

ASSESSMENT OF RECENTLY DEVELOPED INNER CITY  
NEIGHBORHOODS ACCORDING TO SUSTAINABLE URBAN PLANNING  
AND DESIGN CRITERIA: THE CASE OF ÇUKURAMBAR

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KAYHAN KÖKEN

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NEIGHBORHOODS ACCORDING TO SUSTAINABLE URBAN PLANNING  
AND DESIGN CRITERIA: THE CASE OF ÇUKURAMBAR**

submitted by **KAYHAN KÖKEN** in partial fulfillment of the requirements for the degree of **Master of Science in Urban Design in City and Regional Planning Department, Middle East Technical University** by,

Prof. Dr. Halil Kalıpçılar  
Dean, Graduate School of **Natural and Applied Sciences**

\_\_\_\_\_

Prof. Dr. Çağatay Keskinok  
Head of Department, **City and Regional Planning**

\_\_\_\_\_

Assist. Prof. Dr. M. Anıl Şenyel Kürkçüoğlu  
Supervisor, **City and Regional Planning, METU**

\_\_\_\_\_

**Examining Committee Members:**

Assist. Prof. Dr. Burak Büyükcivelek  
City and Regional Planning, METU

\_\_\_\_\_

Assist. Prof. Dr. M. Anıl Şenyel Kürkçüoğlu  
City and Regional Planning, METU

\_\_\_\_\_

Assist. Prof. Dr. Deniz Altay Kaya  
City and Regional Planning, Çankaya University

\_\_\_\_\_

Date: 09.09.2019

**I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.**

Name, Surname: Kayhan Köken

Signature:

## **ABSTRACT**

### **ASSESSMENT OF RECENTLY DEVELOPED INNER CITY NEIGHBORHOODS ACCORDING TO SUSTAINABLE URBAN PLANNING AND DESIGN CRITERIA: THE CASE OF ÇUKURAMBAR**

Köken, Kayhan

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The world population is increasing rapidly while the most significant effects can be observed in cities. Environmental, economic and social problems are increasing continuously along with this urban growth. Classical urban planning and design approaches are no longer sufficient to address these problems. Thus, more sustainable methods are being developed to solve them. Sustainable development concept addressing current environmental, economic and social issues are on the agenda of Turkey, similar to the worldwide approaches. Nowadays, sustainability practices are mostly shaped around development of new urban land or transformation of degraded urban areas, in Turkey. In this process, sustainability of the old neighborhoods and the recently developed neighborhoods are ignored. In order to reach urban sustainability targets, sustainability analysis and necessary improvements should be done in such neighborhoods. The aim of this study is to examine to what extent the newly developed central city neighborhoods are sustainable according to the sustainability criteria, since these neighborhoods are not likely to be transformed in the near future. For this aim, a comparison is made with another neighborhood whose sustainability is certified. First, existing neighborhood sustainability assessment tools are analyzed. Based on these tools, a list of sustainability assessment criteria including local

conditions has been developed. Çukurambar Neighborhood, whose spatial plans were prepared in the 1990s and whose construction began in the 2000s, is identified as the case study area. As a result, to what extent Çukurambar Neighborhood is sustainable in accordance with the sustainable neighborhood criteria are revealed with a comparative benchmarking analysis.

Keywords: Sustainability, Sustainable Urban Development, Neighborhood Sustainability, Neighborhood Sustainability Assessment

## ÖZ

### **SÜRDÜRÜLEBİLİR KENTSEL PLANLAMA VE TASARIM KRİTERLERİNE GÖRE YENİ GELİŞMİŞ KENT İÇİ MAHALLELERİN DEĞERLENDİRİLMESİ: ÇUKURAMBAR ÖRNEĞİ**

Köken, Kayhan  
Yüksek Lisans, Kentsel Tasarım  
Tez Danışmanı: Dr. Öğr. Üyesi M. Anıl Şenyel Kürkçüoğlu

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Dünya nüfusu hızla artarken bu artışın en büyük etkileri kentlerde görülmektedir. Kentler büyürken çevresel, ekonomik ve sosyal sorunlar da artmaktadır. Ancak klasik kentsel planlama ve tasarım yaklaşımları bu sorunların çözümünde yetersiz kalmaktadır. İçinde bulunduğumuz dönemde bu sorunların çözümü için daha sürdürülebilir yöntemler geliştirilmektedir. Kentlerin içinde bulunduğu çevresel, ekonomik ve sosyal sorunlara karşı ortaya çıkan sürdürülebilir kentleşme kavramı dünya genelinde olduğu gibi Türkiye'nin de gündeminde önemli bir yer tutmaktadır. Günümüzde, bu konudaki uygulamalar yeni yerleşim alanlarının açılması ya da bozulmuş kentsel alanların dönüştürülmesi üzerinde şekillenmektedir. Bu süreçte, hem eski hem de yapılaşmasını yakın zaman içerisinde tamamlamış, yeni binalardan oluşan yapı stoğuna sahip mahallelerin sürdürülebilirliği göz ardı edilmektedir. Sürdürülebilirlik hedeflerine ulaşmak için bu mahallelerin de sürdürülebilirlik analizlerinin yapılarak iyileştirmelerin yapılması gerekmektedir. Bu çalışmanın amacı yapılaşmasını yeni tamamlamış ve yakın zamanda dönüşüme girme ihtimali olmayan mevcut mahallelerin ne derece sürdürülebilir olduğunun sürdürülebilir mahalle kriterleri çerçevesinde incelenmesidir. Bunun için Türkiye dışında sürdürülebilirliği sertifikalandırılmış bir mahalle ile karşılaştırma yapılmıştır. Öncelikle sürdürülebilir

mahalle kriterlerinin belirlenmesi için sürdürülebilirlik değerlendirme araçları analiz edilmiştir. Bu araçların ortaya koymuş oldukları ilke ve kriterler temel alınarak yerelin özgün şartlarını içerecek şekilde yeni bir sürdürülebilirlik değerlendirme kriterleri listesi oluşturulmuştur. Sonuç olarak imar planları 1990'lı yıllarda hazırlanan ve yapılaşması 2000'li yıllarda başlayarak günümüzde son şeklini alan Çukurambar Mahallesi örnek çalışma alanı olarak ele alınmıştır. Tezin sonucunda Çukurambar Mahallesi'nin ne derece sürdürülebilir olduğu karşılaştırmalı kıyaslama (benchmarking) analizi ile ortaya konulacaktır.

Anahtar Kelimeler: Sürdürülebilirlik, Sürdürülebilir Kentsel Gelişme, Mahalle Sürdürülebilirliği, Mahalle Sürdürülebilirlik Değerlendirmesi.



To my beloved family

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## **CHAPTER 1**

### **INTRODUCTION**

The rapid increase in the world population causes rapid depletion of natural resources. Increasing consumption and energy need due to the population increase along with technological developments made it necessary to make more efficient use of limited natural resources. If we continue with our current consumption habits, we will need three worlds by 2050 (TEMA, 2015). The future of the world depends on whether it is sustainable or not. In fact, without sustainability, we will no longer live.

The concept of sustainability started to be discussed in the second half of the 20th century, when consumption and environmental problems reached its peak. Over the time, sustainability concept has begun to focus on issues such as global warming, climate change, irreversible natural environment degradation. International studies on environmental problems and proposals for solutions show that one of the main factors of environmental problems is urbanization and increasing urban population.

At the beginning of the 19th century, only 12% of the world's population lived in cities. The world reached the critical threshold of 50% in 2010. It is estimated that the ratio of urban population will rise to 70% by 2050. This rate is even higher in developed and developing countries where production and consumption are greater. In view of the developing technology and endless development goals in global competition, it is very likely that the estimated rate of urbanization will be achieved. This situation demonstrates that the development pressure on the cities will gradually increase. Issues related to urbanization such as environmental pollution, climate change, carbon emission, etc., require the review of urbanization practices.

Planning and design of cities have been studied by many different disciplines over the past century to determine and prevent negative impacts of urbanization on the

environment, without hampering development and growth. All these studies suggest that the most fundamental issues to be solved by the 21st century regarding urbanization are carbon emissions and climate change. All interventions and changes in urban areas affect the manageability of carbon emissions and climate change to a certain extent. Sustainable planning and urban design have become a necessity to eliminate negative environmental impacts.

The phenomenon of sustainable urbanization has brought new perspectives to urban planning and design. It re-defined the quality of space through promoting public transportation and non-motorized transportation modes, using clean fuels and vehicles, re-cycling and re-use in consumption, increasing the share of renewables in energy production, increasing open and green spaces, using environmentally friendly and local building materials.

Various urban models were proposed to solve the environmental and social problems caused by rapid urbanization because of all these studies, a wide range of literature and practice have been developed to guide sustainable urban planning and design practice. In this respect, there are efforts to build sustainable settlements in different parts of the world.

When all these models are examined, it is seen that neighborhood scale is taken as the basis in the development processes of urban sustainability. This is because the sustainability of a city is directly related to the sustainability of its constituent units. Therefore, neighborhoods, which are the ideal scale of self-sufficiency, are at the center of sustainable urbanization practice.

Likewise, in Turkey, there has been some works and academic studies on sustainable neighborhoods until today. These sustainable neighborhood studies are generally implemented for a new urban transformation project or on a new development area which has not been developed before. Although these experiments are good examples for creating a sustainable urban tissue and raising awareness, it is obvious that most of the existing new urban tissue is not formed in line with sustainability principles.

The existing urban tissue which was built within the last years is not likely to be regenerated for a long time, but it will continue to be used for a long time. This will cause environmental, social and economic problems in the future. Add text here

### **1.1. Problem Definition, Aim and Scope**

Urbanization in developing countries has been an economic defining feature of the 21st century. Today, around 90 percent of global urban growth takes place in developing countries and it is foreseen that all settled urban areas in developing countries will triple between 2000-2030 (Suzuki et al., 2010). Turkey, which is among the developing countries, should take sustainable measures against this growth. However, urbanization practices of Turkey are shaped by continuously changing policy. In the 2000s, when sustainable urbanization practices around the world began to increase in this process, Turkey started experiencing a rapid urbanization. In this process, old and degraded neighborhoods undergo transformation and cities rapidly expand into new residential areas. Because the history of sustainability studies in the country was very recent, the concept of sustainability could not be included in the technical or legal framework during this rapid urbanization period. For this reason, it will not be possible to talk about sustainability-based understanding in urbanization practices of this period.

Today, there are some sustainable neighborhood projects undertaken by the public or private sector. When these ongoing projects are examined, it is understood that works to create sustainable neighborhoods focus on the transformation of problematic urban areas or the opening of new construction areas. In this process, the sustainability status of the existing neighborhoods is ignored.

Therefore, this study focuses on existing neighborhoods. In this study, recently constructed neighborhoods, which are in the center of the city and in high demand, are examined. A neighborhood developed in the 2000s will not be transformed in the coming years and will probably continue to be used for at least 40-50 years. When this period is considered, the importance of seeking sustainability for existing

neighborhoods will be better understood. For this, firstly to what extent the existing neighborhoods are sustainable should be determined.

The aim of this study is to examine to what extent the existing central city settlements are sustainable in accordance with the sustainable neighborhood criteria. For this aim, it is developed and tested a simple benchmarking framework for existing neighborhoods in Turkey, focusing primarily on sustainable urban planning and design, using selected key sustainability performance criteria and taking into account the most significant urban problems faced.

The research question is “to what extent the existing neighborhoods are sustainable in Turkey?” and then the sub-questions are; "how to assess neighborhood sustainability" "how existing sustainability criteria can be advanced considering local conditions", "what measures can be taken to increase neighborhood sustainability levels of existing neighborhoods". According to these research questions this thesis predicts that problems caused by urbanization can be eliminated by improving sustainability of the existing settlements. Thus, the effects of climate change can be reduced, quality of life can be increased, and the resources can be used in a more efficient way. This thesis also provides a basis for assessing, monitoring and improving the sustainability of existing neighborhoods in Turkey.

## **1.2. Methodology**

For the purpose of the thesis, quantitative and qualitative methods are used together. The emergence and development of the concept of sustainability, the evolutionary process of addressing urban and neighborhood scale is made by examining the existing literature and practices. The current methods used to assess sustainability at the neighborhood scale are analyzed comparatively.

The study utilizes sustainable neighborhood assessment tools to discuss sustainability of existing neighborhoods in terms of urban planning and design. After an overview of neighborhood assessment systems, LEED-ND (USA), BREEAM Communities (UK), CASBEE-UD (Japan) and Green MARK for Districts (Singapore) assessment

tools are examined. The similarities and differences between these tools are revealed. The principles and criteria of these four tools are examined within the framework of meaning similarities and differences. Then, a new checklist is created by adding criteria including the local conditions of Turkey to these principles and criteria. In the checklist, qualitative and quantitative sustainability criteria are handled together and how to test each criterion in urban areas is described. Variables within the checklist are standardized to give a result between “0” and “1”.

Within the framework of the checklist, created within the scope of the thesis, the sustainability performance of the Çukurambar neighborhood compared to Hoyt Yards is examined. The Hoyt Yards Neighborhood, chosen for benchmarking analysis, is an existing neighborhood with superior sustainability performance and it has the platinum certification, the highest certification by LEED-ND. As a result of this benchmarking, the deficiencies of Çukurambar Neighborhood in the face of a sustainable neighborhood are discussed and suggestions are made for possible improvements.

Benchmarking analysis is used as the research method of this study. Çukurambar Neighborhood (Ankara / Turkey) is chosen as the case study area and Hoyt Yards (Portland / USA) is chosen as the benchmark neighborhood. The area to the north of Ufuk University Avenue (MTA Campus, Şap Institute, Tax Inspection Board, Çankaya University, Arı Schools, Evrensel Schools, USA Embassy (Under Construction)), where there is no direct pedestrian access in the Çukurambar Neighborhood, is excluded from the study. The remaining total of the neighborhood is ~ public realm.7 ha. area is determined as the study area. Hoyt Yards Neighborhood covers an area of ~ 16.9 ha.

In the light of the questions in the problem definition, aim and scope part, in the second chapter of the thesis, the concept of sustainability is examined. The reasons for the emergence and the development of the concept are examined. In this regard,

international conferences and meetings that contribute to the recognition of the concept of sustainability and its relationship with urbanization, have been discussed.

In the third chapter of the thesis, the relationship between sustainability and urbanization is discussed and the general characteristics of a sustainable city are revealed. In this section, planning and design approaches which can be considered as the foundations of sustainable urbanization are presented, and the contributions of sustainable urbanization approaches to the creation of the modern urban practices are emphasized.

In the fourth chapter of the thesis, the features of sustainable neighborhood and its relationship with planning and design are studied. It is focused on how to evaluate whether a neighborhood is sustainable or not and tools for measuring urban sustainability will be evaluated.

In the fifth chapter of the thesis, the sustainable urban planning-design criteria, which are based on the sustainability assessment tools, are examined. The selected neighborhood is discussed according to the sustainable neighborhood criteria (checklist). In line with the sustainable neighborhood criteria, the sustainability status of the built-up neighborhood has been demonstrated. In the final chapter, concluding remarks and future directions are discussed.

In the studies related to neighborhood sustainability, it is observed that there is a comparison between the existing criteria of sustainability valuation tools in general. No study has been found that adds new criteria to the system according to the specific conditions of the countries. In this respect, both the method and the scale of the case study and the comparison criteria are introduced in this thesis.

The current unsustainable urban environment and the unplanned tissue of cities of Turkey causes many problems. Therefore, it is important to recognize the solutions developed by the contemporary world on the problems of urbanization. This study aims to contribute to the sustainable urban development studies which is one of the

most neglected issues in Turkey by examining the sustainability results of the existing neighborhoods in the country.





## **CHAPTER 2**

### **SUSTAINABILITY**

#### **2.1. Sustainability and Evolution of Sustainability Concept**

Our recent story is full of troubling, interrelated and complex themes, growing inequality; an increasingly dangerous climate; depletion of resources and serious risk of ecosystems; ideological, cultural and geopolitical struggles inseparably connected with all these problems (Fitzgerald, 2016, xiii).

These issues have led to the revisions of consumption-production relationships and development ideas to achieve environmentally, economically and socially balanced urbanization through urban planning and design. Industrial production led considerable increase in urban population and extensive urbanization, which resulted in increasing consumption and depletion of scarce resources. The problem was not fully recognized until the 1960s.

Before the last quarter of the 20th century, some measures were taken to alleviate environmental pollution, unplanned urbanization and deforestation, but the convincing results have not been observed at a global scale. Growing concerns have led to a multi-dimensional and comprehensive approach including all environmental, social and economic aspects.

##### **2.1.1. The Concept of Sustainability**

'Sustainability' is related to 'futuraity' (Basiago, 1995, 109) and it can be expressed as a balancing act, in fact. This concept assumes that resources are limited and should be used sparingly and rationally for long-term priorities. Sustainability as a concept has its origin in Our Common Future Report (Brundtland Report) published in 1987. In this report, the concept of sustainability is considered as a development program,

defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.

Sustainability is a universal principle that can be applied to all systems; therefore, it is seen as a necessary concept or situation to ensure continuity in any issue (Manderson, 2006, 85-97). Sustainability is not a fixed goal or a goal to be achieved, instead it is understood as an endless process that is defined neither by defined objectives nor by specific means

### **2.1.2. Components of Sustainability**

Sustainability is considered as an interrelated three-dimensional model: “economic sustainability”, “social sustainability” and “environmental sustainability”. While sustainability is expected to be achieved as a consequence of the cooperation of these three components. Definition of the concept varies with the emphasis on which aspect is discussed but eventually all the definitions are shaped on the environmental problems and the contradiction of economic development based on the continuity of the world's livability criteria. In this model, a common value is created for human beings as a result of the environmental, economic and social processes that operate in connection with each other, and this value can only be found in the intersection of these three processes.

#### *Economic Sustainability*

Economic sustainability considers a well-balanced growth without hampering the social structure and the environment. Growth is not excluded as long as the ecological limits on economic activities are considered.

The necessary production should be done with measures to change the current consumption habits, not to encourage excessive consumption by taking into account that the world population is increasing day by day. Production- consumption balance should be achieved considering environmental and social benefits in a functioning economy. This equilibrium is related to the use of limited resources in nature. The

needs of societies and individuals are intertwined with the use of natural resources. Each activity without considering the environmental consequences will lead to an increase in the costs of natural resources and the difficulty of replacing environmental degradation after a period of time, and consequently the negative impacts will be seen both economically and environmentally.

### *Environmental Sustainability*

Environmental sustainability predicts that biological and physical systems (ecosystems) are balanced through the principles of eliminating the harmful effects and harmonizing all systems with nature. A system that is environmentally sustainable must sustain a strong resource base, avoid excessive use of renewable resource systems or sinking of the environment, and deplete non-renewable resources only to the extent that adequate substitutes are invested (Harris, 2000, 6). Gürlük (2010, 87) describes the environmental sustainability aim as ensuring the adaptation capacities of ecosystems to changing conditions. Excessive use of resources can reduce short-term costs, but it can lead more problems in the future in terms of the continuity of biodiversity.

Sustainable development principles do not eliminate the use of resources, instead, they encourage the use of renewable resources or recommend substitutable resources. In environmentally sustainable activities the use of resources continues, but this consumption is below the capacity of self-renewal of nature and thus the carrying capacity of nature is not exceeded. In other words, to ensure the ecological balance the level of contamination should not exceed the limit the ecosystem can absorb (Mengi and Algan, 2003, 10-11).

This concept includes measures such as balanced water consumption, preferring renewable materials as much as possible, waste collection and recycling, evaluation of empty lands in a city, and reducing CO<sub>2</sub> emissions.

### *Social Sustainability*

A socially sustainable system must achieve equality in distribution and enable sufficient provision of social services such as health and education, gender equality, political accountability and participation (Harris, 2000, 6). The concept of social sustainability, in which the basic rights of democracy and legal security, housing, social security and minimum livelihoods are addressed, requires international cooperation.

Social infrastructure services (education, health etc.), which are the most basic services of cities, should be delivered equally and fairly to the whole city so that disadvantaged groups can also benefit. Here, it is an important issue that urban administrations attach importance to strategies of urban infrastructure services in terms of controlling and directing urban development both in their strategic and spatial plans. The importance of technical and social infrastructure services should be emphasized in urban policies and planning studies aiming to ensure a healthy, livable and sustainable urban life quality. Equal and fair urban spaces and spatial development can only be mentioned in this way.

In addition to these, issues related to urban planning such as preferring public transportation systems, creating new urban squares or increasing availability of existing ones, ensuring the continuity of cultural diversity may contribute to social sustainability.

#### **2.1.3. Evolution of Sustainability**

Although sustainability is a frequently used concept, its origins were based on old times. The emergence and development of the idea of sustainability were based on medieval and earlier periods in Europe and Eastern cultures (Campbell, 1996, 302). However, although environmental problems and human relations were based on very old periods, the history of research and efforts to solve environmental problems is very recent. Keleş (2013, 119) states that the imbalance between human and nature

relations have gained importance and actuality after capitalism had given all kinds of value to the command of capital after the industrial revolution.

Development policies which were on the agenda of the world in the second half of the 20th century are the most important reason for the emergence of the sustainability concept. In this period, developed countries emphasize that there should be no obstacles against development policies. Keleş (2013, 108) states that, according to Malthusian view, development policies must have some limits and this view constitutes the ideological basis for the concept of sustainability. Keleş also emphasizes the importance of preventing the effects of these limitations on growth, resource depletion, pollution and climate change.

Especially, the activities carried out under the name of development until the 1960s had been considered to be necessary in a level that potential environmental issues were ignored (Tekeli, 1996, 26). In the 1960s and the 1970s, problems such as energy crises and the depletion of natural resources couldn't have been ignored more. Many studies have been carried out by academic community, international organizations and states, in order to take some measures or to minimize their contributions to the increase in these problems.

In 1968, a research was conducted by the Club of Rome, a non-governmental organization, and the Massachusetts Institute of Technology to show how environmental conditions were changing in the world. This research, called the Limits to Growth was published in 1972, and it was an important turning point in terms of revealing the connections between economic developments and environmental problems. The main prediction of the research was that the world will have lose most of its livability measures up to 150 years with the current economic policies, population growth rates and industrialization rates. The research mentioned that it was necessary to stop population increase and limit the economic growth to prevent an undesired bad end. Besides, it showed the fact that resource-related problems and

environmental disasters would confront humanity with the threat of extinction as a result of the continuation of the existing development strategies.

The research, which had very striking implications for that period, focused on attracting the world's attention to environmental problems and ensuring their prevention. As a result of this and other researches, studies concerning the environment have begun to increase in the world and have been a major contributor to the conceptualization of sustainable thinking.

#### *1972 – Stockholm*

One of the most important works to ensure sustainable development is The United Nations Conference on the Human Environment held in Stockholm, Sweden on June 5th, 1972. As a result of the conference, a declaration consisting of 26 principles and opinions, determinations and suggestions regarding the environmental problems was published.

The paper briefly sets out the main objectives for a sustainable world in line with the principles which draw attention to the carrying capacity of the environment, consider intergenerational equity in resource use, link economic and social development to the environment, emphasize the unity of development and environment (Bozloğan, 2005, 1015). The Stockholm Declaration is of great importance that it proves the causes of environmental problems vary according to the development level of the countries. In the declaration, it was shown that the environmental problems in the underdeveloped countries were caused by low income levels, underdeveloped technology and production- consumption imbalance on the contrary; in developed countries excessive consumption, production technology and inefficient use of resources have led to environmental problems. The necessity of applying rational planning to the protection of the environment and development is another issue presented in the Declaration.

### *1976 – Habitat I*

A conference was held in Vancouver, Canada in 1976 by the United Nations in order to respond to the needs of rapid urbanization effectively all over the world. Thanks to the Habitat I Conference, it was realized that housing and urbanization had to be addressed together, and in 1978 the foundation of the United Nations Human Settlements Programme (UNCHS) was laid.

At the time of its establishment, UN-HABITAT was provided with a low level of support due to the fact that two thirds of the world's population live in rural areas and therefore the problems related to urbanization have not reached their present importance yet.

### *1987 – Brundtland*

Another study, which led to a stronger understanding of the concept of sustainability and deepened the world's view of environmental problems, is Our Common Future Report. The Report was prepared by The World Commission on Environment and Development (established under the presidency of the Norwegian Prime Minister Gro Harlem Brundtland in 1983) and completed in 1987.

The report elaborated on sustainable development and made it a more frequently used concept. There was a conciliatory attitude between the emphasis on development in the 1960s and the solution of environmental problems in the 1970s (Tekeli, 1996, 26). In this report sustainable development was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition constitutes the main goal of sustainability.

### *1992 – Rio Summit*

The Conference on Environment and Development, organized by the United Nations with the participation of 178 countries, was held in Rio de Janeiro, Brazil in 1992. It is also known as the Rio Summit and the Rio Conference.

