An Evaluation of Interior Space Defining Elements of Re-functioned Historic Warehouses: Liman Road, Famagusta

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ABSTRACT

There has been a great tendency in regarding the adaptive re-use of historic buildings in last half of the 20th century. Adaptive re-use is known as the main key in the field of conservation which has an impact on controlling: deterioration, change of use, legal restrain, conservation and sustainability. Walled-City Famagusta encloses a variety of historic warehouses from 19th century, which were built in the British period.

The thesis aims to evaluate the interior space defining elements of re-functioned historic warehouses, considering elements defining space, arrangement of elements and design principles. These elements define visual aspect-spaces, features and finishes of interior space characteristics. Most of these buildings are re-used in order to transform to a new function such as, retail store, market and club. The conversion of these buildings has led to alter the main interior space characteristics, which decreases the space efficiency to minimum.

The space organizations of original states and re-used state of warehouses are analyzed and assessed from the inventories in order to, compare and identify the reasons, which caused appropriate and/or inappropriate alteration of the interior space characteristics.

Keywords: Conversion, Adaptive re-use, interior Space characteristic, Space organization, Historic Warehouse.

ÖZ

20. yüzyılın son yarısında itibaren tarihi binaların yeniden kullanımı ile ilgili olarak birçok eğilim olmuştur. Tarihi binaların korunması ve sürdürülebilirliğinin, yasal kısıtlamaların, kullanım değişikliğinin ve bozulmaların kontrolü üzerinde güçlü etkisi olan "yeniden kullanım", koruma alanında esas anahtar olarak bilinmektedir.

Gazimağusa Suriçi İngiliz döneminde inşa edilmiş birçok tarihi depo binasına sahiptir. Tezin amacı ise yeniden fonksiyon verilmiş ve yukarıda belirtilen depo binalarının iç mekanını tanımlayan elemanlarını, mekanı tanımlayan elemanlar, elemanların organizasyonu ve tasarım ilkelerine bağlı kalarak değerlendirmektir. Bu elemanlar ise iç mekanın görsel değerlerini -mekanları, özelliklerini ve bitiş elemanlarını- ifade etmektedir.

Tarihi depoların önceki ve bugünkü durumuna bağlı olarak mekan organizasyonu analiz edilerek değerlendirilmiştir. Ayrıca tezde, tarihi depo binalarının iç mekan karakterindeki uygun ve / veya uygunsuz değişimin nedenlerini belirlemek ve karşılaştırma yapmak için envanterlerden yararlandırılmıştır.

Anahtar kelimeler: Koruma, Yeniden Kullanım, İç Mekan Karakteri, Mekan Organizasyonu, Tarihi Depo Binaları

To My Family

"Some love lasts a lifetime. Your love lasts forever"

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Chapter 1

INTRODUCTION

> "Interior architecture, interior design and building reuse are all disciplines that deal with the development and design of interior space. The interior architecture or designer will transform a given space, whether the crumbling ruins of an ancient building or the drawn parameters of building proposal. This complex process requires an understanding of the qualities of the given existing building, while simultaneously combining these factors with the functional requirements of new users" (Brooker, 2007).

1.1 Overview

Re-use of historic warehouses has become immensely practical, because of its easy adaptation to new functions. Whilst in some projects negative transformations have been observed after re-use. Such as the re-used warehouses chosen for this study the visual characteristics of the original interior space is changed inappropriately in some of the cases. In order to prevent the inappropriate alteration the characteristics of the interior space should be identified before re-use process. This can be done by analysis of historic warehouses space defining elements, arrangement of elements and design principles. For instance to write an essay at first we have to know that alphabets are the basic elements which structure a word. Then there should be a logical way to put these words together to make a phrase or a sentence which is grammatical. Therefore in the same manner firstly we have to find out what element defines interior space and how these elements should come together so that they make sense. As design principles are the grammars, which are used in designing and organizing the position of the elements of space; the elements of space are the vocabulary of interior design. Therefore these principles are necessary to develop a

visual awareness to identify the composition of design in the past, which provide a designer the ability to analyze the new design work on the interior space.

Also as the study concentrates on re-use of historic buildings, which has to be preserved mainly by the inquiry of adaptive reuse, it should be evaluated first. Therefore in this study interior visual aspects-space, features and finishes of original state of historic Warehouse have been identified. Secondly these historic warehouses in walled city of Famagusta Liman road will be analyzed in terms, according to Ching, (1995) and Brooker, (2007) statement about elements defining space, arrangement of elements and design principles. Afterwards the results will be evaluated by comparison of original and re-used state.

1.2 Aim and Objectives of the Study

These days many historic Warehouses have been preserved or re-used. The transformation of historic warehouses in Liman road, walled city, Famagusta has not been oriented in a right way. As a result the characteristics of interior space have been changed inappropriately. So this study is aiming to find out answers to the question stated below.

- What caused appropriate or inappropriate changes to the interior space characteristics of historic warehouses in Liman road, Famagusta after re-use process?

As we can see the research has main objectives: as seen in the historic warehouses in Famagusta, after re-use the original characteristics of interior space have been changed and even happened to lose its original identity of the building. Reasons that have affected this have been estimated by analyzing the interior space. To achieve this estimation the following terms have been searched. First the definition of space

and its relation with interior design is discussed. Then the theory of elements defining space, arrangement of the elements in space and design principles according to Ching, (1995) and Brooker, (2007) surveyed. As the study is about historic warehouses, according to adaptive reuse sections the original interior visual aspect-spaces, features, finishes of mentioned warehouses have been identified.

1.3 Research Methodology

This research has been done in three steps as shown in figure 1.1:

1. Literature survey: to determine the analysis criteria for evaluation of interior space defining elements and adaptive re-use. Data has been collected from books, articles, journals and internet sources.
2. Case study: historic warehouses in Liman road, Famagusta have been chosen for this study. These warehouses analyzed by taking photos from the site, drawing schematic sketches in two dimensional and isometric (drawings are not in scale), and preparing inventories.
3. Evaluation: the original and re-used interior space characteristics of each warehouse are analyzed and compared to evaluate appropriate or inappropriate alteration which took place after re-use process.

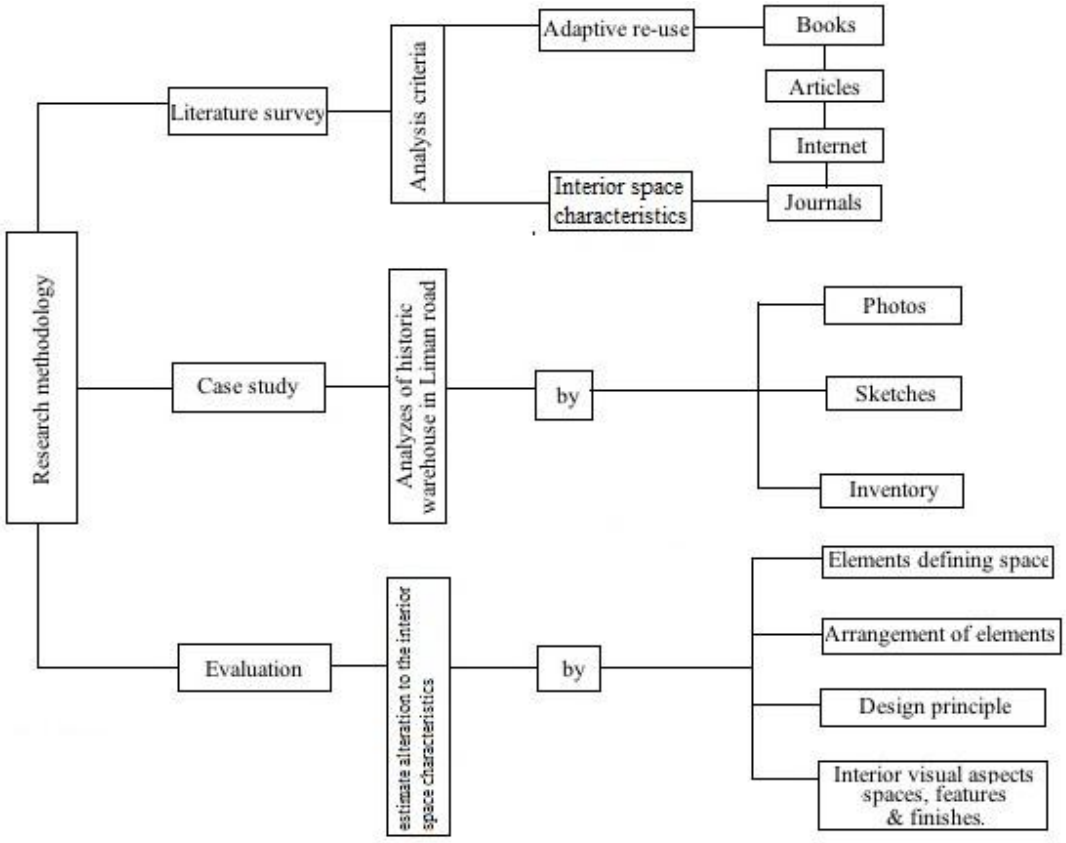

Figure 1.1: Research Methodology

As a result the structure of this thesis which is shown in figure 1.2 is based on interior space characteristics evaluation on adaptive re-use. Each historic Warehouse will be analyzed in four sections:

1. Elements defining space

2. Arrangement of elements

3. Design principles

4. Visual identification of interior space

Then each warehouse original and after re-use state will be compared and the comparison will be evaluated to define the reasons which cause appropriate or inappropriate changes to the interior space characteristics.

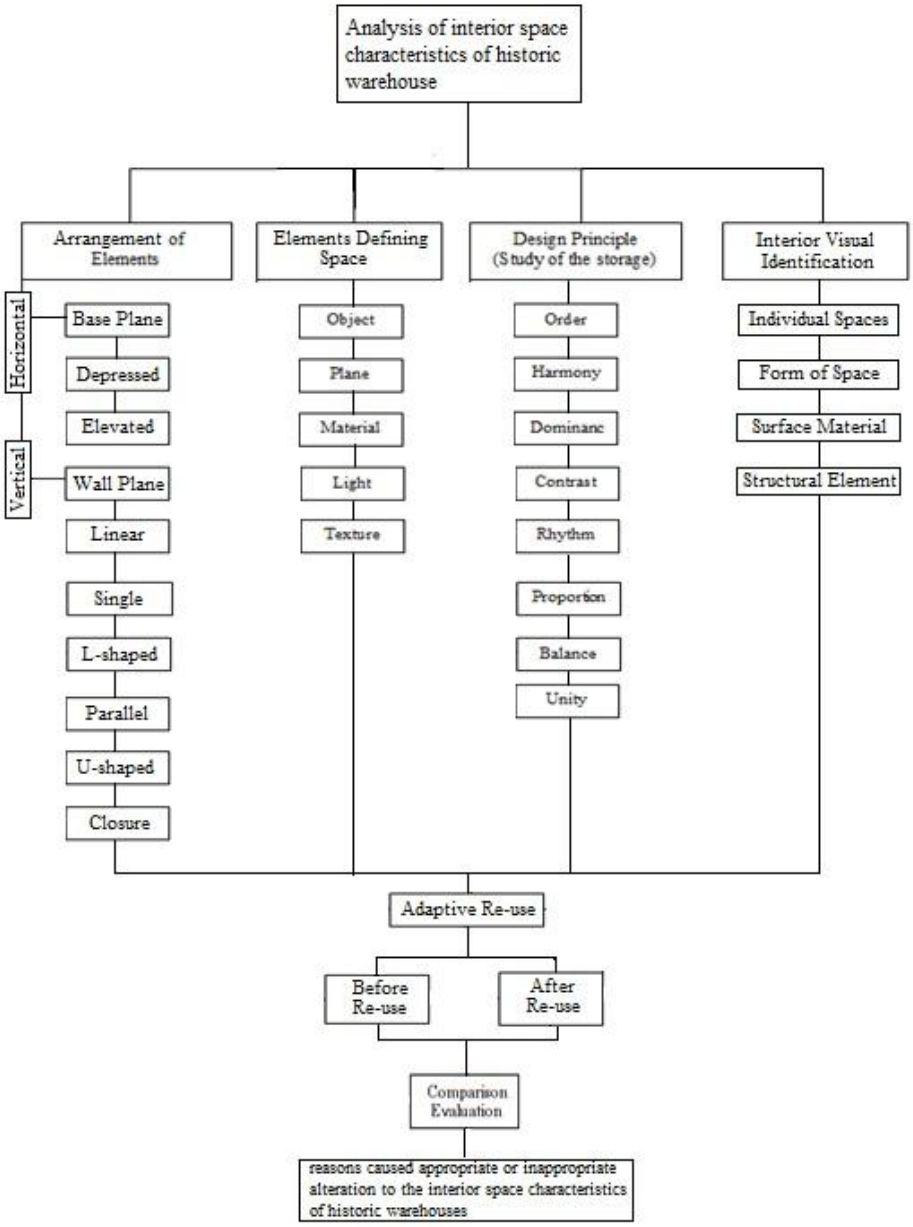

Figure 1.2: Structure of thesis

1.4 Limitation

The main goal of this research is to determine the elements which have direct impact on interior space characteristics of historic warehouses in Liman road. To maintain the original interior space characteristics while adding new elements in re-used process of historic warehouses. The interior spaces of warehouses are analyzed in terms of elements defining space, arrangement of elements and design principles. This study has been carried out according to the definitions and approaches of Ching, (1995) and Brooker, (2007) and to the classification of Douglas (2006) for interior visual aspects of spaces, features and finishes. The literature has been chosen with regard to their approaches and definitions that concentrate directly on the effects of design principles, elements defining space and arrangement of elements on interior space characteristics. The criteria derived from these three sources have been used to estimate the reasons, which cause appropriate or inappropriate changes to the characteristics of interior space of warehouses. This study is limited to the analysis of eleven attached reused historic warehouses in Liman road, which is the main axis reaching the historic center of the walled city of Famagusta, Cyprus. It gives opportunity to make a comparative assessment between the original and re-used states of these warehouses.

Famagusta is selected as the case study area and the focus is on Liman road in walled city because of the following reasons: Cyprus known as a significant place by historians. Walled city, Famagusta has long history from various civilizations which left their mark on it. These warehouses are a mark from British period which are located in Liman road. This road situated in front of one of the main gates of the

harbor which used to be a commercial interaction. These eleven attached warehouses which used as storage for a customs have been re-used recently.

Chapter 2

INQUIRY OF ADAPTIVE REUSE OF HISTORIC BUILDING

2.1 Adaptive Re-use

During the last half of the 20th century, the adaptive re-use of historic buildings has recognized as a practical option for historic buildings and thus has become a key factor in the field of conservation (URL1, 2012). The adaptive re-use of historic buildings is not only defined as a process of conservation of buildings in a well-kept condition, but it is also the stage that provides the buildings new and continuous uses (Latham, 2000). The main aim of adaptive re-use is to convert the abandoned or de-functioned industrial, commercial or other kind of buildings to a purpose other than they were designed. The newly assigned uses should be more effective and more efficient in order to ensure the property owner's or investor's requirements in a beneficial way. Being more efficient is related to the performance aspects of the building, which enhances its spatial and technical characteristics (Douglas, 2006). Adaptive re-use will extend the buildings' life, while retaining their authentic features and overall character (Craven, 2008; Douglas, 2006; Latham, 2000).

In general, the re-use of historic buildings has been approved and valued as a high potential market, since new development zones have extremely decreased and many historic buildings have become redundant with the changing living conditions. As stated by Gregg & Crosbie, (2001) many buildings which are potentially redundant

are still of good quality and it would be waste of valuable structures if they are destroyed. Besides, re-using the existing building stock and preserving the historic character of the environments are much more feasible. In addition to satisfy the needs of contemporary living conditions by re-using historic buildings, these environments can also turn to tourist attractions (Wang & Zeng, 2009).

There are plenty of reasons for adapting buildings. The main influences have been discussed as follows according to Douglas, (2006) and Latham, (2000).

Deterioration:

A considerable adaptation plan should extend the economic life of a building. A building should worth more and increase its service life after re-use.

Change of use:

If a building is left for a long time without any use, its previous use might not be in demand. Adaptive reuse might be carried out to ensure the building's continuous beneficial occupancy.

Legal Restrains:

When an owner of disused building is not permitted to demolish it, he could leave the property to destroy naturally.

Conservation:

The cultural and technical reasons often affect the decision to adapt a building. The historical or architectural importance of a building could be a reason to save it.

Sustainability:

Reusing and upgrading old buildings ,have less impact on environment than redevelopment.

The buildings such as warehouses, schools and factories can more easily be converted in to new uses like offices, commercial and multi-functional spaces, when

compared to churches, which are built for a special purpose (Kiley, 1994). The new use may involve spatial and functional requirements that are different than the original, such as structural alterations to accommodate the change of use. Therefore, the buildings like warehouses with larger and higher interiors are easier to adapt to another use. The selection of the new function should regard the form and structure of a property. Since the conversion mainly comprises modification of the interior of the building, the original features of the interior space and the visual character should be identified (Douglas, 2006; Latham, 2000).

2.2 Identifying the Interior Visual Aspect-Spaces, Features, Finishes

In architecture, conservation is different to renovation but they both have the same main aim which is not damaging or destroying the historic building as much as possible. Conservation is also a process of changing the function of the building to prevent it from being deteriorated or ruined. Usually after modifying the building situation minor or major (in some cases structural) changes should be done to prevent the building, from decline, while supporting the new function (Asoobar, 2009; Douglas, 2006). Thus before starting to adapt or convert historic building, the visual characteristic should be established.

This involves looking at the interior of the building. This should be done slowly in order to identify its spatial characteristic. These are the visual aspects to be considered:

- Individual spaces and their relationship to each other (relationship between spaces creates a visual linkage and closing the opening will change it completely)

- Interior character (Form, if the organization is altered the interior character is changed)
- Surface materials and finishes (main aspects of visual character)
- Structural elements without covering (expose of structural elements are not usual but may be presented in a church, train station, factory, warehouse)

2.3 Options for Re-use of Redundant Warehouses

The single story space of the warehouse can be divided into smaller units for work shop or storage purposes. They can be adapted to accommodate a similar use to the former one. The alteration involved in such a conversion is enlargement or reduction of entrance door ways to warehouse area and strengthening its structure if necessary. The configuration, access provision and potential of the warehouses can take separate occupiers. It has a large open space and volume which can provide ideal settings for displaying. To name of few according to the mentioned characteristics the following options are suitable for these warehouses.

- New industrial use
- Offices
- Art galleries
- Shops

There are lots of successful examples of adaptive re-use of warehouses. In following tables some of these projects will be examined to support the aim of this thesis. First one is a warehouse in china which re-used as an artist complex. Second one is a warehouse in USA which re-used as an office. Third one is a warehouse in USA which is re-used as a show room. Fourth one is a warehouse which is in USA and re-used as a multi-functioned building. This is to prove the importance of warehouses to carry in to future. There are four selected warehouses, which have been re-used

successfully. These re-used warehouses are good examples of the adaptive re-use approach because interior aspects-spaces, features and finishes of the original warehouse have almost been maintained. The other reason is, bringing new elements and their arrangement to in the interior space and alteration of existing one didn't affect interior space characteristics of original state.as in some of the cases chosen for this study an in appropriate changes to the interior space characteristics has been observed. Adaptive re-use has a direct effect on efficiency life of the building; ensures beneficial occupancy; prevents dilapidation; and saves the historic and architectural aspects of building and sustainability.

Table 2.1: Example of adaptive re-use of warehouse to artist complex (URL2, 2012)

<table>
<tr><td>Name: Renovated Warehouse Wrapped in a Flowing Cinderblock Skin</td><td>Location: China</td></tr>
<tr><td colspan="2">New Function: Artist complex by Archi Union Architects</td></tr>
<tr><td colspan="2">

Three old warehouses were combined and transformed into an artist complex in order to gain enough space for new use.
The old fabrics of the warehouses were renovated successfully thus the original surface characteristic was restored.
The cinderblocks are transformed which allows daylight to flow in through the walls to the interior space to improve its lighting quality as the original lacked.
A large open area joins a studio, office, and meeting areas in one warehouse with an exhibition space in the other. This keeps the original spatial definition of the space.
Façade consists of a wall of glass shrouded in an undulating cement block skin that provides light and the appearance of movement.
Much of the original structure has been preserved throughout the project. So the original structure is preserved.
The addition of new elements and alteration for new usage did not affect the main form of the space.
Space within a space created and new added elements are free standing and they don’t touch the sides.

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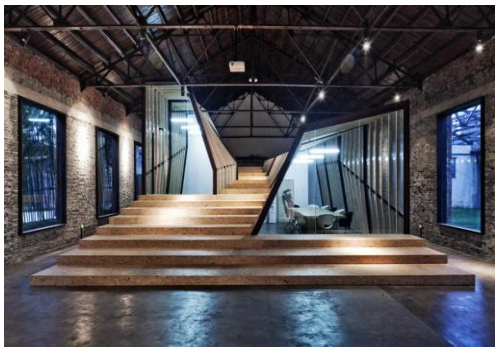
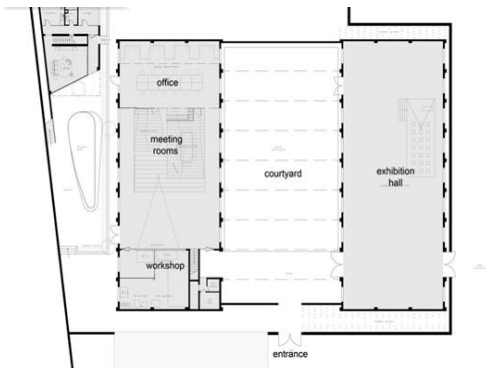
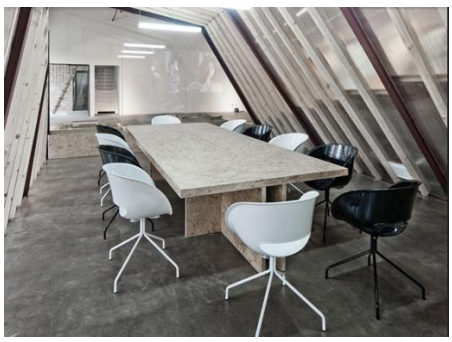
<tr><td>  </td><td>  </td></tr>
<tr><td> 
</td><td>  </td></tr>
</table>

Table 2.2: example of adaptive re-use of warehouse to offices (URL2, 2012)

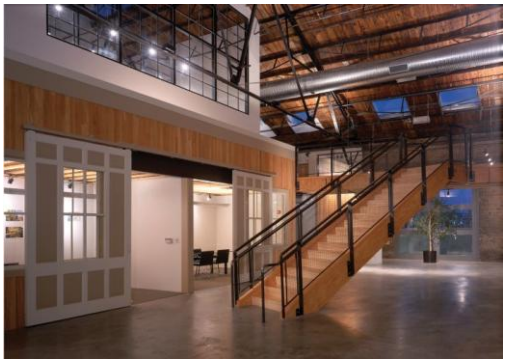
<table>
<tr><td>Name: Historic Bogue Warehouse</td><td>Location: USA</td></tr>
<tr><td colspan="2">New Function: Outstanding solar powered offices by FFKR architects</td></tr>
<tr><td colspan="2">Altering as little as possible in order to retain the building's original character.
The original arrangements of elements were preserved and new elements were added according to its original composition.
A mezzanine was added to one side of the space in the open warehouse to provide extra workspace. Even by adding mezzanine the original massive high height didn’t change.
Original wood beams were cleaned with a water wash. Windows were cleaned. So the original surface characteristic is preserved. Whole space to be perceived.
Space divided by vertical elements but they don’t touch the ceiling so it allows the whole space be perceived.</td></tr>
<tr><td>  </td><td>  </td></tr>
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Table 2.3: Example of adaptive re-use of warehouse to showroom (URL3, 2012)

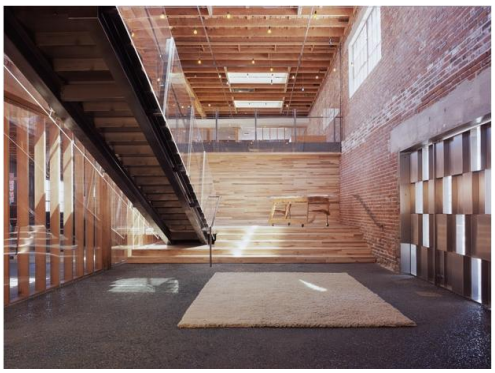
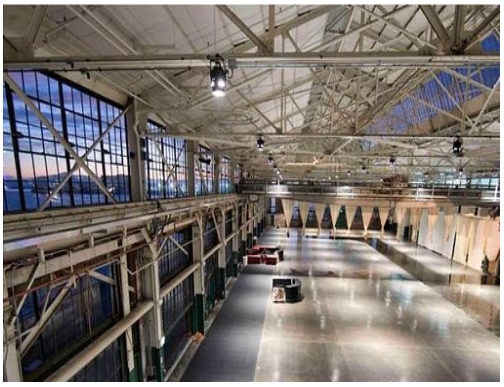
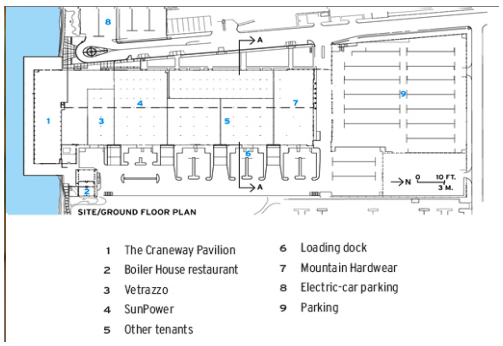
Name: L.A. Design center	Location: USA
New Function: Showroom + Venus for cultural events by Alice Kimm, Dan Brunn	
• Two warehouses combined to achieve larger area for show room which will exhibit many furniture products.. • To show respect for the social history of the site, the existing buildings are layered with rich texture palette of materials and screens that seem both permanent and temporary at the same time. • Hiding, illuminating, and filtering of the original building aspects and the surrounding environment. The architect is inspired from what is original to the site while simultaneously creating a unique identity for this venture. • Materials such as concrete, polycarbonate, cement board, fabric, and ordinary lumber were selected for their low cost, ease of construction, industrial nature, and natural beauty. • The building's interior brings back the warmth of the existing wood and masonry structures. • Two bays of the second floor were removed and a stair was added to draw customers up to the Showroom. Thus the alteration and addition didn't change its original features completely.	
	
	

Table 2.4: Example of adaptive re-use of warehouse to multi-function (URL4, 2012)

<table>
<tr><td>Name: Ford Point</td><td>Location: USA</td></tr>
<tr><td colspan="2">New Function: Multi-function by Marcy Wong Donn Logan</td></tr>
<tr><td colspan="2">• Conceived as a single space, beneath a saw-tooth roof that flooded the workspaces with indirect daylight. Thus the main spatial characteristics have been preserved.
• The architects tried to make little visual intercession as possible — in part to focus attention on the factory's innate to keep its original spatial definition.
• The original structure maintained as its original
• It kept its long, massive, single story volume of the original space.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td> 
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</table>

The observation shows that, the main interior space characteristics of original state of the warehouses were maintained. Re-use process did not change the total perception of the whole space. These warehouses kept their single story space. The division has been done by vertical freestanding elements. New elements didn't touch the ceiling or side walls. Space within a space is created. The structure of the warehouse is kept the same as the original state. Similar elements are used to cover or replace the original ones. Therefore the following chapter introduces the determination of analysis criteria. So the interior space characteristics of the historic warehouses in Liman road will be analyzed. To estimate the reasons that has caused in appropriate changes to interior space characteristics of these warehouses.

Chapter 3

DETERMINATION OF ANALYSIS CRITERIA

Interior Space Analysis

The interior architecture space analysis will be determined mainly according to Ching, (1995) and Brooker, (2007) definition and approaches. This study concentrates on evaluation of interior space defining elements. Chings', (1995) and Brookers', (2007) definition and approaches shows that these elements are directly affecting the interior space characteristics. To emphasize the points of view of this thesis other references such as Coles & House, (2007), Antony & Antoniades, (1986) who worked on the of space characteristics, concept of design, elements defining space, arrangement of elements and design principles are also considered.

Architectural design is the point of contact between mass and space. Architecture and interior design form, material, light, texture and object are united to introduce the quality which clearly expresses space. The quality of the architecture or interior architecture will be determined by the skill of the designer in using and relating these elements in interior spaces or the space around the building (Bacon, 1974). Thus the primary elements of design will be introduced to be able to describe the elements, which define space.

To understand what affects the space characteristics, at first we have to know the definition of space and the relation of it with interior architecture.

3.1 Definition of Space

The boundless three-dimensional extended in which objects and events occur and have relative position and direction (URL5, 2012). Mentioned space is the holder of elements, it sets boundaries to work in. As Meis, (1998) mentioned a space may look empty but each element and object has a position within a space. For interior architect the empty space between floor, wall and ceiling is the place where the activities take place, which is under control (Meiss, 1998).

To describe the relation of space with architecture and interior architecture can be claimed that an architect creates the main building while an interior architect creates interior spaces for people to live in the created areas. In a new project interior architect and architect work as a team. While in a renovation project they may work individually. Interior architect creates the atmosphere in space; revise spatial organizations; etc. Space is organized according to the needs of people. Space can be defined as three-dimensional spaces where all objects are located inside and all events occur eventually (Coles and House, 2007).

3.2 Space characteristics

The space characteristics depend on the elements forming and organizing that space. So to determine the characteristics of enclosed space the elements defining that field, arrangement of these elements and principles used to organize them should be studied (Coles & House, 2007; Antony & Antoniades, 1986; Ching 1995). These elements used to create the original space of the building and also used to recreate new spaces within it. Thus in the following parts, at first the elements which are used to define the space will be studied; and then the principles of design and their effect

on the space will be explored; and in the third part the arrangement of these elements in space and how principles can be achieved in these arrangement will be studied.

