Audit of open space design criteria In Neighborhood Residential Areas Case in Batisehir complex, Istanbul

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Abstract:

The aim of this study is to propose a checklist-based model that can be used to assess the open spaces of residential complexes, based on the example of Batisehir complex in Istanbul. International studies and reference points of view on this topic have been investigated in detail in order to identify criteria that can be used to evaluate this type of urban spaces. The main criteria that are believed to have an impact on the quality of open spaces are; Accessibility (sub-standards: building entrances, Pedestrian Circulatıon and Linkage System , way finding, Vehicular Access and Servıce Areas, Bicycle Paths, parking), open spaces (sub-standards: children's playgrounds, Restıng Area/ Seating Arrangement, sports Fields, Intermediate Fields) and urban furniture (standards Sub: floor covering, seating elements, lighting elements, trashes, signs & symbols and water elements), smart furniture (sub-criteria: smart HD camera, smart path and smart seating elements), safety and landscaping. The checklist that was created was tested in the open areas of the Batı?ehir complex, which is one of the largest residential complexes in Istanbul. The methods used in the study conducted between 2020-2021 were site selection, observation, photography and analysis. As a result of the study, it was decided that the design of open spaces, especially sports stadiums, should pay more attention and allocate more space in the design.

Keywords: Open space, Design criteria, Neighborhood, Residential areas, Batisehir complex

1. INTRODUCTION

Open spaces not only provide a pleasant and natural environment, but also improve the quality of life in urban areas and satisfy basic ecological functions ((Bolund & Hunhammar, 1999; Jensen , Guldager, person, Reeh, & Nilsson, 2000; Jim & Chen, 2008) In addition, much of the literature has reported that the appearance of the park has had significant effects on its neighboring residential areas ((Espey & Owusu-Edusei, 2001; GLA , 2003; Jim & Chen , 2010).

Many studies have emerged that focus on open spaces in residential areas and complexes, but most of them focused on the impact of these spaces on social interaction or user satisfaction without focusing on the design itself and design standards and trying to modernize them. Accessibility, open spaces, urban furniture, safety, and landscaping are the main considerations for outdoor spaces in residential areas quality.

Accessibility can be considered as the part that includes the necessary activities. The necessary activity is the involuntary activities such as working, studying, shopping, waiting, etc. In other words, people more or less carry out this activity, which is a part of daily life, and activities (Jienan, 2009) . Since this activity is mainly related to walking and movement, the road, walkways, entrances, stairways etc. becomes an essential element in relation to the necessary activities in the space. This criterion can be considered in design as a basis for other standards. Mobility and movement in all its forms within the residential complexes are arteries that feed open spaces and work to change the landscape and orientation towards different attractions in the design through a change in level or a change in direction. There is a strong relationship between spatial composition, accessibility and social interactions (Ferguson, 2007).

The criteria for accessibility in the external spaces of residential complexes have been divided into building entrances, pedestrian cırculatıon and lınkage system, legıbılıty, way

finding, vehıcular access, and servıce areas, Bıcycle Paths, parking (Lynch, 1960; kansoy, 1988; Özkan & Küçükerba, 1995; T.S.E, 1997; Kurtulu, 1997; Neufert, 1998; Suba, 2000; Sayan, 2002; Jienan, 2009).

Open spaces are the vital part of outdoor spaces, in other words, they are places that include community activities. Community activity refers to the various activities in public places where people tend to interact. They include greeting, talking, children's games, recreational and sports activities, etc. (Jienan, 2009). If these spaces are comfortable and enjoyable, then people want to play, relax, stroll and be in the same place more. Naturally, it brings more diverse social activities, increases communication with residents, and creates an active atmosphere in the residential area, that is, an optimal use of spaces. These spaces are divided into children's playgrounds divided by ages (3-6), (7-12) and (13-17).) and various sports arenas according to different sports, rest areas and median squares (Seyhan, 1991; Ak it, 1994; Kurtulu, 1997; Ozkan, 2001; Lestan, Eržen, & Golobi, 2014; Open Space Provision within New Residential Developments, 2015; Bonenberg, 2015; Salih & Ismai, 2017).