As a result of the discussions during the summit, sustainable development was accepted as the common goal of all humanity in the 21st century. As a result of the summit, the emphasis was that sustainable development puts humanity at the center and gives them the right for a healthy life for all humanity in harmony with nature. This emphasis is the basis of the principle of social equality of the sustainability concept. At the summit, it was stated that sustainable development and environmental protection should not be separated from each other.

As a result of the Summit, which has led to environmental awareness and sustainable development to be seen more effectively in the world public, an action plan named Agenda 21 was prepared. In the action plan, in addition to the concept of sustainable development, the sustainability of human settlements, sustainability in agriculture and rural development was examined in detail. The planning of cities in line with sustainability principles and the importance of local governments were among the most important issues of the conference. It is understood that the new concepts put forward by the Rio Summit show the applications that need to be made on issues such as urbanization, environment and economy in reaching sustainable development (Bozdoğan, 2005, 1020).

#### *1996 – Habitat II İstanbul*

The second conference of the United Nations on Human Settlements was held in İstanbul in 1996 under the name Habitat II. Two important universal topics, “affordable housing” and “sustainable human settlements”, formed the basis of the conference (Keleş, 2013, 136).

It was mentioned that planning of human settlements in the light of the sustainable development principles is a necessity in the texts accepted at the end of the conference (Report of The United Nations Conference on Human Settlements, 1996, 18). The role of non-governmental organizations, scientists and local governments in the implementation of the decisions of the conference was given special importance.



It was agreed that affordable housing production and sustainable human settlements would be created for all. Besides, it was emphasized that urbanization should be seen as an opportunity to be considered as the engine of global growth.

Five years after the Habitat-II Conference in 2001, “Declaration on Cities and Other Human Settlements in the New Millennium”, referred to as Istanbul + 5, was adopted.

#### *2002 – Johannesburg*

The World Summit on Sustainable Development (WSSD), held in the tenth year of the Rio Summit in 1992, was a general appraisal of the implementation of the decisions taken over the past decade.

The conference, which was broadened with the participation of state officials, local administrators as well as non-governmental organizations and private sector representatives, has an important place in the evaluation of the experiences, new proposals and difficulties encountered in the implementation of sustainable development strategies. At the end of the conference, it was examined whether the decisions taken in previous conferences were applied and new targets were defined according to the problems. In this context, fighting against poverty, reviewing consumption attitudes and the use and protection of natural resources were the main topics of the conference.

#### *2016 – Habitat III*

The third of Habitat conferences was held on 17-20 October 2016 in Quito, Ecuador. Habitat III is the most recent and comprehensive meeting on sustainable urban development and the goals of sustainable development was put forward more clearly. Furthermore, it further clarifies the achievement of these goals and depends on the planning and management of urbanization.

“The New Urban Agenda was accepted on in the Conference. It shows a shared vision for a better and more sustainable future. If well planned and well managed,

urbanization can be an effective tool for sustainable development for both developing and developed countries” (The New Urban Agenda, 2016, iv).

The New Urban Agenda invites all actors to work collaboratively in design, construction and management of sustainable, inclusive and resilient cities. In the agenda, sustainable urban development is seen as an opportunity to contribute to the development of nations in the fields of economic growth, social and cultural development and environmental protection. In this way, it will be possible to overcome many challenges such as inequalities, social and economic exclusion and environmental degradation which will affect the world population expected to double by 2050 (The New Urban Agenda, 2016).

The agenda foresees that sustainability will be achieved through a holistic approach with urban planning and design, finance, development, governance and administrative dimensions (The New Urban Agenda, 2016).

#### **2.1.4. Current Status of the Concept of Sustainability**

The concept of sustainability has now become the main core of the environment and development movements. Sustainable development targets have been established by international organizations such as the United Nations, the European Union and many states for some years to come, some of these targets have been implemented and some base years such as 2020, 2030, and 2050 have been determined and studies are being carried out in line with these targets. Among the targets set for the future, the existence of sustainable cities has an important place.

In order to support sustainable urbanization in various countries, special tax advantages are provided for sustainable practices, and projects that are at a sustainable level are encouraged with some grant support and it is aimed to increase the interest and participation of the societies with the organizations and competitions.

In this context, it is not only the responsibility of international organizations or states to achieve the goals of sustainable development, but also private sector firms, non-

governmental organizations and individuals. For this purpose, to leave a livable world to future generations, all individuals should take measures in this direction with a sustainable world consciousness.

## **2.2. Relationship Between Sustainable Development Scales**

It is possible to say that the scope of sustainable development has a direct relationship with the scale and the target to be reached. Although priorities may change, integrated management strategies need to be developed at global, national and local scales in order to achieve comprehensive sustainability. When it is understood that global strategies are insufficient for a comprehensive sustainable development target, it is necessary to localize general targets and to monitor these targets at the implementation stage (UN, 2000).

Urban and neighborhood scales have been defined as key scales that can be collected as real-time data for sustainable development practices in the local context. And also, these scales directly affect the development of new approaches and guide designers and decision makers (Özdal Oktay, 2015, 16). Although it is difficult to distinguish two scales from each other, it is discussed in many studies that sustainable neighborhood designs should be emphasized because they will affect and contribute to initiatives and approaches at higher scales (Symes, 2005, 42-48).

### **2.2.1. Global Scale**

In parallel with the process of defining the concept of sustainability, the introduction of global principles is based on a long process. International conferences, declarations and reports, such as Stockholm, Habitat meetings, are the leading figures in this field. These initiatives, which took place on a global scale from the early 1970s to the present day, required national commitment, collaborations on different scales, local-specific feedbacks and practices (Özdal Oktay, 2015, 16-19).

### **2.2.2. National Scale**

Principles have been defined about the development of various policies and plans to ensure the implementation of global-scale studies within the countries own unique systems in the 8th section of the Agenda 21 report. The aim here is to create transition strategies in order to ensure that global sustainable development principles are combined with country policies and implemented at local levels.

### **2.2.3. Urban Scale**

The urban scale constitutes the first scale defined by national strategies with local principles. Urban scale differs from the upper scales as an implementation scale. Sustainable development strategies at the urban level are crucial for understanding the importance of local initiatives and raising awareness. And sustainable development targets require innovative planning approaches within the framework of integrated policies. These approaches play a decisive role in the development and promotion of local and sustainable models through urban planning and design and contribute to this process (Özdal Oktay, 2015, 21).

### **2.2.4. Neighborhood Scale**

Attempts for sustainable development at the local level can be addressed at the neighborhood scale, which is the most basic unit comprising society, individual and environment. It has shown that the practices to be carried out on this scale have an important role in the spreading of sustainability on a wide scale, creating local-specific developments that respond to both society and individual needs. Implementation decisions at this scale pioneer building-scale sustainable practices (Özdal Oktay, 2015, 28).

### **2.2.5. Building Scale**

The concept of sustainability has been shown more effects in buildings than in neighborhoods, cities and communities until today. This is because buildings are responsible for one third of total energy use and most of the greenhouse gas emissions

in many countries. Due to their small scale, buildings have great potential in reducing energy use and greenhouse gas emissions through appropriate investments and technology.

As a result, if we want to talk about the existence of a sustainable world, it is necessary to establish a top-down relationship that addresses the general objectives and main aspects of sustainable development at national and international levels. And also, a bottom-up relationship needs to be established at regional and national level following local and regional strategies and implementation projects (Hamedani & Huber, 2012). In order to achieve a sustainable world, sustainability goals should be set at all scales. The importance of urban and neighborhood sustainability, which acts as a bridge between the upper scale and the lower scale in the top-down relationship, is better understood.



## CHAPTER 3

### URBAN SUSTAINABILITY AT NEIGHBORHOOD SCALE AND ITS ASSESSMENT THROUGH URBAN PLANNING AND DESIGN

#### 3.1. Urban Sustainability

Throughout history, cities as centers of basic economic, social and environmental processes affecting human communities have undergone radical changes, according to people's lifestyles. In particular, developing countries continue to undergo these changes (UN-Habitat 2008a, X). It is expected that the world's urban population will almost be doubled in 2050 and this makes urbanization one of the most transformative tendencies of the twenty-first century (UN-Habitat III, 2017, 3). Such an intensive urbanization rate brings many problems in urban centers and their periphery.

Today, considering the footprint (consumption of water-food-energy-urban space etc.) the cities need many interventions in terms of sustainability. It is an issue to evaluate sustainability concept with regard to environmental problems created by the cities that has been on the agenda for the last 20-30 years. McCormick, Anderberg, Coenen and Neij (2013, 1) point out the role that the cities play in global economic development has been shown to be of greater interest.

The concept of a sustainable city does not yet have a fully agreed definition. Nevertheless, in addition to the three main components of sustainable development; economic, environmental and social aspects; demographic, institutional and cultural objectives can be considered as part of the concept of sustainable urbanization (Satterthwaite, 1997, 1668).

The urban sustainability phenomenon, which has an important place in sustainable development, is defined as the process of balancing the chaotic ambience of cities with the environmental, economic and social dimensions (Rasoolimanesh et al., 2012, 623). Ertürk (1996, 175) defined sustainable urbanization as the process of creating cities that respond to human needs better than today's cities and development of urban systems in a way that does not prevent supply the needs of future generations. Mega (2010, 16) defines the sustainable cities as cities not increasing the use of renewable resources beyond their capacity for regeneration whereas contributing to the substitution of non-renewable resources, especially through innovation, research and austerities. In addition, Zhang and Li makes the following explanation to describe the urban sustainability;

*“Urban Sustainability is the active process of synergetic integration and co-evolution between the subsystems making up a city without compromising the possibilities for development of surrounding areas and contributing by this means towards reducing the harmful effects of development on the biosphere. (Zhang & Li, 2018, 145)”*

### **3.1.1. Characteristics of a Sustainable City**

Today, it is perhaps impossible for cities to be fully sustainable. However, there are various studies on the subject which can be considered as an important progress to improve urban sustainability. In many parts of the world, some policies and implementations intervene in the existing built-up area to make it more sustainable, as well as there are some examples of newly built urban areas with sustainability principles. All interventions and changes that people make in their living areas directly affect the natural environment. The deterioration of the ecological balance in the process has created a necessity in the development of ecological based solutions for the continuity of the nature and the sustainable planning of the cities. The 15th and



16th principles <sup>1</sup>of the Declaration issued at the end of the Stockholm Conference are of great importance in terms of emphasizing sustainable urbanization. According to these principles, three main dimensions of sustainable development are discussed together while emphasizing the necessity of implementation of urban plans.

The issue of sustainability of cities has been addressed more in conferences and studies after the Stockholm Conference. Arguments on issues such as the re-evaluation of cities within the framework of sustainable development and management of cities were discussed and negotiations were held on the development of affordable housing and sustainable human settlements for all.

The organizations pioneered by the developed countries and discussions in this field helped to build up sustainable city criteria. The European Environment Agency (EEA) (1995), one of the institutions working on urban sustainability at the European level, has identified measures to be taken for achieving a sustainable city, some of which are “minimizing the consumption of space and natural resources”, “protecting the health of the urban population”, “equal access to resources and services”, “maintaining cultural and social diversity”.

According to Wheeler (2004, 66-84) the sustainable city approach, which is determined in accordance with the sustainable development principles, should be defined in a way to include “growth management and land use planning, transportation, urban design, housing, energy and materials use, economic

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<sup>1</sup> 15- “Planning must be applied to human settlements and urbanization with a view to avoiding adverse effects on the environment and obtaining maximum social, economic and environmental benefits for all. In this respect projects which are designed for colonialist and racist domination must be abandoned.”

16- “Demographic policies which are without prejudice to basic human rights and which are deemed appropriate by Governments concerned should be applied in those regions where the rate of population growth or excessive population concentrations are likely to have adverse effects on the environment of the human environment and impede development.”

development, environmental protection and restoration, green architecture and building, population, economy, equity and environmental justice”.

In 2013, a framework for sustainable cities was drawn by the UN-HABITAT report on quality of life, urban prosperity and environmental sustainability. According to the report; sustainable cities, which aim to improve the quality of life, should also be committed to improve efficiency and equality issues. These cities, which prioritize public space, provide new green spaces, parks and recreation areas, are successful in improving the quality of life. They also play an important role in the formation of social harmony and urban identity. At the same time, increasing accessibility of public spaces will improve the quality of life that is the result of a sustainable city, which will be the basis of urban prosperity (UN-HABITAT, 2013, XV).

The environmentally sustainable cities are expected to be more productive, competitive, innovative and prosperous. These cities draw a balance between economic growth and environment in the processes of development, recovery and resilience. A sustainable city should offer a more compact form, high energy efficiency, low pollution levels, high accessibility and an improved transportation network (UN-HABITAT, 2013, XV).

The New Urban Agenda (2016) draws a broader framework for urban sustainability. According to the Agenda sustainable human settlements are; defined as cities for all; those who have equal rights, adequate housing and accessible, functional, physical and social systems, covering all segments of society without spatial discrimination. Sustainable development of cities is committed to such principles which are accessible for urban transport with strong connections, having resistant infrastructure to disasters and climate change, sustainable production and consumption, long-term integrated urban planning and design. In order to increase urban resilience and environmental sustainability, the appropriate density and compactness, multicenter and mixed use, sustainable land and resource use are supported through urban planning and design tools.

Considering the need for directing urban expansion, it is encouraged to provide accessible and well-established infrastructure and services, sustainable population densities, and small-scale design. Long-term and integrated urban and regional planning and design, resistance-based and climate-efficient site design are among the targets to optimize the spatial dimension of urban form and to ensure the positive results of urbanization. It is aimed to educate urban planners at national, sub-national and local levels to improve their urban planning and design capacity (The New Urban Agenda, 2016).

The implementation of sustainable urban development programs which provides solutions to the housing needs of the sub-income groups regardless of their social and economic segments, giving priority to well-positioned and well-distributed housing designs in the urban space to prevent the development of detached and isolated public housing from the urban system, are supported (The New Urban Agenda, 2016).

Moreover, local governments, public institutions, non-governmental organizations and local people should take an active role in the preparation and implementation of urban policies in order to be able to talk about a sustainable city. The policies and decisions of the city prepared in this way will be more easily assimilated by all the residents of the city and will minimize the problems that may occur in the implementation (Karakurt Tosun, 2009, 11).

As a result, a sustainable city represents a livable city where the environmental, economic and social requirements are met in a balanced way and it is aimed to increase the welfare of the citizens. The most important tools in the production of a sustainable city are urban planning and design. In this context, the existence of a sustainable city is only possible in geographies where urban planning and design practice develops with a protected nature and open green spaces by taking the walking distances, healthy urbanization with human scale and diversity in urban space into account (Aklanoğlu & Erdoğan, 2011, 130).

### **3.1.2. Evolution of Sustainability Concept in Planning and Design Approaches**

While the cities had organic structures and low populations, they experienced a rapid growth process after the industrial revolution. However, this growth has rendered the urban areas inadequate and has created unhealthy urban spaces.

As a result of the problems arising in the urban area, the interest in aesthetics in architecture and urban design has been replaced by urban planning and urban engineering since the mid-19th century and at the same time ecological concerns began to come to the fore. Some attempts have been made to prevent the deterioration of cities, but in most cases, they have not been implemented or have failed in practice. Although these studies were of service for the development of trade and industry, they could not be sustainable in terms of environment or social life of societies. These utopias which were proposed in the 19th century and developed against the negativities of the capitalist urban disorder, dealt with the problems of cities in an ideological perspective rather than being about needs. In the twentieth century, ideology-based urban designs were replaced by urban designs that attempt to ensure the harmony of the individual with society and nature (Akkoyunlu Ertan, 2004, 12).

From the 1970s and 1980s to the early 20th century, some approaches were developed to take the environmental and social deterioration in cities in hand, before the concept of sustainability emerged as the planning and design approaches in cities. These approaches, which is the basis of the reflection of the sustainability concept to urban space, were discussed later on with the suitability of human nature and as a result, there have been changes in the paradigms of urban design.

There are many urban models that have been put into practice or have remained in theory, but they all have an active role in the creation of sustainable urban design principles. The examination of these approaches will be useful in the efforts to improve the tissue, identity, form and viability of cities within the framework of sustainable approaches.

### **3.1.2.1. Urban Utopias**

#### *Garden City Movement*

In the early 1900s, the overpopulation in cities created unbearable cities, while rural areas were not preferred due to social and economic shortcomings. Within these handicaps, Ebenezer Howard introduced the idea of a rural-city that would be a combination of the advantages of cities and rural areas. This movement is often described as typical example of an unsustainable, low density and space-consuming urbanization. However, earlier implementations can be taken to focus on a range of issues and concerns in a sustainable approach, such as administration, mobility, community, economics, agriculture, housing, energy and health (Vernet & Coste, 2017, 45).

In his designs, the business opportunities and shopping areas are located in the central avenues. At the same time, opinions about population pattern were also included. Howard foresees a socially mixed population structure in the garden cities (Sharifi, 2016, 4). The mixed-use approach that did not receive much interest in this period was applied in these cities and the original social and morphological structures of the towns have started to revive in these cities. This movement has an important place in terms of forming the basis of sustainable urban design and planning approaches; its spatial characteristics such as pedestrian circulation pattern, bicycle paths and mixed land use; mixed and self-sufficient social structure (Vernet & Coste, 2017, 58).

#### *The Neighborhood Unit*

Another approach that contributes to the development of sustainable planning and design approaches is the Neighborhood Unit approach. The approach was produced by Clarence Perry in 1923 on the idea that social problems such as alienation, the increase of young people's inclination to crime and lack of public participation could be solved by the physical improvement of cities. It is aimed that neighborhood units will recreate the social and economic ties of small towns unlike the realities of metropolises (Forsyth & Crewe, 2009, 62).

Each neighborhood unit ensures a safe pedestrian environment. In addition to the establishment of a safe place for pedestrians, it is recommended that the settlements should be within 400 meters of walking distance from public uses and commercial areas. It is foreseen that the proposed pedestrian priority, social and physical space will increase face-to-face communication between the inhabitants and this will ultimately contribute to public awareness (Sharifi, 2016, 5).

### *The Radburn Plan*

The Radburn plan, designed by Henry Wright and Clarence Stein, has been characterized as a traffic-free dead end (cul-de-sac) and super-blocks, where vehicle traffic and pedestrian traffic are considered separately (Banister, 2012, 2). Public uses and shopping places are located in open areas, above pedestrian links.

There are some negative criticisms about this approach. The Radburn distinguishes between vehicle and pedestrian circulation, creating superblocks, but also a functional decomposition and a solid regionalization between neighborhoods. In addition, criticism has been made of that no progress has been made in terms of walkability, and even decreases have been observed and this has reduced social integration and increased automobile dependency in contrast to the expectations. In spite of all these criticisms and negative aspects, the Neighborhood Unit approach and its continuation, Radburn, play an important role in the formation and development of sustainable urban approaches.

### *Broadacre City*

Frank Lloyd Wright, one of the pioneers of the modernist movement, attempts to bring rural values to the industrial city in the model of the Broadacre city, which includes a socio-political concept. In the model in which the effects of the industrial society are observed intensively, the centralized institutionalizations in the big cities are rejected and it is foreseen that the decentralized local units will fulfill the economic functions more effectively and efficiently (Stankiewicz, 2016, 31; Akkoyunlu Ertan, 2004, 15).

Wright advocates that large cities should be replaced by low-density cities. He proposed a land arrangement in the periphery of the urban area. He believes that people who will live in these areas will not have transportation problems in this model, which offers a suitable residential area for everyone providing cheap energy and increasing the ownership of vehicles and a heavy motorway network.

Although the approach contains many practices that contradict with today's sustainable city concept, Wright believes that the Broadacre system is the only urban form that can help humanity to regain its freedom and restore re-introduction with nature. Implementations; inspired by the Broadacre approach in the United States and in various countries; accelerated suburban developments and still continue to create new problems that urban planners still try to solve (Sharifi, 2016, 7). Although Wright's proposed model against the urban deterioration created by the industrial cities includes practices contrary to the sustainable city concept, it has been effective in the emergence and development of the concept with its positive and negative aspects.

#### *Le Corbusier's ideas*

Le Corbusier sought solutions to current and future problems created by the industrial city in his models. Le Corbusier who uses the idea that the laws of the universe will determine the beautiful form, used the standard forms such as cube, cone and cylinder in his designs, and he stated that the images of these standard forms are related inherently with the human nature, and that the human soul can be in harmony with the world by using standard forms (Le Corbusier, 1923/1965). According to Corbusier, the existing cities are obliged to die because they are not designed in a geometrical structure. Corbusier's view is important in the context of linking the sustainability of cities with the city's form.

His models have an important position in sustainable urbanization practice due to its importance for public transportation and pedestrian walking distances. However, He has applied to the zoning of land use by separating them according to their functions. Mixed use was avoided in land use. While doing this zoning, he has discriminated the

residential areas according to the social structure. Besides, it is predicted that housing production will be done collectively, but their positions and typology will be determined in line with the social hierarchy. His ideas were discussed for many years with positive and negative aspects in terms of sustainability. These discussions contributed to the development of sustainability in the architecture and urban planning literature.

Modernist approaches propose a structure that is composed of large-scale block of buildings and dependent on private vehicles, where there is a lot of open space. Modernist approaches have been criticized that the silent and passive streets would worsen social conditions and so it would bring about social segregation (Filion & Hammond, 2003, 275). In addition, Sharifi (2016, 7) states that modernism has collapsed and the reason for this is the attempt to create a new environment by ignoring the past.

### **3.1.2.2. Contemporary Approaches**

In the second half of the 20th century, the desired results could not be fully reached despite all efforts to create self-sufficient and inclusive cities in the modernist period. Problems such as decreasing housing stock, dilapidation of commercial zones, urban overpopulation, poverty and inequality, increase in crime rates, social segregation, traffic problems and pollution were still evident. As a solution to all of these problems, since the early 1980s, urban planners have begun to offer a new generation of urbanization proposals as a Post-Modernist approach (Sharifi, 2016, 7).

#### *New Urbanism*

In terms of the principals involved the New Urbanism is seen as a sustainable response to the problems of modernist planning and design approaches (Morris, 2011, 123). The New Urbanism movement is a development and planning approach based on principles such as walkable blocks and streets, proximity of residential and commercial areas, facilitating access to public spaces, well-designed and located public buildings and spaces, mixed land-use. In other words, New Urbanism aims to



create sustainable and human-sized spaces where people can live a healthy and happy life (Morris, 2011, 124; the Charter of New Urbanism). The New Urbanism movement reveals principles from the smallest structural unit to the whole the city.

Another planning and design model associated with the New Urbanism and having common principles with this movement is the Traditional Neighborhood Development model (Sharifi, 2016, 8). This model aims to make the development of the neighborhood scale. This model, first of all, recommends the re-use of existing buildings in a way to meet the current requirements and a new construction on empty spaces. Projects implementing the principles of Traditional Neighborhood Development, should have a wide range of housing typologies, and should consist of well-designed streets, blocks, public spaces at the same time, shopping areas, schools should be within walking distance of residential areas. While the Traditional Neighborhood Development Model develops planning and design approaches in neighborhood or town scale, the New Urbanism movement has an approach to addressing all scales of planning and design from the housing unit to the whole region.

The New Urbanism movement, which sets out the principles of planning and design aiming at the improvement and development of the traditional settlement fabric by considering the technological developments, is seen as an exemplary approach in the formation of sustainable cities. The new urbanism movement has been an important basis for today's practices of sustainable urban development.

#### *Transit Oriented Development (TOD)*

Transit Oriented Development (TOD) is the urban development approach in which land use decisions are determined according to the stops of public transport systems or their transportation corridors. TOD aims to create urban areas around high-quality transportation facilities in compact, walkable, mixed use areas. In this way, it reduces ecological footprints by preventing spatial spread of cities (Banister, 2012, 4). It is stated that an urban environment designed in accordance with TOD standards will bring an environment where the stress level is low, the need for vehicle use and the

dependency decreases (Transit Oriented Development Institute). At the same time, TOD proposes an alternative urban development for the solution of climate change with a low carbon consumption lifestyle that people change their walking habits and reduce vehicle use.

### *Smart Growth*

The Smart Growth approach has emerged as a strategy against difficult problems such as urban sprawl and prevention of over-structuring. The approach is not against the structuring and development, but it advocates that the practices should be carried out in a consensus, being sensitive to the environment, social life and economic situation.

The purpose of the Smart Growth strategies is to create more aesthetic, safe and healthy settlements and to ensure that existing neighborhoods with these characteristics can maintain these features. In addition, it produces urban designs that encourage social and physical activities and aims to preserve environmental values while carrying out economic development (This Is Smart Growth).

### *Eco-Urbanism*

Many of the features of eco-urbanism have been advocated by the earlier urbanism movement. What distinguishes the eco-urbanism from previous movements is the combination of using technologies such as smart-grid, water treatment systems, solid waste management systems, solar energy technology and zero energy buildings (Sharifi, 2016, 9).