3.2.1 Elements Defining Space

Plane

As plane defines three-dimensional volumes, mass and space in an interior architecture so the properties of plane (material, texture) and their spatial relationship to each other affect the characteristic of the space they define .There are three types of plane as shown in figure 3.1 according to Ching, (1995):

Overhead plane (ceiling)

Overhead plane which is a horizontal element defining space can be roof plane that cover the interior space of a building or the ceiling plane that forms the upper enclosing surface of the room.

Wall plane (wall)

Wall plane, which is a vertical element defining space, can be seen in eye level and critical for the shaping and enclosure of space. The plane of an exterior wall can express the façade of a building, which serves as walls which separate inside from outside. Interior wall plane manage the size and shape of the internal space.

Base plane (floor)

Base plane which, is a horizontal element defining space can be the ground plane, which is the foundation and a base for building form, or the floor plane that forms the lower enclosing surface of a room upon which we walk.

Planes are vertical and horizontal, mostly in form of walls and floors or ceilings. “They define and organize in a way that they control the visual and physical limits of a space” (Brooker & Stone, 2007). But they can be more than a pure surface; walls can act as container, they can hide or characterize things, ceiling can create atmosphere or specifies direction and floors can give clearness and direction (Brooker & Stone, 2007).

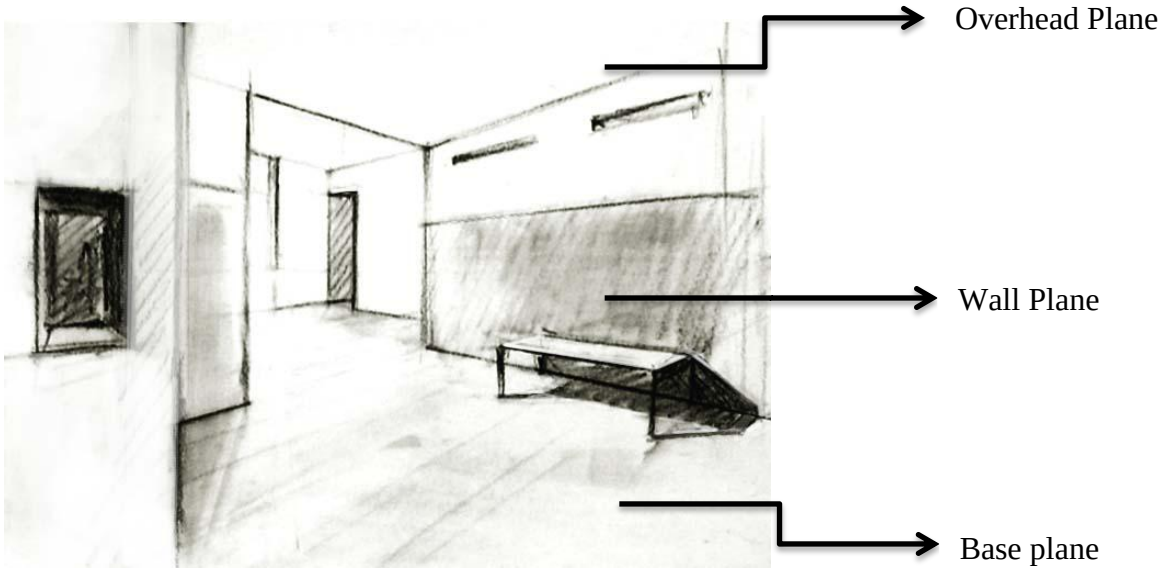


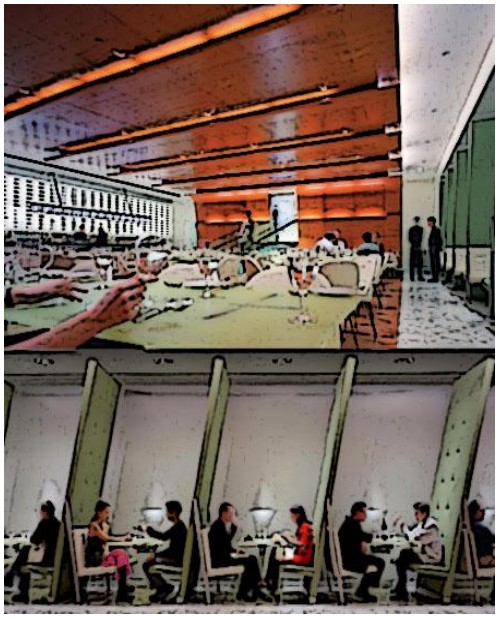
Figure 3.1`: Thee main plane elements in interior space (URL 6, 2012)

Organization of interior spaces is composed by arrangements of vertical and horizontal plane elements. These primary plane elements can act as wall, ceiling, and floor or united and make an object. This elements surface that has their own characteristics such as material and texture which also affect the space they are in contact with. Also the amount of light that reflected from the surface of plane element affects the space around it. Thus to be able to evaluate the interior space characteristics texture, material and light which have been used should be considered.

As Unwin, (1997) and Ching, (1995) stated that space of a place can be identified by a range of basic elements such as ground, walls and ceiling. Form is the shape, visual appearance or configuration of an object. The shape of an object is a geometrical part of the space that occupied by that object, as defined by its external boundary – abstracting from location and orientation in space, size, and other properties such as color, content, and material composition (URL7, 2012).

In table 3.1 planes can be seen in interior space examples. The example on the left is a warehouse re-used as parada store. It influences both the physical and visual connection between the front and rear of the shop. The wave shape floor overstates and strengthens the quality of space to change direction abruptly the length of space. The zebra wood surface united the ground floor with basement (Brooker & Stone, 2007).On the right side of the table is a bar in New York. The pear wood plane wraps around the dining area, which allows it to cover lighting to become seating at ground level as its folded and define the dining space. It shows that plane shouldn't be always horizontal, vertical or flat (Brooker & Stone, 2007).

Table 3.1: Example of Plane in interior space organization (URL8, 2012), (URL9, 2012)

Name: Prada store	**Location:** New York, USA	**Name:** The Brasserie	**Location:** New York, USA
Date: 2011	**Designer**: Rem Kolhaas / OMA	**Date:** 2000	**Designer:** Diller Scofidio + Renfro
			
• The waves form horizontal plane links the ground floor with basement • Floor can control movement and circulation through space		• Plane shouldn't be always horizontal, vertical or flat • It defined a separated space for dining • Place can be folded to create furniture	

Object

Objects can offer focus to a space, encourage movement, provide rhythm or balance and endorse direction, both visual and physical (Brooker & Stone, 2007). They can be an art object or a piece of furniture, or a large construction such as shell or pavilions (Coles&House, 2007).

In the table 3.2 on the left side is a film studio, which the designer inserted a ready-made container to in the new space. They installed a shipping container in the shop window at the front of the reactor film studio. This unusual element was adapted to contain the meeting room. It has become a signal of the creative process within the building.

On the right side of the table a multi user freestanding object inserted in warehouse which is used as an apartment now. Separate activities can be collected together to form a tight single element. It contains of dinning space below a raised sleeping platform which is accessed by a stair that contains bookshelves.

Table 3.2: Example of object in interior space organization (Brooker & Stone, 2007)

Name: Reactor film Studio	**Location:** Los Angeles, USA	**Name:** Magna Science Adventure Centre	**Location:** Rotherham, UK
Date: 1996	**Designer**: Pugh & Scarpa	**Date:** 2001	**Designer:** Wilkinson Eyre
			
• Ready-made object (container) removed from its natural context and placed in new space and created surprise and interest • The container is remodeled to house the meeting room		• Freestanding object designed to accommodate and contain a number of different function • It contain different spaces and functions	

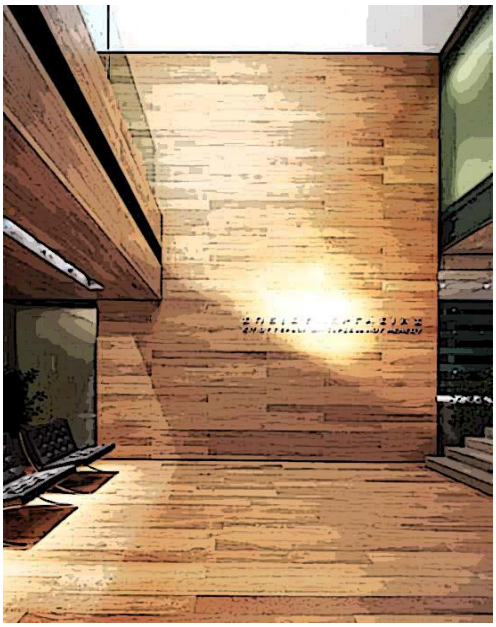
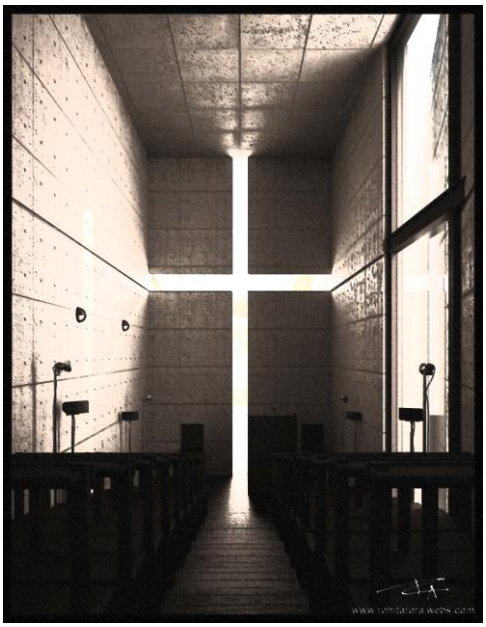
Light

As Le Corbusier said “Light is the masterly, corrected and magnificent play of masses brought together in light”. Light will reveal space and define form. It can be artificial or natural light it can emphasize objects or spaces, suggests direction and helps the understanding of the building. Light is a fundamental element and a correct pronunciation, it might affect the interior space characteristics of the building (Brooker & Stone, 2007; Coles&House, 2007). The size of the window or skylight controls the amount of day light a closed space receives. If the opening oriented to receive certain direct natural light it will provide high degree of illumination. Also the texture and material which characterize the surface of the horizontal and vertical elements of the space estimate the amount of the light that space achieve. As lighter and less textured surfaces illuminate more than the surfaces which are darker and textured (Ching, 2007).

In the table 3.3 on the right side is a church where the designer has defined the space of the chapel by light and strong contrast between light and solid. The light enters from the cross cut in the concrete wall which extends from floor to the ceiling vertically and from one wall to another wall horizontally. The designer has tried to transfer the region into a spiritual one (URL 10, 2012).

On the left side of the table is a bank building. It shows the sitting area in the basement of the building; therefore artificial light is used to illuminate the space. On the celling over the sitting furniture, lighting elements are located to direct the customers to that zone. Light has been reflected to the front wall to emphasize the logo of the bank.

Table 3.3: Example of light in interior space organization (URL11, 2012), (URL12, 2012)

Name: CO OP Bank building	**Location:** Larnaca, Cyprus	**Name:** Church of light	**Location:** Osaka, Japan
Date: 2005-2009	**Designer**: AMSA Architects	**Date:** 1989	**Designer:** Tadao Ando
			
• Lighting on top of the sitting area direct customers to that part of space • Light reflected on the front wall to take the attention of the customers		• Space of the chapel defined by light • Contrast created by solid and light	

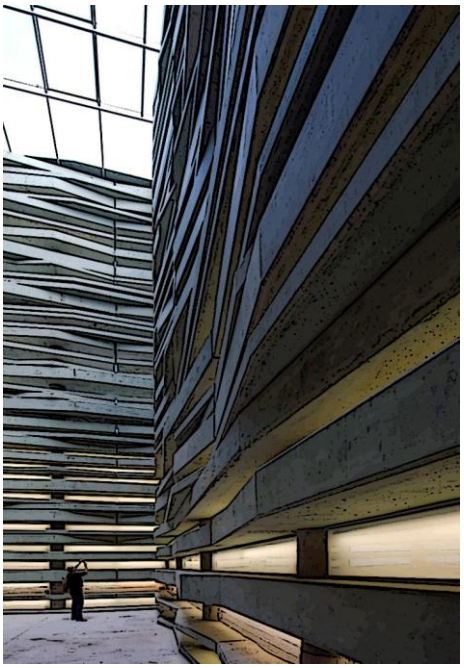
Texture

"The texture of an element describes the materials it is made of" (Brooker & Stone, 2007). It is the stuff that is touched, felt or handled. It not only has to provide ergonomic (designed and intended for safe and efficient use) and environmental strength when necessary, but also has to signal personality (Coles&House, 2007).

In table 3.4 on the left side there is a two story contemporary home. The front wall is covered by stone material which created a different texture and continuous to the left and right side of the wall and relates spaces to each other. The rope stair railing has created a regular rhythm which gives movement and direction to the occupiers to the second floor.

On the right side is a Peace Peres house. Irregular shaped concrete has created a rhythmical texture by use of solid and void. This influences the movement in space and also emphasizes massive volume of the space.

Table 3.4: Example of texture in interior space organization (URL13, 2012), (URL14, 2012)

<table>
<tr><td>Name: Buenos Mares Villa</td><td>Location: Jose Ignacia, Urguary</td><td>Name: Peace Peres House</td><td>Location: Avrir, Israel</td></tr>
<tr><td>Date: 2009</td><td>Designer: RDR Architects</td><td>Date: 2008</td><td>Designer: Massimiliano & Doriana Fuksas</td></tr>
<tr><td colspan="2">  </td><td colspan="2">  </td></tr>
<tr><td colspan="2">• Stone wall and the rope railing stairs added texture and depth to the space
• The rope railing created a continuous regular rhythm which orient the owner to the second floor
• It created a minimalist space</td><td colspan="2">• The solid and void concrete material in wavy way created a flowing rhythm texture which gave the space a sense of movement</td></tr>
</table>

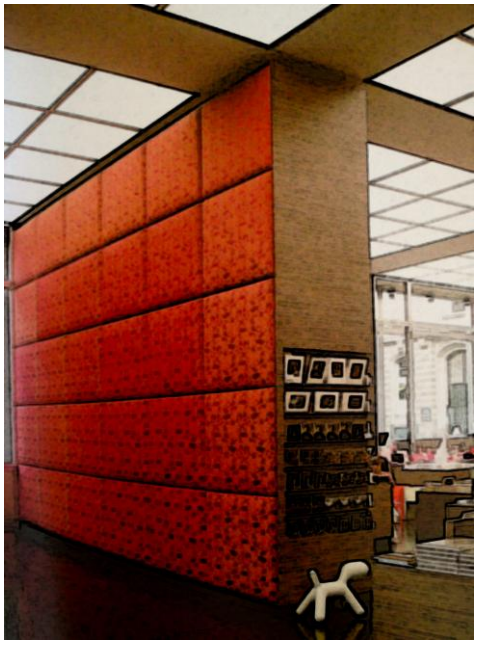
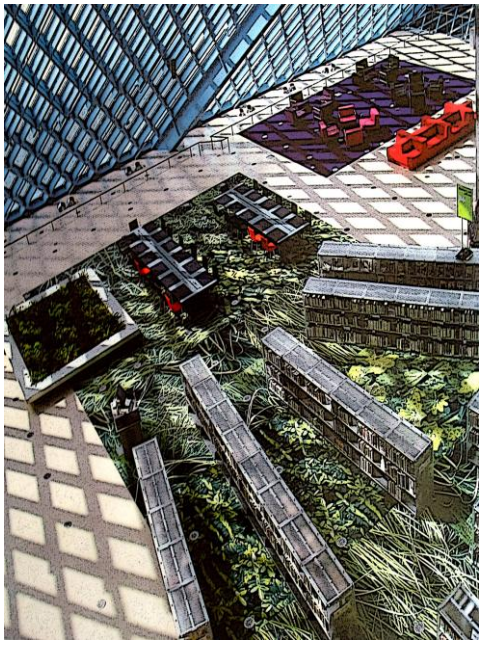
Material

“The materials and construction of the fabric will be the legacy of the style and purpose of the original building and of its subsequent history” (Coles & House, 2007). The choice of materials can give identity and meaning to an element as an example the character of a wall depends upon its textual quality more than its structure. A rough concrete has a different quality compared to polished marble. Materials such as steel, plastics and acrylic, which have been used for industrial use, are now approved as interior finishes. This can create appropriate atmosphere and mood in an interior space (Brooker & Stone, 2007).

On the table 3.5 on the left side there is a museum shop. The designer positioned the display cabinets with the boundary of the square grid and the proportion reflects the scale of the building. These dividing barriers covered with fabric, which are in contrast with the rest of the museum. The fabric has been detailed in the same way as the building. It divided into grids the same as the ceiling.

On the right side of the table is a public library, which is commonly known as a huge, open warehouse that the individual areas have been defined by something rather than walls and rooms but through ornament and edge made texture. The curtains however, are made of traditional materials such as velvet and canvas. The designer created a series of dramatic statements.

Table 3.5: Example of material in interior space organization (Coles&House, 2007)

Name: Wallraf – Richartz Museum shop	**Location:** Cologne, Germany	**Name:** Seattle Public Library	**Location:** Seattle, USA
Date: 2001	**Designer**: O.M. Ungers	**Date:** 2004	**Designer:** OMA and LMN Architects
			
• Red wall with different material located to separate space • The different use of material made this wall interesting and take the attention • The same grid shape as the ceiling related it to other part of the design		• Graphic carpets describe areas of the library, such as bookshelves and reading spaces.	

3.2.2 Design Principles

"Design elements and principles describe fundamental ideas about the practice of goods that are assumed to be the basis of all intentional visual design strategies. The elements form the 'vocabulary' of the design, while the principles constitute the broader structural aspects of its composition. Awareness of the elements and principles in design is the first step in creating successful visual compositions. These principles, which may overlap, are used in all visual design fields, including graphic design, industrial design, architecture and fine art" (URL15, 2012).

Synthesis

As Ching (1995), Antony & Antoniades, (1986), Cindy, (2004) and Antoniades, (1990) stated, the first way to think about a principle is that a principle is something that can be repeatedly and reliably done with elements to produce some sort of visual effect in a composition. Awareness of the principles is the first step in creating meaningful visual composition (Antoniades, 1990).

Basic steps in process of composition are organizing and establishing order of elements. If the elements of composition are organized properly in an unquestionable manner and are related one to another then the work of the architecture or interior architecture exhibits the spatial qualities of well living creature. "We can safely say that "organization," as used in architecture, is a quality of the specific synthesis. "Synthesis is a combination of two Greek words, *syn* and *thesis*: *syn*-together, adding, or plus; and *thesis*- thesis, situation, position, entity, statement. The word *synthesis*, therefore means "to put together" certain elements… in a way that a new thesis is stated, a new position is created, a new work is generated" (Antony & Antoniades, 1986).

“The process of “organizing” is not only a step in the design process, but it is also a quality of the work of architecture. If organization exists, then the building would have good chances to stand as an “organism”(all parts holding rationally together and working as a whole)” (Antony & Antoniades, 1986).

Principles of design will be explored in the following part, which is mainly based on Mc Clurg-Genevese, Ching’s and Antony & Antoniades, studies. All design principles affect the principle of unity at the same time, which makes it as a key principle in design.

Unity

“It is the quality that exists when all previous concepts operate within a balanced equilibrium holding the work together as a total whole. If some parts of a design do not “hold” together, if there is emphasis of one design aspect over another, if it seems that the building possesses elements of conflicting qualities that are unfit and disobedient to the total sprit of the composition, then we say that the building lacks unity” (Antony & Antoniades, 1986).

Unity is keeping your design compositions related one to another which all sections of the design make other sections feel complete or in another meaning it shows that order is existed which gives the viewer to feel comfortable. According to Ching, (1995), Mc Clurg-Genevese, (2005) and Gilbert, (1992), unity is the quality of being combined into one, as the ordering of elements in an artistic work that establishes a harmonious whole or encourages a singleness of aspects of a given design that are necessary to tie the composition together, or to break it apart and give it a sense of variety.

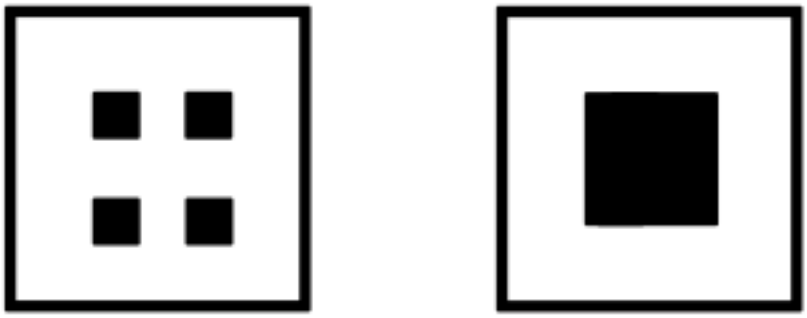
Unity within a well-composed design accomplishes:

- Sense of order by uniformity of sizes and shapes/a harmony of texture/repetition of key elements/balancing elements through the composition/adding variety to provide feeling of personality.
- Completeness and belonging together so, design will be viewed as a whole not separate elements/prevent using too many shapes and forms except design will be confusing/use of a basic shape, which is repeated in the composition.

Approach to Achieve Unity

- Unity created by line or edge of element leads into another
- Unity created by adjusting other elements to these axes which creates a visual relationship that join them
- Unity created by placing elements close and related to each other to be seen as one cohesive group rather than bunch of unrelated items.
- Unity created by using similar element to create a sense of consistency and completeness
- Unity created by making an uninterrupted connection between elements and create the sense of family likeness
- Unity created by repeating elements to create a visual relationship between them

Table 3.6: Example of unity in interior space organization (Brooker & Stone, 2007)



Unity in space organization

As an example in the following interior space unity achieved:

- Line and edge of elements leads to other which make them one cohesive group
- Continuous horizontal element on ceiling created a horizontal axis
- Other elements adjusted to this axis and created visual relationship between them
- Uninterrupted connection between elements (the horizontal elements on ceiling continued in vertical plane to the floor) united these elements
- Repeating the same material, texture, object created visual relationship

Order

Vitruvius defines order as giving "due measure to the members of a work considered separately and symmetrical agreement to the proportion of the whole. It is an adjustment according to the quantity" (Vitruvius, 1960).

Order is the quality of an architect work that says the observer or user there is not any unfairness in the organization of the elements, and all elements are arranged logically and harmoniously or comprehensibly and group of elements are properly controlled according to other elements and their purpose. Hence equilibrium or balance is at hand. Equilibrium might search by the designer in terms of function, activity, or form (Antony & Antoniades, 1986; Ching, 1995). Order is the basic component of compositions that is represented by ideal mathematical forms and ideal relationships-perpendicularity, parallelism, symmetry, asymmetry, regularity, dominance, repetition. The order makes the feeling of harmony, seriousness and monumentality. Omission of order makes the reading of the composition difficult. Therefore for a proper spatial quality of space the balance between order and chaos is necessary (Alberti, 1955; Moughtin, 1992).

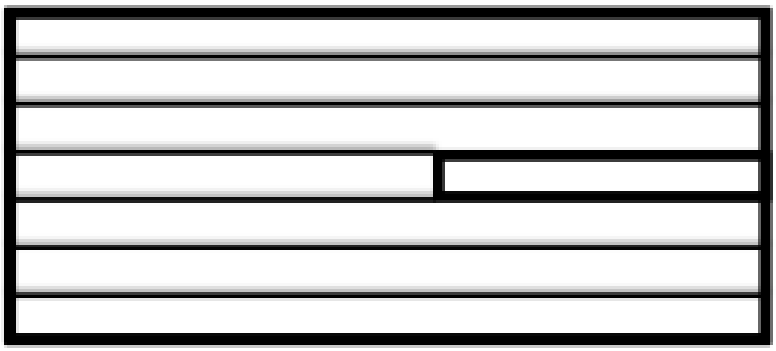
Order within a well composed design accomplishes:

- Brings out the feeling of harmony or seriousness
- Agreement of members to each other
- Logical arrangement of elements

Approach to achieve order:

- Order created as the edge of an elements leads to other element perpendicularly
- Order created by placing elements close to each other parallel
- Order created by using similar elements in logical manner
- Order created by arranging elements continuous in a row
- Order created by making balance in the whole design
- Order created by repeating elements regularly
- Order created by making a variety in appropriate amount

Table 3.7: Example of order in interior space organization (Brooker & Stone, 2007)



Order in space organization

As an example in the following interior space order achieved:

- The edge of the wall plane element which leads to floor plane is perpendicular.
- The linear elements on the ceiling are close to each other and parallel.
- Similar elements repeated in the same logical manner with the same distance to each other.
- The white object made contrast in the space.

Harmony

Ching believed that harmony is "The orderly, pleasing, or identical harmonious arrangement of the elements or parts in an artistic whole". Harmony is when all the elements of design are in agreement when all sections of design make each other complete. Harmony combines a composition with similar units, which makes it opposite of contrast and also suggests simplicity to design (McClurg-Genevese, 2005). Harmony is a final result that gives the viewer the ability to sense the unity of the composition which means, it includes the entire composition and the interrelationships between parts or elements instead of emphasizing one point. It should create a feeling of completeness between the composition of elements and it is used in conditions such as likeness or similarities between particular elements on a whole design. In interior design, harmony is the culminating principle of design following proportion, scale, balance, rhythm and emphasis (Ching, 1995; Mc Clurg-Genevese, 2005; Gilbert, 1992).

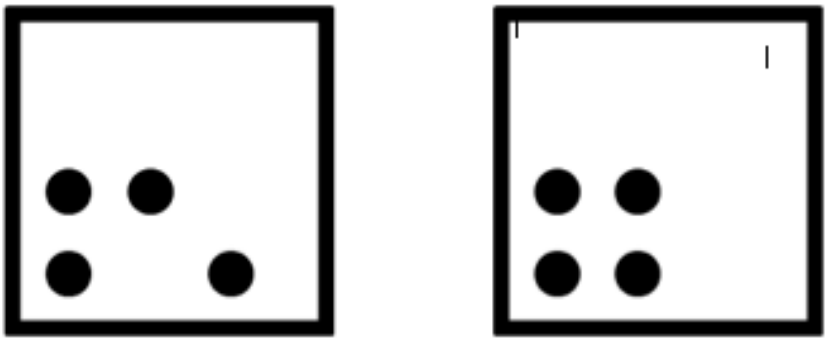
Harmony within a well composed design accomplishes:

- Each section makes the other complete
- Perceives unity of the composition
- Achieves completeness
- Space has its sense of personality

Approach to Achieve harmony:

- Harmony created by juggling with similar elements in the space
- Harmony created by situating elements in continuous manner
- Harmony created by balancing elements in the space
- Harmony created by repeating similar elements in an interesting manner
- Harmony created by adding a little variety

Table 3.8: Example of Harmony in interior space organization (URL16, 2012)



Harmony in space organization

As an example in the following interior space harmony achieved:

- Repeating the same objects, texture, material
- Elements balanced through the space symmetrically
- Similar Elements are juggled
- All the objects are not lined by the edge so there is not much unity to make it boring
- Making contrast by adding even little light in closed space
- Box objects placed continuously.

Contrast

Ching, (1995) and Antony & Antoniades, (1986) Stated that contrast can be described as the arrangement in order to emphasize differences in a composition by the shape, size, direction, color and texture of the visual elements. Contrast makes difference between combined elements to create interest. It breaks the repetition.

Effective uses of contrast enable you to add interests to your design by highlighting specific design elements. This will result in a more visually striking composition. To achieve contrast employed as a means of creating a visual hierarchy among different design elements. It can be used to emphasize a certain element in a design. It can be applied in elements as light, dark, warm, cool, large, small; etc. (McClurg-Genevese, 2005).

Contrast within a well-composed design accomplishes:

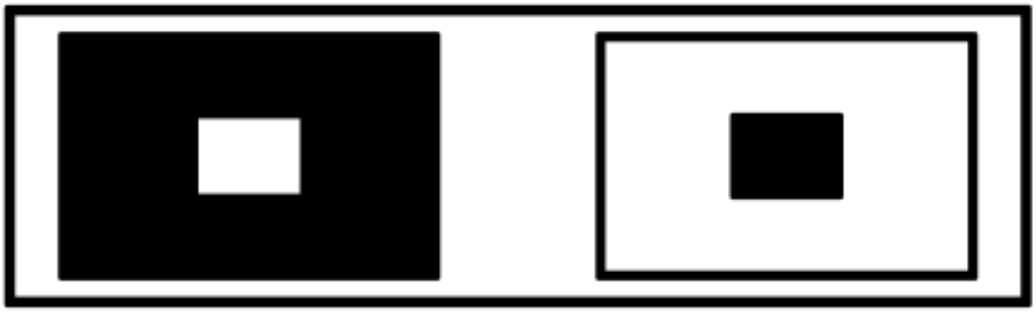
- Gives attention to the area
- Creates center of interest
- Creates emphasis

Approach to Achieve Contrast:

- Stressing of a particular area of focus
- Sudden change in size of an object, texture, material
- Make one element the largest, brightest, darkest or most complex part of the whole

Table 3.9: Example of contrast in interior space organization (URL17, 2012)

Order in contrast organization



As an example in the following interior space contrast achieved:

- By using completely different texture and material contrast created by Stressing of a particular area of focus
- By sudden change in the organization

Rhythm (repetition)

Ching, (1995) Mentioned rhythm is a movement which is characterized by a repetition of formal elements or patterned repetition or themes in the same or changed form. In design it is the act of repeating of the same changed element. An element repeated itself in different parts of the design is used to relate different part of a composition to each other. Though, repetition can be assumed of "consistency" in design. Repetition can be achieved in two ways: full and alternate.

Rhythm is used to create spatial proportion by its time of movement and rate of movement (Antony & Antoniades, 1986). So rhythm acts for the "rules of the game of movements." Which means the time which we had to spend to go from A to B might be completely different from the time spend to go from B to C, etc. It's the designer who should arrange these rules of the game through the design (Antony & Antoniades, 1986).

