

ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE
ENGINEERING AND TECHNOLOGY

**DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE-
CASE OF ISTANBUL, GOLDEN HORN**



M.Sc. THESIS

Mahta AMJADI

Department of Urban Design

Urban Design M.Sc. Programme

JUNE 2019

ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE
ENGINEERING AND TECHNOLOGY

**DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE-
CASE OF ISTANBUL, GOLDEN HORN**



M.Sc. THESIS

**Mahta AMJADI
(519151028)**

Department of Urban Design

Urban Design Programme

Thesis Advisor: Doç.Dr. Fatma Ayçim TÜRER BAŞKAYA

JUNE 2019

İSTANBUL TEKNİK ÜNİVERSİTESİ ★FEN BİLİMLER ENSTİTÜSÜ

**GECE PEYZAJI İÇİN KENTSEL TASARIM STRATEJİLERİ
GELİŞTİRİLMESİ – İSTANBUL, HALIÇ ÖRNEĞİ**

YÜKSEK LİSANS TEZİ

**Mahta AMJADI
(519151028)**

Kentsel Tasarım Anabilim Dalı

Kentsel Tasarım Yüksek Lisans Programı

Tez Danışmanı: Doç.Dr. Fatma Ayçim TÜRER BAŞKAYA

HAZİRAN 2019

Mahta AMJADI, a M.Sc student of ITU Graduate School of Science Engineering and Technology student ID 519151028., successfully defended the thesis entitled “DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE-CASE OF ISTANBUL, GOLDEN HORN”, which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor : **Doç. Dr. F. Ayçim TÜNER BAŞKAYA**
Istanbul Technical University

Jury Members : **Doç. Dr. Hatice AYATAÇ**
Istanbul Technical University

Doç. Dr. Gül ATANUR
Bursa Technical University

Date of Submission : 3 May 2019
Date of Defense : 12 June 2019





For a bright world,



FOREWORD

Firstly I would like to Doç.Dr.Fatma Ayçim Türer Başkaya for her interest, support, and for assisting in the development and discussion of my topic with her valuable ideas and knowledge.

I would like to extend my thanks to ZKLD Studio, who made me like lighting design art and helped me to decide what I want to be.

At last, I am sincerely thankful to my family for their support, encouragement and, love, especially to my brother who advised me to be brave at all times.

June 2019

Mahta AMJADI
(Urban Planner)



TABLE OF CONTENTS

	<u>Page</u>
FOREWORD	ix
TABLE OF CONTENTS	xi
ABBREVIATIONS	xiii
SYMBOLS	xv
LIST OF TABLES	xvii
LIST OF FIGURES	xix
SUMMARY	xxi
ÖZET	xxv
1. INTRODUCTION	1
1.1 Purpose of Thesis	2
1.2 Methodology	2
2. URBAN LIGHTING	5
2.1 Purpose of Urban Lighting	5
2.2 Urban Design and the Design of Light.....	7
2.3 The History and Culture of Urban Lighting.....	9
2.4 Perception of Light.....	9
2.4.1 Psychological effects of urban lighting.....	11
2.5 Lighting For Design A Legible City	11
2.6 Proposed Design Basis of Urban Lighting for Humans.....	16
2.6.1 Clearness of urban structure.....	17
2.6.1.1 Landmark	18
2.6.1.2 Pathways	18
2.6.1.3 Nodes	18
2.6.1.4 Districts	18
2.6.1.5 Edges.....	19
2.6.2 Highlighting details and textures	19
2.6.3 Naturalness and variety	20
2.6.3.1 Coloured lighting	21
2.6.3.2 Differentiation between elements	22
2.6.4 Historical values.....	23
2.6.5 Visual Hierarchy	24
2.6.6 Perceivable Foreground and Background.....	24
2.6.7 Psychological Comfort.....	25
2.6.8 Context and Culture	25
2.7 Results	26
3. URBAN LIGHTING MASTERPLANS AND GUIDES	29
3.1 The approach of Existing Urban-Lighting Master Plans.....	29
3.2 Practical Approaches for Urban Lighting in Turkey.....	31
3.2.1 Sustainable urban lighting policy for Istanbul	32
3.2.1.1 City lighting platform.....	32
3.2.1.2 Environmental protection.....	32
3.2.1.3 Urban lighting regulation	33

3.2.1.4 Integration with the world	33
3.2.1.5 Energy efficiency	33
3.2.1.6 Coordination and communication	33
3.2.1.7 Aesthetic.....	33
3.3 Introduction on Keywords of Application for Urban Lighting	34
3.3.1 IESNA – Guide for outdoor lighting.....	34
3.3.2 British Standards Institute – Instructional Guidance of Outdoor Lighting.....	40
3.3.3 CIBSE & ILE – An excellent urban environment guide.....	41
3.4 Outdoor Lighting Mistakes.....	44
3.4.1 No contrast.....	44
3.4.2 Lighting Glare	45
3.4.3 Bad fixture placement.....	45
3.4.4 Wrong color temperture	46
3.4.5 Under-powered light.....	47
3.5 Results	48
4. NIGHTSCAPE	49
4.1 Nightscape and Nightscape Lighting.....	49
4.2 Nightscape in Impacting Human Activities	50
4.3 Nightscape and the Image of the City	50
4.4 American and European Studies On Nightscape and Nightscape Lighting	52
4.5 Results:	52
5. DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE	
CASE OF ISTANBUL, GOLDEN HORN	55
5.1 General Information of Golden-Horn.....	55
5.2 Research Design and Methodology.....	57
5.3 Phases of Evaluation Process	59
5.4 Evaluation of Case Study	59
5.4.1 Form-based approach	60
5.4.2 Legibility approach	69
5.4.3 Urban-Lighting approach	76
5.4.3.1 Indicators Structuring.....	77
5.4.3.2 Case A: Overall nigtscape status (Vantage ponit 1).....	78
5.4.3.3 Detailed nightscape status	80
5.4.3.4 Case B: Overall nigtscape status (Vantage ponit 2).....	87
5.4.3.5 Detailed Nightscape Status.....	90
5.5 Strategies for illumination of urban values	99
5.5.1 Hictorical building lighting	100
5.5.2 Bridge lighting.....	103
5.5.3 Landscape lighting (parks, squares and green areas)	106
5.5.4 Waterfront and shorlines lighting.....	109
6. CONCLUSIONS AND RECOMMENDATIONS	111
6.1 The Site Analyse Process	111
6.2 Conclusion.....	111
REFERENCES	115
CURRICULUM VITAE	119

ABBREVIATIONS

IESNA	: Illuminating Engineering Society of North America
CIE	: Commission Internationale de l'Eclairage
LUCI	: Lighting Urban Community International
BSI	: British Standards Institute
ILE	: The Institution of Lighting Engineers





SYMBOLS

LUX : Unit of illuminance

K : Color temperature of light

fc : A foot-candle unit of light intensity





LIST OF TABLES

	<u>Page</u>
Table 3.1 : IESNA Defination of envronmental zones.	36
Table 3.2 : Illuminance level for floodlighting buildings.	37
Table 3.3 : Recomended color tempereture for illumination.	37
Table 3.4 : Extract of lighting recommendations.	39
Table 3.5 : Steps to designing of urban lighting master plan.	44
Table 5.1 : Evaluation of case study.....	59
Table 5.2 : Calissification of current status of fisrt vantage point.	63
Table 5.3 : Calissification of domination status of fisrt vantage point.	65
Table 5.4 : Calissification of current status of second vantage point.....	67
Table 5.5 : Calissification of domination status of second vantage point.....	68
Table 5.6 : Categorization of type of legible elements for first vantage point.....	72
Table 5.7 : Categorization of topography impact on elements for 1.st vantage poin..	73
Table 5.8 : Categorization of type of legible elements for second vantage point.....	74
Table 5.9 : Categorization of topography impact on elements for 2 nd vantage point..	76
Table 5.10 : Recommendation for historical buildings lighting.....	103
Table 5.11 : Recommendation for bridge lighting.....	105
Table 5.12 : Recommendation for landscape lighting.....	109
Table 5.13 : Recommendation for shoreline lighting.....	110



LIST OF FIGURES

	<u>Page</u>
Figure 1.1 : Phases of the evaluation process..	3
Figure 2.1 : Calirty in city with lighting, Hong-Kong.....	5
Figure 2.2 : Example of vertical lighting application	10
Figure 2.3 : Glare resulted from use of various colors: Piccadilly Circus, London..	10
Figure 2.4 : The ligibility of the city, the case of Barcelona.....	12
Figure 2.5 : Lighting for city elements example of Paris and Sydney.....	13
Figure 2.6 : Sketch for Lynch’s five elements ...	17
Figure 3.1 : Color temperature description	37
Figure 3.2 : Recommended floodlighting geometry.	38
Figure 3.3 : Example aplication of lighting mistakes- No contrast	44
Figure 3.4 : Example application of lighting mistakes- Lighting glare	45
Figure 3.5 : Example aplication of lighting mistakes- Bad fixture placement	45
Figure 3.6 : Example aplication of lighting mistakes- Wrong color tempereture ...	47
Figure 3.7 : Example application of lighting mistakes- Under powered light.....	47
Figure 5.1 : Location of Golden-Horn	55
Figure 5.2 : View of Golden-Horn.....	57
Figure 5.3 : Scheme of research methods.	58
Figure 5.4 : Locaion of selected vantage points.....	58
Figure 5.5 : Phases of process.....	60
Figure 5.6 : View of vantage point 1: Pierre Loti terrace.	61
Figure 5.7 : Form-based analyse in daylight from the first vantage point.....	62
Figure 5.8 : Form-based analyse at night from the first vantage point.....	64
Figure 5.9 : View of vantage point 2: Galata Bridge	65
Figure 5.10 : Form-based analyse in daylight from the second vantage point..	66
Figure 5.11 : Form-based analyse at night from the second vantage point..	68
Figure 5.12 : Legibility analyze in plan from vantage ponit 1.	70
Figure 5.13 : Legibility analyze in panaroma view from vantage ponit 1.....	71
Figure 5.14 : Legibility analyze in plan from vantage ponit 2.	74
Figure 5.15 : Legibility analyze in panaroma view from vantage ponit 2.....	75
Figure 5.16 : Nightscape panaroma view from vantage ponit 1	78
Figure 5.17 : Right side of nightscape from vantage ponit 1.....	79
Figure 5.18 : Left side of nightscape from vantage ponit 1.	80
Figure 5.19 : Golden-Horn bridge day and night view from Pierre Loti.....	81
Figure 5.20 : Haliç Congress Center day and night view from Pierre Loti.	82
Figure 5.21 : Haliç park night view from Pierre Loti hill.....	83
Figure 5.22 : Bahariye street day and night view from Pierre Loti.	84
Figure 5.23 : Nightscape panaroma view from vantage ponit 2	87
Figure 5.24 : Right side of nightscape from vantage ponit 2.....	87
Figure 5.25 : Front side of nightscape from vantage ponit 2.....	88
Figure 5.26 : Left side of nightscape from vantage ponit 2.....	89
Figure 5.27 : Day and night view of Galata Bridge..	90
Figure 5.28 : Day and Night view of Galata Tower from Galata Bridge..	92

Figure 5.29 : Day and Night view of Atatuk Bridge from Galata Bridge.....	93
Figure 5.30 : Day and night view of Metro bridge from Galata Bridge.	95
Figure 5.31 : Day and night view of Eminonu square from Galata Bridge.	96
Figure 5.32 : Day and night view of New mosque from Galata Bridge.	97
Figure 5.33 : Day and night view of Rustem Pasa mosque from Galata Bridge.....	98
Figure 5.34 : Floodlight example sketch.....	101
Figure 5.35 : Detailed lighting example sketch.	102
Figure 5.36 : Bridge lighting example sketch	104
Figure 5.37 : Steplight for squares example sketch	106
Figure 5.38 : Pole light for general lighting of square example sketch.	107
Figure 5.39 : Plant and tree lighting example sketches.....	108
Figure 5.40 : Path lighting for pedestrian example sketches	108



DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE – CASE OF ISTANBUL, GOLDEN-HORN

SUMMARY

Nightscape of a city could act toward as a re-introduction of the city during the night-time.

On account of the growth of the city economy and citizens' free times, people are more carefulness to their nightlife. A city could have very fascinating pictures as its 'identification card' to the whole world by proper lighting design and enlightenment systems.

Recently, most of the cities in the world have started to give importance to nightscape status. This leads whole cities to put nightscape lighting design into their urban master plans and urban design process. However, as a recent issue, nightscape is usually treated as a topic which belongs to urban planning or enlightenment technology.

Due to the deficiency of multidisciplinary works and studies on nightscape, some cities mistreated about nightscape as just lighting the urban spaces with bright lights in an inaccurate way.

This misunderstanding brings up a nightscape important and makes some cities jumping into a brightness competition.

We conclude that for the cities which have a rich multicultural history like the coastal city of Istanbul and the ones which require a particular concern about their specific natural attributes, the nightscape appearance reveals to be an important subject. However, the most essential issue is how could help for a cityscape to have a legible nightscape and keep its identity during day and night.

Based on the concept of legible cities, for this topic, a city should have some special elements or several features and structures to stay in a person mind in daylight.

For accurate this fact in the night-time, the illumination, and put forward these elements such as historical buildings, bridges, shorelines, or various symbols of the area play an important role. On the other hand, the wrong enlightenment of them in the night scenes could cause chaos and make no sense and also could make light

pollutions. Therefore, emphasizing on the good determination of forms and the correct selection of the items is an issue that this study considers.

This thesis aims to perform some contributions to the studies on nightscape from the content of the urban design. Therefore, this thesis has three main research questions to achieve that main goal:

- 1- How could make legibility in nightscape of a historical district with urban lighting design?
- 2- What are the strong points and shortcomings of the nightscape in the chosen cases in Istanbul?
- 3- What are the dependable strategies to make a memorable nightscape by true urban lighting design methods?

The ultimate objective of this study is to reach a series of strategies about the standard way of lighting design for the elements of urban public spaces in nightscape in the selected areas.

This thesis was studied on the available works of literature about urban lighting and the documents about urban nightscape to make a conclusion of the definition of the nightscape status. Also studies about outdoor lighting guidelines and standards technics, urban design based strategies have been proposed for the correction and adaptation of lighting applications.

Due to the importance of identity in Istanbul, especially in the historical regions, in documental study part two vantage points were selected in the important zones of Golden-Horn area to analyze the nightscape status for silhouettes of them.

This thesis uses graphic analysis on the photos taken from the vantage point and evaluates the image of silhouettes in three steps for both day and night status. From-based analyze, legibility analyze and at last, for the main aim of this study the lighting design analyze and evaluations were done for the selected areas.

Following to the identification of the vantage points, the first step is the selection and categorization of forms and structures which human eye and the perception captures from these points and categorizing them as type, value and the domination status of them. In addition for the second step of the analysis, determination of legible elements were done for both plan and silhouette of the selected study case to understand the perception difference in the plan and the human scale view. For the last step of the analysis, data were collected from the selected areas as photographs and surveying. Based on documental studies after empirical research and analyzing the night

photographs, the strong points, and shortcomings of the nightscape and the way of illumination the elements in the chosen cases in Golden-Horn was figured out.

In the end, a series of strategies of lighting design are addressed for the future nightscape designs based on the theoretic studies about urban design standards and outdoor lighting. The results were categorized by mention the defective applications and the suggestions are given to solve the problems.

As a result, we can conclude that there are two important factors to obtain a pleasant nightscape with urban lighting. It is clear that for the historical cities like Istanbul, the priority of structures and elements to be lit for the nightscape view should be different. Mistaken in the selection of the characters, or not to give priority and enlighten the all of them could make chaos, complexity, and messy image. In addition to this, it is important to pay attention to the concept of composition as well as the lighting properties of each element when the designs are combined. As the wrong strategies are applied, a complex and unimaginable nightscape could be obtained.

As a result of evaluation and results, this study operates the profession of urban design to fill the gap and misunderstandings on this issue and also this thesis could make a template to the cities that have a historical identity like Istanbul or in various points of Istanbul.

Key Words: nightscape, urban lighting, urban design, legibility, Golden-Horn



GECE PEYZAJI İÇİN KENTSEL TASARIM STRATEJİLERİ GELİŞTİRİLMESİ – İSTANBUL, HALIÇ ÖRNEĞİ

ÖZET

Bir kente ait gece manzarası, o kentin gece boyunca yeniden tanıtılmasına imkan vermekte ciddi bir role sahiptir.

Şehir ekonomisinin ve sakinlerinin serbest zamanlarının artması nedeniyle, insanlar gece hayatlarına daha fazla önem vermektedirler. Bir kent, uygun aydınlatma tasarımı ve sistemleriyle donatıldığında tüm dünyaya “kimlik belgesi” niteliğinde hayranlık bırakan resimler sunabilmektedir.

Son zamanlarda, dünyadaki şehirlerin çoğu gece manzarası olayına önem vermeye başlamıştır. Bu durum ile birlikte tüm şehirler gece manzarasına dair aydınlatma tasarımını, imar planları ve kentsel tasarım süreçlerine dahil etmişlerdir. Buna karşın, günümüzde gece manzarası genellikle şehir planlama veya aydınlanma teknolojisine ait bir konu olarak ele alınmaktadır.

Disiplinlerarası çalışmaların ve gece manzarası üzerine yapılan çalışmaların yetersizliğinden dolayı, bazı şehirler gece peyzajı konusunda yanlış kurgulanmakta ve bu durum kentsel mekanlarının parlak ışıklarla yoğun şekilde aydınlatılması ile son bulmaktadır.

Aydınlatma konusundaki bu yanlış, gece peyzajını önemli kılarken bazı şehirleri de parlaklık rekabeti içerisine sokmaktadır.

İstanbul gibi çok kültürlü bir tarihe sahip olan kıyı kentleri ve kendine özgü doğal nitelikleri hakkında özel bir endişe gerektiren kentler için gece manzarası görünümü önemli bir konu olarak ortaya koyulmaktadır. Bununla birlikte, en önemli konu, bir şehir manzarasının okunaklı bir gece manzarasına sahip olması ve şehir kimliğini gece ve gündüz korumaya nasıl yardımcı olabileceğidir.

Okunabilir şehirler konseptine dayanarak, bir şehrin gün ışığında insanın aklında kalabilmesi için bazı özel unsurlara veya çeşitli özelliklere ve yapılara sahip olmalıdır. Gece vakti aynı olguyu doğrulamak için, aydınlatma ile şehirdeki tarihi binalar,

köprüler, kıyıları veya bölgelerin çeşitli sembolleri öne çıkarılmak önemli bir rol oynamaktadır. Öte yandan, gece manzarasında bulunan elemanların yanlış aydınlatılması, kaosa neden olabilir ve anlam ifade etmeyen bir manzara yaratıp bununla birlikte hafif ışık kirliliklerine neden olabilir.

Bu nedenle, formların iyi belirlenmesi ve elemanların doğru seçilmesi bu çalışmanın üzerine düşüldüğü ve durduğı bir konudur.

Bu tez, kentsel tasarım temelinde gece manzarası çalışmalarına azda olsa katkı sağlamayı amaçlamaktadır. Bu amaç çerçevesinde çalışma, üç ana araştırma sorusunu içermektedir:

- 1- kentsel aydınlatma tasarımı ile tarihi bir bölgenin gece manzarasında okunaklılık nasıl sağlanabilir?
- 2- İstanbul'da seçilen örnek alanlarda gece manzarasının artı ve eksileri nelerdir?
- 3- Doğru kentsel aydınlatma tasarım yöntemleri ile akılda kalıcı niteliğe sahip gece manzaraları yaratmaya dair güvenilir stratejiler nelerdir?

Bu çalışmanın nihai amacı, seçilen alanlarda, gece manzarası kapsamında, kentsel kamusal alan elemanları için standart aydınlatma yöntemleri hakkında bir dizi stratejiye ulaşmaktır.

Bu tezde, gece manzarası durumuna ilişkin nihai tanımlamaları üretebilmek için kentsel aydınlatma ile ilgili mevcut literatür çalışmaları ve kentsel gece manzarası ile ilgili resmi-teknik belgeler üzerinde incelemeler gerçekleştirilmiştir.

Ayrıca dış mekan aydınlatma kılavuzları ve standartlar teknikleri, aydınlatma uygulamalarının düzeltilmesi ve uyarlanması için kentsel tasarım temelli stratejiler üzerine yapılan çalışmalar önerilmiştir.

İstanbul'un özellikle tarihi bölgeleri ile daha da öne çıkmakta olan kimliği dikkate alındığında, Haliç bölgesinde yer alan alt bölgelerin silüetleri ile gece manzaraları arasındaki ilişkiyi analiz etmek için iki önemli nokta seçilmiştir.

Bu tez, kentsel bakış noktalarından çekilen fotoğraflar üzerinde grafik analizini kullanarak, gündüz ve gece silüetlerini üç adımda değerlendirmiştir. Form-tabanlı analiz, okunaklılık analizi ve üçüncü olarak da bu çalışmanın ana amacı çerçevesinde Haliç'teki örnek alanlara ait gece manzarasının güçlü ve zayıf

yanlarının tespiti için aydınlatma tasarım analizi ve deęerlendirmeleri gerekleřtirilmiřtir.

Önemli noktaların tespit edilmesinin ardından ilk adım, insan gözünün ve algısının bu noktalardan yakaladığı formların ve yapıların seçilmesi ve kategorilendirilmesi ve bunların tür, deęer ve baskın olma durumu olarak sınıflandırılmasıdır. Analizin ikinci aşamasında ek olarak, plandaki algı farkını ve insan ölçeęi bakış açısını anlamak için seçilen çalışma vakasının hem planı hem de silueti için okunaklı unsurların belirlenmesi yapılmıřtır. Analizin son adımı için seçilen alanlardan fotoęraflar çekilip ve anketler yapılarak veriler toplanmıřtır. Deneysel araştırma ve gece fotoęraflarının analizinden sonra yapılan literatür çalışmalarına dayanarak, Hali'te seçilen bölgeler için gece manzarasının güçlü noktaları, eksiklikleri ve öğeleri aydınlatmanın yöntemleri tespit edilmiřtir.

Sonunda, kentsel tasarım standartları ve dış mekan aydınlatması ile ilgili teorik çalışmalara dayanan gelecek gece manzarası tasarımları için bir dizi aydınlatma tasarımı stratejisi ele alınmıřtır. Sonuçlar hatalı uygulamalardan bahsederek kategorize edildi ve problemlerin çözümü için önerilerde bulunuldu.

Sonuç olarak, kentsel aydınlatma ile kabulenebilir bir gece manzarası elde etmek için iki önemli faktör vardır. İstanbul gibi tarihi şehirler için gece manzarası görünümünde aydınlatılacak yapı ve unsurların öncelięinin farklı olması gerektięi açıktır. Karakterlerin seçiminde hata veya öncelikli olmamak ve hepsini aydınlatmak, kaos, karmařa yaratabilir. Buna ek olarak, tasarım birleřtirildięinde her bir elemanın aydınlatma özelliklerinin yanı sıra kompozisyon kavramına da dikkat etmek önemlidir. Yanlıř stratejiler uygulandıęından, karmařık ve düşünülemez bir gece manzarası elde edilebilir.

Deęerlendirme ve bulguların bir sonucu olarak, bu çalışma kentsel tasarım mesleęi profesyonellerinin bu konudaki açıkları ve yanlıř anlamaları gidermek için yön verebilir ve bu tez aynı zamanda İstanbul gibi tarihi bir kimlięe sahip kentlere veya İstanbul'un çeřitli noktalarına bir řablon oluşturabilir.

Anahtar Kelimeler: gece manzarası, kentsel aydınlatma, kentsel tasarım, okunaklılık, Hali



1. INTRODUCTION

A human being is always in need of light. Without lighting, it is not possible to clearly understand our environment. Without lighting, we are not able to perceive color, depth, space, and size. Darkness for human always has been as ambiguity and also has acted as an Anti-space. Therefore, man is always trying to escape from the dark as much as possible or somehow illuminate the space by using the moonlight, fire, candle or luminaries. Generally, light by its nature can be divided into two categories of natural light and artificial light. The natural light means a kind of light that actually emanates from the sun and the moon and lighting the day and night space, where artificial light that is voluntarily achieved through energy conversion by a human. Light in urban areas is used for two purposes. The mainspring for lighting places at night is to create a sense of safety and security. Optimal and suitable lighting should create clarity and light up blind spots and hidden and crimes ultimately space to make people feel comfort and convenience in urban spaces. Of course, it should be noted to achieve a sense of security, it is considered a certain amount of brightness. How often, lit spaces clumsily rather than establish a person's sense of security, induce him a sense of being under observation. In this case around areas with lack of lighting perceive darker and induce a sense of fear. In this situation, what is the role of cities and urban spaces remains in the citizen's minds mostly relate to the picture which receives during the day from his hometown? Suitable light for a city and its spaced is not only creating legibility but also it can help to create a clear mental image of the city at night for people and also it can be one of the factors reinforcing the identity of a place and promote its special character. With the correct lighting, we could add the attractiveness and vitality of the city and strengthened attendance of citizens in urban spaces and also brought economic revival for places with the permanent presence of citizens all time during day and night.

1.1 Purpose of Thesis

This thesis aims to perform some contributions to the studies on nightscape from the content of the urban design. By analyzing day and nighttime silhouettes of two zones in the Golden-Horn Area from the selected public vantage points, this study aims to evaluate the nightscape of this historic waterfront area and make a series of lighting strategies about urban lighting design in nightscape.

1.2 Methodology

This thesis stands on descriptive analysis to resolve the problems and shortcomings of the urban lighting in nightscape for the chosen site Golden-Horn.

This study uses graphic analysis on the photos taken from the vantage points and evaluates the images of silhouettes in three steps for both day and night status. Form-based analyze, legibility analyze and at the last, for the main aim of this study the lighting design analyze and evaluations were done to figure out the strong points and shortcomings of the nightscape in the chosen cases in Golden-Horn. In the end, a series of strategies of lighting design are addressed for the future nightscape designs based on the theoretic studies and sites analyses

This study involves 6 major phases supported by the sub ones. The phases and pertinent stages of the project process are summarized in the diagram below (Figure 1.1).

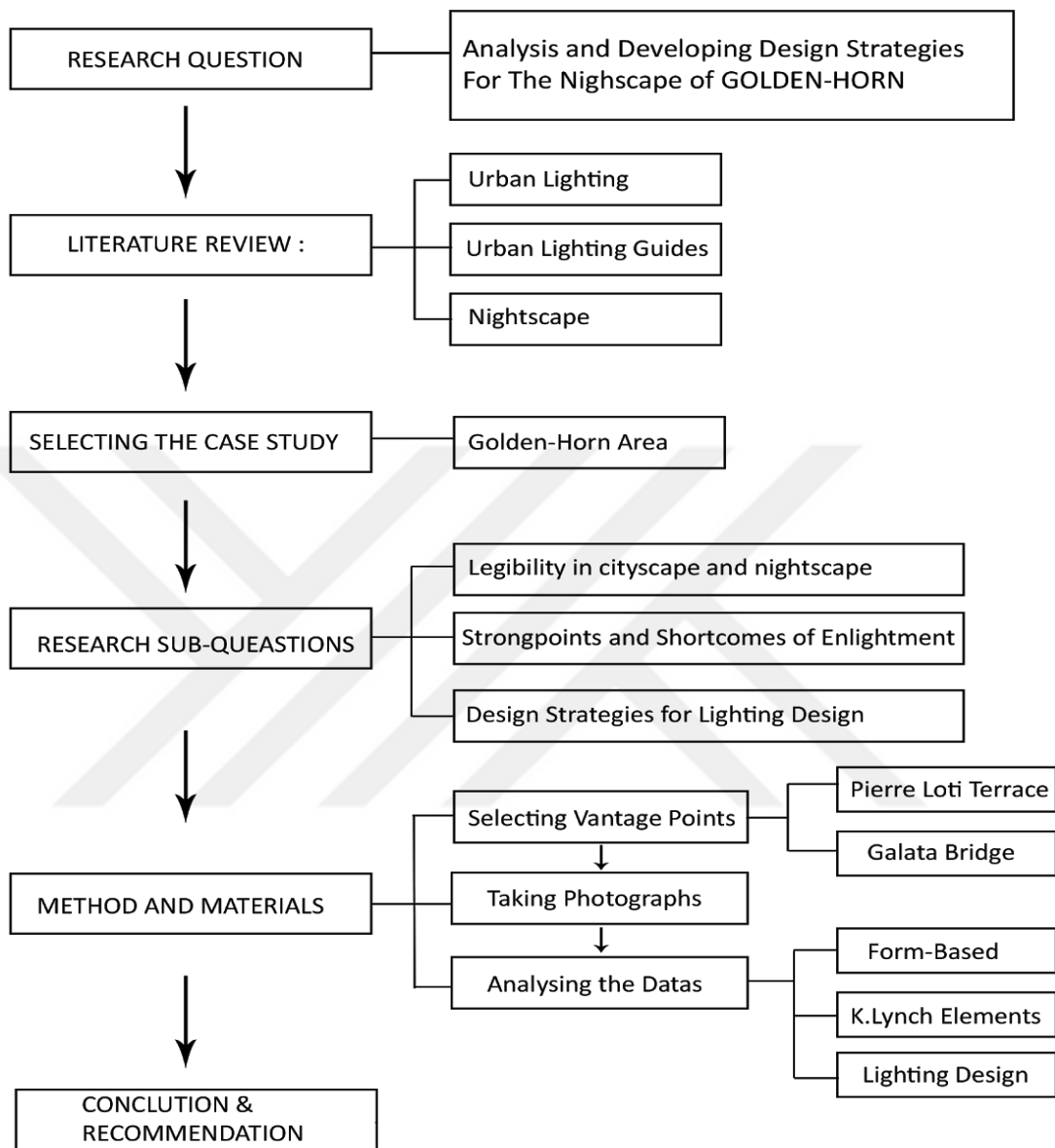


Figure 1.1: Phases of the evaluation process.



