

**Flexibility as a Tool to Improve Functionality and  
Comfort Level of the Five Star Hotel Standard  
Rooms, A Case Study of the Hotels at South-East  
Coast of North Cyprus**

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## **ABSTRACT**

One of the most significant processes in interior architecture is flexibility, which refers to the possible adjustment to the requirements of all alternative situations and patterns of interior architecture in a dynamic system, or the creation of the designed geometric shape that is more connected and meets the requirements of the intended function. In addition, the flexible solutions can help in the creation of changeable space and help in the division of the space for the required functions to meet the user needs.

The main aim for this thesis is to give a comprehensive idea about flexibility as a tool to improve functionality and comfort level of the five star hotel standard rooms by applying the flexible solutions processes to establish a changeable space, which is applied on the hotel rooms in order to increase the number of users and functions. To achieve that aim, first the flexible solutions will be derived from existing industries and researches like articles and multiple theses, which were completed already. Then the hotel rules and regulations of TRNC will be studied, where the case study in the thesis will be about the five-star hotels in South-East Coast of North Cyprus cities. As well, the classifications of TRNC will be studied as the main base for the design and the analysis of the case studies. After that, the application of the flexible solutions on the hotel room is to be looked into prove the potential for flexibility to meet the user's requirements and their changing needs of space. In general, this study is intended to help the five-star hotels in South-East Coast of North Cyprus to deal with the variable number of visitors by creating a changeable interior architecture and increasing the number of functions through the flexible solutions.

**Keyword:** Interior Architecture, Flexibility, Flexible solutions, Hotels, Five-star Hotel.

## ÖZ

İç mimarlıktaki en önemli süreçlerden biri esnekliktir. Esneklik, dinamik bir sistem içinde iç mimarinin tüm alternatif durumlarının ve kalıplarının gereksinimlerine uyum sağlamayı veya daha bağlantılı ve amaçlanan işlevin gereksinimlerini karşılayan tasarlanmış geometrik şekillerin oluşturulmasını ifade eder. Ek olarak, esnek çözümler değiştirilebilir alanlar yaratılmasına ve kullanıcı ihtiyaçlarını karşılamak için gerekli işlevler için alanın bölünmesine katkı sağlayabilmektedir.

Tezin temel amacı, beş yıldızlı otel standart odalarının işlevsellik ve konfor düzeyini, kullanıcı ve fonksiyon sayısını artırmak için otel standart odalarında değişken bir mekan oluşturmak için araç olarak kullanılan esneklik hakkında kapsamlı bir fikir oluşturmaktır. Bu amaca ulaşmak için öncelikle mevcut endüstrilerden ve daha önce tamamlanmış makaleler, çoklu tezler gibi araştırmalardan esnek çözümler çıkarım yapılacaktır. Ardından, KKTC'nin otelcilik kuralları ve yönetmelikleri incelenecek ve tezde vaka çalışması olarak Kuzey Kıbrıs'ın Güneydoğu kıyısı kentlerinde bulunan beş yıldızlı oteller üzerine çalışılacaktır. Ayrıca, vaka çalışmalarının tasarımı ve analizi için temel olarak KKTC sınıflandırmaları incelenecektir. Bundan sonra, esnek çözümlerin otel odasında uygulanması, kullanıcının gereksinimlerini ve değişen alan ihtiyaçlarını karşılamak için esneklik potansiyelini kanıtlamak için araştırılacaktır. Genel olarak, bu çalışma Kuzey Kıbrıs'ın Güneydoğu kıyısında bulunan beş yıldızlı otellerin, değişken bir iç mimari oluşturarak ve esnek çözümlerle fonksiyon sayısını artırarak, değişken ziyaretçi sayısının üstesinden gelmelerine yardımcı olmayı amaçlamaktadır.

**Anahtar Kelimeler:** İç Mimarlık, Esneklik, Esnek çözümler, Oteller, Beş Yıldızlı Oteller.

# DEDICATION

*To My Mother...*

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# Chapter 1

## INTRODUCTION

One of the important issues in human beings' lives is the interior architecture, where it is considered as one of the important processes of the psychological awareness to build the physical world of a person; through linking it with satisfaction to use the space as an inhabitable environment (Hamdy Mahmoud, H.T,2017).

The interior architecture in an accurate sense is the planning process for the form of space and its creation in a purposeful and satisfying way that satisfies the human need utilitarian and aesthetic. As well, it considers as a scientific treatment of space in order to provide the basic conditions, which is functionality, appropriate form. As the history refers according to Kronenburg (2007), one of the interior architecture processes is the flexible process, where it came from the old human being who lived in a desert through made a tent as accommodation to live, that it easy to folded and move. In addition, according to Gjakun, M. (2015) the flexibility in interior architecture that makes the possibility of extending the function of the same space in different forms and several functions. Also, Oliver (1975) believes that is the human nature is being flexible creatures that have the ability to move and the potential to work with the environment around them.

Accommodation considered as one of the important interior architecture industry that is create the space as livable in order to meet human need. In addition, the flexibility

as a tool considered a significant solutions to improvement an accommodation in the interior architecture process by establishing a changeable and multi-function space to suit the user's needs James A. Bostrom (1987).Where the flexibility in interior architecture can change the utilized size of space for makes the interior more livable (Hamdy Mahmoud, H.T,2017).

This thesis tack accounts of accommodation issue in hotel. Where is the hotel consider one of the largest interior architecture accommodations industries according to (Rutes, Penner, & Lawrence, 2001, p. 5). Furthermore, it feed heavily on visitors from outside or inside the country for many reasons (Lawson, 1997: 1). Andin the recent years there are many countries shows an increase in the number of visitors that led to increase in a turnout rate on the hotels for accommodation too.

TRNC has been undergoing one of the countries that has a rapid process of the significantly increasing number of visitors in last eight years, where according to the TRNC Hoteliers Association the tourism rate in 2014–2016 was nearly 83% and 68% , and in 2017 the rate increase by 6–8% (Azarmi, Oladipo, Vaziri, & Alipour, ,2018). In addition , the number of visitors increasing in 2019 according to web studies of North Cyprus International as refers the quotation(URL:109).

“From Europe (France and Germany both up by 25%), North America (Canada and USA up by 10 and 20%), Scandinavia (Finland up by 50%) even new arrivals from China (up by 18%)” (North Cyprus International,2019)(URL:109).

Especially the city of South-East Coast of North Cyprus İskele and Famagusta as the important cities of TRNC has experienced continuous visitors' growth. Where it

received a large number of tourists and the occasions of universities throughout the year and provided accommodation for them.

Also, the five-star hotel standard rooms considers one of the important accommodations to absorb visitors with high standards and specifications. That the main function of star hotels is to provide for the overnight needs of customers(Ransley & Ingram ,2012).In addition, the ministry of TRNC is interested in determining the best standards for hotels in order to meet the hotel sector needs, where the five-star hotel follows the compulsory rules and regulations according to Article 12 from The Council of Ministry of TRNC.

“the five-star hotels adhere to several standards for the minimum capacity of beds with the requirements with superior features such as settlement status, structure, installation, equipment, decoration, and service standards” (Ministry of TRNC ,2005).

## **1.1 Problem Statement**

The five-star hotels in TRNC follow compulsory rules and regulations, that determine the main interior architecture aspects such as the size and features for standard rooms, that in order to keep this classification with high standards to guest service. As well, the furniture consider one of the most important features, where the rules and regulations determine22 compulsory items, and room size is compulsory too where the standard room size is 18 sq. m. Furthermore, the five-star hotel adopting a fixed furniture item to cover the compulsory items in rooms, where this kind of furniture is heavy and it is difficult to move it or change its position easily.

This caused a problem where it restricts the hotel to deal with the change in the number of visitors with the same functionally and level of comfort in different periods, also this problem restrict the ability of the hotel to increase the number of



beds and functions. Additionally, another problem is with the significantly rapid increasing the number of visitors who coming to TRNC the five-star hotels are forced to increase their capacity to absorb much more number of visitors in the same functionally and level of comfort.

These problems require a serious solution to improve the functionally and the level of comfort in five-star hotel standard rooms and increase the functions in order to improve the accommodation and absorb much more visitors. As one of the effective solutions, this thesis proposed solutions by applying flexibility as a tool, that to improve functionality and comfort level in the interior architecture of five-star hotel standard rooms. Also, to increase the functions to make space meets the need of visitors'.

## **1.2 Aim And Research Question Of Study**

The main aim for this thesis is to study the flexibility as a tool to improve functionality and comfort level of the five star hotel standard room, also to increase the number of function and beds in order to enable the five star hotels standard rooms to absorb much more visitors.

This research has two main objectives: First, investigate and study flexibility as a tool from existing industries and researches like articles and thesis. Second, applying the proposed designs in order to developing the flexibility as a tool in the five-star hotel standard rooms in South-East Coast of North Cyprus.

To reach that aim this thesis searches the flexible structure through the elements of interior architecture (Wall, Floor, and Ceiling).As well, investigates a scientific background of the flexible solutions in materials, mechanic techniques and furniture.

Equally important, studying the flexibility processes into the small spaces.

- The thesis research will focused to answer these questions:
  - How does the flexible design affect the interior design in hospitality architecture ? (Position of space \ Number of users)
  - What are the effects of using flexible materials and structures in space?
  - What are the affects of creation changeable space using flexible solutions with a small area and is flexible design an effective use of space?

### **1.3 Methodology**

The research method used within this thesis is qualitative. Moreover, the literature review consider as a scientific background for the thesis where it evaluated from several sources, the sources collected from the flexible industry and researches like articles, and thesis that have already been completed.

The collected sources focus on conducting a scientific background of flexibility as a tool and within this data will be create a proposed design that aimed to reorganize the interior design for five star hotel standers room.

The analysis is based on two methods: first by development and proposed a new solution in flexibility as a tool for a chosen hotel, where the researcher drew the existing architectural plans and sections for hotels by relying on different approaches (Books, articles, old thesis, images, videos, magazines, Google Maps, websites that related to hotels and with a picture taken by the researcher after taking permission requesting from the hotel manager). That due to the country's precautionary measures

regarding the global epidemic situation for close the facilities of hotels. Then the author designed a proposed plan by analyses the table :Evaluation Of Flexible Solutions for the selected cases studies through the information in literature reviews. Also, the information collected is about flexibility as a tool, flexibility patterns, flexibility design in small space type, flexible furniture type, flexible materials, and mechanism of the flexible technology.

Also, the second method analysis is by organize in table: The Effect of Flexibility that making to comparing between existing and proposed design. This part is based on collecting the data from the first method of proposed designed plan and from the existing hotel functions, where explain all the results in the table by compare the findings from proposed plan and findings from existing plans. The comparing include the number of beds and design of main bed unit, secondary bed, kitchen, dining table, living sofa , unit TV, mine bar, safe and wall cabinet.

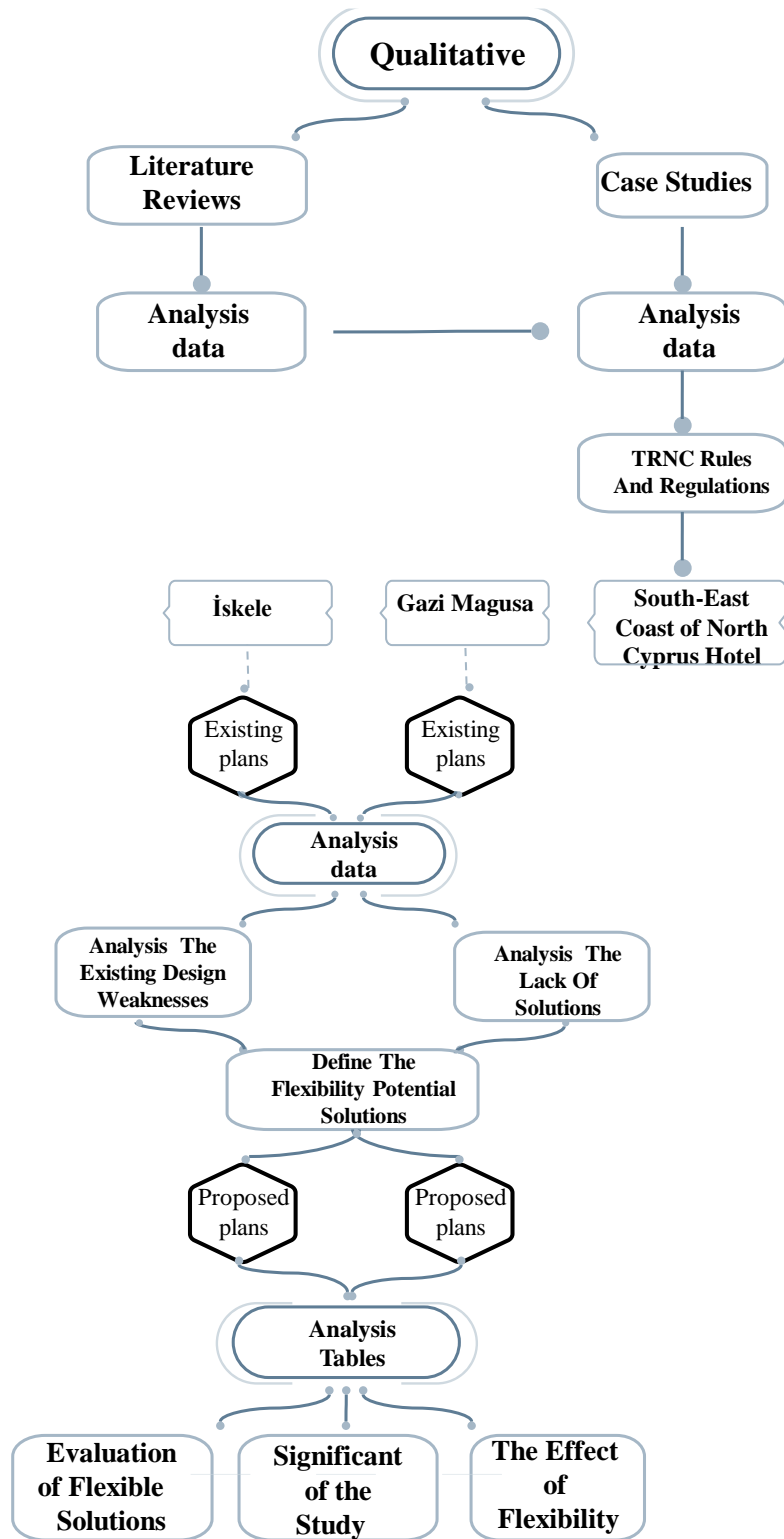


Figure 1: Methodology Of The Thesis

## **1.4 Limitation**

This thesis will focus on five-star hotels in the South-East Coast of North Cyprus as a case study, that is the five-star hotels are one of the most important hotel types for offering a high standard of equipment, decoration and service standards for visitors.

Another limitation focusing on the hotel standard rooms as a space that determines accommodation within the hotel, that is considered as a very significance because it is the main reason for establishing hotel industries and is the largest part of the hotel.

In addition, focusing on a flexibility as a tool processes in interior architecture and evaluates the flexible structure elements, principles and types. Additionally, investigates the effects of flexible solutions in materials, mechanical techniques and furniture in interior architecture. Furthermore, the flexible solutions will be derived from existing industries and researches like articles and theses that were completed already.

As well, this thesis undergoes a rules and regulations of TRNC where the classifications will be as a base for the design and the analysis of the case studies hotels. The case study for the thesis will be chosen from the Five-star hotel classification, within the South-East Coast of North Cyprus with two regions Gazi Magusa and İskele because the number of five-star hotels is not enough compared with the increasing number of visitors.

The hotels chosen are Salamis Bay Conti Hotel, Arkin Palm Beach Hotel, Concorde Resort Hotel, Kaya Artemis Resort and Casino, Limak Cyprus Deluxe, Noah's Ark Deluxe Hotel & Spa.



Figure 2 : South-East Coast of North Cyprus Map Include Selected Five Star Hotels (Paintmaps,2021) Scale 1:1000mm3.( URL1)

Table1 : Cases Studies Table

No. map	Hotel name	Distinct
1	Salamis Bay Conti Hotel	Gazi Magusa
2	Arkin Palm Beach Hotel	Gazi Magusa
3	Concorde Resort Hotel	İskele, Bafra
4	Kaya Artemis Resort and Casino	İskele, Bafra
5	Limak Cyprus Deluxe Hotel	İskele, Bafra
6	Noah's Ark Deluxe Hotel & Spa	İskele, Bafra

## Chapter 2

### FLEXIBILITY

This chapter investigates and analyzes some specific aspects related to the thesis topic through explain the definition of flexibility and identifying differences and similarities comparing the definition of adaptability. In addition, this chapter will be studying the scientific background of the flexibility as tool such as flexibility patterns, the type of flexibility, flexible furniture type, flexible materials, and mechanism of the flexible technical. As well investigate a existing example for all the main section.

#### 2.1 Definition Of Flexibility

The common English handling of the word “flexibility” from Oxford and Cambridge English dictionary it represents refers for easy turning and physical formation for the shape while is still intact as follow quotation:

- "The quality of bending easily without breaking"(URL:2).

In addition, it mean also, that the shape’s have ability to change easily under the current situation.

- "Able to be easily modified to respond to altered circumstances " (URL:2).
- "Ability to change or be changed easily according to the situation"(URL:3).

As well, from the architecture view of the flexibility according to scholar Inani & Ashok (2009) they believes the principle of practical flexibility is considered a clear and a strong request to find a permanent identity in the urban style that gives the

building the ability to deal with future needs and conditions. Also scholar such as Oliver (1975), Kronenburg (2002), believe that the nature of the human being to be flexible creature who can move and has the ability to act according to the surroundings. In addition , flexible interior architecture is the accessible interior space through options that can be modified, added, or removed as needed to suit the occupants(James A. Bostrom ,1987).

Additionally, flexibility mean according to scholars Abdulpader; Sabah; Abdullah, (2014)they are looking to the flexibility as it is one of the physical properties of the engineering shapes of interior design, which allows its features to give the space a flexible field allowing it to be used with more than one function in the same space. Also, Farjami (2014)looking to the flexibility as physical properties where divide the flexibility to three category foldable, movable, and modular systems in the design of structural flexibility in architecture.

Additionally, according to Akyalçın (2015)he believe the flexibility can apply in any place, and flexibility through the elements raise the quality of space especially in function and structure. Also, Farjami (2014)believes flexibility is an important part of performance and function through the ability to change furniture and structure to improve the housing. And ,Karimnezhad (2017) believe using the flexibility as a tool in the 20th century have ability to improve the functionality and the condition of live. As well, according to Gilani, G. (2012) the flexibility connect to the traditional dwellings as one of the significant principles of it, where it adaptable with changing of inhabitants needs.



## 2.2 The Relationship Between Flexibility And Adaptability

To understand the relationship between flexibility and adaptability, it is worth understanding the meaning of adaptation in common English usage.

Adaptability defined as making alterations for a recently developed use give new solutions as refers the follow quotations from Oxford and Cambridge English dictionary:

- " Able to be modified for a new use or purpose "(URL:4).  
Moreover, it the ability or desire to change for established different circumstances.
- " Ability or willing to change in order to suit different conditions situation"(URL:5).

Also, the scholars in the architecture field such as Habraken (2008), Schneider and Till(2007), Andrew Rabeneck (1973), David Sheppard (1974) and another scholar, they believe flexibility and adaptability are highly close in meaning and commonly interferes. And in this chapter it will be highlighted for their scholars research.

Habraken (2008)believes that flexibility as well as adaptability have many and overwhelmingly interlaced meanings that arrive at a mutual practical achievement, making both terms accepted in a dictionary with similar meanings. In addition, Table 2 looking at the definitions of flexibility and adaptability in the architectural field to explain the similarities and differences between them from the scholars' research.

Table 2: Definitions of " Flexibility" and "Adaptability" (Gilani ,2012)

<b>Authors</b>	<b>Year</b>	<b>Flexibility</b>	<b>Adaptability</b>
<i>Andrew Rabeneck, David Sheppard, Peter Town</i>	1973	“Flexibility” is proposed against “tight-fit functionalism”. (p.698)  Flexible housing should be capable of offering “choice” and “personalization”.(p.698)	Adaptability in the housing context refers to housing units that can be “easily altered as circumstances changed”. (p.699)
	1974	The concept of flexibility deals with the “constructional technique and services distribution”. (p.86)	Adaptability is related to the “planning and layout” of a building including the sizes of rooms and the relation between rooms. (p.86)
<i>Steven Groák</i>	1992	Flexibility points to “capability of different physical arrangements”. (p.15-17)	Adaptability points to “capabil[ity] of different social uses”. (p.15-17)
<i>Gerard Maccreeanor</i>	1998	Flexibility is “a designed idea [that leads to] the collapse of the traditional layout”. (p.40)	Adaptability is “a different way of viewing flexibility” which refers to “trans functional[ity] and multifunctional[ity]”. (p.40)
		“Flexibility does not imply the necessity of endless change and breakdown of accepted formula”. (p.40)	Maccreeanor emphasizes that “most adaptable [buildings] were those not originally planned for flexibility”. (p.40)
<i>Tatjana Schneider, Jeremy Till</i>	2007	Flexibility in the context of housing is “achieved by altering the physical fabric of building” (p.5)	Adaptability in the context of housing is “achieved through designing rooms or units so that they can be used in a variety of ways”. (p.5)

About the articles “Housing Flexibility” (1973) and “Housing Flexibility/ Adaptability” (1974) by Rabeneck, Sheppard and Town , they presented the flexibility context as a stand-alone field that meets the needs of each individual resident (1973, p. 709),in addition , believe that the home easily adapts to the circumstances (1973, p. 699), as well as explain the structural system and service areas.

From Groák (1992) through his book(The Idea of Building Thought and Action in the Design and Production of Buildings)he explains the differences between adaptability and flexibility as well as that adaptation depends on constituent parts of the space .In addition, he believes that flexibility is more comprehensive in terms of fit.

In Maccreanor 's (1989)view, the relationship between flexibility and adaptability is part of the notions of flexibility that relates to a period of varying time as a result of the housing capacity in terms of flexibility and the time factor.

According to Schneider and Till (2007, p. 5), space adapts to the foundations of the internal and structural system of space as they believe that flexibility and adaptation have different characteristics by employing form and using technology.

### **2.3 Review The Principles Of Flexibility In Housing**

This section reviews the practical manner of principles of flexibility according to the scholars Milica Živković, Aleksandar Keković, Slaviša Kondić, (2014), Abdulpader, Sabah, & Abdullah(2014)and Baper& Saied (2019).

The flexibility principles influencing the external and internal architecture during the past and present century were adopted as architectural foundations according to Schneider& Till(2007)they defines “flexibility” as “... is housing that can adjust to changing needs and patterns, both social and technological”.

Equally important is the leading principle of James Bostrom (1987)approving that ,“Adaptable housing is accessible housing that does not look different from other housing and which has features that in only minutes can be adjusted, added, or removed ..”

### 2.3.1 Adaptations Principle

The principles of flexibility and adaptability in a small space should be considered gradually. Along with that, the adaptability was to the changes and alterations to adapt the environment to the changing needs of the resident in time where there is the possibility to adapt to change(Figure3).

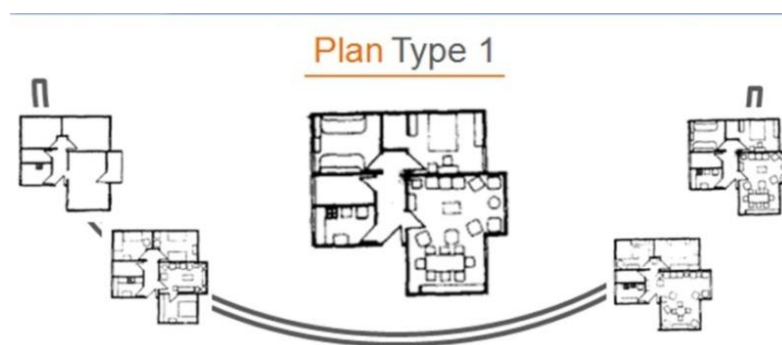


Figure 3: Housing Types From The Article (Spatial Adaptability and Flexibility). Which The Case Study Aims to Study the User Satisfaction For Quality Housing(Altaş & Özsoy,1998)

### 2.3.2 Movable Parts Principle

Based on the principle of the flexibility part in interior architecture, it defined flexibility as one of the physical properties of materials and geometrical forms used

in interior design that can be used for making flexible space in order to gain a transformable and multi-uses(Abdulpader, Sabah, & Abdullah ,2014)(Figure 4) and (Figure5).



Figure4:Flexible Geometrical Property 1(URL6)

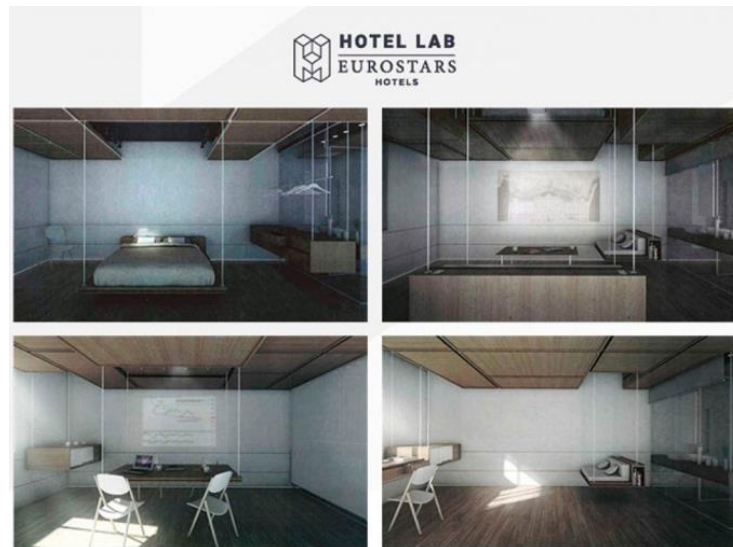


Figure 4: Flexible Geometrical Property 2. (URL6)

Also this principle based on three foundations vertical planes, horizontal planes and flexible furniture as refers on the next point:

- i. Vertical partitions that are movable and have the ability of reshaping space by use floor and ceiling elements in flexible solutions.

- ii. Horizontal partitions, that are movable and have the ability of reshaping space by use wall and movable units elements in flexible solutions.
- iii. Flexibility in furniture as refers in Figure 4 this foundation is a physical piece for saving space by furniture can converting easily such as convert chair to a bed or table.

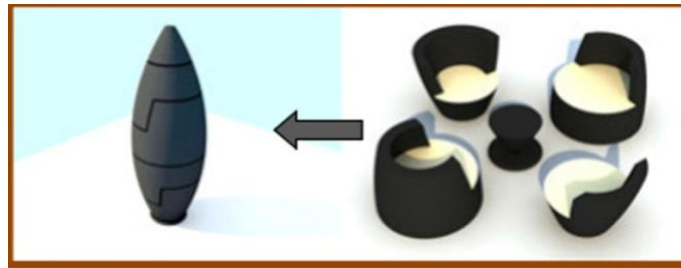


Figure 5: Flexible Furniture. (Hamdy Mahmoud,2017)

Also this principle its contents from more than one piece and it combine in one group until need(Abdulpader, Sabah, & Abdullah ,2014).

### **2.3.3 Smart Flexibility Principle**

Smart flexibility of small spaces principle it interested in investigating the best approach to make interior architecture with flexible qualities, that to reach for the functions need in more effectiveness (Figure 7).

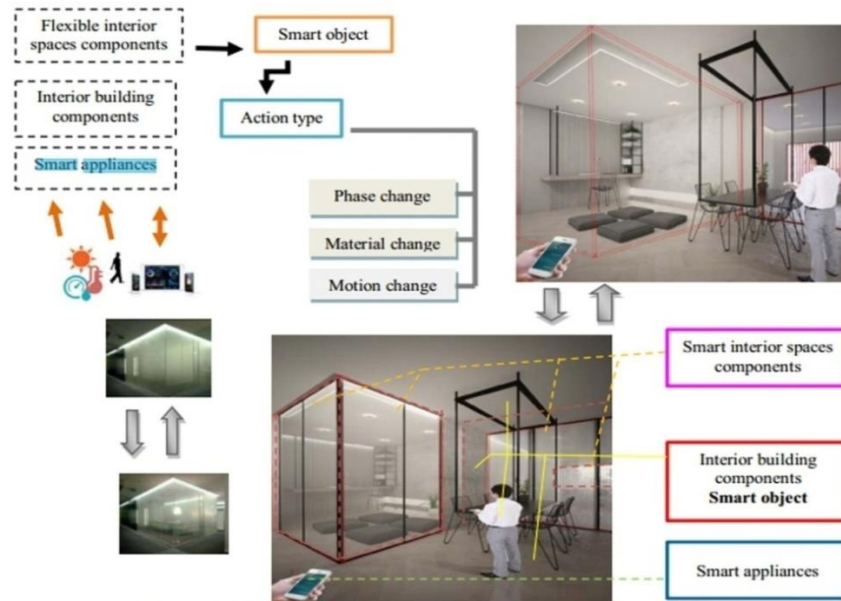


Figure 6: Smart Flexibility Elements With Technology. (Baper & Saied,2019)

According to Baper& Saied. (2019) this principle looking to using the electrical appliances and linking them together with one internet network, to establishing a small area with the ability to expandable with more than one functions. Equally important the technology today plays a big role, and he believes it is possible to provide a better interior design for more flexibility through the use of smart technology due to its characteristics. Also, Saidam , Al-Obaidi , Hussein, & Ismail (2017) they believes the usage of smart flexible process can develop performance for the interior space by proving the relationship between smart technology and interior design. In addition, the new technology led to establish smart design and linked with a dynamic technical system to create interactive form building with multifunction to have a flexible interior design in order to have more functionally space (Figure8).

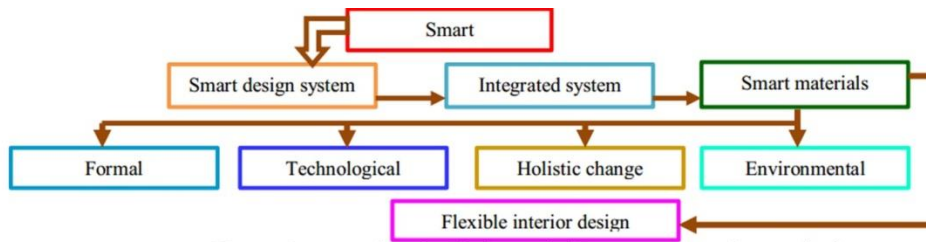


Figure 7: Model of Smart Flexible Process of Interior Design .(Saidam , Al-Obaidi , Hussein, & Ismail,2017)

### 2.3.4 MultifunctionElements Principle

The flexibility can be help to utilize the space in more effectiveness, that by applying the flexible solutions within the structural elements for product of the diverse models of space(Figure 9)(Figure10) (Figure 11).

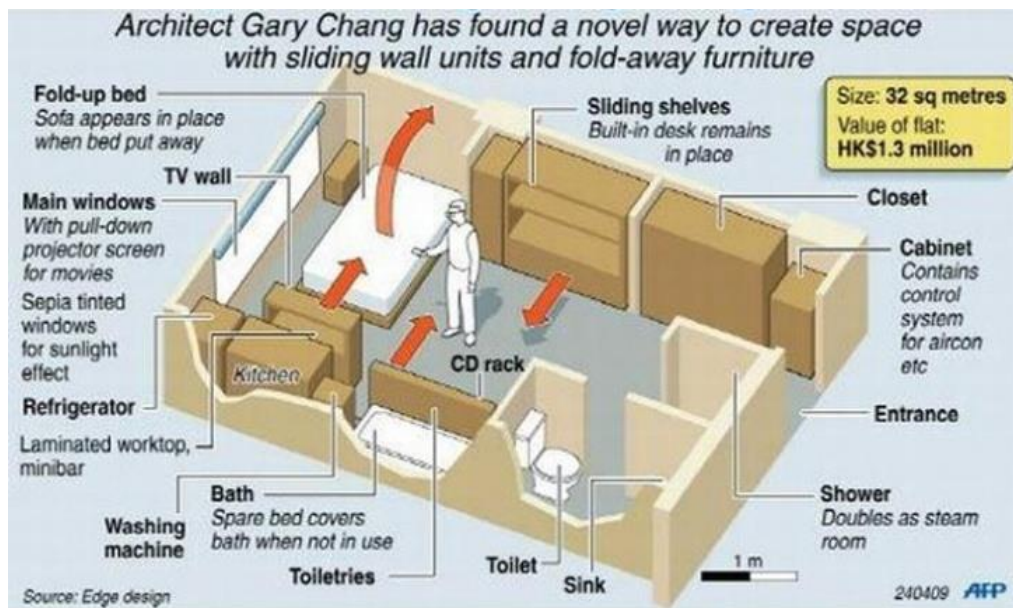


Figure 8:Flexible Multifunction Elements. (URL7)





Figure 9: Example of Flexible Multifunction Elements From Japan Culture 1(URL8)



Figure 10: Example of Flexible Multifunction Elements From Japan Culture 2(URL9)

This principle also make it possible to divide, separate, integrate, or open the small space to access for the best possible space (Figure 12).

In addition , Milica Živković, Aleksandar Keković, Slaviša Kondić (2004)they are believed that when the use of these elements it will change the defined structure from the traditional design approach for new functions.

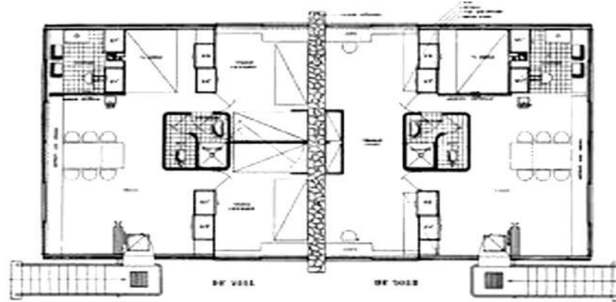


Figure 11: Different Plan According Clients Choose(URL:10)

### 2.3.5 Architecture Structure Element Principle

According to James A. Bostrom (1987) the flexible interior architecture is that accessible interior space with options that can modified, added, or removed as needed to suit the occupants. In addition , Australian Standard (1995) he looks for the flexible to promote the accommodation needs of users of all ages, abilities and suitability for people with any level of disability as refers in Table 4.

Additionally, Leupen (1997) demonstrates the various degrees of flexibility in architecture design, where the interior architectures when apply the flexibility process the flexible led to establish a new active by a dynamic technical in interactive form building with multifunction to utilize a space in more functionally , as it description in (Figure 13).



Figure 12: Various Degrees of Flexibility In Interior Architecture Design(Leupen , 1997)

From the structure of establish the architecture the British architect Frank Duffy (1994) proposed the first principle with the rate of change in buildings "shear layers". Frank also believed that the building is considered to be a free space that has the

ability to be redesigned in terms of its furniture in order to reach flexibility for daily activities(Figure 14).

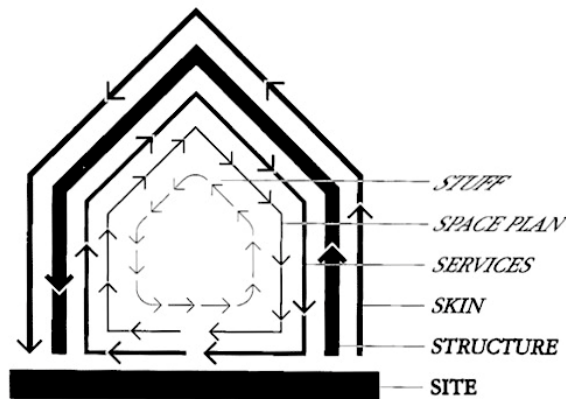


Figure 13 : Layers of The House to Create Flexibility In Maintenance and More Durability(Bostrom ,1987)

Besides Brand (1995) development of the idea of "shear layers" in his book, Daffy has make flexible organize to expanded the layers to six layers in (1994. p.13): Table 3 refers the idea of the layer aim in part of description (McGregor & Then ,1999).In addition, by applying the full separation of multiple layers in the construction process, the building's lifespan increases due to the ease of changing the internal sections and the external facade parts because of the flexibility of the order of the layers.

Table 3: Building Layers .(Bostrom ,1987)

Layer	Description	Longevity
Site	Geographic setting, urban location	Eternal
Structure	Foundations and load bearing elements	30 to 300 years
Skin	Exterior surfaces (Facades)	20 years
Services	Wiring, plumbing, HVAC systems and ...	7 to 15 years
Space Plan	The interior layout	3 years
Stuff	Furniture, kitchen	Daily to monthly

## 2.4 Motivation of Flexible Design

History of flexibility comes from two folds of the human being life and the reason for the difference and change in era and requirements , The first fold comes from human beings who lived in a desert with poor equipments for establishing buildings by creating a moveable place to live in with the option of transportation such as making a tent to be as a faster and an easier option to transport (Kronenburg,2004)(Figure 15). In addition, according to the scholars Oliver (1975), Kronenburg (2002) , Kronenburg (2007) they believe the nature of the human being is that it is a flexible creature that can move and has the ability to deal with the surroundings. As well, our development was dependent on the ability of the person and the ease of movement.



Figure 14: Traditional Building of Yurta – A Mobile, Flexible (Kronenburg, 2004)

The second fold came after the established cities and fixed buildings that require flexibility in order to change shape and content as needed like room in a house or a lobby in a hotel.

At the present time the cultures are living life of almost great stability and flexibility is a possibility that has priority in human development , that because of the speed of economic and social changes and technology that encourages or imposes a new style of existence (Kronenburg, 2007) (Figure 16).



Figure 15: Contemporary Space(URL:11)

## 2.5 Patterns Of Flexibility

There are three flexibility categories for patterns which are quoted from scholars Dittert (1982), Hofland & Lans (2005), Van Eldonk & Fassbinder(1990)is as follow:

- i. Spatial flexibility (structural): It is the possibility of forming the case to suit the professional field.
- ii. Functional flexibility: Enabling the freedom to be given by controlling the internal space while keeping the structural shape as it is.
- iii. Character flexibility: It is concerned with the architectural aspect specially the primary side which is responsible for giving the building its identity.

In addition, according to ,Hofland & Lans (2005)they divided the types of flexibility depending on pattern as shown in Table 4.

Table 4: Types Of Flexibility Depending On Pattern (Hofland & Lans ,2005).

Pattern	Type of flexibility
structural	Possibility for change of floor plan.
	Possibility to reshape apartments.
	Modernization flexibility.
functional	Robustness for calamities.
	Neutral for furnishing.
	Flexibility for changing safety requirements.
	Wheel chair adaptability.
	Capacity for expansion.
	Multi functionality.
	Finance flexibility.
	Capacity to shrink.
	Parking flexibility.
Character	Character flexibility .

Also the scholars Al-Dakheel in 2004 ,Gulaydin (2004) and Bakkaloğlu (2006)classification the patterns according to the notions to clarify in more details for all the patterns as follow.

- i. Structural flexibility : It is the ability to control units from all vertical and horizontal directions and allow the use of the system of installable units ( modular unit system)(Figure17).

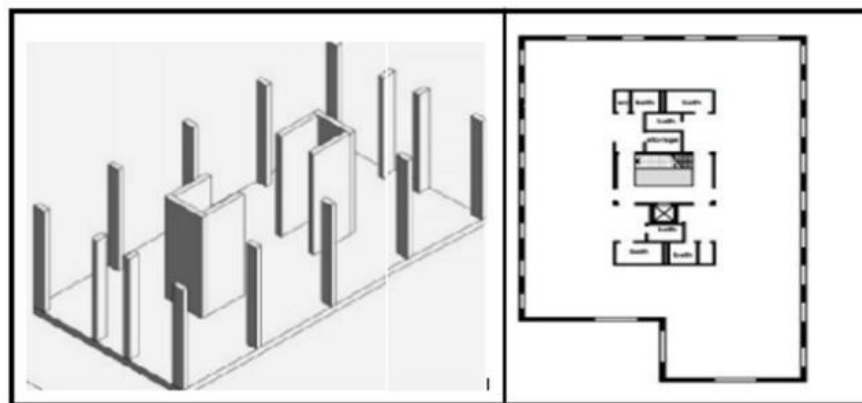


Figure 15:Flat House In Switzerland (2003) Show APlan Which Has Been Designed By Structural Flexibility Pattern .(Gilani,2012)

Also , Table 5 explain the classified of extendibility expansion of structural flexibility contains which is written by Gulaydin (2004)and is quoted in Bakkaloğlu (2006).

Table 5: Flexibility Notions Of Expansion Structural Pattern

<b>(Gulaydin, 2004:P.28)</b>								
Expansion according to direction			Expansion according to scale			Expansion according to form		
horizontal	vertical	horizontal and vertical	component scale	building scale	settlement scale	radial	linear	clustered
<b>(Freidman ,2002)</b>								
method of "Add-on"				method of "add-in"				
design that considers expansion beyond the dwelling (add-on)				growth into a space within the perimeter of the original volume				
<b>(Schneider and Till, 2007)</b>								
<b>Based Structure</b>				<b>Polyvalent Organizations</b>				
Open plan and free structural system				Standardized modularization				
<b>Based Structure</b>								
<b>(Habraken , 1972)</b>								
structural elements			access units			servicing		
<b>(Habraken, 2002)</b>								
The elements of fixed/common to <i>supports</i> the compose								
column		girder	retaining wall		mechanical systems ducts		stair and elevator	
<b>Infill System</b>								
partition walls,	floor elements	kitchen	doors	bathroom equipments	conduits for electricity	heating	water	gas
polyvalent organizations.								
polyvalent organizations”								
divided into modules (Albostan, 2009)								
Soft				Hard				

Table 5 shows the flexibility notions of expansion structural from three researchers the first scholar Gulaydin, (2004) he divides the expansion of structure according to direction, scale and form. In addition, Freidman (2002) spirited the expansion to two methods related to broadening the first method considers broadening outside the dwelling (Addition) and the second method by growth into the same space.

As well, Schneider and Till (2007) spirited the expansion as *Based structure* and *polyvalent organizations*. The first category *Based structure* is related to the idea of an open plan to get a free structural system. As well Habraken (1972) divided the Based structure into structural elements, access units and servicing, also Habraken in 2002 support his study to investigate the elements of fixed and Infill system, which elements of fixed explain the main part that considers establishing the building and in Infill system explain the added sections inside the building (Habraken ,2002).

And the second category presents the polyvalent organizations which it divided into two module Soft and Hard. In addition, Schneider , Till (2005) believe the soft is a technique with unspecified capabilities in the field of flexibility in architecture as the word hard symbolizes the identifiable elements that can be used for the designed method and they explained as follow:

- The soft” enable to modify or change projects according to the need of the user to provide the largest possible space and this technology is based on a pattern “relaxed” and “indeterminate”(Schneider& Till ,2007).
  - The hard depends entirely on the architect's experience in determining the best, with what he deems appropriate from changes or modifications to the user(Schneider& Till ,2007).
- ii. Functional Flexibility: It is the possibility of giving full freedom to shape according to the height of the internal space of the residence, which by allowing control of the sizes of items and furniture.

Functional flexibility contains the following:

- Versatility
- Convertibility



- The possibility of forming units by separation or reconfiguration
- The ability to create places to serve the systems responsible for mechanics, such as electricity and plumbing
- Ability to arrange furniture based on quantities

Functionally flexible examples

The Maison Domino and Maison Citrohan from Le Corbusier. The concept of this plan is based on separating the movable parts from the non-movable parts, thus providing this building with space for transfer and freedom of use (Albostan, 2009 ) (Figure18).

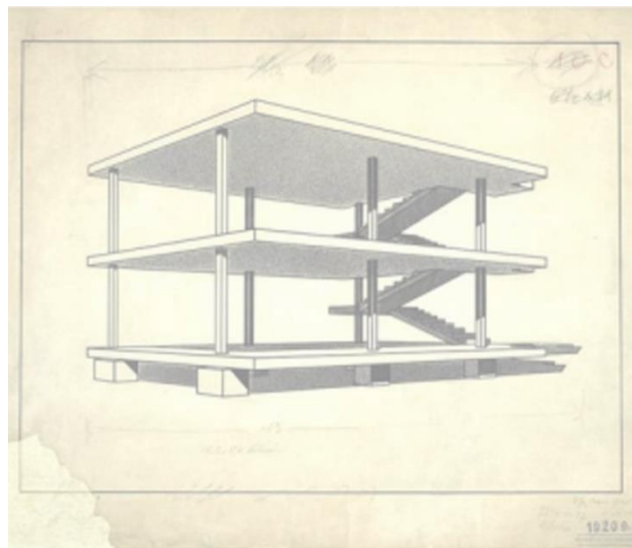


Figure 16: The Dom Eno House By Le Corbusier Designed In 1919.(Estaji,2017)

Le Corbusier's plan was developed during five phases between the years 1919 and 1927 (Figure 19) to allow the formation of the internal surveyors of the building due to its reliance on existing columns that allow functional transformation and mobility according to the required job (Risselada, 1991).

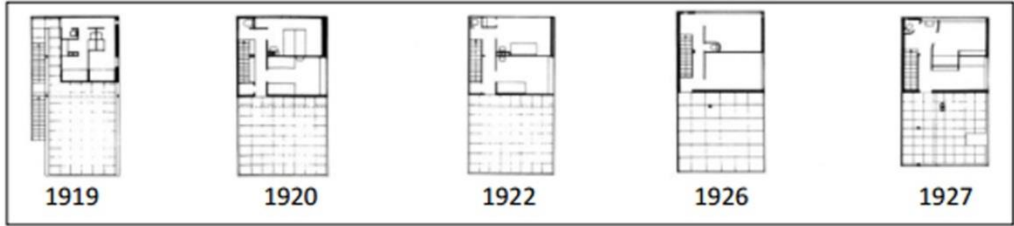
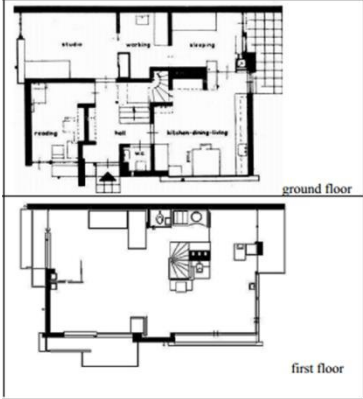

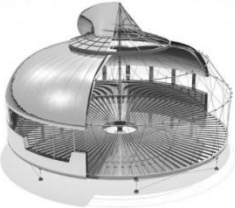



Figure 17 : 5 Option of Ground Flat of Citrohan Houses(Risselada,1991)

Table 6: Functionally Flexible Examples .(Gilani,2012)


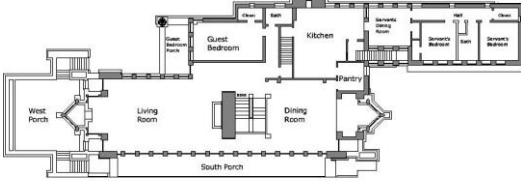
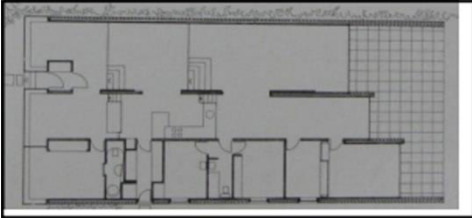

no	name	Figure	Characteristics
1		 <p data-bbox="580 712 935 786">Figure 18: Schroder House Plan.(Gilani,2012)</p>	<p data-bbox="995 306 1393 488">- Created completely according to the De-Stijl principles</p> <p data-bbox="995 524 1393 786">- the living area is one of an explaining symbol of modularity (Friedman &amp; Krawitz, 1998).</p>
	<p data-bbox="395 999 515 1178">Gerrit Rietveld ( 1924 )</p>	 <p data-bbox="580 1245 935 1357">Figure 19: Schroder House Gront and Pinteril Saloon .(Bakkaloğlu, 2006)</p>	<p data-bbox="995 887 1393 1216">- changing (space ,e functions, separate and join of the volume) ,as well the possibility of space-change (Bakkaloğlu, 2006).</p> <p data-bbox="995 1249 1302 1290">(Figure20), (Figure21).</p>
2	<p data-bbox="395 1391 515 1648">Richard Buckminster( 1929).</p>	 <p data-bbox="560 1615 943 1682">Figure 20 : Dymaxion House Mode 1. (URL:13)</p>	<p data-bbox="995 1391 1286 1424">convert functions by:</p> <ul data-bbox="995 1469 1286 1581" style="list-style-type: none"> <li>• movable walls</li> <li>• movable partitions</li> </ul> <p data-bbox="995 1615 1393 1872">The possibility of controlling an area of a room by merging or separating the rooms(Bakkaloğlu, 2006).(Figure22), (Figure23)</p>
		 <p data-bbox="571 1910 943 1977">Figure 21: Dymaxion House Model .(URL:14)</p>	

- iii. Character flexibility :This pattern focus on the exterior architectural quality that by the possibility of change the building facade or the interior architecture identity aspects .Also it contains the personalizing unit , proving exterior privacy , and proving interior privacy(Oskouei, 2016).

#### Character flexible examples

Robie house and Jaffe house shown the possibility of controlling the room space by movable walls and faced by windows. Table 6 show examples of character flexibility.

Table 7: Character Flexible Examples. (Bakkaloğlu,2006)

no	name	Figure	Characteristics
1	Frank Lloyd Wright (1909)	 <p>Figure 22: Robie House Inertial View .(URL:15)</p>  <p>Figure 23: Robie House Plan. (URL:16).</p>	<p>horizontal line, open floor plan and low pitched roof</p> <p>This home embodies open plan principles.</p>
2	Richard Rogers (1966)	 <p>Figure 24: Jaffe House Plan .(Powell, 1999)</p>  <p>Figure 25: Jaffe House Front . (Powell, 1999)</p>	<p>The ability to adapt as needed</p> <p>The possibility of controlling the location of the bedrooms through the movable walls (Powell, 1999)</p> <p>The possibility to improve the space allocated for privacy according to the nature of the beds, because it has an open plan with movable walls(Bakkaloğlu,2006)</p>

## 2.6 Flexible Design Process In Interior Architecture

According to the scholars Heidegger (1993), Kronenburg (2002), Oliver (1975) the flexibility design process in interior architecture distinguish of several point and the most common of this distinguish as follow;

- The most important thing that distinguishes human beings is that they are a flexible type.
- Humans have always had industries that depend on the need and have the ability to change to improve the performance of developing cases.
- Flexible design has a fixed place in the permanent movement axis in the designs made by the human beings.
- The construction period during the recent ages is accustomed to obtain a huge number of forms of flexible buildings suitable for the needs of a different life.

Also, De Neufville & Scholtes (2011) believes the flexibility in interior architecture has three important divisions to become multi-functional in order to give it some kind of ability to protect from future accidents that are difficult to predict. In the categories to meet changes in size, changes in function. Along with that they agree that flexibility is distinguished:

- Flexible design recognizes the ability to respond to economic and technological development and has the ability to reform.
- Flexible design creates an environment that easily adapts for several years with the same efficiency.
- Flexible design includes features that enable the environment to absorb the most anticipated conditions automatically or with administrative supervision.

### **2.6.1 Flexibility In Interior Architecture Small Spaces**

Buildings are not only a solid space as well as it shows the advantage of flexibility in the ability to adapt to the functional change of the user's need (Leupen, Heijne, & van Zwol, 2005), (Estaji, (2017). As well, flexibility have features is that the space can be shrunk or grown depending on the evolution of function need. This gives user the ability to create the functions in space or rooms as needs (Schumacher Schaeffer, & Vogt, 2009).

And as mentioned before the flexibility is one of the physical properties of the interior architecture shapes, which allows its features to give the space a flexible field allowing it to be used with multiple functions in the same space (Abdulpade, Sabah, & Abdullah, 2014). In addition, Leupen, Heijne, & van Zwol, (2005) they believes the flexibility point in interior architecture is the formation of multi-value buildings and the buildings to be permanent and subject to change.

Also, Schumacher Schaeffer, & Vogt (2009) divide the building component into three categorized first space-containing walls, second moving platforms (floors, ceilings, stairs) and mobile cells. Where the flexible building elements and materials can use for change the size of the room by apply flexibility. Also, the flexible system has the ability to respond to expected changes or other changes that are difficult to anticipate in life, such as the events that need to change the rooms functions for another function that to receive the changes.

### **2.6.2 Type Of Flexible In Small Living**

In this section focuses' on the popular flexile type on small space, where the flexible solutions can help to establish small space in more functions with easy to switch

between the easy manner, in addition, flexibility as a tool can help to divide the same space to different type of room such as meeting room , living room and kitchen.

### **2.6.2.1 Sliding Walls Type**

The sliding walls type concepts is slips sideways on a common scale of design Hall& Hall (1969), also Skinner (1971) claims that it is also used as a wall unit, which consists of separate units , cabinets, office and bed.



Figure 26: Flexible Small Living Sliding Walls(URL:17)

Hall& Hall (1969)established the sliding walls relate to the wall elements, where use it to divide the space in temporary situation to utilize the space for more dimension as need, and it made by flexible technical allow sliding to be attached to the wall elements at the top edge directly and to be specified by a horizontal support.



### 2.6.2.2 Transforming Elements Type

The design of transforming elements type review of the flexibility can change the identity of the active room, that by simply of flexibility solutions such as sliding walls and the ability to use this wall as storage for furniture can find what user want inside it(URL:18). And it differs from the multi-folding flexibility type in that it is concerned with creating movable units. In addition, one of the most perfect example of flexible in small space is transforming elements of the Graham Hill apartment "Life Edited Apartment"(URL:18).



Figure 28: Transforming Elements (URL:19)

The best description of this type is it made a hidden rooms inside these walls of the house , such as the bedroom or work area and also the space can be converted into a dining room by expanding the table stored inside the kitchen island(URL:18).

### 2.6.2.3 Pop-Up Interactive Unit Type

The name and the verb (pop-up / pop-up window) indicate that the design forms are the appearance of entities and processes at the same time, also demonstrate the flexibility aspect that depends on a centralization and imagination(Skinner, 2002).



Figure 27 : Pop-Up Interactive Apartment (URL:20)

Pop-up design are characterized by the ease of being transported within a short period of time to another location. It is also considered to be one of the best

temporary solutions that are most responsive in the economy to maintain its workability(Skinner, 2002).

#### 2.6.2.4 Multi-Folding flexibility Type

This system relies on inventive systems that can have a closed, open able shape, including many devices and machines that rely on the idea of speed of disassembly or folding to facilitate their use(Skinner, 2002).

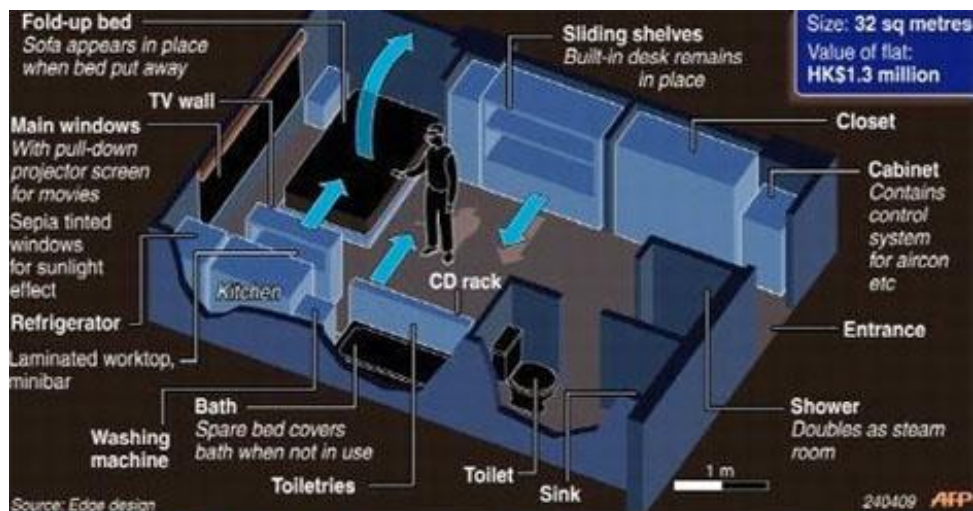


Figure 28 :Multi-Folding House (URL:21)

The multi-folding flexibility of work from Gary Chang house it depends on the creation of easy-to-move cross-section (Figure 32),(Figure 33). This type are distinguished in a manner that allows the separation of its parts either for folding or transportation(Amin & Cohendet, 2004).

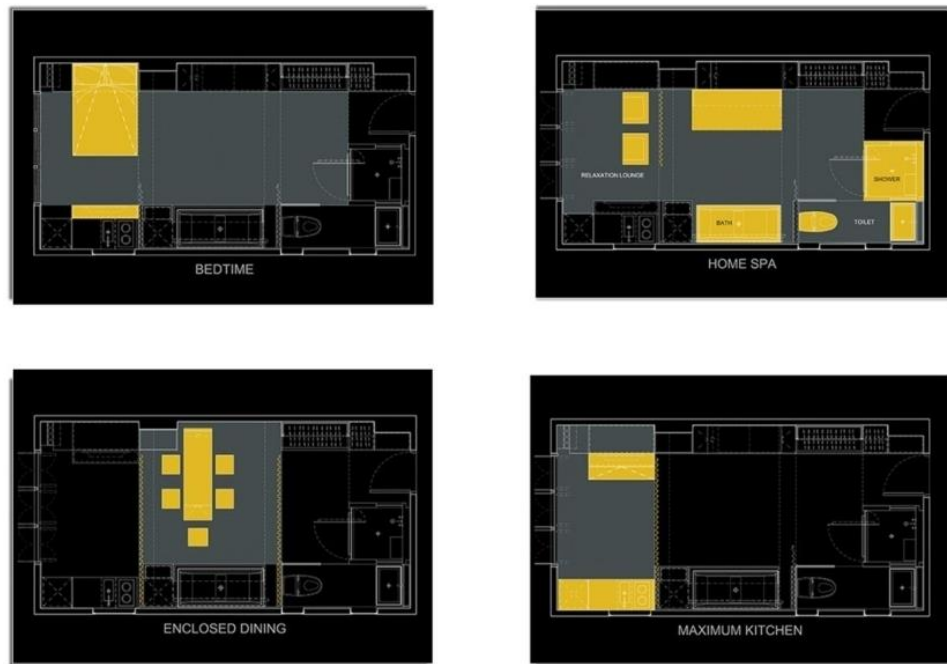


Figure 29 :Multi Folding House Plan (URL:21)

Another example for existing Multi-Folding flexibility in small living in interior architecture is the small home designed by Richard H , Germany, in 2005,where it consists of all services, including the kitchen and the toilet as well as storage units, with the living room containing a dedicated eating area that can be easily converted into a bedroom (Microcompacthome,2021)(Figures 35),(Figures 36),(Figures 37).



Figure 30 : Exterior Building (URL:22)



Figure 31: Interior View(URL:22)



Figure 32: Living And Dining/ Zone(URL:22)

It is a narrow house well enough to be occupied by one or two people with an area not exceeding 2.66 cubic meters. It adapts to the surrounding conditions, including allocating areas for work or sleeping as well as for cooking, food and the bathroom (URL:23).

The second example is the capsule project that design by Kisho K, 1972 it consists of all services too , including the toilet as well as storage units, with the bed room containing a dedicated desk office that can be easily converted into a wall (Ottolini, and Vera ,1993)(Figure 38) , (Figure 30), (Figure 40).

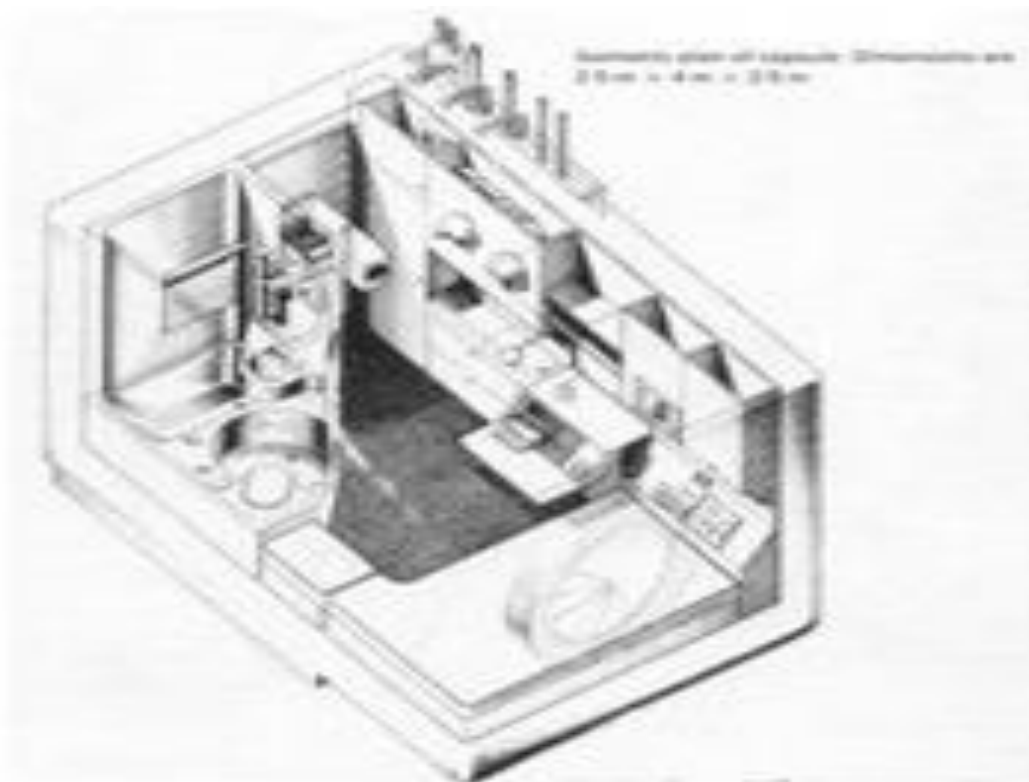


Figure 33 : Interior Design Perspective (URL:24)



Figure 34 : Inertial Wall Flexible Element (URL:25)



Figure 35 : Inertial Flexible Bed Toom Element (URL:24)

From the above illustration and figure 38 , 39 , and 40the Capsule design , it consists of all services too , including the toilet as well as storage units, with the bed room containing a dedicated disk office that can be easily converted into a wall.

Third example is the tiny house designed by Renzo P, 2013 it is a house designed with a thoughtful engineering system for the small space organization with all its mechanical services needs in order to meet the basic needs of the house(URL:26).



Figure 36: Exterior View of Building.  
(URL:27)



Figure 37: View Flexible Table  
(URL:27)



Figure 38: View Flexible Bed (URL:27)



Figure 39: View Flexible Kitchen  
(URL:27)

## 2.7 Flexible Furniture Design

Flexible furniture design is classified as one of the smartest designs that the principle of its work to allows the space to be modified in a changeable manner as needed.





Figure 40: Flexible Furniture Design. (URL:28)

In this section focuses' on the most popular flexile furniture design type , example of flexible multiple functions furniture, and view the flexile furniture for saving space, also view the success existing example for the flexible furniture used.

The types of flexible aim to establish furniture units in order to utilize the space as possible. Also , there are three types of furniture as refers in this section the first type is the movable furniture , the second type is modular furniture, and the last type is foldable furniture as follow:

- Movable Furniture : It flexible design is based on the creation of modern techniques to form new elements used in the fields of interior design, such as floors, walls, etc, with more than 14 changes being flexible as show in (Homedosh ,2021) (Figure46).



Figure 41 : Movable Furniture Design .(URL:29)

Modular Furniture: Is a system consisting of many small parts within subsystems working on principle units with regular shapes to be used as needed as show in (Heidegger, M. 1993)(Figure 47).

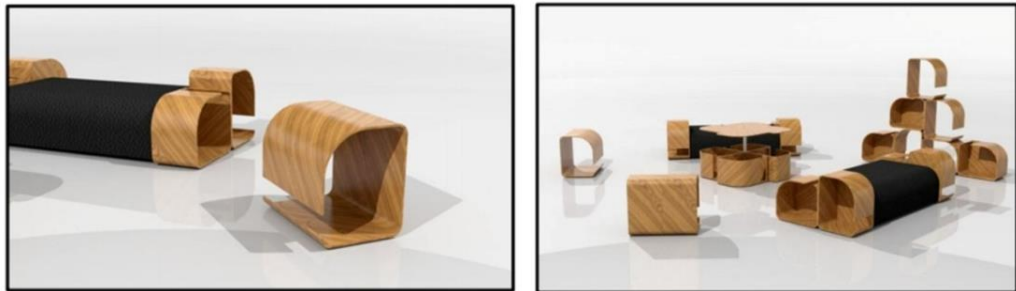


Figure 42 : Modular Furniture(URL:30)

Foldable Furniture: It works on the principle of preserving the space to make it free. The maximum design is to make use of the space, which is difficult to provide furniture that meets the full needs of the functions required in small places as show in (Heidegger, M. 1993)(Figure48).



Figure 43 : Foldable Furniture Design(URL:31)

## 2. 7.1 Flexible Multiple Functions Furniture

1- Joe Colombo kitchen for Boffi, 1963

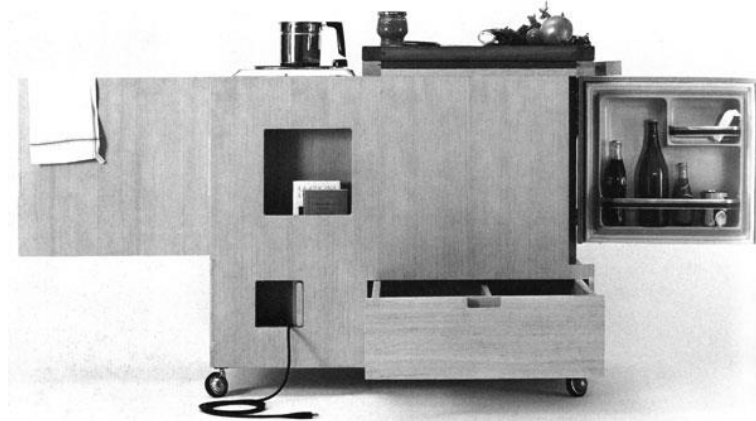


Figure 44 : Small Kitchen on Wheel In MOMA, New York.. ( URL:32)

The simple kitchen shown in Figure 49 constitutes a room that can be used effectively by one person and the compact kitchen design aims to reduce the size of the kitchen to save space for the work assigned to the kitchen (Schittich,2010).

2- Chair transformable by Alessandro Mendini, for Zanotta, Italy, 1984(Figure 50)(Figure 51).

It is a chair with flexible option to convert totable to save the space until needed the function.



Figure 45:Flexible Furniture In The Position of A Chair.  
(URL:33)



Figure 46 : Flexible Furniture In The Position of A Table(URL:34)

3- Tuttuno by Carlo B , Gianni F , Nilo G, Italy, 1969

Contains different elements in one component (a place to sit, a table and a place to sleep) (Figure 52)



Figure 47: Tuttuno( Ambasz1972)

And (Figure 53), (Figure54, (Figure55)review new industry in the same design that is used to keep Tuttuno but with contemporary design



Figure 48 : Show The Side of The Bed and The Sitting Area(URL:35)



Figure 49: Show The Side of Table. (URL:35)

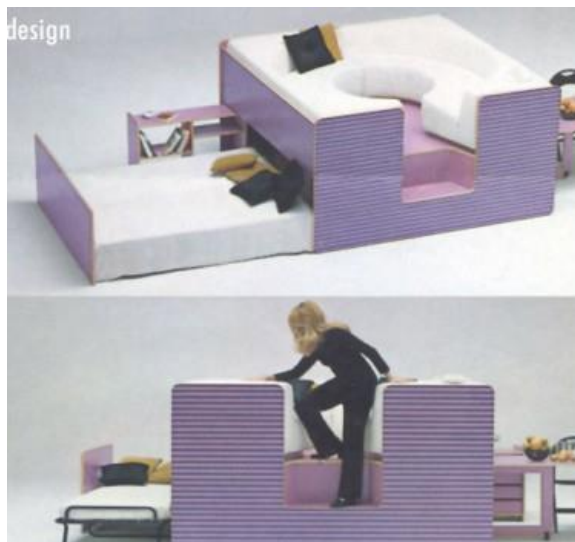


Figure 50 : Front Side (URL:35)

4- Flexible kitchen designed by Tomoyuki Utsumi Japan, 2005. Modern design and also does not need a huge space (Figure 56) , (Figure57), (Figure58)

The principle is by establish Movable Island with more than one function.



Figure 51 : From a Magazine That Shows It keeps Up With Modern Design(Brown2005)



Figure 52 : The Side of The kitchen Contains The Essentials of The kitchen (Brown2005)



Figure 53 :The flexible Island Appears(Brown, 2005)

5- Full Size Folding Kitchen Tables. Designed by Morten Storgaard / February 21, 2019. Pull-out dining table, which sits flush within the kitchen bench and extends into a large dining table when needed (Figure59 ),(Figure 60 ),(Figure 61 ).



Figure54: Flexible Moveable Dining Table(URL:36)



Figure 55: Flexible Drawer Dining Table(URL:36)

6- Full-size dining table designed by Morten Storgaard / February 21, 2019.

It being hidden on the wall. Normally these types of tables are only made for 2-3 people.



Figure 56 : Flexible Stored Dining Table 2(URL:36)

7- Flexible bed designed by Alberto S and Ambrogio T, Italy, 1967(Figure 62),(Figure 63)

Easy to fold, does not need much space and can be used in high efficiency.

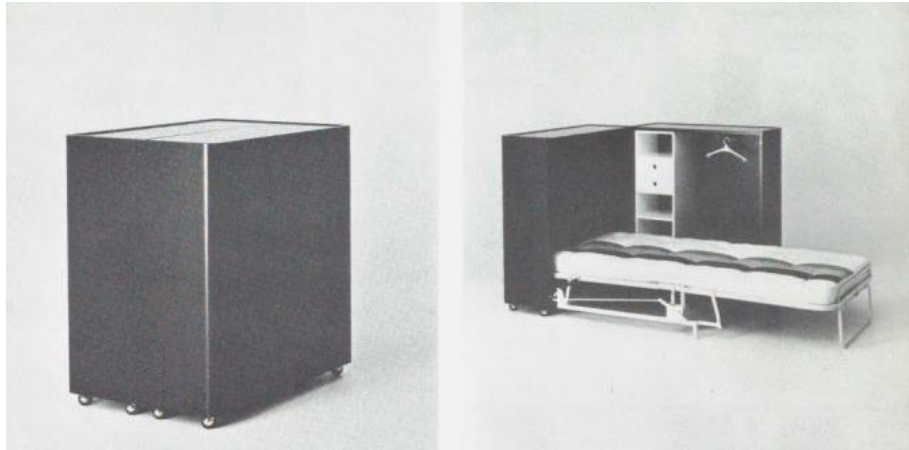


Figure 57 :The Flexible Bed Close and Open(URL:37)

8- Modular Room, design by ODA ,New York, 2012.(URL:38).



Figure 58: It Shows The Side of The Bed and The Desk(URL:38)



Figure 595: Shows Bedside and Cabinets(URL:38)

The aim of the design is to create a box that contains the required function within any possible space through three main transforming axes, which include the elements of the rooms from the area of use, each sleeping, storage and work roomas shown in(URL:38) (Figure 64) ,(Figure 65).



One of the features of the principle of its work is the folding that allows the use of the surrounding space easily as the components of the model can reach nine pieces that can be separate and combine (URL:39).

### 2.7.2 Furniture For Saving Space

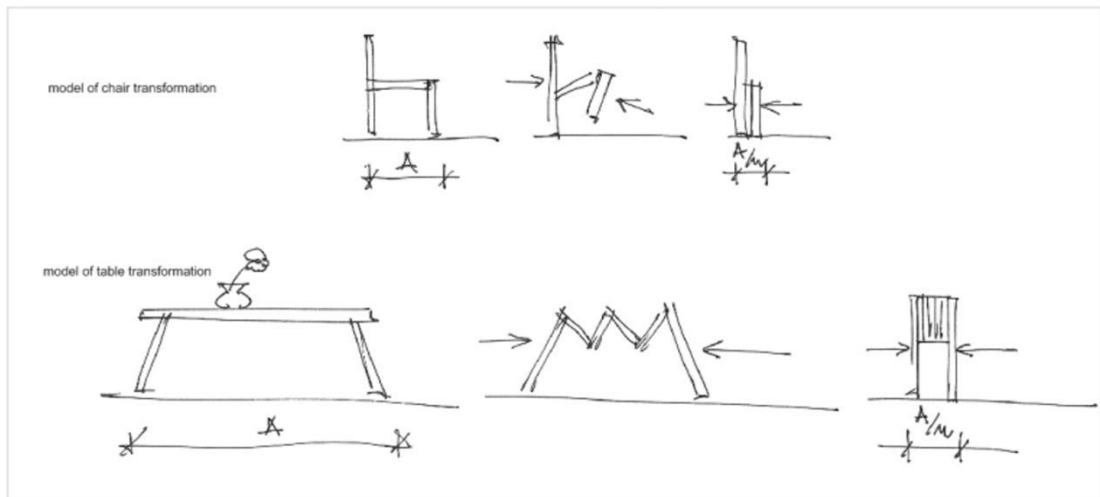

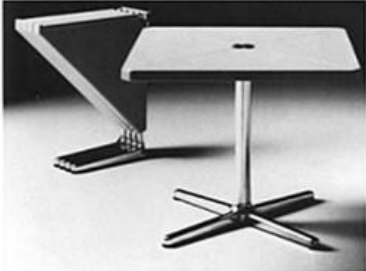


Figure 60: Sketch Examples of Fully Folding Furniture(Gjakun, 2015).

This type of furniture has the advantage of saving space for all items without taking up permanent space as shown in Figure 66, also Table 8 shows the examples of flexibility Furniture for saving Space(Gjakun, 2015).

Table 8: Flexibility Furniture For Saving Space

No	<p><b>Plia Chair Designed By Giancarlo, Italy, 1969</b></p>	
1	<p>(URL:40).</p>	
	 <p>Figure 61: Flexible Folding Chair . (URL:40).</p>	
	<p>Description : Its characteristics that distinguish Giancarlo Piretti design show flexibility, ingenuity, workmanship and engineering precision(URL40).</p>	<p>Dimension : chair size 75 x 47 x 50,5 (when opened) with the seat height 45,5 cm; material: polished die-cast aluminium, oval tubular steel, plastic(URL40).</p>
2	<p><b>Folding Desk, designed by Giancarlo P, Italy, 1971.</b></p> <p>(URL:41).</p>	
	 <p>Figure 62: Flexible Folding Small Table1. (URL:41) .</p>	 <p>Figure 63:Flexible Folding Small Table 3. (URL:41)</p>
	<p>Description : It features no storage space when finished(URL:41).</p>	
3	<p><b>Folding tab</b></p>	

 <p>Figure 64 : Flexible Folding Table 1. (URL:42).</p>	 <p>Figure 65 : Flexible Folding Table 2. (Habegger,Osman, 2005) .</p>
<p>Description :</p> <p>It is easily stored because it contains four interconnected parts that lead to the folding mechanism in a compact way, which is one of its most important features (Habegger,Osman, 2005).</p>	<p>Dimension : table diameter is 96 cm; in square version the dimensions are 85 x 85 cm, with the height 71,5 cm; material: aluminium base, polyester tabletop (Habegger,Osman, 2005).</p>

## 2.8 Flexibility Within The Structure Element

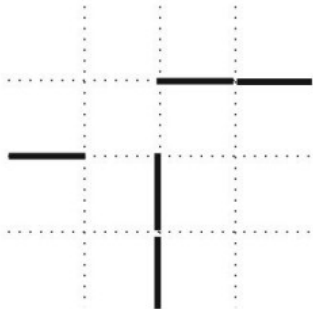
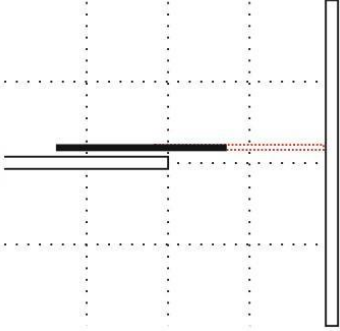
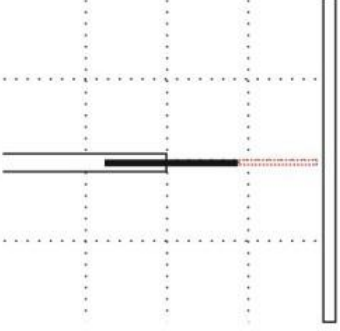
The building structure forms identified by the main elements (floor, ceiling, and wall) which is the cause of dividing or change in the space. Nevertheless, this element can be use as a flexible solution by storing furniture that distinguishes it that it has the ability to combine, shrinking, moving, and folding.

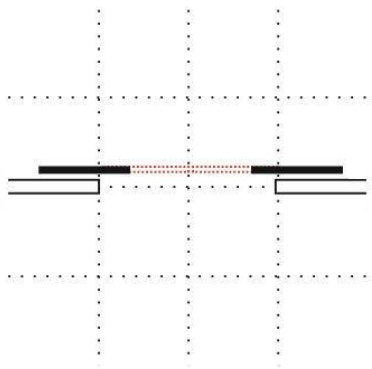
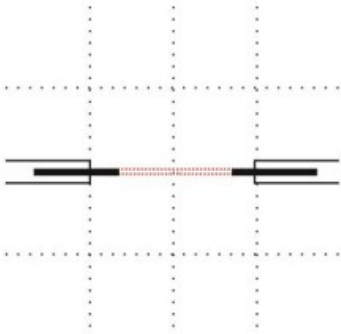
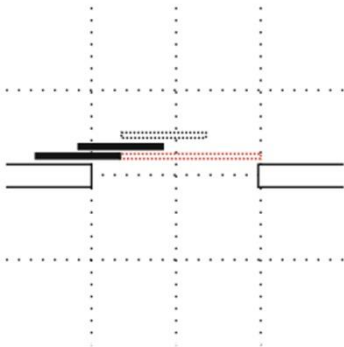
An example of the use of structure to achieve flexibility Le Corbusier” designed “Plan Liber” as “ Domino House” Estaji (2017)where the building just have a columns without wall to give the ability to form the space as need. Also, for that it can use this element as a part of flexible processes by use it as follow.(Figure18)

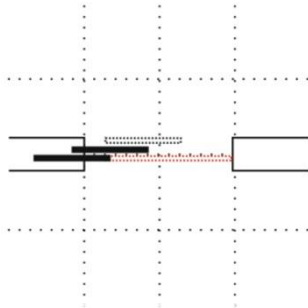
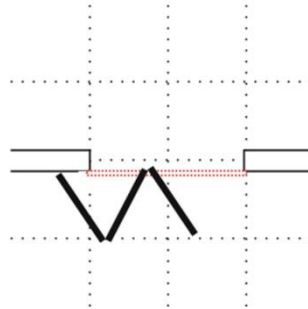
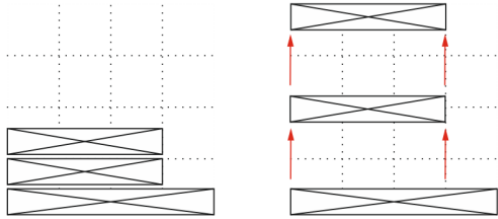
### 2.8.1 Flexible Walls

Establish the walls with the advantage of being easy to move to can be divided, repositioned, and fixed on a structure to shape and move them. Table 9 illustrates the flexible sliding wall panels types.

Table 9 : Sliding Wall Panels Types (Gjakun, M. ,2015)

No.	Description	Figures plan
1	Plan 1 : The walls have the advantage of being easy to move and can be divided, repositioned and fixed on a structure to shape and move them.	 <p data-bbox="949 1010 1262 1043">Figure 66 : Walls Plan 1</p>
2	Plan 2 : It relies on a moving side while the other side is fixed	 <p data-bbox="941 1487 1281 1520">Figure 67 : Walls Plan 2</p>
3	Plan 3 : It relies on a moving side inside the fixed wall	 <p data-bbox="941 1930 1281 1964">Figure 68 : Walls Plan 3</p>

4	<p>Plan 4 : Walls adopt moving side that wall moving in both sides</p>	 <p>Figure 69: Walls Plan 4</p>
5	<p>Plan 5 A wall that relies on a moving side inside the fixed walls surrounding it on both sides</p>	 <p>Figure 70 : Walls Plan 5</p>
6	<p>Plan 6 Variation of walls adopt moving side organize it behind together</p>	 <p>Figure 71: Walls Plan 6</p>

7	<p>Plan 7 Variation of walls adopt moving side organize it behind together inside the fixed wall.</p>	 <p>Figure 72 : Walls Plan 7</p>
8	<p>Plan 8 The diversity of the walls depends on the use of the folding process</p>	 <p>Figure 73 : Walls Plan 8</p>
9	<p>Plan 9 Walls that can be stored and moved by sliding conveniently with the components of the occupied space and to store the elements of entire rooms inside.</p>	 <p>Figure 74: Walls Plan 9</p>

### Storage dividers example

A figures 83 and 87 review the wall use it as a flexible feature , which can be use it as a store, it can contain furniture that can be used easily with ability to fold and open it whenever needed.

Model No. 1 using moveable walls for maximum spatial flexibility designed by PKMN Architectures, with an area of 164 m<sup>2</sup>(Figure83).



Figure 75: Storage Dividers Model No. 1/ Moveable Walls (URL:43)

Model No. 2 designed by Graham H , New York, in 2011.



Figure 76: Storage Dividers Model No. 3(URL:44)

Life Edited Apartment as mentioned on above figure it depends on moving walls, where this feature help the small space to have extended functionality, also can with movable wall divided the functions.



Model No. 3 designed by studio01 (Alex K and Akinori H)Tokyo in 2012.

