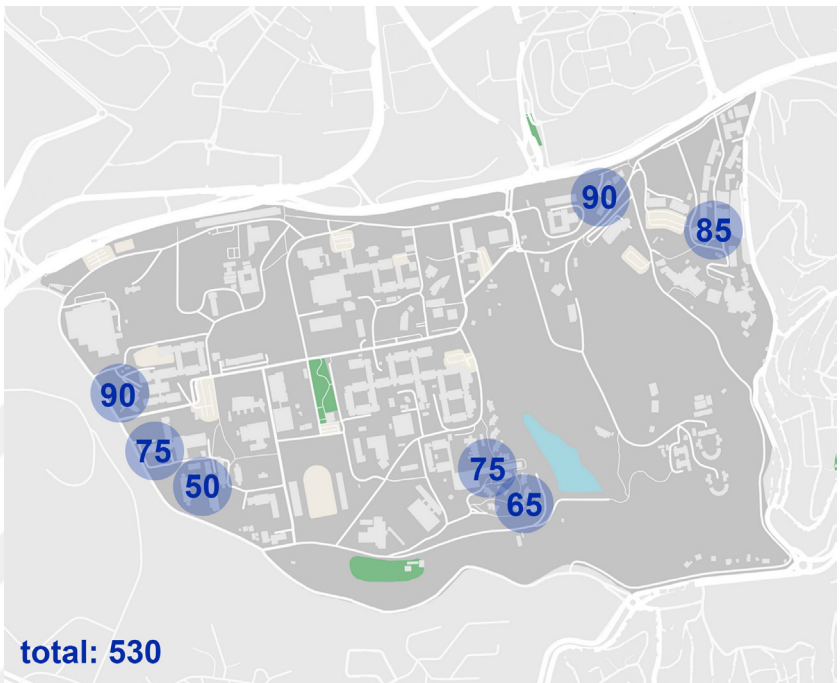


Figure 58: Distribution of Volu-te's in the Ayazağa Campus

It is seen that new spatial experiences emerged with the increase in capacity as a result of the placement proposal of Volu-tes to Istanbul Technical University. As a disadvantage of the Volu-te project, it can be said that ITU dormitories provide more student capacity in the same area.

On the other hand, the construction of a dormitory for 125 people causes a complete change in the texture of a certain area; Volu-te, on the other hand, can be thought of as a fragmented structure. Its integration into the area by dispersing it creates a living space without disturbing the spatial integrity.The vertical design of Volu-te provides advantages in the residential area. By minimizing the area occupied by 1 person on the floor, it facilitates integration into the environment.

Volu-te zoning conditions were taken as reference in site selection. The proposal for Istanbul Technical University was chosen depending on the university's dormitory needs and space capacity. Volu-te's modular structure allows for capacity increase in case of need. It is important that the number can be increased for the needs of the students, as well as that it can be used in other functions by moving it if there is no need.

In addition to these, the existence of individual micro accommodation units offers us different options in exceptional and emergency situations. Dormitories at ITU that are empty outside of school periods are opened as guard for visitor groups in some periods. In such a case, instead of opening a dormitory building, it also offers an alternative accommodation proposal

Epilogue

The underlying causes of dormitory problems which are researched and discussed throughout the thesis, It has been observed that they are related to population growth. Human population is growing and the density in the city is increasing. However, the meter square owned remains constant. The population of Istanbul is increasing exponentially every year. This leads to the formation of insufficient areas. With the increase of the population, living areas expand horizontally and vertically. While Istanbul has an area of 5,343 km², according to 2020 data, there are 2831 people per km².[74]

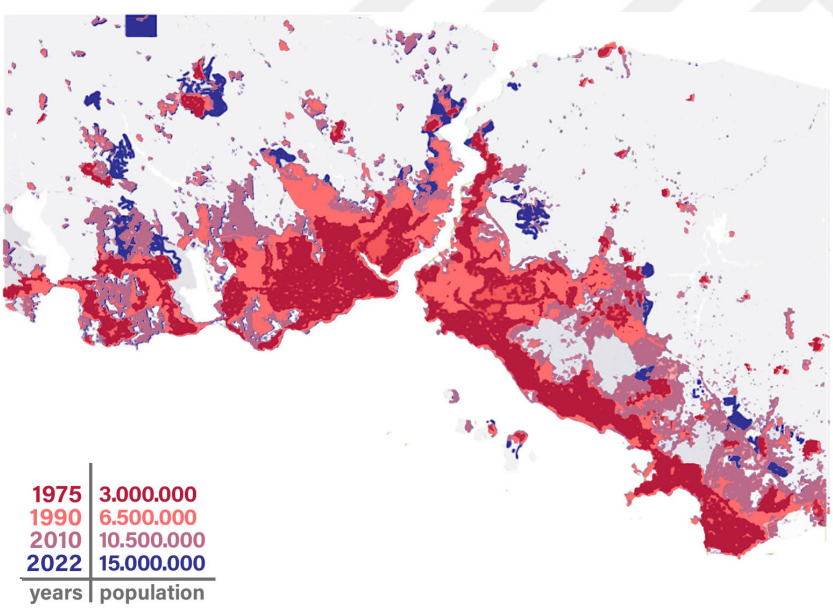


Figure 59: Residential Population in Istanbul

With the increasing density of buildings in megacities, living spaces are getting smaller. In the future, these areas are expected to become even smaller and scarce. Reducing living spaces increases the value of every square meter. Population growth causes the housing crisis.We can see examples of housing crises and the resulting financial difficulties in mega cities. In order to draw attention to the points that this can reach in the future, Alejandro Aravena describes this situation as “By 2030, out of the five billion people that will be living in cities, two billion are going to be under the line of poverty.