2. URBAN LIGHTING

2.1 Purpose of Urban Lighting

Urban lighting has three main goals: Bringing clarity, security, and aesthetic. These three goals call upon particular topics about night environments.

CLARITY prevents damage: Landscape lighting aims at clearing the environment from any non-concrete objects like steps, the place where water and land meet and children's toys left out on the way.

SECURITY also keeps the trespassers away from your territory by playing the role of a safeguard and providing the inhabitants with a feeling of protection which is psychologically an added value (Moyer, 1992).

Security lighting can be defined as separated systems. Sometimes one layer of the whole structure and maybe in other times the central part of the overall system is controlled.

AESTHETICS provides the audience with the joy of their surroundings. Exterior lighting creates a view from indoor which brings a sense of connection to the outdoor spaces and landscapes while staying inside. Such connection facilitates entertaining activities and sports (Moyer, 1992).



Figure 2.1: Clarity in city with lighting, Hong-Kong (Philips, 2017).

While dealing with lighting design for a landscape, the designers always take these three main aims into consideration. As a designer, one may face occasions in which one objective tends to be more important than others based on the taste of the client. Yet by combining safety and security and integrating them into the aesthetic commands, visually appealing sceneries can be created (Moyer, 1992).

Definition of Urban Lighting involves public and private lights that lighten up public areas in direct and indirect ways. The definition of the night in cities and towns has been totally altered by electric lights since the beginning of the 20th century (in London around 1880) since these lights push away the darkness. The emergence of nightlife world tackles the borders of daytime with its inner attraction which is considered as captivating danger (Barney, 2006).

The brightened night inserted a novel beauty to the cities a spectacular feeling. The study of the existing light at the end of the 20th century helps us to understand the process of developing an appropriate concept. The concept consists of two parts as functional lighting and effect lighting exactly the same as street lighting and pedestrian lighting which were basically utilized in designing and producing most public light. For a long period of time, the design of our lighting systems was restricted to constantly adding to the existing; new buildings were constructed light.

Luminaires, lamps, and networks were technically improved over decades. The well-shaped networks of street lights which have been developed over years are now visible from space satellites as on the opposite side light pollution covers our eyes from witnessing the deep dark sky at nights (Barney, 2006).

Orientation, safety and the visual characteristic of spaces after darkness are heavily influenced by artificial light. It serves to technical and security purposes by enabling the users to easily relocate in streets and paths and eliminating dark places in public areas. Artificial light has social and aesthetic purposes too. It affects the way the lit spaces are employed and understood. Urban architects make an attempt in building secure and appealing public areas and lighting design is a key to their success. Since a considerable part of each day is spent in darkness, by taking advantage of light public areas could be cautiously and efficiently utilized at night (Paskovic, 2012).

Architects, landscape architects have been conventionally designing lighting and luminaries in cities for a special reason. The studies suggest the practice of this

industry occurs in North America like that of the Illuminating Engineering Society (IES), which discusses the technical necessities of luminaires (Jakle, 2001).

Luminaires could contest and encounter with one another, once the lighting is designed in isolation. Since the human eyes only can be adjusted to a single level of illumination, the expected impacts of a luminaire are reduced when light sources contest. In the field of outdoor lighting, critics believe that the lighting designs created by IES stress the fact that exploration in the area of social and aesthetic lighting design still needs to be completed particularly when it comes to the capacity of light to unite urban atmosphere and strengthen neighborhood character (Brandston, 1994).

Key industrial figures employ luminaires for various purposes; this can result in generating surplus light in public areas which is regarded as light pollution. Inefficient lighting techniques influence natural residence in a negative way and also is considered as an annoying element by neighbors in public places.

Based on findings of Derek Phillips (2002, p.4), an International Association of Lighting Designers Lifetime Achievement Award recipient, there exists five major objectives for an exterior lighting technique:

1. Offering safe environments for residents and people;
2. Building secure pathways for traffic, cyclists and pedestrians;
3. Facilitating more lengthy usage of parks, outdoor spaces and sports resources;
4. Improving major essentials and crucial features etc. making lighting opportunities; and
5. Lastly, with the employment of a 'Visual Master Plan' assuring the synchronization of all the components in harmony.

When experts aim to set priority for objectives, it leads to conflicts in the illumination of public areas, fading its aesthetic function and loss of integrated view of place (Brand, 2009). By employing their knowledge and expertise, urban architects guarantee the harmonization and implementation of all five objectives. However, there are not many academic studies, adopting a planning point of view, government look after or best practice case studies about lighting design in North America.

2.2 Urban Design and the Design of Light

Today, cities are not gone to sleep when it is dark and woke up with the sunrise like the past. Modern cities and spaces have been turned into boarding-house (day and night

places. So to avoid half of the useful life of the city (at night) stay useless and achieve quality with the right lighting design and also city and residents will be given the right lighting, should avoid simple-minded and not convinced to Standards, Illuminating Engineering and just light spaces at night. Even for lighting design in a simple place or small space in the city, several key questions should come to the urban designer's mind. The most important ones are:

Where is the design, what kind of place is it?

What elements of that place should be lighting?

What is the main audience of lighting design?

What are technical facilities in there?

How is availability of the financial and application personnel?

People for understanding and remembering the entities divide and categorize them into different species. Due to the fact, the most general types of spaces that exist in cities are including hard spaces and soft spaces (Pakzad,2010).

The soft spaces are spaces where natural elements play a major role in it such as parks, lakes and etc. The soft places in a city are both pristine and man-made spaces. The main elements of this soft spaces that require lighting are waters (fountains and waterfall), plants (trees, bushes, grass, and weeds) and geographical formations (mountains and rocks).

The hard spaces are the ones which are formed by solid materials such as pavements involving brick, stone, etc. Where hard elements are the dominant elements of in them (Pakzad,2010).

The specific issue in lighting design is that attention to the meaning of the space somehow must be in a way which would satisfy the expectations of this place or space. For instance, in designing a historic space should Antiquity and evocative space to be emphasized, while in designing a modern place should index freshness and precision in its execution (Unver,2009).

The lighting scheme as a general matter contains factors that each of them affects the design process. In other words, the achievement of the objectives, the implementation and acceptance plan largely depends on the attention of these factors.

In general, these factors could divide into four categories: the environment, the characteristics of a light source, the mentality of the audience, and the antiquity (Pakzad,2010).

2.3 The History and Culture of Urban Lighting

Light is requirement stimulus for life and has been an essential factor of the man-made world. Men were limit to the daytime and nighttime axle; also at the beginning of the modern civilization the duration of the daytime was define with the hours' people could receive sunshine (Gokhale, 2010).

The first nightscape images designed by humans are based on the 17th-century illumination for the Baroque feast, where systematical use of lighting in outdoor is shown (Narboni, 2004). Environment lighting became more popular since the invention of electric lighting in the 19th century. In the 20th century, both inner and outside spaces were lit by electric lighting. The introduction of new man-made lighting technologies; introductions and new industrial substances made the usage of illumination cheaper and more efficiently. Till 1970 the artificial enlightenments were used as a way for the protection and security of the urban community at nighttimes. Light has been now regarded as one of the main factors in producing the man-made environment which determines people's experimentation of urban life at the darkness of night (Gokhale, 2010).

2.4 Perception of Light

The human mind unconsciously is always an endeavor to create a meaning for what he/she observed, in order to design lights, the designer needs to understand how observance organs and the brain work and the exact interaction among them. The eyes adopting light and the brain interprets the visual data transfer signs and directions to people at night-time. A human eye is always fascinated by the brightest light in the field of view, this could be exploited to build a composition by planning which area or object in a landscape should be more noticeable. This fact should deem very carefully because it could distract the eye from a more important element in the composition. This also could be utilized to direct people glimpse and how people concentrate on spaces also this could be used to direct people's movements. As an example, walking in a dimly lit area will feel comfortable as long as a person is moving towards an area with a higher level of light that the viewer can see. This highly affects individuals walking through dark areas. Also designer should care to do not make a contract when he/she plans to vary the level of light from area to area or object to object, it may cause

some confusion to space. Besides, it could be referred that a person will feel comfortable when he could see the borders and the edges of the space clear so that issue should be considered in the matter of design.

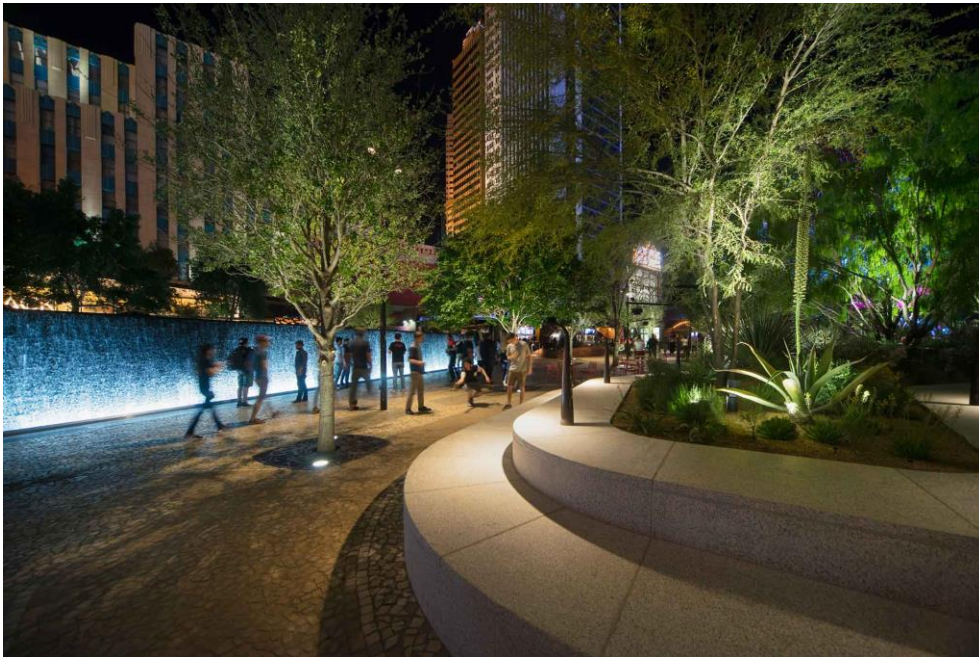


Figure 2.2: Example of vertical lighting application (Philips, 2017).

In any city, there is a large amount of light emitted from the sky, that causes the brightening of it and it is named as sky glow. This phenomenon causes negative effects on humans suchlike to decrease the capability of experience the natural vision of the sky and reduces the contrast of darkness and light, in order, reduce the legibility and visual quality of the urban night-time landscape.



Figure2.3: Glare resulted from use of various colors: Piccadilly Circus, London.

Source: <http://www.flicker.com>

The cast of light in a definition of light trespass and it means unwanted and unnecessary directions of light. It causes discomfort when it comes to area perception. (Moyer,1992).

2.4.1 Psychological effects of urban lighting

Nowadays, there are very few limitations on designing lights which provide tremendous fortune to be utilized on various shapes, and etc. to appeal various emotions and response. Even it offers the possibility to innovatively fashion a new reality to a familiar place by using compositions. Light highlights particular sides of the urban environment, which may alter the daytime appearance while non-appearance of illumination can form a part of the bright composition. The components that could be manipulated for better efficiency and to gain desired results are three elements: Direction, intensity, and color of light. Another important aspect would be location since it determines the perceptual qualities and also its significance in the overall composition. Also opting the characteristic of lighting must consider daytime and nighttime appearance (Moyer,1992).

2.5 Lighting For Design A Legible City

Visual plan for the city or metropolitan area gives directions for shaping and reshaping: a group of suggestions and regulations which would be dealt with a visual type on the urban level (Lynch, 1960).

As previously discussed in earlier chapters, a more comprehensive visual environment is achievable through many factors, and it would assist the extraction of relevant visual information.

Recent studies concentrate on reaching calculable quantity chosen for each element, while the suggested design basis focused on answering several concerns in the designing of the urban lighting master plan. The recommended design basis aims to combine the proposed basis with the employment the lighting level as suggested to realize the space usability.



Figure 2.4: The ligibility of the city, the case of Barcelona.

Source: <http://www.flicker.com>

First of all, the illuminated nightscape should not be identified as a part of the environment as it is mentioned in the Codes of Practices, whereas the composition and interrelationship between each element should be regarded as a whole.

The imageability of the urban environment was resulting from the combination of numerous forms with hierarchy and clear construction and this would lead to the imageability of the space, as Lynch suggested (Lynch, 1960).

Besides, Kaplan and Nasar proposed in their researches that human's understanding of their environment is not through individual parts but a general experience. Hence the enrichment of the urban elements would multiply their passion for the environment (Kaplan, 1998; Nasar, 1988).

It is evident that the lighting master plans try to pinpoint the highlighting of landmarks, but only the physical or historical sights and circulation were stratified in harmony with the use of diverse Color Temperature for recognitions.

The Lighting Designer's personal preferences play a key role in designing master plans since its underlying concept is subjective; however, these plans and their designers strategically attempt to recognize varied lit elements and opportunities for applications. This thesis proposes another viewpoint for the creation and usage of design basis for urban lighting master planning, tries to concentrate on the human intuitive desires an improved synchronization of the illuminated elements while

recommending a hierarchy for lighting centered on the environmental discernment theories.

According to Lynch lighting is considered as an instrument for recognizing areas from one another while making patterns which make the movement in space easy (Lynch, 1960). Consequently, the suggested basis will be defined following the study of the design basis and main design topics recommended by Lynch and other visual design features recognized by Nasar and Kaplan and by the usage of lighting design make them realized.

The meaning of five elements and main design strategies which were cited by Lynch and their relation to the creation of the lighting master plan should evidently be studied.

Secondly, all the urban daytime features should be preserved through the whole composition of illuminated space even at night and also this composition should promote the characters of daytime urban elements and target these elements to bring the ease in navigation in spaces.

In order to do so, the daytime features of urban areas should be identified cautiously via physical examination or interview with locals to recognize key points for illumination.

"Images of a large city in daytime and night time, winter and summer, close and remote, motionless and in motion, focused and neglectful should convey the notion of steadiness; therefore, forms should be manipulated. The main city elements should be detectable under various circumstances not concretely but abstractly way" (Lynch, 1960, p. 109).

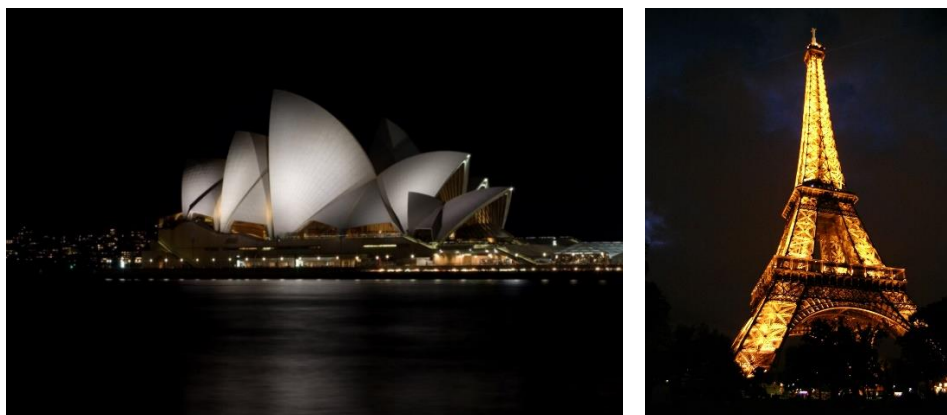


Figure 2.5: Lighting for city elements, Case of Paris and Sydney.

Source: <http://www.flicker.com>

Lynch also mentions that the city key elements are needed to be sustained distinctively in day and night, and urban lighting master plan should be formulated in a way to maintain the continuity of the city image.

Thirdly, to design a premium urban environment visual satisfaction and variety should be considered as influential elements however, they should be applied with consideration to keep the coherence with site context. It needs to be noted that one's sensory perception should not be excessively stimulated or deprived, as stated by Kaplan and Lozano (Kaplan, 1983; Lozano, 1988). Thus, the formulation of lighting master plans ought to include elements of interest plus contrast for the varied spatial experience. Generating spatial tonality through different lighting intensity would add to the variation in a visual environment, encouraging space interest (Kaplan, 1983). Moreover, more pleasing complexity can be accomplished by creating variation in environment lighting technique, colored lighting, or mechanized lighting sight varying fixture and lighting control.

Fourthly, based on surveys the ability to distinguish "naturalness" of the place plays a crucial role in perception of the environment and is highly preferred by people (Rapoport, 1977; Nasar, 1998; Kaplan, 1983; Kaplan, 1998) taking this point into consideration, lighting masterplans required to focused on the original green spaces and maintain the features and texture of plants while highlighting them. As a result, contrary to recent practice, the lighting of green areas should not only be limited to particular designated lighting level for basic functionality but should also be moving toward the visual construction of the green areas in order to preserve daytime character at night.

Finally, based on what Gibson emphasizes, the information and details obtained from the textures of objects and the environment can create the human perception.

Whenever the existence of visual "information" is more highlighted, the information about the perceived object and located spaces could be more easily extracted and received.

To permit the identification of architectural details and urban elements at night, lighting master plan should take into account the human's ability to elicit information through the illumination of related urban images. To obtain more information about the object and better structuring of the perceived object, the individual needs to have

a perception of details and texture. Consequently, lighting should not only focus on the illumination of the object but also should reinforce its unique details and texture so that the object can certainly be recognized and related to its daytime appearance. Future studies will reveal which sort of illumination results in a more preferred lit environment: strengthening the illumination of details or the illumination of building's geometrical form.

The above points display the connection between visual design principles needed to scheme a coherent city form and interpretation of these points for the urban lighting master planning design basis. To fulfill this task comprehension of current urban structure, the examination of the local necessities and recognition of the overall public's approach about the urban spaces are highly required.

It would lead to the explanation of the interactions amongst the illuminated and the visual hierarchy of the constituted illuminated environment which would enrich the precision of the current urban structure.

Hence, the recent practice of urban lighting master plan design will be renewed by this current proposed urban lighting master plan design basis while offering a new perspective about the subject which was previously focused on the employment of the measurable and modern luminaire technology. The pursuit of new design basis of urban lighting master planning and its underlying objective had been captured and stated by Lynch when he mentioned, "the notion of the city as a whole observable form." (Lynch, 1960, p.116).

This subchapter will reunite the theories suggested by researchers on environmental discernment and the standard disciplines. It would then suggest a modern series of suggested design strategies basis for the outlining of future lighting master plans. Nevertheless, it should be taken into account that these proposal bases are acting as the beginning basis to this fresh new survey topic and not as the final list of visual bases which would deal with all human-lit urban environmental points. Besides, future studies related to this topic need to be backed, and the addition of investigation into this list of basis should be inspected into how these could be interpreted into upcoming research prospects and aims.

2.6 Proposed Design Basis of Urban Lighting for Humans

The theories suggested in visual design about an Imageable surrounding and how lighting could attain these suggested strategies will be unified in the subsequent list of the design basis.

These suggested design bases should complete the present Codes of Practices which were employed to decide about suitable lighting level to accomplish the practicability of the area. Nevertheless, due to the fact that there were no existing studies about the relationship between the quality of façade of the lit urban surroundings and the human-lit surroundings, this connection is remained unclear and leaves place for speculation. As a result, this thesis tries to commence the research in this area by proposing these group of design basis, which would probably assist the design of upcoming lighting master plan. It attempts to aid these future master plans by strictly consider the design employing another approach by following the same technique as a pictorial design of the urban environment. Likewise, the set of outlined criteria would keep an eye on the existing practice of exaggerated use of color changing lighting systems or lamps of low color renderings. This misuse would end in creating a visual surrounding, which is damaging to human perception and ignore essential human perceptual needs. This list is gathered upon comprehension and examination of human needs and review of the related literature on the environmental insight and visual design theories. It contains the following:

1. Clearness of Urban Structure
2. Highlighting Details and Textures
3. Naturality and Variety
4. Colored Lighting
5. Differentiation between Elements
6. Historical Values
7. Visual Hierarchy
8. Perceptible Background and Foreground
9. Psychological Cosiness
10. Culture

According to Lynch, the lighting has the capacity in “pattern-making” in the urban surroundings differentiating between various elements in the urban environment (Lynch, 1960).

Each of these parameters was taken from the researches and was also graded as principals in urban design that were favored by an individual. It should be attended that the factors are not regarded individually in their indirect meaning as they are broadened to leave space for various strategies which fulfill its realization. Although this list is not an exhaustive one, detailing all the necessary design basis that would contribute to a highly legible visual nightscape, it provides a starting point into the analysis of human perception and urban lighting, whilst addressing potential future research topics.

2.6.1 Clearness of urban structure

Clarity is recognized by Lynch in the urban structure and is highly regarded as an important element in comprehension and highlighting the variances between various urban elements in the greater environment. “Identification with a place is also related to uses, perceptual differences, affect, social identity and status.” (Rapoport 1977, p 114) The capacity to generate an image of the environment is connected with the capacity to identify different elements which build up the urban environment while simplifying the navigation. Following Lynch theories, researchers had tracked his five urban elements which facilitate the creation of the mental map if were reinforced (Nasar, 1998). Lynch also cites that these five features are multi-dimensional and could convey a variety of meanings based on the local urban context (Figure 2.5). That is to say, the so-called landmark should not be regarded as the physical one which is tangible among other urban features but as an item which is historically or culturally valuable and brings intimacy for the locals. To gather information about the cultural landmarks, interviews should be arranged with the locals so the lighting designers would not limit themselves to stressing the physical landmarks. This would reduce the risk of urban image misinterpretation in daytime versus nighttime and escape reinforcing certain identifiable urban objects in the local background.

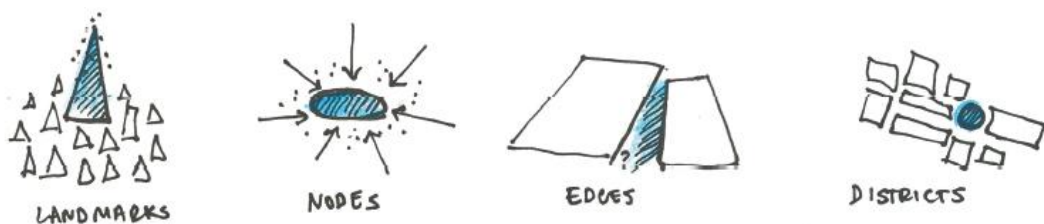


Figure2.6: Sketch for Lynch’s five elements.

Source: www.arup.com

2.6.1.1 Landmark

Landmarks are also the implication of culture and history. Consequently, they should be highlighted in the lighting master plan and to do such interviews with the local should be arranged, and observation of the site context should be conducted. Also, these landmarks are required to be illuminated in their “true form” to avoid daytime and nighttime image distortion. To sustain the actual appearance of landmarks at night, proper Color Rendering fixtures and lamp resources’ Colour Temperature or illumination technique ought to be employed (Hong, 2007).

2.6.1.2 Pathways

To ease transportation and orientation pathways should be marked and separated from the surroundings. Lighting strategy should be applied in a way to distinguish the significance of pathways and its connection to the human-environment; however, the previous strategies had failed to do so. In earlier practice, pathway lighting served for practical purpose and tried to provide sufficient lighting level for orientation, nevertheless because of the low lighting level, they were not visible for navigating people in the urban environment. Future lighting master planning should create a contrast between the pathways and their surroundings to preserve the visual distinction of these elements. Various pathway illumination strategies (direct, indirect or indication lighting) emerged by generating different luminaries and lamps, and they may lead to the study of how these strategies would probably influence human perception (Hong, 2007).

2.6.1.3 Nodes

Central points of activities are regarded as nodes. Nodes need to be highlighted for locals so that they can identify and employ them as public facilities at night. Since these structures are served as a means of direction for the inhabitants and the place for the public to assemble, they should be recognized by lighting within the larger environment (Hong, 2007).

2.6.1.4 Districts

A group of similar elements or the separation of a distinguished part from the neighboring area marks a district. The lighting strategy adopted by Lyon perfectly shows that a city is divided into parts based on their historical significance. When

areas are separated via illumination, the difference among urban zones become more noticeable and vivid. Yet, it should be noted that putting too much emphasis on highlighting the difference among the zones may cause visual variety, which would result in over-stimulation of the senses and fatigue (Hong, 2007).

2.6.1.5 Edges

It is defined as a multi-dimensional concept, the borderline between various items or the classification of the construction or shape of geometrical figures (Lynch, 1960) when illuminating edges of forms, the object become more clear against the background, besides as edges are highlighted improved understanding of the geometrical shape of the item is acquired, this would end in facilitating perception and obtaining instant information about the object. The boundary between two different objects is also described as edges. This boundary needs to be distinguishable for transparency of shapes and visual distinction. When objects are illuminated, the edges are visibly highlighted while preserving a proper degree of contrast between the item and its background. Moreover, the edges of the geometrical forms would be more apparent when forms are illuminated via the employment of constant lighting fixtures, like the LED strip. This could sketch the shapes and strengthen the silhouette (Hong, 2007).

2.6.2 Highlighting details and textures

Gibson emphasized that in observation, the capacity to recognize the textures or specifics of the items is significantly essential. (Nasar, 1988) The illumination of forms needs to be explored even if objects' textures and details are equally illuminated in daylight. Every distinctive detail or texture of the objects ought to be considered while illuminating to preserve uniformity with their daytime appearance. In order to avoid unpleasing shadows when objects have specific details, the placement items and the connection of the light and the angle of illumination should be applied with caution. According to studies about the perception of statues at night, once the lighting fixtures were positioned at the underneath of the sculpture (which is commonly applied for sculpture illumination), it would lead to unpleasant shadows which turn the statue into a "frightening" and "intimidating" appearance (Mavhik, 2000).

2.6.3 Naturalness and variety

As studies suggest, naturalness is regarded as a prevailing element of preference. Besides, people show more tendencies towards green areas and prefer natural surroundings to the ones manipulated by human interference. (Nasar,1998, p.64). The individual had an inherent liking towards nature and green areas (Kaplan, 1983, Kaplan, 1998; Nasar 1998; Rapoport, 1977 et al). As it is mentioned in researches, there exists a connection between nature and human preference of space. Nasr has come to this conclusion that “cities can improve their evaluative image by adding natural elements (such as trees, water, and mountain) and providing views to nature.” (Nasar, 1998, p.65) The impact of green areas artificial lighting on space preference still leave a place for more investigation; however, green areas lighting has great importance in the creation of the lighting masterplan. The codes of practices do not emphasize on the lighting of parks; however, the illumination of nature should pinpoint its texture and forms of trees while offering suitable lighting level for the functionality of space. To bold, the greenness of vegetation, lamps of appropriate Color Temperature and translation should be employed and not the grayish tone of Low-Pressure Sodium Lamp Lighting. The Sodium Lamps would not generate an appealing translation of colors as they were often utilized for their economic life span and output in public area lighting. Through the evaluative maps; theory and studies point out that humans choose visual arousal and complication. The human sees some indirect references to this variant in the preferences for historical zones that tend to have more detail and in the visual richness of the most similar spaces (Nasar, 1998).

Variety could provide sensory stimulation that is desired by a human. Studies stated that although people would rather a variety, there should be an order in it. This order is generated by gathering the same elements or refined creation of visual groups. Excessive variety would cause complication, which is not desirable at all (Kaplan, 1983). Thus, variety should remain as an essential feature in designing urban lighting masterplan to satisfy the users' interest and eagerness for more exploration (Kaplan, 1998).

A variation could be realized by,

1. Various lighting techniques
2. Employment of colored lighting (the subsequent shall explore the associations of colored lighting)

3. Dividing the whole illuminated area into areas, based on their functions or preferred impression. This would result in generating a tempo in the urban surroundings, which provokes a desire for more exploration. It should be noted that the edges between these zones should be treated attentively (See the previous section on “edges”.)