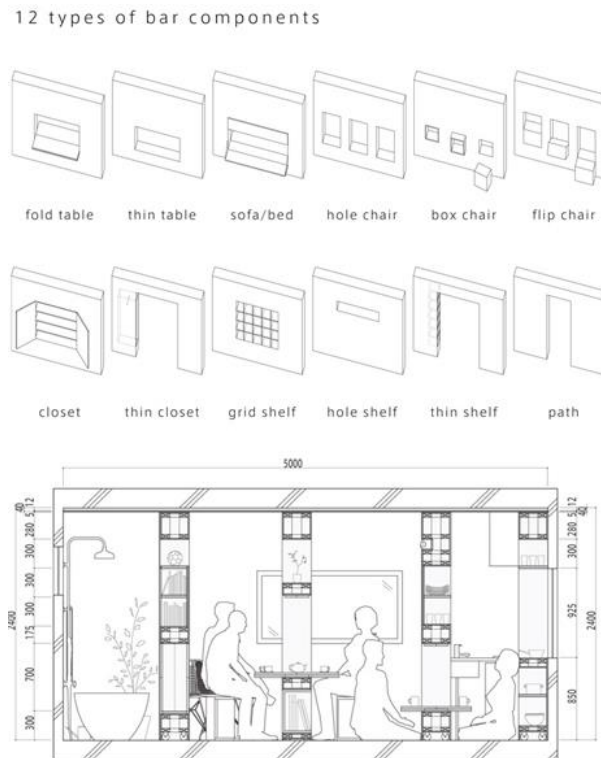


Figure 77: Storage Dividers Plan(URL:46)



Figure 78: Storage Dividers Perspective(URL:46)

Barcode projects dedicated for small space accommodation were stored the function furniture inside the movable wall can move throughout the room.

Model No. 4 as mentioned before designed by Gery C, Hong Kong, in2010.

This project of Gery Figure 87:soared the 24 different room with all functions in 32m<sup>2</sup>, the movable wall work to store the function of rooms in order to cover daily actions and use the space as a house have full functions.

Model No. 4 as mentioned before designed by Gery C, Hong Kong, in2010



Figure 79: Storage Dividers Model No. 4(URL:47)

## 2.8.2 Flexible Floors

The most common element is the floor area and by means of the flexible properties the use can be changed. Figure 88 and 90 show the maximum use of the space through floor (Gjakun,2015).

Model: YO – Home, by Simon Woodroffe, UK, 2012, ca. 24 m. (URL:48)



Figure 80 : Step 1

Figure 81: Step 2

Figure 82 : Step 3

The main characteristic of using this architecture element is collect many functions beneath the floor.

Suitcase House, by Gary Chang, Hong Kong, 2001

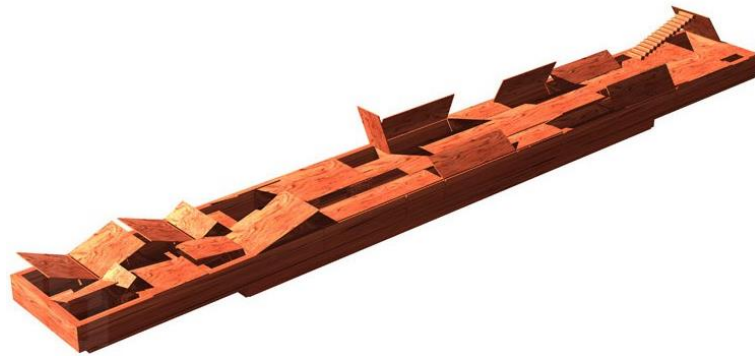


Figure 83 : Suitcase House, By Gary Chang, Hong Kong, 2001 / Floor Plan(URL:49)



Figure 84 : Suitcase House, By Gary Chang, Hong Kong, 2001 / It Shows The Location of The Flexible of The Floor (URL:50).



Figure 85 : Suitcase House, By Gary Chang, Hong Kong, 2001 / The Rooms Are Shown Under The Floors(URL:50).

Above figures review the floor area as a flexible feature can be use it as a store, it can contain furniture that can be used easily with ability to fold and open it whenever needed or use it as a second level for establish place to sit.

### 2.8.3 Flexible Ceilings

The ceilings form a kind of integrated warehouse in the understanding of functional disparity, that as a store, it can contain furniture that can be used easily when applying the flexibility feature by the ability to fold and open it whenever needed(Gjakun,2015) (Figure 94),(Figure 95), (Figure 96).

1- YO – Home, by Simon Woodroffe, UK, 2012, ca. 24 m2 (URL:51).

The bed is placed on a flexible ceiling that can be moved from top to bottom

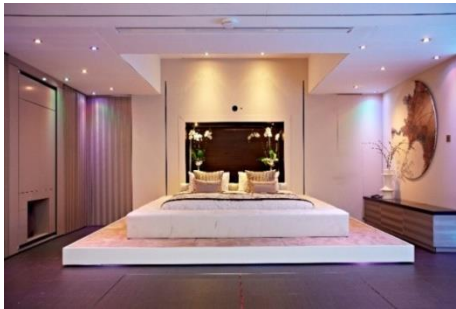


Figure 86 : YO – Home, By Simon Woodroffe, UK, 2012, ca. 24 m2/The Bed is Placed on A Flexible Ceiling That Can Be Moved From Top To Bottom (1)(URL:51)



Figure 87: Home, By Simon Woodroffe, UK, 2012, ca. 24 m2/The Bed is Placed on A Flexible Ceiling That Can Be Moved From Top To Bottom (1)(URL:51)

2- Villa Lemoine with Pierre Paulin’s Ensemble Dune: The ceiling elements use a hydraulically-operated system to make a ceiling work as a moving floor to reach the next floor and down to the same floor. Thereby, change all the space environment not just the functions.



Figure 88: Villa Lemoine With Pierre Paulin’s Ensemble Dune/The Sofa is Placed on A Flexible Ceiling That Can be Moved From Top to Bottom(URL:52)

Schumache , Schaeffer, & Vogt (2012) believe that the technical side of the ceiling is a component capable of configuring the vertical space because it varies and depends on the elevator technology, which is inspired by semi-complex solutions, but with a high degree of safety through devices, hydraulic lifters and complex transmission systems.

## 2.9 Flexible Materials In Interior Design

Flexible material is attached to forming elements that have the ability to stretch form, and it is easy to use because it contains sliding adhesive material Gilani (2012).



Figure 89: Flexible Material Décor(URL:53)

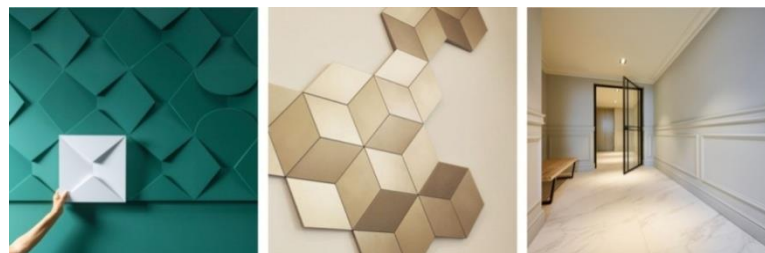


Figure 90 : Flexible Material décor 2(URL:54)



Figure93: Purotouch For Interior Décor(URL:55)

It consists of ingredients that have several designs characterized by their ability to stretch because they contain woven interior chips. They are characterized by the ease of rippling with the edges along their length Gilani (2012)(Figure 97),(Figure 98), (Figure 99).

### **2.9.1 Solid Materials**

Used in finishing and decoration by applying in a flexible technical. Schumache , Schaeffer, & Vogt (2012) believe the results from movement within the element material that leads to configuration and spatial transformations. In addition, the fabrics used in this field have properties that increase their hardness but without compromising their flexibility.

The fabric as a type of solid flexible material is " high-strength fibrous composites made of glass, carbon, aramid, synthetic resin, elastomer, or thermoplastic; meshes made of brass, copper, bronze, aluminum, nickel, titanium, silver".

Table 10 includes some important existing wall models in this field.

Table 10 : Flexible Fabric Type




No.	Image	
1	<p data-bbox="571 405 708 439" style="text-align: center;">Alphamesh</p>  <p data-bbox="419 750 863 853">Figure 91: Texture of Alphamesh Component of Copper and Aluminum. (URL:56)</p>	<p data-bbox="1066 506 1222 539" style="text-align: center;">Description</p> <p data-bbox="900 577 1394 1126">It is considered one of the latest innovations in the field of architecture and design with high quality and excellent flexibility, made of two types of copper and aluminum. Both of them are characterized by flexibility and lightness(URL:56).</p>
2	<p data-bbox="507 974 778 1008" style="text-align: center;">weave constructions.</p>  <p data-bbox="451 1288 831 1355">Figure 92 : Metallic Threads Texture 1. (URL:56)</p>	<p data-bbox="900 1167 1394 1715">It is characterized by being made of 100% metallic threads and it is made of rust-resistant steel as well as aluminum and copper, and despite its thicker thickness than silk, it does not affect the flexibility of its design adapted from the skeletal fabric on the surfaces of reptiles(URL:56).</p>
	 <p data-bbox="451 1780 831 1848">Figure 93 : Metallic Threads Texture 2. (URL:56)</p>	
<p data-bbox="389 1928 1318 1962" style="text-align: center;">Figure (100- 102): Various products designed by AlphaMesh(URL:56)</p>		



Figure 94 : Metallic Threads Texture Fabric(URL:56)

### 2.9.2 High Flexibility Materials

A material that is not easy to tear, strong, but easy to cut with a sharp tool is a substance that has the property of not passing liquids through it, and on the contrary, water vapor can penetrate it(URL:57). Also, the best use for it is as a screen for the door and window , in addition, can used as a room divider (Figure 104)(Figure105).

Snowflake Threaded Ultra- was designed by Mia Cullen (URL:58).



Figure 95: This Snowflake Threaded Ultra- was Designed By Mia Cullen. (URL:58)



Figure 96 : This Snowflake Threaded Ultra- was Designed By Mia Cullen. (URL:58)

An example of high quality flexible materials( Paper Soft wall)by (Stephanie F and Todd- M) Figure 106.It is characterized by the method of every beginning with the end of the last layer and its end is covered by wool, that in order to create a stretch that controls the handles easily and forms a protective layer during the collapse to be



stored after. Also, it is characterized by easy to arrange as it is flexible and light(URL:59).



Figure 97: High Flexible Wall Paper Material, Designed By Stephanie Forsyth and Todd Mac Allen. (URL:60)

### **2.9.3 Material Manufactured Flexibly**

Table 11 includes showing the materials that were flexibly manufactured and used with high flexibility.

Table 11: Flexible Manufactured Materials




no	Name of Projects
1	<p data-bbox="391 304 850 338"><b>Blobwall by Greg Lynn</b>(URL:61).</p> <div data-bbox="419 383 1370 719">  </div> <p data-bbox="507 730 1275 763">Figure 98: Material Based on The Point System. (URL:61)</p>
	<p data-bbox="391 846 552 880">Description:</p> <p data-bbox="391 913 1393 983">They are parts of plastic it joined together that can be formed to allow shapes to be constructed elements (walls, furniture, etc.) (URL:61).</p>
2	<p data-bbox="391 1021 1251 1055"><b>Benjamin Hubert's Amass Modular Curtain System</b> (URL:62).</p> <div data-bbox="395 1115 842 1361">  <p data-bbox="408 1361 829 1431">Figure 99: Curtain Construction Unit. (URL:62)</p> </div> <div data-bbox="900 1115 1362 1368">  <p data-bbox="877 1368 1382 1438">Figure 100: Curtain Construction Unit. (URL:62)</p> </div>
	<p data-bbox="391 1473 552 1507">Description:</p> <p data-bbox="391 1541 1393 1798">The design concept is adapted from nature and depends on the mechanics of reuse available in tree branches, similar to the cell structure. In addition, it can be used as a curtains or dividers wall in any thickness need, and it made from 3D structures distinguish easy to form(URL:62).</p>
3	<p data-bbox="391 1854 552 1888"><b>Soft system</b></p>



Figure 101: Vertical Panels are of Unequal Heights to Create Multiple Designs. (URL:63)



Figure 102: Vertical Panel in Chairs Design. (URL:63)

**Description:**

It soft system with the technology of creating and shaping the space in a fast and a more effective manner(URL:63). It is characterized by

1. Ability to remove it quickly due to its high flexibility.
2. Use the honeycomb shape in the internal structure of the material that enables it to expand and contract easily .
3. Can sculpt the shape in a bending way to form its terrain as you like.

**4 Hexagon shaped**



Figure 103 : Hexagonal Steel Cable Curtain 1. (URL:64)



Figure 104 : Hexagonal Steel Cable Curtain2. (URL:65)

Description:

It consists of geometric shapes with a hexagonal design that can be linked together to form the objects required for the design(URL:65).

## 2.10 Technical Mechanism Of The Flexible

This part reviews the important mechanisms used in the flexible furniture design sector, forming a flexible space, using movable walls and mechanism flexible furniture.

### 2.10.1 Mechanism Of Flexible Construction Tools

This part reviews the important mechanisms of flexible construction tools that used in structure, forming the flexible space.

Table 12 : Construction Mechanism Of Flexible

**i. Flexible tubes hoses lot**

It is an electric wire tube that possesses flexibility in terms of job performance, therefore it is foldable and extensible in a manner that suits use. It flexibility manufactured because it is frequently moved and changes its position (URL:66).



Figure 105 :Flexible Tubes Hoses Lot. (URL:66)

**ii. Flexible Electricity bar**

It is a strip of electrical wires that possess the quality of flexibility in terms of functions performance, making it foldable in a way that suits the use. Flexibility of the cord is manufactured to facilitate making it foldable (URL:66).




Figure 106 :Flexible Electricity Bar. (URL:66)

**iii. Heat shrink tubing**


Usage:

Suitable for short-circuit and earth-fault proof installations; in switchboards and distributors up to 1000 V (URL:67).

<u>Advantages:</u>	
<p>Time saving</p> <p>Reduce stock items</p> <p>Smaller outer diameter facilitates insertion into the fanning strip</p> <p>No creasing</p> <p>No risk of overheating the wire end ferrules with a heat gun</p> <p>Improved look</p>	 <p>Figure 107 :Flexible Heat Shrink Tube. (URL:67)</p>

**iv. China TPU wire reinforced hose, good flexible, blowpipe, Bronze wire**

It is a flexible tube used to keep electrical wires on the move(URL:68).

Key Specifications/Special Features:	
<p>TPU hose/ Blow pipe:</p> <ol style="list-style-type: none"> <li>1. Technical---Extruding, Wire wrapping</li> <li>2. Material and Construction---TPU/Wire spring reinforced.</li> <li>3. Medium---air,water, and duct</li> <li>4.Size: ID(or ID*OD) Φ25; Φ60;Φ65;Φ80;Φ85*Φ100;Φ120;Φ160;Φ180; Φ200;Φ220;Φ250</li> <li>5.Material Test Data. Typical Temperature: -40°C~100°C</li> </ol>	 <p>Figure 108: China TPU Wire. (URL:68)</p>

**v. Drag chain cables**

Cable chain is a flexible chain-shaped structure that facilitates and keeps wires as long as possible (URL:69)

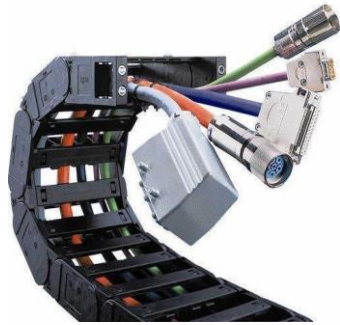


Figure 109 : Drag Chain Cables.  
(URL:69)

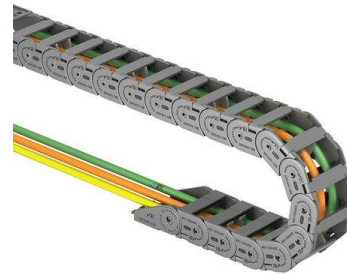


Figure 110: Drag Chain Cables.  
(URL:69)

**2.10.2 Mechanism Of Flexible Plumbing Extensions Tools**

This part reviews the important mechanisms of flexible plumbing extension tools used in structure, forming the flexible space.

Table 13: Plumbing Mechanism Of Flexible

**i. Flexible technical tubing copo PA PU PE PVC PRO**



Figure 111 : Nama Produk Pneumatic Spiral Hose. (URL:70)

flexible, quick connector, polyurethane rolled hose. widely used for air tools, air compressors and air related equipment(URL:70).

**ii. Flexible Air Conditioner Exhaust Pipe Vent Hose Duct**

**HG POWER**



Figure 112: Flexible Air Conditioner .(URL:71)

It is a flexible tube to adapt instead of the fixed tube and helps to facilitate installation or move the opening of the conditioner flexibly(URL:71).



**iii. Universal Sink Drain Pipe Flexible Expandable S-Trap Stainless Steel Accessory for Kitchen Lavatory**



Figure 113 : Universal Sink Drain. (URL:72)

Descriptions:

High-quality Solid Structure the drain pipe is made of high-quality stainless steel,

Features:

Strong and durable long-term

Use not easy to beak.

flexible and expandable which can be adjusted according to different shapes.

**iv. stainless steel wire braided flexible hose for washbasin**



Figure 114: Stainless Steel Wire . (URL:73)

Stainless steel wire braided

High-quality inner tube

Brass nuts with nickel-plated

Brass Inserts ferrules

## Portable sink

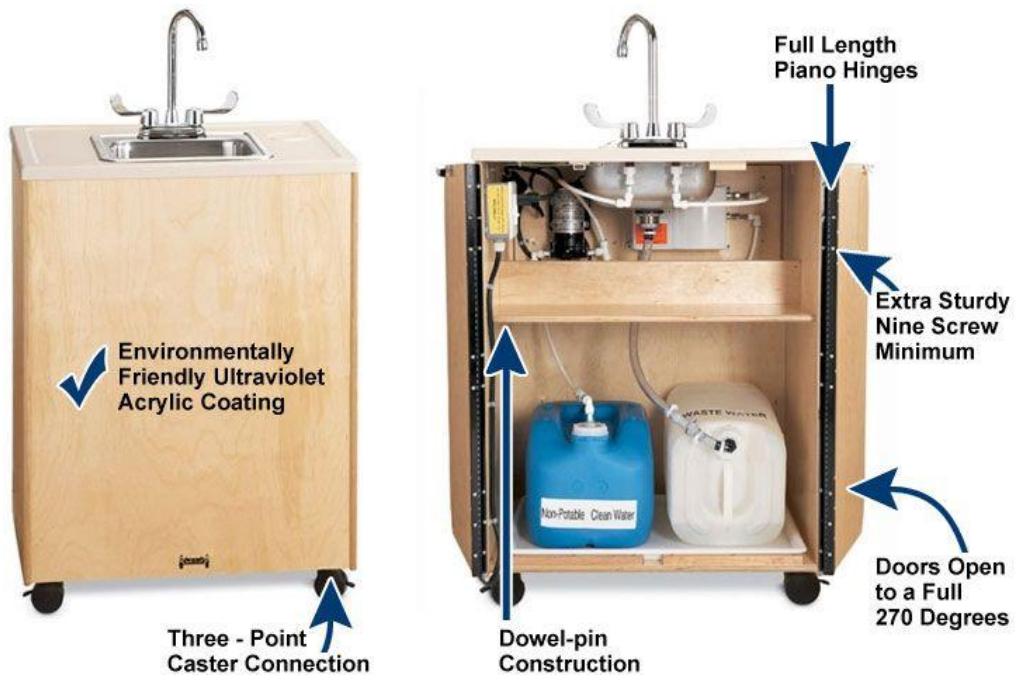
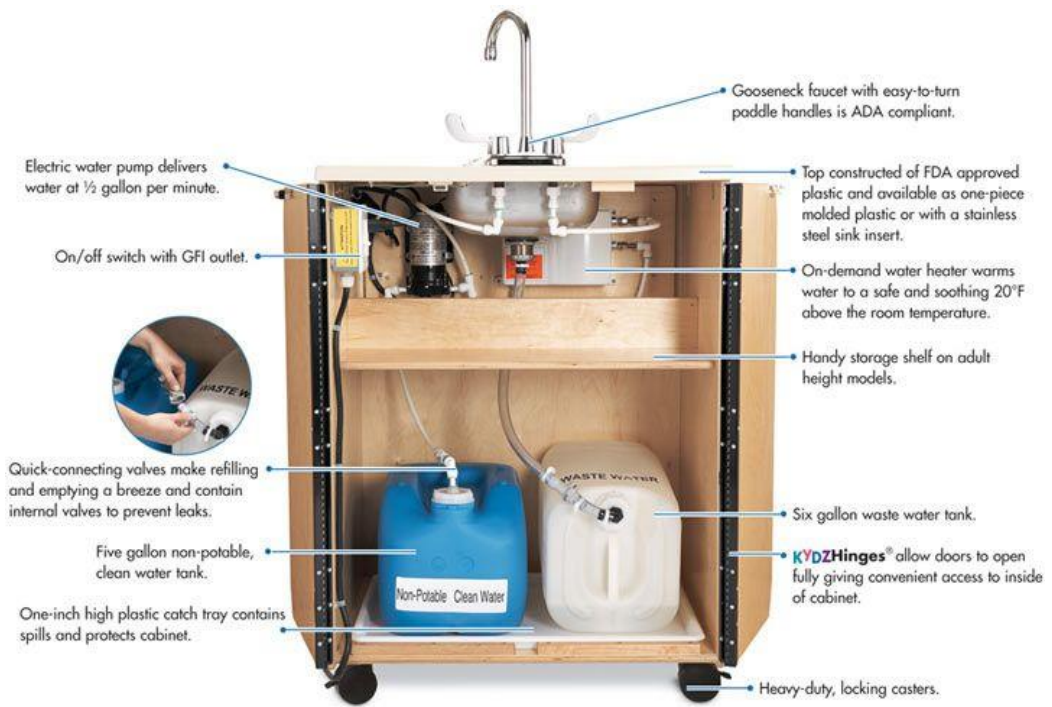


Figure 115 : Sink Part Elements. (URL:74)

### 2.10.3 Mechanism Of Flexible Furniture

This part reviews the important mechanisms of flexible furniture tools used in structure, forming the flexible space.

Table 14: Mechanism Of Flexible Furniture

#### 1 Folding bed mechanics.

Consists of

- 1- Two boxes
- 2- Two sides can be ironed
- 3- The bed base is made of four equal parts of wood panels of equal size tied by hinges that allow them to be folded in a vertical way.

It works with the principle that it allows boxes to roll in and out and includes back storage for your mattress and linens

Designed for a one-bedroom apartment flexible for a client who wants to sleep with a guest without a permanent extra bed.

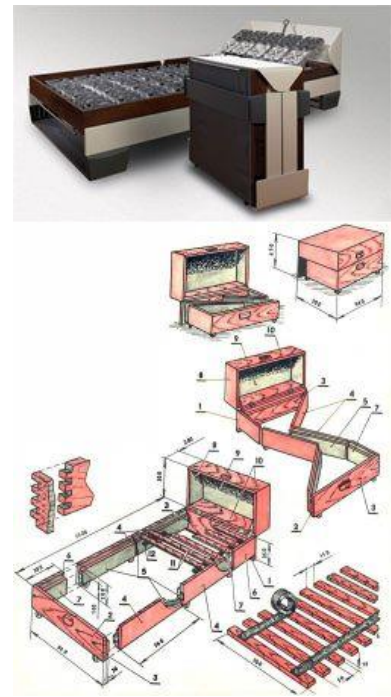


Figure 116 : Folding Bed Mechanism. (URL:75)



Figure 117: FOLD AWAY BED /  
March 26, 2017.(URL:76)



Figure 118 : FOLD AWAY BED /  
March 26, 2017. (URL:76)



Figure 119: FOLD AWAY BED /  
March 26, 2017. (URL:76)



Figure 120: FOLD AWAY BED /  
March 26, 2017. (URL:76)

## 1 Sliding Gear System For Folding Furniture

### Features

For wooden and composite furniture  
Reliable system for interior doors  
Two or four folding doors  
Max individual door weight - 25 or  
40 kg  
Door thickness 18-40 mm

### Contents of complete set:

Aluminum track  
Carriages  
Carrier plates  
Stopper(s)  
Pivoting point(s)  
Connecting hinges  
Mounting Screws  
Installation instructions

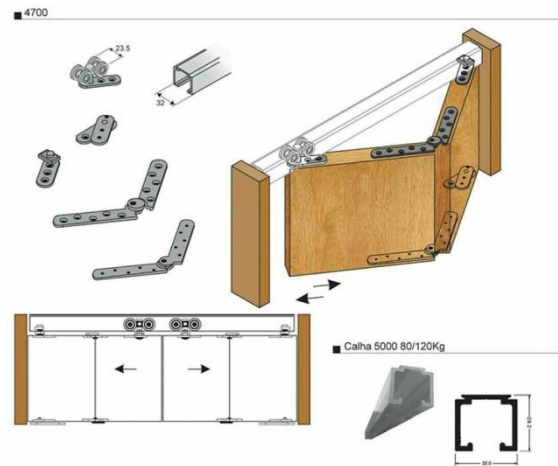


Figure 121 :Folding Gear System Mechanism.  
(URL:77)

## 1 Folding Wall Mounted Shelves

### Features

Material Steel Style  
Space number of shelves  
Mounting wall  
Folding mechanism folding



Figure 122: Folding Shelves Mechanism.  
(URL:78)

## 1 Height adjustable bed mechanics.

### Consists of

Bed base

Four ropes

Z circular lobes for the passage of ropes

8 fixing screws, 4 to ceiling and 4 to bed

The motor works with the working range of raising and lowering the base



Figure 123: Lift Bed Mechanism Down .(URL:79)



Figure 124 :Lift Bed Mechanism Up. (URL:79)

## 1 Lift platform is a type of industrial elevator

Designed to transport packed loads and platforms .

They are mainly used

Whereas, the pallets have two sizes which are considered standard

1.00 x 1, 20 meters

1.20 x 1.20 meters



Figure 125: Lift Sofa Mechanism. (URL:80)

sofa bed mechanism

This is 3-fold sofa bed mechanism and the size is 92CM,102CM,112CM,122CM,132CM,142CM,152CM,162 CM and 172 CM

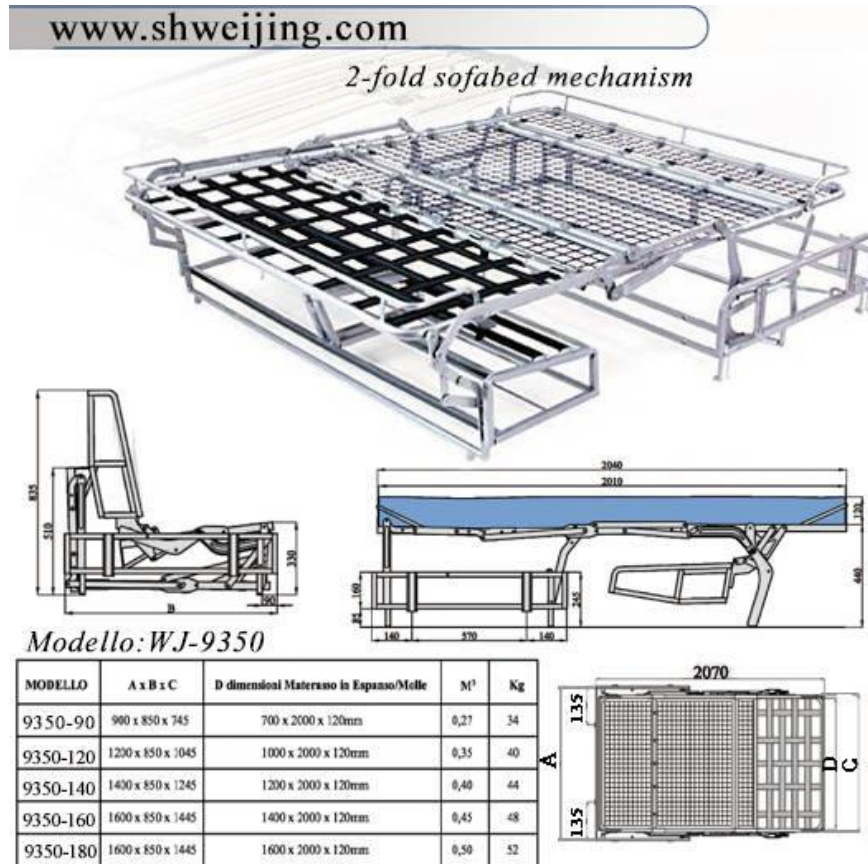


Figure 126: Sofa Bed Mechanism. (URL:81)

Flexible joints \NV01, by Noir Vif, Paris, 2013

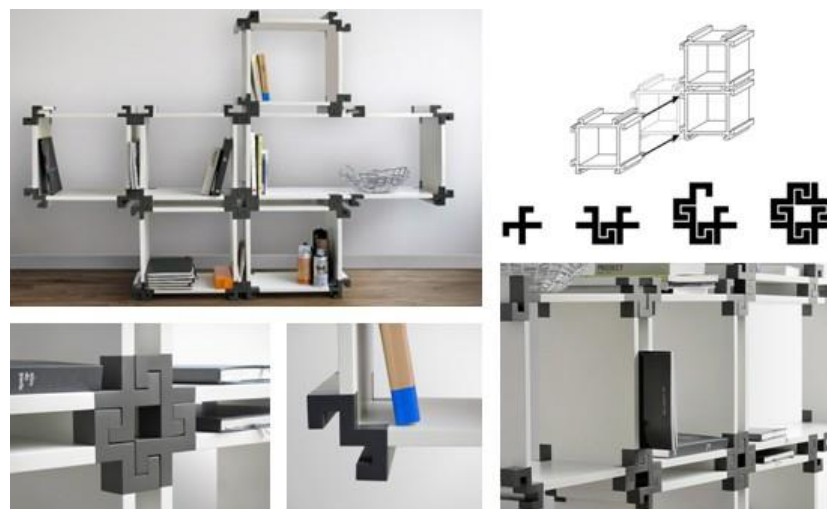


Figure 127 : Joints With High Flexible Pattern Use. (URL:83)

NV01 dividers are designed with a system that allows flexible shelving arrangement to suit design and space (URL: 82).

1 **FoldingFlexible joint patent no. US 3779176 A**

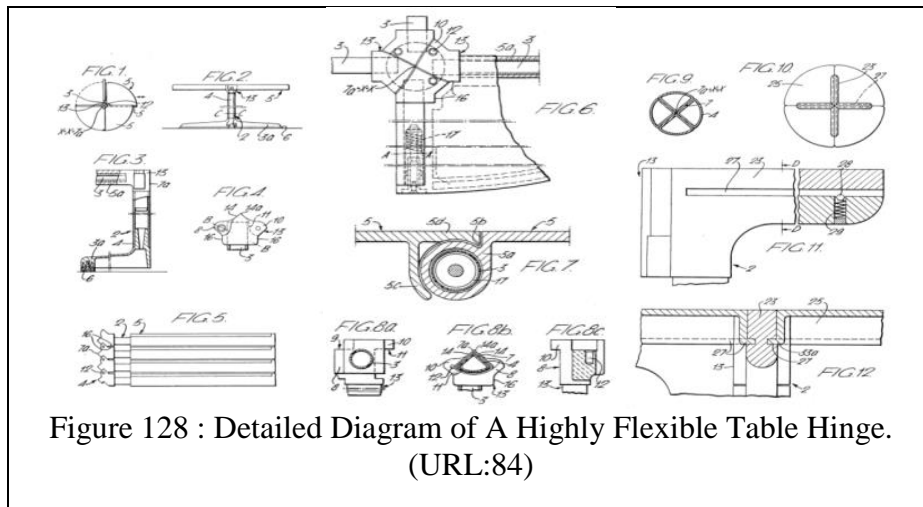


Figure 128 : Detailed Diagram of A Highly Flexible Table Hinge. (URL:84)



Figure 129 : Highly Flexible Table Hinge. (URL:84)

Joints that are linked and separated in a flexible manner, formed by a vertical system and installed in a geometric way(URL:85) .(148)

1 **Electric Hydraulic Jack Wireless Remote Control**



Figure 130 : Drag Chain Cables. (URL:86)

- Weight Capacity Approx.:200LBS.Made by High quality Steel, High quality electronic hydraulic scissor lift.
- 55w Linear actuator hydraulic control the lift up from 7 1/2" to 28 3/4" ,working quietly

### 1 Mechanism of Flexible Furniture (Wall)

Lightweight steel bed frame with interlocking double steel(URL:87).

- Steel bed frame
- Spring lift mechanism
- Trip- free fold- away legs

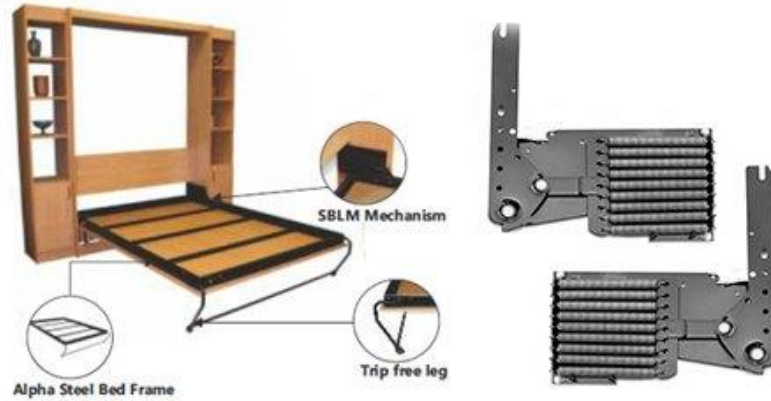


Figure 131: Furniture Mechanism Flexible Wall Details Illustration . (URL:87)



Figure132: Furniture Mechanism Flexible Wall Details Illustration Open and Close .(URL:88)



Figure 133: Furniture Mechanism Flexible Wall Details Illustration Open and Close. (URL:89)



Figure 134: Furniture Mechanism Flexible Wall Details Illustration Open and Close. (URL:90)



## 2.10.4 Mechanism Of Flexible Wall

This part reviews flexible wall mechanism , which it include the high quality and its mobility. In addition, the size can be formed according to the space available for wall placement and site opening (Al-Dakheel,2004) (Figure 143)<sup>(49)</sup>.

Figure 143 show the mechanisms of flexible wall tools used in structure, forming the flexible space.

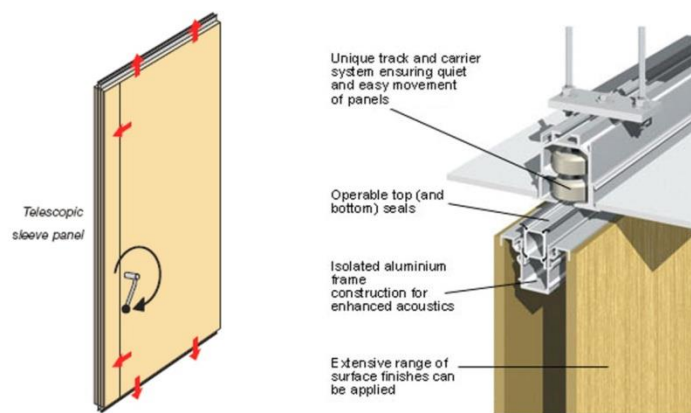


Figure 135: Movable Flexible Door Detail and Reveal Door Structural Rail(URL:91)

The Construction detail (URL:91).

1. The structure consists of double panels with a strong aluminum frame arranged on a frame.
2. These acoustic panels are not rigid to prevent the vibration from transmitting to the other side of the structure.
3. Durable rubber gaskets or bitumen membranes are placed. Mineral wool may also be used to ensure sound insulation and the filling of each plate has entered.

4. The retractable rails are manufactured with specifications that allow the exercise of high pressure .
5. The single-roller double-roll plate is arranged in several forms depending on the available sides.

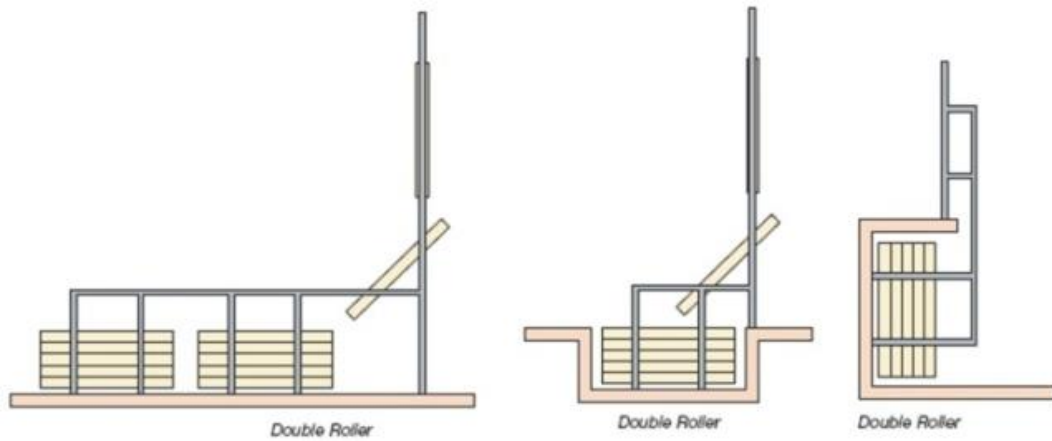


Figure 136: Movable Flexible Door Plan(URL:47)

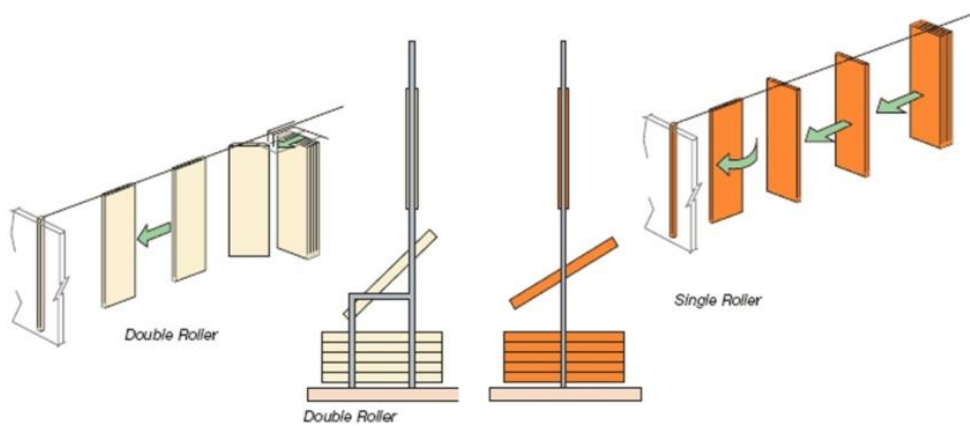


Figure 137 :Panel Stacking Movable Walls Details(URL:92)

Table 15: Construction Flexible Walls Details (URL:92)

**Technical Information**

**Track types**

- The first is to install a single cylinder
- The second is for dual rollers

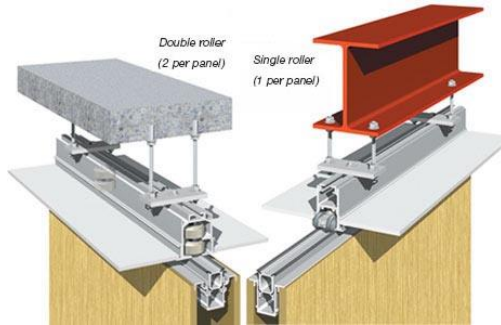


Figure 138: Track Types .(URL:92)

**Panel Options**

There are 3 panel options; Type 85, Type 100, and Type 110.

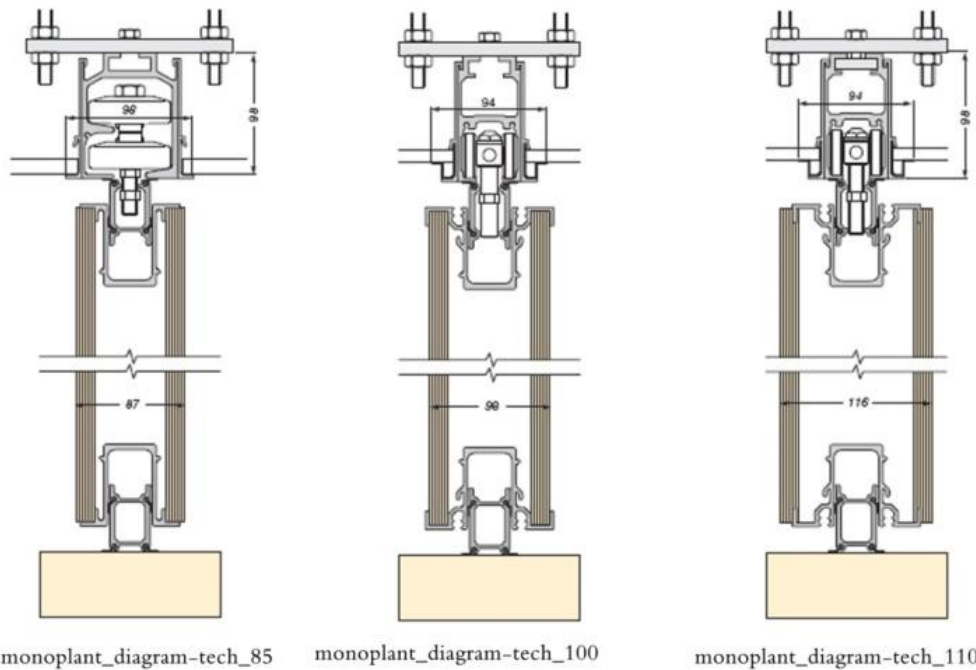


Figure 139: Panel Options Types(URL:92)

### **Bespoke Solutions**

The wall is manufactured according to the required space within divisions in the interior design space. Traffic doors, corners, or visibility panels can be added to the design.

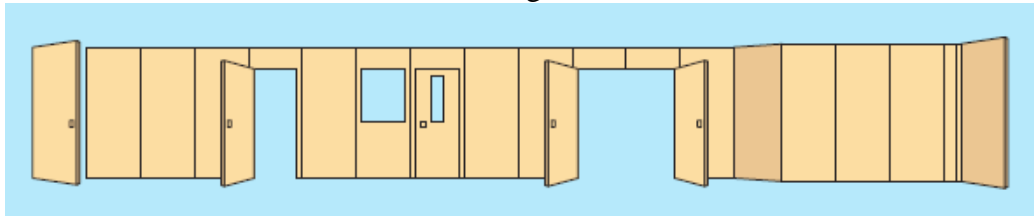


Figure 140: Bespoke Solutions. (URL:92)

## **Chapter 3**

### **HOTEL**

This chapter considers of study and investigatethe hotels' classification world popular and especially the five stars classification in TRNC specific, where study the hotel types, stars classification, classification systems worldwide popular and TRNC Star standards of hotels industries.

According to (Rutes, Penner,&Lawrence, 2001, p. 5) the hotel considers one of the largest interior architecture accommodations industries. In addition, the design of hotels aims to create a more comfortable space in the available range. But there is a difference in hotel classification that is due to an increase in the aims in design and technology, as well as led to the production of many types of hotels such as star hotels. Additionally, the quality of hotels has progressed remarkably, but it still retains the basic elements (Ransley & Ingram, 2012). For that in this chapter will investigate the hotels sciences and background, also study the rules and regulations for hotels industries.

#### **3.1 Hotel Types**

To understand the hotel types it is worth understanding the definition of hotel first as in the worldwide definition, the hotels are known as companies that provide temporary accommodation for both visitors and travelers with all accommodation services. In addition, there are more than 100 regulations for building and classifying

hotels internationally are set by international and governmental agencies in order to be a condition for classifying hotel categories(Lawson, 1997).

This section looking to explains the types of hotels based on the standards and specifications,as well, the dataare taken from the hotel researchers as Lawson (1997: 20), Lane and Dupre (1996: 32), Baltin (1999: 22), Ransley and Ingram (2000: 199) and Schwanke (1997)and it organized in Table 16.

Table 16: Standards And Specifications Of Hotel Types (Venter, 2007)

<b>Hotel Types</b>	<b>Standards and Specifications</b>
1. <i>Convention Hotels</i>	<ul style="list-style-type: none"> <li>- Hotel dedicated to conferences and meetings with a capacity of 400 to 500 rooms, of which 10% are suites, and it features huge lobbies equipped for meetings.</li> <li>- Registration office.</li> <li>- It contains a variety of food and beverage.</li> <li>- The reception area is equipped with large lounges.</li> <li>- It has the qualitative flexibility to meet the size of the needs of any meeting or conference, whether for a small or large group</li> </ul>
2. <i>Commercial Hotels</i>	<ul style="list-style-type: none"> <li>- Small business hotel compared to conference hotel with capacity from 100 to 500 guest rooms</li> <li>- Meeting rooms are an optional standard and provide good service in the catering sectors.</li> <li>- Has a limited selection of food and beverage outlets.</li> </ul>
3. <i>Luxury Hotels</i>	<ul style="list-style-type: none"> <li>- It is distinguished by the luxury of its construction, exterior and interior designs</li> <li>- It is located in urban areas with high numbers of visitors who pay excellent prices for accommodation.</li> <li>- With a capacity of approximately 300 guest rooms</li> <li>- In addition , it has meeting rooms, but it's intended for the small business owner.</li> <li>- The advantage of having high quality facilities, furniture and services</li> <li>- It has a variety of food and beverage but it is not compulsory.</li> <li>- It directly serves small business owners</li> </ul>
4. <i>Economy Hotel</i>	<ul style="list-style-type: none"> <li>- Budget low- with limited services .</li> <li>- The hotel consists of one or two floors with a capacity of 50 to 150 rooms.</li> <li>- It does not provide food and drink services.</li> <li>- It is located on the highway outside the cities, in areas with relatively low-priced land</li> <li>- Spread in the late 1970s and 1980s in suburban, airport, and city center areas.</li> </ul> <p><b><i>It is divided into three separate layers:</i></b></p> <ul style="list-style-type: none"> <li>• The first is a higher category: with a capacity of more than 100</li> </ul>

	<p>rooms and small rooms of higher quality than the standard of commercial hotels</p> <ul style="list-style-type: none"> <li>• Secondly, the middle class: with a capacity of 60 to 125 rooms, with full furnishings, and their prices are generally 25 to 40 percent lower than the market</li> <li>• And finally, the lowest level: with a capacity of 50 to 125 rooms within (essential amenities) whose prices are generally 50 percent lower than the market prices</li> </ul>
5. <i>Boutique Hotel</i>	<ul style="list-style-type: none"> <li>• A hotel that provides the highest levels of entertainment at the lowest cost</li> <li>• It is distinguished for its small size and urban location,.</li> <li>• It is distinguished by offers the entertainment that is worth in exchange for the fees paid, and the latest modernization of the hotel with everything that is modern in the technology sector such as the Internet</li> <li>• <b>Rooms feature amenities that are as follows:</b></li> <li>• Coffee maker,</li> <li>• Hair dryer,</li> <li>• Iron and ironing board</li> <li>• CD players, stereos</li> <li>• Free cappuccino bars, ginseng soda in the minibar</li> </ul>
6. <i>All-Suite Hotel</i>	<ul style="list-style-type: none"> <li>• Hotels only contain suites, usually with an area of 45 square meters or more, and mostly contain a kitchen inside the suite.</li> </ul> <p><b><i>It is classified according to the area where it is created, and they are of three forms:</i></b></p> <ul style="list-style-type: none"> <li>• The first is urban areas: it is characterized by a medium building containing 200 to 300 suites</li> <li>• Secondly, the suburbs: It is located in areas with numerical density, and the building consists mostly of 4 to 8 floors</li> <li>• Last Residential: It is a residential complex that contains all the facilities, guest rooms, separate living room, kitchen and separate entrance</li> </ul>
7. <i>Airport Hotels</i>	<ul style="list-style-type: none"> <li>• Hotels established to serve airport guests near airports</li> <li>• It contains conference rooms aimed at international agents.</li> <li>• The hotel has markets to serve guests</li> <li>• Interested in its design to form a landmark with a translucent character to light</li> </ul>
8. <i>City Centre (Downtown ) Hotels</i>	<ul style="list-style-type: none"> <li>• A hotel characterized by its location within cities.</li> <li>• It is characterized by either converting old buildings to a hotel or expanding an old hotel, with a capacity of 150 to 350 rooms in medium-sized, renovated or converted hotels in old cities</li> <li>• The other type is considered to be of a new construction with a capacity of 300 to 600 rooms.</li> <li>• The hotel is characterized by excellent safety standards and quality of services.</li> <li>• The same building contains <u>offices, conference centers, commercial shopping centers, exhibitions.</u></li> <li>• It contains a lobby and a magnificent resignation.</li> <li>• The entrance to the serviced apartment area is separate from the hotel entrance</li> </ul>
9. <i>Suburban</i>	<ul style="list-style-type: none"> <li>• Hotels aiming to invest in various markets and do not adhere to</li> </ul>

Hotels	<p>international standards for rooms .</p> <p><b><u>The types of suburban hotels</u></b></p> <ul style="list-style-type: none"> <li>• The first is the company's main hotels featuring excellent accommodation and conference rooms</li> <li>• Secondly, hotels with courtyards are close to the first type</li> <li>• The last of the individual old hotels, which are either old buildings or converted builder</li> </ul>
10. Resort Hotels	<p><b><i>As Schwanke (1997: 4)knew, the resort has 3 distinct parameters</i></b></p> <ul style="list-style-type: none"> <li>• First, they are considered enterprises run by private companies</li> <li>• Second, it is established in the natural environment areas</li> <li>• Third, it targets tourists and travelers during the holidays</li> </ul> <p>It is classified into three dimensions</p> <ul style="list-style-type: none"> <li>- The first is its proximity to the market</li> <li>- The second is basic facilities</li> <li>- Third, its proximity to residential areas</li> </ul> <p>It is also classified according to its quality</p> <p>It is characterized by its general amenities and facilities</p> <p><b><i>Also Schwanke (1997: 8)adds that resorts have two classes</i></b></p> <ul style="list-style-type: none"> <li>• The first is the resort hotel: It is characterized by a large size and includes all facilities and amenities</li> <li>• Secondly, other accommodation facilities in the resort: It is characterized by its proximity to the same places of natural environment, but by hotels of lower quality</li> </ul> <p><b><i>Different types of other facilities for residing in the resort:</i></b></p> <ul style="list-style-type: none"> <li>• Beach Resort Hotels</li> <li>• Health Resort Hotels</li> <li>• Rural Resort Hotels</li> <li>• Ski Resort Hotels</li> <li>• Themed Resort Hotels</li> <li>• Casino Resorts Hotels (Schwanke,1997).</li> </ul>
11. Conference Centres	<ul style="list-style-type: none"> <li>• Hotels designated as a convention center and near major city areas</li> <li>• Capacity from 200 to 400 guest rooms</li> <li>• A large number of fully equipped meeting and conference rooms with international features and standards.</li> <li>• It provides food and drink services .</li> <li>• It offers entertainment facilities within the laws of the country in which it is based, but of a larger size than traditional hotels</li> </ul>

Also star hotel classification have standards and specifications and the hotel stars classification criteria popular in the world concerns of the consumer's view. Where it guides the adoption of the type of classifications and criteria. As well the hotel classification criteria that determine by (AA and AAA) and follows [www.theaa.com](http://www.theaa.com) which was created in the UK(URL:93), and American hotel classification criteria



that were created in the USA by automobile associations, they mainly depend on the consumer's views (URL:94).

This section looking to explain the stars hotel standards and specifications classification, where data are taken from (AA and AAA) and American hotel.

Table 17 : Hotels Star Classification (Kosar & Masic ,2015)

<b>Hotel Classification</b>	<b>Standards and Specifications</b>
One Star Hotels	<ul style="list-style-type: none"> <li>• Small hotel, mostly independent family owned.</li> <li>• The services are provided by the owner.</li> <li>• There are no requirements for the facilities and food can be served.</li> <li>• Maintenance and cleaning work must be daily .</li> </ul>
Two-star hotels	<ul style="list-style-type: none"> <li>• Small to medium sized hotel compared to other star class ratings.</li> <li>• Not required to have facilities for services in it.</li> <li>• Business hotels are of the same class.</li> <li>• The hotel has a reception area.</li> <li>• It contains facilities for serving food and drinks.</li> </ul>
Three Star Hotels	<ul style="list-style-type: none"> <li>• The size depends on the existing facilities support and the level of staffing. The size is always larger than that of one and two star hotels.</li> <li>• It has a reception area and it must be spacious.</li> <li>• There is a restaurant that provides services to guests and non-residents as well.</li> <li>• The administration has the right to provide services to guests that are not restricted by conditions to provide services that distinguish it from other hotels</li> </ul>
Four star hotels	<ul style="list-style-type: none"> <li>• Luxury is the basic idea of a hotel and includes (furniture, equipment, decorations).</li> <li>• The bedrooms are equipped to offer the best degree of comfort that meets the needs of all guests</li> <li>• There is a reception area and there are porter services</li> <li>• 24-hour room service is available</li> <li>• Laundry and dry clean service available</li> <li>• There is a restaurant to serve guests</li> </ul>
Five Star Hotels	<ul style="list-style-type: none"> <li>• Provides amenities that meet the demands of all guests.</li> <li>• It is characterized by the presence of large areas in parts of the hotel for its services.</li> <li>• 24-hour room service is available.</li> <li>• Laundry and dry clean service available.</li> <li>• Services provided under administrative supervision.</li> <li>• The restaurant includes serving dishes of the highest international standards.</li> </ul>

Table 18 : Provide The Standards And Specifications For Hotel Star Bed Room (Kosar & Masic 2015).

<b>Hotel Classification</b>	<b>Standards and Specifications Bed Room</b>
One Star Hotels	<ul style="list-style-type: none"> <li>• Bedrooms are equipped for sleeping only. En-suite bathroom is not required.</li> </ul>
Two-star hotels	<ul style="list-style-type: none"> <li>• The rooms are equipped to provide well-equipped services to the guests.</li> <li>• The rooms have en suite bathrooms.</li> </ul>
Three Star Hotels	<ul style="list-style-type: none"> <li>• The rooms size depends on the regulations and laws presented by the Ministry of Tourism of each country</li> <li>• Each room has an en-suite bathroom equipped with a bathtub and shower. Also contains equipment such as (hair dryer and telephone)</li> </ul>
Four star hotels	<ul style="list-style-type: none"> <li>• The rooms are well furnished, the size of which depends on the regulations and laws presented by the Ministry of Tourism of each country</li> <li>• Each room has an en suite bathroom that includes a shower and a bathtub, the size of which depends on the regulations and laws provided by the Ministry of Tourism for each country</li> </ul>
Five Star Hotels	<ul style="list-style-type: none"> <li>• The size of room depends on the regulations and laws presented by the Ministry of Tourism of each country.</li> <li>• The rooms are well appointed to provide all the guests need.</li> </ul>

### 3.2 Hotel Classification Systems Worldwide Popular

They are many classification hotel in world and it different according to standards and specifications that are related to the country governments or agent companies. For that in the early sixties The World Tourism Organization (WTO) have been establish a system for organizing hotels, as well , within last thirty years the system (WTO) had more than one hundred classifications (Lawson, 1995). And on the anther hand the European Union, through the Union of National (*Hotel and Restaurant Associations* (HOTREC)), followed a system represented by symbols to organizing hotels(Lawson, 1995), that to distinguish it from the rest of the world hotels classifications. In additions , Lawson, (1997) creates two hotel classification depend on size and number of rooms. For that Chellan explains the different of classifications that there is no official standard method adopted for assigning the classifications for the entire world(Le Guide Rouge: Paris ,2003).

Table 19 is an explanation of the hotel guide for the official Worldwide Categorization Standards. The data collected in order to explain the classification hotel systems worldwide popular with brief information.

Table 19: Specifications Of Hotel Classification (Kosar & Masic,2015)

<b>HotelClassification</b>	<b>Specifications</b>
Deluxe:	<ul style="list-style-type: none"> <li>A hotel that is concerned with the residents who look for:</li> <li>the level of service is high</li> <li>it is concerned with providing services that satisfy the public.</li> </ul>
Medium Deluxe	<ul style="list-style-type: none"> <li>The hotel is based on its name among hotels</li> <li>It is concerned with providing amenities that satisfy all tastes.</li> <li>Places of luxury and places for accommodation within the criteria of comfort</li> <li>It is aimed to accommodate the businessmen .</li> </ul>
Superior First Class:	<ul style="list-style-type: none"> <li>It offers rooms with comfortable new furniture. .</li> <li>Hotel provides services to first class guests</li> <li>The hotel building is usually old but has been maintained periodically according to the USA Tourism Organization standards</li> </ul>
First class	<ul style="list-style-type: none"> <li>There is no distinctive design, but the guest rooms are comfortable and follow the standards of the American Ministry of Tourism</li> <li>It is suitable for ordinary guests who are not looking for luxurious services,</li> </ul>
Medium first class	<ul style="list-style-type: none"> <li>It does not contain restaurants and public facilities</li> <li>Appropriate to guests who are interested in the lowest cost</li> <li>They are of the same class as first-class hotels, but are simpler.</li> </ul>
Superior Tourist Class	<ul style="list-style-type: none"> <li>An economic hotel as it has a low cost of accommodation</li> <li>The quality standards imposed by the Ministry of Tourism are applied in the country of origin of the hotel</li> <li>Aimed for low cost guests like students</li> </ul>
Tourist Class	<ul style="list-style-type: none"> <li>A low-cost hotel that is affordable.</li> <li>It is suitable for guests who are looking for basic amenities.</li> <li>It is located near national parks and highways</li> </ul>

On another hand, from Lawson view classification is formed on features that are the main point to calculation and quantity, and under the planning item. Based on this, the degree of construction is determined. The features are summarized according to (Lawson, 1997) are ( Room size, Room facilities, and Availability of services).

Lawson(1995)believes the classification according to size and number of rooms, through which classification is made on the basis of targeted hotels with relatively high non-fixed categories such as families or hotels, and guesthouses.

And Lawson (1997: 21)adopts two major hotel classifications. The first is based on the hotel's location and quality standards as indicated in the 20Table.And the second ,Lawson (1997: 20) utilizes size as a boundary along which hotels are arranged ad refer in Table 21.

“The stock of hotel accommodation in most developed countries is characterized by a high proportion of small family-run hotels, inns and guesthouses. New hotels are generally in the mid- to large size range to justify commercial investment and group operation. The optimum for efficient staffing is usually round 200 rooms (120 rooms for budget / mid-tariff hotels) while larger units can provide savings in property operation and advantages in marketing. In prime locations (city centers, resort prominence) the high cost of site acquisition with usually dictate the minimum size and grade to achieve a viable cost/room ratio"( Lawson ,1997: 20).

Table 20: Hotel Identification (Source: Lawson 1997)

Identified by	Examples	Characteristics
<b>Location</b>	City centre, Provincial town Resort, Country house Airport, Motel	Business travel, urban visitors Vacation and conference users Transient and staging needs
<b>Quality</b>	Official or voluntary grading systems denoted by 1 to 5 stars, crowns, diamonds, etc.  Company tiering or sub-branding of products to serve differentiated markets.	Standards of space, facilities and services appropriate for hotels of that grade  Budget, mid-markets and luxury hotels distinguished by brand names, specific design features and range of services offered
<b>Operation</b>	Large hotel companies operating as a chain or group of company-owned, managed or franchised properties  Individual hotels which may be fully independent or associated with a marketing consortium	Similar standards of quality, facilities and services. Branding is usually adopted to provide a recognizable and consistent product at a common national tariff  Emphasis is often placed on the distinctive character of the hotel and personal service
<b>Specialisation</b>	Hotels offering particular facilities and services, e.g.:  Resort hotels  Convention hotels  Spa hotels  Casino hotels	  Orientated around resort and leisure attractions  Including extensive facilities for meetings and conventions  Providing medical, paramedical, fitness and convalescence services  With gaming rooms, spectacular entertainment and public facilities

Table 21 : Classification Hotel By Various Size (Source: Lawson 1997).

Size Range	Characteristics
Fewer than 25 rooms	Typical guesthouses, farmhouse and cottage conversions, small private hotels and traditional inns and lodges. Usually family run and individually owned. This form of small-scale dispersed tourism development is actively encouraged in many rural tourist areas
50 - 80 rooms	Includes the smaller independent hotels, country houses and luxury conversions of stately houses, Paradors (Spain). Hotels of this size are large enough to employ a separate manager and may be operated independently or as part of a company or marketing consortium
80 - 120 rooms	Most new budget hotels, inns, lodges and motels are in this size range providing standard rooms with an independent restaurant. Depending on location, the development may include a small outdoor swimming pool and children's play area
120 - 200 rooms	New provincial hotels in Europe tend to be in this size range. The number of rooms allows for better utilisation of space and facilities — which usually include some business meeting/private function rooms, a separate coffee shop and restaurant and health-fitness centre
150 - 250 rooms	Luxury hotels in resorts and spas. Hotels of this size can retain a personal service while offering a wide range of exclusive facilities (private beach, golf-course, speciality restaurants, remedial treatments)
200 - 300 rooms	Typical size for resort hotels supporting more extensive dining areas, lounges and recreational facilities. This size is also representative of mid-scale city centre hotels and many airport hotels
300 - 500 rooms	High-grade hotels in city centre, downtown and prime resort locations. Invariably these provide more than one restaurant, a health - fitness club including an indoor pool and extensive business facilities. This size is also necessary to support more extensive convention facilities
300 - 800 rooms	Most integrated resorts, holiday centres and club complexes have a large capacity to support extensive recreational and entertainment facilities and marketing costs
800 - 1000+ rooms	Mega city centre hotels where economies-of-scale can allow spectacular designs and cost savings in construction and operation. This includes the larger convention hotels and casino hotels

### 3.3 TRNC Star Hotel Standard

This section contains the categorization standards in TRNC hotels sector.

Note : The main reference for the information in this section is taken from (OTELLER YASASI,2007).

The main function of hotels is to provide the needs of customers. In addition, they can also provide daily requirements such as food, drink and entertainment needs.

The classes of star hotels are classified as (One) star hotels, (Two) star hotels, (Three) star hotels, (Four) star hotels, and (Five) star hotels.

The classes of the star hotels as quoted and translated are as follows:

Table 22:Special Features Of Hotel TRNC Classification (OTELLER YASASI,2007)

<b>HotelTRNC Classification</b>	<b>Special features</b>
One Star Hotel	<p>At least 20 beds capacity, these hotels have the following capacities:</p> <ul style="list-style-type: none"> <li>• Windbreaker at the entrance, reception arranged according to hotel capacity, lobby covering the waiting area and telephone service a reception hall of cloakroom.</li> <li>• Breakfast office and connected breakfast room (large enough). The living room or restaurant can be used for this purpose, cottage facilities may be open for part of the hall used for this purpose</li> <li>• Management room</li> <li>• Living room</li> <li>• At least 50% (fifty percent) of the number of rooms where guests staying at the hotel can easily park their vehicles.</li> <li>• Ventilator in case of absence of cooling system in general volumes, electrically operated stove in case of absence of heating system.</li> <li>• TV in public areas</li> <li>• Buffet service if there is no restaurant</li> <li>• First aid equipment and supplies.</li> <li>• Office or closet for housekeeping on bed floors.</li> </ul>
Two Star Hotels	<p>These are the hotels with a minimum capacity of 40 beds and have the following qualifications:</p> <ul style="list-style-type: none"> <li>• There should be a carpet or a suitable material to prevent noise.</li> <li>• An additional management room.</li> <li>• Bar arrangement in the living room or independent sections.</li> </ul>
Three Star Hotels	<p>They are at least 80 beds with the following requirements for two star hotels:</p> <ul style="list-style-type: none"> <li>• Dining Hall.</li> <li>• Swimming pool and children's pool.</li> <li>• Multi-purpose hall and foyer for at least 80 people, 1.20 m<sup>2</sup> per person (twenty meters per square meter).</li> <li>• Laundry and ironing service.</li> </ul>
Four Star Hotels	<p>These are the hotels with the capacity of at least 120 beds which have the following qualifications with the requirements for three star hotels.</p> <ul style="list-style-type: none"> <li>• Acceptance hall consisting of a service entrance suitable for the capacity of the hotel, a luggage room connected with a service elevator or stairs.</li> <li>• Floor office arrangement on each floor (service stairs or elevators are arranged in connection with floor offices. In separate settlements, the floor office is not obliged to be on each floor provided that service is not interrupted).</li> <li>• Dry cleaning and tailor service.</li> </ul>

	<ul style="list-style-type: none"> <li>• Tourism sales unit.</li> <li>• Internet fax, computer, etc. a venue for office services .</li> <li>• Cafeteria or snack bar</li> <li>• Sauna or Turkish bath with alarm system</li> <li>• At least 100 m in size, nightclub, discotheque and so on. entertainment hall or a theater, cinema, conference hall and so on. at least one of the</li> <li>• At least 60 m<sup>2</sup> of equipment gym, aerobics or billard hall, mini golf, tennis, basketball, or volleyball court, bowling alley, go-kart track, sea sports, bocce, squash hall or similar facilities that provide at least two</li> <li>• Landscaping and greening according to landscape project.</li> <li>• Satellite or digital broadcasting, to have a food engineer or personnel who has been trained in food</li> </ul>
<p style="text-align: center;">Five Star Hotels</p>	<p>These are the hotels with a minimum capacity of 200 beds with the following requirements for the four-star hotels with superior features such as settlement status, structure, installation, equipment, decoration and service standards.</p> <ul style="list-style-type: none"> <li>• Parking for at least 75% (seventy-five percent) of the number of rooms, and 24-hour staff in these spaces</li> <li>• At least 60 m<sup>2</sup> (sixty square meters) of equipment gym, aerobics or billard hall, mini golf, tennis, basketball, or volleyball court, bowling hall, go-kart track, sea sports, bocce, squash hall or similar facilities that provide at least (only gymnastics, aerobics and billiard rooms can be seen in city hotels which are not connected to the sea)</li> <li>• Providing services such as customer relations and consultancy in a separate location from the reception by experienced staff</li> <li>• Dental cleaning kit in rooms, disposable slippers, sewing kit, shoe wiper, shoe polish, makeup cleaning cotton, etc. at least five emblem materials ,</li> <li>• Nursery.</li> <li>• A separate a la carte restaurant serving at least five hot and cold regional dishes and dessert varieties.</li> <li>• Indoor pool and children's pool. (In city hotels, a separate pool is not required if the open pavement is covered with material that can be opened and heating system is provided.)</li> </ul>



Table 23: Provide The Standards And Specifications For Hotel Star Bed room (OTELLER YASASI,2007)

<b>HotelTRNC Classification</b>	<b>Standards and Specifications Bed Room</b>
One Star Hotel	<ul style="list-style-type: none"> <li>• At least 20 beds</li> <li>• The minimum size of single-bed rooms should be net 9 m<sup>2</sup> (nine square meters); the side length can not be less than 2.80 m (two meters eighty centimeters).</li> <li>• Air conditioning system in bedrooms</li> <li>• Number of rooms that can serve 25% of the number, such as a combination of encrypted or double-key safe deposit box service to the customer .</li> </ul>
Two Star Hotels	<ul style="list-style-type: none"> <li>• a minimum capacity of 40 beds</li> <li>• The minimum size of single-bed rooms should be 10 m<sup>2</sup> and the minimum size of double-bed rooms should be 12 m<sup>2</sup>; side length can not be less than 3 m<sup>2</sup></li> <li>• The bedrooms have a fridge and TV.</li> <li>• Air conditioning system in public spaces and bedrooms.</li> <li>• Bathrooms have hair dryers.</li> </ul>
Three Star Hotels	<ul style="list-style-type: none"> <li>• at least 80 beds</li> <li>• The minimum size of single-bed rooms should be net 11 m<sup>2</sup> (eleven square meters) and the minimum size of double-bed rooms should be net 14 m<sup>2</sup> (fourteen square meters); side length is 3 m. (less than three meters).</li> <li>• Internet service.</li> </ul>
Four Star Hotels	<ul style="list-style-type: none"> <li>• a minimum capacity at least 120 beds</li> <li>• The minimum size of single-bed rooms should be 12 m<sup>2</sup> (twelve square meters), while the minimum size of double-bed rooms should be 15 m<sup>2</sup> (fifteen square meters); side length is 3.50 m. (three meters fifty centimeters).</li> <li>• In addition to the furnishing envisaged in the bedrooms, tulle and opaque window curtain, required number of table lamps, flower vase, wall hanging table, pictures or photos, possibility of preparing hot drinks.</li> <li>• In-room safes.</li> <li>• In-room minibar.</li> <li>• Additional management rooms</li> <li>• Room service from 06:00 until 24:00 .</li> </ul>
Five Star Hotels	<ul style="list-style-type: none"> <li>• a minimum capacity of 200 beds</li> <li>• Minimum size of single bed rooms is 14 m<sup>2</sup> (fourteen)square meters), minimum size of twin rooms net 18 m<sup>2</sup>(eighteen square meters); side length is 4 m. (fourmeters).</li> <li>• Central heating and cooling system .</li> <li>• Bathrooms have bathtubs.</li> <li>• 24-hour room service.</li> <li>• Non-smoking room arrangement of at least 10% (ten percent) of the room capacity</li> <li>• Rooms have full-length mirror and bathrobes</li> </ul>

### **3.4 Grading And Standards**

It can understand the Grading and Classification of hotel from the definition of them. Grading and Classification definition from the scholars Deroos(2011) and Cooper, (2008) they are defined the Classification of hotels according to the facilities and properties of the integrated hotel agency in the building designated for the hotel, in addition, the amenities sets the dimensions of quality. And for the Grades, they reflect the quality provided for the operations that are run and are considered a secondary sign that does not affect the hotel's classification category in terms of the star symbol or other agency.

As above definition there are differences between the grading and standards in functions use and there are differences in the grading and standards between the rules of the world level. According to Martin-Fuentes (2016) he confirms that the standards are not in conformity with the international level. Nevertheless, Martin adopts the criteria for classification that are different for world classification such as ( room size, number of rooms, facilities, common space, services, and finally the infrastructure) .Additionally Lawson (1997) divided the grading systems into two groups:

- i. Official classification: The government is responsible for the legislation of the standards through the Ministry of Tourism and the Tourism Board.
- ii. Independent ratings: It is based on internationally recognized societies in the field of hotel classification, such as (hotel or car unions) or commercial bodies.

As above information, it refers is several types of Grading and Classification, but the definition of Deroos.(2011) and Cooper (2008) is comprehensive for the meaning as it explains differences between them.

### **3.5 Hotel Rules And Regulations**

The hotel's rules and regulations consider the main aspects to establish a hotel, where most of them are compulsory in order to establish system to divide between the types of hotel.

In addition , it includes the general rules of hotel communal areas, and bedrooms rules, that to keep this classification with good standards in guest service. Also, the rules of hotels in all members of the hotel industry are the same within several countries, but every company has its own characteristics.

The aim of rules and regulations are to standardize the quality of the same union or group for the hotel property(Lane & Dupre: ,1996). In addition , in Table 24 according to Venter (2007) it explain the important rules and regulations that must the hotel industry observed.

Table 24explaining the main point that use it to form the rules and regulations in order to standardize the quality between the types in worldwide.

Table 24: Description The Rules For The Hotels (Venter ,2007).

<b>Building</b>	<b>It is the building to which the design is applied in its detailed phases, including its layouts to determine the different areas and construction methods under the spatial planning item.</b>
<b>Site</b>	<b>It lies in the importance of the site being appropriate to the nature and design of the hotel.</b>
<b>Room Size</b>	<b>The room design in terms of space, based on the needs of each category separately.</b>
<b>Bathrooms</b>	<b>Each hotel class has specifications that must be followed in terms of sizes and bathroom contents, such as the length of the pool in four-star hotels, designed with a minimum length of 160 cm.</b>
<b>Public toilets</b>	<b>Each floor must contain at least one public toilet to serve visitors or clients.</b>
<b>Salons and reception</b>	<b>They differ in terms of space and luxury design according to the classification of the hotel and its location.</b>
<b>Concert Halls</b>	<b>The place designated for the largest gatherings and events and is also considered a type of conference room.</b>
<b>Dining halls</b>	<b>Its design depends on many conditions that in general provide services to all categories of the hotel and also visitors.</b>
<b>Cafeteria</b>	<b>It is obligatory for hotels with three stars and more and have certain conditions to serve hotel guests and also provide service to visitors</b>
<b>Secretarial Service</b>	<b>one of the most important services provided to the business center, and also considered a type of services with a high rating and the most important client</b>
<b>Stores</b>	<b>It is one of the most important divisions of the hotel to give it the ability to take advantage of the visible space in front of customers with the ability to keep furniture or structure materials also away from the view of the guests and use them when needed.</b>
<b>Dining hall and staff lounge</b>	<b>An important zone and depends on the type of hotel and its classification in terms of area and design</b>
<b>Furniture</b>	<b>An important condition depends on the type of hotel and its classification in terms of area and design</b>
<b>Fire Protection</b>	<b>It is mandatory for all categories and must be taken into consideration during design</b>
<b>Medical Service</b>	<b>First aid is required in all categories</b>
<b>Baggage storage room</b>	<b>Must be available in all hotel categories</b>

### **3.5.1 Rules And Regulations For TRNC Hotel**

This thesis cases studies undergoes a rules and regulations of TRNC where the classifications will be as a base for the proposed design and the analysis of the case studies hotels. The case study for the thesis will be chosen from the Five-star hotel classification, within the South-East Coast of North Cyprus region.

The stars hotels in TRNC follow rules and regulations where most of them are compulsory, also it include the general rules, the rules of hotel communal areas, and bedrooms rules, that in order to keep this classification with good standards in guest service. This section collected the rules and regulations for star hotels from the Ministry of TRNC in the Article 12 of the Hotels Law (Chapter 138, 59/1991, 23/1996 and 5/2007 Laws)( Ministry of TRNC 2007 (OTELLER YASASI,2007)which it include details within the laws for each hotel classification separately. Which summary in three table 29 ,30 , and 31 that in order to take into account as a reference data into proposed design for cases studies.

Moreover, the stars hotel classification criteria popular in the TRNC concerns of the consumer's view, where it guides the adoption of the type of classifications and criteria. And the main criteria for stars hotel as follow (OTELLER YASASI,2007).

The main function of star hotels is to provide the overnight needs of customers.

In addition to this service, they can also provide supplementary units for food, drink, and entertainment needs.

They have special characteristics according to their classes star hotels are classified as (One) star hotels, (Two) star hotels, (Three) star hotels, (Four) star hotels and (Five) star hotels.

Table 25 include the general rules and regulations that must be available and the rules that non-compulsory in hotels for each star category(OSELLER YASASI,2007).

Table 25 : The General Rules And Regulations (OSELLER YASASI,2007)

<b>Rules and regulations - Hotel</b>	<b>5 star hotel *****</b>	<b>4 star hotel ****</b>	<b>3 star hotel ***</b>	<b>2 star hotel **</b>	<b>1 star hotel *</b>
The minimum number of beds	a minimum capacity of 200 beds	at least 120	at least 80 beds	a minimum capacity of 40 beds	At least 20 beds
Gym	Compulsory	Compulsory	-	-	-
a swimming pool (The dimensions referred to in paragraph (a) shall apply to units of up to 240 beds)	Compulsory	Compulsory	-	-	-
gardens and areas of green	Compulsory	Compulsory	-	-	-

The Table 25 show the compulsory rules for the hotel ,where in the 5 and 4 star hotel the general rules and regulations must be available with the capacity of beds more than 200 beds for 5 star and 120 bed for4. On the other hand, hotel with star classification 3 ,2, and1 jut the minimum number of bed is compulsory.

Also hotel communal areas shall be those constructed for the purpose of serving all guests and visitors of the hotel the communal areas indispensable for every hotel, irrespective of class, are:

- a) The lobby
- b) Breakfast- room

c) The entrances, corridors and staircases

d) The communal sanitary areas

Table 26 include the hotel communal areas rules and regulations that must be available and the rules that non-compulsory in hotels for each star category.

Table 26 : Hotel Communal Areas (OTELLER YASASI,2007)

<b>Hotel communal</b>	<b>5 star hotel *****</b>	<b>4 star hotel ****</b>	<b>3 star hotel ***</b>	<b>2 star hotel **</b>	<b>1 star hotel *</b>
a lounge	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
a dining-room and television room	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
closed hall of multiple use	Compulsory	Compulsory	Compulsory	Compulsory	Compulsory
entrance lobby	reception arranged according to hotel capacity	reception arranged according to hotel capacity	reception arranged according to hotel capacity	reception arranged according to hotel capacity	reception arranged according to hotel capacity
The bar	Cafeteria or snack bar	Cafeteria or snack bar	Dining Hall.	Bar arrangement in the living room or independent sections.	-
The breakfast-room	√	√	√	√	√
The door of the main entrance	√	√	√	√	-
The corridors	√	√	√	√	√
toilets	√	√	√	√	√
parking area	Parking for at least 75% of the number of rooms, and 24-hour staff in these spaces	Parking for at least 75% of the number of rooms, and 24-hour staff in these spaces	At least 50% of the numbers of rooms	At least 50% of the numbers of rooms	At least 50% of the numbers of rooms
The bedrooms single-bedrooms	14 m <sup>2</sup>	should be 12 m <sup>2</sup>	should be 11 m <sup>2</sup>	should be 10 m <sup>2</sup>	should be net 9 m <sup>2</sup> ; the side length can not be less than 2.80 m
The bedrooms twin-bedrooms	net 18 m <sup>2</sup> ; side length is 4 m	should be 15 m <sup>2</sup> ; side length is 3.50 m	should be net 14 m <sup>2</sup> < length is 3 m	should be 12 m <sup>2</sup> ); side length can not be less than 3 m	-
Multi-purpose hall	one hundred square meters in size	one hundred square meters in size	at least 80 people, 1.20 m <sup>2</sup> per person	-	-
equipment gym	At least 60 m <sup>2</sup>	At least 60 m <sup>2</sup>	-	-	-



The Table 26 show the hotel communal areas compulsory rules and regulations for the hotel ,where all hotel classification rules is must be available ,except some rules in 2 star and 1 star classification .Furthermore, the 5 star hotel rules and regulations distinguish that all of them must be available.

### **3.5.2 Rules And Regulations For TRNC Hotel Standard Rooms**

Table 31 shows the details and specifications of the standard rooms for each hotel classification separately, and the mandatory rules for them and the rules that non-compulsory for each hotel classification.

Table 27: The Bedrooms Rules And Regulations (OTELLER YASASI,2007)

<b>The Bedrooms</b>	<b>5 star hotel *****</b>	<b>4 star hotel ****</b>	<b>3 star hotel ***</b>	<b>2 star hotel **</b>	<b>1 star hotel *</b>
The minimum number of beds	200 beds	120 beds	80 beds	40 beds	20 beds
The bedrooms single-bedrooms	14sq. m	12sq. m	11sq m	10sq. m	9sq. m
The bedrooms twin-bedrooms	18 sq. m	15sq. m	14sq. m	12sq. m	12sq. m
The dimensions of the private bathrooms or shower rooms	5.00, 4.50 and 4.00 square meters respectively	5.00, 4.50 and 4.00 square meters respectively	5.00, 4.50 and 4.00 square meters respectively	-	-
telephone	shall be provided	shall be provided	shall be provided	shall be provided	-
number of rooms outside	cannot be more than 30% (thirty percent)	cannot be more than 30% (thirty percent)	-	-	-
kitchen and bathroom for twin-bedrooms and Four beds	Up to 60 m2	Up to 60 m2	-	-	-
The height of the bedroom	Up to 2.80 m	Up to 2.80 m	2.80 m	2.80 m	2.80 m
table lamps	√	√	-	-	-
flower vase	√	√	-	-	-
wall hanging	√	√	-	-	-
pictures or photos	√	√	-	-	-
possibility of preparing hot drinks.	√	√	-	-	-
In-room minibar.	√	√	-	-	-
In-room safes	√	√	-	-	-
Internet service	√	√	√	-	-
Fridge and TV	√	√	√	√	-
An extra bed can be placed only ,upon clients request	√	√	√	√	√
Two bedside tables	√	√	√	√	√
Sconce on the wall by the bed or portable lampshade	√	√	√	√	√
Dressing table and mirror	√	√	√	√	√
Luggage table	√	√	√	√	√
closet	√	√	√	√	√
Two armchairs and a good quality coffee table	√	√	√	√	√
curtain	√	√	√	√	√
Wastebasket	√	√	√	√	√
carpet	√	√	√	√	√
Doors from outside for security	√	√	√	√	√
Measures are being taken to prevent opening	√	√	√	√	√

The Table 27 show the standard room compulsory rules and regulations for the hotel ,where all hotel classification rules is must be available ,except some rules in 3star, 2 star and 1 star classification .Furthermore, the 5 star hotel rules and regulations distinguish that all of them must be available.

The bedroom cannot be built in basements however, due to the slope of the base floors that are not below the current ground level and which receive adequate natural light are excluded from this base:

- ❖ Bedroom windows cannot be opened to light as there are places such as kitchens and toilets that might disturb the customer.
- ❖ In urban hotels, ground floor bedroom windows open to the road are at least two meters above the road.
- ❖ Ground floor bedroom windows that open to the garden are at least one meter above the ground.
- ❖ When calculating the area of the bedroom, the places occupied by the hallway, corridor, bathroom, shower and wardrobe in the room are not taken into account.

## **Chapter 4**

# **FLEXIBLE SOLUTIONS AS A TOOL EFFECTS IN THE FIVE STAR HOTEL STANDARD ROOM**

### **4.1 Introduction**

This chapter is concerned with explaining the six case study hotel and apply the flexibility as a tool in it. This chapter also contains information about the problem, limitation and method for analyses as well as method of proposing new solution by using flexibility as a tool that were collected from chapter 2. Furthermore, the proposed designs of five-star hotels standard rooms follow the rules and regulations from the Council of Ministers of the TRNC.

#### **4.1.1 Problem of Cases Studies**

The problem of cases studies are related of the reasons that it causes an obstacle to improving the functionality and comfort level of the five star hotel standard rooms. Where the size of room and the function need consider one of the main problem for all cases which it determine the number of beds and functions. Also, the hotel used an item of fixed furniture where that kind takes a lot of room space, as well as it heavy and it is difficult to move it or change its position easily, that led to difficulties in an increase or decrease the number of furniture. In addition, the number of hotels visitors is related to the number of beds, where the rooms with one bed are only absorbing one visitor and it is difficult to accommodate two visitors and the room with two beds it is difficult to accommodate three visitors. Furthermore, it can't change the type of room from another type such as living room or to kitchen.

The flexibility as a tool offers option to increase or decrease the number of beds and functions that for help the five star hotel standard rooms to improve functionality and comfort level, also to absorb the largest number of visitors'. As well, it can help to establish changeable space that can change the type of room such as living room, dining room, kitchen and bedroom. In addition, the flexibility as a tool adopting create folding furniture inside the structural element or units to save the space.