According to the study of Joss, Cowley and Tomozeui (2013, 59), areas of the eco-urbanism implementation are mostly located in infill urban areas, urban extensions and urban retrofits. When examined spatially, it is understood that eco-urbanism studies are implemented in the new development-greenfield outside the city as well as the built-up areas (Joss, et al., 2013, 56). When the implemented eco-urban studies are examined, it is observed that the majority of the projects are located in urban built areas (Sharifi, 2016, 10). As a result of the implementation of eco-cities within the

existing built areas, the preservation of valuable natural areas and agricultural areas will be ensured.

The eco-urban movement has facilitated the global information transferring process, which is not significantly involved in the previous urban movements (Joss, et al., 2013, 62-63; Sharifi, 2016, 11). Another feature that distinguishes the eco-urban movement from the previous ones is the evaluation and follow-up of the performances of the projects during the implementation. Performance evaluation programs are necessary to test the compliance of the project with the objectives.

#### *A Critical Review of Sustainability in Urban Planning and Design Approaches*

These approaches have been the basis for the development of today's sustainable cities. The concept of space production and quality of life, which is the focal point of the planning and design concept of the modernist era, has come to a different point with the inclusion of principles such as inclusiveness, climate-specific flexibility, efficiency in materials and use of space, and carbon footprint.

All contributed to the development of sustainability concept though their applicabilities vary over scale and the problems addressed. Unlike the modernist period, new generation urbanization principles are seen more applicable and consequently more sustainable cities emerge. In such residential areas; increase in density, increase in walking and cycling use and decrease in vehicle usage were observed.

Nevertheless, some negative opinions are also expressed for new generation sustainable urban models and their incentives. There have been criticisms about that these models are shaped according to economically sustainable priorities and weakened in social aspects. Beal (2014, 312) criticizes the fact that state funds under the name of ecological sustainability in urban planning are symbolic investments made to convince local people and politicians, and that their main goal is to take part in inter-city competition.

Contributions that urban planners and architects such as Howard, Perry, Wright, Corbusier and the subsequent post-modernist practices have added to the neighborhood theory provided a rich basis for developing a range of criteria for the creation of sustainable neighborhoods (Choguill, 2008).

Although some ideas are introduced to achieve sustainable urbanization, there are still inefficiencies and gaps in sustainability-related legislations and policies. Because cities are living organisms, sustainability principles have to be evolved according to their changes. For this reason, it will not be possible to talk about sustainable urban policies that can be applied under any conditions in any period and it will be inevitable that new sustainable urban models will emerge.

### **3.2. Sustainability at Neighborhood Scale**

Cities are manifestations of the ideas and lives of humanity and reflections of history, culture, science and innovations in space (UN-HABITAT, 2008a: X). However, neighborhoods, which are parts of cities, can be defined as the main areas of social interaction as sociologists say or the home as their inhabitants describe (Friedmann, 2010). When considered subjectively, neighborhoods may also be expressed as settlements with limited borders in the mental perception of their inhabitants (Hugh Barton, Grant, & Guise, 2003). As it can be understood from these statements, neighborhoods appear as urban parts that define their own living spaces in the memory of their inhabitants and the interaction areas formed around them.

In addition, Dover and Friedmann (2010) describe the neighborhood from an objective point of view as walkable sized, mixed-use public settlements with a distinctive center and boundaries. In addition to all these definitions, the neighborhood can be defined as one of the parts of a city.

In the early 1990s studies on urban sustainability progressed towards the development of green construction technologies and the creation of egalitarian and environmentally friendly living spaces (Sharifi, 2013). In the early years, these sustainability studies were mostly on the scale of buildings. However, these studies were insufficient to

influence urban space. In parcel-based building sustainability projects, the relations of different parcels and buildings are ignored. While the buildings are sustainable within themselves, the space encountered when leaving the building is far from showing the sustainability features. therefore, a neighborhood where all buildings are sustainable cannot be claimed to be sustainable at the same time. sustainability of a neighborhood can only be achieved if the buildings and the areas between them are sustainable.

In order to overcome this deficiency, studies began to shift from the building scale to larger scales. After all, they started to cover the planning and design of neighborhoods and even entire cities. Van der Salm states that “even the problem is on a global scale, solutions can be on smaller scales”. He claims that “the scale of the neighborhood seems to be the most promising scale for the implementation of sustainable solutions” and it is starting point for sustainable urbanism. Neighborhood have the right mass, density, amount of population and mix of functions that is required effectively implement sustainable solutions (Van der Salm, 2015).

Neighborhoods, as the building blocks of cities, are of great importance in achieving urban sustainability and finally global sustainability. They considered as subsystems are then brought together to form larger subsystems until a fully sustainable urban system is established (Lylykangas, 2016). Ensuring the sustainability of continuously growing and changing cities at neighborhood level has been a way of making an entire city sustainable. At the same time, neighborhood scale offers much better opportunities for monitoring and evaluation. According to a study on sustainability and happiness (Paralkar et al., 2017), addressing sustainability at neighborhood scale will pave the way for providing healthier data and easier feed-backs.

### **3.3. Neighborhood Sustainability Concept in Planning and Design**

The sustainability of a neighborhood also depends on the quality of the urban space. Urban planning and design are also a set of actions that come into play at this point and aim at the creation of sustainable urban spaces and thus sustainable cities. Urban space, which can be defined as physically accessible areas, is like a “living organism”

that can develop itself against socio-economic and cultural changes (Madanipour, 1999). According to these changes, urban planning and design can be seen as the art of shaping space or as the source of this organism's life. In that sense, urban planning and design studies are among the important tools to ensure the sustainability of neighborhoods. Implementations of urban planning and design, such as supporting public transport, creating pedestrian zones free of vehicle traffic, increasing accessibility between urban spaces, are the preconditions of a sustainable neighborhood (Günay, 1997: 56).

However urban planning and design alone are not enough to provide sustainable neighborhoods, since policy making is an equally important complementary tool. Policies such as producing walkable streets, increasing green spaces and developing public transportation alternatives guides planning and design while being supportive for the sustainability of cities. For example, if walkability is suggested as one of the design criteria, people would be encouraged to walk which would reduce the use of vehicles and thus fossil fuel consumption, carbon emissions and asphalt ground.

In addition to the effort to reveal an aesthetic environment because of physical intervention in the neighborhood tissue, urban planning and design address to all the social, cultural and economic phenomena of this environment and prepare an urban environment to meet the needs of the citizens. In this respect, it would be a correct approach to express urban planning and design as a detailed arrangement method that include urban detail analysis by considering spatial, ecological, socio-cultural and socio-economic conditions together (Kaplan et al., 2003).

Societies' value judgments, aesthetic perception and architectural styles change over time. However, in order to ensure the sustainability of community life, neighborhoods and cities as a whole need to meet the environmental, social, economic and even psychological needs of people (Günay, 1997: 56).

At the intersection of the social and economic dimensions of the sustainability concept, cultural sustainability of societies takes place. The environmental awareness

of the societies, the level of urban planning and design and aesthetic understanding are directly proportional to their cultural level. When it is considered that cities are the most basic cultural elements produced by human beings, it will not be reasonable to seek identity and aesthetic concern in poorly planned and designed neighborhoods in terms of ecological environment, urban space, and socio-cultural opportunities.

Consequently, sustainability in urban planning and design will only be possible if the neighborhoods, the smallest settlement and management units of cities, are sustainable within themselves.

### **3.4. Assessment of Sustainability in Neighborhood**

Ensuring urban sustainability in recent years has become one of the basic elements of achieving sustainable development goals all over the world. Much work has been done on the need to make human settlements sustainable and how to do so (Choguill, 2008, 41). Paralkar et al. (2017, 18) state that assessing sustainability and happiness at the neighborhood level will bring together strong potentials and knowledge to promote sustainable community development.

There have been many implementations on this issue at the local scale. The importance of sustainable urbanization is understood when implementations become more widespread. Practices including policies and incentives to effectively integrate concerns about environmental protection, economic equality and social welfare with urban plans have begun to be developed.

Sustainable urban planning and design approaches have appeared mainly against urban sprawl, rapidly increasing suburbs and vehicle dependence and the weakening of individuals' connections with society and environment. These approaches generally included important principles such as conservation of green spaces, creating active settlements, increasing participation and supporting local characteristics.

However, understanding the fact that these practices have moved away from the holistic objectives of sustainability in the implementation has increased the

importance of control and monitoring processes. Therefore, there has been a need for the establishment of appropriate assessment program for monitoring the implementation of these policies and providing feedback to achieve the desired level of sustainable urban development (Yıldız et al., 2016, 2; Özdal Oktay, 2015, 48-49).

Various assessment tools have been developed in different countries to answer whether urban settlements are sustainable or not. It is not possible to give a clear answer to this dilemma without defined comparison standards. These tools assess the status of a settlement in the way of sustainability and its success in achieving its objectives in the context of a set of principles and criteria. Assessment tools can be used to better conceptualize and define how we can contribute to urban sustainability through planning and design.

#### **3.4.1. Background of Assessment Tools - Assessment of Building Sustainability**

As a result of dramatic global changes in all aspects (environmental, economic, and social), the adoption of strategies for sustainable urbanism, as well as the creation and development of effective mechanisms for assessing sustainability and improving the strategy, are key issues at all the scales (Hamedani & Huber, 2012, 122).

The need for monitoring and implementation assessment have increased with growing attention on sustainability policies and initiatives. The first goal of sustainability assessment initiatives has been to learn whether societies or organizations are making progress in terms of sustainability (Özdal Oktay, 2015, 48-49). In this process, choosing the right tools and providing effective feedback have gained importance. Sustainability assessment methods applied in different contexts and scales in different parts of the world provide a holistic, contextual, pluralistic, applicable and progressive framework (Gil & Duarte, 2013, 312).

Sustainability assessment methods in the urban area are based on the grading of the development in three dimensions; building level, neighborhood level and city level. Initially, these assessment methods have emerged to measure the sustainability



performance of environmentally friendly buildings, also called green buildings, and to certify them according to the measurement results.

First, the BREEAM (Building Research Establishment Environmental Assessment Method) system was developed in 1990 to assess environmental issues concerning buildings. The number of building evaluation systems has increased since then. These systems assess the building performance in terms of different criteria such as energy efficiency, water efficiency, CO<sub>2</sub> emission, indoor air quality, and accessibility, visual, auditory and thermal comfort.

When the rapidly developing urban environments in the world are taken into consideration, it is inevitable that new settlements should be produced in accordance with the principles and criteria of sustainability. However, sustainability tools at building scale were insufficient to produce sustainable settlements. For this reason, new programs have been developed to monitor the sustainability of the neighbourhood.

#### **3.4.2. Evolution of the Tools in Neighborhood/Urban Sustainability**

Indeed, sustainability performance of buildings does not necessarily mean the sustainability of the entire urban area. For example, even if an entire neighborhood consists of buildings with high sustainability performance, it would not be right to mention the sustainability of the neighborhood if it is surrounded by heavily paved parking lots (Farr, 2008, 5). For an appropriate sustainable urbanization policy, it was understood that an assessment program should include the urban area. The inadequacies of sustainability assessment on building scale encouraged assessment programs to be developed in a more holistic way.

If sustainable settlements are followed from urban utopias to new contributions, it is seen that most sustainability ideas have been made on neighborhood scale (Choguill, 2008, 41). Based on this understanding, sustainability assessment programs are developed in the neighborhood scale in the current century. Movements such as Smart Cities, New Urbanism which play an important role in the implementation of the

sustainable development concept in urban area, form the basis of assessment tools (Farr, 2008, 5).

As Choguill (2008, 41) mentioned, the sustainability of a city will remain limited as long as the parts that make up themselves are not sustainable. Taking sustainability assessments at the level of neighborhood is an effective way of conducting a holistic assessment that considers the synergies between the various components of the urban system (eg population, building, land use, transportation, water, energy, biodiversity, air, geology and topography) and the dimensions of all sustainability (Sharifi & Murayama, 2014, 3). The assessment of the neighborhood scale means not just singular buildings, but also the assessment of the synergies and activities between these buildings, the services provided, the people living there, the other living things and all the elements in this wide range (Cole, R.J., 2010, 277). With all these features, the assessment of the sustainability of neighborhoods is directly related to urban planning and design.

Firstly, the assessment of settlements started with the CASBEE-Urban Development, which was developed by CASBEE. Then, the tools developed by LEED (Leadership in Energy and Environmental Design) and BREEAM followed. The use of neighbourhood sustainability assessment tools contributes to an increase in awareness of sustainable urban development and an evolution of urban growth from absolute production of building and space to environmental design, in part.

Although these assessment tools are used in building, neighborhood and district scales, sustainability assessment tools at urban scale are still under development. Implementations often guide development plans, but they are not widely used yet. Sharifi (2013) explains this situation with the multi-stage planning processes at different urban scales, with long term evaluation and low number of applications.

### **3.4.3. Review and Comparison of Different Tools**

In this study, in order to examine the sustainability of the existing neighborhoods in terms of urban planning and design, the criteria of different neighborhood sustainability assessment tools used worldwide are evaluated.

These tools assess sustainability from buildings to neighborhood and urban scale and implemented in various regions of the world differentiate according to variables such as economic, social, climatic characteristics of the geography in which they are located (Yıldız et al., 2016). For this reason, considering the variable structures of cities, there is no agreed system of sustainable neighborhood assessment principles and criteria that can be considered valid in every region.

In assessment systems, it is seen that the sustainability criteria at neighborhood level contains similar meanings but sometimes they are named differently and collected under different principles. The main difference is seen in the scoring. It is understood that criteria having similar meanings have importance in different weights in all assessment tools. Sustainability levels may vary with the weights assigned to criteria. (Hamedani & Huber, 2012; Abu Bakar & Cheen, 2013; Cohen, 2017; Yıldız et al., 2016; Sullivan et.al., 2014; Sharifi & Murayama, 2014). Weights are usually determined through a consensus of a group of experts. However, in this study, criteria weighting is skipped for simplicity.

In this thesis, four different assessment tools –LEED-ND (USA), BREEAM Communities (UK), CASBEE-UD (Japan) and Green MARK for Districts (Singapore)- are discussed. Their widespread use, recognition, access to open source information and originating from different parts of the world are effective in the selection of these tools. Moreover, these tools include principles and criteria that refer to issues related to urban planning and design.

Since the objective is to achieve sustainability in urban areas, it can be said that the approaches are basically similar in the four systems. However, subjects with the same meaning can be examined under different headings and the number of criteria they

contain varies. For example, the criteria related to the site selection of neighborhoods are expressed under “Smart Location and Linkage” in LEED, “Land Use and Ecology” in BREEAM, “Environmental Planning” in Green MARK, and there are no criteria for this in CASBEE (Sharifi & Murayama, 2014, Özdal Oktay, 2015; Yıldız et al., 2016).

The number of principles and criteria that these tools vary, as well. When examined, it is understood that each system differs according to the country conditions that they are originated from. For instance, automobile-dependent transportation systems in the USA let the LEED system to have the highest weight in transportation criteria among all. Singapore has a small surface area, limited energy resources and few natural areas. Therefore, the Green Mark for Districts has a low number of criteria for natural environment and conservation. Since the transportation infrastructure and socio-economic needs are met in Singapore, the weight of the criteria including these issues has been kept low.

After analyzing the contents of the four assessment tools, their principles and criteria which have similar meanings are regrouped. And eventually the main principles are assembled under five headings: “Location Selection and Planning”, “Transportation and Accessibility”, “Harmony with Natural Environment and Conservation”, “Green Buildings, Landscape and Infrastructure”, Social Development, Economy and Management” (Table 3.1).

The number and percentages of the criteria under “Green Buildings, Landscape and Infrastructure” principle are close to each other in all tools while LEED-ND appears to be prominent under principle of “Location Selection and Planning”. The principle of “Harmony with Natural Environment and Conservation”, contain more criteria in LEED and CASBEE, when compared to the Green Mark. In the assessment tools other than Green Mark for Districts, the share of “transportation” criteria are close to each other. There are comparably few criteria for the principle of “Social Development,

Economy and Management” in LEED-ND and Casbee-UD, whereas Green Mark is particularly focused on issues related to sustainability management (Table 3.1).

Table 3.1. Comparison of LEED-ND, BREEAM Communities, CASBEE-UD and Green MARK for Districts

MAIN PRINCIPLES	CONTENT	LEED-ND		BREEAM Communities		CASBEE-UD		Green Mark for Districts	
		number of criteria	% total number of criteria	number of criteria	% total number of criteria	number of criteria	% total number of criteria	number of criteria	% total number of criteria
<b>Location Selection and Planning</b>	<b>Where to Build?</b> *Efficient Land Use, Mixed Land Use Preferred Location, Urban Tissue, Building Orientation etc.	8	18%	5	13%	1	3%	5	13%
<b>Transportation and Accessibility</b>	<b>How to Access?</b> *Public Transportation, Bicycle and Pedestrian Roads, Accessibility to Public Spaces and Public Transportation etc.	9	20%	5	13%	4	13%	2	5%
<b>Harmony with Natural Environment and Conservation</b>	<b>How to Protect Natural Areas?</b> *Conservation of Wetlands and Farmlands, Green Spaces etc.	5	11%	3	8%	6	19%	1	3%
<b>Green Buildings, Landscape and Infrastructures</b>	<b>How to Build?</b> *Building Design and Technology, Existing Buildings, Energy Efficiency, Quality of Material Used, Recycle and Water Systems etc.	17	38%	12	30%	13	42%	15	39%
<b>Social Development Economy and Management</b>	<b>How to Integrate and Manage?</b> *Social Awareness, Education, Communication, Crime Rate, Employment, Management, Information Systems etc.	6	13%	15	38%	7	23%	15	39%
<b>TOTAL</b>		<b>45</b>	<b>100%</b>	<b>40</b>	<b>100%</b>	<b>31</b>	<b>100%</b>	<b>38</b>	<b>100%</b>

The standards of these four tools provide the basic data for the checklist created in this thesis. All the criteria collected under the five main principles are shown in Table 3.2. Criteria addressing to similar contents are considered under the same principle. By using the principles and criteria examined here, a checklist of principles / criteria that we can examine the sustainability of urban space has been created. The common criteria of these four tools selected from different geographies of the world are included in the checklist. However, the over mentioned tools are lacking criteria addressing to local conditions and issues, such as disaster risks, plan hierarchy, plan modifications, traffic safety. For this reason, additions and omitting are made in the checklist, which was formed with the criteria of the four assessment tools, including the country's local conditions.

In this context, the following variables are added to the criteria in the checklist.

- Fit to Construction/Against Earthquake and Ground Problems
- Plan Changes
- Planning Hierarchy/Consistency with Upper Scale Plans
- Necessary Road Surface Marking for Safety and Parking

The meaning of the principles and criteria in the resulting customized and combined checklist will be discussed in Chapter 4. Sustainability benchmarking analysis will be carried out according to this checklist on the neighborhoods determined for the case study.

Table 3.2. All Criteria of LEED-ND, BREEAM Communities, CASBEE-UD and Green MARK for Districts

MAIN PRINCIPLES	CRITERIA			
	LEED-ND	BREEAM Communities	CASBEE-UD	Green Mark for Districts
<b>Location Selection and Planning</b>	<ul style="list-style-type: none"> <li>*Preferred Locations</li> <li>*Brownfield Redevelopment</li> <li>*Locations with Reduced Automobile Dependence</li> <li>*Housing and Jobs Proximity</li> <li>*Compact Development</li> <li>*Mixed-Use Neighborhood Centers</li> <li>*Reduced Parking Footprint</li> <li>*Neighborhood School</li> </ul>	<ul style="list-style-type: none"> <li>*Housing Provision</li> <li>*Public Realm</li> <li>*Local Parking</li> <li>*Inclusive Design</li> <li>*Land Use</li> </ul>	<ul style="list-style-type: none"> <li>*Consideration for Urban Context and Scenery</li> </ul>	<ul style="list-style-type: none"> <li>*Site Planning and Building Orientation</li> <li>*Green and Blue Spaces for the Public</li> <li>*Site Selection</li> <li>*Future Provision and Connections</li> <li>*Green Urban Design Guidelines</li> </ul>
<b>Transportation and Accessibility</b>	<ul style="list-style-type: none"> <li>*Bicycle Network and Storage</li> <li>*Walkable Streets</li> <li>*Street Network</li> <li>*Transit Facilities</li> <li>*Access to Civic and Public Spaces</li> <li>*Access to Recreation Facilities</li> <li>*Visibility and Universal Design</li> <li>*Tree-Lined and Shaded Streets</li> <li>*Transportation Demand Management</li> </ul>	<ul style="list-style-type: none"> <li>*Safe and Appealing Streets</li> <li>*Cycling Network</li> <li>*Access to Public Transport</li> <li>*Cycling Facilities</li> <li>*Public Transport Facilities</li> </ul>	<ul style="list-style-type: none"> <li>*Performance of transportation systems</li> <li>*Consideration of Universal Design</li> <li>*Consideration for Traffic Load</li> <li>*Regional Transportation Planning</li> </ul>	<ul style="list-style-type: none"> <li>*Self-Sufficiency and Accessibility within District</li> <li>*Green Transport within District</li> </ul>
<b>Harmony with Natural Environment and Conservation</b>	<ul style="list-style-type: none"> <li>*Agricultural Land Conservation</li> <li>*Floodplain Avoidance</li> <li>*Steep Slope Protection</li> <li>*Site Design for Habitat/Wetland&amp;Water Body Conservation</li> <li>*Restoration of Habitat/Wetlands and Water Bodies</li> </ul>	<ul style="list-style-type: none"> <li>*Flood Risk Assessment</li> <li>*Water Pollution</li> <li>*Enhancement of Ecological Value</li> </ul>	<ul style="list-style-type: none"> <li>*Consideration and Conservation of Terrain</li> <li>*Consideration and Conservation of Water Environment</li> <li>*Conservation and Creation of Habitat</li> <li>*Performance of supply and treatment systems</li> <li>*Use of local resources</li> <li>*Mitigation of impact on geological features outside the designated area</li> </ul>	<ul style="list-style-type: none"> <li>*Habitat Conservation and Restoration</li> </ul>
<b>Green Buildings, Landscape and Infrastructures</b>	<ul style="list-style-type: none"> <li>*Certified Green Buildings</li> <li>*Building Energy Efficiency</li> <li>*Building Water Efficiency</li> <li>*Water-Efficient Landscaping</li> <li>*Existing Building Use</li> <li>*Historic Resource Preservation and Adaptive Reuse</li> <li>*Minimize Site Disturbance in Design and Construction</li> <li>*Stormwater Management</li> <li>*Heat Island Reduction</li> <li>*Solar Orientation</li> <li>*On-Site Renewable Energy Sources</li> <li>*District Heating and Cooling</li> <li>*Infrastructure Energy Efficiency</li> <li>*Wastewater Management</li> <li>*Recycled Content in Infrastructure</li> <li>*Solid Waste Management Infrastructure</li> <li>*Light Pollution Reduction</li> </ul>	<ul style="list-style-type: none"> <li>*Green Infrastructure</li> <li>*Noise Pollution</li> <li>*Microclimate</li> <li>*Adapting to Climate Change</li> <li>*Light Pollution</li> <li>*Existing Building and Infrastructure</li> <li>*Sustainable Buildings</li> <li>*Low Impact Materials</li> <li>*Resource Efficiency</li> <li>*Transport Carbon Emissions</li> <li>*Landscape</li> <li>*Rainwater Harvesting</li> </ul>	<ul style="list-style-type: none"> <li>*Consideration and conservation of microclimates in pedestrian space in summer</li> <li>*Other Consideration of the Environment inside the Designated Area</li> <li>*Reduction of thermal impact on the environment outside the designated area in summer</li> <li>*Prevention of air pollution affecting outside the designated area</li> <li>*Prevention of noise, vibration and odor affecting outside the designated area</li> <li>*Mitigation of wind hazard and sunlight obstruction affecting outside the designated area</li> <li>*Mitigation of light pollution affecting outside the designated area</li> <li>*Reduction of mains water supply</li> <li>*Reduction of rainwater discharge load</li> <li>*Reduction of the treatment load from sewage and greywater</li> <li>*Reduction of garbage treatment load</li> <li>*Effective energy use for the entire designated area</li> <li>*Consideration of global warming</li> </ul>	<ul style="list-style-type: none"> <li>*Energy Efficiency for Infrastructure and Public Amenities</li> <li>*On-site Energy Generation</li> <li>*Energy Management System</li> <li>*Water Efficient Fittings for Infrastructure and Public Amenities</li> <li>*Water Efficient Landscaping</li> <li>*Minimise Cut and Fill in Earthworks</li> <li>*Sustainable Construction for Infrastructure and Public Amenities</li> <li>*Sustainable Products for Infrastructure and Public Amenities</li> <li>*Microclimate Optimization</li> <li>*Outdoor Thermal Environment</li> <li>*Conservation and Integration of Existing Structures and Assets</li> <li>*Minimise Site Disturbance</li> <li>*Green Buildings Within District</li> <li>*Intelligent Infrastructure</li> <li>*Light Pollution Reduction</li> </ul>
<b>Social Development Economy and Management</b>	<ul style="list-style-type: none"> <li>*Mixed-Income Diverse Communities</li> <li>*Community Outreach and Involvement</li> <li>*Local Food Production</li> <li>*Long-Term Conservation Management of Habitat or Wetlands</li> <li>*Innovation &amp; Exemplary Performance</li> <li>*LEED Accredited Professional</li> </ul>	<ul style="list-style-type: none"> <li>*Training and skills</li> <li>*Demographic needs and priorities</li> <li>*Delivery of services, facilities and amenities</li> <li>*Local vernacular</li> <li>*Utilities</li> <li>*Consultation and engagement</li> <li>*Consultation plan</li> <li>*Design review</li> <li>*Community management of facilities</li> <li>*Economic impact</li> <li>*Flood risk management</li> <li>*Energy strategy</li> <li>*Water strategy</li> <li>*Transport assessment</li> <li>*Ecology strategy</li> </ul>	<ul style="list-style-type: none"> <li>*Disaster and crime prevention performance</li> <li>*Convenience of daily life</li> <li>*Contribution to the formation of social infrastructure</li> <li>*Consideration for nurturing a good community</li> <li>*Performance of information systems</li> <li>*Environmentally responsible construction management</li> <li>*Monitoring and management system</li> </ul>	<ul style="list-style-type: none"> <li>*Stakeholder Engagement, Feedback and Evaluation</li> <li>*Public Awareness, Education and Community Involvement</li> <li>*Green Lease</li> <li>*Safe Environment</li> <li>*Minimise Energy Consumption During Off-Peak Hours</li> <li>*Stormwater Management</li> <li>*Alternative Water Sources</li> <li>*Water Efficiency Management</li> <li>*Waste Reduction</li> <li>*Waste Management and Segregation</li> <li>*Waste Conveyance</li> <li>*Waste Reuse and Processing</li> <li>*Green and Gracious Builders Scheme Certification</li> <li>*Environmental Management System</li> <li>*Other Green Features and Innovation</li> </ul>





## **CHAPTER 4**

### **SUSTAINABLE NEIGHBORHOOD PLANNING AND DESIGN PRINCIPLES AND CRITERIA**

In general, although sustainable urban principles used in assessment systems are similar, there is not a single framework comprising all different tools. Nevertheless, the four sustainability assessment tools discussed in the previous section are systems that address neighborhoods as a whole. Therefore, they formed a foundation for the sustainability principles and criteria determined in this study. The principles and the criteria in these systems will be considered as planning and design standards in the examination of existing neighborhoods.