2.6.3.1 Coloured lighting

Colors are regarded as a fundamental part of the environment. Their possible impact on perception is highly recognized in many studies and literature (Mahnke, 1987). Lighting can possibly modify the appearance of the objects since colors would be restored in objects or the form of colored illumination. Survey indicated that since colors could provoke mental images, they would influence one's preference for the object in both illumination and surfaces of the objects. It is also emphasized that particular colors have powerful cognition meaning, based on cultural influences.. According to Mahnke (1996), when color lighting is employed, the choice of colors should be done with attention and in accordance with the illuminated object and the context. An endless variety of mechanized color changing LED lighting practices are accessible for outdoor lighting as LED illumination technology is promptly developing. The common combination of LED lighting practices with façade structures is the attribute of the growing popularity of colored lighting for outdoor façade lighting. This is observable in plenty of outdoor lighting projects and combination of these colored lighting practices with urban lighting master plans.

The utilization of light filtered through colored filters, or the colored lamps, such as Neon or Cold Cathode Lamp resources are among the elements of outdoor colored lighting. It should be cautiously decided to what level colored lighting could be employed even though it inserts enthusiasm and dynamism into spaces. According to studies, light and color have a visual and non-visual effect on human (Mahnke, 1987). It is also summarized that colors have a huge mental influence on the individuals within the space since colors intellectual connotations would assist people to grasp the significances of the space. Therefore, the translation of space and complementation of the spatial intentions could be achieved through colors (Thompson, 1994). For instance, the recovery of patients could be positively influenced by vibrant colors;

however, the exaggerated use and combination of them would result in chaos and over-stimulation of senses and sensory fatigue.

It should also be noted that if the environment becomes deprived of colors monotony, would lessen the desire for environment exploration. The choice of color and insertion of balance in the visual environment would add to the visual quality and ends in appreciation of our environment.

Few pieces of research have been done about colored lighting and its possible influence on spatial perception. However, the general influence of colors on perception could be noticed via patterns. Studies on color temperature from lamp resources and its consequent influence on understanding had proved that forms can be noticed from the preference of spaces translated in various Color Temperature spaces; similarly, diverse Color Temperature lamps are regularly connected with diverse planned atmosphere. (Laurentin, 2000; McCloughan, 1999).

It is clearly stated in many studies that color lighting should be related to the context of the illuminated object and not be utilized excessively. This would diminish the visual distortion of daytime images. If the difference of daytime image with its nighttime image is considerably high, it will generate an undesirable sense and feeling of disorientation (Lynch, 1960).

2.6.3.2 Differentiation between elements

As mentioned by Lynch, the visual influence of every item in the urban area should be driven into context by lighting (Lynch, 1960). When considerable diversity of objects exists in the environment, preserving their appearance and avoiding visual distortion become crucial in their illumination. Likewise, the clever and proper selection of lighting strategy and lamps would complete the setting of the item and connect it to its environment. It is significant to obtain differentiation but it should be noted that exaggerated contrast would interpret the object in isolation from its setting. The uniqueness of each element has to be characterized and at the same time each element has to be visually integrated, this would guarantee the continuity in experience through the urban spaces.

2.6.4 Historical values

Historical values or significance is regarded as an element for the construction of a likable city as suggested by Naser, “historical content enhances building imageability”, “meaning” and “historical significance may also evoke favorable responses through favorable associations”. (Nasar, 1998, p. 72)) In his work on the design features for urban planning, Rapoport said that the recognition of historic landmarks was frequently preferred by users and that this recognition would not only strengthen the imageability of the environment but also be linked to preference. (Nasar, 1998; Rapoport, 1977).

Historical forms are regarded as landmarks in many lighting master plans but they are not highlighted properly by lighting strategy. These historical landmarks were illuminated by low-pressure Sodium lamps as they produce orange lighting outcome which relates them to an ancient world charm.

Yet, these Low-Pressure Sodium Lamps had low Color Rendering, which causes the primary color of the construction to soften. Besides, the luminaries containing these Low-Pressure Sodium lamps are generally massive and will be visually frustrating in connection with these historical facades.

The subsequent notes should be attended for lighting historical landmarks:

1. Selection of lamp resource
2. Direction and cut-angle of illumination
3. Forming focal points within façade (for highlighting the entrance and main details)
4. Protection of luminaries on buildings
5. No noticeable mounting on façade

As it is previously mentioned, each lamp source has its own technical characters, and it is served for various goals. It is preferably suggested to highlight the historical construction in their real form and definite colors through the application of lamps of the proper color. The illumination of historical buildings is delivered by application Lower Color Temperature lamps to obtain desired historical atmosphere. The selected luminary has a connection with the illuminated façade, which should be taken into consideration. This connection would decide if a soft lighting or a stressed one is required to highlight certain architectural features. Moreover, such luminaries should not be visually noticeable throughout the daytime, and they have to be perfectly merged into the specifics of the façade while decreasing the physical destruction on

the façade. The position of the luminaries should be adjusted carefully as it deals with the appearance of the building, and similarly, the angle of luminaries should be noted as it carries the desired effect for building lighting.

2.6.5 Visual Hierarchy

Researches in quality lighting of indoor environment had concluded that human responded to an illuminated environment of varied lighting level and contrast. (See Chapter 3.1.4) In the lighting master plan, a sense of rhythm should be maintained through the movement in the larger environment, as human would prefer variety and the senses are heightened from the presence of environmental stimulants. (Lynch, 1960) In the creation of different visual hierarchical structure for the whole master planning, it would lend clarity and highlights in the urban night time environment, and orientation would be easier, while visual landmarks identifiable. Hierarchy should be identified in the order of importance in relation to the daytime image of the city, and districts can be drafted to separate the spaces of different lighting intensity or brightness level, in relation to whether special lighting effect would be utilized. This would enable the analysis of the composition of the resultant illuminated space. Lighting should not only consider the illumination of the landmarks individually, but how each landmarks should relate to another landmarks, whether in close proximity or distant.

Also, the highlighted elements should not have high contrast to the neighbouring elements, to prevent glare.

2.6.6 Perceivable Foreground and Background

In all the lighting codes and practices, many masterplans had considered the illumination of building or districts individually, without consideration of the composition of the entire illuminated nightscape, in relation to how human perceive his environment. Since the urban composition is more complex, as compared to indoor lighting environment, together with the elements which existed in different geometrical shape and height, there would be visual “layering” of these elements. This is extremely evident when panoramic views across the whole skyline were possible, with example like the Victoria Harbour Lighting Master plan. In these instances, the composition of the foreground elements to the perceivable background would be important, and whether the contrast between the foreground and background would be

appropriate to highlight either of the elements. In addition, in the physical landmarks, the top of these building should be sufficiently highlighted using quality illumination, to allow visual identification of these landmarks at any point within the city, which would ease orientation.

2.6.7 Psychological Comfort

All Code of Practices proposed tables of allowable illumination for different areas in the lit environment. However, these had fulfilled the functional requirement for lighting within each zones but neglected the human psychological needs. Nasar had highlighted in his case-study of the ratings derived of same spaces within the city during the day and night and concluded that the spaces which were favourably rated in the day, were rated neutral to unfavourable in the dark. (Nasar, 1998) Hence, this indicate that the lighting level is not just a quantitative requirement but is correlated to psychological comfort of the illuminated space, which is perhaps attributed to the foreboding sense of danger lurking in the corners in these areas. (Parkes and Thrift 1980; Hanyu, 1995) Studies had demonstrated that the level of brightness is not necessarily correlated to the psychological comfort it would render on the users. Another factor that should be considered is the environment which is of proximity to the illuminated space or the character of the illuminated environment. It is especially evident in areas where the crime rate is higher or if there were no clear visual access to any neighbouring inhabitants. Therefore, “guidelines sensitive to both conditions might call for a deflected vista during the daylight but the use of permeable vegetation and lighting to remove concealment after dark” (Nasar, 1998, p.124), were two design strategy to increase the psychological comfort of users in the dark.

2.6.8 Context and Culture

Nasar had elaborated on the importance of context in relation to urban design. (Nasar, 1998) In perception, there exist 3 components, namely, direct perception, evaluation and cognition. (Rapoport, 1977) From the name, we would derive that direct perception is the direct reaction to the viewed objects, while evaluation and cognition relied on the mental processing on the significance of the processed object. (Rapoport, 1977) Although cognition is often volatile and affected through a variety of personal factors, it is still clear that site context and cognition still play a role in the resultant visual imagery formed. Lighting could consider the culture through the choice of

appropriate coloured lighting, as colours would have psychological effects on human perception. For example, red might be related to good fortune for the Chinese, yet might relate to the opposing meaning in another culture. In addition, the lighting designers should have a thorough understanding of the site context before the proposal of any drastic lighting design for the area, for example, some might feel that the modern LED lighting or perhaps the concepts of illuminated flooring should not be seen together with old historical elements. Although these installations would not pose to be of any visual highlight in the day, they might appear to be jarring or disturbing at night, which demonstrate a strong contrast to the daytime image of the city.

2.7 Results

In this section, we have investigated and collected the information about the history of urban lighting, the foundations of urban lighting design, the impact of lighting on people, and required design ways to strengthen in nightscape for the city identity. The results summarized below.

- Illumination of building and landscape elements develop neighborhood identity and provide nighttime interest.
- Lighting design with considering energy efficient fixtures and contribute to more sustainable development.
- To avoid half of the useful life of the city (at night) stay useless and achieve quality with the right lighting design
- The urban landscape is more than the physical morphology of a city or an urban space.
- Urban Lighting affects human perception in addition to providing enough illumination for the functionality of spaces.
- The urban lighting system includes the choice of lighting technique use of fittings as well as the human-environment factors which make urban lighting design a complex phenomenon which should not be underestimated.

- Design of urban lighting needs an understanding of the intricate relationship between the available technology and human perception in order to make urban lighting design basis to complement the existing urban structure.
- Considering the large scale emergence of new lighting technology, architects and urban designers must give adequate attention to the design process as well as the use of technology for achieving desired results as far as nightscapes in the cities are concerned.





3. URBAN LIGHTING MASTERPLANS AND GUIDES

In the last two decades, urban areas have been developed and renewed due to the progress, innovation, and attraction created by urban lighting master plans which will extend its importance and impact to the following three decades (Tellini and Ianone, 2006).

According to Narboni (2004), 'urban lighting master plan has been widely considered as an element of 'reformation of urban identities' since the 1980ies. The city of Lyon, France can be regarded as an example of a notable and pioneer lighting master plan project which leads to enhancing the city's image in a positive way. By offering nightly sceneries, these master plans build resourceful and conceptual images of the cities (Phillips, 2004; Tellini&Ianone, 2006) Urban lighting master plans combine and harmonize basic rules in lighting design and in this way, they bring coherent and vivid nightly structures, pleasing ideas, and protected and assured urban areas. Moreover, urban lighting master plans target the questions of energy saving, budget saving solutions for urban façades and green and recyclable lighting supplies (Unver, 2009).

3.1 The approach of Existing Urban-Lighting Master Plans

The cities' night sceneries are made of hundreds of various illuminated urban segments with different size and intensity. These segments include public lighting, the insides of residential areas and offices, and illuminated constructions which both form nightly urban landscapes.

Without a holistic approach, it becomes challenging to generate a design and composition which offers an improved reading of the site of the morphology or the urban form, of the depth and topography of the urban area (Narboni, 2004).

From the beginning of the 20th century, artificial light has been illuminating the roads, marketplaces, residential and office blocks and main city elements.

The night composition of the urban sceneries has been constantly growing and improving in Europe and North America, even if it experienced deterioration all through the war and post-war eras amongst 1930ies and 1950ies Ritter (2008) until the

late 1980ies the city illumination designs were more concentrated on some parts of the city and not the entire the first thorough urban lighting plans were designed in France 1980ies due to the “festive lighting” event which was held in Paris in that time and promoted more investment in urban lighting (Enginöz, 2004). During the 1980ies, lighting designers and urban architects are making attempts to initiate composed, alluring, practical and adaptable urban appearances at night by the means of urban lighting master plans.

Studies show that engineers who have designed the master plans of urban lighting attempt to reinforce particular areas in the nightly urban atmosphere. These areas are regarded as the people’s perception of the city image based on what Kevin Lynch (1960) concluded in his study. Edges, districts, nodes, and landmarks are among them.

The outcomes of Lynch’s survey suggest that the insight, attitudes, and memories of people traveling to an urban area are basically formed through these five basic features. The Space Needle in Seattle, the Eiffel Tower in Paris, the Bosphorus Bridge in İstanbul or the Brandenburg Gate of Berlin -regardless of the city size- inhabitants and guests create a unique image of the city in their thoughts.

When it comes to sketching a city or an area, people tend to draw basic city elements such as highways, pathways, a main square, an exceptional building or a monument which are repeatedly observed in their sketches. Urban lighting master plans strengthen these features to deliver a pleasant arrangement.

Urban lighting master plans provide lighting designs for roads and pathways which are not lightened up for transportation security and people welfare, consider the efficient employment of energy and also satisfy the aesthetic need of people. These master plans also offer a unified and categorized street lighting that adds to the city distinctive features. Additionally, they illuminate city edges in order to outline borders of urban areas and separate spaces which are aesthetically and functionally different.

Urban lighting master plans bring the distinctive experience of daytime into the nighttime in a variety of districts. Here districts are basically regarded as the atmosphere and character of the area whereas their nighttime character is defined and shaped by urban lighting. Furthermore, urban lighting master plans notice the significant ‘happenings’ in the nodes with the help of lightings, like outlining the transportation lines and transition zones from one form of transport to another or one

rank of hierarchy to another. Lighting describes functionally distinguished zones in nodes (including squares), stresses and improves the aesthetic characters of intersections (Unver, 2009).

Through lighting the urban spaces and preserving their unique personality throughout the night, a well-organized urban silhouette is created. Rather than attracting people's attention in an unorganized manner with separated nightly layouts, urban lighting master plans centralized the attention with creating organized silhouettes at night and unified nightscape composition of the city.

According to studies lighting principals which are particularly designed for urban areas, generate desirable sights in the city at night; however, urban lighting master plans generate a consistent city image at night by placing these segments within an abstract and all-inclusive context (Unver, 2009).

Yet, urban lighting master plans are considered as durable tools for city authorities: lighting plans offer flexibility and are strategically performing to achieve the goals of lighting design for several years. Besides, the implementation of these master plans cleverly find solutions for questions like substitution and reusing of the mercury lamps, energy saving light resources and lighting patterns, and monitoring the general light concentration to prevent light pollution (Unver, 2009).

3.2 Practical Approaches for Urban Lighting in Turkey

With the globalization process in Turkey, in line with the developments experienced in urban planning; both in terms of sectoral and planning, a significant progress has been made in lighting and the importance given to urban lighting has increased. In the process up to the present day, so far no lighting master plan study has been conducted. O. Sunguroğlu's Bosphorus and its Surroundings, Lighting Master Plan Study, 2001, N.İlgürel; M.Ş.Sözen's İstanbul Lighting Master Plan Preliminary Studies, Kadıköy Region, 2001 etc. regional and partial studies remain as academic publications. The inadequacy of these studies and the fact that they remain in the academic literature shows that they have not passed to the implementation stage and our cities do not have a lighting master plan or master plan preliminary work. The fact that there are no authorized institutions and organizations on this subject indicates that we have not yet come out of a fragmentary approach.

As a result of a meeting held with a firm engaged in interior and exterior lighting design, lighting fixture sales and lighting design applications in Istanbul; manufacturers and designers do not get enough support in order to develop themselves and to do their jobs correctly. It was found that they did not receive proposals and suggestions. However, according to our studies, in several cities there is a public department where each city has experts in this field and there are private companies, lighting designers, universities and academic staff working in cooperation with this department.

3.2.1 Sustainable urban uighting policy for Istanbul

The City Lighting and Energy Department continues its activities in urban lighting to contribute to the urban image of Istanbul and to a sustainable life in Istanbul.

The systematic illumination of Istanbul, revealing the unique daytime appearance at night and emphasizing its value will bring security, happiness and ownership to the inhabitants in many ways, while providing added value for our country in terms of tourism. Undoubtedly, any work to be carried out in this direction will be a preparatory for 2010 and at the same time will be an inevitable part of the Istanbul Lighting Master Plan.

3.2.1.1 City lighting platform

In line with public needs and expectations, the City Lighting Platform has been established to guide the city lighting policy. Important lighting projects will be discussed, objectives will be determined and the quality of urban life will be improved with the platform established. To ensure the participation of non-governmental organizations related to urban illumination which emphasizes the historical richness and cultural identity of Istanbul and to create a sense of belonging to the projects will be the main goal.

3.2.1.2 Environmental protection

Urban lighting systems also have a negative impact on the local and global environment. Light pollution, glare, waste energy generation, urban sky brightness etc. In this context, this issue will be dealt within the city lighting regulation.

3.2.1.3 Urban lighting regulation

The main aim of this study is to prevent outdoor lighting that would endanger the safety of drivers and pedestrians, to prevent light pollution and to bring order to the lighting in cities.

3.2.1.4 Integration with the world

In order to share city lighting experiences of major cities in the world, Istanbul Metropolitan Municipality joined LUCI (International City Lighting Association) in Moskova and Paris.

3.2.1.5 Energy efficiency

Energy consumption is controlled by the automation system and energy efficiency is considered in the design stage.

Architectural lighting systems are turned off at a certain hour at night to save energy. The first example of this strategy was realized in Bozdoğan Belt Lighting. At 01:30, the entire lighting system is switched off.

Lighting dimming systems in road lighting systems will be included in the agenda items in the near future.

3.2.1.6 Coordination and communication

With the City Lighting Directorate; Urban Design, Urban Planning, Historic Environmental Protection, Tourism directorates and district municipalities within IMM Coordination between AYEDAŞ, BEDAŞ, Police Department, General Directorate of Foundations, Ministry of Highways, Culture and Tourism is required.

3.2.1.7 Aesthetic

The material used in lighting fixtures and their assembly methods have great importance in terms of urban environmental aesthetics. For this reason, special solutions will be produced for the region to be illuminated in terms of environmental, cultural and historical harmony in Istanbul. The local identity of the city will be preserved by making special design for the place (Şerefhanoglu, 2010).

3.3 Introduction on Keywords of Application for Urban Lighting

Design of Urban Lighting Master plan is still dependent on the choices made by the lighting designers, while implementing the recommended lighting requirements from Codes of Practices, to ensure an aesthetically pleasing, yet functional, illuminated environment.

The Codes of Practices stayed as the main reference book for designers who aim at drafting lighting requirements for each individual space, however, some other design handbooks printed by others (Philips, 2002; Lumsden, 1974).

Lighting designers refer to four leading lighting authorities including CIE (Commission Internationale de l'Eclairage), the IESNA (Illuminating Engineering Society of North America), BSI (British Standards Institute) and the CIBSE (Chartered Institute of Building Service Engineers).

The subsequent chapter deals with the above publications and their suggested design basis for outdoor lighting and urban lighting. As a conclusion, the lighting guide published by IESNA is the one with a holistic view in terms of urban lighting while considering various zones of the city with their special requirements and standards. In this discipline, the town is divided into different areas regarding its architectural design and the suitable lighting technique. Sort of luminaries or lamps are indicated for their benefits and suggested use. British standards focused on strategies which are suitable for street lighting while considering the further outdoor areas such as parks and squares as subordinate spaces standing nearby to roadways. These principals adopt an extremely basic manner in dealing with urban lighting as they did not offer a wide-ranging list of suggested luminaries and lamps to those presently available.

3.3.1 IESNA – Guide for outdoor lighting

The Illuminating Engineering Society of North America (IESNA) is a specialized group known for their commitment to the delivery of good lighting. This society is also recognized for its publication about design standards and Codes of Practice for the lighting of indoor and outdoor areas. These publications are considered as a source of references for the design of the lit environment.

The Lighting Guide for Outdoor Environment was meant as a generic guide to good exterior lighting, with introduction on the constituents to the quality lit environment,

with main objectives as to “assist all who take or influence decisions that affect the safety, security, and pleasantness of urban and rural districts.” (IESNA, 1975, p. 6).

The previous edition of this guideline was published in 1975 (IESNA, 1975) while the second edition was published in 1999 (IESNA, 1999). As far as these publications are compared, it can be concluded that the guidelines are concentrated on the visual comfort of a lit environment rather than the strict application of lighting density and engineering values.

Consequently, the writer had regarded the second edition of the Code of Practice as a more inclusive one in suggesting appropriate urban lighting practice, so that it would be studied in this subchapter.

“Outdoor or exterior lighting should allow promoting safety and security at night, enhancing appreciation and enjoyment of the surroundings and by giving a sense of belonging, assisting people to relax.” (IESNA, 1975, p.7). IESNA guideline for outdoor lighting contains below elements,

- a. Aesthetics and Influence on Visual Understanding
- b. Environmental Concern of Urban Lighting
- c. Technical Attributes to Well-Lit Environments
- d. Lighting for Various Urban Features
- e. Economic Concerns Rising from Urban Lighting

a. Aesthetics and Influence on Visual Understanding

When it comes to appropriate lighting, aesthetics and comfort regarding visual aspects are regarded as key elements of the lit environment.

Three categories of vision are namely Mesopic, Scotopic, and Photopic Vision. (For more details see IESNA, 1999, P7) Consequently, in the beginning section of this Code of Practice, rudimentary pieces of knowledge to good lighting are presented, among which some topics are brightness compared with Illuminance, Reflectance, Illuminance, Color Rendering, Glare, and Color Appearance. In order to have good lighting, we are required to take the mentioned points into account besides different lighting techniques presented in this guideline including area lighting, floodlighting, accent lighting, covered area lighting, and emergency lighting. The urban lighting guideline, which was edited and published in 1999, explained the concept of quality urban lighting and supplemented the previous edition.

This concept “helps define a positive urban character and image.” (IESNA, 1999, p.3) It is exceptionally significant how to compose the illuminated environment. It should be connected with the community that established the theme of lighting while visual hierarchy needs to be created to provide clarity in the nightscape’s formation and structure.

b. Environmental Concern of Urban Lighting

In urban lighting guideline (published in 1999) two concepts are discussed “light pollution” and “light trespass”. These concepts are regarded as two main problems caused by mismanagement of the illumination techniques. The utilization of lighting, which is directed towards hemisphere, should be limited to avoid these problems as much as possible.

Table 3.1: IESNA Defination of envronmental zones (IESNA, 1999).

Zone and Description	Recomended Maximum Illuminance Level
Zone E1: Areas with intrinsically dark landscape- exaple are national parks, areas with outstanding natural beauty, or residential areas where inhabitants have expressed a stornng desire that all light trespass be trictly limited.	1 lux (0.1 fc)
Zone E2: Areas of low ambient brightness – these may be outer urban and rural resiidential areas.	3 lux (0.3 fc)
Zone E3: Areas of medium ambient brightness- these will generally be urban residential areas.	8 lux (0.8 fc)
Zone E4: Areas of hight ambient brightness – normally these are urban areas having both residential and commercial use and experience high levels of night-time.	15 lux (1.5 fc)

When it comes to escaping an uncomfortable visual environment, we should center directional light exactly on the object to reduce the form of light called “stray”. The fixtures should be programmed in a way that it would be switched when it is in non-use status. Additionally, for diminishing the light trespass impact, the outdoor space is categorized to four distinguished zones (IESNA, 1999), based on the things done and occurred within each zone and its relevant requirements of lighting. Also, this determines the employed luminaire level of brightness in each zone (IESNA, 1999).

c. Technical Attributes to a Well Lit Environment

A suitable lamp selection is crucial in a well-lit environment’s composition. Color Rendering and Color Temperature are regarded as features that are prone to change the façade of the objects perceived to its real shape.

Table 3.2: Illuminance level for floodlighting buildings (IESNA, 1999).

Area Description	Average Target Illuminance (Vertical)
Bright surrounding and light surfaces	50 lux (5 fc)
Bright surrounding and medium light surfaces	70 lux (7 fc)
Bright surrounding and dark surfaces	100 lux (10 fc)
Dark surrounding and light surfaces	20 lux (2 fc)
Dark surrounding and medium light surfaces	30 lux (3 fc)
Dark surrounding and medium dark surfaces	40 lux (4 fc)
Dark surrounding and dark surfaces	50 lux (5 fc)

To utilize lamps properly, one should consider, lamps life and their efficiency, features of each lamp as they vary from one to another and their pros and cons.

Table 3.3: Recommended color temperature for illumination (IESNA, 1999).

Recommended Color Temperature (K)	Illuminated Object
2100 – 3500 (Warm)	When a warmer setting is required or in lighting of specific type of architecture like Brick or Sandstone
4000 – 5000 (Cool)	Green landscape

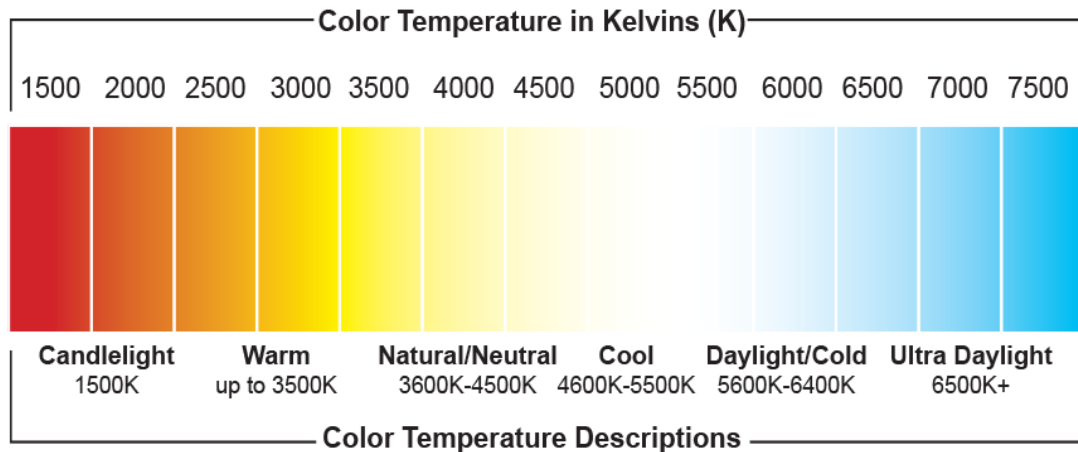


Figure 3.1: Color temperature description (IESNA,1999)

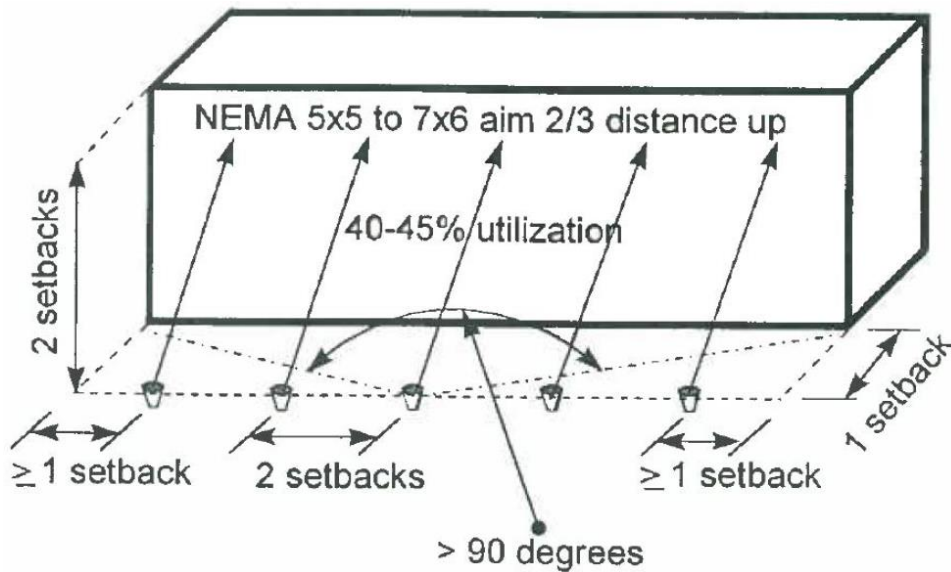


Figure 3.2: Recommended floodlighting geometry (IESNA,1999)

d. Lighting for Various Urban Elements

Due to the existence of a variety of urban elements, one of the main objectives in lighting would be to suitably highlight the different textures of these elements and to enhance the skyline. There are practices of lighting design for the elements of landscaping and architecture suggested by IESNA. A properly composed well-lit environment would definitely contribute to the overall urban planning strategy of the city, by creating focal points and “circulation patterns can be reinforced, and the entire area unified with street lighting and landscape lighting” (IESNA, 1999).