Urban furniture is a very important part in the design of outdoor spaces, as it is not only a piece of furniture, but also rich in expressions, attracting people's attention and interest easily (Jienan, 2009) . It can be one of the focal points in space in addition to the focused expression of the spirit of the place and through it the identity of the place can be expressed. Urban furniture has very wide ranges. The design criteria for floor covering, sitting elements, trashes, lighting elements, signs, symbols and water elements have been shown in this study (Harris & Dines, 1988; Booth, 1989; CCPT, 1990; Moughtin, 1992; Verhe, 1995; Stoneham & Thoday, 1996; T.S.E, 1997; Edward, 2019).

Smart cities are international projects and trends that have become frequently mentioned in recent years, so there must be smart housing complexes (not only smart homes, but also outdoor spaces), because the development of technology must be reflected in this field. *Smart urban furniture* is the next generation of furniture urban furniture, which has become available in the streets of some cities, but is not available in abundance in residential complexes. In this study, smart urban furniture was addressed, such as a smart high-resolution camera, smart path and smart seating elements (Hassanein, 2017; Ciaramella, et al., 2018).

Safety is an important criterion within the design criteria for open spaces in residential complexes, as it is considered a priority for the residents, as people will not be satisfied with life if security is not guaranteed and safety is threatened, therefore safety awareness is a crucial aspect in achieving environmental quality. Environmental quality is an important indicator for the study of livability as it has a direct impact on human activities and opportunities by creating a healthy physical and social environment (Bigio & Dahiya, 2004). Urban safety is one of the most influential factors in evaluating residential complexes. In this study, the design standards that achieve safety and modern technology that are adopted to achieve safety were addressed. (Giap, Thye, & Aw, 2014; Saitluanga, 2014; Kashef, 2016; Edward, 2019 ; Thanoon & Haykal , 2021).

Residential green spaces that not only constitute the main outdoor activity space for residents, but also the most widely distributed space with the highest rates of use in the urban green system. No element can replace it and without it the design loses its elegance and aesthetics. Green is often found as edges of the age, a natural barrier that gives privacy, green yards part of the site, etc. in residential areas. Although these green elements are separated, they still preserve the ecology of the space as a whole. It plays a positive role in the regulation of psychology and spiritual relaxation. The microclimate can also be modified to some extent. In this study, the crops, their cultivation, types and care were discussed (PAMAY, 1971; Çalı, 2001; Jienan, 2009; Lestan, Eržen, & Golobi, 2014; Bonenberg, 2015; Edward, 2019 ; Yang, Zhang, & Shi, 2019).

In this study, the design criteria were divided into five main sections. The criteria of these sections were separated in a table that was verified by testing it in the study and analysis of a residential complex considered newly established in Istanbul. The aim of the study is to establish open space

Figure 2. the neighborhoods of the study area

design standards for collective housing environments through analysis and study (Batissehir Project) based on research previously conducted internationally. Accordingly, five main factors were analyzed: accessibility, open spaces, urban furniture, safety, and landscaping.

MATERIALS AND METHODS

In order to achieve the aim of the study which is establishing modern design standards for open areas of residential complexes that are more in line with contemporary requirements in this study, the research objectives are as follows:

Objective of the Study

- Study and review international research and studies to know the standards for designing open spaces and its sections
- Analysis of the open spaces of the Batisehir complex with reference to the five main criteria that were identified by reference to references and studies
- Create a criteria checklist outlining design criteria for open areas and their impacts

Study Area

During the selection of the study area, the preference was made between residential complexes with large outdoor areas in different points of Istanbul province. Batisehir complex is located in Bagcilar district, Istanbul Valley complex in Sariyer, Istanbul halls complex in Kucukcekmece district. The main reason why Batı?ehir complex is preferred as a study area is the large size of its open spaces and its ability to meet the above criteria.

Batı?ehir Complex is located in Bagcilar, Istanbul, Turkey. It is a complex of 1148 apartments and can accommodate 15,000 people. With an area of 818,000 square meters. The green area covers 100,000 square meters.

There is a direct access from the TEM and Ba?ak?ehir North Marmara connection road in Batı?ehir, which is located at the intersection of the TEM Highway and Vatan Street. As well as direct access from E-5 for vehicle owners.

Figure 3. the map of the roads leading to the site

Data collection

In this study, a checklist was prepared by taking previously conducted international literature studies as a guide. The current state of (Batı?ehir complex) was later identified as a research area, and examined over a period of approximately one year between 2020-2021 using in-situ analysis and monitoring methods along with images and measurements.

RESEARCH RESULTS

More attention has been paid to the design and construction of apartment complexes in the recent period in Turkey. The tendency of people to live in these complexes has increased to provide a suitable and pleasant environment for their families, because the environment of these complexes has a very close relationship with human life. Meanwhile, it has a positive effect on the whole city. Therefore, creating a suitable living environment becomes a common goal. As the residential area is not only a place to live in, but also a place to practice activities for the residents, and the quality of the open areas in it contribute to creating a healthy community. Therefore, it is the responsibility of open space designers to strive to meet the needs of people, both physical and spiritual, in a contemporary way with the changes that are constantly taking place. This design should be based on correct and up-to-date information, so there is a need for study, information collection and analysis.

The study area was monitored and analyzed, measurements and pictures of the site were taken, then the observations were recorded according to the basic design criteria that were developed based on references and research. These pictures and notes of the study area are presented in tabular form below.

Table 2. Accessibility in Batisehir complex Assessment

	Good	*Average*	*Bad*
Building Enterances			
Use of hard materials on the floor	✓		
Adapting the entrances to the buildings for people with special needs	✓		
Non-slippery floor	✓		
Night lighting quality and suitability for people with special needs	✓		
The width of the entrance is not less than 915 mm	✓		
Isolated building entrances from vehicle entrances	✓		
Pedestrian Circulation and Linkage System			
Pedestrian paths are at least 4m away from residences	✓		
Distinction from vehicle roads	✓		
Safe for the elderly and people with special needs	✓		
Avoiding steep and sharp corners	✓		
Max. 8.33% slope		✓	
Min. 1.5m stair width	✓		
Having a vehicle road or parking lot exit from the main pedestrian axes	✓		
Orientation to visual attractions by changing scenery and level of vision	✓		
The presence of slopes next to the stairs	✓		
Easy access to the destination	✓		
Encouraging residents to walk	✓		
Legibility and Wayfinding			
The presence of landmarks, landscapes, or markings that can aid orientation	✓		
Direction signs readable over 20m		✓	
The presence of texture differences on the handrail wall and floor	✓		
Presence of at least 1 main transportation axis	✓		
Predictable road designs	✓		

Vehicular Access and Service Areas			
The presence of a service entrance in the buildings	✓		
Isolated from pedestrian and bicycle traffic	✓		
Taking measures to slow down traffic (landscape, lighting, paving changes)	✓		
Limitation of long corridors along roads	✓		
Limiting speed by bumps, sharp bends and narrow roads	✓		
Sufficient lighting so that speed reducing elements can be seen at night	✓		
Lighting pole height 3.5m	✓		
A lighting pole placement at 25m		✓	
The doors are not open on the road between the house and the street	✓		
Separation of roads to parks and playgrounds	✓		
Separation of playground equipment areas by bollards, fences or chains	✓		
Avoid entrances close to bends and hills	✓		
Parking spaces are not dominant over outdoor spaces	✓		
Presence of precautionary arrangements for insulation	✓		
20% separation for service vehicles and motorcycles		✓	
The presence of parking spaces for service cars			✓
Bicycle Paths			
Separation of pedestrian and bicycle paths		✓	
Separation of vehicles movement	✓		
The track width is not less than 1.8 m			✓
Parking			
Parking distance from homes is a max. of 50 m	✓		
Choosing a place isolated from open spaces	✓		
Allocation of 12.5 m for the car and its movement	✓		
Use of dense trees or low walls in parking lots for security	✓		

Table 2. Open Spaces in Batisehir complex Assessment

	Good	*Average*	*Bad*
Open Spaces			
Good use of open spaces (use and access to sunlight)	✓		
Multiple common areas for different activities of different users	✓		
Water sensitive design	✓		
Presence of visitor parking spaces that can be used for children's games			✓
Natural surveillance presence	✓		
Presence of the roof garden	✓		
Changed width at driveway entry slowing vehicles entering the site	✓		
Presence of open viewing areas for perception of security	✓		
Playgrounds			
Choosing a place away from the road and parking lots	✓		
The opportunity to monitor and protect young children aged 3-6	✓		
Use of rubber material on the floor (to prevent injury to children)	✓		
Separation of playgrounds according to age groups	✓		
7-12 years old children's playgrounds from the residences max. 300m distance	✓		
Providing enough space of 1-2m^2 for 7-12 years old children	✓		
Associating playgrounds and dwellings with an indirect relationship for the 13-17 age group	✓		
Providing enough space of 3-4m^2 for 13-17 year old children		✓	
Resting Area			
Presence of passive resting areas such as sitting, resting and watching	✓		
Per person min. Area not less than 2.7m^2	✓		
Service for all age groups	✓		
Roof cover for sun, shade and rain protection	✓		
Sport Filds			
5m^2 area per person (3m^2 of which is grass)			✓
2m^2 area per person for training			✓
Stadiums and residences max. 1000 - 1500 m	✓		
Football field 70 * 105 m	✓		
Basketball court 15 * 28 m	✓		
Volleyball court 9 * 18 m	✓		
Tennis court 23.8 * 23.77 m	✓		
Intermidiate Fields			
Presence of courtyards and common spaces between buildings	✓		

Accessibility

The entrances to the buildings are at the same level as the corridors and covered with anti-slip material, while the doors are made of transparent glass with a gray stripe to distinguish them for the visually impaired. The doors open automatically, which means they are suitable for users of rotating chairs and strollers. The entrances lack a Bariel line for the blind. Pedestrian roads are completely isolated from car parks and their channels, so that all lanes are designated for pedestrians within the open spaces. The pathways are not the same and do not cause loss for people with poor memory and children. The routes are constantly directed to different attractions and increased interest, and the change of level plays the largest role in this. Movement, parking and service cars are isolated from the exterior design of the complex, as the complex is surrounded by a service street that secures the service to the complex, where service cars and school delivery cars provide service and delivery through it. Do not enter the complex. All gates, entrances and exits of the residents' car parks are connected to this street. This street is called Batisehir Street. For bicycles, one lane surrounds the sports field, 1 m wide. The car parks are completely isolated from the open spaces of the complex and linked to them by stairs covered with transparent plastic cabins distributed in different places in the open spaces (Table 2).

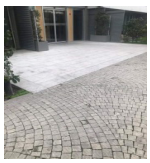
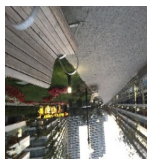
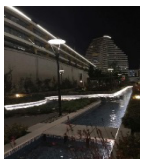
Open Spaces

Children's playgrounds are far from the street and isolated from the movement of cars. Children's playgrounds are classified according to ages and their distribution in the complex follows this classification. Children's playgrounds for this category are divided into 4 places in order to be close to all buildings. They are mostly surrounded by wooden fences and sometimes surrounded by plants. The floors of these playgrounds are made of shock-absorbing rubber. Children's playgrounds for this category are distributed over 4 different areas of the complex to be close to all buildings. Children's playgrounds of this category are centralized and grouped in one place in the middle of the open spaces of the complex. Seating areas are distributed in various places in the complex, often located near children's toys and water elements. Seating is partially shaded. Sports fields are located in the middle of the open spaces. The running tracks are distributed over 3 different regions. There are stationary sports near the games for children from 3 to 6 years old. In this complex, the intermediate fields are not clearly visible, because the design of the buildings is circumferential, but these spaces are located between some of the buildings.

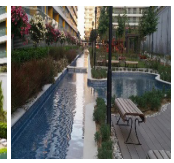
Street Furniture

The floors are covered with coarse and smooth stones. It is used rough for driveways and slopes and smooth (non-slippery) for building entrances and stairs. Children's toys, jogging tracks and some rest areas are covered with shock-absorbent materials as mentioned above. The main material it is made of is wood. The iron legs are not slippery and matte at a height of 45 cm from the ground. Most of them are equipped with side and back struts, and some without struts. Some places are shaded with pergolas in order to provide relative protection from the weather conditions. Light poles are regularly scattered on the walkways, and solar lights have been installed in the gardens. The sports fields are brightly lit, while the seating areas are dimly lit. Trash cans are often located near the benches and are spaced approximately evenly in the aisles, installed at a height of 50 cm from the floor. The signs in the open spaces are mostly indicative. They are installed at a readable medium distance. The letters are engraved in black, the warning signs are few and are installed on the ground mostly. This complex contains two types of elements of stagnant and moving water. The complex contains 3 swimming pools distributed in different places, each pool has its own facilities. distributed the moving water elements in the interior spaces are abundant and take different forms. The complex does not contain any type of smart furniture (Table 3).

Table 3. Street Furniture in Batisehir complex Assessment





	Good	*Average*	*Bad*
Floor Covering			
Non-slippery material	✓		
Enable seeing the boundaries of the earth	✓		
The materials used for coating secondary road surfaces are different from each other	✓		
The visually impaired areas are made up of three different materials		✓	
The difference in the color of the surfaces to facilitate the detection of the road for the visually impaired	✓		
Surface coating with neoprene	✓		
Sitting Place			
The seating seats are made of non-slip and glossy materials	✓		
Choosing the right place for seating	✓		
For wheelchairs to dock next to the seating, min. 90cm place	✓		
Seat height 45 - 50 cm	✓		
The presence of side supports for the seats		✓	
Seating seats protected by umbrellas or roofs	✓		
The presence of guide signs to indicate the transition from the walking area to the seating area	✓		
The presence of litter boxes near the seating seats	✓		
Lıghtıng Elements			
Provide a guide line of lighting for the elderly and the disabled	✓		
Accuracy in choosing lighting elements to suit people with special needs and the elderly	✓		
The presence of lighting along the road and at obstacles	✓		
Lighting installlation according to the type of activities and the movement intensity in each area	✓		
The presence of dim lighting in some places	✓		
The presence of intense lighting at road intersections	✓		
Trashs			
Trash bins do not intersect with the movement path	✓		
Installed at a maximum height of 90 cm	✓		
The possibility of using trash cans with one hand by the disabled	✓		
Litter boxes are circular in design and do not have sharp edges	✓		

Signs and Symbols			
Information is clear and easy to read	✓		
It can be read by all people, including the visually impaired		✓	
The ability to distinguish upper and lowercase letters		✓	
Using colors as semantic symbols in panels	✓		
The letters are embossed, not printed	✓		
The presence of tactile reading panels for the blind			✓
The presence of audio notifications in some places for the purpose of warning the blind			✓
Panels are at eye level	✓		
Signs and symbols are everywhere	✓		
Water Elements			
Stagnant Water Elements			
Swımıng Pools			
Compatible with the exterior design	✓		
It stands out in space and is easily perceived	✓		
Attractive element	✓		
It occupies a central position and forms an important part of the exterior design decoration	✓		
The number and size of swimming pools correspond to the population of the complex	✓		
Moving Water Elements			
It has a positive effect on the perception of the place	✓		
Exploitation of natural factors in the movement of water	✓		
Distributed in the exterior design in harmony with the green spaces and other activities in the place	✓		
Smart Urban Furniture			
Smart HD Camera			
The presence of a smart camera			✓
The presence of warning systems against penetration			✓
The presence of surveillance cameras	✓		
Smart Path			
Having a smart path			✓
Smart Seating Elements			✓

Safety

As already mentioned, there is isolation between pedestrian and vehicular traffic, the lack of parking spaces in the open spaces of the complex, due to the impossibility of their entry. The activities in the interior design were distributed to different places in the complex in the form of focal points to facilitate observation. The complex has 10 pedestrian gates, each entrance is equipped with a guard room and surveillance with cameras, The gates are opened through a device to identify the population cards of the complex. As for the car parks, they are monitored by cameras, guard rooms, and the entrances to the parking lots are equipped with a system to identify the car regulations for residents (non-residents are not allowed to enter the parking lots) (Table 4).

Landscape

10 thousand species of plants were planted in the outer spaces of the complex (Egeyapı, 2021). These plants are automatically watered every morning by sprinklers in the summer (Table 4).

DISCUSSION

According to the above table, accessibility, open spaces, urban furniture, smart urban furniture, safety and landscaping were determined for the study.

The site generally lacks a Bariel line for the blind and that some slopes are more than 8.33%, and this poses a danger to wheelchair and pram users. Direction signals cannot be read from a distance, which presents an obstacle for blind people to find their way. As for the lighting poles, they are not within the required distance, especially on the service street.

As for the service street surrounding the complex, it is necessary to commend the design solution that provided complete isolation between vehicular traffic and pedestrians within the open spaces, but this street is considered narrow and crowded due to the services it provides to the entire complex as it lacks serviced parking spaces.

The bike path is narrow and short and not commensurate with the size and density of the population of the complex but it should not be overlooked that the open spaces do not penetrate the streets and do not have car parking, so all the paths in the complex are for pedestrians, bicycles, buggies, wheelchairs and skating.

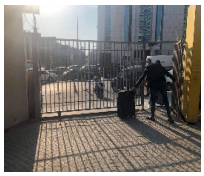
Most of the design criteria were taken into account when designing children's playgrounds for the age group 3-6 and 7-12 years old, but children's playgrounds for the age group 13-18 years are considered insufficient compared to the population density. From the complex, and because these playgrounds are commonly used by adults as well, they are insufficient as playgrounds for children of this age group, sports fields for adults and the same for training areas.

The floors are fine and as per specifications, but gray is the only color approved for floors, driveways, stairs, and ramps, so the visually impaired may not recognize it. As for seating, there are some seats that do not have armrests. These seats are not comfortable. As for the lighting elements, it should be noted that the outdoor spaces are well lit. Crowded areas such as playgrounds and cafe area are well lit and relaxation areas are dark and quiet. Sign boards and symbols are distributed in the complex, but they cannot be read from a distance and letters cannot be distinguished by the blind, and some warning boards are also installed on the floor, making them difficult to notice. Water elements have been widely adopted in the exterior spaces of the complex. They are abundant and add aesthetics to the place. It must be noted that the complex is devoid of any kind of smart urban furniture, and this is disappointing.

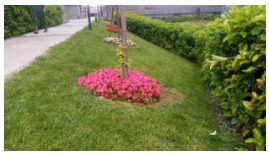
The security standards in the complex are good, the entrances and exits of the complex are controlled from entering outsiders, and the outside spaces of the complex are monitored with cameras throughout the day. However, night activities cannot be confined to one place due to the large area of the complex.

The plants vary in the external spaces of the complex, and different types of trees and plants have been planted, which add beauty to the place and do not require much watering and are not seasonal. However, through a simple tour of the site, it is noted that some areas need maintenance and attention. Plantings do not provide privacy, especially for houses on the ground floor that have their own gardens fenced with plants, and the administration of the complex does not encourage the residents to plant.

Table 4. Safety and Landscape in Batisehir complex Assessment



Safety	*Good*	*Average*	*Bad*
The residential complex is surrounded by a wall	✓		
Exterior fence design carefully to allow permeability without strangers entering	✓		
The presence of clear and specific portals	✓		
Equipping the gates with population identification systems through project-specific cards	✓		
The gates are equipped with cameras on each side. These cameras are linked to the monitoring room	✓		
In each gate, a room or cabin must be provided for the guards so that the gates are guarded throughout the day	✓		
Use implants that not aid penetration, such as spiked or vision-blocking implants	✓		
Centralized night activities for easy monitoring and supervision		✓	
Keep the street away from the project and not penetrate it	✓		
Separation of car and vehicle traffic from pedestrian traffic	✓		
Separation of car parks and their isolation from pedestrian traffic, whether by a wall or by plants	✓		
Equipping the entrances to the buildings with identification devices for the residents of the complex	✓		
Providing car park entrances with a plate recognition system for residents' cars	✓		

Landscape	*Good*	*Average*	*Bad*
Selecting plants appropriate to the local setting and which will survive well under local and particularly subtropical/tropical conditions	✓		
Considering watering requirements	✓		
Considering maintenance requirements		✓	
Considering height and privacy versus surveillance		✓	
Providing landscaping that recognises seasonal and diurnal differences (e.g., diversity throughout the year, flowering plants at different seasons)	✓		
Encouraging resident participation in on-site gardening and maintenance where feasible			✓
Recognising that thorny shrubs have their uses in deterring entry but may be impractical around play areas and attract litter	✓		

CONCLUSION

The criteria tested in the study area indicate that the open areas of the complex scored well in most of the criteria, but there are deficiencies in other criteria that had to be taken into account in the design.

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