The process of creating a sustainable urban part can be realized through detailed research, interdisciplinary work and gathering different ideas together. Sustainable neighborhood principles and criteria provide a general framework for urban planning and design in a way that supports the creativity of planners and designers. Instead of defining a strict order, these principles and criteria describe a sustainable way in which each design can have its own specificity.

The urban planning and design principles and criteria shown in table 4.1., which are briefly explained in this chapter, contribute to the design and planning processes by setting out the objectives in the creation of sustainable urban space and urban fabric.

Table 4.1. Suggestion Neighborhood Sustainability Assessment Checklist

MAIN PRINCIPLES	CRITERIA	VARIABLE
<b>Location Selection and Planning</b>	*Preferred Locations	Brownfield Redevelopment
		Regeneration/Infill Development
		Fit to Construction/Against Earthquake and Ground Problems
	*Compact Development	Meets Minimum Densities
	*Mixed-Use Neighborhood Center	Mixed-Use Neighborhood Center
	*Reduced Parking Footprint	Underground Parking
	*Public Realm	Public Square
		Park, Marketplace etc.
Green and Blue Spaces for the Public		
*Land Use Planning	Master Plan/Land Use Plan	
	Plan Changes	
	Planning Hierarchy/Consistency with Upper Scale Plans	
<b>Transportation and Accessibility</b>	*Bicycle Network	Bicycle Path
	*Safe and Walkable Street Network	Tree-Lined and Shaded Streets
		Inviting Pedestrian Environment
		Continuous Sidewalks
		Necessary Road Surface Marking for Safety and Parking
	*Accessibility to Public Transport Facilities	Distances to stations/bus stops etc.
	*Accessibility of Public Realm	Public Realm within Walking Distance
	*Accessibility of Neighborhood Center	Mixed-use Neigh. Center within Walking Distance
*Visitability and Universal Design	Accessibility of Sidewalks for People of Diverse Abilities	
	Accessibility of Commercial Units for People of Diverse Abilities	
	Accessibility of Residential for People of Diverse Abilities	
<b>Harmony with Natural Environment and Conservation</b>	*Steep Slope Protection	Slope Max % 15
	*Consideration and Conservation of Ecological Value/Wetland&Water Body	Use of Ecological Values in Design
<b>Green Buildings, Landscape and Infrastructures</b>	*Sustainable/Green Buildings and Landscape	Green Roof, Green Facade etc.
		Certified Green/Sust. Building in Neighborhood
	*Conservation and Adaptive Reuse of Older, Historical and Cultural Structures	Conservation and Adaptive Reuse of Older, Historical and Cultural Structures
	*Heat Island Reduction	Minimized Asphalt Ground
	*Mitigation of Water Use and Light Pollution	Green Stormwater Retention Techniques
Green Lighting Techniques		
<b>Social Development, Economy and Management</b>	*Crime Prevention	Abandoned Building and Plots
		Well-lighted Streets
	*Public Awareness, Education and Community Involvement	Public Awareness, Education and Community Involvement
	*Affordable Housing	Affordable Housing
*Waste Management	Waste Segregation, Reuse and Processing	

## **4.1. Location Selection and Planning**

### **Preferred Locations**

As one of the limited resources of human life, land is consumed under the pressure of continuous urban development. Rather than opening new development areas for sustainable implementation, areas within a city should be evaluated as much as possible. Evaluation of unproductive and inactive areas and decaying urban areas within a city is the key strategy of sustainable urban development (A Citizen's Guide to LEED for Neighborhood Development). Use of these preferred locations within a city in sustainable urban development helps to use urban land stock efficiently, protect urban open spaces, ecological areas and agricultural areas and decreasing of infrastructure costs.

In order to ensure a sustainable environment, the determination of the area where urban development projects implemented should be prioritized. Even if all the buildings consist of green systems, it will not be possible to talk about sustainability if the area where the development is targeted is determined because of a bad site selection process. In such a case, automobile dependence may increase, natural areas may be destroyed, and habitat areas may be degraded.

Additionally, planning legislations make it compulsory to carry out a settlement suitability analysis in Turkey during the site selection process. The aim is to determine the ground conditions of the area which is used in the design stage. In other words, it is aimed to get information about the characteristics of the region such as the degree of risk in terms of seismicity, its distance to a possible fault line, soil types, bedrock depth, and the risk of landslide. The results of these analyses provide important input for site selection.

### **Compact Development**

Efficient use of land prevents excessive and irregular spread of cities and alleviates the pressure on rural areas in urban environments, thus protects natural habitats,

agricultural areas and water basins (A Citizen’s Guide to LEED for Neighborhood Development).

Compact urban development models combining various urban land uses, and public transport facilities are designed within walking distances. Such a development contributes to the development of walking habits, reduces public transport costs and reduces dependence on private vehicles. In a compact neighborhood, schools, shopping, parks, etc. can be designed closer to each other and so, walking and cycling are more attractive for people.

In addition, compactness of a neighborhood can also be considered as the density of the neighborhood. A low-density neighborhood with the same number of inhabitants will have higher infrastructure costs than a high-density neighborhood.



Figure 4.1. Dispersed Neighborhood Vs Compact Neighborhood <sup>2</sup>

### **Mixed-Use Neighborhood**

Mixed-use neighborhoods will have more active and different uses will reinforce each other and strengthen the character of the neighborhood. Likewise, people living in mixed-use neighborhoods will have less travel needs for their shopping, entertainment

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<sup>2</sup> Retrieved from: Illustration made by author on Google Earth visual material.

and service facilities, resulting in reduced dependence on private vehicles (A Citizen's Guide to LEED for Neighborhood Development).

Sustainable use of the neighborhood should be ensured by providing mixed land use and functionality in areas of use such as the workplace, social areas, and residential areas. Harmony and interaction between different social groups in the same neighborhood should be considered and equal access to urban facilities should be provided by offering different types of housing (cheap housing, rental housing, residence etc).

Mixed land use and social networks interact with and support each other. The social and physical qualities of space play a decisive role in integration with the urban environment. In addition, high population density creates favorable demand for industrial and commercial services, while mixed land use creates enough production and service areas (UN-HABITAT, 2011, 2).



Figure 4.2. Mixed-use Neighborhood<sup>3</sup>

### Reduced Parking Footprint

Underground and multi-storey parking should be increased to reduce parking footprint. If there are no suitable conditions for the use of underground parking in buildings, it would be right to consider the back and side gardens as parking instead

<sup>3</sup> Retrieved from: <https://nextstl.com/2018/03/big-plans-for-chouteau-in-lafayette-square/>

of the front yard. In this way, a more sustainable urban environment can be created (A Citizen’s Guide to LEED for Neighborhood Development).

Designing the minimum size of the space reserved for each vehicle in all indoor and outdoor parking spaces is also an important strategy for reducing the parking footprint (BREEAM Communities Technical Manuel). At the same time, the road sides must be adapted to the vehicle park. While doing this, the optimum area size that the cars can park on the road side should be determined and the lines should be drawn on the roadside. The use of road side as a car park will also create a safer pedestrian environment by separating vehicle and pedestrian traffic. Besides, large outdoor parking lots reduce relationship between building and pedestrian, especially if it is constructed between sidewalks and building. Likewise, these parking lots reduce quality of public spaces such as parks, squares and pedestrian roads.

When designing sustainable urban areas, in addition to the design of open spaces, housing etc., the vehicle load and parking requirements of all these uses should be calculated. These calculations, called Transportation Demand Management, aim to reduce vehicle ownership and dependence and determine the amount of parking needed.



Figure 4.3. Different parking recommendations<sup>4</sup>

<sup>4</sup> Retrieved from: <https://nextcity.org/daily/entry/seattle-reduces-parking-requirements-in-bid-for-affordability-and-sustainab> and <https://www.pinterest.at/pin/717972365564185287/>

## **Public Realm**

The term “public realm” is often used to refer to external urban areas that are publicly accessible. It encompasses parks, plazas, pedestrian streets, green spaces and the other outdoor places whether residential, commercial or civil. The public realm is the urban space necessary to step from the individual to the community. They are the areas that enable communities to come together and experience the city.

High quality public realm is essential for creating coherent and socially inclusive communities. Public realm affects the formation and function of cities and the daily interactions within the community. Successful public spaces can be measured by how much people use these spaces in their daily lives. This success is also directly linked to accessibility.

## **Land Use Planning and Future Provisions**

Land use planning is aesthetically and orderly arrangement of land, resources, facilities and services to ensure the health and welfare of communities. The main purpose is to distribute land use to meet the needs of people while reducing the negative impacts and increasing the effective use of resources. Ecological impact assessment in the planning process is one of the tools that can be used to minimize negative impacts and effective use of resources. For all that, sustainable land use planning should encourage the use of pre-developed or degenerated land and avoids8 lands (especially those of agricultural and ecological importance) that have not been disturbed before (BREEAM Communities Technical Manuel, BCA Green Mark for District).

Land use types are fully separated and defined in land use planning. The primary determining factor in the planning area is how much housing will be proposed in the project area.

The Master Land use planning also consists of decisions that determine the orientation of the blocks and buildings and ultimately reveal the urban fabric. Urban fabric and

orientation affect the use of solar energy passively (natural lighting, solar heating). The sunlight from the southern front (valid for the northern hemisphere, the opposite is true for the southern hemisphere) is more effective and long-term than the sunlight from other facades. For this reason, especially in regions with cold winters, the long facades of the buildings should be oriented to the south.

## **4.2. Transportation and Accessibility**

### **Bicycle Network**

The use of bicycles does not have any negative environmental impact, furthermore it is also very low in cost to the user and to city administrations compared to other means of transport and methods. In addition to its environmental and economic benefits, the use of bicycles is a very efficient tool for the health of society.

Today, bicycle paths, which are met in many modern cities, are handled more carefully in the planning and design process of sustainable cities. In this respect, the necessary equipment for a comfortable ride should be applied on the roads and these roads should be connected to each other by bicycle network. In order to ensure the safety of the bicycle paths, they must be designed separately with the vehicle roads. In cases where it cannot be designed separately from the vehicle roads, necessary arrangements should be made to reduce the traffic speed. These arrangements can be applied in the form of speed bumps, paving the road floor from stones with a decelerating feature.

The availability of well-located, sufficient and secure bicycle parks that work together with bicycle paths will make cycling attractive for both citizens and visitors in that city. Compared to car parking, bike parking occupies much less space. The ratio between the vehicle parking lot and the bicycle park for the same number of users goes up to 10-12 times (A Citizen's Guide to LEED for Neighborhood Development).





*Figure 4.4. Bicycle paths and parks*<sup>5</sup>

### **Safe and Walkable Street Network**

As mentioned earlier, smart location, compact development and mixed-use neighborhoods that are essential for the realization of sustainable urban development encourage citizens to regulate their walking habits.

The design of the neighborhoods plays an important role in encouraging people to walk. For example, buildings that are separated from the pedestrian path by parking lots and positioned far from the street front and low-rise buildings on wide streets cause a decrease in the sense of space and weakens the pedestrian comfort. Excessive empty walls, lack of frequent entry into public spaces, shutters or rare windows and non-aesthetic facades (non-plastered, over-colored, mismatched materials on the frontage of buildings) can also make the pedestrian environment worse (A Citizen's Guide to LEED for Neighborhood Development). In addition, interruptions in pedestrian roads due to garage entrances are among the reasons affecting pedestrian circulation negatively.

Contrary to all these design problems that negatively affect walkability, buildings with entrances with easy access from pedestrian roads, and windows and openings

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<sup>5</sup> Retrieved from: <https://cyclingmagazine.ca/sections/news/vancouver-plans-overhaul-of-some-bike-routes-citing-concerns-with-safety-and-accessibility-for-cyclists/> and [https://www.thestar.com/news/gta/2009/05/28/bike\\_riding\\_is\\_bliss\\_in\\_copenhagen.html](https://www.thestar.com/news/gta/2009/05/28/bike_riding_is_bliss_in_copenhagen.html)

associated with the street will attract people's interest and create architectural diversity.

Frequent and regularly planted trees on the streets provide a more comfortable pedestrian environment by providing shades and strengthening people's connection to nature. In addition, the safety and comfort of pedestrian circulation can be increased by applications such as continuity of pedestrian roads, low traffic speed, roadside parking lot (which is buffered between pedestrian circulation and vehicle circulation).

In order to achieve a sustainable urban environment, number of street connections in neighborhoods should be high and the distance between them should be low. The number of street connections between neighborhoods is directly related to the lengths of the blocks.

The walkability of the neighborhoods decreases due to excessive long block lengths and the use of dead-end streets and such situations make people to drive even at close distances. Therefore, in urban design projects, connection roads between neighborhoods should be designed in a way that minimizes the use of vehicles and factors such as block sizes and dead ends should be taken into consideration in these designs.

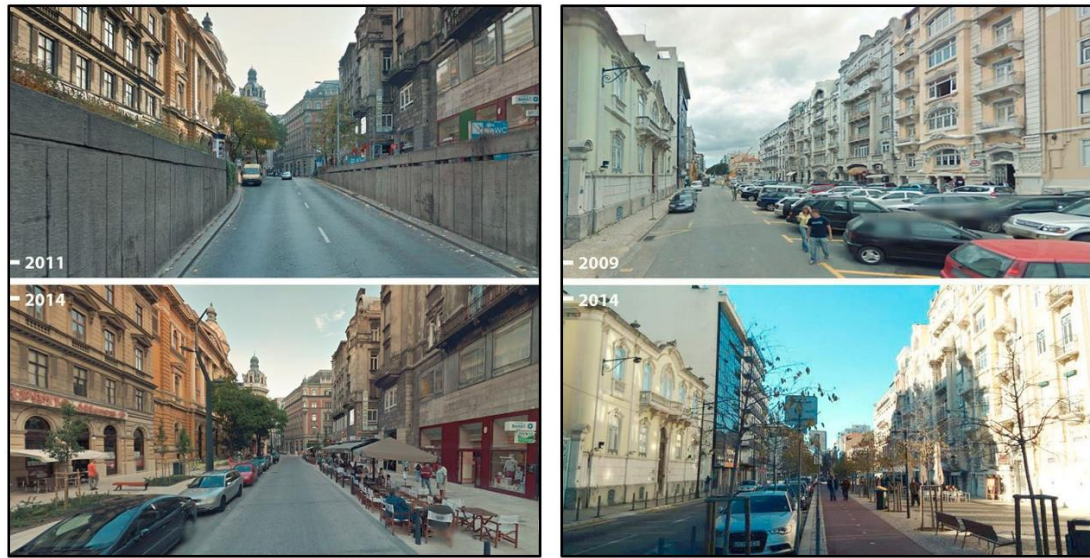


Figure 4.5. Increasing the walkability of the streets <sup>6</sup>

### **Public Transport Facilities – (Reducing Automobile Dependence)**

The basic principle of sustainable public transport is to minimize the need for traveling and individual driving. Designing residential areas and business areas together with public transportation systems will encourage people to prefer public transportation networks by decreasing car usage rates and increasing walking habits.

One of the major factors of greenhouse gas emissions worldwide is the use of car, so it is necessary to take measures to prevent that. These measures can be made through prohibitions and penalties, as well as through incentives and design decisions. The most sustainable option to reduce car use is to promote the frequent use of public transport throughout the year, providing safe and comfortable transport facilities (BREEAM Communities Technical Manuel). The quality of stations and stops (protection from wind, rain water and sun, etc.) and also distances between stops should be considered in order to provide sustainable transportation at neighborhood scale as well as the existence of different public transportation options.

<sup>6</sup> Retrieved from: <https://www.greatauckland.org.nz/2015/09/14/showing-street-transformation-through-streetview/>



Figure 4.6. Area occupied by the same number of people in different modes of transport <sup>7</sup>

Car-sharing and carpooling are encouraged in many countries. For such car sharing implementations, special lanes and parking lots can be applied to the roads (Figure 4.7).



Figure 4.7. Special lane road for vehicle sharing application <sup>8</sup>

<sup>7</sup> Retrieved from: <https://www.seattlebikeblog.com/2011/05/19/bikelash-id-rather-go-ride-in-the-sunshine/car-bus-bike/>

<sup>8</sup> Retrieved from: <https://thecoguide.org/carpooling> and <https://tiresandparts.net/news/parts/survey-says-consumers-prefer-carsharing-due-convenience/>

## **Accessibility of Public Spaces, Neighborhood Center and Public Transport**

Accessibility is defined by being able to travel from one place to another within the desired time period economically, safely, comfortably and without damaging the environment (Kuntay, 2006).

The neighborhood with high accessibility will only be possible with a strong pedestrian circulation network. The strong pedestrian circulation network will enable stronger ties within the neighborhood and between adjacent neighborhoods. In addition, it facilitates access to parks, schools, workplaces, shopping and creates a more sustainable neighborhood fabric. In order to manage this, it is necessary to examine the tendencies of traveling in the neighborhood and to make arrangements for land use and public space access accordingly.

## **Visitability and Universal Design**

While designing a sustainable neighborhood, design principles for the elderly and disabled people living in the neighborhood have to be decided. For this purpose, building entrances, street intersections, pavement and road connections should be designed in accordance with these population groups. In addition, it is necessary to produce affordable housing both physically and economically for people of diverse abilities in sustainable neighborhoods.



*Figure 4.8. Visitability and Universal Design*<sup>9</sup>

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<sup>9</sup> Retrieved from: <http://buildipedia.com/aec-pros/design-news/understanding-universal-design> and <https://cobodesigner.com/universal-design/>

### **4.3. Harmony with Nature Environment and Conservation**

#### **Steep Slope Protection**

The steep slope areas within the development area should be determined and the design should be shaped by taking these slopes into consideration. In this way, the areas with high slope should be determined during the planning stage and their usage should be prevented. Areas that are not used for construction because of the steep slope can be evaluated for urban landscape by integrating them with the appropriate urban landscape elements into the natural habitat of the city. In sloping areas suitable for construction, an aesthetic urban fabric can be obtained by making designs suitable for slope.

#### **Consideration and Conservation of Ecological Value/Wetland & Water Body**

Ecological values and wetlands are in danger of extinction under the pressure of continuous urban development. This situation has been increasingly observed in many parts of the world. In order to solve this problem, approaches to stop growth are being developed by limiting urban sprawl. These approaches require protection of the ecologically valuable areas within the the city. Even in sustainability assessment systems, the prohibition of settling in ecological values or wetlands is requisite. In order to be successful in the protection of these areas, land use demands need to be concentrated on the development of the potentials within existing residential areas.

Rehabilitation and conservation of habitat and wetlands is an important sustainable strategy. The priority strategy should be to prevent damage to natural ecological communities, water bodies and wetlands during development. If this is not possible, it would be a sustainable approach to ensure that the habitat is restored to the pre-project status or better after the project is built.

In a sustainable neighborhood, the natural landscape elements such as stream beds, woodlands, lakes within the city should be protected and integrated into the city to the benefit of the citizens.

#### **4.4. Green Buildings, Landscape and Infrastructure**

##### **Sustainable/Green Buildings and Landscape**

Green building designs emphasize environmental sensitivities. Therefore, strategies such as energy and water efficiency, indoor air quality, usage of sustainable or recycled materials are implemented in the architectural designs. Green buildings, one of the most basic elements of a sustainable neighborhood, are actively used in sustainability assessment systems.

The amount of water used in the building, the landscape elements in the neighborhoods and the trees planted on the roadside determines the total water consumption of the neighborhoods. Selecting plants used in landscaping from endemic species, especially in arid regions, will reduce water use. In this way, a more efficient landscape arrangement will be formed as the plants will adapt better to their environment.

Green roof and facade systems are preferred for energy and water efficiency in sustainable buildings. These systems can be briefly described as vegetal layers placed on the roof and building facade. These systems combine drainage, water and moisture retention functions. Wind and sun resistant, requiring less water, easy-care plants are used in these systems. They make contribution economically by reducing the energy used for heating and cooling. These systems add aesthetic value to homes and neighborhoods and contribute to the creation of healthy living spaces. Streets with a green building facade are encouraging to walk.



*Figure 4.9. Green facade and roof*<sup>10</sup>

Among the measures to be taken for energy efficiency in landscape designs is locating trees in accordance with the sunshine. If the trees are located selectively, the amount of sunlight reaching the houses can be regulated. In this way, the use of air conditioning tools can be reduced and energy savings can be achieved. For this purpose, the trees to be planted should be selected from the species suitable for the climatic conditions of the region. Trees that shed its leaves annually provide perfect prevention from the sunlight in summer but allow sunlight to reach the interior in winter (Figure 4.10). They are one of the most effective way at reducing heating and cooling energy costs. Likewise, with appropriate tree planting, the effects of cold winds in winter can be minimized to save energy.