This instruction has recognized different urban elements according to their types while employing proper lighting systems and techniques for their illumination. The guideline also divides the whole outdoor area into separate spaces with their particular illumination requirements which are Town and City center, rural districts as well as urban residential areas.

Besides elaborating on the general lighting requirements in terms of the measurable luminance level and composition of the lit environment, the guideline address to the lighting of selected urban elements as explained below,

- 1 Buildings
- 2 Viaducts and Bridges
- 3 Individual Specifications
- 4 Entertainment and Recreational Areas

Table 3.4: Extract of lighting recommendations (IESNA,1992).

Typology of space	Illumination technique
Architectural structure	<p>Floodlighting technique, when employed in different methods:</p> <ol style="list-style-type: none"> 1. Positioning in illuminating direction can create different effects on illuminated surfaces, either the diffused shadows from direct aiming of light on surface or the modelling of the details from sharper shadows. 2. Floodlighting when directed in various methods can strengthen the dimensional qualities of the element, like the construction details (finish, textures, shape of surface material) 3. Nature of finishing would determine whether floodlighting would be utilized. It is not recommended for highly reflective surfaces. 4. Application of highlighting of discrete architectural details. <p>Architectural character of the illuminated structure should be considered in whether floodlighting would be used. In the event of buildings with strong verticality or distinctive architectural features, accent lighting would be more appropriately used.</p> <p>It is important to minimize instances when floodlighting is directed upwards, to reduce lighting pollution. Hence, choice of correct beam spread, external and internal shielding and careful field aiming would aid in the reduction of light pollution.</p>
Landscaping (Soft-scape)	<p>Primary lighting objectives:</p> <ol style="list-style-type: none"> 1. controlling glare

The aforementioned guideline talks about the favorable situation for the implementation of the floodlighting technique in the architecture illumination or Soft-scapes. In order to influence the floodlight to achieve better highlighting and visual effects, some suggestions are made by the instructional guideline.

e. Economic Concerns Rising from Urban Lighting

“Lighting system conditions should be considered in realistic rather than optimistic terms when establishing such maintenance factors, as lamp lumen depreciation, luminaire dirt depreciation and ballast factor.” (IESNA, 1999, p. 22) The proposed lighting system should offer both appealing nighttime environment and practicality. Consequently, as lighting designers aim at drafting urban lighting master plans, they should pay careful attention so that the proposed system remains maintainable. Besides, they need to keep an eye on the most appropriate luminaire or lamp source concerning the site condition.

3.3.2 British Standards Institute – Instructional Guidance of Outdoor Lighting

Being the National Standards Body of the UK, The British Standards provide principals and standardized means of solving problems to answer the demands of businesses and society besides the lighting designers who employ their lighting codes for outdoor lighting and design of the lit environment. The publication is categorized into nine different chapters describing various outdoor lighting environment and their requirements. (See BSI, 1992) The ninth part of the publication emphatically deals with urban lighting. That is to say, this Codes of Practice is considerably focused on the need for road lighting with an eye on different kinds of pedestrian or vehicular circulation while generating the ideal lightened space for them. The final part in this Codes of Practice deals with other areas of urban center by separating them in accordance with their functionality. In addition to offering adequate lighting level for crime prevention and safety of moving vehicles, lighting would “bring a sense of order to a space where it is lacking and enhance those building of significant architectural merit.” (BSI, 1992 , P. 4) in this way, a balance between visual hierarchies and urban elements of various items that require lighting is fulfilled. This should also be noted that lighting master plan minds the following points as cited in BS 489, page 5 (BSI, 1992):

1. Design of illumination and selection of utensils and tools in correlation with the architectural scenery and urban landscape
2. Lighting for the purpose of delivering safety for pedestrians against vehicles and to prevent offensive behavior
3. Illumination in accordance with the specification and heaviness of vehicular traffic (cyclist included)
4. Managing illuminated advertisements to the convenience.
5. Managing and combining long-lasting floodlighting equipment within the visual master plan
6. Managing temporary particular lighting effects including floodlighting and decorations of festive
7. Management of pathways and signs and their connection with lighting elements
8. Management and combination of illumination from private and public sources, such as bus stations and telephone kiosks.
9. Protecting residential expansion from light pollution

10. Security of equipment and installation from unintentional or intended damage

11. Installations preservation and maintenance.

The ninth part of this Codes of Practice will be carefully reviewed in this sub-chapter as this part is focused on the trending ways for urban illumination and lighting stressed in Codes of Practice. The afore-mentioned part of the Code of Practice addresses the following urban spaces: areas of circulation, parking lots, service areas, conservation areas, landscapes and playgrounds, landmarks, decorative lighting, and lighting of fountains. For each of these spaces within a city, lighting requirements are suggested such as lighting level and technical recommendations including lamp properties.

Nevertheless, a number of elements cited in the afore-mentioned Code are not to be studied since the lighting suggestions and objectives resemble those that were indicated in the Code of IESNA.

3.3.3 CIBSE & ILE – An excellent urban environment guide

Uniting all practice codes for the benefit of different sections in city centers is the main purpose of this lighting guideline and the ultimate aim is deriving a harmonized nightscape. Presently, this is realized that the outdoor lighting cover is not adequate in current Codes and Guidelines and more control ought to be exercised. Therefore this guideline would try to “form a basis for future controls.” (ILE and CIBSE, 1995, p.1). it should also be noted that exterior lighting would bring benefits such as:

1. Atmosphere utilizing lighting to generate preferred ambiance and spirit
2. Identity utilizing lighting to stress the distinctive personality of the area
3. Safety that brings about a nighttime atmosphere with an adequate level of lighting for inhabitants' security
4. Security-purposed illumination helps in decreasing nighttime crime and safeguarding people possessions and belongings at the same time
5. Orientation lighting of pathways and buildings would assist in distinguishing unacquainted nighttime surroundings and could aid individuals to locate themselves.
6. Promotion a town or city so as to increase tourism and boost the pride of the residents
7. Spectacle Lighting helps employment of outdoor spaces for recreation and extending the functionality of those spaces at night.

The present guide has pinpointed the lighting necessities of different outdoor areas including the urban fringes, towns, and cities.

1. Urban Fringes

The first space is also known as the zone of transition and is situated between the developed city area and the city surroundings. Since the brightness level is considerably lower in the countryside in comparison with the concentrated city areas, it falls mainly susceptible to the outcomes delivered by artificial lighting. As a result, there needs to be constancy in the level of lighting, without any “sudden or frequent variations in lighting levels” (ILE and CIBSE, 1995, p.10). Besides, the proper lamps selection, color temperature, and rendering of lamp sources should be considered while bridging the gap between the lightened areas and darker spaces which are adjacent to them. The intrusion of light into the darker areas needs to be attentively reduced because of the huge contrast between the illuminated environments and other areas neighboring them. This one objective can be executed through reduction of luminaries’ use. The luminaries are mainly equipped with utilities and utensils to minimize the glow and glare in order to conduct the light downwards or toward the preferable space.

2. Towns

Towns are smaller scaled comparing to cities with less human activities and mostly inhabited spaces. Alongside providing a visually pleasing space for residents, the lighting level should be maintained lower compared to city centers. We, as lighting designers, should treat fringe areas which are between towns just like other fringe areas. Moreover, centers of the towns require proper highlighting with the aim of improving conveniences of the public and generating appealing nightscape in terms of aesthetic aspects.

3. Cities

The very essence of human activities is embodied in the city where even in one area there exist a wide range of lighting systems comparing to towns or fringes. As a result, lighting plans in cities need to focus on various concerns and rank them according to their priority. Moreover, this plan should also notice the appearance of a lit environment to create a feeling of awareness. The lighting plan is also required to address the whole environment while taking the skyline and objects’ structure and composition into consideration. Diverse strategies toward lighting can be employed to

foreground the dissimilarities and peculiarities among districts within a city and to generate visual variety while arousing desired moods. It should also be noted that the luminaries' physical aspects need to be consistent with the object that is illuminated to preserve visual coherence. Such a lighting master plan would also provoke interest and attention as individuals transport through the city. This objective could be fulfilled by "variation in lighting pattern, color, and Illuminance from one area to the next." (ILE and CIBSE, 1995, p.17).

Finally, to satisfy the environment lighting needs, the city lighting should observe the following points:

- Practical requirements
- Structural and architectural
- Convenience
- Publicity

Prior to classifying the illumination precondition of an area, the listed points are to be taken into account. Therefore, the proper lamp source selection and necessary lighting level for the illuminated area comparing to its neighboring areas can be easily recognized. Identification of the overall visual hierarchy of the composed nightscape is crucial to guarantee a well-composed illuminated nightscape whilst making sure that the pinpointed space falls within the visual range alongside with the major direction of viewing. Following up on the steps described below contributes to the realization of the urban nightscape design.

Besides applying the steps described earlier in the master plan regarding urban lighting, there exists a necessity to cross-reference the official publications on "Sport Fileds Floodlighting", "Residential, Commercial and Various developments", "Sign & Advertisements" and "On Record Buildings", to obtain further comprehensive details about lighting essentials and lighting intensity of those spaces (Hong, 2007).

Table 3.5: Steps to designing of urban lighting master plan (ILE&CIBSE, 1995).

Step 1:	Identification of the overall composition of the illuminated urbanscape The assignment of the relative brightness of the individual building elements, on a logarithmic scale, for example, $1 : 3 : 5 : 10 : 30 : 50 : 100$ but the increment of this ratio should be kept manageable, to reduce the incurrence of overly varied lighting environment of varied intensity.
Step 2:	For example, If our structure is in the urban fringe, then the ratio would translate into $5\text{cd/m}^2 : 15\text{cd/m}^2 : 25\text{cd/m}^2$ With these ratios in mind, these could be translated into the designed Illuminance with knowledge of the surface reflectance.
Step 3:	After the establishment of the basic requirements, the designer would need to choose the mounting position for the luminaries, to allow the appropriate light modelling of the illuminated element.
Step 4:	Finally, one would need to select the appropriate luminarie and the lamp with desired lighting distribution.

3.4 Outdoor Lighting Mistakes

3.4.1 No contrast

Oversimplified lighting — such as an overuse of large floodlights — results in a lack of contrast that will make your object appear flat and boring. Carefully planned outdoor lighting design will create drama and highlight. This is accomplished by incorporating layers of light and using shadows (Bui,2005).



Figure 3.3: Example application of lighting mistakes- No contrast (Bui,2005).

Unlike sunlight, in outdoor lighting design we can control and apply light spread selectively to draw the eye to certain areas. First, it's important to determine the focal point of the design and create a lighting hierarchy. At Enlightened Lighting, designers consider how the home looks from all angles – not just from the street, but also from the entryway, from a deck or patio, and even from inside the house. This helps create depth in the design (Bui,2005).

Then, a plan is drawn up to include layers of primary, secondary, background and soft lighting, as well as dark areas to create contrast.

3.4.2 Lighting Glare

Even a dramatic lighting scheme can be ruined by lighting glare. If a contractor is careless and doesn't position a fixture properly ,you'll end up with an eyesore that looks like a reflection from a flashbulb.

Eliminating lighting glare will prevent distractions and allow the eye to focus on the whole picture, rather than a bright blemish. Lighting glare can be easily fixed by using frosted lenses or shrouds, and by considering the angle of the light (Bui,2005).

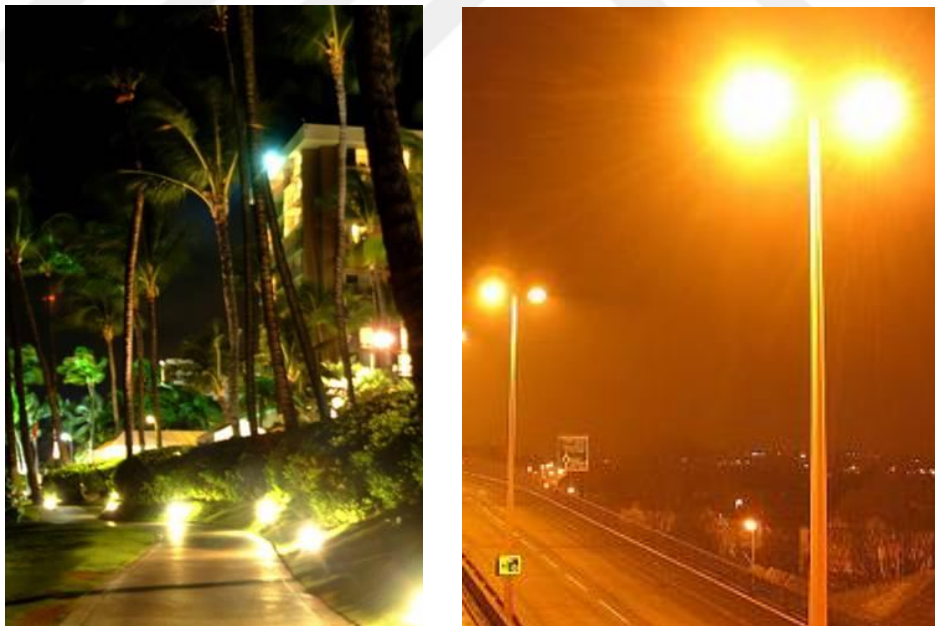


Figure 3.4: Example application of lighting mistakes- Lighting glare (Bui,2005).

3.4.3 Bad fixture placement

Just as the wrong angle can create lighting glare, bad fixture placement can result in over-illumination or an imbalance in the overall look of the home.

Our goal at Enlightened Lighting is to create understated elegance. Depending on the object we are lighting, we aim to diffuse the light to create a subtle and even appearance (Bui,2005).

For instance, on a larger tree, one light under the trunk may create an unwanted hot spot, whereas using 2-3 fixtures spread out around the tree will create a more balanced look.



Figure 3.5: Example application of lighting mistakes- Bad fixture placement (Bui,2005).

3.4.4 Wrong color temperature

Different fixtures have different color temperatures, and these color temperatures set the mood of your design.

If the color temperature in a fixture is too warm, it will produce a yellow-tinted light, which can appear dirty or dated.

A light that is too white can create a commercial, sterile feel.

Fixtures that create a bluish hue can make your object look dreary when not used for a specific purpose, such as moon lighting.

It's crucial to find the perfect color balance to accomplish your desired look. Also, look for consistency among all of the fixtures you choose. Don't forget to consider how a fixture's color temperature can shift as it burns out, which could result in inconsistency down the road.



Figure 3.6: Example application of lighting mistakes- Wrong color temperature (Bui,2005).

3.4.5 Under-powered light

When you spend time and money to create a beautiful design plan for your outdoor lighting, the last thing you want is for it to be ruined by under-powered lights. If a light beam isn't sufficient for the task at hand, a well thought out design will fall flat.

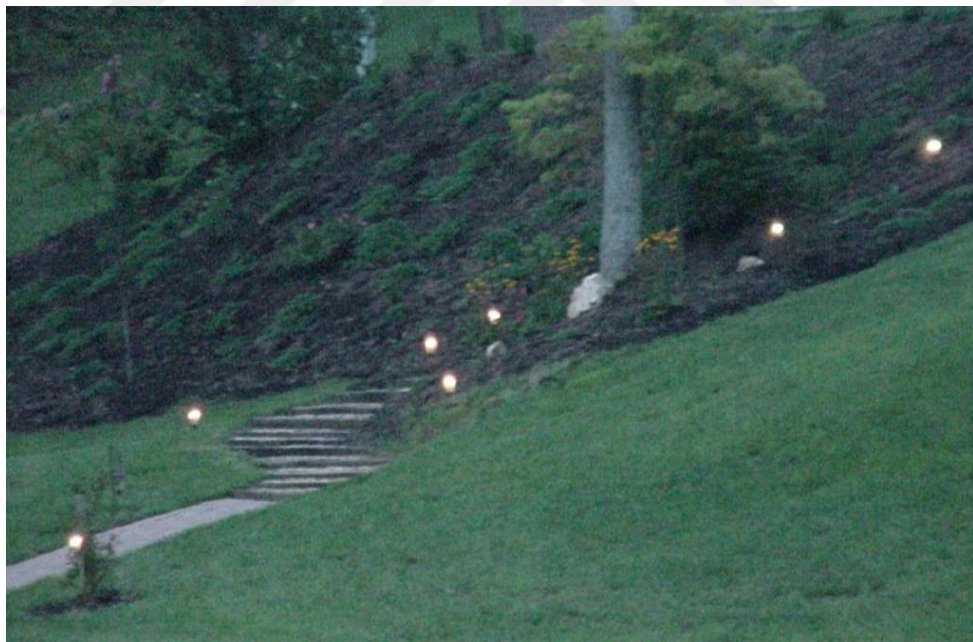


Figure 3.7: Example application of lighting mistakes- Under powered light (Bui,2005).

For instance, a light beam might only extend halfway up an object, or the spread of light might be too weak to wash a large area. The cheap, battery and solar-powered lights tend to be under- powered and appear dim, undermining a high quality outdoor lighting design (Bui,2005).

Lighting design can make or break your home's curb appeal. Contact us today and let us help you create a beautiful lighting plan that will bring out the best in your home.

3.5 Results

In this section, we have searched the urban lighting design guidelines and standards and summarized below:

- Outdoor lighting provides aesthetic appeal and safety, cultivate comfortable, safe pedestrian activity at night.
- Lighting integrated with city standards and with consider to general street illumination will complement the urban and mixed-use nature of the Site.
- Proper lighting for streets to reduce glare and contrast provide security and safety feeling for pedestrians
- Lighting design with considering energy efficiency fixtures and contribute to a more sustainable development.
- Outdoor lighting should eliminate glare or light spillage onto similar properties.
- All light fixtures should provide cut-off or shielding to minimize light trespass directly to the sky or into residential areas.
- Light levels should conserve energy and minimize the influence on surrounding neighborhoods by reducing one hour after business operation.
- Security lighting fixtures shouldn't be substituted for a parking area or walkway lighting fixtures and limited to loading, storage, and similar service areas.
- Security lighting should be protected.
- All wiring, transformers and equipment should be hidden or screened from public view.
- Alleys should be lighted by fixtures attached to buildings rather than by street lights or pedestrian lights.
- Outdoor lighting should consider energy efficiency and glare control so that it does not reduce the quality of the urban environment.

4. NIGHTSCAPE

4.1 Nightscape and Nightscape Lighting

According to Literature, nightscape in urban spaces can be admitted in the generalized conception of the urban landscape. In the subject of urban design, a generalized definition to the urban landscape can be reported as the comprehensive characters in a city or an urban space, including the interactions between different landscape factors, its spatial structure, local functions, cultural features and also its visual images to people. The urban landscape is more than the physical morphology of a city or an urban space. It has its artistic value, which can offer individuals different visual perceptions. Nightscape can be addressed as a branch of the urban landscape, just as the day time landscape. Nightscape is a re-performance of the day time landscape in urban spaces; the fundamental components that build nightscape separated from day time landscape are the differences between the natural lighting and man-made lighting on a different time. Nightscape does not mean nightscape lighting; nightscape design is part of urban design. There is another definition to nightscape lighting: “it means the lighting of outdoor spaces and urban landscape, except the security lighting and the lighting in stadiums or construction sites.” (Beijing Illuminating Engineering Society, 2004, P. 21).

Also, nightscape lighting is a new concept, compare with decorating the city, nightscape lighting is some sort of improved public lighting which applies illuminating facilities and methods to raise urban landscape. To make a better understanding of the relationship between nightscape and nightscape lighting, we could say, firstly, it contains illuminating technology, such as lighting facilities and electric knowledge. Secondly, it has artistic effects, like the forms, colors, how the lights rebuild the objects, and human’s psychological feeling about them. Thirdly, it still has the characters of the urban landscape, which might be in different types (Hongxiang, 2014).

4.2 Nightscape in Impacting Human Activities

Whatever is anticipated from an appropriate nightscape differs from an appropriate landscape. The view of a city acts like a coin with two sides: daytime and the landscape, nighttime and the nightscape.

Lighting is the main element that makes this difference. However, this difference is also recognized by a change of climate and environment, citizens' life in day and night, and ongoing activities in public spaces. The natural sunlight has a great impact on the city during day time. The colors and luminance of a city vary according to the cyclical changes of the sunlight and the climate conditions in different periods of the day. However, the nightscape of a city does considerably change by the influence of time or climate.

Yoshinobu Ashihara is a Japanese architect who has explained the differences between day and night in his book <The Aesthetic Townscape> “when darkness arrives in the city, lights inside the apartment building have been turned on. And then, the façade of the building just fade away into the darkness. During the day time, the façade was the focus of the building, but at night we can only see the windows and the view inside the windows.” (Ashihara, 1984 p.12). The nightscape becomes stable and somehow monotonous when the colors and the luminance of the lighting remain unchanged. Humans' visual perception is different at night, and their activities become more dramatic and hazardous as they are influenced by a change of light. Human's sense of control and visual judgment lessen during darkness and the same time they don't feel any obligation for rational and logical thinking as much as they do during working day time (Rudolf, 2001). Humans are also in pursuit of spiritual peace at night, and they become more sensitive and emotional. Consequently, a well-designed nightscape should provide mental relaxation and peace.

4.3 Nightscape and the Image of the City

Image of a city is the resultant image of it which has impressed the audience and has made them memories with it. On the other hand, the urban landscape in the world's major cities understood by symbolic buildings or places, as in the cases of; Paris and the Eiffel Tower, Beijing and the Forbidden City, Tehran and Azadi Tower (Cullen,2003). It seems that these symbolic elements generate the most prominent

memories that have been recorded in the minds of most visitors to a city. However, what creates the general image of a city.

Then the image of a city during the night and which stay in the user's minds is its nocturnal image.

The city's image is based on the emotional impact of the human mind, personal experience and memories, experiences of aesthetic judgment and collective memories, historical events and cultural framework of values. Also aspirations beside ideals forms that shapes the landscape and the landscape forms of urban areas and also exist by the quality of emerge and environmental physical factors through repetition. In front of people who percept it, turned to the common linking element between the members (Mardani,2010).

The urban landscape is defined by a number of factors, on one hand, the kinds of urban activity by the users which need more urban spaces, and on the other hand, how to define and design of the urban spaces that encourage users to participate in this space. These two streams affect why and how dynamic urban spaces are during the day.

Lighting buildings and index element which includes hard and soft origins of the landscape for making a dynamic urban space during the night hours, increase security and economic prosperity and make it readable, lively and habitable. Perhaps, illuminating the buildings, trees or one of the city's streets, could be the factor of a reputation for a city among the people on there.

Identity of a city defines the soul and form of it and vice versa. This interaction over time, induce a structure and specific image of a city in residents and visitors ' minds. The identity of a city, not only affected by general factors relatively stable such as functions but also dependents on variable factors such as the face of the city. How often, if a person enters a city without any previous knowledge and mentality about it could recognized dominant identity of this city just with carefully watching the image of it in this way. The landscape of a city is the objective and subjective factors such as geographical locations and communication with surrounding villages, history and culture, functional and physical potential and overall identity of the city (Mardani,2010).

4.4 American and European Studies On Nightscape and Nightscape Lighting

Following the invention of electricity at the end of the 19th century and the extensive use of illuminating technology, scholars in America and some other European developed countries initiate studying of nightscape and nightscape lighting. The progress in the nightscape of New York City in 1920 attracted attention worldwide and accelerated the construction of urban nightscape (Huiqian, 1999). As time goes by the studies about outdoor space illumination have been developed, and more scholars have become interested in designing and generating appropriate parameters and the calculation formulas of various types of lamps. The book <Lamps and lighting> written by J.R. Coaton, M.A. Cayless and A.M. Marsden also focused on the light pollution and provided some possible solutions in the book (1997).

The Illuminating Engineering Society of North America (IESNA) has indicated that “the lighting in outdoor spaces generally can make the lightened objects more outstanding at night environment, making them visible from a long distance.” IESNA also contributed to the influence of nightscape on human’s life: “nightscape and illumination may have some impacts on people’s emotions and normal life. Regarding their privacy and visibility, the control of lighting is rather crucial.” The International Commission on Illumination (CIE) explained nightscape lighting as “exterior lighting for the decorations of the nighttime urban landscape” (1989).

4.5 Results:

Based on what available literature presented, the definition of nightscape as a concept is considered as follows:

- Nightscape can be regarded as a subsidiary of the landscape. It covers both the natural landscape and culture landscape. While the first one refers to the natural environment which is not manipulated or only slightly altered by humans, the second one refers to the landscape which is primarily generated by human activities. The nightscape lighting is provided by the moon and other luminous planets besides man-made illuminating elements.
- It typically emerges as a combination of the natural environment, urban elements, human activities, and lighting facilities and so on. It is also a representation of urban landscape depending on the same elements and urban

facilities, but from a different viewpoint that is to say different from the day time.

- Creating the night view for a particular area or the city with artistic effects is the main objective of the nightscape. In order to achieve this objective, different lighting strategies are applied to modify the appearance of urban areas and the human's psychological feeling about them.
- A nightscape can be a permanent one lasting for years or a temporary one designed for special purposes. However, it contains the features of the urban landscape and can be categorized into various types.





5. DEVELOPING URBAN DESIGN STRATEGIES FOR THE NIGHTSCAPE CASE OF ISTANBUL, GOLDEN HORN

5.1 General Information of Golden-Horn

Golden-Horn (Haliç), which feeds on Kağıthane and Alibey rivers, is a state that reaches 7.5 km and divides Istanbul from north to south. There are islands along the estuary close to the coasts of Eyüp district. Due to the changing color of the sun, the travelers of the past called the water-inlet the Golden Horn. Throughout history, the Golden Horn has always provided an enthusiastic space for people to settle, as it is a well-protected port both from natural conditions and from enemies (Figure5.1).



Figure 5.1: Location of Golden-Horn

Source: Google earth

The Golden Horn located in a historical urban area and has performed a significant role in the culture of this city for centuries, especially due to its countless harbors, numerous fish populations, and entertainment areas (Aksit, 1977; Eroğlu, 2001). The Golden Horn is a narrow entrance which divides the European section of Istanbul into

two parts, therefore, forming a natural harbor that has been hosting Roman, Greek, Byzantine, Ottoman, and others for thousands of years. It has four bridges as a safe port of 8 km, and the fifth one is under construction; The most significant bridge among them is Galata Bridge. This one connects Eminönü and Sirkeci to Karaköy and Beyoğlu. The Galata Bridge and its surroundings are one of the most active and colorful zones of Istanbul. With the population explosion and ineffective construction laws, in the 1950s many of the shipyards, factories, and other enterprises were based on the shores of the Golden Horn, so grey city sewerage and ugly depot of industrial wastes were verified. All of these issues had heavily contributed to the pollution of the Golden Horns nature and caused the area emitting a bad odor. After 1983, pollution was controlled where near than 4 thousand factories, houses, and other structures were demolished and replaced by the green areas. Today it has a beautiful appearance with spectacular views and people can keep fishing in this place.

There were an old commercial port and a popular residential area in the Byzantine period (Aksit, 1977; Eroğlu, 2001). The entry was blocked by a giant chain to stop unwanted ships from entering. It was a place where Jewish immigrants from Spain lived largely during the Ottoman period. A mixed population involving Armenians, Greeks, Gypsies, and Turks were reflecting the colorful ethnic mosaic of the city. At the beginning of the 16th century, Leonardo da Vinci envisioned a bridge to be built on the Golden Horn for the sultan. A single 240 meters, 8 meters wide and 24 meters height, intended to be a single opening, but never built (Aksit, 1977; Eroğlu, 2001). In the first half of the 18th century, the Golden Horn was prominent for the tulip gardens where grandeur people began to enjoy their luxury at sunset and paddle with boats. Many poets described it as "Sadabad" or "place of happiness" in their poems.

Fener and Balat are the ancient neighbors of the Golden Horn with their traditional old wooden buildings, Byzantine churches, synagogues of the first Jewish community, and also the Orthodox Patriarchate.. Before the 19th century, there was no bridge over the Golden Horn and first Galata Bridge connecting to present day. The small boats between two seas have provided transportation.

The bridge between Karaköy and Eminonu were built in 1836 and rebuilt in 1845, again in 1912 and finally in 1993. In the Golden Horn, Unkapanı (also called Atatürk) Bridge manages the flow of traffic between Beyoğlu and Saraçhane. The third bridge

on the Golden Horn is called Golden-Horn Bridge with the rout passing through.



Figure 5.2: View of Golden-Horn.

Source: <https://www.privatephesustours.com/golden-horn.php>

5.2 Research Design and Methodology

To answer the thesis main research questions, this study involves various research methods following the scheme in figure 3.

In the hypothetical piece of this thesis, at the initial, a literature study is done. To accomplish the last objective, it is important to get a thorough and exact comprehension of the key idea "nightscape", which is featured in this thesis. The literature review will concentrate explicitly on the part of urban design. Getting a proper understanding of the meaning of nightscape, the distinctive suppositions of researchers, the design principles and standards in lighting design can help to figure out the base of this dissertation to respond to the research questions.