74. Martı, accessed February 2021; https://www.marti.tech/en.html

That means that we will have to build a one million-person city per week with 10,000 dollars per family during the next 15 years. A one million-person city per week with 10,000 dollars per family.”.

Housing crisis in mega cities causes an increase in dormitory prices. Dormitories whose living standards are provided at the border will be deprived of these living standards as a result of unplanned growth in the future. At the same time, this situation causes our living spaces in dormitories to get smaller and our lives in this area intensify. One of the reasons for this is that the dormitory buildings are not designed to be open to growth in their architectural planning. Capacity increase is provided by increasing the number of students in a room.

The square meter per student is decreasing. We can see examples of these future scenarios in dormitories in China that lack minimum living standards. There are dormitories with 14 students in 1 small room. In the process of not making alternative designs in future scenarios, it increases the crises that may occur in the dormitories in Istanbul. As seen in the research, many people who do not stay in dormitories live in shared houses to avoid small rooms. Some of the students have to accept these conditions due to high prices.

Future scenarios are expected to reach the point where all segments of the society cannot reach with the increase in the severity of this situation and a decrease in the quality of life with poverty. In the light of Existenzminimum principles, which were planned as an alternative to the housing crisis of the 1920s, research was conducted in order to offer an alternative to today’s dormitory problems. Alternative dormitory projects examined within the scope of the thesis proposes alternatives based on these principles.

Volu-te has been examined under 5 headings together with alternative dormitory examples. One of the biggest reasons for this is that Volu-te was designed on the same principle as these. The proposed alternative systems include changes along with today’s problems and benefits. In this direction, it proposes a dense and complex order system in megacities. In addition to being an alternative in terms of the relationship it establishes in the city and the lifestyle it describes, it also constitutes an alternative with its design process. The design made specifically for Istanbul uses the advantages of being micro while creating a network for the city. It is aimed to present an alternative to the common solution of today’s megacity problems and dormitory problems.

Volu-te proposes an alternative design and way of life without claiming to solve current problems and future problems.

It is not specially designed for a one-way user. At the same time, it offers an alternative to the problem of the group, which includes students and is described as a “floating society”. This floating community; consists of individuals who need temporary accommodation, such as students, tourists, health workers. Considering the potential to live in different users, it has been thought to be used as a living unit in emergency situations. As one of these emergencies, we can talk about the effects of the Pandemic process.

It is foreseen that the covid pandemic, which was encountered in 2019 and still continues today in 2022, is a temporary problem. However, considering that we are in 2022, we cannot say that it is a short process.This 4-year process covers the entire university life of a student. We can say that the pandemic has caused great changes in the educational lives of students who are actively studying. Most of the dormitory buildings remained empty during these 4 years and are therefore not used.In this process, students participate in the online lessons.The community only meets at certain times for exams. This process has caused students to return to their homes from their dormitories or to their hometowns.

In addition, dormitory buildings remain empty not only during the coronavirus period, but also at certain time intervals. For example, most of the dormitory buildings are vacant in the summer and the midterm of the school. At the same time, tourist travels are increasing in Istanbul during this period. However, there is a need for accommodation for tourists. According to these needs, Volu-te offers seasonal accommodation potentials to users. Periodically, a system that can keep up with different user profiles has been designed. In addition to creating a network between dormitories with a mobile network, it also offers a system that tourists can rent periodically during the summer period. At the same time, the mobile network provides potential for use in many aspects. Apart from student use, it provides many uses such as tourists, business trips, and hospital staff. As a structural design, it is designed to accommodate a single person. This design supports the isolation of the person. In this period, it is an opportunity for hospital staff where isolation is important.

Unlike the existing dormitories, it has an architectural design that is prone to growth and proliferation. Volu-te is basically a modular architectural design proposal that we can describe as a living unit.

In case of an increase in the capacity of the dormitory, this capacity can be provided by increasing the number of units without any change or intervention in the interior. It has the potential to prevent the decline in living standards brought about by the growth foreseen in the future scenarios. In this direction, a proposal has been made within the scope of the thesis in order to examine the use of the Volu-te project as a dormitory model. The general conditions and settlement conditions required for the project have been determined. Istanbul Technical University was chosen as an example and a proposal was made. The design of Volu-te as a system that is open to growth provides advantages in site layout. It can be positioned without interfering with the existing area.

Finally, the conditions we live in and the problems of the dormitory increase in severity with the changing world order. Sustainable designs will reduce such problems and the development of designs can have positive effects on both economy and quality of life. Volu-te proposes an alternative living unit for new situations that will occur in this direction. In this research, it has been shown that Volute does not only aim to fill the shortage in the number of dormitories, but also offers a new and different living space alternative to students. It has been showed how it can be located on the ITU campus that I have chosen as an example, and how it offers common living spaces. It is concluded that the existing dormitory problems can be supported by projects such as Volu-te that offer alternative potentials, and that they can be made livable without compromising our living standards.

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