#### **4.1.2 Limitation**

The limitation of this chapter is focus on five-star hotels at South-East Coast of North Cyprus ,also focusing on hotel standard rooms as a space that determines as accommodation. In addition, focusing on applying solutions taken from flexibility as a tool processes that collected from chapter 2 in order to improve functionality and comfort level of the five star hotel standard rooms.

#### **4.1.3 Method of Analysis Part**

The analysis is based on two methods: the first is by the development and proposition of a new solution by using flexibility as a tool for chosen hotels, then the design of a proposed plan by analyzing the table: Evaluation Of Flexible Solutions through the information that is collected from the literature reviews chapters . The second analysis method is organized in table : The Effect of Flexibility which making a comparison between existing and proposed design.

The methodology process steps are :first the data collected from the literature review will be utilized in order to create proposal designs for the case studies. Then proposed plans and sections for each case study will be drawn. After that, the findings in the table: Evaluation of Flexible Solutions will be analyzed in order to

make a comparative analysis findings between the problem of the existing plan and the proposed solutions for each case study.

#### **4.1.4 The Method Of How Proposing New Solution**

The method of proposing new solutions that were taken from the researches in chapter 2 that were applied to establish a new design in order to improve functionality and comfort level of the five star hotel standard rooms . Also, each case study has different solutions in order to improve functionality and comfort level for space, where the most suitable solution is related to the room condition is chosen:

- First, analyzing the existing standard room findings then comparing what the room's function needs to meet the visitor's need.
- Next step, Choosing the solution from the literature reviews that are summarized in Table 28: Proposed Flexibility As a Tool Solutions, where the most suitable flexibility type of small space is related to the flexible pattern , furniture, mechanism, material and main unit, the latter is used in proposed design in order to increase the number of functions and beds to improve functionality and comfort level.
- Additionally, using the elements of the room's structure in order to store the flexible solutions or use it as a furniture unit.
- The last step is investigating the effects of applying flexibility as a tool in order to improve the room.

Table 28: Proposed Flexibility As a Tool Solutions (author ,2021)

Table A: Porposed Flexibility As Tool Solutions			
<b>1</b>	<b>Patterns of Flexibility</b>	A	Spatial flexibility (structural)
		B	Functional flexibility
		C	Character flexibility
<b>2</b>	<b>Type of flexibility</b>	A	Sliding walls
		B	Transforming Elements
		C	Pop-Up Interactive Apartment
		D	Multi-folding flexibility
<b>3</b>	<b>Flexible Furniture Design</b>	A	Movable Furniture
		B	Modular Furniture
		C	Foldable Furniture
		D	multiple functions
<b>4</b>	<b>Flexible Materials in interior design</b>	A	Solid materials
		B	High flexibility materials
		C	Manufactured flexibly
<b>5</b>	<b>Elements of flexibility within the internal structure</b>	A	Wall
		B	Floor
		C	Ceiling
<b>6</b>	<b>Mechanism of Flexible</b>	A	Mechanism of Flexible Construction Tools
		B	Mechanism of Flexible Plumbing Extensions Tools
		C	Mechanism of Flexible Furniture
		D	Mechanism of Flexible Wall

#### 4.1.5 Hotels Case Study Information

As a general review of information about case studies hotels region it was motivated after separating the island into two parts in 1974 as the Republic of Cyprus (in the South) and the Turkish Republic of Northern Cyprus (situated in the North) (Altinay and Bowen, 2006). The TRNC proclaimed its freedom in 1993 which rolled out new improvements in the island's natural, social, political, conservative, and spatial ramifications (Dinkov and Stoyanov, 2005). From that point forward, North Cyprus has started to build itself up as a reasonable economy based on the travel industry. This includes the beginning of the hotel industry in general as well in TRNC.

The hotels case study they are located in South-East Coast of North Cyprus cities , and this section view the general information of hotel company such as founded year , the space structure dimension , the room number and size as follow:

1. Case Study1 : Salamis Bay Conti Hotel

The hotel is located at Famagusta front the beach of Salamis on North Cyprus(URL:95), the hotel founded in 1973 with the structure is built on 65 acres, It contains 912 rooms in 9 floor (URL:96).

2. Case Study2 :Arkin Palm Beach Hotel

The Arkin Palm Beach Hotel is situated in the old port city of Famagusta, North Cyprus (URL:97). Stars in the 1950's-60's Kiessel, M. (2019) with structure is built on 500 square meters of function space(URL:98) . The hotel has a total of 108 guest rooms (URL:99)

3. Case Study3 :Concorde Luxury Resort and Casino

Arranged right on its own sandy sea shore Concorde Luxury Resort and Casino in İskele, Bafra, North Cyprus offers contemporary style (URL:100),Stars in the 1950's-60's (URL:101) and the structure is built on 125-acre. The hotel offers 569 luxury rooms and suites, 13 different types of rooms and suites in different sizes ranging from 45 m<sup>2</sup> to 135 m<sup>2</sup>, suitable for everyone(URL:102).

4. Case Study4 :Kaya Artemis Resort and Casino

The hotel is situated at front the sea shore of Salamis on İskele, Bafra North Cyprus Mersin 10 and highlights in the town ,as well hotel was built in 2007 It was renovated in 2016.In addition, it contains 739 rooms of which 162 in the primary structure and 576 in the occasion town, moreover, total Outdoor Space 165000 m<sup>2</sup>, and total Indoor Space 65.000 m<sup>2</sup>(URL:103).



#### 5. Case Study5 :Limak Cyprus Deluxe Hotel

The eighth hotel of Limak Holding was put into service in 2018 in the Turkish Republic of Northern Cyprus. It consists of 6 floor , 598 rooms with 1338 bed capacity, ultra-all- inclusive concept and unique nature– (URL:104).

The type of room standard rooms 28-32 m<sup>2</sup> option , Extra deluxe rooms(42 m<sup>2</sup>) , family rooms (48m<sup>2</sup>), junior suite , Suite rooms(URL:105).

#### 6. Case Study6 :Noah's Ark Deluxe Hotel & Spa

The hotel was put into service in2011an address 1.2 km from İskele, Bafra tourism investment Area in the Turkish Republic of Northern Cyprus(URL:106).

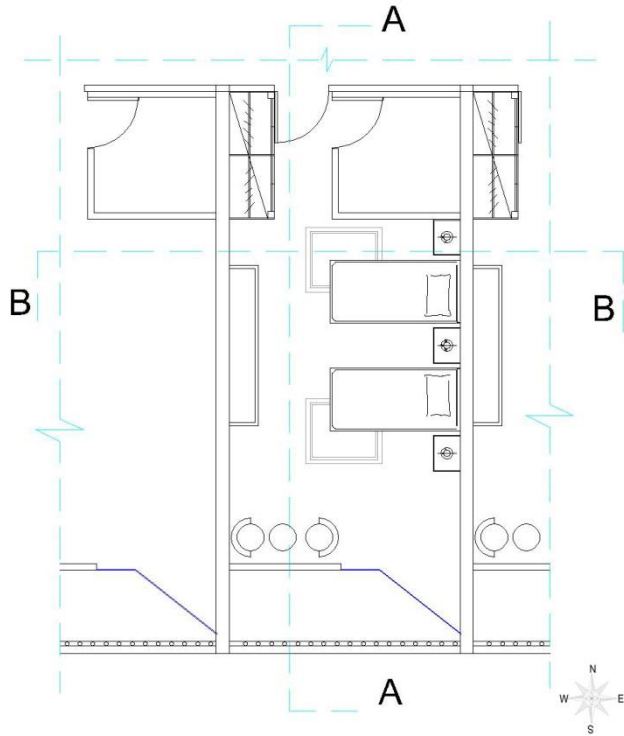
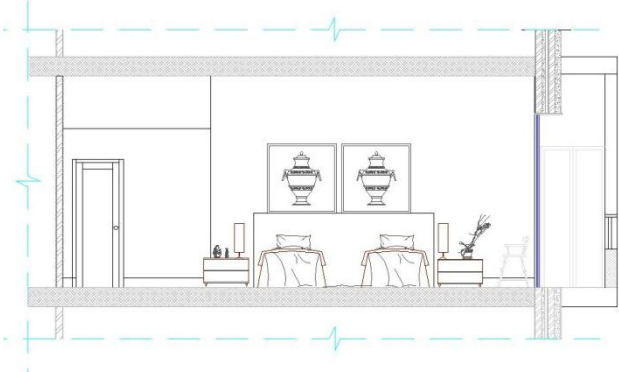
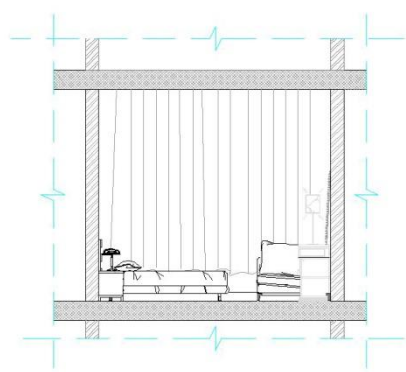
Structure is built on165.000 m<sup>2</sup> open area consists of arranged over 7 floors building(URL:107) , with 616 rooms, which the type of room is the Stander room size 37-42 m<sup>2</sup> , and the Suite size option 72-185 m<sup>2</sup>(URL:108)

### **4.2 Flexibility Proposed Solution Plans And Sections**

The main aim of this section is to applying the flexible solutions in 6 case studies, where the section include problem of existing, the develop solution, and proposed plan. Also include two tables the first table have the existing plan and sections, and the second table includes the proposed designs plans and sections for each case study.

#### 4.2.1 Case Study 1: Salamis Bay Conti Hotel

Table 29 : Existing  $\neg$  Plan, Salamis Bay Conti Hotel

 <p>Existing <math>\neg</math> plan, Salamis Bay Conti Hotel (Personal work)</p>	
<p>PLAN Scale: 1/100</p>	
 <p>Section A-A , (Personal work)</p>	 <p>Section B-B ,</p>
<p>SECTION Scale: 1/100</p>	<p>SECTION Scale: 1/100</p>
<p><b>Problem of Existing Salamis Bay Conti Hotel Plan</b></p> <ol style="list-style-type: none"> <li>1. First problem is the main beds use the largest area of room that due to narrow movement space</li> <li>2. It is difficult to add an secondary bed, that led to difficult to accommodation more number of user.</li> <li>3. No sitting area just two chair.</li> </ol>	

4. Due to room space is narrow it is difficult to add new function or change the room use.

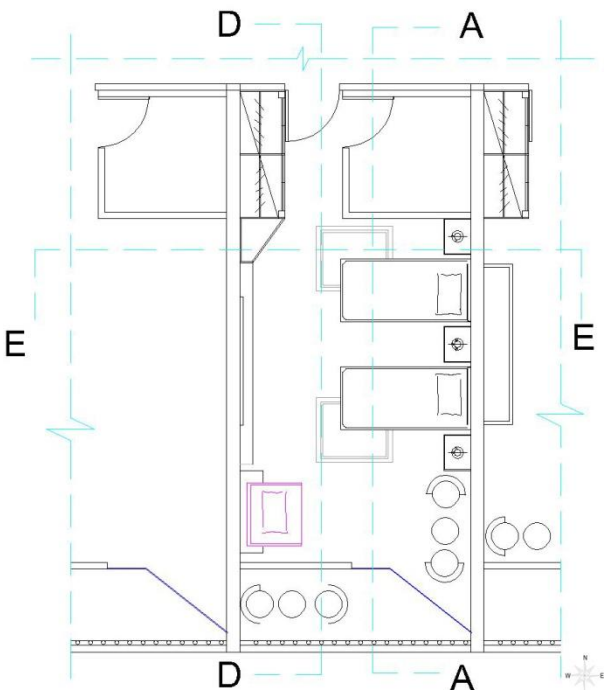
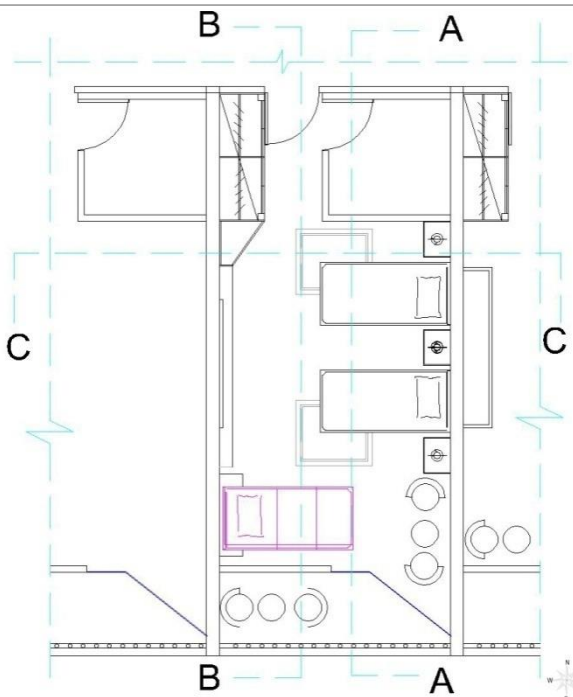
#### **Solutions Proposed**

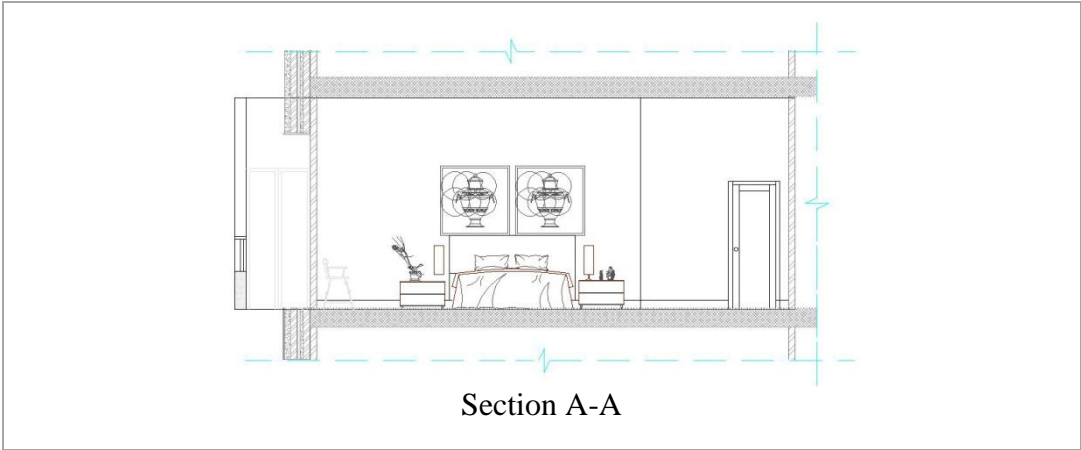
1. Redesign the room in order to create the space to meet the functions need.
2. Establish flexible units with ability o switch between the form of functions.
3. Adopting a foldable and multifunction furniture to save the room space.
4. Increasing the number of beds.
5. Increasing the number of functions.
6. Using sold and manufactured flexibly to create a furniture and folding wall.
7. Adopt flexible mechanism in order to establish the folding wall and the flexible furniture units.
8. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

#### **The concept of proposed design**

1. Increasing the number of beds and functions through use the wall element as a stored the flexible units with an option of opened and closed.
2. Establish sitting area as a function easy to use in the same space.

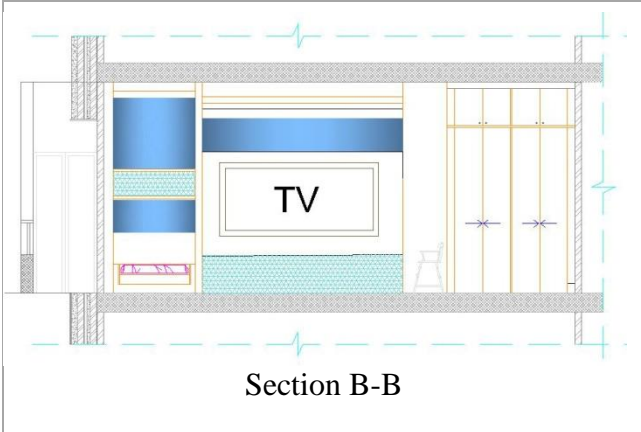
Table 30 : Flexibility Solution Plans Of Case Study 1

<b><u>Proposed increase capacity of bed by flexible solution</u></b>	
<b>Proposed Plans , Scale 1/100</b>	
	<p>Plan (1) , proposed increase bed (Personal work)</p>
PLAN Scale: 1/100	
	<p>Plan (2) , proposed increase bed (Personal work)</p>
PLAN Scale: 1/100	
Proposed Sections , Scale: 1/100	



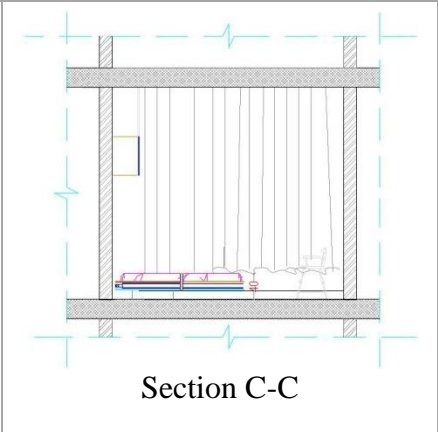
Section A-A

Scale: 1/100,(Proposed plan 1+2) ,(Personal work)



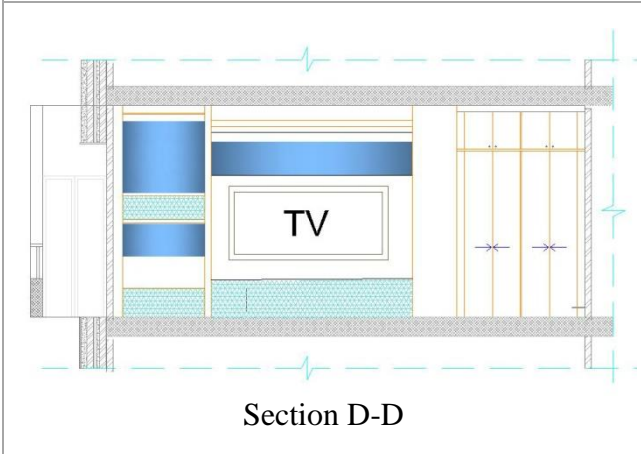
Section B-B

(PLAN 2) Scale: 1/100  
(Personal work)



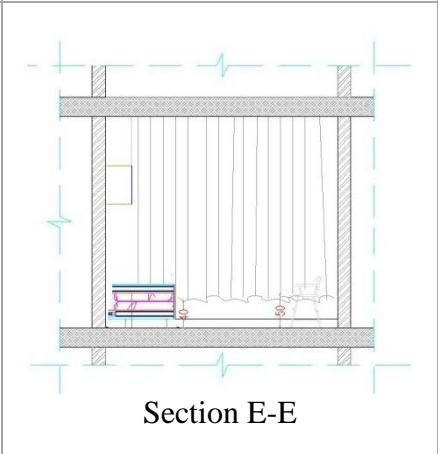
Section C-C

(PLAN 2) Scale: 1/100  
(Personal work)



Section D-D

(PLAN 1) Scale: 1/100  
(Personal work)



Section E-E

(PLAN 1) Scale: 1/100  
(Personal work)

**Proposed materials- Technical- Mechanism**

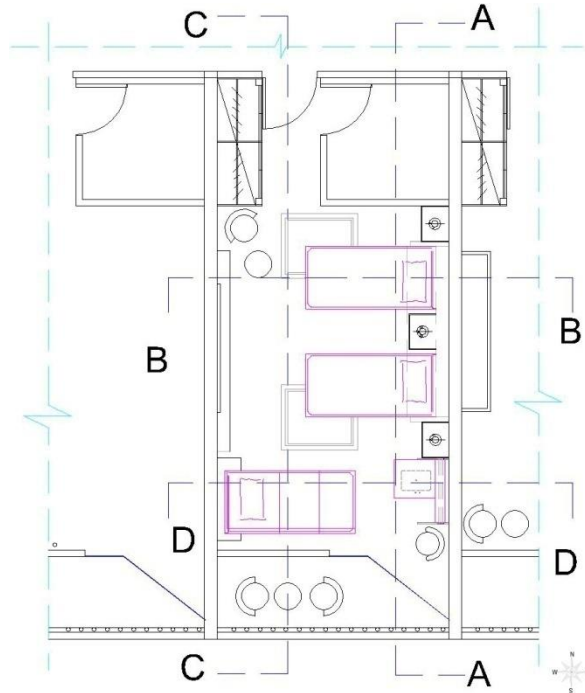
Proposed materials

( Hexagon shaped) Between bed for privacy  
**Solid materials used in finishing and decoration work in a flexible manner**  
**High flexibility materials**

Proposed technical	Mirrors and Secondary Bed	Flexible Wall \ Flexible Furniture (Wall).Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close  Storage dividersModel No. 3
	Wall Cabinet	Flexible sliding wall (plan 6+7)
Proposed Mechanism	Mirrors and Secondary Bed	Construction of flexible wall Folding Flexible joint
	Wall Cabinet	Technical Information

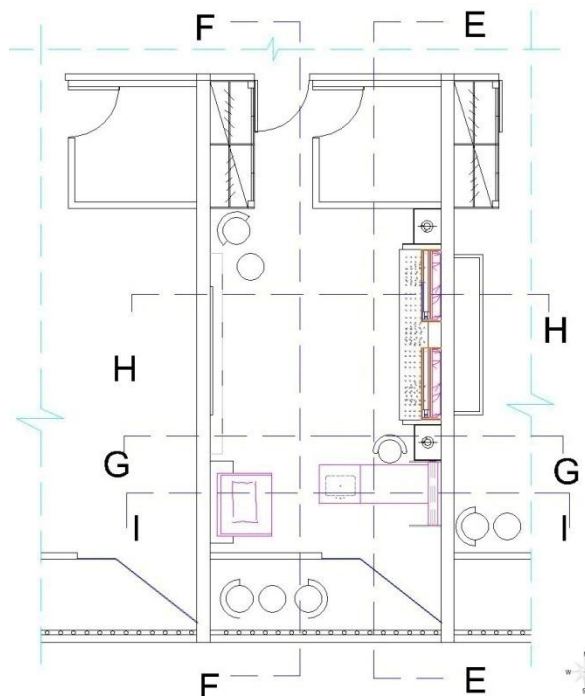
**Proposed increase beds and function by flexible solution**

**Proposed Plans , Scale 1/100**



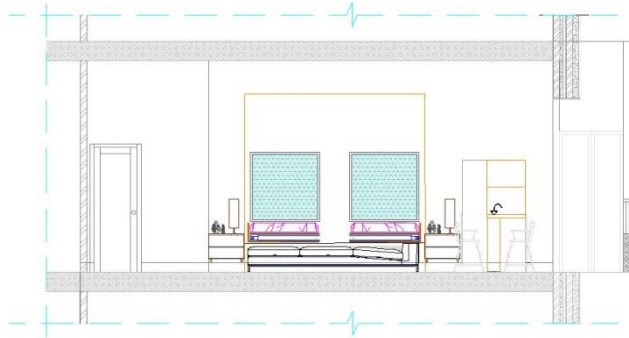
Plan (1) proposed increase beds and function (Personal work)

PLAN Scale: 1/100



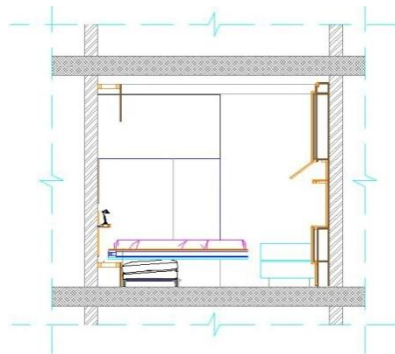
Plan (2) proposed increase beds and function (Personal work)

PLAN Scale: 1/100



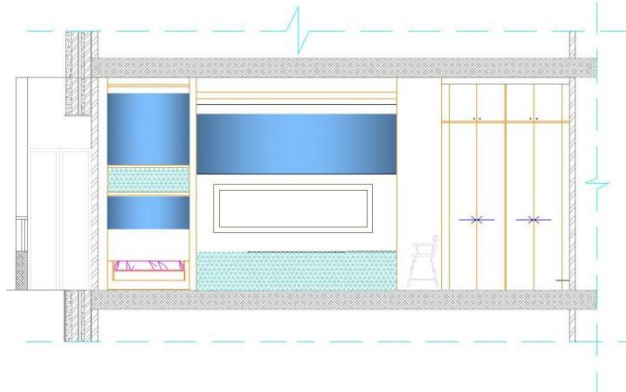
Section A-A

*(Open bed front (PLAN 1) Scale: 1/100 / (Personal work)*



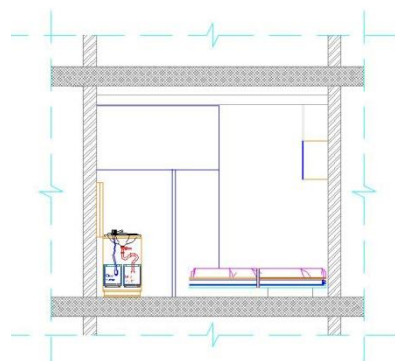
Section B-B

*(Open bed side (PLAN 1)) Scale: 1/100 / , (Personal work)*



Section C-C

*(Open Secondary Bed front (PLAN 1)) Scale: 1/100 . (Personal work)*

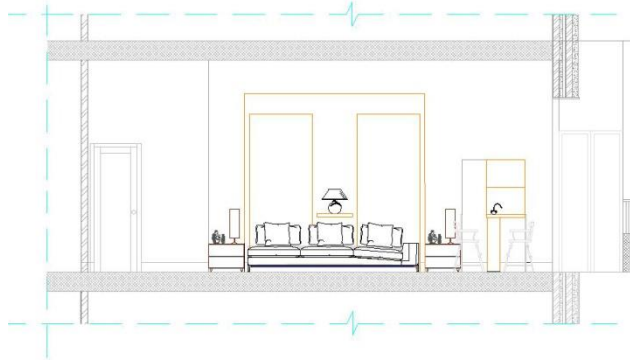


Section D-D

*( Open Secondary Bedside (PLAN 1))*

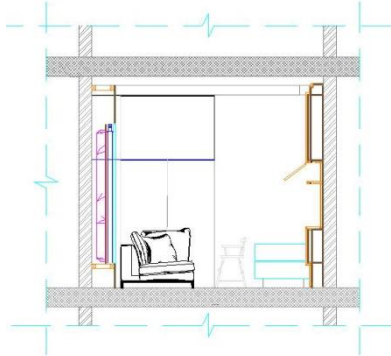


Scale: 1/100(Personal work)



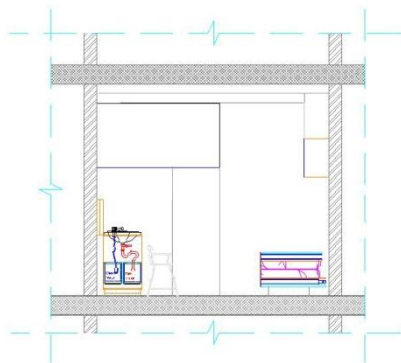
Section E-E

Close bed front (PLAN 2)) Scale: 1/100 / (Personal work)

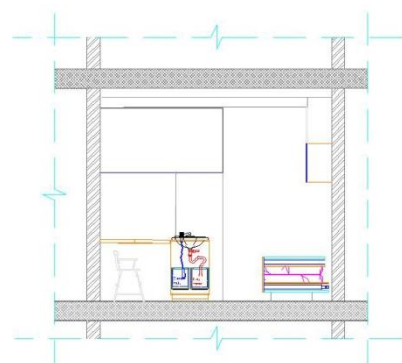


Section H-H

(Close bed side (PLAN 2)) Scale: 1/100 / , (Personal work)



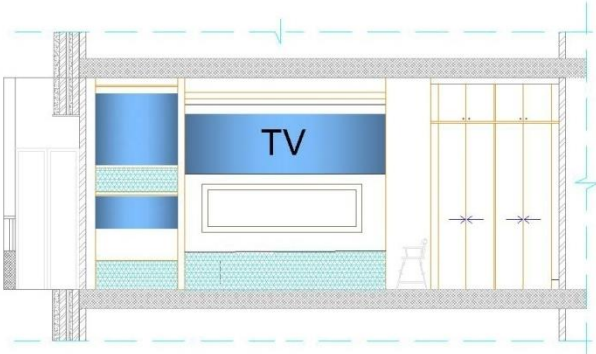
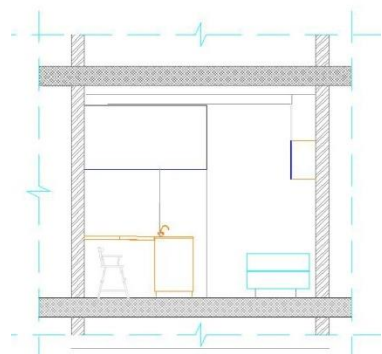
Section I-I



Section I-I (2)

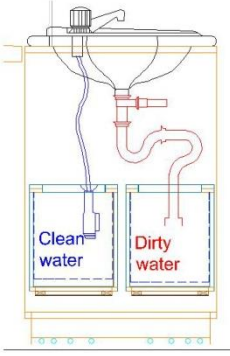
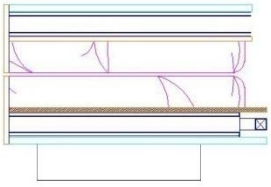
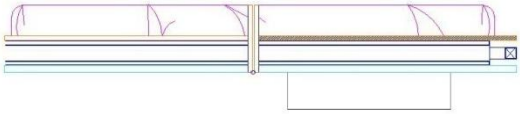
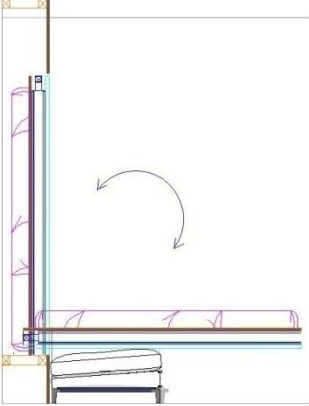
(CLOSE KITCHEN (PLAN 2))Scale: 1/100 / (Personal work)

(OPEN KITCHEN (PLAN 2))Scale:  
1/100 / (Personal work)

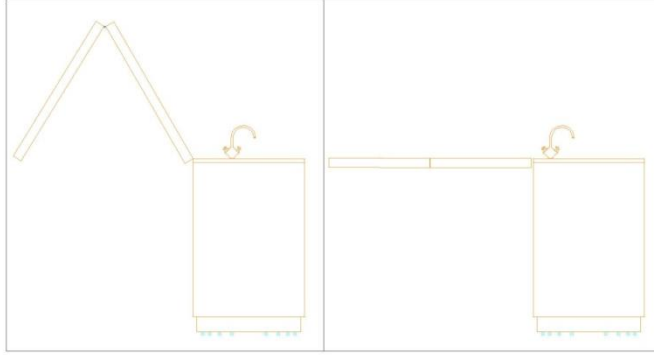
 <p style="text-align: center;"><b>Section F-F</b></p>	 <p style="text-align: center;"><b>Section G-G</b></p>
<p><i>(Close Secondary Bed front (PLAN 2)) Scale: 1/100 , (Personal work)</i></p>	<p><i>(Close Secondary Bed side (PLAN 2)) Scale: 1/100 / (Personal work)</i></p>

**Proposed materials- Technical- Mechanism**

Proposed materials	(Hexagon shaped) Between bed for privacy											
Proposed Technical	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">For Main Flexible Solution</td> <td style="text-align: center;"><b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b></td> </tr> <tr> <td style="text-align: center;">For Main Bed unit</td> <td style="text-align: center;">Type of Flexible Transforming Elements)  Flexible Furniture (Wall) Construction of flexible wall</td> </tr> <tr> <td style="text-align: center;">Mirrors and Secondary Bed</td> <td style="text-align: center;">Flexible Wall \ Flexible Furniture (Wall) Construction of flexible wall  2- Figure 75 Storage dividers</td> </tr> <tr> <td style="text-align: center;">Wall Cabinet</td> <td style="text-align: center;">Flexible sliding wall (plan 6+7)</td> </tr> <tr> <td style="text-align: center;">Kitchen And Dining Table</td> <td style="text-align: center;">Flexible Furniture Design(Foldable Furniture) Foldable furniture design in furniture flexible kitchen designed by Tomoyuki Utsumi Japan, 2005.</td> </tr> </table>		For Main Flexible Solution	<b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b>	For Main Bed unit	Type of Flexible Transforming Elements)  Flexible Furniture (Wall) Construction of flexible wall	Mirrors and Secondary Bed	Flexible Wall \ Flexible Furniture (Wall) Construction of flexible wall  2- Figure 75 Storage dividers	Wall Cabinet	Flexible sliding wall (plan 6+7)	Kitchen And Dining Table	Flexible Furniture Design(Foldable Furniture) Foldable furniture design in furniture flexible kitchen designed by Tomoyuki Utsumi Japan, 2005.
For Main Flexible Solution	<b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b>											
For Main Bed unit	Type of Flexible Transforming Elements)  Flexible Furniture (Wall) Construction of flexible wall											
Mirrors and Secondary Bed	Flexible Wall \ Flexible Furniture (Wall) Construction of flexible wall  2- Figure 75 Storage dividers											
Wall Cabinet	Flexible sliding wall (plan 6+7)											
Kitchen And Dining Table	Flexible Furniture Design(Foldable Furniture) Foldable furniture design in furniture flexible kitchen designed by Tomoyuki Utsumi Japan, 2005.											
Proposed Mechanism	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">For Main Bed unit</td> <td style="text-align: center;">Construction of flexible wall</td> </tr> <tr> <td style="text-align: center;">Secondary Bed</td> <td style="text-align: center;">Construction of flexible wall\ Folding Flexible joint spatent</td> </tr> </table>		For Main Bed unit	Construction of flexible wall	Secondary Bed	Construction of flexible wall\ Folding Flexible joint spatent						
For Main Bed unit	Construction of flexible wall											
Secondary Bed	Construction of flexible wall\ Folding Flexible joint spatent											

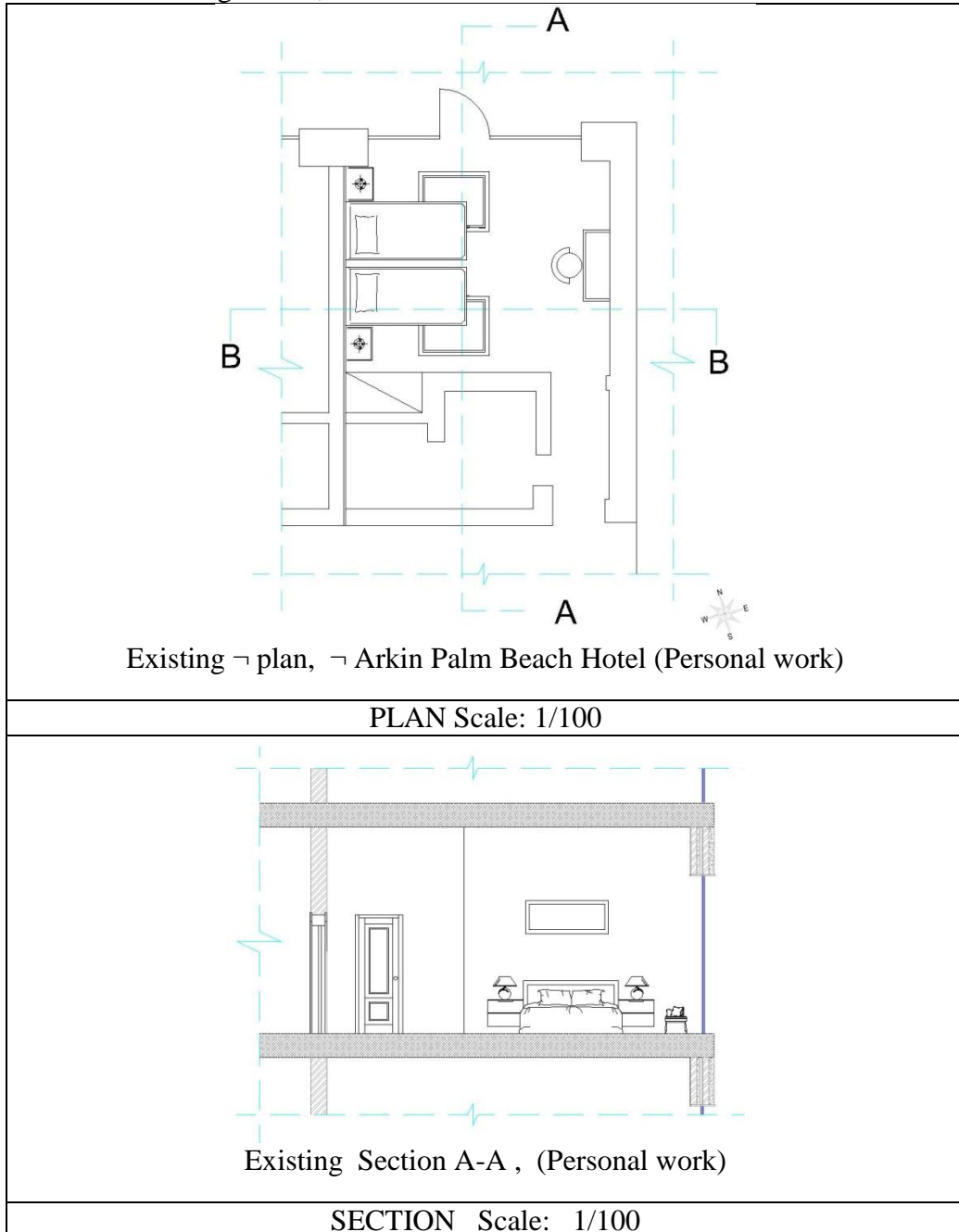
	Wall Cabinet	Technical Information
	Kitchen And Dining Table	Folding Flexible joint spatent. Universal Sink Drain Pipe Flexible Expandable S- Trap Stainless Steel Accessory for Kitchen Lavatory stainless steel wire braided flexible hose for washbasin
<b>Proposed Details plan</b>		
Kitchen Details Illustration		
Secondary Bed Details Illustration	 <p style="text-align: center;"><i>CLOSE</i></p>	 <p style="text-align: center;"><i>OPEN</i></p>
Main bed Details Illustration		

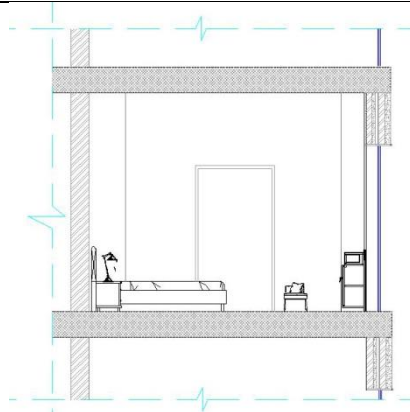
Dining table  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



#### 4.2.2 Case Study 2: Arkin Palm Beach Hotel

Table 31 : Existing  $\rightarrow$  Plan, Arkin Palm Beach Hotel





Existing Section B-B , (Personal work)

SECTION Scale: 1/100

### **Problem of Existing Arkin Palm Beach Hotel Plan**

1. The room is relatively small and just accommodate to two beds.
2. No sitting area.
3. No enough space to increase the number of functions.
4. It is difficult to add an secondary bed, that led to difficult to accommodation more number of user.
5. Room serve the main bed function just.

### **Solutions Proposed**

1. Utilize the floor and wall elements as storage for folding furniture.
2. Using flexible mechanism in order to establish the folding wall and the flexible furniture units.
3. Using Foldable and multifunction furniture to save the room space as possible.
4. Establish flexible units with ability to switch between the form of functions.
5. Increasing the number of beds.
6. Increasing the number of functions.
7. Redesign the room in order to create the space to meet the functions need.
8. Using sold , manufactured and high flexibility materials flexibly to create a furniture and folding wall.
9. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

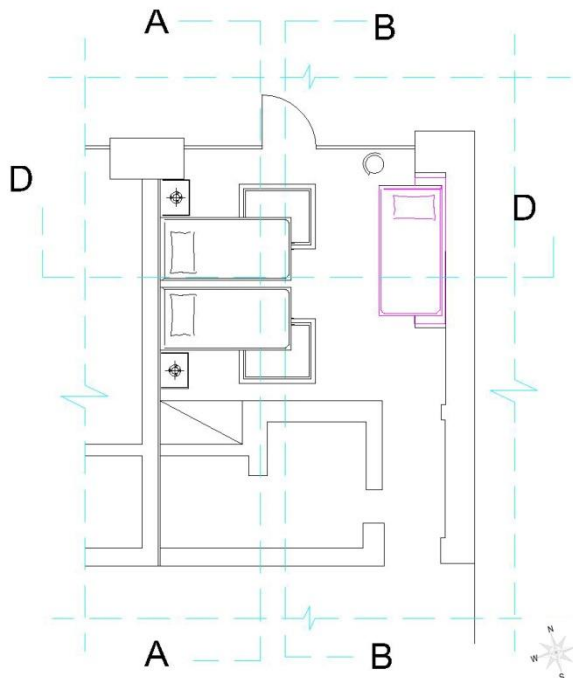
### **The concept of proposed design**

- Achieve flexibility by expanding the utilization of furniture according to use of a volume of space in a horizontal and vertical direction..
- The main concept of flexibility solution is the creates two levels in the ground area through:
  - First level of ground to creating a living room that consisting sofa in the sitting area and a TV unit.
  - Second level creating when close the first level by the flexible wall that use it as a TV unit and it contains from the other side main beds be utilize when open the plank.

Table 32: Flexibility Solution Plans Of Case Study 2

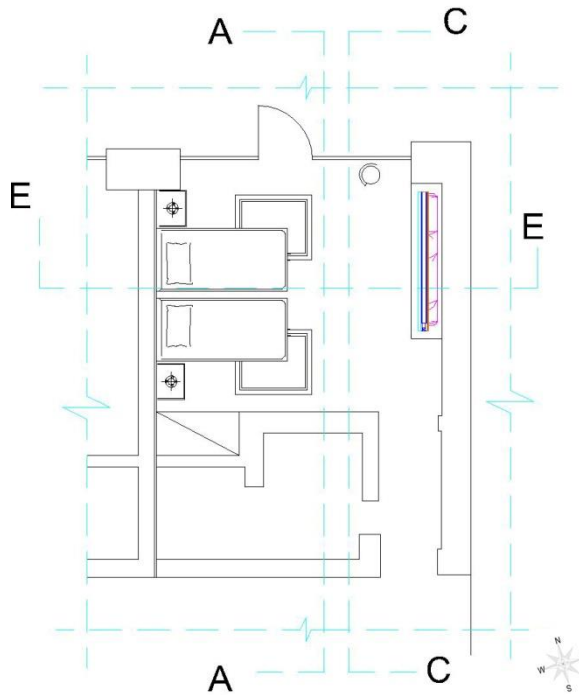
**Proposed increase capacity of bed by flexible solution**

**Proposed Plans , Scale1/100**



Plan (1) , proposed increase bed (Personal work)

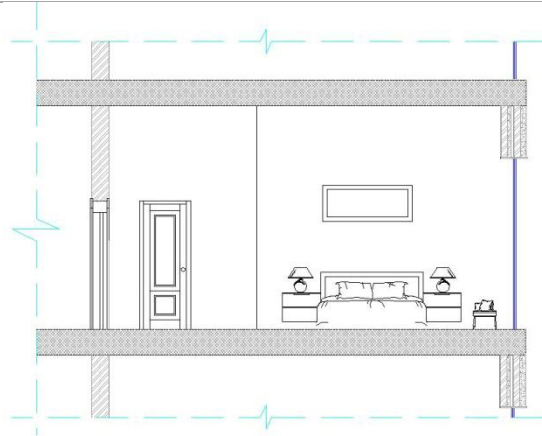
PLAN Scale: 1/100 ,



Plan (2) , , proposed increase bed (Personal work)

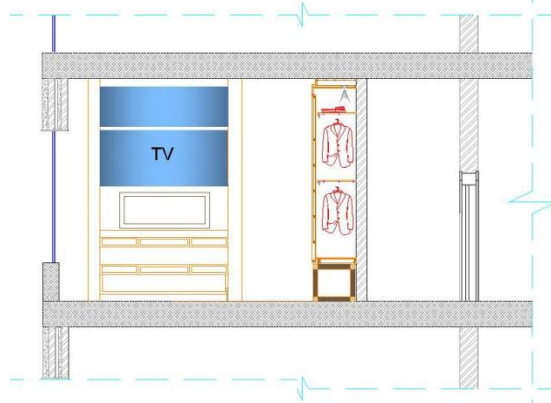
PLAN Scale: 1/100

Section 1/100



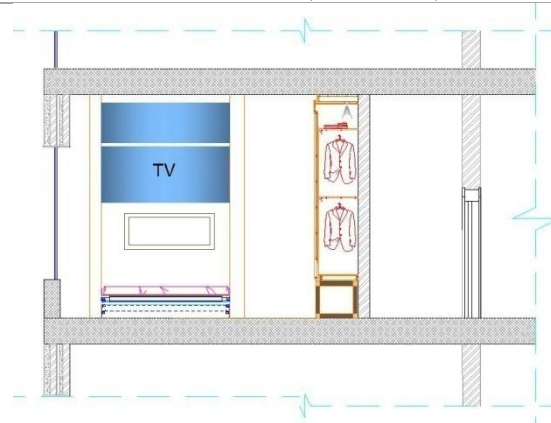
Section A-A

(Proposed plan 1+2) , Scale: 1/100 (Personal work)



Section B-B

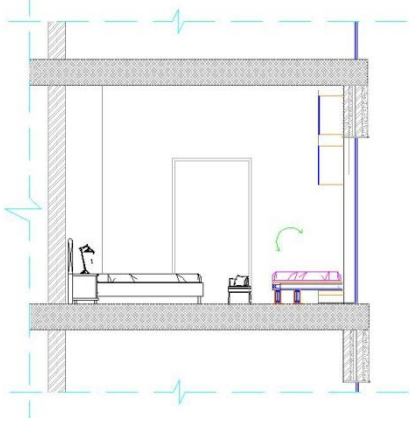
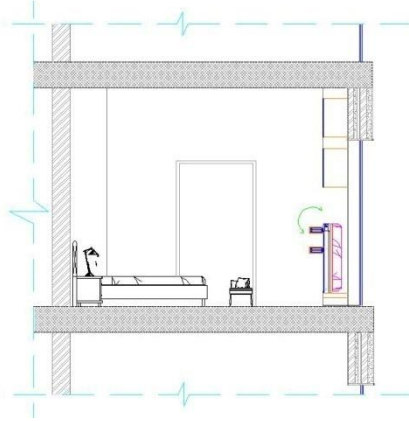
( plan 1) ,  
Scale: 1/100,(Personal work)



Section C-C

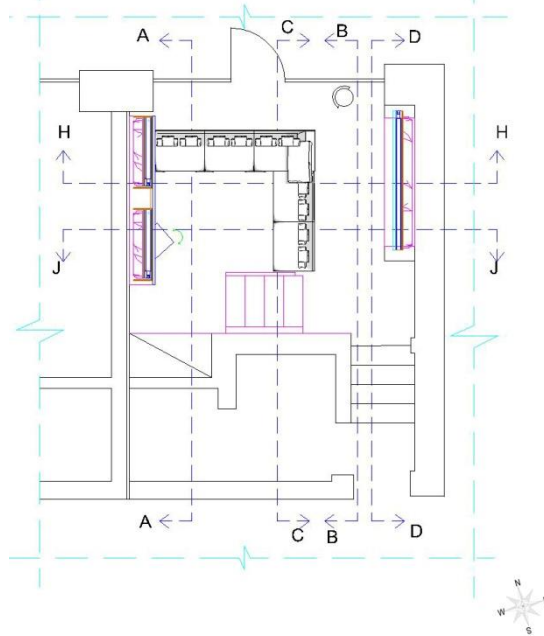
( plan 2) ,  
Scale: 1/100 , (Personal work)



 <p style="text-align: center;">Section D-D</p>	 <p style="text-align: center;">Section E-E</p>				
<p style="text-align: center;">( plan 1 ) , Scale: 1/100(Personal work)</p>	<p style="text-align: center;">( plan2 ) , Scale: 1/100(Personal work)</p>				
<p><b>Proposed materials- Technical- Mechanism</b></p>					
<p>Proposed materials</p>	<p>( Hexagon shaped) Between bed for privacy (<b>Soft system</b>)Vertical panel in chairs design (for sofa zone) ( <b>High flexibility materials</b> ) Figure 102 : This Snowflake Threaded Ultra-Flexible Snowflake Curtain was designed by Mia Cullen ( for bed border</p>				
<p>Proposed technical</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; vertical-align: middle;"> <p>Mirrors and Secondary Bed</p> </td> <td style="width: 50%; padding: 5px;"> <p><b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b></p> <p style="text-align: center;">Storage dividers</p> </td> </tr> <tr> <td style="text-align: center; vertical-align: middle;"> <p>Wall Cabinet</p> </td> <td style="padding: 5px;"> <p>Flexible sliding wall ( plan 6+7)</p> </td> </tr> </table>	<p>Mirrors and Secondary Bed</p>	<p><b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b></p> <p style="text-align: center;">Storage dividers</p>	<p>Wall Cabinet</p>	<p>Flexible sliding wall ( plan 6+7)</p>
<p>Mirrors and Secondary Bed</p>	<p><b>Elements of flexibility \Flexible Wall \ Multi-folding flexibility \ Construction of flexible wall+ Furniture Mechanism Flexible Wall details illustration open and close</b></p> <p style="text-align: center;">Storage dividers</p>				
<p>Wall Cabinet</p>	<p>Flexible sliding wall ( plan 6+7)</p>				
<p>Proposed Mechanism</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; vertical-align: middle;"> <p>Mirrors and Secondary Bed</p> </td> <td style="width: 50%; padding: 5px;"> <p>Construction of flexible wall Folding Flexible joint spatent</p> </td> </tr> <tr> <td style="text-align: center; vertical-align: middle;"> <p>Wall Cabinet</p> </td> <td style="padding: 5px;"> <p>Technical Information</p> </td> </tr> </table>	<p>Mirrors and Secondary Bed</p>	<p>Construction of flexible wall Folding Flexible joint spatent</p>	<p>Wall Cabinet</p>	<p>Technical Information</p>
<p>Mirrors and Secondary Bed</p>	<p>Construction of flexible wall Folding Flexible joint spatent</p>				
<p>Wall Cabinet</p>	<p>Technical Information</p>				

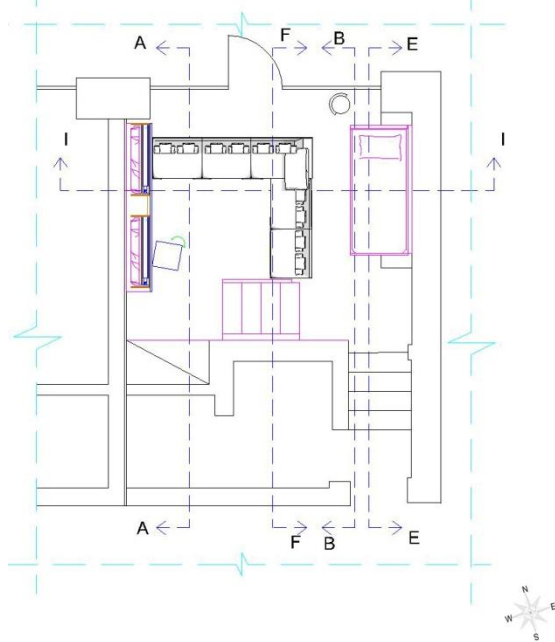
**Proposed increase function by flexible solution**

**Proposed Plans , Scale1/100**



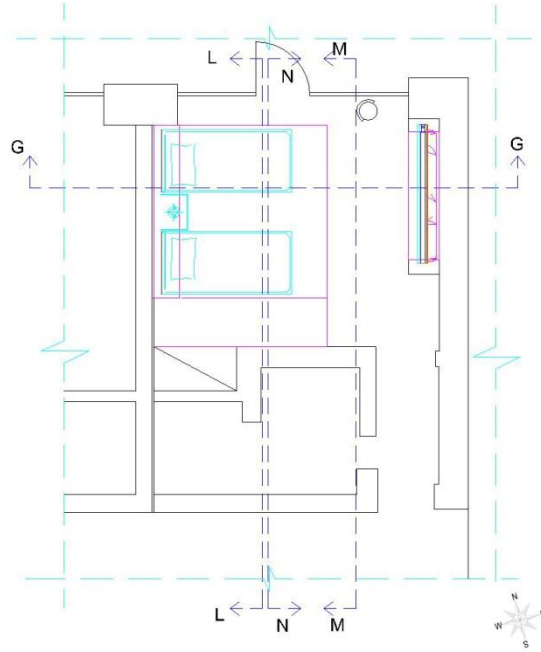
Plan (1), proposed increase beds and function (Personal work) ,

**PLAN Scale: 1/100**



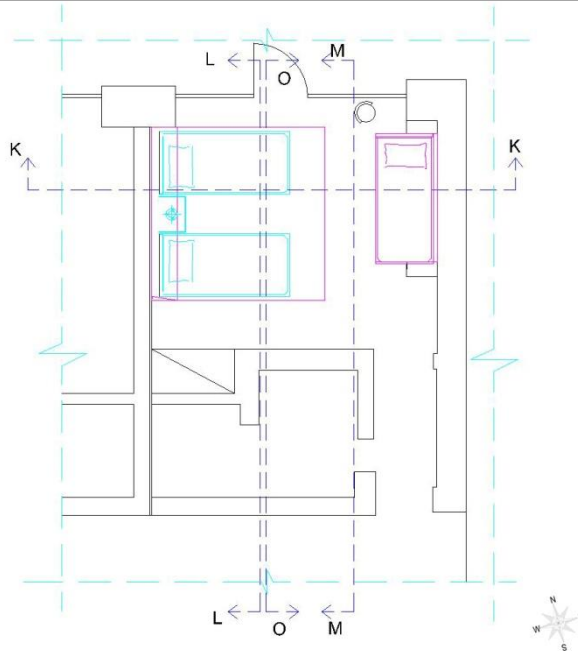
Plan (2) , proposed increase beds and function (Personal work)

**PLAN Scale: 1/100**



Plan (3) ,, proposed increase beds and function (Personal work)

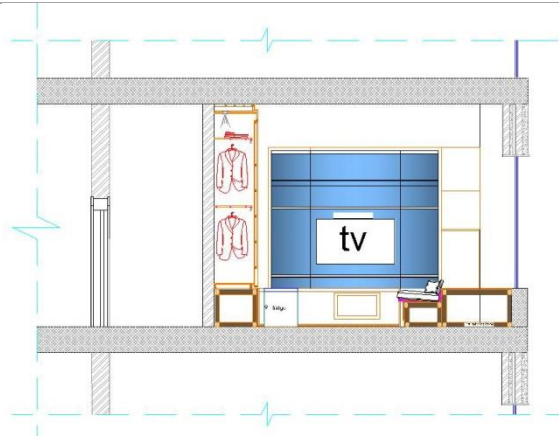
PLAN Scale: 1/100



Plan (4) ,, proposed increase beds and function (Personal work)

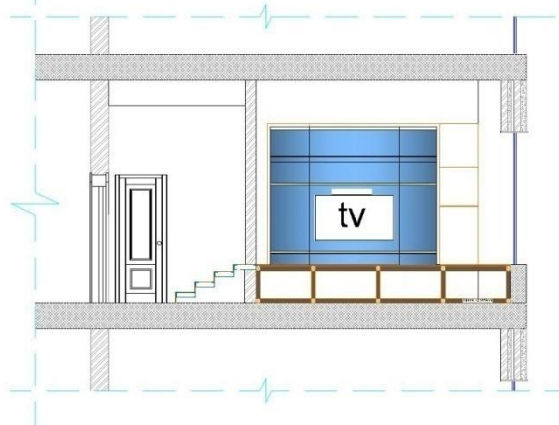
PLAN Scale: 1/100

Section 1/100



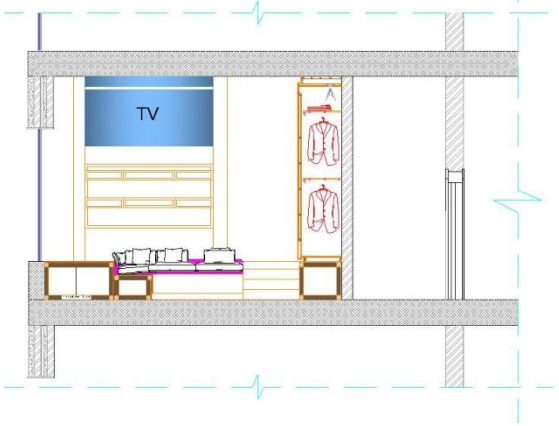
Section A-A

(Bed Open Unit TV Front( plan 1+2)) Scale: 1/100 / , (Personal work)



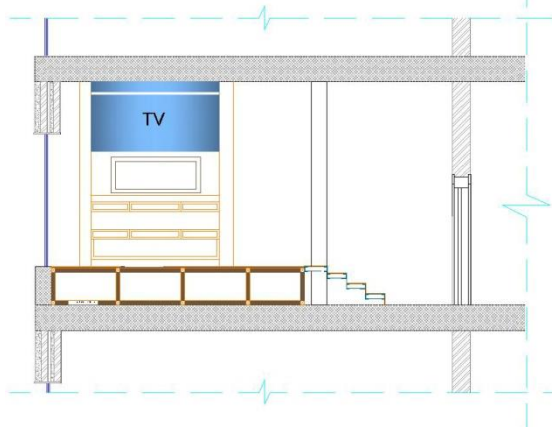
Section B-B

(Bed Open Unit TV Side ( plan 1)) Scale: 1/100 / , (Personal work)



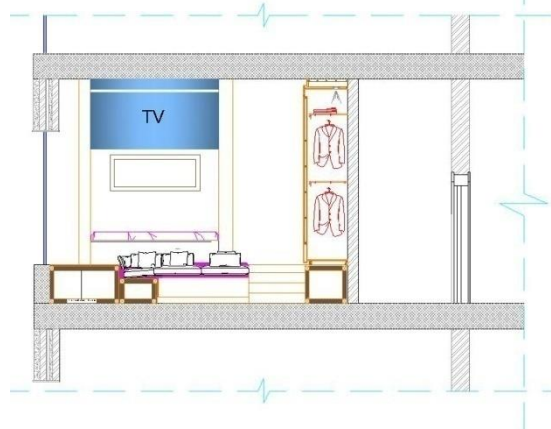
Section C-C

(Living sofa + Close Secondary Bed ( plan 1)) Scale: 1/100 / (Personal work)



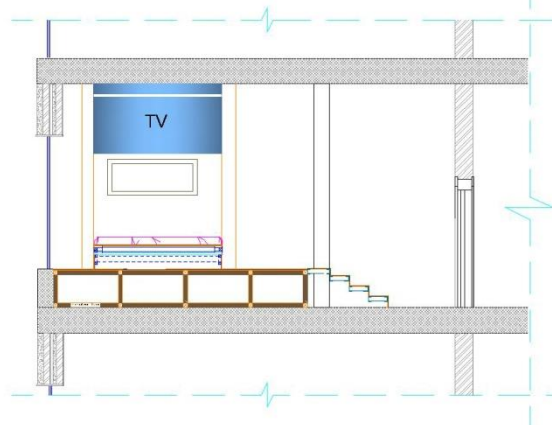
Section D-D

*(Stairs + Close Secondary Bed (plan 1))* Scale: 1/100 / (Personal work)



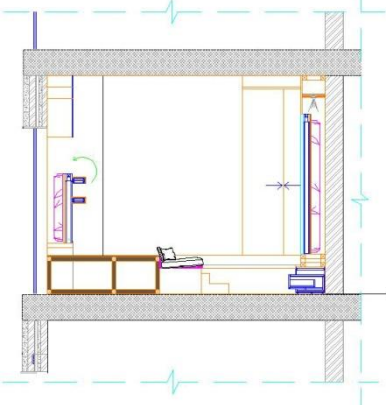
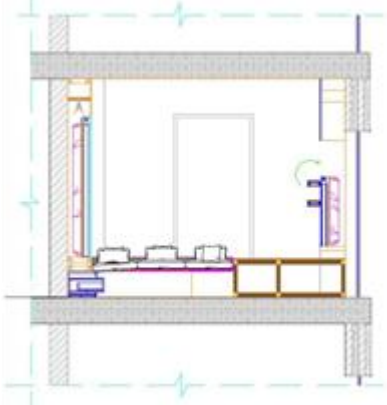
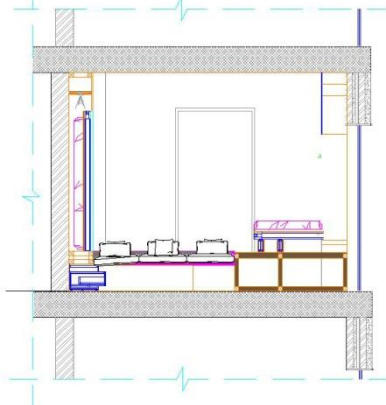
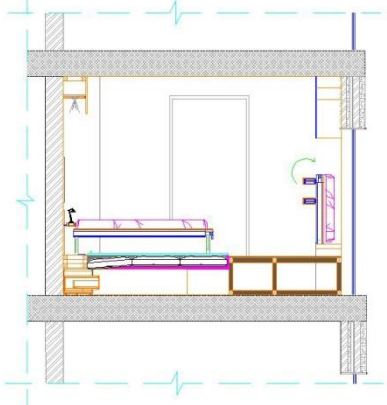
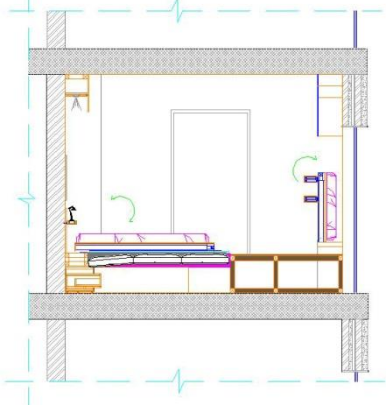
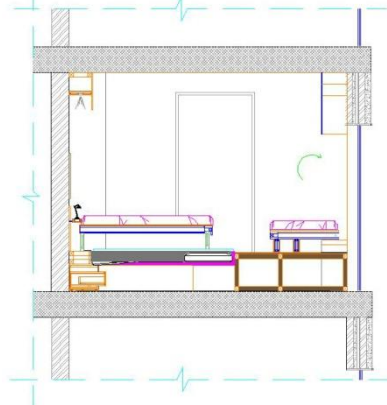
Section E-E

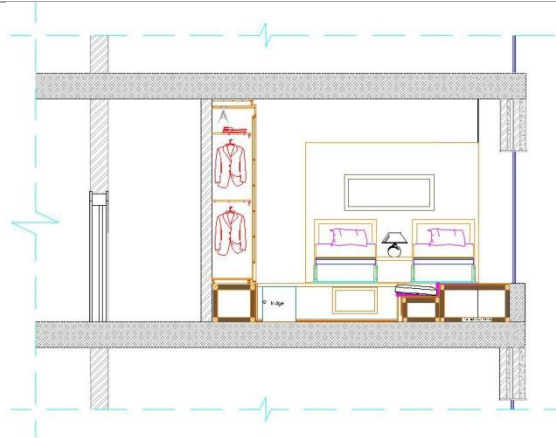
*(Living sofa + Open Secondary Bed (plan 2))* Scale: 1/100 / (Personal work)



Section F-F

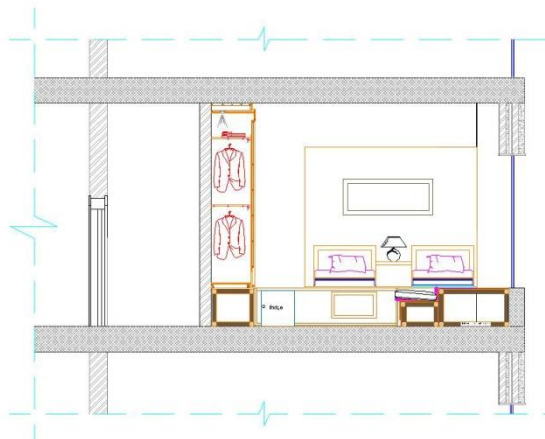
*(Stairs + Open Secondary Bed (plan 2))*, Scale: 1/100 (Personal work)

 <p style="text-align: center;"><b>Section J-J</b></p>	 <p style="text-align: center;"><b>Section</b></p>
<p style="text-align: center;"><b>(OPEN BED(plan 1))</b> Scale: 1/100 / ,(Personal work)</p>	<p style="text-align: center;"><b>(CLOSE BED(plan 1))</b> Scale: 1/100 / ,(Personal work)</p>
 <p style="text-align: center;"><b>Section I-I</b></p>	 <p style="text-align: center;"><b>Section G-G</b></p>
<p style="text-align: center;">(plan 2) Scale: 1/100 / ,(Personal work)</p>	<p style="text-align: center;"><b>(UP BED(plan 3))</b> Scale: 1/100 / ,(Personal work)</p>
 <p style="text-align: center;"><b>Section G-G (2)</b></p>	 <p style="text-align: center;"><b>Section</b></p>
<p style="text-align: center;"><b>(DOWN BED(plan 3))</b> Scale: 1/100 / (Personal work)</p>	<p style="text-align: center;"><b>(UP BEDAND OPEN Bed(plan 4))</b> Scale: 1/100 / ,(Personal work)</p>



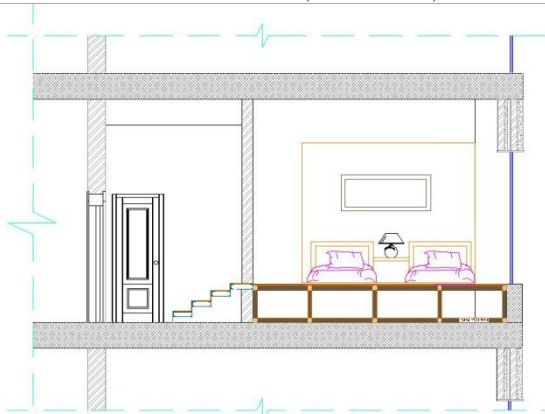
Section L-L

(UP BED (plan 3+4))  
Scale: 1/100 / (Personal work)



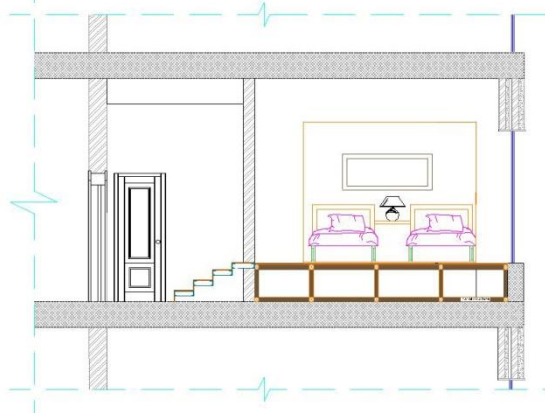
Section L-L

(DOWN BED(plan 3+4))  
Scale: 1/100 / ,(Personal work)



Section M-M

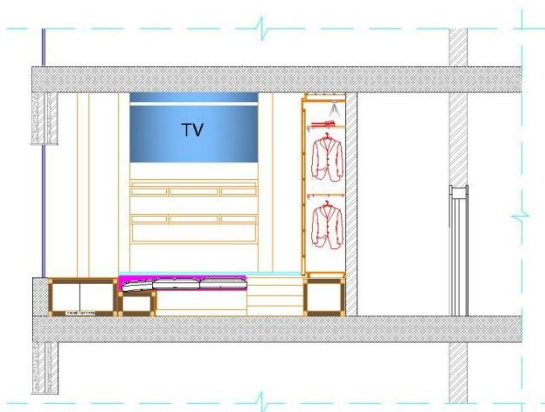
(DOWN BED )  
Scale: 1/100 / ,(Personal work)



Section M-M (2)

(UP BED(plan 3+4))

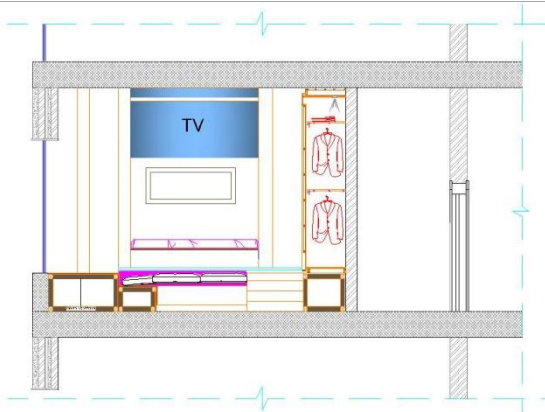
Scale: 1/100 / ,(Personal work)



Section N-N

(Close Secondary Bed (plan 3))

Scale: 1/100 / ,(Personal work)



Section O-O

(Open Secondary Bed (plan 4))

Scale: 1/100 / ,(Personal work)

**Proposed materials- Technical- Mechanism**

Proposed materials

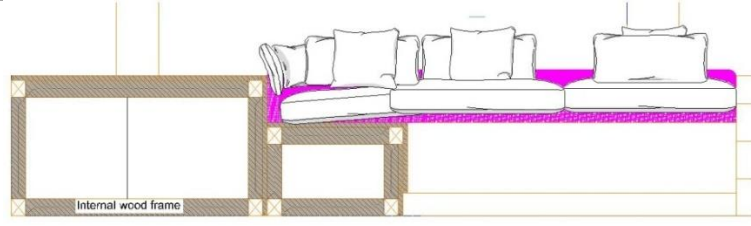
(Soft system) Vertical panel in chairs design (for sofa zone)  
( High flexibility materials ) Figure 102 : This Snowflake

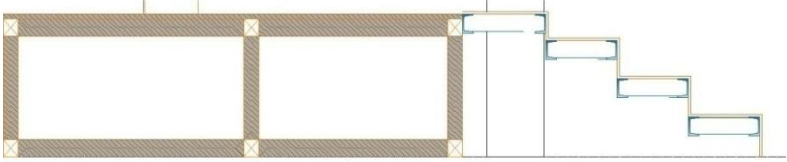
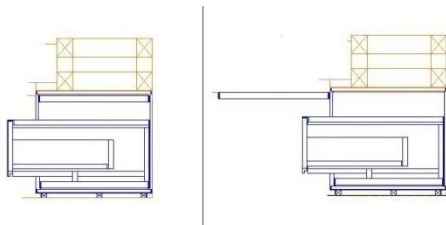
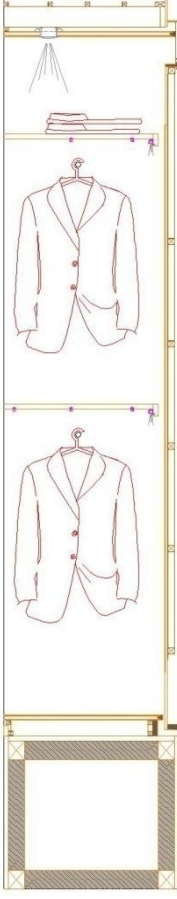
Threaded Ultra-Flexible Snowflake Curtain was designed by



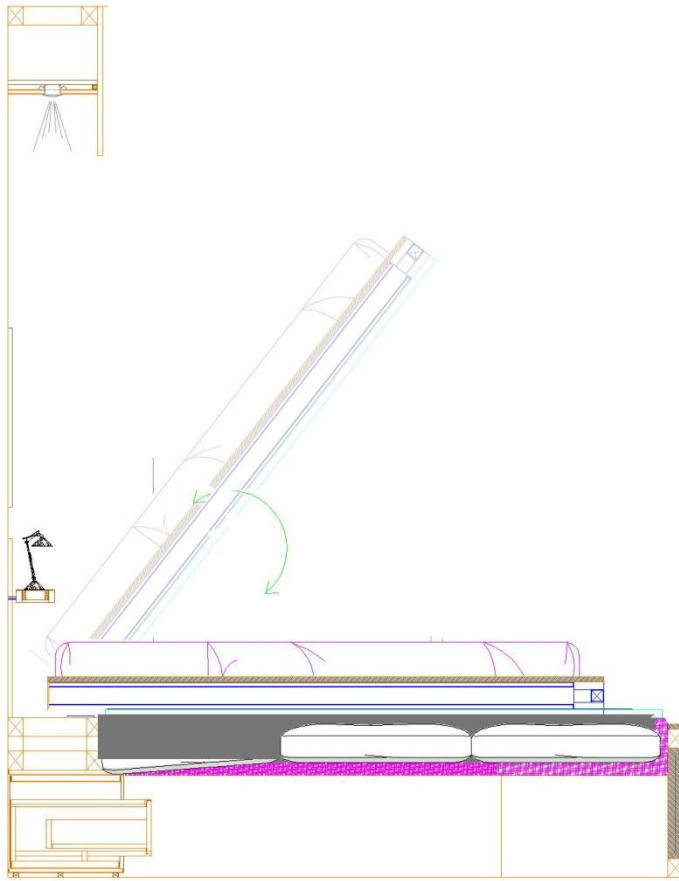
	Mia Cullen ( for bed border )	
Proposed Technical	For Main Flexible Solutions	<b>Elements of flexibility \ Flexible Floor</b> <i>YO – Home, by Simon Woodroffe, UK, 2012,</i> AND FOR SOFA ZON IDEA FROM <b>(Flexible Ceilings \)</b>
	For Main Bed unit	(Type of Flexible \ Transforming Elements)Furniture Mechanism Flexible Wall details illustration open and close Flexible Floor
	Main living room	Flexible Floor Flexible Ceilings \ hidden under Ceiling \ Type of Flexible small living\ - Multi-folding flexibility
	Mirrors and Secondary Bed	<i>Tiny house by Renzo P, 2013 \ Figure41+42+43+44.</i> .Construction of flexible wall Folding Flexible joint spatent
	Wall Cabinet	Technical Information
	Kitchen And Dining Table	<b>Flexible Furniture Design \ Type \</b> Movable Furniture <i>flexible kitchen designed by Tomoyuki Utsumi Japan, 2005.Modern design and also does not need a huge space</i>
Proposed Mechanism	For Main Bed unit	<b>Electric Hydraulic Jack Wireless Remote Control</b> Construction of flexible wall
	Mirrors and Secondary Bed	Construction of flexible wall Folding Flexible joint spatent
	Wall Cabinet	Technical Information
	Kitchen	<b>Xi</b> – Folding Flexible joint spatent. <b>Xii</b> - Universal Sink Drain Pipe Flexible Expandable S- Trap Stainless Steel Accessory for Kitchen Lavatory <b>Xiv</b> - stainless steel wire braided flexible hose for washbasin
<b>Proposed Details plan</b>		

Sofa  
underground  
Details  
Illustration

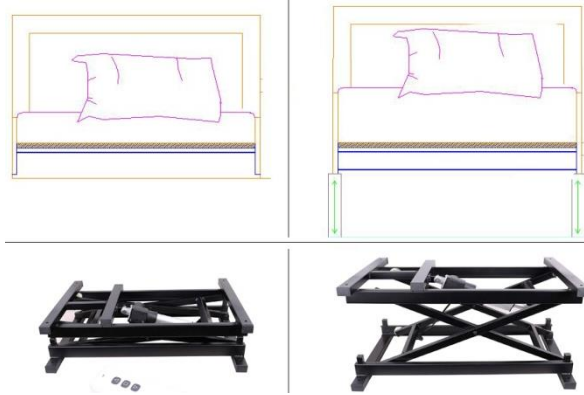


<p>Stairs Details Illustration Scale :1-25 (Personal work)</p>	
<p>Kitchen Table Details Illustration Scale :1-25 (Personal work)</p>	
<p>Wall Cabinet Details Illustration Scale :1-25 (Personal work)</p>	

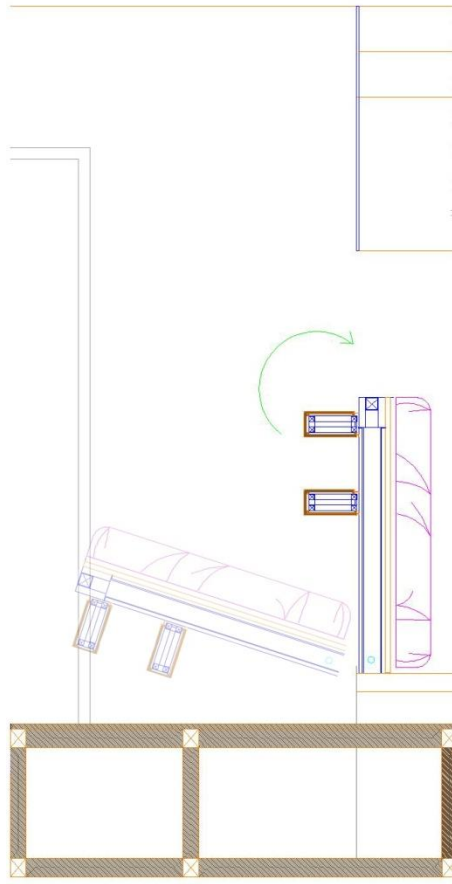
Main bed  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



Main bed  
Details  
Illustration  
Scale :1-25  
(Personal  
work)

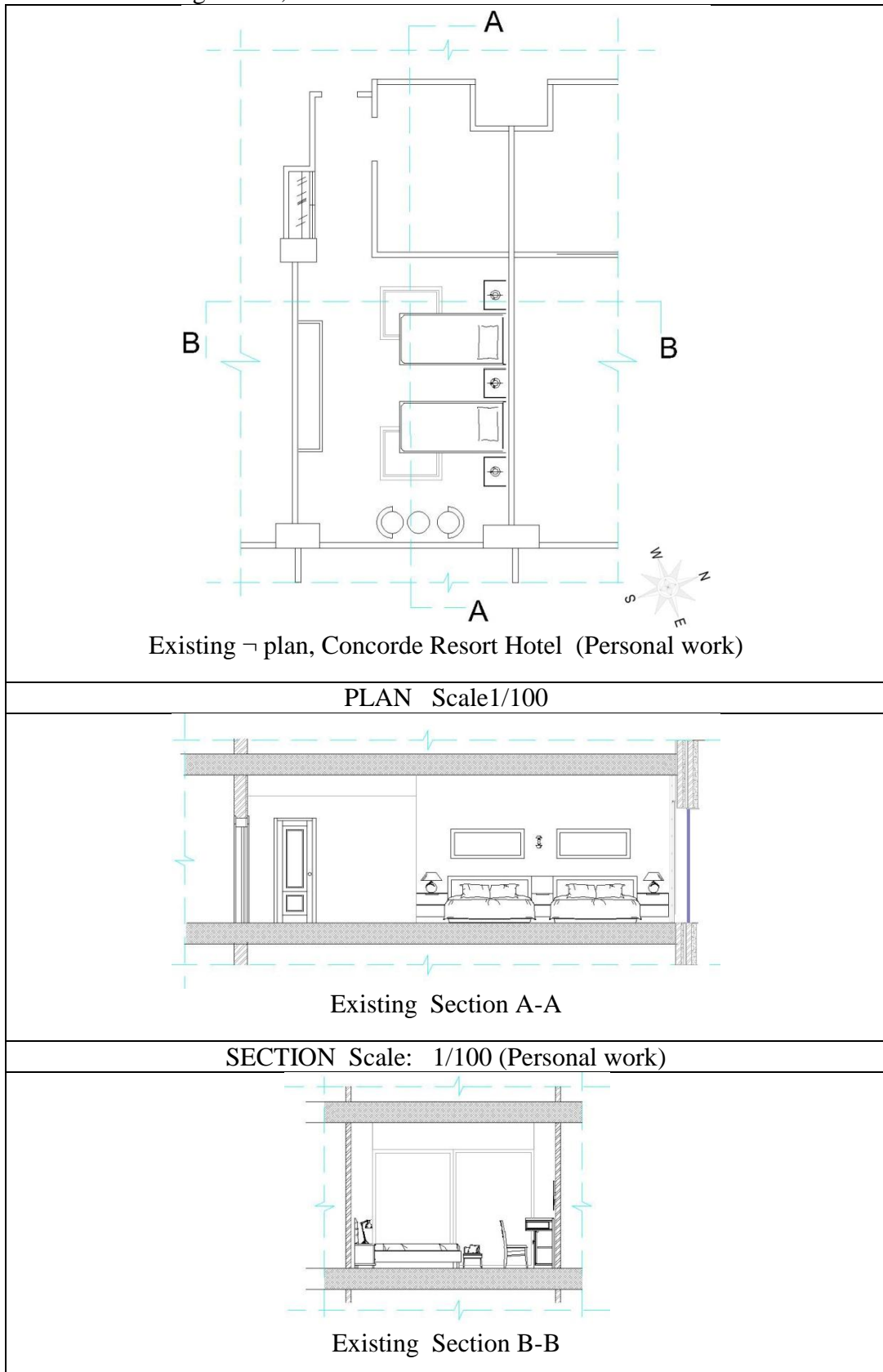


Secondary  
Bed Details  
Illustration



### 4.2.3 Case Study 3: Concorde Resort Hotel

Table 33 : Existing - Plan, Concorde Resort Hotel



**Problem of Existing Salamis Bay Conti Hotel Plan**

1. The room is large but using the space in a non functional manner .
2. No secondary beds or sofa.
3. No sitting area just two chairs and a coffee table.
4. The room has one function that is main beds.

