A Methodological Approach To The Usage of Colour on Façade Design: Case of Salamis Road, Famagusta

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ABSTRACT

Today potentials of colour are not adequately appreciated in architecture and urban design, although colour has many abilities in functional, formal and symbolic terms. Colour, like in all visual arts, is an indivertible mean of design in architecture. Advantage is taken from visual arts when considering the magic of the colour. A part from the professional projects, the colour on the surface of the buildings is applied without considering the environment. Whereas, it is not possible to perceive the building on its own. They are the part of the natural and build environment where they are located. Sometimes they have colour and proportion harmony but sometimes they can be unharmonious.

This thesis has five parts which argue that some effects can be given to the buildings in natural and build environment be using colour on their surface. In the first part of the thesis, the problem is defined. Method and limitations have been expressed. In the second part, the perception of colour, colours in architecture and colour perceptions are defined by using the information in literature. In the third part, the *culture, geographical conditions, climatica factors, design notions* and *gestalts* are investigated related to colour and they are defined through examples. In the fourth part, methods are improved for the usage of colour on the building façades. Through this method, using tables and sample street silhouette how to create the colour effects on the building according to its location in an environment and in the street is explained. The last part of the thesis, the fifth part, includes conclusion and recommendations.

The aim of this thesis is to help to maintain the accurate usage of colour on the façades of architectural surface.

Keywords: Colour, Colour in Architecture, Colour in Façade design, Design Notions, Gestalt, Gestalt perception, Colour Perception.

ÖZET

Simgesel, biçimsel ve işlevsel anlamda küçümsenmeyecek yetenekleri bünyesinde barındırmasına karşın renk bugün, mimarlık ve kentsel tasarım gündeminde potansiyeli yeterince değerlendirilmeyen bir öğedir.

Renk, tüm görsel sanatlarda olduğu gibi mimarlıkta da vazgeçilmez bir tasarım öğesidir. Ancak mimaride kullanımının hak ettiğince gerçekleştirildiğini söylemek mümkün değildir. Bilir kişiler tarafından gerçeklestirilen projeler dışında, genel olarak bina yüzeylerinde kullanılan renk, çevre dikkate alınmadan uygulanmaktadır. Oysa ki binalar yalnız başlarına algılanmaları mümkün değildir. Bulundukları doğal veya yapay çevrenin birer parçasıdırlar. Kimi zaman oran ve renk olarak, bulundukları bu çevre içerisinde uyumlu, kimi zaman ise uyumsuz olabilirler.

Bina yüzeylerinde kullanılan renklerle, bulundukları doğal veya yapay çevre içerisinde binalara birtakım etkilerin verilebilineceği savunulduğu bu tez beş bölümden oluşmaktadır. Tezin ilk bölümünde problemin ne olduğu ortaya konulmuş; metot ve limitasyonlar belirtilmiştir. İkinci bölümünde literatürdeki bilgilerden yararlanılarak, renk, mimari yapılarda renk ve renk kullanımı ve renk algısı anlatılmıştır. Üçüncü bölümde ise mimari cephede renk kullanımını etkileyen faktörler incelenmiştir. Bu faktörler beş ana başlık altında özeltenmiştir. Bunlar sırası ile *kültür*, *iklimsel ve coğrafik yapı*, *tasarım prensipleri*, *geştalt prensipleri* ve *malzeme ile doku* olup bu faktörler bina cephelerinde, renk bağlamında incelenip, örneklerle anlatılmıştır. Tezin dördüncü bölümünde ise bina cephelerinde renk kullanımına yönelik bir metot geliştirilmiştir. Geliştirilen methot ile binaların

bulundukları çevrede, sokak içerisindeki konumlarına ve oranlarına göre binaya verilmek istenilen etkinin renk ile nasıl yapılabilineceği tablolar ve örnek sokak siluetleri yardımıyle anlatılmış ve yorumlanmıştır. Tez, sonuç ve önerilerin bulunduğu beşinci ve son bölümle sonlanmaktadır.

Bu çalışma mimari yapıların dış yüzeylerinde renk öğesinin yeterli ve doğru biçimde kullanılmasına yardımcı olamak üzere bir başvuru kaynağı oluşturma amacına yönelmiştir.

Anahtar Kelimeler: Renk, Mimarlıkta Renk, Cephe Tasarımdında Renk, Temel Tasarım Prensipleri, Geştalt, Geştalt algı, Renk Algısı.

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To My Family…

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Chapter 1

INTRODUCTION

1.1 Definition of the Problem

Colour is one of the most essential parts of all kinds of visually art and hence it can be stated that, it is also a very fundamental design factor. However, it would not be far away from truth to state that, it is not utilized as much as it would deserve.

Designers, such as artists, stylists, interior designers, architects etc. play a key role regarding the issues of colour. Through positive engagement of colour into their design activities, their daily design activities, they can help colour in taking its deserved place both in the creative and scientific domain.

Colour is not an occasional component of human life. It is an agent which people come across with very frequently in their daily lives. For that reason, colour is also quite important for the visual patterns of cities. It is not a seldom fact that a city is sometimes remembered by giving reference to its colours. For example, when talking about the city of Turin, Turin's yellow comes into mind. In a similar way, when the focus is on the Bruno Island in Italy, colourful streets pop up in our imagination. Or, when Mykonos or Santorini in Greece are the topics of conservation white wash façades of houses and blue door and windows spring to mind.

When colour is used in a suitable way, it gives a city an identity and also a character to its architectural elements. However, sometimes when it is not used in a suitable manner, chaos as an unrequested result the perception of the city. Colour with this chaos creates a city appearance with an unharmonious environment.

Due to unplanned urbanization, there is an increase in the number of cities in the world that lost identity and an increase in the number of buildings with different characteristics, widths and heights, without any architectural concern. In a city with unplanned urbanization, when a building is being designed, the architect in question –while colour is a constituent that gives character to architectural elements- does not pay attention to colour and the client and construction companies see the colour as a last touching. However, the colour of a building is a constituent that is noticed first and sticks in the mind the most and also gives buildings an identity and a character. The problem with colouring buildings sometimes arises when a new building will first be coloured and sometimes when an existing building will be recoloured.

Hence, it can be stated that, regarding colour, one of the major problems is at the city scale, and that is the one leading to visual pollution with chaotic appearance and unhealthy environments with urban tension in the long run. On the other hand, at a building scale, this study wants to bring into light another problem and that is the one related to the design process, where the architects are deeply involved. This problem as a starting point, originates from the fact that, the architects to be, during their education do not usually come across the appropriate and meaningful usage of colour on building façades. During the learning process in the studio, there is rarely some time left to discuss this colour dimension of the elevations of their projects. Besides, architectural educational curricula do not often include special courses focusing on a design methodology for using colour on building façades.

Sometimes, it can happen that, the architect, with his/her intrinsic sensitivities and help of 3D modelling technologies, does include colour during the design development stage. In such cases, another dimension of the problem can be mention and that is the one relevant to the inclusion of the context with its various existing colours into this decision making process. Unfortunately, the case in cities where unplanned urbanization is active, the architect rarely takes into consideration the colours dominating the street silhouettes. One could say that, the ideal situation would be where the architect or the design team cooperates with colour experts, city experts and landscape designers. This study want to emphasize that one of the other problems under discussion is the reality that, such cooperation rarely takes place.

Another aspect of the problem involving colour in the building scale it the application of colour at the implementation stage of the design. It is not an infrequent situation to observe that colour comes in as a final touch to the façade and on top of that, frequently as a choice of the construction company or the customers himself/herself. The architect is not often even consulted about the whole process.

1.2 Aims and Objectives of the Thesis

Having in mind all the problems already mentioned above in the earlier sections of this chapter, this study has several aims and objectives. One of the primary aims is to remind other researchers, architects, academicians, educators, and all other people involved in environmental space the importance of colour. Colour is too important to be ignored or neglected. Colour is too important to belong to only painters. Our environments can be much healthier and less tense with the correct usage of colour. For this study, this is extremely important.

Based upon this significance of colour, this thesis, as a second step, hopes to provide a useful summary of available theoretical information regarding colour. Within this theoretical framework, it hopes to include the following issues: Colour basics, colour in relevance to architectural environment and to human perception. Besides, further on, expanding on this theory, it aims to include theoretical considerations at certain junctions, where colour theories meet with building surfaces. From the perspective of this thesis, this means, to include an overview of "design principles" in general and "Gestalt theory and principles".

After a successful analysis of the above mentioned theoretical considerations, this thesis as an end product, aims to develop a model for the usage of colour on building surfaces. In order to create a healthy working model, this study has several fundamental research questions. These questions, similar to the overall approach of the study to the research problems are put forward at two levels: City scale / City planner level and the Building scale / architectural level.

The research questions addressing the first level (City scale / City planner level) are as follows:

- *Can, a street that has superficial, different proportions and sizes of buildings with unharmonious surface colours, be transformed to a more harmonious condition? If so, how can it be done?*
- *In an environment where colour and proportion is in harmony, can a function be highlighted through the usage of colour? If so, how?*

The research questions addressing the second level (the building scale / architectural level) are as follows:

- *What are the different types of effects that can be achieved through the usage of colour on building façades?*
- *How can a designer/architect decide upon, which one of these effects will be implemented on the building façade under focus?*

Within this scheme, following and combining these concerns, this study has a main purpose and that is to answer the following question.

- *What kind of a model, could help to improve our living environment through the usage of colour?*

In other words, as a summary, it can be mentioned that the main purpose of this study is to design a practical and easy to use model, which will help to find solutions to all the problems mentioned above. To support the justification and practicality of this model, this research, aims to identify a specific study area within the perimeters of the living environment of the researcher. With this aim in mind, the current research want to test this model on a part of the Salamis Road, which is one of the most colourful and unharmonious high streets of this city.

1.3 Research Method of the Thesis

This study in a very wide and general sense can be categorized as a qualitative research; however, when going into details, similar to much other research done in the field of architecture and environmental studies, it has a hybrid approach. The most original aspects of this research and its methodology are also hidden within this hybridity, which has a dual nature. Although, in the beginning, this seemed to create complications, throughout the study, on the contrary, it turned into a positive outcome. And that is actually the second nature of the duality.

1) The research method and the structure of the thesis, after a certain phase of the theoretical readings and analysis, started to overlap with each other and in fact towards the end merged into one.
2) The two parallel actions of research, which can be summarized as the creation of a model out of theory and the on-site analysis on Salamis Road, started to feed each other and hence shape too. In this way, the research process started to develop between this imaginary dialogue between the theory and practice around colour and the Salamis Road.

The steps and aspects of the model and the methodology of research are hence explained further explained in detail in Chapter 4. However, in order to help a better understanding of the thesis, a brief summary is provided below.

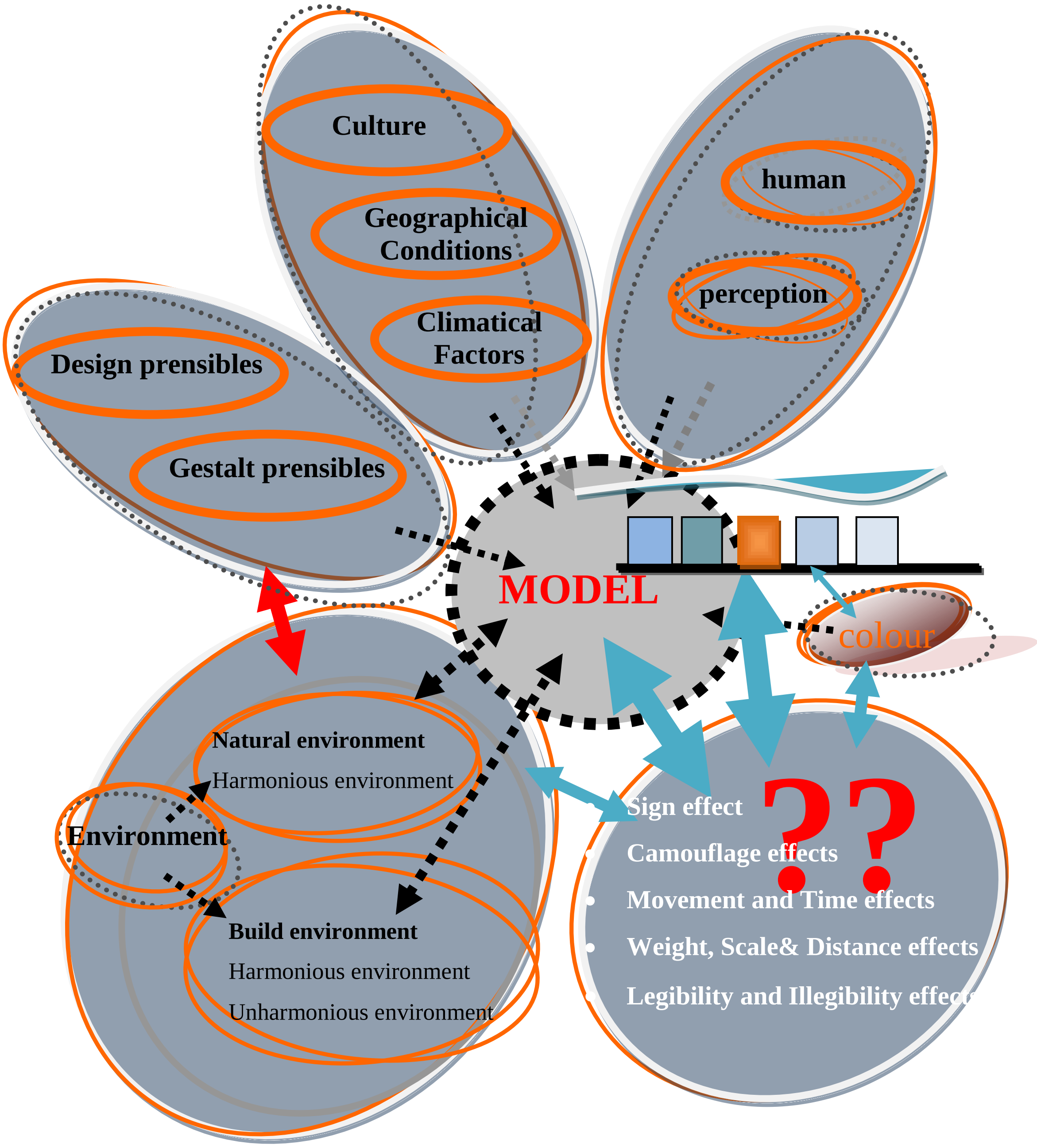


Figure 1. Model development

In the second part, the model has been developed as a result of author's investigation on academic articles related with the topic that leaded to observations and evaluations. When model was being developed, the importance of colour usage is taken into account, architectural surface, building surfaces and outdoor surfaces are examined from various resources. In the scope of the model, these factors are approached as design notions and gestalt perception theories and formed a part of the model. Also, the effect of colour with theoric compilation is again another factor that has an impact on the model. Thus, in the close environment, colour used on building surfaces and how and what effect from the identified five effects (Sign effect, Camouflage effect, Movement and Time effect, Weight, Scale and Distance effect, Legibility and Illegibility effect) will be possible, has been developed to the extent of the model (See, Figure.1).

The model that is developed is constructed in two steps. In the first step, in order to provide the intended effect, colouring of façades in the scope of city planning scale is essential for the building in the street's skyline and the second step is to colour façades in architectural scale. When developing the model, questionnaire studies about evaluation, analysis and onsite observation, photography, measuring and colour perception with community dwellers, are performed and used as a method. As a result of study, a model has been prepared and check list tables are generated. With the usage of these check lists, an assumption was made that a number of effects can be given to the building with the usage of colour on building surfaces. In this assumption and in the third step where these check lists will be tested, Famagusta City's Salamis Street is chosen as a pilot area and the model has been used in this area. All the visual work, photographs and tables that are used in this part, are formed by the author and the maps are obtained from Google Earth and Famagusta City Planning Department.

1.4 Limitation of the Thesis

This study has some limitations. In this study, when colour concept is being researched, the usage of colour on façades of outdoor spaces is being examined instead of interior spaces. Interior spaces and other architectural constituents that form buildings are not included in this study. Colours of the building is taken into account as a first perceived image and the colours that are used for each architectural component of the building and colours of the details are not taken into account in this study.

For a person to perceive the colour, the biggest factor that is required is light. If there is no light, there is no colour. Colours that are used for building façades can be detected differently depending on their location day and night. There are two types of light which are called natural and build. In the process of preparing the thesis, build light factor is not considered and only colour perception in the daylight is being constructed. Within this context, this study examines what effects can be created by using the colours on building façades under the daylight.

According to different societies and cultures, colour concept differs in terms of psychological and sociological factors and it is a known fact that sometimes it has symbolic and sometimes it has cultural or cosmetic values. However, culture-colour relationship is included in study but excluded from the model.

Colour and colour selection which are important for building façades differ according to geographic structure and climate conditions. For the countries that have hot or cold climate conditions, materials used and colours are quite important. However, as this study is mostly constructed on perception and colour-human relationship is wanted to feature, geographic factors like climate conditions are included study but they are excluded from the model.

1.5 Structure of the Thesis

This thesis composed of 5 main chapters. If no attribution is provided for a drawing or illustration, it is the author’s own. The first chapter is an introduction to the research and explains the aims; objectives and research questions of the study, list of sections included in this chapter, the framework of the thesis methodology and discuss the limitation of the research.

The second chapter of the thesis is developed by approaching colour-architecture-human trinity. This chapter is formed of three parts in itself. The first part includes colour theorems and basic information with respect to colour. The second part explains colour’s cultural structure and colour’s relationship with architecture and its usage in architecture in the recent past. And the third part explains the effects of colour on humans and human psychology. In this chapter, colour, colour-architecture and colour-human concepts are examined.

Third chapter of the thesis has also two parts. In the first part, the culture, geographical conditions, climatica factors, design notions and gestalts are investigated related to colour and they are defined through examples. Finally, five effects that can be provided by colouring the building façades are described on contemporary architectural illustrations that are in the recent past. The part that forms a section of the method and that is developed with the help of theories is located at the end of this chapter in the evaluation section. The chapter is finalised by the developed tables and formed models.

In the fourth chapter of the thesis, evaluation studies are carried out and the model that has been created and implemented in Salamis Street, in Famagusta of Cyprus and with the help of data that has been drawn from the implementation, recommendations are developed.

In the fifth and last chapter of the thesis, the general conclusion and recommendations in relation to what research can be carried out about the subject, in the future, are included.

Chapter 2

COLOUR AND HUMAN DIMENSION IN ARCHITECTURE

2.1 Colour Basics

> "In his younger the sixth Ch'an patriarch Huineng visited the Fahsing temple. He overheard a group of visitors arguing about a banner flapping in the wind. One declared: 'the banner is moving'. Another insisted: 'no, it is wind that is moving'. Huineng could not contain himself and interrupted them: 'you are both wrong. It is your mind that moves" Tun-huang manuscript, Tenth century (Bayık, 2001 – Kuehni, 1983).

The chapter is focused specially on general information, theoretical background and physical properties of colour and also it is focused on colour and environment relationship and Human - Colour Perception. Although, it is intended to provide basic concepts and terminology, which are primary importance at understanding of physical and psychological aspects of colour.

> "Being one of the first stimulants humans react to from the birth, colours are elements that cannot be given up in human life. It is not only an aesthetic concern but it is also a physiological concern and mostly a psychological need. That's why it is essential for a designer to understand colours and how to use them" (Haydaroğlu, 2006, p:20).

Colour is the sensory perception based on the light absorption capacity of different surfaces. The amount of light that is not absorbed by any individual surface and reflected as residual light produces a colour sensation within the visual system of the observer. A red object for example, appears red only because it absorbs all rays of light except for the long waves that it reflects to be perceived as red light. The object does not have the colour itself but its surface's molecular constitution is such that it would not absorb the red part of the light shed onto it. This means colours of objects are subtractive (Yağız, 1995).

The definition of colour can be changed from one person to another according to their profession. According to Bayık, colour is pigment however for a physicist it can be a function of a radiant energy of light. From the psychologist's point of view it can be a mean of perception, which forms out in the mind. Furthermore, according a person who experiences objects in daily life, colour is a property of the substances and light sources. Actually, the definition of colour is the total of all these results. On the other hand, according to an architect, despite of changing definition from one to another, colour generally means as a design concept, which affects the perceptual experiences of the architectural end-product. Architect as a designer, mostly benefits from the natural tectonics of the materials while creating architectural objects in order to apply colour to the façades. As a matter of fact, from the architectural point of view the colour is a design concept, which is actively involved into the language of the architecture for the expression of thought (Bayık, 2001).

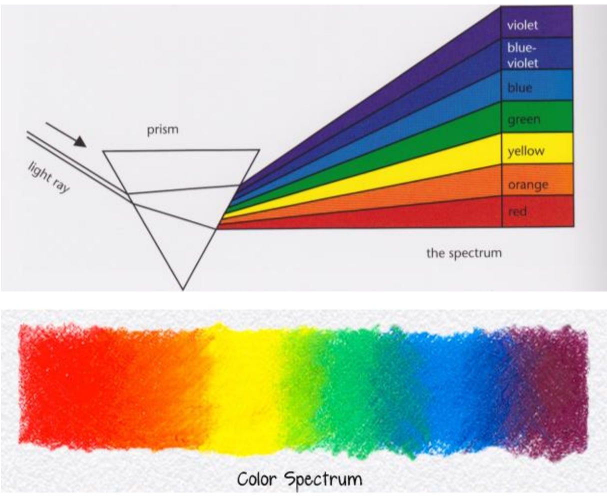


Figure 2. Colour Spectrum (URL 1)

Colour comes either from natural or artificial light. The light rays coming from the sun are composed of waves that vibrate at several speeds. The sensation of colour is deeply interconnected with the human mind and the way that the human vision perceives and responds to the different wavelengths of light. This can be proved through a simple experiment; a beam of light passes through the longest wavelength a glass prism and reflecting from a white surface, separating into different colours: The spectrum. We perceive the longest as red and the shortest as violet (See Figure.2).

In this section, colour's definition, source, colour mixture and types will be examined besides colour circles and colour experts that are used from past to present will be approached and the differences in between will be examined. The dimensions of colour and their meanings will be discussed. After analysing colour concept, its formation, theory and dimensions, colour harmonies will be approached and basic colour schemes and colour interactions will be discussed (see Figure.3).

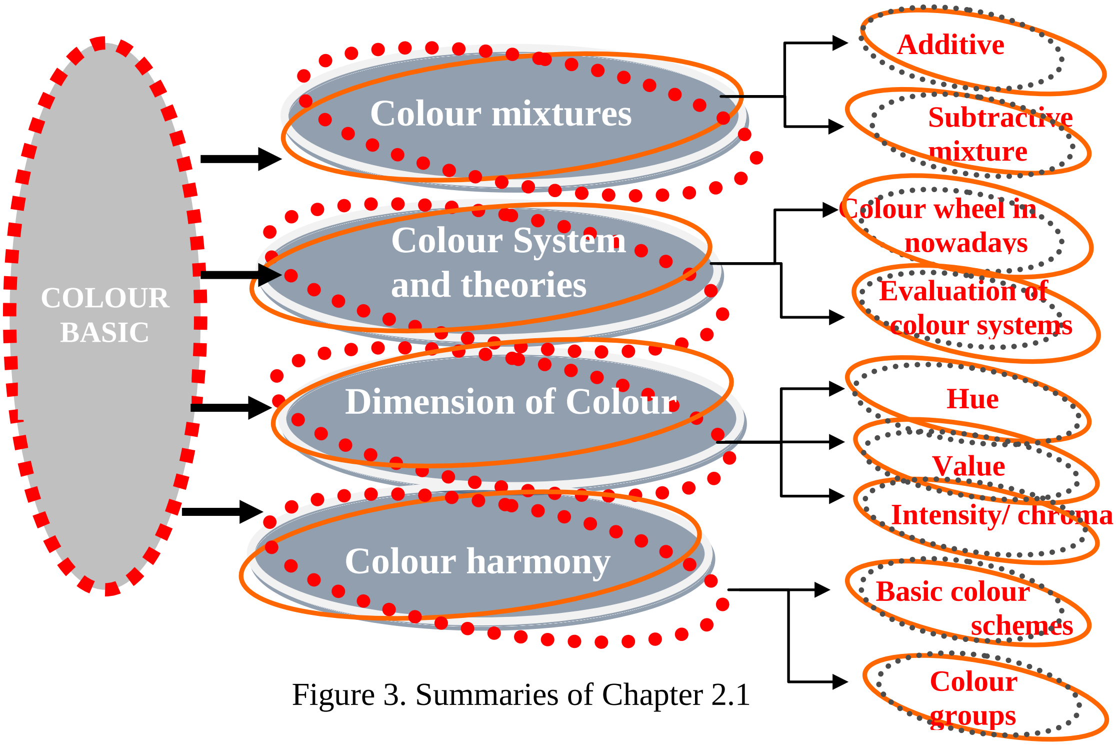


Figure 3. Summaries of Chapter 2.1

2.1.1 Colour Mixtures

There are two ways in order to reproduce a range of colour mixtures: the *additive* and *subtractive* methods. Additive mixture is when the light is mixed. When inks, dyes or pigments are mixed, that is subtractive mixture.

- **Additive Mixture (RGB colour model)**

The colours of the spectrum are pure and represent the greatest intensity (brightness) possible. If all of them are mixed in a reverse process again the white light is achieved. When such coloured rays of light are combined the system is called additive because the mixed are obtained by adding light rays instead of absorbing or subtracting them. (Yağız,1995). Additive colour mixture is the creation of colour by mixing colours of *light*. The additive mixture refers to the process in which colour are produced by addition of coloured light. All applications of coloured light are based on principles of additive system (Briggs, 2007).

Additive colour mixture begins when there is no light (black). Then several colours of light are added together in order to form new colours. Three slide projectors can illustrate how the additive colour mixture can be achieved.

Blue, green and red are used as the additive primary colours. The blue colour is the one-third of the spectrum. The green colour is the second-third. The red colour is the remaining third (Adanson, 2010a).

When two colours are put together or overlap, the combined result accounts for the two-thirds of the spectrum (1/3 + 1/3 = 2/3). Those combinations always produce the following colours: magenta, yellow and cyan. When all three additive primary colours were add together in equal intensities, the combined result is the white light.

Figure.4 reveals how the green, red and blue flashlights appear when they are projected in a dark wall. The black colour, that in essence is the absence of light, is the starting point for additive mixture. Additive colour is used for several purposes. Computer monitors, TV screens and theatrical lighting are only but a few examples (Adanson, 2010a).

Figure 4. Additive principle of colour combination (Light) (URL 2)

Therefore, since the combination of these three colours produces white light (W), the blue (B), the green (G), and the red (R) are referred as primary colours of additive system and a combination of three additive primaries obtains secondary additive colour might be represented by the following figure (see Figure.5).

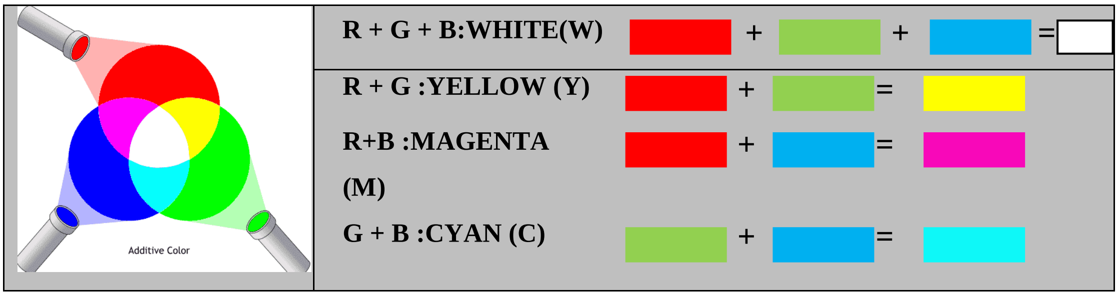


Figure 5. Primary and secondary additive colour (URL 3)

- **Subtractive Mixture (CMYK colour model)**

The colours in subtractive colour mixture are created as in the additive mixture. As an example, the combined result of green and red light (they contain one-third of the colour spectrum respectively) will always be a yellow light (two-thirds of the spectrum are contained). It is not of importance whether white light is taken and subtract one-third of the spectrum or alternatively start with black light (in essence no light) and add two-thirds of the spectrum (Adanson, 2010a). A subtractive colour model explains the mixing of a limited set of inks, dyes, and natural colourants or paint pigments for the creation of a wide variety of colours each of which has been created by the subtraction or absorption of some wavelengths of light instead of some others. Depending on which parts of the visible spectrum will not be absorbed (and therefore remain visible), will significantly affect the nature of the colour that will be displayed on a surface.

The pigments (the colouring matter) are less strong in terms of their intensity or pureness compared to the spectrum colours because their surfaces reflect more than one dominant colour. In other occasions their surfaces might reflect a specific amount of white that dilutes the colour’s intensity. When all the pigment colours were mixed the result will not be a white colour but rather a muddied colour such as black (Yağız, 1995).

Subtractive colour mixture follows the same rules as additive mixture on the way the colour lights interact with each other and the way that they stimulate the human eye. Subtractive mixture is an integral part of almost every practical use of color. Photography, painting, fabric dying and painting are only but a few examples of subtractive mixture.

The first stage of subtractive mixture is when there are all the colours of light in the form of the white colour that is reflected from a white surface. A white surface could be a piece of paper. In the next stage, inks, filters and dyes are used in order to subtract a part of the reflected light. The key element for understanding of how subtractive mixture works is to fully comprehend the way in which colours are subtracted. If there is a white piece of paper and ink or yellow paint is put, it would appear as if the colour was added to the paper. However, the colour already exists; all colours are reflected almost equally in the white paper (Adanson, 2010b).

The term subtractive mixture refers to the selective action towards different wavelength performed by molecules containing in almost all the material. Such molecules, called pigments, have property to subtract certain wavelengths of visible light, resulting in decrease in the relative amount of radiant energy at some regions of the spectrum (Evans, 1948, Artyukhova, 2009).

Cyan (C), magenta (M) and yellow (Y) represent the primary colours of the subtractive system those are former by the subtraction of one of the primary colours from additive mixture. In contrast to the additive mixtures, none of the combination of subtractive color can produce the white colour.

However, when all three subtractive primaries are intermixed in equal proportions, primary additive colour are eliminated from white light and theoretically black – that is absence of all light - is obtained (see, Figure.6) (Davidson,2008). When two of the three primary colours are overlaid, they subsequently subtract one colour each thus allowing the third colour to be reflected. For instance, if yellow and magenta were overprinted on white paper then the magenta would have absorbed the green light. The blue light is absorbed by the yellow light. The red light is absorbed by the cyan and thus when it is reflected by the white paper the viewer can see the orange colour (Adanson, 2010a).

Besides, pairs of primary colour in subtractive system can be mixed to from subtractive secondary's that are green (G), violet (V), and orange (O) (Henderson, 2007) (See Figure.6). Formation of primary and secondary colour in subtractive system is illustrated by the following equations:

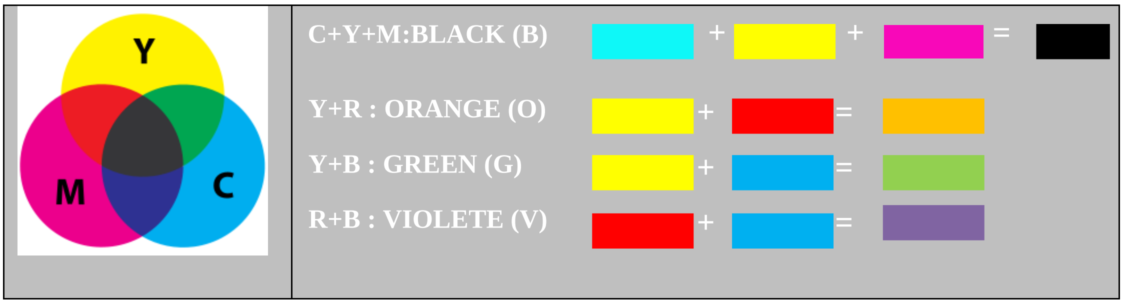


Figure 6. Primary and secondary subtractive colour (URL 4)

Therefore, additive and subtractive colour mixture evaluation might be represented by the following Table. (See, Table 1).

Table 1. Evaluation of Additive and Subtractive Colour Mixture

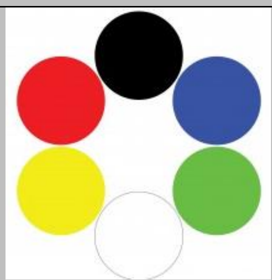
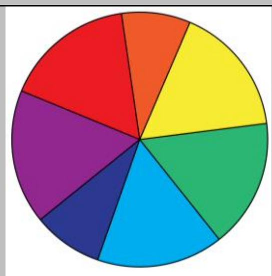
Evaluation	**Additive Mixture**			**Subtractive Mixture**		
Creation	Additive colour mixture is the creation of colour by mixing colours of *light*.			Subtractive colour mixture is the creation of colour by mixing colours of *pigments*.		
Primary colours	Red	Green	Blue	Cyan	Yellow	Magenta
Secondary colours	Yellow	Magenta	Cyan	Orange	Green	Violet
Mix all						

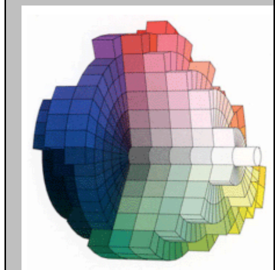
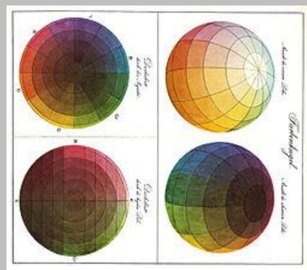
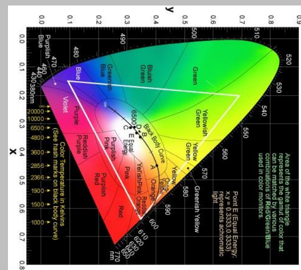
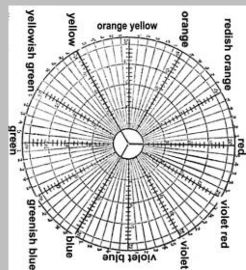
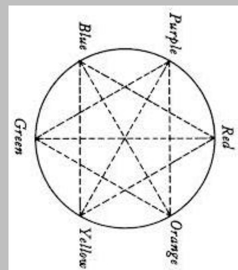
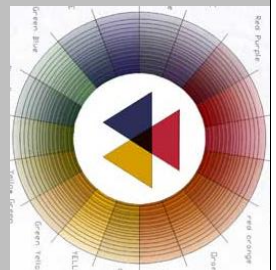
2.1.2 Evaluation of Colour System and Theories

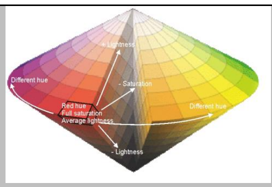
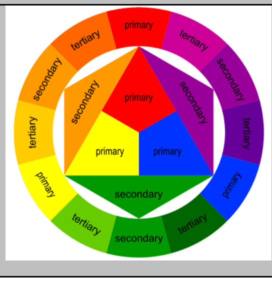
In the historical process, colour is regarded as the most ‘relative’ tool in arts and with the discovery of the need for a number of rules; it appeared that more critical distinctions are needed. Many scholars and artists dealt with the topic, did research and designed two dimensional and three dimensional systems. With information and technological advancements, researches and theories are filtered through science, the ones that proved the accuracy, have still been accepted in today’s world and the ones that have not been accepted are regarded as steps in the path. In the research and studies, it is seen that scholars that work for the colour system and theories to be developed, come from different disciplines. For example, scholars that are artists, poets, physicists or chemists have many studies about colour systems.

In this study, the scholars that have studies on colour circle or colour ball and scholars that have theories that are accepted and are being used in today's world, were selected. Furthermore, it has been paid attention for these chosen scholars to be from different disciplines. (For more detail about *Evaluation of Colour System and Colour Wheel*, see Appendix A). Evaluation of colour wheel is sumarrasied in Table 2.

Table 2. Evaluation of the colour wheel

	PERIOD	OCCUPATION	STARTING POINT OF COLOUR WHEEL	INTEREST	COLOUR WHEEL	PRIMARY COLOURS
Leonardo da Vinci	17th century	artist and scientist	Nature	subtractive colour mixture -Perception of colour		Red Blue Yellow + Green White Black
Sir Isaac Newton	17th century	physicist	Nature	Additive colour mixture - physics of colour		Red Blue Yellow + Green Orange Indigo Violet

Albert Munsell	**Philipp Otto Runge**	**CIE**	**Michel Eugene Chevreul**	**Walfgrang von Goethe**	**Moses Harris**
19th-20th century (1858-1918) theorist	18th - 19th century / (1777 – 1810)	20th century (1931)	18th - 19th century / (1786-1889)	18th - 19th century / (1749 – 1832)	18th century / active 1766-1785
chemist	Painter	International Commission	Chemist	Poet	entomologist and
Chemical	Chemical (3D colour)	Standardization	Psychology	Psychology	Nature
Subtractive colour mixture	Subractive colour mixtue	Additive colour mixture	Additive colour mixture - physics of colour& psychological factors of	Additive colour mixture -physics of colour&	Subtractive colour mixture
					
Red Yellow Blue Green Purple	Green Yellow Blue	Blue Green Red	Red Blue Yellow	Red Blue Yellow	Red Blue Yellow

Wilhelm Ostwald	19^{th}-20^{th} century (1853-1932)	German chemist	Geometrical colour model	Subtractive colour mixture		Red Yellow Blue
Itten	19^{th}-20^{th} century (1888-1967)	Teacher	Psychoanalysis	Subtractive colour mixture		Yellow Red Blue
Colour wheel in nowadays	Nowadays	---	---	Subtractive colour mixture		Red Yellow Blue

2.1.3 Dimension of Colour

In daily speech, colours are often described either in relation to common physical object (e.g. yellow like lemon, or green as a grass), or by attaching different adjectives to colour name (e.g. vivid red, dull blue, muted yellow). However, in any professional applications such colour descriptions would lead to misunderstanding as every individual, while defining colour by means of adjectives or objects, relays on subjective experiences and impressions. Indeed, since the middle of 19^{th} century many manufacturers, artists and scientists realized subjectivity of such verbal characterizations as it did not provide precise colour definition. As a result several ways were devised to give specific colour a particular description based on the primary aspects or colour which are: 1) spectral category a particular colour belongs to; 2) degree of lightness or darkness of specific colour; 3) intensity (for purity) of colour (Miller, 2001).

Dimensions which are basic to all colours can be accurately measured and are essential in visualizing and describing colour. Hence, presently, in order to avoid confusion, international accepted terminology is devised and implied for colour communication in which the foremost requirements are the clear distinction and complete understanding of the three dimensions of colour that are *hue* (spectral category of colour), *value* (degree of lightness of darkness of a colour) and *intensity* (or Chroma or Brightness or Saturation as varying forms of terminology for the same concept) (Artyukhova, 2009 p.76 -Evans, 1948, p.119).

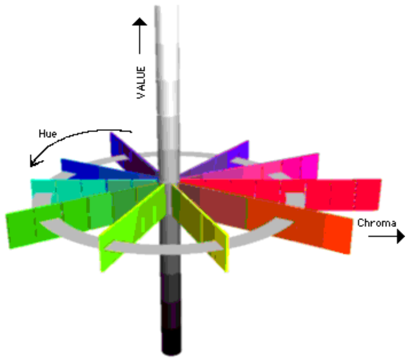


Figure 7. Three Dimensions of Colour and 3D Colour Wheel (Douglas & McKinstry, 2014)

In Figure 7. there is a colour wheel that shows all three proportions of colour. Every colour variation exists on a double cone. The colours change in hue when they move around this solid. The colours change in value when the hues move either up or down. When the colours of the outside move closer to the center their values are neutralized and the intensity or chroma changes (Ocvirk, 1985). Hue is the actual colour, the way in which colours differ from one another. There are twelve hues in the colour wheel red, orange, red-orange, yellow, yellow-orange, green, yellow green, blue, blue-green, violet; blue-violet and red-violet (See figure.8). The value is affected by the amount of mixture between white (or black) with the hue in the colour (Chijiiwa 1990, Callopy 2000). And Intensity or chroma is the degree of saturation of pure colour (Briggs, 2007).

- **Hue**

Hue is the attribute that lets colours to be classified as red, yellow, blue, green, orange, and violet. If the basic hue is mixed with neighboring hues in the colour wheel, a new hue will be produced and is named after the combination, with the dominant hue spelled out first such as: yellow-green, blue-green, blue-violet, red-violet, red-orange, yellow-orange (See figure.8).

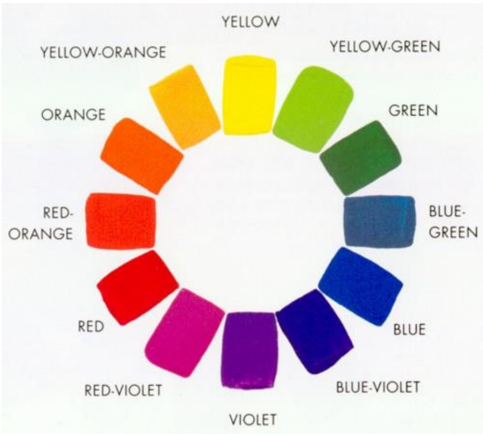


Figure 8. Basic hue and neighboring hues (URL 20)

- **Value**

The value is measured by the degree of lightness (or luminosity) and darkness of a hue in relation with the white and black. As maintained by A.Munsell, value is “the quality by which we distinguish a light colour from a dark one.” In other words, value refers to the relative lightness or darkness of a hue in accordance with black and white scale. The human eye can easily distinguish around nine gradations of value (Briggs, 2007)

Figure 9. Example of achromatic and chromatic colour values (URL 21)

The value of a hue can be raised by adding white and the result is called a *tint*, the value may be lowered by adding black and the result is a *shade* of that particular hue (See Figure 10). If gray is added, meaning both black and white, then the result is a third classification; a *tone*. These values of a hue may serve a variety of purposes when working out colour schemes in the act of designing, and can be used to express certain illusions with reference to the psychology of colour perception (Yağız, 1995)

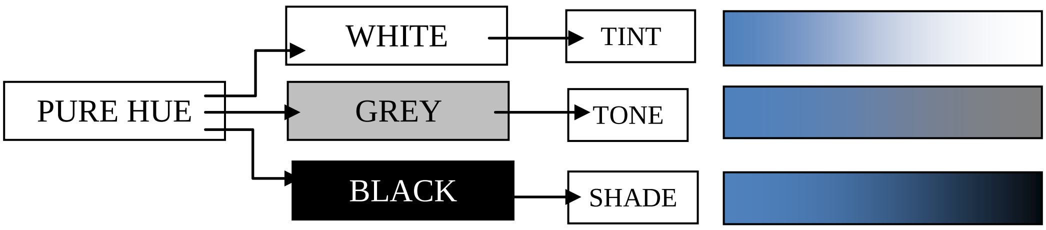


Figure 10. Tint, Tone and Shade of a Blue

Value is related with the lightness (or darkness) of a hue of colour. When there is more lightness (no black added), the value is higher. When the black colour is added the value is lower thus making the hue to appear darker. Value is measured when we look at a grey scale that varies from white (or very light grey) to black. We need to stress the fact that the human eye has difficulty distinguishing more than nine gray tones. It is also of importance to note that the differentiation becomes more difficult at the two ends (very light and very dark respectively) of the value scale. When there are value differences of ten percent the differentiation for easy value or gray tone is not that important. Differences between fifteen to twenty five percent are better suited for an easy gray tone differentiation. The background tone and/or shade also affect the value (Douglas & McKinstry, 2014).

- **Intensity (Chroma/saturation/brightness)**

Intensity or chroma is the degree of saturation of pure colour. The brilliance or dullness, the strength or weakness of the pure colour of a hue are indicated by its intensity. If more of the pure chrome is added to a hue its intensity or saturation is strengthened, if the percentage of pure chrome is reduced, the intensity is weakened (See Figure 11) (Yağız, 1995). In other words, intensity is degree of purity of a colour (such as 75% pure colour and 25% white / black; 50% pure colour and 50% gray) with respect to the neutral colour mixed in it. When the term *contrast of chroma was used,* it means the contrast between the pure and the dull (or diluted) colour (Yağız, 1995).

Figure 11. An Example for Intensity (URL 22)

Chroma (in other words the intensity, saturation, richness or purity of a colour) is in simple words the comparison of a hue to a neutral gray (neutral grey is achromatic whereas a full hue is completely saturated or brilliant and pure. The chroma of every hue varies between 0% (that is neutral gray) to 100% (that is the maximum saturation of colour or chroma). The colour contains no grey and appears pure at the maximum level. We need to stress that the chroma levels vary per hue. For instance, the most intense blue-green appears lesser bright than the most intense yellow (Douglas & McKinstry, 2014).

2.1.4 Colour Harmonies

Harmony appears to be pleasing to the eye in visual experiences. Harmony creates an inner sense of balance and order to the viewer. As a result, harmony engages the viewer. On the contrary, when something lucks harmony it is perceived as either chaotic or boring. On the one extreme, there is a visual experience which is so bland that does not engage the viewer. Information that does not stimulate the brain will be rejected by the latter. On the other extreme, the visual experience is so intense that makes the viewer unable to look at it. The human brain automatically rejects whatever it cannot recognize. A logical structure is needed for the visual task. The colour harmony delivers visual interest as well as a sense of order. There are 3 types of colour harmony:

1. Hue harmony

The colour wheel could be used as the basis for the creation of hue harmony. The simplest colour scheme is monochromatic and is restricted to one hue. Another way is when hues (for example within 60 to 90 degrees) are taken from a portion of the colour wheel and are either juxtaposed randomly or used in gradation with a design.

When it is separated by 90 degrees or more on the colour wheel, hues contrast to a significant extent. The hues contrast more when the distance between the hues on the circle is wider.

If the hue gradations cover a large portion of the colour wheel then the analogy and contrast will be present in the colour scheme.

2. Value harmony:

The scale of gray is the basis in order to create value harmony. Analogous values in a design restrict the chroma and hue gradations to only one (or at least closely adjacent) value steps.

3. Chroma harmony

In chroma therapy, the notions of analogy and contrast are also applied. If some colours have the same chroma strength then they also have analogous chroma. Analogous chroma also occurs with hue gradations that maintain the chroma strength. As a result, hue gradations that maintain the chroma result in the analogous chroma. Also, colours in full chroma neutralize the hues and diminish the hue contrast.

Chroma, value and hue should all be taken into consideration even in case that only one of them is manipulated in order to establish colour harmony.

2.1.4.1 Basic Colour Schemes

The colour theory uses a set of basic colour combinations that are called «colour schemes». Colour schemes are perceived as harmonious. Therefore, they are widely used as a base in several colour applications such as digital mediums or architectural design (Quinn, 2008).

The basic harmonious colour scheme is described as follow:

- **Achromatic Colour Schemes**

Non-chromatic colours with the context of physics as a science in neutral colours there are no black, white and grey colours. They are obtained by mixing basic colours by directly mixing hue (Kalmık, 1964, Yılmaz 1991). A range of grays is produced when black and white pigments are mixed in varying proportions. Consequently, white, gray and black are called neutral colours (See, Figure 12).

Generally, term achromatic refers to black, white and all tones of gray. Thus, achromatic combinations do not contain any hue as they are developed from white to black colours (Carnright, 2004).

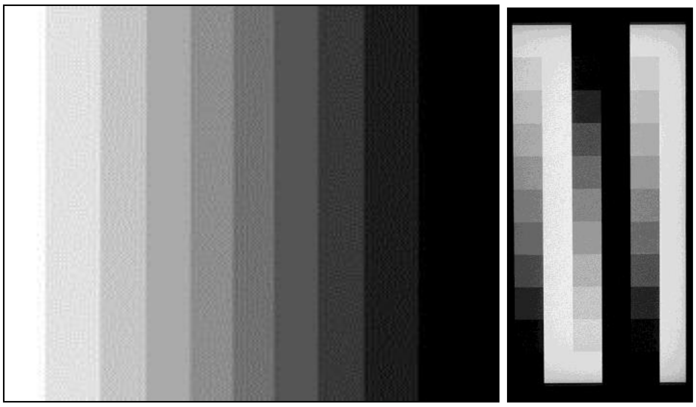
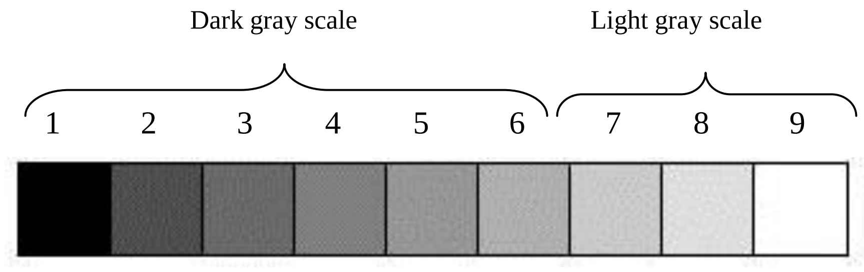


Figure 12. Achromatic Colour Schemes (URL 23)

Even though several steps of gray are possible, only nice are simple to be created (See, Table.3).

Table 3. The Gray Scale (URL 24)



The dark gray scale consists of	The light gray scale consists of:
1. extremely dark gray (blackness amounting to ninety percent)	7. light gray (blackness amounting to thirty percent)
2. very dark gray (blackness amounting to eighty percent)	8. very light gray (blackness amounting to twenty percent)
3. dark gray (blackness amounting to seventy percent)	9. Extremely light gray (blackness amounting to ten percent).
4. dark middle gray (darkness amounting to sixty percent)	
5. middle gray (darkness amounting to fifty percent)	
6. light middle gray (blackness amounting to forty percent)	

These nine steps are used in order to accurately systemize the hue. Table.3 shows a chart that has all the necessary steps. It is called a gray scale. Since the scale provides light-dark comparisons and no colour is as dark as the black or as light as the white, it does not show the black and white. The number 0 is given to the black colour since there is a complete absence of light and its blackness is 100 percent when printed. On the other hand the number 10 is given to the white colour since there is the maximum amount of light and its blackness is 0 when printed.

This standard scale is used as a guide to visual thinking. The naked eye can often judge the values inaccurately because the human brain tends to distinguish more gradations in the range of light grays instead of dark grays.

Black and white pigments are mixed in various proportions in order to obtain the grays that constitute the scale. A mechanical device was used in order to create the gray scale. It features machine-pigments halftones; there was not a physical mixture of black and white pigments.

- **Monochromatic Colour Schemes**

Any hue may be selected and mixed with the achromatic colours. Using a range of different degrees of intensity and values a scheme could be produced/achieved (Yağız, 1995).

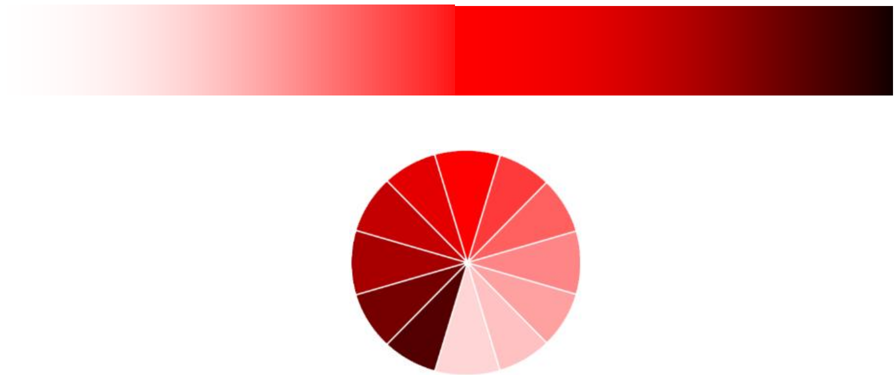


Figure 13. Example of Monochromatic Colour Schemes (URL 25)

The monochromatic combinations can be created by using a single hue with varying values and ranging degrees of saturation (Myers, 1989). Perhaps the most remarkable feature of such combination is unity; however in some cases it might be difficult to set distinct accents (Artyukhova, 2009 p.80).

- **Analogous Colour Schemes**

The analogous colour combinations are also called adjacent and related and produced by the hues that are closely juxtaposed on the colour wheel. Colours that are adjacent in the colour wheel are used in the analogous colour schemes. One must keep the number limited to no more than half the colours: 3 to 6 colours of the wheel (See, Figure 14) (QSX, 2007).

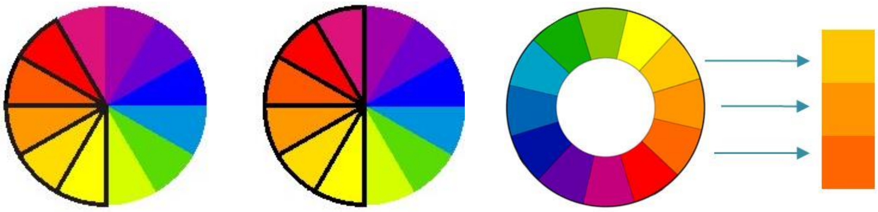


Figure 14. Example of Analogous Colour Schemes (URL 26)

- **Complementary Colour Schemes**

In colour wheel, two colours are seen further from each other and they are seen reciprocal. Contrast colours make each other powerful. With their contrasting colours, the colours can represent their essence characters easily (Yılmaz, 1991). Complementary colour combinations are made of hues that are face to face each other on the colour wheel (Birren, 1987, p.35).

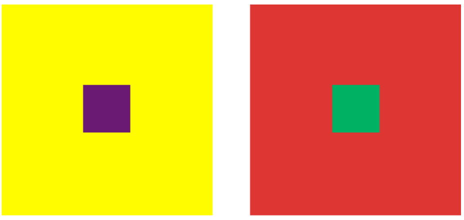


Figure 15. Example of complementary contrast (URL 27)

Every possible colour can be complemented with or opposed to another colour. When someone sees on the colour wheel complimentary colours such as green and red or orange and blue and yellow and violet can get accustomed with the opposite in colour. When one colour is eliminated from the colour wheel then outcome appeared as follows: the combined effect of all the remaining colours will produce the colours compliment. It is a fact that the human eye seeks the opposite colour. When the opposite colour is not present then the human eye will spontaneously generate it.

There can be a further division of the general group of complementary color schemes in specific sub-groups. Their definitions are the following:

-Direct complementary

The colours which stand face to face on colour wheel are direct complementary colours. These colours are orange – blue, green – red, purple-yellow, yellow orange – purple blue, red orange – green blue, red purple – green yellow. These colours always search for each other and when they become side by side they mutually increase their effects. If complementary contrast colours are mixed together they would lose their effect, they become dim and when they mixed together they create grey colour (See, Tablo.4).

-Double complementary (Tetradic-rectangle)

The tetradic (double complementary) scheme is varied the most due to the fact that it used two colour pairs that are complementary. It is difficult to harmonize this scheme. For example if the four hues will be used equally the scheme will look visually unbalanced. Therefore, a colour that is dominant or subdues the colours should be used (See, Table.4).

-Split complementary

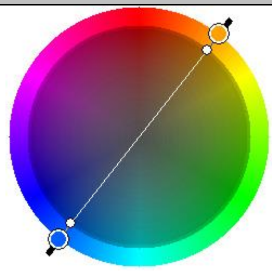
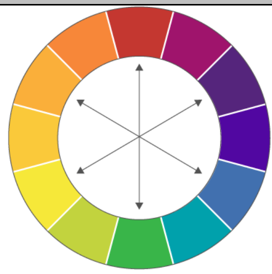
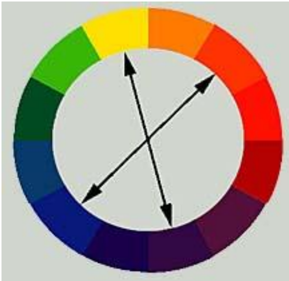
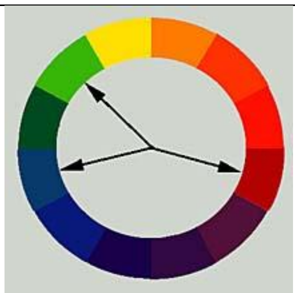
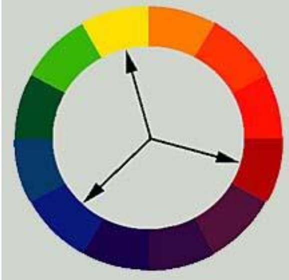
The split complementary scheme is in essence a variation of the standard complementary scheme. The split documentary colour uses a colour and the two colours that are adjacent to its complementary colour. As a result, a high contrast is created that does not have the strong tension of the complementary scheme. One hue and two hues that exist on either side of its direct complement forming a ‘Y’ shape on the colour wheel (See, Table.4).