The regular repetition of design elements works to create visual unity. These elements can be as simple as size, color, shape, pattern, form and texture (McClurg-Genevese, 2005).

Alternative Repetition (Rhythm):

"Rhythm is the tempo of visual movement, achieved through repetition of size, color, shape, pattern, form and texture. Movement characterized by a patterned repetition or alternation of design elements in the same or a modified form" (McClurg-Genevese, 2005). Frequently different kinds of rhythm can be clarified by the feeling or emotions which rise by looking at it.

a) Regular

Regular rhythm takes place when the gaps between the elements and other elements themselves, are similar in size or length.

b) Following

"A following rhythm gives a sense of movement, and is often more organic in nature" (McClurg-Genevese, 2005). It is a development dependent on a soft visual pathway and it's dependent on the arrangement of design elements, a development can be observed as either continuous and flowing or disconnected.

c) Progressive

Progressive rhythm appears when a series of forms are repeated through a development of stages. Characterize the sense of continuity and interconnectedness, which are created by changing texture, shape or size in steps of repetition.

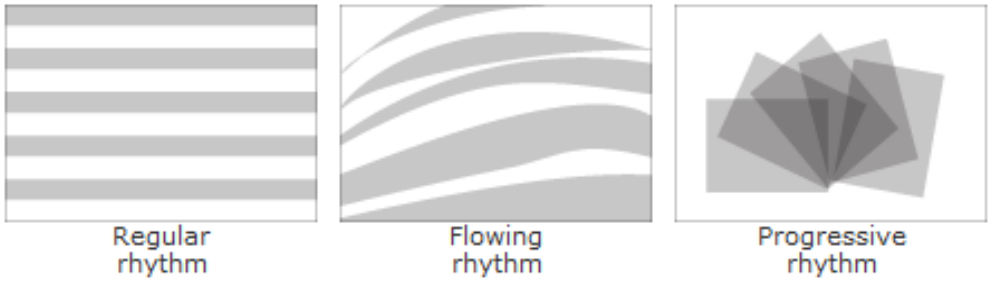
Rhythm within a well-composed design accomplishes:

- Relates different part to each other
- Satisfies unity and harmony but has variety
- Relates elements by the texture created with solid and void.
- Unfinished effect by full repetition
- Flowing rhythm gives a sense of movement or motion

Approach to achieve rhythm

- Regular rhythm created by repetition of similar elements or similar interval
- Rhythm created by alternative repetition with defined intervals
- Flowing rhythm created by repetition of wavy lines or curved shape

Table 3.10: Example of rhythm in interior space organization (URL17, 2012), (URL 18, 2012), (URL19, 2012), (URL20, 2012)



Rhythm in space organization



As an example in the following interior space rhythm is achieved:

- Regular rhythm is created by repetition of similar elements with similar intervals (the same amount of light come in by making opening and steps with the same width)(left)
- Flowing rhythm created by repletion of wavy plane on the ceiling(middle)
- Progressive rhythm created by repetition of continuous elements in the same interval and angle(right)

Balance

Balance is the agreeable or harmonious arrangement of the parts to the whole elements in a design or composition (Ching, 1995). Visual equilibrium in a space is called balance. It is a settlement of opposing forces in a composition that results in visual stability. An arrangement of the elements in a given design as it relates to their visual weight within a composition. It gives a sense of calmness and a feeling of completion. Size, color, shape, pattern, form and texture can be used to create balance in a composition (McClurg-Genevese, 2005).There are two forms of balance in composition:

1. Symmetrical balance (Formal) when the weight of the composition spreads equally across the central axis and create a mirror image
2. Asymmetrical balance (Informal) when the weight of the composition is not equally spread around a central axis. It is the arrangement of objects in composition with different size as they balance one another with their respective visual weights. There should be changes in size, shape, color and placement of the elements in the composition which is required (McClurg-Genevese, 2005).

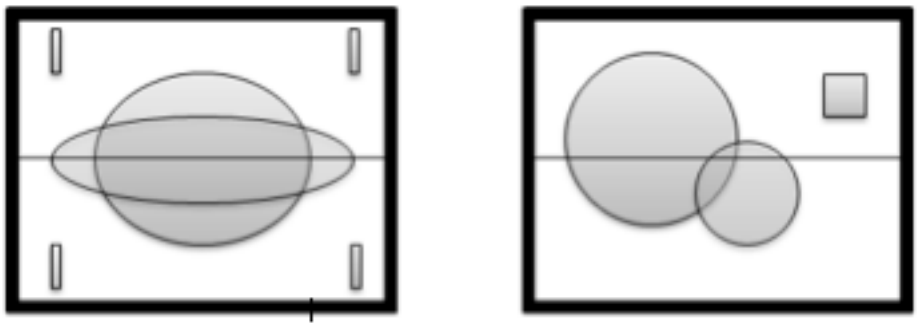
Balance within a well composed design accomplishes:

- Visual equilibrium which gives visual stability
- Sense of calmness
- Feeling of completion
- Mirror image created by symmetrical balance

Approach to achieve balance

- Balance created by the alignment of elements along horizontal or vertical axis
- Formal balance created by spreading the weight of composition equally across the central axis and create a mirror image
- Informal balance created by not spreading the weight of the composition equally across the central axis

Table 3.11: Example of balance in interior space organization (URL21, 2012)



Balance in space organization

As an example in the following interior space balance achieved:

- Formal balance created by spreading the weight of composition equally across the central axis and create a mirror image by locating the same object
- Informal balance created by not spreading the weight of the composition equally across the central axis the massive object on the right side make contrast and takes the eye to itself

Proportion

Proportion is the comparative, proper, or harmonious relation of one part to another it is the relation in scale between one element to another or a whole and one of its part with respect to greatness, quantity, or degree.

Proportion is an element which specifies harmony to the composition. They are considered particular in relation to size, shape and color. A visual depth and weight can establish by using different proportion within a composition and relate to different kind of balance.

The smaller elements seem to retreat into the back while the larger elements come to the front (McClurg-Genevese, 2005; Ching, 1995). All the purpose of considering proportion is to make the sense of balance, unity, order and harmony among the elements in a visual spatial space.

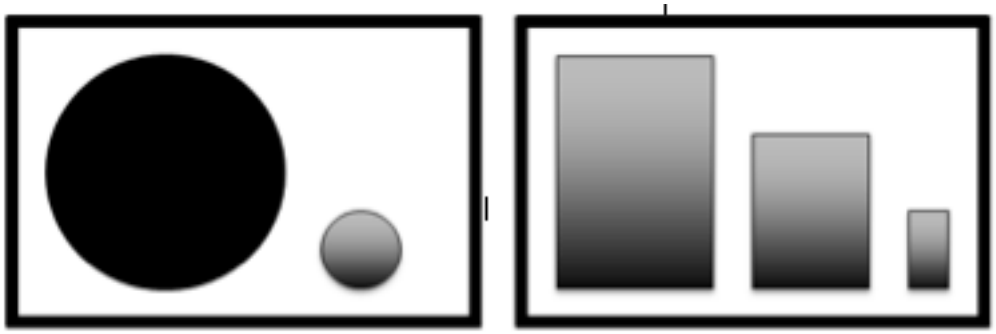
Proportion within a well-composed design accomplishes:

- Creates repetitive order, full repetition, informal balance, asymmetry, symmetrical balance
- Visual relationship between part of the space and the whole
- Reinforces order, harmony, balance, unity
- Comparison of dimension

Approach to achieve proportion

- Proportion created by relation in scale between elements next to each other
- Proportion created by locating a mass of void element in the center of composition
- Proportion created by locating horizontal linear element on 1/3 of rectangular plane
- Proportional order created by repeating 1/3 rule at the size of elements used in composition order

Table 3.12: Example of proportion in interior space organization (URL21, 2012)



Proportion in space organization

As an example in the following interior space proportion achieved:

- Proportion is created by locating a mass of void element in the center of composition
- Proportional order is created by repeating the same size plane elements in composition

3.2.3 Arrangement of Elements

These elements should be arranged next to each other in a manner of logical way. The following arrangements of elements have been chosen according to Ching, (2007) criteria of arrangement of elements and also references from Lawson, (2003), Miller& Schlitt, (1985), Unwin, (1997) and Brooker & Stone, (2007) to emphasize the points of view of this thesis. As earlier explained plane is one of the main elements and texture and material are the elements which characterize the surfaces of planes and light as an essential element which makes it possible for human eye to see these elements. Object is an element which created by horizontal and vertical plane and mass and void and inserted into the building. In this section different arrangements of these elements categorized according to Ching, (2007) are as followed:

1. Horizontal element defining space

Base plane

Architecture is situation which elements managed inside of a mystified space. These situations divided in two main parts. Ground is the first part where an architect starts his/her work. The second part is the space above the ground where the architect creates places which are limited by wall and overhead plane (Unwin, 1997; Ching, 2007).

The way to define a base plane has been illustrated in Figure 3.3 to be able to see a horizontal plane, there must be a change in texture or material between its surface and the surrounding area so contrast will be achieved which gives attention to that area which has been shown on the left side of the figure bellow. On the middle of the figure we can see that as stronger the edge of the definition of a horizontal plane is the clearer will be the field of that space. Although there is a continuous flow of

space across it, however the field generates a spatial zone of space within its boundaries as we can see on the left side of the figure bellow.

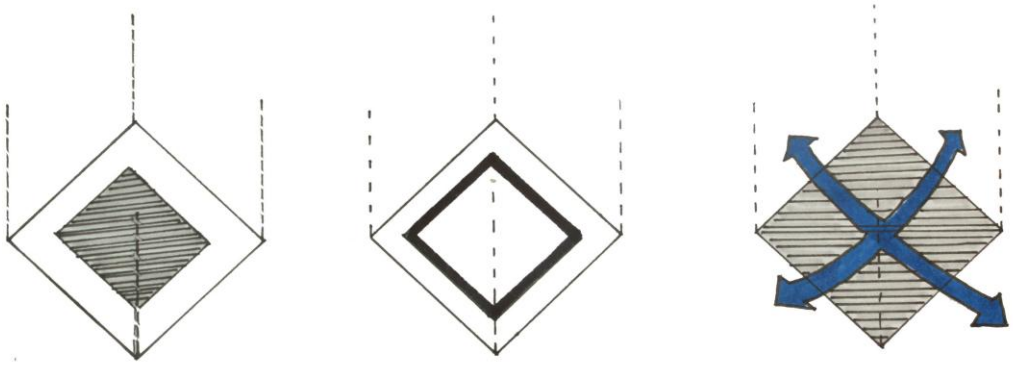


Figure 3.2: Base Plane adapted from Ching, (2007)

Ground or floor plane is often used to define a zone of space within a larger context. This can be used to differentiate a path of movement and place of rest or articulate a functional zone within one space (Meiss, 1998; Ching, 2007). As floor plane is the first thing people perceive while entering a space thus it works as the host for shops therefore it is the strongest element of the space (Krier, 1988).

Base plane can be reinforced in the following ways:

Elevated base plane

- Horizontal plane as illustrated in (Figure 3.4) elevated above the ground plane establishes vertical surfaces along its edges to reinforce the visual separation between its fields of space with the space surrounding it.
- Elevating a portion of the base plane creates a specific area within a larger spatial context. The edges of the elevated plane define the boundaries of its field and interrupts the flow of space across its surface

- If the edge condition clearly marked by a change in form, texture, material then the field will become a high flat surface that is separated and clear from its surrounding by contrast.

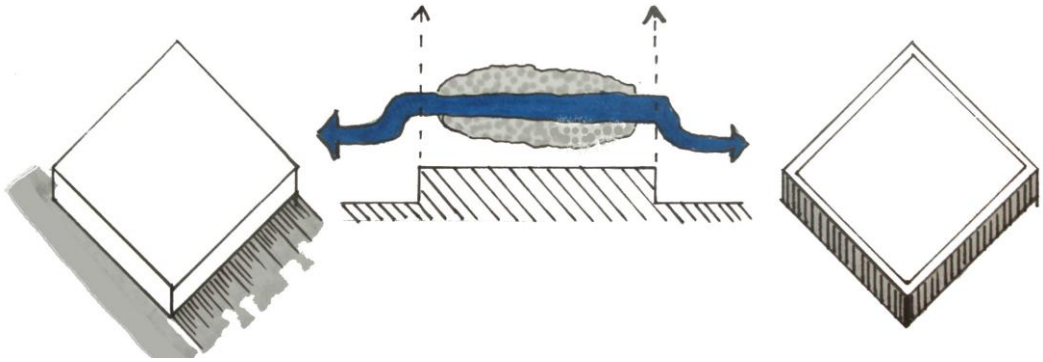


Figure 3.3: Elevated Base Plane adapted from Ching, (2007)

- As shown in figure 3.5 the degree to maintain the spatial and visual continuity between an elevated space and its surrounding depends on the scale of the level change. In the first one the edge of the field is well defined and the visual and spatial continuity is maintained and the physical access is easily accommodated. In the second situation visual continuity is maintained but spatial continuity interrupted the physical access required stairs or ramp. In the third part visual and spatial continuity interrupted and the field of the elevated plane is separated from the floor plane and transformed into a sheltering element for the space under it (Ching, 2007).

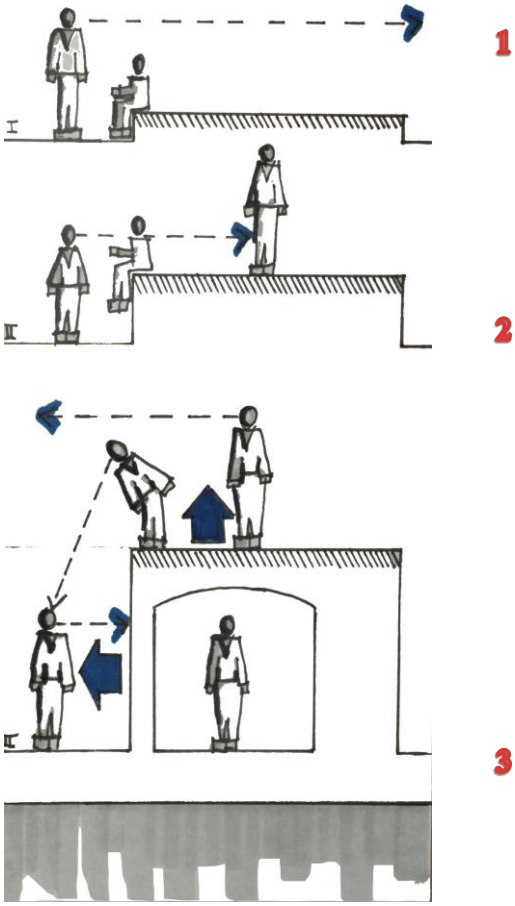


Figure 3.4: Elevated Base Plane adapted from Ching, (2007)

A floor plane can be elevated to establish a singular zone of space within a larger space. This space can serve as a separate space from the activity around it or be a platform from viewing the surrounding space.

Depressed base plane

- Horizontal plane as illustrated in (Figure 3.6) pressed down into the ground plane uses the vertical surfaces of the lowered area to define a volume of space
- Lowering a portion of the base plane separates a field of space from a larger context. Vertical surfaces of the depression establish boundaries of the field

and these edges begin to form the walls of the space (Ching, 2007).

- The field of space can be further expressed by contrasting the surface treatment of the lowered area by using different texture or material with the surrounding base plane (Meiss, 1998).

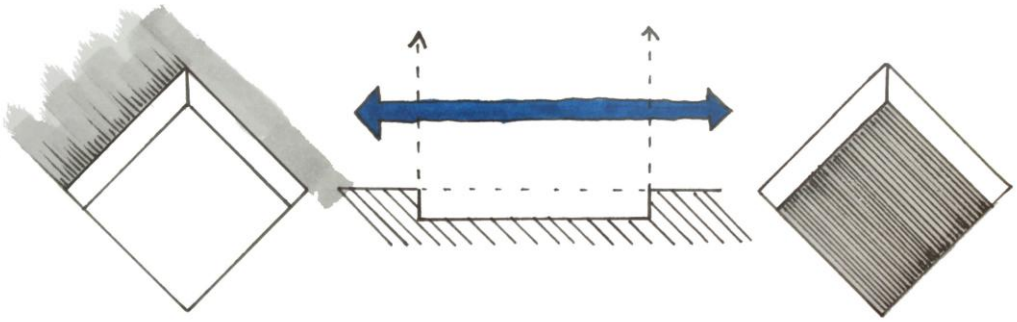


Figure 3.5: Depressed Base Plane adapted from Ching, (2007)

- As shown in figure 3.7 the degree of spatial continuity between a depressed field and the raised area surrounding it depends on the scale of the level change. In the first one it can be an interruption of the floor plane and remain as essential part of the surrounding space. In the second one the increase in the depth of the depressed field weakens the visual contact with the surrounding space and strengthens its definition as a distinct volume of space. In the third one as the original base plane is above our eye-level the depressed field becomes a separate and distinct space itself (Ching, 2007).

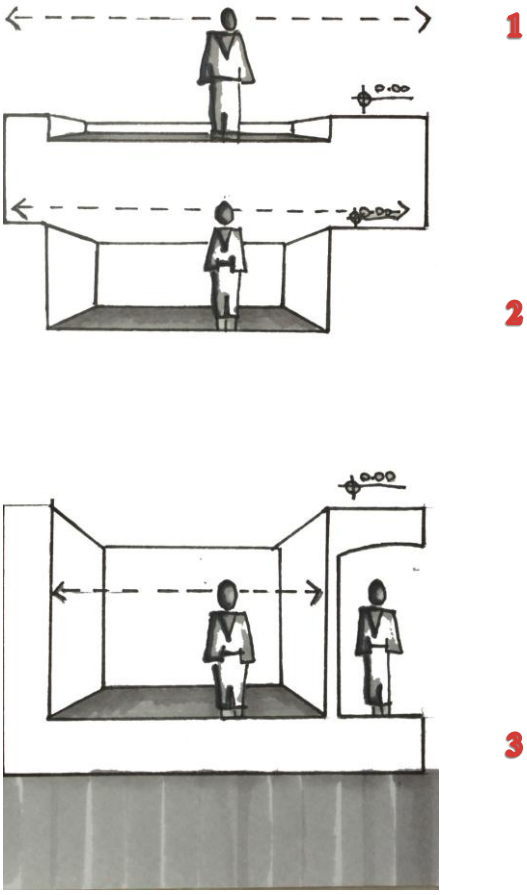


Figure 3.6: Depressed Base Plane adapted from Ching, (2007)

Creating stepped, terraced or ramped transition from one level to the next helps promote continuity between a sunken space and the area that rises around it (Brooker&Stone, 2007).

Overhead plane

- Horizontal plane as illustrated in (Figure 3.8) located overhead and define a volume of space between itself and the ground plane .The edges of the overhead plane establish the boundaries of this field, its shape, size, and height above the ground plane determine the formal qualities of the space bellow it (Ching, 2007).

- Vertical linear elements such as columns or posts are used to support the overhead plane they will help to establish visually the limits of the defined space without interrupting the flow of space through the field.
- As the space created by overhead plane limits by its context, it has the ability to define an individual volume of space practically by itself and also unify the different elements of space (Meiss, 1998).

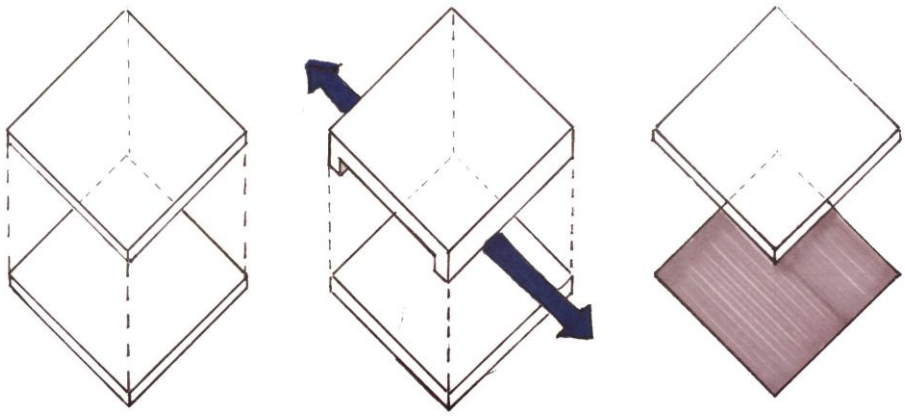


Figure 3.7: Overhead Plane adapted from Ching, (2007)

- As shown in figure 3.9 the ceiling plane can be influenced to define articulate zones of space within a room. It can be lowered or elevated to change the scale of a space, define a path or movement through it, or allow natural light to enter it from above. Ceiling plane in interior space can reflect the form of the structural system supporting the overhead or roof plane. Since it doesn't carry major loads, it can be detached from the floor or roof plane and become visually active elements in a space, which establishes a spatial space below its field (Meiss, 1998; Ching, 2007).

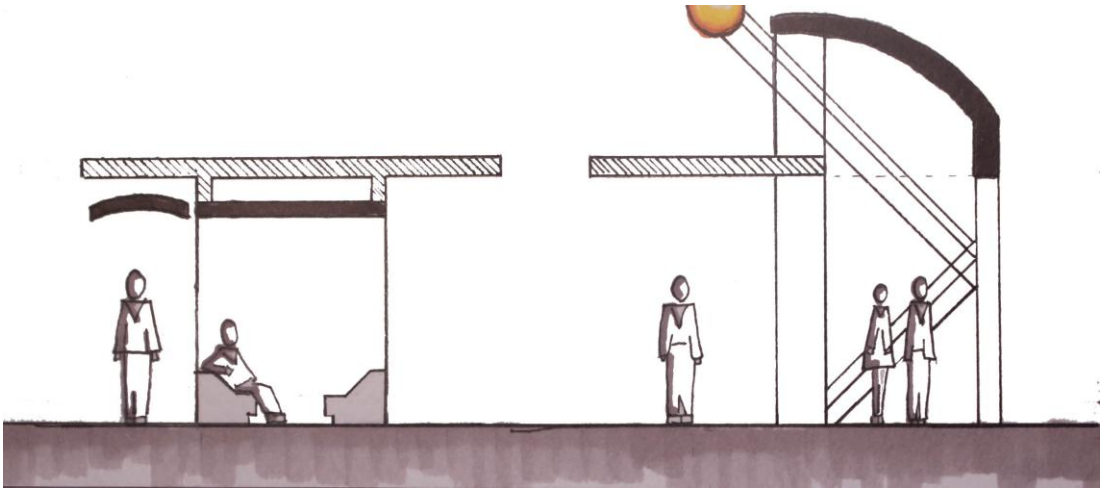


Figure 3.8: Ceiling Plane adapted from Ching, (2007)

- As illustrated in figure 3.10 if the base plane elevated or depressed by a change in level, the boundaries of the defined volume of space will be visually reinforced. Also by using contrast in the form, texture, and material of the ceiling plane can be manipulated to define and clearly mark a zone of space within a room. The ceiling plane can be lowered or elevated to change the scale of a space, defines a path of movement through it or allows natural light to enter it from above.

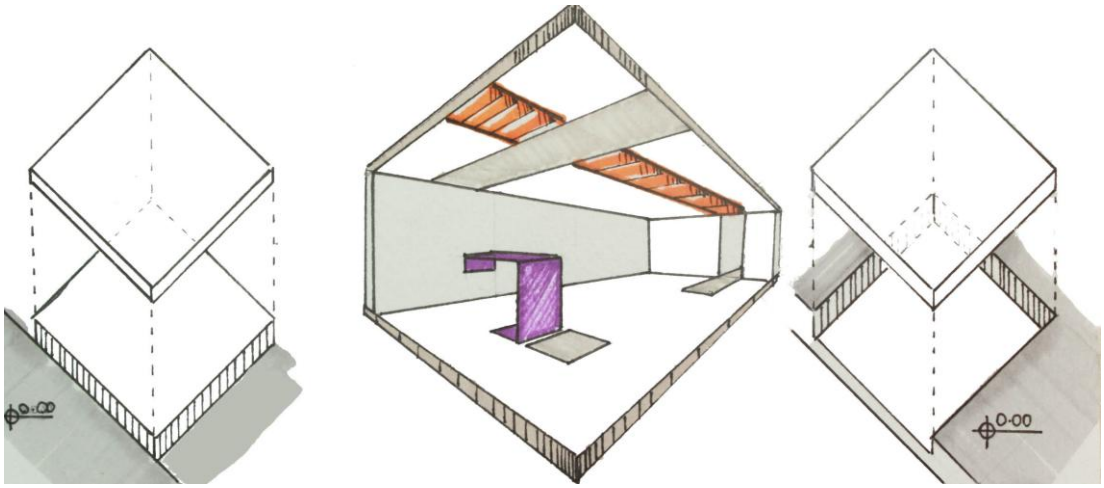


Figure 3.9: Ceiling Plane

2. Vertical element defining space

- As illustrated in figure 3.11 Vertical elements establish the visual limits of a spatial field. Horizontal planes define a field of space in which the vertical boundaries were indirectly suggested rather than clearly described (Ching, 2007; Meiss, 1998; Unwin, 1997).
- Vertical forms have a greater presence in our visual field than horizontal planes; therefore they are more useful in defining an individual volume of space and provide a sense of enclosure and privacy for those within it. Also they serve to separate one space from another.
- Vertical elements also play important roles in the construction of architectural forms and spaces. They serve structural supports for floor and roof plane. They protect the interior space from climatic elements and control the flow of air, heat and sound (Ching, 2007).

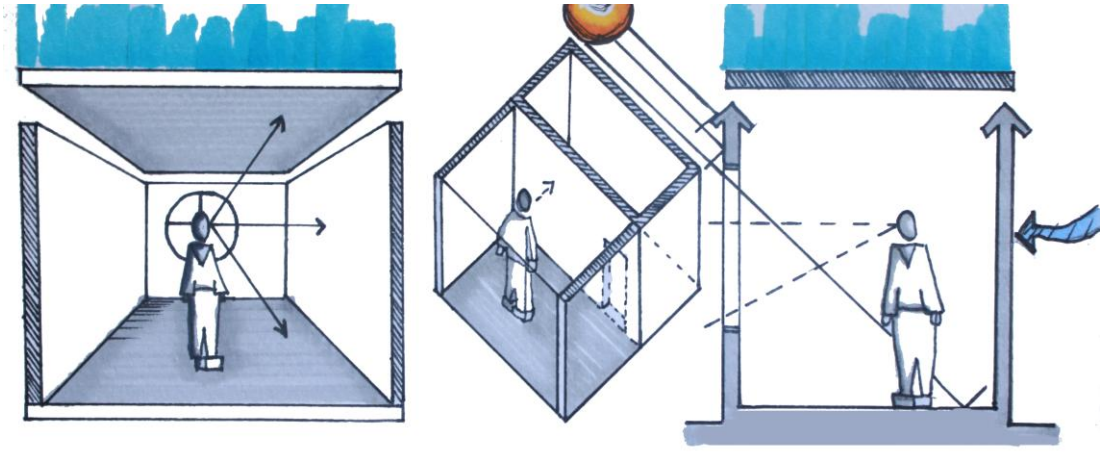


Figure 3.10: Vertical elements defining element adapted from Ching, (2007)

Wall plane

Vertical linear element

For the architects the space between the ground, wall and ceiling is the main aim of his/her activity to keep the space under control .The architect's mission is to create a form of space within walls limitation, where people are free to move (Meiss, 1998; Ching, 2007). The border which is created by walls leads us to move through the space. Also by introducing openings leads us from one space to the other.

- As illustrated in Figure 3.12 it defines the perpendicular edges of space .The edges of the volume of space can be visually reinforced by expressing its base plane by making contrast with using different material or texture and setting its limitation with beams spanning between the columns or with placing the overhead plane.

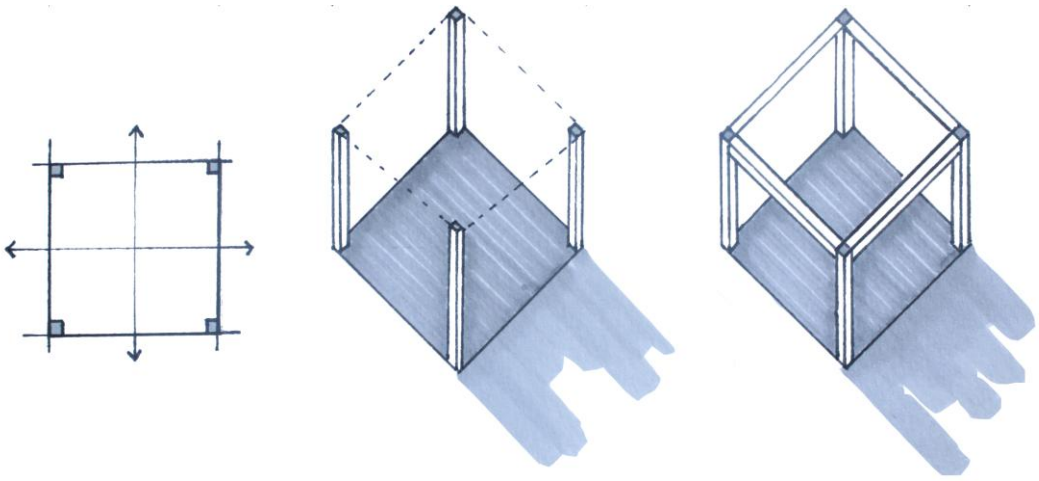


Figure 3.11: Vertical linear element defining space adapted from Ching, (2007)

- As illustrated in figure 3.13 by placing regular series of columns or similar linear elements can establish a transparent spatial layer by the visual tension between their columns that define an edge of a spatial volume while permitting visual and spatial continuity to exist between the space and its surrounding

(Meis, 1998).

- A row of columns can engage a wall and compose its surface to several distinct parts and changes the scale, rhythm and proportioning of its bays.
- A grid of columns within a large space emphasizes the spatial volume made of standardized units which can be assembled in different ways and establish a measurable rhythm and scale which make the spatial dimension understandable. Also it will bring order to the design (Ching, 2007).

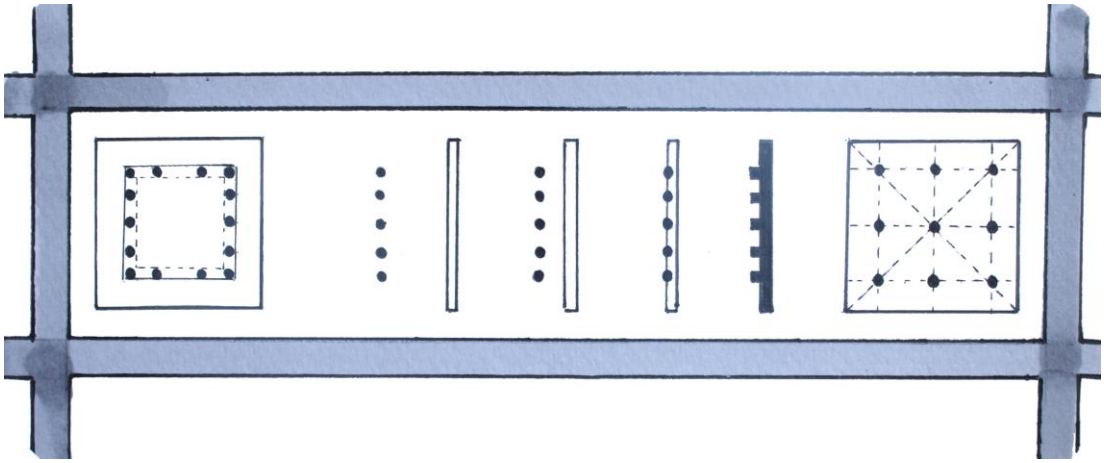


Figure 3.12: Linear vertical elements defining space adapted from Ching, (2007)

- As illustrated in figure 3.14 a column will create a spatial field about itself and interact with the spatial enclosure when a vertical linear element located within a defined volume of space. When a column attached to a wall it reinforces the plane and composes its surface to several distinct parts. A column defines zones of space within the enclosure, when it stands free in the field of a space. When centered in a space it will insist on itself and define equivalent zone of space with surrounding wall plane and create formal balance in space and terminate an axis and provide a focus. When offsetting the column it will define informal balance in space differentiated, by size, form and location of the column (Ching, 2007; Meiss, 1998).

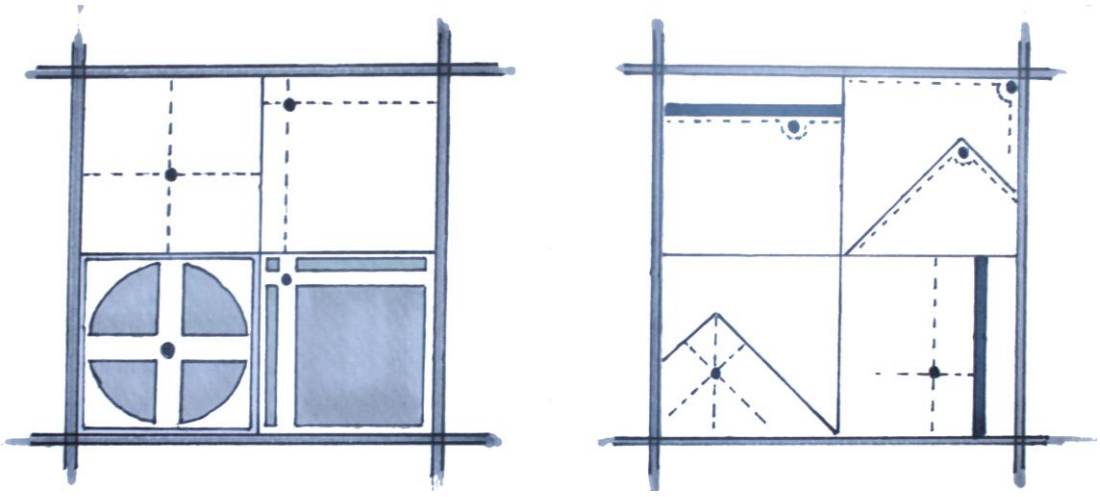


Figure 3.13: Linear vertical elements defining space

Single vertical plane

- As illustrated in figure 3.16 single vertical plane articulates the space on which it fronts and the space on which it fronts is not well defined unless the plane interacts with other elements such as single vertical plane or horizontal plane or by creating contrast by using different material or texture on its surface or the elements trying to reinforce it.

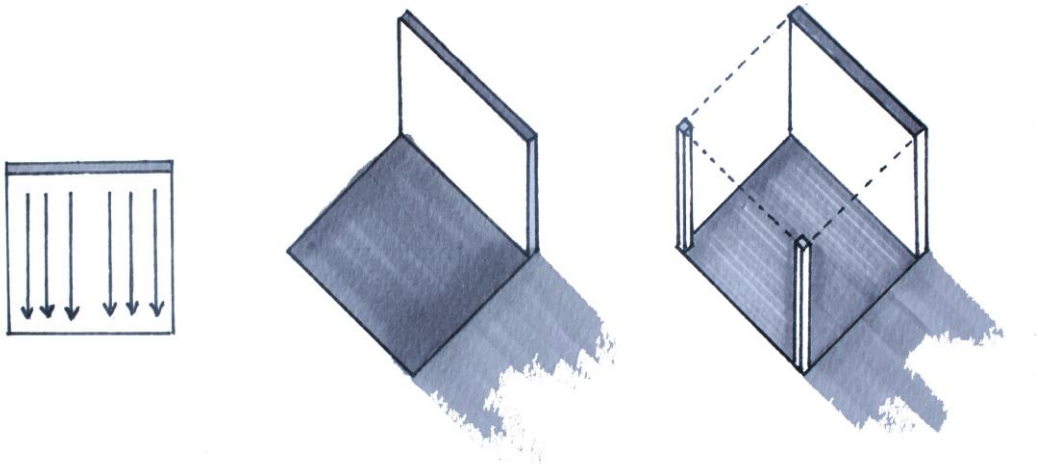


Figure 3.14: single vertical element defining space adapted from Ching, (2007)

- As illustrated in figure 3.15 the height of the vertical plane relative to human scale and the eyelevel is the critical factor that affects the ability of the plane to describe space visually. When plane is used as two feet high, it defines the edge

of a spatial field, yet supplies almost no sense of enclosure. But if it is waist-high it provides a sense of enclosure and visual continuity is available. When it comes up to the eye level it separates spaces. When it is over our height it interferes the visual and spatial continuity between spaces and gives a strong sense of enclosure (Meiss, 1998; Ching, 2007).

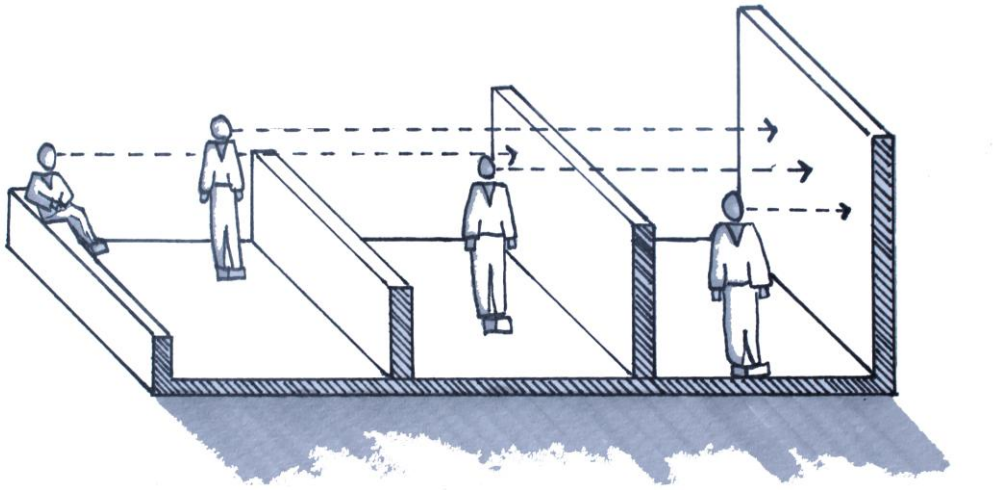


Figure 3.15: Single vertical element defining space adapted from Ching, (2007)

- As illustrated in figure 3.17 a vertical plane can be a fundamental face of that space and specify the orientation of it. It can front a space and define the entrance or can be a freestanding element in the field of a space and divide the volume of space into two separate spaces of related areas (Ching, 2007). As Meiss, (1998) refers to what Martin Heidegger expressed about the grandness of walls as "the walls are opposite our eyes. Their modulation, their texture and their ability to accept the display of messages, play a basic role in determining the character and atmosphere of the space" (Meiss, 1998)

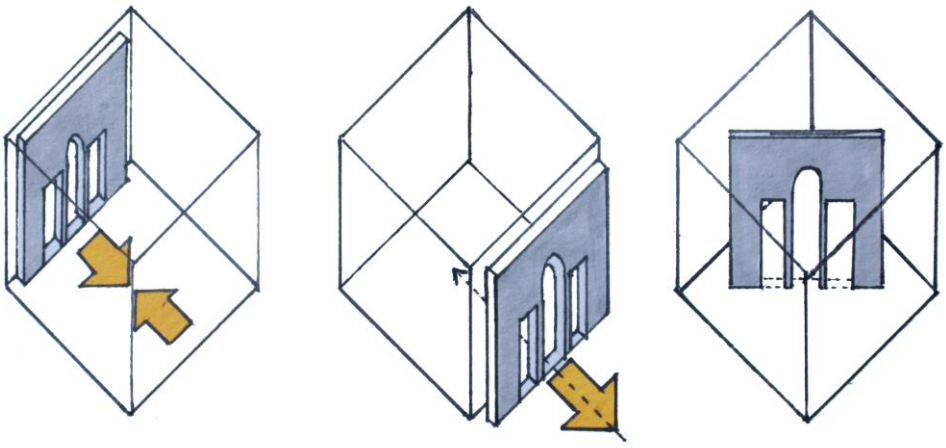


Figure 3.16: Single vertical element defining space adapted from Ching, (2007)

- As illustrated in figure 3.18 a single vertical plane which is standing separately in space has two identical axes, which divide a volume of space through its axes. It has a quality which is related to its front face. It's two surfaces front and back creates two separate spaces and distinct spatial fields. These two faces can be equal and front similar spaces or be different in form, material or texture to express different spaces. Therefore a vertical plane may have two fronts or a front and a back (Ching, 2007).

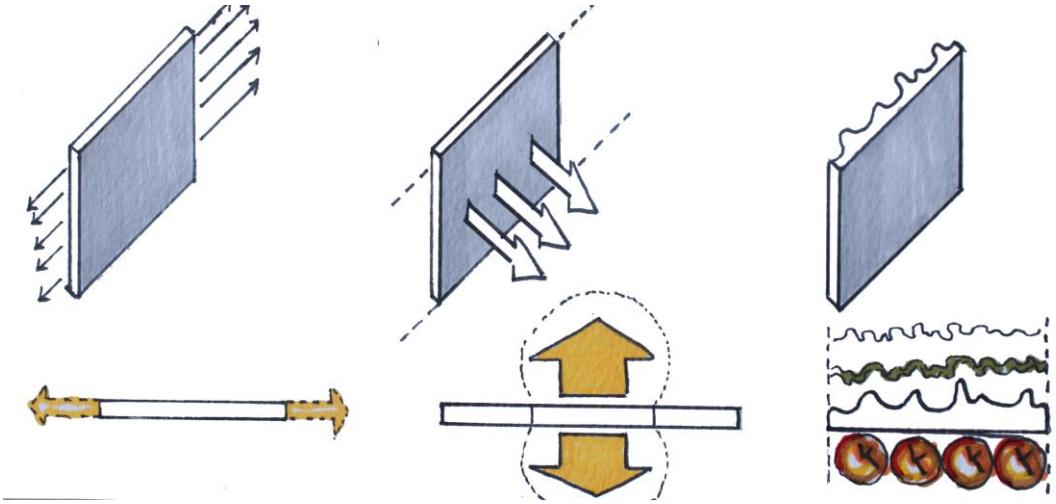


Figure 3.17: Single vertical element defining space adapted from Ching, (2007)

- Composition of vertical single plane cuts continuous quality of the space and creates an open plan of spaces that change with one another. The partitions never form a closed area.
- The surface material or texture of a plane affects our perception of its visual weight, scale and proportion.

L-shaped plane

- As illustrated in figure 3.19 L-shaped arrangement of elements creates a space which is outward from its corner along a diagonal axis. The created field of space is powerfully specified at the corner of arrangement of elements while it distributed as it gets far from the corner. Introverted field of space becomes extroverted along outer edges. The edges, which have not been defined by the vertical planes, remain unclear unless a linear vertical element added or controlled by base plane (different texture or material) or an overhead plane placed on top.

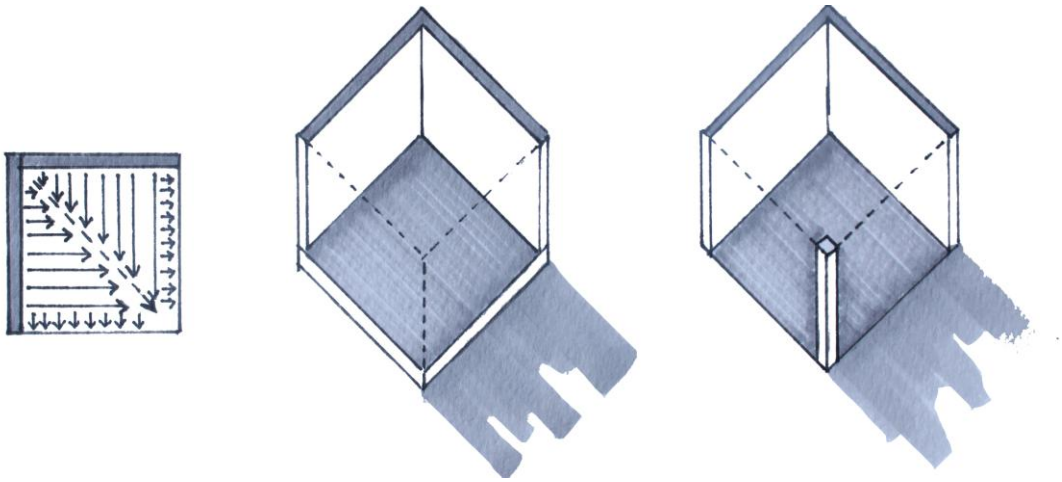


Figure 3.18: L-shape elements defining space adapted from Ching, (2007)

- As illustrated in figure 3.20 if a void introduced to one side of the arrangement of the elements corner the definition of the space will be weakened and one

plane will control the other. If neither plane reaches to the corners, the field of space will become more active and order itself along the diagonal of the arrangement of elements.

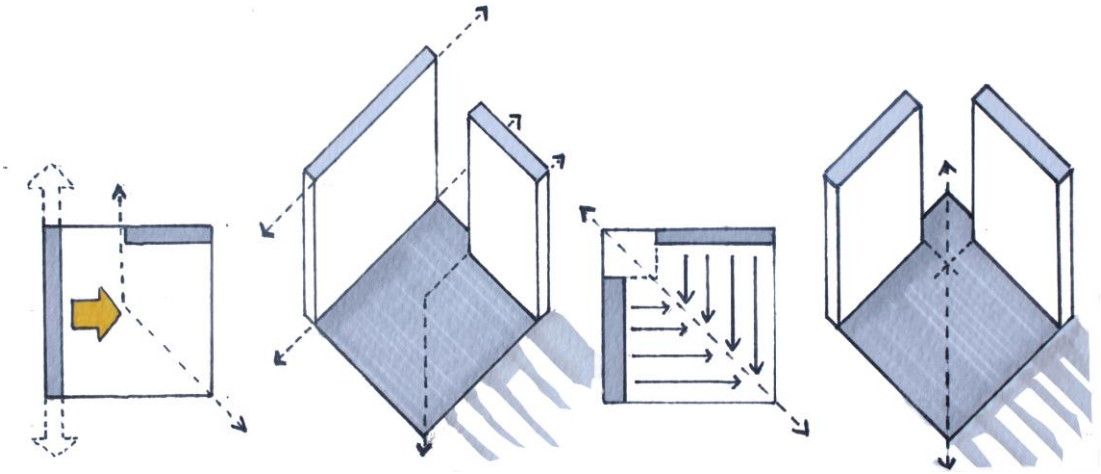


Figure 3.19: L-shape elements defining space adapted from Ching, (2007)

- As illustrated in figure 3.21 in L-shaped arrangement of elements the planes are dependable and self-supporting so they are able to remain alone in space. As their end is open they are elastic space defining elements. It can be used in combination with other elements and define a rich variety of spaces. As we can see in figure (a) bellow if they are repeated next to each other order and rhythm will be achieved. In figure (b) by making differences in ground floor of the space which is created by the L-shaped configuration different, spaces are achieved. In figure(c) the arrangement of the L-shaped plane defines a path of movement and creates with different semi private spaces. In figure (d) arrangement of L-shaped configuration make a common area between each other.

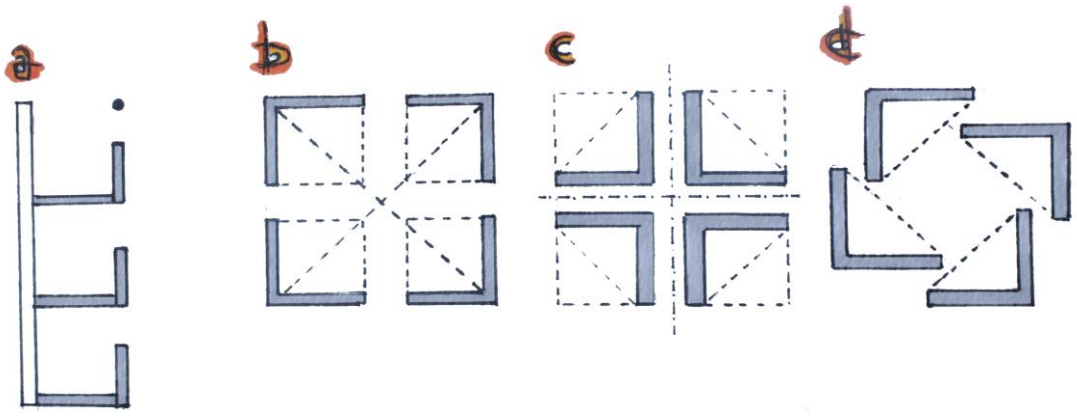


Figure 3.20: L-shape elements defining space adapted from Ching, (2007)

- As illustrated in figure 3.22 a corner of the L-shaped configuration can have different shape to define a special space.

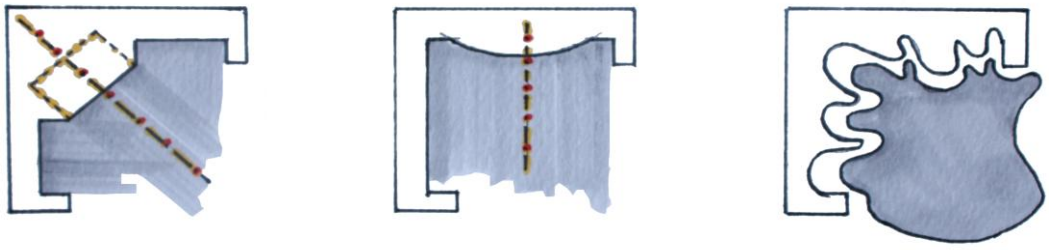


Figure 3.21: L-shape elements defining space

Parallel planes

- As illustrated in Figure 3.23 parallel arrangements of elements of vertical planes define a volume of space between them that is oriented on an axis toward both open ends of the configuration. The edge of the planes, base the field with open ends which creates a strong directional quality for the space. Balance is created as the primary orientation along the axis of the planes is symmetrical. As the planes do not meet and the space is not closed completely the space is extroverted. The spatial field strengthened visually by controlling

the base plane or adding overhead plane to the composition (Ching, 2007).

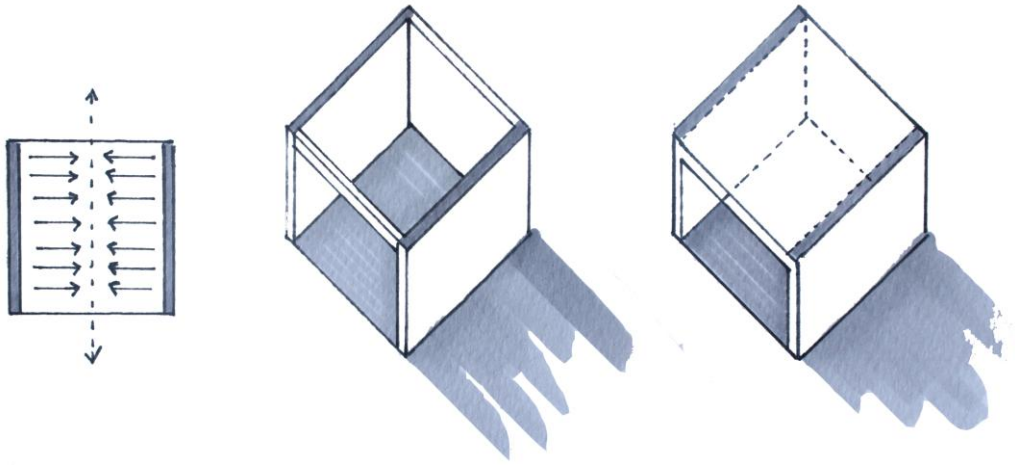


Figure 3.22: Parallel elements defining space adapted from Ching, (2007)

As Unwin, (1997) states “in many buildings, space is organized using parallel walls”, this is based on the use of two straight parallel walls until this day by one of the most ancient architecture (Unwin, 1997).

- As illustrated in figure 3.24 by making a change in form, material, texture or addition of light to the parallel planes a secondary axis which is perpendicular to the primary movement will be found in space. Also opening in one or both planes can introduce the secondary axis to the field and control the directional quality of the space (Ching, 2007).

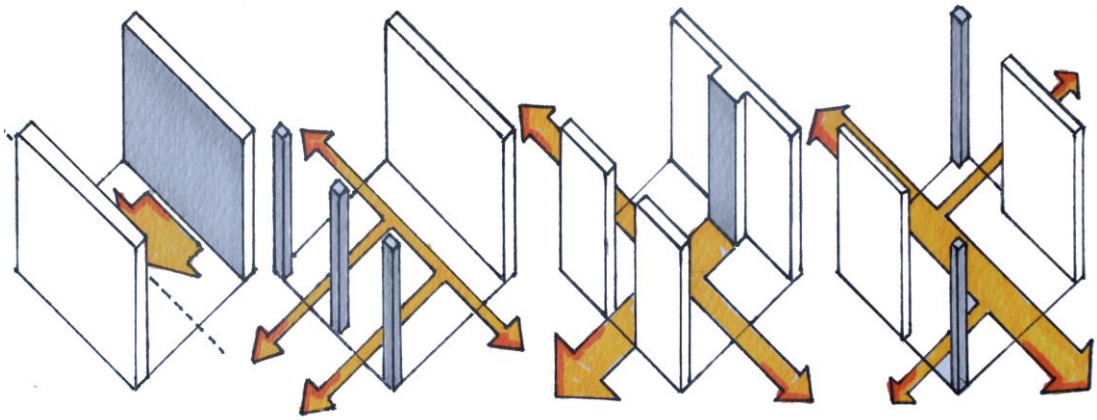


Figure 3.23: Parallel elements defining space adapted from Ching, (2007)

- As illustrate figure 3.25 the extension of the base plan through the open end of the configuration can broad the spatial field .This field can be discontinued by a vertical plane with the same height.

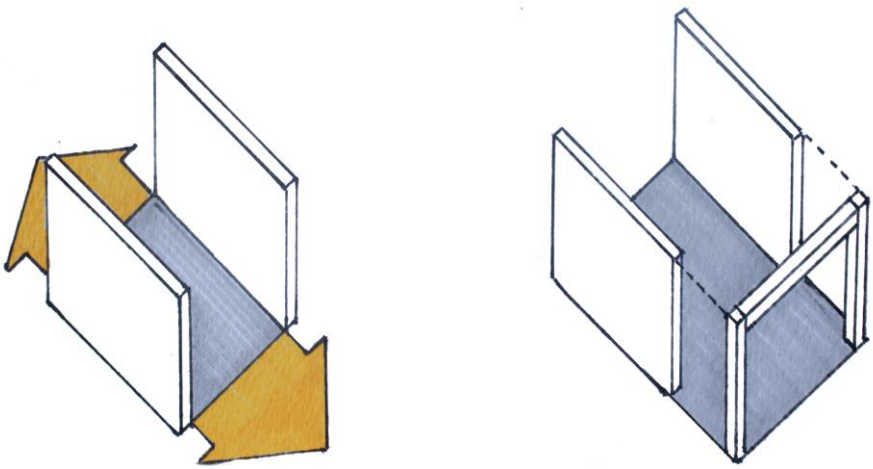


Figure 3.24: Parallel elements defining space adapted from Ching, (2007)

- As illustrated in figure 3.26 (a) arrangement of parallel vertical planes could transform into a broad kind of configuration. The spatial field would be related to each other either through the open ends or by openings in planes, which brings harmony and order to the space. As we can see in figure (b) a space defined by parallel planes created a path of movement along its corridors, halls and galleries and keep different parts of design in relation to each other and bring unity, order and harmony. The parallel planes which make movement would create a private space by their solid characteristic. Also a plane can be set up by a row of columns and create order so that the circulation path, opens on one or both of its side so it becomes parts of the spaces it passes through (Ching, 2007).

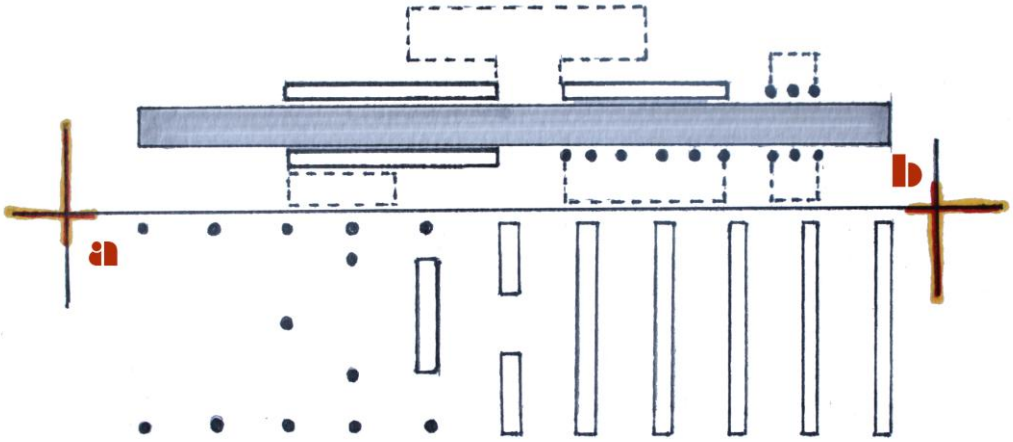


Figure 3.25: Parallel elements defining space

- As illustrated in figure 3.27 the picture of parallel vertical planes is frequently related to the load bearing-wall structure system, where the spaces created between parallel load-bearing walls.
- The parallel vertical planes of a bearing wall structural system are the cause to form and organize a building. Introducing openings to the planes to create larger spaces can change their repetitive pattern. These openings can also clarify circulation paths and set up visual relationships perpendicular to the wall planes (Unwin, 1997; Ching, 2007).

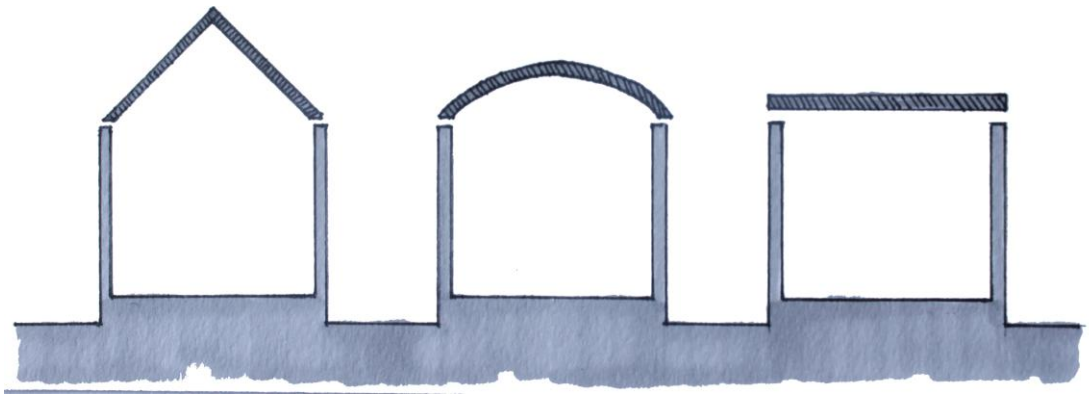


Figure 3.26: Parallel elements defining space adapted from Ching, (2007)

U-shaped plane

- As illustrated in figure 2.39 U-shaped arrangements of elements of vertical planes defines a volume of space that is oriented toward the open end of the configuration. It has a focus toward the inside and orientation toward the outside. Toward the open end of it the field becomes extroverted. If the opening side is more specified with columns or overhead plane, then the definition of the original space will be reinforced and continuity with the attached space will be interrupted (Ching, 2007).

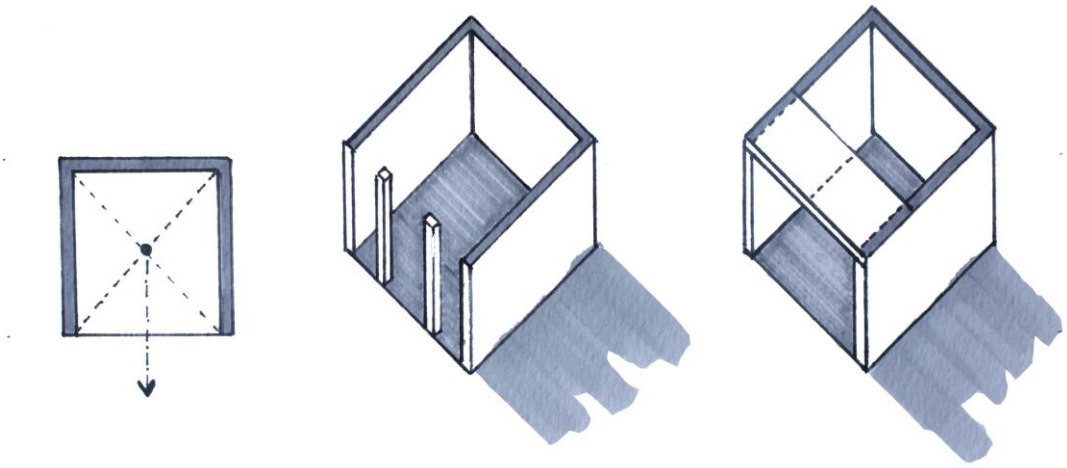


Figure 3.27: U-shaped elements defining space adapted from Ching, (2007)

- As illustrated in figure 2.40 a secondary space is created inside of the multi directional and active space when openings have been introduced at the corner of the configuration. But if the entrance to the space is through the open end, the elevated plane that is situated in front of it will interrupt our view to the space. If the opening is on one of the planes, the view of what situated beyond the open end will take our attention and end the order (Ching, 2007).

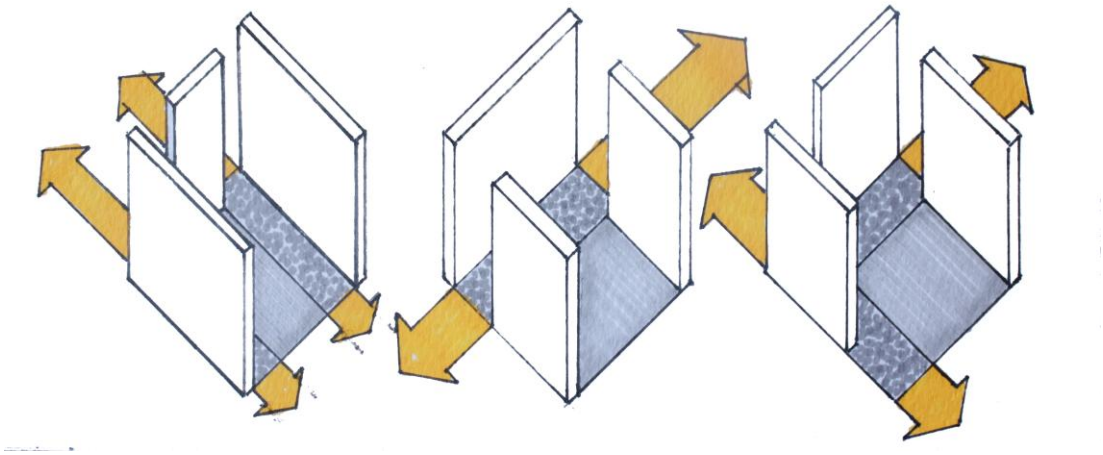


Figure 3.28: U-shape elements defining space adapted from Ching, (2007)

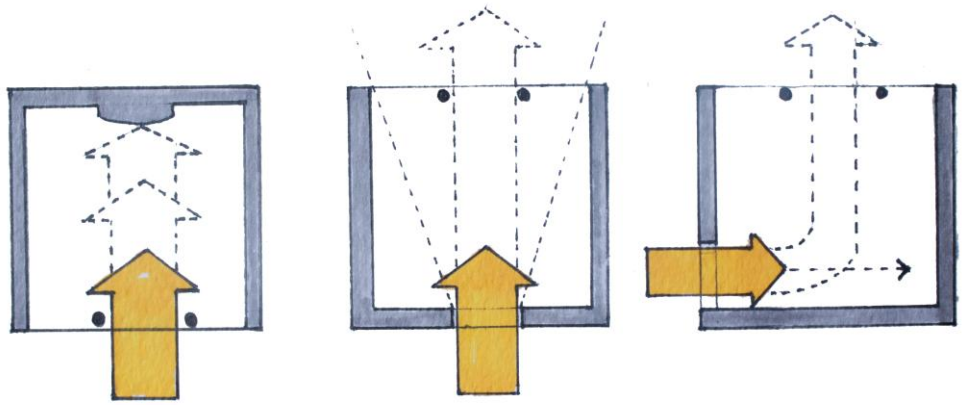


Figure 3.29: U-shape elements defining space adapted from Ching, (2007)

- As illustrated in figure 2.41 the open end is the fundamental direction of the arrangement of element. It permits the space to have visual and spatial continuity with the space which attached to it. If the base plane continues further on the open end the spatial field with the attached space will be reinforced (Ching, 2007).

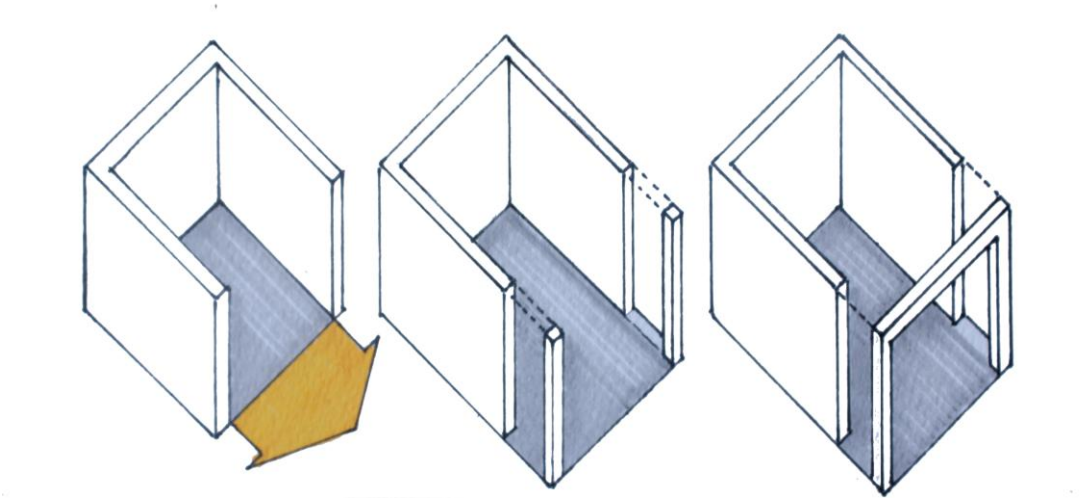


Figure 3.30: U-shape elements defining space adapted from Ching, (2007)

- As illustrated in figure 2.42 when the arrangement of elements is rectangular shape and enclosed, the open end can be in the direction of its narrow or wide side. In both cases, the open end will maintain as the main face of the space. The plane toward the open end will be the fundamental element between the other three planes. In case the end of the narrow field is open the space will inspire movement. While the arrangement of elements creates a square, the space will be still. If the long surface is open the space will be divided into number of zones (Ching, 2007).

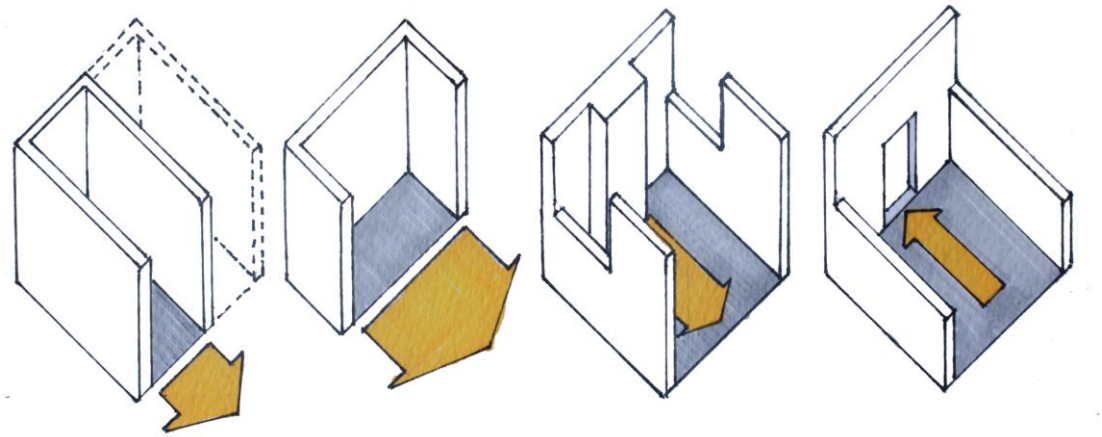


Figure 3.31: Parallel elements defining space adapted from Ching, (2007)

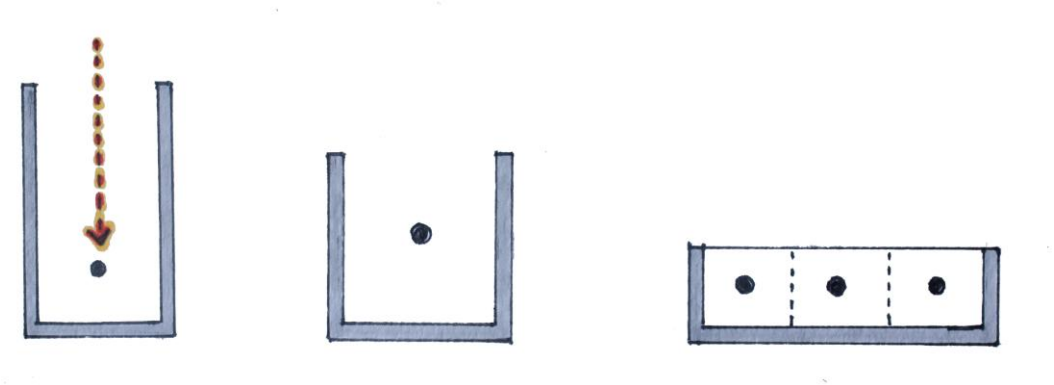


Figure 3.32: Parallel elements defining space

- U-shaped enclosure of interior space creates an introverted organization which has a unique orientation toward the open ends.

Four planes: Closure

- As illustrated in figure 2.43 closure arrangements of elements of vertical planes establish the boundaries of an introverted space and influence the field of space around the enclosure. It has the strongest spatial definition in architecture. As the field is entirely enclosed, the space is introverted. If one of the planes differentiates in its form, material or texture or by making an opening the visual dominance within a space will be achieved by contrast (Ching, 2007).

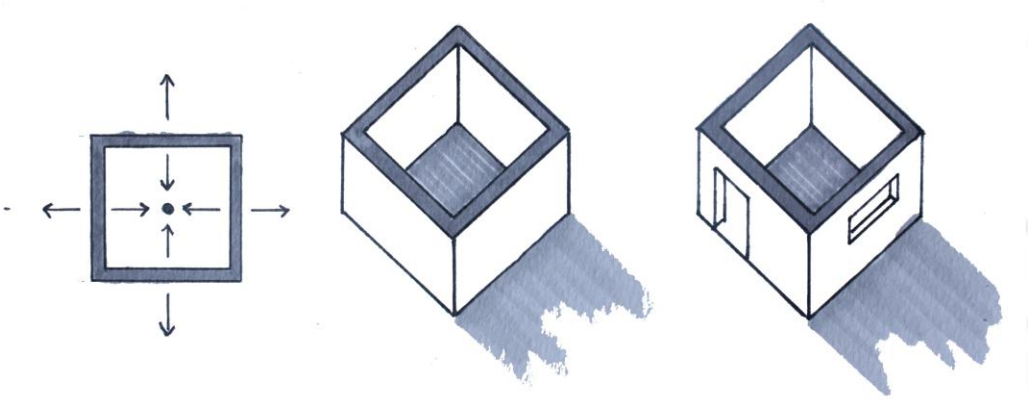


Figure 3.33: Four plane elements defining space adapted from Ching, (2007)

- There would be no Spatial or visual continuity with other attached spaces without any openings in the planes. As Ching, (2007) stated doors offer entry into the space and determine the pattern of movement and use within it. They give the space direction and meaning (Krier, 1988). Windows allow light to enter the space and illuminate the surface of the elements to offer view and establish visual relationships between spaces near to each other. As long as these openings provide continuity, the size and number and location of the opening can weaken the enclosure of the space (Meiss, 1998).

  Openings affect the quality of orientation, light, pattern and movement of the space. Nature of the openings within a space is a major factor in determining the quality of its space. Combination of all these technical elements into one, make the space become observable. It can be defined according to its size, proportion (relationship between length, height and width) and shape (Krier, 1988).

  According to this information elements defining space, arrangement of elements and design principles identify the interior space characteristics. Mentioned three elements are necessary to able the designer to analyze the interior space.

  In the next chapter the chosen historic warehouses as a case study have been evaluated according to these elements.

Chapter 4

THE ASSESSMENT OF SPACE CHARACTERISTICS IN RE-FUNCTIONED HISTORIC WAREHOUSES IN LIMAN ROAD, WALLED CITY, FAMAGUSTA

4.1 Approach to prepare inventories and analysis of interior space of historic warehouses in Liman road

As interior architecture, interior design and building reuse they are all disciplines that deal with the development and design of interior space. So the designer will convert the space for the new use. This process requires an understanding of the interior space characteristics in the existing building, while at the same time combining with the functional requirements of new users. An interior architect's responsibility is redesigning so, it's important to analyze and understand the existing buildings and the new proposed spaces (Brooker&Stone, 2007).

So the interior architect should identify the interior visual aspects-spaces, finishes and structure of the existing building by analyzing elements which defines space, arrangement of elements and design principles. The historic warehouses have been chosen as they have been re-used recently. In some warehouses the re-use process has caused inappropriate changes to the interior space characteristics. Since these warehouses are situated in Liman road, walled city, North Cyprus which puts them in the category of historic monuments that should be preserved for the next generation. It might be true that warehouses are not as important as other historic buildings such as churches but it can be re-used instead of destroying and rebuilding new ones.

So to prevent this, warehouses have been analyzed closely to accomplish what has been left over from the historic part of them. Interior space analyzed according to the elements defining space, arrangement of elements and design principles which have been explained in literature survey.

In this study 11 warehouses in Liman road the walled city of Famagusta have been studied by analyzing and taking photos. Visual observation by drawing schematic sketched plans, sections and isometrics has been done (drawings are not in scale).

Each warehouse has been analyzed in three different inventories. Each inventory is structured in two parts; original state and re-used state.

1. The first prepared inventory is to present the analyses of elements defining space (plane, material, texture, light, and object) which is divided into three main parts: a) First part presents horizontal elements which are base plane (floor), overhead plane (roof), the material and the texture used to cover or built are sketched, in a plan; b). Second parts presents vertical elements (wall, column, arch), the material and the texture used to cover or built are sketched, in two different sections. c) Third part presents the amount of artificial and natural light that the space achieves. The location of where the natural light enters to the interior space and the artificial light installed are sketched, in a plan and a section. Also if an object is inserted in to the interior space it will be mentioned.
2. Second inventory is prepared to present the analysis of arrangement of elements divided into two parts: a) First part presents the spatial definition of space created by the arrangement of elements. The sketches show the

direction of the orientation in interior space from entrance, individual spaces and their relationship to each other. b) Second part presents visual definition of space by the relationship of arrangement of elements to human eye level.

3. Third inventory is prepared to present the analyses of design principles, which are divided in three parts: a) First part presents the spaces created by the organization of the horizontal and vertical elements and the central axis is sketched to discover balance in space. b) Second part shows the organization of all elements in interior space to discover dominance and contrast. Also the relation in size between height and width of the elements is presented by arrows to discover proportion; b). In third part a complete plan and isometric are sketched to see the organization as a whole to discover harmony, order and unity.

The further explanation will be given including the comparison and assessment of the space quality of warehouses in Liman road in the walled-city, Famagusta. It wasn't easy to identify the visual characteristics of the historic warehouses before re-use as there is not much information registered. Therefore information about its history and condition before adaptive re-use has been collected from the local people who rented these warehouses. As the original drawings do not exist and because of limitation by the owners for observation of the interior spaces the drawings have been sketched schematically and are not in scale.

4.2 History and General Information of the Historic Warehouses, Liman Road, Walled City, Famagusta

As these warehouses are situated in Cyprus, so this island should be studied briefly first. Cyprus is one of the greatest islands in Mediterranean Sea. It is known as a significant place by historians as the whole island is full of historical monuments.

The aim of this chapter is to analyze the quality of interior spaces of the warehouses in Liman road, which is situated in the walled city of Famagusta.

The walled city of Famagusta is situated in the eastern part of the Mesaoria. At the beginning of the 13th century because of its commercial interaction between the west and the east, the walled city of Famagusta was very arrogant (Enlart, 1987).

The walled city has always been a significant business origin for Famagusta, because it is based on the sea and has a perfect harbour for commercial interaction.

Figure 4.1: Cyprus Map (URL22, 2012)

The walled city of Famagusta has enormous capability in architectural heritage. Because of its magnificent long history and as many various civilizations crossed through this small city and leaving their own unique marks on it.

These warehouses, which are located in Liman road in the walled city of Famagusta are built in British period (1878-1960) but have kept their Ottoman architectural style by arches as they are supposed to give back to Ottomans. At present these warehouses are private property which belong to Kemal Reis Company Ltd and rented by locals to be used as stores. They were used as storage for the custom in the past. After 1963 because of the problems in Cyprus some of them were used as jail, some as soldiers' hostel and some were left empty.

Some of these warehouses in the walled-city Famagusta have been reused. Some of them were successfully re-used but some not. These warehouses according to current use are listed as follows:

1. Warehouse NO 1: Retail (Burberry Nalken)
2. Warehouse NO 2: Retail (Estetik)
3. Warehouse NO 3: Retail (The Walls)
4. Warehouse NO 4: Retail (Champion Inn)
5. Warehouse NO 5: Retail (The original Store)
6. Warehouse NO 6: Retail (Rapid)
7. Warehouse NO 7: Club (Bailer house club)
8. Warehouse NO 8: Club (Bailer house club)
9. Warehouse NO 9: Retail (The Lal)
10. Warehouse NO 10: Super market (Norol Market)
11. Warehouse NO 11: Super market (Norol Market)

Figure 4.2: Warehouses in Liman road, the walled city, Famagusta

Figure 4.3: Warehouses in Liman road, walled city Famagusta map (URL24, 2012)

Most of these 11 warehouses have been re-used mostly as retail store and a club and a market. In most of them the historic visual characteristics have been covered or destroyed. The thesis will evaluate the interior space characteristics of original and re-used state of these warehouses. To obtain what caused inappropriate changes in interior space characteristic after re-use process. Therefore each warehouse will be analyzed according to analysis criteria which have been defined in the literature survey.

4.3 Adaptive Re-use of Warehouses in Liman road, walled city

Warehouses located in Liman road, walled city are built by the British in 20th century. In order to have effective and efficient conversion, conditions of interior visual aspect-spaces, features and finishes of mentioned warehouses should be investigated for demolition and alteration. Interior visual aspects for mentioned warehouses built in 20th century are listed below:

- Load bearing system
- Pitched roof built by timber material and covered by ceramic tiles
- High height
- Two small windows on northern and southern side of the building
- Massive opening of southern side of the building
- Walls covered with lime stone.
- Single story space
- Division of space by Arches
- Materials of floors are altered completely
- Rectangular form
- Designed and constructed to minimal thermal standard
- Composed of a group of attached buildings
- Single storey area with generous floor to ceiling heights
- Capacity of the Load-bearing system may need to be increased to suit new use or arrange additional mezzanine floor.
- Higher level of new uses than other type of buildings

Table 4.1: Elements Defining Space Analysis of Warehouse NO.1

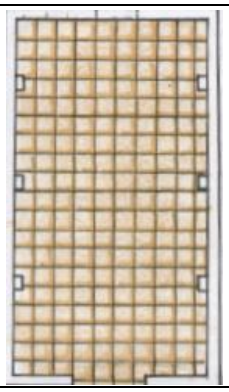
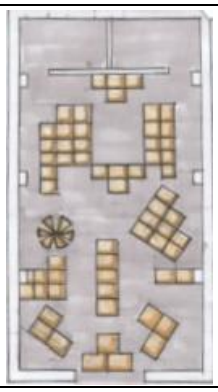
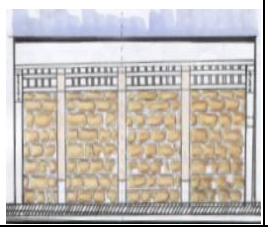
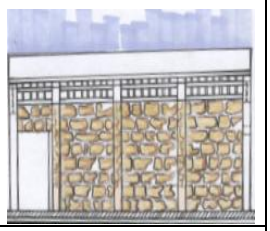
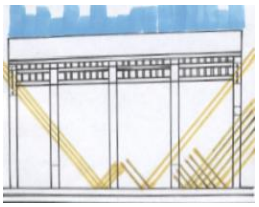
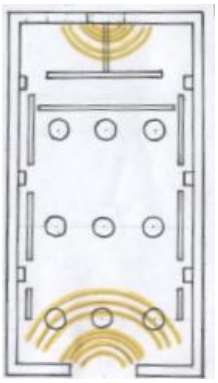
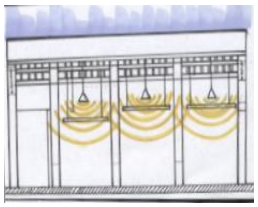
W_1	Elements Defining Space Analysis of Warehouse NO.1			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail store	
	Horizontal elements defining space with Material, Texture, Object			
Elements Defining Space	Base Plane	Overhead Plan	Base Plane	Overhead Plane
				
	Vertical elements defining space with Material, Texture, Object			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.2: Arrangement of elements Analysis of Warehouse NO.1

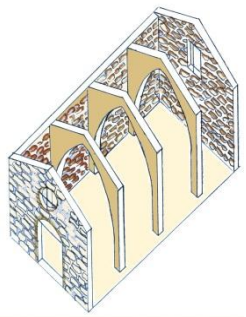
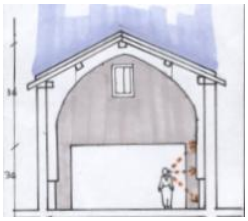
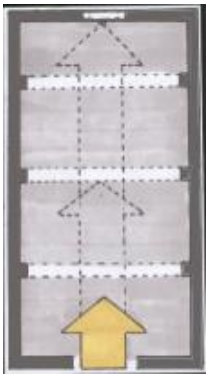
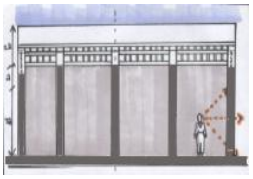
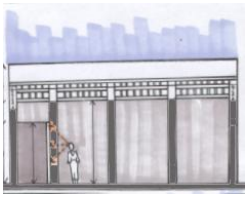
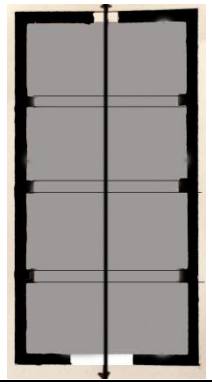
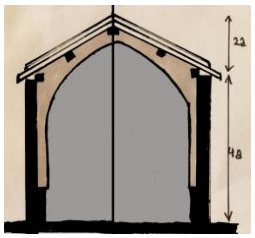
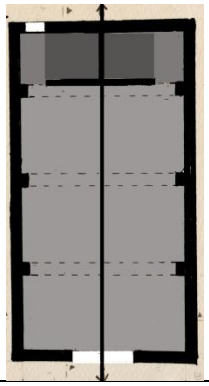
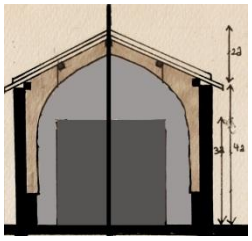
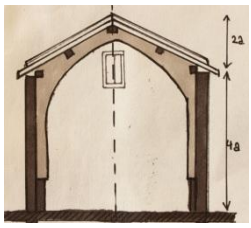
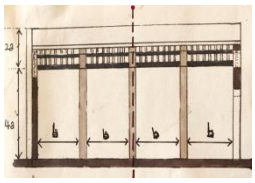
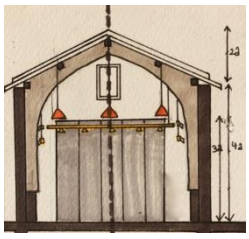
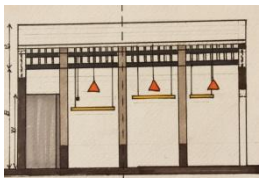
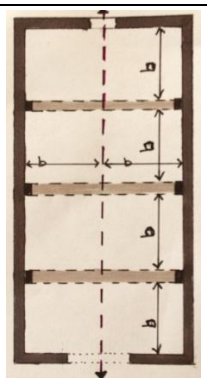
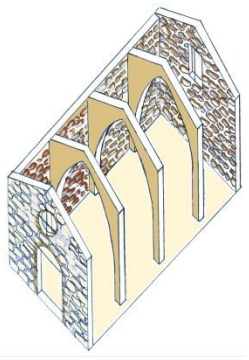
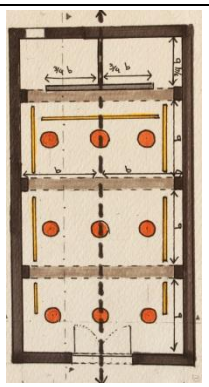
W_1	Arrangement of elements Analysis of Warehouse NO.1			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.3: Design Principle Analysis of Warehouse NO.1

	Design Principle Analysis of Warehouse NO.1	
W_1	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm is created through the repetition of arches and columns/Formal balance created through the central axis
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by locating an object through the main opening/Contrast created by adding a different massive object/used the same proportion between elements
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony is achieved as all elements works harmoniously together/there is a logical order between existed and new elements/Unity is achieved as there is harmony
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 1: Retail Store (Burberry Nalken)

Warehouse NO1 has been re-used as a retail store. Original state of the warehouse is represented on the left side of the inventories. Comparing to the original horizontal elements (floor, roof) of the re-used state of the surface material and texture of the base plane (floor) has been changed with cement and the original tile covering material, which is located in some parts and has created a different orientation and texture in space. The pitched overhead plane has preserved its longitudinal beam elements but the transverse beam elements covered with wooden board and plaster are different to the original state. In original state the regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam and transvers beam elements. Comparing the original vertical elements to the re-used, surface material and its texture of the wall plane and linear elements such as columns and arches has been preserved. Comparison of both states showed that on the west wall plane, an opening was introduced to join warehouse NO1 to warehouse NO2 which was closed with the same lime stone material. Comparing the original state to the re-used state, a door opening was introduced to the wall plane on the north side. Artificial lighting elements suspended from the overhead plane on west and east side of the space near to the wall plane are used to illuminate the surface of the wall plane. Also three lighting elements are suspended from the overhead plane in three rows in a logical proportion. Thus the addition of lighting elements through the central axes reinforced the brightening the dark inner spaces as there are only two small windows existing for natural light. Also the addition of lighting elements on each side of the warehouse near to the wall was helpful for displaying the products.

The original space was created by parallel arrangement of the elements (load bearing walls). The re-used state used the same arrangement just two L-shaped arrangement of elements are added on the north side to create two private spaces (changing room, storage). Also a single vertical wall plane is located on the north side of the warehouse in front of the entrance. Comparing to the original state the addition of the vertical arrangement of elements has created the same orientation except on the part which the opening introduced to the north wall plane.

Comparing the re-used state of the warehouse to the original state explains that it used the same proportional order between the height and width of elements and the distance between the columns to create new spaces in most parts. Formal balance created through the central axis is the same as the original. The original rhythm and repetition of arches and columns preserved. Contrast is created by covering the added single wall plane with different material compared to the original material. The arrangements of lighting elements are in a way that it illuminates the single wall plane and takes the attention of the customers. As the original state didn't have any contrast so, creating contrast makes the space interesting. Elements situated or repeated in continuous manner and made each other complete the same as the original warehouse. Therefore the harmony is achieved through repetition of the same limestone material and arches.

In original state the arrangement of linear elements (columns and arches) are in logical proportion in size, height, width and distance between their arrangements. Re-used state maintained and used the same order of the original state to create new spaces. In the north space the L-shaped arrangement with single wall plane created a semi private space. An opening in the north wall plane and arrangement of material

on base plane changed the space orientation definition. The added light elements strengthened the lack of light in original space. Therefore the visual characteristic is almost the same as the original warehouse and the spatial definition changed its orientation. Thus unity is almost achieved in all parts of the composition.

New added element and the existed element work harmoniously together as a whole. Therefore the addition and subtraction did not change the interior space characteristics of the original state completely.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job, shading elements added and advertisement boards installed on each side of the entrance. Therefore the façade of the building does not represent the interior space characteristics.

Table 4.4: Elements Defining Space Analysis of Warehouse NO.2

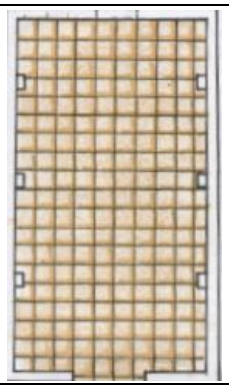
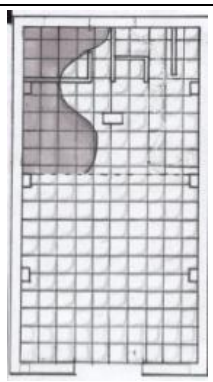
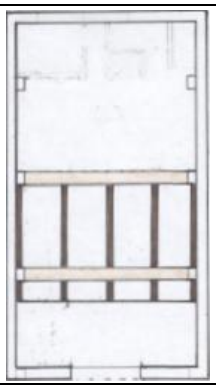
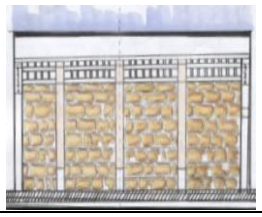
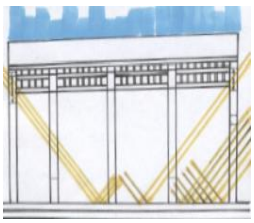
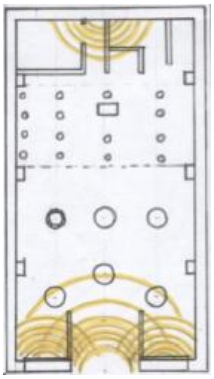
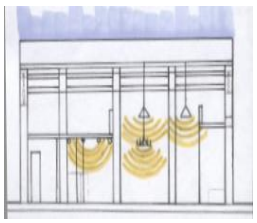
W_2	Elements Defining Space Analysis of Warehouse NO.2			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail store	
	Horizontal elements defining space with Material, Texture, Object			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Vertical elements defining space with Material, Texture, Object			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.5: Arrangement of elements Analysis of Warehouse NO.2

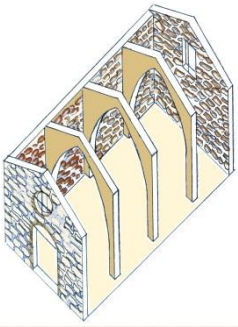
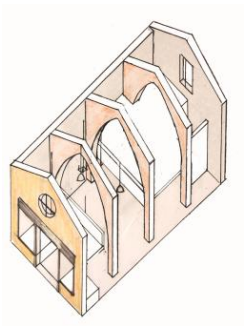
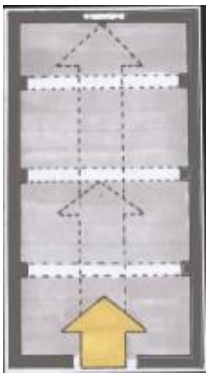
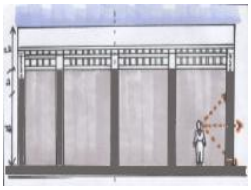
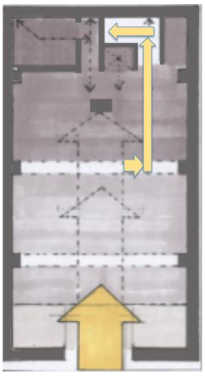
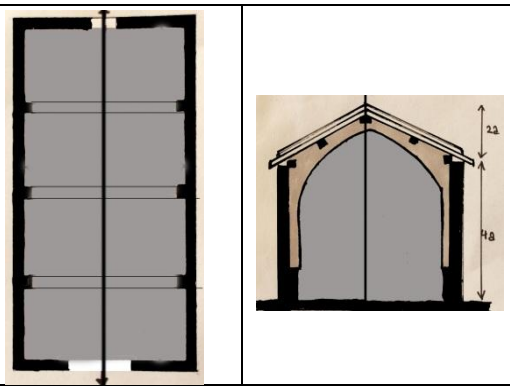
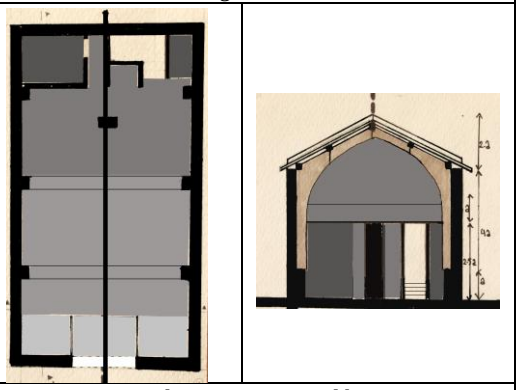
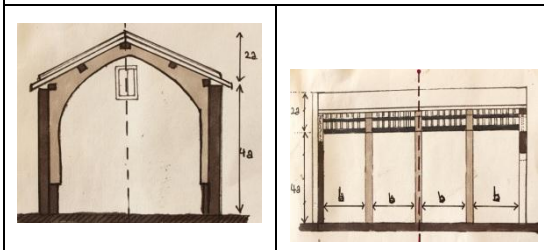
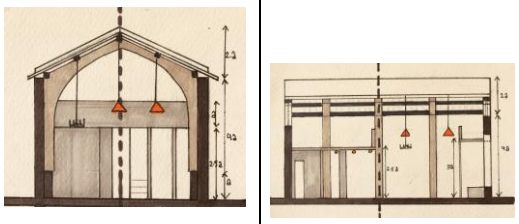
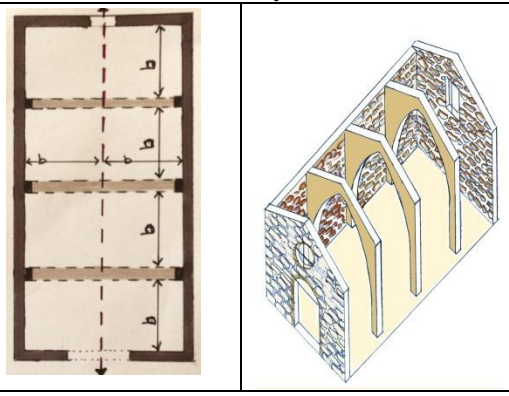
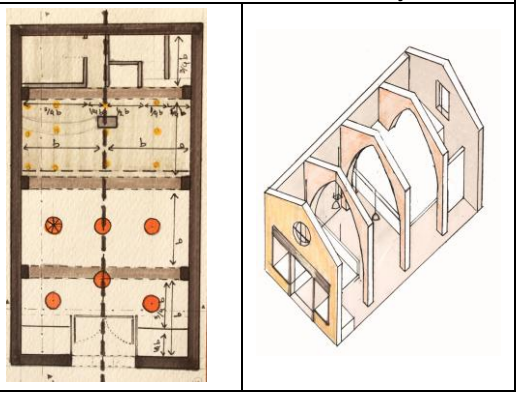
W_2	Arrangement of elements Analysis of Warehouse NO.2			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.6: Design Principle Analysis of Warehouse NO.2

W_2	Design Principle Analysis of Warehouse NO.2	
	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm which was created through the repetition of arches and columns is changed/Informal balance created through the central axis
		
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	In appropriate dominance created by creating a mezzanine through the main opening/Contrast does not exist/used the same proportion between elements
		
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony did not achieve as all elements does not work harmoniously together/there is not a logical order between existed and new elements/Unity did not achieve as there is no harmony
		

Comparing the interior space of original state and re-used state of warehouse NO 2: Retail (Estetik)

Warehouse NO2 has been re-used as a retail store. The original state is represented on the left side of the inventories. Comparing original horizontal elements (floor, roof) to the re-used, the surface material and texture of the base plane has been changed completely with ceramic tile material. On the north side of the warehouse a second space is created by elevating the base plane which is covered with timber material and different texture. The pitched overhead plane has preserved its structure and longitudinal elements but the transverse elements are covered with boards which created a different texture comparing to the original. As in original state a regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam and transvers beam elements. On the north and south side a flat ceiling (overhead plane) is created by elevating the base plane which created mezzanine. Comparing the original to the re-used vertical elements, the surface material and texture of the wall plane and linear elements (columns, arches) have been changed completely. Arches got different texture by using rectangular cubic material. Walls are covered except the middle of the east wall plane which has been altered by introducing an opening to attach warehouse NO1 to warehouse NO2. This was filled with the same limestone of original state. Comparison of both states showed that on the south side, the wall plane, which introduces the entrance to the space, is altered by introducing two windows on each side of the main entrance. It affected the amount of natural light entering in the space. This brightened the dark space of the original space. Artificial lighting elements are suspended from the roof plane and the added elevated base plane to illuminate the north and middle side of the warehouse. However the

elevated base plane on the north side causes to create a darker space and needs to be reinforced by more addition of artificial lighting elements.

Original space was created by parallel arrangement of the elements (load bearing walls) with entrance on south side of the warehouse. While in re-used state different spaces were created by parallel arrangement. On north side a private space (changing room) is created on the corner and in the middle the staircase to reach the top of the elevated base plane. Also a small narrow corridor to reach to the private space (rest room) is created by L-shaped arrangement and an opening is introduced at the end of one of the wall planes. Also a single linear (column) element is situated next to the north side wall plane to support the mezzanine, which has created a complicated space with other added elements. On the south side of the warehouse an open space is created by elevating the base plane which does not have access to reach the top. Comparing to the original state the addition of the horizontal and vertical arrangement of elements and alteration and addition of new openings has changed the orientation. Comparison shows that on south and north side of the re-used state of the warehouse, the base plane has been elevated and altered the height of the building. Visibility to arches is possible unless standing under the elevated base plane.

Comparing the re-used warehouse to the original warehouse explains that the same proportional size, order between height of elements and distance between columns did not use to create new spaces in most parts. Informal balance is created through the central axis opposite to the original state. The original rhythm and repetition of arches and columns have almost disappeared by elevating the base plane and disabling the visual ability. Inappropriate contrast is created by elevating the base

plane on the north side. Comparing to the before re-use situation, an inappropriate contrast is created in re-used state. There is no harmony as the new and existed elements do not work together and inappropriate contrast created. Despite the fact that in original state of the warehouse harmony was achieved through repetition of the same limestone material and arches.

In original state the arrangement of linear elements (columns and arches) which created logical order by proportion in size, height, width and distance between their arrangements has almost changed in re-used state. Therefore there are conflicting qualities that are disobedient to the total spatial and visual characteristic. So after re-use situation lacks unity and the composition of new addition and alteration of elements does not work harmoniously together as a whole. Therefore the interior space characteristics of original state are mostly altered.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job, shading elements added and windows introduced on each side of the entrance. Therefore the façade of the building altered in re-used state.

Table 4.7: Elements Defining Space Analysis of Warehouse NO.3

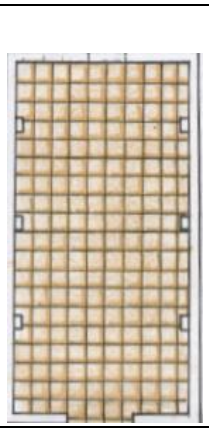
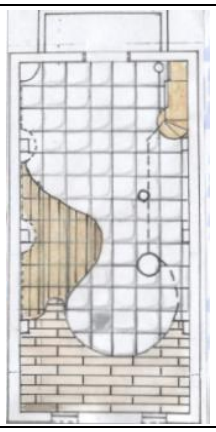
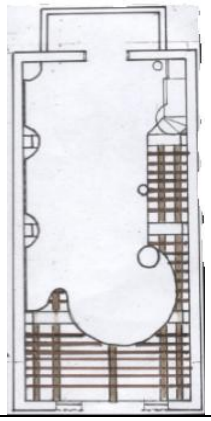
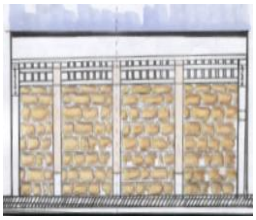
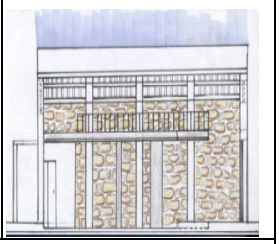
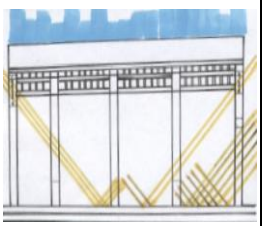
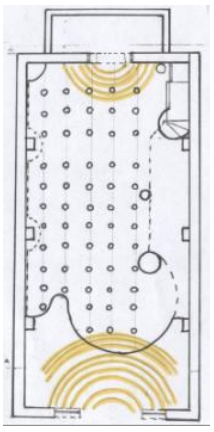
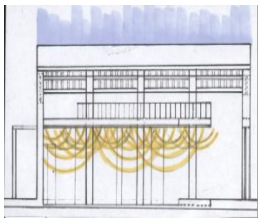
W_3	Elements Defining Space Analysis of Warehouse NO.3			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
	Material, Texture and Horizontal elements defining space			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.8: Arrangement of elements Analysis of Warehouse NO.3

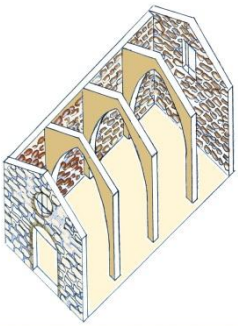
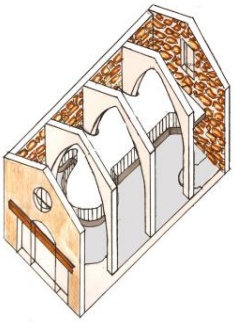
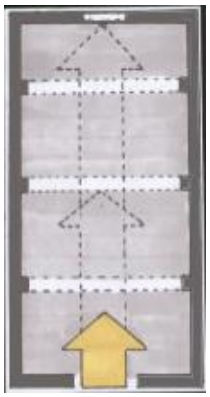
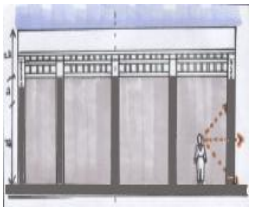
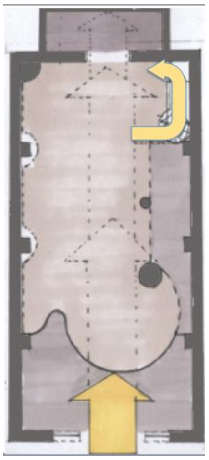
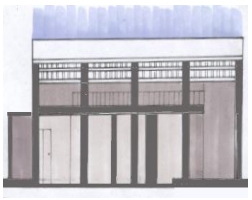
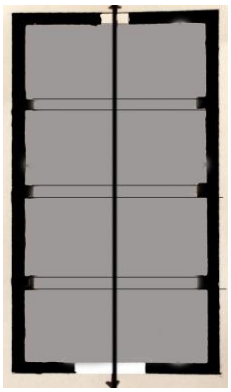
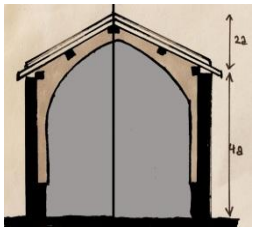
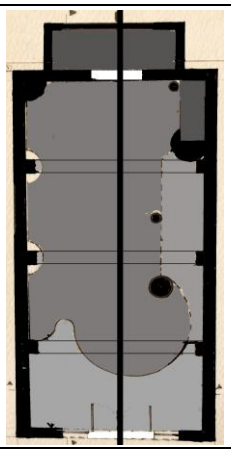
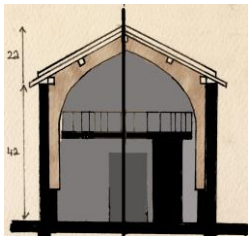
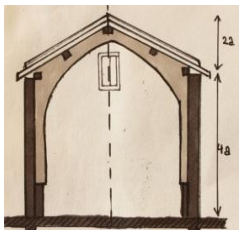
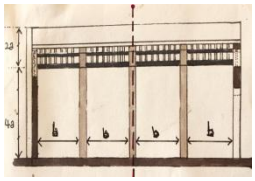
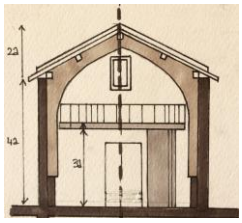
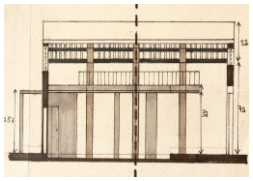
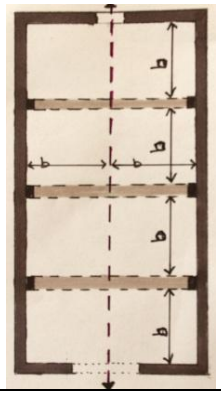
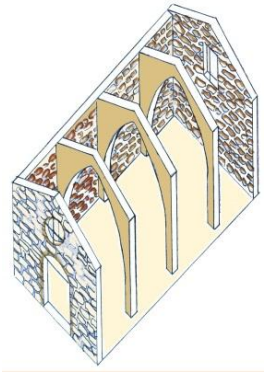
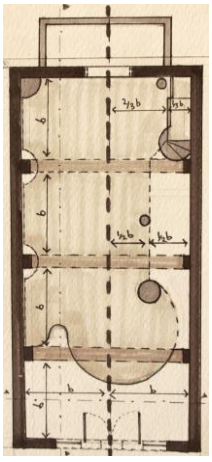
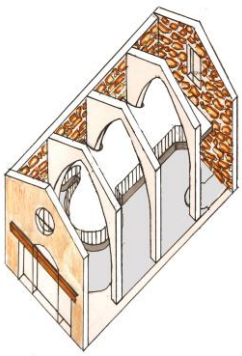
W_3	Arrangement of elements Analysis of Warehouse NO.3			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.9: Design Principle Analysis of Warehouse NO.3

	Design Principle Analysis of Warehouse NO.3			
W_3	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis		Regular rhythm of the original is almost altered /Informal balance created through the central axis	
				
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches		Dominance created by locating a column and addition of mezzanine through the main opening/Contrast created by locating a different column/used the same proportion between elements	
				
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony		Harmony did not achieve as all elements does not work harmoniously together/there is a logical order between existed and new elements/Unity did not achieve	
				

Comparing the interior space of original state and re-used state of warehouse NO 3: Retail (The Walls)

Warehouse NO3 has been re-used as a retail store. The original state is represented on the left side of the inventories. Comparing the original horizontal elements (floor, roof) to the re-used state, the surface material of the base plane has been changed with two different materials such as ceramic tile and parquets which created two different spaces. On the north side of the warehouse a second space is create by elevating the base plane which is covered with parquets with a different texture. Space is created under the elevated base plane by depressing the base plane. The pitched overhead plane structure is preserved except the transverse elements are covered with boards. In original state a regular orderly rhythmical texture is achieved by the arrangement of longitudinal beam and transverse beam elements. On the north side a flat ceiling is created by elevating the base plane. Comparing the before re-use vertical elements (wall, column, arch) with the after re-use elements, surface material and texture of the wall plane is renovated in the same texture as the original state of the warehouse. But linear elements such as columns and arches have been changed as they are covered with plaster and paint job. Comparison of both states showed that on the south side, the wall plane, which introduces the entrance to the space, is altered by extending the opening toward each side of the wall plane. It reinforced the amount of natural light entering to the space. On the south wall plane an opening is introduced in the middle of the plane which changed the orientation of the definition of space. Artificial lighting elements are added on the elevated base plane. Thus comparing to the original state, alteration of the south wall and introduction of new openings reinforced the amount of light it achieves. But toward the north side the

additional lighting element couldn't fulfill the lack of light especially in the space, which is created by elevated base plane.

Original space was created by parallel arrangement of the elements (load bearing wall) with a wide entrance on south wall plane. In re-used state different spaces were created by addition of two vertical linear elements (columns) in the middle of the warehouse near to east wall plane to support the mezzanine. Mezzanine includes ¾ of the space. The space bellow the mezzanine is strengthened by depressed plane with the same shape as the elevated base plane. Private spaces (restroom, storage, and kitchen) were created by U-shaped arrangements which are extended on the north exterior side of the warehouse. It can be reached by the opening, introduced on the north wall plane. Comparison of both states of the warehouse shows that the alteration and addition of the horizontal and vertical arrangement of elements has changed its orientation. Created mezzanine changed the height of the building since original state of the warehouse was an open space with spacious high height while in reused state the visibility to arches is perceived only by ¼ of the space. A space, which is created by elevated base plane (mezzanine), is physically possible to reach by staircases.

The re-used state of the warehouse has used the same logical order in proportional size, height, width of elements and distance between columns to create new spaces in some parts. The informal balance created through the central axis is opposite to the formal balance of original state. Rhythm and repetition of arches and columns are weakened by elevating the base plane and disabling the visual quality of re-used state. A little contrast is created by covering the base plane with different materials. A little harmony is achieved by keeping the same repetitive columns. Despite the fact

that, the original state of the warehouse, had strong harmony through the repetition of the same limestone material and arches.

In original state the arrangement of linear elements (columns and arches) were in logical proportion in size, height, width and also the distance between them created order. Re-used state achieved almost the same order. Elevating the base plane which contains ¾ of the space conflicting qualities accrue that is disobedient to the total spatial and visual characteristic of original state of the warehouse. Therefore re-used state lacks unity and all parts of the composition of new added elements and the existing elements don't work harmoniously together. Therefore the interior space characteristics of the original warehouse are altered mostly visually.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job, shading elements added and the entrance extended through each side of the entrance. Therefore the façade of the building altered in re-used state.

Table 4.10: Elements Defining Space Analysis of Warehouse NO.4

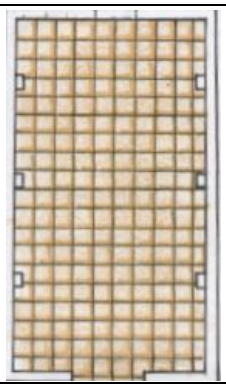
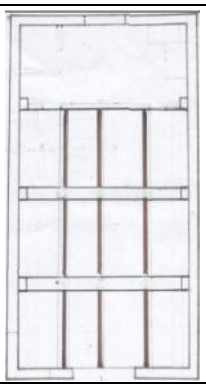
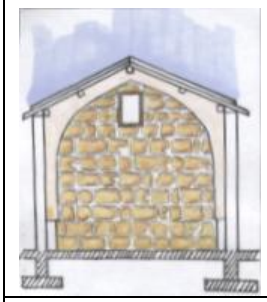
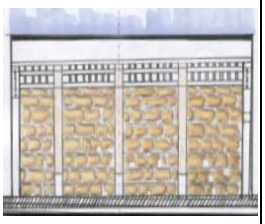
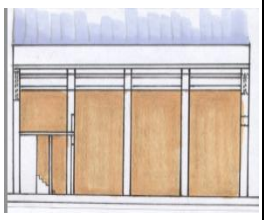
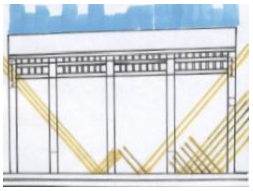
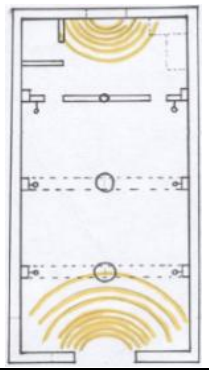
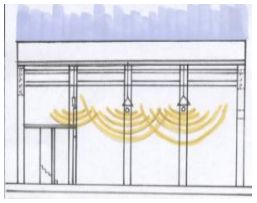
W_4	Elements Defining Space Analysis of Warehouse NO.4			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail store	
	Material, Texture and Horizontal elements defining space			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.11: Arrangement of elements Analysis of Warehouse NO.4

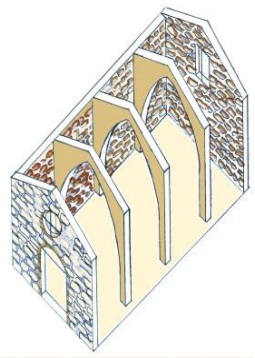
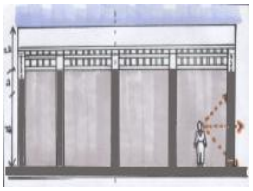
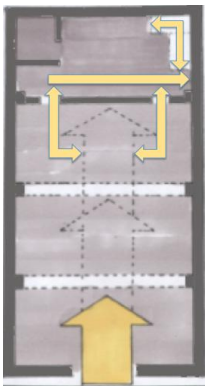
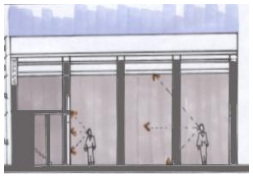
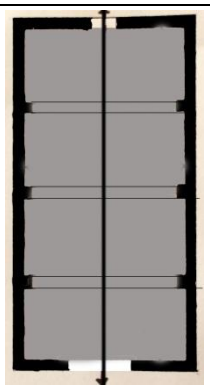
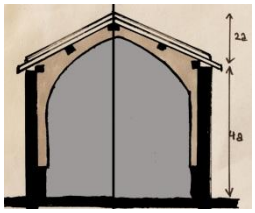
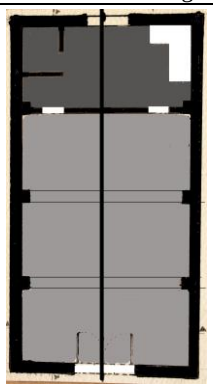
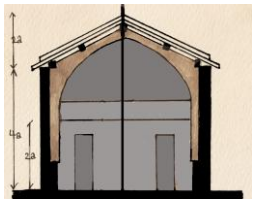
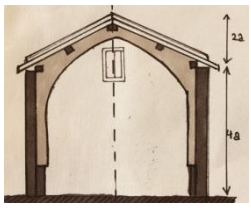
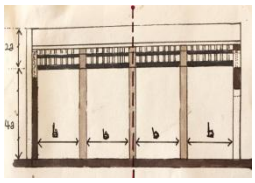
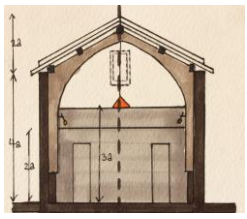
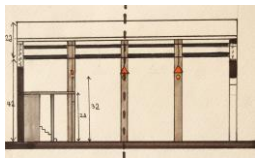
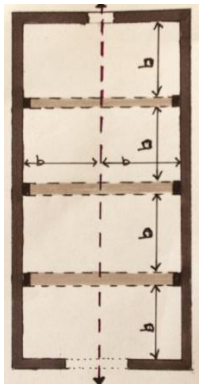
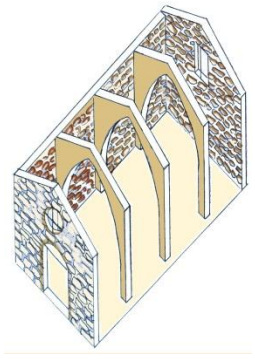
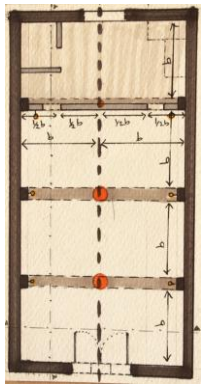
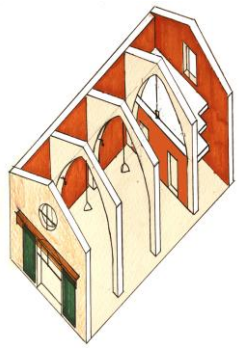
W_4	Arrangement of elements Analysis of Warehouse NO.4			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.12: Design Principle Analysis of Warehouse NO.4

W_4	Design Principle Analysis of Warehouse NO.4	
	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm is created through the repetition of arches and columns/Formal balance is almost created through the central axis
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by locating a single wall plane through the main opening/Contrast created by adding a different wall plane/used the same proportion between elements
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony did not achieved completely as all elements does not work harmoniously together/there is a logical order between existed and new elements/Unity is almost achieved
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 4: Retail (Champion Inn)

Warehouse NO4 has been re-used as a retail store. The original state is represented on the left side of the inventories. Horizontal elements (floor, roof) of the surface material and texture of the base plane are covered completely with two different materials such as laminates and granite and created two different spaces in re-used state. On the north side of the warehouse a second space (mezzanine) is created by elevating the base plane which is covered with timber material which has different texture. The pitched overhead plane has preserved its structure but the transverse elements have been covered with boards and gave the space a different texture. In original state of the warehouse a regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam and transvers beam elements. Comparing the original state to re-used state the vertical wall plane elements and linear elements such as columns and arches have been changed completely. Wall planes are covered with wooden boards and columns and arches with plaster and paint job. Comparison of both states showed that on the south side, the wall plane, which introduces the entrance to the space, has been kept as the same while the height of entrance is changed by addition of a new door frame. The orientation definition of space is the same as the original space. Artificial lighting elements are suspended from the roof plane. Thus comparing to the original state, addition of artificial lighting reinforced the illumination, except the north side where a base plane is elevated and created a darker space.

Original space was created by parallel arrangement of the elements (load bearing walls) with entrance on south wall plane. Re-used state, a single wall plane is used

with two openings which attached to east and west wall and created a private space (storage, rest room) on the north side. Comparison shows that addition and alteration of the horizontal and vertical arrangement did not change the orientation of the original space but became a little confusing. On the north side of the warehouse where the base plane is elevated and a space (mezzanine) is created it is physically possible to reach with the staircase. Arches can be perceived visually, except the space under the elevated base plane.

Comparison explains that in re-used state, the same proportional size and order between height of elements and distance between columns are used to create new spaces in most parts. Formal balance created through the central axis is the same as the original space. Rhythm and repetition of arches and columns disappeared by covering the original materials of the vertical and horizontal element. Weak contrast is created by elevating single wall plane in front of the entrance on the north side of the warehouse. There is a small amount of harmony by keeping the arches and columns despite the fact that harmony can be achieved through repetition of the same limestone material and arches of original state.

Original state shows that arrangement of linear elements (columns and arches) and surface materials are in logical proportion in size, height, width and distance. But arrangement of elements which created order in original state is mostly changed. Therefore it lacks unity and composition of new added elements and the existed elements do not work harmoniously together. So the interior space characteristic has mostly altered.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job and shading elements added. Therefore the façade of the building altered in re-used state.

Table 4.13: Elements Defining Space Analysis of Warehouse NO.5

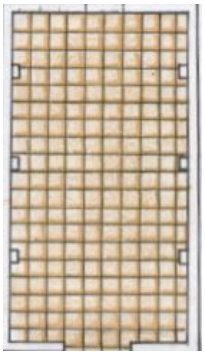
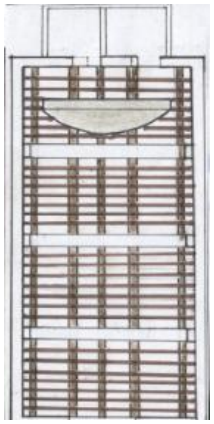
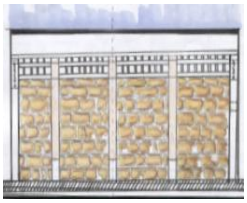
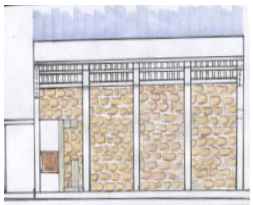
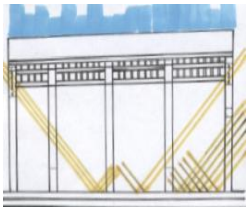
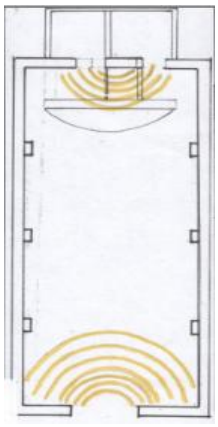
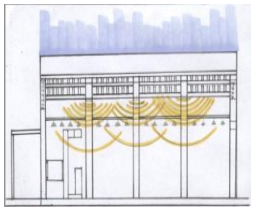
W_5	Elements Defining Space Analysis of Warehouse NO.5			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail store	
Surface Characteristic of Elements Defining Space	Material, Texture and Horizontal elements defining space			
	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.14: Arrangement of elements Analysis of Warehouse NO.5

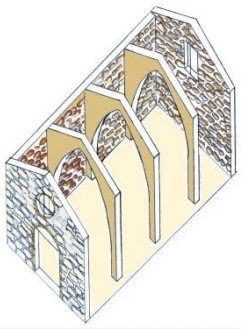
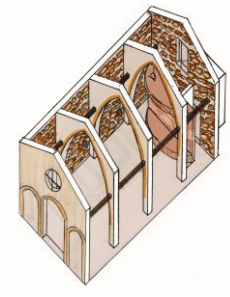
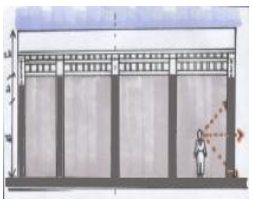
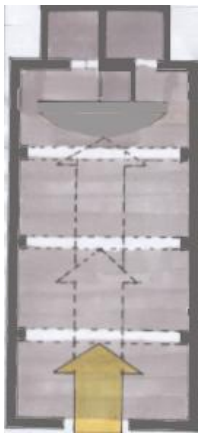
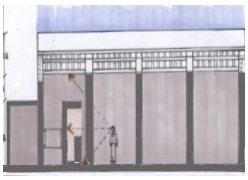
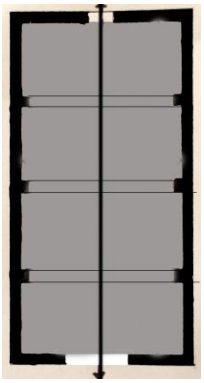
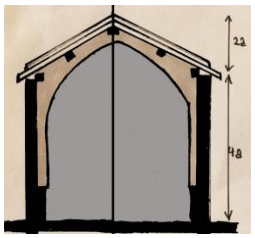
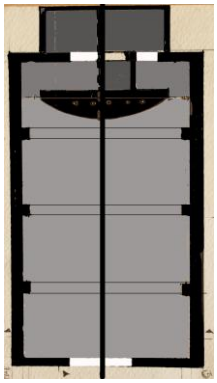
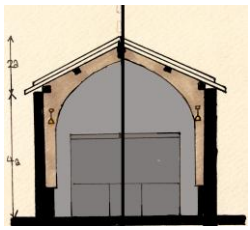
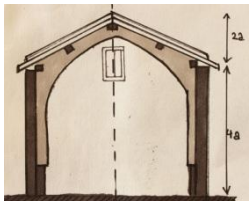
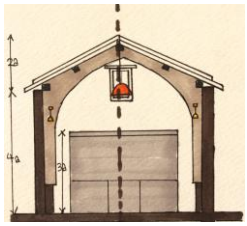
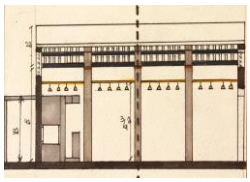
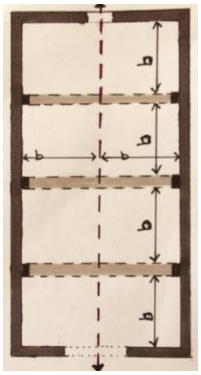
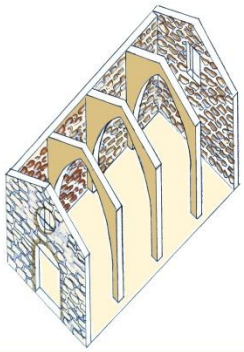
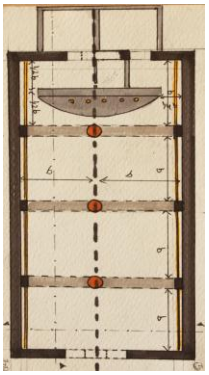
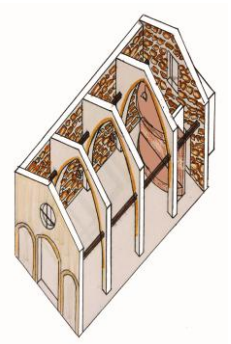
W_5	Arrangement of elements Analysis of Warehouse NO.5			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.15: Design Principle Analysis of Warehouse NO.5

W_5	Design Principle Analysis of Warehouse NO.5	
	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Regular rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Regular rhythm is created through the repetition of arches and columns/Formal balance created through the central axis
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by locating an object through the main opening/Contrast created by adding a different massive object/used the same proportion between
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony is achieved as all elements works harmoniously together/there is a logical order between existed and new elements/Unity is achieved as there is harmony
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 5: Retail (The original Store)

Warehouse NO5 has been re-used as a retail store. The original state is represented on the left side of the inventories. Horizontal elements (floor, roof) of the surface material and texture of the base plane are covered with laminate and created different texture after re-use. The pitched overhead plane has preserved its structure, material and texture. In original state a regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam and transvers beam elements. Comparing the original state to re-used state the vertical wall plane elements and linear elements such as, columns and arches have been preserved completely. Shape and sizes of the windows and entrance on the south and north wall plane have been kept the same as before re-use warehouse. Artificial lighting elements are suspended from the arches through the central axes to reinforce the brightening the dark space of original state. Two rows of artificial lighting are installed on western and eastern sides of the warehouse. Addition of lighting elements reinforced the illumination of displaying products.

The original space was created by parallel arrangement of elements (load bearing walls). The re-used state of the warehouse used the same arrangement just an object is inserted on the north side (in front of the entrance) of the warehouse. The objects structured by vertical plane which acts as wall and horizontal plane as ceiling. Private spaces (rest room, storage) were created by two U-shaped arrangements of elements on the north exterior side of the warehouse. They can be reached by the openings, introduced on the north wall plane. Also semi private spaces (changing room) were created by a single wall plane added to the back of the object.

Comparison of both states of the warehouse shows that the insertion of an object and addition of the single vertical elements has not change the orientation. The visibility to arches is perceived.

The re-used state of the warehouse has used the same logical order in proportional size, height, width of elements and distance between columns to create new spaces. The formal balance created through the central axis is the same as the original state. Rhythm and repetition of arches and columns are preserved by use of the same arrangement of element. Contrast is created by inserting a different massive object to the space. As original state did not have any contrast, addition of contrast makes the space interesting. Harmony is achieved through repetition of the same limestone material and arches. Harmony is strengthened by repetition of the same lighting elements in logical continuous manner.

The original state were used the arrangements of linear elements (columns and arches) in logical proportion in size, height, width and distance between them to creat order. In re-used state the same order was achieved .A semi private space is created on the northern side of the warehouse by inserting a massive object. Private spaces are created by U-shaped arrangement of element on exterior south part of the warehouse. The dark inner space is illuminated by addition of artificial lighting elements. Therefore the visual characteristics reinforced and the spatial definition kept its original orientation. Thus unity is completely achieved as composition of new added elements and the existing elements work harmoniously together as a whole. Therefore the interior space maintained its original characteristics while adapted with the new elements.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job, shading elements added and advertisement boards installed on each side of the entrance. Therefore the façade of the building does not represent the interior space characteristics.

Table 4.16: Elements Defining Space Analysis of Warehouse NO.6

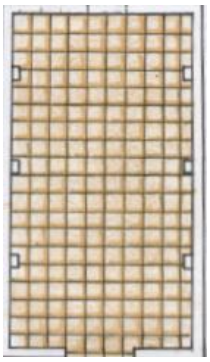
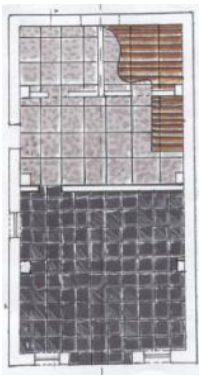
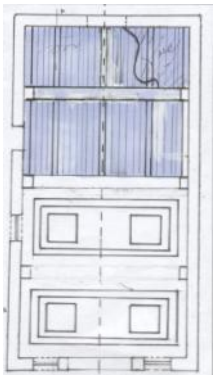
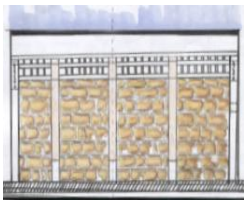
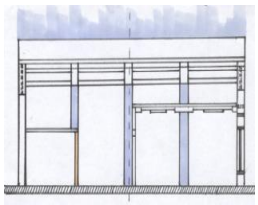
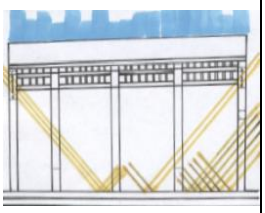
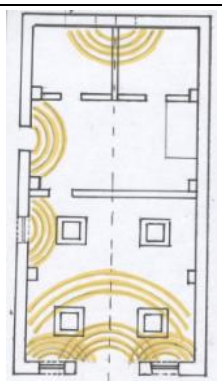
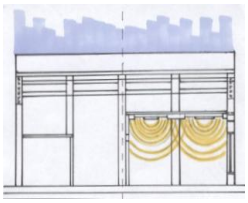
W_6	Elements Defining Space Analysis of Warehouse NO.6			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail store	
Surface Characteristic of Elements Defining Space	Material, Texture and Horizontal elements defining space			
	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.17: Arrangement of elements Analysis of Warehouse NO.6

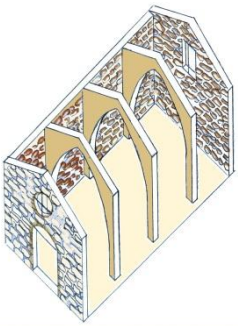
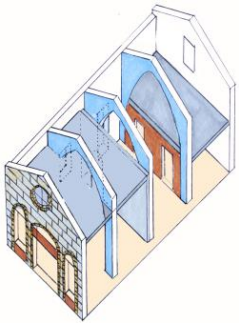
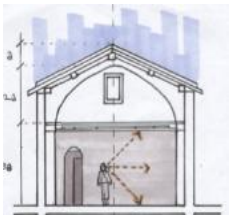
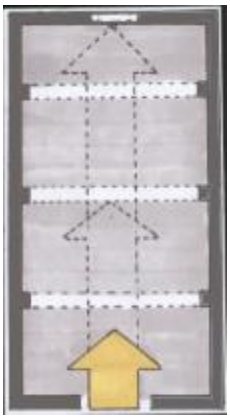
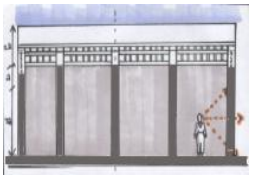
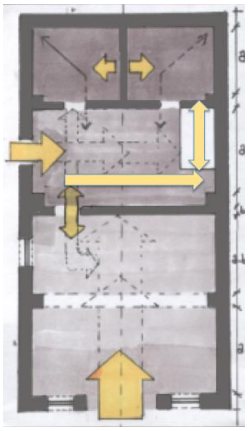
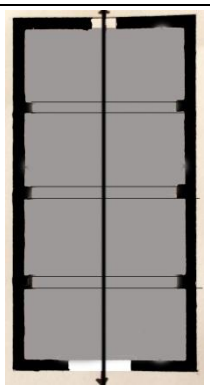
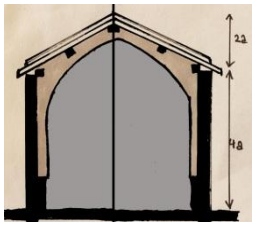
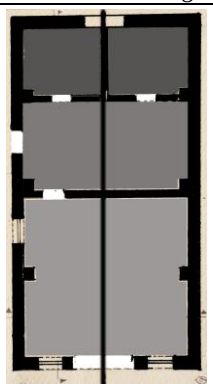
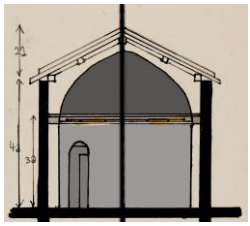
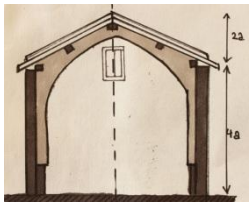
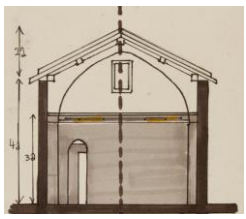
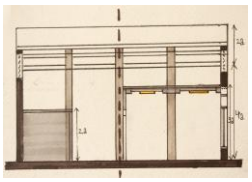
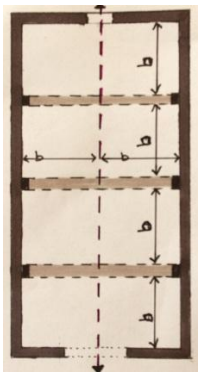
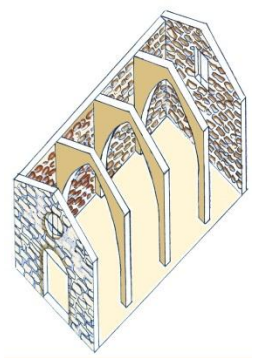
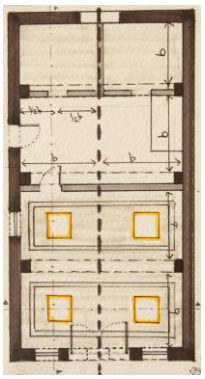
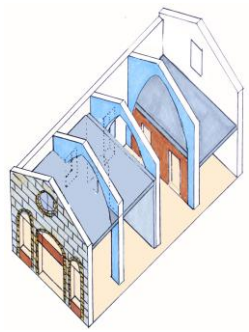
W_6	Arrangement of elements Analysis of Warehouse NO.6			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.18: Design Principle Analysis of Warehouse NO.6

	Design Principle Analysis of Warehouse NO.6	
W_6	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm which was created through the repetition of arches and columns is lost/Formal balance created through the central axis
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by adding a vertical and horizontal elements through the main opening/Inappropriate contrast created by covering the floor with different material/used the same proportion between elements
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony did not achieve as all elements does not work harmoniously together/there is a logical order between existed and new elements/Unity did not achieve as there is no harmony
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 6: Retail (Rapid)

Warehouse NO6 has been re-used as a retail store. The original state is represented on the left side of the inventories. Comparing original horizontal elements (floor, roof) to the re-used, the surface material and texture of the base plane has been changed completely. Different spaces are created by use of two materials such as granite and marble. On the north side of the warehouse a space is created by elevating the base plane (mezzanine) which is covered with timber material that has different texture. The pitched overhead plane has been changed completely by covering it with a new row of timber material. On the south side of the warehouse a flat ceiling is created by elevating the base plane which is not accessible. As in before re-use situation a regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam and transvers beam elements. Comparing the original state to the re-used states' vertical elements, the surface material, texture of the wall plane and linear elements (columns and arches) has been changed completely. Arches are covered with plaster and paint job. Comparison of both states showed that on the south side, the wall plane, which introduces the entrance to the space, is altered by introducing two windows on each side of the main entrance. It affected the amount of natural light entering in space which illuminated the dark space of the original space. West wall of the before re-use warehouse had two entrances. In re-used state, one of the entrances is changed to in a window which is altered the orientation of the original warehouse. Artificial lighting elements are added on the elevated base plane. However the addition of the wall plane in the middle of the warehouse has caused creation of darker space in the north side which needs to be reinforced by more addition of lighting elements.

Original space was created by parallel arrangement of the elements (load bearing walls) with the main entrance on the south wall and two entrances on the west wall. While in re-used state different spaces are created by L-shaped arrangement on the north side which created private spaces (rest room, kitchen). In the middle of the warehouse semi-private space (working area) is created by parallel arrangement and related to the south space by an opening on the left wall plane. On the south side of the warehouse a U-shaped arrangement is created which includes the main wide entrance. The south wall is altered by introduction of two windows on each side of the main entrance. Comparison of both states of the warehouse shows that the addition and alteration of the horizontal and vertical arrangement of elements has changed the orientation of space completely. On south and north side of the r-used state of the warehouse, the base plane has been elevated and altered the height of the building. So visibility to arches is impossible on north and south side of the warehouse. The space which is created by elevated base plane on the south side is not accessible. On the other hand north side elevated base plane (mezzanine) is accessible by staircase.

Comparing both states explains that the same proportional size and order between height of elements and distance between columns are used to create new spaces in most parts. Formal balance is created through the central axis the same as the original state. Rhythm and repetition of arches and columns have disappeared by elevating the base plane and disabling the visibility to other parts. Weak contrast is created by covering the base plane with dark different material. There is no harmony as no elements are situated or repeated in continuous manner and does not make each other complete. Despite the fact that in original state harmony could be achieved through repetition of the same limestone material and arches. The logical order of the

arrangement of linear elements and arches of original state is almost changed. Therefore there are conflicting qualities that are disobedient to the total spatial and visual characteristics. So re-used state of the warehouse lacks unity and the added elements and the existing elements do not work harmoniously together. Therefore interior space characteristics of original state are completely lost.

As represented on isometric drawing the surface characteristic of façade is maintained the same as the original except introducing two windows on each side of the entrance. The façade of the building does not represent the interior space characteristics.

Table 4.19: Elements Defining Space Analysis of Warehouse NO.7, 8

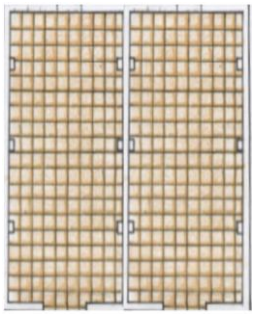
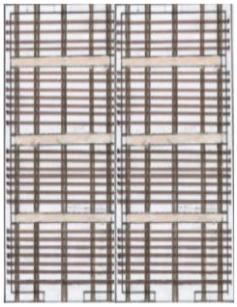
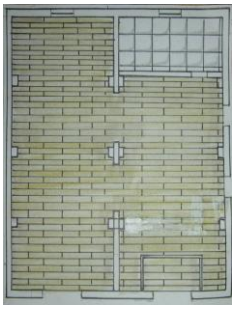
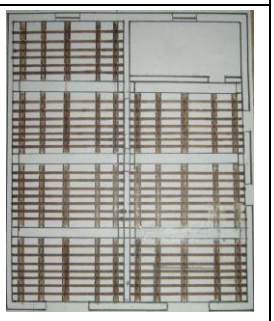
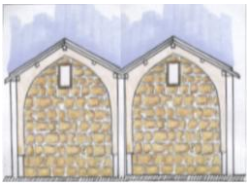
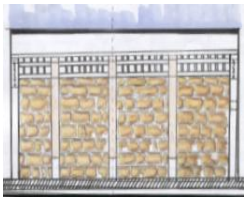
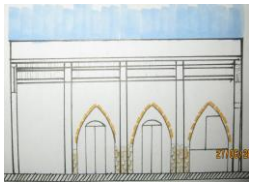
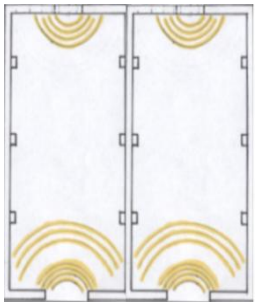
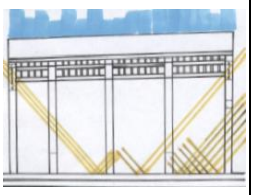
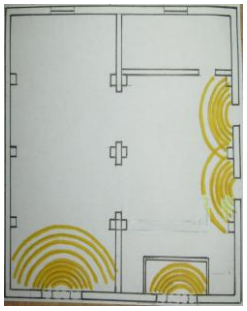
$W_{7.8}$	Elements Defining Space Analysis of Warehouse NO.7,8			
	Original state		Re-used state	
	Function: Warehouse		Function: Club	
	Material, Texture and Horizontal elements defining space			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.20: Arrangement of elements Analysis of Warehouse NO.7, 8

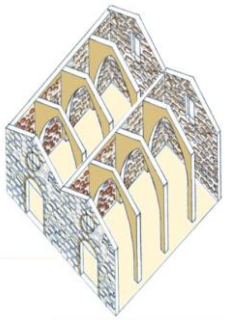
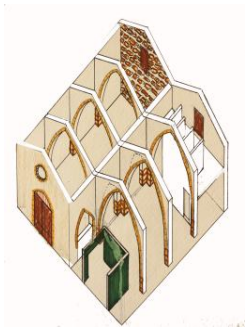
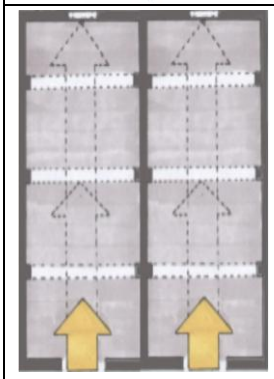
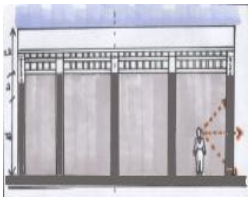
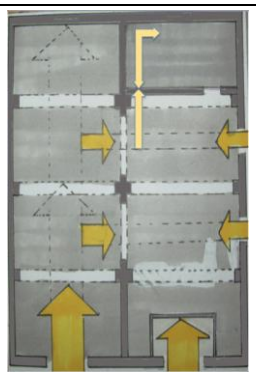
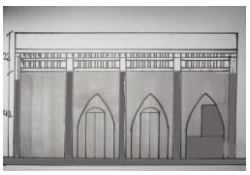
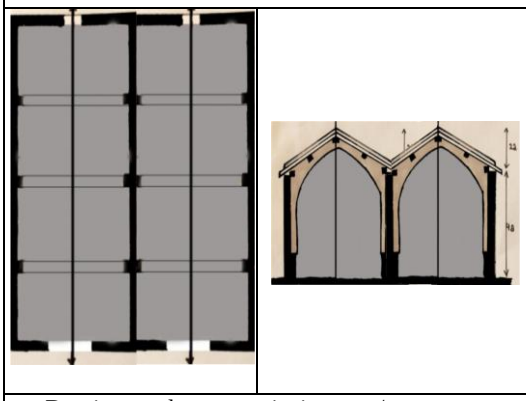
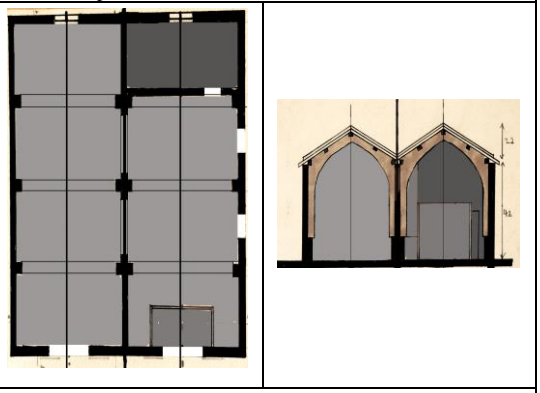
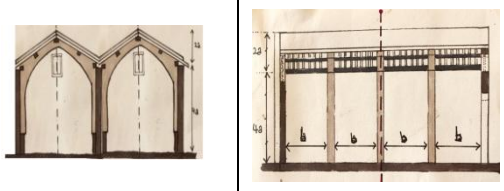
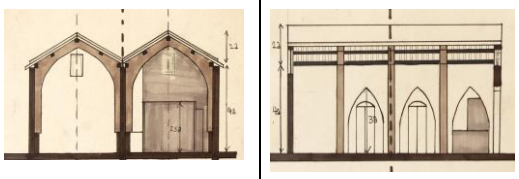
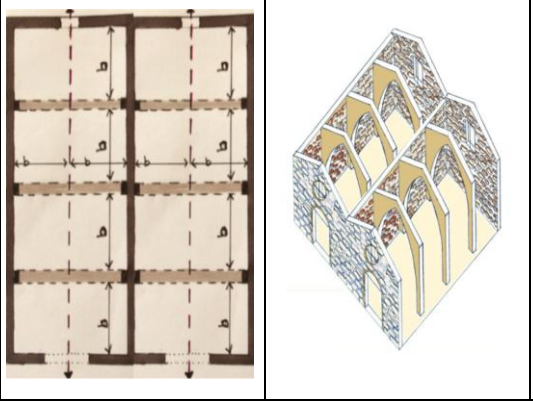
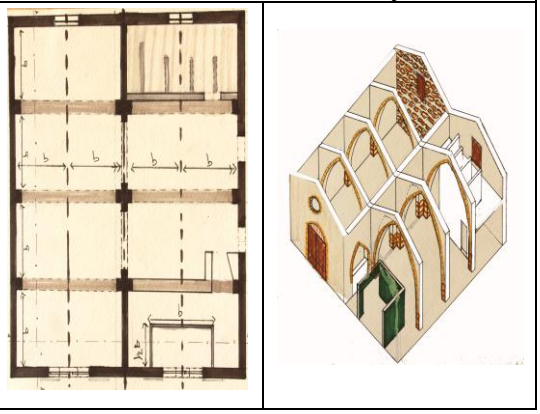
$W_{7,8}$	Arrangement of elements Analysis of Warehouse NO.7,8			
	Original state		Re-used state	
	Function: Warehouse		Function: Club	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.21: Design Principle Analysis of Warehouse NO.7, 8

$W_{7,8}$	Design Principle Analysis of Warehouse NO.7,8	
	Original state	Re-used state
	Function: Warehouse	Function: Club
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm is created through the repetition of arches and columns/Formal balance created through the central axis of each warehouses but in a whole new space the informal balance is created
		
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by adding a massive vertical wall plane through the main opening/Contrast created by adding a wall plane with different material/used the same proportion between elements
		
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony is almost achieved as all elements works harmoniously together/there is almost a logical order between existed and new elements/Unity is almost achieved as there is harmony
		

Comparing the interior space of original state and re-used state of warehouse NO 7 and 8: Club (Bailer house club)

Two warehouses NO7, 8 has been joined and re-used as a club. The original state is represented on the left side of the inventories. In re-used state, horizontal elements (floor, roof) of surface material and the texture have been changed. Base plane has been changed completely with two different materials such as long timber and ceramic tile which created two different spaces. On the north side of the warehouse NO7 a second space is created by elevating the base plane which is covered with ceramic tile. The pitched overhead structure has been preserved completely with the same texture and material. On the north side of the warehouse NO7 a flat ceiling is created by elevating the base plane. As in original state a regular orderly rhythmical texture was achieved visually by the arrangement of longitudinal beam and transverse beam elements. Comparison shows that the vertical elements, surface material and texture of the wall plane and linear elements such as columns and arches have been changed completely. They are covered with paint job. The wall between these two warehouses has been partially removed to relate warehouses by arch shaped openings. South wall planes are preserved as original state. In the warehouse NO7 the north wall plane has disappeared behind a single vertical wall plane. The wall plane between the first and second column (from south wall) altered to waist height. Therefore it is physically not related to the other warehouse but visibility is possible. On the south side, the wall plane, which introduces the entrance to each warehouse, is kept in the same manner. But in warehouse NO7 it is closed by addition of wall planes. The two rectangular small windows on the north wall planes of each warehouse are closed with a wooden board. Original state of warehouses has

a dark space therefore, by closing one of the main entrances and windows it needs extra artificial lighting to reinforce its illumination.

In original state a space is created by parallel arrangement of the elements (load bearing walls) and the main entrance on south wall planes in warehouse NO8 and NO7 and also two entrances on east wall in warehouse NO7. In re-used state, different spaces were created by adding a single wall plane which reaches the roof. Also access to elevated base plane is possible by staircase on the north side of the warehouse NO7. Private spaces (rest room) are created by these additions of elements. Also a U-shaped arrangement is added in front of the main entrance of the south wall plane of the warehouse NO7 which created a semi private space. The two circle windows on top of the entrance are maintained. Comparison shows that the addition and alteration of the horizontal and vertical elements have changed the orientation of the original warehouse. But it did not change the height and width proportion relation completely.

Comparison explains the same proportional size and order between the height of elements and distance between columns used to create new spaces in most parts. Informal balance is created through the central axis of the new space but the original state of each warehouses had a formal balance. The rhythm and repetition of arches and columns of original state are almost maintained. Inappropriate contrast is created by a high height wall plane with different texture. There is little harmony as elements are situated or repeated in continuous manner and almost make each other complete. Despite the fact that in original warehouse harmony could be achieved through repetition of the same limestone material and arches.

Original stats' logical order in size, height and width between arrangement of linear elements and arches is somehow achieved in re-used state. But there are conflicting qualities that are disobedient to the total spatial and visual characteristics. Therefore re-used state of warehouses lack unity and the composition of new added elements and the existing elements do not work harmoniously together as a whole. Therefore the interior space characteristic did not maintained completely.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job but the façade of the building is representing the interior space characteristics.

Table 4.22: Elements Defining Space Analysis of Warehouse NO.9

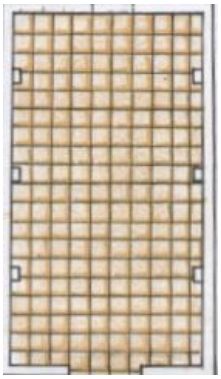
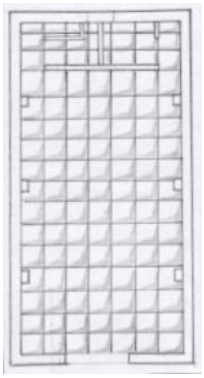
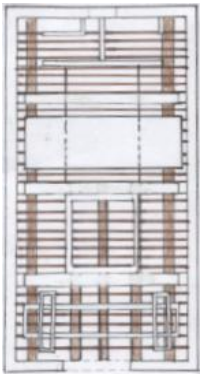
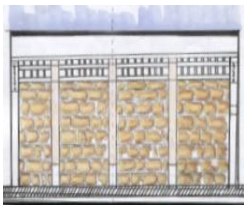
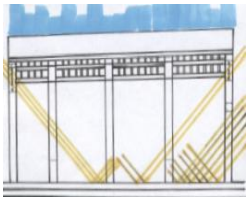
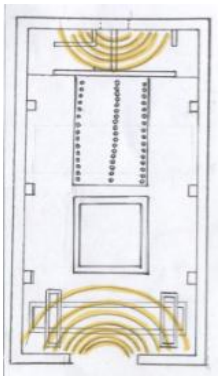
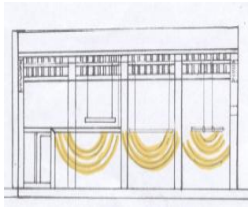
W_9	Elements Defining Space Analysis of Warehouse NO.9			
	Original state		Re-used state	
	Function: Warehouse		Function: Warehouse	
	Material, Texture and Horizontal elements defining space			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.23: Arrangement of elements Analysis of Warehouse NO.9

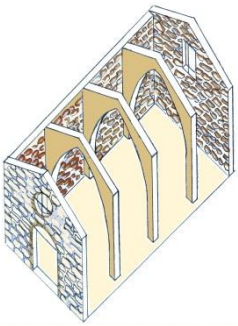
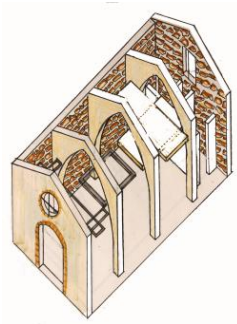
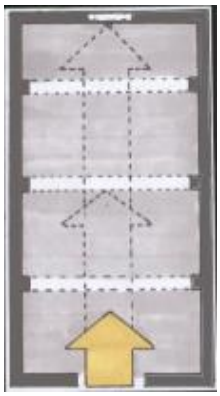
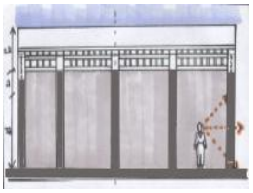
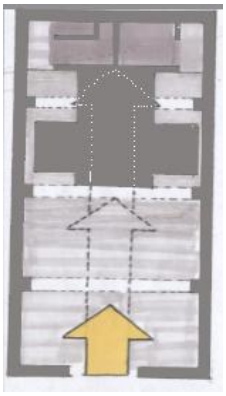
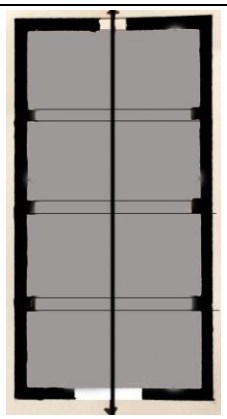
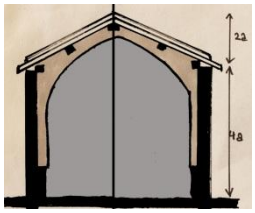
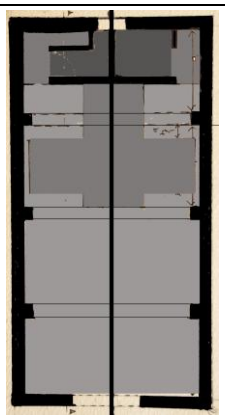
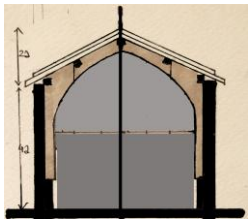
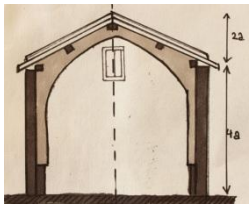
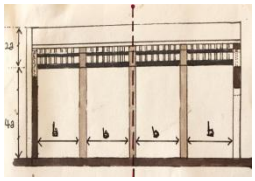
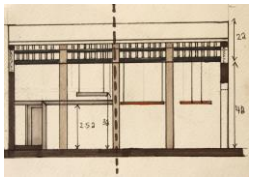
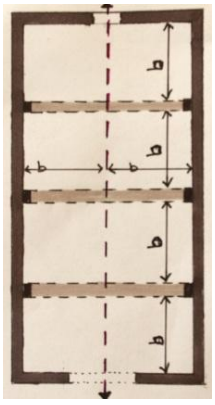
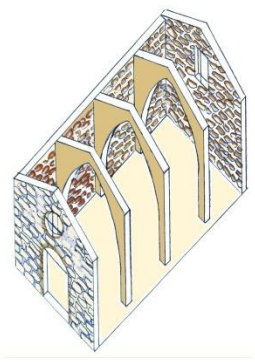
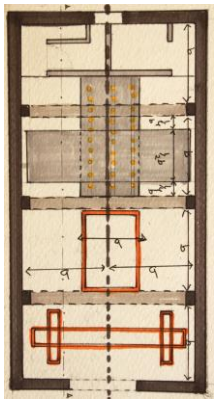
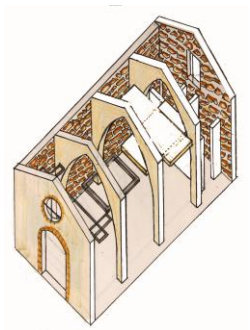
W_9	Arrangement of elements Analysis of Warehouse NO.9			
	Original state		Re-used state	
	Function: Warehouse		Function: Retail Store	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.24: Design Principle Analysis of Warehouse NO.9

W_9	Design Principle Analysis of Warehouse NO.9	
	Original state	Re-used state
	Function: Warehouse	Function: Retail Store
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Rhythm is created through the repetition of arches and columns/Formal balance created through the central axis
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance created by locating an object through the main opening/Contrast created by adding a different massive object/used the same proportion between
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony is achieved as all elements works harmoniously together/there is a logical order between existed and new elements/Unity is achieved as there is harmony
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 9: Retail (The Lal)

Warehouse NO9 has been re-used as a retail store. The original state is represented on the left side of the inventories. Re-used horizontal elements' (floor, roof) surface material and texture of the base plane has been changed with ceramic tile. The pitched overhead plane has been preserved with the same structure, material and texture. In original state, regular orderly rhythmical texture was achieved visually by the arrangement of longitudinal beam and transverse beam elements. Two ceiling planes are suspended in different level which their material is different to the roof plane. In re-used state vertical elements, surface material, texture of the wall plane and linear elements such as columns and arches has been maintained completely. Comparison shows that the entrance and the circle window on the south wall plane and a rectangular window on the north wall plane are maintained as original state. Artificial lighting elements are installed from roof between the south wall plane and first arch. Second artificial lighting is installed between the first and the second arch. The third one is installed on the surface of the ceiling plane. They reinforced the amount of light in inner space and the display of products.

The original state of the warehouse the space was created by parallel arrangement of elements (load bearing walls) with a main entrance on the south wall. Re-used state has used the same arrangement just an object which is structured with a vertical and horizontal plane is inserted to the warehouse. The object is located in front of the entrance on the north side of the warehouse. Three L-shaped arrangements of elements are added. Base plane is elevated in the north side of the warehouse to create private spaces (rest room, storage). By inserting an object and adding L-shape

arrangement the orientation did not change in re-used state. Thus the insertion of the massive object didn’t interrupt the visibility to the arches.

The same proportional size, order between height of elements and distance between columns are used to create new spaces in re-used state. Formal balance created through the central axis is the same as original. The rhythm and repetition of arches and columns are preserved as they kept the arrangement of elements in original state. Contrast is created by inserting a different massive object to the space. In original state no contrast existed in the warehouse while now a little contrast has made the space interesting. Harmony is maintained through repetition of the same limestone material and arches which has strengthened by repetition of the elements in logical continuous manner.

Comparison shows that the same proportional size, height, width between elements is used to create new spaces. Addition of lighting elements has reinforced the amount of light needed to display the products. Therefore the visual characteristic is reinforced comparing to original warehouse. Spatial definition has kept its orientation. Thus unity is completely achieved by the composition of the new added elements and the existing elements work harmoniously together as a whole. Therefore interior space characteristics maintained and new elements adapted with the original elements.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job. Therefore the façade of the building does not represent the interior space characteristics.

Table 4.25: Elements Defining Space Analysis of Warehouse NO.10, 11

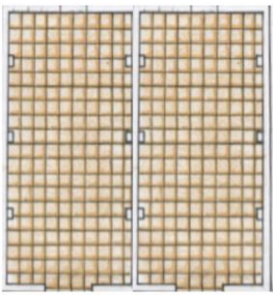
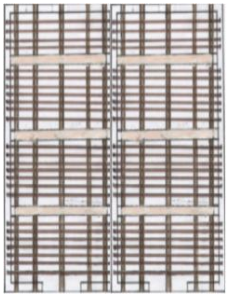
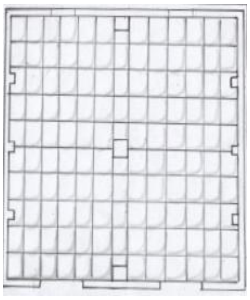
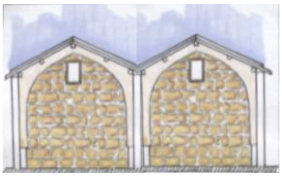
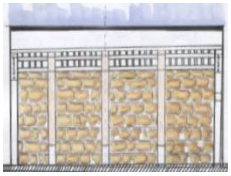
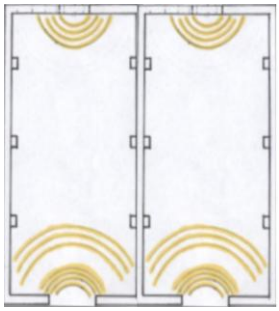
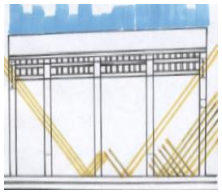
$W_{10,11}$	Elements Defining Space Analysis of Warehouse NO.10,11			
	Original state		Re-used state	
	Function: Warehouse		Function: Market	
	Material, Texture and Horizontal elements defining space			
Surface Characteristic of Elements Defining Space	Base Plane	Overhead Plane	Base Plane	Overhead Plane
				
	Material, Texture and Vertical elements defining space			
	Wall Plane		Wall Plane	
				
	Natural Light and Artificial Light defining Space			
				

Table 4.26: Arrangement of elements Analysis of Warehouse NO.10, 11

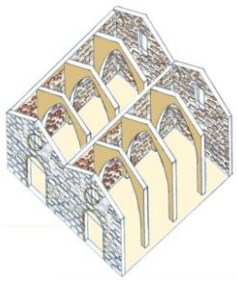
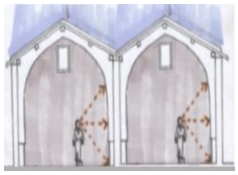
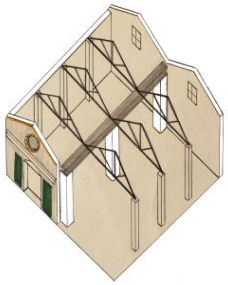
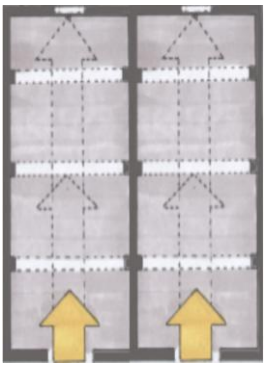
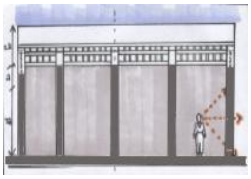
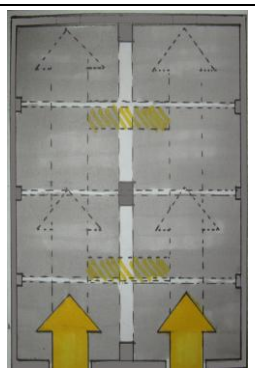
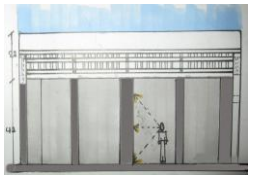
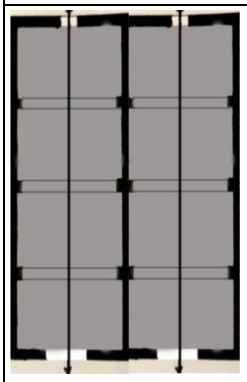
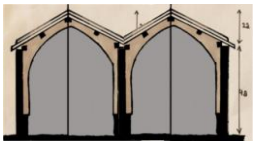
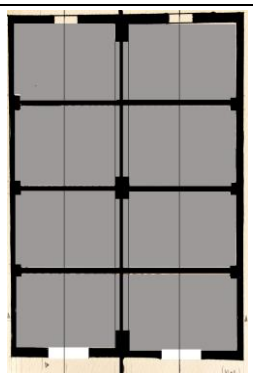
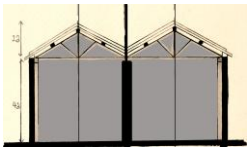
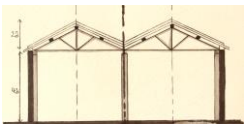
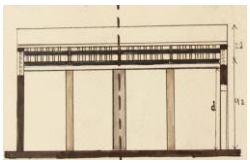
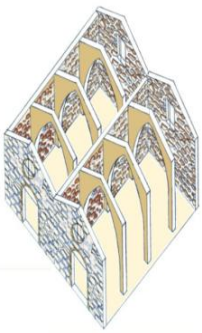
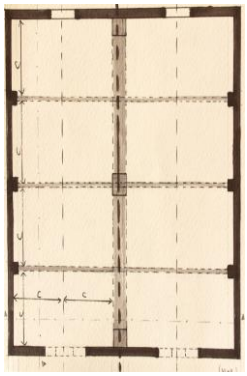
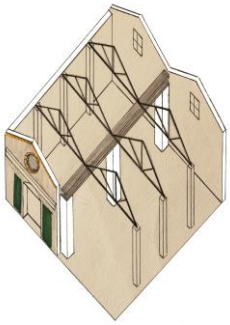
$W_{1\ 0,11}$	Arrangement of elements Analysis of Warehouse NO.10,11			
	Original state		Re-used state	
	Function: Warehouse		Function: Market	
Arrangement of Elements	Spatial Definition	Visual Definition	Spatial Definition	Visual Definition
				
				

Table 4.27: Design Principle Analysis of Warehouse NO.10, 11

$W_{10,11}$	Design Principle Analysis of Warehouse NO.10,11	
	Original state	Re-used state
	Function: Warehouse	Function: Market
Design Principles	Rhythm created through the repetition of arches and columns/Formal balance created through the central axis	Different rhythm is created through the repetition of columns/Formal balance created through the central axis of each warehouse and the whole new space
	 	 
	Dominance does not exist in space/no contrast existed in space/there is a similar proportion between columns and arches	Dominance does not exist as there is no contrast/used the same proportion between elements
	 	 
	Harmony is achieved as all elements works harmoniously together/there is a logical order between elements/Unity is achieved as there is harmony	Harmony did not achieve as all elements does not work harmoniously together/there is a logical order between existed and new elements/Unity did not achieve completely as there is no harmony
	 	 

Comparing the interior space of original state and re-used state of warehouse NO 10 and 11: Super market (Norol Market)

Two Warehouses NO: 10, 11 have been joined and re-used as a super market. The original state is represented on the left side of the inventories. Original horizontal elements (floor, roof), surface material and texture of the base plane have been changed completely with ceramic tile. The pitched overhead plane has kept its texture and material as original state, but arches were destroyed completely and three truss systems are replaced. A regular orderly rhythmical texture was achieved by the arrangement of longitudinal beam; transvers beam elements and arches before re-use. Vertical elements, surface material and texture of the wall plane and linear elements such as columns and arches have been altered completely after re-use. Walls and columns are covered with plaster and paint job. Arches and wall plane between these two warehouses are altered completely. Three new linear elements (columns) are replaced instead of the middle wall. One is located in the middle the other two are attached to the north and south wall planes. Comparison of both warehouses shows that the main entrance and circle window are kept as original state. Also the rectangular shape window on the north wall plain is kept as original. Alteration of the wall plane has changed completely the orientation definition of the space. Artificial lighting elements are suspended from the roof plane which reinforced the illumination of the original warehouse.

Original space was created by parallel arrangement of the elements (load bearing walls) with one entrance on south wall plane. While completely different space is created by ruining the middle wall plane and arches, and replacing it with columns in re-used state. So the orientation definition of the space has changed completely.

Re-used state of the warehouse is used proportional size between distances of columns of original state to create new space. Formal balance created through the central axis is the same. The rhythm and repetition of arches have disappeared and ruined completely. No contrast is achieved. There is little harmony created by truss elements and linear elements (column) which are repeated in continuous manner. Despite the fact that in original state harmony could be achieved through repetition of the same limestone material and arches.

The arrangement of linear elements and arches in logical proportion in size, height, width and distance which created order has almost changed by destroying the arches in re-used state. Therefore there are conflicting qualities that are disobedient to the total spatial and visual characteristics .So re-used state of the warehouse lacks unity and composition of new added element and the existing elements do not work harmoniously together. Therefore interior space characteristics are completely lost.

As represented on isometric drawing the façade of the original warehouse is altered as the surface covered with pain job and addition of shading elements. But the façade of the building represent the interior space characteristics of re-used state.

4.4 Evaluation of comparison of all warehouses

As shown in the following tables, all the 11 attached warehouses compared in three sections.1) elements defining space analysis in table 4.28 2) arrangement of elements analysis in table 4.29 3) design principles analysis in table 4.30.

In the first inventory all warehouses elements defining space such as plane (wall plane, base plane, and overhead plane), light, texture, object and material of the original states and re-used state are compared.

Comparison showed that elements defining space of warehouse number six and joined warehouses number ten and eleven is completely changed and/or destroyed and/or covered. Therefore the interior space characteristics of mentioned warehouses re-used state are altered completely.

In the second inventory all warehouses arrangement of elements and the visual and spatial definition of them in interior space of original state and re-used state are compared.

Comparison showed that the visual definition of interior space characteristic in warehouse number six is completely altered by to many division of original single storey space and addition of mezzanine. The spatial definition of interior space characteristic in joined warehouses number ten and eleven is completely altered by destroying the arches and common wall plane. In the third inventory all warehouses design principles which used to organize the elements in interior space of original state and re-used state are compared.

Comparison showed that as warehouse number six and joined warehouses number ten and eleven did not use the same logical order as the original state. Regular rhythm of arches and columns did not maintain as they covered and/or destroyed. Appropriate contrast did not achieve as the original state lacked it. They both used

the same proportion as the original state. But new and existing elements do not work harmoniously together as a whole and the re-used state lacks unity. Therefore the interior space characteristics are altered.

Chapter 5

CONCLUSION AND FINDINGS

Re-use of historic warehouses is known as a highly potential market because of their ability for an easy adaptation. Caused by inappropriate alterations to the original state of the warehouses, in some re-use projects the interior space characteristics regarding the original state have been severely harmed. In order to prevent such inappropriate results, the elements defining the interior space should be analyzed prior to any adaptive re-use project. Given the lack of research on the subject, this study aimed to set up certain criteria to analyze the interior space characteristics of historic warehouses through cases selected from Liman road in the walled city of Famagusta. The walled city contains a variety of historic warehouses among which the eleven attached warehouses have been evaluated in the content of this study.

By examining the reasons that caused the inappropriate changes to the interior space characteristics of historic warehouses, the study derived the importance of the determination of elements defining a space, arrangement of elements and design principles during the adaptive re-use process. Therefore, selected historic warehouses were analyzed according to these criteria. To make the analyses more comprehensive inventory charts are prepared for each historic warehouse. Each chart includes the state of building before and after re-use project in order to conceive the changes to interior space characteristics respectively.

The results of analyses reveal that the characteristics of interior space would be affected by elements defining space, arrangement of elements and design principles. The analyses indicate that by considering these three factors before re-use process of the warehouses, the interior space characteristics of historic warehouses would be maintained without harming the original features.

The original characteristics of spaces have been maintained in warehouses number one (Burberry), number five (The original store) and number nine (the Lal) which have been re-used as a retail store. In these three warehouses, new elements added in the re-use process are in harmony with the elements of buildings themselves. Arrangements of newly introduced elements of the warehouses are organized in such a way that, their proportion, rhythm and order comply with the original states of buildings. In all cases, the entire organization is balanced through the central axes of the original spaces. With the insertion of a contrasting massive object, which can immediately be perceived from the entrance, the contrast has also been created in some cases. Both by creating similarity and contrast the harmony is achieved in these warehouses. Thus, original organization is unified with the re-used organization which kept the original interior space characteristics.

The analyses of inventories show that inappropriate changes would appear by addition and/or subtraction of elements that change the main characteristics of original space. Additions such as interior panels, mezzanine floors may cause division of space which interferes with single storey characteristics of the warehouse. Too many division would refuse to go along with the application of elements defining space; arrangement of elements and design principles of original organization. Therefore the original characteristics of the warehouse might be lost by

inappropriate alteration by addition of new elements and subtraction of existing elements. On the other hand, any adaptation to a new function will require additions and/or subtractions. Therefore the alterations should be considered in a way that the main characteristics of interior space maintain as similar as possible to the original state and the new added elements are in harmony with the existing elements.

In warehouses number six (Rapid), which is re-used as a retail store and number ten and eleven (Norol Market), which are joined to serve as a market, interior space characteristics is completely changed by destroying and covering main elements. In these buildings with the addition of horizontal and vertical elements such as; walls, columns and mezzanine floor, the original space of single storey is divided. Addition of mezzanine floor may contribute to space perception in some cases, unless it covers too much space or it touches to the side walls to prevent perception. Besides, removal of arches and change in the load bearing structural system in joined warehouses ten and eleven, and panels hiding the arches in warehouse 6, which are the main elements and characteristics of these historic buildings, can be considered as the main reason for the loose of interior space characteristic. Rhythm and order which were created by repetition of arches have been destroyed by their removal, which caused the loss of harmony in re-used warehouses. These two cases demonstrate that, proportion and rhythm of the original warehouses have been changed by destroying and covering arches and columns. As the new added elements and existing ones do not work harmoniously together therefore there is no unity in space.

In other cases interior space characteristics did not completely altered but some of the main characteristics of historic warehouses are covered. As in warehouses number two (Estetik) and number three (The wall) have been re-used as retail store a mezzanine created and covered more than half of space. Therefore the height of the original state of the warehouse is changed. In warehouse number four (Champion) which have been re-used as a retail store all the vertical wall plane elements covered by completely different material and changed the texture of original state. In warehouse number seven and eight (Boiler House Club) which have been joined and re-used as a club the orientation of original state is changed by closing the main openings. So, if the addition and/or subtraction of new or existing elements are not in harmony and does not work as a whole, therefore the main characteristics of the original interior space is altered.

In order to have a successful re-use of warehouses, it is important to maintain the main interior space characteristics of them, such as; single storey space, high heights, length, pitched roof, load bearing structure and lime stone material. New design should be either related or in accordance to the elements defining space, arrangement of elements and design principles used to build a warehouse. New elements should be arranged in order not to alter the spatial and visual definition of interior space. So if the re-use design is in accordance to the mentioned factors the main characteristics of interior space might not be altered.

REFERENCES

Anthony, C. Antoniades, AIA, AICP, (1980, 1986). *Architecture and Allied Design: An Environmental Design Perspective*, United State of America: Kendall/Hunt Publishing Company

Antoniades, Anthony C. (1990). *Poetics of architecture: Theory of design*, New York: Van Nostrand Reinhold.

Asoobar. N, (2009). *A comparative assessment of the design approaches for the conservation of historic residential buildings*, EMU, North Cyprus, Famagusta

Brooker, G. & Stone, S. (2007). *Form and Structure*, Switzerland: Ava Publishing SA.

Cindy, Wang I-Hsuan, (2004). *Experimental on Teaching Basic Graphic Formation with graphic image and design principle*, Journal of Kun Shan University of Technology

Coles, J. & House, N, (2007). *The Fundamentals of Interior Architecture*, Switzerland: AVA Publishing SA

Craven, J. the new york times company, (2008). *Adaptive Reuse of older buildings*, Retrieved April 22, 2012 from the world wide (web:http://architecture.about.com/od/adaptivereuse/adaptive_Reuse_of_Older_Buildings.htm)

Enlart. C, (1987). *Gothic Art and the Renaissance in Cyprus*, London, Trigraph Limited.

Feilden. B. M, (1994). *Conservation of historic building*, London: Reed Educational and professional Publishing Ltd

Ching, Francis D. K, (1995). *A Visual Dictionary of Architecture*, Canada: John Wiley & sons, Inc.

Ching, Francis D. K, (1975). *Architecture: Form, Space & Order*, Van Nostrand Reinhold, New York.

James Douglas, (2006). *Building Adaptation,* published by Elsevier Ltd.

Kiley. C. J, (2004). *Adaptive re-use of churches*, Mater in city planning, Massachusetts Institute of Technology, Cornell University

Krier. R, (1988). *Architectural composition*, London, Academy Additions

Latham. D, (2000). *Creative Re-use of buildings* Volume1, London, Hardback Publication

Latham. D, (2000). *Creative Re-use of buildings* Volume2, London, Hardback Publication

McClurg-Genevese, Joshua David, (2005). *The Principles of Design*, Retrieved March 25, 2012, from the World Wide Web: http://www.digital-web.com

McClurg-Genevese, Joshua David, (2006). *Principles and Elements of Design*, Retrieved March 25, 2012, from the World Wide Web: http://www.digital-web.com

Meiss. P. V, (1998). *Elements of Architecture from form to place*, 29 west 35th street, New york, NY 1001

Miller, S. & Schlitt, J. K. (1985). *Interior space: Design concept for personal needs*, Preager Publishing

Unwin. S, (1997). *Analyzing Architecture*, USA, Routlished

Vitruvius, (1960). *Ten books on architecture*, Translated by Morris Hickey Morgan, Dover Publications.

URL1: Retrieved March 25, 2012, from the World Wide Web: http://en.wikipedia.org/wiki/Adaptive_reuse

URL2: Retrieved March 25, 2012, from the World Wide Web: http://inhabitat.com/gallerys-undulating-skin-of-block-wraps-a-reclaimed-warehouse/cinderskin-ed03/

URL3: Retrieved March 25, 2012, from the World Wide Web: http://www.jfak.net/projects/26

URL4: Retrieved March 25, 2012, from the World Wide Web: http://celladdition.wordpress.com/category/precedents/adaptive-reuse-warehouses/

URL5: Retrieved March 25, 2012, from the World Wide Web: http://en.m.wikipedia.org/wiki/Space

URL6: Retrieved March 25, 2012, from the World Wide Web: http://www.draw23.com/interior-sketch-perspective

URL7: Retrieved March 25, 2012, from the World Wide Web: http://en.m.wikipedia.org/wiki/Shape

URL8: Retrieved March 25, 2012, from the World Wide Web: http://www.superstock.com/stock-photos-images/1801-43410

URL9: (http://friendseat.com/restaurants/New-York/Brasserie)

URL 10: Retrieved March 25, 2012, from the World Wide Web: http://en.wikipedia.org/wiki/Church_of_the_Light

URL 11: Retrieved March 25, 2012, from the World Wide Web: http://www.evermotion.org/portfolio/show/rohitarora/763929

URL12: Retrieved March 25, 2012, from the World Wide Web: http://www.architecturezine.com/architecture-design-of-co-op-bank-building-in-kiti-by-amsa-architects/

URL 13: Retrieved March 25, 2012, from the World Wide Web: http://www.archdaily.com/15233/peace-peres-house-massimiliano-doriana-fuksas/

URL 14: Retrieved March 25, 2012, from the World Wide Web: http://www.homedsgn.com/2012/05/17/buenos-mares-villa-by-rdr-arquitectos/

URL15: (http://en.wikipedia.org/wiki/Design_elements_and_principles)

URL16: Retrieved March 25, 2012, from the World Wide Web: http://www.art-in-berlin.de/incbatektur2.php?id=423

URL17: Retrieved March 25, 2012, from the World Wide Web: http://www.omdesign.co.uk/web-design-london/2010/11/the-principles-of-design-how-does-web-design-fit-in/

URL18: Retrieved March 25, 2012, from the World Wide Web: http://le_woltaire.sitesled.com/projects.html

URL19: Retrieved March 25, 2012, from the World Wide Web: http://www.decodir.com/2010/04/rythmic-and-subtle-modern-restaurant-interior-design-by-so-architecture/

URL20: Retrieved March 25, 2012, from the World Wide Web: http://cutedecision.com/creative-design-japanese-starbucks-coffee-shop-in-tokyo/

URL21: Retrieved March 25, 2012, from the World Wide Web: http://www.homeinteriormag.org/tag/architecture/

URL22: Retrieved September 10, 2012, from the World Wide Web: http://www.paphosfinder.com/paphos-cyprus-maps/index.htm

URL1 23: Retrieved March 25, 2012, from the World Wide Web: http://famagustawalledcity.com/interactivemap/

URL 24: Retrieved March 25, 2012, from the World Wide Web: www.googleearth.com