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<sup>10</sup> Retrieved from: <https://www.archdaily.com/148548/vertical-living-gallery-sansiri/5014ce0d28ba0d58280005ea-vertical-living-gallery-sansiri-photo> and <https://www.geoplastglobal.com/en/insights/the-green-choice-of-france-plants-or-solar-panels-for-all-new-buildings-rooftops/>



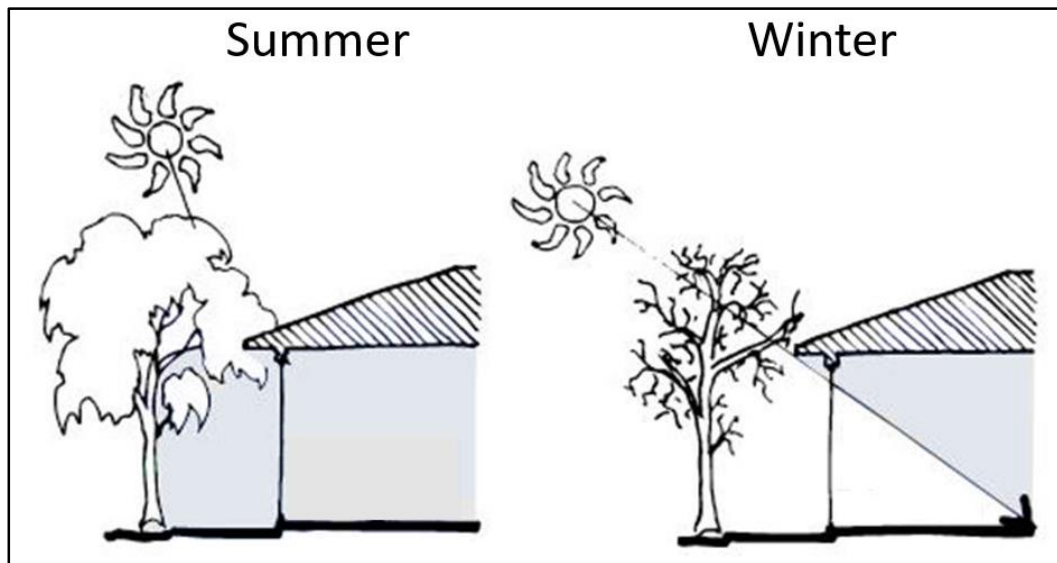


Figure 4.10. The effect of deciduous trees on sunshine in summer and winter <sup>11</sup>

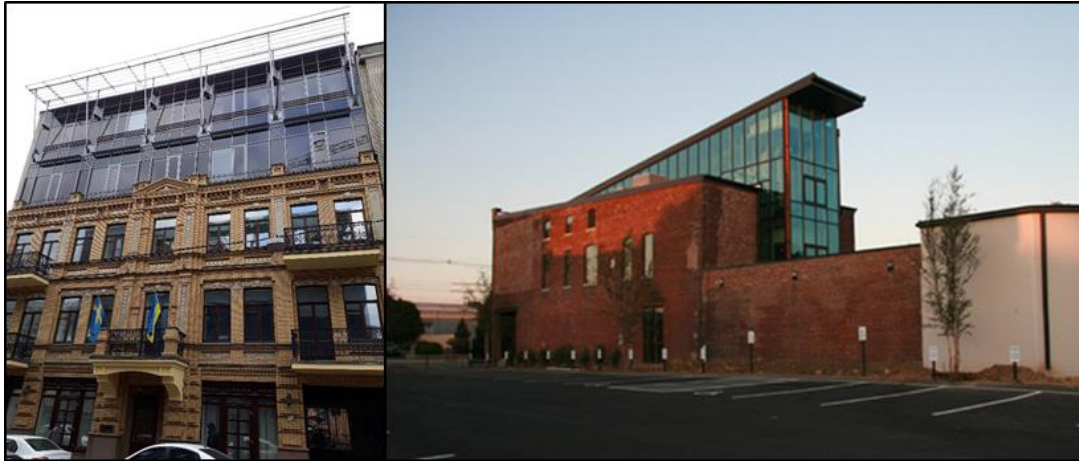
### **Conservation and Adaptive Reuse of Older, Historical and Cultural Structures**

The old structures, which are the cultural and historical memories of societies, appear as the memory of humanity and cities. Maintaining the memory of cities is an important criterion for the sustainability of that city. A city that has lost its memory will always be socially incomplete, even if it is environmentally sustainable.

Protecting existing old buildings as much as possible is a necessary strategy for sustainable development. In some cases, it may not be possible to protect all parts of these buildings. In such cases, the building shell, or only the building's salvageable components can be used and evaluated in new projects (A Citizen's Guide to LEED for Neighborhood Development). Old buildings can be preserved originally, and can be renewed by adapting them to urban texture according to modern architectural and urban design decisions (Figure 4.11).

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<sup>11</sup> Retrieved from: <http://www.yourhome.gov.au/passive-design/shading>



*Figure 4.11. Reuse of old buildings in new architectural style*<sup>12</sup>

The conservation and reuse strategies applied to existing buildings will contribute to the preservation of the memory of the society, increasing the viability of the neighborhood and creating a more defined urban fabric by identifying a landmark within the neighborhood.

### **Outdoor Thermal Environment and Heat Island Reduction**

The heat island is a particular environment whose temperature much higher than other nearby environments and the natural environment. Unshaded hard floor coverings, dark roofing and building surfaces absorb sunlight and cause heat island to rise. In the summer months, the wide streets with no trees planted can become 10 °C warmer than those tree-lined and narrower streets around them (A Citizen’s Guide to LEED for Neighborhood Development). Open spaces such as streets and squares that are directly exposed to sunlight create unsuitable environments for pedestrians and create serious health risks for vulnerable people. Besides, the heat island makes the environment difficult for the plants to grow and increases water requirement.

In order to eliminate all these negative consequences, measures are being developed against the heat island effect. Tree planting is the most important strategy to combat

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<sup>12</sup> Retrieved from: <http://www.thegreenbuilding.net/articles/archives20.html>

the heat island effect. Reducing the sun-absorbing surfaces is one of the measures to reduce the heat island effect. Especially the reduction of asphalt floors, so designing smaller, narrower streets and parking areas is the most important tool to be used in planning and design works. The use of light-colored roofs, building facades and floor coverings that do not absorb sunlight can minimize the heat island effect.

### **Mitigation of Water Use and Light Pollution**

Necessary measures should be taken to reduce water use and light pollution in a sustainable neighborhood. In order to minimize the use of clean water, rain water should be separated without interfering with the waste water networks and its use in urban areas should be increased as much as possible. Existing water infrastructure network may not handle sudden and strong rains, and as a result, floods and landslides on slopes may occur.

Sustainable management of rainwater will not only reduce water use but will also help solve problems such as erosion and flooding, and alleviate the burden on water infrastructure networks. In sustainable urban design processes, necessary design decisions should be taken to reduce the amount of rain water to be delivered to water networks and to improve water quality. It is necessary to minimize the burden on the network by sustainable drainage system. Bioswales are both natural and aesthetic and inexpensive way to make this drainage system (Figure 4.13).



Figure 4.12. Bioswales <sup>13</sup>

Whenever it rains, rainwater trickles between gaps in the permeable paving and can flow towards the bioswale. Rainwater that is collected on hard-paved public spaces and the surrounding roofs can also enter the bioswales by passing down pipes and then along surface channels. Holding rainwater here will help reducing local flooding, prevent sewer overflows into rivers and create a valuable space for plants and wildlife. Water-permeable paving materials, green roofs, light green spaces and landscape elements help to keep rainwater and use it by plants.

In addition to use of water in a sustainable neighborhood, some precautions should be taken against light pollution. Light pollution can be defined as the negative effect of direct or reflected lights on dwelling units, public spaces and natural areas or use of light in the wrong place, wrong direction, and wrong time. Light pollution adversely affects the natural life and life cycle and reduces the livability of the neighborhoods.

Important strategies to reduce light pollution include preferring downward lighting systems rather than up and side lighting (Figure 4.14). Another strategy is implementation of less bright illuminators at more frequent intervals rather than using very bright illuminators at large intervals. In addition, energy-efficient motion-sensitive lighting systems help prevent light pollution.

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<sup>13</sup> Retrieved from: <https://www.greatauckland.org.nz/2017/07/28/three-waters-infrastructure-part-4-green-streets/>



Figure 4.13. The lighting in the right direction <sup>14</sup>

## 4.5. Social Development, Economy and Management

### Crime Prevention

Throughout the history, cities have been remembered with the crimes; crime has continued to be a constant problem of the cities. Cities are ideal places for committing crimes because of both crowded and heterogeneous population structure and also alienation and weakening social control mechanisms; and the abundance that the cities have.

Spatial features enabling the development of crimes can be divided into two as physical and social. According to this, existence of abandoned buildings and plots, inadequate lighting and the streets and main roads without mixed use becoming lonely at evening hours can be specified as physical features.

In sustainable neighborhoods, security related factors such as lighting, visibility, and sightedness should be approached together, and measures should be taken for abandoned buildings in a way that they don't cause security problems.

### Public Awareness, Education and Community Involvement

In a sustainable society, every person has equal access to basic needs such as nutrition, shelter, education and health. Economical systems use transparent, ethical and fair applications as base. As long as individuals don't know what the sustainable society

<sup>14</sup> Retrieved from: <https://www.greaterauckland.org.nz/2017/07/28/three-waters-infrastructure-part-4-green-streets/>

is, they cannot make sustainable choices; and as long as the states don't get responses from their citizens, they cannot take action directly.

People have started to become conscious of the negative results of interferences to the nature such as increasing greenhouse gas rates and decreasing forest lands. Yet, this consciousness shouldn't remain limited to upper scale decisions that only the states can interfere with. All the individuals' consciousness should be expanded about the things they can do for a sustainable society and the world order.

For this purpose, educative and informative studies can be conducted by founding associations on a local scale. Encouraging the participation of all the inhabitants of the neighborhood is important for a successfully sustainable neighborhood organization. Furthermore, public awareness can be raised by means of sustainability projects on the neighborhood scale, encouraging steps for new sustainable projects can be taken.

Besides all these, encouraging free and fair access to a quality education and health services is one of the most important matters that will form the future society model.

### **Affordable Housing**

Today, the supply for affordable housing appropriate for low income group in Turkey poses a problem. The measures taken against the constantly increasing housing costs fail to satisfy. Dwelling production is being quickened in order to turn the tide for this situation, but the investments are generally made in new housing zones in uptown areas. While quality housing supply cannot be satisfied in such affordable housing investments, an uptown living space brings about social disintegration.

Instead of this, sustainable housing policies should provide different types of buildings with different sizes together and also provide housing for sale and/ or rental housing percentage at a high level of affordability. This way, people from different age and income groups are enabled to live together.

At the same time, affordability is directly related to livability. A survey by Szibbo (2019) shows that affordability is a major concern for existing residents in the

neighborhoods. The survey results showed that the majority of respondents in all case study quarters believed that the cost of housing in their neighborhood affected the viability of their neighborhood (Szybbo, 2019, .

### **Waste Management**

The world's resources are limited. As the steps we take in order to remove waste and unnecessary consumption increase, the planet will be in a better condition for the future generations. While reuse of recycled waste decreases the resources and the energy used in production, it also helps protecting the natural environment. Recycled waste are also utilized in streets, pavements and infrastructure materials.

In sustainable neighborhoods, recycling domestic waste, disposal services for domestic hazardous waste, compost services, and use of recycling bins for glass, metal, paper and plastic are encouraged. In order to provide all these, integrated waste management mechanisms on the neighborhood scale are founded





## CHAPTER 5

### SUSTAINABILITY ASSESSMENT OF EXISTING NEIGHBORHOODS: THE CASE OF ÇUKURAMBAR

#### **5.1. Benchmarking Analysis for Assessing Neighborhood Sustainability**

##### **5.1.1. Benchmarking Analysis**

Benchmark, as a noun in Lexico Dictionaries, means “a standard or point of reference against which things may be compared or assessed”. The comparison methods, in the simplest form, is defined as the process of searching for the best applications and adaptation of them to the thing being compared with reference to that everything that is measurable and observable can create a basis for comparison study (Efil, 2002).

Benchmarking is doing performance evaluation by putting criteria about the issue to be used for comparison. Shortly, it is a comparison method to ensure learning what the other do right and encouraging the search of the best applications. “Benchmarking provides information on relative performance and guides them through a process of performance enhancement” (Henning et al., 2011).

Until recently, it has been mostly used as an analysis method to reveal the negative sides of companies. However, later on it has achieved a wide range of usage area including the sectors like education, health, security and service (Erdem, 2002). Today, this technique is utilized for comparing urban areas.

##### **5.1.2. Benchmarking Analysis in Urban Area**

The use of benchmarking in urban areas began with the studies of the World Bank, the UN and the European Union. In these studies, comparative analysis are made according to flexible criteria about building/neighborhood or city. By following this comparison method, similarities and complementarities, and assessed advantages,

disadvantages and potentials of analysed neighborhood/city in relation to other neighborhoods/cities according to a range of different indicators can be viewed (ESPON, 2016).

Benchmarking is defined in the building scale in report which is named “Building Sustainability Assessment and Benchmarking – An Introduction” published by UN-Habitat in 2017. The definition in the report is as follows;

*“a methodology that, firstly, assesses a building along a set of criteria; secondly, rates its performance against a given standard (e.g. reference sets of rated buildings, set criterion values or standards, national averages, modelled/simulated building behaviour, or other methods of comparison); and thirdly, communicates a value judgment about its performance (Un-Habitat, 2017).”*

Rok (2014) identifies five main objectives of urban benchmarking as follows:

*“To objectively assess the performance of the city or specific spheres of its activity (e.g. quality of selected public services), to identify areas where improvement is needed, to find comparable units or entities with a superior performance with a view to using good practices, i.e. transfer and adaptation to the conditions of a given city, to evaluate the effectiveness of programmes intended to restructure and improve the operation of a given city, to enhance accountability to various groups of stakeholders, particularly the public at large.”*

Rok (2014) states that according to these main objectives, practices can be implemented in three different ways and that there are three success factors (table 5.1).

Table 5.1. *Features of Urban Benchmarking by Rok (2014)*

	Objectives	Practices	Success Factors
URBAN BENCHMARKING	1) Objective assessment of city's performance 2) Identification of areas for improvement 3) Transfer of good practices, learning from leaders 4) Assessment of the effectiveness of restructuring programmes 5) Strengthening of accountability and civic participation	Bottom-up approach, involving policy makers and other stakeholder groups at all the evaluation stages. Three types of benchmarking: 1) process benchmarking: analysis of process(es) focused on specific result in a group of organisations; emphasis on understanding differences and identification of good practices; 2) results benchmarking: comparing results of similar organisations in selected areas; emphasis on improving efficiency. 3) standards benchmarking: measuring results of organisation in respect of agreed standards; emphasis on monitoring of results and continuous improvement	1) willingness of policy makers to choose objectives based on analysis' results 2) willingness to learn from others and be compared with others, while avoiding a ranking-based approach 3) including process measures to better analyse how interventions are planned and implemented

Henning, Essakali and Oh (2011) mentions that the agenda of sustainability and climate change has increased the interest in the studies executed by using comparison analyses. Utilizing this method enables collecting consistent and comparable performance data by determining good applications and starting process of performance development and improvement by learning from model over-performing cities (Henning, Essakali & Oh, 2011).

## 5.2. Sustainable Neighborhood Concept in Turkey

Sustainable neighbourhood concept has started developing and being acknowledged in the different geographies of the world, as well as in Turkey. Although there hasn't been a legal basis concerning the neighbourhood sustainability yet, sustainable neighbourhood studies in different regions of the country are approached via public projects, public- private cooperation or only private projects.

### 5.2.1. Legal Framework of Sustainable Neighborhood

The systems that form the neighborhoods in Turkey because of their urban space has been continuously taking shape with the development plan laws from the years of establishment of the Republic to today. If we examine the development of planning system in this frame, it is seen that the frame of urban planning concept was tried to be formed with Law on the Buildings and Public Roads dating in 1933 numbered

2290, in 1956 with the Development Plan Law No. 6785, in 1972 with the Law No. 1605, which changed the Law No. 6785, and in 1985 with the Development Plan Law No.3194 respectively, until today (Yazar, 2006). In other words, Development Plan Laws that didn't respond the needs in the face of rapid urbanization in the country, were renewed in gradually decreasing intervals. When examining in summary, the legal framework concerning the development planning in Turkey couldn't have responded to the necessities of the time in any period.

On the other hand, the Development Plan Law No. 3194, which has still been in effect, has been the main text leading the urbanization in Turkey from 1985, the year it was adopted, until today. Although it was amended somewhat in time, it has still been preserving its first main frame.

In addition to the Law No. 3194, Spatial Planning and Planned Land Building Bylaws were made in order to control the order of country's level of urbanization and spatial organization. Although general principles regarding sustainability in some parts of these regulations are mentioned, no exact sustainability criteria for practice are spoken of.

Yet, the only way to create healthy settlements in line with the legislation provisions directing the country's urbanization process is to strengthen the link between the nature and development, accordingly its sustainability. Therefore, the laws and regulations directing the formation of today's cities should be made and applied to create livable cities for next generations in accordance with the sustainability principles.

Much as there are no clear and directive provisions in the Law on Public Improvement No.3194, which is the fundamental law organizing urban space in our country, and in the relevant legislation regarding the sustainability principles, especially in the recent period, it has been seen that the importance paid to the sustainability practices has increased in the workshops carried out by the Ministry of Environment and Urban Planning. Sustainable neighborhood concepts like "Turkuaz Kent", "Superkent"

(Sustainability Performer Urban Transformation), “Akıllı Şehir” were put on the Ministry’s agenda against the problems such as illegal housing, excessive urban sprawl, and inadequate infrastructure, being defenseless against disaster risks, traffic problems, social disintegration, and ineffective use of resources. Sustainable approaches such as decreasing energy consumption and CO<sub>2</sub> emission, utilizing urban lands effectively, encouraging bicycle use, increasing public transportation opportunities form the basis of these neighborhood studies<sup>15</sup>.

The expression “Turkuaz Şehir” means liveable, peaceful, ecological and green cities. It has been expressed that the concept of Turkuaz Cities will give the cities brand value and add prestige. In addition to this, it has been explained that Turkuaz Cities are important in terms of creating liveable cities as a certification system adapted to Turkey’s conditions and values. However, aforesaid project was left in the stage of draft and ended before getting elaborated.

Within the scope of 2019- 2020 National Smart Cities Strategy and Action Plan, the concept of “Akıllı Şehirler” is being studied. “Akıllı Şehir” is defined as a more livable and sustainable city actualized with the cooperation of the parties, utilizing new technologies and innovative approaches, creating enriching solutions by foreseeing possible future problems and needs. Yet, no proper result, also, has been get within the scope of this study.

Among these works that refer to the sustainable neighborhoods similarly, “Superkent” model differs from the others in terms of including the sustainable urban design in a more detailed way. In the Superkent model, 6 strategies have been determined, and “land use and urban design” has been discussed as the 1<sup>st</sup> strategy. In the frame of this strategy, minimum criteria such as smart site selection, protecting farming areas,

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<sup>15</sup> The information regarding these studies have been collected from information booklets and brochures prepared by the Ministry and from the interviews had with the specialists taking part in the teams that prepared these studies.

walkable streets with pedestrian priority, and the general principles and decisions such as priority settlement areas, limitation on sprawling and settling into open spaces, afforested and shaded streets were determined. However, since the model was ended before completing the studies on it, the detail on how to provide and apply these criteria couldn't be presented.

Nevertheless, all these models show that there are some studies that is being worked on about forming the new settlements on sustainability performance. Yet, it is clearly seen that neither legislation nor the ended and continuing works exhibit a sustainable neighborhood consciousness.

### **5.2.2. Sustainable Neighborhood Practices**

Although legal basis hasn't been formed yet, some practices concerning the sustainable neighborhoods are being performed. In addition to some practices started under the leadership of The Ministry of Environment and Urban Planning and continued with the cooperation of private sector, some projects with neighborhood concept certified by sustainability evaluation tools are being realized.

Two of these projects, which include different income groups and mixed use and local administrations play a role on, are Kilis Road Eco-City conducted by Gaziantep Metropolitan Municipality and Nilüfer Eco-City conducted by Nilüfer (Bursa) Municipality.

Kilis Road Eco-city project was designed on a new extension area of approximately 2300 ha. on Kilis State Road. In development, main objectives of the design have been defined as “protecting the ecological balance, sustainable use of the natural resources, keeping soil, water and air alive, protecting the existence of flora and fauna, developing organic agriculture, energy effectivity and productivity, and increasing the region's being invitatory by becoming an attraction center with permanence of green space, various cultural structuring” (Özdal Oktay, 2015). When examining the design objectives, the project containing ecological/ sustainable neighborhood criteria in modern standards came in for criticism such that it increased the building density with

the revisions applied in time although cultivation area whose agricultural feature to be conserved had been zoned for construction and originally low and medium density building had been suggested. As a result of the lawsuits filed in line with the criticism, the development plan implementation, which formed the basis for the project, was ceased by the court.

Bursa, Nilüfer Eco-City Project includes an area of 1212 ha. on the west side of the city. Basic principles of Bursa Nilüfer Eco-City Project have been defined as “neighborhood concept and components of neighborhood; adaptation to topography; pedestrianization; sensitivity for natural brinks; self- sufficiency; links to central parts of Bursa; integrated transportation systems; harmony with the environment; association in living and working” (Özdal Oktay, 2015, 16). This project was also criticized for being planned on new development areas and it hasn’t been implemented yet because of the problems in approval of the plan between the Metropolitan Municipality and the District Municipality.

There some other mixed use housing projects with neighborhood concept, which have been certified by sustainability evaluation tools or in the stage of certification, among the sustainable neighborhood practices in addition to these two unfinished projects. The only project among these projects that got in the stage of construction is Piyalepaşa İstanbul. Piyalepaşa İstanbul has been deemed worthy for the level of golden certificate by LEED-ND. Since the project was formed as a result of transforming an old storage yard, it got a high score in “preferred location” criteria. There six more projects that have applied for certification by LEED-ND evaluation tool other than Piyalepaşa İstanbul Project. However, no evaluation result has been got for these projects.

As it can be understood from all these examples, the sustainable neighborhood studies and practices continuing in Turkey have been designed either in order to create new housing stocks in new settlement areas or creating sustainable neighborhood by transforming present old areas.

### **5.3. Sustainability Status of Existing Neighborhoods: Benchmarking of Çukurambar with Hoyt Yards**

Neighborhood sustainability studies and implementations continuing in Turkey have been designed either to create new building stock in new settlement areas or sustainable neighborhoods by transforming existing old areas. Academic and implementation-oriented studies that have been examined on the national scale seem quite inadequate in terms of the objective of providing sustainability for the existing neighborhoods which are recently constructed and have no possibility for undergoing transformation in the near future. This situation reflects the need for new studies to make the existing neighborhoods in Turkey sustainable.

This study aims to search in the context of Turkey for the sustainability status of existing neighborhoods which are recently constructed and have no possibility to undergo transformation in the near future.

In this chapter, sustainability levels of the existing neighborhoods will be assessed in accordance with the sustainability criteria in the checklist analysed in the previous chapter. Çukurambar Neighborhood (Turkey/ Ankara/ Çankaya), which is recently constructed and has no possibility for transformation in the near future, has been chosen for this assessment. Benchmarking analysis has been utilized in order to compare to what extent the performance of Çukurambar Neighborhood is sustainable. In this method, Hoyt Yards Neighborhood (USA/Oregon/Portland) has been used as an example for a sustainable neighborhood.

#### **5.3.1. Çukurambar Neighborhood**

In this chapter, Çukurambar Neighborhood, which is the application area of this study, will be introduced and location of the area, the history of its structuring and planning, the process of urban transformation it has gone through and its current situation as a result of the transformation will be explained in order to form a basis for the future studies afterwards.



Çukurambar Neighborhood, which is located within the boundaries of Ankara Province, the District of Çankaya, starts on the area where Mevlana Boulevard (Konya Highway) and Dumlupınar Boulevard (Eskişehir Highway) cross and expands southeastward. It is on a central location which is 3.5 km away from Kızılay, Ankara's city center. Several shopping malls such as Armada, Next Level, CEPA and Kentpark and also ODTÜ, Çankaya University, Ufuk University are all closely around it; also buildings with commercial and administrative use and densely housing zones are located within the neighborhood. Public transportation is enabled via subway, bus and minibus.

In 1950's, the region including Çukurambar and Karakusunlar densely allowed immigrants (Gülbay Yasin, 2006, 19). The main reason why this neighborhood allowed dense immigration was possessing cultivable agricultural land. As the products collected from these lands were kept in storehouses named "ambar" and these storehouses were in the hole, the neighborhood has been called "Çukurambar (Hole Storehouse)" (Durmaz, 2014, 91).

Since the immigration, which is one of the main problems of unplanned urbanization, intensified in Karakusunlar Neighborhood, once Karakusunlar Village, the borders of the village started to expand and afterwards it constituted the population around Dumlupınar Boulevard and in Çukurambar Neighborhood. In line with the demands of overpopulation, landholders started to divide and sell their immovable property. The claim to satisfy the shelter and the daily needs of the over-population created a massive pressure on Çukurambar Neighborhood for structuring, and consequently it has become a part of an unplanned, inadequate and poor quality city. Between the years 1950-1980 when Ankara took a shape in terms of urbanization, is a period that affected the structuring of Çukurambar Neighborhood to a great extent. The immigrants in that region tried to fulfill their shelter needs by building their own housings and the base for a squatter house type structuring in the neighborhood was founded this way (Gülbay, 2006, 19). While there is no infrastructure such as electricity and drinking water, as a consequence of unplanned development, the region

came entirely short of social reinforcement. Balgat Neighborhood whose layout planning had been provided before was used for transportation. In time, infrastructure and social reinforcements were created with the money collected by the inhabitants of the neighborhood and consequently the cultivable agricultural land was transformed into an urban area (Durmaz, 2014, 94).

When examining the planning history of the region, it is seen that the first planning studies to identify the area was conducted in 1970 and comprised mostly of partitive areas these plans didn't include the neighborhood completely. In 1982, Ankara Metropolitan Municipality prepared an urban plan (named 1990 Ankara Nazım Planı) (figure 5.1) and in this plan, Çukurambar Neighborhood has been defined as the new urban development area. This plan exceeded the current building heights with high intensity for that period (Armatlı-Köroğlu ve Yalçınır-Ercoşkun, 2006). It is seen that planning activities were mostly conducted in and around Karakusunlar Neighborhood. The plan of Çukurambar which stays out of cooperative associations and locality development planning studies was approved in 1992. Renewing the urban texture, creating a healthy environment are among the objectives of the plan (Gülbay Yasin, 2006).



In Çukurambar- Karakusunlar Revision Plan which was the first master plan prepared in 1/5000 scale in 1984, calculations were determined as follows: minimum land area as 2500 m<sup>2</sup>, building height as 2 storey, facade setback as 10 meters and lateral facade as 5 meters (Armatlı-Köroğlu and Yalçiner-Ercoşkun, 2006). In 1991, this plan that didn't meet that period's needs was revised. In Çukurambar-Karakusunlar Revision Plan (1/5000), transportation problems and social reinforcement were taken care of (Ankara Metropolitan Municipality, 1991 cited by Durmaz 2014). Since Development Readjustment Share cutback was found high in Çukurambar-Karakusunlar Implementary Development Plan 1/1000 scale approved in 1991, the plan was revised and approved by the Metropolitan Municipality. According to the latest plan, it is seen that structuring up to 10 storey was allowed and the floor area ratios differs between 1.70- 2.00. The ratio of Development Readjustment Share was kept in 35% and 10% Expropriation Share was left to use for community centers. It is seen that a new order was created with the plan decisions (Ankara Metropolitan Municipality, 1991 cited by Durmaz, 2014).

After the plan's approval, a period of fast change was entered. In 1996, urban renewal studies were started and owners of squatter houses were given land title deeds. Afterwards, high- rise buildings were started to be built after demolishing the squatter houses.

When considered within this planning framework, the structure of the development plans in Çukurambar could not have gone beyond producing and controlling the urban space quantitatively. In this process, the object inspected by the implementation plans has been the parcel/plot. Since the single parcel was highly manageable, it became the basic unit produced both in the planning and implementation process. While the parcel-based approach in the implementation plan formed to the blocks with the merger of parcels, the priority was how to distribute construction rights rather than creating spatial quality. This implementation plan defines the specific construction conditions for each blocks. These conditions consist of floor area ratio, building-height and set-backs. There is no other condition or rule to define to shape the urban

space. Within the framework of these conditions given on the block scale, all parcels were designed separately by the contractors.

This problematic fact is not only specific to Çukurambar, but also appears to be the general problem of the country. Maybe another important issue to be questioned here is the adequacy of the country's spatial planning legislation and existing urbanization practices in creating sustainable urban space. Therefore, the relations of the buildings with the neighborhood are left to the initiative of the contractors.

As mentioned, the planning history of Çukurambar has progressed in accordance with the planning regulation and the neighborhood has taken its current form. The fact that the neighborhood is developed in accordance with the current urbanization legislation of the country is an important factor for the selection of the benchmark analysis. In this way, the sustainability of the current urbanization practice will be tested. However, Çukurambar has some features that distinguish it from other neighborhoods developing in this way. Çukurambar is near the city center and has high rentable land and quality construction systems compared to other neighborhoods and this makes Çukurambar more conspicuous neighborhood.

### **5.3.2. Hoyt Yards Neighborhood**

Hoyt Street Yards is located in Pearl District. District had one of the railway area important in the beginning of 20th century. At the end of the 1800's, Pearl District was started to be structured according to the plan (figure 5.2.) consisting of blocks of 60x 60 meters' grids and came at its current texture (Gorsek, 2012).

The region went through an economic recession between 1950- 1970 and over the years the railroads and the storehouses around them were started not to be used. When it came to the 1900's, Hoyt Yards consisting of abandoned storehouses and railroad were decided to be transformed. In the beginning of 1994, Hoyt Street Properties bought the old railroad of 34 acres. In 1997, Hoyt Properties started to cooperate with Portland Development Commission to transform it into a mixed- use neighborhood.

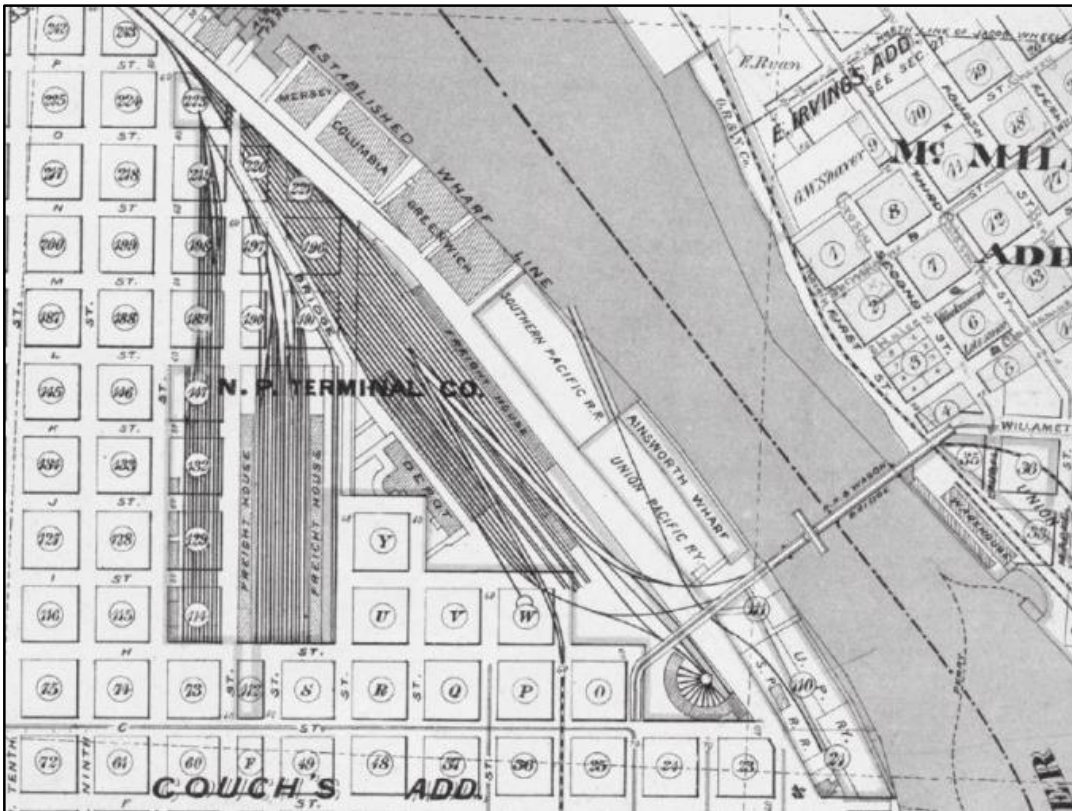


Figure 5.2. First plan of Hoyt Yards (1890s)<sup>17</sup>

High-density buildings were preferred in the design prepared for the transformation. In line with the existing texture of neighborhood, integrity with the environment was tried to be enabled by continuing to use the 60x60 grid texture. The first building in the neighborhood was built in 1998 and ~ 90% of the neighborhood's structuring was completed in the transformation process in which block based development was implemented. The project designed a part of the transformation was deemed worthy for Platinum certificate by LEED-ND.

In contrast to the parcel-based development in Çukurambar, the housing production process in Hoyt Yards was carried out on a block-based and by a single contractor (Hoyt Street Properties). In the housing production process, the Portland Zoning Plan provides the basis for general land-uses, while all details of the construction are

<sup>17</sup> Retrieved from: Gorsek, C. S. (2012). Portland's Pearl District. Arcadia Publishing.

described in detail in the "Central City Plan District-Chapter 33.510". In addition to floor area ratio, building heights and setbacks, many standards have been developed under titles such as "floor area bonus, transfer options, shadow study, required building lines, ground floor windows, windows above the ground floor, bird-safe exterior glazing, ground floor active uses, drive-through facilities, demolitions, ecoroofs, low carbon buildings, additional standards in the north pearl subarea, additional standards in the south waterfront subdistrict, additional standard in the central eastside subdistrict, greenway overlay zone in the south waterfront subdistrict, central city master plan, signs for additional uses allowed in the open space zone" (Portland Zoning Plan - Central City Plan District).

### **5.3.3. Benchmarking of the Neighborhoods with Sustainable Urban Planning and Design Criteria**

Çukurambar and Hoyt Yards Neighborhoods, which are compared with benchmarking analysis, are the examples of neighborhoods, locating on the periphery of the city center, whose planning studies were prepared in 1990's, started to be built up in 2000's and whose structuring were completed except the small parts. In the selection process of these neighborhoods criteria such as ease of transportation, land values, construction quality, building heights are taken into consideration.

While Çukurambar Neighborhood do not have any studies depending on sustainability in planning and development processes among these neighborhoods, Hoyt Yards Neighborhood has been deemed worthy for platinum certificate, which is the highest degree, by LEED- ND sustainability assessment tool. The reason why such a comparison is made is to show the situation of the existing neighborhoods as compared to the neighborhoods delivering a superior performance in terms of sustainability by using comparable performance data, and to provide data and consciousness for enabling the start of developing and improvement process of their sustainability.

With this understanding, these two neighborhoods are discussed in this chapter of the study in terms of their compatibility with neighborhood sustainability criteria. At this

stage, a comparison is made by using benchmarking method according to the checklist shown in Table 5.2., which is prepared depending on the sustainability evaluation tools examined in the previous chapters.

In the suggested sustainability evaluation checklist, there are 5 main principles which are “Location Selection and Planning”, “Transportation and Accessibility”, “Harmony with Natural Environment and Conservation”, “Green Buildings, Landscape and Infrastructure”, “Social Development, Economy and Management”. According to the criteria determined within the context of these principles, to what extent Çukurambar Neighborhood is sustainable as compared to Hoyt Yard Street is exhibited by comparing the numeric values achieved from measurable criteria. A value description by proportioning between “ $0 \leq \dots \leq 1$ ” is made in order to compare the measurable criteria on the neighborhoods.

The results achieved as a consequence of examining the variables depending on the determined criteria specific to the neighborhoods are given in Table 5.2. In the stage of examination, on- site observation specific to Çukurambar Neighborhood is made in order to collect the necessary data and satellite pictures are also utilized. For Hoyt Street Yard Neighborhood, documentations are obtained over the internet and also satellite pictures, again, and Google Street views are utilized.





Figure 5.3. Satellite imagery of case study areas (a) Çukurambar / b) Hoyt Yards <sup>18</sup>

In cases when criteria can be measured, measures to understand to what extent the neighborhood includes that criterion is made and a value between “ $0 \leq \dots \leq 1$ ” is achieved. In cases when the measured criteria can’t be met at all, “0” is used; when it is completely met, “1” is used, and when it is partially met, a value between “ $0 \leq \dots \leq 1$ ” is achieved. Some immeasurable criteria are given a value of “0” or “1” depending whether they exist in the neighborhoods or not.

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<sup>18</sup> Retrieved from: Illustration made by author on Google Earth visual material

Table 5.2. Benchmarking of the Cases According to the Neighborhood Sustainability Assessment Checklist

MAIN PRINCIPLES	CRITERIA	VARIABLE	DEFINITION	VALUE OF ÇUKURAMBAR	VALUE OF HOYT YARD	
Location Selection and Planning	*Preferred Locations	Brownfield Redevelopment	(Total Infill+Brownfield+ Regeneration/Total Neighborhood Area)	1,00	1,00	
		Regeneration/Infill Development				
	*Compact Development	Meets Minimum Densities	Fit to Construction/Against Earthquake and Ground Problems	(Total Fit to Construction Area/Total Construction Area)	1,00	1,00
			At least 17 dwelling units for Hectare ("1" if (Total Dwelling Unit/Total Hectares of Area) ≥ 17 - "0"≤...<"1" if (0 ≤ (Total Dwelling Unit/Total Hectares of Area) < 17))	1,00	1,00	
	*Mixed-Use Neighborhood Center	Mixed-Use Neighborhood Center	Maximise Different Uses in Neigh. Center ("1" if (Total Dif. Uses ≥ 19) - "0"≤...<"1" if (0 ≤ (Total Uses) < 19))	1,00	1,00	
	*Reduced Parking Footprint	Underground Parking	(Total Building with Underground Parking/Total Building Unit)	1,00	1,00	
	*Public Realm	Green and Blue Spaces for the Public	Public Square	(Total Public Realm Area/ Total Neighborhood Area)	0,08	0,14
			Park, Marketplace etc.			
	*Land Use Planning	Master Plan/Land Use Plan	Existence of a Master/Land Use Plan ("1" if there is - "0" otherwise)	1,00	1,00	
Plan Changes			Existence of Plan Changes ("1" if there is no change - "0" otherwise)	0,00	1,00	
Planning Hierarchy/Consistency with Upper Scale Plans			Existence of Planning Hierarchy ("1" if there is - "0" otherwise)	1,00	1,00	
Transportation and Accessibility	*Bicycle Network	Bicycle Path	(Total Bicycle Network Length/ Total Street Length)	0,00	0,55	
	*Safe and Walkable Street Network	Tree-Lined and Shaded Streets	(Total Tree-Lined Street Length/ Total Street Length)	0,03	1,00	
		Inviting Pedestrian Environment	(Total Inviting Street Length/ Total Street Length)	0,01	1,00	
		Continuous Sidewalks	(Total Sidewalks Length/ (2xTotal Street Length))	0,78	1,00	
		Necessary Road Surface Marking for Safety and Parking	(Total Marked Street Length/ Total Street Length)	0,00	1,00	
	*Accessibility to Public Transport Facilities	Distances to stations/bus stops etc.	(Total Area within 400m to public transport facilities/ Total Neighborhood Area)	1,00	1,00	
	*Accessibility of Public Realm	Public Realm within Walking Distance	(Total Area within 400m of Public Realm/Total Neighborhood Area)	0,90	1,00	
	*Accessibility of Neighborhood Center	Mixed-use Neigh. Center within Walking Distance	(Total Area within 400m of Neighborhood Center/Total Neighborhood Area)	0,59	1,00	
*Visitability and Universal Design	Accessibility of Sidewalks for People of Diverse Abilities	Accessibility of Sidewalks for People of Diverse Abilities	(Total Ease of Access Street Corners/ Total Street Corner)	0,29	1,00	
		Accessibility of Commercial Units for People of Diverse Abilities	(Total Ease of Access Commercial/ Total Residents)	0,90	1,00	
		Accessibility of Residential for People of Diverse Abilities	(Total Ease of Access Residents/ Total Residents)	0,33	1,00	
Harmony with Natural Environment and Conservation	*Steep Slope Protection	Slope Max % 15	(Total Constructed Area less than % 15 slope/ Total Constructed Area)	1,00	1,00	
	*Consideration and Conservation of Ecological Value/ Wetland&Water Body	Use of Ecological Values in Design	Existence of Eco. Value in Design ("1" if there is - "0" otherwise)	0,00	0,00	

Table 5.2. Cont.

<b>Green Buildings, Landscape and Infrastructures</b>	*Sustainable/Green Buildings and Landscape	Green Roof, Green Facade etc.	Existence of Green Roof/Facade Building. (“1” if there is - “0” otherwise)	0,00	1,00
		Certified Green/Sust. Building in Neighborhood	Existence of Certified/Green Building (“1” if there is - “0” otherwise)	0,00	0,00
	*Conservation and Adaptive Reuse of Older, Historical and Cultural Structures	Conservation and Adaptive Reuse of Older, Historical and Cultural Structures	Existence of Reused Building (“1” if there is - “0” otherwise)	0,00	0,00
	*Heat Island Reduction	Minimized Asphalt Ground	1-(Total Asphalt Ground/Total Neighborhood Area) (*total asphalt ground includes half width of adjoining roads)	0,81	0,88
	*Mitigation of Water Use and Light Pollution	Green Stormwater Retention Techniques	Existence of Green Storm Ret. Tech. (except Parks-Green spaces) (“1” if there is - “0” otherwise)	0,00	1,00
		Green Lighting Techniques	Existence of Green Lighting. Tech. (“1” if there is - “0” otherwise)	0,00	0,00
<b>Social Development, Economy and Management</b>	*Crime Prevention	Abandoned Building and Plots	Existence of Abandon Building and Plots (“1” if there is none - “0” otherwise)	0,00	1,00
		Well-lighted Streets	(Total Well-lighted Street/ Total Street Length)	0,95	1,00
	*Public Awareness, Education and Community Involvement	Provide Neighborhood Association	Existence of Neighborhood Association (“1” if there is - “0” otherwise)	0,00	1,00
	*Affordable Housing	Affordable Housing Policy	Existence of Affordable Housing Policy (“1” if there is - “0” otherwise)	0,00	1,00
	*Waste Management	Waste Segregation, Reuse and Processing	Existence of Waste Management (ΣXi/3 - i{C, R, G}) Xi=“1” if there is - “0” otherwise) (C=Composting, R=Recycling, G=Garbage)	0,66	1,00

## 5.4. Discussion

Sustainability levels of Çukurambar and Hoyt Street Yards Neighborhoods are compared by using 22 criteria gathering under 5 different principles and total 36 variables related with these criteria. While Hoyt Yards Neighborhood, its sustainability performance officially registered by LEED-ND, displayed high performance except the principles of Green Buildings, Landscape and Infrastructure, Çukurambar Neighborhood can’t display a high performance except the principle of Location Selection and Planning.

### Location Selection and Planning

When they are evaluated according to “Preferred Location” criteria, both the neighborhoods meet the criteria, since they both are transformation area. Çukurambar and Hoyt Yard Neighborhoods have transformed into their current situation, the first one from squatter settlement and the latter from being used as railroad and train station (Figure 5.4). Both the neighborhoods are located near city center and on the main

public transportation route. Because of this aspect, it can be mentioned that they have a convenient location for contributing to decrease automobile dependence. According to the settlement suitability analyses within Turkey’s planning practices, Çukurambar is a convenient neighborhood for structuring provided that necessary precautions are taken and all the structures are built on appropriate areas.

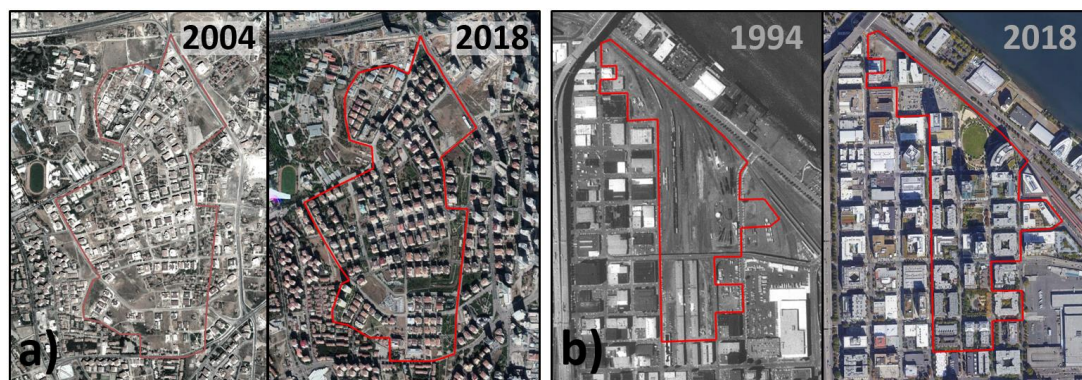


Figure 5.4. Old and new satellite imagery of neighborhoods (a) Çukurambar / b) Hoyt Yards <sup>19</sup>

As a consequence of the measurements made within “Compact Development” criteria, it is seen that Çukurambar Neighborhood has ~56 dwelling unit/hectare and Hoyt Yard has a density of ~116 dwu/ ha. Both the neighborhoods are seen to have a density far above 17 dwu/ha, which is the minimum limit. That both the neighborhoods have a dense urban texture is evaluated as an opportunity for easing the access to facilities such as work, social reinforcements and public transportation.

When the neighborhoods are examined according to “Mixed-use Neighborhood Center” criterion, while mixed-use in Hoyt Yard spread over the neighborhood, it is located on a single main road in Çukurambar. In both of the neighborhoods different uses (restaurant, bank, sports hall, clothes shop, supermarket and etc.) over 19 are located. With this aspect, it is seen that both the neighborhoods are self- sufficient with the characteristics decreasing the need for private car transportation outside the neighborhood.

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<sup>19</sup> Retrieved from: Illustration made by author on Google Earth visual material

All the buildings in the both neighborhoods are examined according to “underground parking” variable which is under the criterion of “reduced parking footprint”. As a result of the observations, it is seen that all the buildings in both of the neighborhoods have underground parking. Therefore, the rate of the buildings with underground parking to all the buildings is 1.00 for both of the neighborhoods.

When evaluating the Public Realm criterion, the public realms, which have been used after being organized according to the plan, have been taken into account and the parks and green fields, which haven't been organized yet although it has been planned, have been ignored. Calculations are made on among the open areas which have direct pedestrian access. According to these calculations the public realm rate is 0,08 in Çukurambar (if all the public realm in the plan is calculated, the ratio rises to 0,14 in Çukurambar), while it is 0,14 in Hoyt Yards. When examining the public realms located in Çukurambar, it is seen that a whole block or plot are reserved as park. On the other hand, when examining the public realms in Hoyt Yards Neighborhood, it is seen that there are active green fields with direct pedestrian access and street passes within the blocks other than the blocks reserved wholly as park (figure 5.5).



*Figure 5.5. Public realm in blocks – Hoyt Yards* <sup>20</sup>

Within the planning hierarchy of both the neighborhoods, there are sub-scale and upper scale plans (figure 5.6 and figure 5.7). However, more than one modifications have been made in the implementation development plan of Çukurambar Neighborhood with 1/1000 scale. Unsustainable approaches such as transforming the “recreation area” into “housing and trade areas”, and the “university area” into “diplomatic usage area” are among these modifications.

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<sup>20</sup> Retrieved from: Illustration made by author on Google Earth visual material

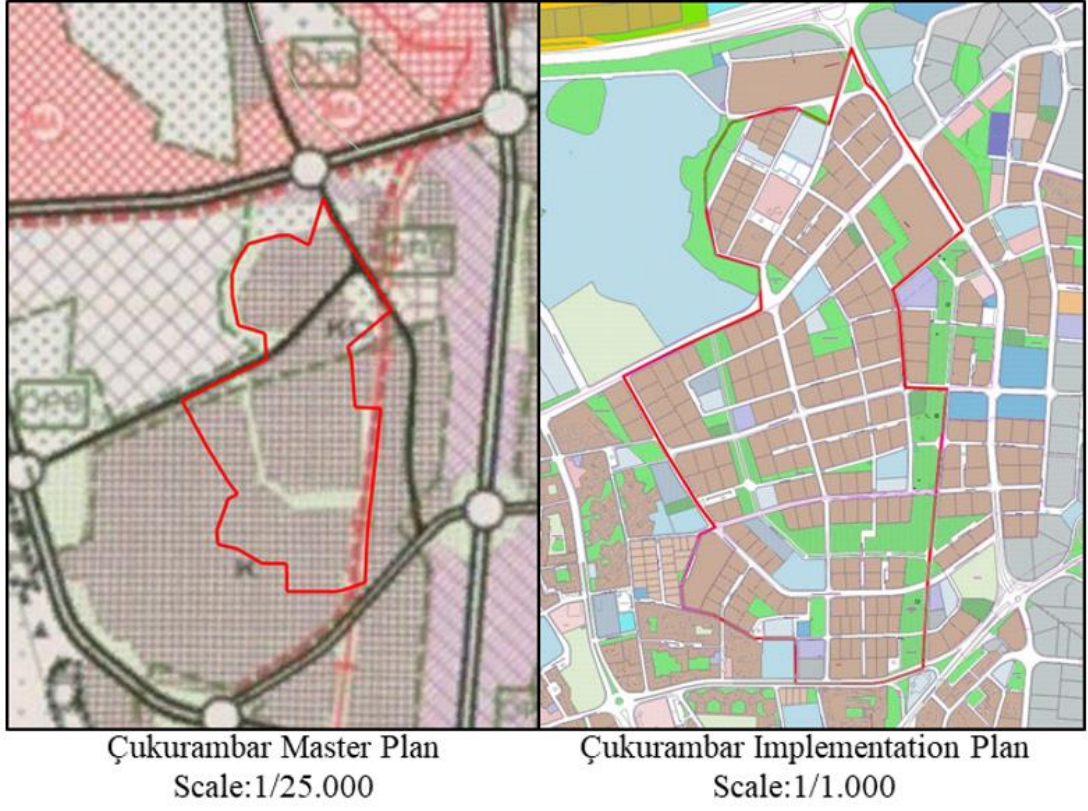


Figure 5.6. Çukurambar's Plans<sup>21</sup>

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<sup>21</sup> Source: Çankaya Municipality

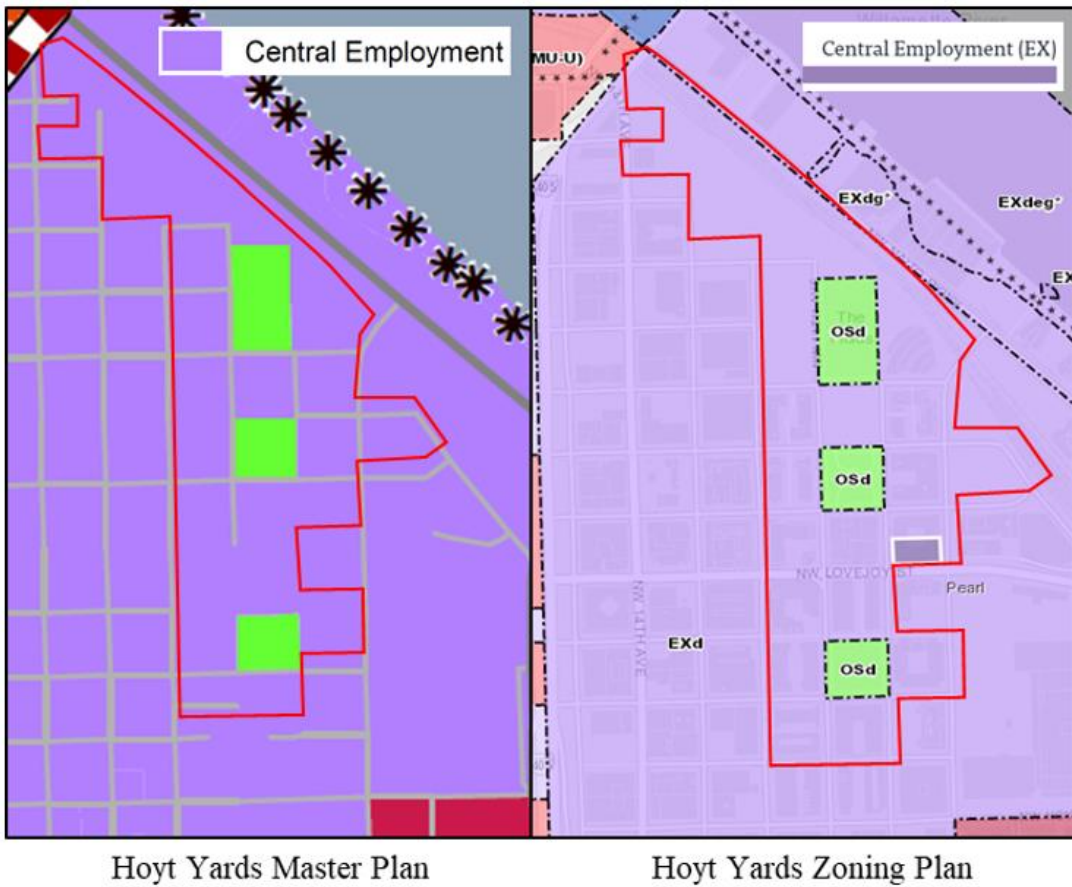


Figure 5.7. Hoyt Yards' Plans<sup>22</sup>

### Transportation and Accessibility

There is no implementation for encouraging bicycle use in Çukurambar. As for Hoyt Yards Neighborhood, there are cycle paths separated from surface street with road markings and going with the surface street. Also, there are bicycle parking spaces in cycle path routes. Necessary road signs are set on roadsides and crossroads in order to regulate and provide security for the bicycle traffic (figure 5.8). The rate of described cycle paths to overall street network in the neighborhood is 0,55.

<sup>22</sup> Retrieved from: <https://www.portlandmaps.com/bps/zoning/#/map/R499913>



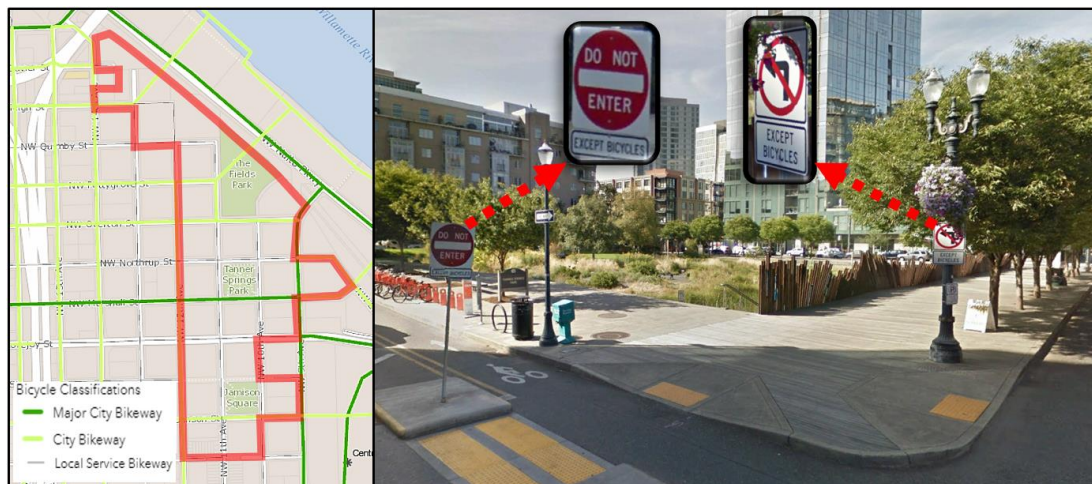


Figure 5.8. Bicycle Network and Necessary Road Signs – Hoyt Yards <sup>23</sup>

According to the observations and calculations conducted around the variables within the criterion of “Safe and walkable street”, performance of Çukurambar Neighborhood is low. According to this, the rate of tree-lined and shaded streets to overall street network is 0,03; the rate of inviting pedestrian environment is below 0,01; the rate of continuous sidewalk to overall sidewalk is 0,78 and the rate of necessary road surface marking is 0. Besides, in the observations made in tree-lined and shaded streets, it is seen that the sidewalks aren’t large enough, so the trees, street lights and even electricity transformers affect pedestrians’ wandering negatively (figure 5.9).

In Hoyt Yards Neighborhood, all variables under “safe and walkable street criteria” are provided at a rate of 1.00. All sidewalks and pedestrian streets in the neighborhood are tree-lined and shaded (figure 5.10). Blind walls are avoided on the facades of the buildings and no disharmonious colors are used. Monotonous formation is prevented by using active building facades. The sidewalks surround all the blocks and are connected by pedestrian crossings at the street intersections and thus the continuity of the sidewalks are ensured (figure 5.10). And also all streets in areas that have completed construction in the neighborhood have necessary road surface markings.

<sup>23</sup> Retrieved from: Illustration made by author on Google Earth visual material



Figure 5.9. Current situation of streets – Çukurambar <sup>24</sup>



Figure 5.10. Safe and Walkable Street – Hoyt Yards <sup>25</sup>

Within the criterion of “Accessibility of Public Transport Facilities”, it is seen that public transformation systems in the neighborhoods are examined and this criterion is fully met in both of the neighborhoods (figure 5.11 and figure 5.12). While streetcars

<sup>24</sup> Source: Personal Archive

<sup>25</sup> Retrieved from: Illustration made by author on Google Earth visual material

and buses serve in Hoyt Yards, only city buses are utilized in Çukurambar. “Dolmuş” routes that cannot be taken as a sustainable transportation means give service in 1425<sup>th</sup> Main road which is located in the center of Çukurambar Neighborhood. Despite the fact that access to bus stops can be provided in Çukurambar, criteria such as bus stops’ compliance with the standards (figure 5.13), frequency that public transportation vehicles pass by the stops and CO<sub>2</sub> emissions of these vehicles should be taken into consideration. If these criteria are taken into account, city buses are based on natural gas and their CO<sub>2</sub> emission is low. However, private public buses’ sustainability is a matter of debate within the scope of the fuel they use.

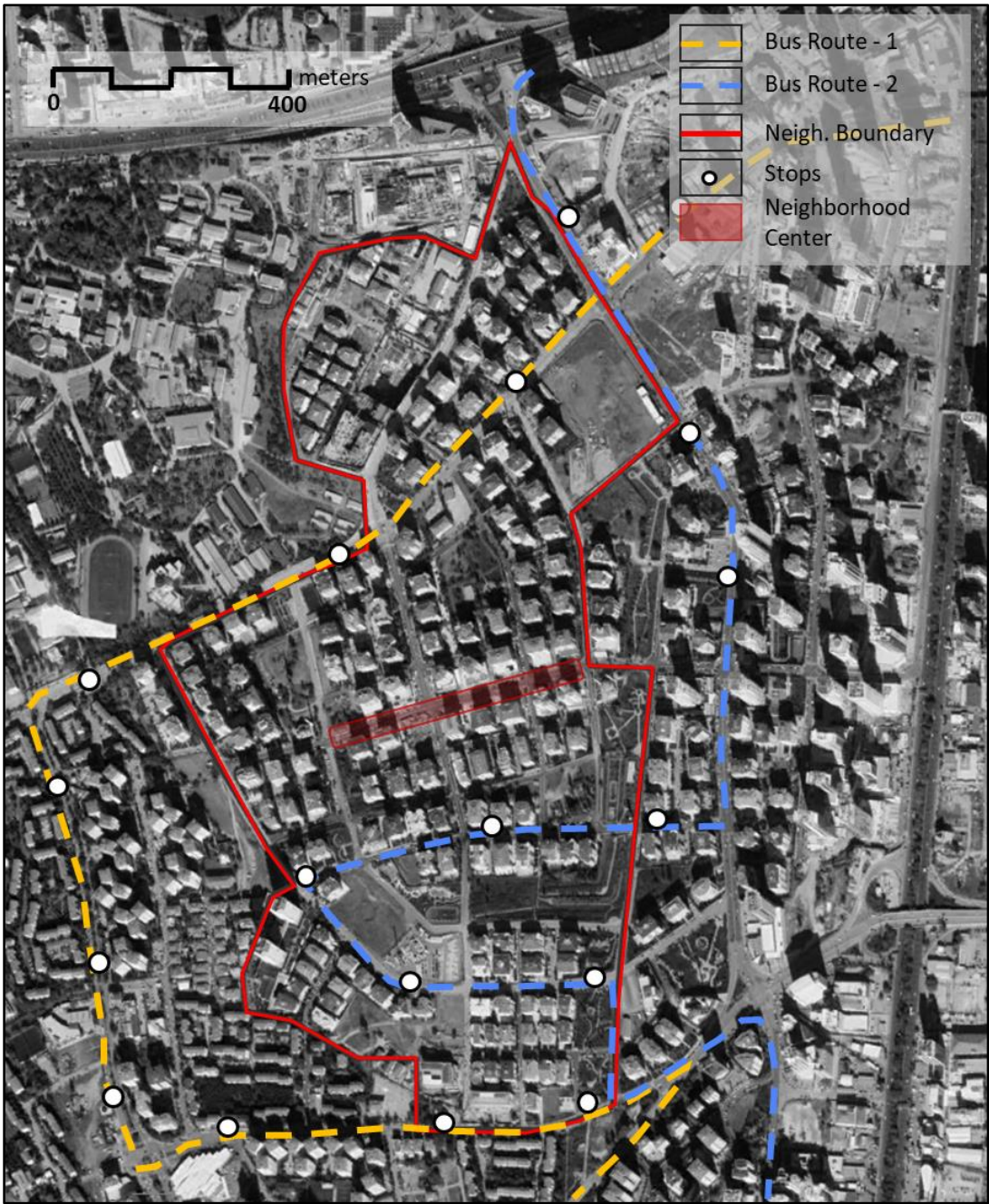


Figure 5.11. Transportation Facilities - Çukurambar<sup>26</sup>

<sup>26</sup> Retrieved from: Illustration made by author on Google Earth visual material

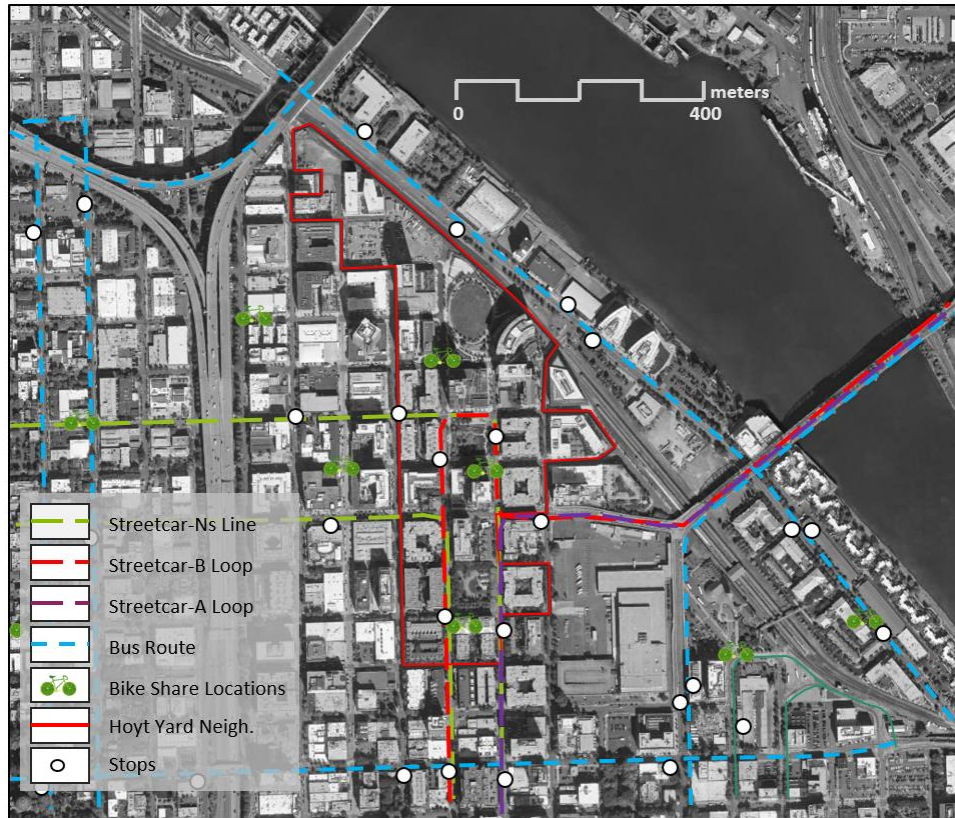


Figure 5.12. Transportation Facilities – Hoyt Yards<sup>27</sup>

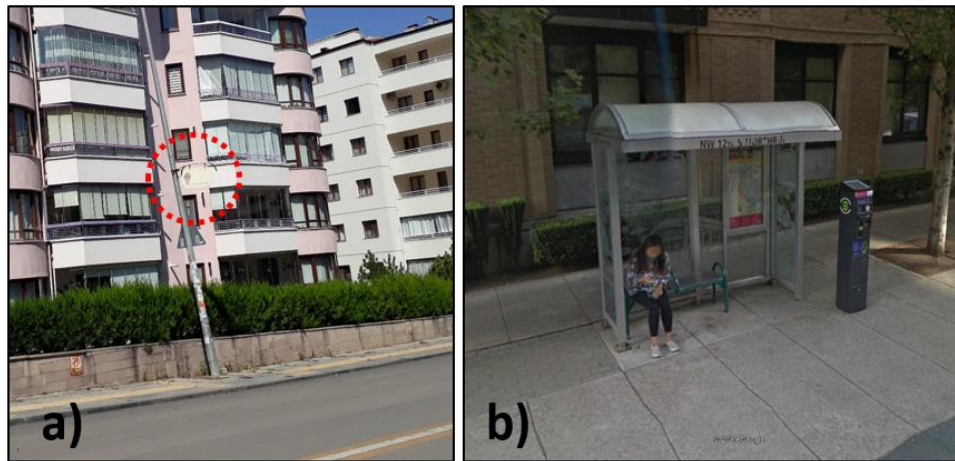


Figure 5.13. Standards of bus stops (a) Çukurambar - b) Hoyt Yards<sup>28</sup>

<sup>27</sup> Retrieved from: Illustration made by author on Google Earth visual material

<sup>28</sup> Source: a) Personal Archive - b) Retrieved from: Illustration made by author on Google Earth visual material

As a result of the examinations conducted under the criterion of “Public Realm”, while the rate of places within walking distance to public realms in Çukurambar is 0,90, in Hoyt Yards this rate is 1,00. The area of 0,10 out of walking distance in Çukurambar is because green fields in existing implementation plans haven’t still been organized (figure 5.6).

The rate of the areas within walking distance to mixed-use neighborhood center in Çukurambar is 0,59, while it is 1,00 in Hoyt Yards. That mixed-use has spread to all the neighborhood in Hoyt Yards is effective for such a result. In Çukurambar, that the neighborhood center has been designed to be located on a single main road makes access difficult (figure 5.14).



Figure 5.14. Accessibility of Mixed-use Neighborhood Center of Çukurambar <sup>29</sup>

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<sup>29</sup> Retrieved from: Illustration made by author on Google Earth visual material

When the neighborhoods are examined under the criterion of “Visitability and Universal Design”, the rate of accessibility of sidewalks for people of diverse abilities 0,29, accessibility of commercial units for people of diverse abilities is 0,90, accessibility of residential units for people of diverse abilities is 0,33 in Çukurambar. In Hoyt Yards, these rates for all variables are 1,00. The results that show up in Çukurambar reflect that accessibility needs of people with diverse abilities are ignored. In the observations made in Çukurambar, it is seen that there is no standard in studies to provide accessibility (figure 5.15).

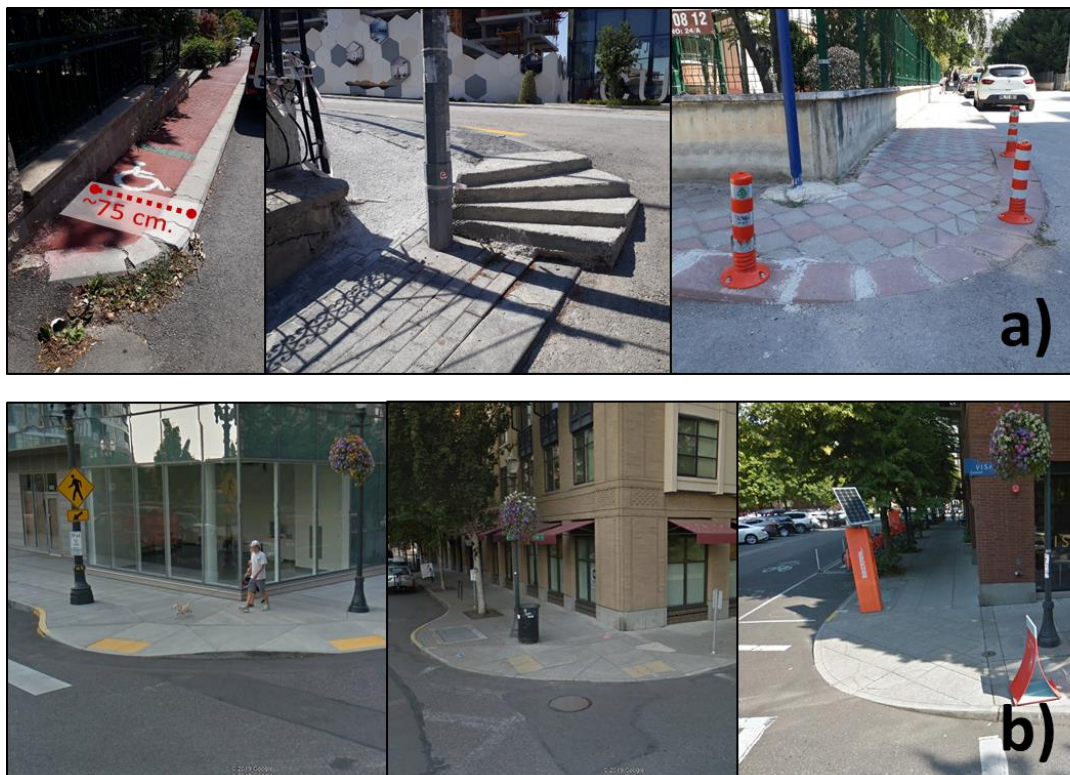


Figure 5.15. Ease of Access Street Corners (a) Çukurambar / b) Hoyt Yards<sup>30</sup>

<sup>30</sup> Source: a) Personal Archive / b) Retrieved from: Illustration made by author on on Google Earth visual material



Figure 5.16. Ease of Access Commercial Units (a) Çukurambar / b) Hoyt Yards<sup>31</sup>

### Harmony with Natural Environment and Conservation

Examinations are conducted on 2 different criteria under this principle. These are “Steep Slope Protection” and “Consideration and Conservation of Ecological Value/Wetland& Water Body” criterion. Hoyt Yards Neighborhood has been developed on a completely flat area, while slope rate in Çukurambar varies from 0% and 10%. For this reason, the rate of the buildings built on the areas below 15% slope comes at 1,00. Besides that, high slope areas in Çukurambar have been reserved for green fields and a sustainable approach is shown.

<sup>31</sup> Retrieved from: Illustration made by author on on Google Earth visual material



No ecological value that used in the design by conserving is encountered in the examinations conducted in both of the neighborhoods within the scope of “Use of Ecological Values in Design” criterion. The reason for this is both of the neighborhoods are located in transformation areas. Consequently, both of the neighborhoods don’t meet the criterion, since there is no ecological value utilized in the design.

### **Green Buildings, Landscape and Infrastructures**

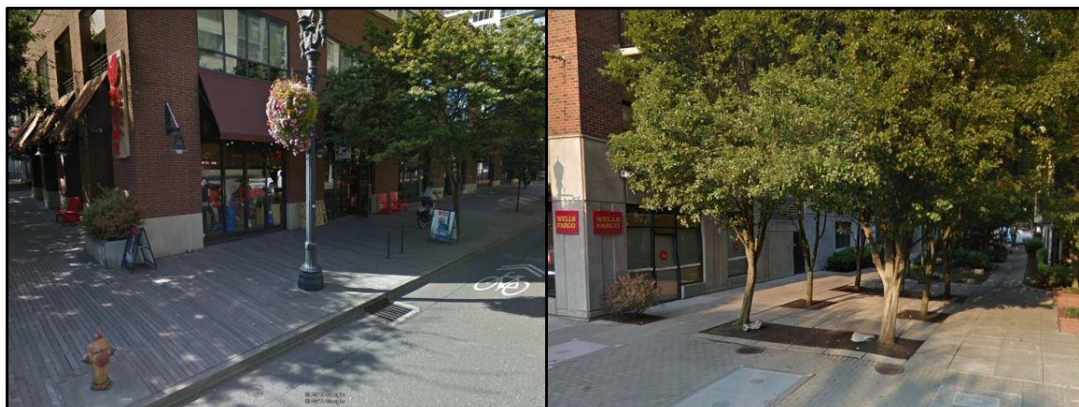
Two different examinations are conducted under the criterion of “Sustainable/Green Buildings and Landscape”. In Green roof/ facade examination, while there are green roof systems in 4 of 19 existing blocks located in Hoyt Yards, there isn’t any building with green roof/ facade in Çukurambar. Therefore, Hoyt Yards Neighborhood meets the criterion, while Çukurambar doesn’t. Another examination is conducted on the existence of certified green buildings that can set an example within the neighborhood. Although there are buildings having the features of green buildings in both of the neighborhoods, there aren’t any certified green buildings. Despite the fact that Hoyt Yards Neighborhood has been deemed worthy for Platinum certificate by LEED- ND certification program, it has got this certificate on the neighborhood scale. It didn’t get any certification specific to the buildings. Therefore, neither of the neighborhoods meet these two criteria.

Any structures are encountered meeting this criterion in both of the neighborhoods in the examinations conducted under the criterion of “Conservation and Adaptive Reuse of Older, Historical and Cultural Structures”. The reason for this is neither of the neighborhoods reserve buildings with historical and cultural value that can be reused (figure 5.3).

Within the scope of “Heat Island Reduction” criterion, asphalts grounds in both of the neighborhoods are calculated. According to these calculations, while the rate of areas without asphalt ground to the overall neighborhood areas is 0,88 in Hoyt Yards, this rate in Çukurambar is 0,81. Existence of streets without sidewalks and inexistence of

implementations such as traffic island/refuge in wide main roads lower this rate in Çukurambar. That there are no open space parking areas and satisfying this need with underground parking areas in Çukurambar Neighborhood is a feature that increases the neighborhood's sustainability performance against heat island effect.

There isn't any implementation under the criterion of "Mitigation of Water Use and Light Pollution" in Çukurambar Neighborhood. In the Hoyt Yards Neighborhood, a 350-meter sidewalk is covered with high water permeability wood (boardwalk) and active green street arrangements are implemented (figure 5.17). Thus, the storm water management system is harvesting 90% of the site's rainwater (Sharifi & Murayama, 2014, 247-248). However, Hoyt Yards has failed to meet the requirements for light pollution by contrast with storm water retention techniques. Sustainable systems were not preferred for the lighting systems in the neighborhood.



*Figure 5.17. Green Stormwater Retention Techniques – Hoyt Yards*<sup>32</sup>

### **Social Development, Economy and Management**

In the examination carries out under the criterion of "Crime Prevention", existence of 3 different buildings in a very poor condition as a result of disuse is detected (figure 5.18). In addition, there are some empty plots in the neighborhood. When examining the plan status of the plots in which these buildings are located, two of these buildings are identified to be located in the areas reserved for public use (area for education and

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<sup>32</sup> Retrieved from: Illustration made by author on on Google Earth visual material

pre-school). This situation shows that not using the areas which have been reserved for public use in their plans, relevant to their purposes can make these areas suitable for crimes. There is sufficient lighting in the by-streets of the neighborhood is such as to increase trust in the street. For these reasons, Çukurambar Neighborhood meet the requirements of crime prevention criterion. In Hoyt Yards there aren't any abandoned buildings. At the same time, although sustainable green techniques haven't been utilized, all the streets have a decent lighting system.



*Figure 5.18. Neglected buildings - Çukurambar*<sup>33</sup>

Examinations are conducted in both of the neighborhoods under the criterion of “Public Awareness, Education and Community Involvement”. There isn't any association in Çukurambar Neighborhood in order to expand awareness in terms of sustainability in the neighborhood or support social cohesion there. In Hoyt Yards, there are two different associations named Hoyt Street Yards Community Association and Pearl District Neighborhood Association.

Within the scope of “Affordable Housing” criterion, there is no sustainable or affordable housing policy in Çukurambar Neighborhood. In the neighborhood, prices of housings with minimum 3 rooms open from ~600.000 TL and rents from ~2.500 TL. It is not possible to mention that rent and purchase prices of the housings located in Çukurambar Neighborhood are affordable in the country where the hunger limit is 2.058 TL and the poverty line is 6.705 TL (Turk-İş Syndicate, August, 2019). In Hoyt

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<sup>33</sup> Source: Personal Archive

Yards, there is an affordable housing policy. In 1994, transformation decision has been made for the neighborhood, a goal of 35%- 55% affordable housing was set, but 28% of the total housings could be put out affordable (Szibbo, 2015, 69). Right to recover property exists to ensure building affordable housing in Pearl District Neighborhood in cases when the city government cannot meet the production objectives. Since Hoyt Yards has affordable Housing policy, it meets this criterion.

Within “Waste Management” criterion, whether 3 different types of wastes, composting, recycling and garbage, are collected with a sustainable method in both of the neighborhoods or not is examined. In Hoyt Yards Neighborhood, a separate policy for waste management aren’t needed. The reason of this is the waste management policy implemented throughout the city by the City of Portland. Within this implementation, collection date and type of the waste and firm doing this is determined one by one. This information is localized and the data is entered in an interactive map. When the inhabitants of the neighborhood click on their building on the map, they can access to all the related information. Detailed information relevant to which waste should be separated according to what and how to keep them is given to the users by informing them about all types of waste. Waste collection process is conducted separately for each of three waste types. Therefore, Hoyt Yards fully meets this criterion. In Çukurambar Neighborhood, there no implementation specific to blocks. Waste collection and recycling is conducted by Çankaya Municipality there. 10 waste collection bins are placed within the neighborhood for this purpose. Yet, only recycling materials are collected in these bins. Composting and garbage waste are collected together and they don’t go through any recycling process. Therefore, the rate of Çukurambar for meeting the criterion is 0,66.

## **CHAPTER 6**

### **CONCLUSION**

The concept of sustainability, first mentioned in Our Common Future Report (The Brundtland Report) in 1987, is one of the most important development agenda items in the world today. Initially, sustainability discussions have primarily revolved around environmental issues and natural resources. Then, the concept has been expanded to different topics such as economy, culture, and social development. The literature shows that cities are one of the major problem areas where sustainable solutions are needed due to the area they occupy and the centrality of over-consumption habits. Therefore, the focus is on cities at the center of environmental and social problems in sustainability. For the research of the urban sustainability, the history and development of sustainability are first examined. Then, scales starting from the building to the globe, which includes neighborhood sustainability as an intermediate scale, are examined. It is seen that planning and design approaches examined in terms of sustainability have content to improve the quality of life by creating self-sufficient, operating and livable environments.

In order to achieve sustainability, it is important to address the issue in a multi-dimensional and multi-scale way. In that sense, neighborhood is a plausible scale to discuss all physical, environmental, social and economic dimensions of sustainability. Policies and practices on neighborhood sustainability are still quite primitive in Turkey, which particularly include newly developed areas. Sustainability of the existing neighborhoods, on the other hand, have not even mentioned. When the size and share of existing neighborhoods within cities are considered along with their possible lifespan, their sustainability should be handled in an urgent way. Existing neighborhoods, particularly the ones built in recent decade, are expected to be inhabited for many years and not likely to be transformed in the near future. A holistic

sustainability approach is needed for defining sustainability-related problems and suggesting improvements for the existing neighborhoods.

The aim of assessing the current sustainability performance of the existing neighborhoods is to reveal their deficiencies and provide the necessary data for the improvement. Therefore, the literature on assessment of neighborhood sustainability performance has been examined. Neighborhood sustainability assessment is handled in different ways in different geographies of the world. After an analysis on sustainability criteria and evaluation methods of different neighborhood assessment tools a hybrid checklist is developed. Additional criteria regarding the local conditions are added, and finally a new checklist is proposed to test neighborhood sustainability.

This checklist is particularly utilized to examine the sustainability of existing neighborhoods in terms of urban planning and design. The neighborhood sustainability assessment tool developed for this research includes 5 main principles and 22 criteria, which can be qualitative or quantitative measures. Benchmarking analysis, a comparative method, is used to provide insight into the sustainability performance of a neighborhood with regard to a better performing neighborhood. Çukurambar neighborhood, which can be considered as a good representative of an existing, recently developed, inner-city neighborhood is selected as the case study. Hoyt Yards (Portland / USA) Neighborhood, which has the superior sustainability performance and is awarded the platinum certificate by LEED-ND, is chosen as the reference benchmark neighborhood. The aim of benchmarking is to identify Çukurambar's sustainability performance in comparison to Hoyt Yard, reveal its sustainability performance with regard to the neighborhood sustainability checklist criteria, and provide insight into possible improvement opportunity areas.

The data is collected through site observations for the Çukurambar Neighborhood. The data obtained from the documents for the Hoyt Yards Neighborhood. Çukurambar and Hoyt Yard data are standardized to find out criteria values in each principle. Finally, the values are compared, and the potentials and the most problematic items are revealed.

Both sites performed good in the overall in “Location Selection and Planning”, particularly in “preferred location”, “compact development”, “mixed-use neighborhood”, and “reduced parking footprint” criteria. There is room for improvements in the share of “public realm” in both neighborhoods. Çukurambar has issues in “plan changes”, unlike Hoyt Yard, which can be considered as a hinder for sustainability in terms of the continuity and the reliability of planning.

One of the most remarkable difference among the principles sets out in the checklist is “transportation and accessibility”. In the comparison, it is found that Çukurambar has a very low sustainability performance under the criteria of “bicycle network” and “safe and walkable street network”. In the accessibility criteria, Çukurambar's performance varies against Hoyt. While access to public transportation and public spaces can be provided in Çukurambar, there are problems with accessibility to the neighborhood center. Apart from these, the facilities for people for diverse abilities that require easy accessibility are very limited in Çukurambar, especially in building entrances, sidewalks and street corners.

When “Harmony with the Natural Environment and Conservation” is considered, both neighborhoods perform in a desired way in terms of topographic slope dimension, whereas neither of the neighborhoods include conservation of ecological value, a wetland or a water body.

Both neighborhoods have some issues in “green buildings, landscape and infrastructure” principle. Unlike Hoyt, Çukurambar does not have any green roof or facade and green stormwater retention technique. Neither of the neighborhoods have a certified green building or a reused/historical building. None of them utilized green lighting technique, as well. Çukurambar performs worse than Hoyt Yard when the share of asphalt grounds is considered.

“Social development, economy and management” is the principle that the Hoyt Yards Neighborhood performs the best. In the Çukurambar Neighborhood; factors such as the existence of abandoned buildings, the lack of neighborhood associations, and the

lack affordable housing policies adversely affect the neighborhood's sustainability performance. Waste management is handled city-wide in Portland, so that Hoyt Yard benefits from that in terms of recycling, garbage collection and composting. Although there are some implementations conducted by local government regarding waste management in terms of recycling and garbage collection in Çukurambar, the neighborhood lacks composting facilities

After all the assessments, the average performance value of Çukurambar Neighborhood is 0.46 / 1.00 and the average performance value of Hoyt Yards Neighborhood is 0.84 / 1.00. These values are found without any weighting on the criteria. The results may be different in a sustainability performance assessment by weighting.

When all these results are evaluated collectively, the issues that need priority improvement in Çukurambar Neighborhood can be listed as follows;

- Plan changes,
- Tree-lined and shaded streets,
- Inviting pedestrian environment,
- Continuous sidewalks,
- Necessary road surface marking for safety and parking,
- Accessibility of sidewalks and residential buildings for people for diverse abilities,
- Green storm retention techniques,
- Existence of abandoned buildings,
- Lack of neighborhood associations,
- Affordable Housing,
- Waste management

The unsustainable situations identified in Çukurambar decrease the quality of life in the neighborhood. The most important of these are lack of safe and walkable street and lack of accessibility of sidewalks and residential for people of diverse abilities.



However, with a correct approach, these problems can be solved both in a very short time and at very low costs. A more sustainable neighborhood can be created with low-cost and applicable regulations such as making the streets tree lined, ensuring the continuity of the sidewalks, making the facades of the shops located on the main streets more inviting, and making the necessary surface marking on the roads. Also stormwater retention techniques can be applied in streets, building gardens or other open spaces.

Partial and small-scale improvements may increase sustainability performances to a certain extent. In order to achieve long-term, overall sustainability urban policies should be developed and a functioning urban management should be introduced to regulate control, monitoring and feedback. Some policies may be beyond the neighborhood scale and necessitates national regulations, such as provision of affordable housing. For instance, affordable housing can be made compulsory at certain rates in new housing projects or local governments can provide affordable housing in certain parts of the city. Moreover, in order to increase sustainability awareness in all neighborhoods, local governments, NGOs, neighborhood associations and other public and private institutions can engage in raising public awareness and public participation on sustainability.

### **Limitations**

A case study is conducted within the thesis and benchmarking analysis is considered as the comparison method. This method is used to critically analyze the sustainability performances of existing neighborhoods from an urban planning and design perspective and to better understand the possibilities of sustainable neighborhood development. However, there is no agreed general system used in the assessment of sustainability including the assessment tools examined within the scope of the thesis. In this study, an assessment system is proposed for the existing neighborhoods. In this respect, it should be noted that the study is on to what extent existing neighborhoods are sustainable. The thesis does not claim to decide whether neighborhoods are

sustainable. In this context, the study is a guide for measuring the sustainability performance of the existing neighborhoods. In this thesis, the sustainability performance of the existing neighborhood is only examined by using determined criteria and simple suggestions is made regarding the improvements that can be made.

### **Contribution to Literature**

Although the studies related to the sustainability assessment on the scale of the neighborhood are limited, no studies have been found to question the sustainability of the existing neighborhoods. Considering the planning and design problems of the existing cities, the necessity to investigate this issue will be better understood. For this reason, it is thought that the study provides an infrastructure for the sustainability improvement of the existing neighborhoods and constitutes a viable model.

In addition, adding Turkey's local conditions to the checklist prepared on the basis of assessment tools shows a different approach from the studies on this subject.

Moreover, benchmarking analysis used for comparison method is a new concept in urban scale. This concept can be used in studies on other urban issues other than sustainability. The use of benchmarking in urban areas is seen as an opportunity to objectively assess the performance of the city and identify areas where improvement is required. The use of benchmarking analysis is expected to facilitate the follow-up of good practices and new strategies at international or national level.

### **Further Research Questions**

The limit of this study is determined as to examine to what extent the newly developed central city neighborhoods are sustainable according to the sustainability criteria. Therefore, all discussions have been made within this limit. In addition to the data obtained from the study, some advanced research may focus on the following questions:

- What are the codes/standards of neighborhood sustainability criteria in practice?

- How should neighborhood sustainability criteria be added to implementation plans in Turkey?
- How do neighborhood sustainability criteria show results in different urban development types in Turkey?

The fact that even neighborhoods made in accordance with the plans are not sustainable causes us to question the current urbanization system; “is it not only neighborhoods that are unsustainable but also is it the legislation itself?” As a result, necessary changes should be made in the urbanization practice of Turkey. The legislation that shapes the cities of the country needs to be rearranged on the basis of sustainability. It should not be forgotten that making a city sustainable through plans and design alone is not enough. Basically, the most important point to ensure sustainability is to prevent wastage by using resources effectively and efficiently. In summary, the most important requirement to achieve sustainability is lifestyle change. There is always hope.



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## APPENDICES

### A. Principles and Criteria of Four Assessment Tools

<b>Governance</b>	
GO- 01	Consultation plan
GO- 02	Consultation and engagement
GO- 03	Design review
GO- 04	Community management of facilities
<b>Social and economic wellbeing</b>	
SE-01	Economic impact
SE-02	Demographic needs and priorities
SE-03	Flood Risk Assessment
SE-04	Noise Pollution
SE-05	Housing Provision
SE-06	Delivery of services, facilities and amenities
SE-07	Public realm
SE-08	Microclimate
SE-09	Utilities
SE-10	Adapting to climate change
SE-11	Green infrastructure
SE-12	Local parking
SE-13	Flood Risk Management
SE-14	Local vernacular
SE-15	Inclusive design
SE-16	Light pollution
SE-17	Training and skills
<b>Resources and Energy</b>	
RE-01	Energy Strategy
RE-02	Existing buildings and infrastructure
RE-03	Water strategy
RE-04	Sustainable buildings
RE-05	Low impact materials
RE-06	Resource efficiency
RE-07	Transport carbon emissions
<b>Land use and ecology</b>	
LE-01	Ecology strategy
LE-02	Land use
LE-03	Water pollution
LE-04	Enhancement of ecological value
LE-05	Landscape
LE-06	Rainwater harvesting
<b>Transport and movement</b>	
TM-01	Transport assessment
TM-02	Safe and appealing streets
TM-03	Cycling network
TM-04	Access to public transport
TM-05	Cycling facilities
TM-06	Public transport facilities

*Figure A.1. BREEAM Communities*

<b>Concerned Categories</b>	
<b>Q<sub>10</sub> Environmental Quality in Urban Development</b>	
<b>Q<sub>101</sub> Natural Environment (microclimates &amp; ecosystems)</b>	
<b>1.1 Consideration and conservation of microclimates in pedestrian space in summer</b>	
	Mitigation of heat island effect with the passage of air
	Mitigation of heat island effect with shading
	Mitigation of heat island effect with green space and open water etc.
	Consideration for the positioning of heat exhaust
<b>1.2 Consideration and conservation of terrain</b>	
	Building layout and shape design that consider existing topographic character
	Conservation of topsoil
	Consideration of soil contamination
<b>1.3 Consideration and conservation of water environment</b>	
	Conservation of water bodies
	Conservation of aquifers
	Consideration of water quality
<b>1.4 Conservation and creation of habitat</b>	
	Grasping the potential of the natural environment
	Conserving natural resources (Conservation or regeneration of natural resources)
	Creating ecosystem networks
	providing a suitable habitat for flora and fauna
<b>1.5 Other consideration for the environment inside the designated area</b>	
	Ensuring good air quality, acoustic and vibration environments
	Improving the wind environment
	Securing sunlight
<b>Q<sub>102</sub> Service functions for the designated area</b>	
<b>2.1 Performance of supply and treatment systems (mains water, sewerage, ...)</b>	
	Reliability of supply and treatment systems
	Flexibility to meet changing demand and technical innovation in supply and treatment systems
<b>2.2 Performance of information systems</b>	
	Reliability of information systems
	Reliability to meet changing demand and technical innovation in information systems
	Usability
<b>2.3 Performance of transportation systems</b>	
	Sufficient capacity of transportation systems
	Securing safety in pedestrian areas etc.
<b>2.4 Disaster and crime prevention performance</b>	
	Understanding the risk from natural hazards 3.0.0.25
	Securing open space as wide area shelter
	Providing proper evacuation routes
	Crime prevention performance (surveillance and territoriality)
<b>2.5 Convenience of daily life</b>	
	Distance to daily-use stores and facilities
	Distance to medical and welfare facilities
	Distance to educational and cultural facilities
<b>2.6 Consideration of universal design</b>	
<b>Q<sub>103</sub> Contribution to the local community (history, culture, scenery and revitalization)</b>	
<b>3.1 Use of local resources</b>	
	Use of local industries, personnel, and skills
	Conservation and use of historical, cultural and natural assets
<b>3.2 Contribution to the formation of social infrastructure</b>	
<b>3.3 Consideration for nurturing a good community</b>	
	Formation of local centers and fostering of vitality and communication
	Creation of various opportunities for public involvement
<b>3.4 Consideration for urban context and scenery</b>	
	Formation of urban context and scenery
	Harmony with surroundings
LR <sub>10</sub>	Load reduction in urban development

Figure A.2. Casbee-UD (1)



<b>LR<sub>UD</sub>1 Environmental impact on microclimates, façade and landscape</b>	
<b>1.1 Reduction of thermal impact on the environment outside the designated area in summer</b>	
	Planning of building group layout and forms to avoid blocking wind
	Consideration for paving materials
	Consideration for building cladding materials
	Consideration for reduction of waste heat
<b>1.2 Mitigation of impact on geological features outside the designated area</b>	
	Prevention of soil contamination
	Reduction of ground subsidence
<b>1.3 Prevention of air pollution affecting outside the designated area 3.4 0.1</b>	
	Source control measures
	Measures concerning means of transport
	Atmospheric purification measures
<b>1.4 Prevention of noise, vibration and odor affecting outside the designated area</b>	
	Reduction of the impact of noise
	Reduction of the impact of vibration
	Reduction of the impact of odor
<b>1.5 Mitigation of wind hazard and sunlight obstruction affecting outside the designated area</b>	
	Mitigation of wind hazard
	Mitigation of sunlight obstruction
<b>1.6 Mitigation of light pollution affecting outside the designated area</b>	
	Mitigation of light pollution from lighting and advertising displays...
	Mitigation of light reflection from building façade & landscape mat.
<b>LR<sub>UD</sub>2 Social infrastructure</b>	
<b>2.1 Reduction of mains water supply (load)</b>	
	Encouragement for the use of stored water
	Water recirculation and use through a miscellaneous water system
<b>2.2 Reduction of rainwater discharge load</b>	
	Mitigation of surface water runoff using permeable paving & percolation trenches
	Mitigation of rainwater outflow using retaining pond and flood control basins
<b>2.3 Reduction of the treatment load from sewage and greywater</b>	
	Load reduction using high-level treatment of sewage and greywater
	Load leveling using water discharge balancing tanks etc.
<b>2.4 Reduction of garbage treatment load</b>	
	Reduction of collection load using centralized-storage facilities
	Installation of facilities to reduce the volume and weight of garbage and employ composting
	Classification, treatment, and disposal of waste
<b>2.5 Consideration for traffic load</b>	
	Reduction of the total traffic
	Efficient traffic assignment on local road network
<b>2.6 Effective energy use for the entire designated area</b>	
	Area network of unused and renewable energy
	Load leveling of electrical power and heat through area network
	Area network of high-efficient energy system
<b>LR<sub>UD</sub>3 Management of the local environment</b>	
<b>3.1 Consideration of global warming</b>	
	Construction and materials, etc.
	Energy
	Transportation
<b>3.2 Environmentally responsible construction management</b>	
	Acquisition of ISO14001 certification
	Reduction of by-products of construction
	Energy-saving activity during construction
	Reduction of construction-related impact affecting outside the designated area
	Selection of materials with consideration of the global environment
	Selection of materials with concern for impact on health
<b>3.3 Regional transportation planning</b>	
	Coordinating with the administrative master plans for transportation system
	Measures for transportation demand management
<b>3.4 Monitoring and management system</b>	
	Monitoring and management system to reduce energy usage inside the designated area
	Monitoring and management system to conserve the surrounding environment of the designated area

Figure A.2. Continued: Casbee-UD (2)

Category	
<b>Energy Related Requirements</b>	
	<b><i>Energy Efficiency</i></b>
<b>GMD 1-1</b>	Energy Efficiency for Infrastructure and Public Amenities
<b>GMD 1-2</b>	On-site Energy Generation
<b>GMD 1-3</b>	Site Planning and Building Orientation
<b>GMD 1-4</b>	Energy Management System
<b>GMD 1-5</b>	Minimise Energy Consumption During Off-Peak Hours
<b>Other Green Requirements</b>	
	<b><i>Water Management</i></b>
<b>GMD 2-1</b>	Water Efficient Fittings for Infrastructure and Public Amenities
<b>GMD 2-2</b>	Stormwater Management
<b>GMD 2-3</b>	Alternative Water Sources
<b>GMD 2-4</b>	Water Efficient Landscaping
<b>GMD 2-5</b>	Water Efficiency Management
	<b><i>Material and Waste Management</i></b>
<b>GMD 3-1</b>	Minimise Cut and Fill in Earthworks
<b>GMD 3-2</b>	Sustainable Construction for Infrastructure and Public Amenities
<b>GMD 3-3</b>	Sustainable Products for Infrastructure and Public Amenities
<b>GMD 3-4</b>	Waste Reduction
<b>GMD 3-5</b>	Waste Management and Segregation
<b>GMD 3-6</b>	Waste Conveyance
<b>GMD 3-7</b>	Waste Reuse and Processing
<b>GMD 3-8</b>	Green and Gracious Builders Scheme Certification
	<b><i>Environmental Planning</i></b>
<b>GMD 4-1</b>	Self Sufficiency and Accessibility Within District
<b>GMD 4-2</b>	Green and Blue Spaces for the Public
<b>GMD 4-3</b>	Microclimate Optimisation
<b>GMD 4-4</b>	Outdoor Thermal Environment
<b>GMD 4-5</b>	Site Selection
<b>GMD 4-6</b>	Conservation and Integration of Existing Structures and Assets
<b>GMD 4-7</b>	Habitat Conservation and Restoration
<b>GMD 4-8</b>	Minimise Site Disturbance
<b>GMD 4-9</b>	Environmental Management System
<b>GMD 4-10</b>	Future Provision and Connections
	<b><i>Green Buildings and Green Transport</i></b>
<b>GMD 5-1</b>	Green Buildings Within District
<b>GMD 5-2</b>	Green Urban Design Guidelines
<b>GMD 5-3</b>	Green Transport Within District
	<b><i>Community and Innovation</i></b>
<b>GMD 6-1</b>	Stakeholder Engagement, Feedback and Evaluation
<b>GMD 6-2</b>	Public Awareness, Education and Community Involvement
<b>GMD 6-3</b>	Green Lease
<b>GMD 6-4</b>	Intelligent Infrastructure
<b>GMD 6-5</b>	Safe Environment
<b>GMD 6-6</b>	Light Pollution Reduction
<b>GMD 6-7</b>	Other Green Features and Innovation

Figure A.3. Green Mark for Districts

Number	Title
<b>Smart Location and Linkage</b>	
Prereq 1	Smart Location
Prereq 2	Imperiled Species and Ecological Communities
Prereq 3	Wetland and Water Body Conservation
Prereq 4	Agricultural Land Conservation
Prereq 5	Floodplain Avoidance
Credit 1	Preferred Locations
Credit 2	Brownfield Redevelopment
Credit 3	Locations with Reduced Automobile Dependence
Credit 4	Bicycle Network and Storage
Credit 5	Housing and Jobs Proximity
Credit 6	Steep Slope Protection
Credit 7	Site Design for Habitat or Wetland and Water Body Conservation
Credit 8	Restoration of Habitat or Wetlands and Water Bodies
Credit 9	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies
<b>Neighborhood Pattern and Design</b>	
Prereq 1	Walkable Streets
Prereq 2	Compact Development
Prereq 3	Connected and Open Community
Credit 1	Walkable Streets
Credit 2	Compact Development
Credit 3	Mixed-Use Neighborhood Centers
Credit 4	Mixed-Income Diverse Communities
Credit 5	Reduced Parking Footprint
Credit 6	Street Network
Credit 7	Transit Facilities
Credit 8	Transportation Demand Management
Credit 9	Access to Civic and Public Spaces
Credit 10	Access to Recreation Facilities
Credit 11	Visitability and Universal Design
Credit 12	Community Outreach and Involvement
Credit 13	Local Food Production
Credit 14	Tree-Lined and Shaded Streets
Credit 15	Neighborhood Schools
<b>Green Infrastructure and Buildings</b>	
Prereq 1	Certified Green Building
Prereq 2	Minimum Building Energy Efficiency
Prereq 3	Minimum Building Water Efficiency
Prereq 4	Construction Activity Pollution Prevention
Credit 1	Certified Green Buildings
Credit 2	Building Energy Efficiency
Credit 3	Building Water Efficiency
Credit 4	Water-Efficient Landscaping
Credit 5	Existing Building Use
Credit 6	Historic Resource Preservation and Adaptive Use
Credit 7	Minimized Site Disturbance in Design and Construction
Credit 8	Stormwater Management
Credit 9	Heat Island Reduction
Credit 10	Solar Orientation
Credit 11	On-Site Renewable Energy Sources
Credit 12	District Heating and Cooling
Credit 13	Infrastructure Energy Efficiency
Credit 14	Wastewater Management
Credit 15	Recycled Content in Infrastructure
Credit 16	Solid Waste Management Infrastructure
Credit 17	Light Pollution Reduction
<b>Innovation and Design Process</b>	
Credit 1	Innovation and Exemplary Performance
Credit 2	LEED Accredited Professional
<b>Regional Priority Credit</b>	
Credit 1	Regional Priority Credit

Figure A.4. LEED-ND