-Triadic colour

Triadic colour combinations are composed of three hues which separated from each other by angle of 120 degree in a colour wheel (Myers, 1989, p.28).

Three colours that are equally spaced around the colour wheel are used in the triadic colour scheme. Many artists are fond of this scheme because of the fact that it offers a strong visual contrast while at the same time it manages to maintain its richness and harmony. The triadic scheme is less contrasting compared to the complementary scheme. However, it looks more harmonious and balanced (See, Table.4).

Table 4. Table of Complementary Colour Schemes (URL 28 & 29)

Complementary colour schemes		
Direct complementary		
Double complementary (Tetradic-rectangle)		
Split complementary		
Triadic colour		

2.1.4.2 Colour Groups

- **Warm - Cold colour groups**

There can be a simple generalization concerning the colour wheel. If a line is drawn along the violet yellow-axis then the following colours are referred as warm: orange, red-orange, yellow, yellow, orange, red, red-orange and red-violet. On the other hand, the following colours are referred as cold: green, yellow-green, blue, violet and blue-violet (See Figure.16).

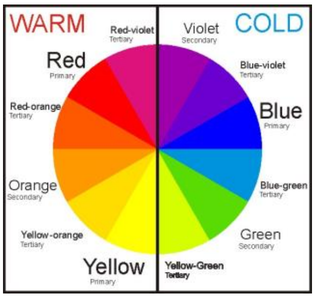


Figure 16. Warm and Cold colours on colour wheel (URL 31)

The coolest colour is the manganese oxide (blue-green) and the warmest hue the red-orange. Warm colours are called the group of colours between yellow and red-violet while cold colours are considered the hues from yellow-green to violet.

The combination of the excessive strength of warm and cold contrasts has been a part of some impressive artistic work. The artist is using this contrast when he wants to indicate the nearness and farness of objects. If painted beside cold colours, the warm colours will appear warmer. Accordingly, when the cold hues will be situated by warm ones they will appear cooler. Of course, the opposite can be applied as well. When cold hues were put alongside with warm hues they will appear warmer and the warm colours will appear less powerful when they are put next to other warm colours (HubPages & Hubbers, 2014).

2.2 Human and Colour Perception

The colour around us gets meaning directly with human perception. All the theories, approaches and comments with respect to colour, make sense when they get integrated with perception. In accordance with this, in this part of the study, human and human perception concepts are researched. Firstly, processes like light, object and eye & brain relationship that are needed for perceiving are analysed and how humans perceive colour is researched and illustrated. The effects of perceived colour on humans are included later in the research and it is seen that there are two kinds of effects on humans called Physiological and Psychological and these effects are explained (See, Figure.17).

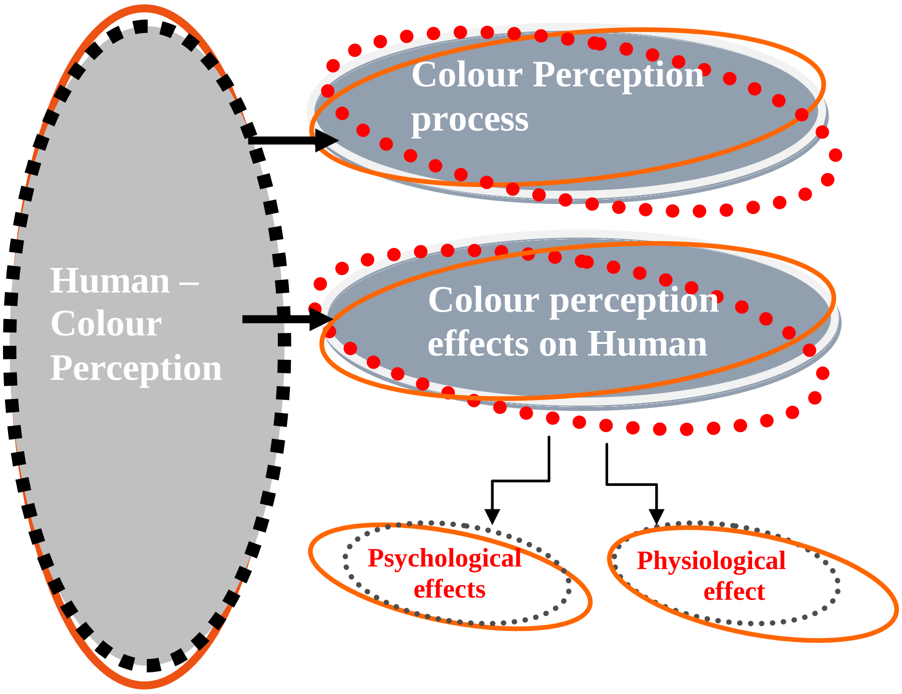


Figure 17. Summaries of Chapter 2.2: Colour Perception– Human Relationship

2.2.1 Colour Perception Process

Perception is the only way to communicate with the environment for all of the creatures who live and experience this universe. It is obvious that, all of the relations between a living beings and another depend on the balance between the stimuli and the reactions like all the other living creatures human being are bombed by the lots of stimuli, in daily life and most of the reactions against them are formed automatically by the human body. However, none of the stimulus is as important as the one that has a visual effect. Because, the visual perception provides individuals to recreate and modify the environmental in their minds (Bayık, 2001).

Colour is one of the most important aspects that constitute the visual perception. It provides human beings to perceive three dimensions of the object or distinguish them. From the scientific point of view, human colour perception can be considered in three different points of angles, which are determined by the different scientific disciplines. They can be categorized as the physical, the physiological and the psychological of colour. All of these domains define colour perception by the way that their professional point of view. As far as the scientists consider that colour perception process includes three important factors and steps (Porter&Mikellides, 1976).

Light, is the small portion of the electromagnetic spectrum of the radiant energy which is visible for the eye and provides human beings perceiving the space which they live in, is the primary element of seeing and observing colour. There are so many ways to perceive light, which stem from the environment that human beings exist. Light almost never comes to eyes directly from the glowing object, it is usually reflected or transmitted by them. Even if it comes from both the natural or artificial light sources, the objects, which creates environment, is required to refract them in order to let individuals perceived (Faulkner, 1972). There are two main light sources; the sun and the artificial light source elements for example tungsten filament bulbs, fluorescent bulbs, neon, led.

In fact, the objects do not have any inherent colour. They do not have any intrinsic energy to show themselves or their properties such as colour or texture. However, their reflected light provides them to be perceived. Objects can never be appeared without light that is always reflected, transmitted or absorbed by the surface of the object depends on the physical properties of the material. Consequently the changing quality of light alters the object's perceived colour and its visual perceptional peculiarities (Bayık, 2001).

> "If we take light for granted, we can consider colour as a property of objects in so far as it is the physical and chemical composition of the objects which will determine how much light to be absorbed and how much to be reflected." (Porter&Mikellides, 1976, p: 82)

Both absorbed and reflected light determine the colour of object. If an object, which is made by an opaque material, appears white this means that it reflects all wavelengths of light almost equally, and absorbs or transmits little or none. On the contrary, if it looks like black, this means that the opaque object absorbs light of all wavelengths equally and reflects or transmits very little. Since, in order to look coloured, the opaque object should reflect light of certain wavelengths and absorb their complementary selectively (Faulkner, 1972).

Eyes get information from the environment and transform the three-dimensional objects to the two-dimensional retinal images but brain reconstructs the object to the three-dimensional images. The information about the space is converted in mind with the objects that define the world according to their shape, size, texture and colour.

Although the basic components of the seeing have been understood as eye and brain for years, the relationship between these two organs has not been completely solved yet. It is considered as simple to explain colour in physical terms such as wavelength, reflection or absorption. However, the perception of colour includes also a complex series of effects. The basic components of colour perception process are eye and brain. Eye collects the information and the brain interprets it. Lights, which reflect or transmitted by an object, contain sensory messages of which the inner colour meaning will not be solved until it reaches the brain. They enter the eye through the cornea that covers and protects the eye from the environmental effects. It is a transparent outer covering. The muscles of iris provide to see well under different conditions of illumination. They expand or contract the iris in order to regulate the quantity of light available through the pupil (See Figure.18) (Kuehni, 1983).

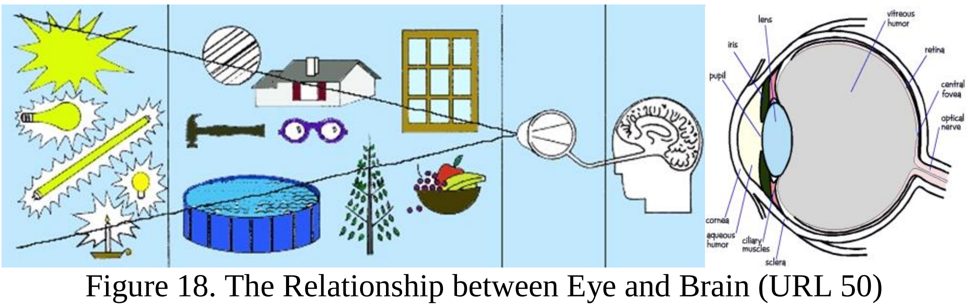


Figure 18. The Relationship between Eye and Brain (URL 50)

> "Thomas Young theory offers an understanding of the visual processing of colour by the eye and the Hering theory appears to be the most satisfactory explanation of our final perception of colour in the brain. It accounts for most of the colour phenomena discussed thus far" (Porter & Mikellides, 1976, p: 86).

As mentioned before the colour perception phenomenon is formed out by the three stages as effects of light, object, Eye-brain relation & psychological reactions of living beings. Eye-brain relation & psychological scales of these three stages are strictly based on the mental and physical structure of observer. Therefore the greater part of the process occurs in the mind. The psychological and the physiological types of the individual are influenced by it. As same as all kind of animals, human beings react against to the colour by means of their mental and physical systems.

2.2.2 Colour Perception Effects on Human

2.2.2.1 Psychological Effects

As it was mentioned before, the greater part of the colour perception process occurred in the mind of the living beings. Consequently the result of the process is highly influenced by the mental structure of the individual person. However it is obvious that psychological measurements are often subjective and in a manner which is hard to determine the principles for all living beings. Nevertheless, although the psychological response to the colour differentiated in details, it is possible to establish the general rules for the human beings. It is considered that by the scientists behind the psychological responses to colour are more basic responses to specific wavelengths of radiant energy. There are various effects which change the colour perception of the human beings such as age, culture, religion, etc… for instance according to the children, perception process is colour dominant more than the form dominant (Birren, 1982).

The main colour effects can be pointed out in two groups as warm and cool colours. The major hues of these groups red and blue cause different activation in the autonomic nervous system of the brain. According to the investigations warm colours causes the living beings overestimating time. On the other hand, with the influence of the cool colours time is underestimated. Furthermore, the objects which are coloured with warm hues are perceived longer bigger and heavier than reality. Cool colours cause the object being perceived shorter, smaller and lighter than the real one (Porter & Mikellides, 1976). Warm colours (advancing colours) can be considered as the colours of long wavelengths and the cool colours (receding colours) as the colours of short wavelengths. However the brightness is one of the most important effects in determining the advancing colours and receding ones (Bayık, 2001).

From Gestalt's point of view (For more information about Gestalt psychology and Gestalt principles you can see page 89) colour has an effective role on the perception process of the human beings.

> "Colour not only produces mood associations, subjective and objective impressions, but also influences our estimation of volume, weight, time, temperature and noise. Collective findings have shown that there are basic reactions to colour common to most people" (Mahnke & Mahnke, 1993 p: 10).

2.2.2.2 Physiological Effect

As far as it is stated in this study the greater part of the colour perception process occurs in the mind of the living beings. Therefore, as mentioned before the result of the phenomenon is influenced by the mental structure and influences of the attitudes of the individual. Furthermore the effects of the colour on the organism are not limited with the psychological responses. It also affects the physical structure of the human body. Cure power of the colour had been known and profited by the man –

kind since the Egyptian period. However greater part of its opportunities had last with the religions effects.

> "The healing power of colour has been realized and practiced for many centuries in the East, where a 'colour cure' has been used not only for psychological disorders but also for physical ailments. In India, for example, coloured light was projected on to ailing patients – specific colours being seen as remedial for particular symptoms and stages of disease" (Porter & Mikellides, 1976, p :87).

From the physical point of view, it is considered that every hue has its own effect on the organism of the living beings. For instance, red as a colour has an effect on the body of the human beings which causes increasing the bodily tension. It is obvious that the mankind like all other living beings have a radiation sense. According to the investigations blind people can also recognize the existence of light. Reactions of the muscular system of the human body show diversities according to the colours. For instance, they are more active with warm colours than the cool ones (Birren, 1982). On the other hand another experiment was stated that red coloured light increases the pressure of the muscles. Green causes the least pressure on the muscle of the human body. As a matter of fact it is possible to establish the relations with the physical effects and the emotions to the colours.

> "It may thus be generalized that colour affects muscular tension, cortical activation (brain waves), heart rate, respiration, and other functions of the autonomic nervous system – and certainly it arouses definite emotional and aesthetic reactions, likes and dislikes, pleasant and unpleasant associations" (Birren, 1982, p: 20).

Furthermore this fact shows us the importance of the colours of the environment where the human beings live in, since the emotions of the growing man – kind is developed by the physical reactions of his/her body towards the colours of the surroundings.

2.3 The evolution of colour in architecture: Before and after 1960

In this section, *colour and environment* being the main subject, generally *colour and architecture,* and sometimes colour and building façades are examined. In the study, colour's cultural characteristics and colour's effects on building's surrounding, which are regarded as factors forming colour and architecture, are researched. (See Figure.19).

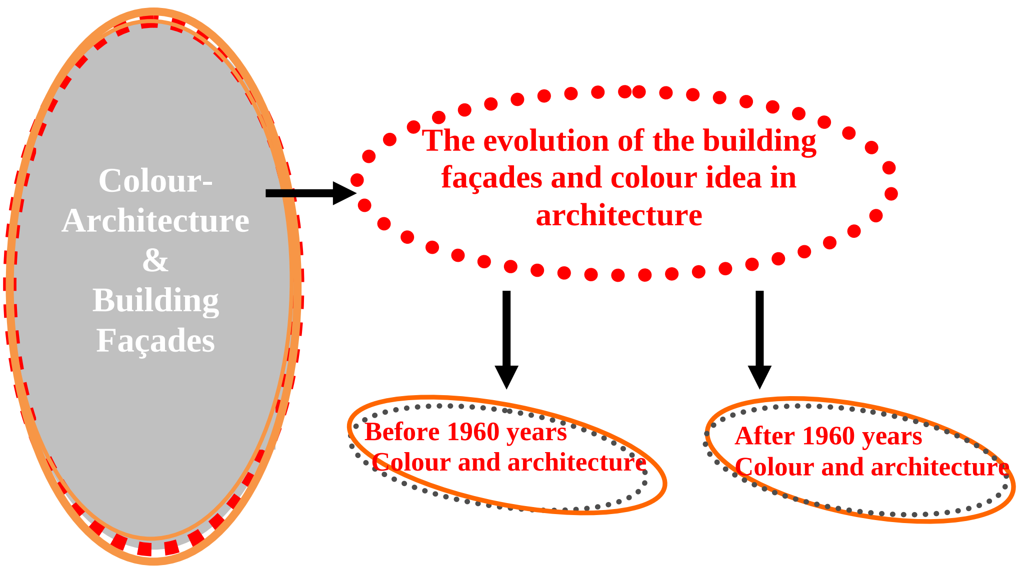


Figure 19. Summaries of Chapter 2.3: Colour –Architecture and Building Façades

The utmost concern for scholars that deal with cultural identity is that architectural variety is decreasing in the world and in the coming years all the cities will start to look like each other. It is really easy to see this problem clearly, as in today's cities; similar buildings are being built more. Also correspondingly to these similarities, the pursuit of identity and identity protection discussions go ahead, and social, artistic and architectural studies are being carried out. Also, protection of traditional architectural values is approached, and in these traditional values, the colours of streets and building façades that give identity to cities, is included.

In western architecture the usage of colour can be categorised with respect to time as before 1960 and after 1960. Before 1960 the usage of colour started by thinking about architectural colour and it is the era that the discussions about where and how to use colour on buildings are carried out in order to build-up more theories.

After two major wars, Europe went into reconstruction period. However, after 1960, in relation to the issue, a number of studies were carried out, new ideas and arguments were developed and publications were made. In eras after wars, development of technology, having an easier transportation from one city to another with the increase in transportation, gave an opportunity to learn about world’s other countries, cities, villages and cultures. With these opportunities, reconstruction bringing drives to gain new experiences with new dyes and materials coming into the market, makes the era after 1960 more colourfull compared to era before 1960 (Habib, S, 1995).

Will for colour to be more effective in public places, is recorded as a suggestion of colouring by the public for “Crystal Palace” (See, Figure.20). In 1850s, in Spain, Owen Jones’ colour scheme that was designed for “Crystal Palace” with the influence of Alhambra Palace’s colourfulness, had negative reaction from architects whereas positive reaction came from the public. In a newspaper of the time, colour suggestions were requested from the public and these colour design suggestions were a lot braver and colourful compared to Jones’ designs (Farmer, B., Louw, H., 1993).

Figure 20. Crystal Palace (URL 38)

At the beginning of twentieth century, architects and designers also used the colour on public places and realised the importance of colour. In 1901, Fritz Schumacher referred to “colour craving”, that was as a result of era’s architectural work in the cities, in his article that was published in Der Kunstwart. He also discussed that architects endeavored for interior spaces to find its colour, thereafter started to find solutions for exterior walls’ colour problems and chose old farmhouses as a source of inspiration (Düttmann,M., Schmuck, F., Johannes, U, 19800).

In 1920s, De Stijl designers realised that there is a strong relationship between painting and architecture and they suggested that primary colours and achromatic colours should be on building façades. Rietveld’s “Schröder House” project (See, Figure.21) reflects the approach of De Stijl.

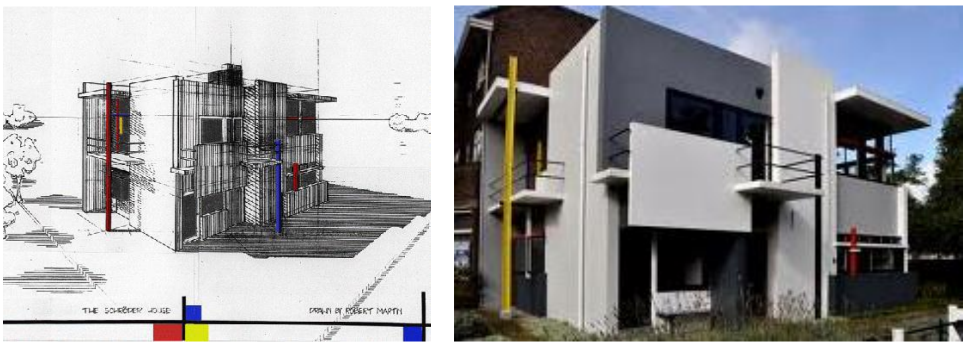


Figure 21. Schröder House project by Rietvel (URL 39)

> “One of the founders of De Stijl, Theo van Deosburg, in 1924, wrote, in an article published by De Stijl, that: “ New architecture is against ornamentation. Colour is not an ornament or decoration; it is an organic element of architectural expression” (Farmer, B., Louw, H., 1993).

One of the architects that were influenced by this misunderstanding is Le Corbusier. According to Doesburg, contrast to the known fact, Le Corbusier likes “colour’s strong murmuring” a lot and especially enjoyed using slots and spots that were painted with bright colours to façades’ concrete floor. One of the examples that can be given is Unité d'Habitation'da (See, Figure.22) in Marseille. Here, in order to separate the interior and the exterior and to colour sunshine slightly that was reflected inside from the balcony spaces, outer façade’s recessed parts were stressed by bright colours. Another example is in La Tourette monastery where bright colours were used in roof’s and illuminated wall’s hollow coves. Corbusier preferred to use three primary colours; red, blue and yellow on building façade’s pure white floor. In contrast to that, he preferred to use natural colours like gray-green, umber and brown on interior space sketches and “Purist” paintings. Like other architects did, he used colour as a tool to change living space and form and he saw color as an element that can be included at the very end of the design process, in order to show surfaces wider and make volume spacious (Farmer, B., Louw, H., 1993).

Figure 22. Unité d'Habitation by Le Corbusier (URL 40)

However, in this era, in Germany, Bruno Taut was braver than Le Corbusier and he changed the usage of colour from building scale to street and neighbourhood scale. Bruno Taut recognised the colour as a part of spaces that forms the city, saw and implemented it as an element of urban space. Bruno Taut linked successful architectural colour with architectural form's simplicity and plainness. The best example of this is in Falkenberg, close to Magdeburg around Berlin, where he constructed garden cities. According to Behn, "these house units with different colours reflect the freedom of garden cities perfectly and this freedom does not resemble to private home owners' discretionary freedom. However, it can be an indication of free will of social order's members" (Düttmann, M., Schmuck, F., Johannes, U, 1980).

Behne argued that awakening of 19th century were like enemies and because of that he believed that on top of ideological and social reasons, cosmetic reasons leaded to the need for fighting with them. He believes that, because of bright colours in the garden cities, people living in the houses open up to the environment with hope and a strong and sensational link is created between daily life and the environment. Additionally, in the architectural studies in Falkenberg and in Magdeburg, Taut prioritised colour. People living there nicknamed these studies with love and affinity as "Paintbox settlement" and "Red Castle". These, as well as Taut's usage of colour in Germany to maximise social identity and communication resulted in Taut being the first architect to achieve this (Düttmann, M., Schmuck, F., Johannes, U, 1980).

Taut, continued to use colour at Magdeburg city scale but he had some problems with respect to dyes' quality and standards. Nevertheless, he had put into practice his successful projects at many points. Taut cited his words that were for one of Vandoyer's projects in his memoir, with pride and pleasure. "Houses have quite simple and modern architecture and above all they are quite vibrant and cheerful. Every street has its own façade and its own colour below the pine trees' covering. It is known that, that kind of houses are not required for people's joy. However, they at least invite you to be cheerful" (Düttmann, M., Schmuck, F., Johannes, U, 1980).

In another article of his, he wrote: "In Magdeburg, on a rainy day, in an old street that half of it was painted and half of it was left grey, you can see it with your eyes that how painted half comes to life with a plastic appearance and how the grey half looks like a disturbing and intangible ghost" (Portoghesi, P., 1980).

In 1920s, Bruono Taut was one of the architects that treated colour as an inseparable part of architecture. However, at that time he was braver than the other architects and used the colour extensively in his work.

In 1930s, architectural colour left the social area was used for economic reasons rather than cosmetic reasons, as a tool for appealing, as a sign for cleaning and order or for protecting the resources, and it was dependent on form.

In 1940s and 1950s, only protective colours and colours that were used as camouflage were allowed to be used. Also, resurrection of architectural colours was in 1960s.

In 1960s, after war, reconstruction had to be quick. Being quick came with monotony and in a little while reactions started because of that. In the meantime, technological developments started to offer new materials and products. In this era, the number of studies and work of architects, colour experts and architects that created murals at city scale were increased.

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In general, in the historical development, architects' approach to colour is divided into two main groups based on architectural work. The ones that use the colour because of its features and the ones that use the colour to enrich architectural form are included in the first group. Many architects' work, like Gaudi and Gehry's, are easily included in this group. In the second half of the twentieth century, with the arising of new structure systems, another birth of Machine Aesthetics and the work that fits with its usage of colour are also included in this first group (Habib, S, 1995). The second group approaches the colour as a feature of something else and uses colour to remind it. This group can generally be divided into four. First group *refers to nature* for the usage of colour. An architect that uses blue in order to refer to the blue sky or an architect that uses green in order to recall green grassland, are included in this group. For example, with the collaboration of architect Emile Aillaud and "colourist" Fabio Riet, in new city La Defense, around Paris, high towers obtain their colour from the region's shades of yellow and brown land and from the shades of blue sky that changes with different weather conditions.

Another architect that revives his work with environmental "polychromy" by using colour and colouring is Michael Graves. Graves gives symbolic references to various themes in his projects and he is an architect who is strictly committed to his own form philosophy. He believes that, with respect to the theme, form's classical origin is "nature" and "human". Floor is land, ceiling is sky and colon is the tree. Also, rules are raised from geometry of human body, from symmetry and proportions. Colour's classical language originates only from nature and nature's supplies, not from humans. In relation to this, Graves used "grassland" or "meadows" green for the floor of Egypt's temples and "sky" or "heavens" blue for the medieval vaults, as an example (Porter, T., 1982) and (Graves, M., 1978).

There is another group that refers to *history*, *tradition* and therefore to the *historical and traditional colours in the texture*. Colour is used with various symbols and meanings from old times till today. It is known that in traditional architecture colour has many messages and meanings. However, after 1960s, colour was sometimes used in architectural work as a fake element in order to associate it to something and sometimes it was only used as an architectural element without attributing a meaning to it. In colour schemes, the ones who choose "*history*" as a resource both refer to the old times and also to the recent history. To sum up, these designers that use colour in architectural work, either by referring to history or by referring to their or different cultures' traditions, created the colour schemes (Graves, M., 1978).

Lois Swirnoff believes that regional architectural colours, in other words traditional colours and patterns are directly related to the amount and angles of the sunshine that the region receives. Neither the amount of sunshine received in North Pole nor its angles is similar to the sunlight received in Mexico. Lois Swirnoff claims that the choice of colours and their mixtures that have been used for centuries in regional architecture corresponds to the amount of sunlight and the angles that it received (Swirnoff, L., 2000).

Swirnoff's aforementioned approach reminds the Pakistani practices of 1950s, where upon arriving in the United Kingdom; Pakistanis coated the outer walls of their houses in bright warm colours reflecting their colourful cultures. Although these practices initiated negative reactions in the neighbourhood at first, they were later on repeated by the residents of these neighbourhoods. Architects belonging to the new generation are known to be influenced by these practices in their search of using brighter colours both inside and outside façade of the building (Porter,T.,1982).

The five gardens located within the Walden Seven residential complex designed by the Taller de Arquitectura Group are mainly tiled in bright orange and blue colours as well as with some pink and yellow ceramics as a result of Spanish and Moresque influence (See, Figure 23). These colours create a nice contrast with the earth coloured coating of the complex on the façade (Porter, T., 1982).

Figure 23. Walden Seven Residential Complex (URL 41)

The Walden Seven residential complex located on the exit of a highway near the city of Barcelona resembles to a huge red statue. The building takes its colour from brick being reddish brown in winter and turning into reddish orange under the summer sun.

Luis Barragan became globally renowned with the Pritzker award he received in 1979. However, he had started his career in 1920s and colours had an important place in his architectural designs since the very beginning. Although he used colour occasionally due to its particularity, he was generally influenced by the Pueblos of his childhood and used the colours of Mexico that are renewed every year with traditional feasts by referring to them (Ambasz, E., 1989).

Architect Aldo Rossi prefers to place a higher importance to the city and cultural values over the structure. He claims that national and regional traditional colours and materials are important determinants in cultural values just like the date and the settlement area. For example, in 1987, he realised a creation reminding the traditional Japanese colours in Palazzo Hotel in Fukuoka, Japan using green steel components together with a regional brick that changes colour due to the change in the angles of the sunlight (See, Figure.24) (Jodido,P.,1993).

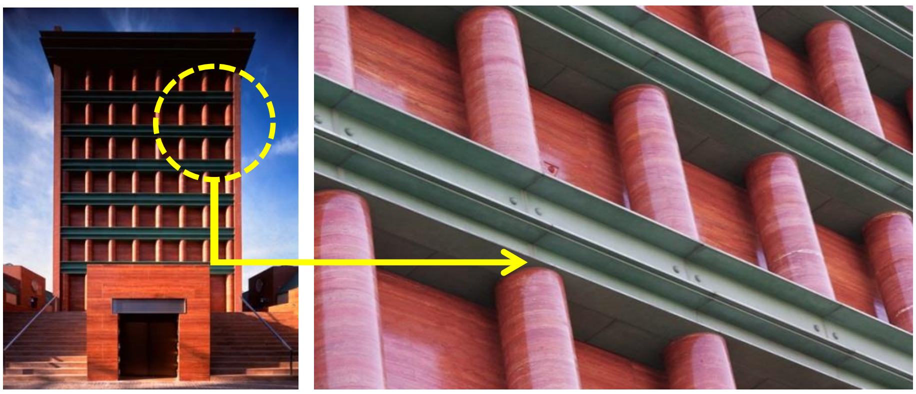


Figure 24. IL Palazzo Hotel (URL 42)

Paolo Portoghesi is among the architects referring to history in the colour choices of buildings. During the Renaissance Period, horizontal red, orange and dark yellow stripes were widely used to create a visual wide effect. Coloured stripes are also found in the designs of Paolo Portoghesi (See, Figure.25) (Portoghesi, P., 1980).

Figure 25. Politeama Theatre Design by Paolo Portoghesi (URL 43)

Thomas Gordon Smith appreciates symbolic values in architecture. He is known as a creative user of Mediterranean architectural colours and materials. Smith always uses 'Polychromy' in various ways in both the internal and the external façades of buildings he designs. Frescos and colourful material in interior spaces, natural elements' colour and colourful marbles in the outdoor façades are elements vitalising his sophisticated designs. Smith may equally refer to ancient Greek temples while colouring his buildings as well as to the buildings in the proximity (See, Figure.26) (Jenks, C., 1990).

Figure 26. Vitruvian House, South Bend, Indiana, design by Thomas Gordon Smith (URL 44)

Those using the architectural colour based on the buildenvironment constitute the third group of using colouring as a reference to something else rather than using the colours based on their own characteristics. Architects belonging to this group can be further broken down to two: *those aiming to harmonise with the buildenvironment* *and those wanting to create a contrasted effect to their environment.* First group considers buildenvironment to be a segment of the history, stays loyal to it and stays close to those referring to the history with regards to colour usage. ‘History’ is mainly used to mean the ‘Past’ in this context and it does not solely mean old times, their buildings and works. Thus, the past year, the past month, even the past day becomes important and their works are treated as objects that can be referred to (Habib, S, 1995).

Recognising the city and the close environment and reacting consciously to it, the desire to create a contrasted effect with the environment means taking a stand not only architecturally but also socially. Aldo Van Eyck designed "Mothers House" for single mothers in a 19th century street of Amsterdam. Through his usage of colour scheme and his choice of form on the façade of the building, rebels against the conservative traditional fabric and colours of the surroundings as well as abolishing a taboo within the society(See,Figure.27) (Porter,T.,1982).

Figure 27. Mother’s House design by Aldo Van Eyck (URL 45)

A similar case is valid for the structures of Hundertwasser in Vienna. In the homogenous streets of a historical city like Vienna, Hundertwasser’s “polychrome” structures revolt against uniformity. Hundertwasser believes that everyone should be free to colour his/her house's walls and windows with a colour that he/she wants and he thinks that architecture is like human's skin. Although, he did not directly use the colour of country houses on his buildings, he embraces that kind of approach that is in the huts and rural areas. At the beginning, his structures drew reaction from people living in Vienna because of his usage of polychormy in and out. However, thereafter, tourists' interest in his structures helped to change city-dwellers' thoughts. (See, Figure.28) (Hundertwasser, F., 1997).

Figure 28. Hundertwasser Houses' –Viyana (URL 46)

Last category is using the colour by referring to a specific material in the architectural colour. Although it is not after 1960, a distinct example that comes to mind is the usage of red on country houses in Norway and Sweden (See Figure.29). Red is regarded as the brick's colour and in the region; rich people had their houses' exterior walls constructed with brick. As the usage of brick was expensive, the ones who wanted their housed to be "real" houses and they did not have the money, painted their houses' exterior walls to red and felt that they had a "real" house (Habib, S, 1995).

Figure 29. Example of Norway Houses (URL 47)

The most widespread example in this category is formed by referring to brick, timber or to a specific regional stone fabric and colour. Architects using this method can be shown by looking at Michael Graves' Schulman House (See Figure. 30) that refers to "stone" on the front part and to "brick" with yellow in the entrance and in the flue or by looking at Taller de Arquitectura's Walden Seven Residence Complex that refers to "brick" colour on the outdoor façade (Porter,T.,1982).

Figure 30. Schulman House Design by Micheal Graves (URL 48)

After 1960 and especially starting from 1970, it was witnessed that the usage of colour is free from many limitations and is used more freely. With the revival of architectural colour, environmental designing has developed as a professional field. It was also witnessed that in this field, people specialising in determining the colour, motifs and patterns in the buildenvironment, has come along as colourists. Colourists have proven that colour can give "life" to a building's character rather than bringing an artificial appearance to a surface. Their work showed that colour not only define the outdoor space but also can draw attention to significant conclusions (Farmer, B., Louw, H., 1993) & (Porter, T., 1982).

In the buildenvironment, the history of colourists comes from 1850s from city of Turin (See, Figure.31). Turin’s Municipal Council prepared a colour plan for the buildings in the city and the citizens applied it. However, in a little while, only one colour started to dominate the city. In order to get rid of this colourful uniformity, studies were started and therefore the colourists gained one of their most important experiences in Turin. In this experiment, in 1978, a team of architects, environmental designers and colourists tried to revive Turin’s colours of 1800s and 1850s. The reconstruction and propagation of Turin’s colour map belonging to 19th century, was documented and archives, examples and documents that survived till today were prepared according to Munsell Colour System. In the old city centre and where modern Turin is located, the application of these colours were accelerated, in accordance with renewal of history master plan, and with the participation of municipality, designers, property owners and building painters (Porter,T.,1982).

Figure 31. Turin in Italy (URL 49)

Chapter 3

THE USAGE OF COLOUR ON FAÇADE DESIGN

> "Colour in an immensely evocative medium, possessing inherent powers to provoke immediate and marked reactions in the onlooker, and as such it has been developed as a language of symbol in both the natural and the man-made worlds. Its use in architecture is no exception, serving to dramatically affect perception of architectural space and form" (Toy, 1996-Bayık, 2002).

As far as it is considered that the basic elements of art and architecture are line, form and colour. However generally in the architectural history, it is admitted that colour is mostly associated with the painting, form and line mostly is related with the architecture. At the beginning of the human civilization, these elements of the phenomenon of visual perception were considered as similar for the art and architecture. Therefore colour was the element of the design as well as the painting. As the time had gone by, it started to be separated from the architectural activity and was imputed to painting. It could have only been in the design process as decorative elements with its aesthetical value. Whereas colour is the part of the surroundings that cannot be distinguished and even in the nature itself, it always expresses a functional beyond being the symbol of the beauty. Nevertheless re-understanding this fact cost the human beings for the centuries (Bayık, 2001).

In historical development, there is a direct dialogue between architecture and colour.

It is a fact that cannot be denied colour in one of the most important component of the visual integrity of the three dimensional objects. According to Giedion colour is the living element of bare wall which can be perceived as 'dead, anonymous surface' without the help of objects and colour (Giedion, 1976). On the other hand, Ruskin in his book entitled *The seven lamps of architecture*, pointed out his ideas that colourless architectural could not be perfect. Ruskin considered that colour and form could not be united. The perceptiveness of the one was based on the simplicity of the other (Ruskin, 1989).

As mentioned before, the living beings explain their environment with their senses and the most effective one of these senses are considered as is the visual perception. Therefore if light is the basic necessity of this perception phenomenon, colour is both its result and complementary. For the reason that the purpose of architecture is to organize the environment that the human beings live in, experiencing the architectural activity highly depended on the sense of visual perception. Colour occurs as long as the light exists even if the architect does not design it consciously. It exists in the surroundings as background or in the sunlight itself (Porter & Mikellides, 1982). In fact, it is not possible to separate the architectural object from the context, the effect of the environment and, therefore, from the colour perception itself. Consequently, the design of the architect is influenced by the colour and its quality whether he/she is conscious or unconscious. Le Corbusier pointed out his ideas about the colour inputs of the environment itself as;

> ‘As early as 1910, I knew about the bracing quality of chalk white. Practice showed me that the joy of white explodes only when surrounded by the powerful hum of colour’ (Porter & Mikellides, 1982, p.38).

Therefore, colours that are used on building façades, not only give meaning to coloured buildings but also to the environment and the whole city. The environment that the livings beings grow up or live have an important role in the development of their colour sense. Every geography and culture has their own colour approach. It is possible to point out the colour of country, besides of a city. This phenomenon occurs in the time with the effects of the physical and the mental forces. Colour can be considered as a visual signature of a city which is least recognized but most direct (Swirnoff, 2000). The colour palette of the city was formed by the humans but afterwards it starts to shape the mental structure of the settlers. *Culture, geography, climate and religion* are the most important factors which affect this colour sense.

Colour palette of a city means the hues of the building façades in the city. This buildings façades simultaneously occurs by the façades of the individual buildings. Architect as a person who expresses his/her experiences to the design and affected this palette, reflects his/her knowledge on the façades of the architectural objects.

The expression of the behavior on the façades is formed out in order to organize the design components of the architectural activity. Architectural three-dimensional object as an end-product of a design process, created in the way that being influenced by the attitude of the designer.

Architects form out their private language and exhibits it on the façades where the building communicates with its surroundings, by means of using the components of a three dimensional object in order to combine them according to his/her architectural design approach. At the point which these designs have a three-dimensional property, the building façade is gained its visual characteristic such as static, dynamic, heavy, light, stable, unstable means of these elements. Furthermore, it is transformed into a whole occurred by them. From the architectural point of view, these elements generally are considered as the peculiarities of the beauty. Consequently an architect as a designer designates a standpoint against these rules according to the thought, which he/she wants to express on the building façades of the architectural end-product.

Perception of form is always loaded with meaning and they are considered that the architecture as a designing activity is a system of signs or languages (Weber, 1995). This language can be seen as an architect's private tendency on the other hand can be formed out as a style.

3.1 Factors Affecting The Usage of Colour on Façade Design

Even when the architect has his or her language of design, there are factors that affect the design during the designing process. In this context, this section will involve a discussion of the factors that affect the design of the building façades colours. The first factor is culture and second factor is climate - geographical conditions. And the third factor is the principles of design. Alongside this, it is emphasized that Gestalt principles of perception are required in order for the surface to be recognized as desired. The relationship of the principles of design and Gestalt rules of perception with the main focusing point of the thesis which is the colour concept, are investigated and commented in the study. Next step of the study involves a research into the possible effects of colours on the building surfaces with an examination of these effects (See, Figure.32).

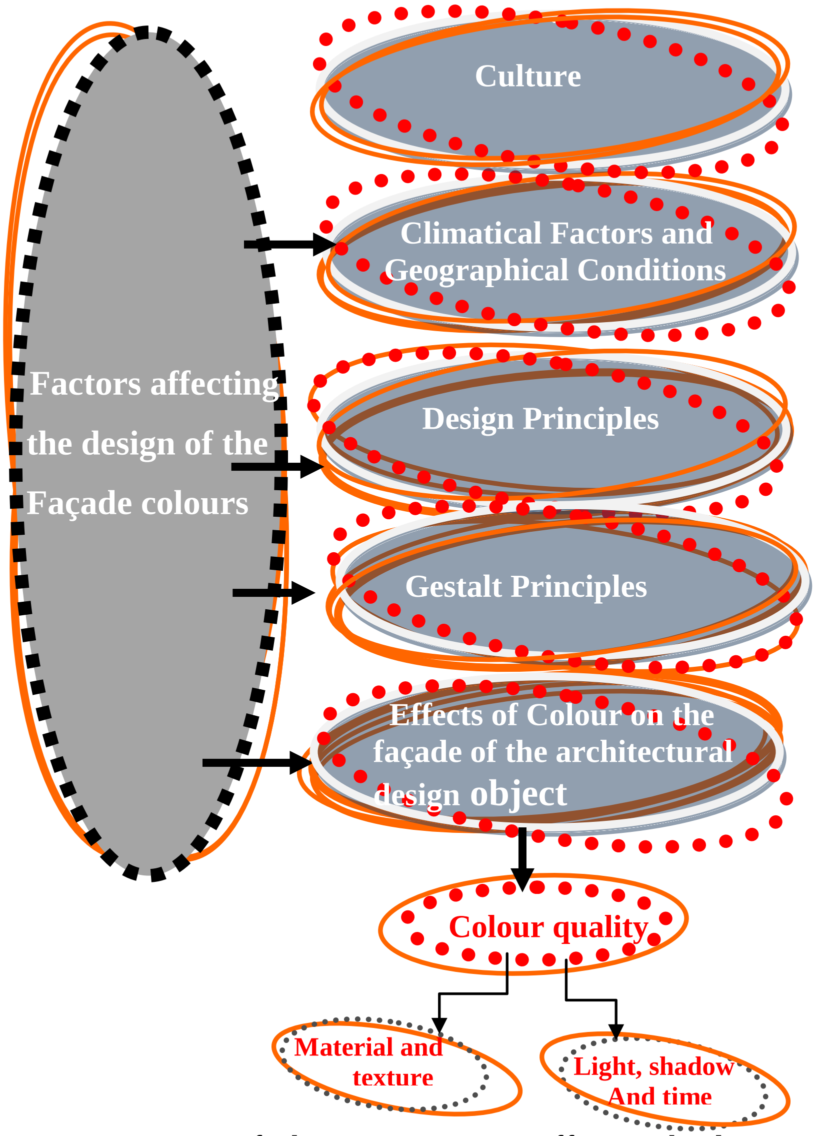


Figure 32. Summaries of Chapter 3.2: Factors affecting the design of the Façade colours

3.1.1 Culture

Each culture possesses its own distinctive colour inheritance and, consequently, cultural bachgrounds are traditions may considerably affect personal responses to colour of individual with particular cultural values (Artyukhova, 2009).

On the other hand, beliefs of culture and religion have an important role in determining the symbolic meanings of colour. Cultural and symbolic meanings of colour, from the other hand, are resultant from intercultural communication and not necessarily supported by personal experiences (Griggs, 2007). In the other words, information about colours and its pre-existing associations, influenced by various beliefs and values, are passing from generation to generation and giving rise to cultural experience (Griggs, 2007).

It is evident that cultural aspects often influence perception of colours and may induce certain emotions, since each country has its own unique colour heritage. Thus, it might be essential to analyse user's profile in terms of his cultural background to verify whether certain colours are appropriate for utilization in particular application (Carnright, 2008).

There are a number of examples that can be given for city-culture and colour relationship; however, in order to examine the subject more closely, emphasis is put on four randomly selected examples. First one is Luis Barragan's design, Francisco House. Famous Mexican architect Luis Barragan can be considered as the best example to this manner. It is not possible to separate the effects of his geography from him. Francisco Gilardi House which was designed by Barragan in Mexico City can be the example to this attitude (See, Figure.33). The colours on the façades of the buildings in fact are the colours of the Mexican culture (Bayık, 2001).

> "Though exceptional, the work of Barragan should not be considered a typical of or isolated from Mexico's architectural traditions. His work shows strong links with his precursors and fits naturally into its chorological and geographical context."(Julbez, 1996, p: 24)


Figure 33. Francisco Gilardi House (URL 36)

Antoni Gaudi can be considered as the other important architect who used to colour that was affected by cultural and local characteristics. He evaluated a unique façades language which depended on the elements of Gothic, Moorish and his creativity. He influenced by the heritage of the Catalan architecture or the Catholic way of belief. Therefore his colour approach was shaped according to these effects of his geography. He generally used fragments of glass and bits of pottery in order to colour the exterior façade of his architectural design objects. As same as all of his buildings the Palau Güell building can be a good example to this attitude (See, Figure.34).


Figure 34. Palau Güell building (URL 37)

On the other hand in Mexico, Ricardo Legorreta started his architectural profession in the light of Barragan. In just the same way as Barragan, he used colour by begging affected by the cultural and traditional colour approach of Mexico. According to him, Mexican approach about colour on the façades can be summed up as being freedom which requires pure emotion and no rules.

The IBM Technical Centre can be a good example to the colour approach of Legorreta (See, Figure.35). As far as he point out that he designed the outermost façades as grey on the other hand he applied vivid colours such as violet, yellow, pink to the inner façade. He explains his purpose as alluding the inner life and warmth from the observers of the outside. He explained the effects of his culture on his colour approach as;

> There are moments while I am designing when, instead of saying ‘I am going to make a wall red’, I say; ‘I am going to make a red that will be a wall.’ This typically Mexican. Sometimes we are more interested in colour that the object that carries it” (Legorreta, 1990, p: 58).

Figure 35. IBM Technical Centre (Legorreta, 1990)

3.1.2 Climatical Factors and Geographical Conditions

Even the climate in which we live influences our colour preferences, according to psychologist E.R. Jaensch. Jaensch's research indicates those who live in climates with a lot of sunlight prefer warm bright colours; while those from climates with less sunlight prefer cooler, less saturated colours. But the environment and the climate also dictate the way colours are classified, according to the relevance they have in the everyday life. For example, Eskimos use 17 words for white as applied to different snow conditions (Bortoli & Maroto, 2001, p.4).

Particularly, geography was the main designating elements for the historical settlements because of the colours of the environmental materials. However nowadays, with the effects of the industrial revolution and, therefore, developments in the communication and commerce and also material technology, geography started to lose its importance on the colour palette of the city. Nevertheless, climate as a factor which is in fact depends on the geography, still has its importance. As explained in the effects of light and time on the colour perception, climate directly affects the result of the colour perception process. For instance, a same white colour appears different in England from Mediterranean country (Swirnoff, 2000).

Figure 36. Colour Scheme of Guanajuato (URL 35)

3.1.3 Design Principles

The principles of design are useful tools for mentally constructing a 2D or 3D environment. In this process, the Gestalts play a role as visual forces that hold together the design, to relate its parts but design principles belong to a higher level of organization. They are the basis of architectural design also, to create an order in architectural composition.

In this context, design elements and principles can be defined as the constitutive parts of the design construction. Design requirements are consisting of: design elements, characteristics of the elements (texture, colour, dimension, direction) and design area. Design elements can be grouped as point, line, two dimensional design elements- shapes (triangle, rectangle, square, trapezoid, polygon, ellipsis etc.) and three dimensional design elements- forms (cube, prisms, sphere, cylinder, pyramid, cone etc.). Principles of design are guidelines for gathering design elements in order for ensuring an effective communication (Brainard, 1998, p.92.). If we define design elements as the "What" of the design, then the principles are its "How" (Faimon & Weigand, 2004, p.25). In recipe metaphor, the design elements correspond to ingredients of the food recipe and the principles correspond to cooking directions. Principles of design are guiding the planning phase of the works of art. Additionally, they play role in the analysis how the art works are planned (Chapman, 1992, p:54). In construction of two dimensional or three dimensional compositions, principles assist the decision making on the way how design elements and characteristics of the elements are used.

When some materials are put before us and stated "Let's design something like this", it is definite that constructed design will not be same, rather different types of designs will be observed. Because, within the scope of his/her own background knowledge and skills, each designer adds his or her own emotions to the designed product. Yet, through the combination of these emotions with particular principles, universally correct constructs are produced and intentional designs are disappeared.

> "The most important principle in design is development of each component in a comprehensive way and the absence of incompatibility or unfamiliarity either among the design elements or with the design area. In other words, the main objective of principles of design is provision of coherence among the design elements that are constitutive of the product and provision of a coherent variation within the composition. This objective can be achieved through using at least one of the design principles" (Dağlı,U., Şahin,N., Güley,K., 2012).

The master principles or fundamental principles are order, unity, balance, harmony, contrast, repetition, rhythm, hierarchy, focal point, proportion and scale.

3.1.3.1 Order

> "Order means letting different figure and ground elements (which are forms and spaces in architecture) of a design field to co-exist perceptually within a unified whole. An orderly organization is governed by an overall principle whereas a disorderly one is not. Order is the identification of relationships among elements of a whole" (Yağız,Ş. 1995).

The most significant delusion with regard to order is its conception as similarity of all elements. It must definitely be emphasized that order does not mean similarity of all elements. Variety is what makes everthing more pleasant. Order without diversity is monotony; diversity without order is kaos.

As can be seen also on the Figure.37 order concept is very important for all design groups including the basic design scale, graphic design, 3 dimensional object design and industrial object design. As a matter of fact, while order is a principle of design, different principles of design are also required for realization of the order. In this regard, principles of design that are used for realization of order are very important as well.

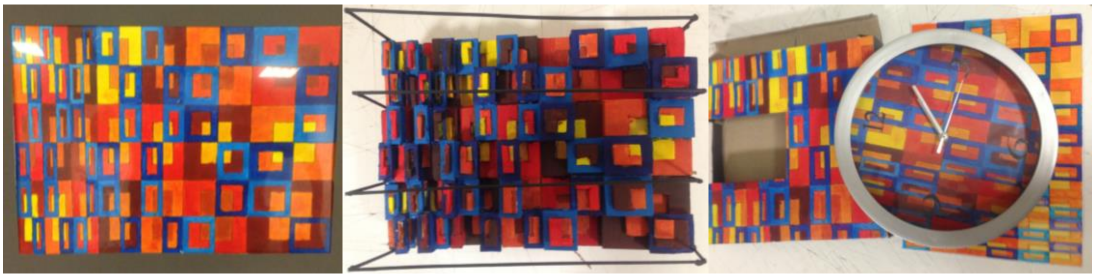


Figure 37. Order in Basic Design, Graphic Design, Industrial Design
(Personal archive, CIU, INPD 102 student's project, 2014)

3.1.3.2 Unity

It is the combination of different elements for constituting a whole. Rather than the meaning each element has on its own, unity refers to realization of comprehensive meaning resulting from the elements. Unity can be the most important one among the principles of design, yet it is frequently the one that is most difficultly grasped (Brainard, 1998, p.112). Unity is the main principle of design and is also supported by the other principles (Evans & Thomas, 2004, p.5). If the designs do not have a unity, it cannot be conceived as successful (Bevlin, 1994, p.125). Unity creates an integrated view (Lauer&Pentak, 1995, p.18.) and all the elements work as a whole for supporting the design (Brainard, 1998, p.112). An integrated design is more than the sum of its constitutive parts; it is seen as a whole before the recognition of the individual elements of design (Lauer & Pentak, 1995, p.21). Unity is the based on gestalt visual perception theory (Lauer & Pentak, 1995, p.23) and the eye of the viewer says that it is searching for a single shape and a coherent whole (Arnston, 1998, p.75). This means that viewer is searching for a connection among the elements, a kind of order, and coherence in the design (See, Figure.38) (Lauer & Pentak, 1995, p.23).

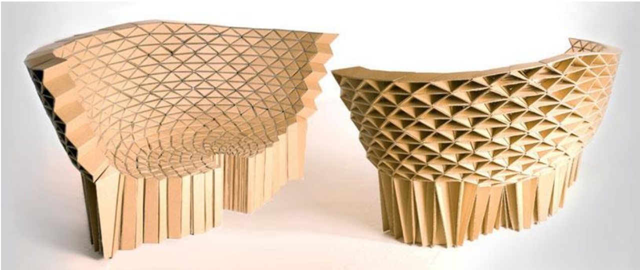


Figure 38. Example of Unity in Industrial Design (URL 52)

The ‘intelligence’ is an important factor in perception of an object. As intelligence simplifies and orders the information, it constitutes a shape. Intelligence does this by creation of a whole through grouping the elements. Understanding of the way how intelligence groups the elements helps for grasping the way how this unity is achieved.

There are 3 approaches contributing to the constitution of unity. Among these, closeness is based on the grouping of close elements (Lauer & Pentak, 1995, p.24); it is more possible to perceive elements standing close with each other as a group (See, Figure.39) (Arntson, 1998, p.76). The second approach is repetition, and it is based on grouping connected with similarity; similar elements are perceived as visually related with each other (See, Figure.40).

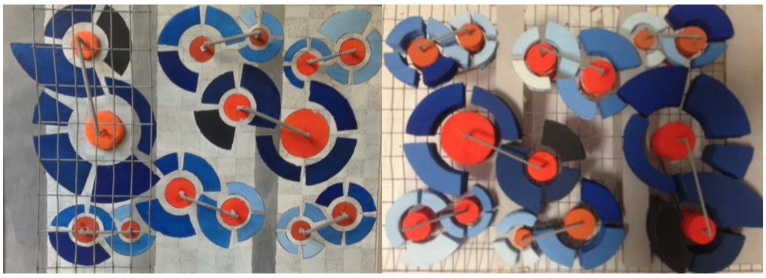


Figure 39. Proximity– Unity Relationship in 2D and Relief Design
(Personal archive, CIU, INPD 102 student's project,2014)

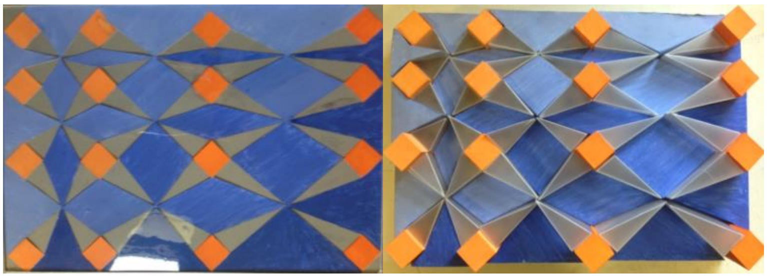


Figure 40. Repetition – Unity Relationship in 2D and Relief Design
(Personal archive, CIU, INPD 102 student's project,2014)

The final approach is difference and it means differentiation of the characteristics of the elements (Brainard, 1998, p.114). Difference is the supplement of unity and is required for creation of visual interest (Evans & Thomas, 2004, p.5). Without the existence of unity, an image will be chaotic and illegible; and in cases where difference is absent, the image will be boring, dull and unattractive (Lauer & Pentak, 1995, p.38). A good design is achieved through the balance between the unity and difference. As we grasp the elements as a single whole because of their adequate similarities, we find them interesting as a result of the sufficient difference among them (Faimon & Weigand, 2004, p.30). Differentiation of elements is achieved by means of the thinness, thickness, value, colour, angle, length of the line; the magnitude, colour, orientation and texture, type of the shape; the tone and value of the colour; and of the smoothness and straightness of the texture. One of the effective ways for ensuring integration of the unity and difference is development of variations in a theme.

3.1.3.3 Balance

Equal distribution of the visual weight in a design is called balance (Lauer & Pentak, 1995,p.73). Visual balance is constructed in vertical axis and eyes require equal distribution of the visual weight in both of the axes (Faimon & Weigand, 2004, p.110).

A design can be dealt with two types of balance; one is the symmetric balance (having the same distance according to a particular axis) and the other is the asymmetric balance (having different distances according to a particular axis). Symmetric or formal balance is also known as two-sided balance (Bevlin, 1994, p.143) and this can be boring (Brainard, 1998, p.96). In Figure.41 symmetric and asymmetric balances are displayed.