After that, a further theoretical study in a relation between legibility and nightscape will be done along with analyzing the skyline and form-based analyze of the blocks in the silhouette. According to the information we have obtained, and the analysis of the Golden – Horn region in question, we have selected vantage points to answer our first research question.

Vantage point means a place or position affording a good view of something or somewhere. The vantage points chosen in the Golden-Horn zone are generally selected in the public open spaces, in which people spend more time as a daily or as a tourist.

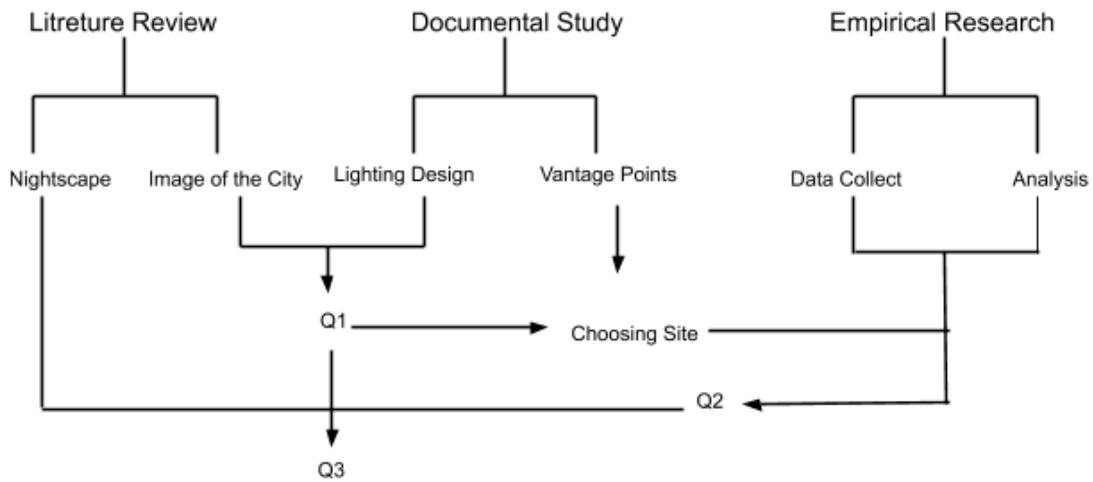


Figure 5.3: Scheme for research methods

Two vantage points were selected, and the analysis is done in these places for the view of a silhouette that in front of the people who are in there at the night.

Selected vantage points are as follows:

1. Pierre Loti Terrace
2. Golden-Horn Bridge



Figure 5.4: Locaion of vantage points

Source: Google earth

Q1: How could we make legibility in nightscape of a historical district with urban lighting design?

In order to find the answer to the second question, the lighting design factor of the buildings and the elements that contributed to the nightscape in the selected silhouettes were investigated.

After that, there is an empirical study taken on the chosen buildings and, including practical observation, field study and nightscape analysis.

Q2: What are the strong points and shortcomings of the nightscape in the chosen cases in Istanbul?

The results of the case study investigations, in blend with the hypothetical examinations on nightscape and its typology, will help accomplish the last objective of this thesis, as state in research question 3:

Q3: What are the dependable strategies to make a memorable nightscape by true urban lighting design methods?

5.3 Phases of Evaluation Process

This study involves 6 major phases supported by the sub ones. The phases and pertinent stages of the project process are summarized in the diagram below (Figure 5.5).

5.4 Evaluation of Case Study

To achieve the purpose of the thesis for the selected area 3-steps analysis was performed in this section:

Table 5.1: Evaluation of case study

1. Form-based analysis of the components	2. Specifying Lynch elements	3. Evaluation of lighting design in nightscape
--	------------------------------	--

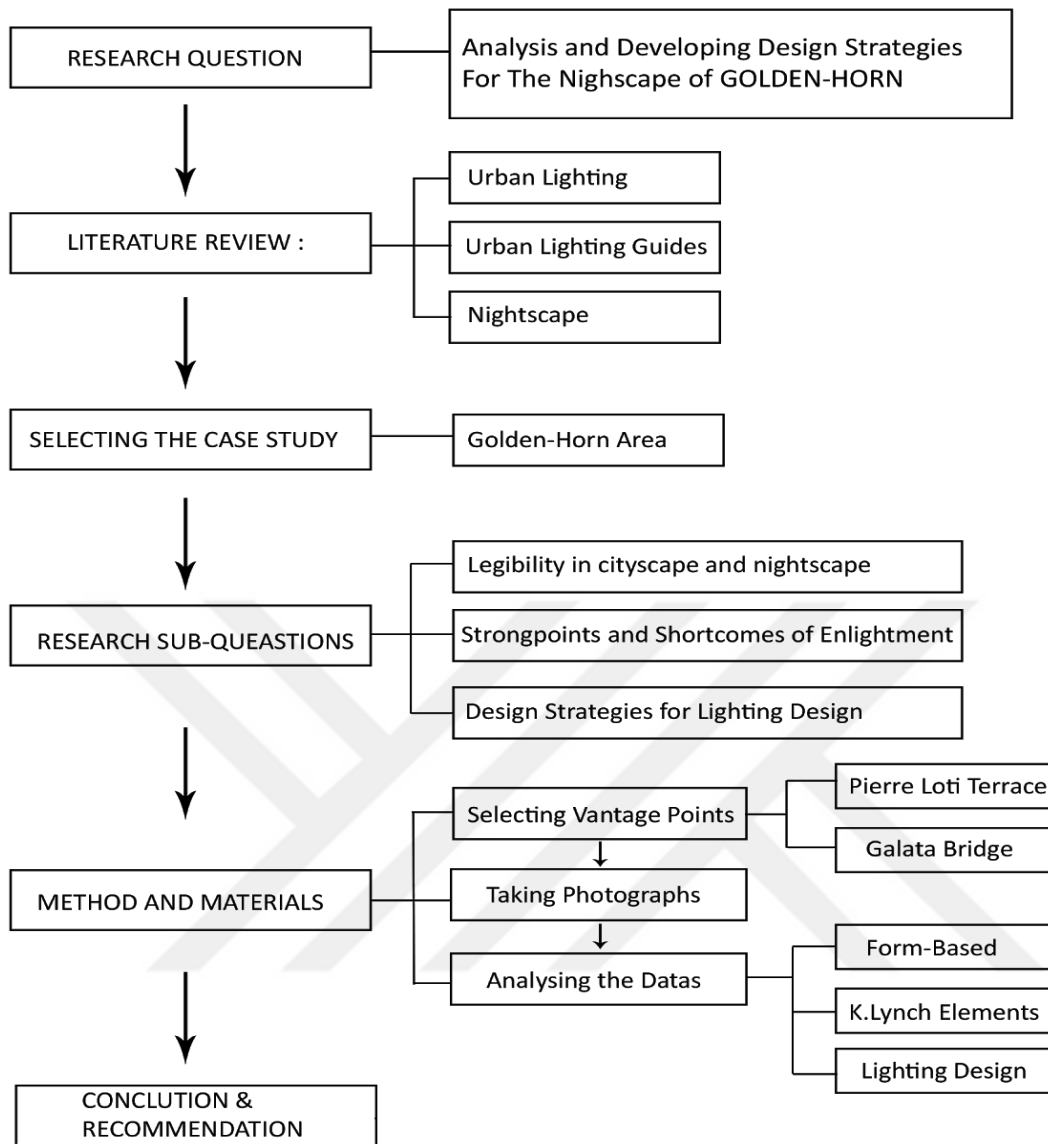


Figure 5.5: Phases of the evaluation process

5.4.1 Form-based approach

Urban design features have a major influence on how people comprehend and act their involvement with space. All attributes or in other words, qualities of the urban form cannot be measured in a direct way. The more notable ones appear to be perceptions - how people interpret environmental qualities? Although urban design is like art in the audience's eyes, significant studies have been conducted to develop a quantitative assessment of the physical properties that determine the urban form. For example, the design of structures is considered to be an important action on the quality of the urban environment, and the building height measures the human scale. The consistency of the structures and the height of the elements provide an evaluation of design harmony.

The elements that make the audience to observe urban landscapes have eight qualities: legibility, imageability, enclosure, human scale, transparency, linkage, complexity, and coherence (Ewing et al, 2008). The outcomes recommend that various subjective attributes of fine urban design can be ascribed to specific and quantifiable design factors– elements that can then contain into urban design guidelines (Ewing et al, 2008).

According to literature, the first thing a human perceives when he or she looks at the area for the first time is the form of the blocks. Based on this reason, before beginning to analyze the enlightenment of the nightscape of the golden-horn, this section initially examines categorizing the form of silhouettes of the area. Separating the forms of the objects around helps to select the items that need to be illuminated for the nightscape from within the readability classification.

The form of the components could be categorized in the items below:

- Horizontal
- Vertical
- Chain form
- Monoblock

Case A: The initial analysis was done for the first vantage point, the Pierre Loti terrace. (Figure 5.6)

A series of photos were taken from the silhouette that front the viewer standing on the terrace and the form of the items were specified as illustrated in (Figure 5.7)

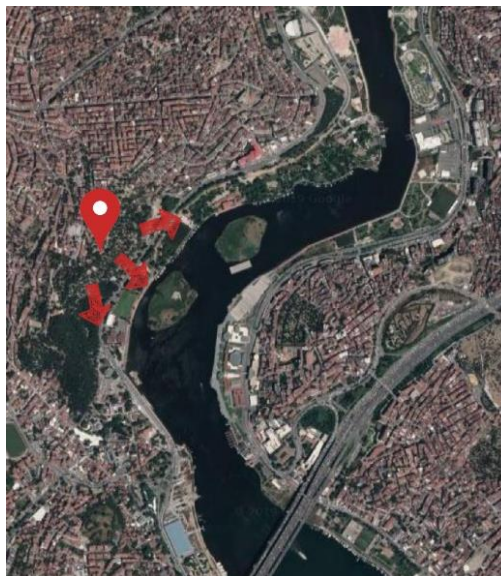


Figure 5.6: View of vantage point 1: Pierre Loti terrace

Source: Google earth

The form analysis was made on the panorama photographs of the area taken from the first vantage point.

How the forms appear in that aspect of daylight is determined and illustrated on the photograph (Figure 5.7).

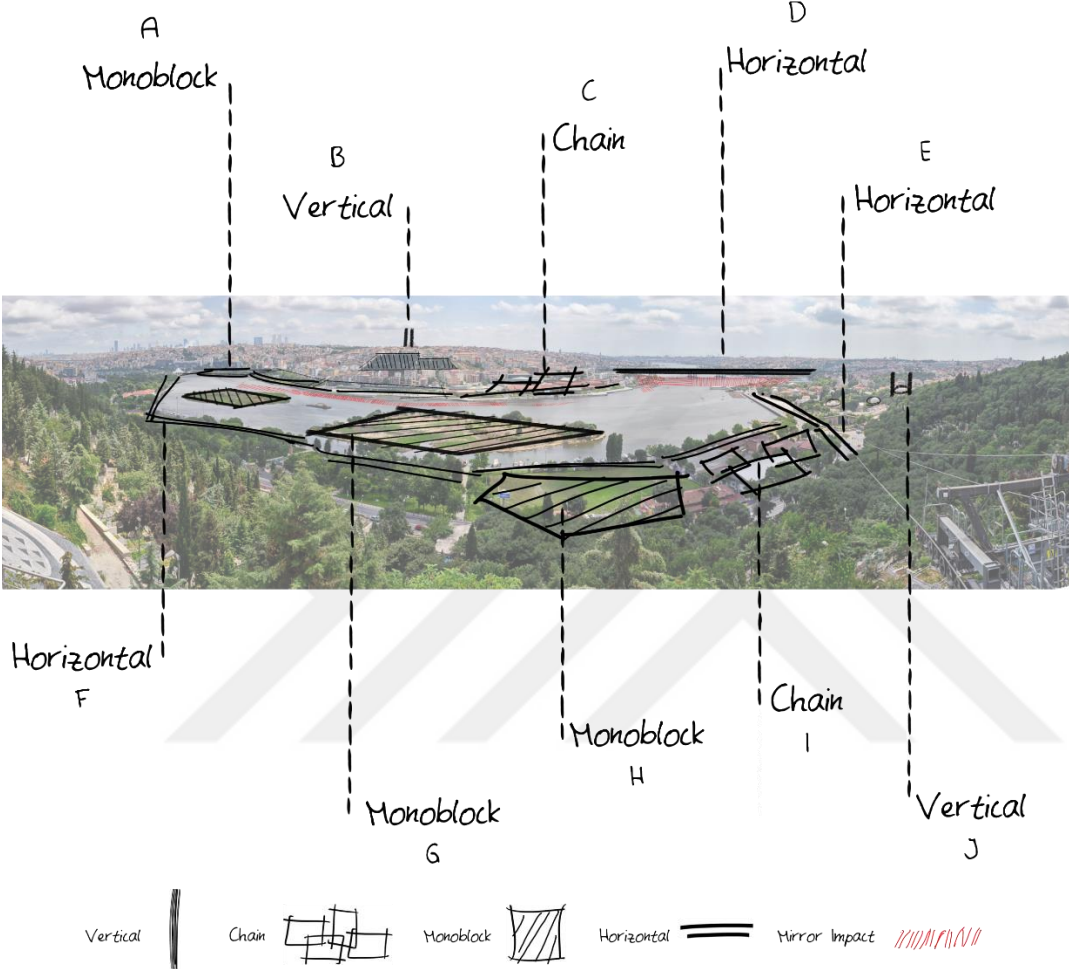


Figure 5.7: Form-based analyse in daylight from the first vantage point.

Source: Author

Mirror impact: The mirror impact concept is an important subject and has an effective role in in the perception of the figure. This phenomenon occurs because of the reflection of the figures in the stagnant water and might change the recognition of forms in both day and night. Therefore, the mirror effect feature of the forms was highlighted in the photo and classified too.

The forms of existing elements and structures, the typologies, value status and the concept of the mirror effect of them are categorized in Table 5.2.

Table 5.2: Claissification of the current status of the first vantage point.

Name	Type	Form	Valuable	Mirror Impact
A: Halic Park & Miniaturk	Green Area	Monoblock	Yes	Yes
B: Bademlik Mosque	Memorial Building	Vertical	No	No
C: Halic Congress Center	Historical Cultural	Chain	Yes	Yes
D: Golden-Horn Bridge	Historical Transportation structure	Horizontal	Yes	Yes
E: Bahariye Street	Transportation	Horizontal	No	No
F: Tekke Park Shoreline	Green Area	Horizontal	No	Yes
G: Island	Green Area	Monoblock	No	No
H: Eyup Sport Complex	Green Area	Monoblock	No	Yes
I: Eyup Sultan High-School	Historical Educational	Chain	Yes	No
J: Eyup Sultan Mosque	Historical Building	Vertical	Yes	No

In the direction of the thesis subject, the analysis of the nightscape was made from the same point when the daylight disappeared.

The forms appearing on the night panorama photograph taken from the first vantage point, were determined in the same process (Figure 5.8).

In this way, a different perception of forms was realized according to the effect of lighting between night and the day.

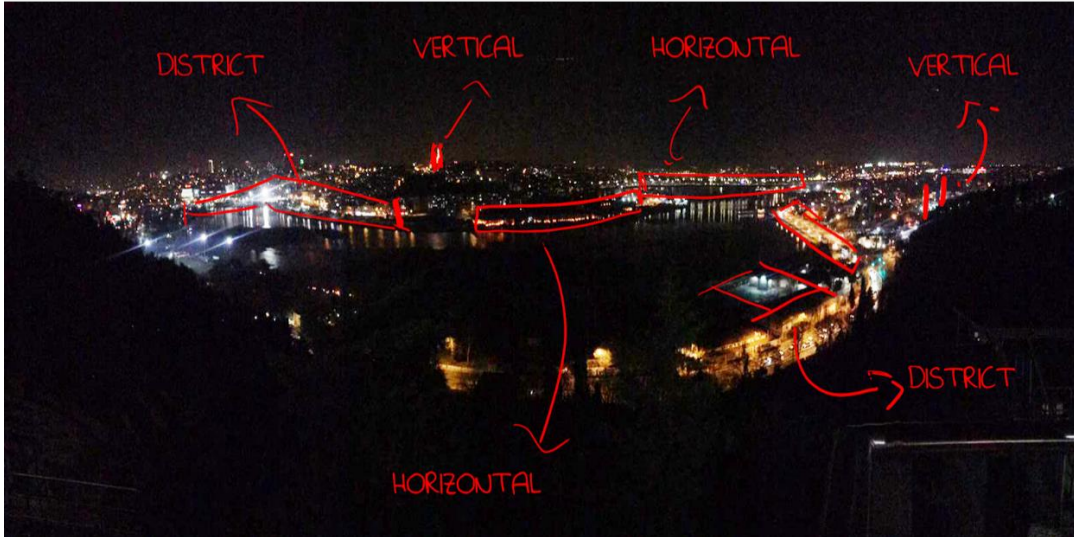


Figure 5.8: Form-based analyse at night from the first vantage point.

Source: Author

When we compare the two forms-based analysis for day and night status, we realize that it is different to perceive forms due to the illumination of them in the nightscape.

The presence of illumination, the reflection in the water, the current state of the surrounding structures affect our perception.

As a result, we can conclude that some forms can only be detected at daylight and some only dominant at night and several of them at both day and nightscape.

Therefore, the domination status of the structures of the panorama from the first vantage point is categorized as follows (Table 5.3).

Table 5.3: Classification of domination status of first vantage point.

Name	Dominant at Night	Dominant in the Daytime
A: Halic Park & Miniaturk	✓	✓
B: Bademlik Mosque	✓	✓
C: Halic Congress Center	✓	✓
D: Golden-Horn Bridge	-	✓
E: Bahariye Street	✓	-
F: Tekke Park Shoreline	-	✓
G: Island	-	✓
H: Eyup Sport Complex	-	✓
I: Eyup Sultan High-School	✓	✓
J: Eyup Sultan Mosque	✓	✓

Case B: The initial analysis was done for the second vantage point, the Galata Bridge (Figure 5.10).

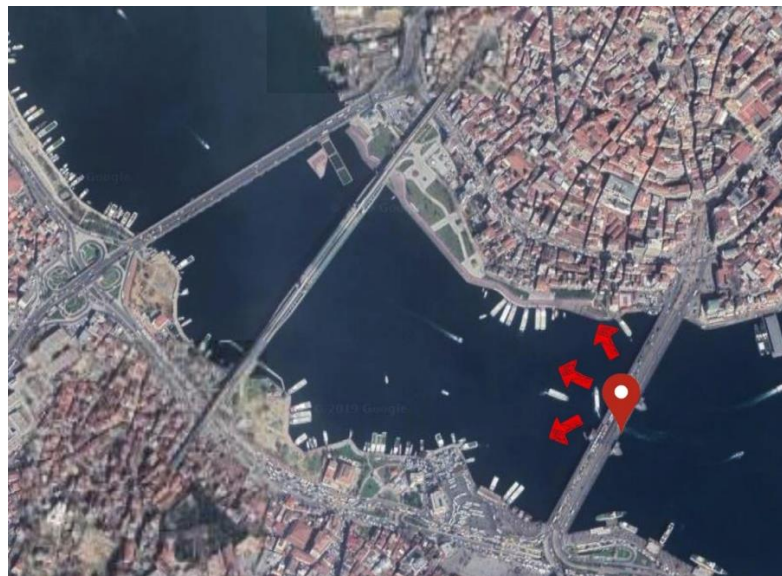


Figure 5.9: View of vantage point 2: Galata Bridge.

Source: Google earth

A series of photos were taken from the city image that front the viewer standing on the edge of the bridge or fishing there and then the form of the items were specified as illustrated in (Figure 5.9)

The form analysis was made on the panorama photographs of the area taken from the second vantage point. How the forms appear in that aspect of daylight is determined and illustrated on the photograph (Figure 5.10).

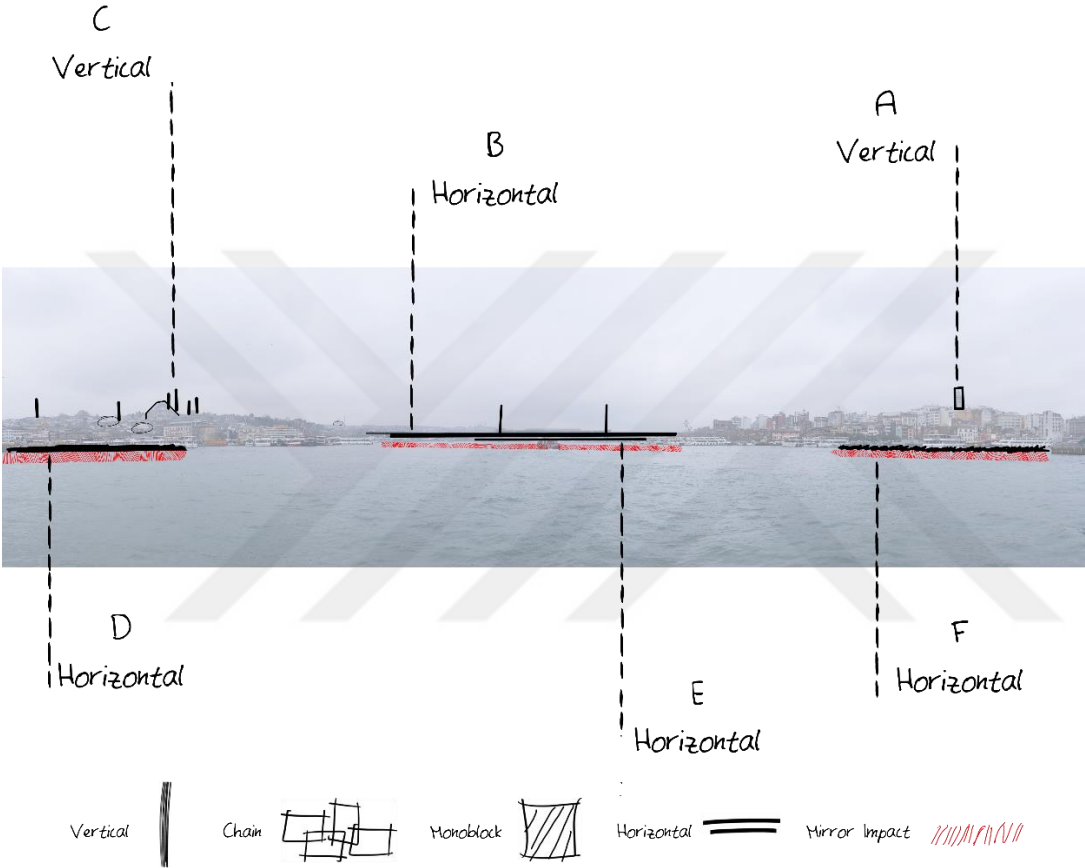


Figure 5.10: Form-based analyse in daylight from the first vantage point.

Source: Author

For the second case the mirror effect feature of the forms was highlighted in the panorama photo and classified in (Table 5.4) too.

The forms of existing elements and structures, the typologies, value status, and the concept of the mirror effect of them are categorized in Table 5.4.

Table 5.4: Classification of the current status of second vantage point.

Name	Type	Form	Valuable	Mirror Impact
A: Galata Bridge	Historical Transportation structure	Horizontal	Yes	Yes
B: Halic metro bridge	Transportation structure	Horizontal	No	Yes
C: Ataturk bridge	Historical Transportation structure	Horizontal	Yes	Yes
D: Galata tower	Historical building	Vertical	Yes	No
E: Eminonu Square	Historical Cultural	Monoblock	Yes	No
F: New Mosque	Historical building	Vertical	Yes	No
G: Rustem Pasha Mosque	Historical building	Vertical	Yes	No
H: Karakoy port	Transportation structure	Horizontal	No	Yes

In the direction of the thesis subject, the analysis of the nightscape was made from the same point when the daylight disappeared.

The forms appearing on the night panorama photograph taken from the second vantage point, were determined in the same process (Figure 5.11).

In this way, a different perception of forms was realized according to the effect of lighting between night and the day.

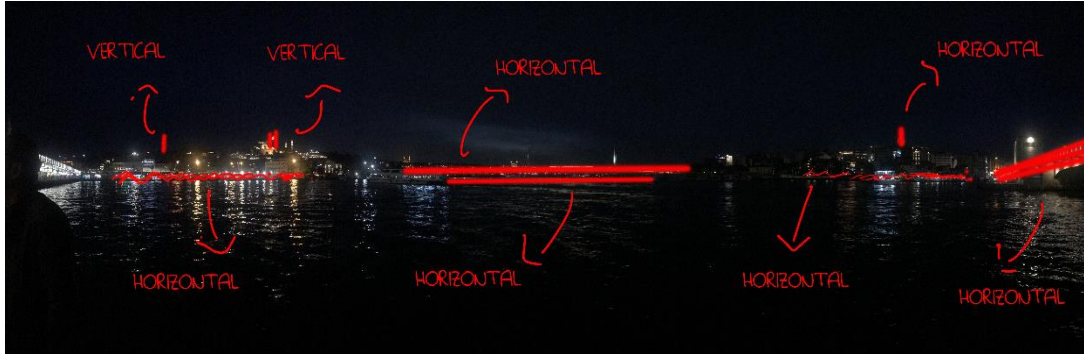


Figure 5.11: Form-based analyse at night from the second vantage point.

Source: Author

When we compare the two forms-based analysis for day and night status, we realize that it is different to perceive forms due to the illumination of them in the nightscape.

The presence of illumination, the reflection in the water, the current state of the surrounding structures affect our perception.

As a result, we can conclude that some forms can only be detected at daylight and some only dominant at night and several of them at both day and nightscape.

Therefore, the domination status of the structures of the panorama from the second vantage point is categorized as follows (Table 5.5).

Table 5.5: Classification of domination status of the second vantage point.

Name	Dominant at Night	Dominant in the Daytime
A: Galata Birdge	✓	✓
B: Halic metro bridge	✓	✓
C: Ataturk bridge	✓	✓
D: Galata tower	✓	✓
E: Eminonu Square	-	✓
F: New Mosque	-	✓
G: Rustem Pasha Mosque	-	✓

5.4.2 Legibility approach

Urban space can be understood as a “mental map” for people, comprised of the urban elements. The legible elements were categorized and gathered in this study as K.Lynch five legible elements which specified in *The Image of the City* (1960). Those are edges, paths, districts, landmarks, and nodes.

The Golden Horn is a part of the city which has a special place in the history and physical structure of Istanbul. Istanbul is a sub-region which has got wealthy identity elements with its original, natural, and human environment and the environmental data formed in the upper identity. The elements that primarily affect the formation of the Golden Horn are the

1. Topography,
2. The natural harbor,
3. The cultural structure and,
4. The historical past.

The urban functions and historical buildings that are formed depending on these elements play an active role in the formation of the Golden- Horn identity.

The most important elements of the physical structure of the Golden Horn are the hills, and also they are the most important elements in terms of shape and silhouette. These hills, which emphasize the Istanbul skyline in seven points, are in fact the high points of a ridge element separated by valleys.

It is vital to form the general image of this area in our minds when we look at these hills from the vantage points. The shape of the skylines, the elements and buildings are the things that we capture in daylight. However, city identity is not just related to the daylights. Therefore, the appearance of this image at the night hours gains importance. At this case, the nightscape lighting topic is revealed.

In this section, the type of elements has been identified from the forms that classified before. Then, analyze were done on the image of the silhouettes taken from the selected vantage points.

Case A: In order to better understand Lynch's analysis, it was first performed on the regional plan. This method helped to emerge the perception difference in the plan and the silhouette (Figure 5.12 and Figure 5.13).

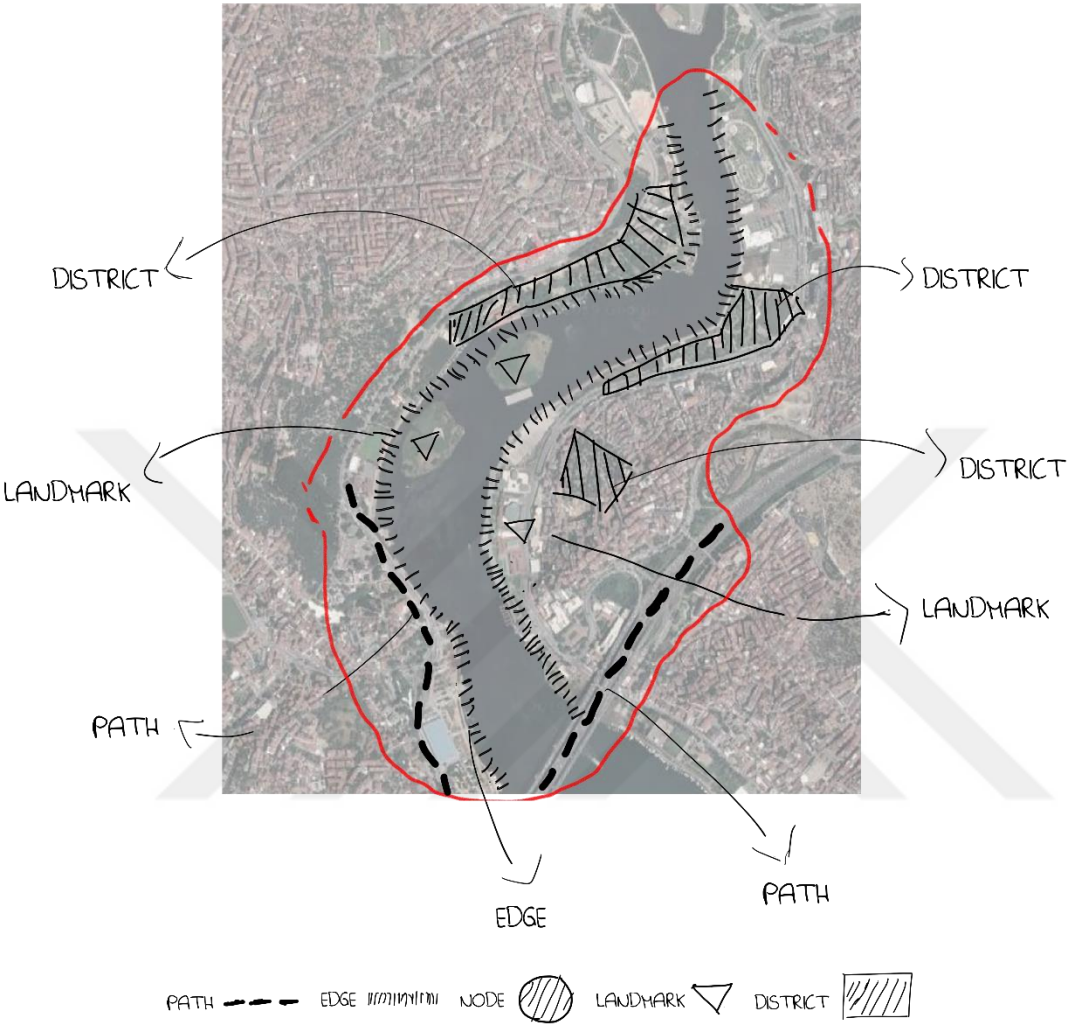


Figure 5.12: Legibility analyze in plan from vantage point 1.

Source: Google Earth

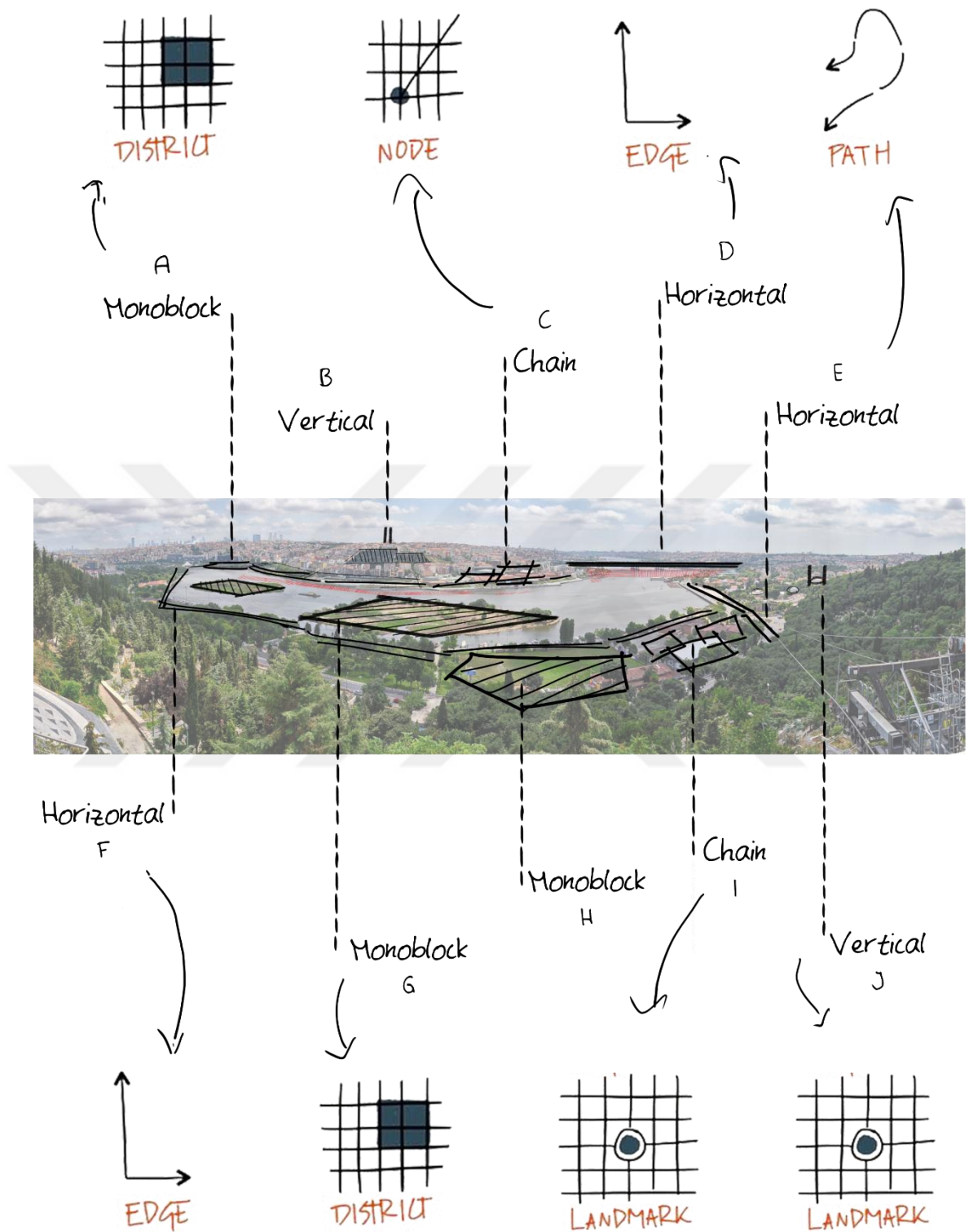


Figure 5.13: Legibility analyze in panorama view from the vantage point 1.

Source: Author

As we see, we can conclude that for human perception, there is a difference in some form between the plan and the silhouette. Further for the legibility issue, categorizing the Lynch elements were different through the silhouette image. Therefore, due to the importance of engaging the research for human scale, the elements were selected through the silhouette analysis.

Table 5.6: Categorization of type of legible elements for the first vantage point.

Name	Type of Legible elements
A: Halic Park & Miniaturk	District
B: Bademlik Mosque	Landmark
C: Halic Congress Center	Node
D: Golden-Horn Bridge	Edge
E: Bahariye Street	Path
F: Tekke Park Shoreline	Edge
G: Island	District
H: Eyup Sport Complex	Node
I: Eyup Sultan High-School	Landmark
J: Eyup Sultan Mosque	Landmark

Topography impact: Cities are developed based on two main elements, natural and cultural. Natural elements are effective in the form of urban development, while cultural elements are effective in the formation of identity. Topography, climate, water relations, vegetation, geological occurrences are just some of the natural components of the urban environment. While the natural environment formed by the elements determines the localization areas and development directions of the city, the construction types, historical structures and sites, archaeological values, effective functions, etc. all kinds of cultural elements of past and future constitute the identity of the city (Karaguler and Korgavus, 2014).

Istanbul is a significant world city; the historical richness of Ionian, Greek, Roman, Byzantine, Ottoman and Turkish civilizations, together with the city and building culture, includes a geographic and topographic structure that combines two continents with the Bosphorus, the Golden Horn and its seven hills. Therefore, it is essential and necessary to protect the Historic Peninsula region, which is the most intense of the historical and urban richness of the city, not only with the local texture but also with the visual effects and views that will be created on the ground with the environmental structures and arrangements (Karaguler and Korgavus, 2014).

It is clear that topography besides the elements of legibility is effective on bolding the structure and outstanding them in the silhouette. Therefore, the topography impact for the elements, selected to analyzing was categorized, to see if the topography affects them to perceive from the vantage point or not.

Table 5.7: Categorization of the topography impact on elements for the first vantage point.

Name	Topography impact type
A: Halic Park & Miniaturk	Sea Level
B: Bademlik Mosque	High
C: Halic Congress Center	Sea Level
D: Golden-Horn Bridge	-
E: Bahariye Street	Sea level
F: Tekke Park Shoreline	Sea level
G: Island	-
H: Eyup Sport Complex	Sea level
I: Eyup Sultan High-School	Medium
J: Eyup Sultan Mosque	High-Medium

Case B: All process for identified and categorized the legibility issue was done for the second vantage point, Galata Bridge too.

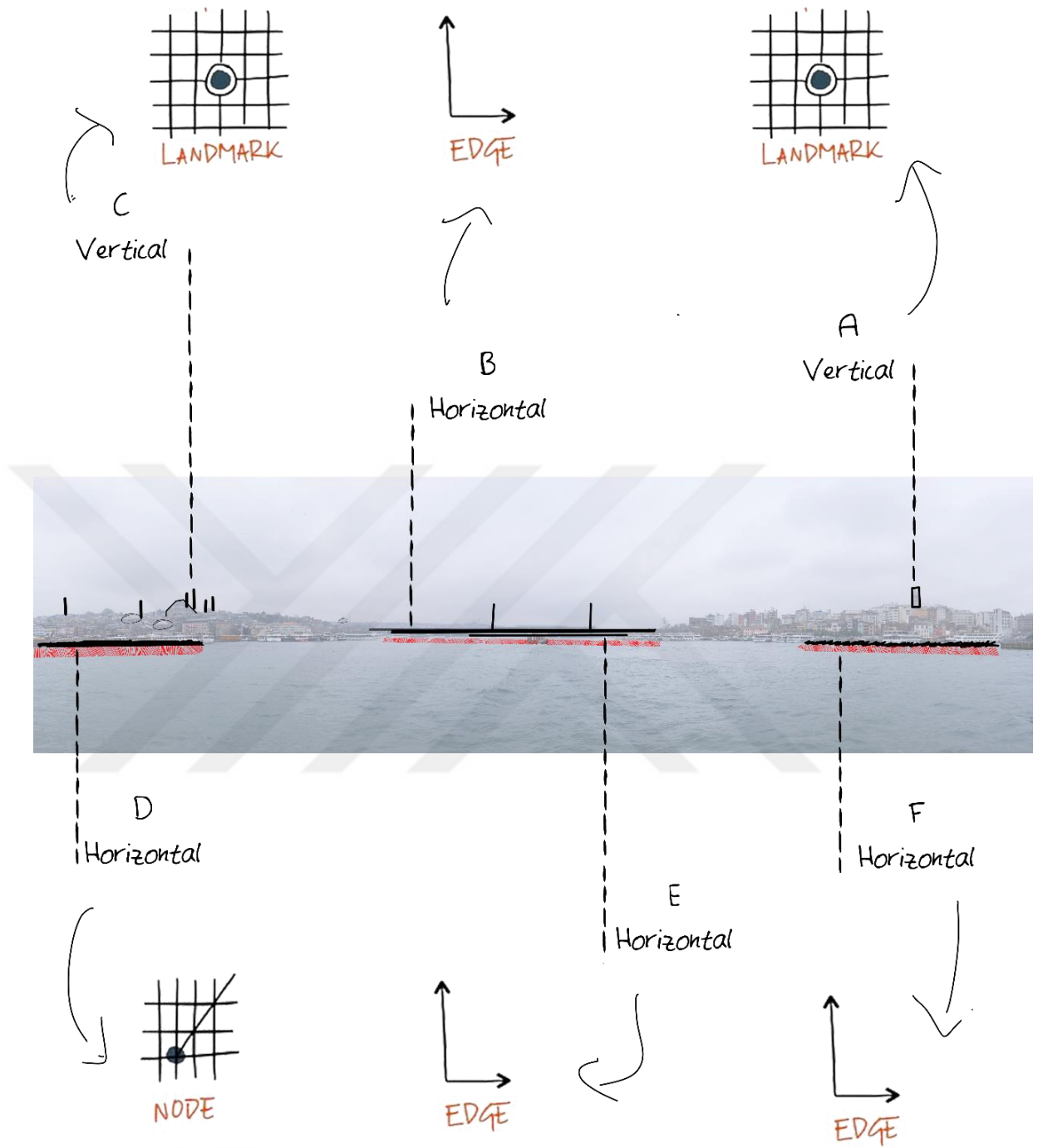


Figure 5.15: Legibility analyze in panorama view from the vantage point 2.

Again, the categorization of the topography effect was done in the second point as below (Table 5.9).

Table 5.9: Categorization of the topography impact on elements for the second vantage point.

Name	Topography impact type
A: Galata Bridge	-
B: Halic metro bridge	-
C: Ataturk bridge	-
D: Galata tower	Medium
E: Eminonu Square	Sea level
F: New Mosque	Medium
G: Rustem Pasha Mosque	High

5.4.3 Urban-Lighting approach

After addressing the image of city in Istanbul, in this chapter, this thesis will choose several elements of the selected sites to analyze which formed the nightscape of the golden horn from the selected vantage points.

The overall study was done for the general nightscape view of each vantage point, afterward, the specific analysis was accomplished for the selected elements.

It is important that finding a simple mode to follow up for evaluating or analyzing a nightscape can be hard.

It may need various photometrical measurements and information to get the practical data of the lighting attributes. Furthermore, as a specific type of landscape, nightscape is quite difficult to discover an alternative case to compare. Additionally, people could have dissimilar opinions on the effects of a nightscape that might base on their individual experiences, taste, and knowledge.

In this thesis, the evaluation process was done from the sight of urban designing.

5.4.3.1 Indicators Structuring

In this section, the indicators used in the following evaluation were specified, and the clarification of them prepared. These indicators were divided into two categories: physical indicators and mental indicators. Physical indicators were selected in accordance with <Terminology and Description of Night Landscape Lighting>. (Xiao & Zhang, 2004).

Luminance: In the field of photometry, the intensity of light emitted from a surface per unit area in a given direction. According to the Lighting Design Glossary, Luminance indicators show how bright light is perceived by an eye when looking at the surface from a certain angle. Luminance is thus an indication of how bright the surface will look. (Mischler, 2004). In this thesis, luminance will be used as an indicator of how bright the light source spreading or the reflection from lightened objects surfaces is, relation with human brightness perception.

Reflectance: Reflectance means when the occurrence light brightens the surfaces, the amount of luminous power will be reflected (Xiao & Zhang, 2004).

Analyzing the reflectance helps to judge if the lighting design suited to the substance surfaces.

Spill light: When the direction, amount or other feature of the spill light distract or decrease the visual ability of people or makes uncomfortable in a certain situation, temporarily, this type of spill light can also be named as obtrusive light (Xiao & Zhang, 2004).

Glare: It is a visual fact that generally due to incorrect brightness dispersion or lighting limits, or even high contrasts, so as to reason a feeling of discomfort and a casual decrease in the capability to observe details or objects.

Light pollution: Light pollution is usually caused by obtrusive light or other extreme artificial light. It may cause harmful consequences to human health, ecological environment, and vegetation. Recently, it has been stated that light pollution can interfere with astronomical observations. Furthermore, there may be even more unfavorable impacts that are not yet known (Xiao & Zhang, 2004).

Besides mentioned the indicators, during the evaluation, the maintenance states of lighting resources during the day and night and also the special lighting modes, such as dynamic lighting, will also be taken into consideration. The evaluation of this thesis will be human-oriented, and it will be written in the angle of urban design. In this case,

the following parts will be represented by an emphasis on the human dimension and attitude.

To analyze the night view of the elements in the Golden Horn, in the first step, some photos were taken from the vantage points to forward features of the the silhouettes, as shown below. In those nightscapes, the relationships between the night view and illuminating of these elements could be seen.

At the second step, selected elements have been analyzed separately as following. In this thesis, the evaluation process was done from the sight of urban designing.

5.4.3.2 Case A: Overall nightscape status (Vantage point 1)

Location: Pierre Loti Hill

Pierre Loti terrace is located in Eyup district of Fatih region on the European part of Bosphorus in Istanbul. It is the best spot of the district to watch the Golden Horn's famous panoramic view. At first glance in the daytime, the shape of the shoreline and the hill with its vast green area draw attention, and then we mostly can see houses on the hill.

Subsequently, the city elements that make the identity of this view appearing. They could be categorized as landmarks, edges, paths, and districts. These elements have been analyzed when the daylight goes out, to determine if the identity and image of this nightscape are legible as much as the daytime or not.

Significant elements were selected such as A: Halic Congress Center - B: Golden Horn Bridge - C: Halic Park - D: Bahariye Street - E: Feshane International Fair and Congress Center to analyzing the nightscape status of them at darkness.



Figure 5.16: Nightscape panorama view from the vantage point 1.

Source: Author

Through the field survey and observations, the overall nightscape status in Golden-Horn from this point could be described as below.

When we look at the right side of the panorama (figure 5.17) from the top of the hill on the terrace, first of all, Bahariye Street took our attention due to the high level of its illumination than the surrounding area. This street continues to the entire coastline and emphasizing the border at nighttime.

Feshane is an important element located in the continuation of the street; unfortunately, it does not appear in this nightscape image because of inappropriate illumination.

When we come to the left, we encounter the Golden-Horn Bridge as a horizontal element of the day time. Top of the bridge is illuminated since it is the route of vehicles and the illumination helps it be detected slightly at night.

Halic Congress Center is located on the left foot of the bridge. Lighting design applied to the building helps us to perceive the building and its surroundings at night.

At that point, we have the houses located on the hill in the background with a dim light, and the Mosque on the top of the hill that highly attracts attention with its illumination.



Figure 5.17: Right side of nightscape from vantage point 1.

Source: Author

When we look across the hill, it is hard to perceive the coastal boundary after congress center in an account of any lighting application. Later we coincide to the Halic park on the left side of the nightscape (Figure 5.17), and we found out the light pollution

issue because of pole lights and projectors that made the light glare. The sports field located below the hill also disturbs the eye and the nightscape with incorrect lighting implementation.

Additionally, in the overall view of the left side, we could see the lack of illumination of the green areas that we discover as the district of Lynch's city elements. Also, the skyscrapers have been found with strange lighting plan and incompatible form with the historical area on the top of the hill.



Figure 5.18: Light side of nightscape from the vantage point 1

Source: Author

5.4.3.3 Detailed nightscape status

A: Golden- Horn Bridge

Haliç Bridge (Turkish: Haliç Köprüsü, "Golden Horn Bridge") is located in the left side of the perspective when are we looking through the Pierre Loti Hill. This bridge is a highway bridge on the Golden Horn, and it connects the neighborhoods of Ayvansaray in the southwest and Halıcıoğlu in the northwest. The bridge carries the O-1 motorway, also known as the Istanbul Inner Beltway.

This bridge constructed during 1971-4 years and started to be infunction on the 10th of September 1974. It has 995 meters length and 32 meters width, and a height of 22 meters up above sea level (Kuban, 2010).

Golden-Horn Bridge is a flat bridge with three openings below it for boats to get through.

The night view of the bridge shows a yellow route for the vehicles on the bridge (Figure 5.19). It uses 6-meter-high pole lights (with 20 meters between each two along the other side of the road). But there is no lighting design for space under the arch, making the boating space totally in dark during the night.

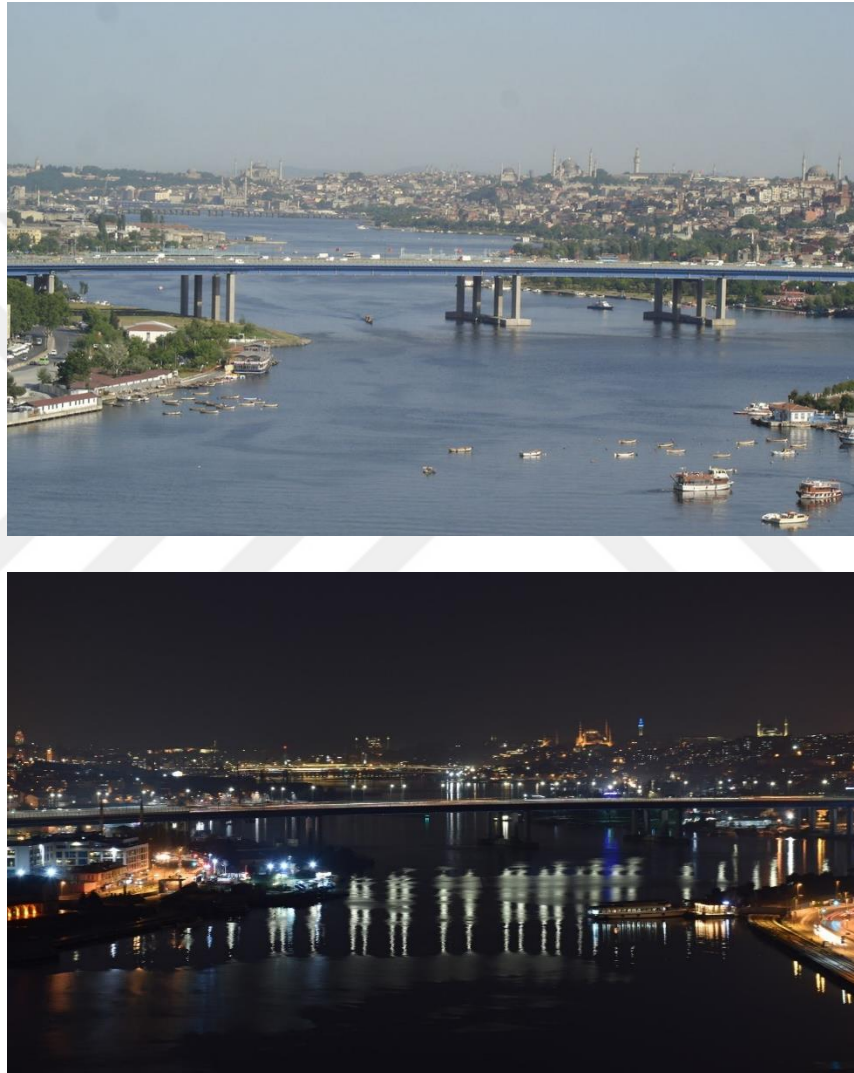


Figure 5.19: Golden Horn Bridge day and night view from Pierre Loti Hill

Source: Author

B: Haliç Congress Center

Haliç Congress Center is located on the Golden Horn seashores. It is one of the most attractive districts of Istanbul, and also it is a zone with unique historical interest.

This Center has a selective mixture of a historical and modern scheme. It is the only

spot in Istanbul by the seaside which gives the special chance of using marine transportation.

The Congress Center was constructed on 102.000 meter-square area and it has 86.000 meter-square indoor spaces such as 17 conference, 5 state-of-the-art concrete hall and function rooms that they extended over four buildings and connect to each other via major foyers (ICVB, 2016).

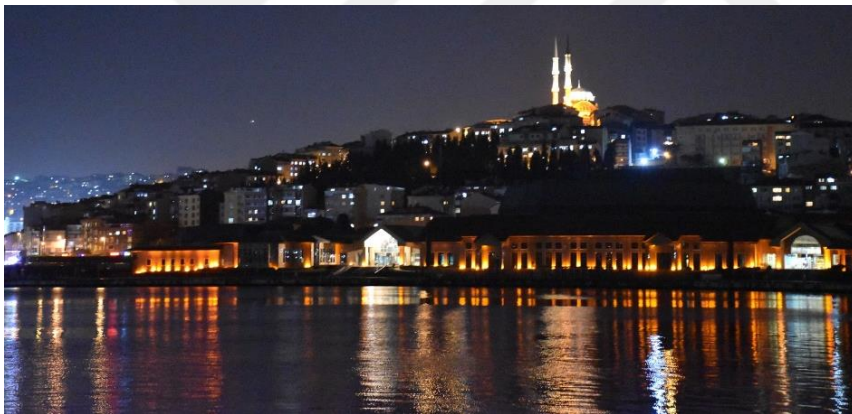


Figure 5.20: Haliç Congress Center day and night view from Pierre Loti Hill

Source: Author

According to the lighting design of the building in the nightscape status, the facade of the building lit with the amber uplights. The surface between the two windows is washed with the light from bottom to the top. The warm color of the light source is suitable for the historical area, and the high luminance of it help to emboss the building. However, there is a lack of light in the landscape, and it makes it difficult to perceive the contour of the shoreline in this block.

C: Halic Park and Miniaturk

Halic park and the Miniaturk are located on the left side of the front hillside when we look from the Pierre Loti terrace. Haliç park which continues along the coast in the Golden Horn is a suitable place for the people during the day with its walking paths, cafes and the playing areas.

Miniaturk, in other words, Turkey Miniature Park and Museum, is located at Sütluçe of Istanbul's historic peninsula in the estuary beside the Haliç Park. It is located on an area of 60,000 square meters, Miniaturk has a miniature park in the world's largest area and is also one of the important Istanbul museums (Kuban, 2010).



Figure 5.21: Haliç park night view from Pierre Loti Hill

Source: Author

At the night-time when we analyzed the lighting of both places, encountered with the lack of standard illuminating design of them. The lighting of the Halic Park was done only by the pole with 6-meter height. There isn't any path lighting or plant light to highlight the detail of nature or emphasis the foreshore. Neither in the Miniaturk, we couldn't see any bollard to lit the walking path or the green area lighting.

High-level lighting elements can only provide general lighting and safety of the area. However, the wrong selection of the lighting fixtures could make light glare which shown in (figure 5.16) and also it does not help to emphasize the feature of the place during the night.

D: Bahariye Street

Bahariye street located in Eyüp Merkez Mh. and Eyüp district. As it seems in figure 4, in the image from the Pierre Lotti terrace, this street isn't dominant in the day time but it is taking attention at night because of its overloaded illumination (figure 5.22).



Figure 5.22: Bahariye street day and night view from Pierre Loti hill

Source: Author

Due to the unimportance of this street both the density and the luminance of the lights along the main roads need to be improved. One possible solution might be decreasing the brightness of the pole lights or reducing the numbers of them. This road lighting system is similar to the conventional road lighting with HPSV. However, while traditional lighting technologies include a single light source (the bulb), the luminaires with a LED light source combined with optics, heat management, and a driver to

control the light density during the day could be a good solution for road lighting (LED road lighting design manual, 2014).

Additionally, the color of lighting is so warm and it might change all real colors of the environment.

E: Feshane International Fair and Congress

Feshane International Fair Congress and Culture Center located in Figure 5.3 has all the necessary facilities for an unforgettable and accomplished occurrence in Istanbul. It is built on an area of 56,000 square meters.

This construction inserts a different theme of color to the Golden Horn with its nature and green landscape around the historic building. Feshane center also has a special port which opening to the Golden Horn.

Feshane center was constructed in 1839 by Sultan Abdülmecit I. order to meet the needs of the Ottoman army. The first textile company of our country was one of the first examples of the steel construction building, which was originally brought from Belgium in 1954 and assembled in 1951 with columns. Feshane, which was brought from abroad in steam looms, was renovated in 1866 as the most advanced textile factory of its time (Mimarizm, 2008).

In 1939 the “Feshane Mensucat A.Ş. (Fez Factory Textile Inc.)”, was closed and changed into Sümerbank Financial Department Factory. In 1986 the 8000 square meter grand looming hall of the factory, which was abandoned because of the Golden Horn environmental organization works, was restored staying loyal to the original (Mimarizm, 2008).

Unfortunately, no illumination has taken place in the night landscape of this area and it loses its identity in the dark-times.

Conclusion:

According to the lighting standards and applications guidelines that mentioned in chapter 2, through the site analysis, the nightscape lighting of the Golden Horn from the Pierre Loti terrace has an intermediate overall lighting planning. It has different lighting proposals for each element, with respect to the special characters of it and there isnt any lighting plan according to the composition of overall light. If the nightscape of this image were compared with the day view of its, we can mention that

all elements which identified as legible elements for the area in at first glance for who look at the view hasn't any proper and planned illumination design.

Further, there isn't any planned design for mirror impact issue for each element beside the water.

The architecture lighting and special structure lighting for all historical buildings don't take attention overall and haven't any prepense design.

Due to the function of the elements in the historical area nonexistence of illumination for the islands which are dominant at the daytime for this view might be count as a strong strategy. However, there are some problems with the nightscape of the park and landscape lighting of green areas. Some of them were overlighted with too many floodlights and projectors. Additionally, the road lighting of the Bahariye street still needs to be improved to have a uniform lighting luminance and density.

Generally, the nightscape from the first vantage point can be concluded as below:

Strongpoints:

- Hierarchical lighting design has been carried out in this area
- Most of the dominant historical building has been enlightenment
- Generally, the lighting of this nightscape was evaluated as acceptable

Shortcomings:

- There isn't any planned design for mirror impact issue for each element beside the water.
- The density of light or overlighting in the parks and sports fields bother the eye comfort and cause light pollution in the nightscape
- The road lighting still needs to be improved to have a uniform lighting luminance and density;
- The lighting methods of some special structures (like Golden-Horn bridge) cannot present the structural features;
- Generally, the color temperatures of the lightings were not made in accordance with each other.

5.4.3.4 Case B: Overall nightscape status (Vantage point 2)

Location: Galata Bridge

The Galata Bridge was a symbolic link between the traditional city of Istanbul proper, site of the imperial palace and principal religious and secular institutions of the empire, and the districts of Galata, Beyoğlu, Şişli and Harbiye where a large proportion of the inhabitants were non-Muslims and where foreign merchants and diplomats lived and worked.



Figure 5.23: Nightscape panorama view from the vantage point 2.

Source: Author

In this respect, the bridge bonded these two distinctive cultures. As Peyami Safa wrote in his novel, *Fatih-Harbiye*, a person who went from Fatih to Harbiye via the bridge set foot in a different civilization and different culture. Apart from its place in fiction, the romantic appearance of the Galata Bridge made it the subject of many paintings and engravings.

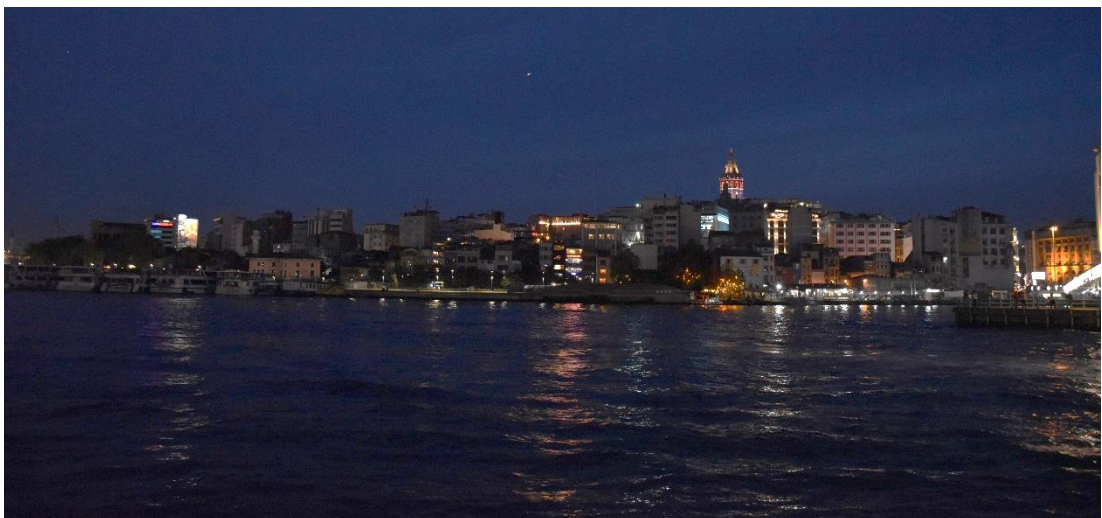


Figure 5.24: Right side of nightscape from the vantage point 2.

Source: Author

All daily city tours in Istanbul include this bridge as it is the passageway to the Old City of Constantinople.

Galata bridge is one of a significant horizontal landmark of the Golden Horn historical district.

Although the Galata bridge has been the route of thousands people and tourist during the day for fishing or spending time in cafes and restaurants, it also gives a chance for visitors to see the historical peninsula of the Golden-horn in 360-degree. Whereupon it was chosen as the second vantage point of this theses to analyzing the nightscape of the silhouettes around.

The overall nightscape in Golden-Horn District shows a variety of different characters in the same picture (Figure 5.23).with historical buildings, mosques, bridges, harbors, and the shoreline in both sides.

The historical area mostly uses quite a different lighting to highlight the special structural features of the historical buildings and sometimes not.

Significant elements and buildings which could be named as a landmark that helped the district to be legible at daytime were chosen to analyzing at the night-time. We had the Galata tower as a vertical symbol and the Ataturk bridge, Halic metro bridge, and the Eminonu square near to historical mosque as important elements in this area. Beside them, we had the Karakoy pier and the shoreline.

Through the field survey and observations, the overall nightscape status in Golden Horn from this point could be described as below.

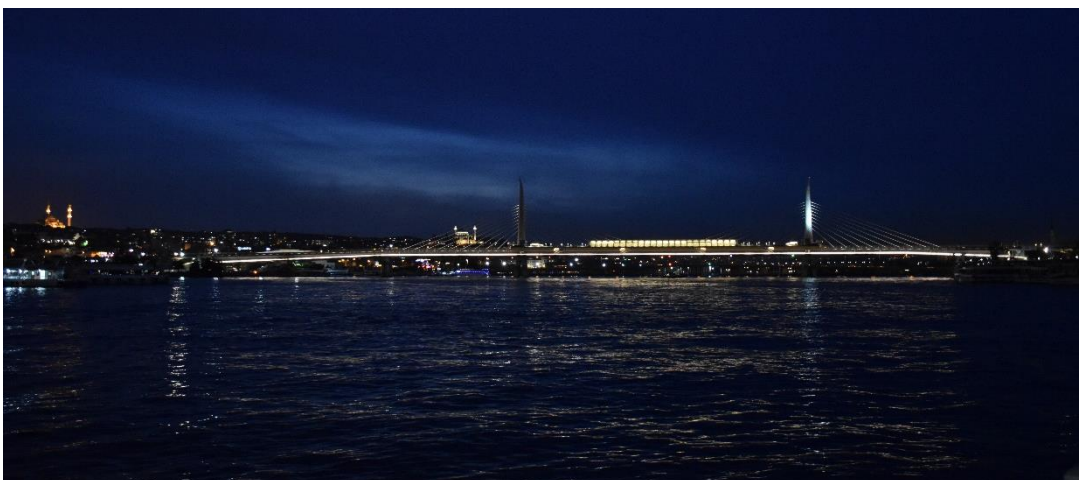


Figure 5.25: Front side of nightscape from vantage point 2.

Source: Author

When we start looking from the right side (Figure 5.24), firstly Galata bridge takes our attention with its white lighting glows and its reflection in the water. Then the shiny food and fish markets illumination is emerging under the bridge.

If we change the direction of our look, behind the dark and old buildings the cone of the Galata Tower manifests itself with its colored of illumination, However, the high-Level lighting of some new buildings like hotels standing before the tower, disturb our vision and become dominant than others.

While we are looking toward the sea, the Golden-Horn Metro bridge glaring with its illumination and diverse structure, covers the figure of Ataturk bridge behind it (Figure 5.25).

Eventually, we look toward the shiny left side of the area around (Figure 5.26) , first of all, the mosques standing top of the hill appears, their illumination glows, and vertical elements of them attract attention. Such other colored minarets in this silhouette are seen too. Then the brightness of Eminönü square with its colored boats shines in this image.

Analysis of the overall night view of silhouette and illumination of each element was studied separately in the next sections.



Figure 5.26: Left side of nightscape from the vantage point 2.

Source: Author

5.4.3.5 Detailed Nightscape Status

A: Galata Bridge

The Galata Bridge, located on the northeast corner (Figure 2.2, A), is the bridge that connects the Eminönü and Karaköy districts on the Golden Horn. From the end of the 19th century, in particular, the bridge has featured in Turkish literature, theater, poetry, and novels. This bridge has not only been a means of getting from one side of the waterway to the other but like a fellow citizen has had symbolic and spiritual significance in people's lives. It is one of the numerous bridges over the Golden Horn, but it has a colorful history involving rebuilding five times in five different locations (Eyice, 1996).



Figure 5.27: Day and night view of Galata Bridge.

Source: Author

The night view of the bridge shows a yellow pedestrian and car space on the bridge and colorful lighting under the bridge (Figure 5.27).

It uses yellow spotlights on the balustrades along the bridge and the blue or red lights of sign lighting of the fish markets.

The neon and colorful lightings of the fishermen shops below the bridge are extremely attracted.

For a bridge located in the historical part of the city and has a historical nightscape in the background, illumination with various color light sources prevent from a consistent view of it.

In addition, it is possible to discuss the compatibility of this kind of lighting with this function and area.

B: Galata Tower

The Galata Tower located in the top right of figure 5.2 called “Christea Turris by the Genoese” is a medieval stone tower in the Galata/Karaköy quarter of Istanbul, Turkey, just to the north of the Golden Horn's junction with the Bosphorus (Hurel, 2001).

The Galata Tower is one of the highest and oldest towers in Istanbul. The 63-meter tall tower provides a panoramic view of the old town. It was built in the 14th century by the Genoese colony as part of the defense wall surrounding their district at Galata directly opposite ancient Constantinopolis (Hurel, 2001).

The Genoese were involved in trade with the Byzantines, and the tower was used for the surveillance of the Harbor in the Golden Horn. After the conquest of Constantinople by Mehmet II, it served to detect fires in the city. After the Republic, Galata Tower was restored and opened to the public in 1967 (Hurel, 2001).

It is considered to be one of the important places of the Golden Horn and also the only vertical element. From a long distance away, the Galata tower looks extremely gorgeous and outstanding in the night, with its golden appearance among the buildings.

Lighting of the tower aimed to create an impressive design to emphasize its architectural features. The new colorful LED lighting also enables the tower to project itself as an urban icon in the heart of Istanbul's cultural and artistic Beyoğlu district, further enhancing the image of the city at night.

In the top of the tower, for the windows located on the round facade of it, the fire yellow color was chosen to reveal the color of bricks. Selected colors were matched the Istanbul's night silhouette tones.

The lower body of the tower is illuminated by projectors positioned at the level of the eye level, in order to emphasize the human-scale approach as well as the city scale. So people sitting around or walking around the challenge; they are able to perceive the cylindrical structure as aesthetically perceived as a stone body. The decorative appliques located around the tower make the center of the towers around by illuminating the sitting, resting and navigation areas in the square at the base of the tower.

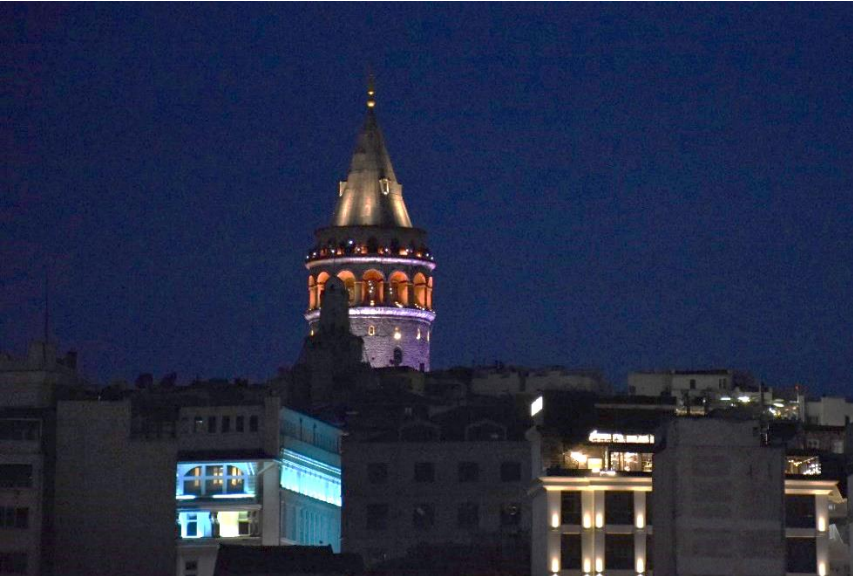


Figure 5.28: Day and Night view of Galata Tower from Galata Bridge.

Source: Author

The cone on the tower was illuminated by small-sized but high-powered LED projectors, helped to make a gathering effect on the top point. The projectors used in the lighting of the cone also illuminated the ALEM and made it glow.

Consequently, the type of illuminating the tower make positive efforts for the overall lighting of the nightscape.

C: Ataturk Bridge

Alternatively known as the Unkapanı Bridge, it is a highway bridge on the Golden Horn in Istanbul, Turkey. The 454 m long Unkapani Bridge was originally designed and constructed with a 16 m wide deck slab allowing a lane of vehicle traffic in each direction flanked by two 4.5 m wide pedestrian lane (Hurel, 2001).

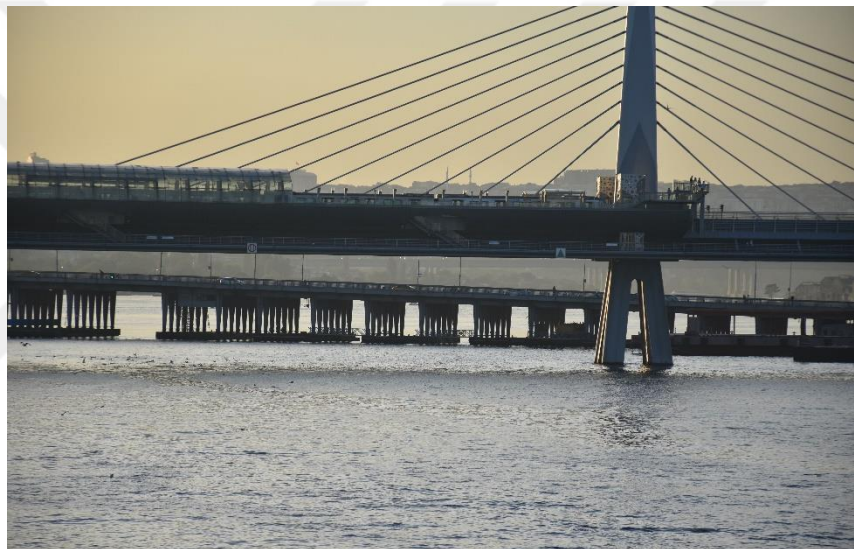


Figure 5.29: Day and Night view of Atatuk Bridge from Galata Bridge.

Source: Author

Originally completed in 1836, the Hayratiye Bridge was united the neighborhood of Unkapanı and Azapkapı. In 1836, II. It was opened by Sultan Mahmud. In 1875, it was replaced by a second bridge, rebuilt by a French company. Between the years 1875-1912, it had been in function but then destroyed as it reached the end of its service life. In 1912, the nearby Third Galata Bridge was dismantled and replaced by the demolished Hayratiye Bridge and replaced by the third bridge of this site.

The existing (fourth) bridge in this area was built between 1936 and 1940 and was inaugurated in 1940 under the name Atatürk Bridge. It is 477 meters long and 25 meters wide.

The nightscape analyzes of the bridge show that route for the vehicles on the bridge enlightened with 6-meter-high pole lights from both sides of the road and make a yellow line on it.

There isn't any lighting application for space under the bridge. It made the boating space totally in dark during the night and also made it difficult to recognize the bridge from a far distance. When the observer watches from the second vantage point to the silhouette of the Golden Horn, it is hidden behind the shiny Golden Horn metro bridge and losing its historical identity.

D: Golden Horn Metro Bridge

The Golden Horn Metro Bridge is a cable-stayed bridge along the M2 line of the Istanbul Metro, spanning the Golden Horn in Istanbul, Turkey. It connects the Beyoğlu and Fatih districts on the European side of Istanbul. It is located between the Galata Bridge and Atatürk Bridge where Süleymaniye Mosque and Beyazıt Tower are seen in the background. The bridge enables a direct connection between the Hacıosman metro station in the Sarıyer district with the Yenikapı transport hub in the Fatih district.

The bridge's conceptual design was carried out by a French engineer and bridge specialist Michel Virlogeux, who also designed the Yavuz Sultan Selim Bridge (Third Bosphorus Bridge) at the Bosphorus strait in Istanbul.

The structure and design of the bridge are discussed with the reason that it is located in a historical area. For the subject of lighting, the bridge has a beautiful lighting design by itself and helps to reveal the details of architectural design.

Due to the historical character of the surroundings and its location in a region with such a historical identity, high level of illumination and being more dominant as other important historical monuments, may not be interpreted very appropriate.

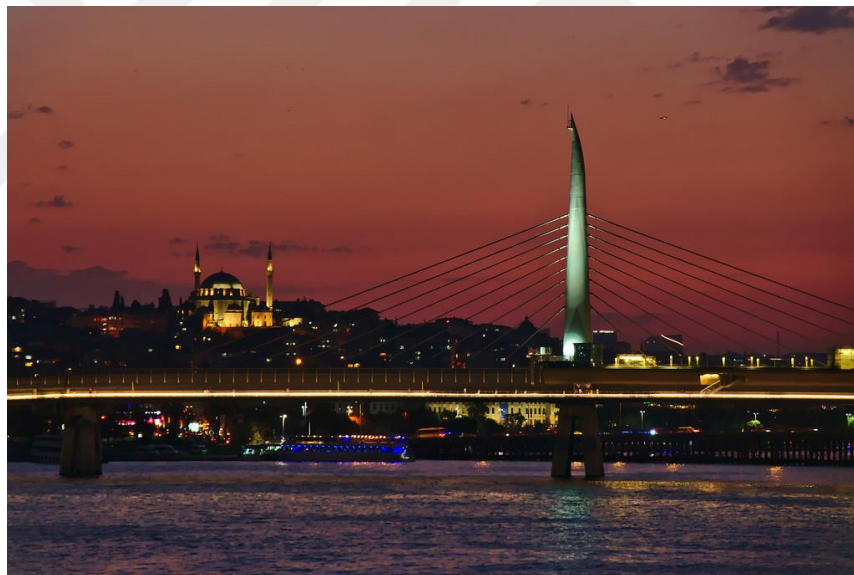


Figure 5.30: Day and night view of the Metro Bridge from the Galata Bridge.

Source: Author

E: Eminonu Sqaure

The Eminonu Square in Eminonu, Istanbul is a famous one located in between the Galata Bridge and New Mosque (Yeni Camii). It is a popular square where especially the Grand Bazaar & Spice Bazaar visitors also pass through (Çelik, 1993).

At night it is a quiet place. There is a limited number of housing in Eminönü, and majority of the buildings are offices, shops and workshops Thus, if one does happen

to be there in the evening the contrast with the daytime is eerie and somewhat menacing. Every day roughly two million people work in or pass through the district of Eminönü.



Figure 5.31: Day and night view of Eminonu square from the Galata Bridge.

Source: Author

F: New Mosque

The Yeni Camii; originally named the Valide Sultan Mosque and later New Valide Sultan Mosque after its partial reconstruction and completion between 1660 and 1665; is an Ottoman imperial mosque located in the Eminönü quarter of Istanbul, Turkey. It is situated on the Golden Horn, at the southern end of the Galata Bridge, and is one of the famous architectural landmarks of Istanbul. The exterior of the mosque itself boasts

66 domes and semi domes in a pyramidal arrangement, as well as two minarets. The main dome measures 36 meters in height and is supported by four flanking semi-domes (Hurel, 2001).

According to the night view of the structure, the general illumination of the mosque helps to come in view during the night.

The body of the building is illuminated by wide-angle projectors or floodlight. We can see the illumination of the body of the minarets from bottom to top, and also we can recognize a different color lighting in their lighting design.

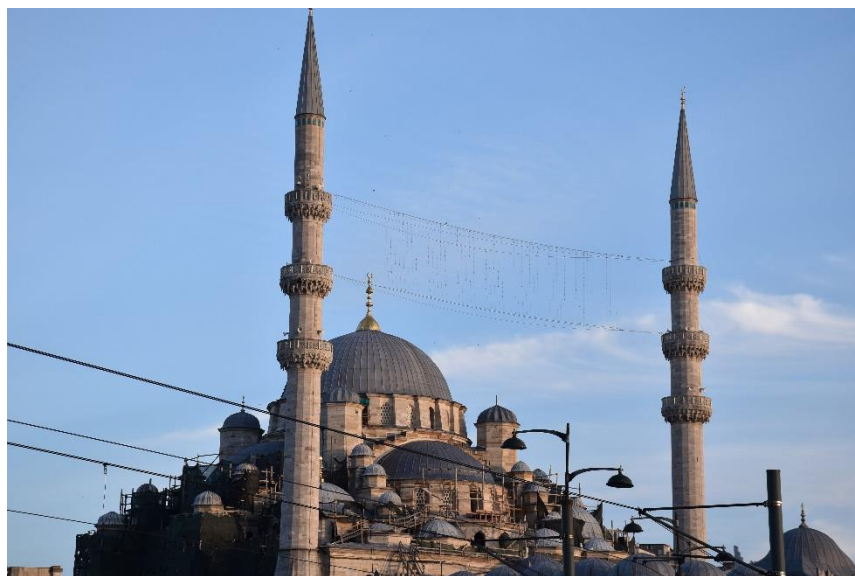


Figure 5.32: Day and night view of New Mosque from the Galata Bridge.

Source: Author

We can point out that the architectural details of the building are not illuminated separately, and there is no illumination for the domes. All illuminations pertinent to the structure are made with warm colored lighting fixtures.

G: Rustem Pasha Mosque

The Rüstem Pasha Mosque is located in an old and busy area of Eminönü area, by the Golden Horn. The mosque was built between 1550-1561 by Rüstem Pasha. Its architect was Sinan, the great imperial architect who also built Suleyman's Mosque nearby. The mosque was damaged in the Great Fire of 1666 and the earthquake of 1776 but restored afterward. The mosque has a double porch with five domed bays, from which projects a deep and low roof supported by a row of columns (Hurel, 2001).

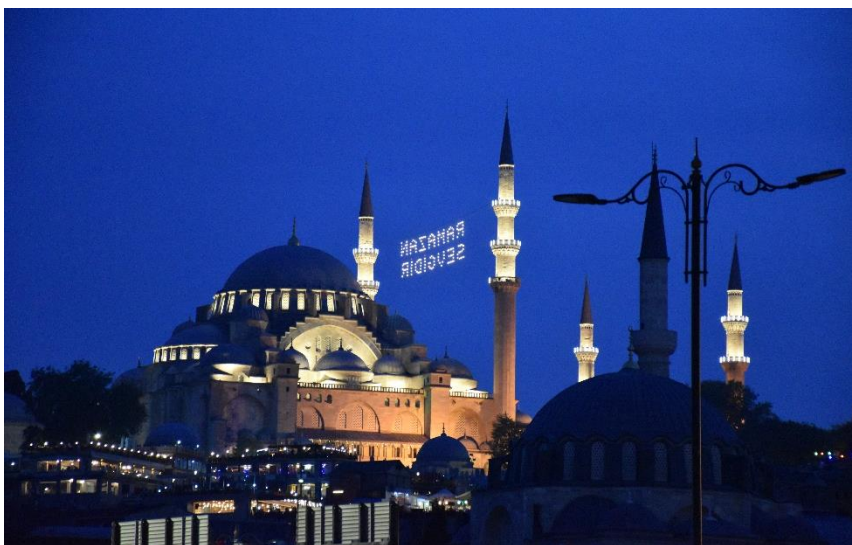


Figure 5.33: Day and night view of Rustem Pasa Mosque from the Galata Bridge.

Source: Author

When we are watching through the Galata bridge, it appears in the silhouette of nighttime on top of the hill. Moreover, it is an important part of the image of this area. About the illumination of this structure, we can mention that it has a nice night appearance due to the true illumination and proper selection of warmness of light.

Vertical features of structures totally enlighten with uplights, and also the spotlights were used to highlight the details under the dome which made it perceivable though to the distance.

Conclusion:

According to the lighting standards and applications guidelines that mentioned in chapter 2, if we do not look at it as an expert eye, we can evaluate the general lighting of the area as pleasant.

According to the thesis main goal, to make legibility of nightscape, the elements that stand dominant in the daylight and help an image memorable with its historical feature or structures should be illuminated during the nighttime to keep these properties up. Therefore, during the analysis of nightscape of this area, it is discovered that most of the elements of this region are enlightened, but the composition issue and obey the guidelines are arguable.

Strongpoints:

- Most of the dominant historical building has been enlightenment.
- Generally, the lighting of this nightscape was evaluated as acceptable.

Shortcoming:

- There isn't any planned design for mirror impact issue for each element beside the water.
- The density of light or overlighting has not planned, and some structures are illuminated at high levels.
- There are dark and undefined areas in the coastal parts and the square.

5.5 Strategies for illumination of urban values

According to the technical studies on available kinds of literature that mentioned in chapter 2 and the site analysis, this section aims to give some strategies and methods

for the nightscape design in valuable areas like Golden Horn in Istanbul. These strategies are listed out according to various lighting objects and the importance of them.

5.5.1 Historical building lighting

Outdoor lighting of historic buildings is an important issue. It must be compatible with the existing architecture of the site and should be used in designs that minimize light pollution and maximize energy efficiency. Outdoor lighting can provide striking effects. With appropriate permits, the projectors can be attached to nearby street lighting poles rather than the body of the building itself. They can also be mounted flush with the ground surface around the building.

Enlighten all the elevation of a building is rarely required because some parts frequently might be unsuited or unreachable for viewing. It is normally recommended to intensify on the primary nearby and far part of night-time viewpoints. In the role of the design guides, position, distance, and angle of the observer always should be taken into account (External lighting for historic buildings, 2015). It is always preferable to illuminate architectural details and modeled features such as pediments, columns, porticos or niches, rather than lighting the whole building.

The intensity of light: Illumination should be plenty of to “wash” an aspect of the facade with lighting at the darkness and, consider other nearby lighting sources (street lighting, interior lighting, etc.). Lighting must be adjusted directly on the facade(s) at issues. It must not spill out onto adjoining features, nor glow directly onto the main street or into the interior of buildings. The light should be minimized “light pollution” of the ambient. Lighting which has scallops affect on the buildings exterior surface walls or distorts the structure with shadows has been avoided.

Variety of light source: The illumination must contain of clear light and does not exchange the color of structures materials and finishes. Colored bulbs, high-pressure sodium lamps, and fluorescents light source are generally not appropriate for lighting historical buildings exterior and facades. Also, metal lamps may not be suitable for orange or red colored wall and facades.

Lighting fixtures must be properly mounted, aimed and shielded so that light is directed only onto the building facade. The maximum level of illumination should not exceed 50 lux. (IESNA, 2000)

Color of light: The choice of color for the illumination of historic buildings is a very important and comprehensive issue. According to the current literature, it is suggested to use cold white and warm white intermittent color temperature for historical buildings and monuments, and colorful lighting becomes a false choice (Choi, 2006).

Type of illumination: Common practices for building floodlighting use up-directed luminaries that project a large proportion of their light directly into the sky.

There are three types of facades lighting for historical building that are commonly using:

1. Floodlight. It occupies about 80% of the total number of purchased lighting devices. Because the glass absorbs a lot of light, this light is used more often for concrete structures;



Figure 5.34: Floodlight example sketch.

Source: Author

Ideal for free-standing objects of culture, because it allows you to keep monumental appearance and holistic perception. Floodlighting is characterized by the installation of lights at a certain distance from the illuminated objects (Figure 5.34) they are often mounted on poles. Floodlight will pass through the window so that the reception is not the best for buildings where at night people are: hotels, business centers, residential buildings.

2. Accent. Allows you to select individual parts, are not fully illuminating the façade. Thus, emphasis is placed on the top or bottom of the building.

Focus Attention to interface elements (window frames, arches, cornices, columns ,balconies) that illustrated in (Figure 5.35). For this type of illumination used lamp small and average power, mounted directly on the facade.

Allowed the use of linear LED luminaires, which successfully ousted bulky fluorescent installation: «Power-Washer», «Emphasis white», «DU-6», «Vari-Spot» and others.

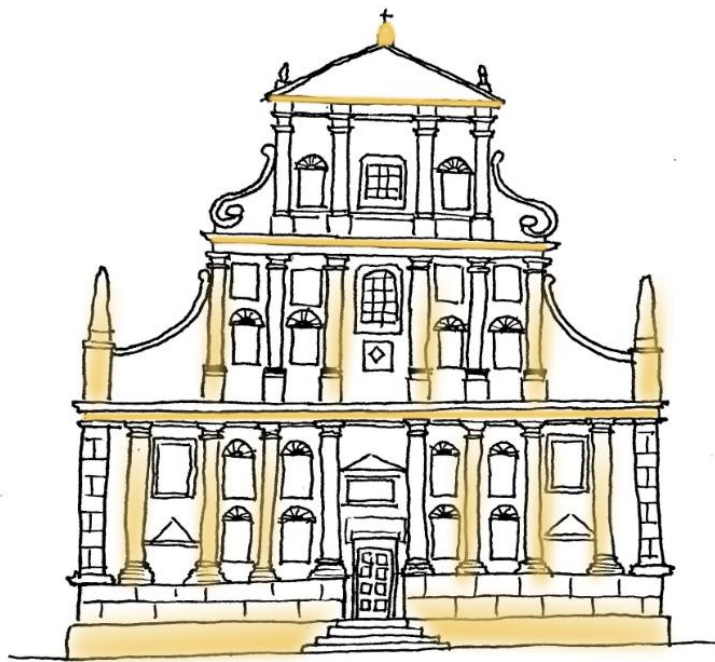


Figure 5.35: Detailed lighting example sketch.

Source: Author

3. LED. A wide range of colors provides unlimited opportunities for the realization of any light fantasies and create extraordinary beautiful light effects

Historical buildings are the most important elements in our research area. The historical buildings are seen from the vantage points are Galata Tower, New Mosque, Rustem Paşa Mosque, and Halic Congress center.

During the site analysis, the general illumination of these historical buildings was evaluated as the lighting appropriateness based on strategies that defined above, and

according to the deficiency of them, recommended design strategies for improvement of nightscape view were described as below (Table.5.10)

Table 5.10: Recommendations for historical buildings lighting.

Name of Building	Recommendations
Galata Tower	<ul style="list-style-type: none"> • To Conceale the lightsources around the building
New Mosque	<ul style="list-style-type: none"> • To illuminate the detail of building (domes) to expose the structure from a distance • To balance the brightness of the illumination on vertical elements • To standardize the color temperature of the light
Rustem Pasha Mosque	<ul style="list-style-type: none"> • To balance the brightness of the illumination on vertical elements
Haliç Congress Center	<ul style="list-style-type: none"> • To standardize the color temperature of the light • To illuminate the detail of building to expose the form of bulding from a distance • To illuminate the environment of building to highlight the boundary

5.5.2 Bridge lighting

Bridges connect – people and places, businesses, or even whole nations. However, bridges are more than functional construction spanning obstacles, towering overseas and skylines: Suspenders, pillars, decks, and stairways create a unique architectural elegance, leaving them second to no other type of building (Figure 5.36). That is why, all around the globe, they have become landmarks, beloved by natives just as well as visitors.

Aesthetics feature of a bridge is a significant design consideration for all bridges. The lighting design takes advantage of the architectural qualities of each bridge. These attributes are increased when bridges are available; but when there is little architectural value, the bridge will be transformed into an illumination sculpture. Low-brightness lights and fiber optic tubes should be used to minimize light glare and provide public safety. Also, the link between the bridges should be visual (C. C. C. 2000). An essential

issue of bridge lighting systems is the ability to protect and maintenance of lighting fixtures and systems throughout the life of the structure.

Bridge lighting should be sensitive to drivers, pedestrians, boaters, and all other users. The design method must be selected and placed to strengthen and emphasize the structure while minimizing glare and unnecessary distractions. In addition to luminaire selection and placement, the color of the lighting can adversely affect or strengthen any of the visual design elements (Bridge Aesthetics Source Book, 2009).

If the bridge is also used for vehicle traffic, the lighting direction, luminance, colors, and angle need to be controlled to avoid glare and visual disturbance.

The spaces under the bridge are also important. The lights on the bridges are always reflected by the water. During the design of bridge lighting, the possible effects of the reflection on the water should also be considered. Since the potential viewing positions could be anywhere, the reflection on the water is likely to cause glare to people.

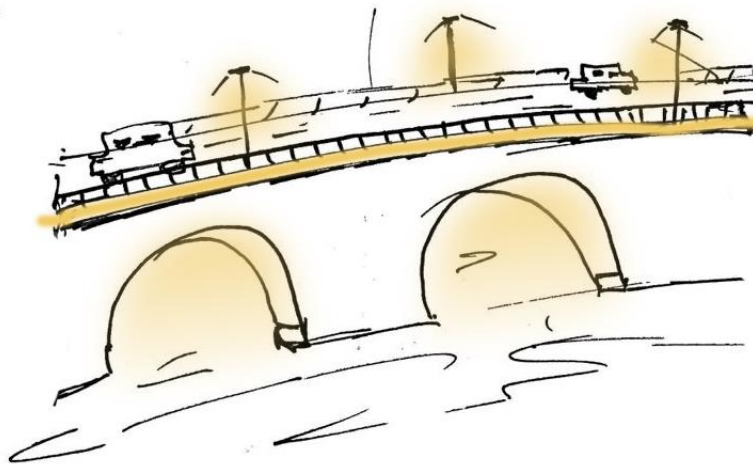


Figure 5.36: Bridge lighting example sketch.

Source: Author.

Therefore, the luminance and colors need to be under control. Additionally, sometimes, the water system might change its water level. For these situations, the selecting of positions to install lighting facilities must have proceeded carefully. Therefore, the bridge lighting should also be careful about using colorful lighting, flashes, dynamic lighting, or other effects (Hongxiang, 2014).

Most of the bridges have their potential viewing positions for people to enjoy the view. Usually, these viewing positions are located on both sides of the bridges, and they could be on the water or the bank from a certain distance. The lighting design of the bridges should take these viewing positions into consideration so that people can be able to see the overall night view of the bridge and also some attractive structural details from the viewing positions (Hongxiang, 2014).

Table 5.11: Recommendations for bridge lighting.

Name of Bridge	Recommendations
Galata Bridge	<ul style="list-style-type: none"> • Improve rout lighting on top of the bridge • to highlight the pedestrian path during the night with lighting • to control the light level to avoid light glare • to remove the neon colored tables for advertising lighting of markets under the bridges • illumination the arc under bridges for the passage of ships and boats
Golden-Horn Metro Bridge	<ul style="list-style-type: none"> • to reduce the lighting level to prevent the new structure from raiding others in the historic area
Atatürk Bridge	<ul style="list-style-type: none"> • Improve rout lighting on top of the bridge • to highlight the pedestrian path during the night with lighting • to control the light level to avoid light glare • illumination the arc under bridges for the passage of ships and boats
Golden-Horn Bridge	<ul style="list-style-type: none"> • To standardize the color temperature of the light • Improve rout lighting on top of the bridge • to control the light level to avoid light glare

During the analyze of site, four existing bridges have been defined as distinct symbols of the region. The bridge that appears from the first vantage point, the Golden-Horn Bridge and the bridges that seen from the second vantage point, such Galata bridge, the Haliç metro bridge, and the Atatürk bridge were evaluated under the mentioned topic.

According to the night appearance and lighting applications of them, deficiencies and inaccuracies were described, and the lighting design strategies and recommendations to improve the nightscape of them were defined as shown above (Table 5.11).

5.5.3 Landscape lighting (parks, squares and green areas)

Squares: Square Lighting is one of the most widely used illuminations in the city while we are regarding public space. In general, there is always an overall lighting planning that contains a specific theme of the square and the general lighting arrangement like (figure, 5.38 and 5.39). The intensity of the lights will be illuminated at an appropriate distance between both lighting fixtures. Does not mean square lighting illuminate the whole frame like the day or do the same brightness for everywhere. Lighting design has usually enlightened the entrances, elements, and assembly areas, while grasses or shrubs are less bright (Hongxiang, 2014).

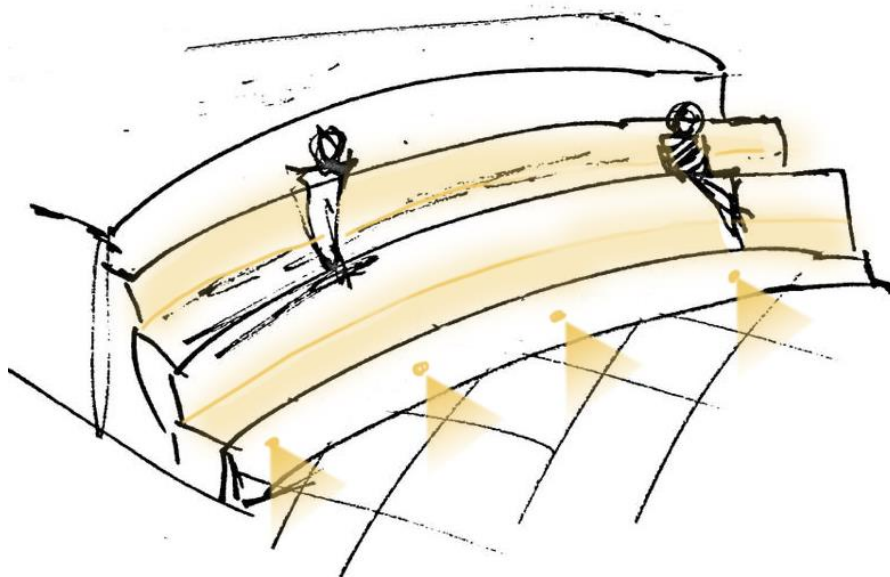


Figure 5.37: Steplight for squares example sketch.

Source: Author



Figure 5.38: Pole light for general lighting of square example sketch.

Source: Author

Parks: Lighting design of parks could divide into two general types: hard landscape lighting and vegetation lighting.

In general, pedestrian areas in the city park include small squares, paths, stages, gardens, and other public spaces. Hard landscape lighting like the illumination of pedestrian areas in a park, entrances, squares, and main paths often have special lighting design and higher brightness to highlight these areas. Besides, places with inclines, steps, stairs, playgrounds, and other elevations need extra lighting to ensure a safe environment. Parks have more natural landscape elements divers to other public spaces. For this reason, the lighting in the parks should be designed on a smaller scale and at a lower density so as not to damage the vegetation or the plant installation. The illumination of the pedestrian areas in the parks usually continues throughout the night. In addition to path lighting, lighting fixtures can be installed on the ground, on the lawns or the sides of the roads.

Landscape lighting provides special effects by controlling the type, intensity, and direction of light to highlight a landscape feature. A few basic light effects can be used to accent landscape features. Some important rules are;

- The light source should be properly positioned, aimed, and protected, and then light directly onto only the selected tree or bush.
- If the lighting fixture is not a decorative element, it should conceal behind bushes, etc. if possible.

- Make creativity by using a mix of lighting techniques for a dramatic and exciting atmosphere.

There are many lighting techniques that enhance the scenery. These are given in Figure 5.39 and Figure 5.40.

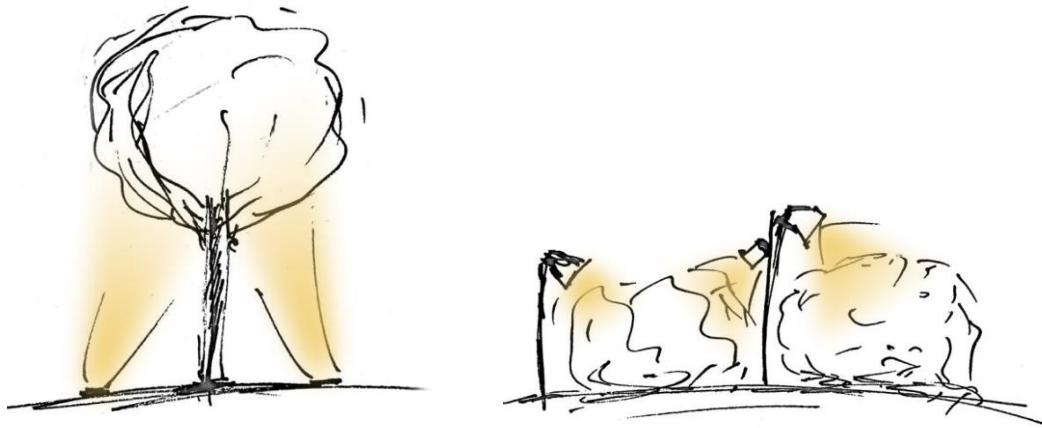


Figure 5.39: Plant and tree lighting example sketches.

Source: Author

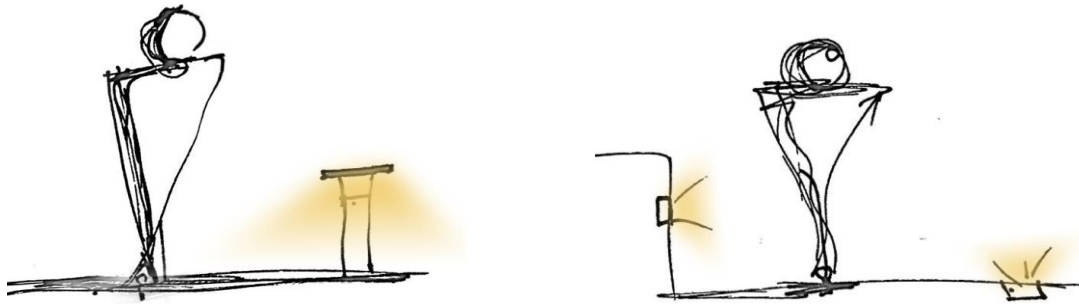


Figure 5.40: Path lighting for pedestrian example sketches.

Source: Author

In the region, we analyzed, as an essential and emerging green area and square, the Golden Horn Park and Eminönü Square were selected for analysis; thus, suggestions and values pertinent to them are presented in the table below (Table 5.12).

Table 5.12: Recommendations for landscape lighting.

Name of Place	Recommendations
Eminönü Square	<ul style="list-style-type: none">• illumination of steps and seating elements• illumination of walking paths with short bollards• illumination to define the square shape and size
Haliç Park	<ul style="list-style-type: none">• illumination of walking paths with bollards or floodlights• to reduce the glaring light of pole lights and projectors• to balance the light temperature of selected light sources• to illuminate the trees and bushes to make a proper nightscape in human scale

5.5.4 Waterfront and shorlines lighting

Waterscape lighting is important to avoid light pollution and focus on fitting into the night view of the city.

Waterscape is one of the major attractions in a city, especially in a park which has a river or a lake inside it. When choosing lighting methods for a waterscape, it should be done according to the morphology of the water and the situations of its reflection. For artificial waterscape like fountains, the lighting can be designed in a dramatic way. The luminance and lighting colors should fit for the shape and height of the spray and not produce light pollution. For the natural waterscape, the luminaires should be concealed in the environment. Protective measures should be taken during the lighting design in case of changes in water level or frozen periods. Besides, on the edges between pedestrian spaces and waterscape, there should be functional lighting set in order to prevent accidental drowning.

Therefore, the waterscape lighting can help light up the shoreline. With the dim vegetation lighting, special structure lighting and the building lighting in the city, the overall night view presents a beautiful image with vivid luminance contrasts and the reflection on the lake, becoming a splendid image of a city.

The waterscape lighting should aim to present the natural scenery of the water, instead of using bright blue lights to remind people about the river.

The most important coastal region of the historic peninsula can be in Golden Horn area. There are many viewing locations where people can see the city from the front shore and the overall night view of the city. Therefore, the illumination and night view of the water coast are essential in this region.

Two sections were selected to propose lighting strategies. There are some recommendations based on the strategies and for Eminönü coast and the Karakoy Harbor.

Table 5.13: Recommendations for shoreline lighting.

Name of Place	Recommendations
Eminönü Shoreline	<ul style="list-style-type: none"> • illumination to provide safety in terms of highlighting the sea boundaries • to be included in the lighting plan for the illumination of small boats standing there to avoid losing their night identity
Karakoy Port	<ul style="list-style-type: none"> • to improve the pedestrian lighting • Reducing the lighting glare

6. CONCLUSIONS AND RECOMMENDATIONS

This thesis aims at completing the theoretical gap between urban design and nightscape design and contributing to the oncoming nightscape structures in Istanbul.

As the fast growth and improvement in cities, nightscape and urban lighting have played an increasing role in cities urban planning. However, some cities have a misunderstanding about these issues, and they are facing a lot of problems during their nightscape constructions. One reason about these messes is that the theoretical studies on urban lighting master plans and nightscapes have fallen behind the cities' development. To help about solving these problems, this thesis searches for a better comprehension of nightscape to promote further studies on nightscape in the field of urban design and to develop the identity of a city during the night.

6.1 The Site Analyse Process

This thesis performs descriptive analysis to resolve the problems and shortcomings of the urban lighting in nightscape for the chosen sites of Golden Horn.

This study used graphic analysis on the photographs taken from the vantage points and evaluated the image of silhouettes in three steps for both day and night status. Form-based analyze, legibility analyze and at last, for the main aim of this study the lighting design analyze and evaluations were done to figure out the strong points and shortcomings of the nightscape in the chosen cases in Golden Horn. In the end, a series of strategies of lighting design are addressed for the future nightscape designs based on the theoretical studies and sites analyses.

6.2 Conclusion

In the process of the thesis, the strategies were given according to the analysis and literature.

We conclude that for the cities which have a rich multicultural history like the coastal city of Istanbul and the ones which require a particular concern about their specific

natural attributes, the nightscape appearance reveals to be an important subject. However, the most essential issue is how could help for a cityscape to have a legible nightscape and keep its identity during day and night.

Based on the concept of legible cities, for this topic, a city should have some special elements or several features and structures to stay in a person mind in daylight.

For accurate this fact in the night-time, the illumination, and put forward these elements such as historical buildings, bridges, shorelines, or various symbols of the area play an important role. On the other hand, the wrong enlightenment of them in the night scenes could cause chaos and make no sense and also could make light pollutions. Therefore, emphasizing on the good determination of forms and the correct selection of the items is an issue that this thesis considers.

Due to its long history, Istanbul has got exceptional tangible and intangible heritage. Natural features of this coastal city like the network of its hills and topographical diversity and the confrontation of two sides make it a significant case. How or from which point the night silhouette of the city will be seen make it necessary to determine the vantage points correctly. It means that these points should capture the majority of the urban character areas and pertinent features besides their ownership should be public or semi-public. Therefore this fact deserves gaining importance in the title of urban design, and it is recommended to determine them in 3d analysis methods.

Following the identification of the vantage points, another step is the selection and categorization of forms and structures which human eye and the perception captures from these points. As mentioned before, Istanbul has varying natural features like the grift network of hills and ridges, so the topography plays a role to put the element forwards and, might have an effect on the perception of forms differently.

Through the detection of forms and legible elements during the day, for the nightscape design, there are two important factors which help us to design a pleasant nightscape:

- The priority of elements to lit
- Composition of lighting design

It is clear that for a city like Istanbul, which could be named as culture-land, the priority of structures and elements to be lit for the nightscape view should be different. For instance, bridges might be a symbol for a city, but in the selected case study of Golden-

Horn, which was a center of the Ottoman Empire, there was a lot of historical features to emphasize. Mistaken in the selection of the characters, or not to give priority and enlighten the all of them could make chaos, complexity, and messy image.

In addition to this, it is important to pay attention to the concept of composition as well as the lighting properties of each element when the designs are combined. As the wrong strategies are applied, a complex and unimaginable nightscape could be obtained. Besides that, the presence, level, and colors of the illumination are the subjects that should be paid attention in order not to lose the identity during the night by overlighting or inappropriate colored lighting. Further, another important issue that should be taken attention is the scale impact. A nightscape designed for human scale sometimes could remain ineffective by the city scale.

This study operates the profession of urban design to fill the gap and misunderstandings on this issue. In the current situation, the lighting design impact was studied in the Golden Horn area, for the views of selected vantage points after the detection of form and features in them. Due to analysis and evaluation, the strategies were recommended for each of the features to developing the nightscape of Golden Horn in order to help to keep the identity of night-time as much as day. As a result of strategies, it was targeted to help similar examples are intended to improve the nightscapes.

According to the research, it is hard to obtain a standard for a nightscape design. However, due to such examples and similar studies for different countries, this thesis could make a template to the cities that have a historical identity like Istanbul or in various points of Istanbul.



REFERENCES

- Ashihara, Y.** (1983). The aesthetic townscape. The MIT press.
- Brandi, U.** (2006). Lighting Design: Principles, Implementation, Case Studies.
- Brandi, U. and Geissmar-Brandi C.** (2007). Light for Cities, Lighting Design for Urban Spaces A Handbook.
- Branstone, H.** (1994). Evaluation of Retail Lighting, Journal of the Illuminating Engineering Society
- Bridge Aesthetic Sourcebook. (2009).**
- British Standards Institute.** (1992). BS 5489:1992 Part 1 to 9: Road lighting. Part 9, Code of practice for lighting for urban centres and public amenity areas. London: British Standards Institution.
- Bui, L.** (2005). Landscaping: The lighting design guidelines. The MIT press.
- Clifton, K. and Ewing, R.** (2008). Quantitative analysis of urban form: a multidisciplinary review, Journal of Urbanism
- Çam, R.** (2004), An analytical approach to the urban outdoor lighting quality of residential areas in İzmir, Master Thesis: Izmir Institute of Technology.
- Çelik, Z.** (1993). The Remaking of Istanbul: Portrait of an Ottoman City in the nineteenth century, University of California Press, Berkeley
- Chartered Institute of Building Services Engineers (CIBSE) and Institution of Lighting Engineers (ILE).** (1995). A Guide to Good Urban Lighting. Birmingham: SP Print Group.
- CIE.** (1992). Guide to the Lighting of Urban Areas , Information 9
- Enginöz, Y.** (2004). Kenti Aydınlatmak, Lyon Işık Festivali, Yirmibir Mimarlık Tasarım ve Kent Dergisi, Sayı 19, Ofset Yapımevi ve Matbaacılık, İstanbul, Türkiye
- Eyice, S.** (1996). Rehabilitation of Two Floating Bridges, Diyanet İslam Ansiklopedisi, Turkey
- Gokhale, V.** (2003). People' Perception of Lighting. Journal of Architecture. India.
- Hürel, H.** (2001). İstanbul'u Geziyorum Gözlerim Açık, Kapı Publication, İstanbul, Turkey
- Hong, Ong Swee.** (2007). Design Basis To Quality Urban Lighting Masterplan ,(B.A (Architecture), National University Of Singapore), A Thesis Submitted for The Degree Of Master Of Arts (Architecture) Department of

Architecture, School Of Design And Environment National University
Of Singapore.

Hongxiang, Y. (2014). Urban Nightscape and Nightscape Lighting, Blekinge Institute
of Technology

Illuminating Engineering Society of North America (IESNA). (1989). RR-89: IES
Lighting Ready Reference. New York: IESNA.

Illuminating Engineering Society of North America (IESNA). (1975). IES Lighting
Guide: The Outdoor Environment. New York: IESNA.

Illuminating Engineering Society of North America (IESNA). (1999).: Lighting for
Exterior Environment. New York: IESNA.

Illuminating Engineering Society of North America (IESNA). (2000). Lighting
Handbook: Reference & Application.

IESB. (2004). Guidance of Urban Nightscape Lighting Technology. China Electric
Power Press.

Iguzzini. (2000). External Lighting Systems, Italy

Jakle J. A. (2001). City Lights; Illuminating the American Night, The Johns Hopkins
University Press, London

Kaplan, R., Kaplan, S., and Ryan, L.R. (1998). With People in Mind: Design and
Management of Everyday Nature. Washington: Island Press.

Kaplan, S. (1976). Adaptation, Structure and Knowledge. In T. G, Moore, ed.
Environmental Knowing: Theories, Research and Methods.
Stroudsburg, Pa.: Dowden, Hutchinson & Ross. pp. 32-45.

Karagüler , S. and Korgavus B. (2014). Kent Kimliğinin Kent Peyzajı Üzerinde
Oluşturduğu Etkiler, Silüetler, Görünümler ve Dengeleri, Gazi
University Journal of Science, Turkey

Kuban, D. (2010). Istanbul- Bir Kent Tarihi, İş Bank Publications, Istanbul, Turkey

Kuçük, P. (2014). Kentsel Aydınlatma, Aydınlatma Master Planları ve Aydınlatma
Master Planları İçin Bir Rehber Önerisi, Istanbul Teknik Üniversitesi Fen
Bilimleri Enstitüsü, Kentsel Tasarım Anabilim Dalı.

Lynch, K. (1960). The Image of the City. Cambridge: The MIT Press.

Lynch, K. (1981). A Theory of Good City Form. Cambridge: The MIT Press.

Narboni, Roger. (2004). Lighting the Landscape: Art, Design and Technologies,
Birkhäuser, Germany.

- Mahnke, Frank H.** (1987). *Color and Light in Man-Made Environments*, Van Nostrand Reinhold Co., New York, USA
- McCloughan, C.L.B., Aspinall, P.A., and Webb S.R.** (1999). *The Impact of Lighting on Mood. Lighting Research Technology.*
- Moyer, J.** (1992). *The Landscape Lighting Book.* John Willey & Sons, Inc. New York.
- Narboni, Roger.** (2004). *Lighting the Landscape: Art, Design and Technologies*, Birkhäuser, Germany.
- Nasar, L. J.** (1998). *The Evaluative Image of the City.* USA: Sage Publications.
- Nasar, L. J.** (1988). *Environmental Aesthetics: Theory, Research, and Applications.* Cambridge, New York: Cambridge University Press.
- Buket ÖNEM. A and KILINÇASLAN, I.** (2005). Haliç bölgesinde çevre algılama ve kentsel kimlik, İTÜ Mimarlık Fakültesi, Şehir ve Bölge Planlama Bölümü, 34437, Taşkışla, İstanbul
- Pakzad, J.** (2010). *Urban lighting and urban design considerations.* Tehran Uni. Iran
- Paskovic, A.** (2012). *Planning for Public Spaces in Vancouver's Southeast False Creek,* Queen's University Kingston, Canada
- Philips, D.** (2002). *The Lit Environment.* UK: Architectural Press.
- Rapoport, A.** (1977). *Human Aspects of Urban Form: Towards a Man-Environment Approach to Urban Form and Design.* Oxford: Pergamon Press.
- Rapoport, A.** (1982). *The Meaning of the Built Environment.* California: Sage Publications.
- Ritter, J.** (2008). *Urban lighting.* Professional Lighting Design Journal. Germany: Verlag fur innovationen in der architektur.
- Şen, Z.** (1997). "İstanbul Boğazı kentsel değerlerinin aydınlatma yönünden incelenmesi ve öneriler", Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü, Mimarlık Anabilim Dalı.
- Şerefhanoglu M.** (1991). *Kentsel Tasarımda Aydınlatmanın Rolü*", Kentsel tasarım ve Uygulamalar Sempozyumu, MSU, İstanbul
- Şerefhanoglu, M.** (t.y.). "Kent Güzelleştirme ve Aydınlatma Master Planı", Mimarlık Fakültesi, YTÜ, İstanbul.
- Şerefhanoglu, M.** (2000). "Aydınlatma ve Kent Güzelleştirme", 3. Ulusal Aydınlatma Kongresi, İTÜ, İstanbul.
- Taylor, N.** (2009). *Legibility and Aesthetics in Urban Design,* Journal of Urban Design

- Tellini & Ianone** (2006). Lichtplanung in den Städten Chinas, Professional Lighting Design
- Thompson, E.** (1994). Colour Vision: A Study in Cognitive Science and the Philosophy of Perception. London: Routledge.
- Tural, M., and Yener, C.** (2005). Lighting Monuments: Reflections on Outdoor Lighting and Environmental Appraisal. Science direct.
- Ünver, A.** (2009). “People’s experience of Urban Lighting in Public Space”. Orta Doğu Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Şehir ve Bölge Planlama Bölümü, Şehir ve Bölge Planlama Anabilim Dalı.
- Xiao, H.** (2000). Urban Nightscape Lighting: Planning and Records. China Architecture & Building Press.
- Xiao, H., and Zhang, S.** (2004), The Terminology and Definition of Nightscape Lighting [J]. China Illuminating Engineering Journal, 4, 55-59.
- Url-1** <<http://www.ildc.com>>, date retrieved 16.01.2017.
- Url-2** <<http://www.enlightenedlights.com>>, date retrieved 23.10.2016.
- Url-2** <<http://http://www.mimarizm.com>>, date retrieved 20.05.2016.

CURRICULUM VITAE



Name Surname : Mahta Amjadi
Place and Date of Birth : 29.01.92 Urmia/Iran
E-Mail : mahta.amjadi@gmail.com

EDUCATION

- **B.Sc.** : 2014 , University of Tehran, Faculty of Fine Arts,
Urban Planning Department
2015, Urmia University, Faculty of Art and
Architecture,Urban Planning Department

PROFESSIONAL EXPERIENCE AND REWARDS:

2010-2011: BEST Photography Studio, editor and portrait photographer, Iran

2011-2015: Sayan Electric Co., a part time Urban and façade lighting designer, Iran

2017 Feb: ZKLD Light Design Studio, Lighting Designer, Istanbul/ Turkey

Projects:

2018-2019: Lighting design project of Unifree Duty Free, Istanbul Airport, Istanbul / Turkey

2018-2019: Merkez Ankara Mixed Use, Ankara/ Turkey

2018: Astana Museum, Astana/Kazakhstan

2017-2018: Adalı Hilton Hotel, Girne/Cyprus

2013 Dec: Attended in workshop: Lighting Master Plan by ROGER NARBONI during Iran Lighting Design Conference which was held in Shiraz, Iran

2016 Oct: Attended in workshop: City Structure as A Design Element by JACOB DE BAAN during third Istanbul Design Biennial ACADEMIC PROGRAM in Istanbul -ITU/Taskisla