**Solutions Proposed**

1. Establish movable multifunction flexible units with ability to switch from the functions.
2. Adopting a foldable and multifunction furniture to save the room space .
3. Adopt flexible mechanism in order to establish the folding wall and the flexible furniture units.
4. Use the floor elements as rail lane for movable multifunction flexible.
5. Utilize the wall elements as storage for folding furniture.
6. Increasing the number of beds.
7. Increasing the number of functions.
8. Redesign the room in order to create the space to meet the functions need
9. Using solid , high flexibility materials and Manufactured flexibly to create a furniture and folding wall.
10. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

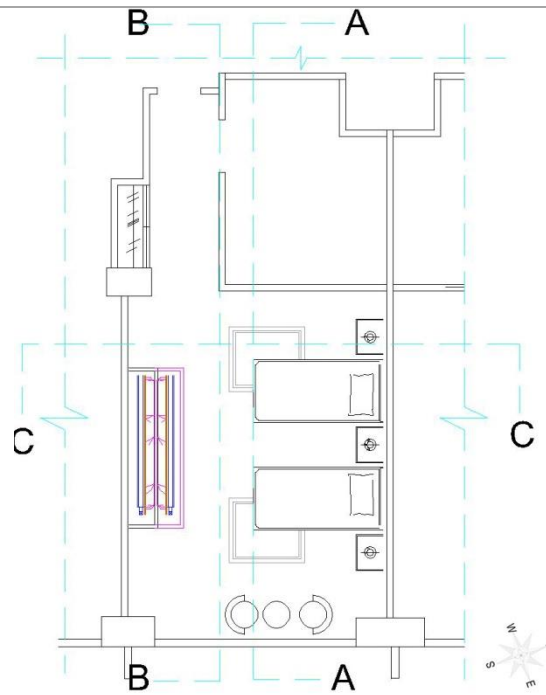
**The concept of proposed design**

3. Establish a movable wall unit that works as storage for the furniture items.
4. The principle of work is by storing furniture inside the walls through using flexible foldable mechanisms.
5. Also, the option of move this unit led to easy convert the room function to a kitchen and dining room , living room or a bedroom.
6. Increasing the number of beds and functions through use the wall element as a stored the flexible units with an option of opened and closed,

Table 34: Flexibility Solution Plans Of Case Study 3

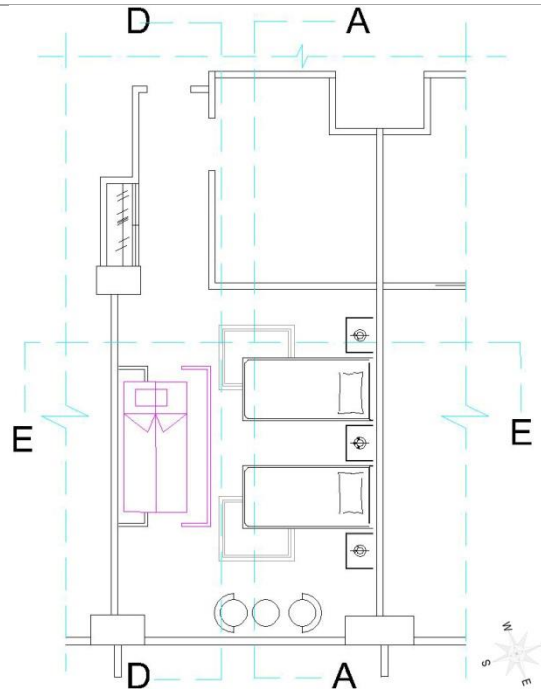
**Proposed increase capacity of bed by flexible solution**

**Proposed Plans , Scale 1/100**



Plan (1) , Concorde Resort Hotel , proposed increase bed (Personal work)

PLAN Scale: 1/100

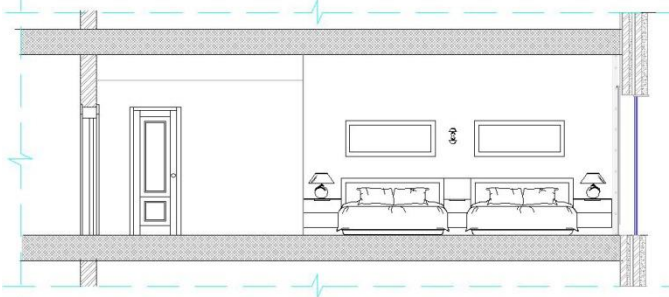
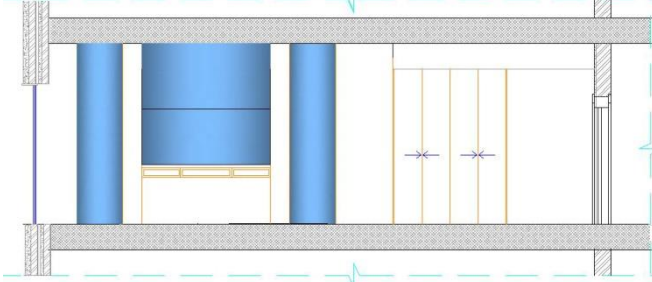
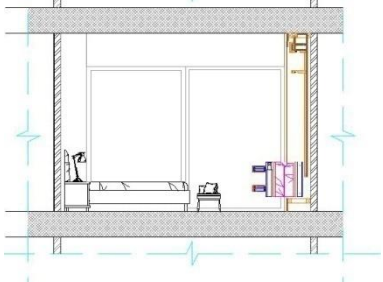
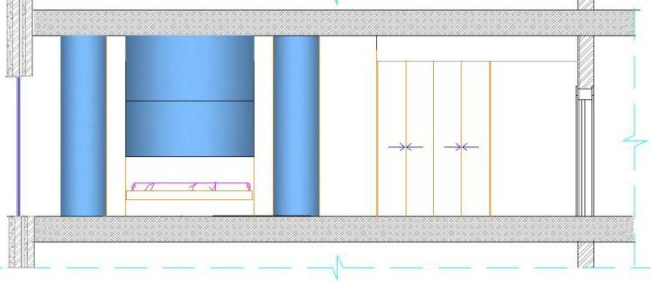
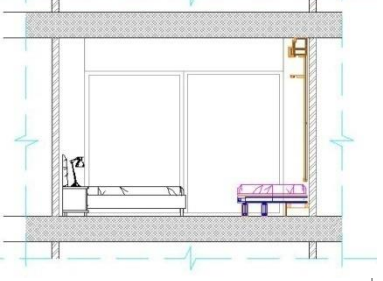


Plan (2) , Concorde Resort Hotel , proposed increase bed (Personal work)

PLAN Scale: 1/100 ,

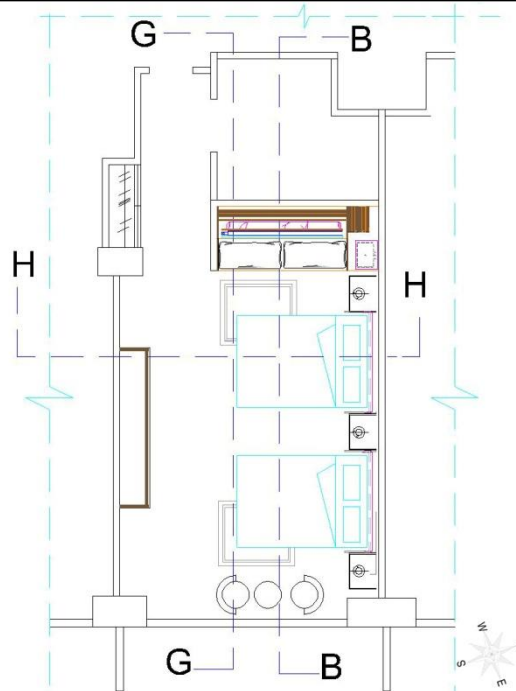
Section 1/100



 <p style="text-align: center;"><b>Section A-A</b></p>	
<p>(Proposed plan 1+2) , Scale: 1/100(Personal work)</p>	
 <p style="text-align: center;"><b>Section B-B</b></p>	 <p style="text-align: center;"><b>Section</b></p>
<p>(CLOSE BED ( plan 1)), Scale: 1/100 (Personal work)</p>	<p>(CLOSE BED ( plan 1) ) , Scale: 1/100 (Personal work)</p>
 <p style="text-align: center;"><b>Section D-D</b></p>	 <p style="text-align: center;"><b>Section</b></p>
<p>(OPEN BED ( plan 2) ) , Scale: 1/100 (Personal work)</p>	<p>(OPEN BED( plan 2)) , Scale: 1/100 (Personal work)</p>
<b>Proposed materials- Technical- Mechanism</b>	
Proposed materials	Manufactured flexibly\ Benjamin Hubert's Amass Modular Curtain System
Proposed technical	<p>Mirrors and Secondary Bed</p> <p><b>Flexible Wall \ wall panels types \</b> No. plan 1+ Plan 9 <b>Type of Flexible small living\</b>  Transforming Elements + Multi- folding flexibility(Tiny house by Renzo view flexible bed)</p>

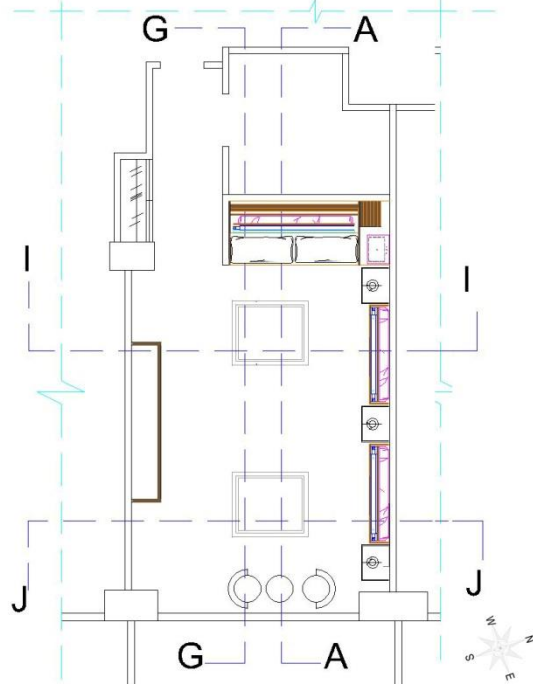
		Wall Cabinet	Technical Information
Proposed Mechanism		Secondary Bed	Flexible Wall \ Mechanism of Flexible Wall \ Mechanism of Flexible Furniture (Wall)Flexible small living Sliding wall Furniture Mechanism Flexible Wall details illustration \ Construction of flexible wall
		Wall Cabinet	Technical Information

**Proposed increase function by flexible solution**



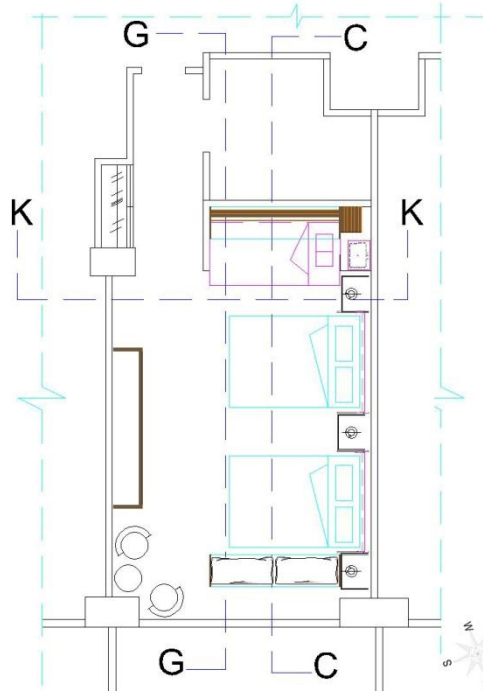
Plan (1) , Concorde Resort Hotel , proposed increase beds and function  
(Personal work)

PLAN Scale: 1/100



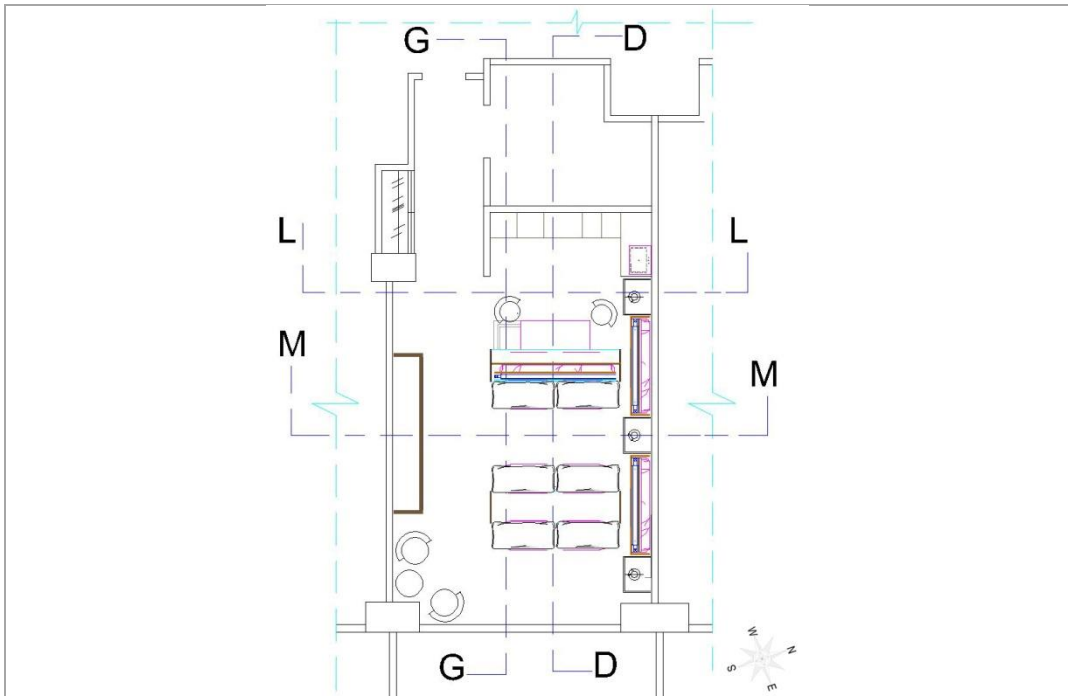
(2) , Concorde Resort Hotel , proposed increase beds and function (Personal work)

PLAN Scale: 1/100



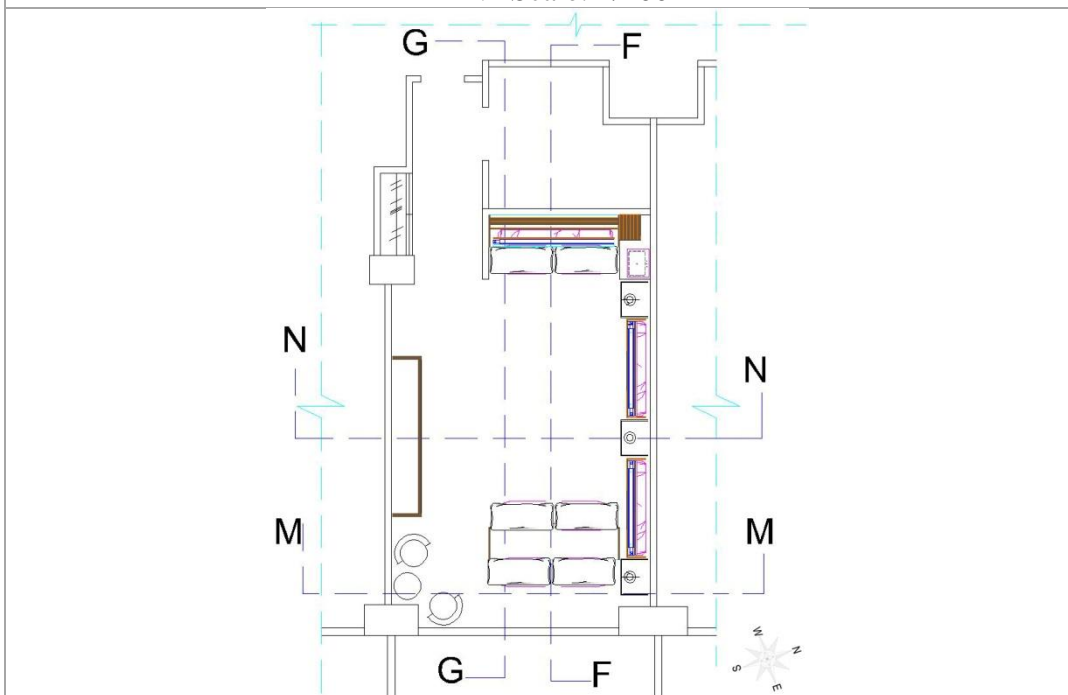
Plan (3) , Concorde Resort Hotel , proposed increase beds and function (Personal work)

PLAN Scale: 1/100



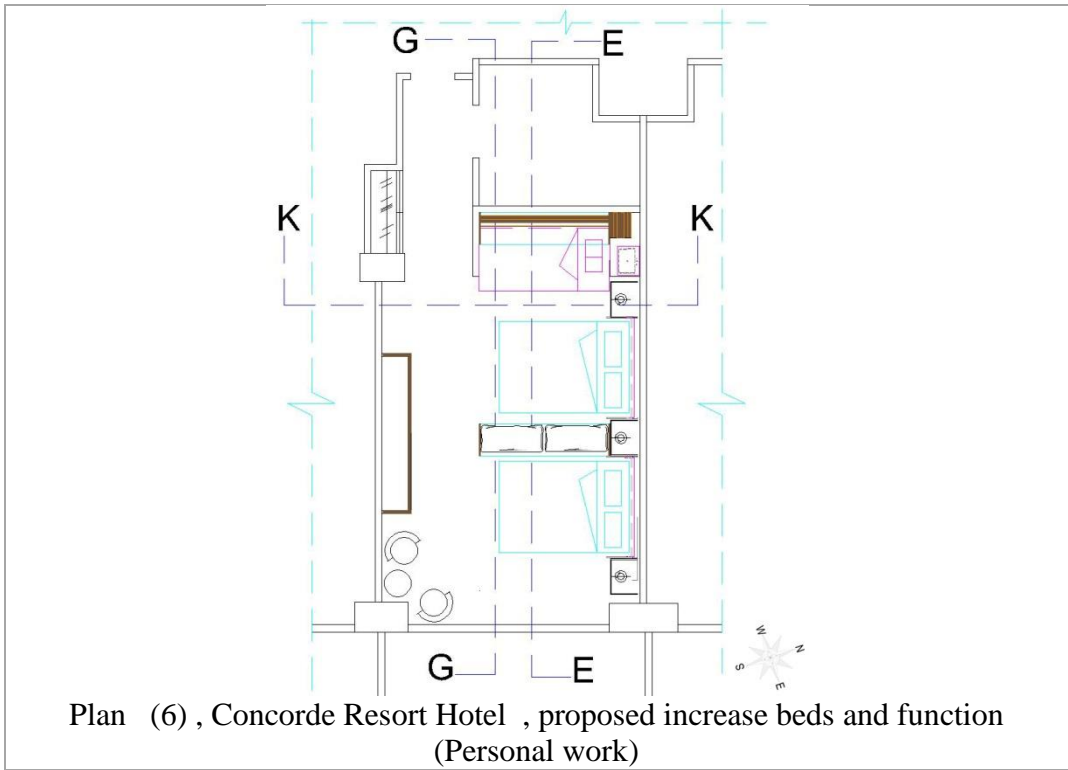
Plan (4) , Concorde Resort Hotel , proposed increase beds and function  
(Personal work)

PLAN Scale: 1/100



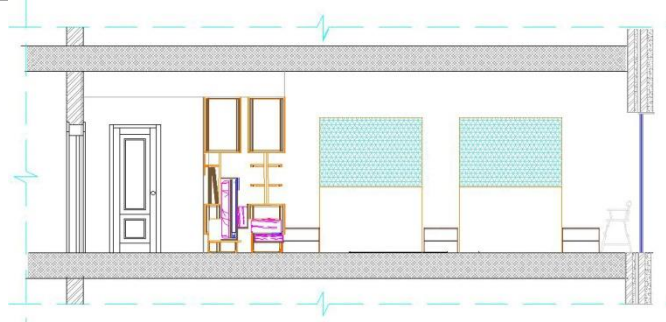
Plan (5) , Concorde Resort Hotel , proposed increase beds and function  
(Personal work)

PLAN Scale: 1/100



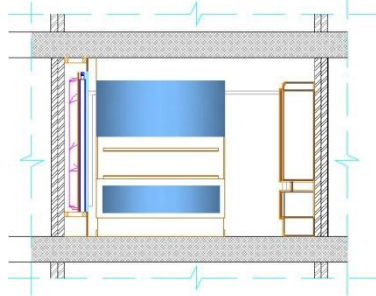
PLAN Scale: 1/100

Section 1/100



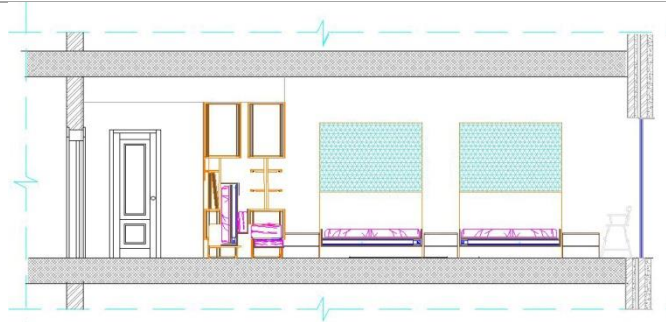
Section A-A

(Close Bed + Close Store Cabinet ( PLAN 2)) , Scale: 1/100 / ,(Personal work)



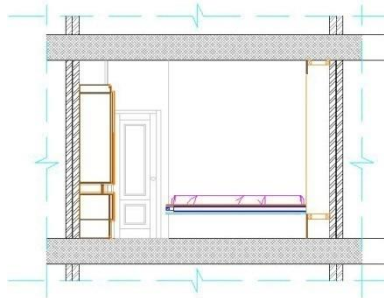
Section I-I

(Close Bed ( PLAN 2)) , Scale: 1/100(Personal work)



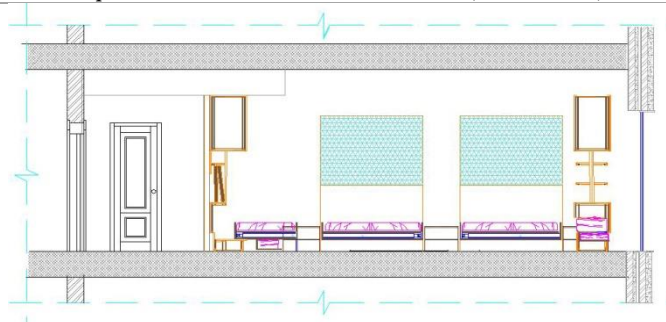
Section B-B

( *Open Bed + Close Store Cabinet ( PLAN 1)* ), Scale: 1/100 / ,(Personal work)



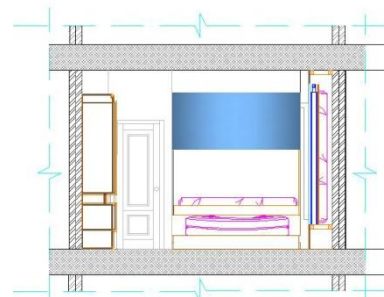
Section H-H

( *Open Bed ( PLAN 1)* ), Scale: 1/100(Personal work)



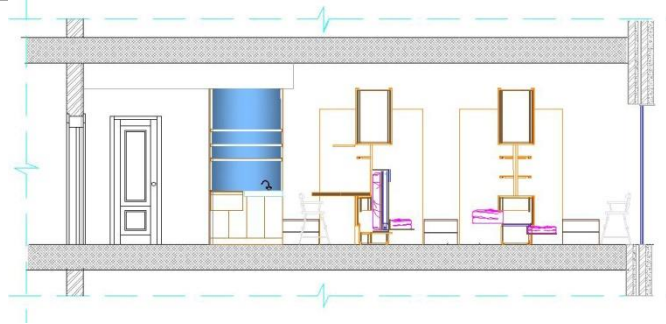
Section C-C

( *Open Bed + Open Store Cabinet (bed) ( PLAN 3)* ), Scale: 1/100 / ,  
(Personal work)



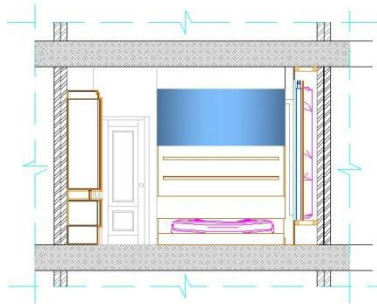
Section K-K

( *Open Store Cabinet (bed)front ( PLAN 3)* ), Scale: 1/100 / , (Personal work)



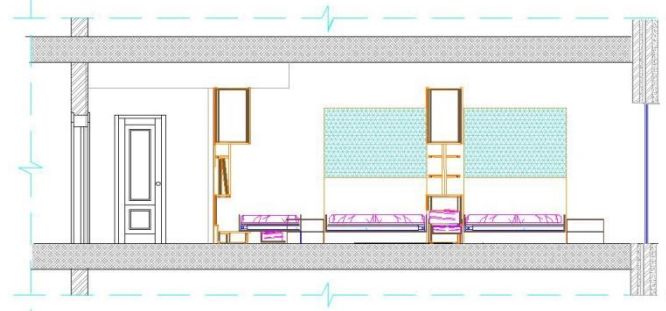
Section D-D

*(Close Bed + Open Store CabinetAll (PLAN 4))*, Scale: 1/100 / , (Personal work)



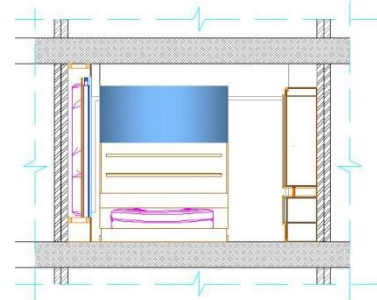
Section M-M

*(Open Store Cabinet (sofa)front (PLAN 4))* Scale: 1/100 / , (Personal work)



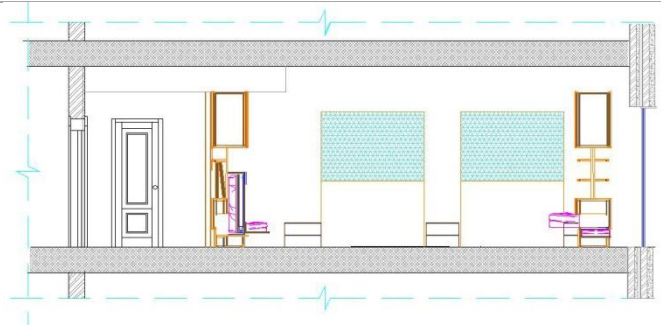
Section E-E

*(Open Bed + Open Store Cabinet (bed) (PLAN 6))*, Scale: 1/100 / , (Personal work)



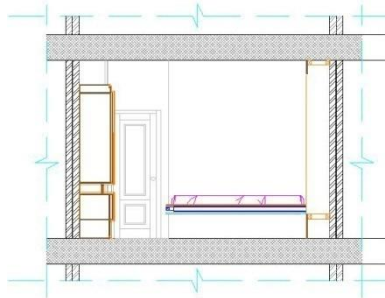
Section N-N

*(Open Store Cabinet (sofa)front (PLAN 6))* Scale: 1/100 / , (Personal work)



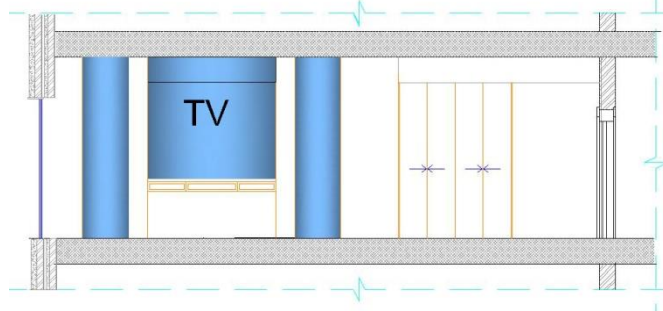
Section F-F

(Close Bed + Open Store Cabinet (PLAN 5)) , Scale: 1/100(Personal work)



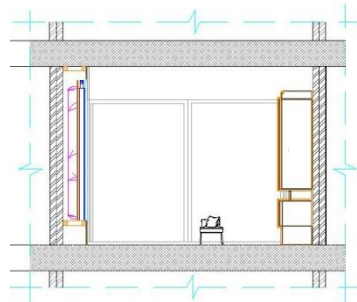
Section H-H

(Open Store Cabinet (sofa) (PLAN 5)) , Scale: 1/100 / , (Personal work)



Section G-G

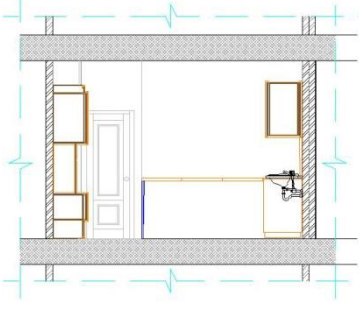
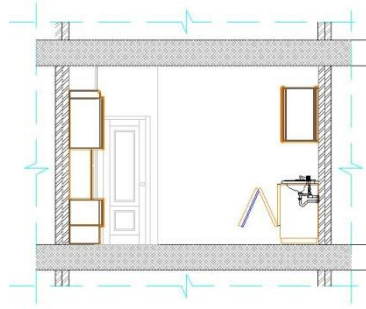
(Wall Cabinet + Unit TV (All PLAN)) ,  
Scale: 1/100 / , (Personal work)



Section J-J

(Close all (PLAN 2)) ,  
Scale: 1/100 / , (Personal work)

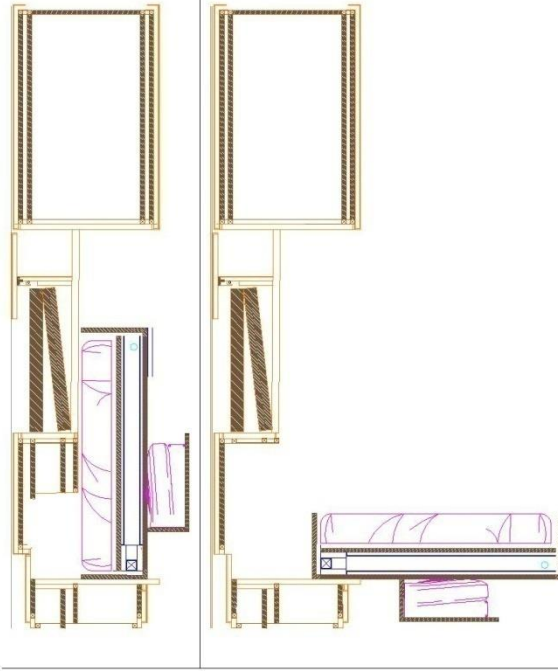


			
Section L-L		Section L-L (2)	
<i>(OPEN Dining Table (PLAN 4)) , Scale: 1/100 / ,(Personal work)</i>		<i>(CLOSE Dining Table (PLAN 4)) , Scale: 1/100 / ,(Personal work)</i>	
<b>Proposed materials- Technical- Mechanism</b>			
Proposed materials	Manufactured flexibly\ Benjamin Hubert's Amass Modular Curtain System		
Proposed Technical	For Main Flexible Solutions	<b>Elements of flexibility \ Flexible Wall \</b> The Flexible sliding wall panels types ( PLAN 9) + Model No. 2 designed by studio01 (Alex K and Akinori H)Tokyo in 2012. + Model No. 3 designed by Graham H , New York, in 2011. Provide in all section and plan	
	For Main Bed unit	i. (Type of Flexible \ -Transforming Elements) Flexible Furniture (Wall) Construction of flexible wal+ Furniture Mechanism Flexible Wall details illustration open and close	
	Main living room	<b>Flexible Wall \</b> Model No. 2 designed by studio01 (Alex K and Akinori H)Tokyo in 2012	
	Mirrors and Secondary Bed	<b>Flexible Wall \</b> <u>wall panels types \</u> No. plan 1+ Plan 9 <b>Type of Flexible small living\</b> Transforming Elements + Multi-folding flexibility(Tiny house by Renzo flexible bed) Provide in ALL section	
	Wall Cabinet	Technical Information	
	Kitchen And Dining Table	Flexible Furniture Design(Foldable Furniture) : Foldable furniture design in furniture flexible kitchen designed by Tomoyuki Utsumi Japan, 2005	
Proposed Mechanism	For Main Flexible Solutions	<b>Flexible Wall Mechanism of</b>	

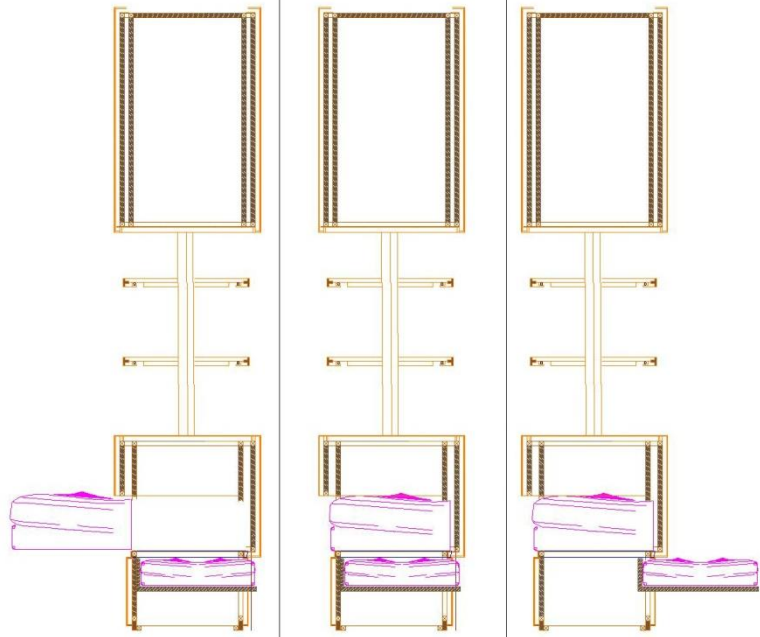
		<p><b>Flexible Wall</b></p> <p>Movable flexible door detail and reveal door structural rail</p> <p>+ Panel Stacking Movable Walls details+Construction of flexible wall</p>
	For Main Bed unit	Construction of flexible wall
	Mirrors and Secondary Bed	Flexible Wall \ Mechanism of Flexible Wall\ Mechanism of Flexible Furniture (Wall) Furniture Mechanism Flexible Wall details illustration \.Construction of flexible wall
	Wall Cabinet	Technical Information
	Kitchen	<p><b>Xi</b> – Folding Flexible joint spatent.</p> <p><b>Xii</b> - Universal Sink Drain Pipe Flexible Expandable S-Trap Stainless Steel Accessory for Kitchen Lavatory</p> <p><b>Xiv</b> - stainless steel wire braided flexible hose for washbasin</p>

**Proposed Details plan**

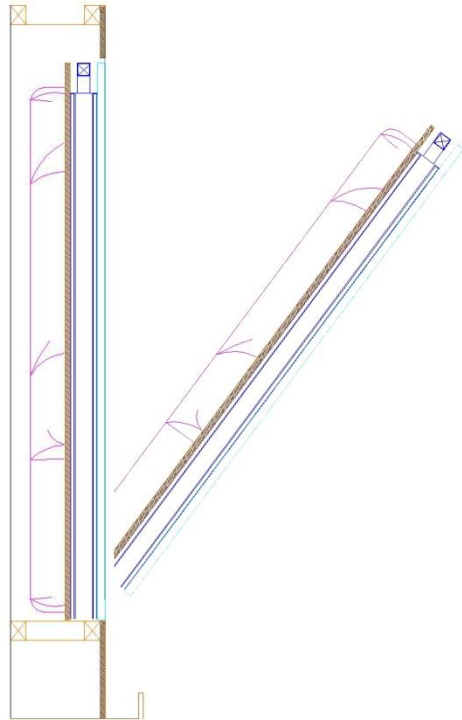
Store Cabinet  
type one (1)  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



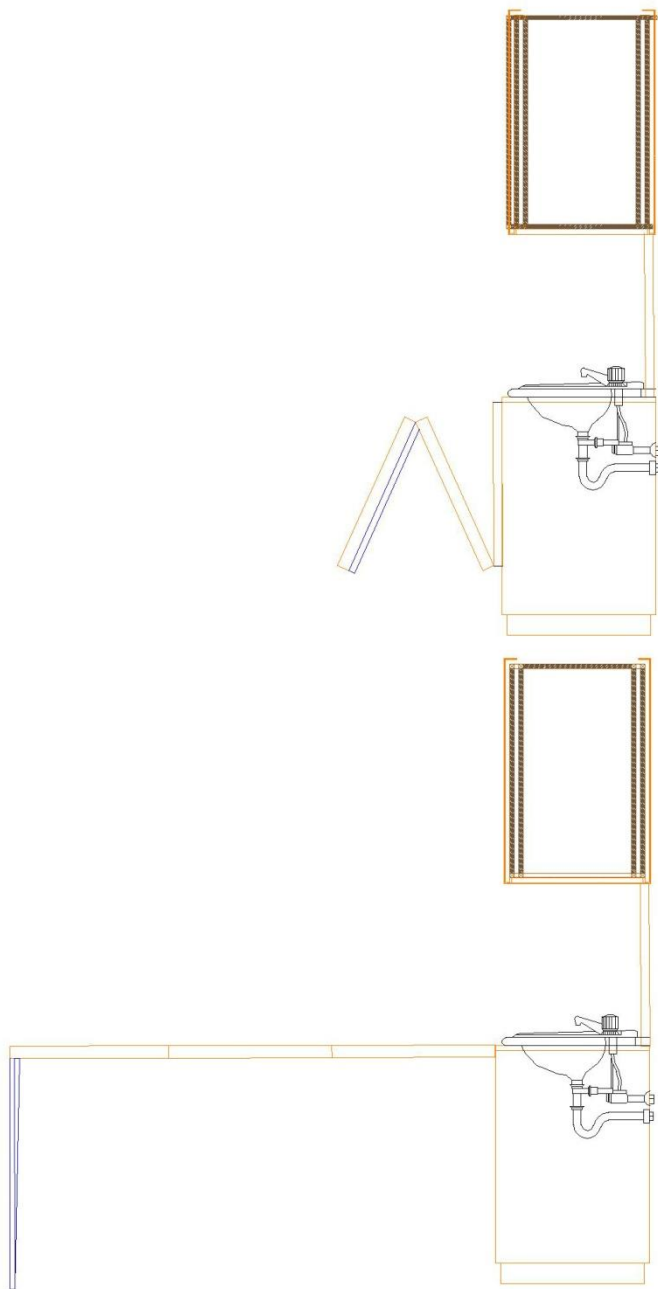
Store Cabinet  
type two  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



Main Bed  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



Kitchen And  
Dining table  
Details  
Illustration  
Scale :1-25  
(Personal  
work)

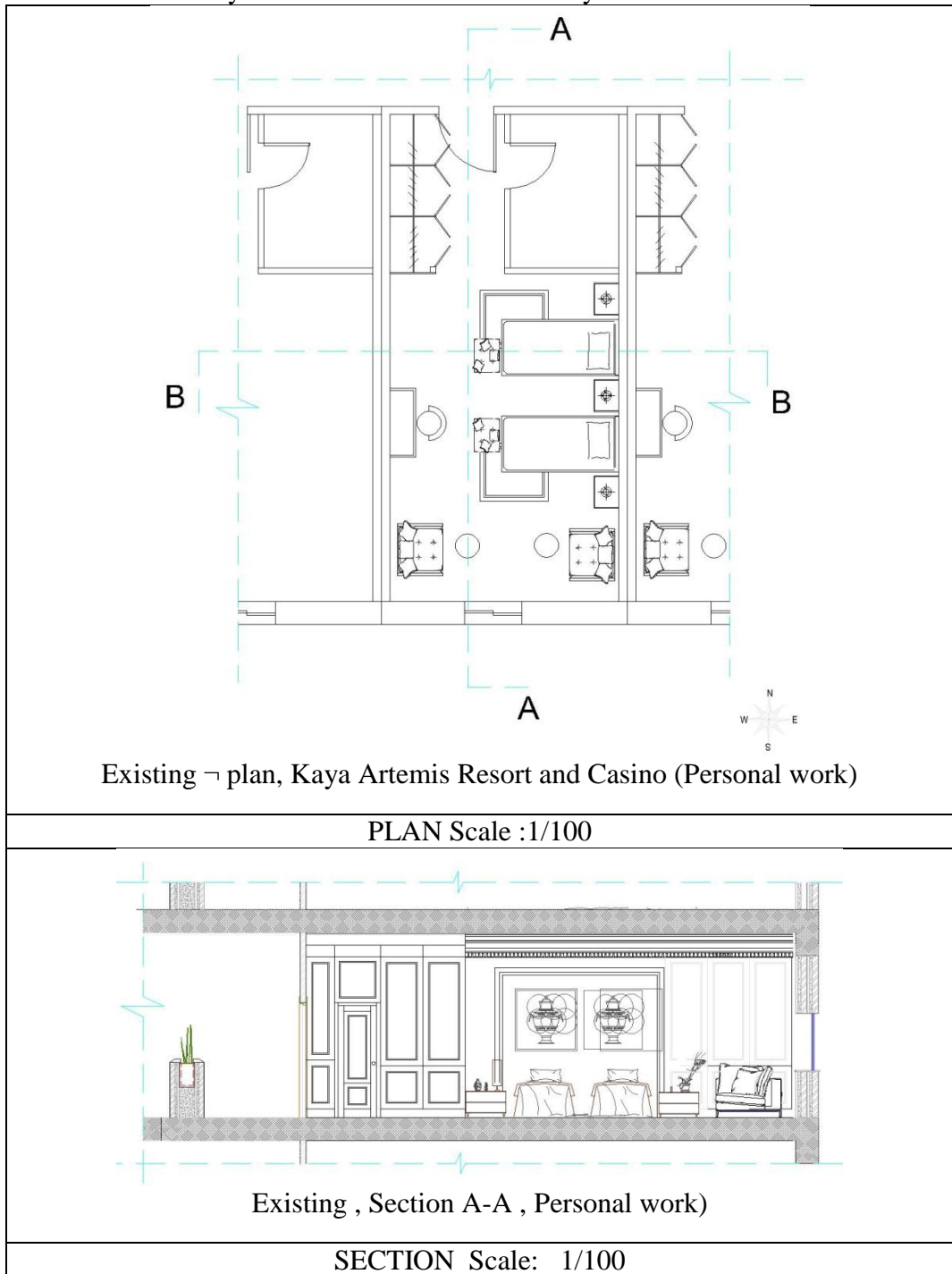


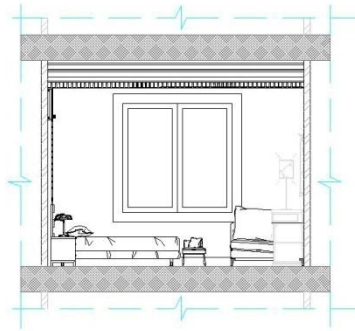
Unit TV  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



#### 4.2.4 Case Study 4: Kaya Artemis Resort and Casino

Table 35: Flexibility Solution Plans Of Case Study 4





Existing , Section B-B , (Personal work)

SECTION Scale: 1/100

### **Problem of Existing Salamis Bay Conti Hotel Plan**

1. The room is large but using the space in a non functional manner.
2. Using two the small sofa but no living area.
3. No secondary beds or sofa.
4. Room serve the main bed function just.
5. Is difficult to add beds or new function.
6. Is difficult to change the room use.

### **Solutions proposed**

1. Adopt flexible mechanism in order to establish the folding wall and the flexible furniture units, and use lift mechanism to rise the secondary sofa.
2. Adopting a multi foldable and multifunction furniture unit.
3. Increasing the number of beds.
4. Increasing the number of functions.
5. Redesign the room in order to create the space to meet the functions need.
6. Using sold and manufactured flexibly to create a furniture and folding wall.
7. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

### **The concept of proposed design**

7. Designed one unit as a multi-function unit which it includes main beds , secondary sofa, secondary bed , and kitchen.
8. From in said it includes two main beds with option to divide it or combine it.
9. From the outside have furniture in two directions one has a secondary bed as a folding unit and have a secondary sofa creates as a part of lift machine. The other direction is to create a kitchen inside the cabinet made of glass doors to give the option to open or close it.

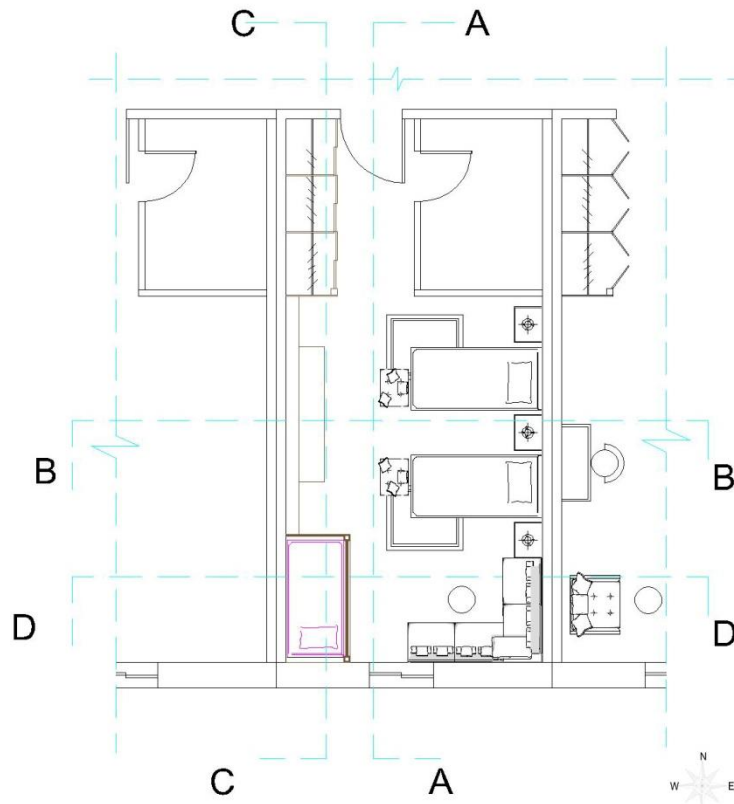
Summary concept, is that combining all functions in one unit where the function's situated in a specific zone without interfering with each other.



Table 36: Flexibility Solution Plans Of Case Study 4

**Proposed increase capacity of bed by flexible solution**

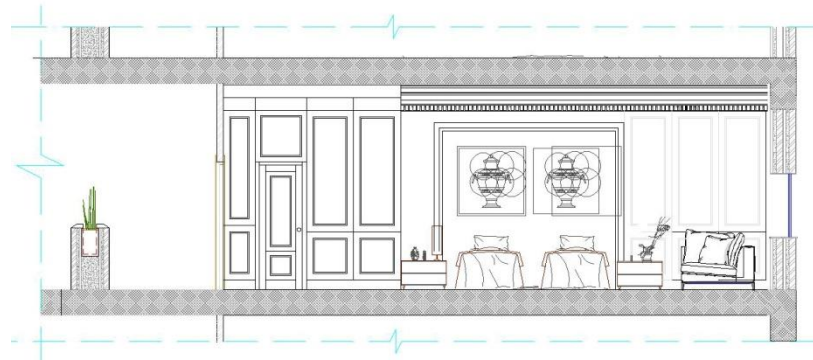
**Proposed Plans , Scale 1/100**



Plan (1) , proposed increase bed (Personal work)

PLAN Scale: 1/100

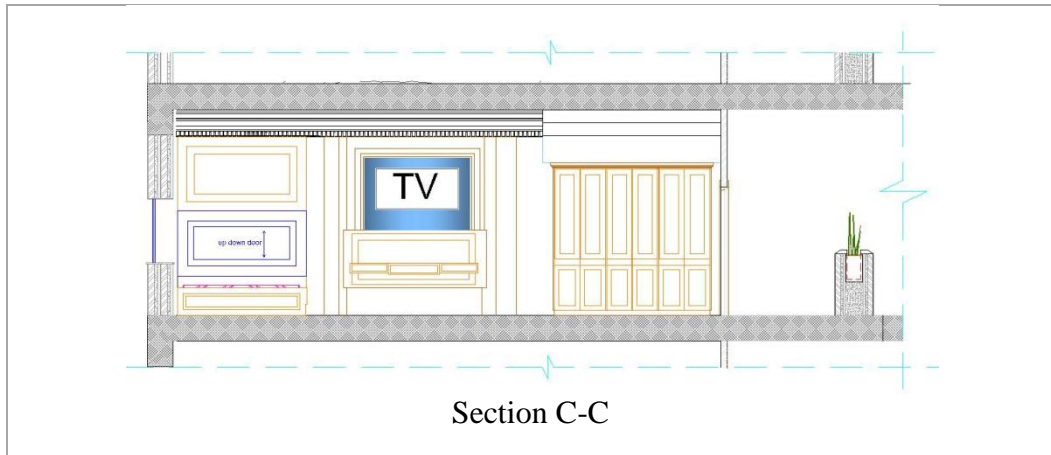
Section 1/100



Section A-A

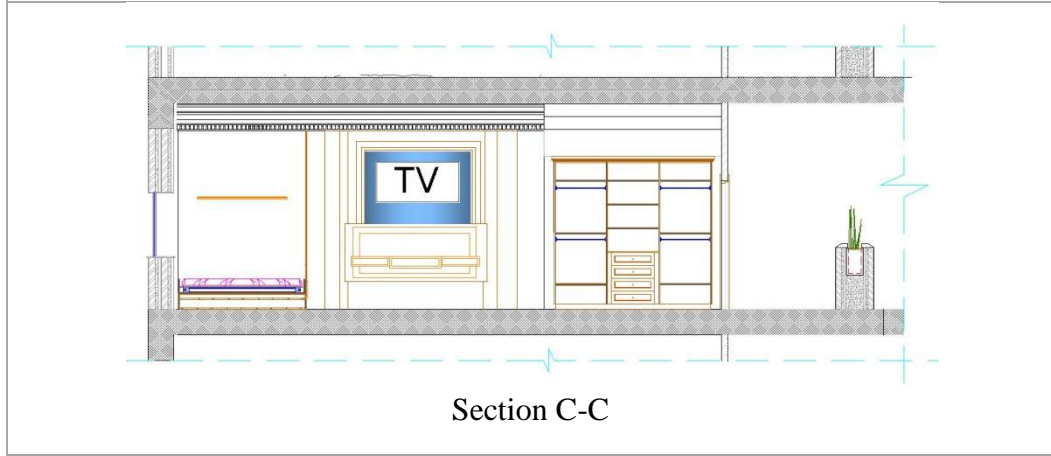
(Proposed plan 1+2) , Scale: 1/100

(Personal work)



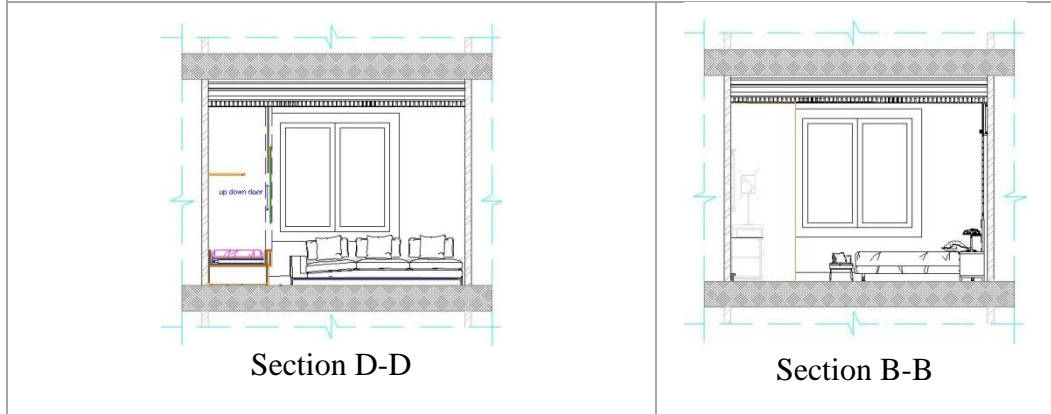
Section C-C

CLOSE SECONDERY BED) , Scale: 1/100, (Personal work)



Section C-C

(OPEN SECONDERY BED) , Scale: 1/100, (Personal work)



Section D-D

Section B-B

Scale: 1/100, (Personal work)

Scale: 1/100(Personal work)

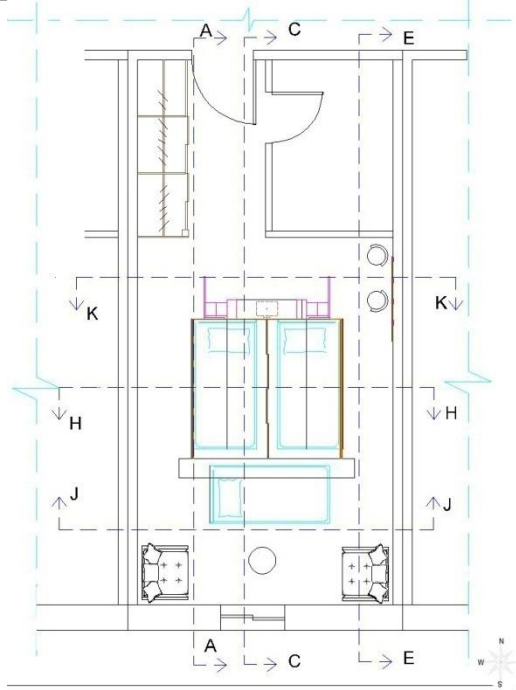
**Proposed materials- Technical- Mechanism**

Proposed materials	<b>High flexibility materials</b> \ Ultra-Flexible Snowflake	
	Curtain	
Proposed technical	<b>Manufactured flexibly</b> \ Benjamin Hubert's Amass	
	Modular Curtain System \ Hexagon shaped	
	Mirrors	<b>Patterns of Flexibility</b> \ Functionally

	and Secondary Bed	flexibly <b>Flexibility in interior design \ Type of Flexible small living \ Sliding walls + Pop-Up Interactive Apartment+ Multi-folding flexibility (Capsule design by Kisho K, 1972)</b> <b>Flexible furniture elements with multiple functions examples \ (Modular Room, design by ODA ,New York, 2012)</b> <b>Flexible Wall \ Plan (3\5\6)</b>
	Wall Cabinet	Technical Information
Proposed Mechanism	Secondary Bed	<b>Mechanism of Flexible Construction Tools</b> (Flexible joints \ NV01, by Noir Vif, Paris, 2013)
	Wall Cabinet	Technical Information

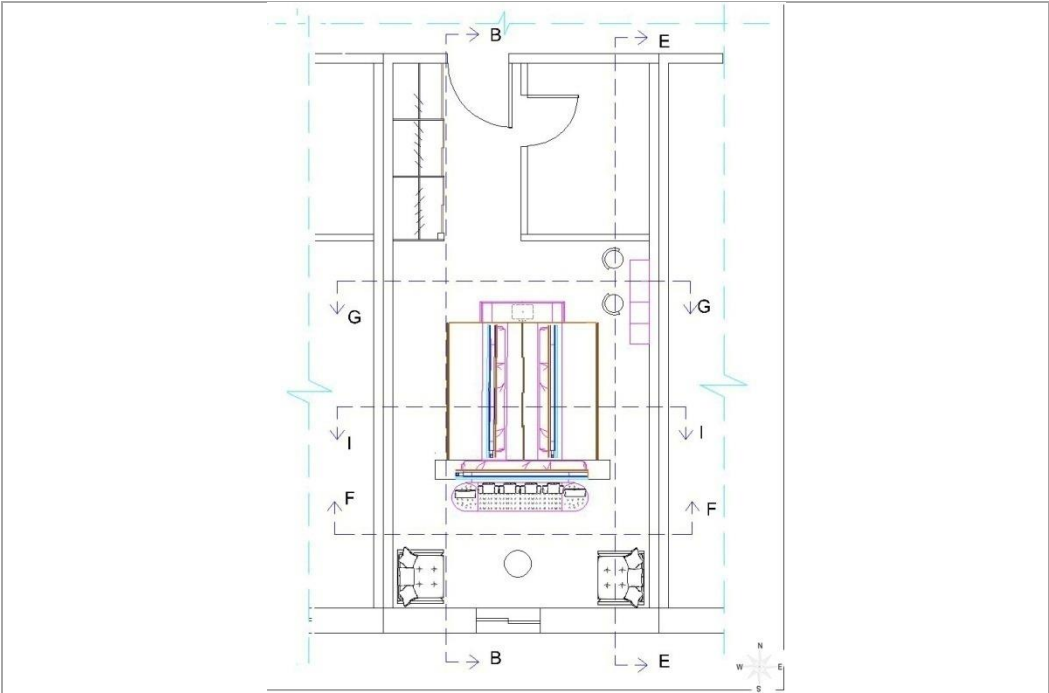
**Proposed increase function by flexible solution**

**Proposed Plans , Scale 1/100**

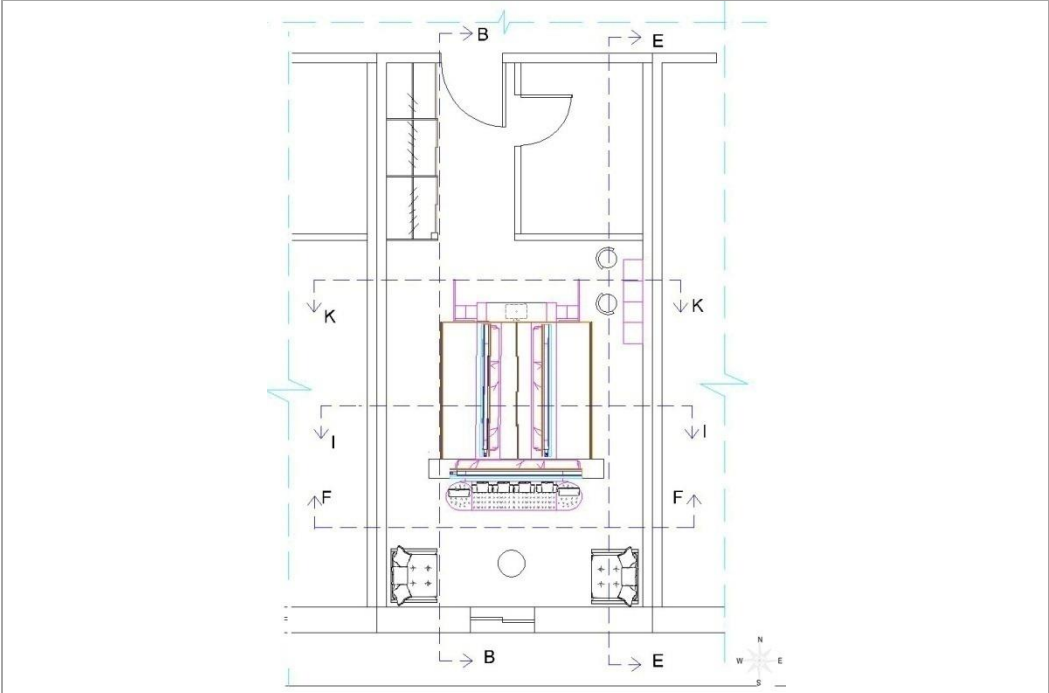


Plan (1), proposed increase beds and function (Personal work)

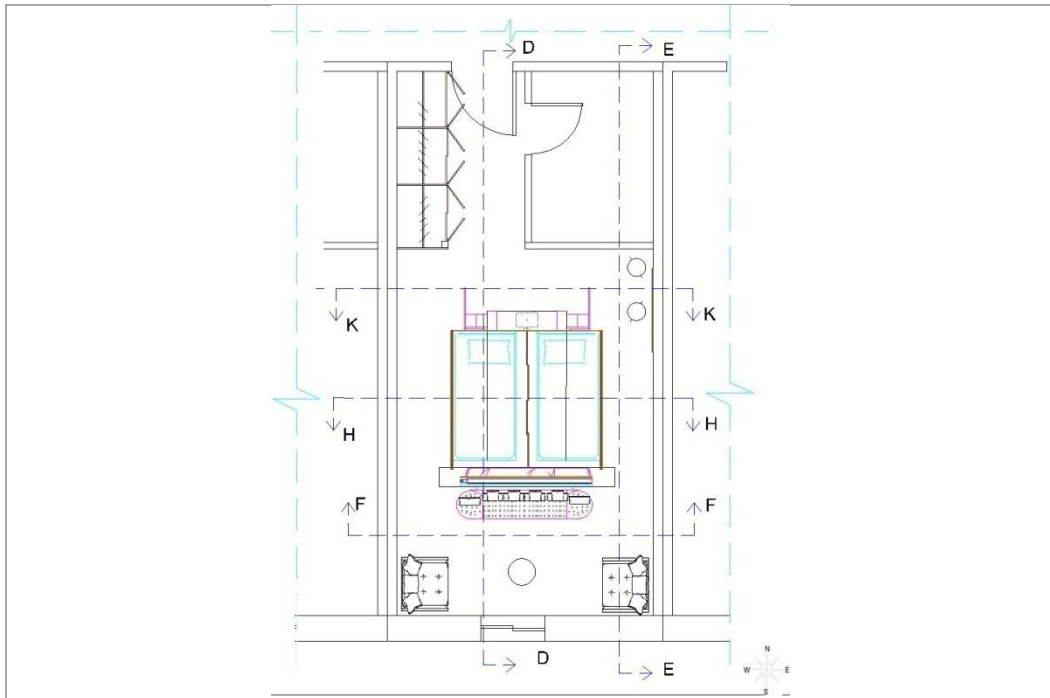
PLAN Scale: 1/100



Plan (2), proposed increase beds and function (Personal work)  
 PLAN Scale: 1/100



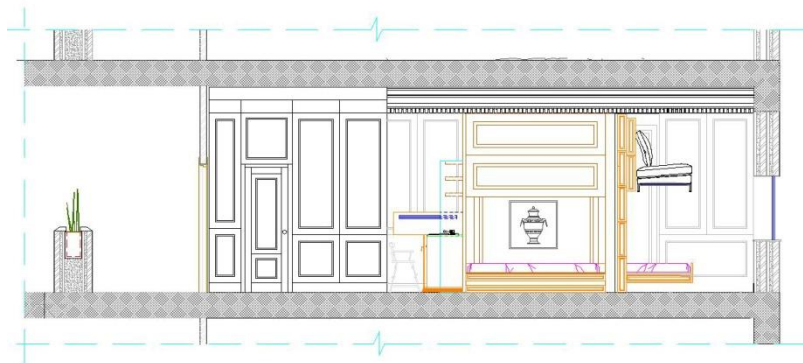
Plan (3), proposed increase beds and function (Personal work)  
 PLAN Scale: 1/100



Plan (4), proposed increase beds and function (Personal work)

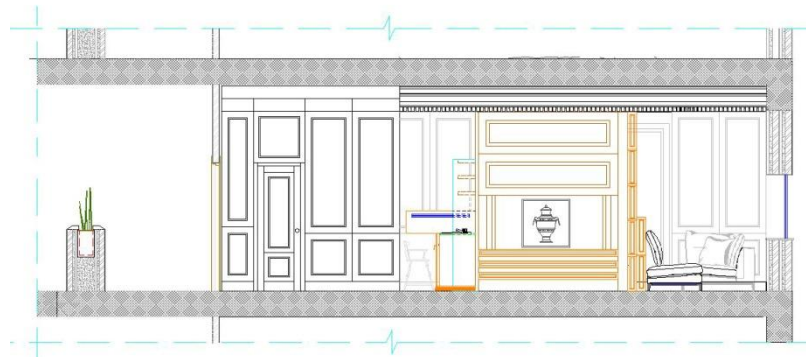
PLAN Scale: 1/100

Section 1/100



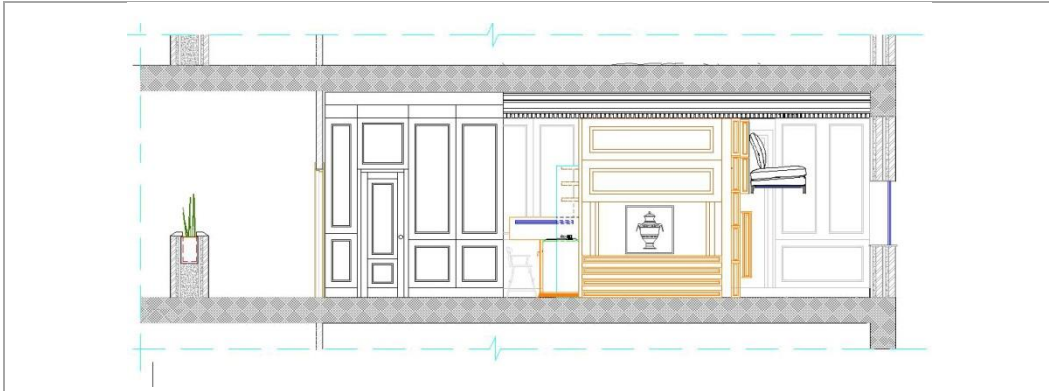
Section A-A

(open bed box+ open Secondary Bed (plan 1)), Scale: 1/100 / , (Personal work)



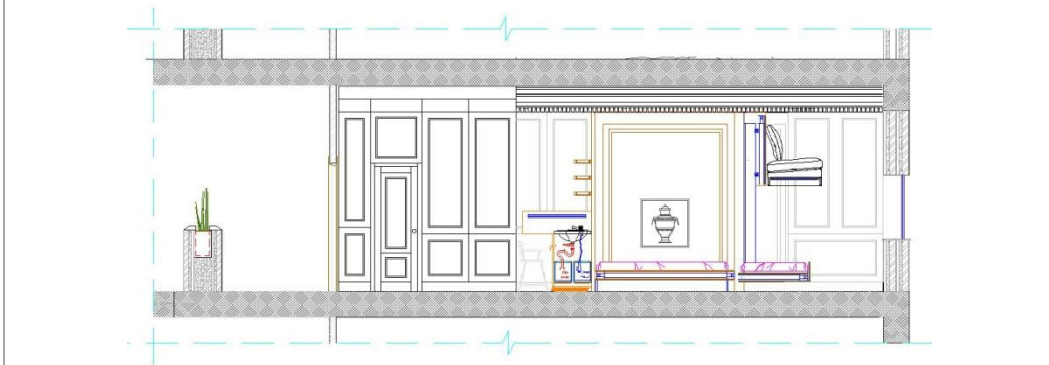
Section B-B

(Close Bed box + Up Sofa Close Secondary Bed ( Plan 2+3)), Scale: 1/100 / , (Personal work)



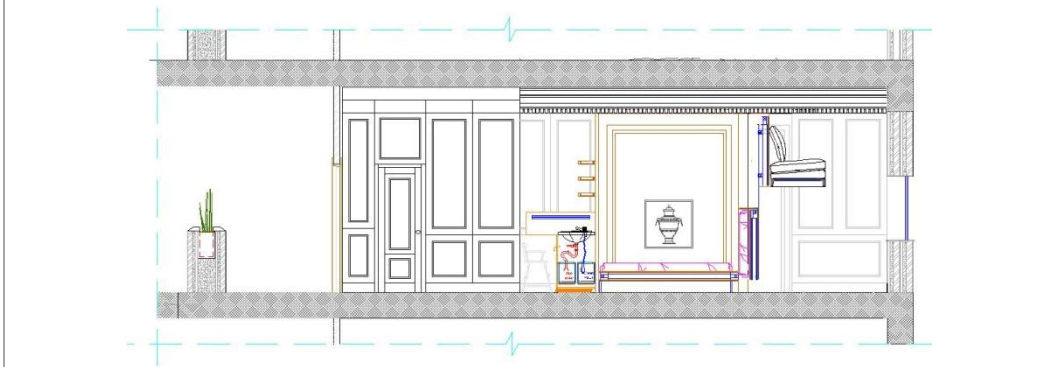
Section B-B (2)

(Close Bed box + Down Sofa Close Secondary Bed ( Plan 2+3) ), Scale: 1/100 / , (Personal work)



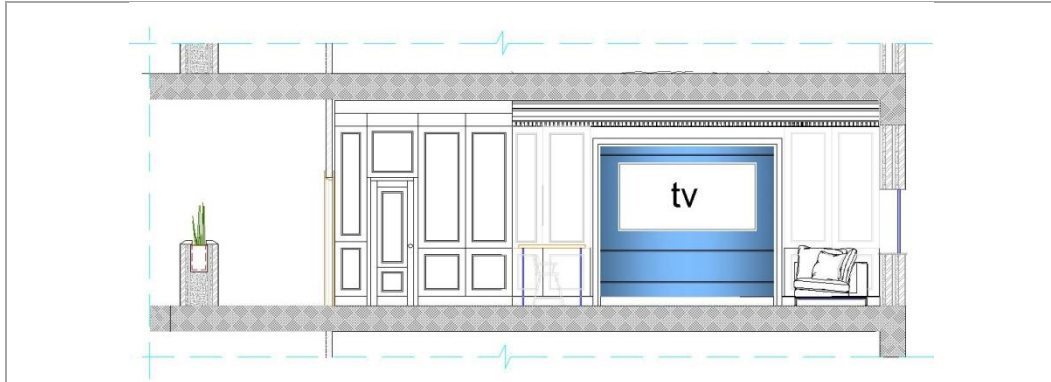
Section C-C

(open bed box cut + open Secondary Bed cut (plan 1) ), Scale: 1/100 / ,(Personal work)



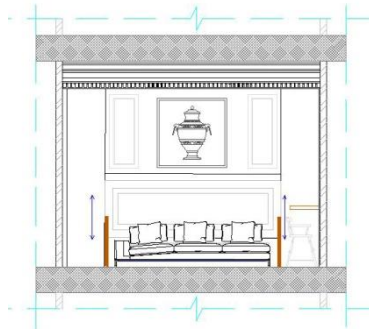
Section D-D

(kitchen cut + bed box cut (plan 4) ), Scale: 1/100 / ,(Personal work)

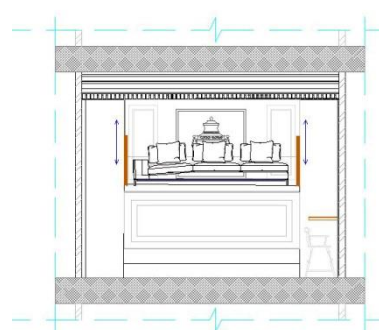


Section E-E

(Unit TV + Dining Table (ALL plan)), Scale: 1/100 / , (Personal work)



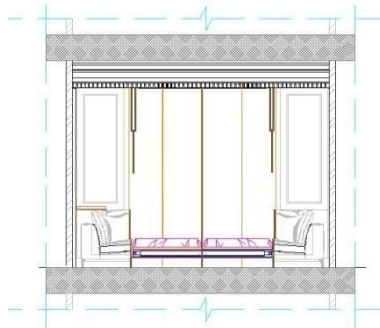
Section F-F



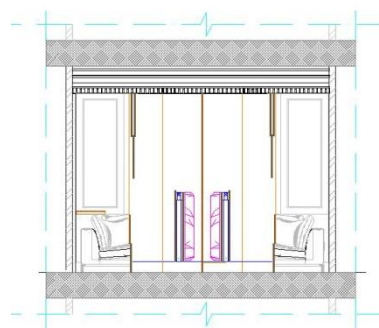
Section F-F (2)

(Up Sofa Close Secondary Bed (Plan 2+3)),  
Scale: 1/100 / , (Personal work)

(Down Sofa (Plan 2+3)), Scale: 1/100  
/ , (Personal work)



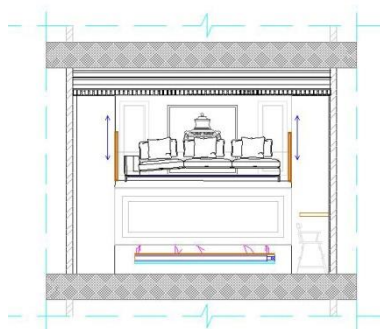
Section H-H



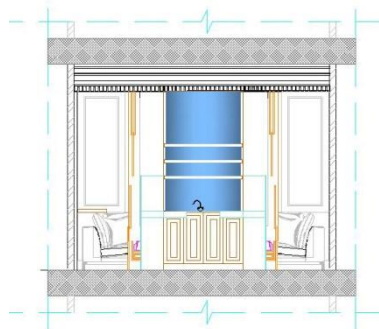
Section I - I

(open bed box cut (plan 1+ 4)),  
Scale: 1/100 / , (Personal work)

(bed box cut close bed (plan 2+3)),  
Scale: 1/100 / , (Personal work)



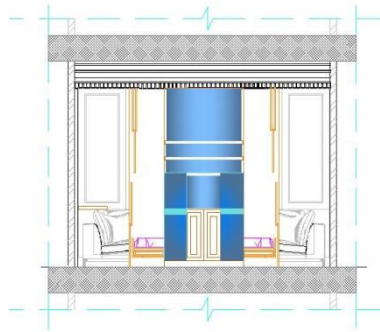
Section J-J



Section K-K

(open bed box+ open Secondary Bed (plan 1)),  
Scale: 1/100 / , (Personal work)

(Kitchen Open (plan 3+4)), Scale:  
1/100 / , (Personal work)



Section G-G

(Kitchen Close (plan 2)), Scale: 1/100 / ,(Personal work)

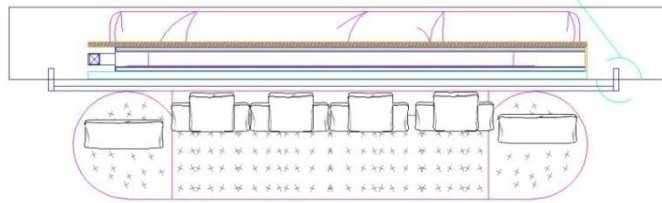
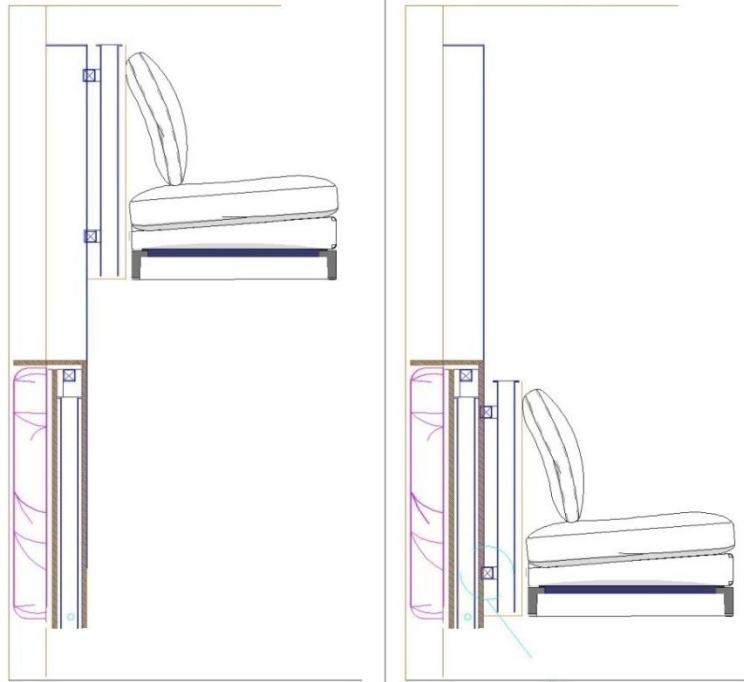
**Proposed materials- Technical- Mechanism**

Proposed materials	<p><b>Solid materials used in finishing and decoration work in a flexible manner</b></p> <p>Ultra-Flexible Snowflake Curtain \ <b>Manufactured flexibly</b> \ Benjamin Hubert's Amass Modular Curtain System \ Hexagon shaped</p>	
Proposed Technical	For Main Flexible Solutions	<p><b>Flexible furniture elements with multiple functions</b> \ (<i>Joe Colombo kitchen for Boffi , 1963 + Tuttuno by (Carlo B , Gianni F , Nilo G), Italy, 1969 (1971) + Modular Room, design by ODA ,New York, 2012</i>)</p>
	For Main Bed unit	<p><b>Patterns of Flexibility</b> \ Functionally flexibly <b>Flexibility in interior design \ Type of Flexible small living</b> \ Sliding walls + Pop-Up Interactive Apartment+ Multi-folding flexibility (<i>Capsule design by Kisho K, 1972</i>)</p> <p><b>Flexible furniture elements with multiple functions examples</b> \ (<i>Modular Room, design by ODA ,New York, 2012</i>)</p> <p><b>Flexible Wall</b> \ Plan (3\5\6)</p>
	Main living room	<p>Storage dividers ( <b>Type of Flexible</b> \ Multi-folding flexibility ) \ Flexible Furniture.</p>
	Secondary Bed	<p>Storage dividers ( <b>Type of Flexible \ ii -Transforming Elements</b>) \ Flexible Furnitur</p>
	Wall Cabinet	<p>Technical Information</p>
	Kitchen And Dining Table	<p>Flexible Furniture Design(Foldable Furniture) Foldable furniture design in furniture</p>
Proposed Mechanism	For Main Flexible Solutions	<p><b>Flexible Wall \ Mechanism of Flexible Wall</b></p> <p>Technical Information</p>

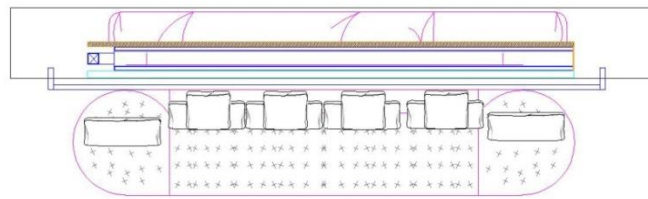
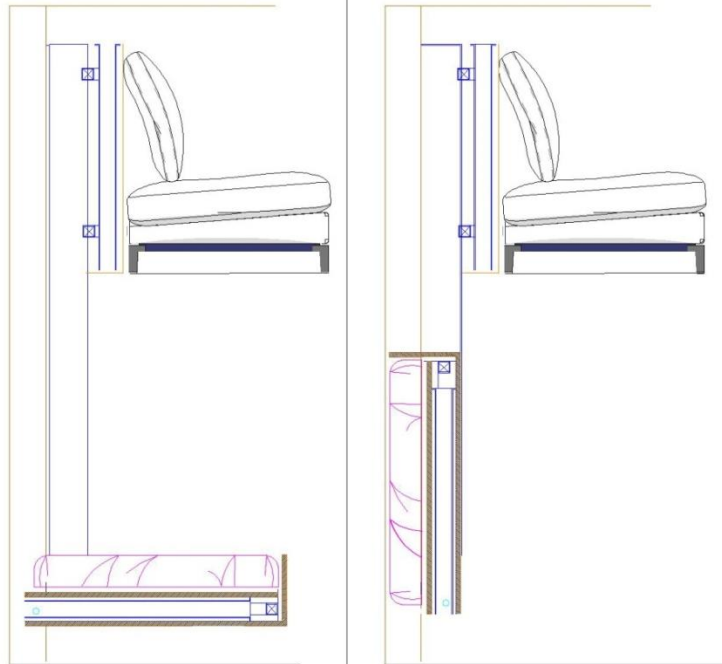


	For Main Bed unit	Construction of flexible wall
	Mirrors and Secondary Bed	<b>Mechanism of Flexible Construction Tools</b> <i>(Flexible joints \NV01, by Noir Vif, Paris, 2013)</i>
	Wall Cabinet	Technical Information
	Kitchen	<b>Xi</b> – Folding Flexible joint spatent. <b>Xii</b> - Universal Sink Drain Pipe Flexible Expandable S- Trap Stainless Steel Accessory for Kitchen Lavatory <b>Xiv</b> - stainless steel wire braided flexible hose for washbasin
<b>Proposed Details plan</b>		

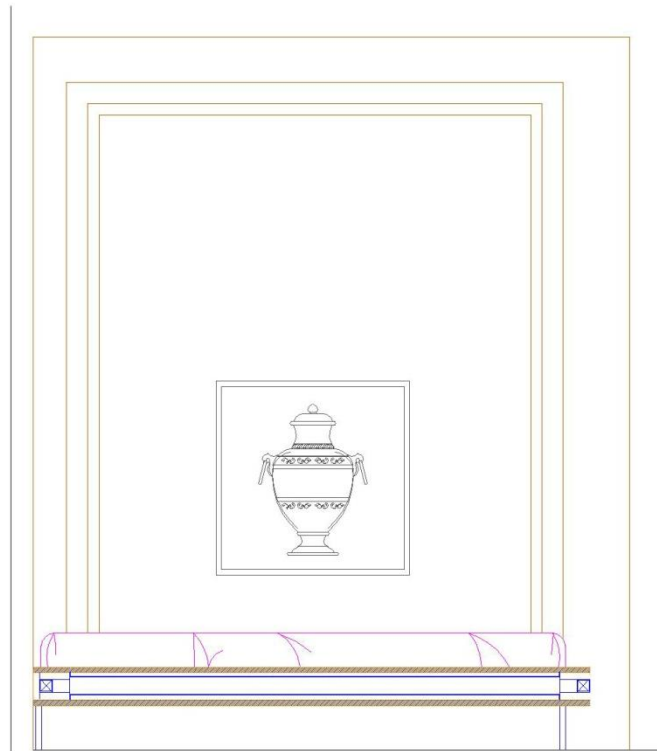
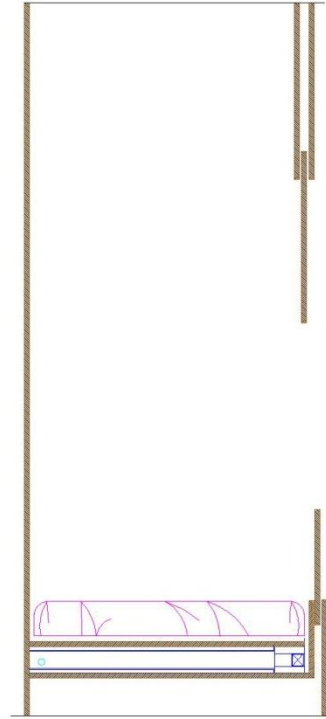
LIFT  
SOFA  
FLEXIBA  
L  
SOULATI  
ON Details  
Illustration  
Scale :1-25  
(Personal  
work)



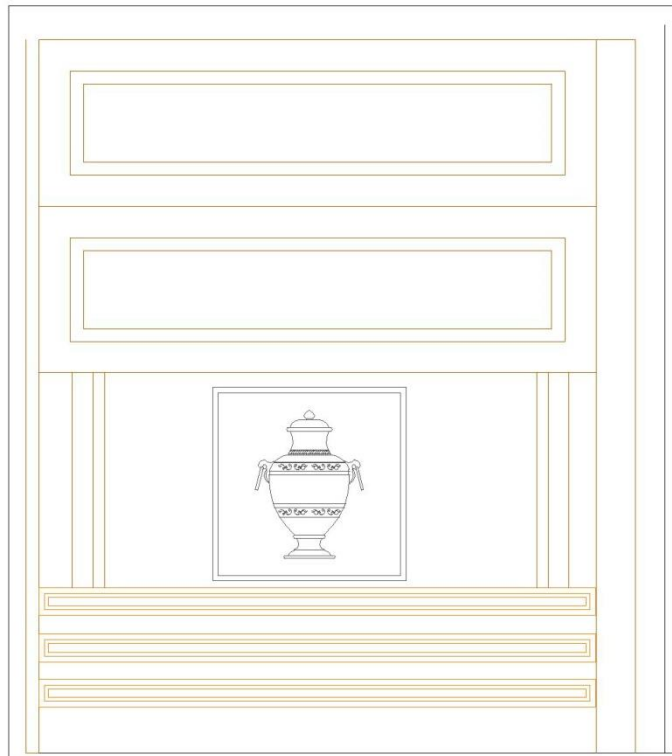
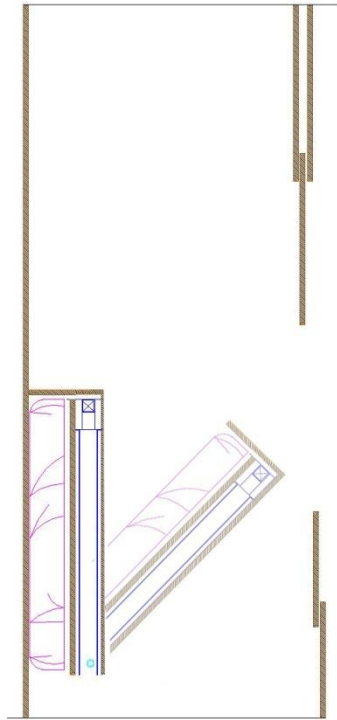
Secondary  
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work)



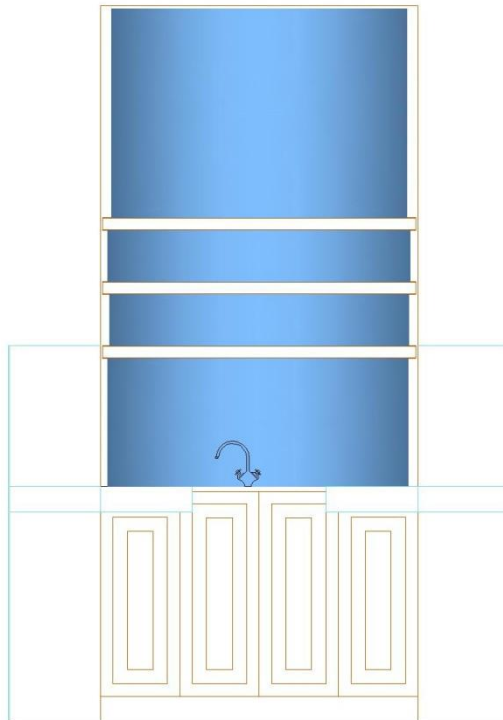
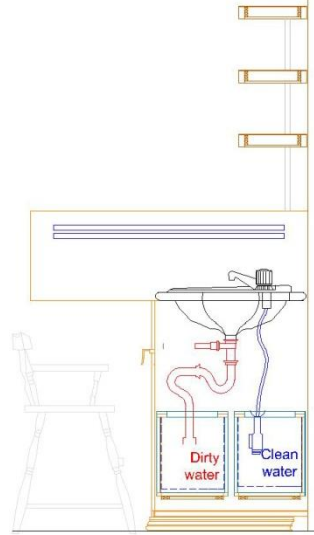
Main Bed  
open  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



Main Bed  
close  
Details  
Illustration  
Scale :1-25  
(Personal  
work)

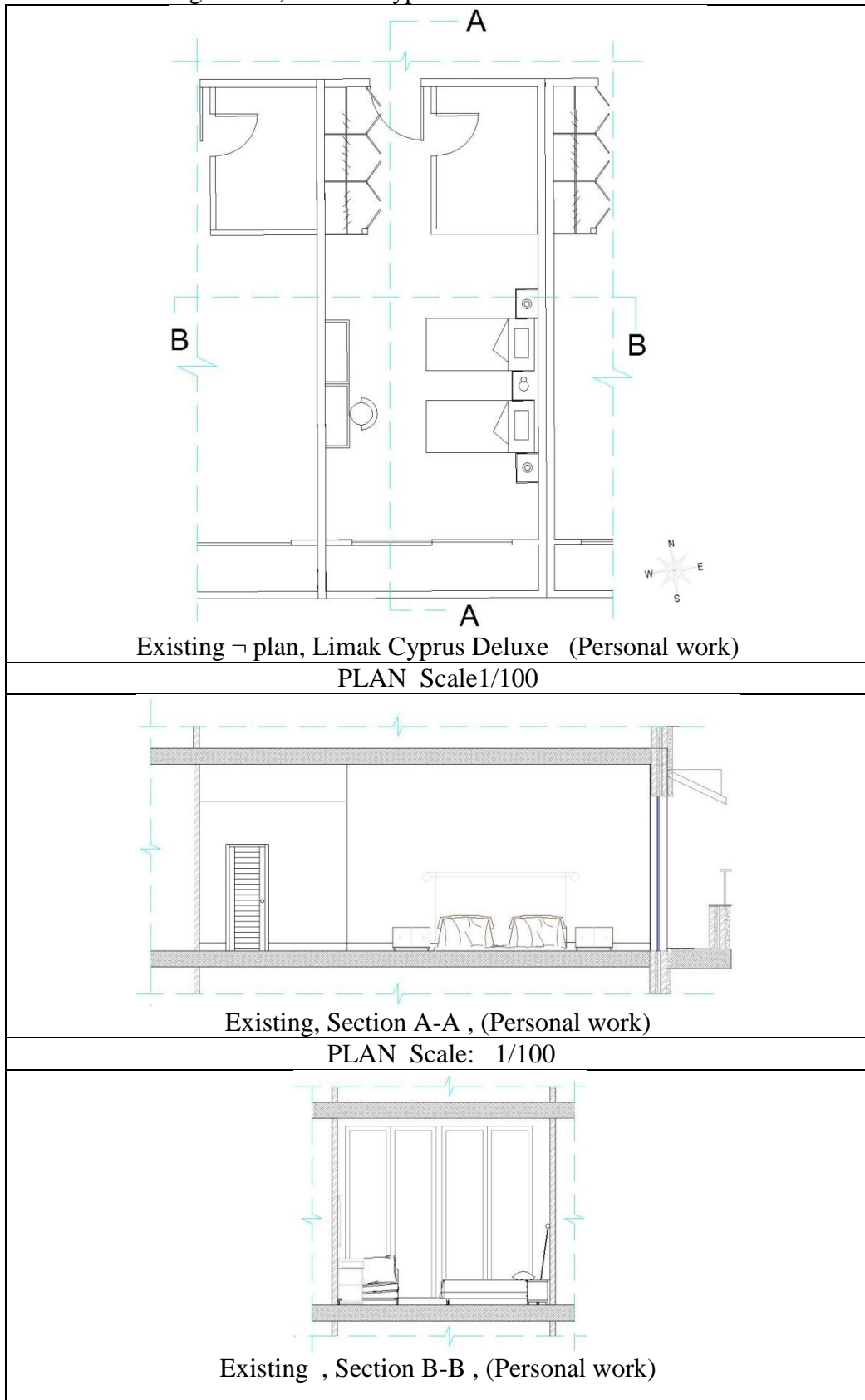


Kitchen  
Details  
Illustration  
Scale :1-25  
(Personal  
work)



#### 4.2.5 Case Study 5: Limak Cyprus Deluxe

Table 37: Existing  $\rightarrow$  Plan, Limak Cyprus Deluxe



**Problem of Existing Salamis Bay Conti Hotel Plan**

1. The room is large but using the space in a non functional manner .
2. No sitting area .
3. No secondary beds or sofa.
4. Room serve the main bed function just.