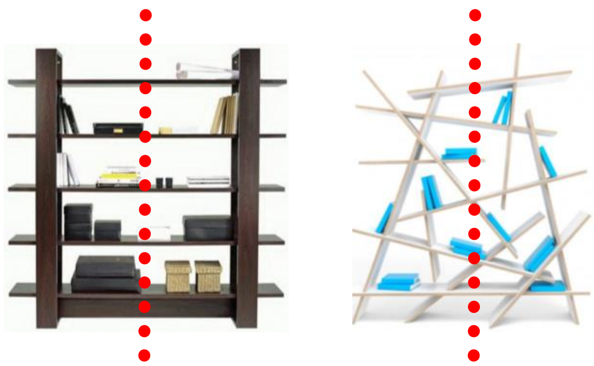
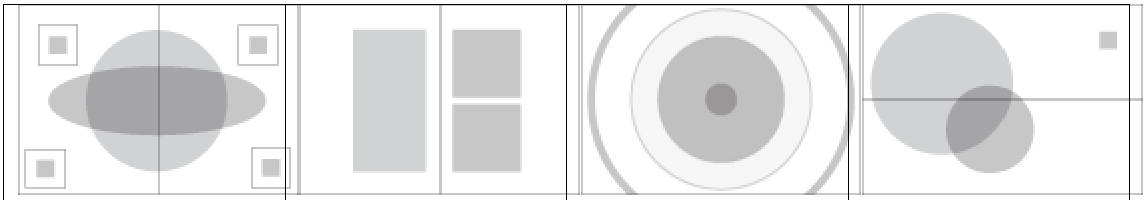


Figure 41. Example of Symmetrical Balance and Asymmetrical Balance in Industrial Design Objects (URL 53)

Symmetry is divided into 3 within its own. Balance that spreads out from the center is realized through centered outwards extension of all elements from a central point (Lauer & Pentak, 1995, p.90) and the visual weight is equally distributed (Brainard, 1998, s.101 Radial balance creates a strong focus point at the center of the design

(Lauer & Pentak, 1995, p:90). The vision of clocks and daisies are examples of radial balance. Additionally, there are horizontal symmetry and approximate horizontal symmetry (See Figure.42).



Horizontal Symmetry	Approximate horizontal symmetry	Radial Symmetry	Asymmetry

Figure 42. Types of Symmetry and Asymmetry (URL 54)

While symmetry balance is realized with repetition which is another principle of design, asymmetric balance is achieved by means of contrast (Arntson, 1998, p.61-69). Asymmetrical or informal balance includes different elements with equal visual weights (Lauer & Pentak, 1995, p.80).

Visual weight is determined with the characteristics of the design elements. Position – an element outside the center is sensed to be heavier (Arntson, 1998, p.65); a wide object being located near to the center can be balanced with a smaller object being located near to the corner (Lauer & Pentak, 1995, p.87). Measure – it is sensed wider and heavier (Arntson, 1998, p.66). Texture – an element having complicated texture is visually heavier than an element with simpler texture or without any texture (Arntson, 1998, p.66). Value – the darker is sensed to be the heavier (Faimon & Weigand, 2004, p.106). Value contrast – en element having higher value contrast is heavier (Arntson, 1998, p.67). Number of elements– multiple small objects can balance a wide object (Stewart, 2002, p.3-11). Orientation – cross direction carries more weight than vertical or horizontal direction (Stewart, 2002, p.3-13). Shape –

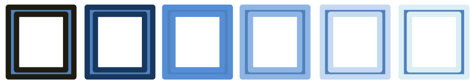
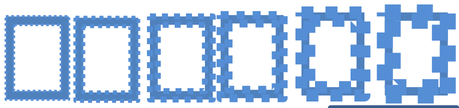
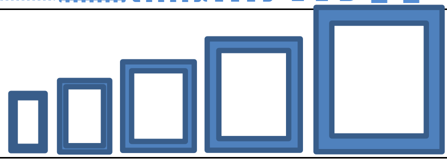
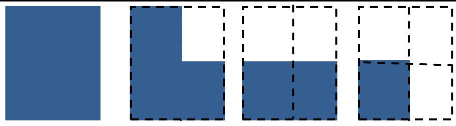
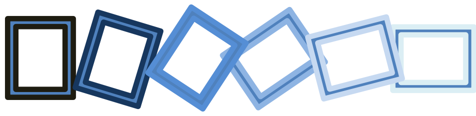
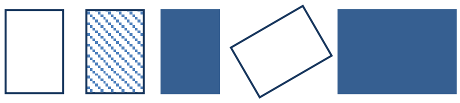
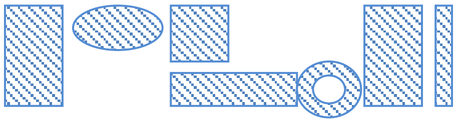
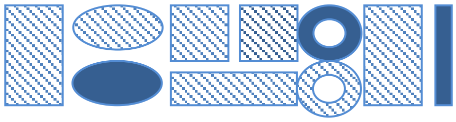
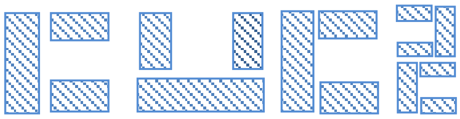
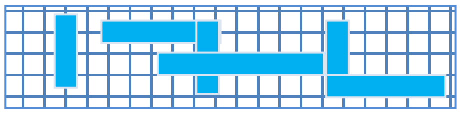
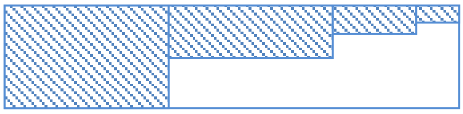
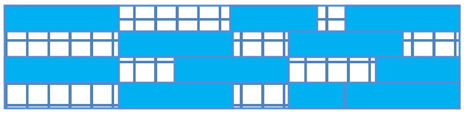
elements with more complicated shapes are sensed to be heavier than the ones with simple shapes (Arntson, 1998, p.68). Colour – brighter and more colorful elements are sensed to be heavier. Asymmetrical balance is irregular, attractive (Brainard, 1998, p.97) and more dynamic as compared with the symmetrical balance.

3.1.3.4 Harmony

Harmony is the pleasing agreement of parts in a design organization. Elements share some common characteristics, a smooth change in size, orientation, colour, texture and shape. It is the easy trip of the eye. In other words, existence of common or relative similarities among two dimensional or three dimensional design elements is called harmony. Harmony is provided by means of identity and characteristics of design elements such as the shape, dimension, colour, texture and direction. One or more of these can be used for ensuring harmony.

In a design, harmony is provided by construction of relation both amongst the elements and between the elements and the design area. Three main elements exist for provision of these relations. These can be listed as the definition of the beginning and finalization of design, provision of commonality between elements and the design area, and construction of shape-ground relation (Dağlı,U.,Şahin,N.,Güley,K., 2012). Table.5 shows the methods that can be used for provision of harmony in design.

Table 5. Methods that Can Be Used for Provision of Harmony in the Design

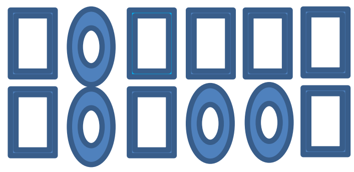
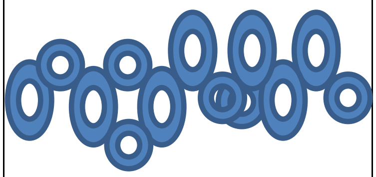
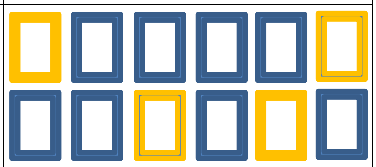
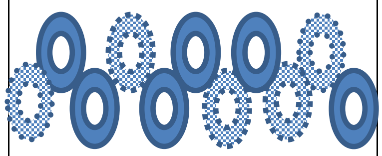
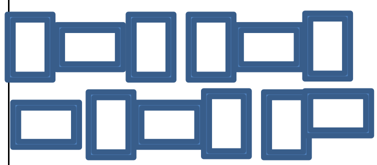
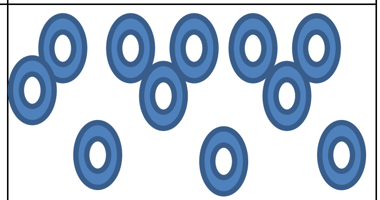
Methods that can be Used for Construction of Harmony in Design	Definition of the start and finalization of the design	**With change of colour**	
		With change of texture	
		With change of dimension	
		With change of Shape(identity)	
		With change of direction	
	Provision of commonality between the elements and the design field	**By provision of continuity:** continuity in design can be provided by using same element in different characters.	
		By provision of similarity: similarity in design can be provided by repetition of different elements in same characters.	
		By Alignment: it can be provided by locating same or different elements into a specific axis.	
		By zooming: it can be provided by Construction of group through zooming same or different elements.	
	Figure-ground relationship	figure-ground relation via **Colour integration**	
		figure-ground relation via **Magnitude integration**	
		figure-ground relation via **Shape (identity) integration**	

3.1.3.5 Contrast

In the absence of common or close characteristics between the design elements, construction of relation becomes difficult and the elements become alien or unrelated with each other. For this reason, unity between the design elements cannot be provided and unconformity or confusion prevails. This condition of unconformity is called contrast. Since they cause to unexpected effects, they chill or stimulate the viewer. This paves the way for aliveness and this situation arouse interest. For this reason, while contrast cause to incompatibility on the one hand, it also works for freshening up the design on the other (Güngör, 1972, p.88).

The place of contrasts in our daily lives is undisputable. Contrast is the absence of monotony, thus; it is frequently approached in order to release from the nuisance owing to the monotony. In our daily lives, contrast naturally exists in the indivisible parts of our lives as in the case of the night-day; light-shadow and fire-water. Such implementations as work and play, activity, or rest are also the results of the requirement of contrast move in functions of human life. Unless such contrasting attitudes exist, human life loses its attractiveness. Contrasts that are constructed through different characters between the design elements can be grouped as it is summarized in Table.6.

Table 6. Types of Contrast in Compositions

Contrast by characters of elements	Explanation	Examples
Contrast by Shapes	It is the contrast that is realized through differences of the shapes of elements. Organic and geometric shapes are contrasting with each other.	
Contrast by Scale	It is the contrast in measurement of the elements. Between the horizontal forms big and small, between vertical forms high-low difference can be indicated. When most of the elements have the same magnitude, similar but small element gains visual importance.	
Contrast by Colour	Construction of contrast by means of using colour is the most frequently applied situation. Contrast is constructed through colour difference, lightness-darkness, and warmness-coldness difference.	
Contrast by Texture	Apart from differences in textures, contrasting condition is constructed by such oppositions as softness-hardness, flatness-rudeness, and brightness-dullness.	
Contrast by Orientations	Maximum contrast is constructed when the angle of elements relative to each other is 90°. Any rotation of same elements within 180° also constitutes a contrasting structure.	
Contrast by Location	It is the contrast situation that is constructed by means of location of elements in the composition. It is realized through such differences in location as up-down, high-low, left-right, central-out of center. .	

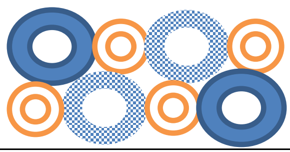
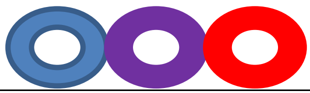
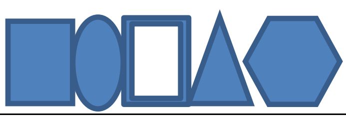
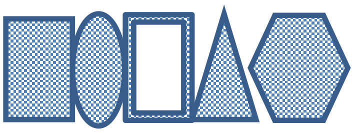
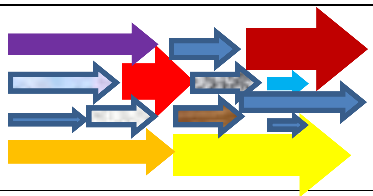
3.1.3.6 Repetition

Repetition is realized through using the same element or similar characters more than one. When design elements that have very close characteristics with each other are located next to each other in a design, the similarity between them works as a connecting bond in the design. (Güngör, 1972, p.69).

Repetition is one of the prioritized principles of design (Eczacıbası Sanat Ansiklopedisi, 1997: 1944) that is applied for realization of coherence, continuity in perception and rhythm (See, 3.1.3.7.Rhythm).

When it is dealt in detail, as can be seen in table.7 the principle of repetition can be varied in visual aspects of elements, that is, in terms of their characteristics and relations between them:

Table 7. Types of Repetition in Compositions

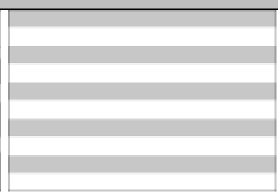
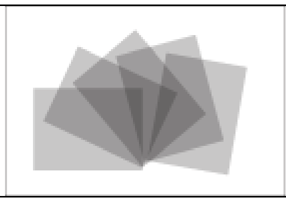
Repetition by characters of elements	Explanation	Examples
Repetition by Shape	Shape is the identity of design elements. Repeated shapes can have different characters as of colour or texture.	
Repetition by Proportion	It is a repetition type in which magnitudes are same but other characteristics are different.	
Repetition by Colour	Despite the shapes are different, same colours come side by side.	
Repetition by Texture	All elements have the same texture but can have different shapes, colour and magnitudes.	
Repetition by Direction	Existence of explicit direction of the shapes and the repetition of these directions are required.	

3.1.3.7 Rhythm

It is the balancing of design elements in a way that they constitute harmony in visual design. Rhythm ensures eyes' catching of the important parts of the design and provides easy perception of the message of the design. Rhythm is a concept that is mostly used for referring to the conformity of the sounds in music. Such situations as clapping, the tempo of a song, and the voice of the stomping feed of a dancer can come into the mind. These examples are related to hearing. Rhythm is not only used for music, but is also used in visual arts with a similar meaning. Basically, it refers to the repeating movement. In design, it turns out to be a visible, rather than hearable phenomenon. Rhythm refers to harmonized and regular use of visual elements in a repetitive way. The regular movement of shapes in a specific direction is followed by the viewer's eyes.

Two types of rhythm exist. These are called Alternating rhythm and Progressive rhythm. (See, Table.8).

Table 8. Types of Rhythm (URL 55)

Types of Rhythm	Explanation	Examples
Alternating Rhythm	Happens when two element groups alternate with each other to produce a regular sequence such as the alternation of elements in the sequence of positive/negative, positive/negative….A regular rhythm occurs when the intervals between the elements, and often the elements themselves, are similar in size or length.	 
Progressive Rhythm	Happens when the repetition changes in a character: progressive variation of the size of elements, or their shape or colour, texture etc.	

3.1.3.8 Hierarchy

> "Hierarchy refers to the systematic construction of variations and domination of the same design element or design groups in the composition" (Dağlı,U.,Şahin,N.,Güley,K., 2012).

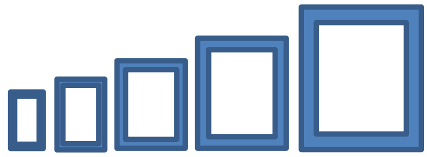
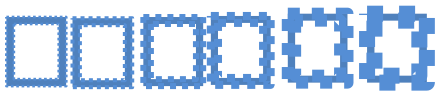
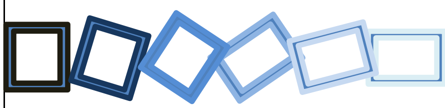
Figure 43. Examples of Hierarchy in Nature (URL 56)

In other words, Hierarchy is the articulation of importance of elements in a design field, by shape, size, orientation or position etc., relative to other elements of the design organization. It is a way of ordering of elements in their degree of emphasis according to their roles in the organization. There are always several levels in hierarchical case. This is the basic difference between hierarchy and dominance, which is next to being explained briefly. Hierarchy involves contrasting end points and the gradation between these end points (Yağız, 1999).

Figure 44. Examples of Hierarchy in Architecture (URL 57)

Hierarchy in design by characteristics of elements is provided in four different ways. Table.9 displays how hierarchy by characters of elements is realized.

Table 9. Types and Methods of Hierarchy

Hierarchy by characters of elements	Explanation	Examples
Hierarchy by Size	Hierarchy can be created by using the same element in different magnitudes.	
Hierarchy by Colour	Hierarchy can be created by using different colours or different colour tones of the same element.	
Hierarchy by Texture	Hierarchy can be created by using texture in different amounts or frequency to a same element.	
Hierarchy by Orientations	Hierarchy can be created by changing the direction of the element in a particular order, whether same or different colours and magnitudes are used.	

3.1.3.9 Focal Point

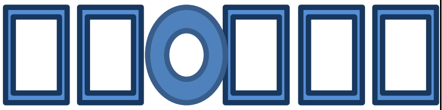
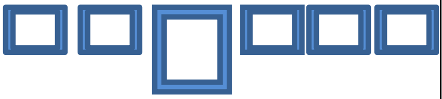
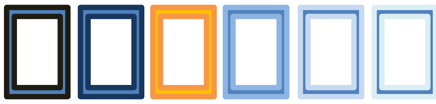
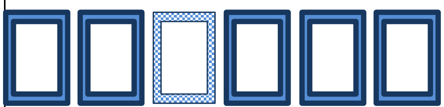
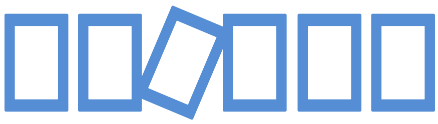
Emphasis refers to construction of focal point in a design (Lauer & Pentak, 1995, p.42) and remarking the most important one (Stewart, 2002, p.3-15). Element that should be brought into forefront and the one that should stay in the background can be provided by characteristic of design elements such as direction, size, texture, colour and shape differences. In Figure.45, the focal point, which is achieved by size and colour, can be observed.

Figure 45. Example of Focal Point, by Colour and Size (URL 58)

An anomaly or an object moving away from the normal also shows itself and takes attention, as in the case of a person wearing winter dresses on a tropical beach. Emphasis can also be realized through positioning. Emphasis can be constructed by means of the position of an element in void, or through its isolation from the other elements (Lauer & Pentak, 1995, p.49). Another point that should be reminded with regard to emphasis is the fact that nothing can take attention , and in fact emphasized, when everything is emphasized (Stewart, 2002, p.3-15).

In short, focal point is important because it significantly influences the attention. In a graphical surface, emphasis can constitute expressive depth and can take the attention to the intended point (Hashimoto, 2003, p:44). Emphasis can be defined as bringing particular side in an arrangement into forefront or as creation of effective element (Buyurgan&Mercin, 2005, p:235). In a graphic design, emphasis can firstly be made on the elements that are more important according to the hierarchical index. In this context, detailed research of the topic whose design will be constructed, decision of the priority elements, and the decision of the visual elements by means of which the priority topic will be emphasized are all important. The designer should also decide the location of the focal point on the design area. Locating the focal element at the optical center of the design area can be a correct move for ensuring the effective provision of the message. Another rule that should be considered is the possibility that various usage of emphasis on the design area can diminish the effect, hence; too much emphasis should not be used (Becer, 2005, p:74). By using emphasis on the design, we can give character of dominance to any element we desire. Dominance in design can be provided in four different ways. Table.10 shows how Focal Point can be constructed by characters of design elements.

Table 10. Types and Methods of Dominance

Focal Point by characters of elements	Explanation	Examples
Focal Point by Shape	In a composition that is consisting elements with same characters, Focal Point can be constructed by changing the shape of any element.	
Focal Point by Size	Focal Point can be constructed in a composition by using the same element with different magnitude.	
Focal Point by Colour	In a composition consisting of same colour or same colour tones, Focal Point can be constructed by using a different colour.	
Focal Point by Texture	In a composition consisting of elements with same colours and magnitudes, Focal Point can be constructed by using texture in any of the elements.	
Focal Point by Orientation	In a composition consisting of elements with same characters, Focal Point can be constructed by changing the direction of any of the elements.	

3.1.3.10 Proportion

Proportion is the relation between size and shape. In any design, for realization of a good proportion, the sizes among the elements and the size between the design area and the elements should be evaluated in detail.

In perception of an image, human eye searches for the required proportional relations between the forms. This search can be explained with the proportional relation within the human being himself/herself and within the nature (Uçar, 2004: 151). Comparative dimensional and positional relation between the whole and the parts and amongst the parts can be defined as proportion. “Proportion” that can shortly be paraphrased as relations between the dimensions is also a principle that assists the construction of visual hierarchy. Because visual hierarchy, at graphical level, can be explained as sizing or dimensioning according to priority order of visual elements that are emphasized in the message (Becer, 2005: 68). In the example in Figure.46, proportional relation amongst the stone pavement elements is displayed.

Figure 46. Example of Proportion (URL 59)

In short, proportion refers to the dimensional relation between the whole and part in terms of size, quantity and degree. Proportion is especially the dimensional conformity between two things. It is the connection between two or more quantities and magnitudes. Human beings perceive by making conscious or unconscious “proportioning” between the dimensions. Unitary, measuremental comparison systematic, comparison order is the proportion (Atalayer, 1994:204). Çaglarca (1999:65) defines proportion as the differences among an object’s constitutive parts and among the heights.

3.1.3.11 Scale

> “Scale is the size of an object or space relatıve to other forms known to us” (Yağız,1995).

Scale and proportion have similarities as terms but they have a different emphasis: Essentially, scale refers to size as well, but size itself is meaningless unless we compare it with other things. For example a “big butterfly” or “small table” phrases are only meaningful if we have an idea about the size of most butterfly or tables. So in visually measuring the size of the element, we tend to use other elements of known sıze in their context, as measuring devices. These are known as scale giving elements (See, Figure.47).

Figure 47. Example of Scale – Butterflys (URL 60)

In architecture human figure is an important reference for scale, because we know what size an average human being can be and compare other elements to this known form. Therefore; human scale means the size of a building element or space, relative to the dimensions and proportions of the human body (Yağız, 1999).

In architecture, other than the term human scale we use another term : generic scale. It means the size of a building element relative to other elements in its context. For example: the size and proportion of windows in a building façade are visually related to one another as well as the spacing and the overall dimensions of the façade. The windows may be very big in their actual sizes, but on a façade that is relatively bigger, they may look as if they are even small. In fact, if we find the relative sizes not in harmony with each other or with human sizes we use the term “out of scale” in comparison.

3.1.4 Appearance of Gestalt Theory

The theory of Gestalt, as a part of a psychological trend in the 19th century, was developed by German psychologist Max Wertheimer (1880-1943) as a draft research.(Although the qualities of gestalt had been mentioned and named in the 1890`s,it wasn’t until 1910 that they were generally considered to be important for psychology (Kaplan,Semih,2003).In order to carry out his draft research, Wertheimer has received assistance from Kurt Koffka(1877-1967) and Wolfgang Kohler(1877-1967) at the University of Frankfurt. The result of the research has been the foundation of the Gestalt psychological movement. The result of this research has been published as an article in 1912 and this article is usually accepted to be the start of the Gestalt School (Türkmen & Dinç , 2011).

These three psychologists, who were the forerunners of Gestalt school evolving in Germany, took the issue of perception in their earlier studies with a special focus on organization of the visual perception which is released from the illusory phenomenon. First Gestalt experiments are about perceived movements. As two separate lights are switched on and off sequentially, the subject witnesses a single light that is moving from one direction to another. The phenomenon of movement had already been known, but the Gestalt psychologists have realized that in order to create this effect, the pattern of the stimulator and the institutive character of it was important (Psikolojiye Giriş, 1999, p.687). Wertheimer and his colleagues primary work on perception has concentrated on the perceptive organization of visual space.

The Gestalt notion is essentially concerned with how the human eye organizes the visual experiences and perceives them (Uztuğ, 2002). Gestalt is a German word meaning 'shape' or 'form'. (Todorovic, D., 2008).There exists no synonym of the word in English, but in the daily use of the language words like `form` and `shape` and in psychology words like `pattern` and `configuration` can be used instead of gestalt (Kaplan, 2003).The word is generally used without translation especially by the psychologists. When the term first appeared in the psychology dictionaries in 1890`s, it was used to specify `gestaltquatitaten`; objects that are perceived but cannot be broken down to different units and consist of perceptive `shape qualities` that fit into their general configuration. `The term Gestalt which can be translated as a `shape` or a `structure` that has been brought together and organized, has settled into the psychology literature as the shortest wording of the notion that, total features of anything cannot be achieved with the dissolution of the components of the whole (Özer, Naci, 2011). In any given situation, instead of focusing on the parts separately, an emphasis is given on the `shape` and `pattern` and this forms the basis of the Gestalt theory (Genel Psikoloji, 1976, p:296).

A design organization has the quality of completeness; nothing more should be added or nothing should be taken away from it without destroying or at least changing the finished or completed design. Therefore the elements that make the design must have some relationship among them, and between them and the design field, for the viewer to perceıve it as a completed whole (Yağız, 1995).

According to Gestalt psychologists, the units that constitute perception make up a whole and are arranged to be patterns which are meaningful on the condition that they correlate with each other. Knowing the function of the units one by one, therefore, will not be enough to provide an explanation. Because the whole is more meaningful than all the units combined and as the Gestalt psychologists argue, the whole is more than the units that constitute it (Kaplan, 2003).

The Gestalt psychologists have emphasized the principle of “The whole is more than the sum of its parts”. Wertheimer has pointed out that the feeling of motion caused by successively displayed, motionless string of pictures, do not exist in any picture when examined on an individual basis (Özer, Naci, 2011).

The basic idea behind it is: *the whole ıs more than the sum of ıts parts,* which leads us toward seeing and thinking in terms of relationships. Perception follows a strong intrinsic urge towards simplification, to better comprehend the structure of our visual field and to order our environment, by taking complex stimuli and converting them into simpler groups. In other words, the human mind tends to perceive the environment in a way that organizes the visual field into dıstınct and related parts (Yağız, 1999).

3.1.4.1 The Theory and Laws of Gestalt in Visual Perception

The first thing that psychologists who are interested in perception learn is the fact that perception is an organization. We do not see world as an environment which is constructed by objects that randomly came together or happen to be there by chance. We attach meanings to senses by compiling, organizing and putting them together. Perception possesses more meaning than the sum of all the sensual inputs that constitutes it.

Perception is the process of obtaining information from and about one's surroundings. We use our five senses (seeing, hearing, smelling, touching, tasting) to develop an awareness of the environment we live in. Then, the stimuli transferring these sensations to our brains, are processed there and they end up as " understanding" or "knowledge" about the environment. This is really meant to be a very simplified explanation, what really concerns us in this context is visual perception about which several theories exist. Gestalt theory proved to be one of the most influential of such theories for architects and designer (Yağız, 1999).

There exist gestalt laws composed by the gestalt theory which are used in visual perception. Gestalt principles (also called Gestalt laws) are the rules concerning the organization of perceptual scenes. When someone's looks at the world, he perceives complex scenes that are composed of several groups of objects in the background. The objects themselves are consisted of parts which in turn might be composed of even smaller parts (Todorovic, D., 2008).

Psychologists of Gestalt compiled a list of factors that influence our perception of form and its environment, in a way that we are able to see objects as related. We shall take a brief look into the seven important ones among these factors which are generally known as Gestalt Principles (Laws) that are explained in the following paragraphs.

3.1.4.1.1 Figure-Ground Interdependence

The visual field is perceived as articulated into two components: 1) the figure (patch) and 2) the ground (surround). These two components are viewed as two segments of the visual field that are not different only in colour but also in other phenomenal characteristics. The character of the figure is object-like while the ground does not have so much perceptual saliency and appears as a "mere" background. Some displays however (such as in Figure.48) are structured in a way in which a smaller region is completely surrounded by a larger region. In that case the former is appears as a figure (despite the fact that it can also appear as a hole) and the latter as ground (Todorovic, D., 2008).

Figure 48. Figure –Ground Relationship (URL 61)

Human perceptive system makes a distinction between the figure and the ground. The figure is what the individuals' attention is focused into whereas the ground is at the background, unnoticed and not within the area of perception. The figure has features that are more remarkable and more striking than the ground (see, Figure.49).

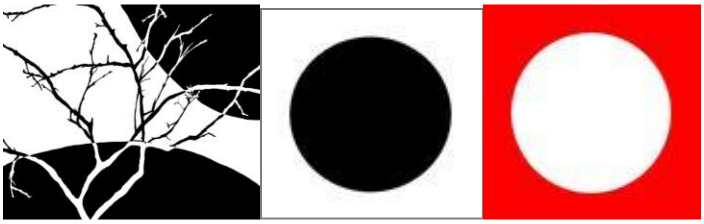


Figure 49. Examples of Figure-Ground Relationship (URL 62)

The areas of the figure and the ground do not usually appear as juxtaposed in a common place (a mosaic for example). Instead they appear as stratified in depth: usually there is a tendency to view the figure as being positioned in front and the ground in more depth plane and continuing to extend behind the figure as it was occluded by it. Additionally, the border that separates the two segments is perceived like it belongs to the figure and not to the ground. It is also perceived that is delineating the figure’s shape as its contour and that it does not play a role to the shape of the ground. Some displays are bi-stable since whatever is thought to be a figure can also be perceived as ground and the opposite (Todorovic, D., 2008). Still, there might be circumstances where the figure and the ground switch places and it is hard to decide which one is the figure and which one is the ground. From one aspect, the individual can perceive the figure as the ground. And from another aspect the ground has the characteristics of the figure (See, Figure.50). But both cannot be perceived as figures at the same time. Humans’ main organizing tendency towards the perception of objects is relative to the distinction of the figure and the ground (Erdal, İ.T., 2006).

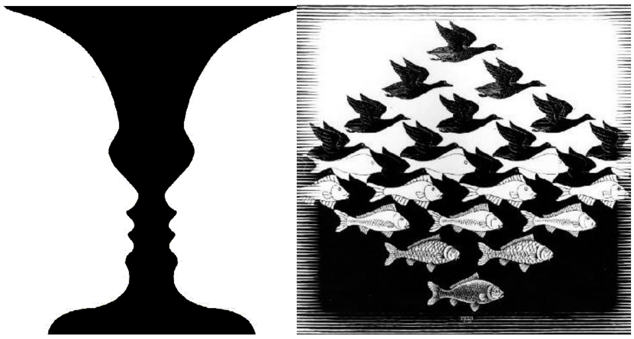


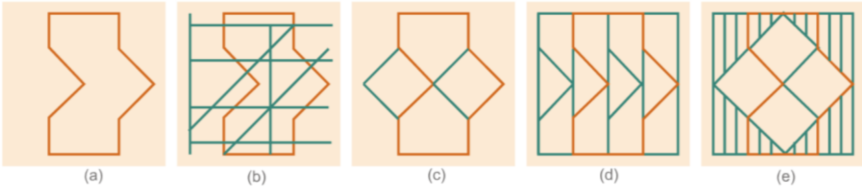
Figure 50. Figure-Ground Relationship (URL 63)

But this distinction must be obligatory in design. Namely: we tend to organize elements of a design field as positive (figure) and negative (ground). Then we find a tie between them in such a way that we perceive them as related**.** The ground becomes part of the design as well. Sometimes both figure and ground elements are of similar value and we cannot differentiate between them, reversible figure/ground patterns may occur (Yağız, Ş., 1995). The deliberate alteration of figure-ground in order for the figure to blend into the ground is called camouflage.

During the Gulf War in the early 1990's, the tanks were repainted to a desert camouflage pattern (initially they had a woodland camouflage) since camouflage is terrain specific. This fact also becomes evident when someone goes to buy camouflage clothes. The latter come in several patterns that are best suited to particular seasons or environments (Todorovic, D., 2008).

The use of a single colour or similar colours can sometimes have a camouflage effect on the figures. With the use of colour, the figure can be disguised and not perceived. With camouflage, while the desired figures can be pushed into the background and perception of them can be prevented, they can also be converted into primarily perceived figures by bringing to the forefront.

a b c d e



a^1 b^1 c^1 d^1 e^1

Figure 51. Camouflage Effect on Drawings (URL 64)

Figure.51 is a good example for camouflage. While the figure at figure Figure.80a can be seen to be made up of lines, it is meeting with figure b made of lines in different directions. The figure b at a is still perceived easily. But at c, due to the use of elements of the same direction and the same colour, the figure loses its identity and becomes very hard to read inside the whole. At Figure.51d and 51e the first figure cannot be perceived in any way, since there are lines repeated in the same direction and therefore producing a new texture. At the sample drawings used in Figure.51a1 –e1, it can be seen how the figure can be perceived at every step with the use of colour (Todorovic, D., 2008).

3.1.4.1.2 Closure Principle

Human mind tends to simplify the visual environment for ease of understanding. Regular forms are easier to understand. So we round up the irregular one to the nearest regular form, or since closed forms are easier to understand, we supply the missing parts of an uncompleted form from memory (Yağız, Ş., 1995).

The recognition of the stimulus triggers the brain's satisfaction of an encoded pattern (incomprehensible meaning). This happens because the brain works in a specific way according to which it believes that the missing details are part of a potential pattern. Once closure is achieved, the brain eliminates the unnecessary details in order to establish a pattern match (incomprehensible meaning) (Tuck, 2010). In line with the definitions above; The principle of closure applies when we tend to see complete figures even when part of the information is missing and Closure occurs when elements in a composition are aligned in such a way that the viewer perceives that "the information could be connected (See Figure.52) (Tuck, 2010).

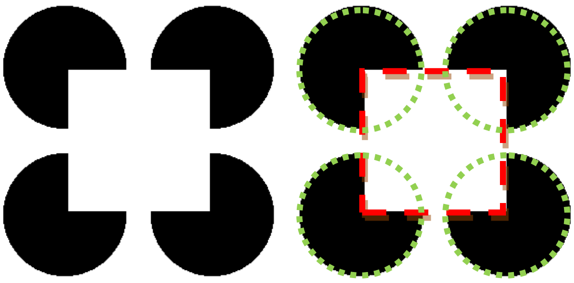


Figure 52. Example of the Real Figure and Imaginary Figure (Tuck, 2010)

The drawing situated at Figure.82 does not have one square and four circles. But it is perceived that way due to proximity of the present drawings at the figures.

The vectors (imaginary lines) and the counter forms (shapes) are the result of these relationships. The human eye perceives them as a part of the composition despite the fact that the is nothing there. As it can be seen at the drawing situated at Figure.53, the eye can read the imaginary lines and complete the shape. The linear vectors control the human eye's direction through the composition. Once the eye is attracted by the prevailing features of the composition, the linear vectors will determine where the eye will focus.

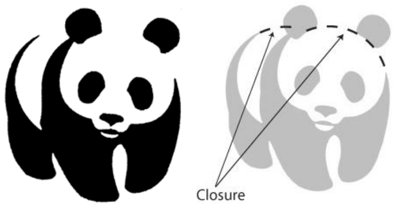
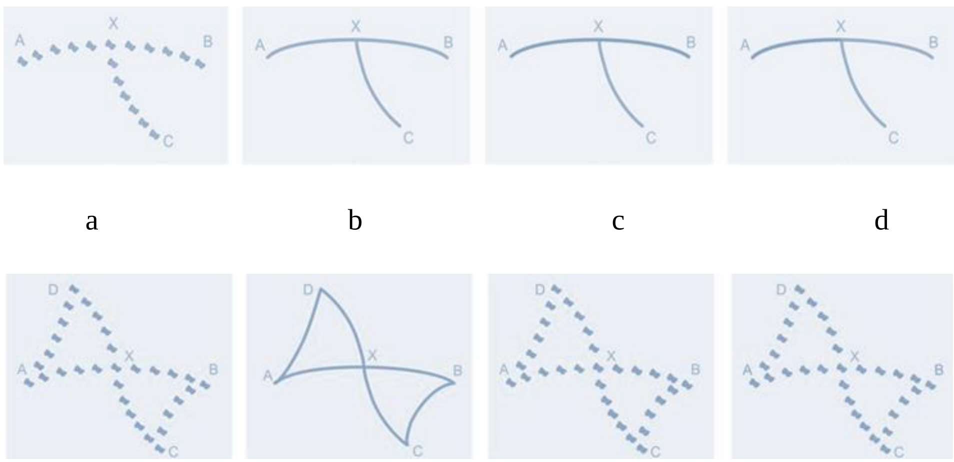


Figure 53. Example of Closure – Imaginary Lines (URL 65)



a b c d

a^I b^I c^I d^I

Figure 54. Closure Principles (URL 66)

Figure.54 can provide a good summary of closure principles. Some appropriate elements to a^I-b^I are added in the Figure.54 a-b. In figure a and b the component BX is matched with AX while in figure a^I and b^I there is a tendency for this component to match/group with the component CX. The BX and CX components are the sides of the BCX side that in its turn is one half of a bow-tie shaped figure. This perfectly illustrates the colour principle. In other words, if elements are parts of a closed figure they tend to group together. In our example, however, the continuity remains relatively effective and competes strongly with closure. The salience of the BCX as a visual sub-whole can be increased or decreased by the use of similarity (see figures c^{I} and d^{I} respectively) (Todorovic, D., 2008).

3.1.4.1.3 Similarity Principle

Objects look like are seen as a group. In this principle, not spatial but physical similarities (colour, shape, value etc.) are more important factors. However, it should be mentioned that there is a degree of similarity; Wertheimer pointed out the degree by the term “more or less dissimilar”, which means that “similarity is not absolute” (MacEachren, 1995). Similar objects in a design field tend to group together, and perceived as related. Similarity can be in terms of shape, colour, texture, size (Yağız, 1999).

Figure 55. Example of Similarity (URL 67)

The above example (Figure.55) (which contains 11 distinct objects) appears as a single unit since all shapes have similarity.

The basic notion of the similarity principle is that the elements have the tendency to integrate to groups that are similar to each other. The Figure.56a-e perfectly illustrates this conclusion. In Figure.56a-e proximity is constantly held because the individual figures are in pretty much the same distance as they also are in Figure a. Despite this fact, due to the similarity of visual attributes (lightness in Figure a, colour in figure b, size in figure c, orientation in figure d and shape in figure e) they are perceptually divided into three adjacent pairs (Todorovic, D., 2008).

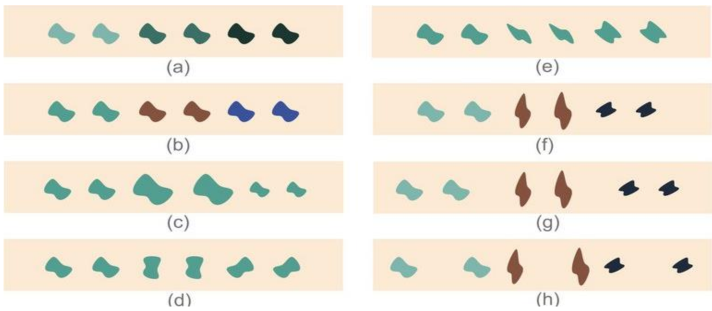


Figure 56. Similarity Principle (URL 68)

The notion that the objects that share some visual characteristics such as size, shape, texture, colour and value will be perceived by the viewer's mind that they belong together is the cornerstone of Gestalt's theory. The key approach in the application of similarity principles to composition is the use of repetition. The deliberate use of similarity in composition (such as the static and dynamic tension) will give the viewer the impression that it is independent of the image's subject matter (Skaalid, 1999).

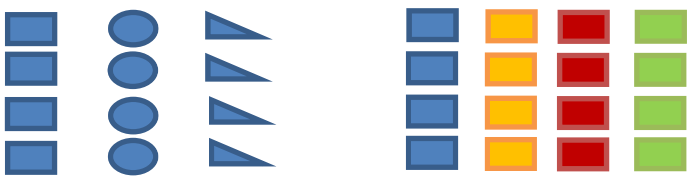


Figure 57. Similarity: Shape and Colour

3.1.4.1.4 Proximity-Adjacency Principle

Proximity defines which items are in relationship to each other. The distance between elements show different attributes as, "objects close together form groups" (MacEachren, 1995).

The conclusion that the shapes or objects which are close appear to form groups is stated in Gestalt's principle of proximity (See Figure.58). The objects that are placed close are perceives as being related. If they are close together they will appear as a group even if the sizes, shapes, objects and colour are different in a radical way.

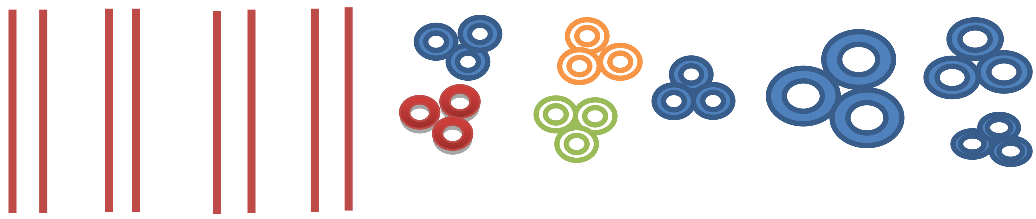


Figure 58. Examples of Proximity

In Figure.59 the ten squares are placed without having proximity. The ten squares appear to be perceived as separate shapes. Unity takes place when the squares are given proximity. Even though they continue to be separate shapes they are perceived now as being one group.

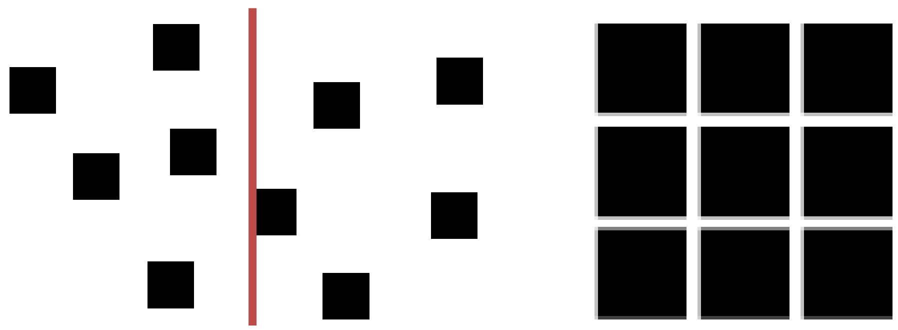


Figure 59. Example of Proximity (URL 69)

Refers to the way in which smaller are "massed in a composition. The proximity (which is also called "grouping") is the principle about the effect that is produced when the collective presence of the set of elements is more meaningful compared to their presence as separate elements. This is also identically valid for linguistics.

Refers to the way in which smaller are “massed in a composition. The proximity (which is also called “grouping”) is the principle about the effect that is produced when the collective presence of the set of elements is more meaningful compared to their presence as separate elements.. Even if the elements are not touching, the elements that are grouped together will create the illusion of planes or shapes in space. This kind of grouping can occur when we use tone/value. Shape, size, colour, or other physical attributes (Skaalid, 1999).

3.1.4.1.5 Continuation Principle

When the eye is compelled to move from one object to another project then continuation occurs.

Figure 60. Example of Continuation (URL 70)

In Figure.60 continuation takes place because the viewer’s eye naturally follows a curve or line. The eye is directly leaded to the maple leaf due to the smooth flowing crossbar of “H”.

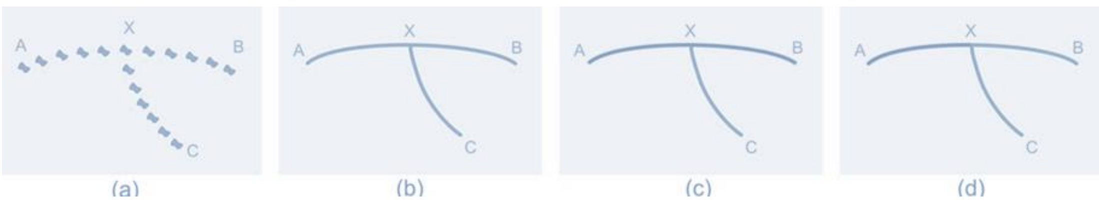


Figure 61. Continuation Principles (URL 71)

The display in Figure.61a consists of a number of elements that are arranged in three sub-wholes or brunches that converge at X. If we use the principle of proximity then the branch AX should be grouped with the branch CX. However, it groups with the branch AX and forms the sub-whole AXB. This fact perfectly illustrates the continuity principle. According to the continuity principle the oriented units tend to integrate into perceptual wholes when they are aligned with each other. The principle of continuity has the same application for elements that are arranged along lines (such as in Figure.61a) and for patterns that are built from the corresponding lines (such as in Figure.61b). The balance between proximity and continuity in the creation of salient sub-wholes can change by varying similarity. The latter can be achieved by colouring in a different way the different branches. Therefore, when we colour BX the same way with AX but in a different way from CX we make the AXB an even more salient unit (see figure c). Additionally, when we colour the BX the same way as CX but in a different way than the saliency of the CXB will be increased by the AX (Figure.61d) (Todorovic, D., 2008).

3.1.4.1.6 Common Fate (Common orientation) Principle

According to the common fate principle the elements, if the move together, will be perceived as being grouped together (Wikipedia, 2014b).

According to the law of common fate the objects are perceived as lines that move to the smoothest part. Some experiments that used the visual sensory modality came to the conclusion that the movement of an object's elements produces paths that the individuals perceive that the objects are on. We tend to perceive that the objects' elements have trends of motion that indicate the path where the subject is. The law of continuity implies the grouping of the objects that have the same motion and are on the same path. If half of the elements of an array of elements were moving upward and the other half downward we would perceive these two elements as two distinct units (See Figure.62) (Wikipedia, 2014b).

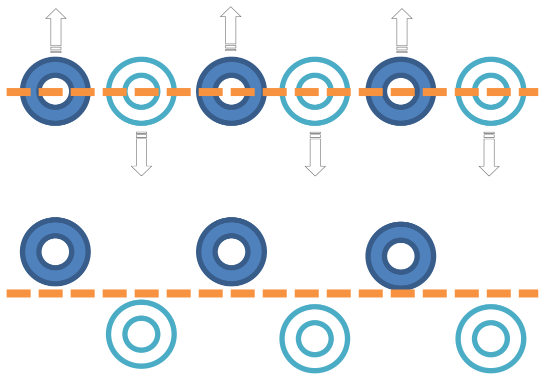


Figure 62. Example of Common Fate Principles

3.1.4.1.7 Symmetry Principles

According to the symmetry law, the objects are perceived by the mind as asymmetrical and forming around a center point. The division of objects into an even number of symmetrical parts is perceptually pleasing. As a result, when two symmetrical elements are not connected then the mind will connect them in order a coherent shape to be formed. The similarities among the symmetrical objects increase the like hood that the objects to be grouped in order a symmetrical object to be created…. For instance, the figure that depicts the law of symmetry reveals a configuration of curled and square brackets. When we perceive the image three pairs of symmetrical brackets are observed instead of six individual brackets (Wikipedia, 2014b).

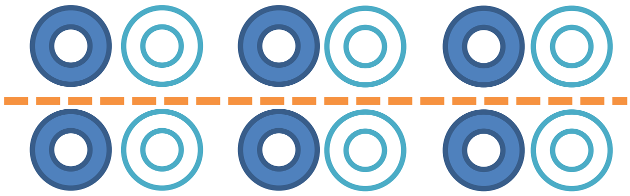


Figure 63. Example of Symmetry

3.1.4.1.8 Law of Good Gestalt (Prägnanz)

According to the law of good gestalt the objects' elements have the tendency to be perceptually grouped together when they form a regular, orderly and simple pattern. The law of good gestalt implies that the way according to which perceive the world they tend to eliminate the unfamiliarity and complexity in order to be able to the reality in the simplest possible way. The elimination of extraneous stimuli gives the chance to the mind to create some meaning. This meaning gives the sense of regularity that has priority over spatial relations. The law of good gestalt gives emphasis on conciseness that has been the key element in gestalt's theory. It is also called as the law of Prägnanz (Stevenson, H., 2012). The exact translation of the German word Pragnanz is "pithiness" and implies the ideas of orderliness, salience and conciseness and the tendency of the human eye to see the simplest form of a complex object (Wikipedia, 2014b).

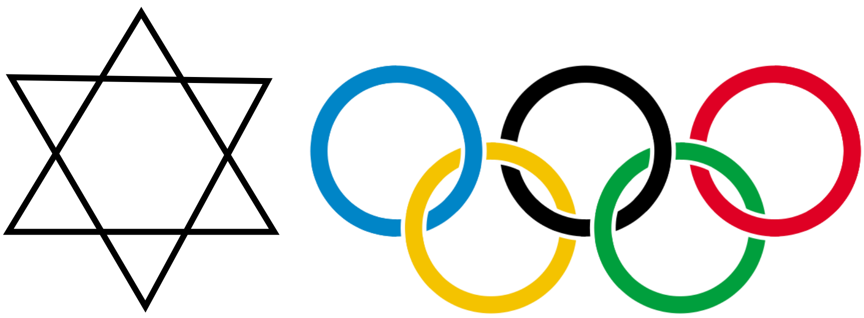


Figure 64. Example of Pragnanz Laws (URL 72)

The graphic symbol for Judaism is seen as the total configuration of a star and not as six separate triangles surrounding a hexagon. The whole is different than the sum of its parts. It is same mention on Olympiad logos (Figure.64).

3.1.5 Effects of Colour on the Façades of the Architectural Design Object

> "Architecture must not be coloured for colour's sake. Colour is a property and the language of form, not a separate element or an intruder. Colour in environments need not forsake elegance if it is used intelligently and tactfully; as a matter of fact, it can lend an aesthetic quality that would otherwise be unobtainable'' (Mahnke & Mahnke, 1993, p: 69).

Architectural shell basically can be considered that has two faces as inner and outer. The colour design approaches of these two faces of the architectural object differentiate each other. Colour concept of the inner faces is generally shaped by the architect according to the necessities of the function and likes and dislikes of the users. On the other hand, colour comes to the fore on the façades with its power in emphasizing the architectural design thoughts. The difference between the design purposes is not the only diversity between the colour concept on the inner and outer façades. The façades as a contour in the endless ground cannot be perceived alone apart from the other natural or man-made objects. In the design of the interior, architect can make his/her choice by only considering the autonomous entity of the building, in a considerably free which are acquired independence from the architect and affect the perception of colour of the building. According to Lange;

> " The complexity of architecture is conditional upon the mutual presence of an 'outside' and 'inside' which cannot be experienced at the same time…With architecture, one does not build a space – one builds around it, thus creating space'' (Lange, 1995, p: 81).

As a matter of fact, architects do not only create an inner space for the building but also forms out a façades for the surroundings. As mentioned before, these façades as a contour occur by the architectural object as a figure in the environment as an endless and shapeless ground. From this point of view it is possible to point out that colour as a visual element that is chosen and applied by an architect do not only influence the perceptions of the observers but also affect the context of the building itself. The façades of a buildings simultaneously become a background for the other building is affected by the colour of the environmental and the other architectural three dimensional objects just as it does for them too. For the reason that the simultaneous colour contrast or background effect affects the colour perception of the living beings. Consequently, colours of the context should be considered as important as the chosen colours of the building itself. For the reason that its effects on the architectural end-product. According to Moughtin;

> “When developing a colour scheme for a building it must first be seen in its strategic relationship with is immediate surroundings. The building’s visual function within the city or district should also be established” (Moughtin, Oc & tiesdell, 1996, p: 21).

Besides all these, according to Moughtin, there are four different scale of colour of the façades of the building which is designed in a city. The first one is the scale of the city itself and the second one is the scale of the streets or squares. In addition, these scales are generally known as the visual concepts of the city which cannot be changed by the architect as an individual. The third one is considered as the individual buildings as a whole and the last scale are formed by the details of the façades itself. Furthermore, these two scales form out the activity domain of the architects in terms of the colour design.

> "A response which should be based on a thorough survey of colour in the local environment. For the reminder of the city, colour can be used to highlight important building and landmarks, colour code important paths and give individuality within the overall pattern for important squares and meeting places"(Moughtin, 1996, p: 21).

In the light of these statements two paradigms should be taken into consideration First it can be considered from the point of view of the city sense and citizens. Secondly colour can be considered from the point of view of the architect as an integral part of his language.

3.1.5.1 Colour Quality

> "Colour in architecture is quite unlike that in painting; first of all it is colour in three dimensions. It is also subjected to changing sunlight and most importantly, it requires the careful use of materials with necessary consideration to their ageing and weathering properties" (Pelli, 1996).

Particularly, since the Renaissance period, colour had been considered as an element of painting rather that the architecture for about three centuries. However with the influences of the De Stijl and Cubist approaches colour was started to gain a volumetric character. It was given a meaning of being the language of architectural form. As a matter of fact, colour as a property of a figure in the three dimensional environment is perceived highly different form the art objects. Since the paintings generally are exhibited in the places which the conditions of the place are carefully organized. In these specific spaces the colour and amount of light, the surrounding figures, besides the climatic factors such as temperature are determined in order to provide the observers the best view. On the other hand in the three dimensional living environments it is not possible to arrange the physical conditions (Bayık, 2001).

> "To take one example, our perception of colour is constantly and simultaneously modified by a supplementary experience of light, texture and form; in other words, colour is light, texture and form" (Porter, 1997, p: 56).

As previously mentioned, the colour perception processes of human beings have four scales as light, object, physiological vision and psychological factors. Although the physiological and psychological factors are depended on the individual person whether he/she is conscious or unconscious, object and light properties are determined by the environmental itself. Therefore, for the reason that the architectural object stands in an environment, the perception of the colour of the building is affected by the conditions of the surroundings too. Furthermore, it is not possible, except the photos, to observe the architectural object from a standpoint which is designated beforehand like for the paintings. Living beings do not only experiences the three dimensional object from the different view of angles but also they perceive it in a context in different times of a day and in different weather conditions (Bayık, 2001). In the light of this entire physical and perceptive factors, the colour quality can be separated into `light, shadow& time` and `material texture`.

- **Light, shadow and time**

> "All of nature is colourful, and even the grey of dust or soot, even the most depressing and melancholy: places have their own typical colours. Wherever light is, there colour must be" (Taut, 1981, p: 14).

The diversities in the properties of light directly affect the colour perception, for the reason that light is the basic necessity of the colour. The relation between the colour and light has been examined by the human beings since the antiquity. Alberti, who was a famous artist and architect of the Renaissance period, pointed out his ideas about the relation between light and colour in his book as;

> “It seems obvious to me that colours take their variations from light, because all colours put in the shade appear different from what they are in the light. Shades make colour dark; light, where it strikes, makes colour bright…” (Lange, 1995, p: 82,83)

Sun is known as the basic light source for the living beings. Sunlight, moonlight and lights of the stars were the only known light sources before the inventions of the artificial one. However even the sunlight itself changes in the daytime, and these changing values of the light alters the colour perception. Colour perception is not only changed by the natural light sources but also is different by the every specific character of the artificial sources (See, Figure.65). For instance, under tungsten light a red object is perceived as orange, on the other hand same object under the white fluorescent tubes appears bluish (Porter, 1997). Although the natural light sources which are the effective for the building façades are accepted as the main illuminating system, with the influences of the developing lightning techniques particularly by means of the coloured lights, architects have the opportunity to create changing colour system for the façades of their buildings.

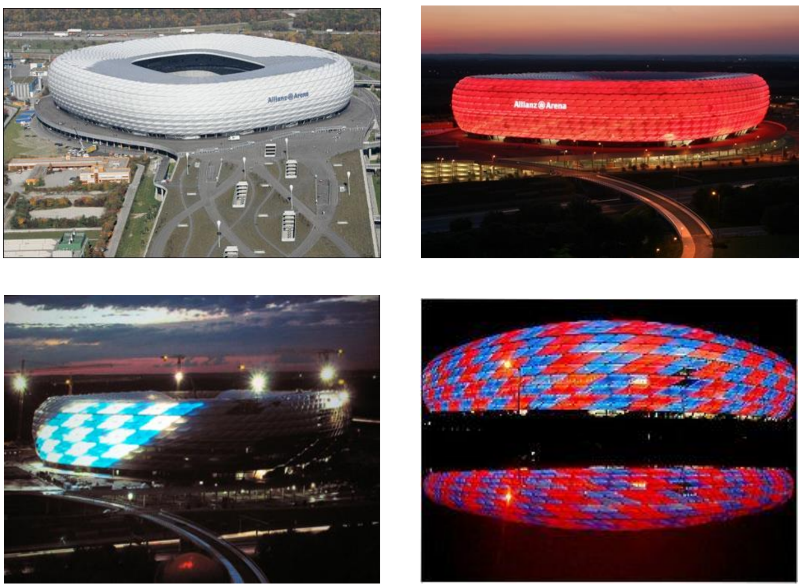


Figure 65. Effects of the Artificial Light on Colour (URL 73)

According to the artistic activities especially for the painting, it was not an easy process to accept and apply the nature itself and its colours on the canvasses as they were in reality. For the centuries artists described the nature in their minds instead of the real one. For the centuries artists described the nature in their minds instead of the real one. Therefore the colour of the environment and the effects of the atmospheric conditions had not been examined for years. Luminosity and the atmosphere began to be effected in 1820's in Turner paintings. He started to examine the alteration effects of atmospheric conditions and especially the light on the perception of colour. For instance he analysed the direct sunlight and diffused light effects on the colour of the building (Lancaster, 1996).

> "For me a landscape does not exist in its own right, since its appearance changes at every moment; but the surrounding atmosphere brings it to life – the air and the light which vary continually. For me, it is only the surrounding atmosphere which gives subjects their true value"(Lancaster, 1996, p: 24).

Furthermore the conditions of the atmosphere differ the colour of the sunlight too. For instance mist, cloud, dust and atmospheric pollution cause the light to be diffused (Lancaster, 1996).This situation causes a change on the perception of the colour. For instance, in sunshine, red-orange hues are dominated the figural character of the building against the context. However in overcast days, red-orange hues cause the building changing its character from figure to ground. On the other hand, blue, blue-green and red-violet hues in the overcast days become more saturated. White especially in the darker environments shows a figural character. Sunlight increases its saturation and, therefore its figural property (Minah, 1996). Bruno Taut pointed out that mixing pigments are weaker to the effects of sun, light, wind effects than the pure hues. They generally lose their homogeneity. Besides, according to him, this is one of the reasons that the green is not the preferred pigment in the antiquity (Taut, 1981).

> "Shadow is colour." John Ruskin (Schumacher, 1981. p: 10).

As far as it pointed out that the effects of light changes the impression of the colour. However it is not possible to ignore the effects of shadow on the building façades which is created by light itself. Shadow and its effects on the perception of the architectural end product have been investigated from the antiquity. Furthermore according to a legend creating of the Corinthian style was based on a shadow on a wall (Reed, 1990). However with the evolution of the modern tradition designing the effects of the shadow started to be removed from the façade of architectural objects. Besides Frank Lloyd Wright pointed out his thoughts about shadow as;

> "Shadows were the brushwork of the ancient architect. Let the modern now work with light, light diffused, light reflected, light refracted- light for its own sake, shadows gratuitous "Frank Lloyd Wright (Faulkner, 1972, p: 8).

Shadow has always been considered by the human beings as the mysterious one. Whereas the in the modern style as the architecture of machine age can never be any narrative approach. Nevertheless that is the fact that no one can be denied, where the chromatic effect of a building is not only depended on the massing or distribution effects of shadow. Shadow dominates the impression of colour. He pointed out that the effects of shadow on the outer façade of the building form out the chromatic plays and this can be considered the primary effect of the shell. On the other hand the colours of the façades which are designed by the architect can be accepted as the secondary effect of the building façades. According to him designing the relationship between these primary and secondary effects is stimulates a critical decision for the architect in order not to interfere or cancel out each other (Schumacher, 1981, p: 11). Lois Barragan who was one of the most important Mexican architects, is known with its polychromatic architecture which is based on cultural and locale characteristic of his nation. Furthermore he designed the effects of shadow on the façades, his buildings as well as colour.

The architectural end-product as a three dimensional object in the living environment is effected by the changing time. Besides, its environmental façade forms out a scene which provides the living beings to observe the time going by. The shadow of the components of the façade changes and therefore, the perception of the applied colour alters. At the early house in the morning the colour of the sunlight is yellowish. At the midday when the shadow occurs as their shortest shape sunlight become bluish. On the other hand it started to become redden until the setting down (Porter, 1997). According to Bruno Taut in the twilight red is perceived darker and blue started to come to the fore (Taut, 1981, p: 13). As far as it is considered that generally it is not possible to be observed the inner and outer façades of a building simultaneously. However in specific conditions time stimulates an exception. When the dark comes with the night the inner surface of some kind of buildings are perceived just like as its façades. Therefore the colours of the inner surface start to be observed as the colours of the environmental façade. The experiences of the architectural design for human beings are completely changed. Time transforms the perception of the façade in the way which is designed by the architect beforehand.

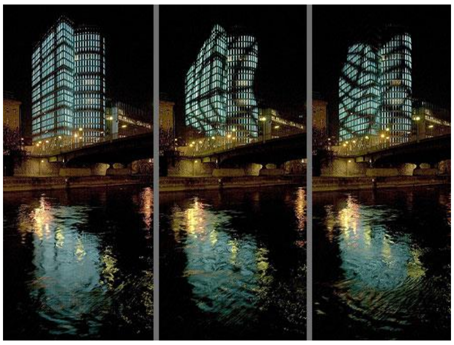


Figure 66. Example of the Time Effects on the Perception of the Building Façade (URL 74)

- **Material and texture**

> "As colour is reflected light, the behavior of light is very strongly related to its perception. The human eye responds both to the quantity and the quality of light that surfaces and objects reflect"(Demigods, 1992, p: 81).

Colour perception process can be considered in four stages and two of them are based on the environmental factors as light and object stages. Light is transmitted, reflected or absorbed by the object and the wavelengths that the object reflects designate the perceived colour. Chemical and physical structure, in order words, the material of the object is the most effective factor on designating the wavelengths of the reflected light beams. It is possible to point out that colour of the object which is perceived by the living beings, can occur in two ways.

One of them is formed by the colour of the natural surface of the object and the other one is constituted by the colour of the applied material on the natural surface. This applied material can be like as a transparent film on the surface in order to protect the natural structural component of the building but not to hide its physical properties. On the other hand, in some situations this artificial surface is observed as being superior to the natural one and the physical properties of the artificial surface is dominated in order to be perceived by the living beings. In the architectural design history, particularly in the 19th century there was an important discussion on the way of whether covering or uncovering the façade of the building.

Although there are exceptional examples in various patterns, particularly for the traditional settlements, the colour of the city is usually designated by the colour of the natural materials of that geography. For the reason that the construction materials of this kind of buildings are generally produced from the nature, the colour of the soil, rock or wood becomes the colour of the façades of the building and therefore the colour of the inner surfaces of the pattern (Porter & Mikellides, 1976).

Figure 67. Safranbolu Houses - Turkish pattern (Personal Archive)

According to Moughtin the city image from the point of view of colour is often formed over a long history. For the reason that even if the architectural styles change, it requires a long time for being changed the building materials. These materials designate the environmental façade of the buildings and therefore the inner façades of the cities. Consequently existing colours of the materials transforms into the general colour palette for this kind of settlements. By examining these colour palettes colour schemes are formed out (Moughtin, Oc & Tiesdell, 1996). In Figure.67, Safranbolu Houses is a good example of architectural style change by building materials.

In the 20th century, innovations of new building materials enabled the architects to alter the environmental façades of their architectural end-products. Therefore the new materials provided the exterior surfaces wide range of possibilities to be utilized various colours. As mentioned before the developing of the surface technology is highly depended on the effects of the industrialization age. Besides, the augmentations of the human civilization can be considered as parallel to the developments in the artificial surface techniques. Especially the machine age aesthetic was suggested a specific surface quality. Therefore this esthetical tendency in applying the specific materials to the building façades brought with itself the new taste of texture and colour.

> “The developments of new materials, including paints, can be seen in terms of the pursuit of precision, which in the machine age can be read as perfection. Modern materials tend to be sleek, smooth, functional and easily reproducible; paints are required to be waterproof, colourfast and durable” (Lancaster, 1996, p: 26).

From the point of view of surface quality texture as a property is accepted as important as the material of the object, texture effects of the building materials has been used in the architectural activity since the first human civilization. However the textures had been improved with the materials and increased its variations with the developing techniques. As a matter of fact, it occurs at the point which the surface transforms its physical character from planer to three dimensional. According to the gestalt patterns and textures can be occurred in either two or three dimensions from anything that can be repeated or in other words they can occur by the repetition of similar and dissimilar individual units which are placed in proximity (Güner, 1999, p: 25). In general, texture is considered as in two main groups as visual and physical textures. Visual texture as a group is formed by the textures which are just perceived with the sense of vision. However the physical textures are constituted by the textures which are perceived with the sense of touch (Ağaryılmaz, 1973).

Figure 68. Example of Colour Texture in the Garden (URL 75)

Figure 69. Example of the Physical and Visual Textures (Source: Personal archive)

Although the textural expression of the material had been considered as an esthetical value for a long time in architecture. Particularly with the beginning of the modern tendencies, functional properties of it had been recognized. First, texture provides the material to form a specific reaction against the effects of heat and sound. However, from the architectural point of view the most important function of the texture can be accepted as its expressive quality. As far as it is considered in this study that texture as well as the colour is one of the design concepts which provide the architects to express their architectural thought. Therefore, particularly architects of 20th century highly benefited from the expressive quality of material and its texture on the façades of their buildings. For instance one of the most preferred effects of texture can be considered as its dynamic or static characteristics. As mentioned before exterior surface of an architectural three dimensional object becomes a part of the inner surface of its context. Besides every context of a building has its own material and also textural characteristics according to its geographical conditions. In the light of this statement it is obvious that architect as a designer designates an attitude towards the context and expresses this attitude on the façades of the building which simultaneously forms out the inner surface surroundings. Therefore, as a matter of fact, texture can be considered as one of the most important design tool of the architect in order to present the architectural approach. As another significance of texture it's three dimensionality which provides colour to be perceived with form (Demirörs, 1992). According to Sven Hesselgren as pointed out below;

> "A textureless surface appears abstract, with one that is textured makes a more concrete impression, and relative distances between the objects and surfaces within the space are more clearly perceived"(Demirörs, 1992, p: 83).

From the architectural point of view it is not possible to consider the texture as independent from the colour and also colour from the texture of material. Light strikes the surface of the material and surface modifies it according to its molecular composition and textural structure. It is reflected, refracted or absorbed by the surface. As shown in the Table.11 different materials from out different reactions against the light.

Table 11. Materials Reflecting Table (Demirörs, 1992)

• **Typical Specular Materials**	**Reflectance (%)**
---Luminaire reflector materials	
Chromium	63-66
Aluminum	60-70
Stainless steel	50-60
---Building materials	
Clean glass or plastic	8-10
• **Typical Diffusing Materials**	
---Luminaire reflector materials	
White paint	70-90
---Masonry and structural materials	
White plaster	90-92
White terra-cotta	65-80
Limestone	35-60
Sandstone	20-40
Marble	30-70
Concrete (Uncoated)	45-55
Granite	20-25
Brick	20-40
---Wood	
Birch	35-50
Oak	15-25
Mahogany	6-12
Walnut	5-10
---Paint	
New white paint	75-90
Old white paint	50-70

Consequently, even if two different materials are painted with the same hue, they will be perceived different each other. Furthermore, it is not possible to be perceived same colour impression even for the materials which have the same molecular composition, if their textural characteristics become different each other. Light beams are reflected by the smooth surfaces directionally. On the other hand rough surfaces scatter it in various directions. When the light is scattered by the surface of an object, the colour of that object is perceived less vivid and pure. On the other hand gloss surfaces are increased the saturation of the colour (Demirörs, 1992). Besides the atmospheric conditions affect the textural quality and the perception of colour too. For instance wet surface's colour is perceived brighter than the dry one.

As can be seen in Table.11, different material reacts to the light in different manner and this situation differentiates the perceived colour. However another significance that can be figure out from that table is the diversity which forms by the time between the same materials such as the diversity between the new and old white paints. As mentioned before, architectural colour differentiated from the other disciplines which are considered colour as a tool such as painting or sculpture, for the reason that the environmental characteristics of the buildings. Under the destructive conditions of the nature itself it is not possible for the environmental objects to protect their appearance just like as at the beginning. Colour is one of the most vulnerable components of the building and time inevitably alters it. For instance, wood becomes grey and darken with years, it loses its endurance. Copper is golden when it first applies but with the ages it continues its life as dark brown and it ends as bright green in twenty years. Ceramic tiles, glass or glazed bricks changes their colour and brilliance. Painted surfaces are highly vulnerable against the effects of time and painting needs to repaint every two or three years (Pelli, 1996). Therefore it is obvious that time does not only affect colour of the façades with its changing perception phenomenon but also it alters its physical structure.

From the point of view of the architecture of the last decade, with the influences of the developments in the material technology colour has been gained a different attitude. Unchangeable structure of colour which is considered as one of the most important characteristics of it, started to be changed by the artists and architects. By means of the opportunities of the new technologies, the façades of the building were saved from its static characteristic. It started to be transformed in to a changeable developing and a dynamic attitude. The tower of winds which is designed by Tayo Ito can be good example to this manner. Changing quality of its environmental façades provides its architect to form out a building which can be react to the effects surroundings. The structures which can change with the alterations of the atmospheric conditions can be other good example to this phenomenon. As a matter of fact, changeable elevation system cannot be considered an invention for the nature itself. Some sort of animals has developed this technique as a part of their protecting and living manner.

3.2 The Use of Colour on the Building Façade as an Influential Design Tool

This part of the study includes effects of colour that can be used on the building façades. These effects of colour have been summoned under 5 headings, and these effects have been examined over selected buildings which all have been designed after 20th century and can serve as good models for the topic (See, Figure.70).

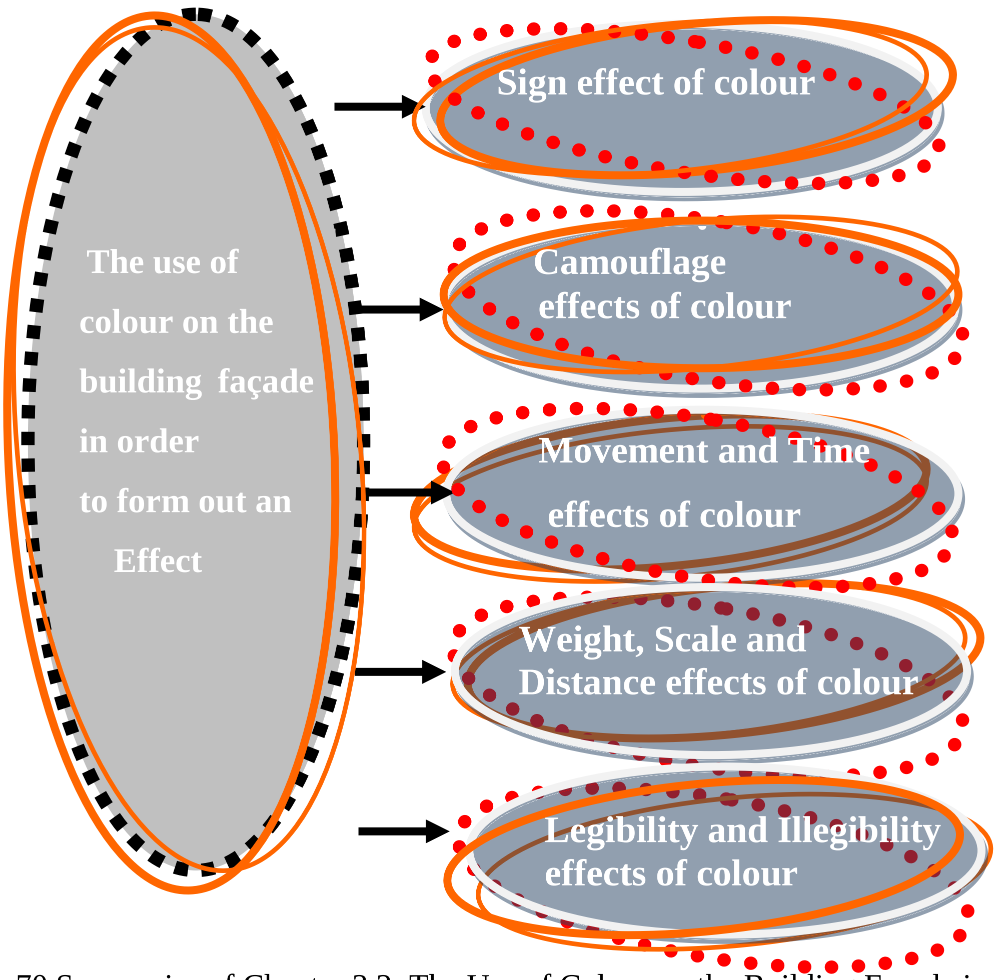


Figure 70 Summaries of Chapter 3.2: The Use of Colour on the Building Façade in Order to Form Out an Effect

As far as it is pointed out in this study, greatest part of the colour perception process occurs in the mind of the living beings and the result of the process is influenced by the mental and the physical structure of the individuals. Therefore this result does not always fix the reality.

Every kind of architectural interference to environment forms out a new figure on the background. The façade of an architectural three-dimensional object displays an attitude, which expresses the language of its designer, towards the context of the structure. Properties of this new construction on the background increase or decrease the figural effect of it. Colour can be considered as the most important one in these properties which has the power to be come to the fore the architectural design object or to be hidden it in its context. The attitudes of hues vary in different manner in a forest or in a city. Furthermore climatic conditions or the geography affects the perception of the object too.

The use of colour as an effect can be considered as one of the oldest technique in applying it to the building façade. In history we can see the effect of colour, for example in ancient Greek architecture the effects of colour on the perception of the human beings had been known and used on the building façade of architectural end-products. Particularly, visual aspects of colour in figure and ground relationship had been applied to the exterior surfaces in this period in order to make the contours of the buildings precise. From the point of view of the effects of colour another important period was the Baroque. Although the architects of the Baroque period avoided from utilizing the wide range of opportunities of the colour effects on the façade of their buildings, they applied and benefited from colour and its effective advantages on the surfaces of the architectural end products. The illusion effect of pictures of the building surface and façade, which is one of the most important properties of this period, was increased with the perceptual deceptions of the colour.

The colour` s effect on building façade can be classified into 5 as follows.

3.2.1 Sign Effects of Colour

> "Sign is colour, colour is sign…In fact, signs and colours can be seen as fundamental values – that is, all of those values that can be associated with expressivity." (Strano, 1998)

Colour, which is one of the most effective phenomenons of the visual sense, has an important role for the living beings in order to enable them to collect information from the environment. Particularly, in nature the signal function of it has an important signification for the living beings. The attractive property of colour forms out the greatest part of their surviving efforts. It is the most important factor to draw the attention of the animals in order to able to be inseminated. On the other hand for the animals the attractive property of colour is one of the most important sign of danger.

The use of colour as a sign is a technique, which is frequently preferred in the contemporary world. As a matter of fact, this effect of colour is not only utilized to the building façades by the architects, it is preferred by the other professions which their works depend on communicating with the observers by means of the concepts of the visual materials such as painters, industrial designer, graphic artists, etc. Especially with the influences of the age, which the advertising of the work is considered as more crucial than the result itself, this effect of the colour is come to the fore. As mentioned before the façade of the architectural end products are most communicative part of the buildings. The use of colour as an effect in order to stimulate a focal point can be considered in two ways of thought. As a first way of the use of this colour effect can be pointed out as the overall structure forms out of focal point or a sign itself. On the other hand as the second one designer applies colour to a specific point in order to sign particular part of the structure (Jencks, 1990).

The bright red follies in the in the Parc la Villette (Figure.71), which were designed by Bernard Tschumi, can be a good example to first way of the use of colour. As a matter of fact this is the final project of a competition, which was organized for a park at the periphery of the Paris. The concept of the design is based on a grid system formed by superimposition of different plants. Bright red folies as the analogy of the machine trees in a garden are the intersection points of these superimposed plans. They are the structural signs of these points, which were transformed from 10m cube into an urban sculpture. The green colour of their ground with its contrast effect increases the signal function of these decomposed cubes. This statement folies on the green background of the park appear redder that they really are. From the point of view of Charles Jencks as;

Figure 71. Parc la Villette, Folie (URL 76)

As a matter of fact, it is possible to consider that the use of colour technique in architectural activity as well as the design concepts of the Deconstructivist architects is highly based on the determinations of the Constructivists' (Chernikov, 2001).

Russian Constructivism is developed spontaneously with the De Stijl movement in Europe. In Russian Constructivism the use of colour as a sign is preferred as well as the other functional utilization. Particularly, their drawings they used from the sign effect of colour in order to emphasis the specific points and thoughts. Kasimir Malevich who was painters of this movement advocated a pure abstraction and proposed his thoughts with his paintings which name was white square on a white ground. He was named this tendency as suprematism (Tietz, 1999).

> "Rather than reacting to purely formal issues, as Constructivism did, Suprematism mode direct analogies between certain colours and social conditions" (Steele, 1997, p.212).

Suprematism as an approach based on expressing the ideas on the canvasses. According to Malevich and friends it can be considered in three stages as the black, red and white squares. Nowadays, it is possible to observe this statement of this approach on the sketches of the Deconstructivists' projects. Zaha Hadid is one of the architects who is influenced the aesthetical approach of the Suprematism (Figure.72). It is possible to point out that on her drawings colour is used as psychological signal (Steele, 1997). The sketches of El Lissitzky for Cloud Props, which were known as horizontal skyscrapers for Moscow, signify the use of colour in order to call the attention of the observers. On the other hand the sketch of Vladimir Ttlin for the Monument to the third international was black and white and had never been built. However if it would have been constructed it was going to be the highest tower and bright red one of the world. Nevertheless most of the designs of Constructivists architects stayed as a drawing or sketches most of them could have never been built.

Figure 72. Kurfürstendamn Project, Zaha Hadid (URL 77)

Another good example to first way of the use of colour in order to transform the building to a sign can be the Info Box of the architects Scheider and Schumacher in Berlin. This temporary structure was built in Berlin Potsdamer Platz where is called as a city within the city (Figure.73). It was designed as a residence for information at the central point of a future work site (Jodido, 1997). The main structure was elevated from the ground by means of the steel construction system. With the influences of being heightened and the colour of the façade of the building is perceived as a sign in the context and comes to the fore with its function as a signal for informations.

Figure 73. Info Box (URL 78)

On the other hand, as a second way of using colour as a sign effect is to apply it in order to signify a specific part of the building. Meteorite Exhibition Centre which was designed by Propeller Z (Vienna Architectural Formation) with its red entrance frame (Figure.74), Funder Factory 3 which was designed by Coop Himmelblau, with its bright red canopy (Figure.75) can be a good example to this attitude. Red, these examples was bore a role which can be determined as signifying the entrance of the buildings. Charles Jencks pointed out his thoughts about the Funder Factory as;

> "The most dramatic eruptions are the front door marked by a zig-zag awning in blood-red (favorite colour of the Neo-Modernists) and a volume in glass and steel – the main office area which faces sought" (Jeneks, 1990.p.277).

Figure 74. Meteorite Exhibition Centre (URL 79)

Figure 75. Funder Factory 3 (URL 80)

As a matter of fact, red is a warmest colour and can be considered as the most preferred colour of the architects in forming a signal function for their buildings. Particularly, for the architects of the 20^{th} century for the reason that its effects on the physical and mental structures of the observer it became one of the most applied colour to the façade. On the other hand, red is accepted the most common colour signal in nature too. Because nature is generally green and red is the contrast of green. According to Humphrey, scientist, the reason of this statement is being contrasting well of the red with green foliage and the blue sky (Camgöz, 2000). In colour perception process as mentioned before, the focal point of the red occurs behind the retina. Because red is warmest colour in colour wheel. This situation provides red to create illusions in the mind of the viewer.

According to this manner architectural object differentiated from its context and therefore it is tried to transform a focal point in the surroundings. Architect Richard Meier creates as attitude between the building and landscape, which is far from being combined each other (Figure.76). According to him, colour on the building façade forms out a whole new environment and this causes destruction between the building and landscape. As a matter of fact from his point of view this manner is the most respectful attitude towards the context of the buildings. His architectural end-product is not tried to look like the landscape. Furthermore their façade is covered with a white mask, which the colour is not common for the nature itself. He respect to surroundings by being came to the fore his buildings and provide them to display themselves in the context with the contributions of the colour.

Figure 76. Smith House, Richard Meier (URL 81)

Another example of sign effect, itself with its colour in the context but for different purpose. The Gatehouse, which was designed by Philip Johnson, is a pavilion for the visitors (Figure.77). According to him, this is a sculpture in the environment and the test of his new theory. The structure with its colour completely reacts to its environment. In the green meadows and the forest it comes to the fore with its bright red colour and displays itself in the context. Furthermore as explained before with the influences of the simultaneous colour contrast effect it appears redder that it really is.

Figure 77. The Gatehouse (URL 82)

3.2.2 Camouflage Effects of Colour

Relationship between context and architectural object the first concept of decision of the designer towards this relation is to determine the attitude of the building relating to hide or to come to the fore in its environment. This can be called as camouflage or the display effect of colour. Camouflage effect can be explained as the colour property of an architectural design object, which provides it to be camouflaged in its context. As well as the other effects this function of colour is common for the nature and the living creatures. Most of the animals developed a skin system to conditions of their habitat. Camouflage can be defined as the use of colour to make objects as inconspicuous as possible (Faulkner, 1972).

Form the architectural point of view camouflage effect of colour generally formed by applying the hues of environment itself to the façade of the building. Most of the design of Frank Lloyd Wright with the influences of the organic architecture can be considered the good examples to this attitude. For instance the Falling Water House which is considered as one of the most important building in architectural design history, with the effects of its formal design and with the contributions of colour of its materials it is perceived as almost completely disappear in its environment (Figure.78). He opposed to apply artificial colours to building façade of the materials (Pfeiffer, 1994). Therefore he generally utilized them to his architectural end-products with their original colours in just the same way as the Falling Water House.


Figure 78. Falling Water House (URL 83)

3.2.3 Movement and Time Effects of Colour

> "Colour can be used to express movement in a number of different ways. This may be implicit in the nature of the colour itself, in eye movements caused by the juxtaposition of colours or by actual movement of coloured materials or lights"(Lancaster, 1996, p: 55).

The use of colour on the building façade as an effect is often preferred by the architects in order to emphasize their architectural thought rather than as an only way to express themselves. The movement effect of colour usually is utilized as a contribution to the general tendency is two main approaches to the use of colour as the movement effect on the exterior surfaces as *dynamism* and *stability.*

The dynamic quality of colour can be considered one of the most preferred effects by the architects in order to emphasize and increase the dynamic impression of an architectural design object. The golden flame of the La Flamme; building which is designed by Philippe Starck can be a good example to this manner (Figure.79). According to its architect this structure appears as an art object more than a functional building where was built at the edge of a very busy elevated road in Tokyo. He explains his design as black granite urn place on a luminescent glass stairway, and topped with a golden flame (Jodidio, 1997). The figure which was placed top of the building symbolizes a blaze with its form and colour. The architect for this example utilized the colour to the façade of the object in order to increase its dynamic impression not to symbolize the colour on the flame. Vivid yellow hue of this blaze emphasizes its flaming attitude.

Figure 79. La Flamme (URL 84)

Most of the works of Tadao Ando or Mario Botta have static impression on the perception process of the observer. The colours of these architectural objects were utilized in order to increase this effect. For instance every cathedral of Botta as a building has a static impression not only by its general articulation of formal design and material but also by its colour (See, Figure.80). As a matter of fact this can be simultaneously an example for the effect of material on the colour quality. It is not possible to form out general statements for the specific colours. For instance, as can be seen at this work of Botta, red as a hue has different impressions depends on the material quality.

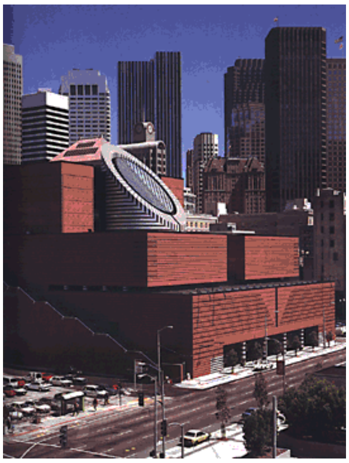


Figure 80. Museum of Modern Art, Mario Botta (URL 85)

Time is the one of the most important effects which determines the perception of the colour quality of the architectural end – products. From the point of view of an observer, the appearance of a building which stands in an environment alters with the changing quality of the sunlight, which differs with the time. This changing attitude of the colour is often utilized by the architects in order to gain the building various perceptual opportunities. Interior design the estimation property of time gains importance. According to the scientists warm colour causes the time to be overestimated, on the other hand cool colours, and the time to be underestimated (Mahnke&Mahnke, 1987). Visionary changeable attitude with the time is always been one of the most wanted properties for the architectural design objects by the designers. Particularly, for the last decade the developments in the building and material technologies provide the architects to create the structures which has changeable façade properties, such as colour.

The effect of the colours of the building which their façade changes moment to moment, highly influenced the time. Actually it is possible to point out that the experiences of these kinds of buildings for the observer deeply depends on the effect of time. Jean Nouvel who is one of the architects that design the media surfaces and changeable façade states that ‘the time that interests me…is the time of movement, which I attempt to materialize.’ (Thomsen, 1994, p: 174). The Tower of Winds which was designed by Taya Ito in Yokohama, can be a good example to this kind of attitude (Figure.81). The façade of this building reacts to the changing situations of the wind. These reactions exhibit on the exterior façade of the structure by means of the changing quality of the colour from one moment to the other.

Figure 81. Tower of Winds (URL 86)

3.2.4 Weight, Scale and Distance Effects of Colour

As mentioned before in this study the part of the perception of colours and the result of this process occurs in the mental structure of the living beings. The process is affected by the physical (stems from the environment) and psychological (stems from the mind) effects. Therefore the physical properties of the coloured object can be differentiated from the reality. Weight, scale and distance effects can be the examples to this changing phenomenon.

According to Kandinsky, a different hue forms out different movement effects. Yellow has a tendency in spreading action therefore the yellow objects tended to be closer. This effort of the yellow objects in order to be wider provides them a dynamic character. On the other hand, blue tend to retreat and therefore appears smaller. According to Kandinsky red as a hue is perceived stable (Birren, 1955).

Generally darker colours are perceived heavier than the lighter ones. On the other hand if the colours have value and intensity, warmer hues appear heavier than the cool ones (Mahnke&Mahnke, 1987). In this kind of situations red as a hue is the colour which is perceived the heaviest and the weight effect of colour is preferred in order to change or emphasize the impression of the design object. The most interesting approach to this phenomenon can be creating confusion with the volume and its colour. For instance, for the reason that the dimensions of the object, one considers that object should be heavier than it appears. Since the colour of the object causes perceiving it lighter than the weight that it should be perceived.

Choosing the white by means of applying them to the building façade is the most preferred method for the architects in order to create this lightness effects. The works of Meier can be good examples to this manner. However in this study two building of Le Corbusier are chosen in order to form out a comparison between two different approach and impressions of weight effect of colour. The first one is the Villa Savoye and the second one is the Chapel of Notre-Dame-du-Haunt or with it’s the most known name the Chapel of Ronchamp. The linear mass of the Villa Savoye is elevated from the ground with a row of pilotis which is one of the five points of new architecture of Le Corbusier (Figure.82). This mass forms out the main part of the building, for the reason that the basic functions of structure was placed with in. This thin rectangular prism looks like going to fly if there are not these pilotis which are the only forces that tie it to the ground. It is the fact that cannot be denied its colour has a very important function to create this flying illusion. Its colour causes the observers being perceived the structure lighter than it really is.

Figure 82. Villa Savoye (URL 87)

On the other hand the second project of Le Corbusier designed in different manner from the colour effects point of view. The main part of this building again washed with white colour (Figure.83). However its roof which is built as a reinforced concrete shell is black. In fact this shell was constructed by a very thin concrete slab. However owing to its form and particularly its colour the roof looks like heavy than it really is. Contrary to the Villa Savoye this building is nailed down to the ground by means of the weight of its roof. The main white part looks like smashing in by this black concrete shell of the building. As a matter of fact, Le Corbusier as an architectural design objects.


Figure 83. Chapel of Ronchamp (URL 88)

According to him colour should be considered as a model of communication and it is the key of the process. He pointed out his ideas about colour as ‘The question of colour is the question of architectural itself’ (Wigley, 1995). From the point of view of Wigley, the approach of the modern architecture to the colour can be summed as;

> “Colour is seen to emphasize, rather than mask, the pure geometries of both the machine and the new forms it makes available. If modern architecture is the child of the machine age, it would seem to make sense that it is coloured like a machine…” (Weigley, 1995).

Colour affects the perception of the sizes or scale of an object too. It causes the objects to appear larger or smaller, taller or shorter, etc. In other words colour causes the scale of the object changing which is perceived by the living beings. Ostwald and Munsell who were the colour scientists evaluated the visual illusions of the colour. According to them, highly saturated colours is applied, becomes important. If the surface too large it can be monotonous or overpowering, if it is too small colour cannot be perceived (Lancaster, 1996).

From the architectural point of view the effects on the perceptual scale of the colour both can be considered to significance that the architect should pay attention when he/she applies colour to the façade and furthermore it can be accepted as a conceptual opportunity in expressing or emphasizing the specific points of the design. Brighter images look larger than the dark ones, for the reason that the reflected light of the bright object when strikes the retina tends to spread out more than the dark ones. If the brightness and the values of the colours are equal, Yellow one appears the largest one and followed by white, red, green, blue and black (Danger, 1987). On the other hand warm colours tend to be perceived larger than cool colours. From the architectural point of view the interesting point of this statement is the changeable attitude of the colour on the façade with the time effect. For instance, in a sunny day the surface which is constructed by the reflected glass system appears dark black on shiny blue background of the sky. However when the dark comes and the day ends it starts to shine with its interior lighting. This situation causes the building to be perceived larger than the normal in the darkness of the night. On the contrary a white building appears darker and, therefore, smaller in the night than in the day times.

The distance effect is one of the most preferred effects of colour by the architects in order to strength their architectural thought. Just like the size effect bright colours and warm colours are perceived nearer on the other hand the dark colours and cool colours are perceived faraway. From the architectural point of view, the distance effect of colour usually is utilized in order to increase the emphasize of the articulation of the masses of the building. For instance ground level of the Villa Savoye is moved backward in order to expose the linear mass of the upper level. Furthermore Le Corbusier was applied the dark grey hue to the façade of the ground level. This causes increasing the perception of this level as at the backward.

Therefore while the bright white hue is drawing the rectangular prism near to the observer, the dark grey hue draws the ground level faraway from him/her.

Figure 84. Winslow House (URL 89)

The other good example to this phenomenon can be the Winslow House which was designed by Frank Lloyd Wright (Figure.84). Although this is one of the early works of the architects, the concept of him which is based on to separate the large roof from the main body and to be perceived the building as floating planes can be easily observed. In the light of, this concept Wright generally has drawn the level which is between the main body and roof backward in order to break off the roof. However in this example he used the distance effect of colour in order to apply this concept to the building. He covered the upper level of the façade with a black hue in order to appear faraway and the lower one with a bright yellow in order to be perceiver nearer. This provided the architect have the observers to be perceived the roof as a separated part the main body of the building.

3.2.5 Legibility and Illegibility Effects of Colour

From the scientific point of view, the definition of the legibility can be formed as the capability with which a figure or shape can be recognized against its background. In the light of the statement it can be pointed out that legibility depends on three main conditions as appropriate illumination, the size of the figure, the colour contrast between the figure and background (Faulkner, 1972). On the other hand, from the architectural point of view, legibility can be defined as the ability to read shapes or functions or the quality that distinguishes one form from another.

> "Some of the ancient Roman architectural compositions were so designed that a brightly lighted element would appear behind a dark one, succeeded by another light one, and so on to make them all `read"(Faulkner, 1972, p:22).

As far as it is proposed in this thesis, legibility effect of colour on the façade can be determined as to be exposed the different building components which have different functions and make them distinguishable by means of applying colour. In the light of the statement, Crystal Palace which is colour design was create by Owen Jones was can be one of the first and obvious examples to the use of legibility effect of colour on the façade of the architectural objects after the enlightenment. The structure components of the Palace construction were coloured according to their functions. Nowadays it is possible to consider that this effect of colour is often used by the architects of High – Tech approach.

> "At the Pompidou Centre and Inmos, Rogers uses bright colours in much the same way engineers do – to distinguish different kinds of structure and services and allow them to be easily understood and effectively used…But this use of colour has an associational component which is as strong as its functional necessity in engineering. Bright yellows, red and blues are the colours of industrial machinery sports cars, ship, and tractors, indeed most technical objects of the present. These colours are thus associated with the present and future tense, a world of objects free from the restraints of the past"(Jencks, 1990,p:98).

In Figure.85, Pompidou Centre which was designed by Richard Rogers in the historical pattern of the Paris can be one of the good examples to this attitude. According to him colour on the façade of the buildings which are in fact machines, can be considered as a tool for the architects in coding the industrial environments and machinery (Porter & Mikellides, 1976, p: 60). He designed the layered façade of the Pompidou in the lights of these ideas as an exterior of a working factory. The hues of this skin transformed a functional notion which provides the observer to read and understand the way of working method of the structure by means of the legibility effect of colour. Each system exposes itself with its own colour. Architect expresses the ventilation installation with blue, water installation with green, electrical system with yellow and vertical circulation system with red. From this point of view, it is possible to consider that the building particularly the layers of its exterior surface though seems like has a complicated structure, with the assistance of the legibility effect of colour it becomes a shape which can be read by the individuals.

Figure 85. Pompidou Centre (URL 90)

On the other hand, at this standpoint there is a significance which is also should be stated that building with its façade in its historical context displays an assertive attitude. Pompidou centre as a figure forms out its background from the historical façades of the Paris. Therefore this surrounding façades are come to the fore the buildings more than it really is. The building does not hide itself with its colours on the contrary it stimulates a focal point for its physical existing environment. On the other hand, another High – Tech structure in the Paris Monde Arab Institute which was designed by Jean Nouvel shows an opposite attitude towards its historical context with its transparent and reflected façades just like the Willis Faber Building of Norman Foster (Figure.86). As a matter of fact these buildings with their achromatic attitude reflect the colours of the environment on their exterior façades. This approach can be considered as multiplying the background instead of stimulating a figure on it. Foster points out this manner as;

> “If our response to the site is to make a more imposing statement, we tend to use vivid colour externally…the building looks as if it recently landed…if we wanted to design non-dominant buildings, tend to use glass as the main material”(Miller, 1978, p: 44)

Figure 86. Willis Faber Dumas building (URL 91)

Most of the architects of High-tech approach prefer to use the legibility effect of colour for the façades of their architectural design objects. For instance the Architect’s House of Helmut Schulitz comes to the fore with its vivid colours in its natural environment (Figure.87). In this building, just as the Pompidou Centre, colours are used to designate the different components which are designed for different functions of the structure. However according to Jencks there is another purpose to use these colours on the façade in order to underscore the hyperbole.

From the point of view of him, the yellow sun sails accentuate the depth of the balcony (Jencks, 1990).

Figure 87. Architect's House (URL 92)

Consciously or unconsciously, with this statement Jencks points out that another function of the colour is the size effect. As mentioned before yellow is the hue which is perceived as the widest colour. Architect in this example by using bright yellow for the sun sails procured the terrace to appear larger than normal. It is possible to increase the examples for the use of the legibility effect of colour on the façades in the High-Tech architecture. The Laboratories and Corporate Facility for PA Technology building (Figure.88) of Rogers can be other good examples to this manner.

Figure 88. The Laboratories and Corporate Facility for PA Technology building (URL 93)

Form the different point of view; it is possible to apply the colours to the exterior surfaces in order to stimulate a complicated image for the architectural end-products in the visual process of the human-beings. On the contrary to the attitude which is based on exposing each parts of the building with their own colours according to this attitude architect designs the façade of the structure in order to confuse the mind of the observer by combining different patterns and colours. Therefore this effect of colour can be called as ineligibility. Groninger Museum which was designed by Coop Himmelblau can be a good example to this manner (Figure.89). Its colourful and also complex façade is got difficult to understand the buildings as a whole.

Figure 89. Groninger Museum (URL 94)

3.3 Five Recommended Methods for Createing the Colour Effects

Taking into consideration the relationship between the figure and the ground on any building façade, the creation of these effects (Sign effect, camouflage effect, movement and time effect, weight, scale and distance effect, legibility and illegibility effect) is done through the extraction of the colours. These are the elements that have moved into the perceived close environment of the building whose façade is to be coloured. This close environment can be natural or build. Within this natural environment, it is accepted that this environment is always harmonious. If it is within a buildenvironment and the scale composed within it is inclusive of a colour group or a colour scheme, it has been accepted within the scope of the thesis that it can be deemed harmonious and unharmonious, if not inclusive.

3.3.1 Necessary Steps to Create Sign Effect

The colour scale of elements surrounding the building to be coloured are arranged and the colours of the environment are designated with the help of these scales. Within this environment, a decision is made about which colours should be used on the surfaces of these buildings in order to create a sign effect (Table.12).

The building to be coloured;

-If situated in a natural environment;

The building to be coloured might be located in forestry, by the sea or on the sea, at the side of a mountain, in rocky region or in various natural environments similar to these examples. If located in places like these, the sign effect can be created by giving the building the opposite colour of the prominent colour, among the existing colours in the region. To exemplify, if the building to be coloured is located in forestry where different tones of green exist, and it is aimed to create a sign effect with this colouring, the opposite colour of green like the red colour, or a colour from achromatic colour scheme such as white can be applied. Thus, the building will become prominent from those around it.

-*If situated in a buildenvironment;*

The close environment can be harmonious or unharmonious

-*If situated in a harmonious buildenvironment;*

If warm colours have been mostly used in the close environment, a colour from the cold colours category can be chosen, or if there are colours that already exist from the cold colours category, a colour can be chosen from warm colours category to perform the same impact. If monochromatic colours have mostly been used, on the façades of the elements within the area of perception, a sign effect can be created within the environment of the building by using this monochromatic colour` s contrast. In case achromatic colours are present in the environment, this impact can still be made by using any colour from the colour wheel. In the achromatic colour scheme, where the colourless colours are dominant, the use of a colour feature translates into that colour having a special feature of being the first one to be recognized. Another possibility is an environment that is dominant at the complementary colour scheme. In this case, any building in the environment can be given achromatic colours, brought into prominence and the sign effect can be composed.

If there are many colours within the perceived area, and if these colours fit into the analogous colour scheme, the sign effect can also be created on the building by choosing a colour from achromatic colour scheme in order to make the same impact.

-If situated in an unharmonious build environment:

It has been accepted within the scope of the thesis that there are 3 types of unharmonious build environment. The first type is an unharmonious environment which is acquired by using a colour from monochrome colour scheme in an environment where acrome colours are used. If sign effect is intended to be created in an environment like this, it can be done by using the contrast of the colour that has been used in the monochrome colour scheme. The second type is one that does not fit into any colour category or any colour scheme, coloured randomly and full of colours. In this case the same impact can be made on the building surface with acrome colours. But if both acrome colours and various colours have been used at the same, just the colour is not sufficient to create a sign effect on this kind of environment. The light and the architectural texture are also taken into consideration while the building surface is coloured. In other words, the sign effect can be given to the building with the help of the light and the architectural texture.

Table.12 summarizes how sign effect can be created with the use of colour on building surfaces in different environments.

Table 12. Sign Effect

<table>
<tr><th colspan="4">SIGN EFFECT</th></tr>
<tr><th colspan="2">Environment</th><th>Colours used in perceived close environment</th><th>Colours to be used on the building to create sign effect</th></tr>
<tr><td>Natural environment</td><td>Harmonious environment</td><td>Natural colours/green/blue/or any other natural colours</td><td>Contrast colour
Achromatic colour</td></tr>
<tr><td rowspan="9">Build environment</td><td rowspan="6">Harmonious environment</td><td>Warm colour groups</td><td>Cool colour // Achromatic colour</td></tr>
<tr><td>Cool colour groups</td><td>Warm colour // Achromatic colour</td></tr>
<tr><td>Monochromatic colour scheme</td><td>Contrast colour</td></tr>
<tr><td>Achromatic colour scheme</td><td>Any colour in colour wheel</td></tr>
<tr><td>Complementary colour scheme</td><td>Achromatic colour</td></tr>
<tr><td>Analogous colour scheme</td><td>Achromatic colour</td></tr>
<tr><td rowspan="3">Un-harmonious environment</td><td>Different colours</td><td>Achromatic colour</td></tr>
<tr><td>Chrome colours with one colour</td><td>Contrast for that colour</td></tr>
<tr><td>Different colour with achrome</td><td>Colour and texture should be use together</td></tr>
</table>

3.3.2 Steps Necessary to Create Camouflage Effect

The colour scale of the elements surrounding the building to be coloured is organized and with the help of these scales the colours of the environment are determined. It is then decided within this environment which colours should be used on the surfaces of the buildings for the camouflage effect (Table.13).

The building to be coloured;

-If situated in a natural environment;

If the building to be coloured is situated within a natural environment, with the repetition of the colours existing in the region or with the rhythm, hierarchy, balance and the proportions between the colours, a camouflage effect can be created. For example, if a building to be coloured is situated in a forestry land where different tones of green exist, and if there is an intention to camouflage this building within the natural environment with the camouflage effect, different tones of green can be assigned to the building. Thus, the building is camouflaged among its surroundings.

-If situated in a build environment;

The colours in the close environment can be harmonious or unharmonious.

-If situated in a harmonious environment;

If warm colours have been used mostly in the close environment, a colour can be chosen from the bright colour category or if different colours exist from cold colour category, a colour can be chosen from that category and this impact can be made by using it on the building`s surface. If monochromic colours have been used on the façade that is within the perceived area, the building can be camouflaged among its surroundings by using any tone of the monochromatic colour that has been used.

If achromatic colours exist in the environment, this impact can be made by repetition of these colours by using an achromatic colour or using them in a hierarchical order. As another means of possibility, in an environment which is dominated by complementary colour scheme, this impact can be made by using an opposite colour. The building surface can be coloured with the repetition of the colour, using it as a rhythm or through the creation of a hierarchical order with the use of different tones.

If a lot of colours exist within the perceived area and these colours fit into analogous colour scheme, by repetition of one of those colours or a follow-up colour from the analogous colours in the colour circle, the building surface can be coloured.

If situated in a unharmonious build environment;

It has been accepted within the scope of the thesis that there are 3 types of unharmonious build environment. The first type is an unharmonious environment which is acquired by using a colour from monochrome colour scheme in an environment where achrome colours are used. If camouflage effect is intended to be created in an environment like this, it can be done by repeating the colour used in monochrome colour scheme or using any tone of it. The second type is one that does not fit into any colour category or any colour scheme, and is coloured randomly and full of colours and in this case the building surface can be coloured with any colour. But if both achrome colours and colourful colours have been used at the same time in its close environment, for this building to create a camouflage effect, either a colour can be chosen from the achrome colours, or any colour used within that environment can be chosen and the building surface can be coloured.

Table.13 summarizes how in different environments camouflage effect can be created on the building surfaces with the use of colour.

Table 13. Camouflage Effect

CAMOUFLAGE EFFECT			
Environment		**Colours used in the perceived close environment**	**The colours to be used in order to create camouflage effect on the buildings**
Natural environment	**Harmonious environment**	Natural colours/green/blue/or any other natural colours	Repetition or rhythm of environment colours
Build environment	**Harmonious environment**	Warm colour groups	Warm colour groups
		Cool colour groups	Cool colour groups
		Monochromatic colour scheme	Monochromatic colour scheme
		Achromatic colour scheme	Achromatic colour scheme
		Complementary colour scheme	Complementary colour scheme
		Analogous colour scheme	Analogous colour scheme
	Un-harmonious environment	Different colours	Any colour
		Chrome colours with one colour	Chrome or monochrome colour scheme
		Different colour with achrome	Any colour or Chrome colour scheme

3.3.3 Necessary Steps to Create Movement and Time Effect

The scales of the elements surrounding the building are organized and with the help of these scales, the colour of the environment is determined. Within this environment, with the use of colours to be used on the building surface, a movement and time effect can be created on the building. With this effect, the buildings can be perceived as more dynamic (Table.14).With the time effect; we can make buildings to be perceived differently with determined timeframes. For example, with the buildings, the perception during the day and perception at night is not the same. The colours used on the building façades can be perceived differently at nightfall. Especially with the effect of the light, the perception of the day and night can be designed as required. While a black and glassware building is perceived as it is during the daylight, with the use of illumination inside the building at night, it is obtainable for it to be perceived as a completely transparent structure.

The building to be coloured;

-*If situated in a natural environment*

If the building to be coloured is situated in a natural environment, the movement effect can be created by the repetition of the existing colours in the area, or with the opposite colour producing a help of rhythm. It is then decided, for the movement effect, whether the colour should be used on the whole of the building surfaces or at a certain designated area. If the building is to be coloured partly, a decision is made which part is to be coloured.

-*If situated in a build environment,*

The colours existing in the close environment can be harmonious or unharmonious. If the intention is to create a movement effect on the building within the build environment, and make it appear more dynamic with the use of the colour on the façade, regardless of whether harmonious or unharmonious, the process will be the same.

If warm colours are used in the surroundings where building façade is to be coloured, a selection is made between the repetition of the warm colours or their opposite cold colours and the designated areas are coloured. If the colours used in the close environment are from monochromatic colour scheme, the designated areas are coloured by again choosing different tones from monochromatic colour scheme. Besides that, this impact can be made by colouring the designated areas with colours from analogous colour scheme, achromatic colour scheme or complementary colour scheme. The same impact can still be made in a street silhouette where no colour harmony exists. In a colourful silhouette, with the application of monochromic colours, complementary colours or achromatic colours on a building façade, can lead to the creation of a movement on the building surface yet within the silhouette. Table.14 summarizes how camouflage effect can be created with the use of colour on building's façades in different environments.

Table 14. Time and Movement Effect

MOVEMENT AND TIME EFFECT			
Environment		**Colours used within the perceived close environment**	**Necessary colours for the Movement Effect on the building**
Natural environment	**Harmonious environment**	Natural colours/green/blue/or any other natural colours	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
Build environment	**Harmonious environment**	Warm colour groups	Warm colour groups Cool colour groups
		Cool colour groups	Cool colour groups Warm colour groups
		Monochromatic colour scheme	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
		Achromatic colour scheme	Monochromatic colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
		Complementary colour scheme	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
		Analogous colour scheme	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
	Un-harmonious environment	Different colours	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
		Chrome colours with one colour	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme
		Different colour with achrome	Monochromatic colour scheme Complementary colour scheme Achromatic colour scheme Analogous colour scheme Natural colour scheme

3.3.4 Necessary Steps to Create Weight, Scale and Distance Effect

The scales of the elements of the façade, surrounding the building are organized and with the help of these scales, the colour of the environment is determined. Within this environment, in order to create a weight, scale and distance effect on the building`s perception, colours are assigned to the necessary spots (Table.15).With the help of the assigned colours, the building can be made to be perceived taller/shorter than it is, wider/narrower and more or less at the front/back.

The building to be coloured;

-*If situated in a natural environment;*

If the building is situated in a natural environment, weight, scale and distance impact can be made with the repetition of the existing colours in the surroundings or with the rhythm, hierarchy, balance and the proportions between the colours.

For Weight Effect to be created;

The buildings can be perceived heavier or lighter than they are with the colours given to them in the setting they are located. To exemplify, within the natural environment, the buildings façades can be perceived lighter when it is assigned the lightest colour within their close environment. They can also be perceived heavier when the darkest colour is assigned. A building façade located in a forestry land where all the tones of the green exist, can be perceived lighter in the environment if coloured with the lightest tone of green. If the opposite is done, and the darkest tone of green is assigned to the building, this leads to the building perceived heavier than it is.

For scale and distance effect to be created;

With the use of colour at buildings façades, the building`s scale can be made to be perceived differently than it is. To exemplify, while for a building to look higher in the natural environment, the top parts of the building need to be coloured with darker colours than the colours of the surrounding, for it to be perceived lower, the top part needs to be coloured with the lightest colour of the colours of the surroundings. During the colouring process, the colouring of the elements situated horizontally at the building`s surface enables the building to be perceived lower and wider, and with the colouring of the elements situated vertically the building is perceived taller and narrower.

This colouring needs to be done by using colour tones of the natural environment. In some cases the building can be made to be perceived more towards the front, or more towards the back, than the elements that form up its close environment. While a building in a natural environment is made to be perceived more towards the front, by the use of the darkest colours of monochrome value within the environment, it can be perceived as the furthest one way when it is coloured with the lightest monochrome value (Table.15).

-If situated in a build environment;

If the façade of the building is situated within a build environment, with the repetition of the colours existing in the area or with the composition of rhythm, hierarchy, balance and proportions between those colours, weight, scale and distance effect can be created.

However, the colours in a build environment can be harmonious or unharmonious. If the building is situated in a harmonious on unharmonious build environment, the use of table below can explain how to give weight, scale and distance effect to the buildings.

Table.15 summarizes how in different environments, with the use of colour on the building`s façades, the weight, scale and distance effect can be applied.

Table 15. Weight, Scale and Distance Effect

Weight, Scale and Distance effect										
Environment		**Colours used within the perceived close environment**	**The desired impact on the building**							
			Weight		**Scale**				**Distance**	
			Light	**heavy**	**high**	**Low**	**wide**	**narrow**	**More front**	**More behind**
Natural environment	**Harmonious environment**	Natural colours/green/blue/or any other natural colours	Tint of colour	Shade of colour	-Up floor: shade of colour Or black -Mono-chrome colour by Vertical way	Up floor: tint of colour or White -Mono-chrome colour by Horizontal way	Mono-chrome colour by Horizontal way	Mono-chrome colour by Vertical way	Last tones of Mono-chrome colour	First tint colour of Mono – chrome colour
Build environment	**Harmonious environment**	Warm colour groups	Tint of warm colours	Shade of warm colours	-Up floor: Shade of warm colour -warm colour by Vertical way --Cool colour by Vertical way	Up floor: tint of colour or White -warm colour by Horizontal way	-Top and ground part on the façades should be coloured by shade of warm colour, horizontal way	-Left and right part on the façades should be coloured by shade of warm colour, vertical way	Last tones colour of cool colour	First tint colour of any warm colours
		Cool colour groups	Tint of cool colours	Shade of cool colours	-Up floor: Shade of cool colour -cool colour by Vertical way -warm colour by Vertical way	-Up floor: tint of colour or White -cool colour by Horizontal way	-Top and ground part on the façades should be coloured by shade of cool colour, horizontal way	-Left and right part on the façades should be coloured by shade of cool colour, vertical way	Last tones colour of warm colour	First tint colour of any cool colours

		Mono chromatic colour scheme	white	black	-Up floor: Shade of mono chromatic colour -black -Shade of Monochromatic colour by Vertical way	-Up floor: Tint of mono chromatic colour -white -Shade of Monochromatic colour by Horizontal way	-Top and ground part on the façades should be coloured by shade of monochromatic colour, horizontal way	-Left and right part on the façades should be coloured by shade of monochromatic colour, vertical way	Complementary colour	white
		Achromatic colour scheme	white	black	Black/dark grey colour by vertical way	Black/dark grey colour by horizontal way	-Top and ground part on the façades should be coloured by shade of achromatic colour, horizontal way or Black	-Left and right part on the façades should be coloured by shade of achromatic colour, vertical way or Black	Any colour	White
		Complementary colour scheme	Tint of cool complementary colour	Shade of warm complementary colour	Grey by vertical way	Grey by horizontal way	-Top and ground part on the façades should be coloured by warm complementary colour, horizontal way	-Left and right part on the façades should be coloured by warm complementary colour, vertical way	Grey	Tint of complementary colours
		Analogous colour scheme	Lighter colour on that group	Darkest colour on that group	-Shade of Analogous colour by Vertical way	-Shade of Analogous colour by Horizontal way	-Top and ground part on the façades should be coloured by darkest analogous colour, horizontal way	-Left and right part on the façades should be coloured by darkest analogous colour, vertical way	Black white	Grey tones
	Un-harmonious environment	Different colours	White	Black	Black or grey colour by vertical way	Black or grey colour by horizontal way	-Top and ground part on the façades should be coloured by tones of achromatic colour, horizontal way	-Left and right part on the façades should be coloured by tones of achromatic colour, vertical way	Black White	Grey tones
		Chrome colours with one colour	White	Black	Black colour by vertical way	Black colour by horizontal way	-Top and ground part on the façades should be coloured by warm complementary colour, horizontal way	-Left and right part on the façades should be coloured by tones of warm complementary colour, vertical way	Complementary colours	Achroma colour
		Different colour with achrome	White	Black	Black or grey colour by vertical way	Black or grey colour by horizontal way	-Top and ground part on the façades should be coloured by tones of achromatic colour, horizontal way	-Left and right part on the façades should be coloured by tones of achromatic colour, vertical way	Black White	Grey tones

3.3.5 Necessary Steps to Create Legibility and Illegibility Effect

The scales of the elements of the façades surrounding the building are organized and with the help of these scales, the colour of the environment is determined. A decision is made within the environment on which colours to use in order to create a legibility or illegibility effect on the building surfaces (Table.16).