**Solutions Proposed**

1. Utilize the wall and ceiling elements as storage for folding furniture.
2. Adopt elevator mechanism in order to store the flexible furniture units in ceiling.
3. Adopting a foldable and multifunction furniture to save the room space .
4. Increasing the number of beds.
5. Increasing the number of functions.
6. Redesign the room in order to create the space to meet the functions need.
7. Establish flexible units with ability to switch form the functions.
8. Using sold and Manufactured flexibly to create a furniture and folding wall.
9. Adopt flexible mechanism in order to establish the folding wall and the flexible furniture units.
10. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

**The concept of proposed design**

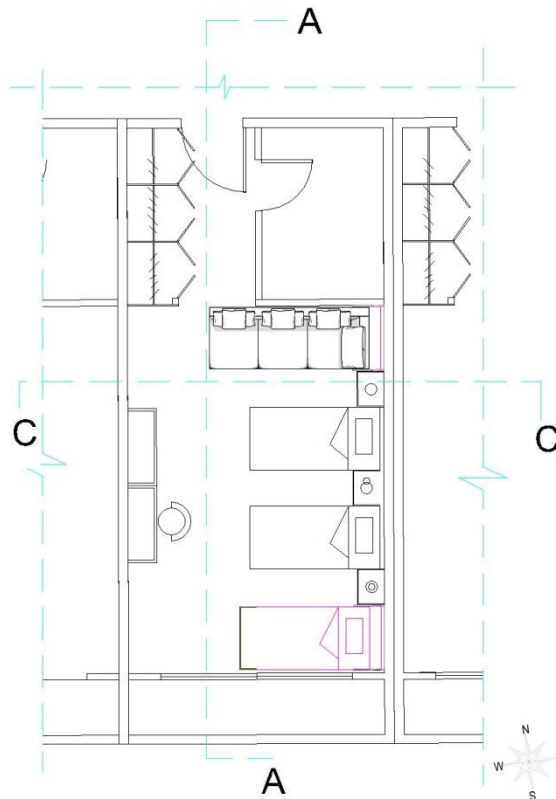
- Use the ceiling element in order to store the furniture by elevator ropes until need the furniture stored in ceiling includes main beds, a secondary bed, and a dining table.
- Add a secondary sofa through use the wall element as a stored the flexible units with an option of opened and closed.
- Establish living room as a function easy to use in the same space.
- Create a kitchen as a part of unit TV.



Table 38: Flexibility Solution Plans Of Case Study 5

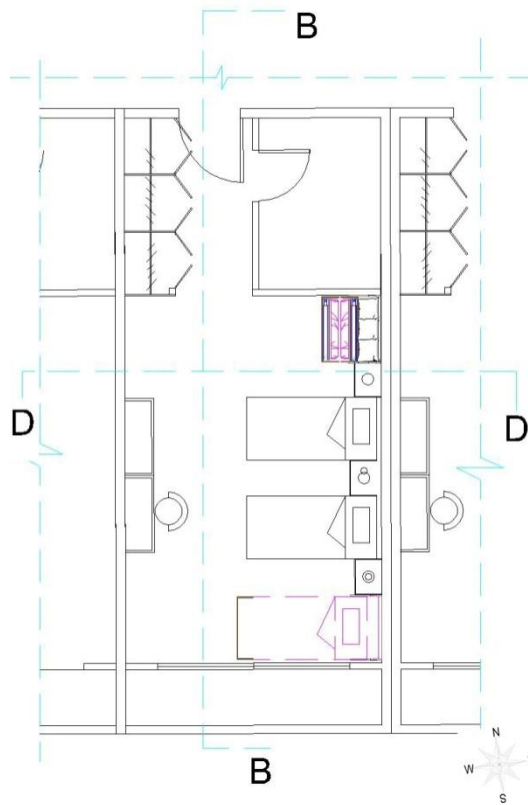
**Proposed increase capacity of bed by flexible solution**

**Proposed Plans , Scale1/100**



Plan (1) , proposed increase bed (Personal work)

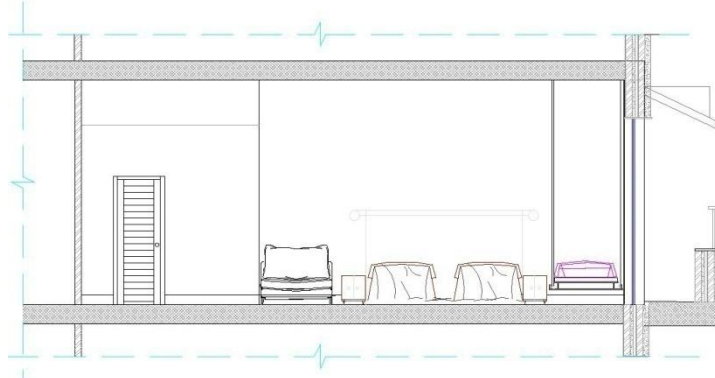
PLAN Scale: 1/100



**Plan (2) , proposed increase bed (Personal work)**

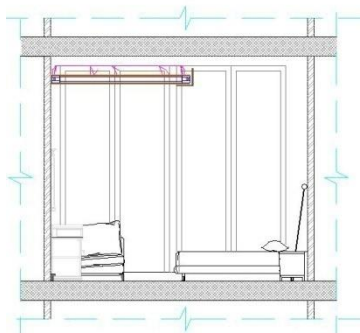
PLAN Scale: 1/100

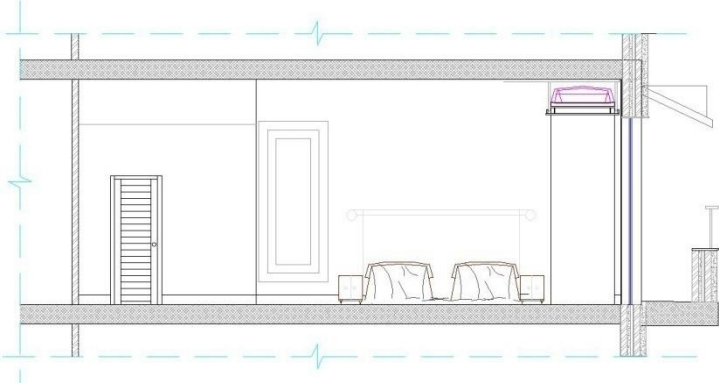
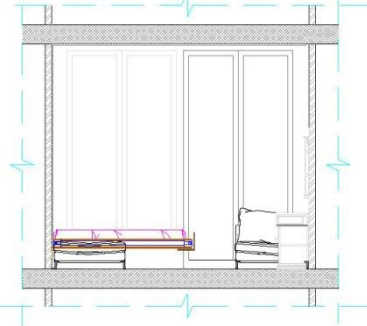
Section 1/100



Section A-A

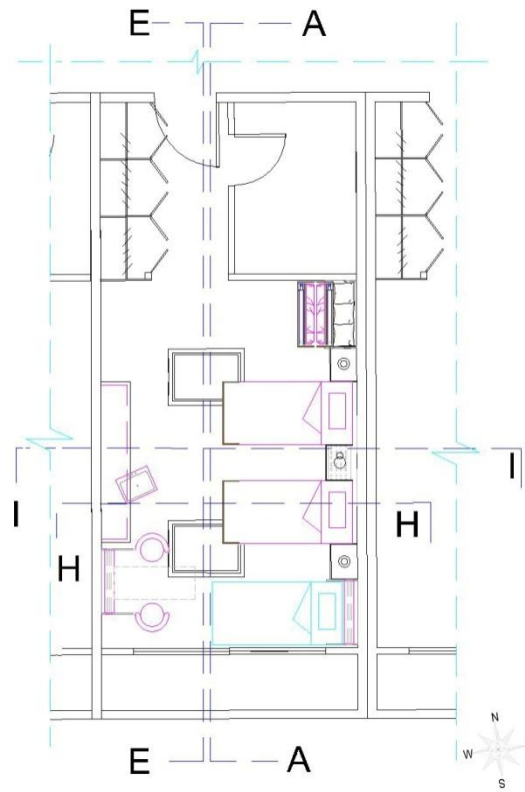
(Plan 1) , Scale: 1/100, (Personal work)



<b>Section D-D</b>		
(Plan 2) , Scale: 1/100, (Personal work)		
		
<b>Section B-B</b>		
(Plan 2) , Scale: 1/100 (Personal work)		
		
<b>Section C-C</b>		
(Plan 1) , Scale: 1/100 (Personal work)		
<b>Proposed materials- Technical- Mechanism</b>		
Proposed materials	<b>High flexibility materials</b> \ texture of Alphamesh Component of copper and aluminum\ metallic threads texture	
Proposed technical	Secondary Bed	<b>Flexible Ceilings</b>
	Secondary Sof	Flexible Furniture
Proposed Mechanism	Secondary Bed	Construction of flexible wall
	Secondary Sof	<b>Drag chain cables</b>

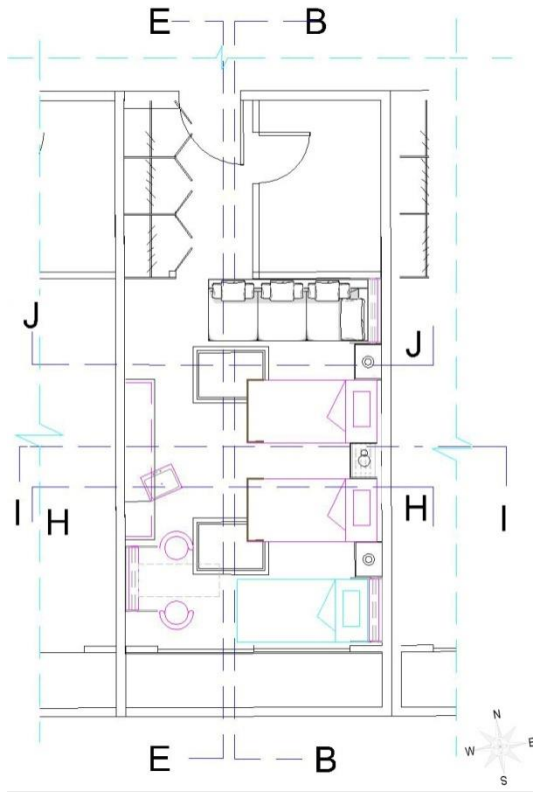
**Proposed increase function by flexible solution**

**Proposed Plans , Scale1/100**

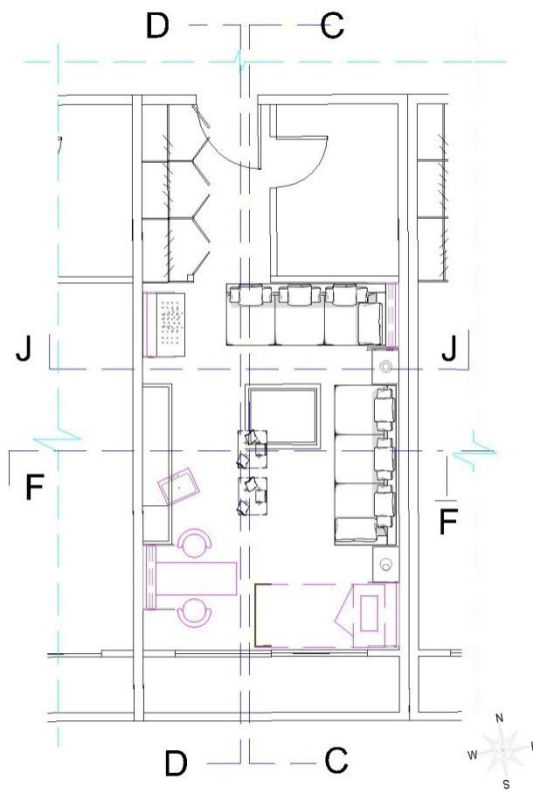


Plan (1) ,proposed increase beds and function (Personal work)

PLAN Scale: 1/100

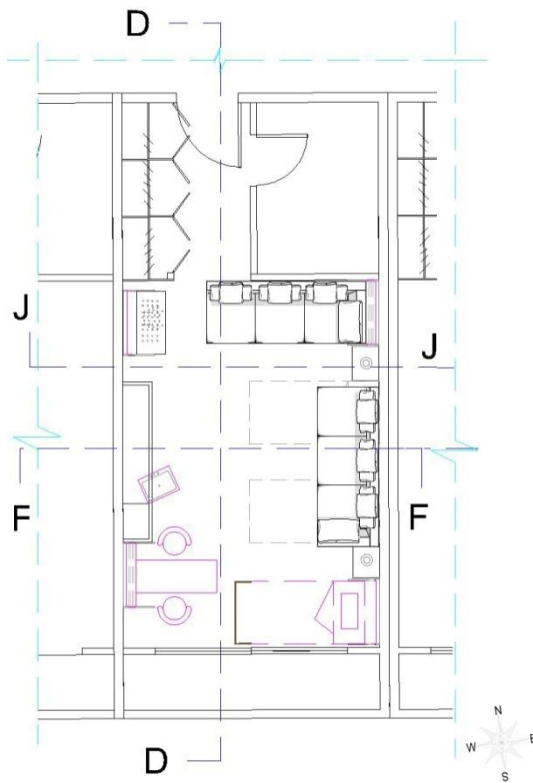


**Plan (2) ,proposed increase beds and function (Personal work)**  
 PLAN Scale: 1/100



**Plan (3) ,proposed increase beds and function (Personal work)**

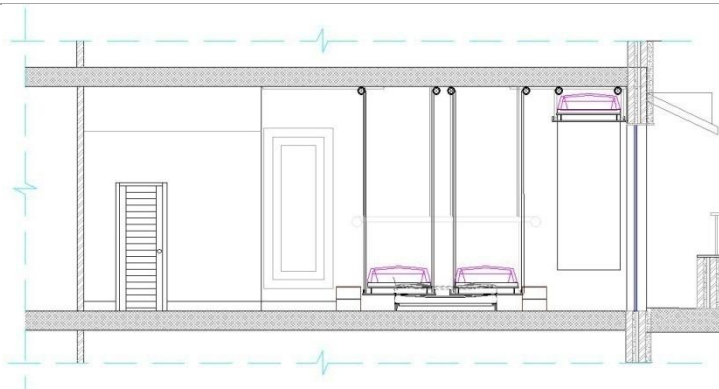
PLAN Scale: 1/100



**Plan (4) ,proposed increase beds and function (Personal work)**

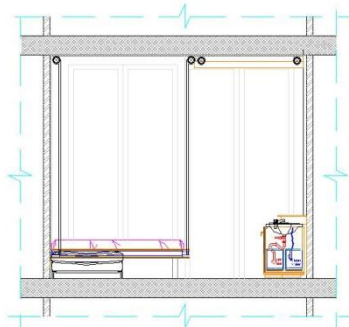
PLAN Scale: 1/100

Section 1/100



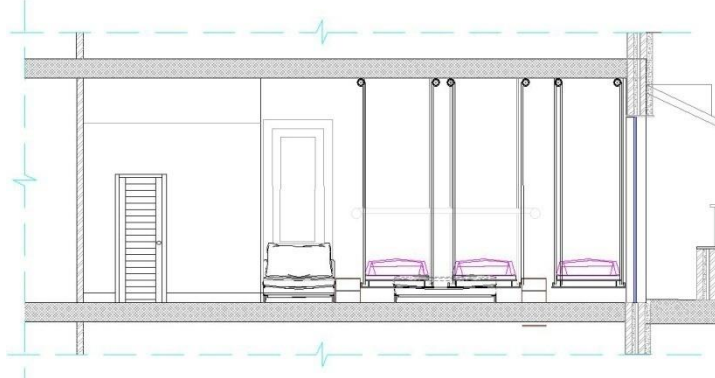
Section A-A

**(Main Bed Down + Secondary Bed up ( PLAN 1) ) , Scale: 1/100, (Personal work)**



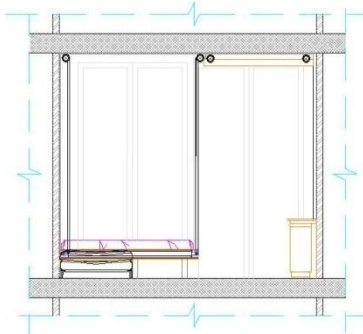
Section I-I

(Main Bed Down ( PLAN 1+2)), Scale: 1/100 ,(Personal work)



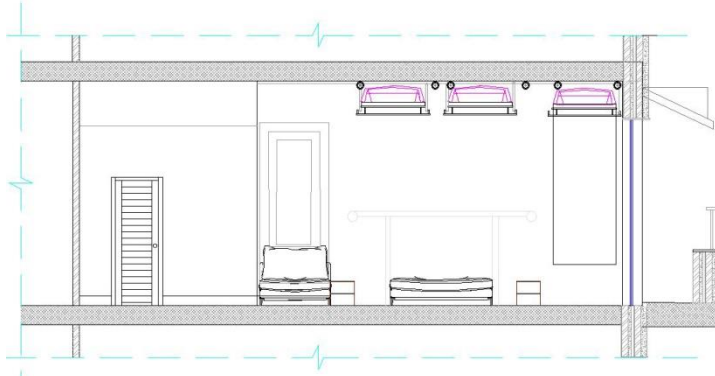
Section B-B

(Main Bed Down + Secondary Bed Down ( PLAN 2)), Scale: 1/100 ,(Personal work)



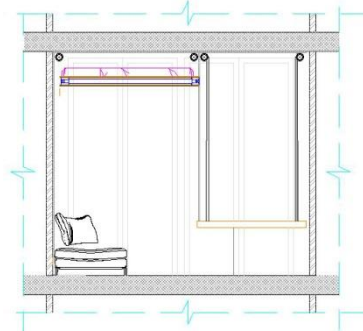
Section H – H

(Main Bed Down ( PLAN 1+2)), Scale: 1/100 ,(Personal work)



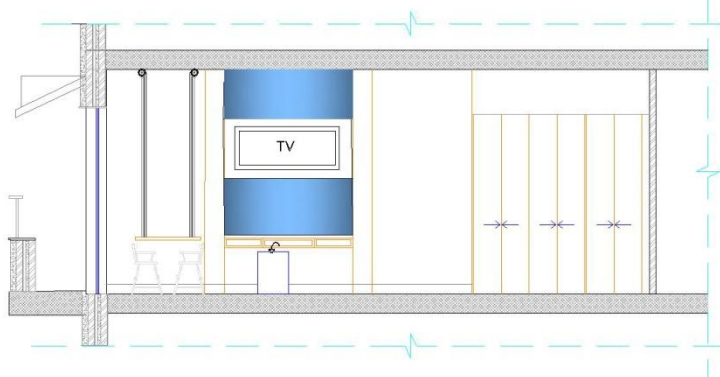
Section C-C

(Main Bed UP + Secondary Bed UP ( PLAN 3)), Scale: 1/100 ,(Personal work)



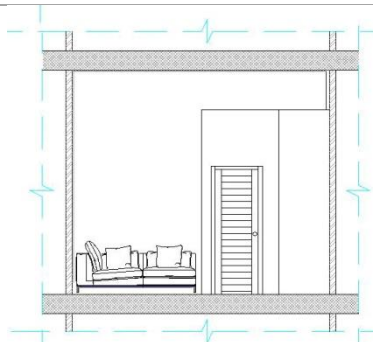
Section F-F

(Main Bed Down ( PLAN 3+4), Scale: 1/100 , (Personal work)



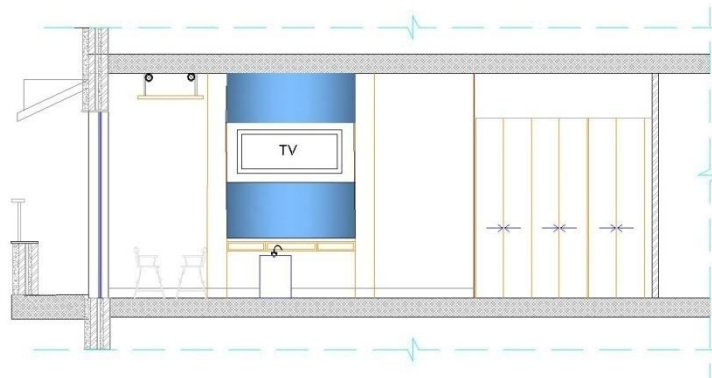
Section D-D

(Open Kitchen + Dining Table Down ( PLAN 3+4)), Scale: 1/100/, (Personal work)



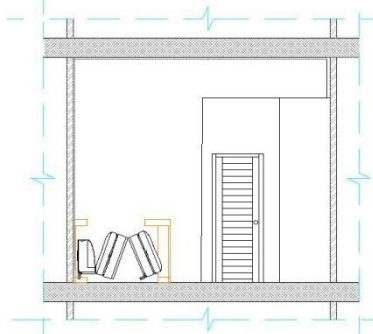
Section J-J

(Secondary Open ( PLAN 3+4), Scale: 1/100, (Personal work)



Section E-E

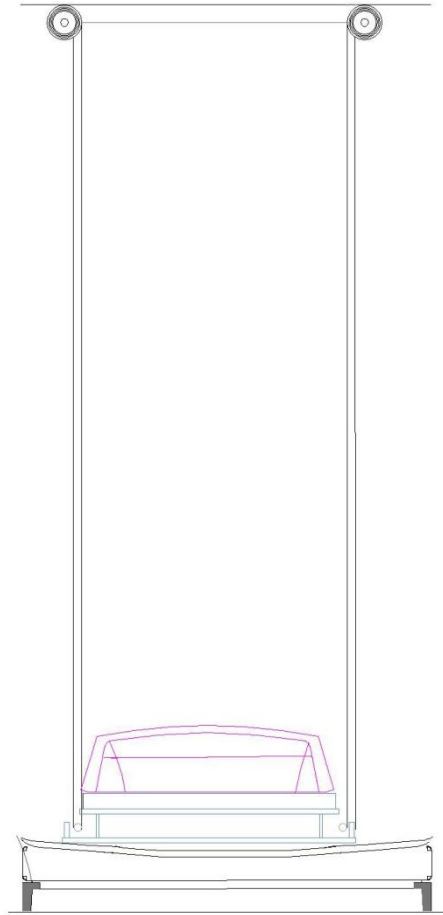
(Open Kitchen + Dining Table UP ( PLAN 1+2)), Scale: 1/100, (Personal work)



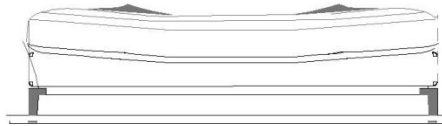
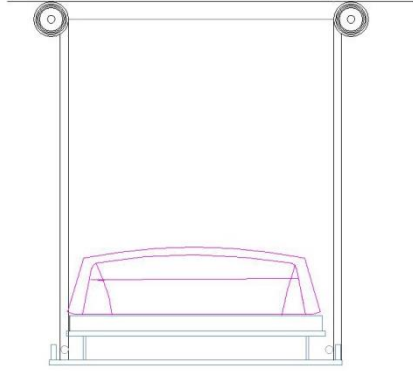


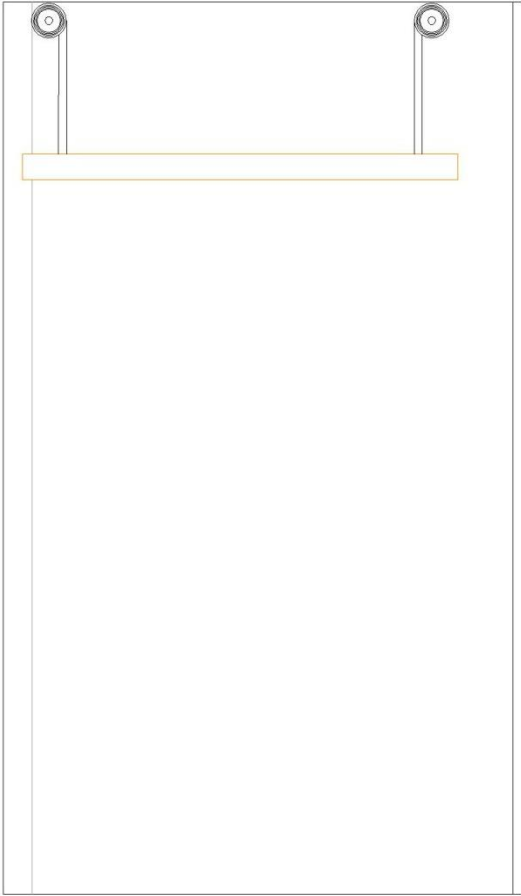
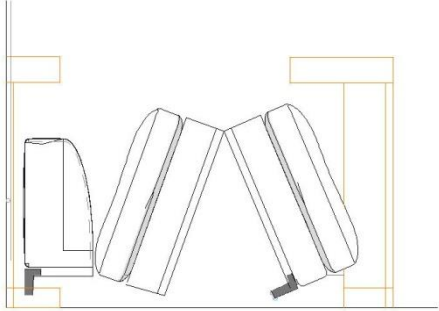
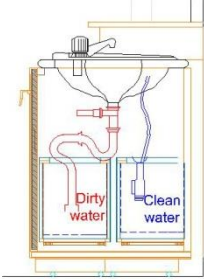
Section J-J		
(Secondary Close ( PLAN 2)), Scale: 1/100, (Personal work)		
<b>Proposed materials- Technical- Mechanism</b>		
Proposed materials	<b>High flexibility materials</b> \ texture of Alphamesh Component of copper and aluminum\ metallic threads texture	
Proposed Technical	For Main Flexible Solutions	<b>Flexible Ceilings</b> \ YO – Home, by Simon Woodroffe, UK, 2012 + Villa in Bordeaux, by Rem Koolhaas, 1998
	Wall Cabinet	Technical Information
	Kitchen	flexible kitchen designed by Tomoyuki Utsumi Japan, 2005
Proposed Mechanism	For Main Flexible Solutions + Wall Cabinet	Technical Information
	Kitchen	<b>Xi</b> – Folding Flexible joint spatent. <b>Xii</b> - Universal Sink Drain Pipe Flexible Expandable S- Trap Stainless Steel Accessory for Kitchen Lavatory <b>Xiv</b> - stainless steel wire braided flexible hose for washbasin
<b>Proposed Details plan</b>		

Bed  
down  
position  
Details  
Illustration  
Scale  
:1-25  
(Personal  
work)



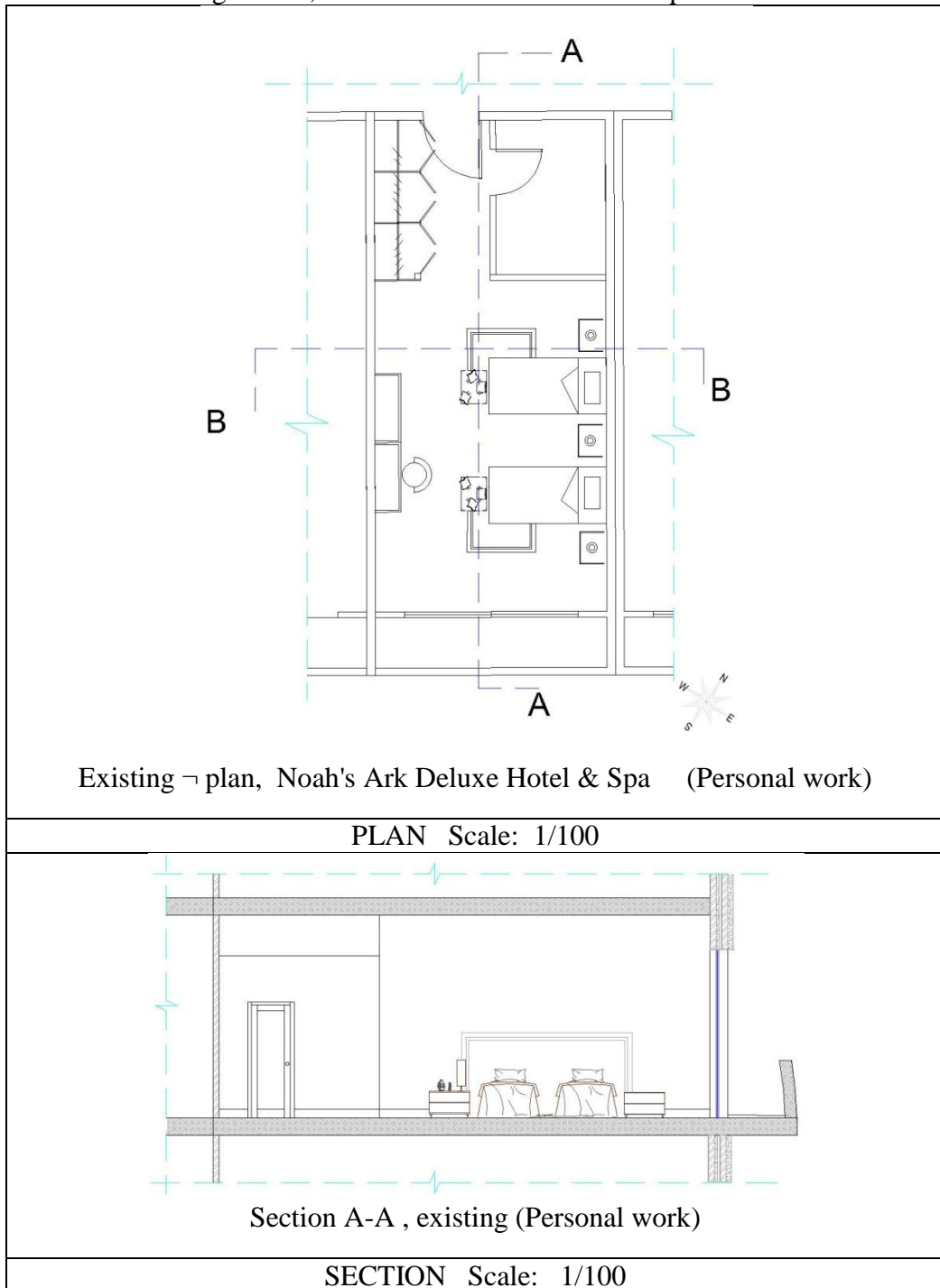
Bed up  
position  
Details  
Illustration  
Scale  
:1-25  
(Personal  
work)

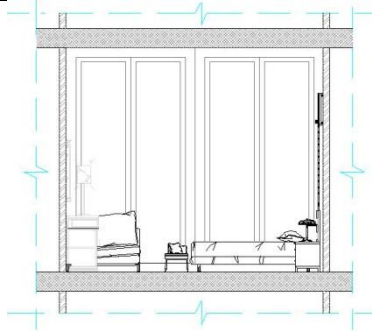


<p>Dining table Details Illustration Scale :1-25 (Personal work)</p>	
<p>Sofa Details Illustration Scale :1-25 (Personal work)</p>	
<p>Kitchen Details Illustration Scale :1-25 (Personal work)</p>	

#### 4.2.6 Case Study 6: Noah's Ark Deluxe Hotel & Spa

Table 39 : Existing - Plan, Noah's Ark Deluxe Hotel & Spa





Section B-B , existing (Personal work)

SECTION Scale: 1/100

### **Problem of Existing Salamis Bay Conti Hotel Plan**

1. The room is large but using the space in a non functional manner .
2. No sitting area .
3. No secondary beds or secondary sofa.
4. Room serve the main bed function just.
5. Is difficult to change the room use.

### **Solutions Proposed**

1. Utilize the wall elements as storage for folding furniture.
2. Adopting a foldable and multifunction furniture to save the room space .
3. Establish flexible units with ability to switch the form of functions.
4. Redesign the room in order to create the space to meet the functions need
5. Increasing the number of beds.
6. Increasing the number of functions.
7. Using sold and Manufactured flexibly to create a furniture and folding wall.
8. Adopt flexible mechanism in order to establish the folding wall and the flexible furniture units.
9. The new design of room include main bed unit, secondary bed, kitchen , dining table, living sofa, unit TV, safe, and wall cabinet.

### **The concept of proposed design**

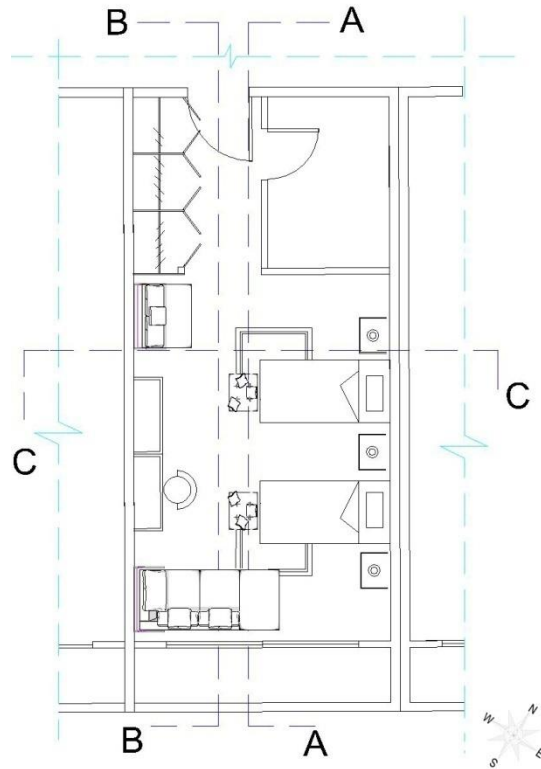
- Create moveable multifunction units that combine two pieces of furniture together such as a sleeping bed with sofa, also, bed with dining room.
- That helps the room to convert as a dining room or a bedroom by the open flexible units or close it depend on the functions use.

Table 40: Flexibility Solution Plans Of Case Study 6

Case Study 6 : Noah's Ark Deluxe Hotel & Spa

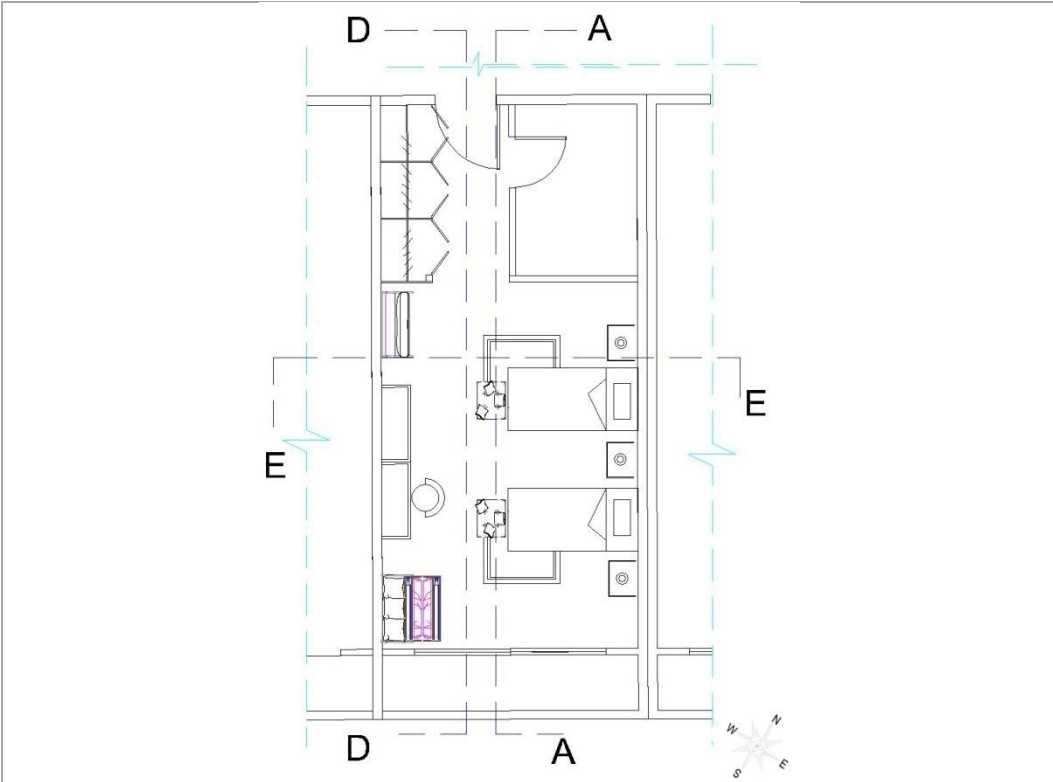
**Proposed increase capacity of bed by flexible solution**

Proposed Plans , Scale 1/100



Plan (1), Noah's Ark Deluxe Hotel & Spa proposed increase bed (Personal work)

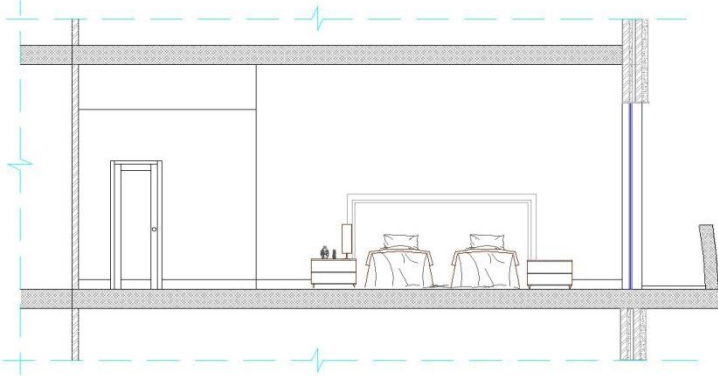
PLAN Scale: 1/100



Plan (2), Noah's Ark Deluxe Hotel & Spa proposed increase bed (Personal work)

PLAN Scale: 1/100

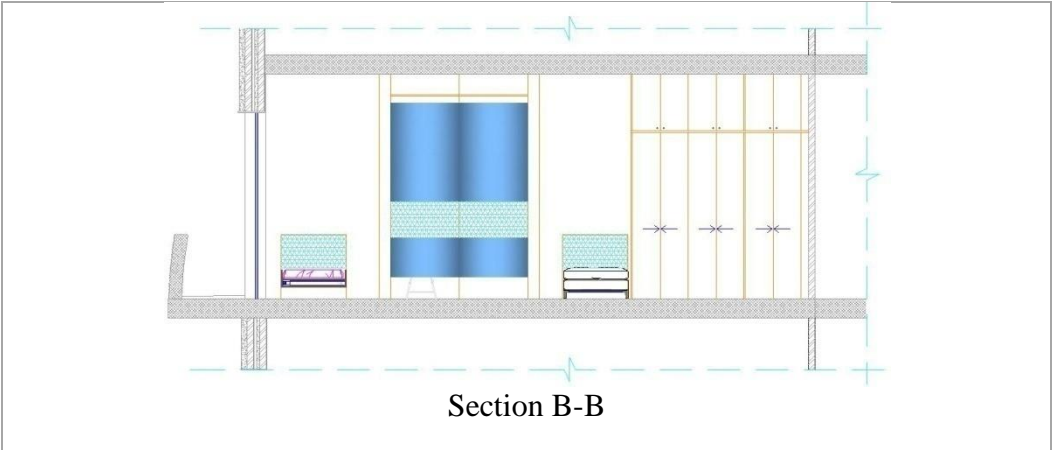
Section 1/100



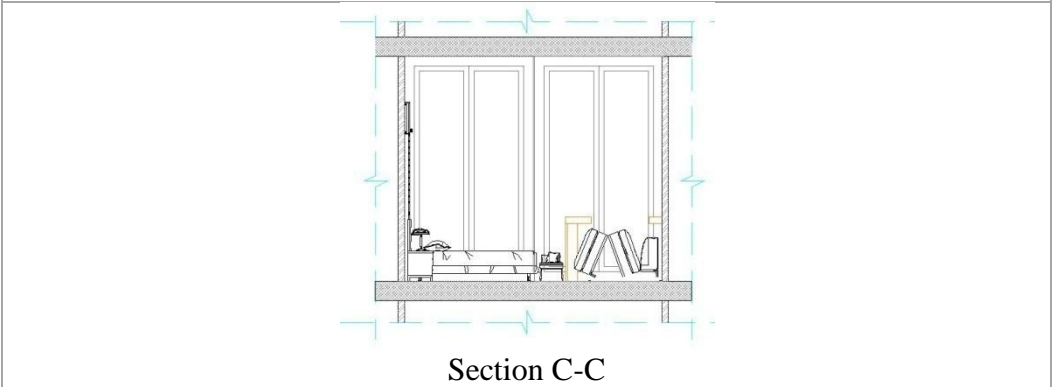
Section A-A

(Plan 1+2),(Personal work)

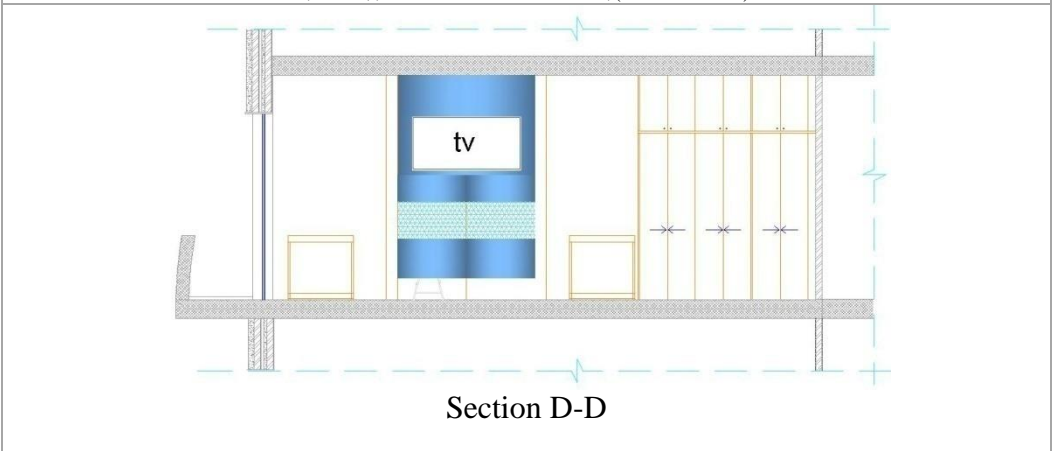




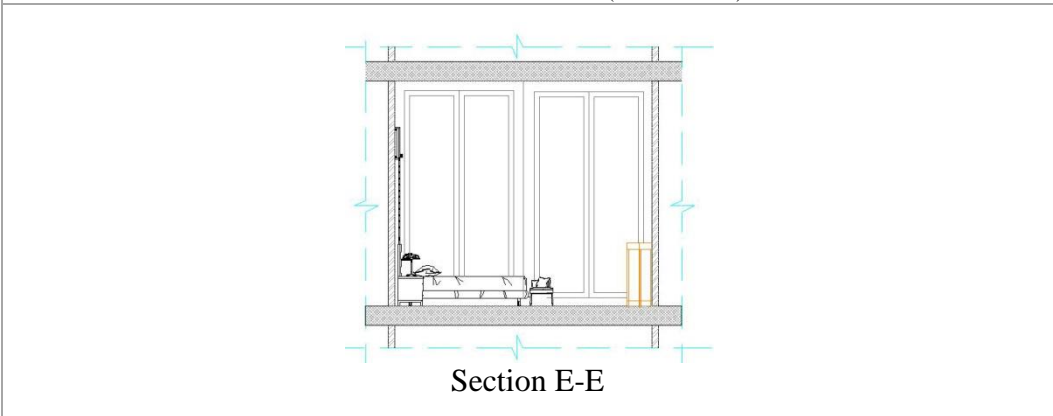
(Plan 1), Scale: 1/100 ,(Personal work)



(Plan 1), Scale: 1/100 ,(Personal work)

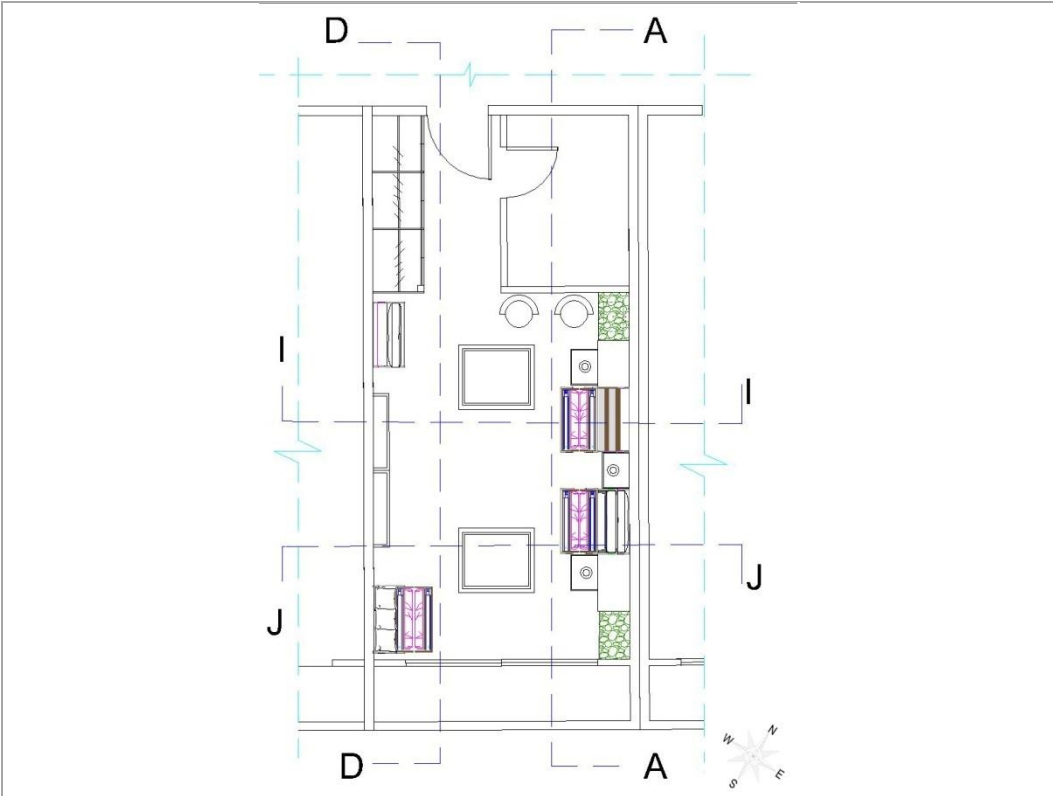


(Plan 2), Scale: 1/100 ,(Personal work)



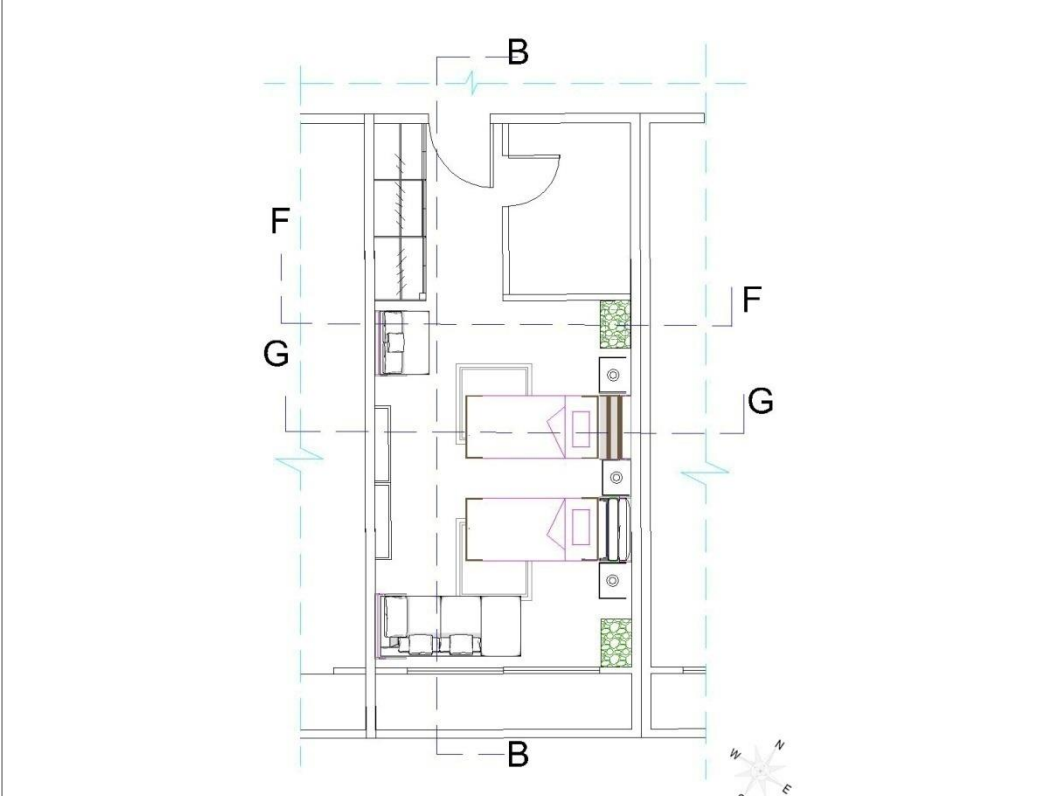
(Plan 2), Scale: 1/100 ,(Personal work)

<b>Proposed materials- Technical- Mechanism</b>		
Proposed materials	<p><b>High flexibility materials</b> \ texture of Alphamesh Component of copper and aluminum\ metallic threads texture</p> <p><b>Solid materials used in finishing and decoration work in a flexible manner</b> \ Ultra-Flexible Snowflake Curtain\ <b>Manufactured flexibly</b>\ Benjamin Hubert's Amass Modular Curtain System \ Hexagon shaped</p>	
Proposed technical	Secondary Bed	<p><b>Flexible Furniture Design</b> \</p> <p>Foldable Furniture</p> <p><i>(flexible bed designed by Alberto S and Ambrogio T, Italy, 1967)</i></p>
	Wall Cabinet	Technical Information
Proposed Mechanism	Secondary Bed	<p><b>Mechanism of Flexible Construction Tools</b></p> <p><i>Flexible joints \NV01, by Noir Vif, Paris, 2013</i></p> <p><i>Folding Flexible joint spatent no. US 3779176 A</i></p>
	Wall Cabinet	Technical Information
<b><u>Proposed increase function by flexible solution</u></b>		



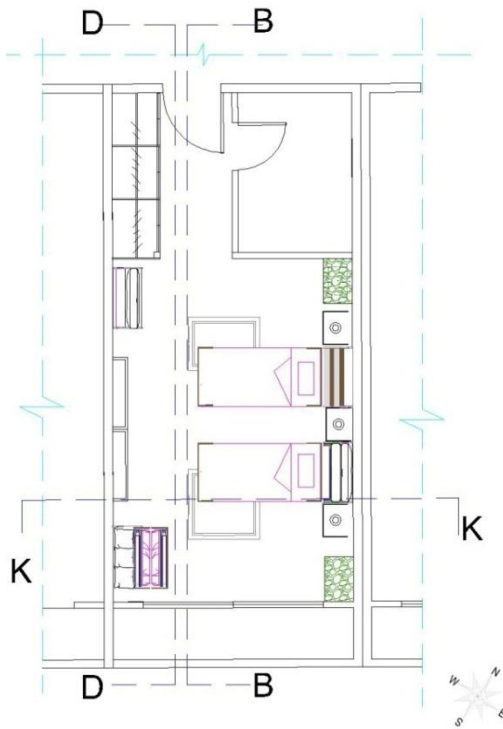
Plan (1) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

Plan Scale: 1/100



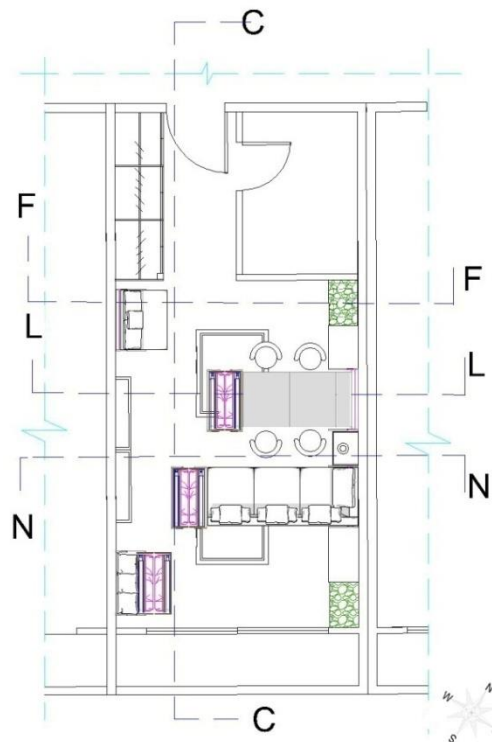
Plan (2) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

Plan Scale: 1/100



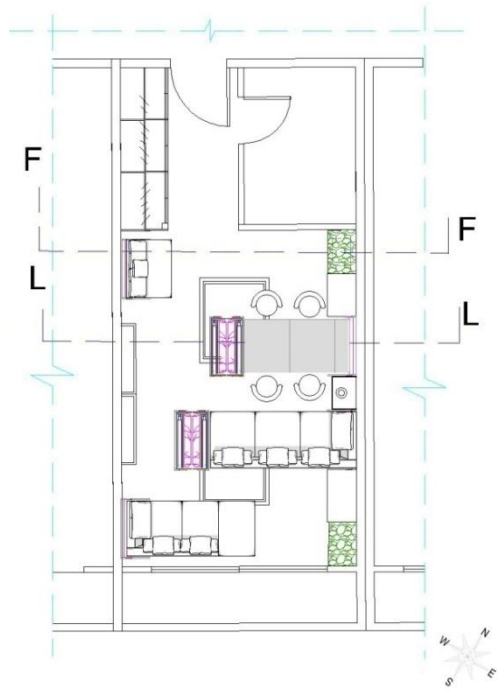
Plan (3) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

Plan Scale: 1/100



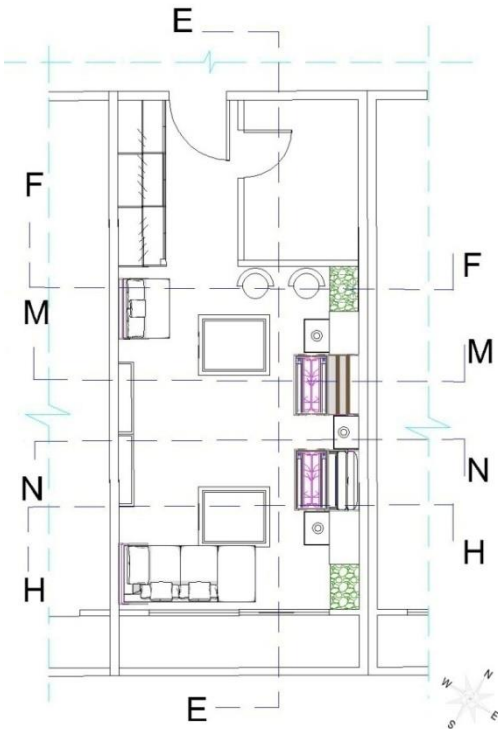
Plan (4) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

Plan Scale: 1/100



Plan (5) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

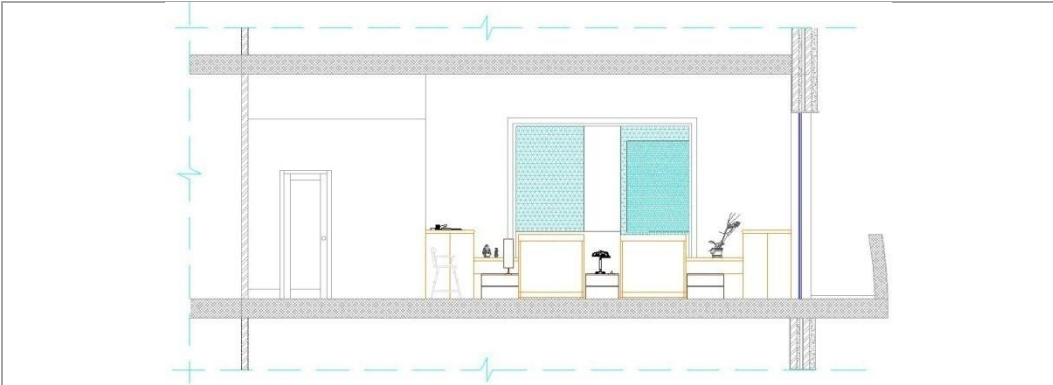
Plan Scale: 1/100



Plan (6) , Noah's Ark Deluxe Hotel & Spa proposed increase beds and function (Personal work)

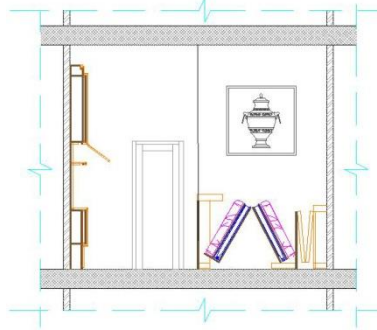
Plan Scale: 1/100

Section 1/100



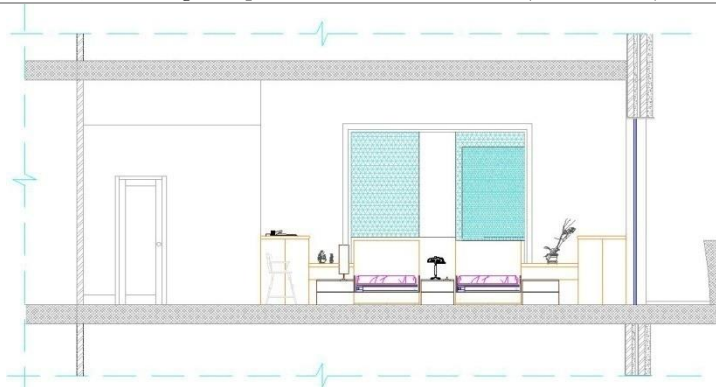
Section A-A

(Close Folding Bed all (( plan 1)) Scale: 1/100 / , (Personal work)



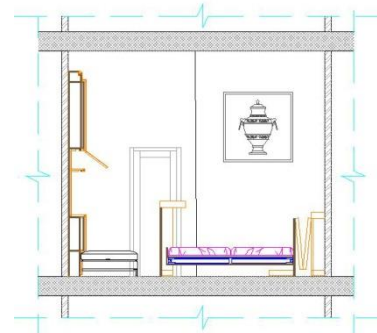
Section I - I

(Close Folding Bed ( plan 1))Scale: 1/100 / , (Personal work)



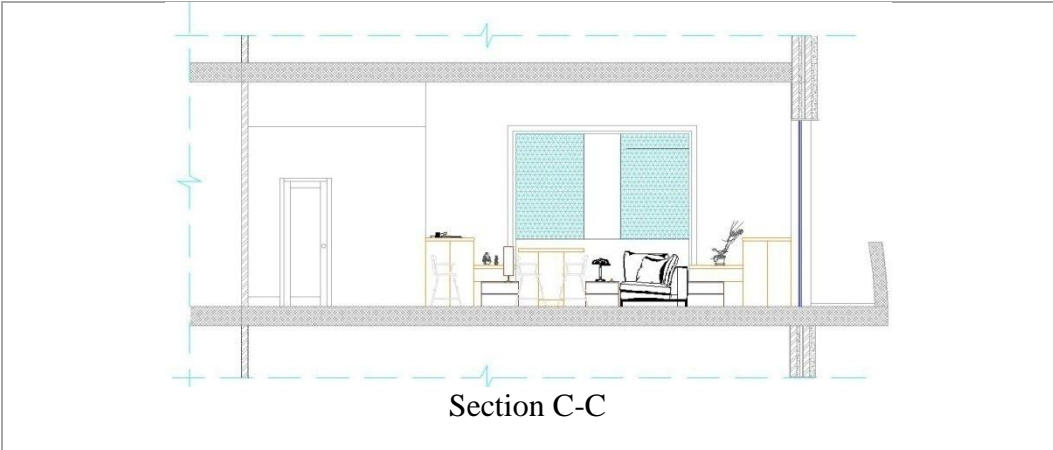
Section B-B

(Open Folding Bed ( plan 2+3), Scale: 1/100 / , (Personal work)

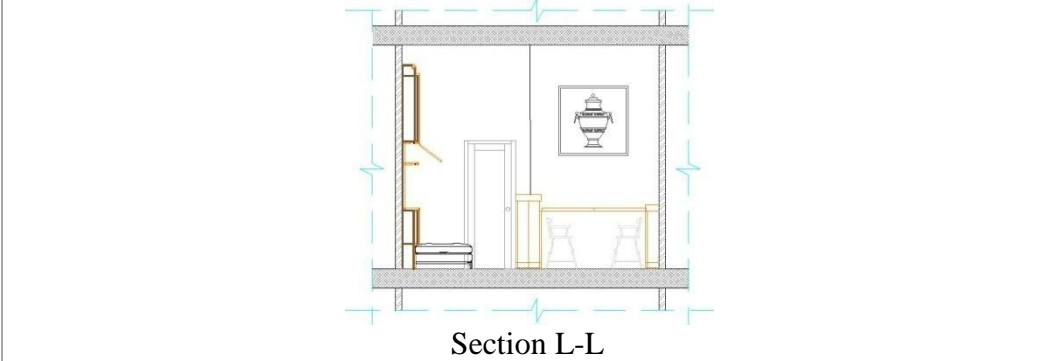


Section G-G

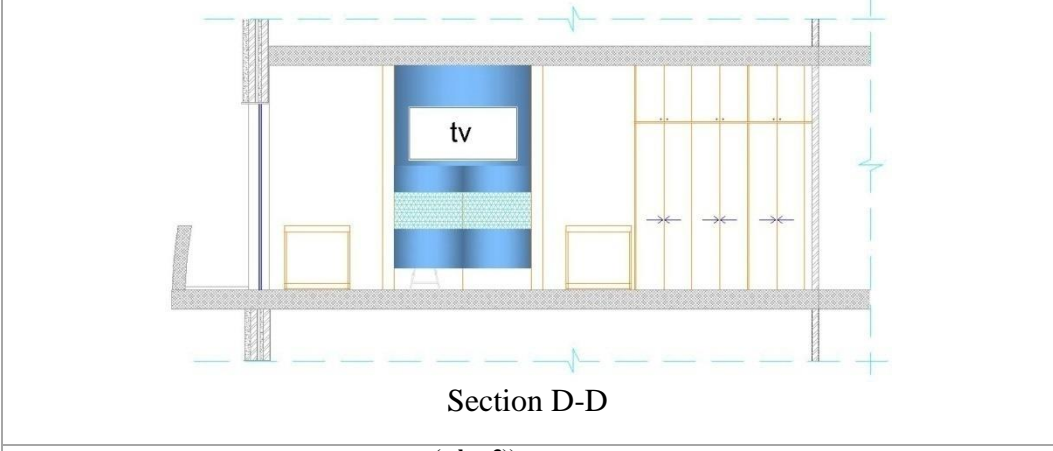
(Open Folding Bed (( plan 2)), Scale: 1/100 / , (Personal work)



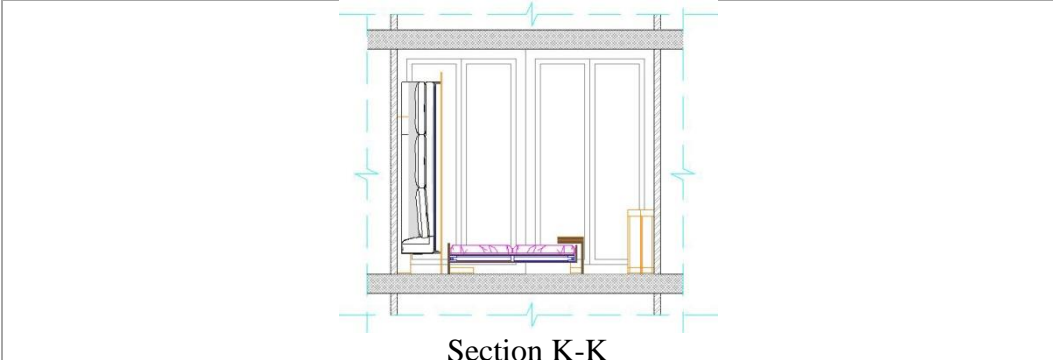
(Close Folding Bed type 1 + Open Folding Bed type 2 ( plan 4) ), Scale: 1/100 / , (Personal work)



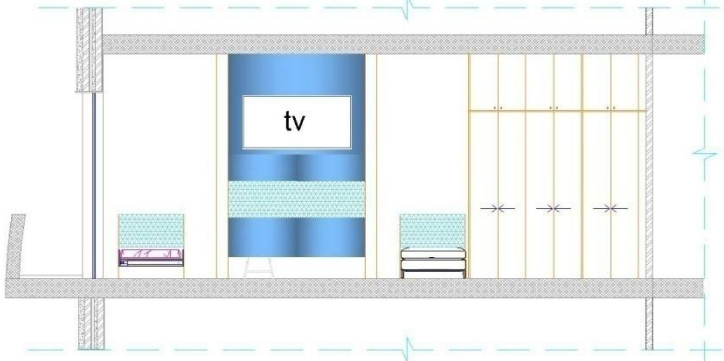
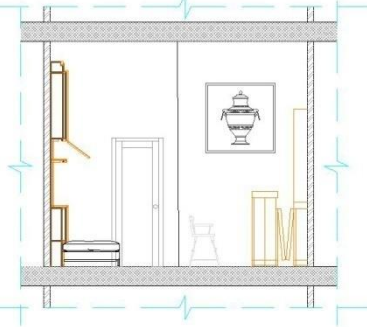
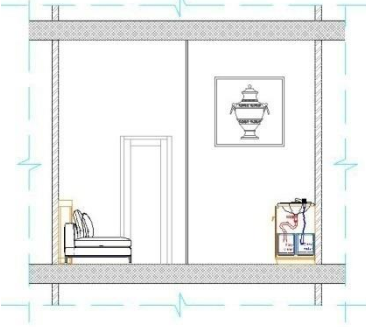
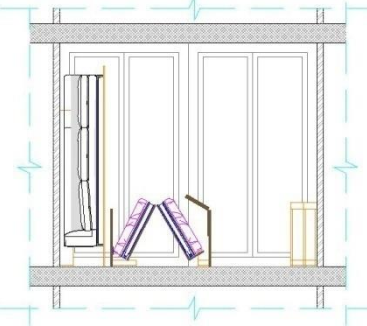
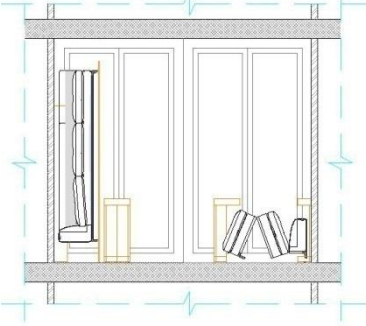
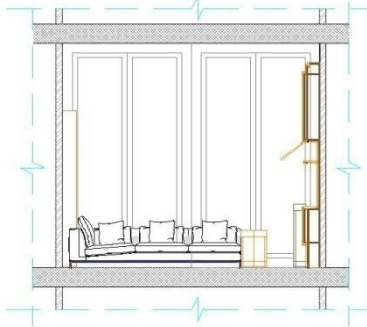
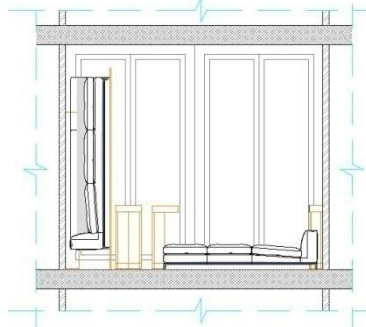
(Open Dining Table ( plan 4+ 5) ), Scale: 1/100 / , (Personal work)



(Unit TV + Close Folding sofas ( plan 3) ), Scale: 1/100 / , (Personal work)



(Open Folding Bed type 2 ( plan 3) ), Scale: 1/100 / , (Personal work)

 <p>Section E-E</p>	
 <p>Section M-M</p>	 <p>Section F-F</p>
<p>(Unit TV + Open Folding sofas ( plan 6) ) , Scale: 1/100 / , (Personal work)</p>	<p>Kitchen ( All plan ) , Scale: 1/100 / , (Personal work)</p>
 <p>Section J-J</p>	 <p>Section J-J (2)</p>
<p>(Open Folding bed type 2( plan 1))Scale: 1/100 / , (Personal work)</p>	<p>(Close Folding bed type 2 ( plan 1)) Scale: 1/100 / , (Personal work)</p>
 <p>Section N-N</p>	 <p>Section H-H</p>
<p>(Folding sofa open + Close Folding bed type 2 (plan 6)) , Scale: 1/100 / , (Personal work)</p>	<p>(wall sofa up + Folding sofa open (plan 6) ) , Scale: 1/100 / , (Personal work)</p>



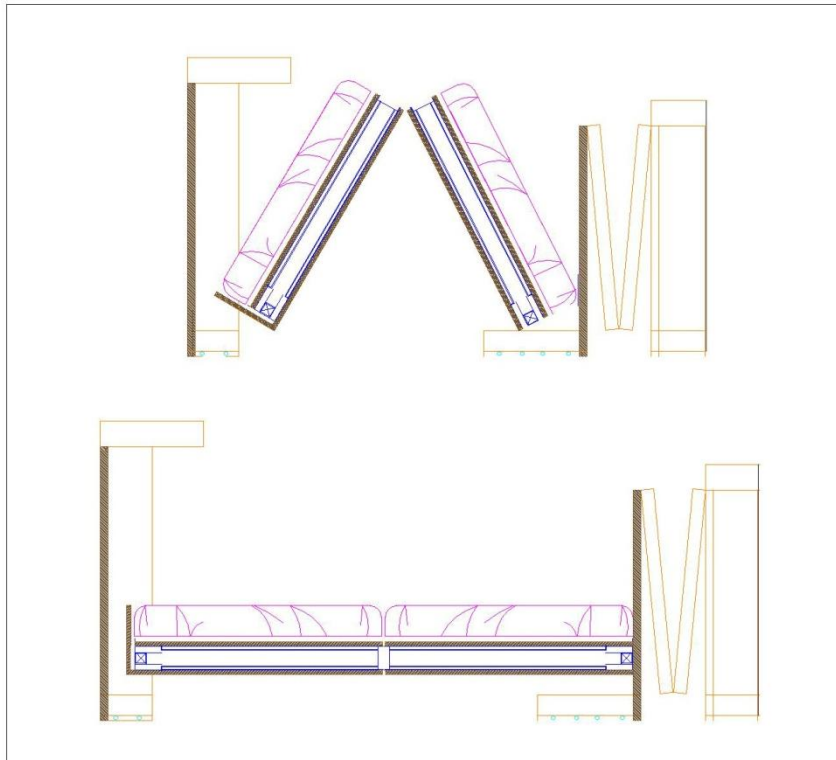
<b>Proposed materials- Technical- Mechanism</b>		
Proposed materials	<p><b>High flexibility materials</b> \ texture of Alphamesh Component of copper and aluminum\ metallic threads texture</p> <p><b>Solid materials used in finishing and decoration work in a flexible manner</b> \ Ultra-Flexible Snowflake Curtain\  <b>Manufactured flexibly</b>\ Benjamin Hubert's Amass Modular Curtain System \ Hexagon shaped</p>	
Proposed Technical	For Main Flexible Solutions	<p><b>Type of Flexible small living</b> \ Multi-folding flexibility</p> <p><b>Flexible Furniture Design</b> \ Foldable Furniture</p> <p>Tuttuno by (Carlo B , Gianni F , Nilo G), Italy, 1969 (1971)</p>
	For Main Bed unit	<b>Flexible Furniture Design</b> \ Foldable Furniture
	Main living room	<b>Flexible Furniture Design</b> \ Foldable Furniture
	Secondary Bed	<b>Flexible Furniture Design</b> \ Foldable Furniture <i>(flexible bed designed by Alberto S and Ambrogio T, Italy, 1967)</i>
	Wall Cabinet	Technical Information
	Kitchen	flexible kitchen designed by Tomoyuki Utsumi Japan, 2005
Proposed Mechanism	For Main Flexible Solutions	<p><b>Type of Flexible small living</b> \ Multi-folding flexibility</p> <p><b>Flexible Furniture Design</b> \ Foldable Furniture</p> <p>Tuttuno by (Carlo B , Gianni F , Nilo G), Italy, 1969 (1971)</p>
	For Main Bed unit	Foldable Furniture
	Secondary Bed	<b>Mechanism of Flexible Construction Tools</b> <i>Flexible joints \NV01, by Noir Vif, Paris, 2013</i> <i>Folding Flexible joint spatent no. US 3779176 A</i>
	Wall Cabinet	Technical Information
	Kitchen	<p><b>Xi</b> – Folding Flexible joint spatent.</p> <p><b>Xii</b> - Universal Sink Drain Pipe Flexible Expandable S- Trap Stainless Steel Accessory for Kitchen Lavatory</p> <p><b>Xiv</b> - stainless steel wire braided flexible hose for washbasin</p>
<b>Proposed Details plan</b>		

Multi-folding  
flexibility  
Furniture(BE  
D Dining  
table)

Type one  
Details

Illustration  
Scale :1-25

(Personal work)

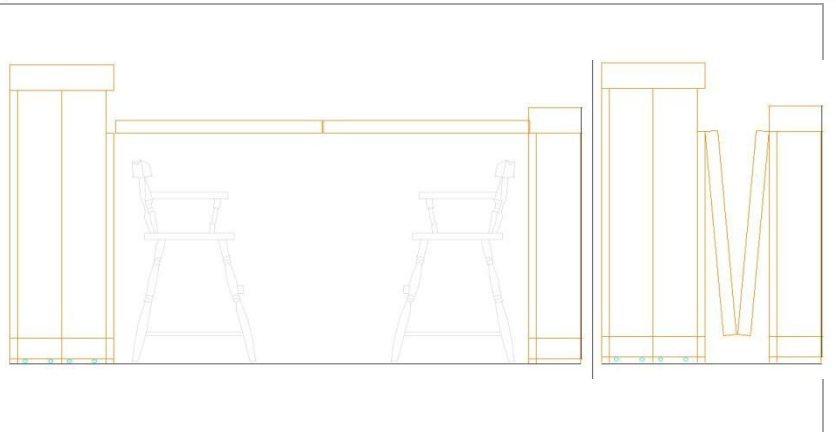


Multi-folding  
flexibility  
Furniture(BE  
D + Dining  
table)

Type one  
Details

Illustration  
Scale :1-25

(Personal work)

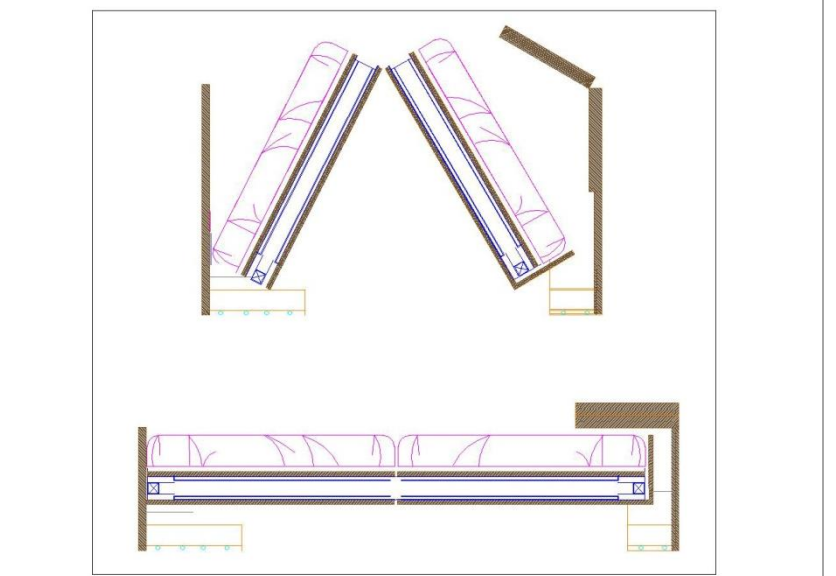


Multi-folding  
flexibility  
Furniture(BE  
D)

Type Two

Details  
Illustration  
Scale :1-25

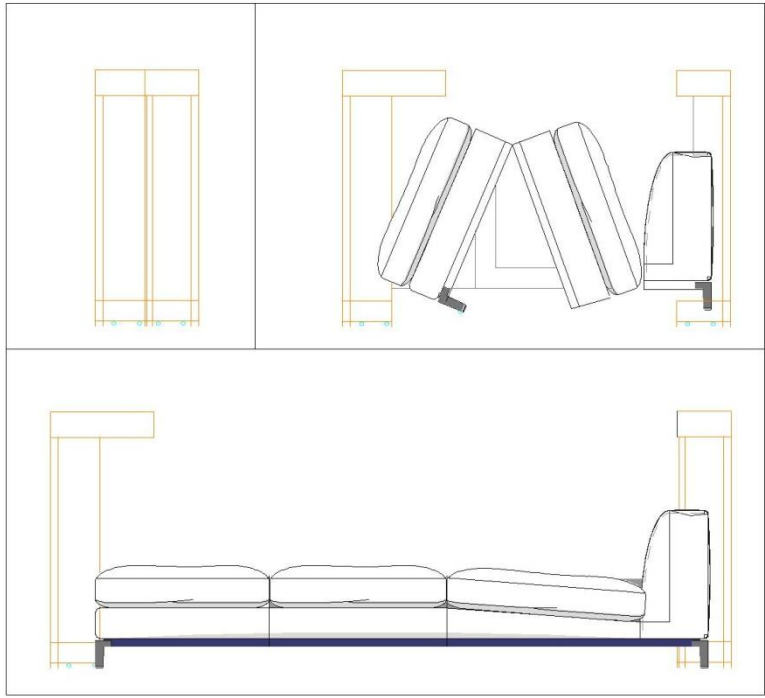
(Personal work)



Multi-folding  
flexibility  
Furniture(sofa  
)

Type Three

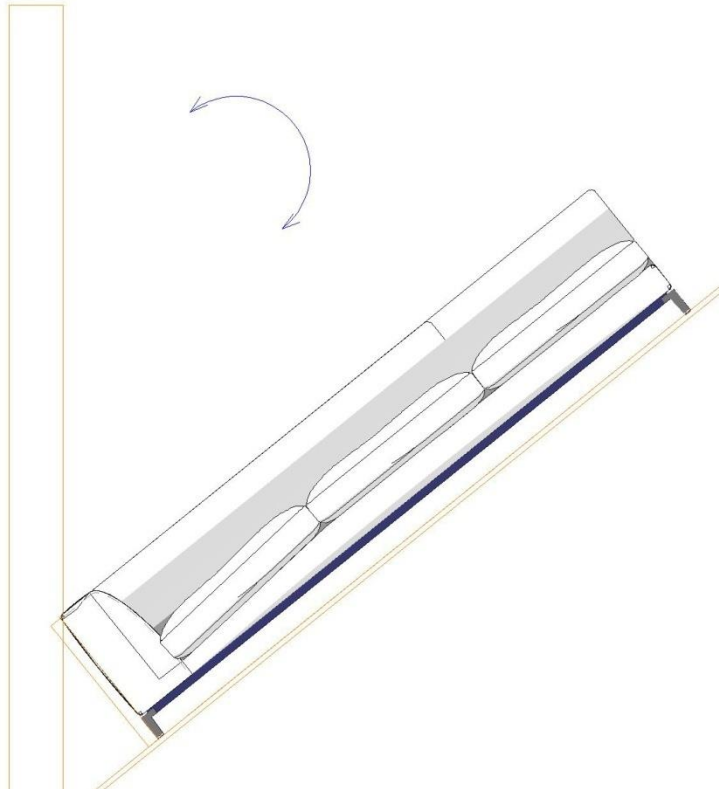
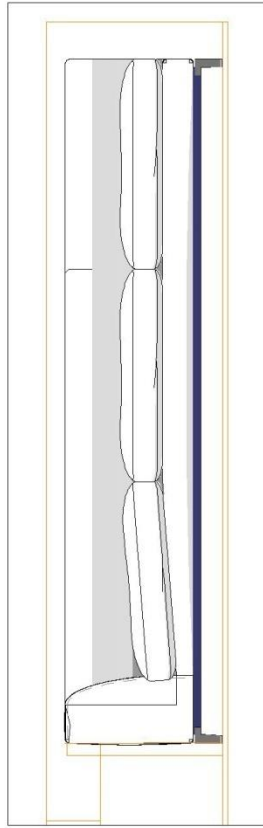
Details  
Illustration  
Scale :1-25  
(Personal work)

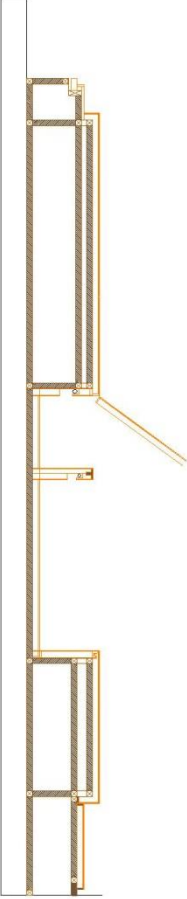
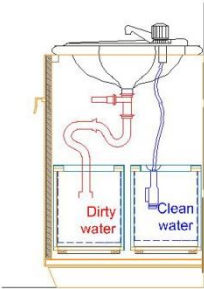


Multi-folding  
flexibility  
Furniture(sofa  
)

Type Three

Details  
Illustration  
Scale :1-25  
(Personal work)



<p>TV UNIT</p> <p>Details Illustration Scale :1-25 (Personal work)</p>	
<p>KITCHEN</p> <p>Details Illustration Scale :1-25 (Personal work)</p>	

### 4.3 Evaluation The Analysis Of The Six Selected Case Studies

The purpose of this section is to analyze the findings for the case studies that will be done with the light of a previous section (Flexibility Solutions) by analyzing plans and sections that had been drawn for the proposed case studies.

### 4.3.1 Introduction

The analysis phase goes by checking up the flexible solutions according to literature review through the table : Evaluation Of Flexible Solutions which is focused on the plans and sections that have been applied to the case study and the second table :The Effect Of Flexibility which makes comparisons on a case study after applying the solutions of flexibility on it with the existing plan.

The points utilized to check up the flexible solution based on the literature review in the Table Evaluation of Flexible Solution are:

1. **Patterns of Flexibility:** 1.A- Spatial (structural) flexibility 1.B- Functional flexibility 1.C- Character flexibility
2. **Type of Flexibility:**2.A- Sliding walls 2.B- Transforming elements 2.C- Pop-Up Interactive Unit 2..D- Multi-folding flexibility
3. **Flexible FurnitureDesign**3.A- Movable Furniture3.B- Modular Furniture 3.C- Foldable Furniture3.D- multiple functions
4. **Flexible materials used:**4.A- Solid materials 4.B- High flexibility materials 4.C- Manufactured flexibly:
5. **Elements of flexibility within the internal structure:**5.A- Wall 5.B- Floor 5.C- Ceiling
6. **Mechanism of Flexible:**6.A- Mechanism of Flexible Construction Tools 6.B- Mechanism of Flexible Plumbing Extensions Tools 6.C - Mechanism of Flexible Furniture6.D- Mechanism of Flexible Wall
7. **Main FlexibleUnit:**7.A- Main Bed unit 7.B- Unit TV 7.C- Secondary Bed 7.D- Wall Cabinet 7.E- Kitchen 7.F- Dining Table 7.G - Living Sofa zone.

Then explains the point that on the tables in case had been applied or not on the case study plans that according to the light of flexible solutions use in the previous section (Flexibility Solution).

As well , a prove the effect of applying the flexible solutions for each case study through comparing the increase in the number of beds and the increase in the number of functions as following :(Main Bed unit , Secondary Bed, Kitchen , Dining Table, Living sofa , Unit TV, Mine bar, Safe , and Wall Cabinet)with the existing plan of the hotel.

Note: All standard rooms of hotel case studied in compliance with the regulations and laws submitted by (TRNC), as mentioned in table 31.

### 4.3.2 Case Study 1

Table 41: Evaluation of Flexible Solutions Case Study 1

Hotel Name		Salamis Bay			
Proposed Flexible solutions			Yes	No	
<b>1</b>	<b>Patterns of Flexibility</b>				
		A	<i>Spatial flexibility</i>	√	
		B	<i>Functional flexibility</i>	√	
		C	<i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>				
		A	<i>Sliding walls</i>	√	
		B	<i>Transforming Elements</i>	√	
		C	<i>Pop-Up Interactive</i>		
		D	<i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>				
		A	<i>Movable Furniture</i>	√	
		B	<i>Modular Furniture</i>		
		C	<i>Foldable Furniture</i>	√	
		D	<i>multiple functions</i>	√	
<b>4</b>	<b>Flexible Materials in interior design</b>				
		A	<i>Solid materials</i>	√	
		B	<i>High flexibility materials</i>		
		C	<i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within the internal structure</b>				
		A	<i>Wall</i>	√	
		B	<i>Floor</i>		
		C	<i>Ceiling</i>	√	
<b>6</b>	<b>Mechanism of Flexible</b>				
		A	<i>Mechanism of Flexible Construction Tools</i>	√	
		B	<i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
		C	<i>Mechanism of Flexible Furniture</i>	√	
		D	<i>Mechanism of Flexible Wall</i>	√	
<b>7</b>	<b>Main Flexible Unit</b>				
		A	<i>Main Bed unit</i>	√	
		B	<i>Unit TV</i>	√	
		C	<i>Secondary Bed</i>	√	
		D	<i>Wall Cabinet</i>	√	
		E	<i>Kitchen</i>	√	
		F	<i>Dining Table</i>	√	
		G	<i>Living Sofa zone</i>	√	



The above table 41 highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. The Patterns of flexibility:

- **1.A- Spatial flexibility (structural):**Used in this case study by Infill system that by use (*mechanical systems ducts, partition walls, kitchen, doors, conduits for electricity, heating, and water*).

Also, by adopting *elements of fixed by use*(*retaining wall, mechanical systems ducts*). And adopting *structural elements, access units, and servicing*.

- **1.B- Functional flexibility:** Used in this case study by :
  - Adopting folding furniture in the secondary bed and dining table.
  - Adopting a movable unit in kitchen units.
  - Adopting a movable wall in beds units.
  - Adopting sliding wall in wall cabinet.
- **1.C-Character flexibility:** Used in this case study by using function unit alone without interfering another functions such as the bed's function or the kitchen's function.

### 2. Type of Flexibility :

- **2.A- Sliding walls :**Used in main beds by hanging the beds on the plank to have the option to store inside the wall and used in the door of cabinet.
- **2.B- Transforming elements:** Adopted in movable kitchen unit through designing the kitchen as a movable box.

- **2.C- *Pop-Up Interactive Unit***: This type is not applied for this propose, because this type is concerned with creating boundaries consisting of the function without needing structural breaks and sections.
- **2.D- *Multi-folding flexibility*** :Used in the dining table that is linked to the kitchen unit.

### **3. Flexible Furniture Design :**

- **3.A- *Movable Furniture***: Adopted in the kitchen unit through designing it as a movable box but to move it horizontally in both directions forward and backward to make it easier to use.
- **3.B- *Modular Furniture***: This type is not applied for this purpose , because it depends on dividing the unit into several parts and installing them in different designs according to the required function.
- **3.C- *Foldable Furniture***: Used in the secondary bed with the option of closing until needed and with the dining table that is linked to the kitchen unit.
- **3.D- *Multiple functions***: Adopted in the dining table that is linked with the kitchen unit to allow the *movable box* to move horizontally in both directions forward and backward to make it easier to use.

### **4. Flexible materials used:**

- **4.A- *Solid materials***: Used in cladding beds and kitchen units.
- **4.B- *High flexibility materials***: This type is not applied for this purpose.
- **4.C- *Manufactured flexibly***: Used in the sofa to change the shape in order to facilitate its use. Also used in sofa, pillow and mattress because it is easy to form and it is comfortable.

### **5. Elements of flexibility within the internal structure :**

- **5.A- Wall:** Adopt the wall as a furniture storage unit and extract it when it is being used.
- **5.B- Floor:** This type is not applied for this propose, because it adopts the floor as a storage unit and extract it when it is being used.
- **5.C- Ceiling:** This type is not applied for this propose, because it adopts the ceiling as a storage unit and extract it when it is being used.

## 6. Mechanism of Flexible :

- **6.A- Mechanism of Flexible Construction Tools:** Applied to extend the electricity to the water motor for the kitchen unit, by using Flexible tubes hoses lot or China TPU wire .
- **6.B- Mechanism of Flexible Plumbing Extensions Tools :** Applied in the kitchen unit, where the use of two tanks one for fresh water and another one for wastewater.
- **6.C - Mechanism of Flexible Furniture :** Applied to main beds stored inside the wall using SBLM Mechanism to move the bed into walls or extract to use.
  - Applied in the secondary bed by using Model No. WJ9350 to allow it to be folded until being used.
  - Applied in the dining tablet that is connected to the kitchen unit by Sliding Gear System For Folding Furniture, but in a horizontal manner to allow it to expand and contract according to the use case
- **6.D- Mechanism of Flexible Wall:** Applied on wall cabinet doors with a machine Track and Panel types from Mechanism of Flexible Wall part .

## 7. Main Flexible Unit :

- **7.A- Main Bed unit** : Designed in a flexible unit that can be moved and stored inside the wall with a scale of (width 2.1<sub>M</sub>X high 1<sub>M</sub>) for each bed separately, the result for this design that it does not take a permanent space in the room and can make use of the space allocated for the bed while using the space for another function.
- **7.B- Unit TV** : Designed in a separate unit with a scale of (width 2.4<sub>M</sub>X high 3<sub>M</sub>) consisting of two parts; first part from the top design is television board and from the bottom design is a dresser opposite to the main beds and sofa.
- **7.C-Secondary Bed** :The unit situated in the bottom of the TV unit with a scale of ( width2.1<sub>M</sub> X length 1<sub>M</sub>). Moreover, it is established as a folding flexible unit whose characteristic is foldable shape to use it as box or opened to be a bed.
- **7.D- Wall Cabinet**: Consisting of 3 sections featuring the sliding doors installed on a bridge that allows them to be cascaded in front of each other without needing space to open them.
- **7.E-Kitchen** : Designed from a unit that contains a portable sink with two water tanks .
- **7.F- Dining Table**: Consists of two wood boxes linked together through *Sliding Gear System* but in a horizontal manner to allow it to expand and contract according to the use case that is linked to the kitchen unit (the sink).
- **7.G -Living Sofa zone**: Designed with a three-seat sofa near the wall for flexible bed storage and in front of the TV unit. Moreover, preferably the material is manufactured flexible because it is easily formed and

does not constitute an obstacle to using the beds unit when opening them from the wall.

Table 42: The Effect of Flexibility Case Study 1

	Room Twin Beds			Existing Plan	Flexibility Solution
<b>1</b>	<b>Number of beds</b>			$912 \text{ rooms} \times 2 = \mathbf{1824}$	$1824 \times \%50 = \mathbf{2736}$
<b>2</b>	<b>Control of beds number</b>			stable	Yes
<b>3</b>	<b>Increase number of beds</b>			stable	Yes
<b>4</b>	<b>Number of functions</b>			<b>6Function</b>	<b>9Function</b>
		<i>A</i>	<i>Main Bed unit</i>	√	√
		<i>B</i>	<i>Secondary Bed</i>		√
		<i>C</i>	<i>Kitchen</i>		√
		<i>D</i>	<i>Dining Table</i>		√
		<i>E</i>	<i>Living sofa</i>	√	√
		<i>F</i>	<i>TV Unit</i>	√	√
		<i>G</i>	<i>Mine bar</i>	√	
		<i>H</i>	<i>Safe</i>	√	√
		<i>I</i>	<i>Sofa bed</i>		
		<i>J</i>	<i>Secondary Sofa</i>		
		<i>K</i>	<i>Wall Cabinet</i>	√	√
<b>5</b>	<b>Control of functions number</b>			stable	Yes
<b>6</b>	<b>Increase number of functions</b>			stable	stable

### Effects of Flexibility

- 1. Number of beds:** Increased by 50% percent more than what is designed by the existing plan.
- 2. Control of beds number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.

**3. Increase number of beds:** Through flexible solutions, the number of beds is increased, while the existing design is committed to a fixed number.

**4. Number of functions:** The number of functions when applying flexible solution increased a sit reached 9 functions with the feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows :

- **4.A- Main Bed unit:**

- **Existing plan :** The existing plan adopts a fixed type of beds
- **Flexibility solution:** Establishes two main beds of the same size with the distinguishable ability of storing them inside the wall unit.

- **4.B- Secondary Bed:**

- **Existing plan :** There is no secondary bed within the existing design.
- **Flexibility solution :** The design offers the secondary bed within flexible solutions in the case of hidden units until needed.

- **4.C- Kitchen:**

- **Existing plan:** There is no kitchen unit within the existing design.
- **Flexibility solution:** Designs a moveable kitchen unit within the function used in the space without affecting the space.

- **4.D- Dining Table :**

- **Existing plan :** There is no dining table within the existing design.

- **Flexibility solution** : The design of a foldable dining table can be used in a useful way for dining or for purposes of serving the sink.
- **4.E-Living sofa** :
  - **Existing plan**: consists of two chairs and a tea table in the middle.
  - **Flexibility solution**: Through the flexible solution, the room space is completely formed to become a living room consisting of the furniture in existing design and the addition of a three-seat sofa.
- **4.F- TV Unit** :
  - **Existing plan**: There is a TV hanging to a separate unit fixed to the wall.
  - **Flexibility solution**: Found within a unit dedicated to two functions together, from the top to a television and from the bottom to a dresser.
- **4.G- Mini bar**
  - **Existing plan**: The existing design is customized within the hotel's table space for serving drinks.
  - **Flexibility solution**: It does not exist in flexible solutions and replaces it with a kitchen unit and dining table.
- **4.H-Safe**:
  - **Existing plan** : Determine its place within a part of the Wall Cabinet in the existing design .
  - **Flexibility solution**: It can be added to any place within the proposed furniture easily.

- **4.H- Sofa Bed :**

- **Existing plan :** There is no sofa bed within the existing design.
- **Flexibility solution :** adopted in the folding secondary bed unit .

- **4.H-SecondarySofa :**

- **Existing plan :** There is no secondary sofa within the existing design.
- **Flexibility solution :** There is no secondary sofa within the Flexibility solution replaced with flexible sofa .

- **4.K- Wall Cabinet :**

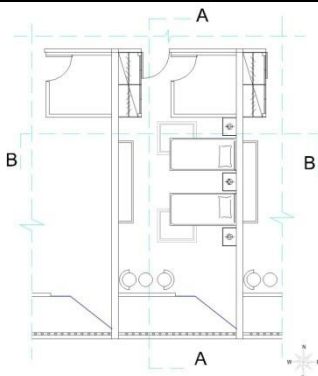
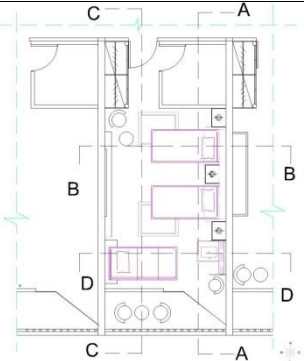
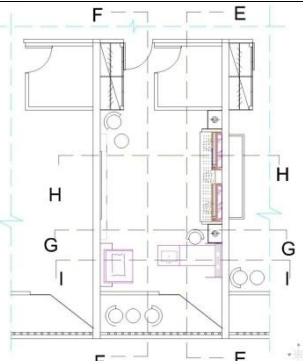
- **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
- **Flexibility solution:** The flexible solution adopted the sliding door in the wall cabinet to provide easy use for customers and utilize space by not reserving space for the doors.

**5. Control of functions' number:** Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.

**6. Increase number of functions:** Through flexible solutions, the number of functions can be increased, while the existing design is committed to a fixed number.



Table 43: Significant Study of Case Study 1 Salamis Bay Conti Hotel

<b>Existing plan</b>	
 <p style="text-align: center;"><i>Salamis Bay Conti Hotel (Personal work) Scale: 1/200</i></p>	
<b>Proposed Plan</b>	
 <p style="text-align: center;"><i>Proposed Plan (1) (Personal work) Scale: 1/200</i></p>	 <p style="text-align: center;"><i>Proposed Plan (2) (Personal work) Scale: 1/200</i></p>
NO	<b>Significant Finding Study for Proposed Design</b>
1	Use features of flexibility in order to create a room with more facilities.
2	The secondary bed became a part of the beds' number calculated in the standard rooms .That increase in the number of beds to reach 50% of the total number.
3	Increase the number of functions
4	Use function without interfering with the other functions.
5	Making possible to room form to another types by separation or reconfiguration.

**1. Use features of flexibility in order to create a room with more facilities.**

That by applying the flexibility as tool into the proposed design in order to create a changeable room .

2. **The secondary bed became a part of the beds' number calculated in the standard rooms .That increase in the number of beds to reach 50% of the total number.**

That by adding secondary bed to each room , where is no need to store it out of room.

3. **Increase the number of functions.**

The proposed design create the room with secondary bed, kitchen, dining table, living sofa, unit TV, and wall cabinet to became as a parts of the room.

4. **Use function without interfering with the other functions.**

The proposed design uses the structure elements to storage the furniture and keep it inside it until need in order to not interfering another functions.

5. **Making possible to room form the types by separation or reconfiguration.**

The concept of proposed design is to storage the beds inside the element wall. In addition, the design established the living room furniture with the option to make it by flexible material and situated inside the room.And give ability to open the main beds on the main sofa to change the type of room to be bedroom.

The significant finding in this case study is improve using the space size. In addition, establish changeable space that can change the type of room such as living room, kitchen, and bedroom.

### 4.3.3 Case Study 2

Table 44: Evaluation of Flexible Solutions Case Study 2

Hotel Name		Arkin Palm Beach Hotel		
Proposed Flexible solutions		Yes	No	
<b>1</b>	<b>Patterns of Flexibility</b>			
	A	<i>Spatial flexibility (structural)</i>	√	
	B	<i>Functional flexibility</i>	√	
	C	<i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>			
	A	<i>Sliding walls</i>	√	
	B	<i>Transforming Elements</i>		√
	C	<i>Pop-Up Interactive</i>	√	
	D	<i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>			
	A	<i>Movable Furniture</i>	√	
	B	<i>Modular Furniture</i>		√
	C	<i>Foldable Furniture</i>	√	
	D	<i>multiple functions</i>	√	
<b>4</b>	<b>Flexible Materials in interior design</b>			
	A	<i>Solid materials</i>	√	
	B	<i>High flexibility materials</i>		√
	C	<i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within the internal structure</b>			
	A	<i>Wall</i>	√	
	B	<i>Floor</i>	√	
	C	<i>Ceiling</i>		√
<b>6</b>	<b>Mechanism of Flexible</b>			
	A	<i>Mechanism of Flexible Construction Tools</i>	√	
	B	<i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
	C	<i>Mechanism of Flexible Furniture</i>	√	
	D	<i>Mechanism of Flexible Wall</i>	√	
<b>7</b>	<b>Main Flexible Unit</b>			
	A	<i>Main Bed unit</i>	√	
	B	<i>Unit TV</i>	√	
	C	<i>Secondary Bed</i>	√	
	D	<i>Wall Cabinet</i>	√	
	E	<i>Kitchen</i>	√	
	F	<i>Dining Table</i>	√	
	G	<i>Living Sofa zone</i>	√	

The above table44 highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. Patterns of Flexibility:

- **1.A- Spatial flexibility (structural):**Used in this case study by *Infill system* by use (floor elements, mechanical systems ducts, partition walls, kitchen, doors, conduits for electricity, heating, and water)
- Also by adopting *elements of fixed* as follow (retaining wall, mechanical systems ducts , and stair), and Adopting *structural elements ,access units, and servicing*
- **1.B- Functional flexibility:** Used in four units as follow :
  - By adopting folding furniture in secondary bed .
  - Adopting a movable unit in dining table.
  - Adopting a movable wall in beds units.
  - Adopting a sliding wall in the wall cabinet.
- **1.C-Character flexibility:** By establish the living area's function without interfering to bed's function.

### 2. Type of Flexibility:

- **2.A-Sliding walls:** This feature was used in flexible bed furniture by lifting into the wall and in the cabinet doors as well.
- **2.B- Transforming elements:** This type is not applied for this propose , because it focuses on the concept of moving units designated for keeping furniture as movable walls.
- **2.C-Pop-Up Interactive Unit :** Using by movable sliding main bed units where can close the plank to be a part of unit TV or open to use the bed .

- **2..D-*Multi-folding flexibility***: Using in the flexible units consist bed and TV , where it have bed unit from inside with option to stored in wall and TV from outside.

### 3. Flexible Furniture Design "

- **3.A- *Movable Furniture***: Used on the dining table situated above the refrigerator as a shelving unit.
- **3.B- *Modular Furniture***: This type is not applied for this propose, because it depends on dividing the unit into several parts and installing them in different designs according to the required function.
- **3.C- *Foldable Furniture***: Adopted in the secondary bed as a part of the secondary TV unit, in close position until needed.
- **3.D- *multiple functions***: Used in the main unit of the room as it contains the main beds' unit from one side, and the TV unit from the other side.

### 4. Flexible materials used:

- **4.A- *Solid materials***: Using in cladding beds and kitchen units.
- **4.B- *High flexibility materials***: This type is not applied for this propose .
- **4.C- *Manufactured flexibility***: Used in the living area that to meet the a material needs, which doesn't tear, that is highly durable and easy to form. In addition, used in pillows and sofas because it is easily formed and comfortable.

## 5. Elements of flexibility within the internal structure :

- **5.A- Wall:** Used to storage the main beds and TV unit. That the room function be a bedroom when extract the units from the wall and will be a living room when closet inside the wall.
- **5.B- Floor:** Used by established in two levels, the first level utilizes the living room zone with movable dining table and the second level for the floor is utilized as a beds' unit when opens the plank from the wall storage.
- **5.C- Ceiling** This type is not applied for this purpose, because it adopts the ceiling as a storage unit which can be extracted when it is being used.

## 6. Mechanism of Flexible :

- **6.A-Mechanism of Flexible Construction Tools:** Used to conduct electricity to the television that is connected to the flexible bed unit, and it can use one of the following flexible tools: *tubes hoses lot or Flexible Electricity bar.*
- **6.B- Mechanism of Flexible Plumbing Extensions Tools:** These tools are mostly used in the process of transporting potable water or wastewater for kitchen unit.
- **6.C-Mechanism of Flexible Furniture:** Applied to *main beds* stored inside a wall using *SBLM Mechanism* to move the bed into walls or extract it.
- Applied in the *secondary bed* by using the mechanism that allows it to be stored in the TV until it is used.
- Applied in the *dining table* that is stored in the TV unit.

- **6.D-Mechanism of Flexible Wall:** Used on *wall cabinet* doors with a machine *Track and Panel* types from *Mechanism of Flexible Wall* part.

## 7. Main Flexible Unit :

- **7.A- Main Bed unit:** A portion of a wall unit that can be folded inside the wall to become a television unit, or be opened as a bed unit.

The part of the bed unit consists of two beds of size (width 2.1<sub>M</sub> X high 1<sub>M</sub>) each one of them contains an electric lift (*electric Hydraulic Jack Wireless Remote Control*) inside it that allows to rise to the global height of 45 cm, as shown in the plans.

- **7.B- Unit TV:** It is the second part of the unit, also the television unit consists of two parts form where from the upper section of the unit that is connected to the main bed unit with a scale (width 2.1<sub>M</sub> X high 2<sub>M</sub>) and the second section below it is made up of the shelves unit, the refrigerator and the dining table.
- **7.C-Secondary Bed :**It is part of the wall unit in front of the main bed unit with the concept of folding type that can store the bed with a scale of (width 2.1<sub>M</sub> X length 1<sub>M</sub>) inside the wall under the secondary TV.
- **7.D- Wall Cabinet:** The wall cabinet established on the secondary floor with two sliding doors consisting of 2 sections for store clothes.
- **7.E-Kitchen:** There is no kitchen in the design but has a fridge and a dining table to serve the customers in sofa zone.
- **7.F- Dining Table:** Established as a part of the TV unit in the below section next to the shelves and the fridge with a scale (length 1<sub>M</sub> X width 0.5<sub>M</sub>) .

- **7.G -Living Sofa zone:** It's the largest part of a room designed which is the reason for establishing the second-floor level to create a living area which consists of two sofas with 3 seats in each.

Table 45: The Effect of Flexibility Case Study 2

	<b>Room Twin Beds</b>			<b>Existing - plan</b>	<b>Flexibility solution</b>
<b>1</b>	<b>Number of beds</b>			$102 \text{ rooms} \times 2 = \mathbf{204}$	$204 \times \%50 = \mathbf{306}$
<b>2</b>	<b>Control of beds number</b>			stable	Yes
<b>3</b>	<b>Increase number of beds</b>			stable	Yes
<b>4</b>	<b>Number of functions</b>			<b>5 Function</b>	<b>9Function</b>
		<i>A</i>	<i>Main Bed unit</i>	√	√
		<i>B</i>	<i>Secondary Bed</i>		√
		<i>C</i>	<i>Kitchen</i>		
		<i>D</i>	<i>Dining Table</i>		√
		<i>E</i>	<i>Living sofa</i>		√
		<i>F</i>	<i>TV Unit</i>	√	√
		<i>G</i>	<i>Mine bar</i>	√	
		<i>H</i>	<i>Safe</i>	√	√
		<i>I</i>	<i>Sofa bed</i>	√	√
		<i>J</i>	<i>Secondary Sofa</i>		√
		<i>K</i>	<i>Wall Cabinet</i>		√
<b>5</b>	<b>Control of functions</b>			stable	Yes
<b>6</b>	<b>Increase number of functions</b>			stable	stable

### Effect of Flexibility

- 1. Number of beds:** Increased by 50% per cent than what is designed by the existing plan.
- 2. Control of beds number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.



**3. Increase number of beds:** Through flexible solutions, the number of beds can be increased, while the existing design is committed to a fixed number.

**4. Number of functions:** The number of functions when applying flexible solution increases up to 9 functions with the feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows :

- **4.A- Main Bed unit:**

- **Existing plan:** The existing plan adopts fixed type beds.
- **Flexibility solution :**The flexible solution design concept establishes beds as part of a unit that has two sides, one of them for beds and the other for the TV.

- **4.B- Secondary Bed :**

- **Existing plan:** There is no secondary bed within the existing design.
- **Flexibility solution:** Made as folding furniture with the ability of being stored inside the wall, and which is characterized that the plank of the bed is a part of the wall that can be extracted when needed.

- **4.C- Kitchen:**

- **Existing plan:** There is no kitchen unit within the existing design.
- **Flexibility solution:** Designs a dining table and a fridge to serve the customer..

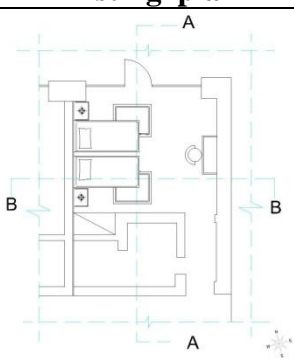
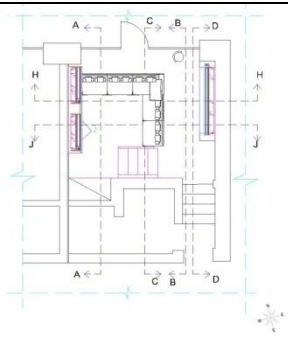
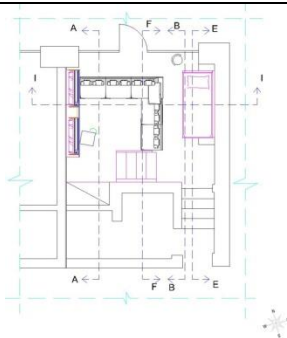
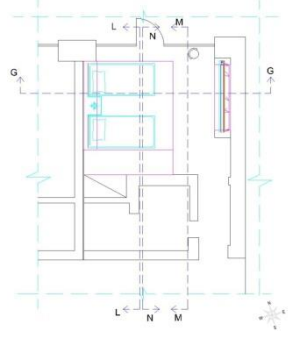
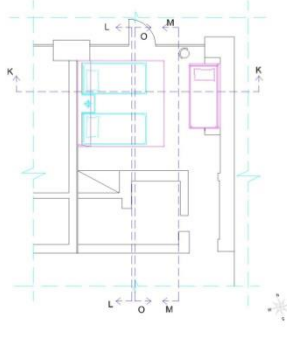
- **4.D- Dining Table :**

- **Existing plan:** There is no dining table within the existing design.

- **Flexibility solution:** The concept of design the dining table is establish as a part of TV unit which can be used when needed.
- **4.E-Living sofa :**
  - **Existing plan:** Consists of two chairs and a tea table in the middle.
  - **Flexibility solution:** The concept of a flexible solution is to create a living room with all elements the customer needs it situated in hide floor level by establishing a two-level in the room, one of them is to hide the sofas zone until being used.
- **4.F- TV Unit :**
  - **Existing plan:** There is a TV hanging to a separate unit fixed to the wall.
  - **Flexibility solution:** Has two TV units, the first one is a part of the main beds' unit to serve the living room when the bed is in storage condition and the second one hanging on the wall unit above the secondary bed to serve customers when using the room as a bedroom.
- **4.G- Mini bar**
  - **Existing plan:** The existing design is customized within the hotel's table space for serving drinks.
  - **Flexibility solution:** It does not exist in flexible solutions and is replaced with a fridge and a dining table.
- **4.H-Safe :**
  - **Existing plan:** Its place is determined within a part of the Wall Cabinet in the existing design.

- **Flexibility solution:** It can be added to any place within the proposed furniture easily.
- **4.H- Sofa bed :**
    - **Existing plan:** There is no secondary sofa within the existing design.
    - **Flexibility solution:** There is no secondary sofa within the flexibility solution but replaced with flexible living area .
  - **4.H-SecondarySofa :**
    - **Existing plan:** There is no secondary sofa within the existing design.
    - **Flexibility solution:** adopting within the sofas in living area.
  - **4.K- Wall Cabinet :**
    - **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
    - **Flexibility solution:** Use a sliding door in the wall cabinet to provide easy use for customers and utilize space by not reserving space for the cabinet door.
- 5. Control of functions' number:** Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.
- 6. Increase number of functions:** Through flexible solutions, the number of functions can be increased, while the existing design is committed to a fixed number.

Table 46: Significant Study of Case Study 2: Arkin Palm Beach Hotel

<b>Existing plan</b>	
	
<i>Existing plan, Arkin Palm Beach Hotel (Personal work) Scale: 1/200</i>	
<b>Proposed Plan</b>	
	
<i>Proposed Plan (1) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (2) (Personal work) Scale: 1/200</i>
	
<i>Proposed Plan (3) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (4) (Personal work) Scale: 1/200</i>
NO	<b>Significant Finding Study for Proposed Design</b>
1	Increase the number of beds.
2	Provide fully serviced seating areas
3	Completely separate for each functions' zones.
4	Better use of space in functionality terms.
5	Ability to increase and decrease the number of beds and functions and absorb more users.
6	Use horizontal and vertical directions of room.

1. Provide more beds for the room.

That by creating a secondary bed inside a secondary TV unit, where create it as a multi folding option.

**2. Provide fully serviced seating areas**

That by establishing new levels for the living area which it contains two sofas; TV unit has fridge and table.

**3. Completely separate functions' zones.**

Each functions applying when the other is stored such as create a living area in the ground while the main bed is storage inside the wall until the need to use it.

**4. Better use of space in terms of functionality and more users.**

The concept proposed design looking to separation and reconfiguration the functions, which use the option of store the furniture inside the element.

**5. Ability to increase and decrease the number of beds and functions and absorb more users.**

Through the option to storage the main beds and secondary bed until need it , and add secondary bed in room furniture.

**6. Use horizontal and vertical directions of room.**

The proposed designs establish two levels in the ground in order to create a living area. As well storage the main bed inside the wall which use it when open the main bed .

The significant finding in this case study is deals with the space size problems. Also, create a living room and zone for beds in the same space. As well, increase the number of functions and beds. In addition, convert the room to be a changeable space that can change the type of room such as living room, kitchen, and bedroom.

#### 4.3.4 Case Study 3

Table 47: Evaluation of Flexible Solutions Case Study 3

	Hotel Name	Concorde Resort Hotel		
	Proposed Flexible solutions		Yes	No
<b>1</b>	<b>Patterns of Flexibility</b>			
		A <i>Spatial flexibility (structural)</i>	√	
		B <i>Functional flexibility</i>	√	
		C <i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>			
		A <i>Sliding walls</i>	√	
		B <i>Transforming Elements</i>	√	
		C <i>Pop-Up Interactive Apartment</i>	√	
		D <i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>			
		A <i>Movable Furniture</i>	√	
		B <i>Modular Furniture</i>		√
		C <i>Foldable Furniture</i>	√	
		D <i>multiple functions</i>	√	
<b>4</b>	<b>Flexible Materials in interior design</b>			
		A <i>Solid materials</i>	√	
		B <i>High flexibility materials</i>	√	
		C <i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within</b>			
		A <i>Wall</i>	√	
		B <i>Floor</i>	√	
		C <i>Ceiling</i>	√	
<b>6</b>	<b>Mechanism of Flexible</b>			
		A <i>Mechanism of Flexible Construction Tools</i>	√	
		B <i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
		C <i>Mechanism of Flexible Furniture</i>	√	
		D <i>Mechanism of Flexible Wall</i>	√	
<b>7</b>	<b>Main Flexible Unit</b>			
		A <i>Main Bed unit</i>	√	
		B <i>Unit TV</i>	√	
		C <i>Secondary Bed</i>	√	
		D <i>Wall Cabinet</i>	√	
		E <i>Kitchen</i>	√	
		F <i>Dining Table</i>	√	
		G <i>Living Sofa zone</i>	√	

The above table<sup>47</sup> highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. Patterns of Flexibility:

- **1.A- Spatial flexibility (structural):**Used in this case study by Infill system by use (*floor elements, mechanical systems ducts, partition walls, kitchen, doors, conduits for electricity, heating, and water*)
- Also, by adopting *elements of fixed* as follow (*retaining wall, mechanical systems ducts*), and adopting *structural elements* ,*access units, and servicing*
- **1.B- Functional flexibility:** Used in four units as follow :
  - By adopting folding furniture in dining table.
  - Adopting a movable multifunction unit in secondary bed, secondary sofa, main sofas, dining table.
  - Adopting a movable wall in bed's units.
  - Adopting a sliding wall in the wall cabinet.
- **1.C-Character flexibility:** By using the living area's functions without interfering with the beds' functions . Additionally by adopting movable units.

### 2. Type of Flexibility :

- **2.A-Sliding walls:** Used in the movable unit through designing a unit like a wall with the ability to move.
- **2.B- Transforming elements:** Used in the movable unit through designing a unit like a wall with the ability of storing the furniture inside the movable units. Also this feature allows configuring the functions of a room according to the use and size needed by the user.

- **2.C-Pop-Up Interactive Unit:** By moving the movable units to form the functions of the room and dividing the spaces within the same room and forming rooms according to the functions need.
- **2..D-Multi-folding flexibility:** The units adopted were multifunction units, depending on the system of combining the functions together with the ability to close and open the furniture stored in it.

### **3. Flexible Furniture Design "**

- **3.A- Movable Furniture:** Using this type in the main unit of the room through establishing units with the option of moving and storage.
- **3.B- Modular Furniture:** This type is not applied for this propose, because it depends on dividing the unit into several parts and installing them in different designs according to the required function.
- **3.C- Foldable Furniture:** Used in the movable unit wall as it consists of folding furniture from the inside.
- **3.D- multiple functions:** Distinguishes the movable unit as it contains folding furniture on two sides to give more than one function in the same unit and in different stages.

### **4. Flexible materials used:**

- **4.A- Solid materials:** Used in cladding beds and kitchen units.
- **4.B-High flexibility materials:** Used to shape the dining table, because its hardness and ease of formation.
- **4.C- Manufactured flexibility:** Used in the sofa's storage because of its ease of formation.
- Use pillows and sofa because it is easy to forma and comfortable.

### **5. Elements of flexibility within the internal structure :**



- **5.A- Wall:** Adopted flexible wall units as it consider as a multi-folding flexibility furniture designed in moveable wall cabinets.
- **5.B- Floor:** Uses the floor to establish the wheel-rail of the walls storage unit in order to make it easy to move in position needed.
- **5.C- Ceiling:** Adopting the ceiling to installing the dual rollers wheel bridge of the walls storage unit from *the Mechanism of Flexible Wall* part in order to move it when needed.

## 6. Mechanism of Flexible:

- **6.A- Mechanism of Flexible Construction Tools:** Adopted in connecting the electricity to the *movable units* because the material characteristic is not perishable and it can be extended or shrunk.
- **6.B- Mechanism of Flexible Plumbing Extensions Tools:** Applied in the *kitchen unit*, where the use of tanks of fresh water for use and tanks for wastewater.
- **6.C - Mechanism of Flexible Furniture:** Used in four units as follow:
  - Applied to *main beds stored* inside the wall by using *SBLM Mechanism* to move the bed into walls or extract it.
  - Applying *SBLM Mechanism* for secondary bed in the *movable unit*.
  - Applied for the *dining table* with using *Sliding Gear System For Folding Furniture Mechanism* but in the horizontal direction manner that to serve the *kitchen unit* and user.
  - Applied for the *secondary sofa* linked in the *secondary bed* in the *movable unit* as explained in the plans by using Model No. WJ9350 Mechanism.

- **6.D- Mechanism of Flexible Wall:** Adopted in the *movable units* to allow the unit to move in a straightway by using the rail type estimated through the weight by installing in ceiling and floor.
  - Used on *wall cabinet* doors with a *machine Track and Panel* types from *Mechanism of Flexible Wall* part.

## 7. Main Flexible Unit:

- **7.A- Main Bed unit:** Establishing a beds unit with a scale of (width 2.1<sub>M</sub> X high 1<sub>M</sub>) on a plank as a part of the flexible movable wall by a folding technical that distinguishes it by the ability of being stored that allows for another function to utilize the room area.
- **7.B- Unit TV:** Hanging on a fixed unit with a scale of (width 3.0<sub>M</sub> X high 3.0<sub>M</sub>) and it serves the room in any function because all functions are arranged in the middle of the unit.
- **7.C-Secondary Bed:** Designed as a part of a movable unit with a scale of (width 3<sub>M</sub> X length 3<sub>M</sub>) for units and with a scale of bed ( width 2.1<sub>M</sub> X length 1.0<sub>M</sub>). Moreover, it is distinguished by the ability to be used in any zone in the room or stored in the unit's until needed.
- **7.D- Wall Cabinet:** Consisting of 3 sections featuring with sliding doors installed on a bridge that allows them to be cascaded in front of each other with no space needed to open them.
- **7.E-Kitchen:** The kitchen situated in the storage zone of units is used when moving the movable units out of the storage zone of units. The unit contains two-part, first one a sink served by two water tanks one of them for freshwater and another one for wastewater, and the second part is a cabinet installed up of a sink.

- **7.F- Dining Table:** Design as a part of the movable walls, it consists of two wood panels linked together through the *Sliding Gear System* but in a horizontal manner to allow it to expand and contract according to the use case.
- **7.G -Living Sofa zone:** Living elements consist of four sofas. In the design of the main sofa, it is composed of 3 seats situated under the main flexible bed unit which is made by *manufactured flexibility material* and the other three sofas consist of two seats in each of them, designed as a part of the flexible movable wall units.

Table 48: The Effect of Flexibility Case Study 3

	Room Twin Beds			Existing - plan	Flexibility solution
1	Number of beds			$147 \text{ rooms} \times 2 = 294$	$294 \times \%50 = 441$
2	Control of beds number			stable	Yes
3	Increase number of beds			stable	Yes
4	Number of functions			6Function	11 Function
		A	Main Bed unit	√	√
		B	Secondary Bed		√
		C	Kitchen		√
		D	Dining Table		√
		E	Living sofa	√	√
		F	TV Unit	√	√
		G	Mine bar	√	√
		H	Safe	√	√
		I	Sofa bed		√
		J	Secondary Sofa		√
		K	Wall Cabinet	√	√
5	Control of functions number			stable	Yes
6	Increase number of functions			stable	stable

## Effects of Flexibility

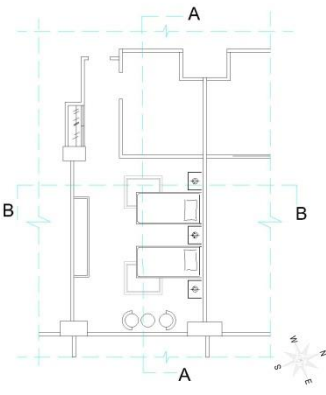
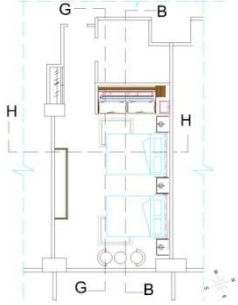
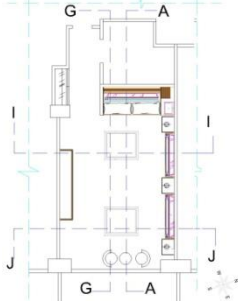

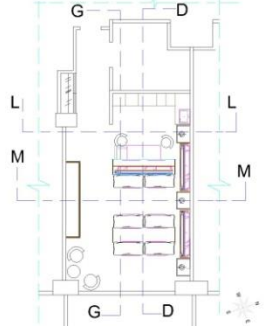
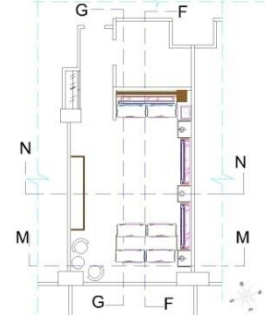
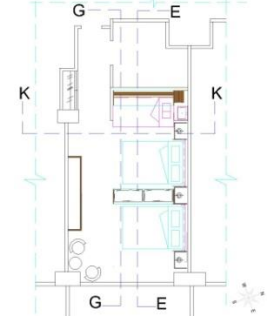
1. **Number of beds:** Increased by 50% per cent than what is designed by the existing plan.
2. **Control of beds number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.
3. **Increase number of beds:** Through flexible solutions, the number of beds can be increased, while the existing design is committed to a fixed number.
4. **Number of functions:** The number of functions when applying flexible solution increases until it reaches 11 functions with a feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows:
  - **4.A- Main Bed unit:**
    - **Existing plan:** The existing plan adopts fixed type beds.
    - **Flexibility solution:** Establishes two main beds of the same size with the distinguishing ability of storing them in the movable unit.
  - **4.B- Secondary Bed:**
    - **Existing plan:** There is no secondary bed within the existing design.
    - **Flexibility solution:** Designs the secondary bed as a part of the flexible movable wall unit with the option of using or keeping it inside the unit.
  - **4.C- Kitchen:**

- **Existing plan:** There is no kitchen unit within the existing design.
  - **Flexibility solution:** Creates a kitchen unit situated in a zone for storing the flexible movable wall units and their use becomes possible when moving the movable units out of the storing zone to serve a living room and user.
- **4.D- Dining Table:**
    - **Existing plan:** There is no dining table within the existing design.
    - **Flexibility solution:** Designs it as a part of the movable unit which can serve the users and the kitchen when needed.
- **4.E-Living sofa:**
    - **Existing plan:** consists of two chairs and a tea table in the middle.
    - **Flexibility solution:** Established as a part of the flexible movable wall units into the dedicated sites in the plans and extract sofas from them to form a living room.
- **4.F- TV Unit:**
    - **Existing plan:** There is a TV hanging to a separate unit fixed to the wall.
    - **Flexibility solution:** Hanging on a fixed unit to serve all the functions when the site of the functions is in the center of the room in front of the TV unit.
- **4.G- Mini bar**
    - **Existing plan:** The existing design is customized within the hotel's table space for serving drinks.
    - **Flexibility solution:** It does not exist in flexible solutions and is replaced with a kitchen unit and a dining table.

- **4.H-Safe:**
  - **Existing plan:** Determines its place within a part of the Wall Cabinet in the existing design.
  - **Flexibility solution:** It can be added to any place within the proposed furniture easily.
  
- **4.H- Sofa bed:**
  - **Existing plan:** There is no sofa bed within the existing design.
  - **Flexibility solution:** Considers it as a part of the flexible movable wall unit with the option for using it or keeping it inside the unit, and is distinguished that it can be moved near the balcony, with a space isolated from the rest of the room.
  
- **4.H-Secondary Sofa:**
  - **Existing plan:** There is no secondary sofa within the existing design.
  - **Flexibility solution:** It offers three secondary sofas which are situated inside the flexible movable wall unit and can be extracted when needed.
  
- **4.K- Wall Cabinet:**
  - **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
  - **Flexibility solution:** Uses a sliding door in the wall cabinet to provide easy use for customers and utilizes space by not reserving space for the cabinet door.

- 5. Control of functions' number:** Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.
- 6. Increase number of functions:** Through flexible solutions, the number of functions can be increased, while the existing design is committed to a fixed number.

Table 49: Significant Study of Case Study 3 : Concorde Resort Hotel

<b>Existing plan</b>		
		
<p><i>Existing plan, Concorde Resort Hotel (Personal work) Scale 1/200</i></p>		
<b>Proposed Plan</b>		
		
<p><i>Proposed Plan (1) (Personal work)</i> Scale: 1/200</p>	<p><i>Proposed Plan (2) (Personal work)</i> Scale: 1/200</p>	<p><i>Proposed Plan (3) (Personal work)</i> Scale: 1/200</p>
		
<p><i>Proposed Plan (4) (Personal work)</i> Scale: 1/200</p>	<p><i>Proposed Plan (5) (Personal work)</i> Scale: 1/200</p>	<p><i>Proposed Plan (6) (Personal work)</i> Scale: 1/200</p>
NO	<b>Significant Finding Study for Proposed Design</b>	
1	Divide the room in order to meet user need.	
2	Storage the furniture and extracting the furniture to be used when needed.	
3	Ability to increase and decrease the number of beds and functions.	
4	Provide used all functions in the same space.	
5	Provide the largest possible space.	
6	Create a moveable store furniture units.	



**1. Divide the room to meet user need.**

The moveable walls have ability to moving easily and storing the furniture inside it.

**2. Extracting the furniture to be used when needed.**

The furniture's create as a part of a movable multi-folding unit with the option to storage and possible to extracting until need.

**3. Increase and decrease the number of beds and functions.**

The moveable wall includes a secondary bed, three sofas, and dining table with ability to moving easily and storing the furniture.

**4. Provide all used functions in the same space.**

Because the functions create inside a movable multi folding units it can easy to move it and extracting the furniture in any position in the room.

**5. Provide the largest possible space.**

The proposed design stores the furniture's inside the units and elements with the option to hide all of them until need.

**6. Give the units the movement ability.**

By using a mechanisms of wall tools where establish a rail in floor or by using the rail in a ceiling and wheel.

**7. Store furniture within a wall.**

Storage a main beds inside the wall to allow using another function.

The significant finding in this case study reorganizing the space to be more functional that by create furniture inside the moveable walls. Also, moveable wall create changeable space that allows to converting the room type such as a dining room, a bedroom, and living room with kitchen.

#### 4.3.5 Case Study 4

Table 50: Evaluation of Flexible Solutions Case Study 4

Hotel Name		Kaya Artemis Resort and Casino		
Proposed Flexible solutions		Yes	No	
<b>1</b>	<b>Patterns of Flexibility</b>			
	A	<i>Spatial flexibility (structural)</i>	√	
	B	<i>Functional flexibility</i>	√	
	C	<i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>			
	A	<i>Sliding walls</i>	√	
	B	<i>Transforming Elements</i>		√
	C	<i>Pop-Up Interactive Apartment</i>	√	
	D	<i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>			
	A	<i>Movable Furniture</i>		√
	B	<i>Modular Furniture</i>		√
	C	<i>Foldable Furniture</i>	√	
	D	<i>multiple functions</i>	√	
<b>4</b>	<b>Flexible Materials in interior design</b>			
	A	<i>Solid materials</i>	√	
	B	<i>High flexibility materials</i>	√	
	C	<i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within the internal structure</b>			
	A	<i>Wall</i>		√
	B	<i>Floor</i>		√
	C	<i>Ceiling</i>		√
<b>6</b>	<b>Mechanism of Flexible</b>			
	A	<i>Mechanism of Flexible Construction Tools</i>	√	
	B	<i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
	C	<i>Mechanism of Flexible Furniture</i>	√	
	D	<i>Mechanism of Flexible Wall</i>	√	
<b>7</b>	<b>Main Flexible Unit</b>			
	A	<i>Main Bed unit</i>	√	
	B	<i>Unit TV</i>	√	
	C	<i>Secondary Bed</i>	√	
	D	<i>Wall Cabinet</i>	√	
	E	<i>Kitchen</i>	√	
	F	<i>Dining Table</i>	√	
	G	<i>Living Sofa zone</i>	√	

The above table 50 highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. Patterns of Flexibility:

- **1.A- Spatial flexibility (structural):**Used in this case study by Infill system by use (floor elements, mechanical systems ducts, partition walls, kitchen, doors, conduits for electricity, heating, and water)
- Also, by adopting *elements of fixed* as follow (*retaining wall, mechanical systems ducts* and elevator), and adopting *structural elements, access units, and servicing*
- **1.B- Functional flexibility:** Used in five units as follow :
  - By adopting folding furniture in beds and dining table .
  - Adopting a movable multifunction box unit consist of main beds, secondary sofa, kitchen unit.
  - Adopting a movable lift secondary sofa.
  - Adopting a foldable secondary bed.
  - Adopting a sliding wall in the wall cabinet.
- **1.C-Character flexibility:** By using the beds' functions without interfering with the living area's function and the kitchen area's function.
  - Adopting a movable wall on the two sides to cover the main beds from the outside and adopt a moveable wall between them that opens and closes like a curtain.

## 2. Types of Flexibility:

- **2.A-*Sliding walls***: Applying between main beds inside the box as a partition section to make it as a single bed when it is closed or one large bed when it is opened.
- **2.B- *Transforming elements***: This type is not applied for this propose.
- **2.C-*Pop-Up Interactive Unit***: Used from the inside where there are beds and from the outside where there are two sides which have different functions, one for sitting and another one for the kitchen.
- **2..D-*Multi-folding flexibility***: Adopted in the box multifunction unit which has main beds, kitchen unit, secondary bed, and sofa

## 3. Flexible Furniture Design "

- **3.A- *Movable Furniture***: This type is not applied for this purpose, because the furniture type has the option that it can be moved without any effort and is distinguished with the ability to shrink.
- **3.B- *Modular Furniture***: This type is not applied for this purpose, because it depends on dividing the unit into several parts and installing them in different designs according to the required function.
- **3.C- *Foldable Furniture***: Used in the main beds and it is distinguished by the ability to be closed inside the main box unit and it can be stored through technical folding to make it invisible after closing the sliding vertical box door.
  - Used also in the secondary bed behind the sofa as it is stored inside the box wall from outside.

- **3.D- *multiple functions***: The unit box is considered as an item of multiple functions furniture as it has from the inside the main bed and from the outside, it has a secondary bed, sofa, and kitchen.

#### **4. Flexible materials used:**

- **4.A- *Solid materials***: Used in cladding beds and kitchen units.
- **4.B- *High flexibility materials***: Used in the separation wall of the flexible unit between the inner beds and on their sides.
  - **4.C- *Manufactured flexibly***: It prefers to use it in the structure of cladding and the moveable wall of the box unit because it is distinguished by the ability to be removed quickly, enabling it to expand or contract easily, and can sculpt the shape as needed. Also used in sofa, pillow and sofas because it is easy to form and comfortable.

#### **5. Elements of flexibility within the internal structure:**

- **5.A- *Wall***: This type is not applied for this purpose, because it adopts the wall as a storage unit and extracts it when it is being used.
- **5.B- *Floor***: This type is not applied for this purpose, because it adopts the floor as a storage unit and extracts it when it is being used.
- **5.C- *Ceiling***: This type not applied for this purpose, because it adopts the ceiling as a storage unit and extracts it when it is being used.

#### **6. Mechanism of Flexible:**

- **6.A- *Mechanism of Flexible Construction Tools***: Used to connect the electricity to a *box unit* for the secondary bed and the mini kitchen.
- **6.A- *Mechanism of Flexible Construction Tools***: Uses *Drag chain cables* for connecting electricity to the industrial sofa lift.

- **6.B- Mechanism of Flexible Plumbing Extensions Tools:** Used in the *kitchen unit*, where the use of tanks fresh water for use and tanks for wastewater.
- **6.C - Mechanism of Flexible Furniture:** Applied to *main beds* stored inside a wall using *lift platform Mechanism* to move the sofa through the box unit wall to rise for using the *secondary bed* or down to complete the living room element. Also applied on dining shelves using *folding wall mounted shelves* technical.
- **6.D- Mechanism of Flexible Wall:** Applied as a partition between main beds inside the box unit by use *folding sliding wall Solutions* .And used on *wall cabinet* doors with a machine *Track and Panel* types from *Mechanism of Flexible Wall* part.

## 7. Main Flexible Unit:

- **7.A- Main Bed unit:** The Designs create two beds that stored inside the box unit with a scale of (width 2.1<sub>M</sub> X high 1<sub>M</sub>) for each bed separately and the design focuses on not taking a permanent space in the room.
- **7.B-Unit TV:** Designs two TV units with a scale of (width 3.0<sub>M</sub> X high 3.0<sub>M</sub>)hanging in the walls in front of the beds.
- **7.C-Secondary Bed:** Designed established on the outside of the box unit wall as a part of it by installing using the flexible folding movement feature with a scale of(width2.1<sub>M</sub> X length 1<sub>M</sub>) and it is used when the sofa is risen.
- **7.D- Wall Cabinet:** Consists of 3 sections featuring with sliding doors installed on a bridge that allows them to be cascaded in front of each other where no space is needed to open them.

- **7.E-Kitchen:** Designed established on out the box unit wall as a part of it by installing using the mechanism of flexible plumbing extensions tools through a portable sink with two water tanks.
- **7.F-Dining Table:** Designed create as a shelf installed on the wall with a scale of width (1.5<sub>M</sub> X length 0.35<sub>M</sub>)and is characterized by flexibility in terms of folding it until needed.
- **7.G -Living Sofa zone:** Established by the two existing fixed sofas and flexible sofa that is linked on the box unit from the outside with the *Lift platform technical*.

Table 51: The Effect of Flexibility Case Study 4

	<b>Room Twin Beds</b>			<b>Existing - plan</b>	<b>Flexibility solution</b>
<b>1</b>	<b>Number of beds</b>			<i>105 rooms x 2= 210</i>	<i>210 x %50 = 315</i>
<b>2</b>	<b>Control of beds number</b>			stable	Yes
<b>3</b>	<b>Increase number of beds</b>			stable	Yes
<b>4</b>	<b>Number of functions</b>			<b>4 Functions</b>	<b>10Functions</b>
		<i>A</i>	<i>Main Bed unit</i>	√	√
		<i>B</i>	<i>Secondary Bed</i>		√
		<i>C</i>	<i>Kitchen</i>		√
		<i>D</i>	<i>Dining Table</i>		√
		<i>E</i>	<i>Living sofa</i>	√	√
		<i>F</i>	<i>TV Unit</i>	√	√
		<i>G</i>	<i>Mine bar</i>		
		<i>H</i>	<i>Safe</i>		√
		<i>I</i>	<i>Sofa bed</i>		√
		<i>J</i>	<i>Secondary Sofa</i>		√
		<i>K</i>	<i>Wall Cabinet</i>	√	√
<b>5</b>	<b>Control of functions</b>			stable	Yes
<b>6</b>	<b>Increase number of functions</b>			stable	stable

## Effects of Flexibility

1. **Number of beds:** Increased by 50% per cent more than in what was designed by the existing plan.
2. **Control of beds' number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.
3. **Increase number of beds:** Through flexible solutions, the number of beds can be increased, while the existing design is committed to a fixed number.
4. **Number of functions:** The number of functions when applying flexible solution increased until it reached 11 functions with a feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows:
  - **4.A- Main Bed unit:**
    - **Existing plan:** The existing plan adopts fixed type beds that are immovable.
    - **Flexibility solution:** Adopts two folding beds inside the flexible box unit with the ability of combing them into one bed.
  - **4.B- Secondary Bed:**
    - **Existing plan:** There is no secondary bed within the existing design.
    - **Flexibility solution:** The design offers the secondary bed as a part of the external wall of the box unit by the folding mechanism.
  - **4.C- Kitchen:**



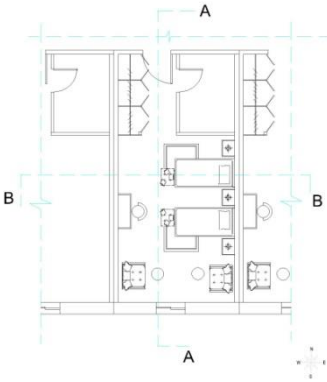
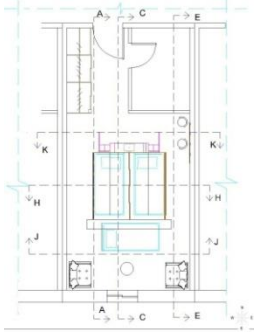
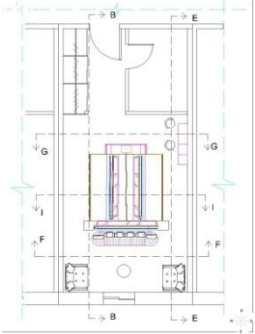
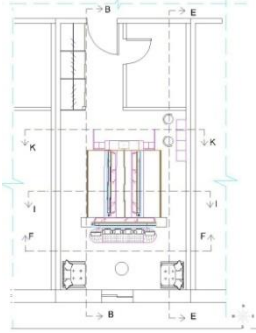
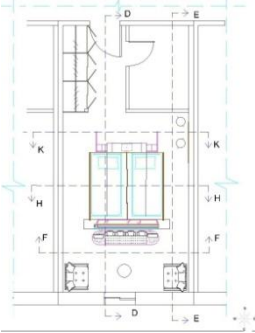
- **Existing plan:** There is no kitchen unit within the existing design.
  - **Flexibility solution:** The design offers the kitchen unit as a part of the external wall of the box unit with the feature of a portable sink.
- **4.D- Dining Table:**
    - **Existing plan:** There is no dining table within the existing design.
    - **Flexibility solution:** Designed as a shelf installed on the wall to serve kitchen and customers.
- **4.E-Living sofa:**
    - **Existing plan:** Consists of two chairs and a tea table in the middle.
    - **Flexibility solution:** Consists of two fixed sofas in the room and the flexible solution offers a lift sofa with three seats installed on the external box wall to form a living zone.
- **4.F- TV Unit:**
    - **Existing plan:** There is a TV hanging to a separate unit fixed to the wall.
    - **Flexibility solution:** Designs a two TV unit in front of the beds to serve the zones of beds and serve the customers.
- **4.G- Mini bar**
    - **Existing plan:** The existing design is customized within the hotel's table space for serving drinks.
    - **Flexibility solution:** It does not exist in flexible solutions and is replaced with a kitchen unit and a dining table.

- **4.H-Safe:**
  - **Existing plan:** Determines its place within a part of the Wall Cabinet in the existing design.
  - **Flexibility solution:** It can be added to any place within the proposed furniture easily.
  
- **4.H- Sofa bed:**
  - **Existing plan:** There is no sofa bed within the existing design.
  - **Flexibility solution:** There is no sofa bed within the flexible solution design replaced with flexible beds.
  
- **4.H-Secondary Sofa:**
  - **Existing plan:** There is no secondary sofa within the existing design.
  - **Flexibility solution:** The design has two types of sofas; the first one is flexible and the other one is fixed.
  
- **4.K- Wall Cabinet:**
  - **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
  - **Flexibility solution:** Uses a sliding door in the wall cabinet to provide easy use for customers and utilize space by not reserving space for the cabinet door .

**5. Control of functions' number :**Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.

**6. Increase number of functions** :Through flexible solutions, the number of functions can be increased, while the existing design is committed to a fixed number.

Table 52: Significant Study of Case Study 4: Kaya Artemis Resort and Casino

<b>Existing plan</b>	
 <p style="text-align: center;"><i>Existing floor plan, Kaya Artemis Resort and Casino (Personal work) Scale: 1/200</i></p>	
<b>Proposed Plan</b>	
 <p style="text-align: center;"><i>Proposed Plan (1) (Personal work) Scale: 1/200</i></p>	 <p style="text-align: center;"><i>Proposed Plan (2) (Personal work) Scale: 1/200</i></p>
 <p style="text-align: center;"><i>Proposed Plan (3) (Personal work) Scale: 1/200</i></p>	 <p style="text-align: center;"><i>Proposed Plan (4) (Personal work) Scale: 1/200</i></p>
NO.	<b>Significant Finding Study for Proposed Design</b>
1	Reorganize the room space to utilize in a functional manner.
2	Provide the largest possible space.
3	Increase the number of functions.
4	Combine all functions in one zone at the same time.
5	Enable to separate the main beds from the rest of the functions.
6	Enable to separate the kitchen from the rest of the functions

**1. Reorganize the room space functions.**

The proposed design creates a multi-function unit in order to improve and use the size of the room in a functional manner.

**2. Provide the largest possible space around the multiple function units.**

A multi-function unit is designed to be situated in the center of the room offer more space to use. **Increase the number of functions.**

The proposed design create the room in order to include three room types living area, bedroom, and kitchen.

**3. Combine all functions in one zone. at the same time**

The multi-function unit enables using all functions in the same place at the same time.

**4. Enable separate the main beds from the rest of the functions**

Where the proposed design create a sliding door for the units to close on beds

**5. Enable separate the kitchen from the rest of the functions**

The proposed design creates a glass door for the kitchen. In order to close it until need.

The significant finding in this case study is reorganizing the space in order to use the furniture of the room in a functional manner, where enables the room to modification to meet the user need. In addition, create room includes three types of room living area, bedroom, and kitchen, that to enable using all functions in the same place and at the same time. In addition, increase in the number of beds and functions.

#### 4.3.6 Case Study 5

Table 53: Evaluation of Flexible Solutions Case Study 5

Hotel Name		Limak Cyprus Deluxe			
		Proposed Flexible solutions		Yes	No
<b>1</b>	<b>Patterns of Flexibility</b>				
		A	<i>Spatial flexibility (structural)</i>	√	
		B	<i>Functional flexibility</i>	√	
		C	<i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>				
		A	<i>Sliding walls</i>		√
		B	<i>Transforming Elements</i>	√	
		C	<i>Pop-Up Interactive Apartment</i>		√
		D	<i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>				
		A	<i>Movable Furniture</i>	√	
		B	<i>Modular Furniture</i>		√
		C	<i>Foldable Furniture</i>	√	
		D	<i>multiple functions</i>		√
<b>4</b>	<b>Flexible Materials in interior design</b>				
		A	<i>Solid materials</i>	√	
		B	<i>High flexibility materials</i>		√
		C	<i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within the internal structure</b>				
		A	<i>Wall</i>	√	
		B	<i>Floor</i>		√
		C	<i>Ceiling</i>	√	
<b>6</b>	<b>Mechanism of Flexible</b>				
		A	<i>Mechanism of Flexible Construction Tools</i>	√	
		B	<i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
		C	<i>Mechanism of Flexible Furniture</i>	√	
		D	<i>Mechanism of Flexible Wall</i>		√
<b>7</b>	<b>Main Flexible Unit</b>				
		A	<i>Main Bed unit</i>	√	
		B	<i>Unit TV</i>	√	
		C	<i>Secondary Bed</i>	√	
		D	<i>Wall Cabinet</i>	√	
		E	<i>Kitchen</i>	√	
		F	<i>Dining Table</i>	√	
		G	<i>Living Sofa zone</i>	√	

The above table 53 highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. Patterns of Flexibility:

- **1.A- Spatial flexibility (structural):** Used the in this case study by Infill system by use (*mechanical systems ducts, kitchen, doors, conduits for electricity, heating, and water*)
  - Also, by adopting *elements of fixed* as follow (*retaining wall, mechanical systems ducts, and elevator*), and adopting *structural elements, access units, and servicing*
- **1.B- Functional flexibility:** By adopting folding furniture in secondary sofa.
  - Adopting sliding wall in wall cabinet.
- **1.C-Character flexibility:** By using the living area's functions without interfering with the beds' functions.

### 2. Type of Flexibility:

- **2.A-Sliding walls:** This type is not applied for this propose
- **2.B- Transforming elements:** Using the vertical manner feature to store furniture in the ceiling.
- **2.C- Pop-Up Interactive Unit:** This type is not applied for this purpose.
- **2..D-Multi-folding flexibility:** Use the folding solution for flexible sofa and kitchen unit.

### 3. Flexible Furniture Design "

- **3.A- Movable Furniture:** Adopted by moving the furniture using ropes to the ceiling .

- **3.B- Modular Furniture:** This type is not applied for this purpose, because it depends on dividing the unit into several parts and installing them in different designs according to the required function.
- **3.C- Foldable Furniture:** Used in the secondary sofa next to the fixed sofa to form a living zone.
- **3.D- Multiple functions:** This type is not applied for this purpose, because its principle works by creating one unit that contains more than one function or furniture that is stored inside the unit until needed.

#### **4. Flexible materials used:**

- **4.A- Solid materials:** Applied in cladding beds plank and kitchen units.
- **4.B- High flexibility materials:** This type is not applied for this propose.
- **4.C- Manufactured flexibility:** Used in the shape of the sofa to easily use it in the furniture unit. Also, used in sofa and pillow because it is easy to form and comfortable.

#### **5. Elements of flexibility within the internal structure:**

- **5.A- Wall:** Adopts the wall as a storage unit and extracts it when it is being used.
- **5.B- Floor:** This type is not applied for this propose, because it adopts the floor as a storage unit and extracts it when it is being used and uses it to establish rails for movable furniture.
- **5.C- Ceiling:** Use ceiling as a storage unit which consists of main beds, secondary bed, and dining table.

#### **6. Mechanism of Flexible:**



- **6.A- Mechanism of Flexible Construction Tools:** Used to connect electricity to the *furniture engine* to transport it from the ceiling or the opposite.
- **6.B- Mechanism of Flexible Plumbing Extensions Tools:** Applied in the *kitchen unit*, where the use of tanks fresh water for use and tanks for wastewater.
- **6.C - Mechanism of Flexible Furniture:** Used in three units as follow
  - Applied to the main beds and the dining table that is stored inside the wall by *Height adjustable mechanics*
  - Applied to secondary sofa that is stored inside a wall by *folding mechanics*.
  - Applied to secondary beds that is stored inside a wall by *SBLM mechanism*.
- **6.D- Mechanism of Flexible Wall:** Used on the *wall cabinet* doors with a machine *Track and Panel types* as from *Mechanism of Flexible Wall* part.

## 7. Main Flexible Unit:

- **7.A- Main Bed unit:** Designed in a flexible unit that can be moved and stored in the ceiling, with a scale of (width 2.1<sub>M</sub> X high 1<sub>M</sub>) for each bed separately where it does not take a permanent space in the room and can make use of the space allocated for the bed while using the space for another function.
- **7.B- Unit TV:** Designed in a unit with a scale of (width 2.4<sub>M</sub> X high 3<sub>M</sub>) consisting of two parts from the top for television and from the

bottom it has the kitchen elements located opposite to the main beds and sofa.

- **7.C-Secondary Bed:** Designed as folding furniture that is attached to the box from the outside which can be opened or closed until needed and when it is opened, the shape is transformed from box to sofa with three seats with a scale of (width 2.5<sub>M</sub> X length 0.75<sub>M</sub>).
- **7.D- Wall Cabinet:** Consists of 3 sections featuring the sliding doors installed on a bridge that allows them to be cascaded in front of each other where no space is needed to open them.
- **7.E-Kitchen:** Designed as a part of the TV unit from a unit that contains a portable sink with two water tanks, fridge and dining table.
- **7.F- Dining Table:** Designed in a flexible unit that can be moved and stored in the ceiling with a scale of (width 1<sub>M</sub> X high 0.5<sub>M</sub>) for each bed separately where it does not take a permanent space in the room and can make use of the space allocated for the bed while using the space for another function.
- **7.G -Living Sofa zone:** Designed with a three-seat sofa made by a manufactured flexible material and a folding sofa unit in front of the TV unit.

Table 54: The Effect of Flexibility Case Study 5

	<b>Room Twin Beds</b>			<b>Existing - plan</b>	<b>Flexibility solution</b>
<b>1</b>	<b>Number of beds</b>			<b>1338 bed</b>	$1338 \times \%50 = 2007$
<b>2</b>	<b>Control of beds number</b>			stable	Yes
<b>3</b>	<b>Increase number of beds</b>			stable	Yes
<b>4</b>	<b>Number of functions</b>			<b>5 Function</b>	<b>10</b>
		<i>A</i>	<i>Main Bed unit</i>	√	√
		<i>B</i>	<i>Secondary Bed</i>	√	√
		<i>C</i>	<i>Kitchen</i>		√
		<i>D</i>	<i>Dining Table</i>		√
		<i>E</i>	<i>Living sofa</i>		√
		<i>F</i>	<i>TV Unit</i>	√	√
		<i>G</i>	<i>Mine bar</i>	√	
		<i>H</i>	<i>Safe</i>	√	√
		<i>I</i>	<i>Sofa bed</i>		√
		<i>J</i>	<i>Secondary Sofa</i>		√
		<i>K</i>	<i>Wall Cabinet</i>		√
<b>5</b>	<b>Control of functions</b>			stable	Yes
<b>6</b>	<b>Increase number of functions</b>			stable	stable

### Effects of Flexibility

- 1. Number of beds** : Increased by 50% per cent more than what was designed by the existing plan.
- 2. Control of beds number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.
- 3. Increase number of beds:** Through flexible solutions, the number of beds can be increased, while the existing design is committed to a fixed number.

**4. Number of functions:** The number of functions when applying flexible solution increase until it reaches 10 functions with a feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows:

- **4.A- Main Bed unit:**

- **Existing plan:** The existing plan adopts fixed type beds that are immovable.
- **Flexibility solution:** Adopts two beds with the option of storage in the ceiling until needed and each bed can be used separately.

- **4.B- Secondary Bed:**

- **Existing plan:** There is no secondary bed within the existing design.
- **Flexibility solution:** It adopts the secondary bed with the option of storage in the ceiling which can be lowered when needed.

- **4.C- Kitchen:**

- **Existing plan:** There is no kitchen unit within the existing design.
- **Flexibility solution:** Designs a place to serve the customer by specifying a part in the TV unit for a dining table and a fridge.

- **4.D- Dining Table:**

- **Existing plan:** There is no dining table within the existing design.
- **Flexibility solution:** Adopts a dining table with the option of storage in the ceiling that is design to serve the kitchen and guests.

- **4.E-Living sofa:**

- **Existing plan:** Consists of two chairs and a tea table in the middle.

- **Flexibility solution:** Designs the room to be a living room with its contents being a sofa and a TV unit with the flexible solution, it becomes possible to increase the functions to have more sofas and a small kitchen.
- **4.F- TV Unit :**
  - **Existing plan:** There is a TV hanging to a separate unit fixed to the wall.
  - **Flexibility solution :** Creates a TV unit as a part of a multi-function unit which consists of a kitchen sink as well.
- **4.G- Mini bar**
  - **Existing plan:** The existing design is customized within the hotel's table space for serving drinks.
  - **Flexibility solution:** It does not exist in flexible solutions and is replaced with a kitchen unit and a dining table.
- **4.H-Safe:**
  - **Existing plan:** Determines its place within a part of the Wall Cabinet in the existing design.
  - **Flexibility solution:** It can be added to any place within the proposed furniture easily.
- **4.H- Sofa bed:**
  - **Existing plan:** There is no sofa bed within the existing design.
  - **Flexibility solution:** Creates it as a folding furniture unit next to the fixed sofa to serve the living room, the bedroom, and the secondary sofa.

- **4.H-Secondary Sofa:**

- **Existing plan:** There is no secondary sofa within the existing design.
- **Flexibility solution:** Creates it as a folding furniture unit next to fixed sofa.

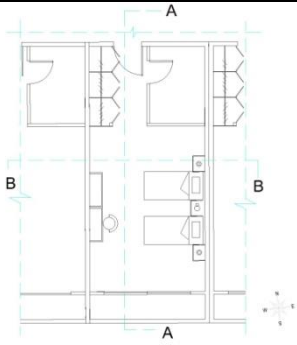
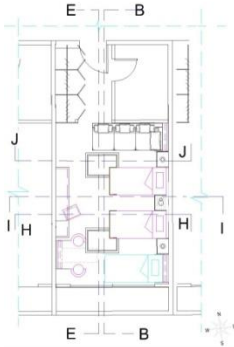
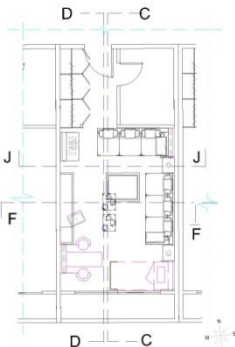
- **4.K- Wall Cabinet :**

- **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
- **Flexibility solution:** Use a sliding door in the wall cabinet to provide easy use for customers and utilizes space by not reserving space for the cabinet door .

**5. Control of functions' number:** Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.

**6. Increase number of functions:** Through flexible solutions, the number of functions can be increased, while the existing design is committed to a fixed number.

Table 55: Significant Study of Case Study 5: Limak Cyprus Deluxe

<b>Existing plan</b>	
	
<i>Existing plan, Limak Cyprus Deluxe (Personal work) Scale: 1/200</i>	
<b>Proposed Plan</b>	
	
<i>Proposed Plan (1) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (2) (Personal work) Scale: 1/200</i>
	
<i>Proposed Plan (3) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (4) (Personal work) Scale: 1/200</i>
NO	<b>Significant Finding Study for Proposed Design</b>
1	Take advantage of the room's height
2	Ability to increase and decrease the number of beds and functions.
3	Provide the largest possible space.
4	Provide seating areas.
5	Provide living areas.

**1. Take advantage of the room's height**

By use the ceiling as an storage element in order to storage main beds, secondary beds, and dining table.

**2. Increase and decrease the number of beds and functions.**

By the ability to choose the functions need to use such as the number of beds and dining table. As well, option of open the secondary sofa or storage as a folding unit.

**3. Provide the largest possible space through the flexible function.**

Through the option of storing the furniture until need, that offers a good space to use the function need while the other still stored.

**4. Provide bedrooms.**

The by create three beds use it to change the room to be bed room.

**5. Provide living areas.**

That by storage the beds and open the secondary sofa.

The significant finding in this case study is increase the number of functions and number of beds take advantage of the high of room by store the main beds ,secondary bed and dining table into the ceiling . Also, that options help the room to change for four type living room , meeting area, kitchen with dining table and bed room with offer three movable beds.



#### 4.3.7 Case Study 6

Table 56: Evaluation of Flexible Solutions Case Study 6

Hotel Name		Noah's Ark Deluxe Hotel & Spa		
Proposed Flexible solutions		Yes	No	
<b>1</b>	<b>Patterns of Flexibility</b>			
	A	<i>Spatial flexibility (structural)</i>	√	
	B	<i>Functional flexibility</i>	√	
	C	<i>Character flexibility</i>	√	
<b>2</b>	<b>Type of flexibility</b>			
	A	<i>Sliding walls</i>	√	
	B	<i>Transforming Elements</i>	√	
	C	<i>Pop-Up Interactive Apartment</i>		√
	D	<i>Multi-folding flexibility</i>	√	
<b>3</b>	<b>Flexible Furniture Design</b>			
	A	<i>Movable Furniture</i>	√	
	B	<i>Modular Furniture</i>		√
	C	<i>Foldable Furniture</i>	√	
	D	<i>multiple functions</i>	√	
<b>4</b>	<b>Flexible Materials in interior design</b>			
	A	<i>Solid materials</i>	√	
	B	<i>High flexibility materials</i>	√	
	C	<i>Manufactured flexibly</i>	√	
<b>5</b>	<b>Elements of flexibility within the internal structure</b>			
	A	<i>Wall</i>	√	
	B	<i>Floor</i>	√	
	C	<i>Ceiling</i>		√
<b>6</b>	<b>Mechanism of Flexible</b>			
	A	<i>Mechanism of Flexible Construction Tools</i>	√	
	B	<i>Mechanism of Flexible Plumbing Extensions Tools</i>	√	
	C	<i>Mechanism of Flexible Furniture</i>	√	
	D	<i>Mechanism of Flexible Wall</i>	√	
<b>7</b>	<b>Main Flexible Unit</b>			
	A	<i>Main Bed unit</i>	√	
	B	<i>Unit TV</i>	√	
	C	<i>Secondary Bed</i>	√	
	D	<i>Wall Cabinet</i>	√	
	E	<i>Kitchen</i>	√	
	F	<i>Dining Table</i>	√	
	G	<i>Living Sofa zone</i>	√	

The above table 56 highlights the flexible solutions involved in increasing the number of beds and functions in the room, which are as follows:

### 1. Patterns of Flexibility:

- **1.A- Spatial flexibility (structural):**Used in this case study by the *Infill system* by use (*mechanical systems ducts, partition walls, kitchen, doors, conduits for electricity, heating, and water*)
  - Also, by adopting *elements of fixed* as follow (*retaining wall, mechanical systems ducts*), and adopting *structural elements, access units, and servicing*
- **1.B- Functional flexibility:** Used in four units as follow
  - By adopting folding units in main beds, secondary bed, secondary sofa and dining table.
  - Adopting the folding units as a movable unit.
  - Adopting a movable wall in sofa units.
  - Adopting sliding wall in the wall cabinet.
- **1.C-Character flexibility:** By using the beds' functions without interfering with the sofa's functions or the kitchen's functions.

### 2. Type of Flexibility:

- **2.A-Sliding walls:** Used in the wall cabinet doors.
- **2.B- Transforming elements:** Used by allowing the unit's elements to move with the characteristic to be stored in the same unit until needed. Also , the principal of this type works through establishing the room functions as required.
- **2.C-Pop-Up Interactive Unit:** This type is not applied for this purpose.

- **2.D-Multi-folding flexibility:** Achieved in folding furniture units. The first combines the sofa with the first main bed and the other unit combines the second main bed and the dining table.

### 3. Flexible Furniture Design "

- **3.A- Movable Furniture:** Used in the multi-folding flexibility function units to meet the room's needs where the folding units contain two parts which can be merged or opened using the wheels attached. To use any part, the other part needs to be moved.
- **3.B- Modular Furniture:** This type is not applied for this purpose.
- **3.C- Foldable Furniture:** Used in main beds, secondary bed, secondary sofa and dining table.
- **3.D- multiple functions:** Used in the folding functions units through linking two folding flexible units together in one unit with the option of moving them to separate the units from each other or combine them again.

### 4. Flexible materials used:

- **4.A- Solid materials:** Used in cladding for main bed and kitchen unit.
- **4.B- High flexibility materials:** Used in cladding the shape of the folding units.
- **4.C- Manufactured flexibly:** Used in sofa and pillow because it is easy to form and comfortable.

### 5. Elements of flexibility within the internal structure:

- **5.A- Wall:** Uses the wall to store the main sofa and the dining table, that the ability of extracted when being used.
- **5.B-Floor:** Using to establish rails for moving the folding units.

- **5.C- *Ceiling***: This type is not applied in this purpose, because it uses the ceiling as a storage unit which can be extracted when it is being used.

## 6. Mechanism of Flexible :

- **6.A- *Mechanism of Flexible Construction Tools***: Used to extend the electricity to the water motor for the *kitchen unit*, by using more than one type such as: *Flexible tubes hoses lot or China TPU wire*.
- **6.B- *Mechanism of Flexible Plumbing Extensions Tools***: Applied in the *kitchen unit*, where the use of tanks fresh water for use and tanks for wastewater.
- **6.C - *Mechanism of Flexible Furniture***: Used in four units as follow:
  - Applied to folding units using *Folding mechanics* to combine the functions together such as a main beds and secondary sofa beds.
  - Applied in the *dining table* connected to the *movable folding bed* unit by *Sliding Gear System For Folding Furniture*, but in a horizontal manner to allow it to expand and contract according to the use case.
  - Applying in the *secondary sofa* by using the *sofa bed mechanism* using Model No. WJ9350 to allow to close in a folded manner until it is used.
  - Applied to main sofa that is stored inside the wall using *SBLM Mechanism* to move the bed into walls or extract it from it or store it.

- **6.D- Mechanism of Flexible Wall:** Used on *wall cabinet* doors with a machine *Track and Panel* types as from *Mechanism of Flexible Wall* part .

## 7. Main Flexible Unit:

- **7.A-Main Bed unit:** Designed in a flexible folding multiple function units with a scale of (width 2.1<sub>M</sub> X high 1<sub>M</sub>) .Which opens positions for each bed separately, and the same feature of previous flexible solutions does not take a permanent space in the room, as well can make use of the space allocated for the bed while using the space for another function.
- **7.B- Unit TV:** It is hanging in the wall unit with a scale of (width 3.0<sub>M</sub> X high 3.0<sub>M</sub>) situated in front of the beds and the living area to serve customers in all functions.
- **7.C-Secondary Bed:** Designs two folding sofas which can be opened or closed until needed and when opened, the shape is transformed from box to sofa, the first one has three seats with a scale of (width 2.5<sub>M</sub> X length 0.75<sub>M</sub>) and the other one has one seat with a scale of (width 0.9<sub>M</sub> X length 0.75<sub>M</sub> ).
- **7.D- Wall Cabinet:** Consists of 3 sections featuring the sliding doors installed on a bridge that allows them to be cascaded in front of each other so that where no space is needed to open them.
- **7.E-Kitchen:** Designed as a box unit by using the mechanism of flexibility for a portable sink with two water tanks.
- **7.F- Dining Table:** Designed to be stored inside the wall using the *SBLM Mechanism* and it is linked to the main bed unit. It is utilized by

folding where the plank consists of two wood boxes linked together through *Sliding Gear System* but in a horizontal manner to allow it to expand and contract according to the use case.

- **7.G -Living Sofa zone:** Designed with three sofas, the main one is stored in the wall with three seats with scale of (width 2.5M X length 0.75M), and the other two secondary sofas are distributed near of the TV unit with scale of (width 2.5<sub>M</sub> X length 0.75<sub>M</sub>) and another one having a single seat with a scale of (width 0.9<sub>M</sub> X length 0.75<sub>M</sub>).

Table 57: The Effect of Flexibility Case Study 6

	<b>Room Twin Beds</b>			<b>Existing - plan</b>	<b>Flexibility solution</b>
<b>1</b>	<b>Number of beds</b>			$194 \text{ rooms} \times 2 = 388$	$194 \times \%50 = 582$
<b>2</b>	<b>Control of beds number</b>			stable	Yes
<b>3</b>	<b>Increase number of beds</b>			stable	Yes
<b>4</b>	<b>Number of functions</b>			<b>5Function</b>	<b>10 Function</b>
		<i>A</i>	<i>Main Bed unit</i>	√	√
		<i>B</i>	<i>Secondary Bed</i>	√	√
		<i>C</i>	<i>Kitchen</i>		√
		<i>D</i>	<i>Dining Table</i>		√
		<i>E</i>	<i>Living sofa</i>		√
		<i>F</i>	<i>TV Unit</i>	√	√
		<i>G</i>	<i>Mine bar</i>	√	√
		<i>H</i>	<i>Safe</i>	√	
		<i>I</i>	<i>Sofa bed</i>		√
		<i>J</i>	<i>Secondary Sofa</i>		√
		<i>K</i>	<i>Wall Cabinet</i>		√
<b>5</b>	<b>Control of functions number</b>			stable	Yes
<b>6</b>	<b>Increase number of functions</b>			stable	stable

## Effects of Flexibility

1. **Number of beds:** Increased by 50% per cent more than what is designed by the existing plan.
2. **Control of beds' number:** Flexible solutions have the ability to increase or decrease the number of beds, while the existing design is committed to a fixed number.
3. **Increase the number of beds:** Through flexible solutions, the number of beds can be increased, while the existing design is committed to a fixed number.
4. **Number of functions:** The number of functions when applying flexible solution increases until it reaches 10 functions with a feature that the whole space becomes the exploiter of one function more than in the existing plan. The comparison analysis between the existing plan and the flexibility solution is as follows:
  - **4.A- Main Bed unit:**
    - **Existing plan:** The existing plan adopts fixed type bed.
    - **Flexibility solution:** The flexible solution establishes two main beds of the same size with the ability to store them in a folding multiple functions unit until needed.
  - **4.B- Secondary Bed:**
    - **Existing plan:** There is no secondary bed within the existing design.
    - **Flexibility solution:** A doptsa sofa next to the TV unit with three seats and can be used for sitting or as an alternative to the secondary bed.

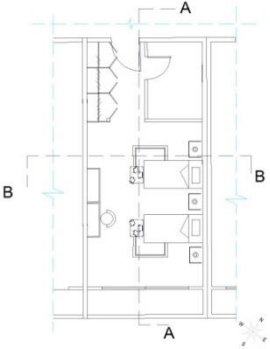
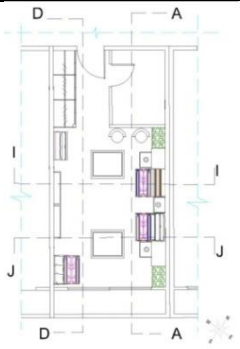
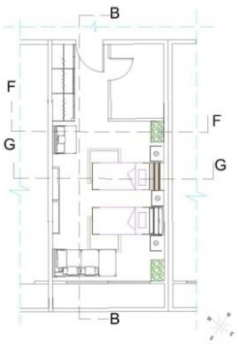
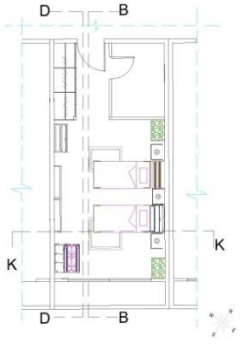
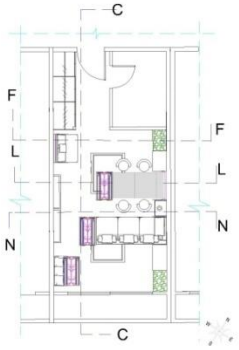
- **4.C- Kitchen:**
  - **Existing plan:** There is no kitchen unit within the existing design.
  - **Flexibility solution:** It establishes the kitchen as a moveable box within flexible solutions that is hidden until needed.
  
- **4.D- Dining Table:**
  - **Existing plan:** There is no dining table within the existing design.
  - **Flexibility solution:** The design of a foldable dining table and can be used in a useful way to serve the customers.
  
- **4.E-Living sofa:**
  - **Existing plan:** Consists of two chairs and a tea table in the middle.
  - **Flexibility solution:** The flexible solution transforms the room space to become a living room through closing the folding units of the main bed and opening the unit which can be utilized for the sofas with extracting the main sofa from the wall storage.
  
- **4.F- TV Unit:**
  - **Existing plan:** There is a TV hanging to a separate unit fixed to the wall.
  - **Flexibility solution:** Designs the TV unit in front of the main beds and the sofa to serve the customers through use all functions in room .
  
- **4.G- Mini bar**
  - **Existing plan:** The existing design is customized within the hotel's table space for serving drinks.



- **Flexibility solution:** It does not exist in flexible solutions and is replaced with a kitchen unit and dining table.
- **4.H-Safe:**
  - **Existing plan:** Determines its place within a part of the Wall Cabinet in the existing design.
  - **Flexibility solution:** It can be added to any place within the proposed furniture easily.
- **4.H- Sofa bed:**
  - **Existing plan:** There is no sofa bed within the existing design.
  - **Flexibility solution:** Creates it as a folding furniture unit next to the TV unit to serve living room, bedroom, and as an alternative to the secondary sofa.
- **4.H-Secondary Sofa:**
  - **Existing plan:** There is no secondary sofa within the existing design.
  - **Flexibility solution:** adopts the sofa next to the TV unit with three seats which can be utilized for sitting or as an alternative to the secondary bed.
- **4.K- Wall Cabinet:**
  - **Existing plan:** The standing design and the flexible design, each of them contains a wall cabinet.
  - **Flexibility solution:** Uses a sliding door in the wall cabinet to provide easy use for customers and utilizes the space by not reserving space for the cabinet door.

5. **Control of functions' number:** Flexible solutions have the ability to increase the number of functions until needed, while the existing design is committed to a fixed number.
6. **Increase number of functions:** Through flexible solutions, the number of functions can be increased, while the existing design is committed to.

Table 58: Significant Study of Case Study 6 : Noah's Ark Deluxe Hotel & Spa

<b>Existing plan</b>	
	
<i>Existing plan, Noah's Ark Deluxe Hotel &amp; Spa (Personal work) Scale: 1/200</i>	
<b>Proposed Plan</b>	
	
<i>Proposed Plan (1) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (2) (Personal work) Scale: 1/200</i>
	
<i>Proposed Plan (3) (Personal work) Scale: 1/200</i>	<i>Proposed Plan (4) (Personal work) Scale: 1/200</i>
NO.	<b>Significant Finding Study for Proposed Design</b>
1	Reorganize the room space functions.
2	Ability to separation or reconfiguration the room functions.
3	Provide the effectiveness of apply the folding flexible furniture in the room.
4	Increase and decrease the number of beds and functions.
5	Ability to change the room type as user need

**1. Reorganize the room space functions.**

The proposed design looking to use an item of folding flexible furniture in order to improve the room size and functional

**2. Ability to separation or reconfiguration the room functions.**

The folding flexible furniture distinguish of it easy to store and easy to change position.

**3. Provide the effectiveness of apply the folding flexible furniture in the room.**

Where use folding flexible furniture in min beds, dining table, secondary sofa, and secondary sofa bed, that in order to improve the functioning of room

**4. Increase and decrease the number of beds and functions.**

Use the folding flexible furniture offer option to store until need, that capable the user to choose any function need.

**5. Ability to change the room type as user need.**

Use the folding flexible furniture offer option to form the room to three type of room a living room ,kitchen with dining table and bedroom.

The significant finding in this case study is establish a design capable of convert the room to functional room containing dining room, a bedroom, and living room with kitchen . Also, improve the effectiveness of multifunction units to increase the room functions and number of bed.

#### **4.4 Findings**

Table 59 below shows the Significant finding of six cases studies through analysis of 35 points in order to evaluate the flexible solutions and investigate the effect of flexibility on hotel standard rooms.



Additionally, analyzing the findings table of the proposed plans for the case studies and the effect of flexibility solutions, it provides highly suggestive evidence that those flexible solutions led to the creation of functions and beds as main parts of the room in order to meet the guests' needs.

Moreover, the flexible solutions can help the room to be a changeable space with eleven functions in the same space, also they establish a technique that allows to increase or decrease the number of functions and the number of beds to reach their respective optimums to achieve the highest comfort level.

The analysis reveals the patterns of flexibility (Spatial flexibility, Functional flexibility, Character flexibility) by which space is added ,removed, or modified in a suitable way by applying a proposed flexible mechanism.

Furthermore, the flexible mechanisms and the materials used allows the furniture to be formed as needed to create a functionally changeable space. Additionally, the flexible furniture supports space-saving through merging the functions together or linking them with each other or it may be movable which gives ease of transformation as needed. In addition, the types of flexibility (Sliding walls, Transforming Elements, Pop-Up Interactive, Multi-folding flexibility) are distinguished by determining the mechanism, material, and flexible furniture to create the flexible room. More than one type can be established in the same space with different functions. The proposed design achieved solutions that developed the hotel cases studies. Table 59 shows the most significant findings in all case studies that were achieved:

Table 60: Significant Study of Cases Studies

N O.	<b>Significant Findings Study For Proposed Design</b>
1	Add new functions into the room (the secondary bed, kitchen, dining table, living sofa, TV unit, and wall cabinet) .
2	Prove the possibility of introducing new units into an already existing project to maximize the functionality of the space.
3	Provides the possibility of using flexible furniture and store it within the same room
4	Increase the number of beds.
5	Increase the number of functions.
6	Provide all used functions with tools in the same space.
7	Improve functionality and comfort level.
8	Create a functionally changeable space.
9	Store furniture within structural elements walls, floors, and ceilings
10	Adopting the pattern of flexibility to establish flexible structure .
11	Ability to change type of room.

The findings of case studies for proposed designs have improved the functionality and comfort level in five star hotel standard room. Also, flexibility as a tool utilized the flexible mechanism inside the elements or as a separate unit to create changeable spaces, by which standard rooms with all functions needed were created. In addition, it can keep the flexible furniture in the room without having to move it out of rooms.

## **Chapter 5**

### **CONCLUSION**

The purpose of this thesis was to assess the effectiveness of flexibility in the hotel in West Coast of North Cyprus cities on the basis of applying the flexible solutions in hotel Standard room. In addition, before developing the proposal of flexible solutions, the analysis of (TRNC) rules and regulations and the hotel's information were held in order to recreate the room design.

This thesis looked into how the flexible design affected the interior space in hospitality architecture, and what the effects of using flexible materials and structures in space. In addition, what the effects of creating changeable space by using flexible solutions in a small area, and if the flexible design was an effective use of space.

The flexible design can help the interior space to achieve the optimum functional space to be more livable by adding new functions into the room without needing more space. As well, the flexible material types help to make the space to be a changeable space by using in creating flexible units that can be stored inside the structures. In addition, the changeable space is cauterized by the ability to change the type of room in order to meet the user's need in the same space.



The results of this study show that the flexible solutions led to a 50% increase in the guests' number and the number of functions has reached 11 functions more instead as compared to 5 functions in the existing plan. Moreover, the study was applied for the flexible solutions in order to establish a flexible space that has ability to absorb the required number of functions. Also, the flexible mechanisms and the flexible furniture can support the applications of the flexibility types through the elements of structure (Ceiling, Wall, Floor).division of the room for the required functions according to the needs of the space such as create **Meeting room , Living room , Bedroom, Kitchen , and Dining room** that by applying the flexible solutions to establish flexible space by function units such as (Main Beds unit, Secondary Bed, Kitchen, Dining Table, Living sofa, TV Unit, Safe, Sofa bed, Secondary Sofa, Wall Cabinet).

In addition, it can meet the user needs through the process of increasing functions or reducing the number of users. Equally important, it also covers the owner's needs to get more profit from rooms by increasing the number of beds and the ability to change the room functions as the market need.

Additionally ,the flexible materials applied into three main structure pattern (Solid materials, High flexibility materials, and Manufactured flexibly). That for many uses for each of them .such as solid materials using flexible mechanism equipment to give solid materials the chance to be used in a flexible solution where it has led to **90%** increased flexibility in units and furniture used. And High flexibility materials, it distinguished by their ability to stretch or collapse to divide the space by **75 %** for each flexibility function used in it. Also , Manufactured flexibly has the ability to be changeable and is characterized by the easy of forming the figure which led to

a **100%** increase in the flexibility of the units to be formed as required. Furthermore, using flexible solutions with a small area can be help to use the interior room space in more effectiveness and also use the space for an increased number of functions.

Flexibility can deal with any function of space in any case by increases the functions in order to make it changeable and more useful. Moreover, it can help to stored the furniture in the same space.

Additionally, the hotel rules and regulations in TRNC consider offering the quality that suits the guest's accommodation need . As well aims to create a stander that corresponds to the specified classification of the hotel. Also, it allows for the five-star hotel classification to applying the designs of accommodation within the conditions to create a high stander interior architecture accommodation.

As a future recommendation, this thesis could provide future researchers with criteria and proposed design for applying flexibility as a tool to improve the functionality for small space. The information in this thesis could offer good data for the interior architectural designer, researcher, and architect who interested in the subject of flexibility or hotels as a reference for further studies.

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URL107: <https://www.noahsark.com.tr/en/about-us/>(accessed MAY 22, 2021).

URL108:<https://www.noahsark.com.tr/en/accommodation/suits/>(accessed MAY 22, 2021).

URL109:<https://northcyprusinternational.com/north-cyprus-tourism-increase/> (accessed MAY 22, 2021)



## **APPENDIX**

### **Drawing The Existing Plan Process**

The process is based on two main parts, firstly, for analysis based and drawing plans, by relying on different approaches (*Books, articles, old thesis, images, videos, magazines, and websites*). Secondly is to apply flexible technology in the field of designing the hotel's criteria.

Analysis process section code . Regarding the analysis section, the plans submitted for hotels were drawn using the following analysis method.

**A note:** in the explanation of the process to draw the existing plans, codes will be used that refer the each used process instead of explaining every process for every case study.

For analyzing, reaching and drawing the plans were done through nine process that have been adopted as follows:

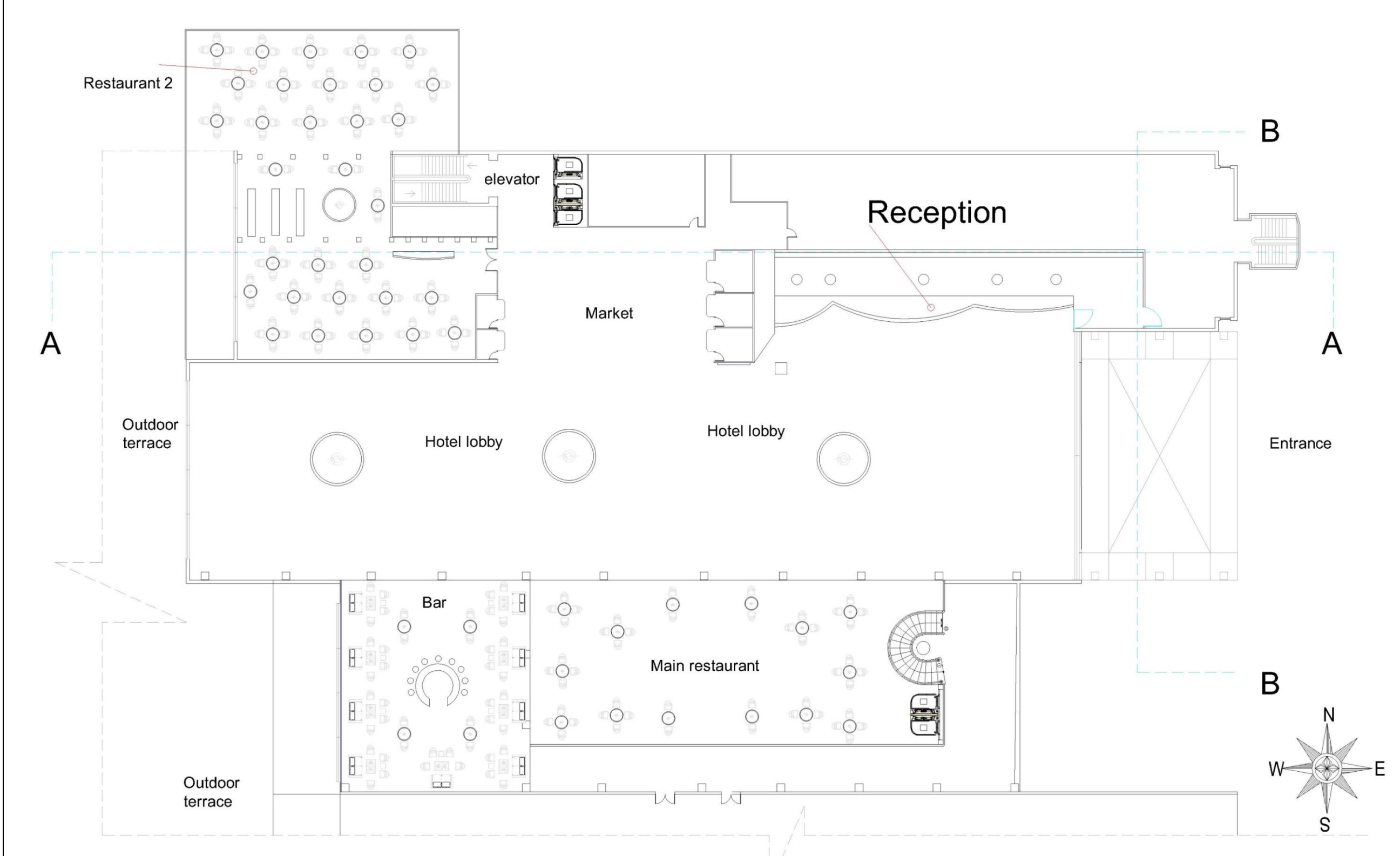
Table 61:Description The Code For This Process Of Analysis

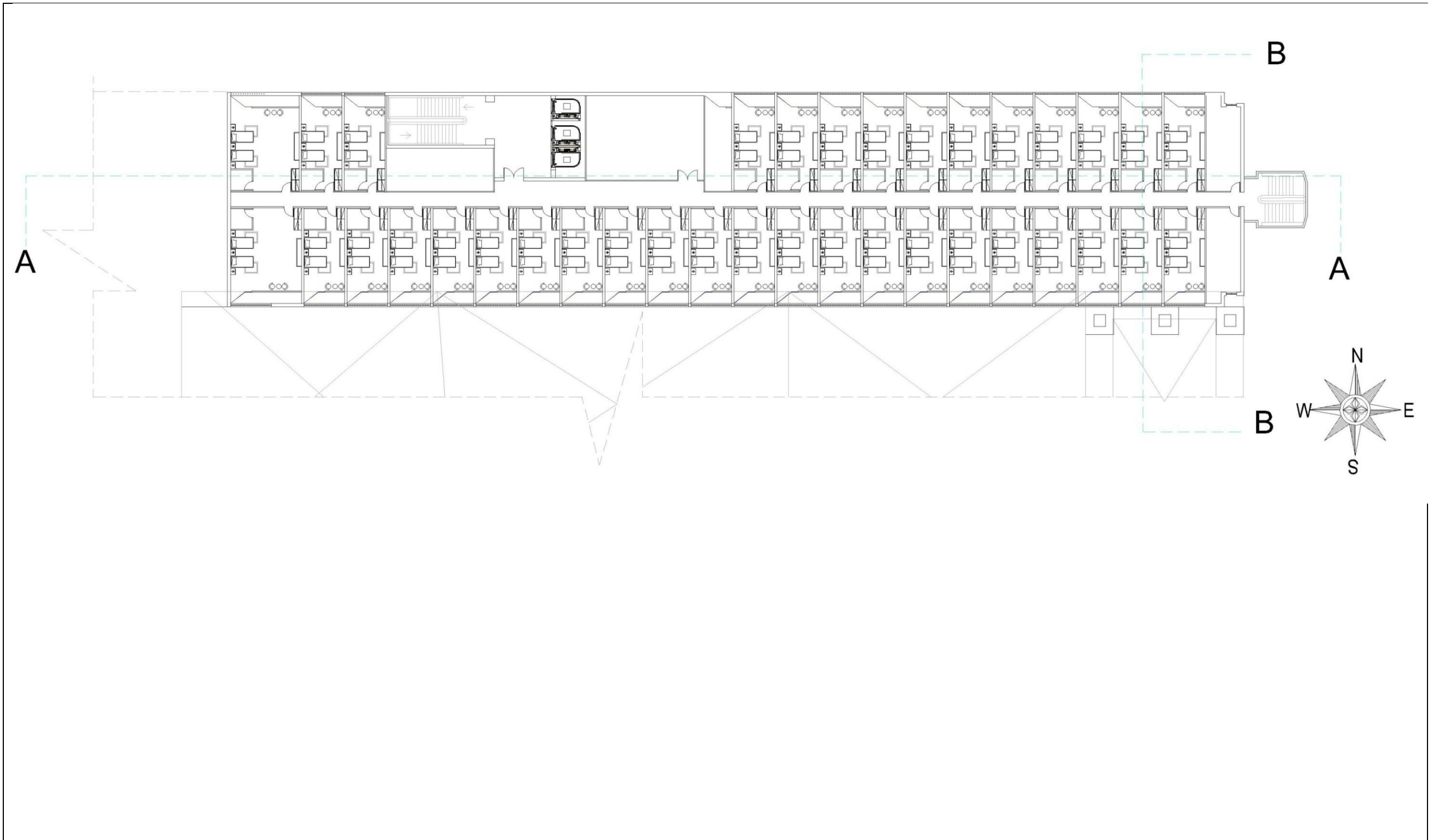
<b>Process of analysis</b>	<b>Description</b>	<b>The code for this Process is</b>
landscape plan <b>First Method</b>	<p>First, through Google Maps: by the Google site option, it allows a tool that enables the knowing of the distance and the area through the satellites of its maps .</p> <p>By using this feature, the main data will be taken for identifying the construction site of a hotel.</p> <p><b>THE DATA THAT WILL BE TAKEN FROM IT :</b></p> <p><i>Outside floor plan</i></p> <p><i>building size</i></p> <p><i>thickness of the structure</i></p> <p><i>(The size of the structural columns for length and width with addition of bricks and cement)</i></p>	GM
landscape plan <b>Second Method</b>	<p>Through history books and tourism magazines, which provide information about the hotel design and the room plan</p> <p><b>THE DATA THAT WILL BE TAKEN FROM IT :</b></p> <p><i>indoor floor plans</i></p> <p><i>number of room</i></p> <p><i>interior design</i></p> <p><i>Outside floor plan</i></p> <p><i>building size</i></p> <p><i>thickness of the structure</i></p> <p><i>(The size of the structural columns for length and width with addition of bricks and cement)</i></p>	GMB
Facade of the building <b>First Method</b>	<p>Through analysis :</p> <p>First use the distances taken from Google Maps as a basic reference to know the height and the width</p> <p>Then the facade of the building from images that are offered on the websites will be used</p> <p>Then, they will be merged to be adapted as follows:</p> <p>Using the distance from the map to know the width of the</p>	FOB

	<p>building from the bottom and through it, the remaining measurements of the façade will be known by using Photoshop to convert it to AutoCad plans.</p> <p>Then, analyze the details of the façade, its windows and door after extracting the plans from AutoCad.</p>	
<p>Façade of the building <b>Second Method</b></p>	<p><i>Through history books and tourism magazines, which provide information about the hotel design and the room plan will be drawn using:</i></p> <p><i>images and plan</i></p> <p><i>convert them into a two-dimensions</i></p> <p><i>and modify them in Photoshop to know the distance to convert it to AutoCad plans.</i></p> <p><i>Then, analyze the details of the façade, its windows and door after extracting the plans from AutoCad.</i></p>	<b>FOB2</b>
<p>The internal division <b>First Method</b></p>	<p>The internal design is drawn using:</p> <p>Video uploaded to YouTube for hotel from the inside then a screenshot is taken and analyzed</p> <p>After that by analyzing the details from the screen shot, the plan and the sketches are drawn</p> <p>By using Photoshop to convert it to AutoCad plans.</p> <p>Then, analyze the details of the interior architecture after extracting the plans from AutoCad.</p>	<b>TID</b>
<p>The internal division <b>Second Method</b> Through pictures taken from internet sites</p>	<p>The internal design is drawn using:</p> <p>Through images taken from internet sites for hotels</p> <p>After that by analyzing the details of the image, the plan and the sketches are drawn</p> <p>By using Photoshop to convert it to AutoCad plans.</p> <p>Then, analyze the details of the interior architecture after extracting the plans from AutoCad.</p>	<b>TIDT</b>
<p>The internal division <b>Third Method</b> Through photographs</p>	<p>The internal design is drawn using:</p> <p>by a picture taken by the researcher after requesting the hotel manager (personal work)</p> <p>By using Photoshop to convert it to AutoCad plans.</p> <p>Then, analyze the details of the interior architecture after extracting the plans from AutoCad.</p>	<b>TIDP</b>

<p>Inner room <b>First Method</b></p>	<p><b>Inner room is drawn using:</b></p> <p>information available on the hotel's website such as : ( <i>number of floors, the size of the room, the furniture available in the room, and the photos posted for the rooms</i>)</p> <p>Then analyze by drawing the plan and the area by using the above method to discover the distribution of rooms on the floors and the room contents of furniture and decorations.</p>	<p><b>IR</b></p>
<p>Inner room <b>Second Method</b></p>	<p><b>Inner room is drawn using :</b></p> <p>Video uploaded to YouTube for hotel from the inside then a screenshot is taken and analyzed</p> <p>After that by analyzing the details from the screen shot, the plans and the sketches are drawn</p> <p>After that, the plans are drawn by using a screen shot to investigate the distribution of rooms on floors and the room contents of furniture and decorations.</p>	<p><b>IRT</b></p>

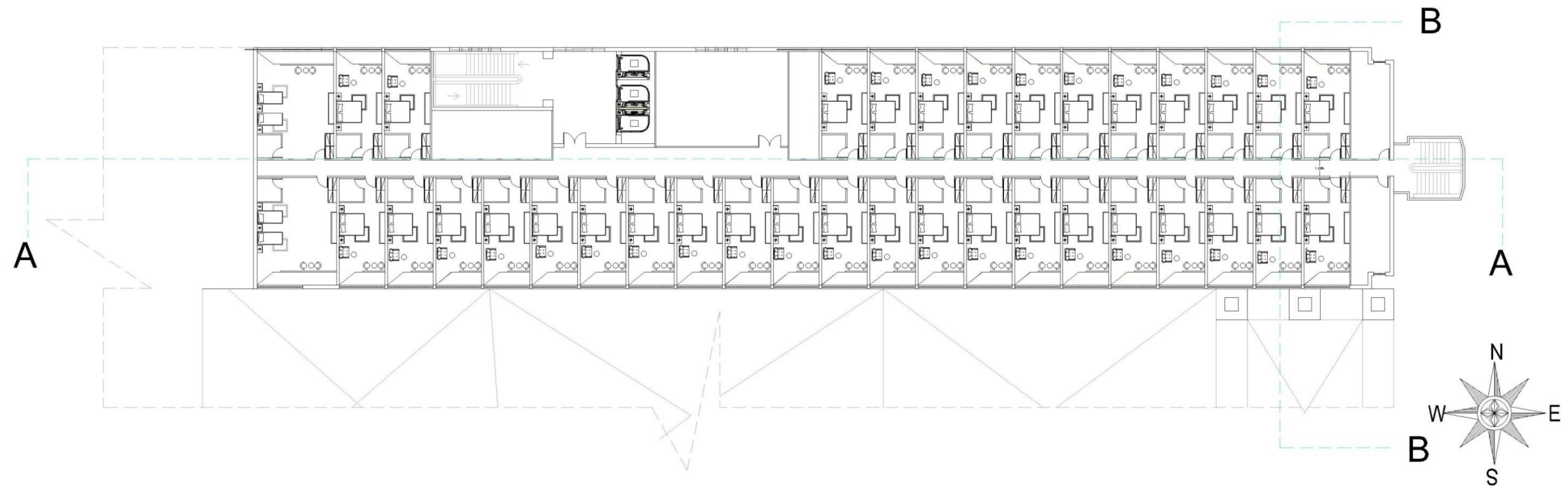






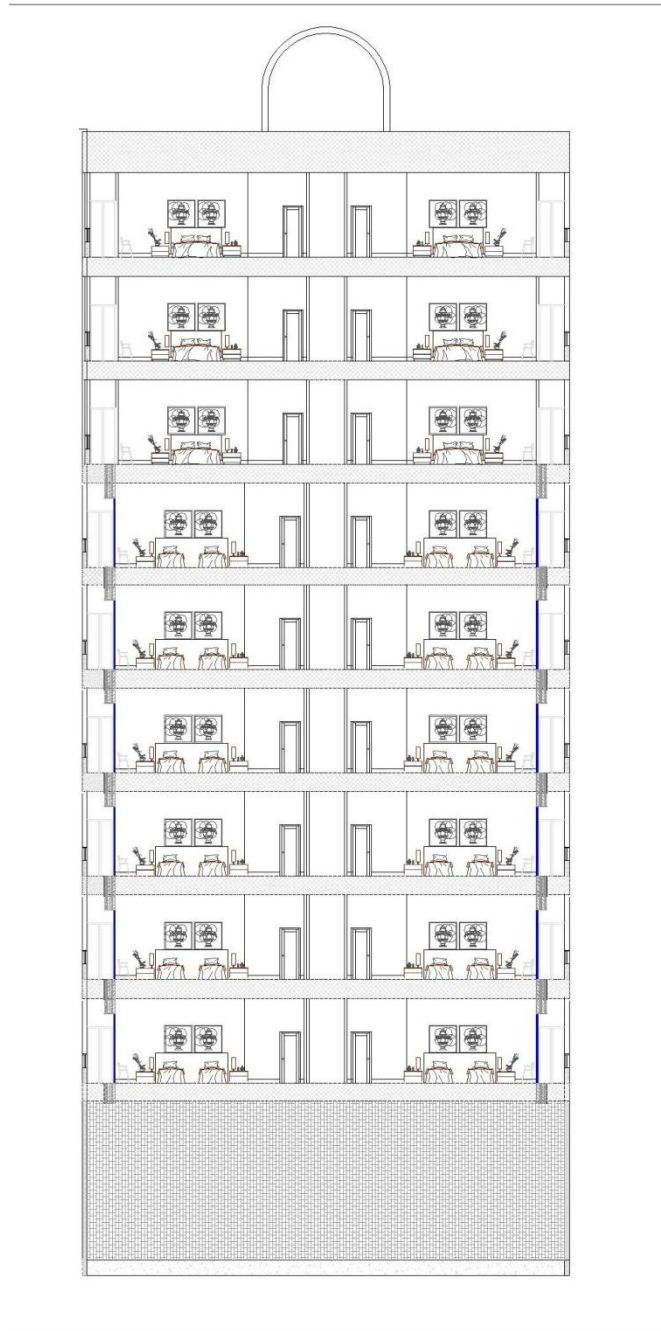
Salamis Bay Conti Part of Hotel Standard rooms plan floor (1st-6th)(Personal work)Scale : 1/250





Salamis Bay Conti Part of Hotel - SECTION A-A(Personal work)

Scale : 1/250



Salamis Bay Conti Part of Hotel - SECTION B-B (Personal work)  
1/250

Scale :

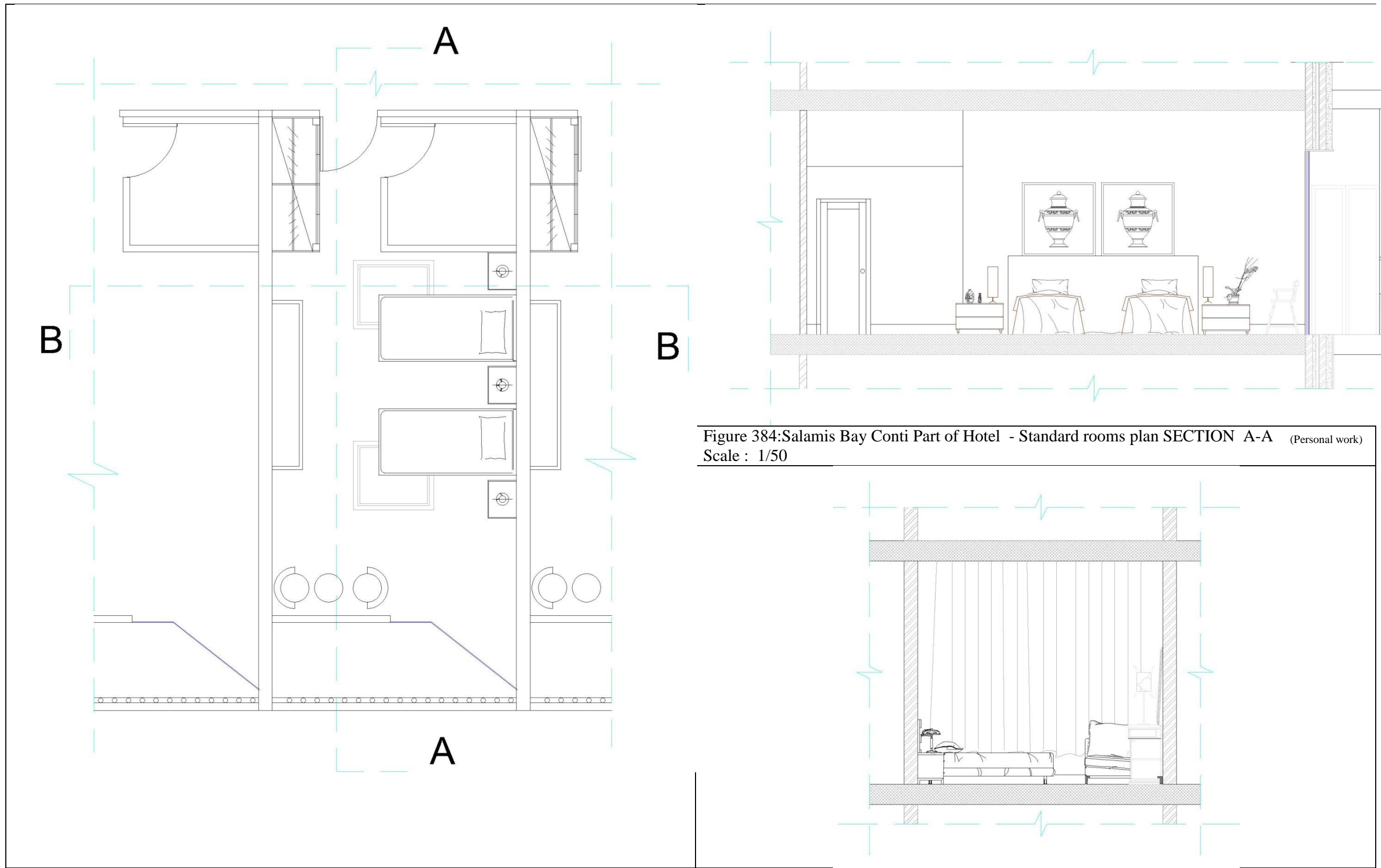


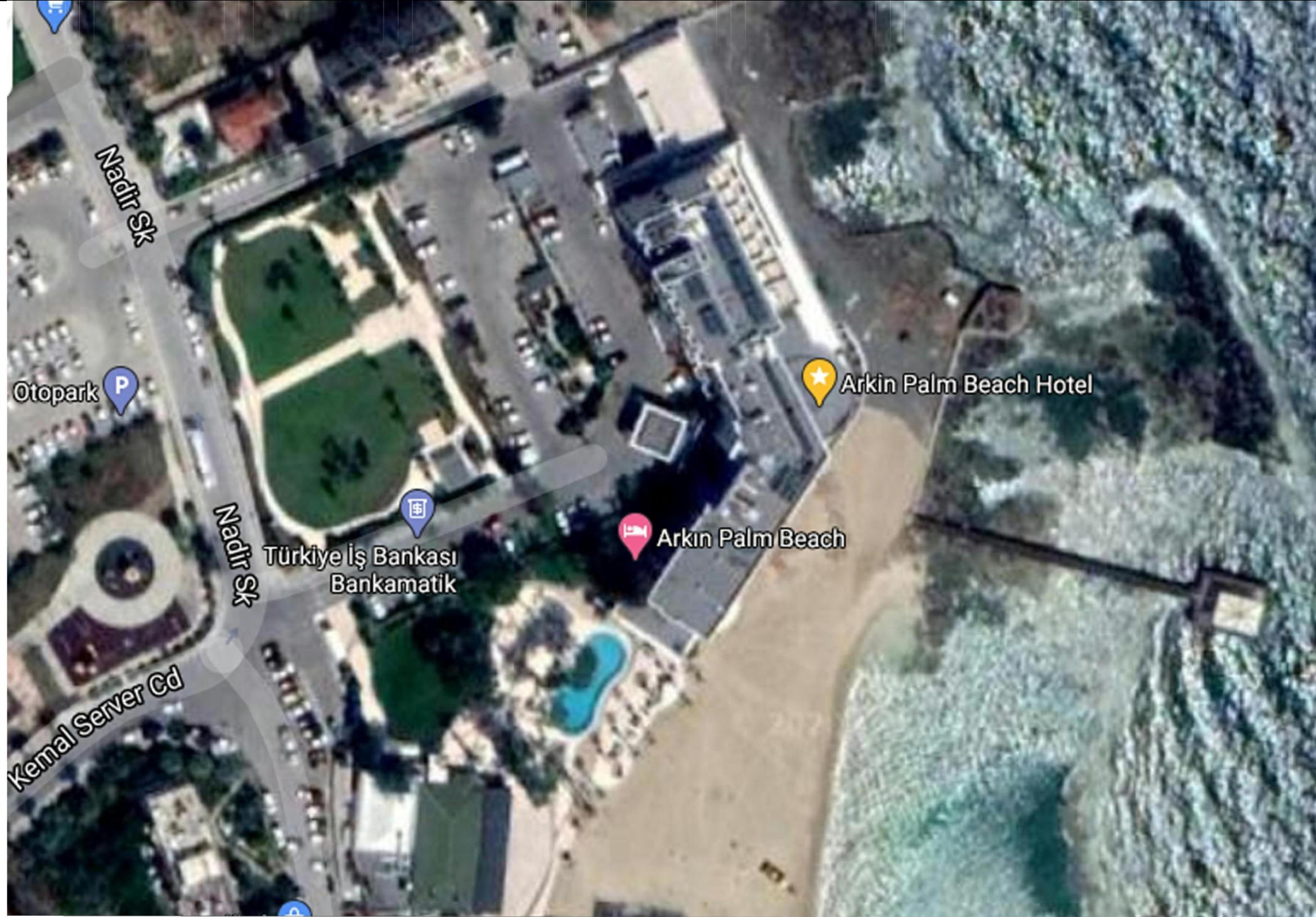
Figure 384:Salamis Bay Conti Part of Hotel - Standard rooms plan SECTION A-A (Personal work)  
Scale : 1/50

Salamis Bay Conti Part of Hotel - Standard rooms plan (Personal work) Scale : 1/50

Figure 385 :Salamis Bay Conti Part of Hotel - Standard rooms plan SECTION B-B (Personal work)Scale : 1/50

Table :Arkin Palm Beach HotelExisting plans

Existing plansArkin Palm Beach Hotel

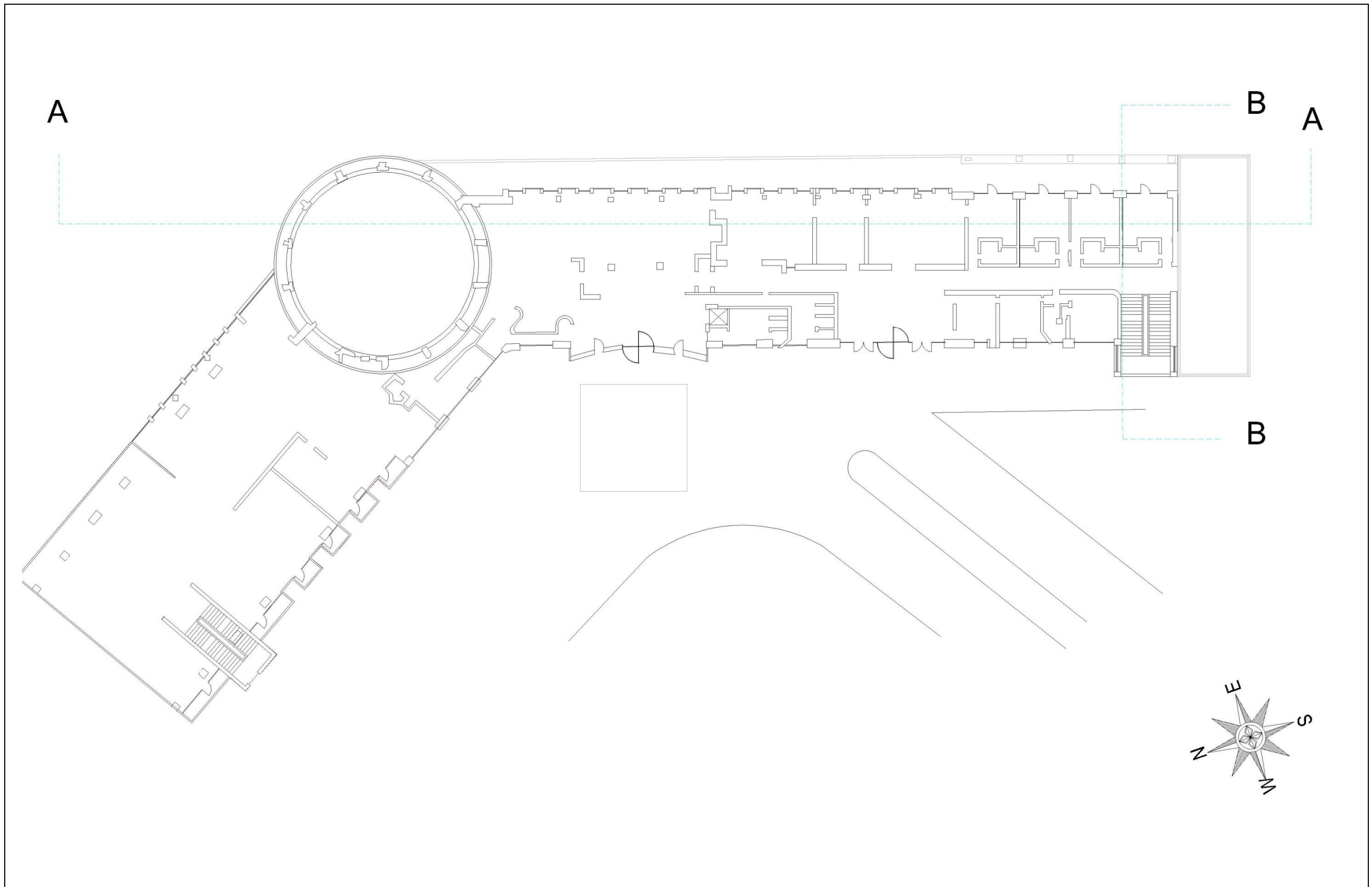


Arkin Palm Beach Hotel Google map location (197)(Personal work)

Scale : 1/500



Arkin Palm Beach Hotel parts image , from Google map (197) and eddied the part (personal work.) Scale: 1/500



Arkin Palm Beach Hotel Ground floor plan(Personal work) Scale: 1/250

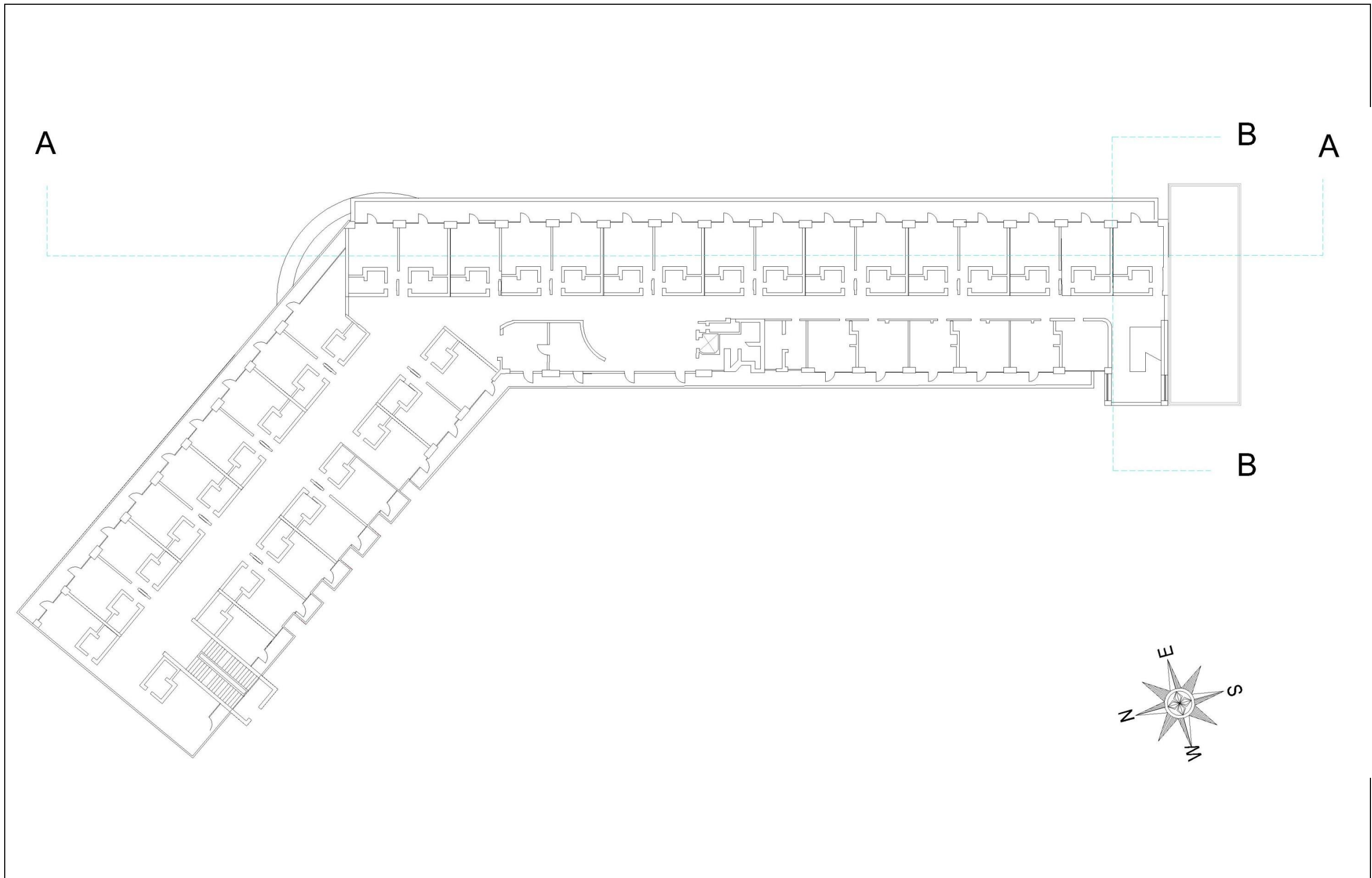


Figure 389 :Arkin Palm Beach Hotel Standard rooms plan first floor (Personal work)Scale: 1/250



Figure 390 :Arkin Palm Beach Hotel Southwestern Elevation(Personal work)Scale: 1/250

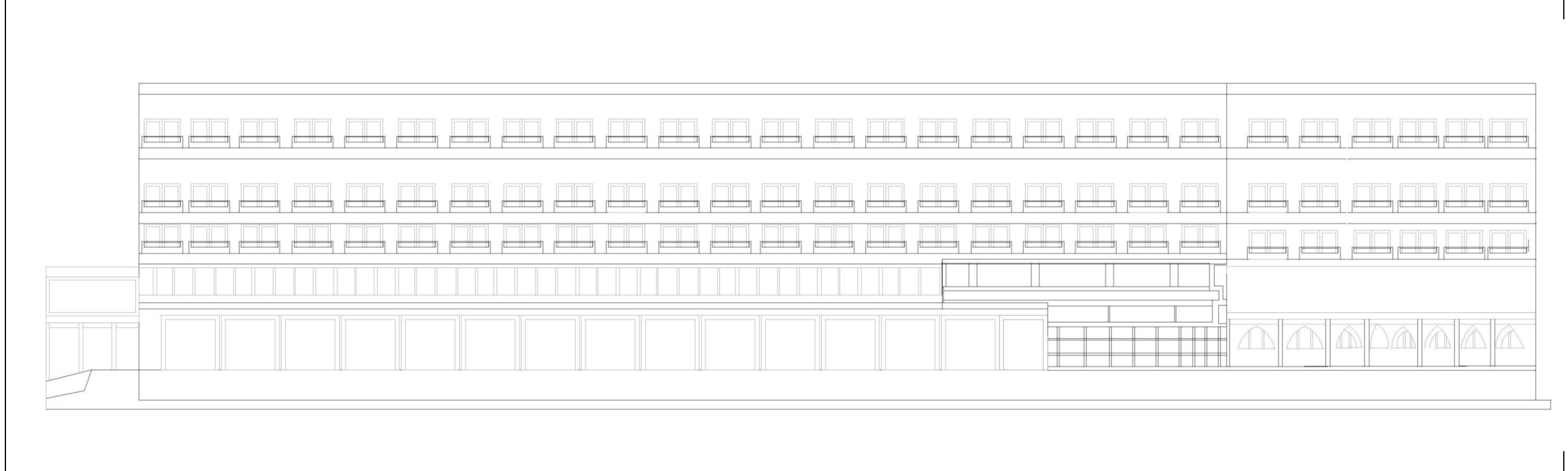
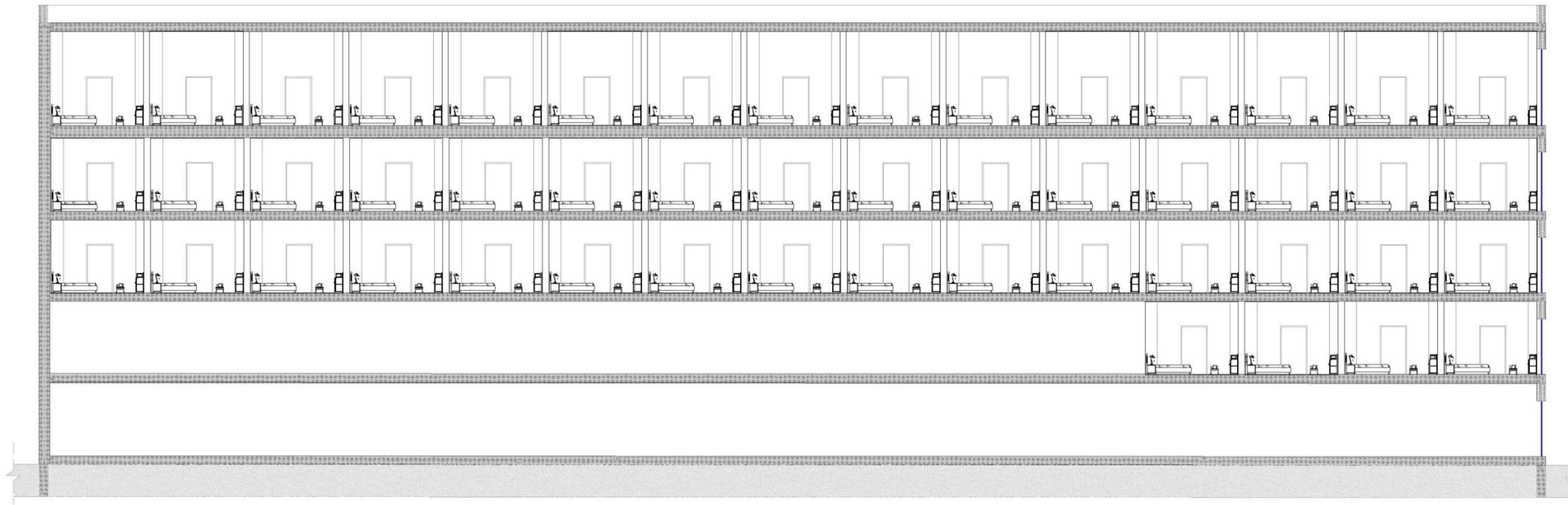


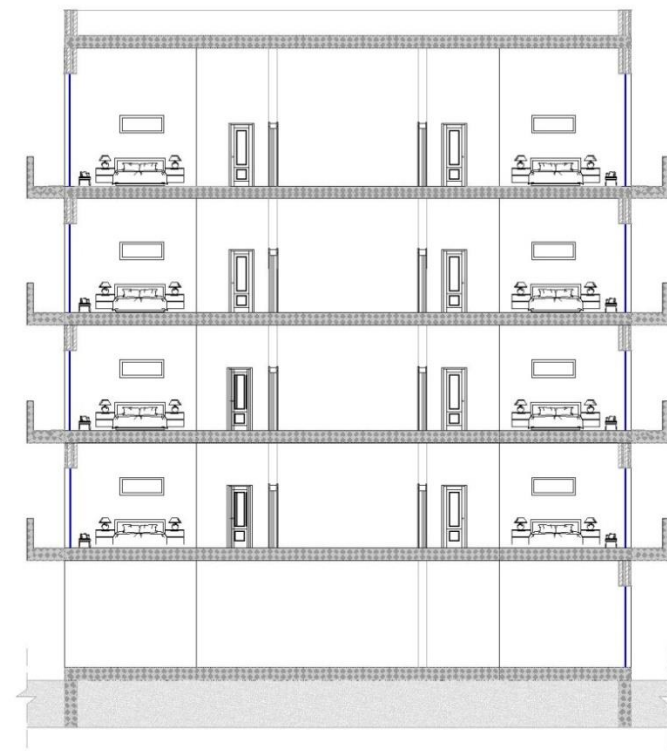
Figure 391 :Arkin Palm Beach Hotel Northeast Elevation(Personal work)Scale: 1/250





Arkin Palm Beach Hotel SECTION A-A(Personal work)

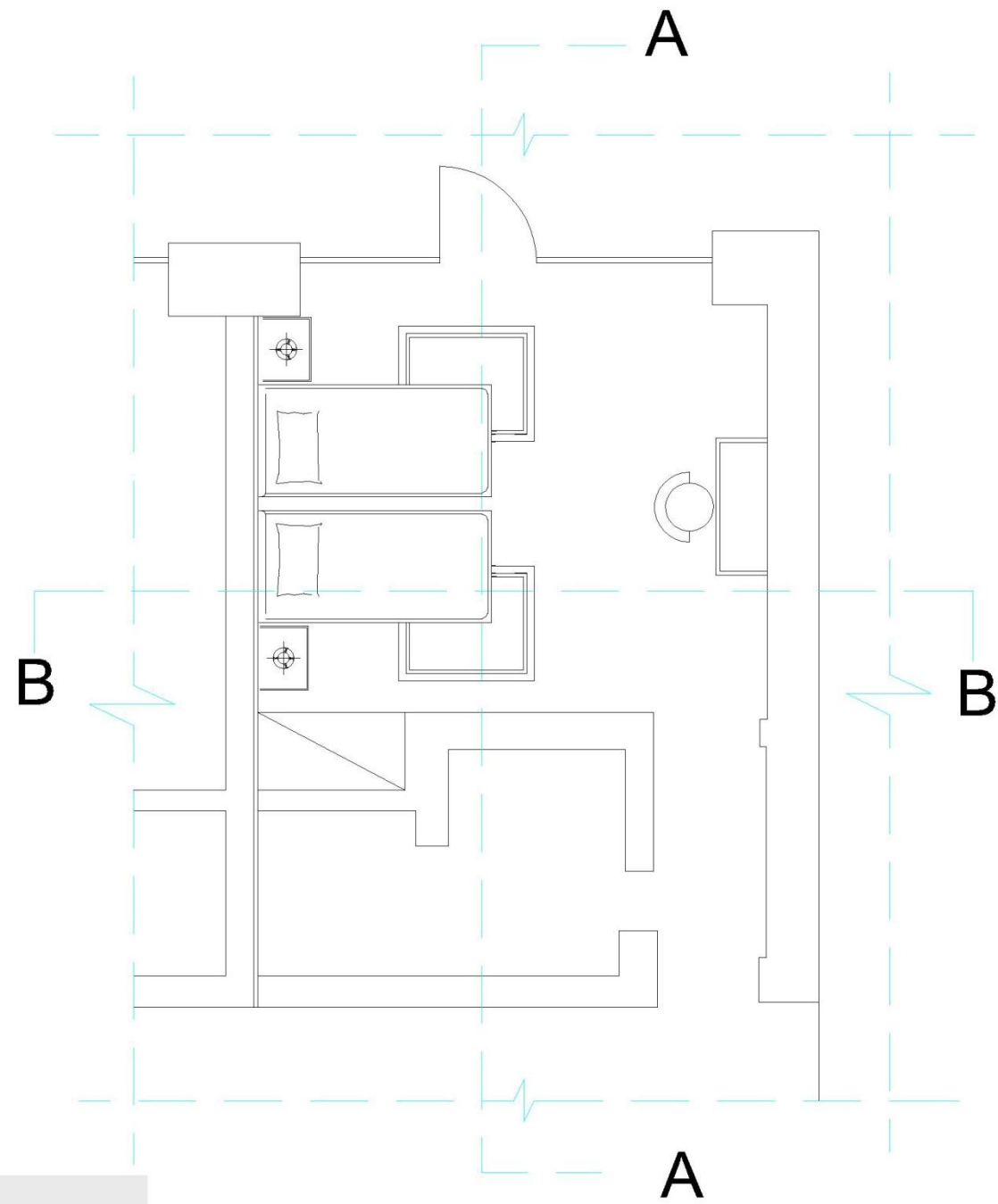
Scale: 1/200



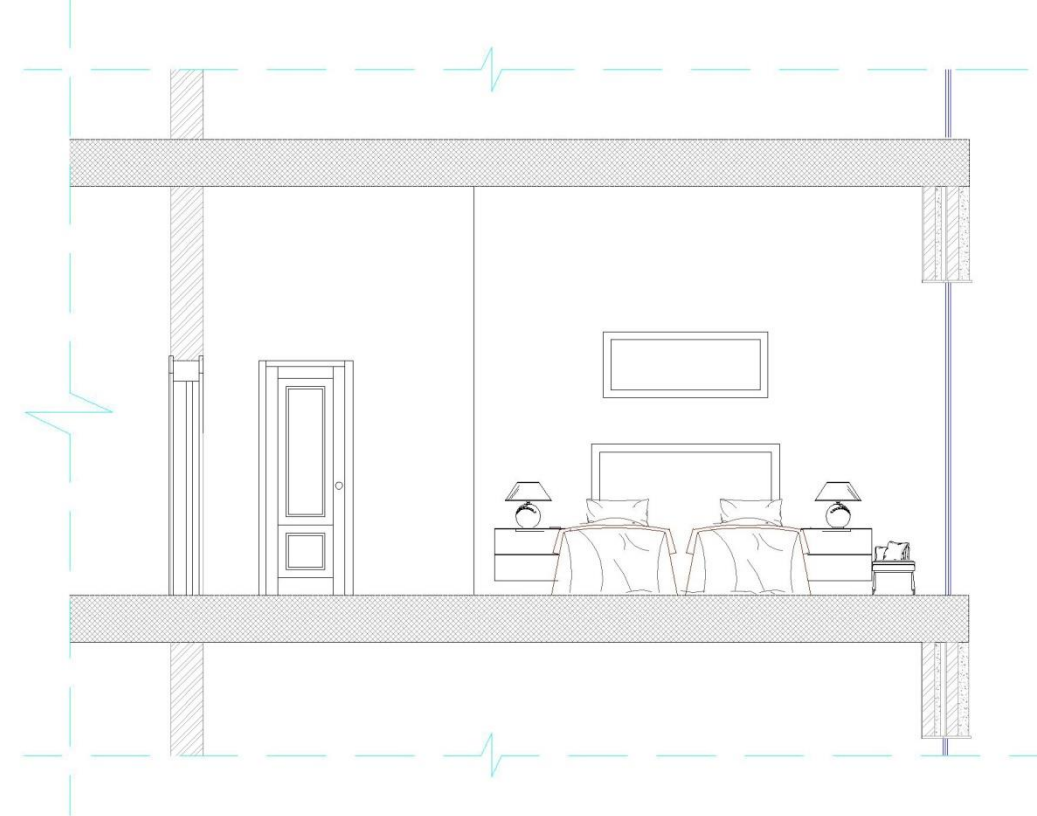
Arkin Palm Beach Hotel SECTION B-B (Personal work)

Scale:

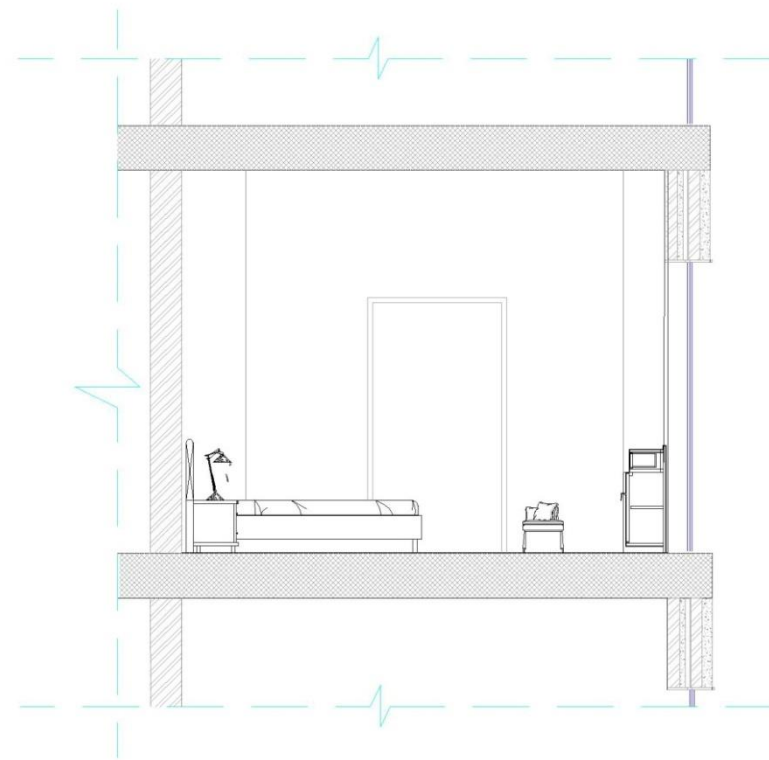
1/200



Arkin Palm Beach Hotel Arkin Palm Beach Hotel room Plan (Personal work) Scale: 1/50



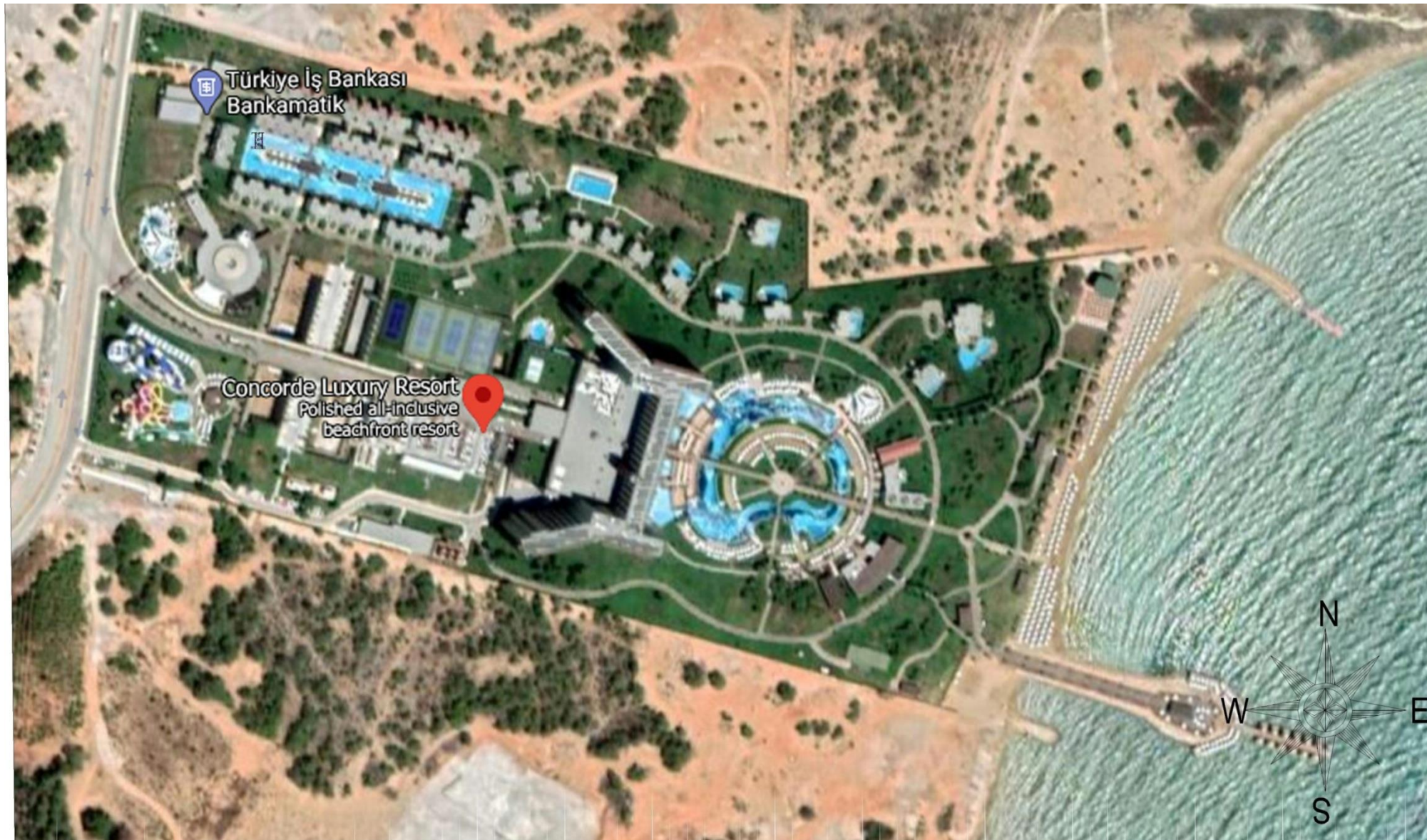
Arkin Palm Beach Hotel Arkin Palm Beach Hotel room Section A-A (Personal work) Scale: 1/50



Arkin Palm Beach Hotel Arkin Palm Beach Hotel room Section B-B (Personal work) Scale: 1/50

Table :Salamis Bay Conti Hotel Existing plans

Existing plansConcorde Resort Hotel



Concorde Resort Hotel Google map location (197) 2000

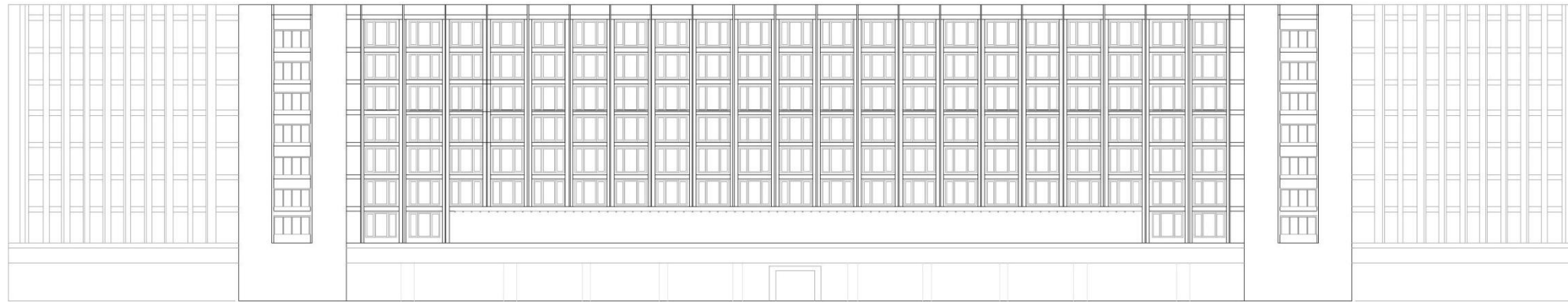
scale: 1-



Concorde Resort Hotel part from Google map location (197) and (personal work)

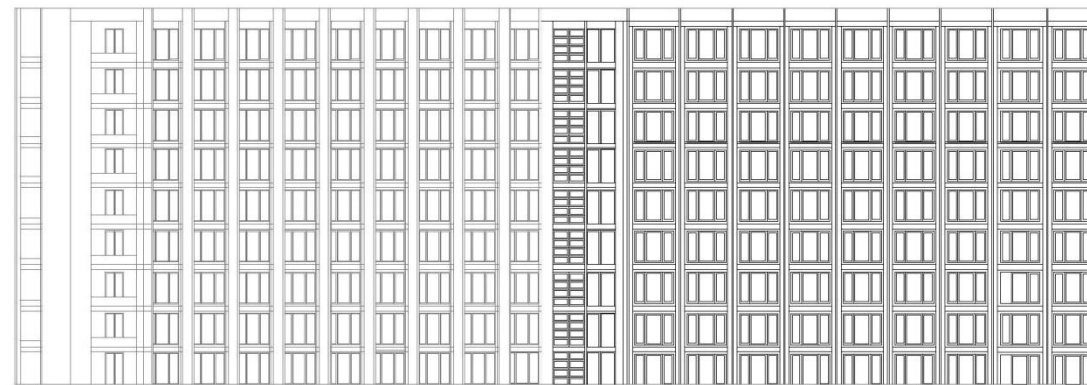
scale: 1-2000

- 1 The main old building
- 2 Restaurant & bar
- 3 Pool
- 4 Hotel Beach
- 5 Aquapark



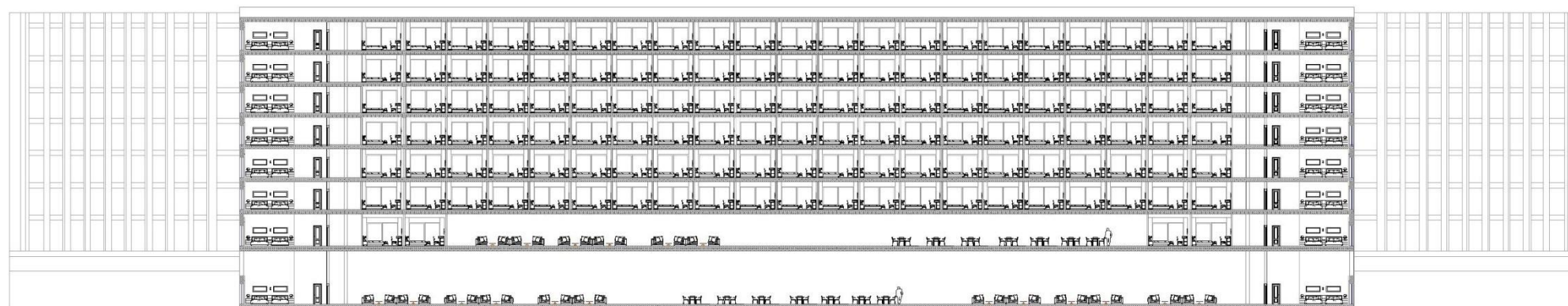
Concorde Resort Hotel **East Elevation** (Personal work)

Scale : 1/500



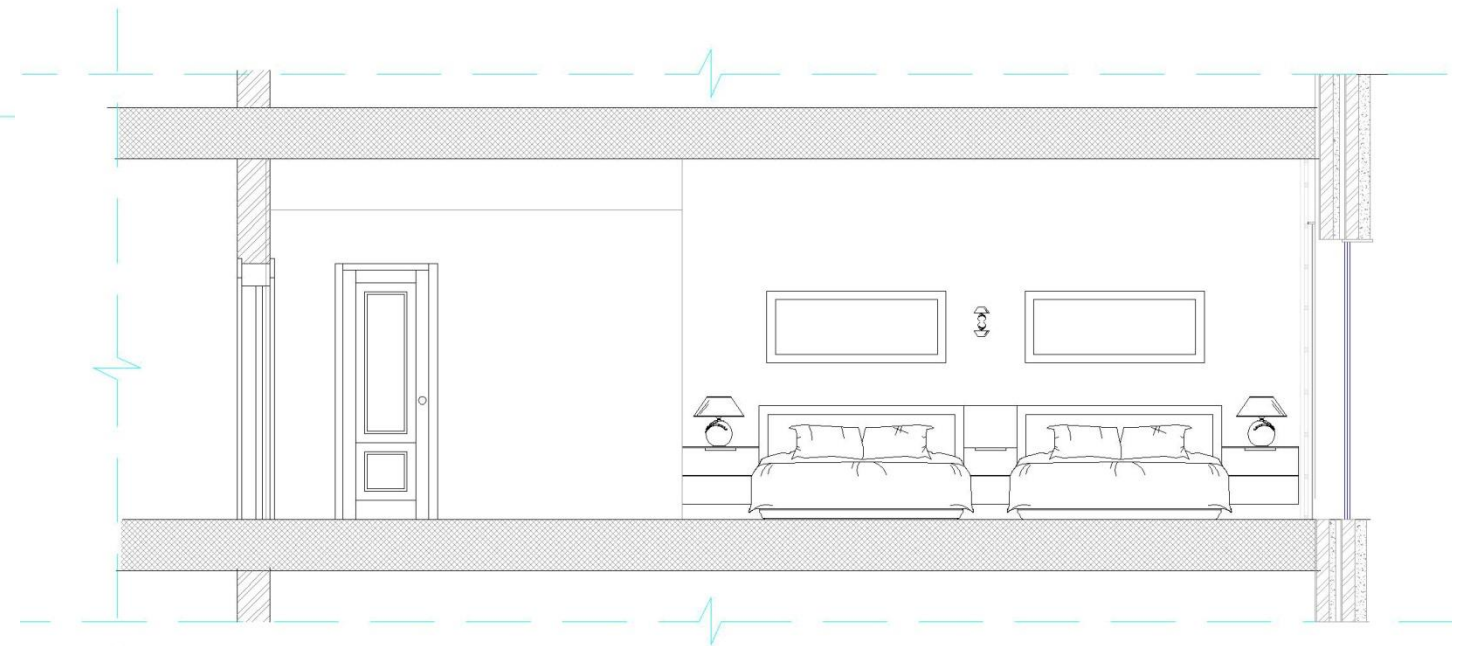
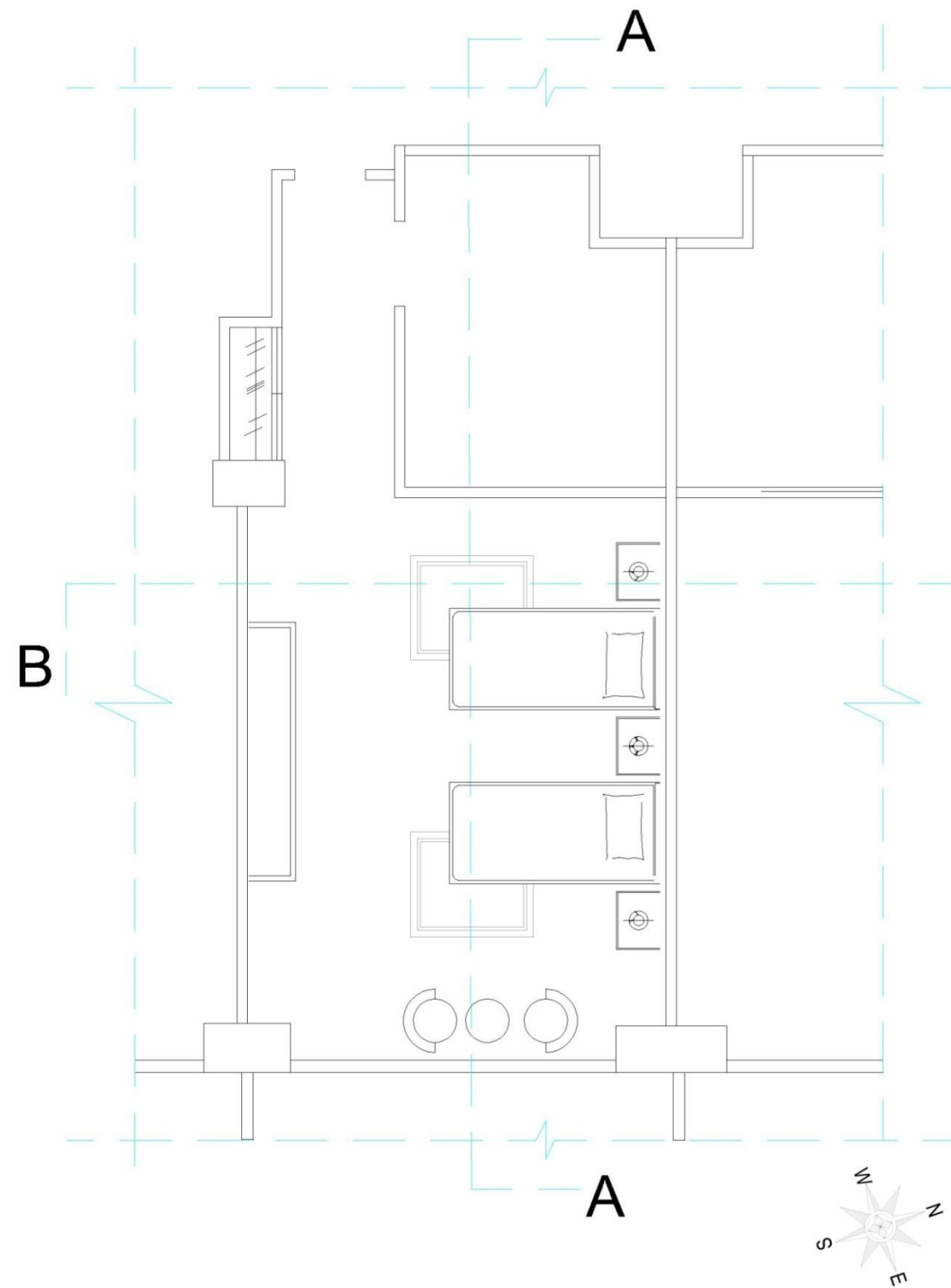
Concorde Resort Hotel **North Elevation** (Personal work)

Scale : 1/500



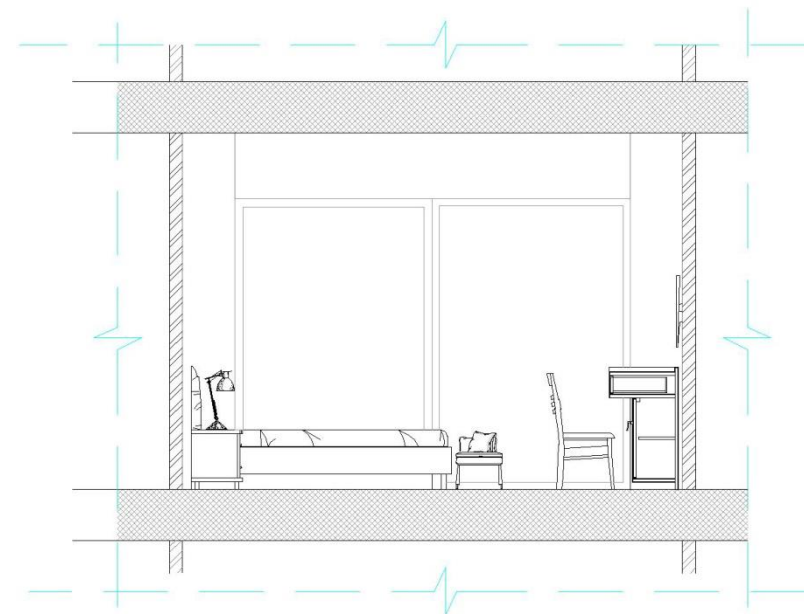
Concorde Resort Hotel **SECTION A-A** (Personal work)

Scale : 1/500



Concorde Resort Hotel Standard Room SECTION A-A (Personal work)

Scale 1/50



Concorde Resort Hotel Standard Room SECTION B-B (Personal work)

Scale 1/50

Concorde Resort Hotel Standard rooms plan (Personal work) Scale: 1/50

Table : Kaya Artemis Resort and Casino Existing plans

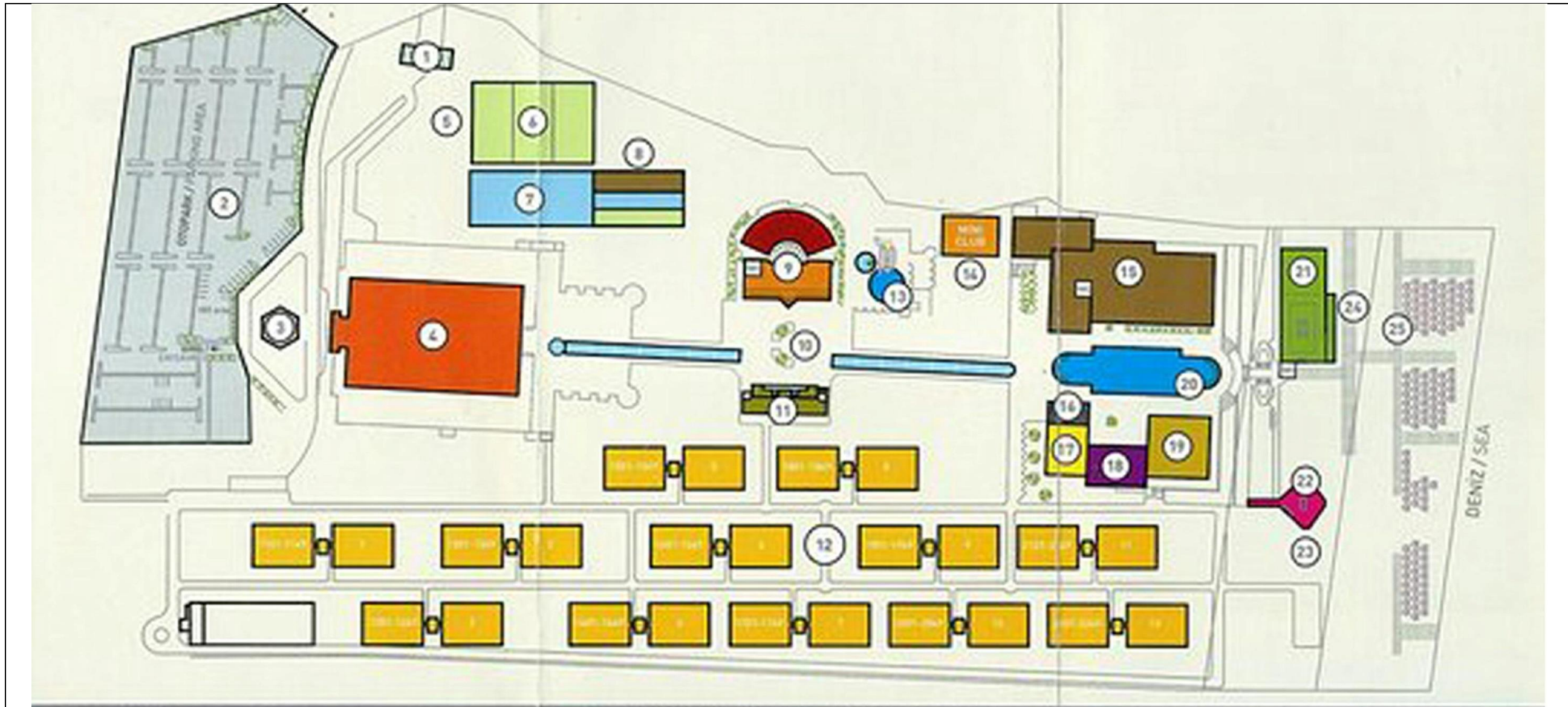
Existing plans

**Kaya Artemis Resort and Casino**



Kaya Artemis Resort and Casino Google map location (211)  
1/1000

Scale :

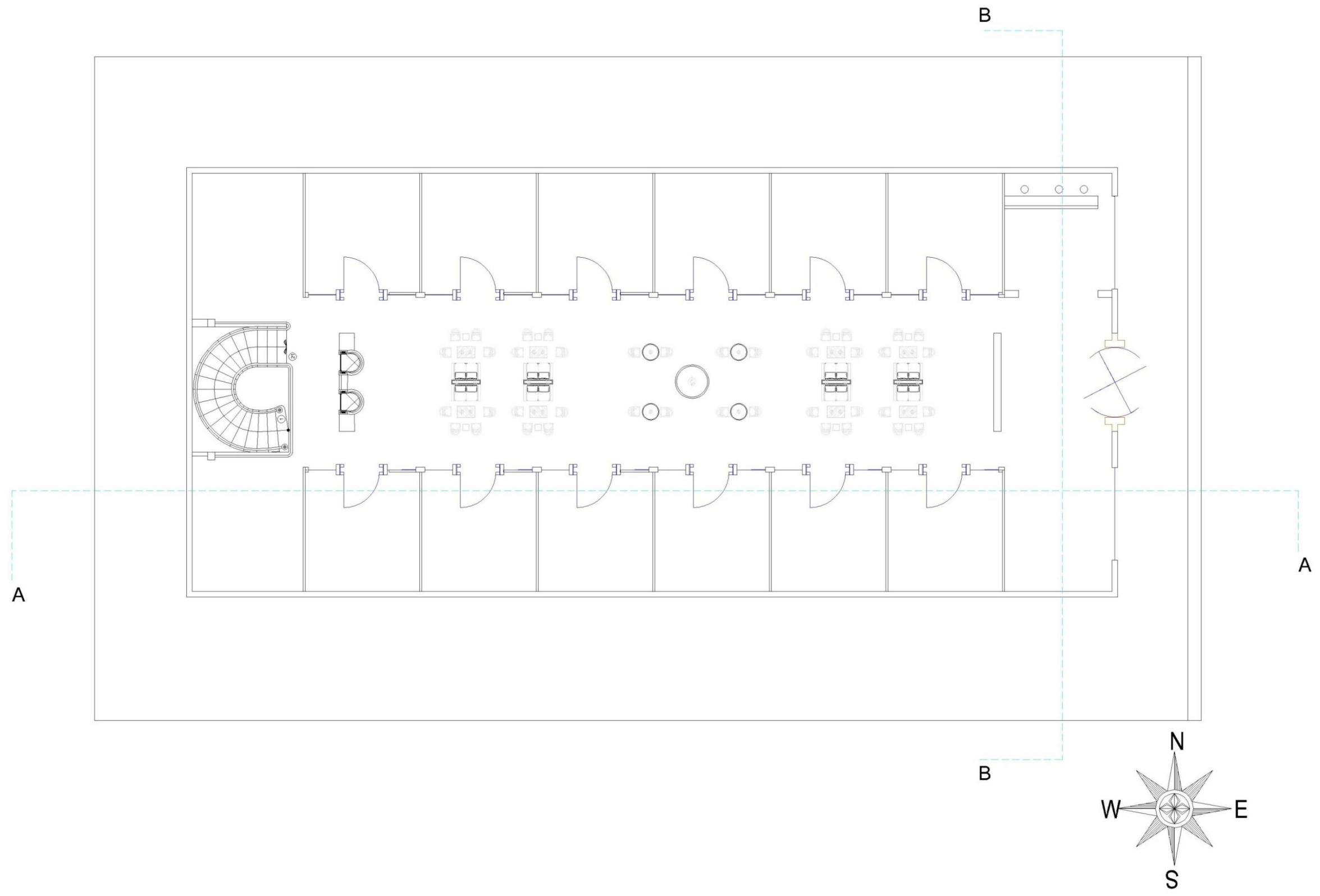


Scale: 1/1000

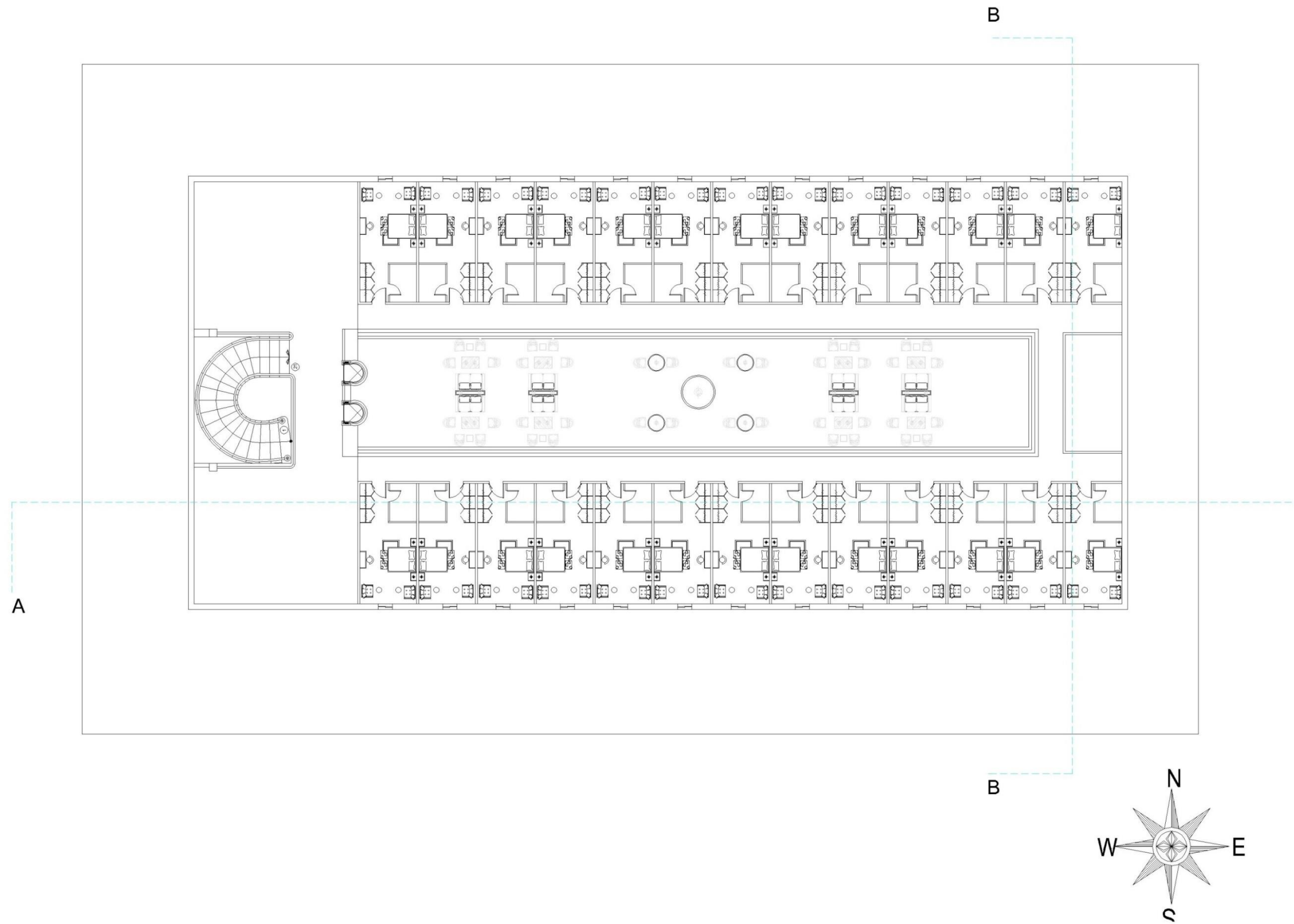
Kaya Artemis Resort and Casino part (211)

- |                         |                                  |                                     |
|-------------------------|----------------------------------|-------------------------------------|
| <u>1 ENTRANCE</u>       | <u>9 KIDS CLUB &amp; THEATER</u> | <u>18 INDOOR POOL</u>               |
| <u>2 PARKING AREA</u>   | <u>10 SHOW POOL</u>              | <u>19 FOOD COUTR &amp; POOL BAR</u> |
| <u>3 ENTRANCE CASIN</u> | <u>11 SHOPPING AREA</u>          | <u>20 MAIN POOL</u>                 |
| <u>4 ARTEMIS Hotel</u>  | <u>12 HOLLYDAY VILLAGE</u>       | <u>21 TEMPEL BEACH CLUB</u>         |
| <u>5 TENNIS COURTS</u>  | <u>13 KIDS POOL</u>              | <u>22 BEACH CLUB</u>                |
| <u>6 CENTER</u>         | <u>14 CLOESED POOL</u>           | <u>23 BEACH VOLLEYBALL</u>          |
| <u>7 VIP POOL</u>       | <u>15 RESTURANT</u>              | <u>24 TEMPEL BEACH</u>              |
| <u>8 ALACARTY ASIA</u>  | <u>16 DOCTOR</u>                 | <u>25 ALACART</u>                   |
|                         | <u>17 SPA CINTER</u>             |                                     |



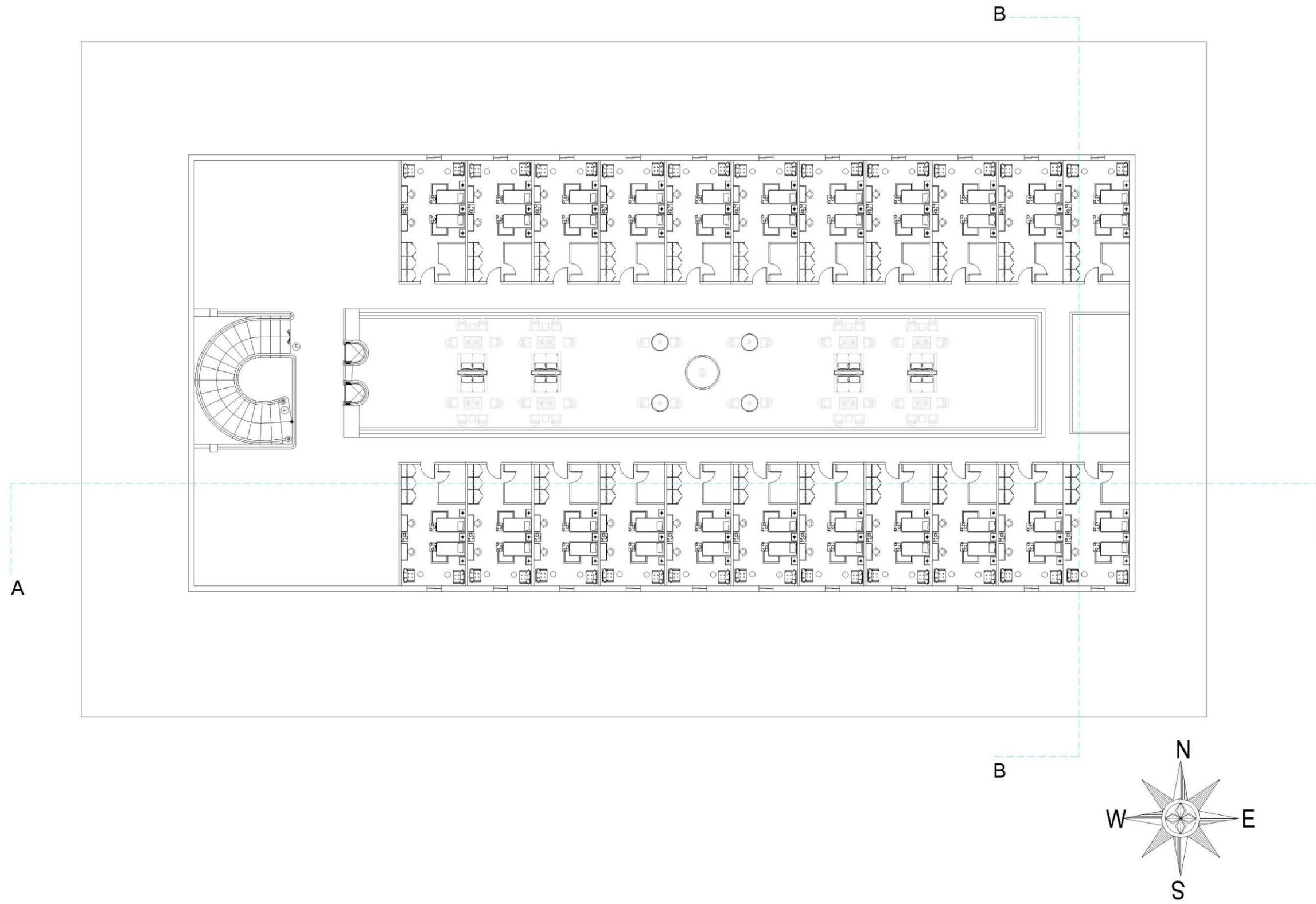


Kaya Artemis Resort and Casino Ground floor plan(Personal work) Scale : 1/250



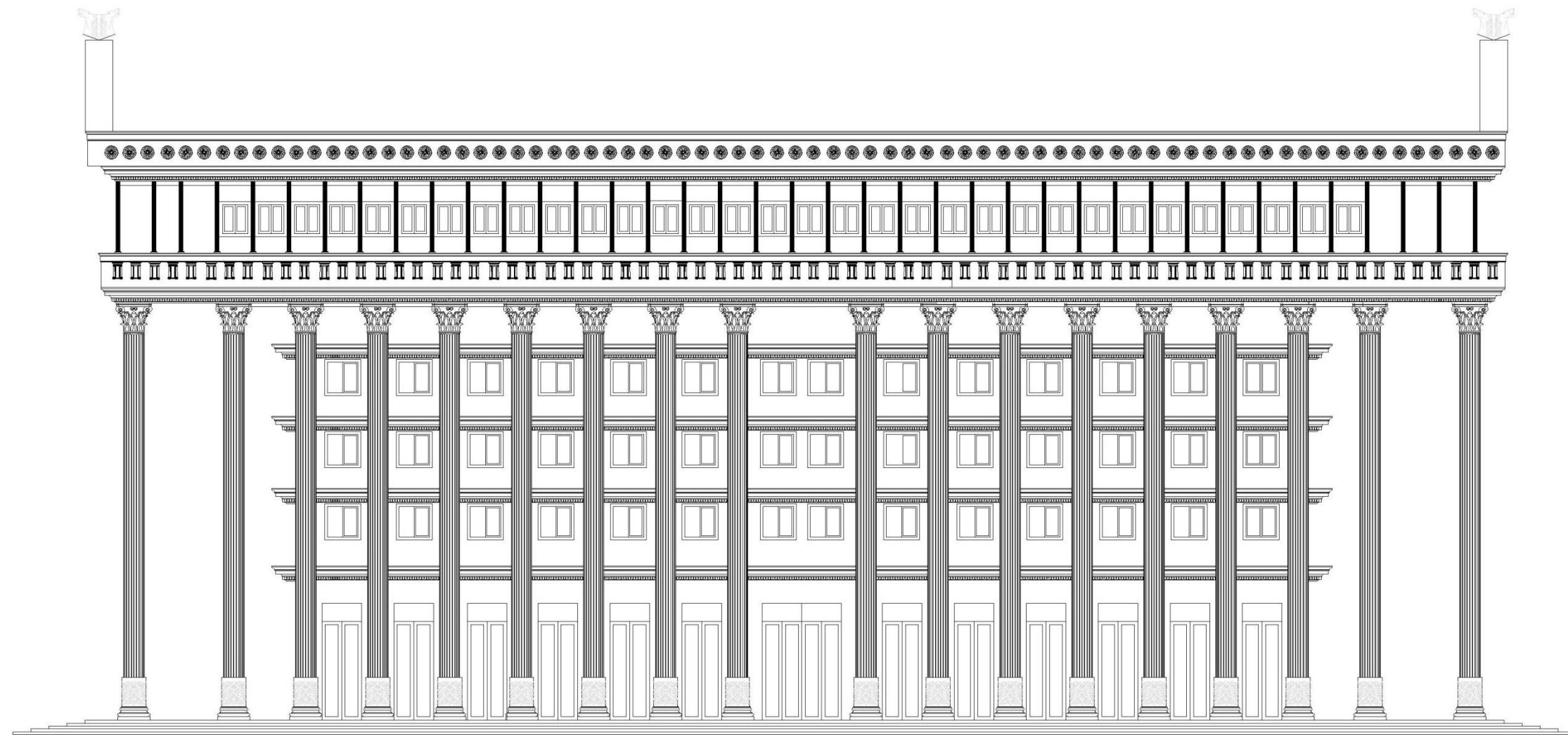
Kaya Artemis Resort and Casino standard rooms plan 1 th - 4 th floor (Personal work)

Scale : 1/250



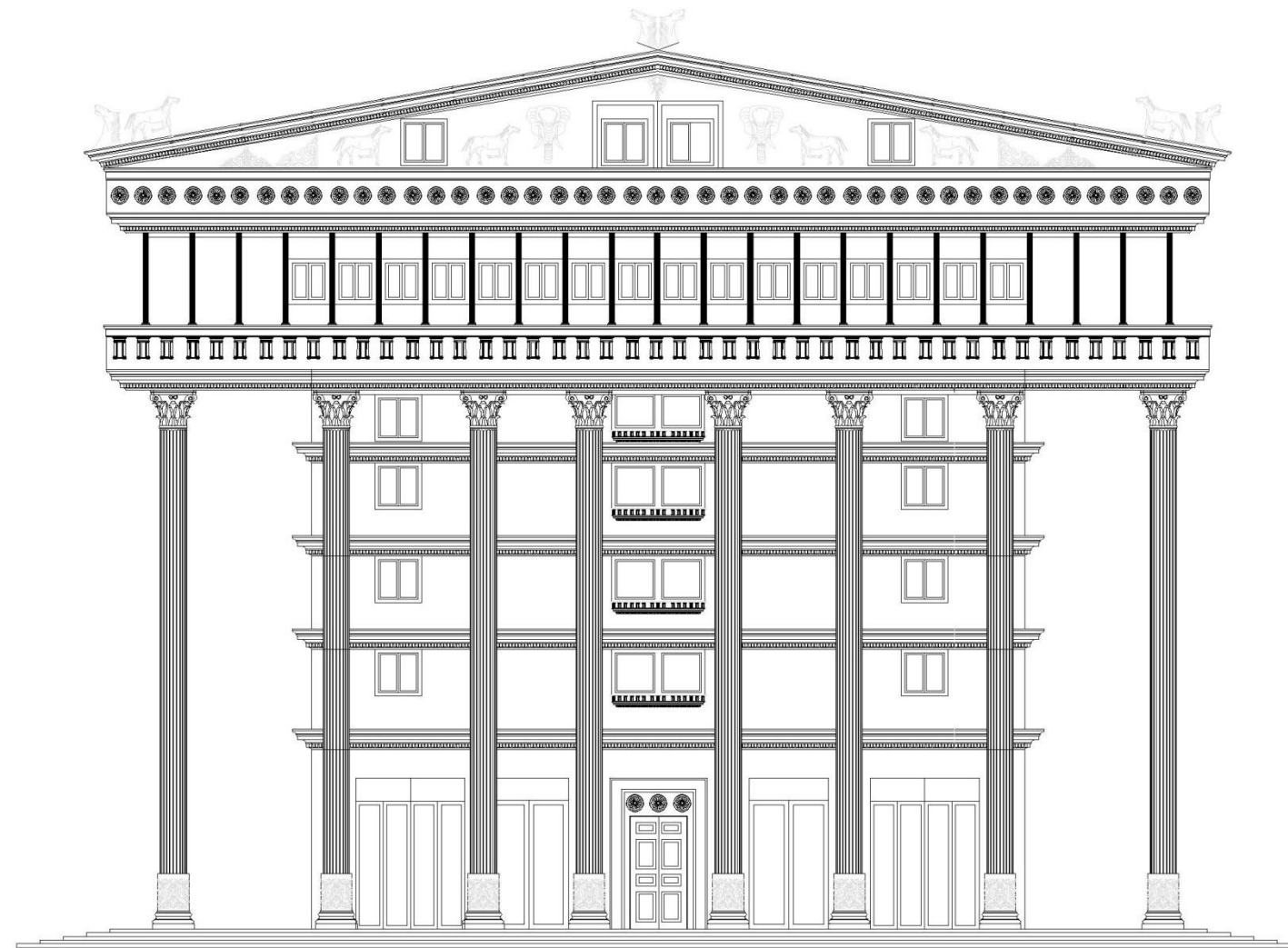
Kaya Artemis Resort and Casino standard rooms plan 5 th -7 th floor (Personal work)

Scale : 1/250



Kaya Artemis Resort and Casino North Elevation (Personal work)  
1/250

Scale:



Kaya Artemis Resort and Casino East Elevation(Personal work)

Scale: 1/250



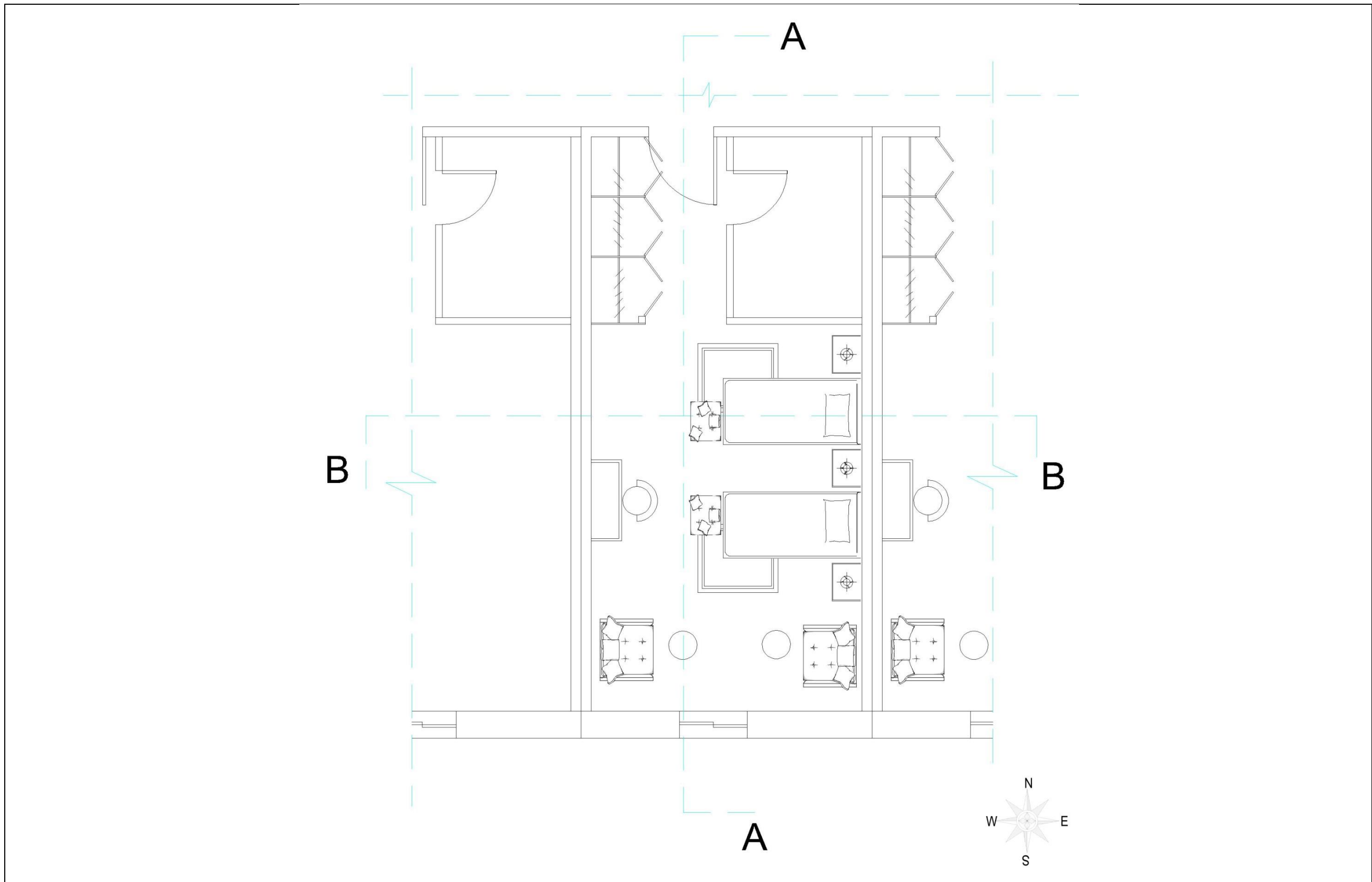
Kaya Artemis Resort and Casino Section A-A (Personal work)

Scale : 1-200

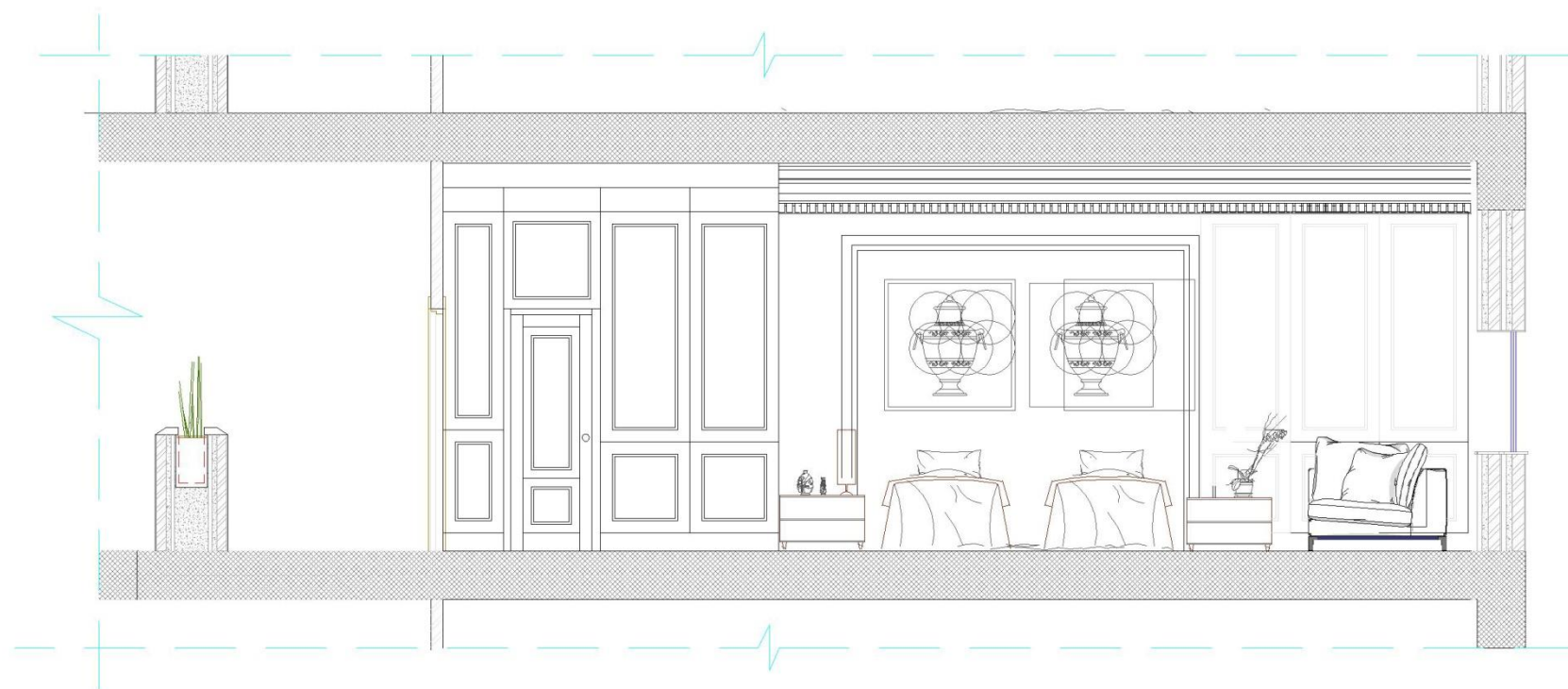


Kaya Artemis Resort and Casino Section B-B (Personal work)

Scale : 1-200

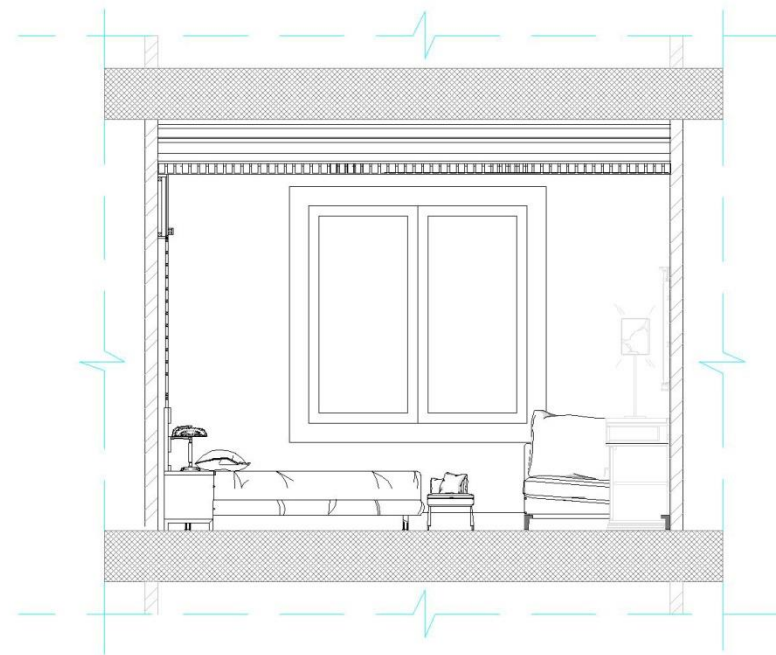






Kaya Artemis Resort and Casino STANDERD ROOM PLAN Section A-A (Personal work)

Scale :1/50



Kaya Artemis Resort and Casino STANDERD ROOM PLAN Section B-B (Personal work)

Scale :1/50

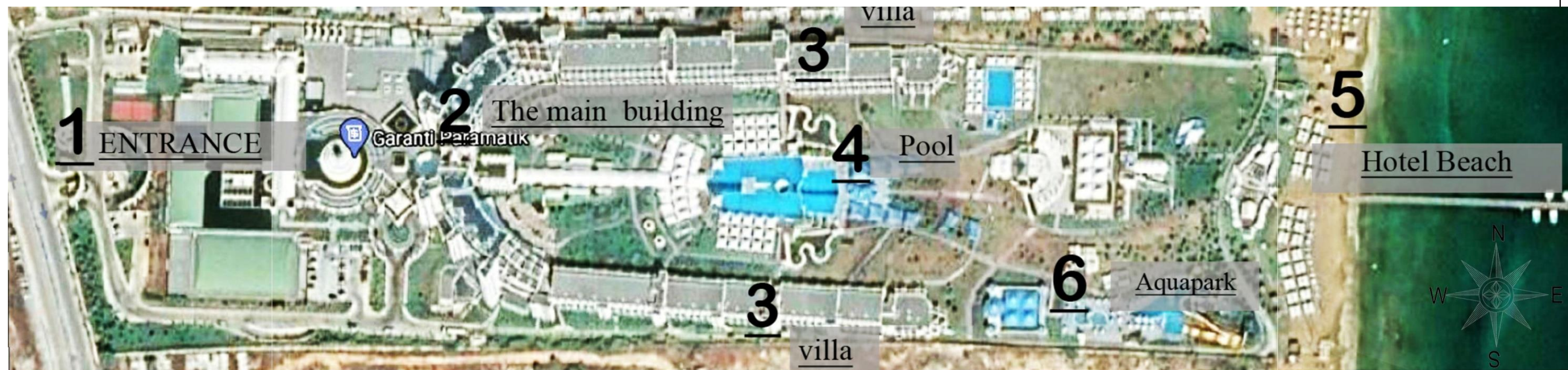
Table : **Limak Cyprus Deluxe** Existing plans

Existing plans **Limak Cyprus Deluxe**



**Limak Cyprus Deluxe** Google map location (217)  
1/2000

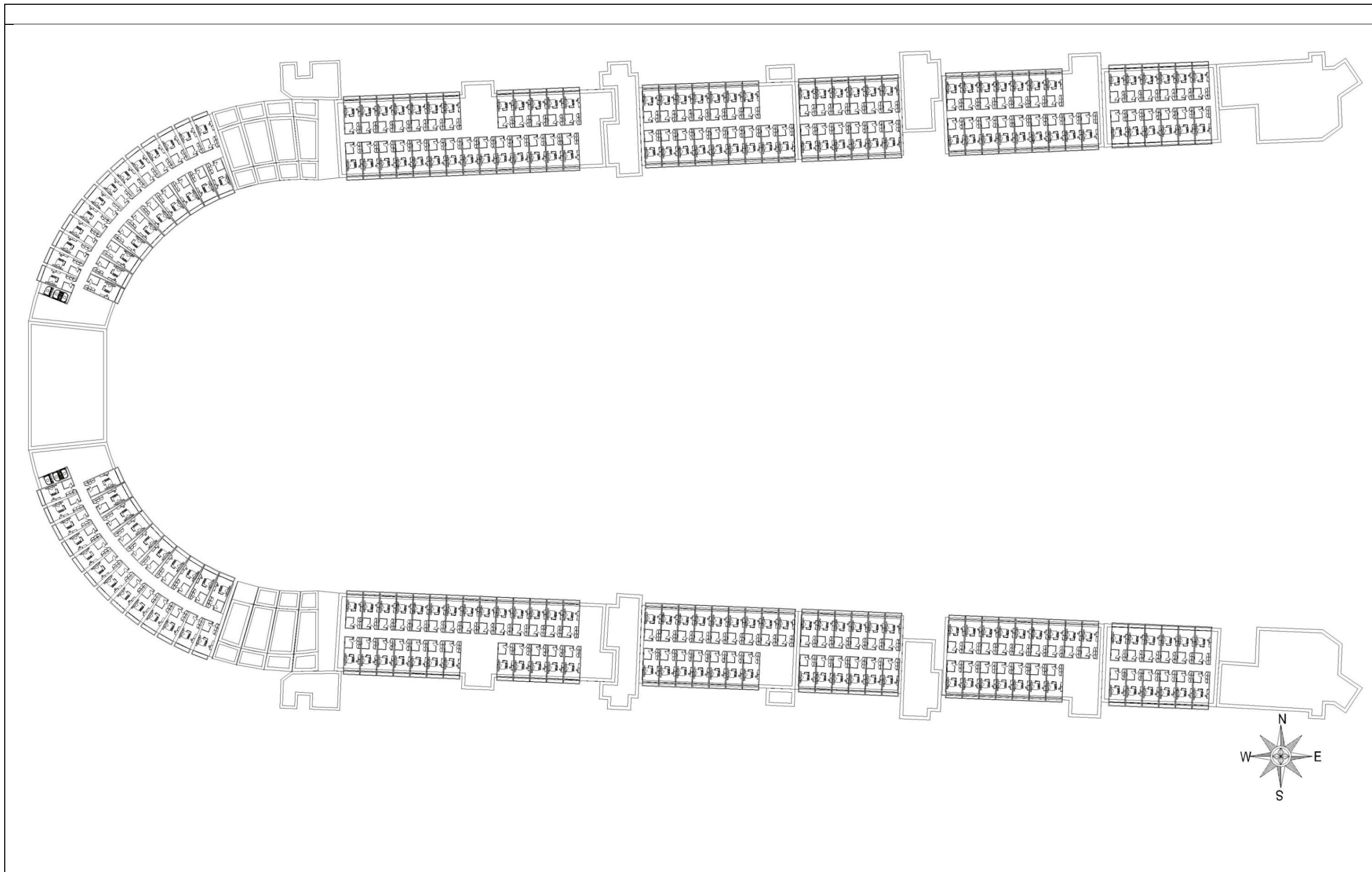
Scale :



**Limak Cyprus Deluxe** part from Google map location (217) and (personal work)

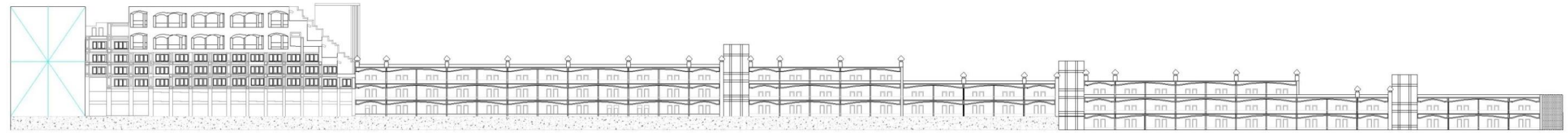
- (1) ENTRANCE
- (2) The main building
- (3) Villa
- (4) Pool
- (5) Hotel Beach
- (6) Aqua park

Scale : 1/2000

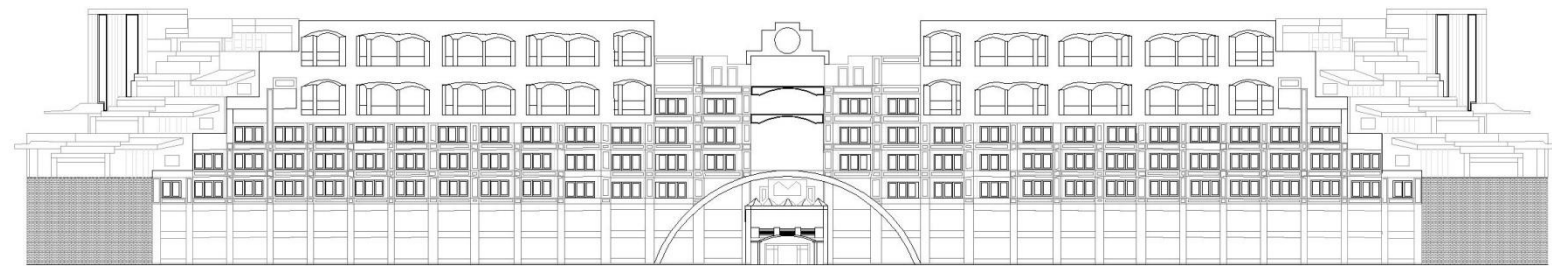


Limak Cyprus Deluxe FLOOR PLAN standard rooms plan 1 th - 4 th floor (Personal work)

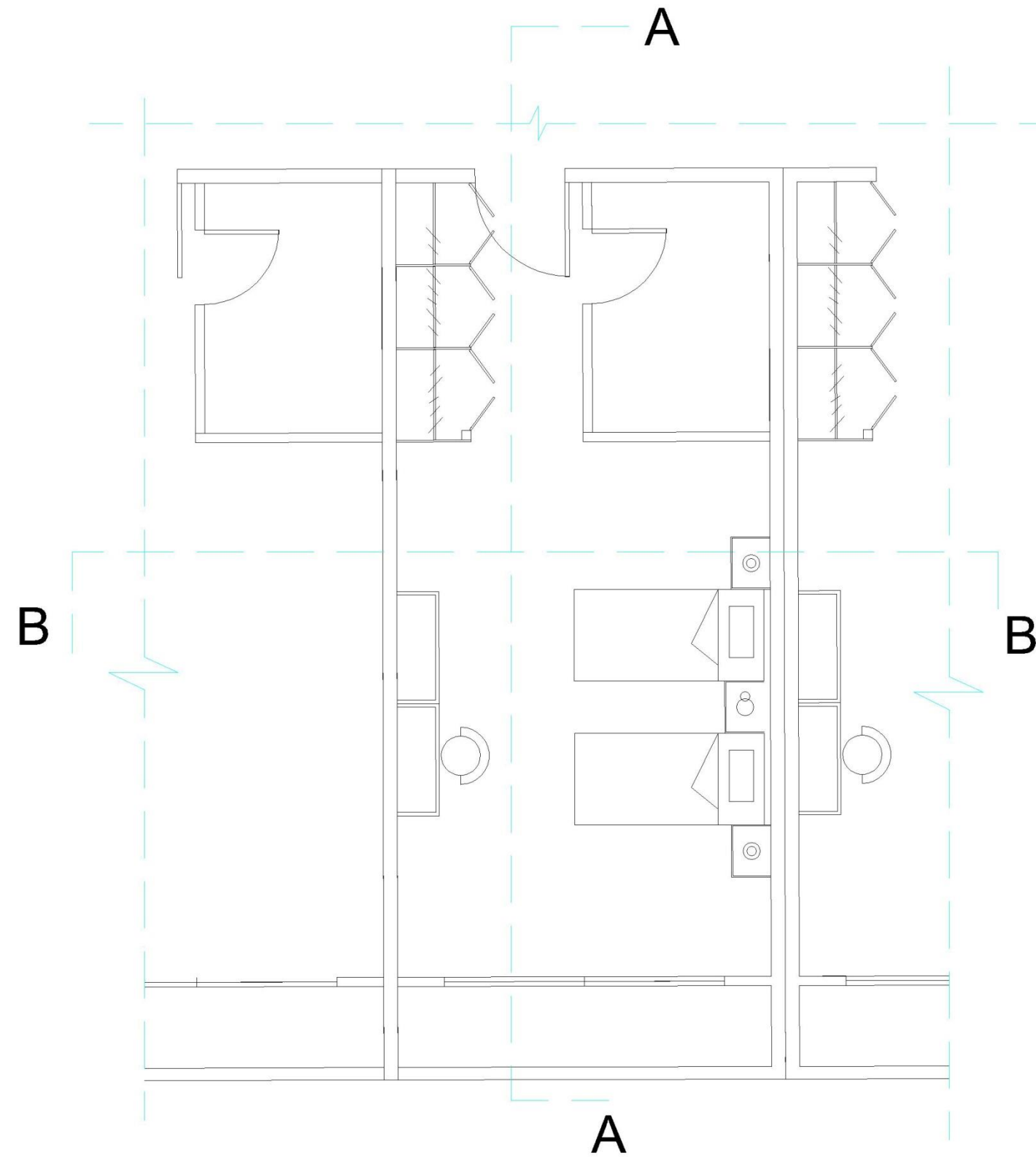
Scale : 1/1000

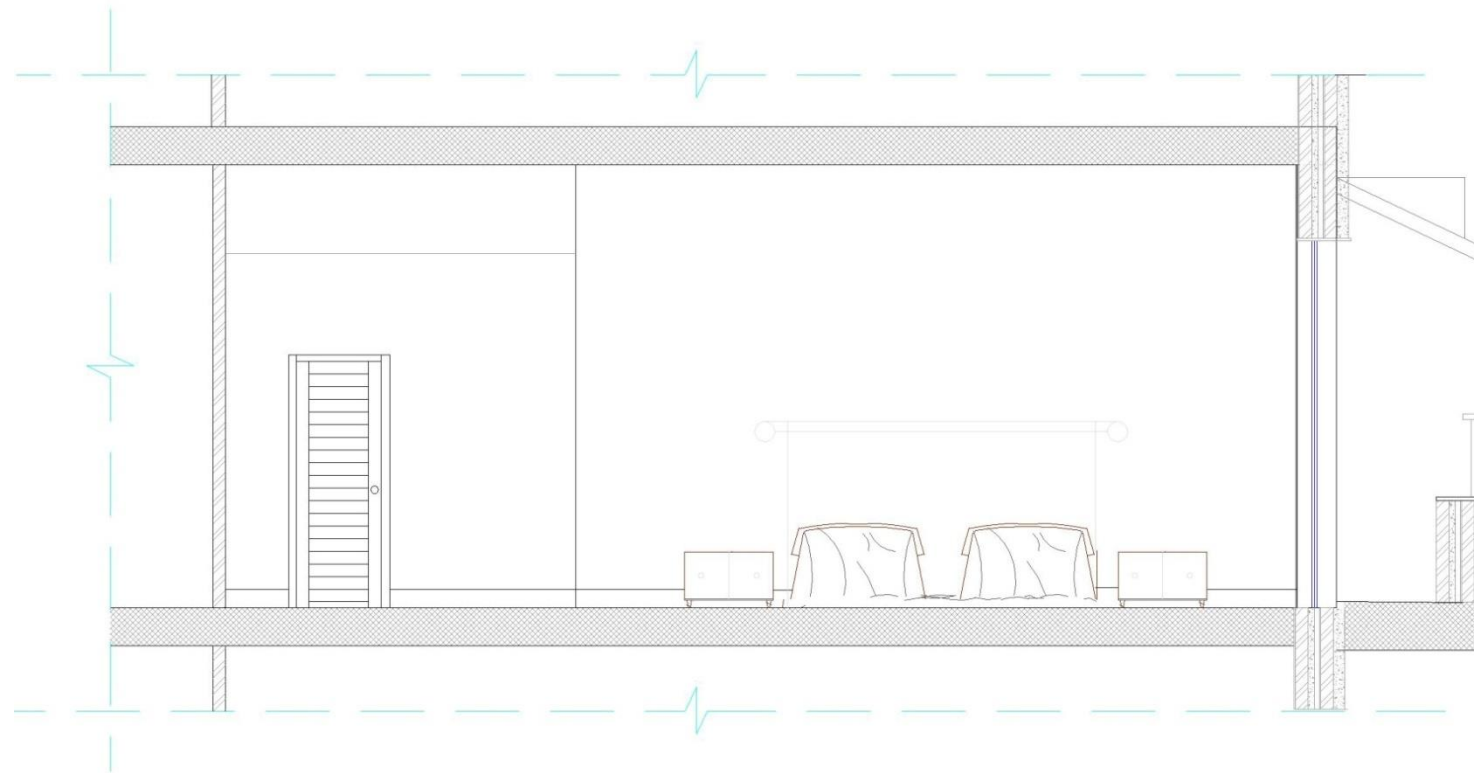


Limak Cyprus Deluxe SOTH ELEVATION (Personal work) Scale 1/1000



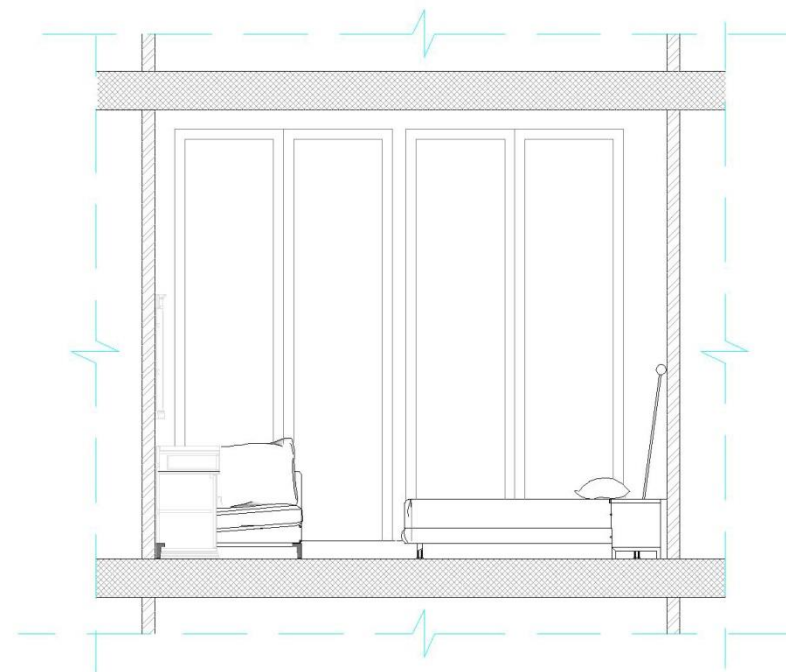
Limak Cyprus Deluxe EAST ELEVATION (Personal work) Scale 1/1000





Limak Cyprus Deluxe STANDER ROOM PLAN SECTION A-A (Personal work)

Scale : 1/50

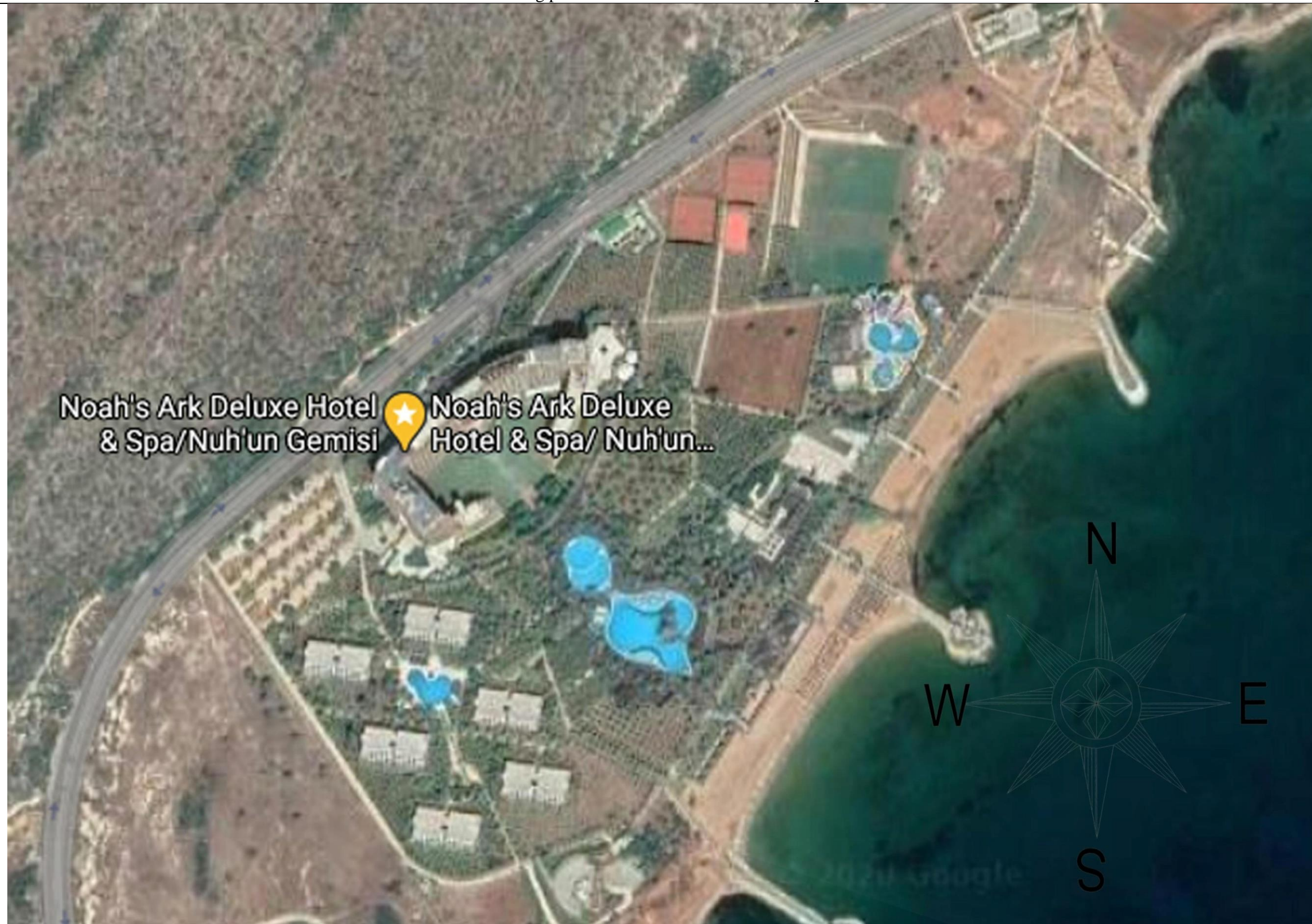


Limak Cyprus Deluxe STANDER ROOM PLAN SECTION B-B (Personal work)

Scale : 1/50

Table : Noah's Ark Deluxe Hotel & Spa Existing plans

Existing plans Noah's Ark Deluxe Hotel & Spa

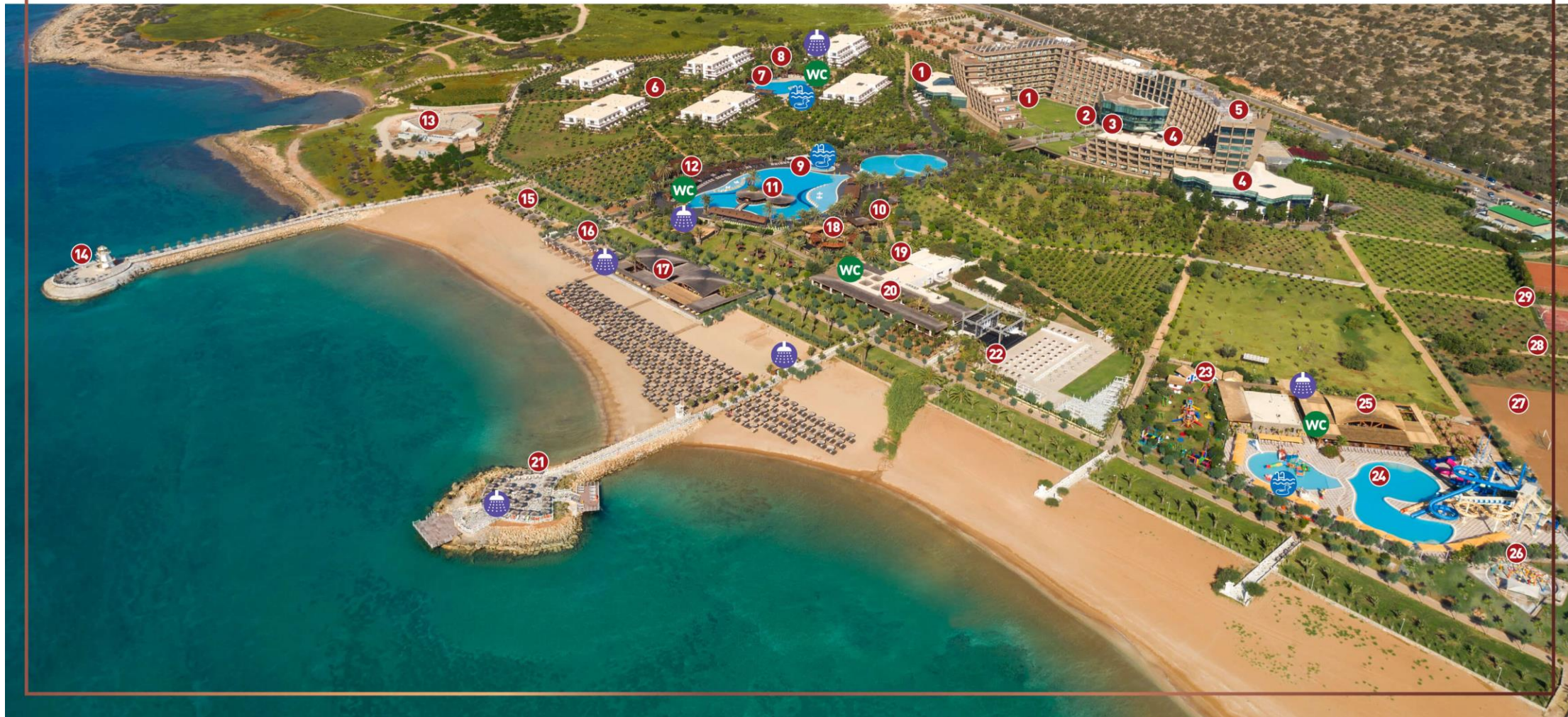


Noah's Ark Deluxe Hotel & Spa Google map location (228) Scale: 1/2500



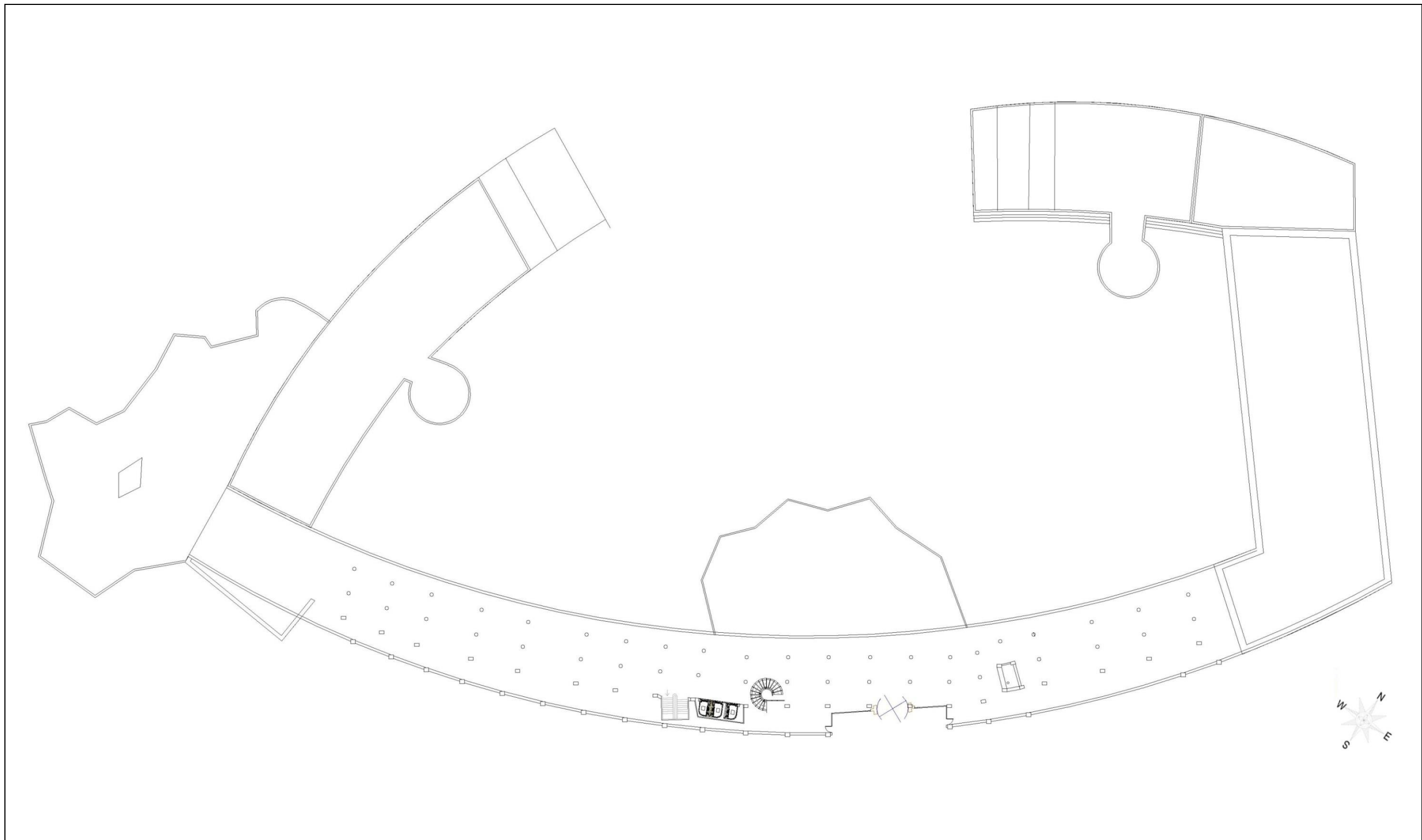
# HOTEL PLAN

- |  |                      |  |                        |
|--|----------------------|--|------------------------|
| 1 Karina Spa & Wellness                    | 9 Main Pool          | 17 Sun & Sun Bar                             | 25 Aqua Bar            |
| 2 English Pub                              | 10 Towel Stand       | 18 Hookah Cafe                               | 26 Kid's Water Park    |
| 3 Noah's Ark Cafe                          | 11 Island Bar        | 19 Game Area (Table Tennis - Table Football) | 27 Football Field      |
| 4 Flora Main Restaurant                    | 12 Pool Bar          | 20 Fora Beach Snack / A La Carte Restaurant  | 28 Basketball Courts   |
| 5 Alabora A La Carte Restaurant (7. floor) | 13 Amphitheater      | 21 Pier - Sunbathing Area                    | 29 Tennis Courts       |
| 6 Holiday Village                          | 14 Light House Disco | 22 Moon Arena                                | Shower - Changing Room |
| 7 Holiday Village Pool                     | 15 Karina Beach Spa  | 23 Karakaçan Mini Club                       | Kid's Pool             |
| 8 Holiday Village Pool Bar                 | 16 Beach Pavilion    | 24 Aquapark                                  |                        |

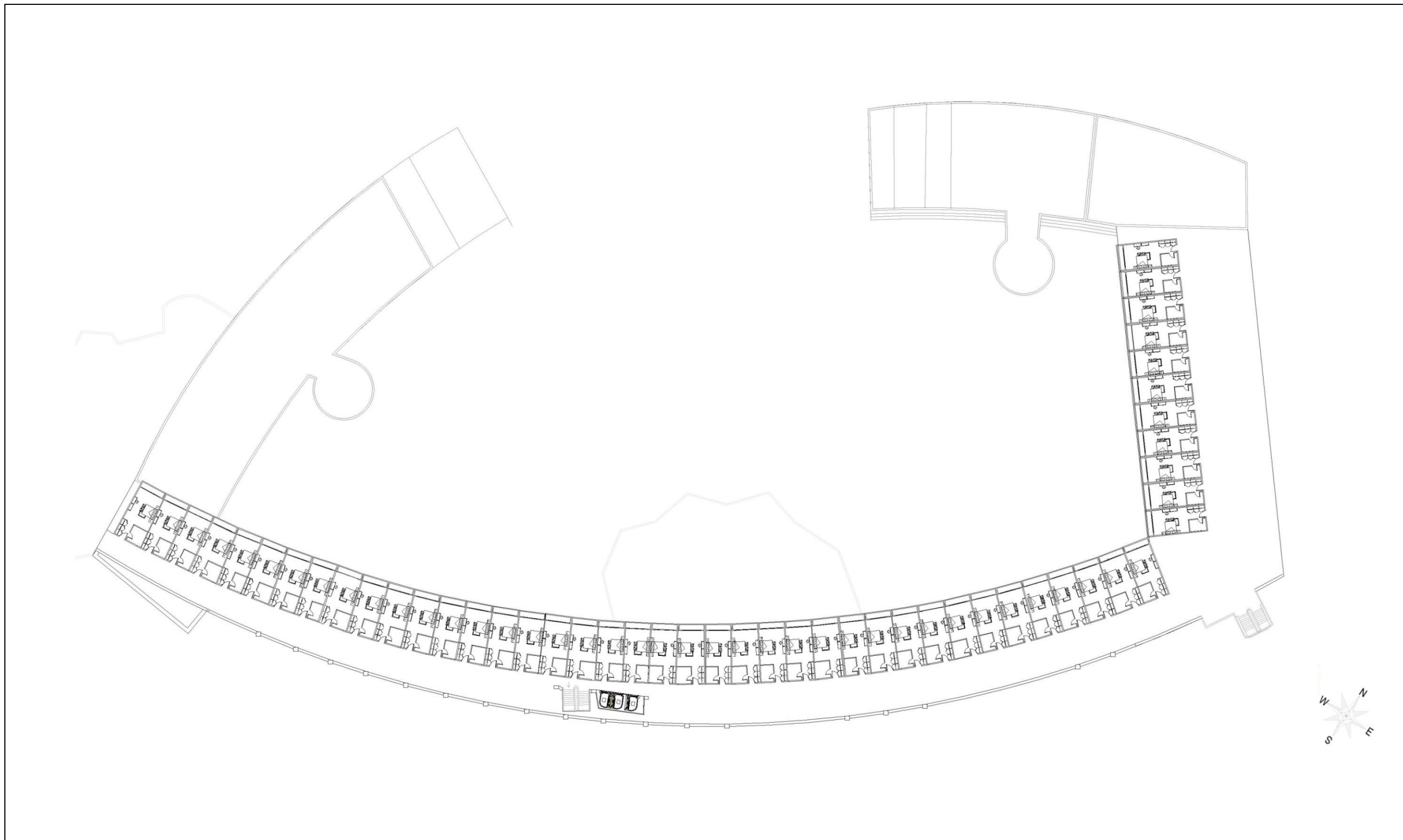


Noah's Ark Deluxe Hotel & Spa part (236)



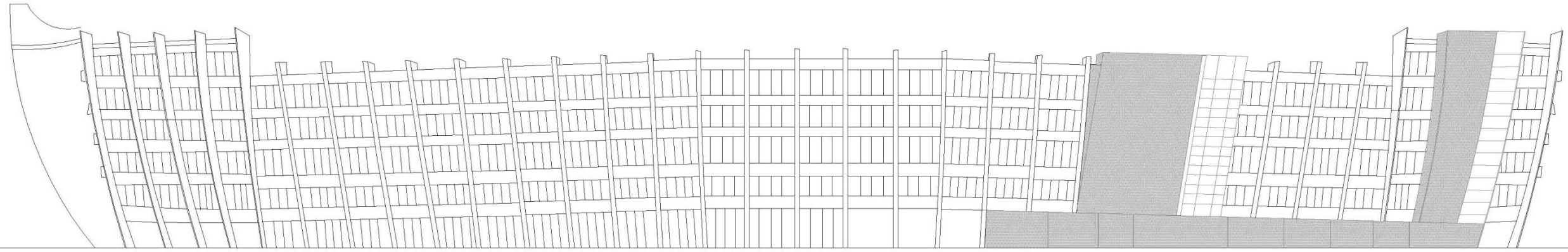


Noah's Ark Deluxe Hotel & Spa Ground floor plan(Personal work) Scale: 1/500



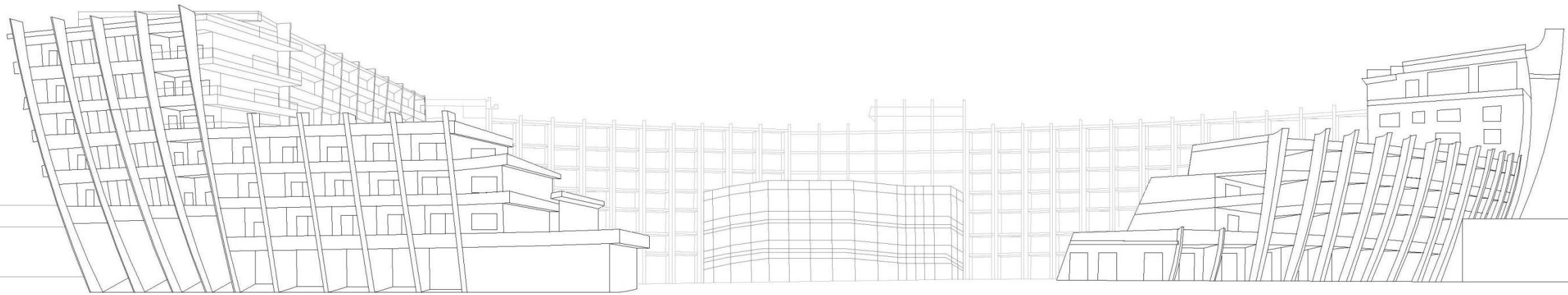
Noah's Ark Deluxe Hotel & Spa standard rooms plan (Personal work)

Scale : 1/500



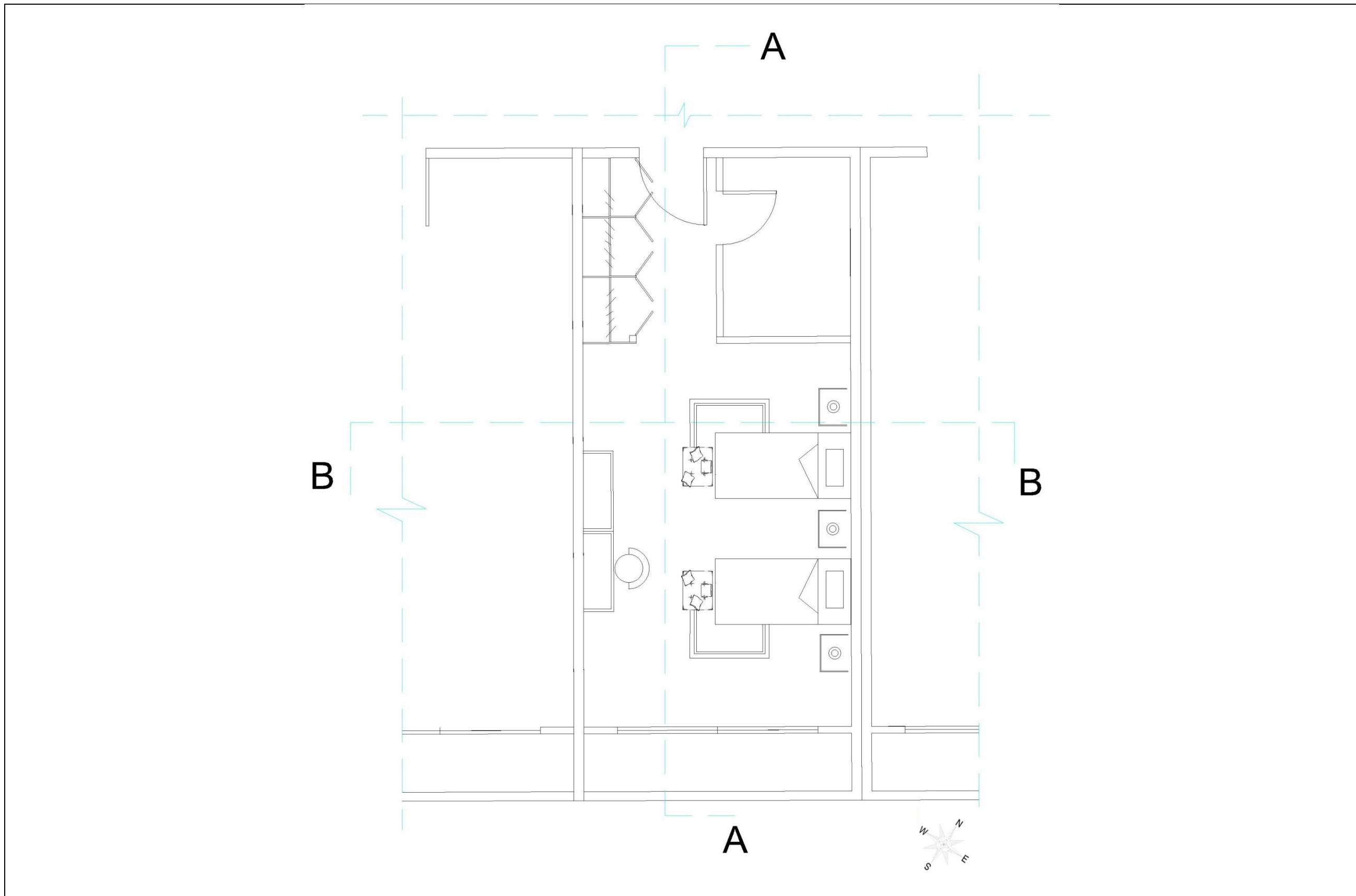
Noah's Ark Deluxe Hotel & Spa northwestern elevation (Personal work)

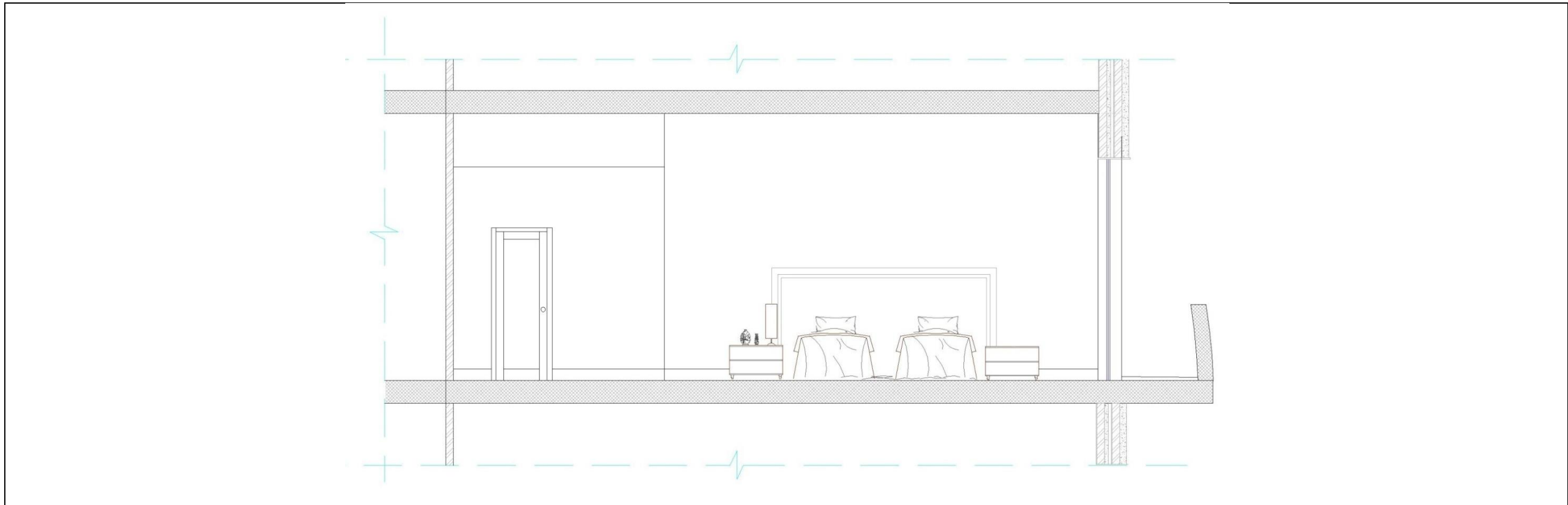
Scale : 1-500



Noah's Ark Deluxe Hotel & Spa southeast elevation (Personal work)

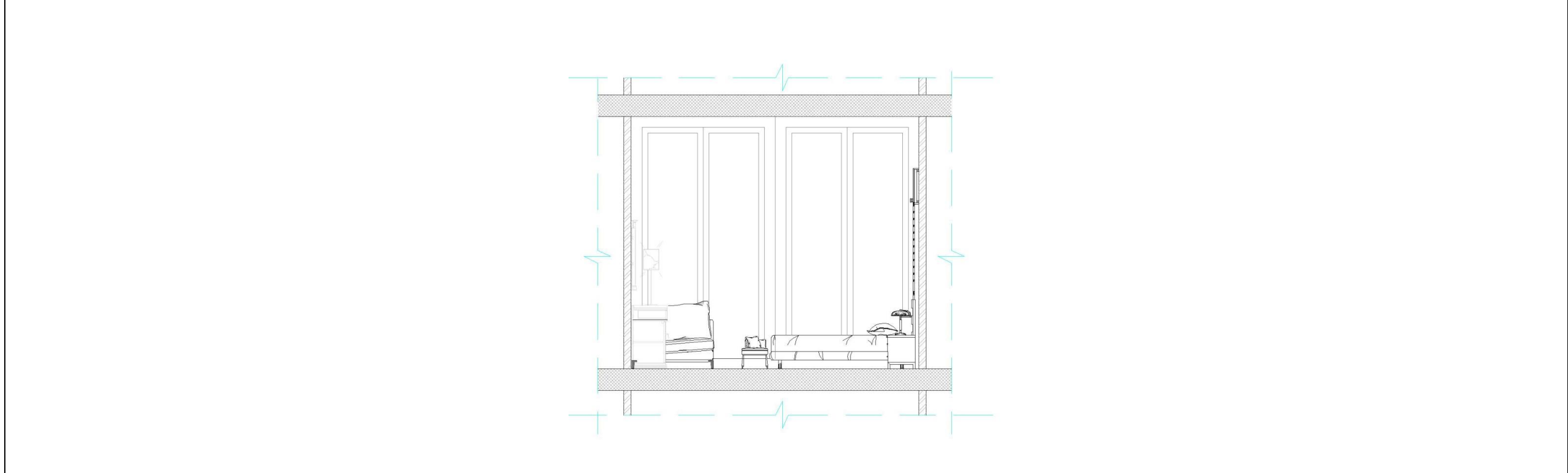
Scale : 1-500





Noah's Ark Deluxe Hotel & Spa STANDERD ROOM PLAN SECTION A-A (Personal work)

Scale : 1/50



Noah's Ark Deluxe Hotel & Spa STANDERD ROOM PLAN SECTION B-B (Personal work)

Scale : 1/50