The façades of the building;

-*If situated in a natural environment;*

If the building`s façade is situated in a natural environment, a legibility effect can be created by using the opposite of the existing colours in the area or with the composition of a rhythm, hierarchy balance and colour proportion with those colours. If a building situated in a forestry land where different tones of green exists, and if there is an intention for this building to be more noticeable within the natural environment, the buildings façades can be assigned the red colour, the opposite of green. The use of close colours to green that resemble blue or red can be used on the building façades enabling the building to be more noticeable within the natural environment.

-*If situated in a build environment;*

The colours in the build environment can be harmonious or unharmonious.

-*If situated in a harmonious build environment;*

If warm colours have been widely used within the close environment, a colour can be chosen from the cold colours category or if different colours from cold colours category exist, a colour from the warm colours category can be chosen, and used in different parts of the building surface to create this effect. If monochromatic colours have been widely used, on the façades of the elements that are within the perception, with the use of any tone of this monochromatic colour, the analogous colours of the colour or the complementary colour, the building can become readable within its environment. If achromatic colours exist in the environment, however, the building can still be made readable by using any colour on the building façade. In an environment which is predominating complementary colour scheme, which is another possibility, this impact can be made by using grey , the mixture of the two opposite colours, which makes the building more readable by bringing the desired areas to the forefront. If analogous colours are predominant in the environment, the same impact can be made by using black or white on the building surfaces.

In some circumstances, we desire the buildings to be unreadable within their environment. In cases like this, we repeat the tones of colours used in the environment, on the surfaces of the buildings to be coloured. This enables the coloured building to be camouflaged and become less readable.

The readability on the building façade can also be obtained by the colour differences between the structural elements used in the building. For instance, in order to differentiate between the vertical elements or the horizontal elements or to enable readability of the building`s structure, colour is used on the building surfaces. Therefore, these architectural elements whose surfaces have been coloured are provided with readability.

-If situated in an unharmonious build environment;

In an environment where achrome colours are used, if there is an intention to create a legibility effect generated with the use of a colour from monochrome colour scheme, this process can be done by using a colour that is the complementary colour of the colour used from monochrome colour scheme or a colour from analogous colour scheme. However, if the intention is the creation of an illegible effect, achrome colours are repeated on the building. In the second case, if the colours in the environment do not fit into any colour category or colour scheme, and is an environment full of colours, the building surface can be coloured with any colour from achromatic colour scheme consisting of black, white and gray and provided as readable. If the opposite is to be done, the readability can be prevented by the use of tones of the colours of environment that are hierarchically different, on the building. However, if both chrome colours and varicoloured colours have been used in the close environment, colours as well as light and texture need to be used in this environment in order to form a legibility effect. To ensure that the building is unreadable, it will be sufficient to repeat the colours of the environment on the building surface.

Table.16 summarizes how the legibility or illegibility effect can be performed in different environments with use of colour on building surfaces.

Table 16. Legibility, Illegibility Effect

<table>
<tr><th colspan="5">LEGIBILITY - ILLEGIBILITY EFFECT</th></tr>
<tr><th colspan="2">Environment</th><th>Colours used within the perceived close environment</th><th>Legibility effect</th><th>Illegibility effect</th></tr>
<tr><td>Natural environment</td><td>Harmonious environment</td><td>Natural colours/green/blue/or any other natural colours</td><td>Complementary Colours</td><td>Repetition or rhythm of environment colours</td></tr>
<tr><td rowspan="9">Build environment</td><td rowspan="6">Harmonious environment</td><td>Warm colour groups</td><td>Cool colour groups</td><td>Warm colour groups</td></tr>
<tr><td>Cool colour groups</td><td>Warm colour groups</td><td>Cool colour groups</td></tr>
<tr><td>Monochromatic colour scheme</td><td>Complementary Colours</td><td>Monochromatic colour scheme</td></tr>
<tr><td>Achromatic colour scheme</td><td>Any colour</td><td>Achromatic colour scheme</td></tr>
<tr><td>Complementary colour scheme</td><td>Grey / achromatic colour scheme</td><td>Complementary colour scheme</td></tr>
<tr><td>Analogous colour scheme</td><td>Black/white (achromatic colour scheme)</td><td>Analogous colour scheme</td></tr>
<tr><td rowspan="3">Un-harmonious environment</td><td>Different colours</td><td>Black/white (achromatic colour scheme)</td><td>Any colour</td></tr>
<tr><td>Chrome colours with one colour</td><td>Complementary Colours</td><td>Chrome or monochrome colour scheme</td></tr>
<tr><td>Different colour with achrome</td><td>Colour+tecture/light</td><td>Any colour or Chrome colour scheme</td></tr>
</table>

Chapter 4

EXAMINING SALAMIS ROAD THROUGHT THE CONSTRUCTED MODEL IN TWO SCALES: STREET AND ARCHITECTURAL

The main theme of the study is that a city structure, having the colour as its leading factor in setting character to the architectural elements that looks unharmonious due to unplanned urbanisation, can be improved and transformed into a more harmonious state than its current status. With this in mind, Famagusta Salamis Road has been chosen as the field of study.

While the colour is the factor setting character to the architectural elements, it has been observed that when a building is designed in Turkish Republic of Northern Cyprus, colour is generally not considered in architectural style, and decided by the customer as the last touch. In fact, colour is the first perceived and most catchy factor on the building.

Colour is crucial in a city`s texture. Sometimes we remember cities with their colours. As discussed earlier, when the city of Turin is mentioned the Turin yellow flashes in minds or the colourful streets when Bruno Island in Italy is mentioned. Mykonos and Santorini islands in Greece are remembered with their white houses, blue doors and windows (See, Figure.90).

Figure 90. Mykonos Island, Greece (URL 95)

In an environment where the proportion and the colour are harmonious, it cannot be perceived which building has what function and that function seems to disappear in the street. But important functions of some cities are brought to the forefront. For example, when the city of Amsterdam in Netherlands is mentioned, first thing that flashes in minds is the Red Light Street and the red colours used in this neighbourhood (Figure.91). Within the street at night time, whichever building this colour is seen on, it can be understood immediately that it is the repetition of the same function. At places where there is an intention to bring function to the forefront, as it has been provided by this light, colours can be assigned to the building façades for the same impact.

Figure 91. Red Light Street, Amsterdam (URL 96)

Colour, which brings in identity to cities and attributes character to architectural elements, can sometimes create chaos in the perception of city when it isn’t used correctly. Within this chaos, colour creates unharmonious environments in the appearance of the city.

The first factor defended within the scope of the study is that in order to create a harmonious outlook, to an environment which has an unharmonious outlook, is the necessity to colorize the building façades within certain approaches. The second factor defended within the scope of the thesis is that in a city, within a natural or build environment, in all the outdoor building surfaces which are surfaces of the public that will provide figure-ground relationship, there is a necessity of the right colours to be chosen by the architect during the process of design. In order for the outdoor surface/façade of the building to be perceived at the desired level within its close environment, the designation of colours are explained within the study at *case 1,* with specification to Famagusta Salamis road. The scope of the study at *case 2* is sectioned into two parts. In the first section, it is explained how the outdoor surfaces of the building in a build environment can acquire a more harmonious outlook with the use of colour while the second section deals with how the desired function can be brought to the forefront within the street`s silhouette and the examination of Famagusta Salamis road with examples specific to street silhouette study area.

In this context, fieldwork has been approached in two steps.

Case 1 : The examination of Famagusta Salamis road at the street scale and the development of suggestions

Case 2 : The examination of outdoor surfaces of buildings on Famagusta Salamis road at the building scale and the development of suggestions

4.1 General Limitations of the Study

During model formation, the assessment of colour has been performed in the context of subtractive colour mixture method. Because the light was left out of the study; the additive mixture has not been included within the scope. The colour categories have been dealt within the context of the modern colour wheel. In colour choosing, the colour dimensions of value and intensity have been left out and data has been entered into the model with the collection of hue only. As hue is studied, inclusive of the photography used within the model and the colouring methods through computer settings, colours set in computer have also been used. In the colour harmony assessments, data has been entered from basic colour scheme which is set underneath colour harmony and warm and cold colour in colour interaction.

Another factor under consideration while the model is created is the notion of building façade surfaces. The model has been approached not from an architectural surface totality, but through the building façades. This originates due to surfaces open to public not being interior surfaces of the buildings and rather being surfaces of exterior façade. Exterior surfaces have been preferred since they are public and generalization can be used in the development of model. Also, exterior surfaces make up defined figure and have a ground at the back whether it’s shapeless or endless.

At the extent of the model, within factors that determine surface quality such as colour, material, texture and pattern, only texture and colour have generated inputs to the model.

The perception of street silhouette being two dimensional and the acceptance of chosen building`s backsides being empty, have been identified as the limitations of the study. Since the buildings have been studied as façades, methods have been developed within the range of Gestalt`s similarity, proximity and alignment principles. Other principles such as figure ground and common movement have not generated inputs into the model.

4.2 Famagusta, Salamis Road in Street Scale and the Development of Suggestions

The city of Famagusta located in North Cyprus (See, Figure.92) grew rapidly as a result of the foundation of Eastern Mediterranean University in 1986 and entered into a process of unplanned urbanisation in this period (Önal,Ş., Doratlı,N.,Dağlı,U., 1999). The Salamis road which is the artery of the city that connects the city with the Eastern Mediterranean University and also unites the city of Famagusta with Karpaz peninsula has been chosen as the field of study in thesis study(Figure.93). The Salamis road with its superficial development, with buildings made in different characters, different width and height, briefly without any architectural concerns, is rapidly losing identity day by day and is creating a street of unharmonious outlook with its unharmonious buildings.

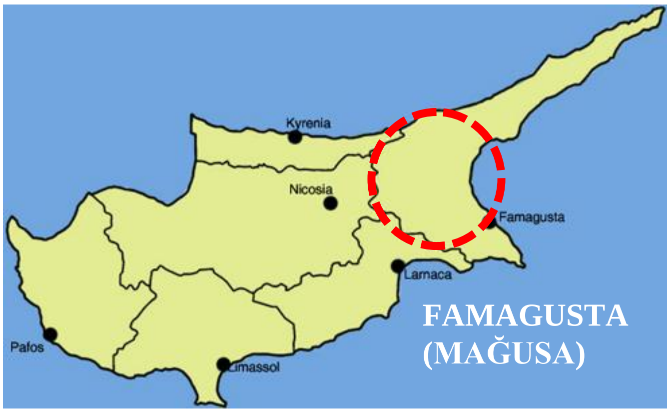


Figure 92. Location of Famagusta (Mağusa) in Cyprus Map (URL 97)

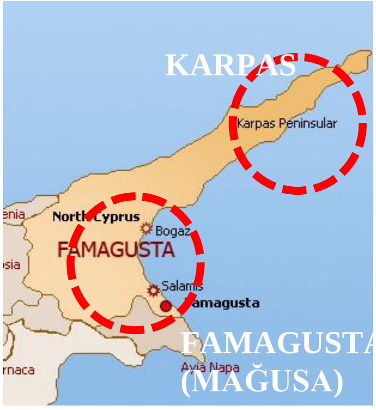


Figure 93. Famagusta and Karpas relationship in Cyprus Map (URL 98)

4.2.1 Determining The Study Area On Salamis Road

4.2.1.1 Describing the study area and its context

If the Eastern Mediterranean University situated on the Salamis road is accepted as the entrance to the city from Karpaz direction, the area starting from the front of the university to the city centre is known to be at the length of 4.5 km (Figure.94). The reason to choose the field of study as more than half of this length is due to the city of Famagusta being the most important and main artery for entertainment/leisure, shopping and socialization.

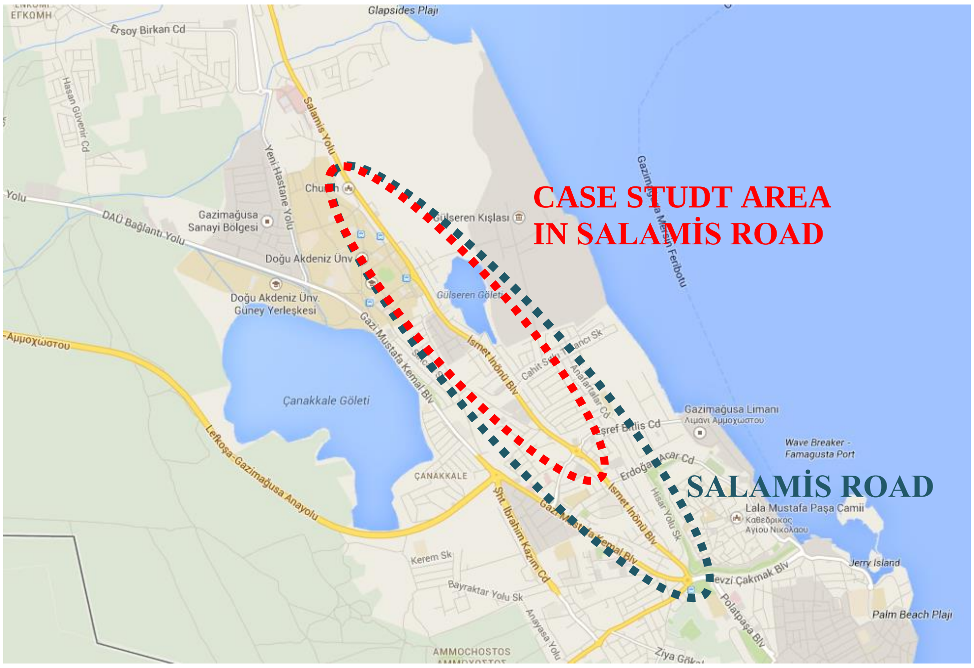


Figure 94. Case Study Area in Famagusta Map (URL 99)

The field of study consists of 91 buildings whose ground floors are open to multiuse (cafe, restaurant, shop etc.) and upper floors being used mainly for residence. Salamis Road consists of two directions which are EMU-City centre (West side) and City centre-EMU (East side). Only west side has been used in the field of study. The reason for this is the existence of many open fields in the western side such as the EMU campus, United Nations camp and sports fields of the Famagusta municipality. The Eastern side, consisting of single or many floored apartments, has been chosen as the scope of the study (Figure.95).

Figure 95. Salamis Road - Case Study area in Famagusta

4.2.1.2 Current Colours in The Study Area Introducing the Method Used for Their Identification

During the study, analysis on the location, observation and identification with photography have been chosen as the main methods. Afterwards, the photographs have been transferred to a digital spectrum and analyzed with the help of computer programs such as Photoshop, Corell and AutoCAD. In order to test the validity of some decisions taken within the analysis, a survey has been conducted with the employees that work in shops and stores on the Salamis Road.

As a result of the identification study made over 90 buildings and the survey conducted with 90 participants (Appendix B: Survey Questions) the current colour of the buildings located on the Salamis road has been decided.

The buildings have been photographed one by one and observations have been made on the field, and this leaded to survey questions to be prepared. The survey has been conducted by the participants both in a digital environment (with laptop) and with printed out photographs. Therefore, the photographs of the buildings on Salamis road have been shown to the shopkeepers located on the Salamis road and the colours of the buildings have been investigated. Which colour is actually perceived on the buildings with plural colours has been found out as a result of this survey. Consequently, it has been determined how the 91 buildings (See Figure.95) on the Salamis road are perceived in terms of colour, and these results have been used throughout the study.

In connection with the survey study, the general colours of the 91 buildings situated on the Salamis road are provided in order by the table below.

Table 17 Results of the Survey Conducted With Shoopkeers on Salamis Road.

Colour groups	Colour Scheme	Colours		Map no	total	%
-	acromatic	White		8,10,16,20,22,26,28,29,30,31,32,34,45, 48,50,51,53,60,65,80,81,82,86,90,91	25	27.47%
-	natural	Cream		1,3,9,13,21,37,38,47,54,57,58,61,64,67, 68,73,74,83,87	19	20.87%
-	acromatic	Grey		5,11,15,24,49,56,63,69,70,75,77,79,89	13	14.28%
-	natural	Light Brown		6,7,12,17,25,36,46,66,78	9	9.89%
warm	-	Red(&pink)		14,18,33,55,59,71,85,88	8	8.79%
warm	-	Yellow		35,43,52,76	4	4.40%
Cool	-	Blue		2,4,27,44	4	4.40%
warm	-	Orange		39,40,41	3	3.30%
Cool	-	Green		19,72,84	3	3.30%
Cool	-	Violete		23,42,62	3	3.30%

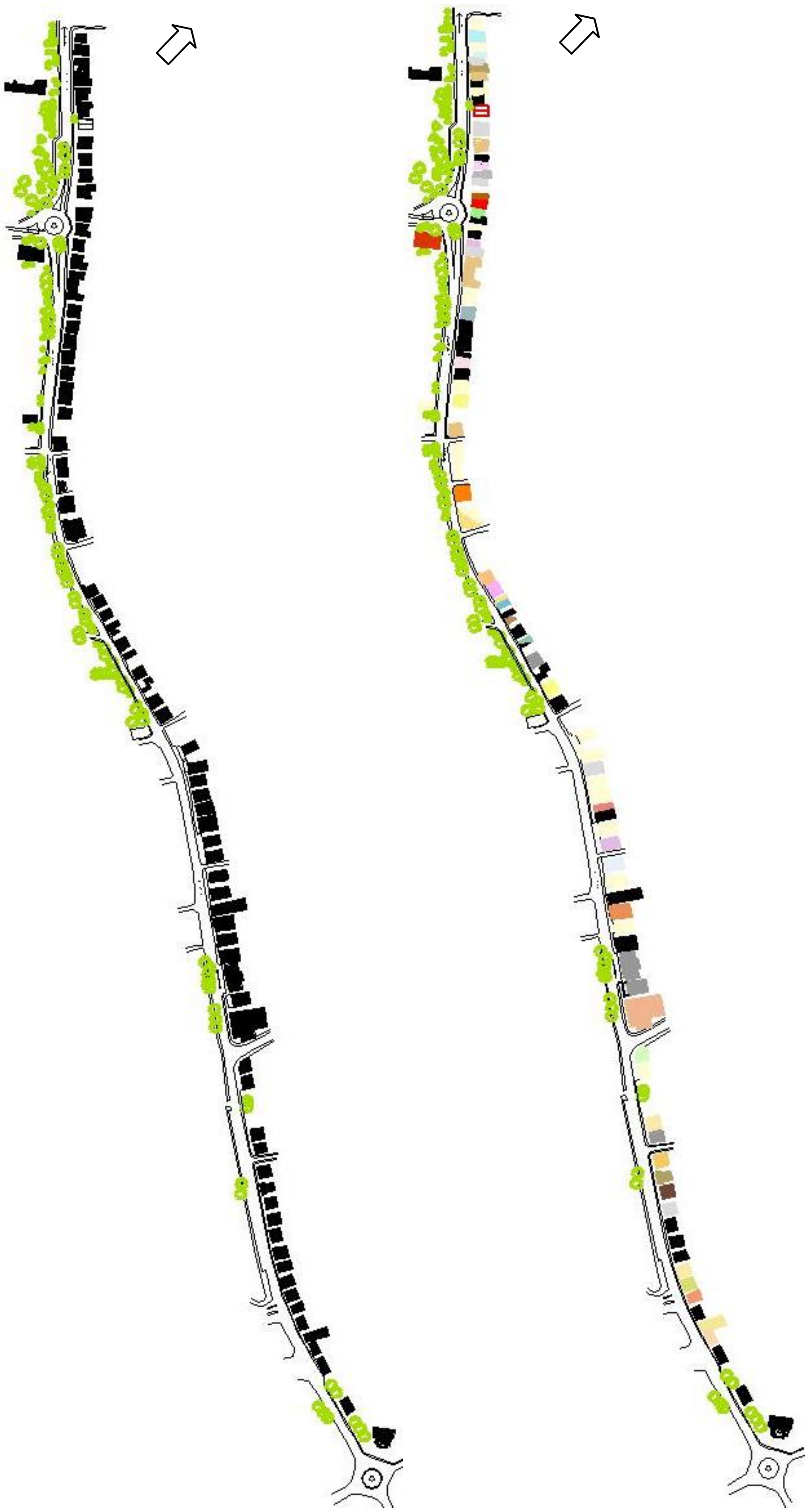


Figure 96. Salamis Road – Case study area: Figure-ground plan and existing colour plan

As a result of the study, it has been observed that the colours set above exist in different tones within the street. For example, it has been observed that the purple colour used on buildings do not have the same tones. In this context, the building`s own colour has been especially chosen in the palettes arranged digitally, and afterwards the façade illustrations have been prepared. Furthermore, while the street can be perceived as colourful at the first observation, it has been discovered that almost half (47.77%) is within the tones of white (27.77) and cream (20.00%). In addition to this, grey, brown, and red (pink as a tone of red) are the colours which are widely displayed in the streets. The table.17 illustrates the colour scale of the Salamis road.(See Appendix C: -Existing Colours of Buildings Façades - Salamis Road / Famagusta, Street Elevation and Street Silhouette Drawings - Scale 1/500// Suggestion: Created Harmonious Environment with Warm Colours - Salamis Road / Famagusta, Street Elevation and Street Silhouette Drawings - Scale 1/500)

4.2.2 Development of Suggestions

The suggestions within the scope of the model have been developed with the help of readings and theoretical approaches.

4.2.2.1 Creation of a Harmonious Street with the Colours Used on the Building Façades

4.2.2.1.1 Creation of Harmony with Proportion and Colour Relationship

This part of the study that is carried out at the street scale argues that the Salamis road, where unharmoniously coloured environmental façades of buildings exist, can have a better outlook. Also, the hypotheses, that the silhouette can look more harmonious with the use of colours, have examined the colours of the façades one by one along the whole street.

Firstly, with the initiative that harmony cannot only be achieved with colour, the notion of proportion between buildings has been studied within the scope of the thesis.

With the colour used on the building`s façades, we can make the existing building to be perceived higher/lower or wider/narrower than it is in reality (See. The issue has been covered with examples in the weight-scale and distance effect section).With this method, we have the chance of making the buildings on Salamis Road which are very different from each other, more perceived in terms of proportion.

4.2.2.1.2 Identification of Problems and Suggestions for Their Solution

In relation to others when considering their position on Salamis road;

A) Taller buildings that affect the city`s silhouette negatively: 1, 3, 4, 7, 18, 25, 31, 33, 41, 49, 55, 58, 64, 68, 71, 75, 81, 86, 87.

B) Lower buildings that affect the city`s silhouette negatively: 2, 5, 6, 9, 10,15,16, 17, 21, 22, 30, 32, 34, 38, 39, 40, 45, 46, 48, 50, 51, 56, 57, 59, 60, 69, 73, 78, 89, 90

C) Wider buildings that affect the city`s silhouette negatively: 2, 25, 40, 69, 71, 89

D) Narrower buildings that affect the city`s silhouette negatively: 33, 43 numbered buildings have been identified (See Appendix C).In this context, 4 main problems have been identified and classified as fault proportions.

As a result of the identification study, the table below summarizes the measures that can be taken with colour, for the buildings located on the Salamis road which create disharmony within their environment.

Table 18. Change of Perception on the Building Proportions with Colour

	Building Condition		Proposals for solution
A	Taller buildings that affect the city`s silhouette negatively	A1	The lower floors should be dark and the upper floors should be light colours.
		A2	The horizontal elements located on the building surface should be brought to the forefront and coloured.
B	Lower buildings that affect the city`s silhouette negatively	B1	While the building is coloured, the colours should be organized hierarchically as down-top and light-dark
		B2	The vertical elements located on the building surface should be brought to the forefront and coloured.
C	Wider buildings that affect the city`s silhouette negatively	C1	While the building is coloured the colours should be separated into 3 as the right, left and centre of the façade. The sides should be defined with darker colours and the centre should be defined with lighter colours.
		C2	The vertical elements located on the building surface should be brought to the forefront and coloured.
D	Narrower buildings that affect the city`s silhouette negatively	D1	While the building is coloured the colours should be separated into 3 as the right, left and centre of the façade. The sides should be defined with lighter colours and the centre should be defined with darker colours.
		D2	The horizontal elements located on the building surface should be brought to the forefront and coloured.

By using the table above, suggestions of colour to improve the buildings on Salamis road, which create an unharmonious environment, can be lined up in the table.19.

Table 19. Suggestions for Unharmonious Building Proportions on Salamis Road and Improvement of the Colours.

Building no	Problem	Solution	Building no	Problem	Solution	Building no	Problem	Solution	Building no	Problem	Solution	Building no	Problem	Solution
1	A	**A1**	20	-	-	39	B	**B2**	58	A	**A2**	77	-	-
2	B/C	**B1/C1**	21	B	**B2**	40	B/C	**B1/C1**	59	B	**B2**	78	B	**B1**
3	A	**A1**	22	B	**B2**	41	A	**A1**	60	B	**B2**	79	-	-
4	A	**A1**	23	-	-	42	-	-	61	-	-	80	-	-
5	B	**B1**	23	-	-	43	D	**D2**	62	-	-	81	A	**A1**
6	B	**B1**	25	A/C	**A1/C2**	44	-	-	63	-	-	82	-	-
7	A	**A1**	26	-	-	45	B	**B2**	64	A	**A1**	83	-	-
8	-	-	27	-	-	46	B	**B2**	65	-	-	84	-	-
9	B	**B2**	28	-	-	47	-	-	66	-	-	85	-	-
10	B	**B2**	29	-	-	48	B	**B2**	67	-	-	86	A	**A1**
11	-	-	30	B	**B2**	49	A	**A1**	68	A	**A1**	87	A	**A1**
12	-	-	31	A	**A1**	50	B	**B1**	69	B/C	**B1/C2**	88	-	-
13	-	-	32	B	**B1**	51	B	**B1**	70	-	-	89	B/C	**B2/C2**
14	-	-	33	A/D	**A1/D2**	52	-	-	71	A/C	**A1/C2**	90	B	**B2**
15	B	**B2**	34	B	**B2**	53	-	-	72	-	-	91	-	-
16	B	**B1**	35	-	-	54	-	-	73	B	**B2**			
17	B	**B1**	36	-	-	55	A	**A2**	74	-	-			
18	A	**A1**	37	-	-	56	B	**B2**	75	A	**A2**			
19	-	-	38	B	**B2**	57	B	**B2**	76	-	-			

In the performed study, it has been decided what parts of the disproportional buildings on Salamis road need to be coloured in order for them to look harmonious with the others. Afterwards, in order for whole Salamis road to be harmonious also in colour, it has been coloured with the sample work and transformed into a harmonious environment. (See, Appendix C: Suggestion Colours of Buildings Façades - Salamis Road / Famagusta)

4.2.2.2 Providing Legibility for Specific Functions

In this part of the study, it has been argued as a hypothesis that, it is possible to bring any function into prominence in an environment which is harmonious in terms of colour and proportion and enable it to be readable with the use of colours on the building`s façades. This has been examined upon the Salamis road.

4.2.2.2.1 Determination of the Specific Functions

As a result of the investigation made across the whole city of Famagusta, it has been observed that functions of entertainment and amusement only exist in two areas of the city. First area is the cafe, restaurant and bars in Walled City (The old town) area and the second area is the cafes, restaurant and bars on Salamis road which is accepted as new area of settlement. When studied city-wide, these locations used for socialization are perceived weakly within the state. In this context, the orientation of the decision to bring the function on Salamis road to the forefront, -the main artery of entertainment/leisure shopping and socialization in the city Famagusta- has been made subject to the survey study (See, Appendix B: survey questions) conducted by 90 people, who work on various stores, cafes, restaurants, stationeries and similar functions on the Salamis road.

The answers and percentage proportions of the participants to the question "How many cafe/restaurant/bar/entertainment venues do you think exists on this street?" are as follows in table.20.

Table 20. Salamis Road – Results of the Survey Study

How many cafe/restaurant/bar/entertainment venues do you think exists on this street?		
a) 1 to 10	39 participant	42,85 %
b) 11 to 20	33 participant	36,26 %
c) 21 to 30	11 participant	12,08 %
d) 31 to 40	8 participant	8,79 %

It has been detected at the on-site monitoring that 31 entertainment/leisure venues exist on the street. But as one can see in the survey study, the number of entertainment-leisure venues is not perceived as such by the vast majority of the participants. Vast majority of the participants complained that the city of Famagusta does not have a place for entertainment and leisure. These complaints and the survey study show that there are some difficulties with the perception of some functions by the residents.

As a result of the observation and the survey study, it has been detected that the entertainment-leisure functions in the city of Famagusta are difficult to be perceived.

4.2.2.2.2 Solution Suggestions for Legibility

With the help of approaches indicated in below table (Table.21) intended function within an environment with compatible colours is brought into forefront and its perception in the street is ensured.

Table 21. Colour Usage Suggestions for Bringing any Function in the Street into Forefront and Enhancing Its Perception

Colours in a street with compatible colours	Suggested colours for the function intended to be brought into forefront
Warm Colour Groups	Cool Colour // Achromatic Colour
Cool Colour Groups	Warm Colour // Achromatic Colour
Monochromatic Colour Scheme	Contrast Colour
Achromatic Colour Scheme	Any Colour İn Colour Wheel
Complementary Colour Scheme	Achromatic Colour
Analogous Colour Scheme	Achromatic Colour

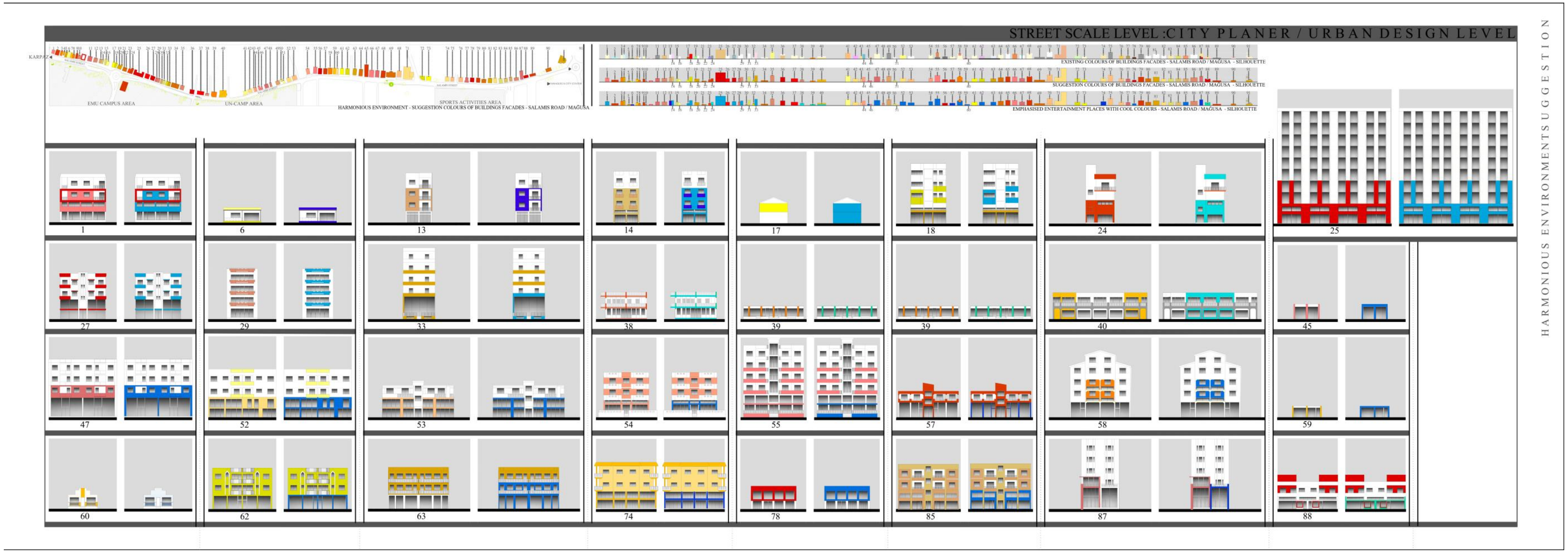
Assuming that Salamis Road is developed with ‘warm colour groups - analogous colour scheme’ colours in terms of proportion and compatibility (See, Appendix C: Suggestion Colours Of Buildings Façades - Salamis Road / Famagusta), approaches being summarized in Table.21 can be used in order to bring the existing entertainment and recreational venues at the street into forefront. In this context, on a street silhouette that is compatible with achromatic colours under the warm colour group, it is seen that this operation can be realized with any colour and its respective tones under the cold colour group. In this framework, to the questions “In which place in Famagusta do you entertain and recreate yourself most?”, “What is the colour of Famagusta for you? Why?” that were asked during the survey conducted with 90 people, “We entertain most at the sea” with 38.4 % (35 participant) percentage and “the colour of Famagusta is blue” with 34,06% (31 participant) percentage were the most popular answers.

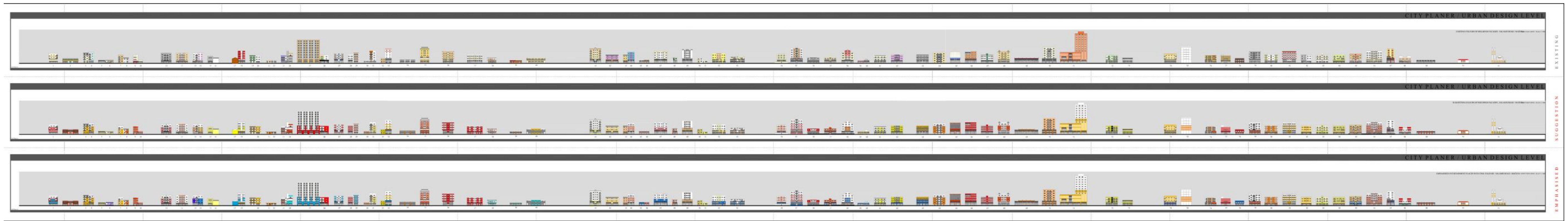
With the help of aforementioned answers, using blue colour and the tones of blue colour in entertainment and recreation venues at Salamis Road is perceived to be appropriate. By using the blue colour on the façades of entertainment and recreation venues, bringing these venues into forefront and their perception on the street is provided for the participants indicating that the sea is the place where they entertain and recreate themselves and that the colour of Famagusta is blue.

Entertainment/recreational venues at the Salamis Road and existing and suggested colours are displayed in the Table.22.(See, Appendix D: Emphasized Entertainment Places with Cool Colours).

As a result of identification studies, buildings that cause to incompatibility with the existing environment in terms of proportionality and colour are re-coloured with the method in Table.18 (Appendix C); and assuming that the whole street is compatible in terms of proportionality and colour, intended functions at the street can be brought into forefront again with the help of colours through using appropriate methods that are indicated in table.21 (Appendix D).

Table 22. Emphasised Entertainment Places with Cool Colours – Salamis Road Famagusta





4.3 Salamis Road in Building Scale

The study is designed on the hypothesis that in any build or natural environment, when a newly designed or an existing building will be coloured, it can have some effects with the help of colours; and the method is developed according to five determined effects.

Possible effects that the buildings can have can be listed as follows;

- Sign Effect,
- Camouflage Effect,
- Movement and Time Effect,
- Weight, Scale and Distance Effect,
- Legibility and Illegibility Effect. (See, page 121)

In order to have aforementioned effects through the colouring operations on the buildings, the operation should be conducted in line with evaluation of the building together with its close environment.

4.3.1 For The Selection Process

Based on the hypothesis that "one of the five intended effects can be achieved through the use of colours on the façades of buildings"; the constructed method of the study is provided by decision making in 9 steps that are explained below

4.3.1.1 Selecting One Out of the Five Effects

Five types of effect can be given through the colours used on the building surfaces. During the design phase of the building, the architect should decide on what kind of effect intended to be given to the building on the street; or when an existing building will be re-coloured, the architect, owner, contractor firm should make decision on the type of intended effect the building will have. For giving these effects (Sign Effect, Camouflage Effect, Movement and Time Effect, Weight, Scale and Distance Effect, Legibility and Illegibility Effect), the colours that are used within the environment of the building should be taken into consideration.

4.3.1.2 Decision of the Close Environment and Silhouette

When it is decided to colour a newly designed or an existing building, it is known that the building is not perceived by its own; rather it is perceived as a whole together with its environment. As also known from the Gestalt perception principles, none of the objects or buildings is perceived with its constituent pieces, but is perceived as the whole which is constituted through the assembling of the pieces (See, page 92).

In this step, the building together with the objects within the close environment that is perceived is decided according to the visual angle of the human and of the width of the street. In other words, the objects that are included within the close environment of the building and will be coloured are identified.

With the help of visual and perception angles, decision for the best place intended for the perception of the building is given; and the objects that are included within the close environment of the determined place is identified. (See. perception-visual angle p.201).

Elements of build or natural environment that are covered within a human's perception angle are recorded with on-site observation and photographing. Recording is made through investigation of the proportions between them, magnitude and of the used colours. The distance between the buildings is identified by measurement or via the Google Earth program. The heights are identified by measurement. Afterwards, for assuring the correctness of the operation, the photographs are recorded into digital media and are cross-checked with the help of AutoCAD or similar programs. By this way, the distances and heights of the build or natural elements within the close environment are identified. After the identification of the distances and heights between the elements within the close environment of the building that will be re-coloured, the façades of these elements are drawn as silhouettes with two dimensions. The differences in distances and heights between elements within the close environment became clearer with the drawn silhouette. The gaps between the buildings and the heights of the buildings can be same or different.

4.3.1.3 Decision of the Environment Type

Natural environment and build environment are two types that an environment can be. An environment that is constituted completely with flora and fauna is called natural environment; and the environment that is artificially constructed by human beings is called build environment. Forest, mountain, sea are given as examples of natural environment; while the buildings, roads, sidewalks, urban furniture that constitute a street can be given as illustrations of a build environment.

Within the framework of the designed model, the three tables that are prepared with the help of Gestalt perception principles include both the natural and the build environments. In this context, decision of the type of environment of the building that will be coloured is made; its place among the tables is found and marked.

4.3.1.4 Decision of Gestalt Perception Principle

According to the heights of and the distance between the buildings, which of Gestalt perception principles is appropriate is found with the help of the drawn silhouette.

The limit of the scope of this study is identified to be the assumption that street silhouettes are perceived in two dimensions and the back of selected buildings is empty. Since the buildings are taken only as façades, the method is developed within the framework of similarity, proximity, alignment principles of Gestalt; and other principles such as figure ground and common movement are not used for the study. (See, Gestalt principles p.89)

After drawing the building that will be coloured together with its environment as a silhouette, its belongingness is decided through the 3 tables developed according to the Gestalt perception principles.

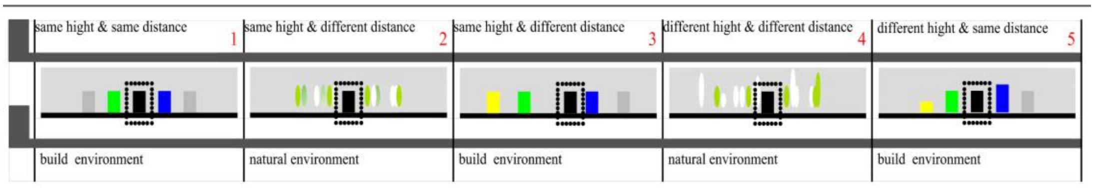


Figure 97. Location within the Close Environment of the Building that Will Be Coloured

During the decision making, the heights of and the distance between the elements constituting the environment of the building is overviewed. As seen in the Figure.97, the building that will be coloured (the one that is marked with black) can be located in different ways in respect to the elements constituting its close environment. In drawing number 1 of the Figure.97, within the unharmonious build environment, the height and distance between the building that will be coloured and the buildings within its close environment are equal; in drawing number 2, within a harmonious natural environment, all the heights and distances between the building and that will be coloured and its close environment are equal; and in drawing number 3, within an unharmonious build environment, the heights of the buildings are equal but the distances between them are different. The drawing number four displays the silhouette of a building that is located along different heights within a harmonious natural environment, and the last drawing number five shows that the buildings constituting the close environment of the building that will be coloured have different heights within an unharmonious build environment.

-The silhouette of the close environment of building that will be coloured can be located in natural or build environment. If the heights of and the distances between the elements within the environment are equal, similarity table will be used. (See, Figure.98). Table.23 displays the expansion of silhouettes constituted under the similarity table.

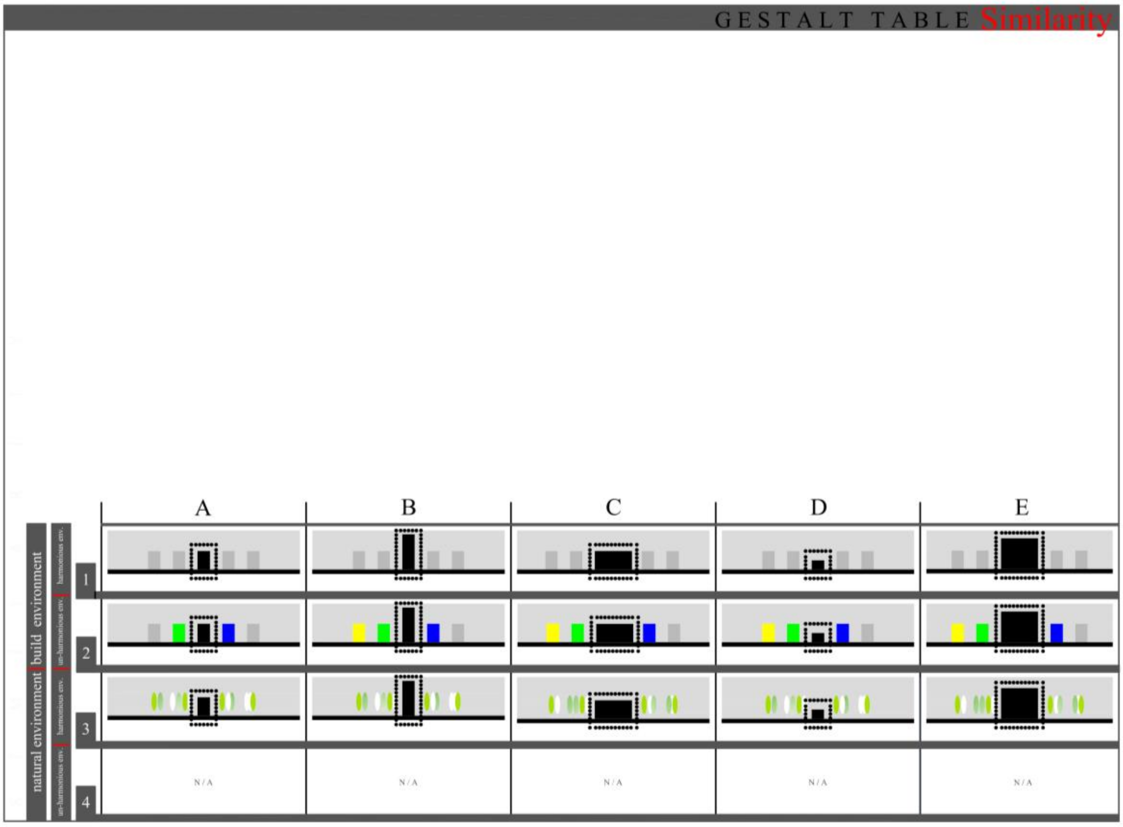


Figure 98. Similarity Key Table

Table 23. Similarity Key Table Explanations

Similarity Key Table		
A	A1	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is harmonious in terms of colour and proportionality
	A2	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is unharmonious in terms of colour and proportionality
	A3	The heights of and the distance between the building that will be coloured and the other elements constituting the environment are equal in a natural environment which is harmonious in terms of colour and proportionality
	A4	No natural environment is unharmonious in terms of colour and proportionality.
B	B1	The building that will be coloured is higher than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	B2	The height of the building that will be coloured is higher than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	B3	The height of the building that will be coloured is higher than the buildings constituting the environment and the heights and the distances between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	B4	No natural environment is unharmonious in terms of colour and proportionality.
C	C1	The building that will be coloured is wider than the buildings constituting the environment but the heights and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	C2	The building that will be coloured is wider than the buildings constituting the environment but the heights and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality

	C3	The building that will be coloured is wider than the buildings constituting the environment but the heights and the distances between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	C4	No natural environment is unharmonious in terms of colour and proportionality.
D	D1	The building that will be coloured is lower and smaller than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	D2	The building that will be coloured is lower and smaller than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	D3	The building that will be coloured is lower and smaller than the buildings constituting the environment and the heights and the distances between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	D4	No natural environment is unharmonious in terms of colour and proportionality.
E	E1	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	E2	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	E3	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	E4	No natural environment is unharmonious in terms of colour and proportionality.

-Within the environment of the building that will be coloured, it is possible that the heights of the elements of the environment are equal while the distances between them are different. If the heights of the elements constituting the environment are equal but the distances differ from each other, Proximity key table is used (Figure.99). Table.24 displays the expansions of silhouettes constituted under the Proximity table.

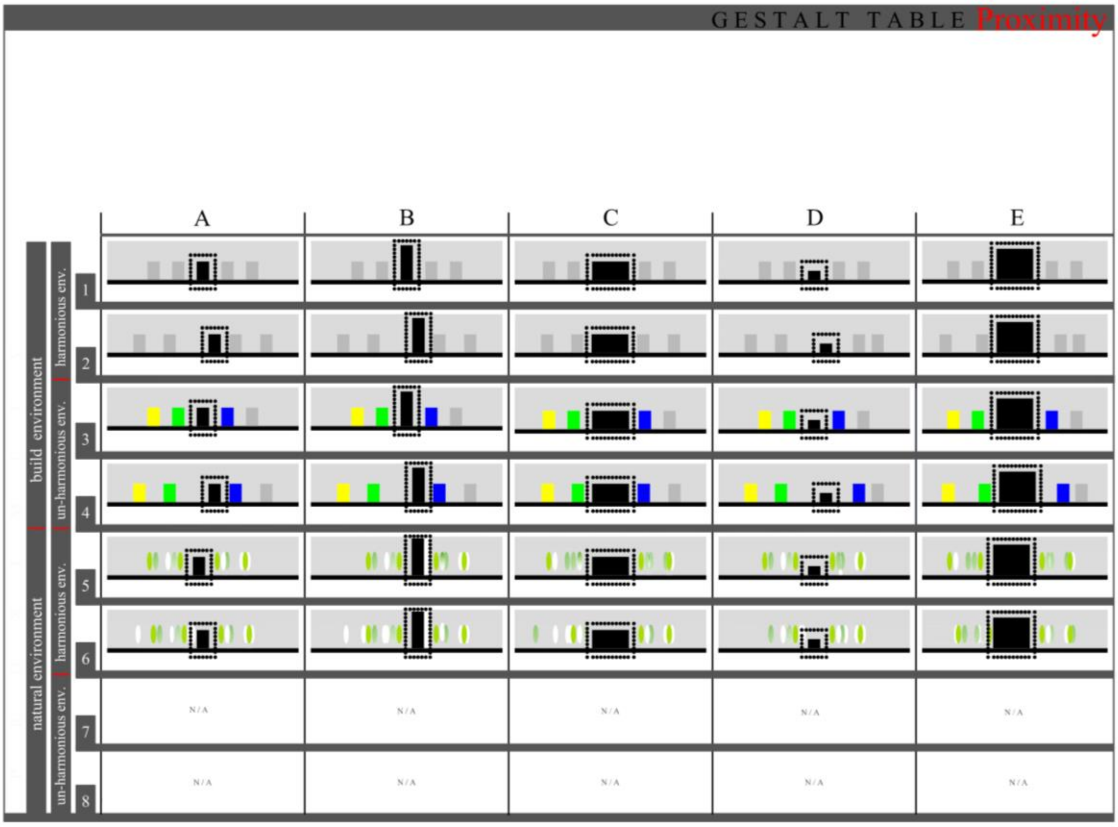


Figure 99. Proximity Key Table

Table 24. Proximity Key Table Explanations

Proximity Key Table		
A	**A1**	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is harmonious in terms of colour and proportionality
	A2	The distances between the building that will be coloured and the buildings constituting the environment are different but the heights are equal in a build environment which is harmonious in terms of colour and proportionality
	A3	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is unharmonious in terms of colour and proportionality
	A4	The distances between the building that will be coloured and the buildings constituting the environment are different but the heights are equal in a build environment which is unharmonious in terms of colour and proportionality
	A5	The heights of and the distance between the building that will be coloured and the elements constituting the environment are equal in a natural environment which is harmonious in terms of colour and proportionality
	A6	The distances between the building that will be coloured and the buildings constituting the environment are different but the heights are equal in a natural environment which is harmonious in terms of colour and proportionality
	A7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	A8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	B1	The building that will be coloured is higher than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	B2	The building that will be coloured is higher than the buildings constituting the environment

B		and the heights of the buildings are equal but the proportions between them are different in a build environment which is harmonious in terms of colour and proportionality
	B3	The building that will be coloured is higher than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	B4	The building that will be coloured is higher than the buildings constituting the environment and the heights of the buildings are equal but the proportions between them are different in a build environment which is unharmonious in terms of colour and proportionality
	B5	The building that will be coloured is higher than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	B6	The building that will be coloured is higher than the buildings constituting the environment and the heights of the buildings are equal but the proportions between them are different in a natural environment which is harmonious in terms of colour and proportionality
	B7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	B8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
C	**C1**	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	C2	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion between the buildings is different in a build environment which is harmonious in terms of colour and proportionality
	C3	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	C4	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion between the buildings is different in a build environment which is unharmonious in terms of colour and proportionality
	C5	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights and the proportions between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	C6	The building that will be coloured has same height but is wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion between the buildings is different in a natural environment which is harmonious in terms of colour and proportionality
	C7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	C8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
D	**D1**	The building that will be coloured lower and smaller than the buildings constituting the environment and the heights of and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	D2	The building that will be coloured lower and smaller than the buildings constituting the environment and the heights of the buildings are equal but the proportion between them are different in a build environment which is harmonious in terms of colour and proportionality
	D3	The building that will be coloured lower and smaller than the buildings constituting the environment and the heights of and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	D4	The building that will be coloured lower and smaller than the buildings constituting the environment and the heights of the buildings are equal but the proportion between them are different in a build environment which is unharmonious in terms of colour and proportionality
	D5	The building that will be coloured is lower and smaller than the elements constituting the environment and the heights of and the distances between the elements are equal in a

		natural environment which is harmonious in terms of colour and proportionality
	D6	The building that will be coloured is lower and smaller than the elements constituting the environment and the heights of the elements are equal but the proportion between them are different in a natural environment which is harmonious in terms of colour and proportionality
	D7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	D8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
E	**E1**	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of and the distances between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	E2	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion is different in a build environment which is harmonious in terms of colour and proportionality
	E3	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of and the distances between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	E4	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion is different in a build environment which is unharmonious in terms of colour and proportionality
	E5	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of and the distances between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	E6	The building that will be coloured is higher and wider than the buildings constituting the environment and the heights of the buildings are equal but the proportion is different in a natural environment which is harmonious in terms of colour and proportionality
	E7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	E8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.

-Within the environment of the building that will be coloured, it is possible that the heights of the elements of the environment are not equal while the distances between them are equal. If the heights of the elements different the environment is equal but the distances equal from each other, Alignment key table is used (Figure.100). Table.25 displays the expansions of silhouettes constituted under the Alignment table.

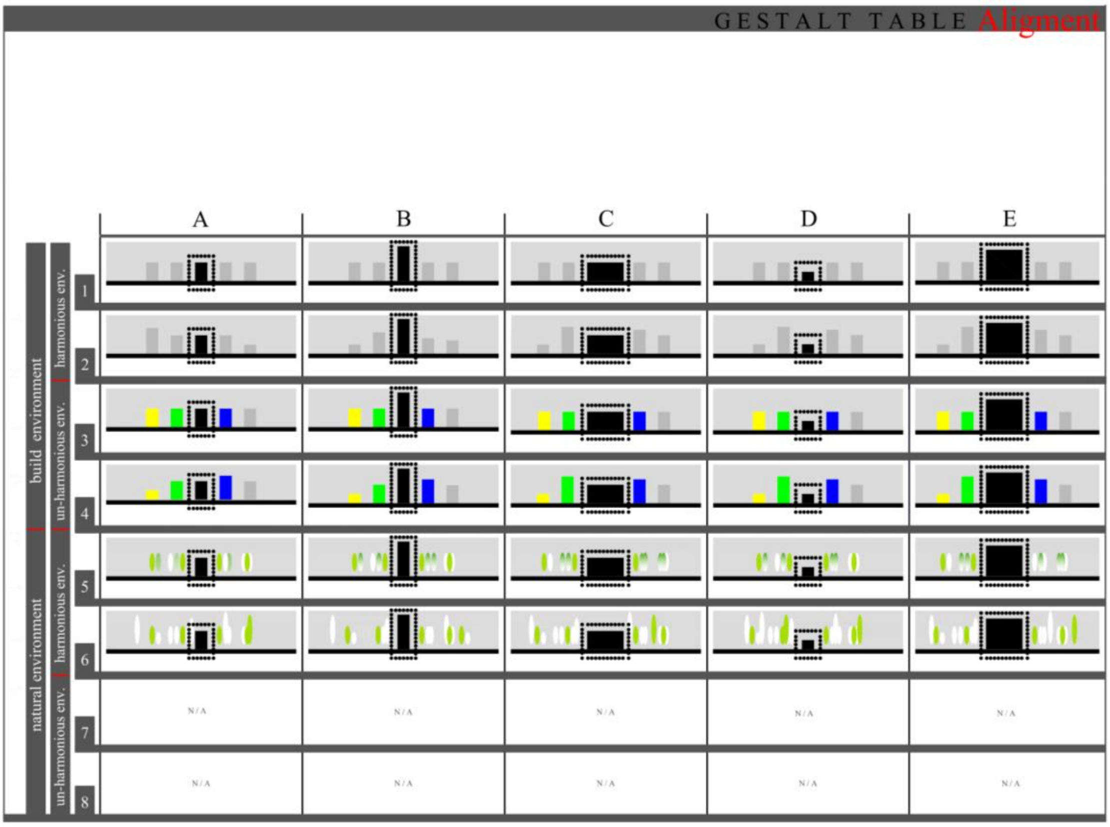


Figure 100. Alignment Key Table

Table 25. Alignment Key Table Explanations

Alignment Key Table		
A	A1	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is harmonious in terms of colour and proportionality
	A2	The distance between the building that will be coloured and the buildings constituting the environment are equal but the heights are different in a build environment which is harmonious in terms of colour and proportionality
	A3	The heights of and the distance between the building that will be coloured and the buildings constituting the environment are equal in a build environment which is unharmonious in terms of colour and proportionality
	A4	The distance between the building that will be coloured and the buildings constituting the environment are equal but the heights are different in a build environment which is unharmonious in terms of colour and proportionality
	A5	The heights of and the distance between the building that will be coloured and the elements constituting the environment are equal in a natural environment which is harmonious in terms of colour and proportionality
	A6	The distance between the building that will be coloured and the buildings constituting the environment are equal but the heights are different in a natural environment which is harmonious in terms of colour and proportionality
	A7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	A8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	B1	The building that will be coloured is higher than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality

B	B2	The building that will be coloured is higher than the buildings constituting the environment and heights between the buildings are equal but proportion is different in a build environment which is harmonious in terms of colour and proportionality
	B3	The building that will be coloured is higher than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	B4	The building that will be coloured is higher than the buildings constituting the environment and proportion between the buildings are equal but heights are different in a build environment which is unharmonious in terms of colour and proportionality
	B5	The building that will be coloured is higher than the buildings constituting the environment and the proportion and heights between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	B6	The building that will be coloured is higher than the elements constituting the environment and proportion between the elements are equal but heights are different in a natural environment which is harmonious in terms of colour and proportionality
	B7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	B8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
C	C1	The building that will be coloured is wider than the buildings constituting the environment but their heights are equal and the proportion and heights between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	C2	The building that will be coloured is wider than the buildings constituting the environment but their heights are equal and the proportion between the buildings are equal but their heights are different in a build environment which is harmonious in terms of colour and proportionality
	C3	The building that will be coloured is wider than the buildings constituting the environment but their heights are equal and the proportion and heights between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	C4	The building that will be coloured is wider than the buildings constituting the environment but their heights are equal; the proportion between the buildings are equal but their heights are different in a build environment which is unharmonious in terms of colour and proportionality
	C5	The building that will be coloured is wider than the elements constituting the environment but their heights are equal and the proportion and heights between the elements are equal in a natural environment which is harmonious in terms of colour and proportionality
	C6	The building that will be coloured is wider than the elements constituting the environment but their heights are equal; the proportion between the elements are equal but their heights are different in a natural environment which is harmonious in terms of colour and proportionality
	C7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	C8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
D	D1	The building that will be coloured is lower and smaller than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality

	D2	The building that will be coloured is lower and smaller than the buildings constituting the environment and the proportion between the buildings are equal but their heights are different in a build environment which is harmonious in terms of colour and proportionality
	D3	The building that will be coloured is lower and smaller than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build which is harmonious in terms of colour and proportionality
	D4	The building that will be coloured is lower and smaller than the buildings constituting the environment and the proportion between the buildings are equal but their heights are different in a build environment which is unharmonious in terms of colour and proportionality
	D5	The building that will be coloured is lower and smaller than the elements constituting the environment and the proportion and heights between the elements are equal in a natural environment which is harmonious in terms of colour and proportionality
	D6	The building that will be coloured is lower and smaller than the elements constituting the environment and the proportion between the elements are equal but their heights are different in a natural environment which is harmonious in terms of colour and proportionality
	D7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	D8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
E	E1	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build environment which is harmonious in terms of colour and proportionality
	E2	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion between the buildings are equal but their heights are different in a build environment which is harmonious in terms of colour and proportionality
	E3	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion and heights between the buildings are equal in a build environment which is unharmonious in terms of colour and proportionality
	E4	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion between the buildings are equal but their heights are different in a build environment which is unharmonious in terms of colour and proportionality
	E5	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion and heights between the buildings are equal in a natural environment which is harmonious in terms of colour and proportionality
	E6	The building that will be coloured is higher and wider than the buildings constituting the environment and the proportion between the buildings are equal but their heights are different in a natural environment which is harmonious in terms of colour and proportionality
	E7	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.
	E8	Irrespective of equal or different distances, no natural environment is unharmonious in terms of colour and proportionality.

4.3.1.5 Decision Whether the Designed Silhouette Belongs to a Harmonious or an Unharmonious Environment

After the type of environment within which the silhouette of building that will be coloured together with its close environment is decided, decision whether this environment belongs to a harmonious or an unharmonious environment will be made. Within the scope of this study, it is assumed that natural environment is always harmonious and that there is no unharmonious natural environment. It is also assumed within the scope of this study that a build environment can display two types of incompatibility. The first reason of this incompatibility is the proportional defects amongst the buildings constituting the close environment. The other reason is the colours used on the façades of these buildings. This incompatibility can sometimes be seen only in proportions or only in colours; yet it is also possible to observe both incompatibilities together. In this context, decision about the type of environment the building that will be coloured belongs to; and decision whether this environment belongs to a harmonious or an unharmonious environment, are taken and marked into the 3 tables (Figure 98,99,100) that are designed in line with Gestalt perception principles.

4.3.1.6 Decision of the Proportion of Building

In terms of proportion, the building that will be coloured can be equal to or different than those existing within its close environment. While the building can sometimes have an equal proportion with its close environment and constitute a harmonious environment, sometimes it can have a different proportion which results in an unharmonious environment in terms of proportionality.

The building that will be coloured can be designed in such ways as:

- It has same width and height with the elements constituting its close environment;

- It is higher than the elements constituting its close environment,

-It is lower than the elements constituting its close environment,

- It is wider than the elements constituting its close environment;

- It is both higher and wider than the elements constituting its close environment. (Figure.101)

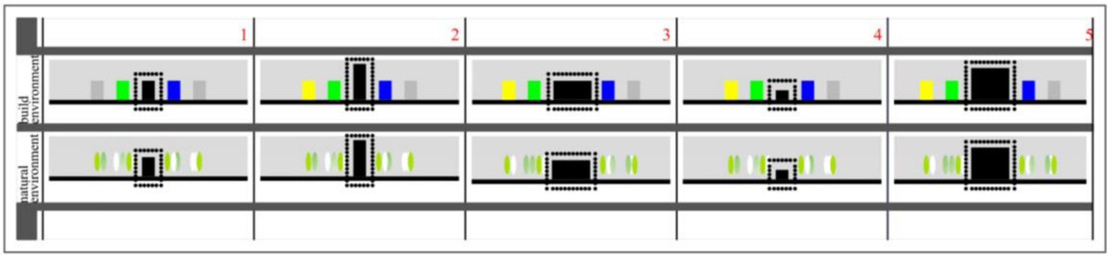


Figure 101. Appearance of the Building that will be Coloured in Terms of Proportion within Its Close Environment

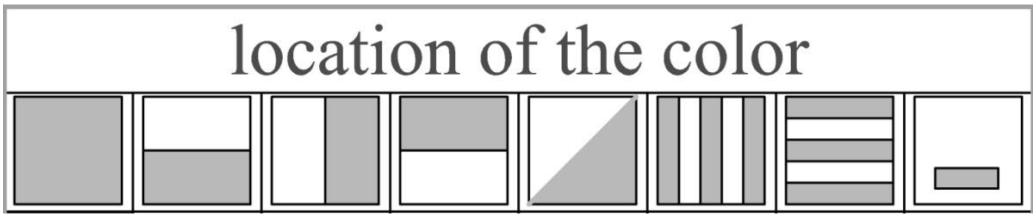
When colouring of the façade of the building that is designed as harmonious or unharmonious with the elements constituting its environment, decision of the appropriate belonging of the building will be made according to the 3 tables designed in line with Gestalt perception principles.

4.3.1.7 Colour Selection According to the Required Effect

The intended effect to be given to the building is decided. For provision of the agreed effect, the colours that will be used on façades are determined. When determining the colours according to the selected effect, the recommended method for ensuring 5 effects in relation to colours in Environmental façades as mentioned in part 3.2 is used. Intended effect is realized through the use of approaches in the recommended model.

4.3.1.8 Proportion of the Colour and Its Realization

After the decision of the effect intended to be given, the decision about the part of the building's surface that will be coloured is given. While in some cases the façade of building is coloured as a whole, it is also possible to colour the half or the part of the façade. In prepared lists, it is thought that 8 different types of colouring of the building's surfaces are possible for the realization of these effects; and it is assumed that colouring of mentioned points is sufficient for realizing the selected effects (Figure.102).



1 2 3 4 5 6 7 8

Figure 102. Location of the Colour on the Building Surface

For realization of the Sign effect, the building as a whole or the parts that are indented to be brought into forefront should be coloured. For example, in some cases only the entrance point is intended to be highlightened. It is sufficient to colour aforementioned point in order for the realization of sign effect in these kinds of buildings (Figure.102 – 8).

A colour for the façade of the building as a whole should be considered for realization of the Camouflage effect. Otherwise, by using colour in one or some parts of the building may result in highlightening the building rather than camouflaging it.

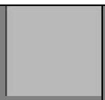
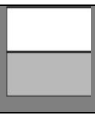
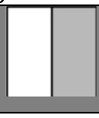
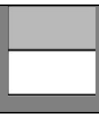
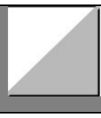
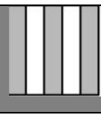
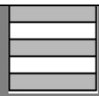
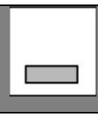
For movement and time effect, rather than colouring the building with a single colour, colouring of the required parts of the building is needed for reaching the intended effect. It is possible that a building is designed in a static way; colouring types: Figure.102 - 2, 3, 4,5,6,7 and 8 can be used in the surface of the building for making such a static design to become more dynamic. If the close environment is defined totally with horizontally dimensioned architectural elements, the movement effect can be given by colouring the building in vertical dimension; or if the close environment is defined totally in vertically dimensioned architectural elements, the movement effect can be reached by colouring it horizontally. If the close environment is defined both with vertical and horizontal architectural elements, the building can be coloured diagonally in order to make it to be perceived more motile and dynamic than the actual.

By means of the weight, scale and distance effect, buildings can be made to be perceived different than the actual. For the movement and time effect, rather than colouring the building with a single colour, colouring of the required parts of the building is needed for reaching the intended effect. As an illustration, if a building is intended to be perceived lower than the actual, it is appropriate to colour it as in example 2 in Figure.102; if it is intended to be perceived narrower than the actual, it is appropriate to colour it as in example 3. Another example is the possibility of making buildings to be perceived higher or lower than the actual. This effect can be reached by means of using colouring types in number 6 and 7, and colouring in vertical or horizontal directions.

For reaching the legibility and illegibility effect, intended angle of readability of the building should be considered. For example, while in some cases the structure of the building is intended to be read, in some cases only the mantle elements of the building are intended to be perceived. The legibility of the elements can be enhanced by colouring of the elements that are intended to be perceived. In some cases, it can be the functions of the buildings that are intended to be perceived. For example, in a building whose basement is designed for commercial purposes and the upper floors are offices, the difference in functions can be made to be perceived by means of outside colouring. (Figure 102– 2,3,4)

In Table.26, the parts of façade that should be coloured in order for reaching the intended effect on the building surfaces are displayed.

Table 26. The Parts of Building Surfaces that Can Be Coloured

								
Sign Effect	X	X	X	X	X	X	X	X
Camouflage Effect	X	-	-	-	-	-	-	-
Movement and Time Effect	-	X	X	X	X	X	X	X
Weight, Scale &Distance Effect	X	X	X	X	X	X	X	-
Legibility and Illegibility Effect	-	X	X	X	X	X	X	X

4.3.1.9 Making Use of the Designing a Check List for Further Use

Decision about the ways of colouring the building surfaces and ways of provision of the intended effects will be made with the help of check list type tables that are developed within the scope of the Model. For provision of the intended effect, decisions about the design notion or notions that will be benefited, colour groups and colour harmony that will be used are marked on the table. Finally, decisions about the parts of the façade of the building that will be coloured are also selected on the table. As a result, the way of provision of intended effect on building façades within the close environment will be decided (Figure.103).

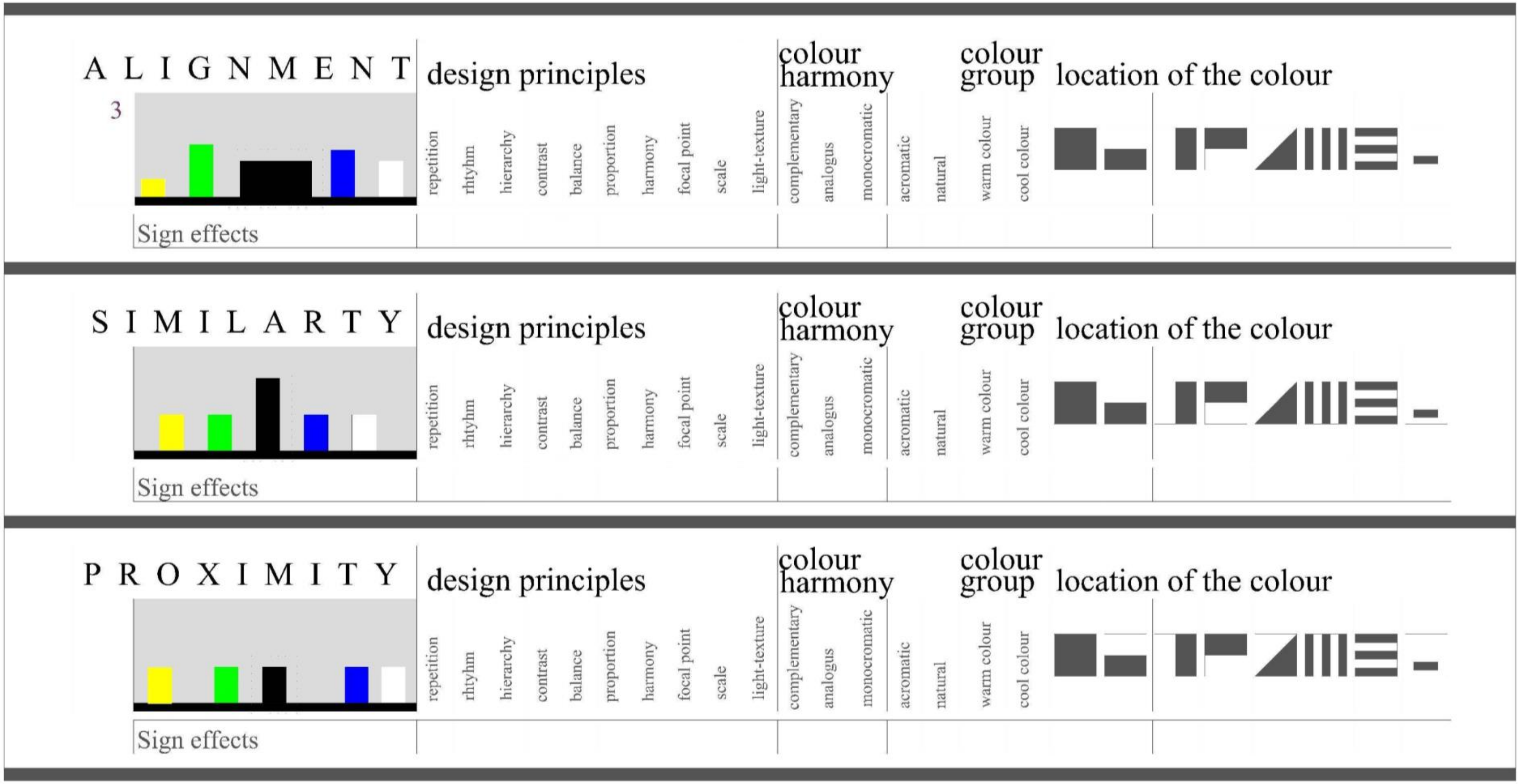


Figure 103. Sample Check List That Will Be Used Within the Scope of the Model

4.4 Re-examining the Constructed Model

4.4.1 Testing of the Method on the Famagusta Salamis Road

Salamis Road of the Famagusta city that is day by day growing with development and unplanned urbanisation is selected as the work field for the testing of the described method. The reason behind the selection of 2.5 kilometers part of the Salamis Road is related to the observation that day by day coloured buildings are being designed, established or the existing buildings are re-coloured randomly. Salamis Road, as the selected area within the scope of this study, is constituted with unharmonious buildings in terms of colour and proportion within a totally build environment. For testing the method, 91 buildings existing within the region are analyzed together with their close environments.

- ***Decision of the effect of the selected buildings at the Street***

How the 5 effects that are indicated in the model (Effect 1: Sign Effect, Effect 2: Camouflage Effect, Effect 3: Movement and Time Effect, Effect 4: Weight, Scale and Distance Effect, Effect 5: Legibility and Illegibility Effect) can be given with the application of façade colouring to randomly selected buildings at the street is discussed in relation to 25 buildings. During the study 5 randomly selected buildings were taken for each respective effect and the ways for giving these effects were discussed. In this study, the way of giving each one of the effects for each and every building respectively is provided on the silhouette drawings.

- ***Identification of close environments of selected buildings at the street***

The elements being perceived within the close environment of the building according to the human visual angle and the width of Salamis Road are identified. In other words, what are included within the close environment of the building that will be re-coloured is identified.

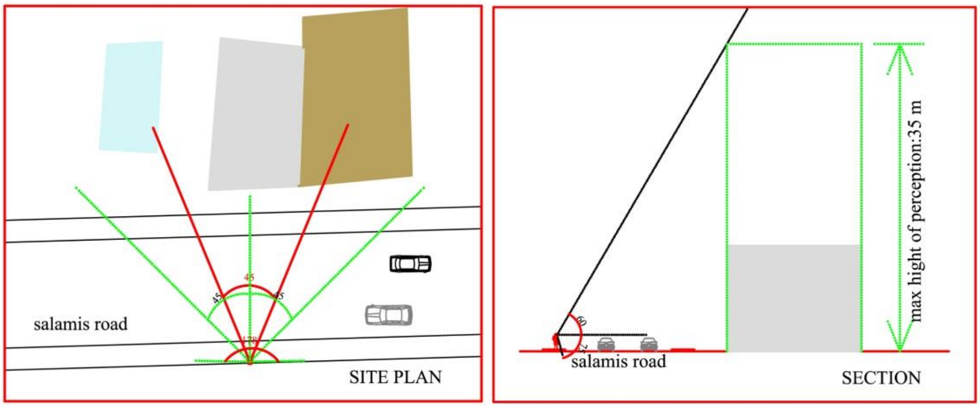


Figure 104. Human Visual Angle on the Salamis Road

Decision of the location where the buildings are best perceived is made during the analysis conducted at Salamis Road. With the assumption that each building is best perceived by standing right across the building, the buildings positioned within the close environment are identified through the use of visual and perception angles by standing right across the buildings. In order to reach best perception of any selected building at the Salamis Road which has 12 m road width and 2, 5 m sidewalk width; one should stand across the road. Since the road is not very wide, when one goes to the furthest point right across the selected building, maximum 3 buildings are included within the perception angle. It is seen that at some points where the Salamis Road is narrower or because the buildings are wide, only two buildings being located side by side can be perceived because of the perception angle. Despite there are more than two buildings within the visual angle, only two buildings fall into the perception angle. Since the buildings are not multiplex or high, no challenge exists for perception angle with regard to height of buildings. All of the façade colours, including the top floor of the buildings, can be perceived (Figure.104). In this context, creation of the silhouettes began with the assumption that close environments of the selected buildings to be coloured on Salamis Road include 3 buildings.

- ***Drawing silhouettes of selected buildings on the street with their close environment***

Within the scope of this study, 91 buildings together with their close environments in selected pilot area on the Salamis Road were photographed. For each of the building, silhouettes were created in a way that they include their respective two neighbors in the close environment. The silhouettes of the buildings together with their close environment were drawn with the help of the measurements in the region and of the taken photos. Drawings that were prepared in Auto CAD program were coloured in digital media later with the help of the Photoshop program. During colouring, existing colours on the building façades were selected from the digital palette and the colouring operation was applied. As a result, how the building together with its close environment is perceived is seen on the scale. For the buildings that are coloured with multiple colours, it is also seen in the surveys on appendix B that they are perceived with the colour that is the most frequently used. As such, silhouettes of the buildings together with their close environment, with the most frequently used colours on their façades; and that preserves the actual heights and proportions were also completed (Figure.105 and Appendix /F/G/H/I/J).

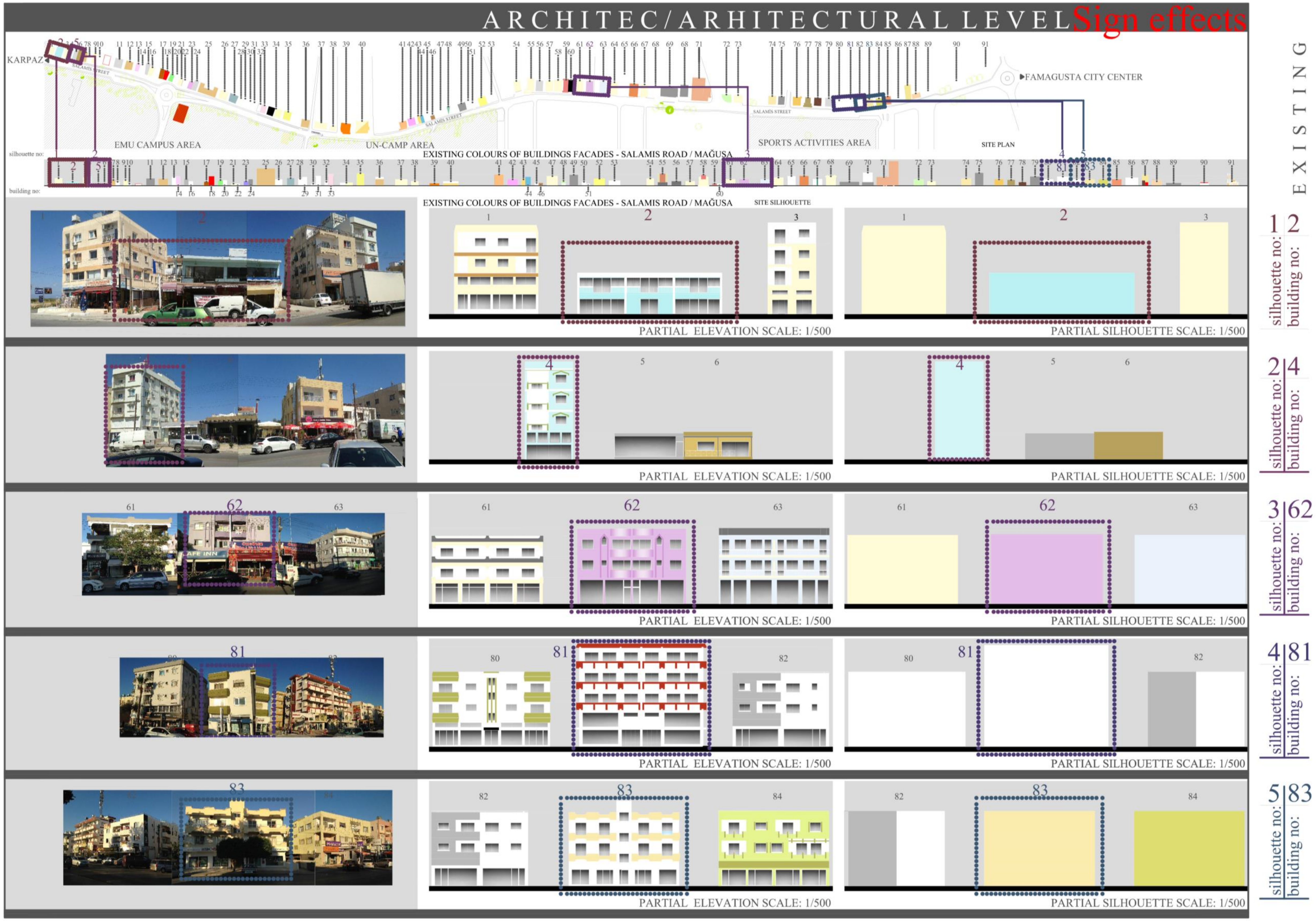


Figure 105. Example of Sign Effect : Architectural Level - Existing

- ***Decision of the type of environment of the building that will be coloured***

When the structure of Famagusta Salamis Road is analyzed in general terms, it is observed that it constitutes a build environment.

- ***Decision whether the created silhouette belongs to a harmonious or unharmonious environment***

Within the scope of this study, it is observed that the selected silhouettes on Famagusta Salamis Road mostly constitute unharmonious environment. When the buildings are analyzed in terms of colour and proportion, it is seen that the buildings constituting Salamis Road have variable proportions and colours as compared to each other and it is observed that they are incompatible with the road in general. However, it is seen that, at some points on the street, buildings being intended to give effect has harmony with their close environments in terms of proportion. While being unharmonious on the whole, some specific harmonious points exist on the Salamis Road. In this regard, it is identified that the street is unharmonious in general terms.

- ***Identification of the proportion of the building that will be coloured***

It is observed from the analysis that Famagusta Salamis Road is composed of buildings with various proportions. It is seen that buildings are lower, higher, narrower or wider than the buildings existing in their close environment or they have same proportions with the ones in their close environment. Selected silhouettes from the street are analyzed in a way that aforementioned diversity can be observed (See, Table.21).

- ***Colour selection oriented to the intended effect of the building***

Colour selection in accordance with the intended effect of the building is made in line with the rules identified in the model (See, Figure.136). Therefore, required colours to give one of the selected 5 effects to the desired building, is decided and adopted to the drawings prepared on the digital environment. (See, Figure.106 & Appendix F/G/H/I/J).

- ***With the aim of provision of effect within the close environment, deciding the parts of the façade of the building to be coloured and the decision of the proportion of colours to be used***

As a result of the observations, it was decided whether a building as a whole or its selected parts require colouring. On street scale, buildings were coloured in a way that visual compatibility within the close environment is ensured. During this operation, adequate point as indicated on Table.26 in the model was selected. By this way, the parts that will be coloured during the provision of effect are decided and the buildings gained the intended effects on the street (See, Figure.106 & Appendix F/G/H/I/J)

- ***Realization of intended effect at the building by means of designed check lists***

For reaching intended effect in selected buildings at Famagusta Salamis Road, the aforementioned steps are marked on the table designed in the model(See, Appendix D),; and the decisions about the ways how the façade of building should be coloured are summarized. This operation was repeated for 5 examples buildings and each respective intended effect to be given was marked on tables accordingly (See, Appendix F/G/H/I/J).

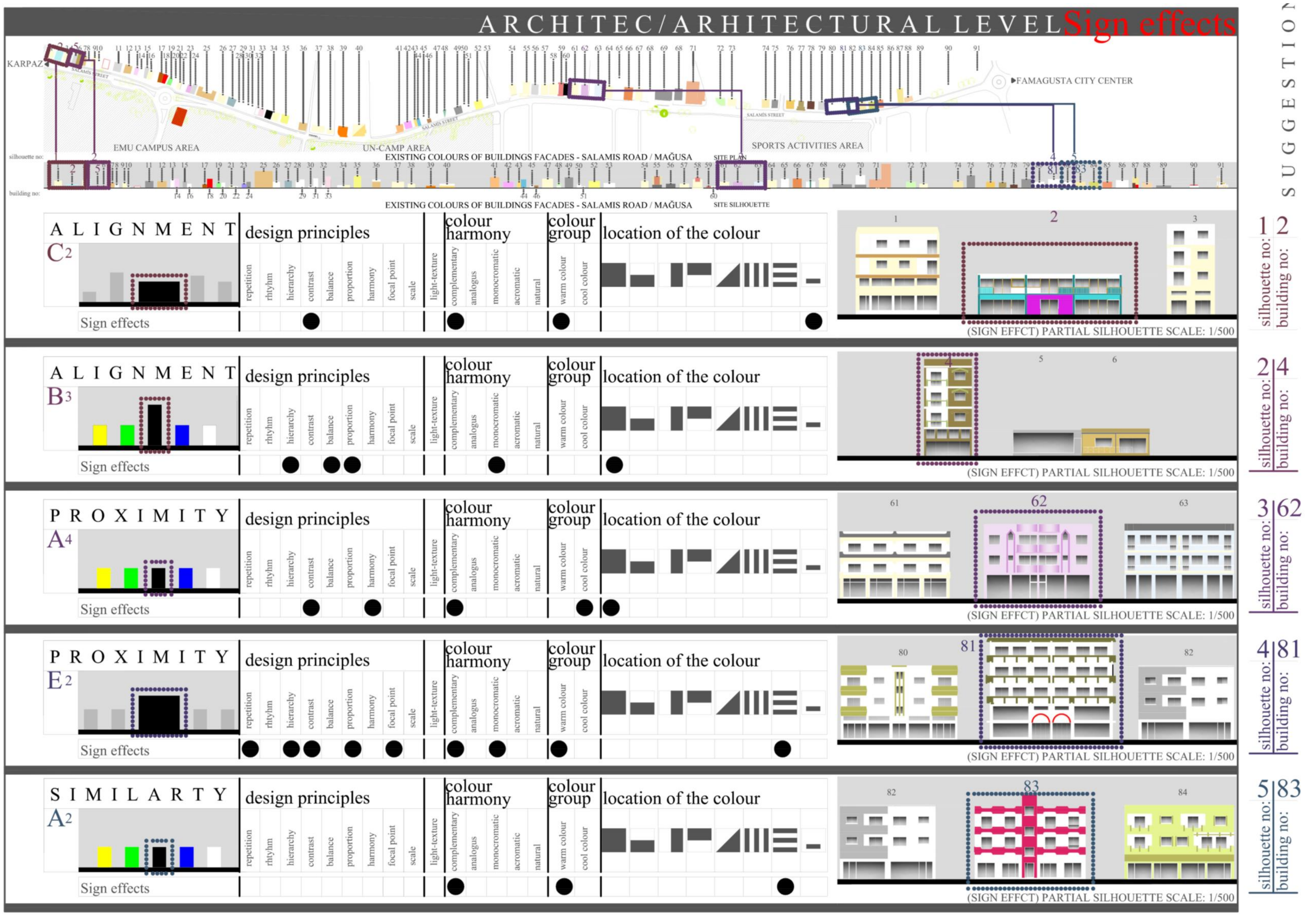


Figure 106. Example of Sign Effect : Architectural Level - Suggestions

4.5 Findings

In architectural structures constructed on any street, it is possible to create compatible or incompatible street visions, especially by using colours on the façades of buildings. On street scale, it is possible to reach two types of compatibility by means of colouring on the surfaces of buildings. The first one of these is reaching more compatible view of an incompatible street view with the help of colours. The other compatibility is visual regularization of proportional defects existing between the buildings. For example, any building can be made to be perceived in different proportions within the environment it is located, such as; lower, higher, narrower, and wider than the actual. For creating compatibility in terms of colour, colour palette of the whole street is constructed and all the street is coloured in line with the colour that is more compatible within the colour harmony or, if there is a master plan prepared for the whole city, all the street is re-coloured with the suggested colours in company with the master plan.

- *Creation of compatibility with Proportion and Colour Relation*

Different solution suggestions are made according to the conditions of identified 4 buildings:

i. Solution suggestions for buildings negatively affecting the city silhouette because of being higher: Lighter colours for lower floors and darker colours for upper floors should be selected and the colouring should be made in such a way that vertical elements on the surface of the building is brought into forefront.

ii. Solution suggestions for buildings negatively affecting the city silhouette because of being lower: During the colouring of the building, colours should be used hierarchically from bottom to the up and from light to dark tones; and the colouring should be made in such a way that the horizontal elements on the surface of the building is brought into forefront.

iii. Solution suggestions for buildings negatively affecting the city silhouette because of being wider: During the colouring of the building, colours should be divided into minimum 3 parts as the right and left side and the middle of the façade. The sides should be defined with darker colours and the middle with the lighter colours. Colouring should be made in such a way that horizontal elements of the surface of the building are brought into forefront.

iv. Solution suggestions for buildings negatively affecting the city silhouette because of being narrower: During the colouring of the building, colours should be divided into minimum 3 parts as the right and left side and the middle of the façade. The sides should be defined with lighter colours and the middle with the darker colours. Colouring should be made in such a way that vertical elements of the surface of the building are brought into forefront.

- *Realization of Legibility of the Function on the Street that is indented to be brought into Forefront*

Within a street silhouette that is compatible in terms of colour and proportion, any intended function can be brought into the forefront. In order to highlight a function, the colours used in the façades of building should be taken into account. For realization of this, first of all, the colour palette of the whole street is designed. Then, the colour group or colour scheme that designed colour palette belongs, is identified. The façades of buildings which include the functions that are intended to be brought into forefront as a result of the identification work are coloured in line with the rules below.

i. Within a street that is compatible in terms of colour, if the used colours are under the warm colour group, colours under the cold colour group or under the achromatic colour scheme should be used for the function that is intended to be highlightened.
ii. Within a street that is compatible in terms of colour, if the used colours are under the cold colour group, colours under the warm colour group or under the achromatic colour scheme should be used for the function that is intended to be highlightened.
iii. Within a street that is compatible in terms of colour, if the used colours are under the monochromic colour scheme, contrast colours should be used for the function that is intended to be highlightened.
iv. Within a street that is compatible in terms of colour, if the used colours are under the achromatic colour scheme, any colour within the colour wheel can be used for the function that is intended to be highlightened.
v. Within a street that is compatible in terms of colour, if the used colours are under the complementary colour scheme, a colour to be selected from achromatic colour scheme should be used for the function that is intended to be highlightened.
vi. Within a street that is compatible in terms of colour, if the used colours are under the analogous colour scheme, a colour to be selected from achromatic

colour scheme should be used for the function that is intended to be highlightened.

In this way, buildings that are coloured in accordance with the rules above will be brought into forefront and the legibility can be increased. Streets can gain character or identity with the legibility of a function. Within the scope of a master plan prepared by central or local authorities, for example; cultural structures or only commercial buildings may intend to be highlightened. Streets can gain names and become specialized with the highlightened function such as bookseller street, flower store street or else, and can contribute to urban legibility.

- **The importance of colour use on façade surfaces on building scale and development of recommendations**

By means of colour use on the surfaces of buildings, five different effects can be given to buildings within their close environment. These effects can be listed as the Sign Effect, Camouflage Effect, Movement and Time Effect, Weight, Scale and Distance Effect, Legibility and Illegibility Effect.

Sign Effect;

Buildings can create sign effect through coming into forefront within the close environment they are located. In general, use of opposite of the colours used within the close environment is sufficient to achieve this. However, use of different colour groups may be required in some particular cases. The rules necessary for achieving sign effect within the close environment where the buildings are located are summarized below.

i. In a natural environment with compatible colours, if the existing colours are green, blue or any colour under the natural colour group and sign effect is intended to be given to a building within that environment, the building should be coloured with the contrast of the colours existing within the environment or with a colour tone from achromatic colour scheme.

ii. In a build environment with compatible colours, if the used colours are; -Colours under the Warm colour group, a colour under the cold colour group or from achromatic colour scheme should be used

-Colours under the cold colour group, a colour under the warm colour group or from the achromatic colour scheme should be used,

-From Monochromatic colour scheme, a colour from contrast colour scheme should be used,

-From Achromatic colour scheme, any colour within the colour circle can be used,

-From Complementary or analogous colour scheme, a colour selected from achromatic colour scheme should be used for achieving a sign effect.

iii. In a build environment with incompatible colours, if the used colours are;

-Various different colours, a colour from achromatic colour scheme should be used,

- Colour used with achromatic colours constitute the unharmonious environment, using the contrast colour of the colour that was used can provide the sign effect.

-If the unharmonious environment is composed of various different colours and achromatic colours, only using colour is not sufficient for achieving the sign effect, colour and texture should be used together.

Camouflage Effect;

Perception of the buildings within their close environment can be camouflaged with the use of colour on the surfaces of the buildings. With the use of colours, a building can be made totally a part of its environment and its perception can be made equal with the other buildings. Frequently, this is done through using the colours on the façades of the buildings within the close environment of that building. The rules necessary for achieving camouflage effect in the perception within the close environment where the buildings are located are summarized below.

i. In a natural environment with compatible colours, if the existing colours are green, blue or any colour under the natural colour group and camouflage effect is intended to be given to a building within that environment, repeating of the existing colours within the environment or rhythmic repeat of the existing colours should be done for colouring.

ii. In a build environment with compatible colours, if the used colours are;

- Colours under the warm colour group, a colour under the warm colour group should be used.

- Colours under the cold colour group, a colour from the cold colour should be used

- From monochromatic colour scheme, a colour from the monochromatic colour group should be used

- From achromatic colour scheme, a colour from achromatic colour group should be used

- From complementary colour scheme, a colour from complementary colour group should be used

- From analogous colour scheme, a colour from analogous colour group should be used for achieving a camouflage effect.

iii. In a build environment with incompatible colours, if the used colours are;

- Various different colours, any colour can be used,

- If the unharmonious environment is composed of achromatic colours together with any particular colour, a colour from achromatic or monochromatic colour scheme can be used for provision of the camouflage effect.

- composed of various different colours and achromatic colours, any colour or a colour from achrome colour scheme can be used for achieving the camouflage effect.

Movement and Time Effect;

Perception of the buildings within their close environment can be changed and buildings with more static view can be made to have a more dynamic effect with the use of colour on the surfaces of the buildings. By means of these motile façades, it is possible to make buildings to be perceived differently. This can be achieved by colouring the identified points in part or on whole of the façade of a building. The required rules for creating movement and time effect to the perception of the buildings within their close environment are listed below.

i. In a natural environment with compatible colours, if the existing colours are green, blue or any colour under the natural colour group and movement and time effect is intended to be given to a building within that environment, colours selected from monochromatic colour scheme, complementary colour scheme, analogous colour scheme or natural colour scheme can be used for colouring.

ii. In a build environment with compatible colours, if the used colours are;

- Under the warm colour group, a colour from the warm or cold colour groups should be used

- Under the cold colour group, a colour from cold or warm colour groups should be used

- From monochromatic colour scheme, a colour from monochromatic, complementary, achromatic, analogous or natural colour scheme should be used

- From achromatic colour scheme, a colour under monochromatic, achromatic, analogous or natural colour scheme groups should be used

- From complementary colour scheme, a colour from monochromatic, achromatic, complementary, analogous or natural colour scheme groups should be used

- From analogous colour scheme, a colour from monochromatic, achromatic, complementary, analogous or natural colour scheme groups should be used for creating the movement and time effect.

iii. In a build environment with incompatible colours, if the used colours are;

-Various different colours, a colour from monochromatic, achromatic, complementary, analogous or natural colour scheme groups should be used

-If the unharmonious environment is composed of achromatic colours together with any particular colour, a colour from monochromatic, achromatic, complementary, analogous or natural colour scheme groups should be used,

-Composed of different colours and achromatic colours, a colour from monochromatic, achromatic, complementary, analogous or natural colour scheme groups should be used for creating the movement and time effect.

Weight, Scale and Distance Effect;

Perception of the buildings within their close environment can be changed and with the use of colour on the surfaces of the buildings, the buildings can be given effects making them to be perceived as more heavy/lighter, higher/lower, wider/narrower, afore/behind than the actual. By means of these effects given through colouring the façades of the buildings, the buildings can be made to be perceived different than the actual. For achieving these affects, identified points at the part or the entire façade of the building should be coloured. The required rules for creating weight, scale and distance effect to the perception of the buildings within their close environments are listed below.

i. In a natural environment with compatible colours, if the existing colours are green, blue or any colour under the natural colour group and building within that environment;

   - If it is intended to make the building to be perceived as lighter or heavier than the actual;

   -If the building is coloured with white-added version of the colours existing within the environment (tint of environment colours), the building will be perceived as lighter than the actual; if it is coloured with black-added version of the colours existing within the environment (shade of environment colours) the building will be perceived as heavier than the actual.

-If it is intended to make the building to be perceived as higher or lower than the actual;

-If the upper floors of the building is coloured with shade of colours or with black or all of the façade of building is coloured vertically with the monochromes of any colours from bottom to the top, and if the lower floors are coloured with shades of the monogram colour and upper floors with the tints of the monogram colours, the building will be perceived as being higher than the actual.

For making the building to be perceived as lower than the actual, the upper floors should be coloured with tint of colours or with white or all the façade of the building should be coloured vertically with the monochrome of any colour from bottom to the top and if the lower floors are coloured with the tints of monochrome colour and the upper floors with the shades of the monochrome colour, the building is made to be perceived as higher than the actual. Or else, if any colour scheme is also used horizontally, the building is again perceived to be lower than the actual.

- If it is intended to make the building to be perceived as wider or narrower than the actual;

-If the façade of the building is coloured with monochromatic colour scheme in a horizontal direction, the building will be perceived as wider than the actual, if it is coloured in a vertical direction, it will be perceived as narrower than the actual.

- If it is intended to make the building to be perceived as more ahead or behind than the actual;

-If the façade of building is coloured with the darkest tone of the monochrome colours existing within the environment, the building will be perceived to be positioned ahead than the actual; if it is coloured with the lightest tone of the monochromatic colours, the building will be perceived to be positioned more behind than the actual.

ii. a) Within a build environment with compatible colours, if the used colours are under the warm colour group, the building that will be coloured within this environment;

- If it is intended to be perceived as lighter or heavier than the actual;

Using tint of warm colour in the façade of the building enables sense of lighter than the actual and the use of shade of warm colour enables a sense of heavier than the actual.

- If it is intended to be perceived higher or lower than the actual;

For achieving this, it is necessary to apply shade of warm colours or to use warm colours vertically on the upper floors of the façade of the building. The other option is colouring vertically the façades of building with the colours under the cold colour group. By this way, the building is perceived to be higher than the actual.

- If it is intended to be perceived as wider or narrower than the actual;

When the upper floors of the façade of the building are coloured with shade of warm colour or when the warm colour group colours are used horizontally, the building is made to be perceived as wider than the actual.

-If the upper floors of the building are coloured with tint of warm colour or with white, or if the colours under the warm colour group are used vertically, the building is enabled to be perceived as narrower than the actual.

- If it is intended to be perceived as more ahead or behind than the actual;

Within an environment dominated with warm colour group, if the building that will be coloured is coloured with the darkest tone of cold colour group, the building is perceived to be more ahead than the actual.

Within the same environment, if the building is coloured with the lightest tone of any colour under the warm colour group, it is perceived as being more behind than the actual.

b) Within a build environment with compatible colours, if the used colours are under the cold colour group, the building that will be coloured within this environment;

- If it is intended to be perceived as lighter or heavier than the actual;

Using tint of cold colour in the façade of the building enables sense of lighter than the actual and the use of shade of cold colour enables a sense of heavier than the actual.

- If it is intended to be perceived as higher or lower than the actual;

For achieving this, it is necessary to apply shade of cold colours or to use cold colours vertically on the upper floors of the façade of the building.

The other option is colouring vertically the façades of building with the colours under the warm colour group. By this way, the building is perceived to be higher than the actual.

-If the upper floors are coloured with tint of cold colour or with white or the colours under cold colour group is used horizontally, the building is enabled to be perceived as lower than the actual.

- If it is intended to be perceived wider or narrower than the actual;

By colouring the upper floors of the façade of the building with shade of cold colour or by using the cold colour group colours horizontally, the building is made to be perceived as wider than the actual.

-If the right and left sides of the façade of the building are coloured with the shade of cold colours and/or if these colours are used in a vertical dimension, perception of the building as narrower than the actual is enabled.

-If it is intended to be perceived as more ahead or behind than the actual;

Within an environment dominated with cold colour group, if the building that will be coloured is coloured with the darkest tone of the warm colour group, it is perceived to be more ahead than the actual.

Within the same environment, if a building is coloured with the lightest tone of any colour under the cold colour group, it is perceived to be more behind than the actual.

c) In a build environment with compatible colours, if the used colours are under the monochromatic colour scheme group, the building that will be coloured in this environment;

- If it is intended to be lighter or heavier than the actual;

Using white colour in the façade of the building enables sense of lighter than the actual and the use of black colour can give a sense of heavier than the actual.

- If it is intended to be perceived higher or lower than the actual;

The upper floors of the façade of the building should be coloured with shade of monochromatic colour scheme colours or black colour should be used.

-If the upper floors are coloured with tint of monochromatic colour scheme colours or with white, or monochromatic colour scheme colours are used horizontally, the building will be perceived as lower than the actual.

- If it is intended to be perceived as wider or narrower than the actual;

By using shade of monochromic colour scheme colours at the top floor and at the base of the building or by using monochromatic colour scheme colours horizontally, the building can be made to be perceived as wider than the actual.

-If the right and left sides of the façade of the building are coloured with the monochromic colour scheme colours and/or if these colours are used in a vertical dimension, perception of the building as narrower than the actual is enabled.

-If it is intended to be perceived more ahead or behind than the actual;

In an environment dominated with the monochromatic colour scheme colours, if the building that will be coloured is coloured with contrast colour the building will be perceived as more ahead than the actual.

Within the same environment, if the building is coloured with white colour, it is perceived to be more behind than the actual.

d) In a build environment with compatible colours, if the used colours are under the achromatic colour scheme group, the building that will be coloured in this environment;

- If it is intended to be perceived as lighter or heavier than the actual;

Using white colour in the façade of the building enables sense of lighter than the actual and the use of black colour can give a sense of heavier than the actual.

- If it is intended to be perceived as higher or lower than the actual;

By using black, dark grey colours on the façade of the building and by colouring in vertical direction, the building can be perceived as higher than the actual.

By using black or dark grey again on the façade of the building and by colouring it horizontally, the building can be made to be perceived as lower than actual.

- If it is intended to be perceived as wider or narrower than the actual;

By colouring the upper floors of the façade of the building with shade of achromatic colours or by using the achromatic colour group colours horizontally, the building is made to be perceived as wider than the actual.

-If the right and left sides of the façade of the building are coloured with the achromatic colour scheme colours and/or if these colours are used in a vertical dimension, perception of the building as narrower than the actual is enabled

-If it is intended to be perceived as more ahead or behind than the actual;

In an environment dominated with achromatic colour scheme colours, if the building is coloured with any colour, it will be perceived as being more ahead than the actual.

Within the same environment, if the building is coloured with white colour, it is perceived to be more behind than the actual.

e) In a build environment with compatible colours, if the used colours are under the complementary colour scheme group, the building that will be coloured in this environment;

-If it is intended to be perceived as lighter or heavier than the actual;

Using tint of complementary colour in the façade of the building enables sense of lighter than the actual and the use of shade of warm complementary colours can give a sense of heavier than the actual.

- If it is intended to be perceived as higher or lower than the actual;

By using grey tones on the façade of the building and by colouring in vertical dimension, the building can be made to be perceived as higher than the actual.

By using grey tones again on the façade of the building and by colouring in horizontal direction, the building can be made to be perceived as lower than the actual.

-If it is intended to be perceived as wider or narrower than the actual;

By colouring the upper floors of the façade of the building with warm complementary colours horizontally, the building is made to be perceived as wider than the actual.

-If the right and left sides of the façade of the building are coloured with the warm complementary colours, perception of the building as narrower than the actual is enabled.

-If it is intended to be perceived as more ahead or behind than the actual;

In an environment dominated with complementary colour scheme colours, if the building is coloured with grey colour, it is perceived to be more ahead than the actual.

In the same environment, if the building is coloured with the tint of complementary colours, it is perceived to be more behind than the actual.

f) In a build environment with compatible colours, if the used colours are under the analogous colour scheme group, the building that will be coloured in this environment;

- If it is intended to be perceived as lighter or heavier than the actual;

Using the lightest tone of the analogous colour scheme used within the environment on the façade of the building enables sense of lighter than the actual and the use of darkest colours used within the environment enables a sense of heavier than the actual.

-If it is intended to be perceived higher or lower than the actual;

-If the façade of the building is coloured vertically with dark tones of the analogous colour scheme colours existing in the environment, the building can be made to be perceived as higher than the actual.

-If the façade of the building is coloured horizontally with shade of analogous colours, this time the building can be made to be perceived as lower than the actual.

-If it is intended to be perceived as wider or narrower than the actual;

-If the top and base of the façade of the building is coloured horizontally with the warmest or coldest tone of the analogous colour scheme colours existing in the environment, the building can be made to be perceived as wider than the actual.

-If the right and left parts of the façade of the building are coloured vertically with the warmest or coldest of the analogous colour scheme colours existing in the environment, the building is made to be perceived to be narrower than the actual.

-If it is intended to be perceived as more ahead or behind than the actual;

In an environment dominated with the analogous colour scheme colours, if the building is coloured with black or white, it is perceived to be more ahead than the actual.

In the same environment, if the building is coloured with grey colour, it is perceived as being more behind than the actual.

iii. a) In a build environment with incompatible colours, if the used colours are different from each other, the building that will be coloured within this environment;

- If it is intended to be perceived lighter or heavier than the actual;

By colouring the façade of the building with black, the building is made to be perceived as heavier and by colouring it with white, the building is made to be perceived as lighter than the actual.

-If it is intended to be perceived higher or lower than the actual;

-If the façade of the building is coloured vertically with black or grey colour, it will be perceived as higher than the actual;

-If the façade of the building is coloured with black or grey colours, this time in horizontal direction, the building will be perceived as lower than the actual.

-If it is intended to be perceived as wider or narrower than the actual;

-If the top floor and the base of the building are coloured horizontally with achromatic colour scheme colours, the building is made to be perceived as wider than the actual.

-If the right and left parts of the façade of the building are coloured vertically with achromatic colour scheme colours, the building will be perceived as narrower than the actual.

-If it is intended to be perceived as more ahead or behind than the actual;

Within the identified environment, if the building is coloured with black or white colours, it will be perceived as more ahead than the actual.

Within the same environment, if the building is coloured with grey colour, it will be perceived as more behind than the actual.

b) In a build environment with incompatible colours, if the used colours are constituted with single colour combination with the achrome colour scheme colours, the building that will be coloured within this environment;

-If it is intended to be perceived as lighter or heavier than the actual;

-If the façade of the building is coloured with black, the building can be perceived as heavier and if it is coloured with white colour, it can be perceived as lighter than the actual.

-If it is intended to be perceived as higher or lower than the actual;

-If the building is coloured vertically with black colour, it is perceived to be higher than the actual;

-If it is coloured horizontally with the black colour, the building can be made to be perceived as lower than the actual.

-If it is intended to be perceived as wider or narrower than the actual;

-If the top floor and the base of the building are coloured horizontally with complementary colour scheme colours, the building can be made to be perceived as wider than the actual.

If the right and left sides of the façade of the building are coloured vertically with complementary colour scheme colours, the building is enabled to be perceived as narrower than the actual.

-If it is intended to be perceived as more ahead or behind than the actual;

Within the identified environment, if the building is coloured with complementary colour scheme colours, it will be perceived as more ahead than the actual.

Within the same environment, if the building is coloured with any of the achrome colour scheme colours, it is perceived as more behind than the actual.

c) In a build environment with incompatible colours, if the used colours are constituted with various colour combinations with the achrome colour scheme colours, the building that will be coloured within this environment;

- If it is intended to be perceived as lighter or heavier than the actual;

-If the façade of the building is coloured with black the building can be perceived as heavier and if it is coloured with white colour, it can be perceived as lighter than the actual.

- If it is intended to be perceived as higher or lower than the actual;

-If the façade of the building is coloured vertically with black or grey colours, it is perceived to be higher than the actual;

-If the façade of the building is coloured with black or grey colours this time horizontally, the building can be made to be perceived as lower than the actual.

-If it is intended to be perceived as wider or narrower than the actual;

-If the top floor and the base of the building are coloured horizontally with the achromatic colour scheme colours, the building can be made to be perceived as wider than the actual.

-If the right and left sides of the façade of the building are coloured vertically with achromatic colour scheme colours, the building can be perceived as narrower than the actual.

-If it is intended to be perceived as more ahead or behind than the actual;

Within an identified environment, if the building is coloured with black or white colours, the building is perceived to be more behind than the actual.

Within the same environment, if the building is coloured with grey colour, it is perceived to be more behind than the actual.

Legibility and Illegibility Effect;

Perception of the buildings within their close environment can be changed with the use of colour on the surfaces of the buildings, their perceptions can be changed and the components of building or the architectural elements can be made to be perceived one by one or in the intended form. This can be achieved by means of colouring the architectural element or elements that is/are intended to be perceived. The required rules for creating legibility and illegibility effect to the perception of the buildings within their close environments are listed below.

i. In a natural environment with compatible colours, if the existing colours are green, blue or any colour under the natural colour group and legibility effect is intended to given to the building within this environment; selected points of the building should be coloured with complementary colour scheme colours. Yet, if it is intended to give illegibility effect; by repeating of the colours existing within the close environment or by the rhythm constructed with the colours, this effect can be created.

ii. In a build environment with compatible colours, if the used colours are;

-Warm colour group colours, cold colours should be used for creating legibility effect and warm colour group colours should be used for the illegibility effect.

-Cold colour group colours; for creating the legibility effect warm colours should be used; and cold colour groups should be used for the illegibility effect.

-Monochromatic colour scheme; for creating the legibility effect, complementary colours should be used and monochromatic colour scheme colours should be used for creation of the illegibility effect.

-Achromatic colour scheme colours; any colour from the circle of colours can be used, and for the illegibility effect, achromatic colour scheme colours should be used.

-Complementary colour scheme colours; for achieving legibility effect achromatic colour scheme colours and for creation of illegibility effect complementary colour schemes colours should be used.

- Analogous colour scheme colours; achromatic colour schemes colours should be used for creating the legibility effect and analogous colour schemes colours should be used for the illegibility effect.

iii. In a build environment with incompatible colours, if the used colours are;

-Different from each other, achromatic colour scheme colour should be used for creating the legibility effect and any colour within the circle of colours can be used for creation of the illegibility effect.

-If it is an unharmonious environment constituted with a colour and achromatic colours, the contrast of the single colour should be used for legibility effect; any colour from achromatic or monochromatic colour scheme can be used for creating illegibility effect.

-If it is an unharmonious environment constituted with various colours and achromatic colours, only using colours is not sufficient for achieving legibility, light or texture must also be used together with the colour. For creating illegibility effect on the other hand, the façade of the building should be coloured with any colour and a colour from achromatic colour scheme.

Chapter 5

CONCLUSION AND SUGGESTIONS

This study has so far examined literature regarding colour basics, color in relevant architecture and façades, human and colour perception, exterior surface of buildings, design principles and gestalt theory. Through the research process the outcomes of literature survey and analysis of Salamis Road were integrated in to a self-evolving model. This model was explained in detail at two levels:

- City Scale / City planner level
- Building Scale / Architectural Level

This model which behaved as both as a site and tool for analysis ended up with giving several findings. These were in summarized in at the end of Chapter 4 (See, Chapter 4.5 Findings).

The following part of this thesis explains the results and suggestions of this research based on these findings.

The colours used on the surfaces of the buildings are very important in the texture of a city. As a result of unplanned urbanisation, the number of buildings with different characteristics, different widths and heights, in other words, the number of the buildings being constructed without taking any architectural consideration into account and the number of cities that lost identity, are increasing day by day in the world. With a right colour approach being used on the surfaces of these buildings, the visual pollution and incompatible views in these cities can be prevented to a certain extent. As a result of the literature reviews and observatory studies, it is seen that in design of buildings located in the cities with unplanned urbanisation, architects do not take colours into consideration; and it is the customers who make the colour selection of the façade of the buildings.

We come across with the wrong colour selection approaches in façades of buildings sometimes in newly constructed buildings that are coloured for the first time and sometimes during the re-colouring of the existing buildings. In order to overcome this problem, decision on the colour of the façade of the buildings should be made during the design phase. During the design, the region should be analyzed and the buildings should be coloured in company with regional master plans. Colour selections of the building surfaces should be made in accordance with certain reasons. In this context, a model on colour selection and colour use on façades of building was developed within the scope of this dissertation.

Two main topics and their subtitles shaped the format of the developed model.

- The importance of the use of colour on the façade of buildings on street scale and development of suggestions

  - *Construction of Compatibility through Proportion and Colour Relation*

  - *Provision of Legibility of the Function that is intended to be highlighted forefront*

- The importance of the use of colour on the façade surfaces on the building scale and development of suggestions

- The importance of use of colour on the façade of buildings on street scale and development of suggestions

5.1 Suggestions

The aim of this dissertation was to provide a resource which is reminding and underlining the importance of the use of colour on the building surfaces in underdeveloped cities without urbanisation policies that are developing with an unplanned urbanisation. The randomly designed buildings that are repercussions of unplanned urbanisation are also randomly coloured. The model being developed within the scope of this dissertation targeted to be a guideline for colour usage on the façade of the buildings located in such cities. With this aim, the suggestions for the future are designed under three titles.

- *Suggestions regarding to use of colour on building surfaces on city scale;*

1.City Master Plans that also cover use of colour should be prepared with the participation of Local and Central Administrations.

City master plan must be prepared in order to prevent fast urbanisation and unplanned urbanisation. Legislations within the developed master plan should not be limited to the right of usage and the heights of the buildings; possible façade colours should also be stipulated according the areas where the buildings are located. These should be developed with alternative options, and selection should be made by designer architecture and experts within the framework. Colour alternatives existing in the model developed within the scope of this dissertation. With this selection, the buildings will not be coloured randomly and the city texture will have an outlook which is considered and designed beforehand. Abiding to the materials, construction techniques and colour variations that are increasing day by day, using colours in accordance with an authority will remove visual pollution and compatibility problems. Despite the routine use of colour in each and every point within the city structure is not an issue being justified within the scope of this dissertation, places where colours will be used should be identified beforehand.

2.Conducting studies for refining incompatible street/city colours under the leadership of central and local administration authorities

Refining phase of the current cities that are randomly coloured as a result of the unplanned urbanisation and which have incompatible views, should be initiated as soon as possible. For this, city authorities or central administrations should give start to the studies in the framework of the method being presented in this dissertation. For initiating these studies, assistance from volunteers, civil society organizations and experts (urban designers, architectures) should be received under the leadership of central and local administration authorities and the colour palettes constituting the city streets should be developed accordingly. In accordance with the developed colour palettes, the method of improvement of a particular region in line with the existing colours on the street and the colour scheme under which the region can be perceived as compatible should be identified. In this way, decision on the colours that will be used for re-colouring the existing structure will be made; the buildings can be re-coloured and more harmonious environment can be created. At first glance, this work seems to be difficult and it is known that it will cause to reaction from people in the region, building owners and users. However, achieving more compatible view of the cities will make people happier within the process. The most significant measurement for this attitude is raising the public awareness. For this reason, the awareness of the public must be raised as much as possible. Some pilot streets selected within the cities should be selected according to the sizes of the cities and the studies should be initiated and implemented. It is considered that the reactions will be removed in due course owing to the results of implementation. According to the observations and in line with the results of the literature review connected to city-identity and colour trilogy in chapter 2.3, the buildings constituted with compatible architectural elements and the streets constituted by such buildings are always attractive and tourism, economic activity and quality of life potential of such regions are increased. Therefore, refinement of the colours used on the façades of buildings will contribute to city and even country economy in the long run.

First of all, with the use of related method, incompatible colours on street façades should be made compatible. On streets having compatible outlook, function that is identified in the framework of the master plan should be brought into forefront and identity amongst streets should be created. For example, while entertainment-recreation functions can be brought in to forefront on one street of the city, buildings with cultural functions on another street and such functions as commercial or public buildings on still another street can be brought into forefront. By this way, each street will have its own identity. The functions that will be brought into forefront on the street should be identified within the framework of prepared master plan for the city. Within the scope of this dissertation, since no master plan have been existing for Famagusta, the model is identified as survey results and the study is applied to the selected area. The function is identified by means of data reached through survey results and the results of identification studies, and by this way, the buildings with identified function are enabled to be brought into the forefront.

In short, the most significant decision on the city scale is not using colours on the façade of buildings randomly and according to the inclinations, but using them in a way that enables compatibility and gives character to the streets. In order to achieve this, master plan should be developed by central and local administrations. Enforcement capacity is the other important factor. At this point, municipalities should come into the play and ensure the enforcement through strict monitoring. Laws related to the issue should be prepared and some deterrent punishments should be developed. It is known that beautiful and good is always accepted by everyone and in time people will develop sensitivity about the issue.

- *Things that can be done for colour usage on the façade of buildings on architectural scale basis;*

On architectural scale, the reason why the buildings are coloured and how they are coloured should be known. In colouring of the buildings, the colour should be selected in the phase of designing. In some cases, colour can also shape the future of the design of the building. It should be legalized that the colour of the building must be decided beforehand in order for receiving required building permits of an architectural project from such institutions as the Chamber of Architects, Town-Planning Department, Municipality, Ancient Arts Department. Moreover, the way how the colour of building is decided should be reported. In the submitted folder of drawings, these colours should be indicated and the reasons why the selected colours are being used should be reported. The report should be prepared in accordance with the approaches indicated in method. In this context, the effect being intended to be given to the building or intended compatibility or the reasons of incompatibility within the street should be presented in a descriptive manner by the architecture.

These controls should be undertaken within the body of the Chamber of Architectures or by such institutions as Town-Planning Department. Starting from the project design to the end of visas, sanction authorities should exist for the application of selected colours.

- *Things that can be done for architectural education in relation to colour usage on the façade of buildings;*

During the architectural education, also the issue of colour is not sufficiently focused on. The concept of colour is paid attention during the first year of education and mostly used within the scope of the lecture on basic design. Theory of colour and colour schemes that are started to be learnt during the Basic Design lecture are not reflected to the building façade lectures in following years. Designs made on the basis of Idea projects in the following years generally either does not consider colours at all or the issue of colour is touched in the last instance. Yet, colour selection is one of the issues that should be decided in the very first phase of the design. Colour should harmonize with the concept and the design should be considered accordingly. Environmental and building analyses undertaken before the initiation of design should not be limited to factors related to field and climate etc.; they should also cover the colours existing within the environment. With this study, the colour palette of the close environment should be constructed and starting from the first phase of the design, colour should be taken into consideration as a datum. With company of these data, colours should be harmonized with the design and should become a constitutive part of the design. In the phase of evaluation of students, their decisions regarding to colour selection should also be questioned and assessed. During the course of architectural education, awareness about the effects of colours used on the façade of buildings on the cities should be raised and students being graduated from the department should have gained such awareness. It should be reminded that each designed building has a positive or negative effect on the identity of a city.

- *What can be done for the usage of colour on the basis of primary and secondary education (education before university);*

The usage of colour should be more important in the primary and secondary education. Colour is the element that sticks in the mind the most and the knowledge that is taught with the help of colour, is perceived more easily and sticks in the mind. However, the usage of colour in the primary and secondary education is very common and it is not as what it deserved to be. Although it has been a while that "Technology and Design" has been included as a subject in the primary and secondary education for the classes 6, 7 and 8, it has not been taught correctly in North Cyprus. Colour knowledge, theories and design principles should be taught to the students in the early years of education and also how they are needed to be used should be taught. This subject, which is the first meeting point of students with design concept, will be quite important for students in the selection of profession. At that point, students that meet with design principles, which are the backbone for the design world, gestalt theory, perception principles and the colour, which is the strongest design element, will acknowledge the importance of colour in human's life. The students pursuing a career as a designer in the future years, who learned the importance of colour and its impact on the design, will not forget the importance of colour. Starting from the beginning of their career, these students will know that they have to think about the colour for every product. The importance of colour will be intensified during the design education of these students. In the architectural education and architectural career the products are buildings. In this context, if the colour concept and the importance of colour are taught to the students in the primary and secondary education, the cities will seem to be more harmonious and the superficially coloured buildings will have the neccessary colours. With the help of this dissertation, the need for colouring of architectural products, in other words buildings, will be established with the formed model.

The most significant aspect of this dissertation is the fact that a person without any accumulated knowledge or expertise on colour usage can easily give the intended effect to buildings by using the model developed within the scope of this dissertation. Additionally, this dissertation can be improved in different respects by future studies. For example, five effects within the scope of this dissertation can be increased by future analyses and experimental studies and the model can accordingly be improved. The other point that can be improved in this dissertation is the possibility of developing different interpretation of the dissertation by removing the limitations one by one. As an illustration, within the scope of this dissertation, the streets are assumed to be located on a flat field. The condition of existence of sloping fields can be included within the scope of the thesis. Additional Gestalt principles that can be included for sloping fields can be identified. Another issue that can be improved is related to the perception of colours at night and during the day, that is; their perception under the natural and synthetic light and identification of the way for provision of intended effects at night. When constructing the model, all streets are considered as two dimensioned. On the streets, syntheses that are constituted with the possible other buildings behind the selected buildings were not analyzed. In other words, it is known that the perspective can also be changed as a result of the shape-floor relations amongst the buildings. The colours that are considered under the model are only additive colour mixture colours. Subtractive colour mixture colours, that is, the colours of light are not included within the scope of the study. Different effects can also be given with additive colour mixture colours, especially at night. This topic can be included and the study can be improved accordingly. In short, the limits of the study can altogether or partially be removed and a model can be developed accordingly, thus; the study at hand can be enriched in different respects.

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URL 95: http://thenatureoftheworlds.blogspot.com/2012/10/mykonos-greece.html

URL 96: http://www.tripadvisor.com/Attraction_Review-g188590-d190584-Reviews-Red_Light_District-Amsterdam_North_Holland_Province.html

URL 97: http://www.akasty.com/english/country_property.php?country=Cyprus

URL 98: http://www.lupain-holiday-rentals.com/Cyprus-Famagusta-North.html

URL 99: https://www.google.com/maps/@35.1447511,33.9082048,14z

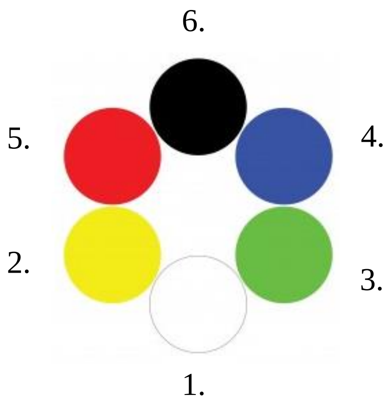
APPENDICES

Appendix A

Evaluation of the Colour Wheel

- **Colour Theory of Leonardo da Vinci**

The Renaissance artist and scientist Leonardo set out his beliefs on colour theory in his "*Treatise of Painting*", which was not published until 1651. He believed that the white and black were in fact colours and put in the category of simple or primary colours of the following lights: white, green, yellow, red, blue and black (see Figure.107). This was the first appearance of the four primaries of the visual wheel, even though Leonardo did not arrange them in a circular configuration. Leonardo, through the observation of his own optical reaction, came to the conclusion that when colours were placed next to each other certain responses occurred. This was later called "simultaneous contrast" Essentially be discovered that when placed side by side, complementary colours intensity watch other (Freinser, 2006, p: 13).



1.White : light
2.Yellow: earth
3.Green: water
4.Blue: air
5.Red: fire
6.Black: total darkness

Figure 107. Primary colour of Leonardo da Vinci (URL 5)

Leonardo ranked colours in importance, saying that white was the first and simplest of colours and represented light, second was yellow (earth), third was green (water), fourth was blue (air), fifth was red (fire), and sixth was black (total darkness). He also worked with modeling and shading of objects, using light and shadow effects in his painting and further developed his concepts into the technique known as sfumato, in the sfumato techniques, colours are slightly graded and blended in order to produce a foggy and blurred effect. Sfumato techniques can be accomplished by close grading of values of colours, blending colours, and glazing of colours (Freinser, 2006, p: 13). Leonardo Da Vinci's Mona Lisa painting is the most known case of the sfumato techniques (see Figure.108).

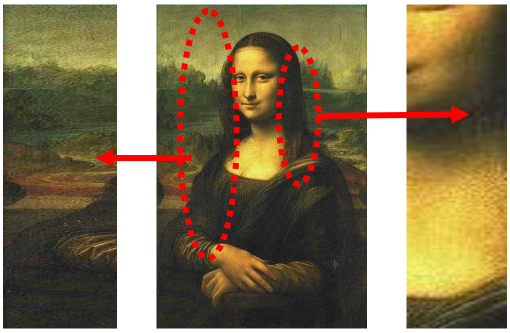


Figure 108. Mona Lisa painting by Leonardo Da Vinci - grading of colour (URL 6)

- **Colour Theory of Sir Isaac Newton**

The English physicist Isaac Newton was interested purely in the physics of colour, rather than in perception. Although in 17th century concept of Aristotle, suggesting that black and white are the true origins of all colours, was still founding many supporters, Newton challenged this view by performing a number of experiments with monochrome drawings. As a result be found that there were no colour which would be produced by intermixture of white and black (Gage, 1995). Isaac Newton began experimenting with refracted light when he finished his tests with monochromatic prints. In a dark room, he set a glass prism and a narrow beam of light passed through it, ending up splitting into spectral components (Mueller & Rudolph, 1972, p.128).

Newton, discovered that as a ray of white light passes and is bent, or refracted, through a prism it is broken into an array of colours, or spectral colours such as orange, red, green, yellow, indigo, violet and blue. Newton noted that the white light was a mixture of all the spectral colours. He took this ‘array’ and turned it into a two-dimensional circular model that became the first colour wheel (See, Figure.109). Newton fount when mixed pigments of opposite colours on his wheel that ‘some faint anonymous colour’ was produced. During his experiments, Newton was unable to mix pigments of two or three of his colours in order to obtain white, because his theory was based on the mixing of light (additive colour), while the mixing of colour pigments is based on subtractive colour. (Freinser, 2006, p: 14).

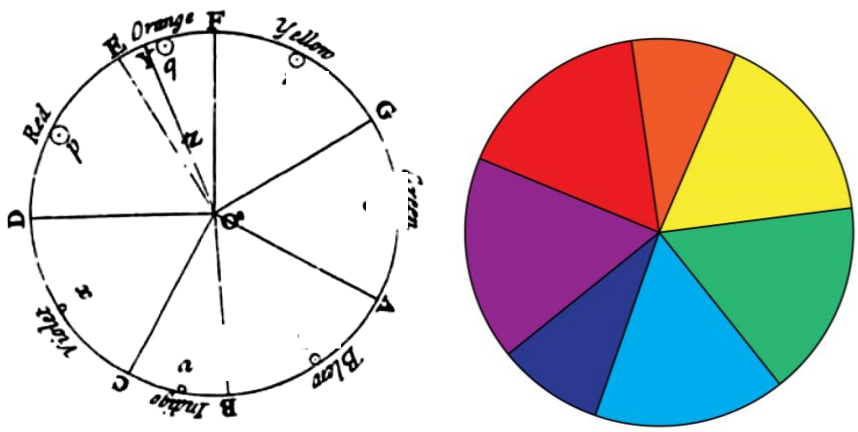


Figure 109. Newton two-dimensional colour wheel (URL 7)

- **Colour Theory of Moses Harris**

Moses Harris, an English entomologist and engraver (active 1766-1785), wrote *The Natural System of Colour* in 1766. In this book he presented red, yellow and blue as the primary colours, which he termed ‘primitives’. The mixture of these primitives produced the ‘compound’ colours (secondary) of orange, green, and purple. The primitive/compound mixtures were each categorized into two progressions-red and orange yielded red-orange which was more red than orange, and orange-red which was more orange than red. Harris' wheel had eighteen equal colour divisions. Each division was graded by value, light (including white) to dark (including black) (See Figure.110) (Freinser, 2006, p: 15).

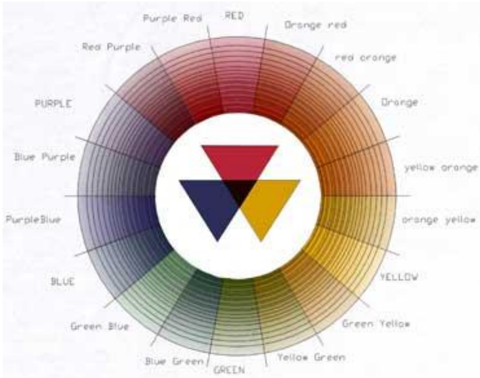


Figure 110. The Harris colour wheel (URL 8)

Harris came to the conclusion that when the three colours were mixed together equally, they worked one against the other and destroyed themselves. As a result, they produced, theoretically, the black colour (Lowengard, 2006). Harris generally worked with pigment colours and at the center of his circle is what is currently known as the subtractive colour mixture. On the other hand, Harris was not able to properly place the white colour in his system. Even though Newton argued that the white was an ideal mixture of all colours, Harris claimed that the white was the outcome of the deficiency or complete absence of colour. (Lowengard, 2006).

- **Colour Theory of Walfgrang von Goethe**

In 1810 the German poet Goethe (1749 – 1832) published his *Theory of colours*, which he thought would be more important to posterity than his poetry. He was one of the first modern thinkers to investigate and record the human eye's functions and how it interprets the colour instead of the properties of light. He was a vigorous opponent of Newton's physics of light. Goethe's two-dimensional wheel was based on three primary colours (yellow, red and blue) with several secondary colors complementing the primary ones. Besides Goethe's colour wheel (See, Figure.111) he also formulated a colour triangle that according to his view was reinforcing the relationship between colours (See, Figure.110). Goethe put a number in the colours according to their relative luminosity. Yellow had nine. Orange had eight. Red and green had six. Blue had four while the violet colour had three (Freinser, 2006, p: 15).

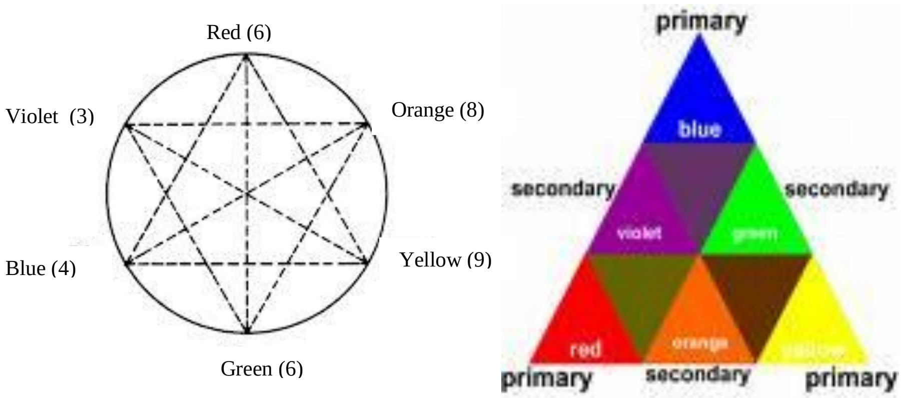


Figure 111.Goethe's colour wheel and colour triangle (URL 9)

After several experimental studies and observations, Goethe developed his colour diagram that had a hexagonal shape. Violet, orange and green were representing the three transitions in the kingdom of colour. Red, blue and yellow were representing the primary qualities (Holtsmark, 2013). Additionally, Goethe created a colour wheel that was based on the concept of psychological colour temperature, emphasizing that blue could bring forward sensation of coldness while reddish and yellowish colours felt to be warming (Seamon & Zajonc, 1998).

- **Colour Theory of Michel Eugene Chevreul**

The French chemist Chevreul (1786-1889) was hired by the famous French tapestry-weaving studio Gobelins to be its dye master. In this position he began his intensive investigation into colour and its reactions. His findings became part of his major publication *The Principles of Harmony and Contrast of Colours*. He verified that all colours could be obtained from mixtures of the primaries red, yellow, and blue, but his greatest combination was his recording of the reactions that colours have when placed side by side or in relationship to each other. This research led to the colour theory laws of simultaneous contrast, successive contrast and optical mixing. His research led his proposing 'colour harmonies' which are used to this day in the form of colour schemes (Freinser, 2006, p: 15).

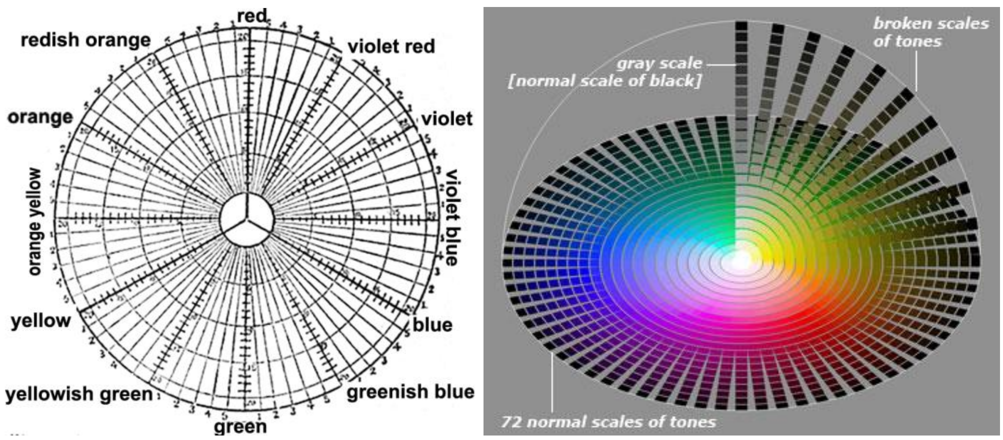


Figure 112. Chevreoul's classification of colours and chromatic diagram (URL 10)

The purpose of the system was to establish the law/notion of "Simultaneous Contrast". Leonardo Da Vinci has been most probably the first who noticed that the colours will influence each other when they are observed adjacently. Despite this fact, it was Goethe who first draws our attention to these associated contrasts. Chevreul's 72-part colour-circle radii, besides the three primary colours (blue, red and yellow), depicts three secondary mixtures of violet, orange and green. It also depicts six additional secondary mixtures (See, Figure.112). The sectors were subdivided into five zones. All radii were divided into twenty segments in order categorize the different levels of brightness. This was the first time in which we learned about the importance and the active role of the human brain in the formations of colours. This fact should remind to us that the colours are also the product of the way in which the human brain works (Fischer, 2011).

- **Colour Theory of CIE**

At the 1931 International Commission on Illumination (Commision International de I'Eclairagei or CIE) the need for standardization of colour notations was explored. The outcome was a precise colour matching system based on lights. Here mechanics rather than observation or pigment measure served as the basis for colour identification. A colour-meter was used in order to ensure the three variables of any colour: the luminance (intensity of light given off), the saturation and the hue. These three values combined would determine the colour's «chromaticity». The hues in the CIE «chromaticity» diagram (or triangle) are around the edge. The mixing (or sum) of these hues id in the meter's center and was given the letter E for equal energy (See, Figure.113). E is white for light mixtures and black or dark neutral for pigment mixtures. Despite being called triangle, the diagram is in fact a curve that is based on the luminosity curve (Freinser, 2006, p: 19)

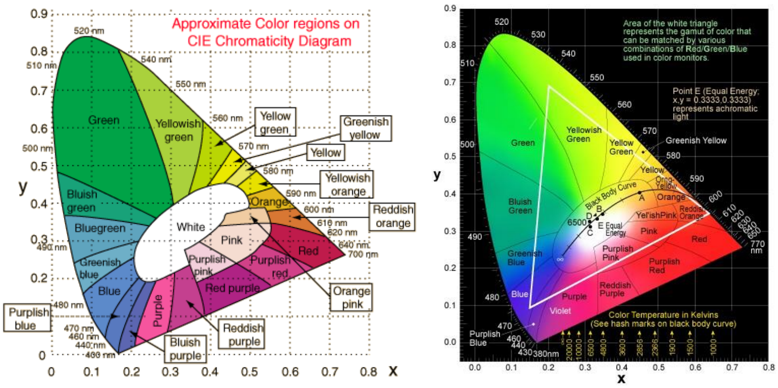


Figure 113. CIE chromaticity diagram (URL 11)

- **Colour Theory of Philipp Otto Runge**

Philip Runge (1777-1810) was a German painter. In his book The Colour Sphere, published in 1810, he arrange twelve hues in a spherical format, thus giving us the first three-dimensional colour model. Runge's primaries were still red, yellow and blue and the remaining nine hues were interspersed to form a diameter or equator around the center of the sphere (See, Figure.114). The hues were each mixed in two steps, with white on one side of this equator and two steps of black on the contribution was hic recording of the reactions that colours have when placed side by side or in relationship to each other (Freinser,2006, p:15,16).

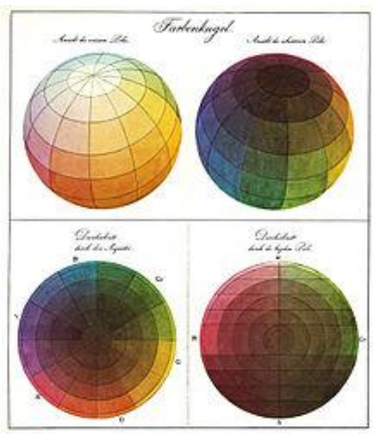


Figure 114. Colour Sphere -Philipp Otto Runge (URL 12)

- **Colour Theory of Albert Munsell**

Albert Munsell (1858-1918) was an American colour theorist. The US Bureau of Standards has adopted Munsell's system as the acceptable language of colour. This language was published by Munsell as Colour Notation in 1905. He followed Hermann Helmholtz (1821-1894) in stating the colour could be described according to three variables –hue, value (lightness or darkness), and chroma (saturation or brightness). He assigned a numbering system to these variables as they occurred within each hue category. His experimentation led to his expansion of the primary hues to number five. They are red, yellow, blue, green and purple. After images of these principal colours formed the basis for Munsell's complementaries; red and blue-green, yellow and purple-blue, blue and yellow-red, green and red-purple, and purple and green-yellow. Munsell's colour tree represents gradations in saturation or Chroma as steps along the horizontal branches. The equator of solid shows the hues (See, Figure.115) (Freinser, 2006, p: 16).

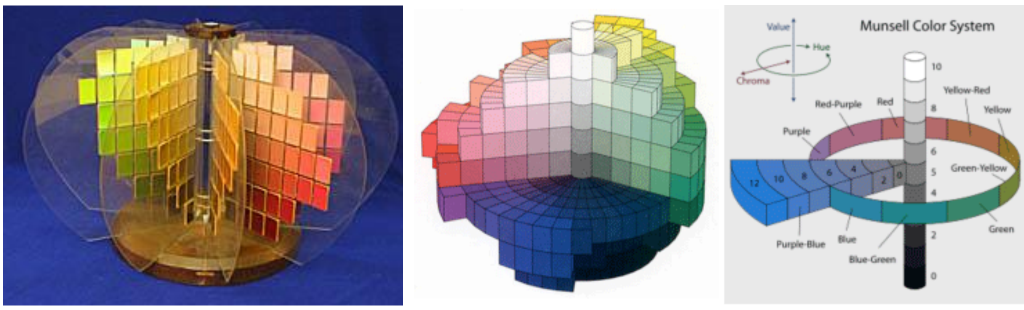


Figure 115. Munsell colour tree (URL 13)

Munsell gave each of the hues the number 5 and an initial latter, so that red is 5R, yellow-red is 5YR. He allotted the hues that fall between the five principal and five complementary hues an intermediate numbering system, so that 10R is a hue that falls halfway between 5R and 5YR. The number 5, therefore, indicates the midpoint of each hue family (See, Figure.116).

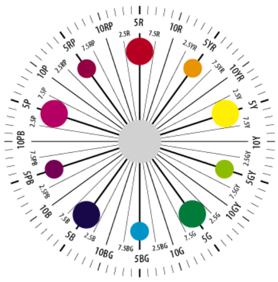


Figure 116. A cross section of Munsell colour tree (URL 15)

Munsell expressed the value of the hue by adding a number between 0 and 9 as the second part of the notation, so that 5R5 is a middle-value red, and 5R9 is a very pale pink. In order to indicate the chroma and/or the level of saturation and purity of the hue at that value, Munsell added a notation after the slash. The value of the hue varied from neutral gray to the greatest saturation that has been observed in each hue at a particular value. For example, a pure middle red value was 5R5/14. In contrast, the value of a less saturated red might have been 5R5/6 (Freinser, 2006, p:17).

The Munsell notation may be summed up as follows: the first number and letter is the hue, the second number is the value, and the third is the chroma. Each plotting of a hue was flattened out into pages that became the branches of the Munsell colour tree revolving around the value scale trunk. This system allowed the artist to determine the components of a colour without experimentation, and therefore to determine the reaction or interaction that a particular colour choice would impart. It also provided pigment specifications that were precise, allowing industry to become colour standardized (Freinser,2006, p:18).

- **Colour Theory of Wilhelm Ostwald**

Wilhelm Oswald (1853-1932) is a German chemist and he won Nober Prize with his colour model on geometric progression. A value scale based on the absorption qualities added arithmetically would result in a 1, 2, 3, 4, 5, …. format. However, when absorption is analyzed on a geometric basis, scale of 1, 2, 4, 8, 16, 32 could be seen, … This provided a scale with more optically equal steps in value gradation. Oswald’s resulting gray scale contained wight steps.

His colour system consisted of two triangular solids joined at one side, with black at one point, white at the other, and twenty four pure hues at the equator (See, Figure.117). He based his hues on the familiar red, yellow, and blue primaries. Ostwald argued that every colour is a combination of white, black and hue. As a result of this conclusion, the percentages of hue, black and white were the basis for the intermediate portions of his colour triangles. The total always amounted to 100, in the percentage mixtures. Therefore, they were complete. Ostwald, termed the addition of white to a colour tinting or hue; the addition of black shading (Freinser, 2006, p: 18).

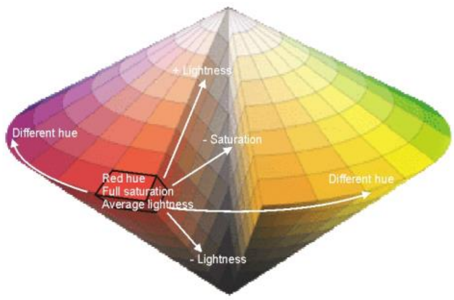


Figure 117. Ostwald colour solid (URL 15)

- **Colour Theory of Itten**

Itten was born in Sudern-Linden, Switzerland. Between 1904 and 1908 Itten worked as an elementary school teacher. Since 1908, his teaching was influenced by the methods of Friedrich Frobel who practically invented the notion of the kindergarden. Additionally, he was significantly influenced by psychoanalysis. One year later

(1909), Itten enrolled at the Ecole des Beaux-Arts in Geneva, Switzerland. Despite the institution's reputation, Itten was not impressed by the educators and consequently returned to Bern. There, he studied at the Hofwill Teacher's Academy with Ernst Schneider. His experience at the Howfill Teacher's Academy proved to be a turning point for him and influenced his later work as a master at the Bauhaus (Wikipedia, 2014a).

Johannes Itten (1888-1967) is probably best known to the colour student for his book The Art of Colour and its condensed version The Elements of Colour. Design and colour were both taught by Itten at the influential and prestigious Bauhaus School in Germany. Itten's approach to education combined physical and mental conditioning. In 1919, he developed his star and colour sphere for the preliminary courses that he was teaching in Bauhaus. The star was simply a flattened version of the sphere developed earlier by Runge. Itten decided to put the yellow colour at the top of the diagram since it was visually the closest to the white light as well as the brightest colour of the hues. His diagram had twelve hues each of which were presenting in seven gradations: the points were dark while the center was light (See, Figure.118). This diagram's advantage was that it was helping the students to understand the differences in hues while at the same time they could also understand the values of the hues.

In his later work, Itten suggested that the colour contrasts were six: 1) Quantity or extension 2) Quality or saturation 3) Simultaneous Contrast 4) Complementary 5) cold-warm and finally 6) light dark. In 1961 Itten developed another wheel based on the primaries yellow, red, and blue which assumed a triangular position within the circle.

Figure 118. Itten colour wheel (Ford, 2013a)

- **Colour Wheel in Nowadays**

The colour wheel is a chart system that consists of two dimensions for the classification of colours. According to their chromatic relationship, the colours are visually represented in a colour wheel or colour circle (Ford, 2013a). Being a systematic arrangement, colour wheel, with different scholars' different explanations and approaches, has come till today since 17^{th} century. Itten's colour wheel is the last one and it has been developed and taken today's shape.

A formation of a colour wheel starts with identification of three primary colours, which are positioned equidistantly from each other. The term "primary" indicates that a particular colour can not be obtained by any mixture. Further, each two primary colours are combined to produce secondary colours; and finally, intermixture of one primary and one secondary colours yields tertiary colours (see Figure.119) (Ford, 2013b).

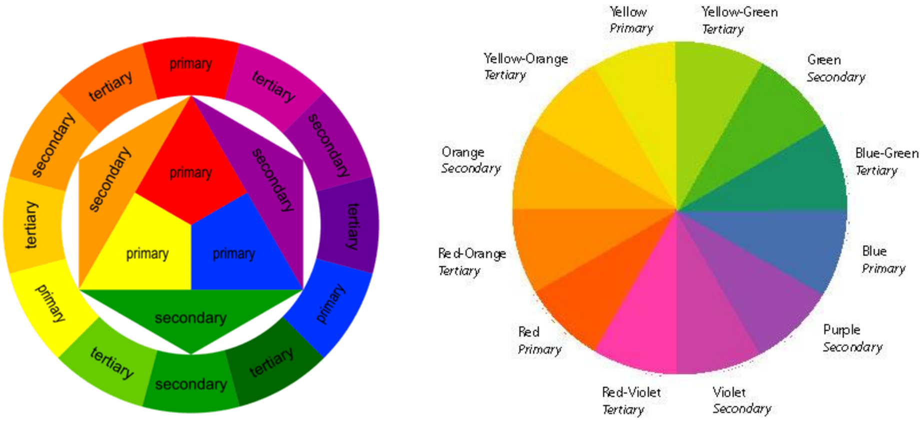


Figure 119. Colour wheel (URL 16)

Primary colours: The colour wheel has three primary colours that are blue, red and yellow. Due to the fact that these three colours cannot be created by the mixing of other colours they were called *primary colours*.

According to the colour theory or colour mixing, the primary colours can be used for the mixing of the overwhelming majority of all the other colours. They are arranged at equal distances from each other in the most widely used colour wheel (See below, Figure.120).

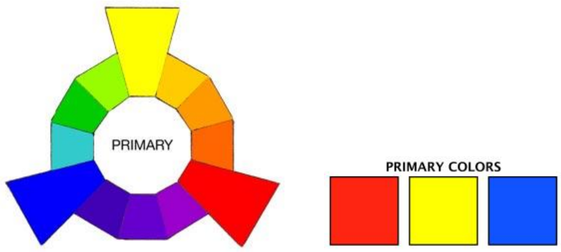


Figure 120. Primary colour: Red, Blue, and Yellow (URL 17)

Secondary colours: They're located in-between the primary colours in colour wheel. Secondary colours are colours produced by combining two of the primary colours in equal amounts (Figure.121). A secondary colour is a colour created from a combination of two primary colours (Williams, 2012). The secondary colours are green, orange and violet. According to the subtractive theory of colour, primary and secondary colours are fundamental colours (See page: 18 subtractive colours).

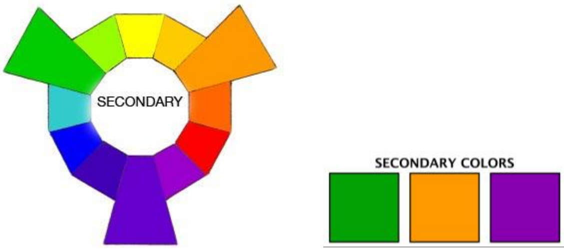


Figure 121. Secondary Colours (URL 18)

The combinations of primary with secondary colours are called *tertiary colours*. The tertiary colors are six: 1) yellow-orange 2) red orange 3) yellow-green 4) blue-green 5) red-violet and 6) blue violet (See, Figure.122). When we compound for example red with orange in order to make red-orange, we place the name of the primary colour first in order to indicate the excess of the latter over the other colour.

Figure 122. Tertiary Colours (URL 19)

For practical purposes, the utilization of the name of the name of the colours has a prerequisite their systematic organization/categorization. Therefore, the circular arrangement of colours that is called either colour circle or colour wheel is the most adequate and therefore such widely accepted. Isaac Newton was the first who tried to bend the prismatic spectrum into the circle. In his effort, he used the purple colour as a link among the two opposite ends of a spectrum. Indeed, through purple does not take place in visible spectrum, it often appears in nature as a blender of red and violet (Artyukhova, 2009 p.77).

Appendix B

Survey Questions

EASTERN MEDITERRENEAN UNIVERSITY//DOĞU AKDENİZ ÜNİVERSİTESİ

FACULTY OF ARCHITECTURE // MİMARLIK FAKÜLTESİ

This questionaries is related visual perception and it's solution will use Kamil GÜLEY's (student no:016015) PhD thesis // Bu anket çalışması görsel algı üzerine olup, çıkan veriler 016015 öğrenci numaralı Doktora öğrencisi Kamil GÜLEY'in tezi kapsamında kullanılacaktır.

A) The participant identifier // Katılımcının künyesi:

1) **Sex // Cinsiyeti:** a) female / kadın b) male / erkek

2) **Education // Eğitim durumu:**
a) Primary school // ilk okul b) High school / orta okul

c) Lycee / lise d) University / Üniversite e) Master / Yüksek lisans

3) **Age / Yaş :**
4) **Occupation / Meslek:**
5) **Nationality / Uyruk :**

B) How many cafe/restaurant/bar places have got on Salamis Street? // Sizce cadde üzerinde yaklaşık kaç tane cafe/restorant/bar/eğlence mekanı vardır?

a) Between 1-10 (1-10 arası) b) Between 11-20 (11-20 arası)

c) Between 21-30 (21-30 arası) d) Between 31-40 (31-40 arası)

C) Where are you enjoying and resting in Famagusta cities? // Mağusa'da en çok nerede eğlenip dinleniyorsunuz?

a) Walled City District / Sur içi Bölgesinde b) Sea and beach / Deniz ve sahil

c) Salamis Street / Salamis Yolu d) Others / Diğer...........................

D) What is the colour of Famagusta cities? Why? / Sizce Mağusa'nın rengi nedir? Neden?

a)Yellow / Sarı b) Blue / Mavi c)Green / Yeşil d)Red / Kırmızı e)Other / Diğer.....

Because / Çünkü;
....

E) Colour Perception / Renk algısı:

Gazimağusa-Salamis Yolu üzerinde bulunan ve aşağıda fotoğrafları var olan binaların rengini tek bir renk söyleyerek verebilirmisiniz.

	Picture of the building / Binanın fotoğrafı		Picture of the building / Binanın fotoğrafı		Picture of the building / Binanın fotoğrafı
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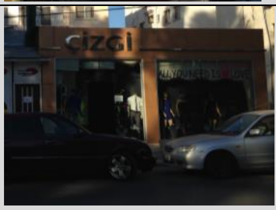
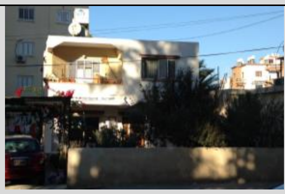
46		**47**		**48**	
49		**50**		**51**	
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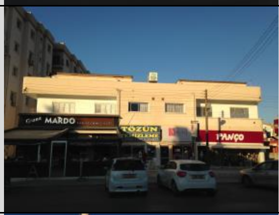
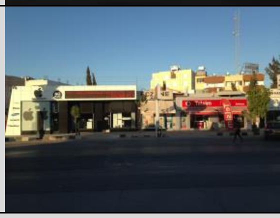
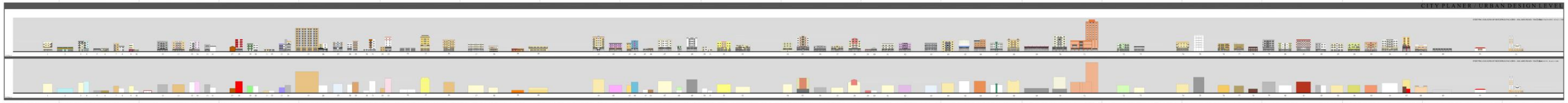
88		**89**		**90**	
91					

Appendix C

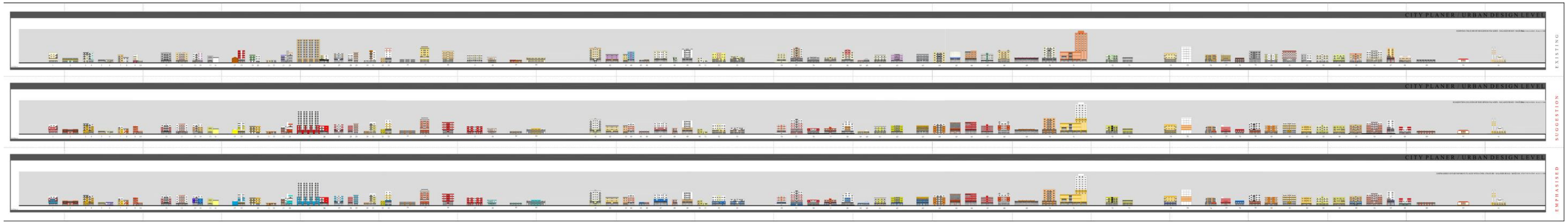
Existing Colours of Buildings Façades - Salamis Road / Famagusta,
Street Elevation and Street Silhouette Drawings - Scale 1/500
Suggestion: Created Harmonious Environment with Warm Colours - Salamis Road /Famagusta,
Street Elevation and Street Silhouette Drawings - Scale 1/500

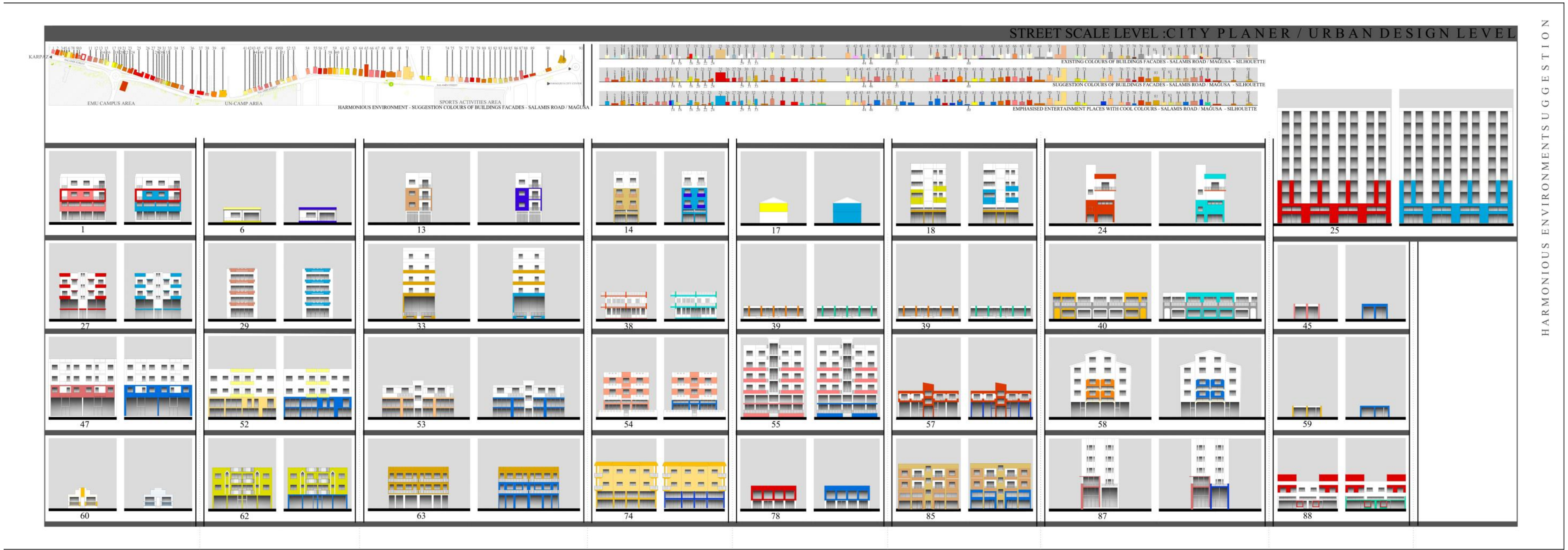

CITY PLANER / URBAN DESIGN LEVEL


CITY PLANER / URBAN DESIGN LEVEL

Appendix D

Emphasised Entertainment Places with Cool Colours
Street Elevation and Street Silhouette Drawings - Scale 1/500


CITY PLANER / URBAN DESIGN LEVEL
EXISTING
CITY PLANER / URBAN DESIGN LEVEL
SUGGESTION
CITY PLANER / URBAN DESIGN LEVEL
EMPHASISED


STREET SCALE LEVEL :CITY PLANER / URBAN DESIGN LEVEL
HARMONIOUS ENVIRONMENTSUGGESTION
KARPAZ
EMU CAMPUS AREA
UN-CAMP AREA
SPORTS ACTIVITIES AREA
HARMONIOUS ENVIRONMENT - SUGGESTION COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA
EXISTING COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA - SILHOUETTE
SUGGESTION COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA - SILHOUETTE
EMPHASISED ENTERTAINMENT PLACES WITH COOL COLOURS - SALAMIS ROAD / MAĞUSA - SILHOUETTE
1
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13
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87
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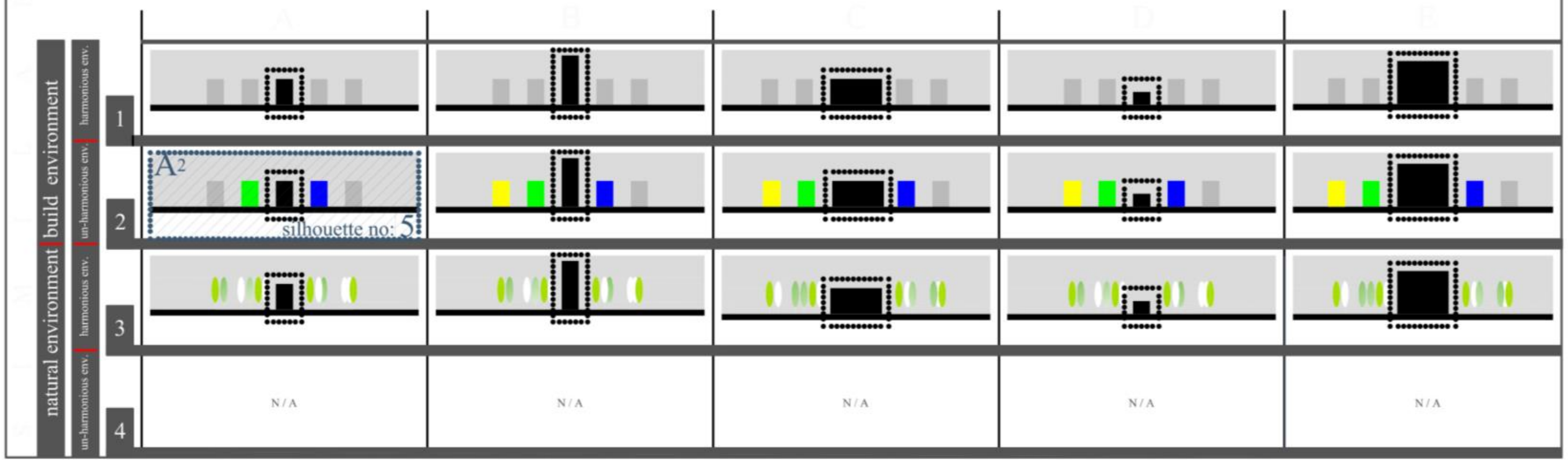
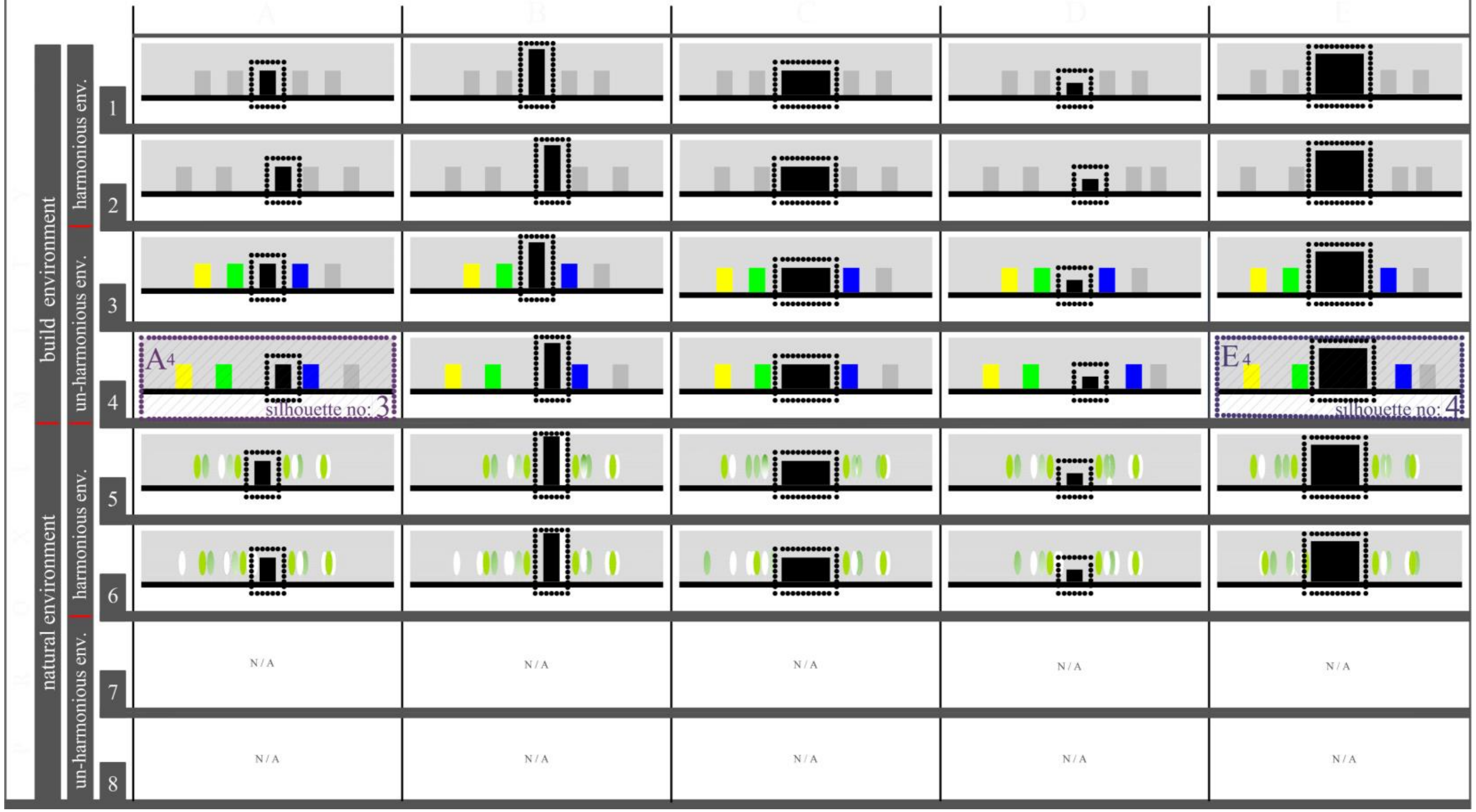
Appendix E

Gestalt Key Tables – Selected examples of Famagusta Salamis Road
Similarity// Proximity // Alignmen

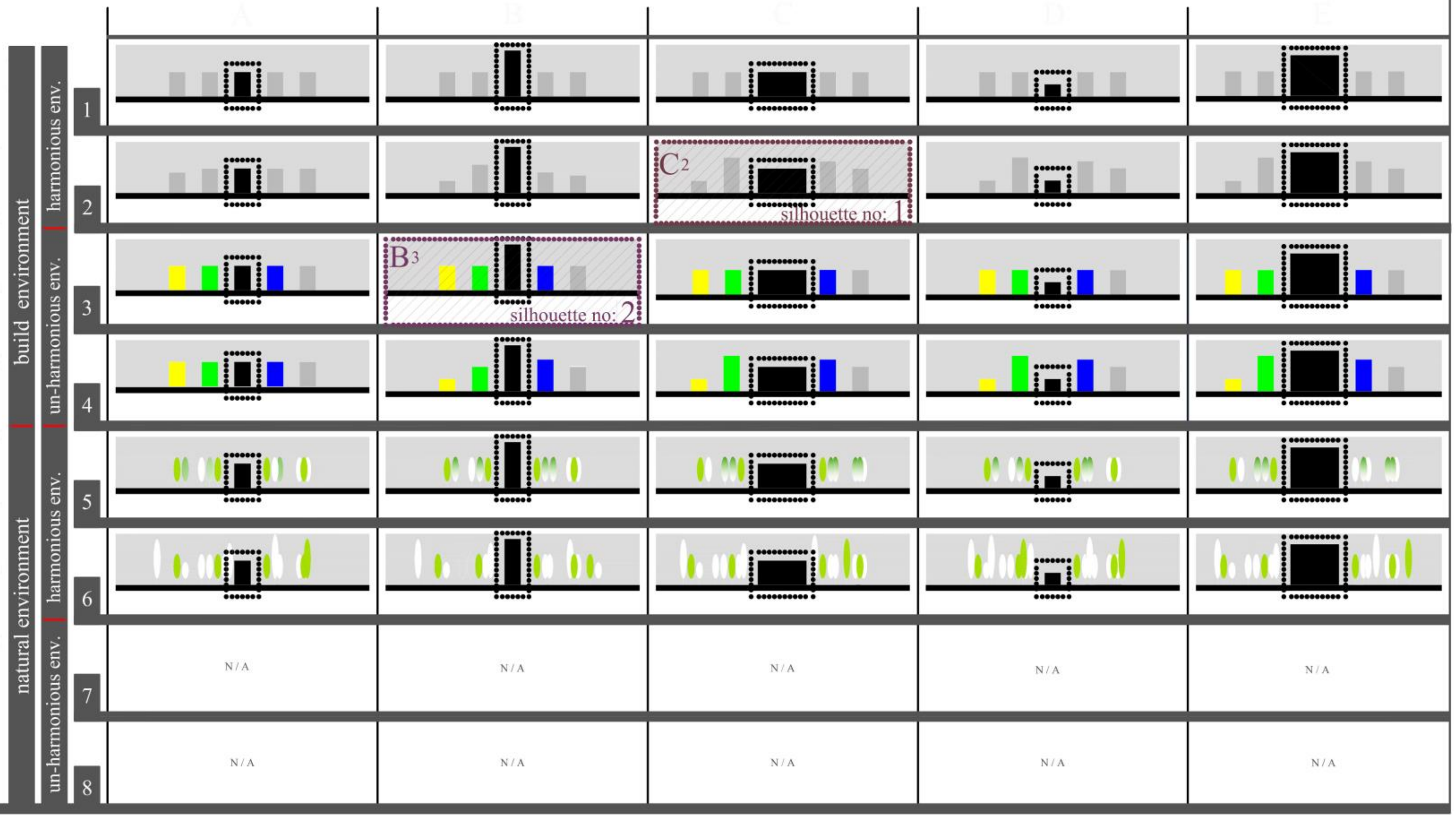
GESTALT TABLE Similarity



GESTALT TABLE Proximity



GESTALT TABLE Aligment

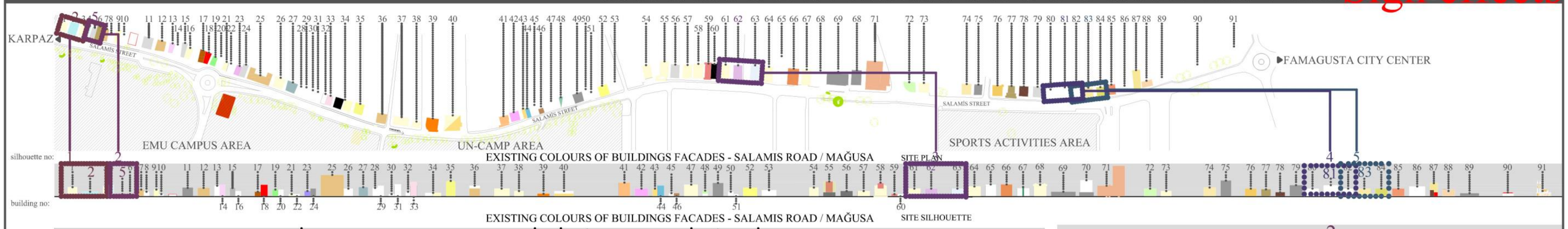


Appendix F

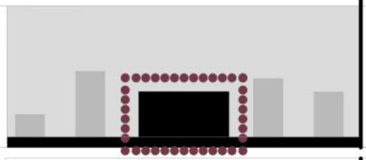
ARCHITEC/ARHITECTURAL LEVEL Sign effects

ARCHITEC/ARHITECTURAL LEVEL Sign effects

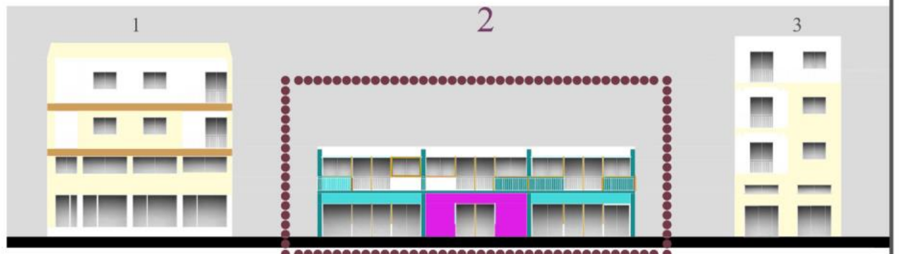
SUGGESTION



ALIGNMENT C2



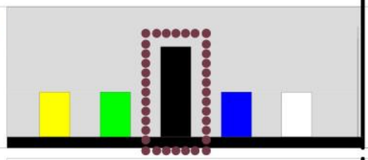
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour	location of the colour							
Sign effects				●							●					●									●



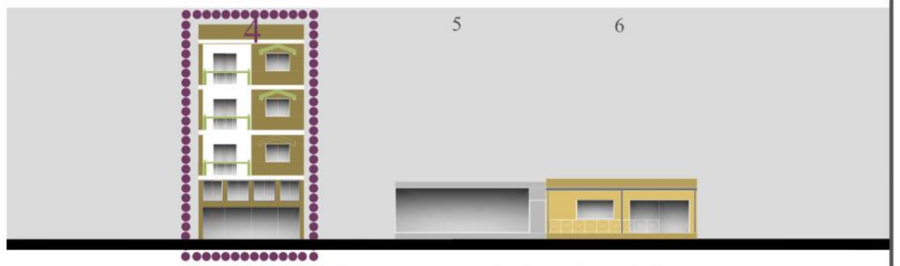
(SIGN EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

1 | 2 silhouette no: | building no:

ALIGNMENT B3



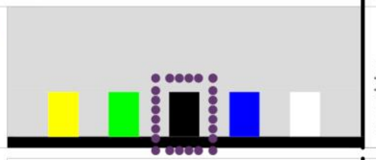
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour	location of the colour							
Sign effects			●		●	●							●					●							



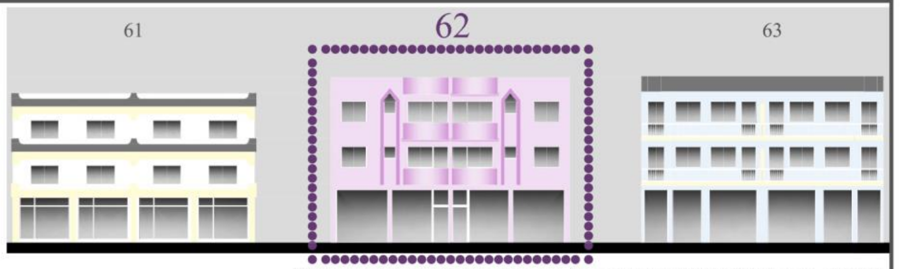
(SIGN EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

2 | 4 silhouette no: | building no:

PROXIMITY A4



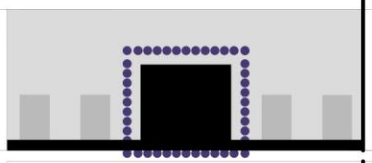
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour	location of the colour							
Sign effects				●			●				●						●	●							



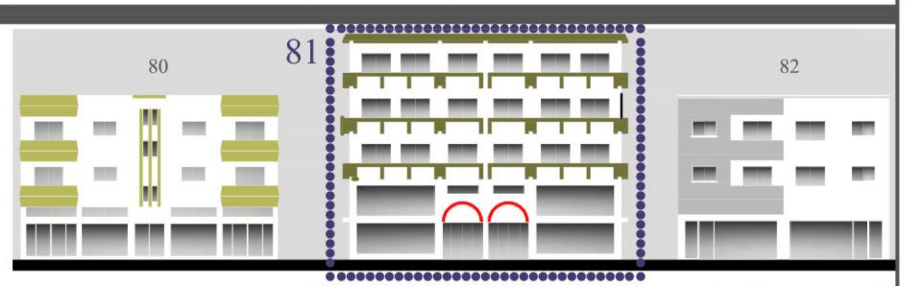
(SIGN EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

3 | 62 silhouette no: | building no:

PROXIMITY E2



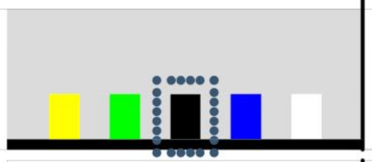
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour	location of the colour							
Sign effects	●		●	●		●		●			●		●			●								●	



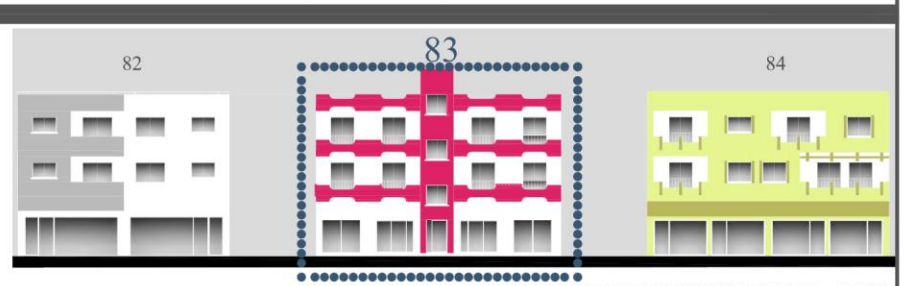
(SIGN EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

4 | 81 silhouette no: | building no:

SIMILARTY A2



	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour	location of the colour							
Sign effects											●					●								●	



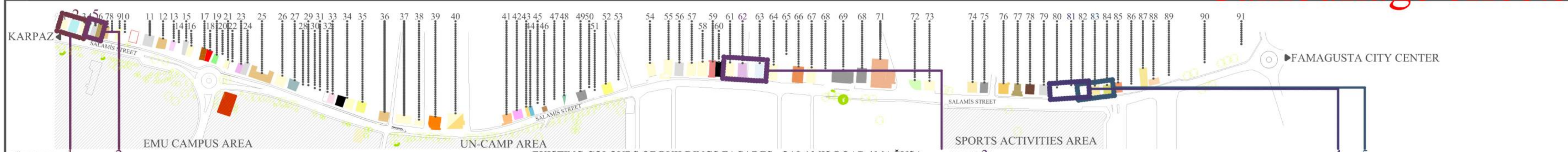
(SIGN EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

5 | 83 silhouette no: | building no:

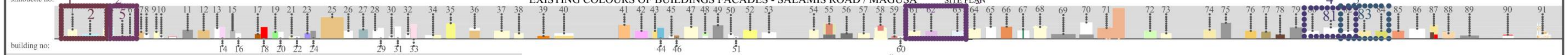
Appendix G

ARCHITEC/ARHITECTURAL LEVEL Camouflage effects

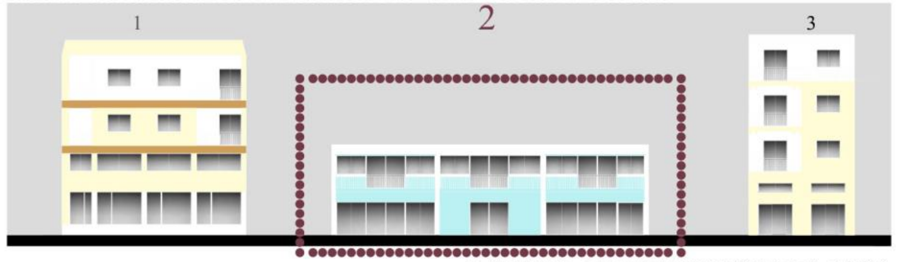
E X I S T I N G



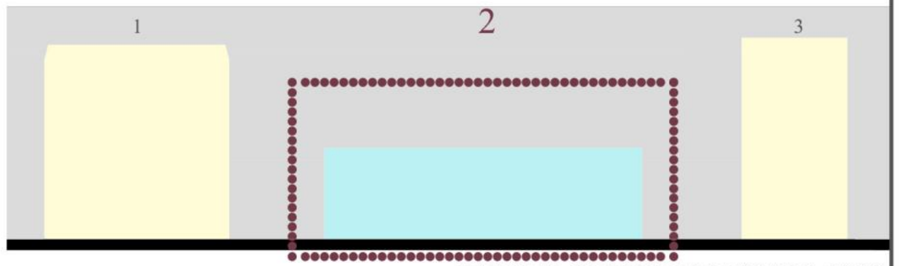
EXISTING COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA SITE PLAN



EXISTING COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA SITE SILHOUETTE

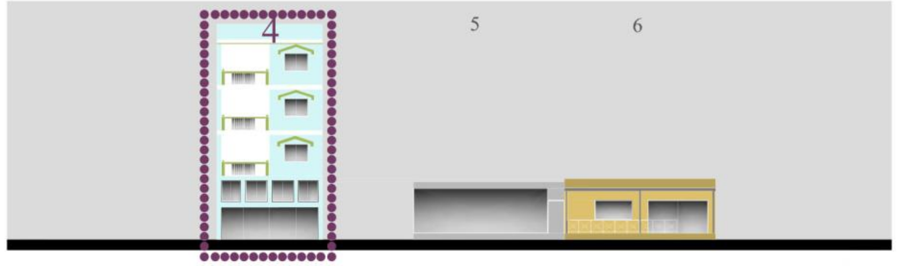


PARTIAL ELEVATION SCALE: 1/500

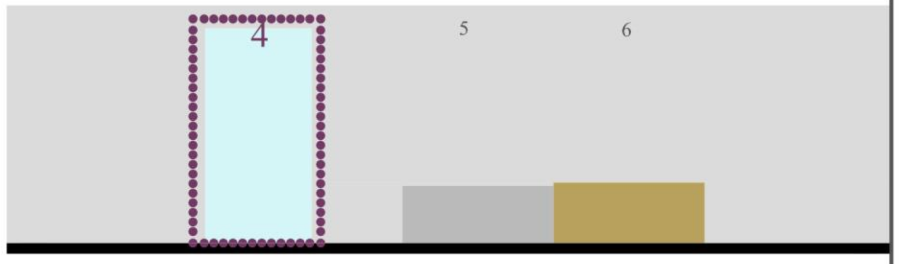


PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 1 | building no: 2

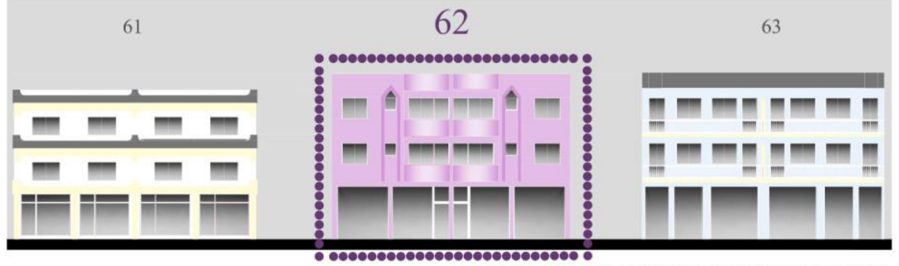


PARTIAL ELEVATION SCALE: 1/500

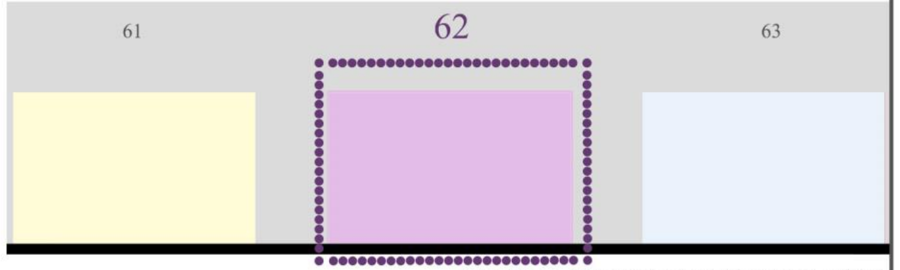


PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 2 | building no: 4

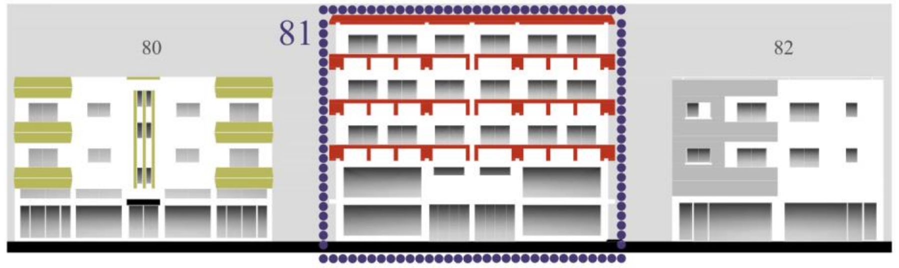


PARTIAL ELEVATION SCALE: 1/500



PARTIAL SILHOUETTE SCALE: 1/500

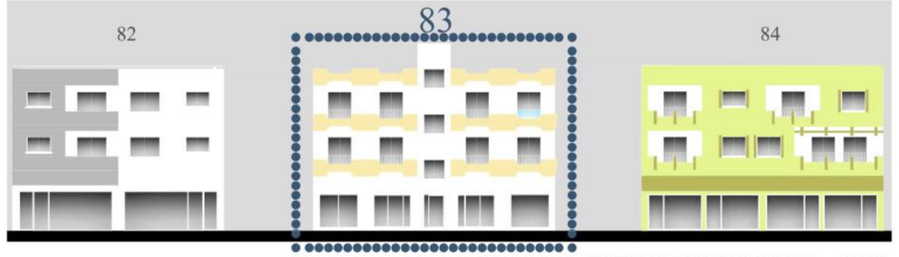
silhouette no: 3 | building no: 62



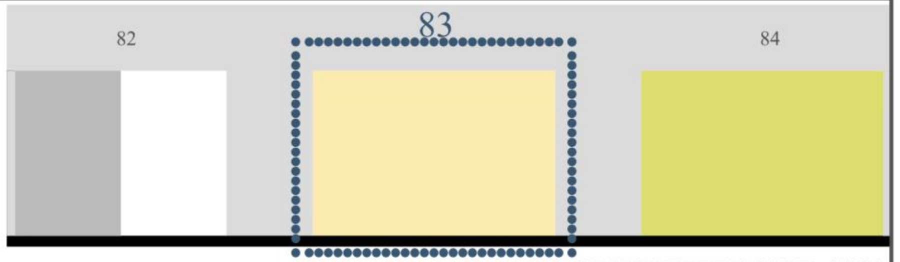
PARTIAL ELEVATION SCALE: 1/500

PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 4 | building no: 81



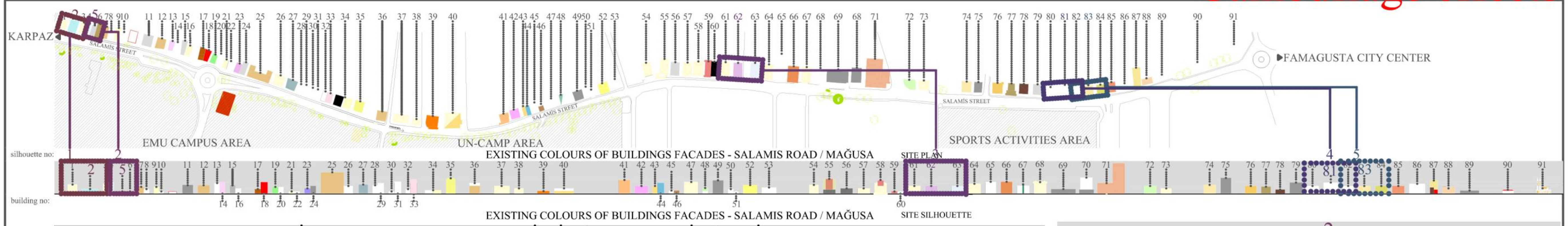
PARTIAL ELEVATION SCALE: 1/500



PARTIAL SILHOUETTE SCALE: 1/500

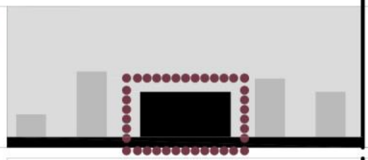
silhouette no: 5 | building no: 83

ARCHITEC/ARHITECTURAL LEVEL Camouflage effects

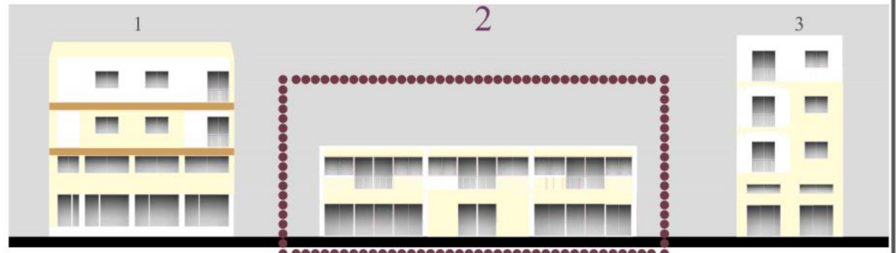


SUGGESTION

ALIGNMENT C2



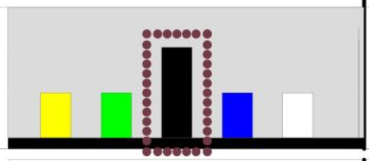
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Camouflage effects	●				●	●	●						●				●	●							



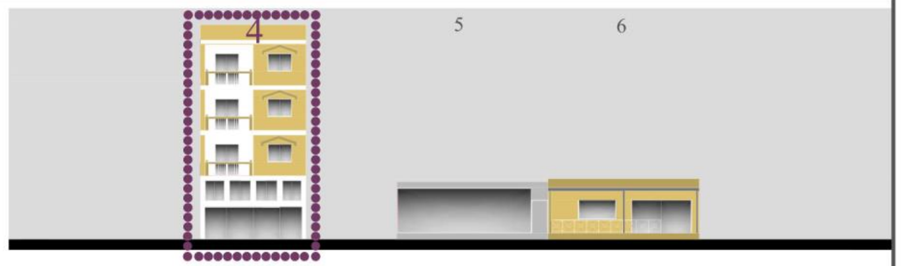
(CAMOUFLAGE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 1 | building no: 2

ALIGNMENT B3



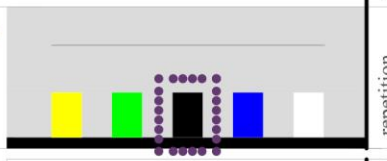
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Camouflage effects	●				●	●							●				●	●							



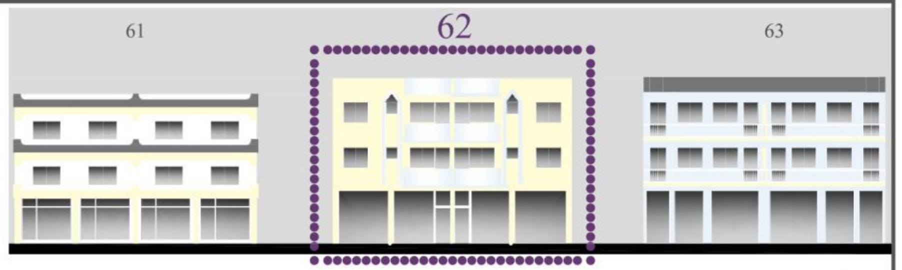
(CAMOUFLAGE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 2 | building no: 4

PROXIMITY A4



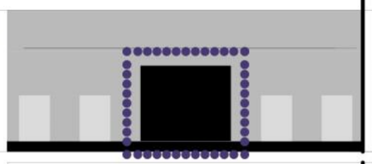
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Camouflage effects	●				●	●									●		●	●							



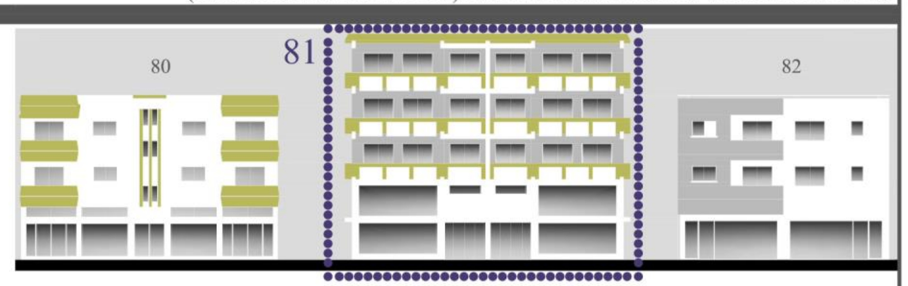
(CAMOUFLAGE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 3 | building no: 62

PROXIMITY E2



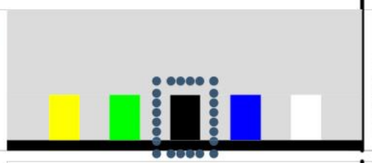
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Camouflage effects	●		●			●							●				●							●	



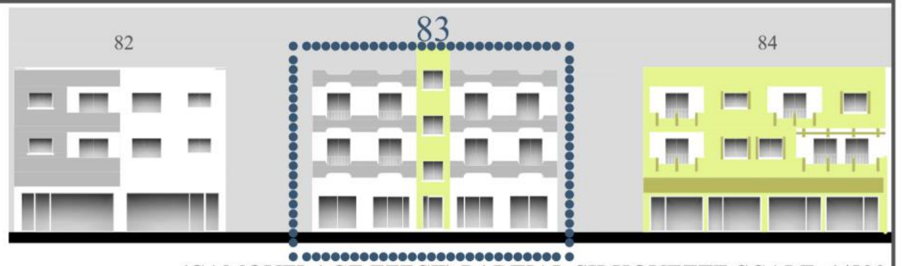
(CAMOUFLAGE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 4 | building no: 81

SIMILARTY A2



	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Camouflage effects	●												●	●		●							●	●	



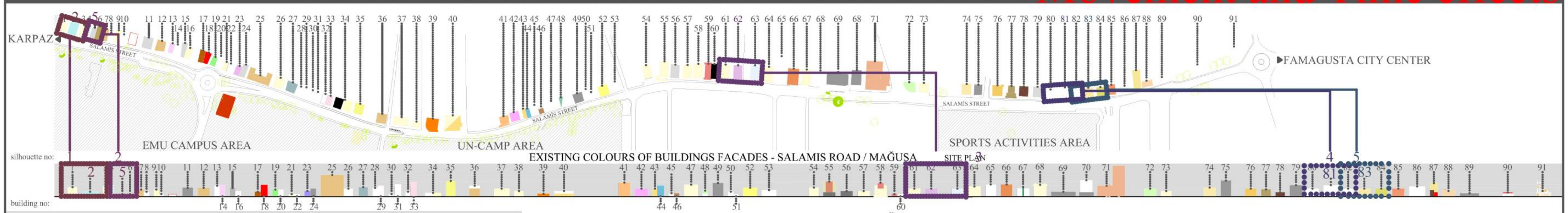
(CAMOUFLAGE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

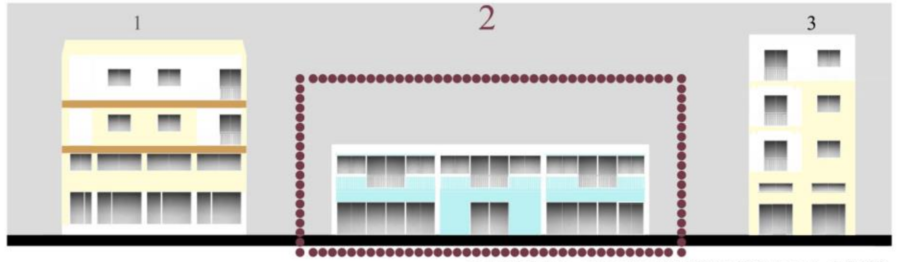
silhouette no: 5 | building no: 83

Appendix H

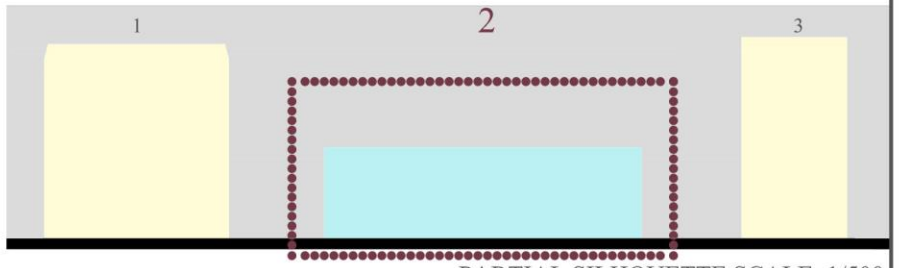
ARCHITEC/ARHITECTURAL LEVEL Movement and Time effects

E X I S T I N G



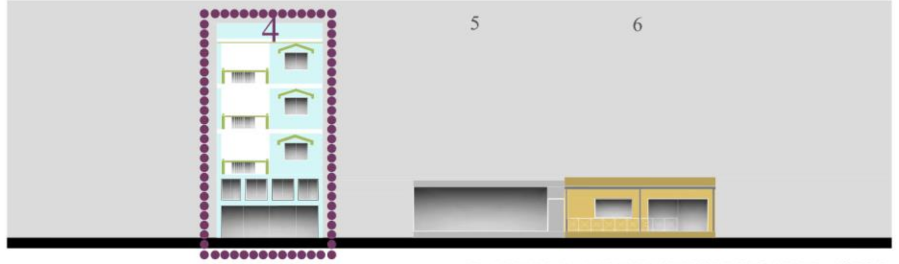


PARTIAL ELEVATION SCALE: 1/500

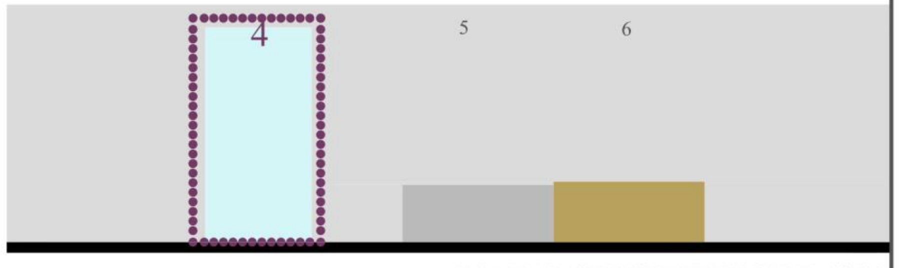


PARTIAL SILHOUETTE SCALE: 1/500

1|2 silhouette no: building no:

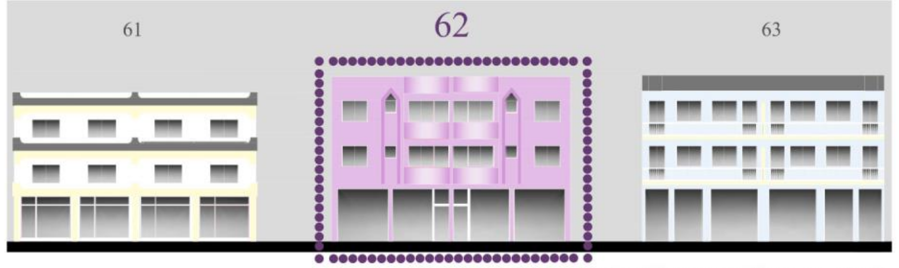


PARTIAL ELEVATION SCALE: 1/500

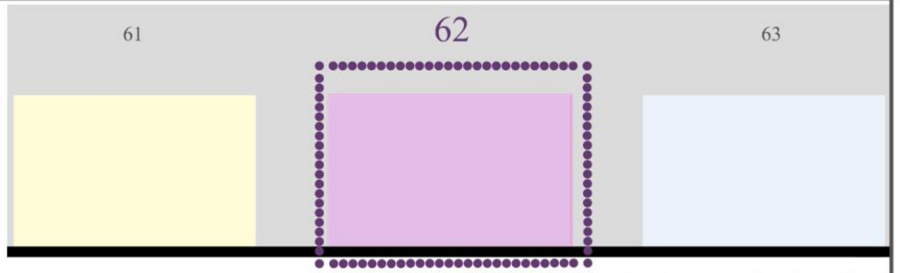


PARTIAL SILHOUETTE SCALE: 1/500

2|4 silhouette no: building no:

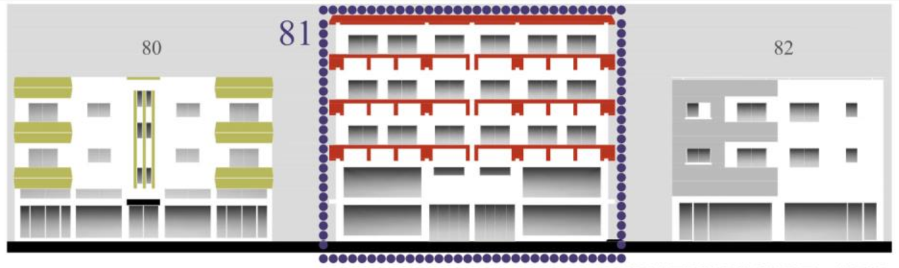


PARTIAL ELEVATION SCALE: 1/500



PARTIAL SILHOUETTE SCALE: 1/500

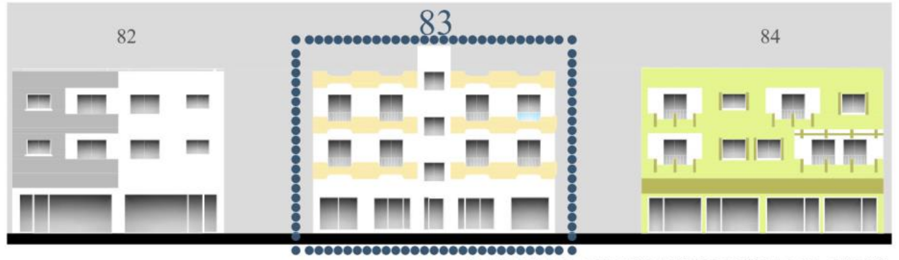
3|62 silhouette no: building no:



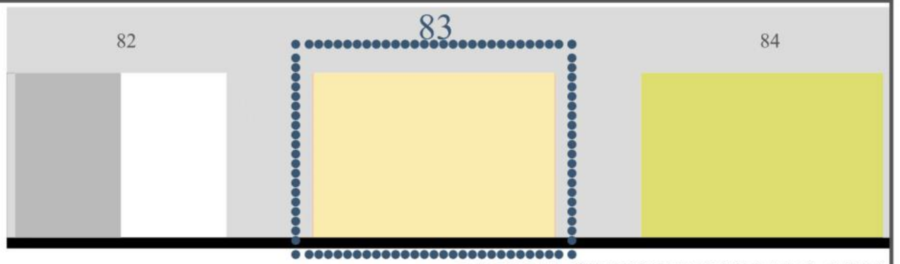
PARTIAL ELEVATION SCALE: 1/500

PARTIAL SILHOUETTE SCALE: 1/500

4|81 silhouette no: building no:



PARTIAL ELEVATION SCALE: 1/500

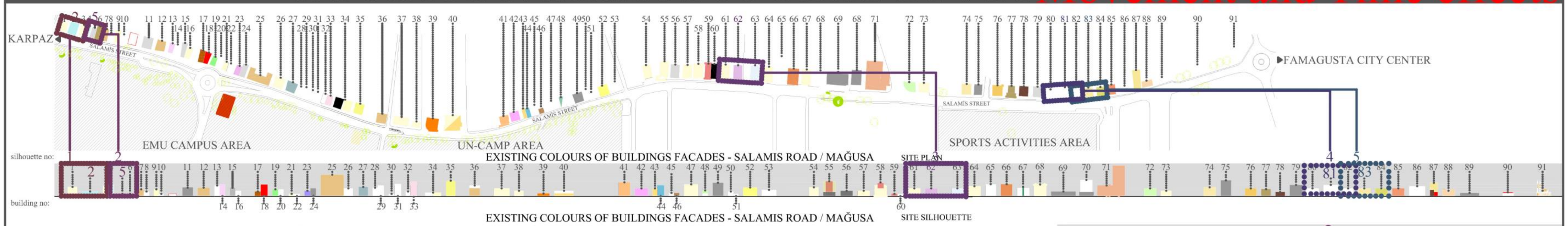


PARTIAL SILHOUETTE SCALE: 1/500

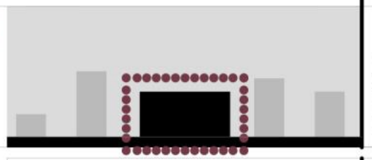
5|83 silhouette no: building no:

ARCHITEC/ARHITECTURAL LEVEL Movement and Time effects

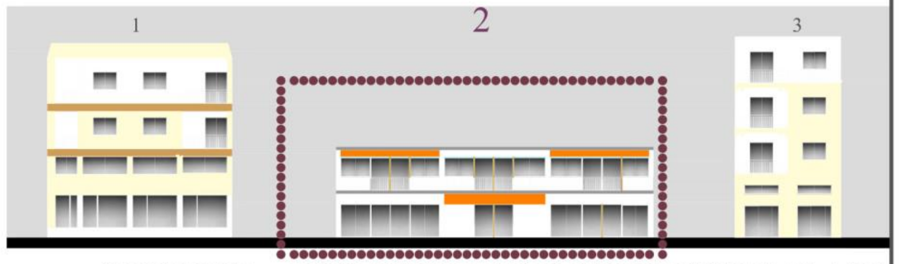
SUGGESTION



ALIGNMENT C2



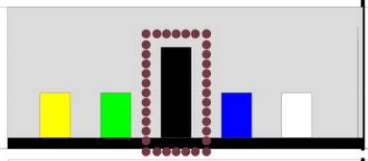
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Movement and Time effects			●		●	●		●					●			●								●	



(MOVEMENT and TIME EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 1 building no: 2

ALIGNMENT B3

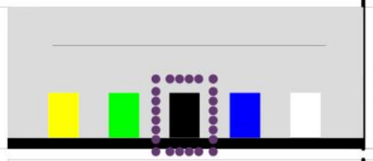


	design principles									colour harmony						colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Movement and Time effects			●			●							●				●			●					

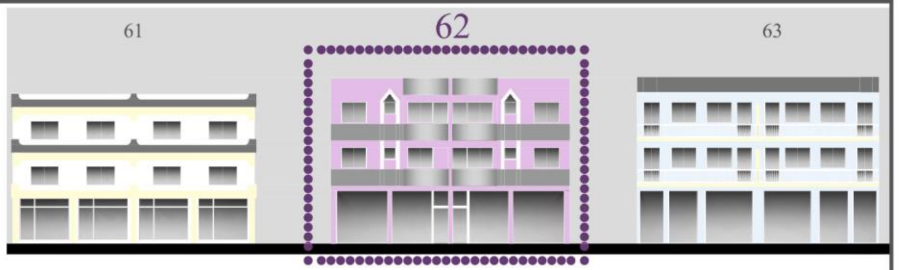
(MOVEMENT and TIME EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 2 building no: 4

PROXIMITY A4



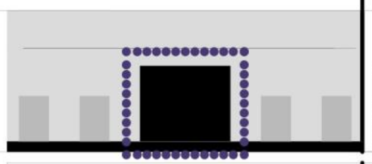
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Movement and Time effects	●			●	●	●	●				●						●							●	



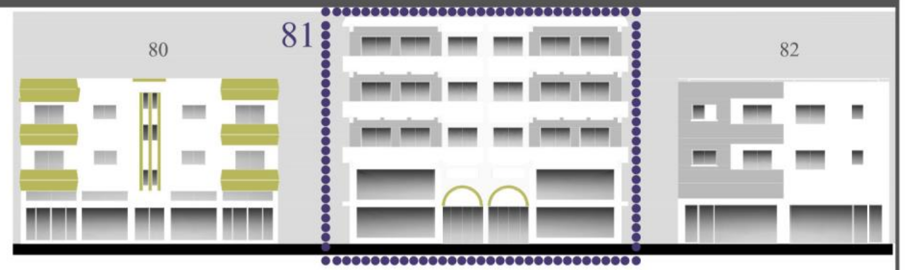
(MOVEMENT and TIME EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 3 building no: 62

PROXIMITY E2



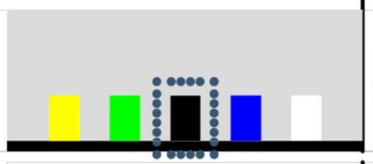
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Movement and Time effects					●		●	●			●						●						●		



(MOVEMENT and TIME EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 4 building no: 81

SIMILARTY A2



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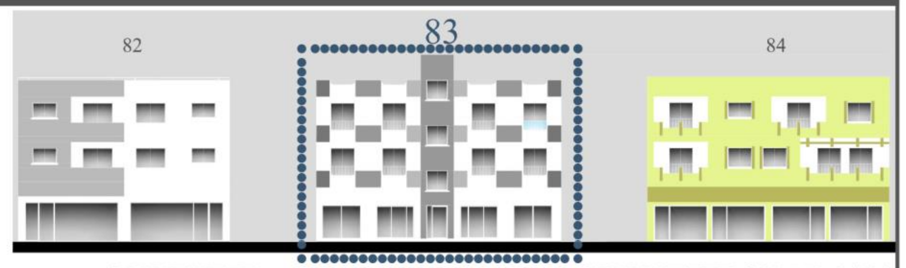
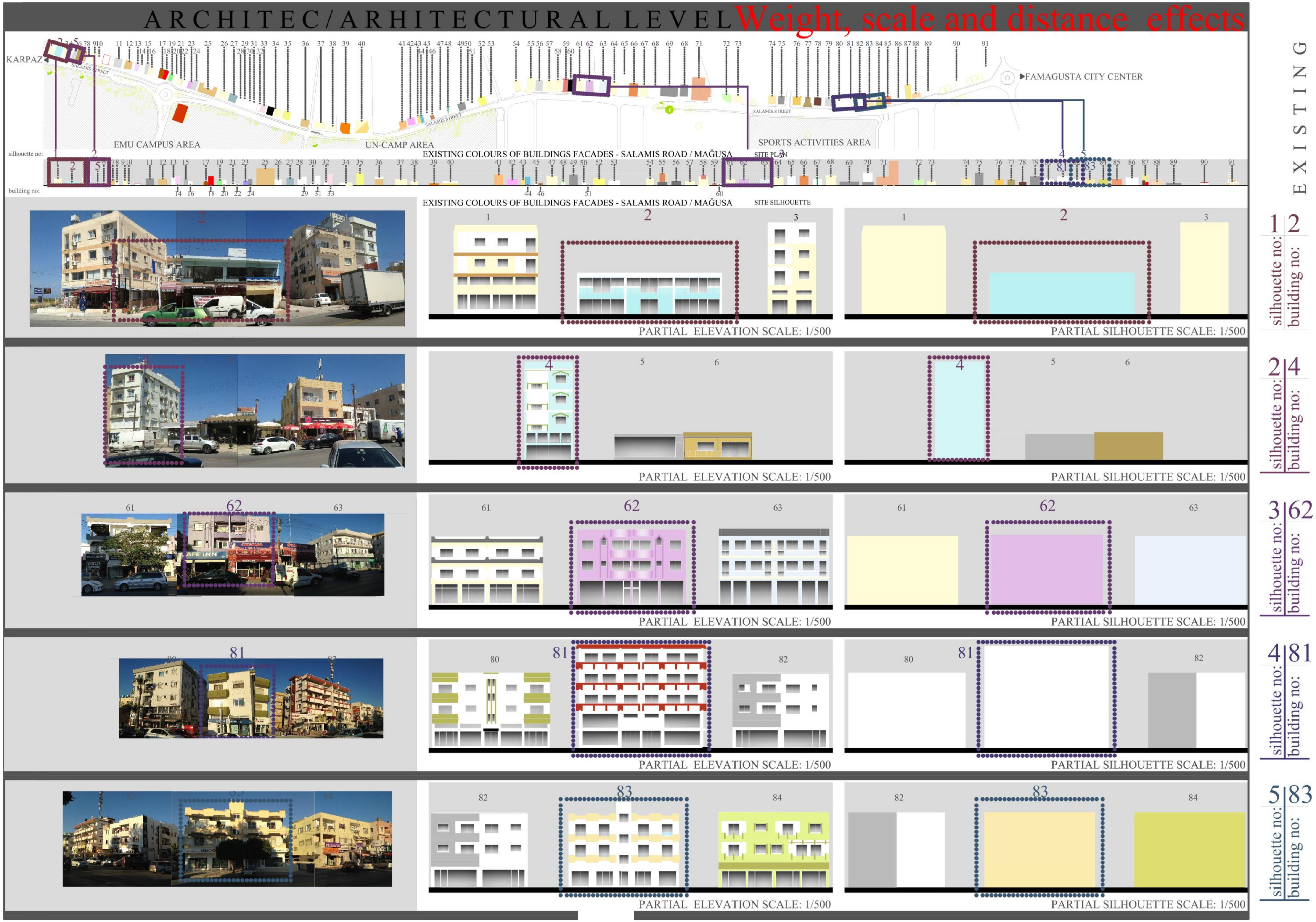
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Movement and Time effects	●	●			●	●	●							●									●	●	



(MOVEMENT and TIME EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

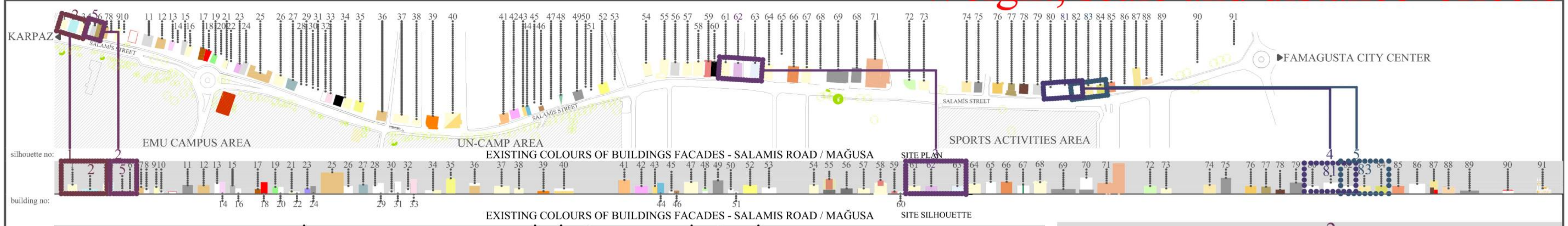
silhouette no: 5 building no: 83

Appendix I

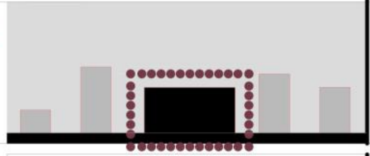

ARCHITEC/ARHITECTURAL LEVEL
Weight, scale and distance effects
KARPAZ
FAMAGUSTA CITY CENTER
EMU CAMPUS AREA
UN-CAMP AREA
SPORTS ACTIVITIES AREA
SALAMIS STREET
silhouette no:
building no:
EXISTING COLOURS OF BUILDINGS FACADES - SALAMIS ROAD / MAĞUSA
SITE PLAN
SITE SILHOUETTE
PARTIAL ELEVATION SCALE: 1/500
PARTIAL SILHOUETTE SCALE: 1/500
EXISTING
silhouette no: 1
building no: 2
silhouette no: 2
building no: 4
silhouette no: 3
building no: 62
silhouette no: 4
building no: 81
silhouette no: 5
building no: 83

ARCHITEC/ARHITECTURAL LEVEL Weight, scale and distance effects

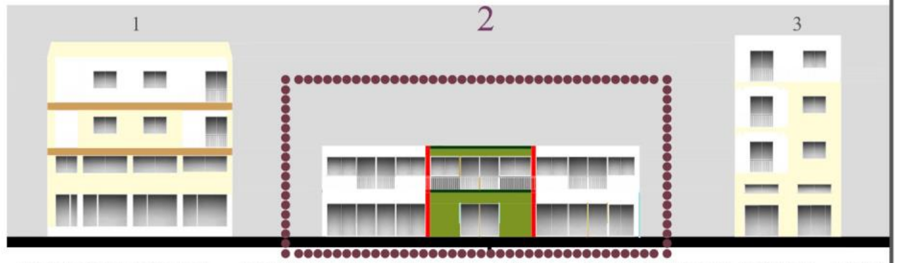
S U G G E S T I O N



ALIGNMENT C2



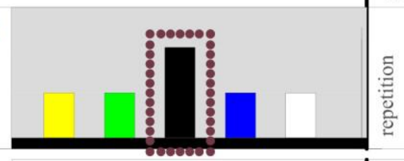
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhythm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Weight,Scale and Distance effects			●		●	●				●	●			●		●									●



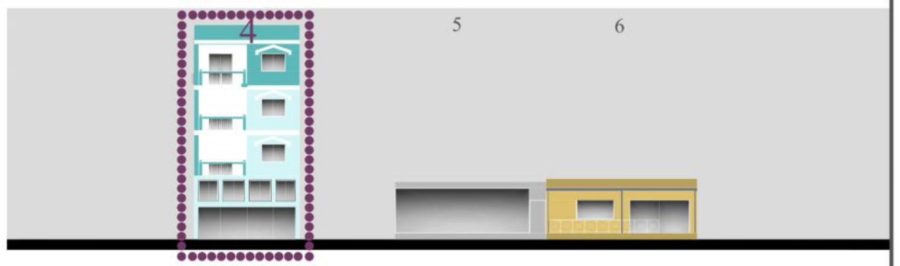
(WEIGHT,SCALE and DISTANCE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 1 | building no: 2

ALIGNMENT B3



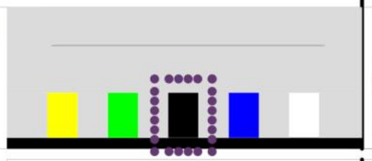
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhythm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Weight,Scale and Distance effects					●	●				●			●				●			●					



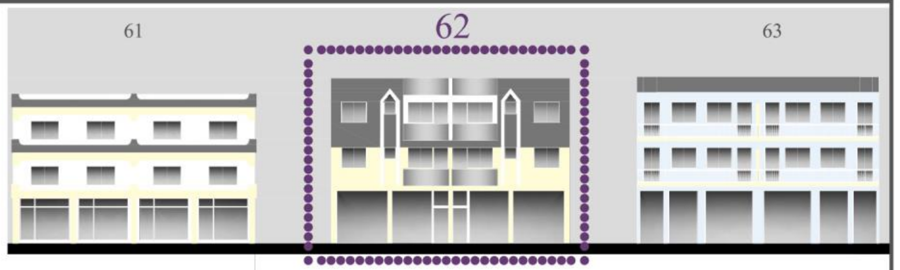
(WEIGHT,SCALE and DISTANCE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 2 | building no: 4

PROXIMITY A4



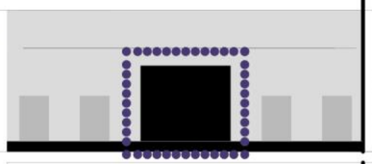
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhythm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Weight,Scale and Distance effects	●		●		●			●		●				●							●				



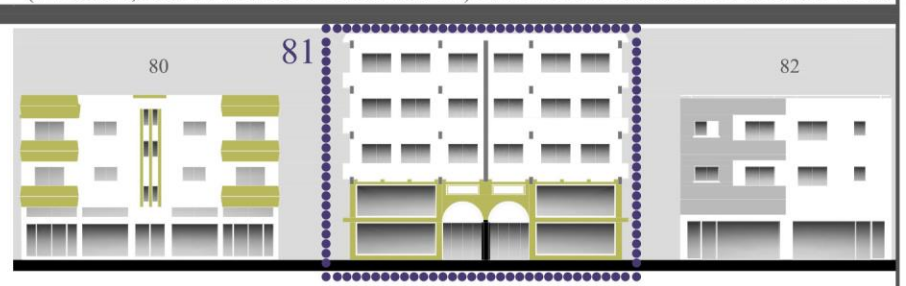
(WEIGHT,SCALE and DISTANCE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 3 | building no: 62

PROXIMITY E2



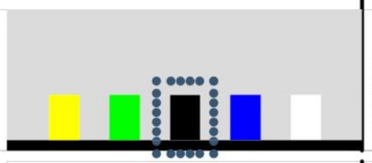
	design principles									colour harmony						colour group		location of the colour							
	repetition	rhythm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Weight,Scale and Distance effects	●				●			●		●			●						●						



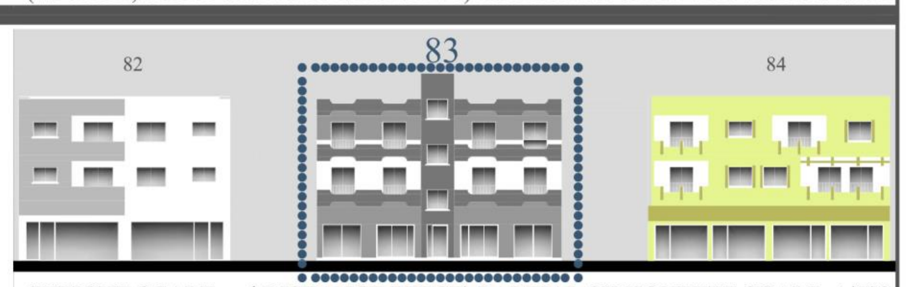
(WEIGHT,SCALE and DISTANCE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

silhouette no: 4 | building no: 81

SIMILARTY A2



	design principles									colour harmony						colour group		location of the colour							
	repetition	rhythm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Weight,Scale and Distance effects			●		●	●				●				●										●	



(WEIGHT,SCALE and DISTANCE EFFCT) PARTIAL SILHOUETTE SCALE: 1/500

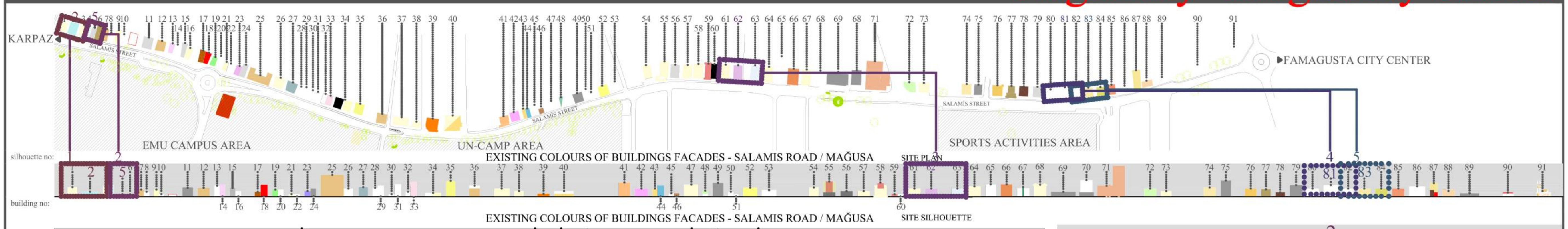
silhouette no: 5 | building no: 83

Appendix J

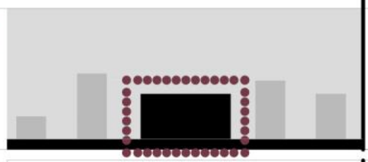
ARCHITEC/ARHITECTURAL LEVEL Legibility -Illegibility effects

ARCHITEC/ARHITECTURAL LEVEL Legibility -Illegibility effects

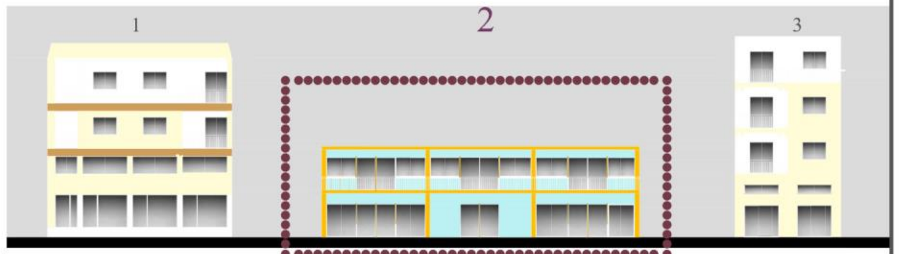
SUGGESTION



ALIGNMENT C2



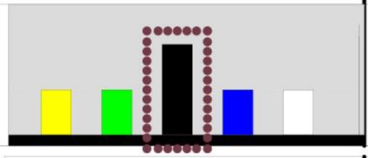
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Legibility-Illegibility effects		●	●								●					●		●							



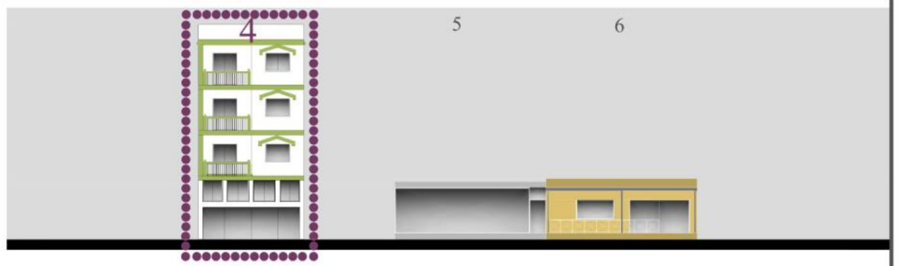
(LEGIBILITY-ILLEGIBILITY) PARTIAL SILHOUETTE SCALE: 1/500

1 silhouette no: | 2 building no:

ALIGNMENT B3



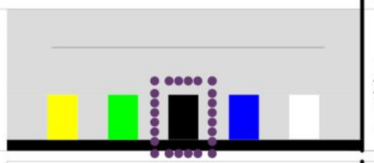
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Legibility-Illegibility effects			●										●				●						●	●	



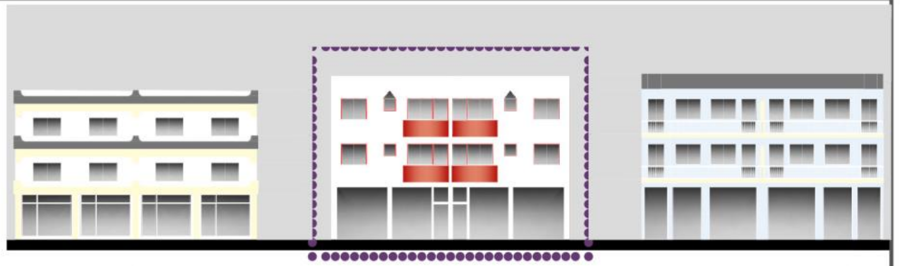
(LEGIBILITY-ILLEGIBILITY) PARTIAL SILHOUETTE SCALE: 1/500

2 silhouette no: | 4 building no:

PROXIMITY A4



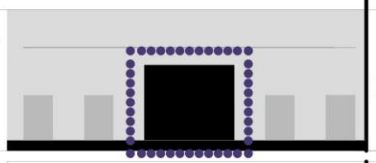
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Legibility-Illegibility effects								●					●			●					●			●	



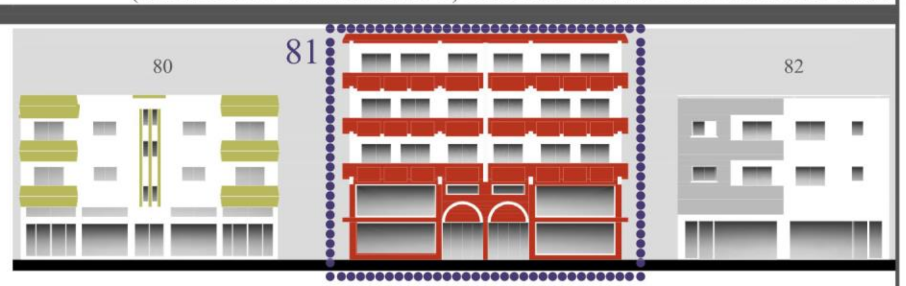
(LEGIBILITY-ILLEGIBILITY) PARTIAL SILHOUETTE SCALE: 1/500

3 silhouette no: | 62 building no:

PROXIMITY E2



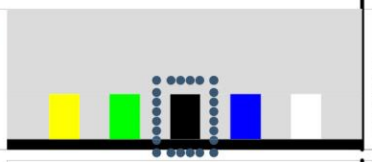
	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Legibility-Illegibility effects				●							●					●								●	



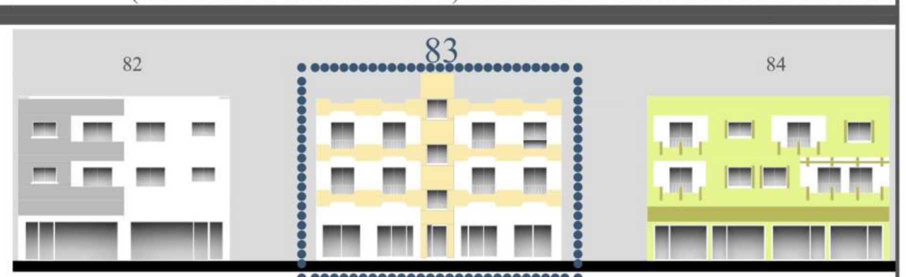
(LEGIBILITY-ILLEGIBILITY) PARTIAL SILHOUETTE SCALE: 1/500

4 silhouette no: | 81 building no:

SIMILARTY A2



	design principles										colour harmony					colour group		location of the colour							
	repetition	rhtyhm	hierarchy	contrast	balance	proportion	harmony	focal point	scale	light-texture	complementary	analogus	monocromatic	acromatic	natural	warm colour	cool colour								
Legibility-Illegibility effects	●			●	●										●	●								●	



(LEGIBILITY-ILLEGIBILITY) PARTIAL SILHOUETTE SCALE: 1/500

5 silhouette no: | 83 building no: