An Investigation of Urban Equipment Design in the Historical Environment based on Hagia Sophia - Sultan Ahmed Square Example

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Abstract
Historical environment requires a respectful act of conservation with a view to sustain cultural heritage. The increasing trend of continuous change in cities is associated with emergent requirements in physical, economic, and socio-cultural fields. There is an ongoing quest for solutions in the fields of architecture and urban planning aimed to accommodate the ever-changing conditions. Nevertheless, despite the projects at city and building scale, the same are uncontrolled or inadequate at the detail scale. Therefore, approaches adopted in the industrial product design level may fall outside the scope of the conservation project in historical environments. The use of urban furniture is required in the public squares in historical environments. However, these products may be in disharmony with their historical environment and have an appearance that harms the urban culture. In case negligent installation techniques are used for the equipment element, this may lead to destruction of the historical environment and hinder the sustainability of cultural values. The “urban equipment element” term was adopted for the general definition of the objects, products, elements, equipment, units, and modules investigated within the scope of the study. The present article aimed to investigate the criteria that could ensure that urban equipment elements were in harmony with the historical environment and help with conserving cultural heritage. The design and classification criteria of urban equipment elements were investigated within the framework of the integrity and harmony of the historical city. For the purposes of the field study, the criteria associated with the functional type, user type, assembly technique, duration of use, infrastructure use along with visual relationship (form-color-tissue-material) in interaction with historical environment, and experiential relationship with environment in the scope of the historical vicinity of Hagia Sophia and Sultan Ahmed Square were analyzed. It was concluded as a result of the that urban equipment elements in historical environments should be designed in an original appearance in harmony with cultural heritage in relation to each other; thus, cultural sharing and transfer might also benefit from experiential relationship with the historical environment; and furthermore, combining multiple functions in urban equipment elements would eliminate visual chaos in the historical environment, contributing to visual harmony.

Keywords
historic environment; urban equipment elements; industrial product design; harmony criteria

1. Introduction

Cities gradually expand around the central location, where they were first established, throughout the historical process. The area of the first settlement is generally the historical environment. The definition for the historical environment as prescribed in the Venice Bylaws included monuments, architectural works, and works of all scale in urban areas and rural settlements, which are witnesses of history, (Venice, 1964, ICOMOS, 2011, p.2). The physical and social structures of the cities, which shape their cultural history, constantly change as the city expands around the central location of their settlement (Topal, 2004, p.277). Each city consists of districts that reflect different value systems, lifestyles, and cultures (Rapaport, 1977). Although the historical environment is particularly separated from the other parts of the city, it is equally affected by

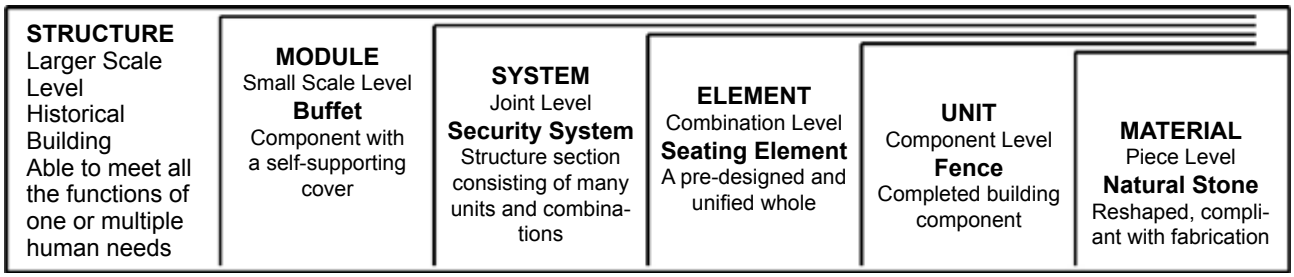

Figure 1. Developed by the authors with a reference to the Sweet's Production Matrix (McGraw Hill Information System Company, Sweet's Production Matrix 1971; Özkan, 1976:130).

the changes inflicted to the city as a whole. The city-wide requirements also extend to the historical environment and the renewed form directs the space designs. Those changes have also affected the appearance, silhouette, and identity of cities beyond architectural design (Hasol, 2011, p.2). Urban change is important for the conservation of historical fabric and the sustainability of cultural heritage in historical environments with architectural, archaeological, and monumental values (ICOMOS, 1987, p.2). The idea of preserving historical environments is generally accepted throughout the world, and despite the fact that governing laws and rules are in place, those laws are not sufficiently internalized and implemented.

International non-governmental organizations, including (UNESCO) and (ICOMOS), made suggestions with regard to conserving the historical environment. Nevertheless, the design criteria for the urban equipment intended for open areas often fail to consider harmony with and sensitivity to the historical environment and cultural heritage assets. This adversely affects the general appearance of the historical environment due to the dense installation of urban equipment elements. The expansion of cities throughout history and population increase are associated with intensive use of urban open spaces. New requirements have emerged upon aforementioned changes and developments in urban life. Urban furniture/equipment elements with multiple functions are introduced to accommodate the emergent requirements in the urban setting. Urban furniture/equipment can be defined as stationary equipment and fittings installed in the open areas of the city to serve a number of functions intended for all the urban users (Akyol, 2006; Moughtin, Oc, Tiesdell, 1999, p.127). Today, those elements are a part of city with functional, social, and cultural significance for the urban life, and they are also necessary for historical environments with a view to facilitate social interaction between urban residents (Mantho, 2014, p.80; Peris-Ortiz, Álvarez-García, Rueda-Armengot, 2015, p.118). The said equipment is developed through industrial product design process to meet urban needs, and also referred to as city/urban furniture, landscape elements, street furniture, and city accessories among others. Furthermore, the equipment consists of objects from diverse categories of functions and uses, including lighting elements, outdoor furniture, infrastructure connection units, air conditioning equipment, separator systems, and floorings etc. In the present article, Sweet's Production matrix was used to combine those diverse categories under a single definition.

On the grounds that the majority of urban reinforcements (furniture, products, objects, items, modules, equipment and units) belonged to the combined category of elements, the "**Urban Equipment Elements**" term was used for the purposes of the study. Urban equipment elements are visual elements in relation to the culture and identity of the city and therefore the historical environment, in which they are located (Bayraktar, et al., 2008; Great Britain Department of the Environment, Transport and the Regions, 2000; Soares, 2016, p.420). Several classifications based on different aspects are available, which aim to better analyze urban equipment elements. Those classifications fall under four general titles of purpose, space, technical capability, and mobility (Aksu, 1998). Function is the main

determinative factor of the urban equipment element form. The function as Schürer and Gros used in their diagrams primarily consists of four components: social, individual, product, and environmental (Jaspersen, 1986). The environmental function includes the criterion of being in harmony with the historical environment.

Urban equipment elements are also used for different/multiple purposes in the urban setting. For example, lighting elements (path-area lighting) are also used for protection purposes. A variety of urban equipment includes but not limited to information boards (Billboards, clocks), points of shelter/accommodation; seating units for recreational purposes (benches, chairs, group seating elements); street signage for directional purposes; and kiosks (Vending Machines) for shopping purposes. Other purpose-oriented applications include the urban equipment placed for entertainment and game purposes (playgrounds and sports equipment), decoration purposes (pots, pools), cleaning purposes (garbage cans, ashtrays), communication purposes (telephone booths, mailboxes), and limiting purposes (Durmuş, 2008, p.11; Larice, Macdonald, 2013; Satiroglu, E., 2016; Ertaş, 2017). Therefore, urban equipment is defined on the basis of various types of functions. The urban equipment elements in widespread use in the public sphere by their functions include the following:

Flooring elements: flooring, covers, grids, natural and artificial stones or in situ produced floorings, special ramps, boundary stones, tree root concealers etc.
Seating units: benches, chairs, group seating elements etc.
Lighting elements: road lighting equipment, area lighting equipment.
Signposts and information signs: locators, advertising and information boards etc.
Limiting elements: deterrents, barriers, pedestrian-traffic barriers, limiters surrounding flower beds.
Water elements: decorative pools, fountains, pumps, canals, and fire hydrants etc.
Top cover elements: stations, shades, pergolas etc.
Sales units: kiosks, exhibition pavilions, kiosks, ticket vending machines etc.
Artistic cultural objects: sculptures, artistic and historical elements etc.
Cleaning elements: bins, public toilets.
Stations/waiting elements: public transportation stops, parking meters, bicycle parking lots etc.
Landscape elements: flora areas consisting of greeneries, planting, flower groups etc.

There are relevant classifications by different authors (Bulut, Yeğli, 2008; Derek Lovejoy Partnership, 1997, p.409; Kuşkun, Yılmaz, 2003; Kuter, Zeynep, 2019; Rubenstein, 1992, p.57; Şatir, Korkmaz, 2005; Yıldızcı, 2001, p.29;). It cannot be suggested that the urban equipment elements used in historical environments feature distinctive characteristics compared to other examples across the city in terms of required functions.

It is well-established that the urban equipment elements in the historical environment are utilized basically by three distinctive user categories. The first, i.e., the local user category, includes the residents of the relevant neighborhood and city and mostly the commercial business owners (tradesmen). The second user category includes the temporary users from other districts of the city, who make use of the area in question for transit purposes due to the fact that the said area is an urban hub. In addition, the temporary user category also includes the tourists visiting the historical environment, contribute to a multi-layered (heterogeneous) social construct therein. The employees constitute the third user type associated with urban equipment elements in the historical environment.

Urban equipment elements are classified into four main groups by the duration of use. First of all, the permanent use is that the city residents attend to certain foci in the outdoor space for certain periods of time. The aforementioned uses usually range from shopping activities to sitting, resting, and waiting. The second use is that the residents use the area while passing by on occasion. The transportation activities may be considered in the scope of the said use. The third use, or the functional use, is aimed to accommodate the outdoor needs of the residents. Accordingly, it is possible to refer to individual and social needs of the people living in the city. Public elements can perform multiple functions to meet a variety of multi-user purposes. Finally, there are auxiliary functional and aesthetic uses, including organization, maintenance, and security, which facilitate

the three groups of uses above (Asatekin, 2001, p.58-59; Bayraktar et al., 2008; Kuter, Erdoğan, 2009).

A similar classification can be applied for the duration of use of urban equipment elements inside the historical environment. Cities can be defined as a system of parts fed on the whole. Therefore, it is possible to classify urban equipment elements by the use of urban infrastructure. The infrastructure-dependent urban equipment elements include road and area lighting accessories, traffic lights, illuminated columns, square clocks, ticket vending machines, parking meters, infrastructure facility maintenance covers, grills, fountains, sales units, telephone booths, and bus stops among others. Whereas, the urban equipment elements, which do not rely on infrastructure, include temporary traffic lights, traffic signs, street signs, pedestrian barriers, canopies/shades, flagpoles/pikes, flower beds, routers, locators, deterrents, limiters, flooring elements, trash bins, seating elements, advertising-poster panels, and playground elements among others (Doğan, Erhan, Toka, Uysal, 1986).

'How a large city is formed' is a frequently visited question in the scope of urban sciences. Urban morphology is shaped by economic and social dynamics and technology as reflected in the production of urban space. In this case, a classification of urban equipment elements can be suggested based on materials and production methods. For the purposes of urban equipment elements, materials, which are resistant to environmental conditions (relative humidity, corrosion, climate, air flow, precipitation) and vandalism, which require minor maintenance, which are cost-effective and easy to produce, are preferred (Mainier et al., 2013; Ghorab, Caymaz, 2015). Urban equipment elements as elevated structures vary by building materials and components used in the floor. All urban reinforcements, except for a small number of species that are applied in situ, are mass produced in a factory setting and then installed in places as deemed appropriate. Factory productions vary by the selected material. Urban equipment elements are mass produced using natural stone, marble, granite, concrete, cast iron, stainless steel, cast aluminum, wood, and plastic injection only or with a combination of materials, including concrete-metal-wood, metal-wood, metal-glass, and plastic-metal (Main, Hannah, 2010, p.207-225; Şatir, Korkmaz, 2005). While natural materials, stones, glass, and metal are approved in historical places, the use of plastic in such places should be prohibited (Şatıroğlu, 2016, p.698). Albeit rare, materials in harmony with the historical fabric, are also used in the urban equipment elements in the historical environments. However, in case the design and production of urban equipment elements are independent of each other and of the fabric of historical environment they are intended for, this may create a harmony problem.

Mostly the in situ applied or fixed (stationary) assembly technique is used for the urban equipment elements (American Planning Association, 2006, p.292). However, there are also semi-mobile and mobile applications (Aksu, 1998). The quality of workmanship is of great importance during the in-situ application or installation phase of urban equipment elements. The incoherent design of urban equipment elements may have an adverse effect on the appearance of the historical environment, when the same is used concurrently with other elements. The layouts of the elements arranged in a visual harmony in urban design provide particularly remarkable and memorable images. The urban equipment elements as an attractive item of the city image also play an important role as regards the aesthetic dynamics. Urban equipment were elements that facilitated the personal and social life of citizens in the urban fabric, provided communication between individuals, had different quantities and qualities, and added functional and aesthetic meaning to spaces. Accordingly, they are of great importance not only for functional purposes, but also because of their vitalizing effects on the urban landscape. The elements that make up the identity of a city must be correctly identified and defined (Grove, Cresswell, 2013, p.125; Kong, do Rosário Monteiro, Neto, 2019). The natural environment, socio-cultural structure (historical environment features), and built environment should be considered and evaluated as a whole in determining the city identity (Önem, Kılınçarslan, 2005). Urban equipment elements are also used to make urban life comfortable, to make public space meaningful, and to create a sense of aesthetics (Şatıroglu, 2016). It can be suggested that the urban equipment elements complement the urban identity and put a complexion thereon (Moughtin, Oc, Tiesdell,1999, p.127; Soares, 2016, p.420; Van, Adams, 2012,

p.281). Urban equipment should be furnished in such a way that contributes to the socio-cultural characteristics of the users and not to the detriment historical features, if any. In this context, design principles such as “harmonious simplicity”, “ratio, rhythm”, “composition”, and “environment-oriented planning” should be regarded between urban equipment and the environment (Atabay, Pilehvarian, 2001, p.50-51). First of all, it is necessary to conserve the original or the original available, secondly, to synthesize historical qualities with modern lines, and thirdly, to enable people recognizing the historical landscapes before urban furniture by the use of transparent or semi-transparent units (Şatıroglu, 2016).

The effect of urban change on the historical environment can be defined as “Heritage Open Space in Transformation” (HOST). A HOST should be considered in relation to: (a) its location; (b) size and shape; (c) surrounding impact; and (d) benefit and use. It should also be considered with a view to its contextual use: (a) socialization; (b) rest; (c) accessibility; (d) mobility; (e) heritage conservation; and (f) urban security. Historical environments (HOSTs), including squares, mosques, and museums are very important for the conservation of the heritage and for visits. However, they are considered targets vulnerable to terrorist attacks. Therefore, until recently, the security techniques as traditionally applied in public spaces often included military-class methods, such as barriers, fences, or flower pots, generally to the detriment of the attractiveness of spaces. Nevertheless, it is essential to adopt softer spatial interventions in order to make the elements that conserve the cultural heritage more secure but more attractive. It is possible to design urban equipment elements, which are in harmony with the aesthetic appearance of the environment and cultural heritage, and which have functions and locations that can help prevent possible attacks (Babalis, 2022). In cities, technology, culture and the needs of city dwellers have changed drastically over time, and this change has also found its reflection on the developments in urban equipment element placed on the streets. The legacy Victorian lampposts are replaced by high-quality electric street lights and LED signs around the city display important news and daily weather conditions (miko, 2022; Xia, Yang, 2018). Here, it is essential to ensure optimization in harmony with the historical environment without resisting the change. Facilitating the opportunity to visit historical environments has been proved to be effective in conserving the identity and physical values of monuments. Compatibility with the modern conditions and needs of the tourists is essential for revitalization of the historical environment and in the design of the urban equipment elements. The role of urban furniture may then be to convey, exhibit, and emphasize the particular concepts of historical artifacts. Accordingly, it may be preferable method to develop the aesthetic and semiotic indexes of the historical environment and to include them in the design process for the transfer of cultural assets (Barani, Shirvani, 2020).

Designs for a new building and urban equipment in a historical environment may not be based on the same perceptions. The new design either adapts to or contrasts with the environment or may replicate the existing forms in the environment. It should be ensured that urban furniture establishes a connection between the city and the citizen through certain design principles, including functionality, form, color, material, fabric, and aesthetics (Aksu, 2012, p.375). Urban equipment elements intended for historical places should be in harmony with the environmental identity through a holistic aesthetic perception based on form, color, fabric, and material. One of the important aesthetic features of urban equipment is coherence with people and the environment in which they are located. Accordingly, urban furniture in proportionally larger or smaller sizes compared to other elements with which they hold a visual relationship may fail to meet aesthetic standards (Seyrek, 1992). The harmony of the historical environment with the cultural identity of the urban equipment elements is important for preserving the uniqueness of the city in which they are located (Yıldırım, 2004). Urban equipment designs in the historical environment with no association with the environmental contexts, may create certain issues, including confusion and disorder in the historical fabric and trigger an identity crisis (Barani, Shirvani, 2020). Although in some cases harmony may be based on contrast, such furniture should not create visual pollution or incoherence. A site-specific design approach should be adopted. The design and selection of urban equipment elements in the historical environment requires a consideration of visual harmony (Shah, Kale, Patki, 2002). In addition to the designs that reflect the historical city, the use of nov-

el and modern designs indicative of cultural continuity would improve visual diversity and reflect cultural richness (Şatıroglu, 2016).

Urban equipment elements are designed independently of each other based on certain factors including, function, aesthetics, and economy, in accordance with the currently accepted design approaches. It can be suggested that urban spaces interact with human behavior and thus remain alive (Kuloğlu, 2015). The characteristics of the historical environment should be considered in the design approaches of urban furnishings classified as per different criteria. The forms of urban equipment elements also affect their surroundings. Visual harmony should be ensured between the historical environment and urban equipment elements; in that regard the number of equipment ele-

Table 1. Main determinants of urban furniture design and applications in historical spaces (ACT, 2012; cheshirewestandchester.gov.uk, 2022; Güzel, Sözen 2003; Grosvenor's London Estate, 2011; Historic England, 2022; Maidstone Borough Council, 2022; Penn, 2007; Uslu, Ertürk, 2019, p.1851; Xia, Yang, 2018; Xia, Yang, 2018)

(Güzel, Sözen 2003)	**(Penn, 2007)**	**(Uslu, Ertürk, 2019)**	**(Xia, Yang, 2018)**
Determining the region's own traditional/spatial language	literal replication	Determining the historical and cultural values of the urban area	To be "human-oriented" and "demand-oriented"
To have a function that suits human use	invention within the same or a related style	Observation in the urban area and determining the existing urban elements	To reflect the regional characteristic culture, follow the cultural difference
Having a long-lasting structure that can stand for a long time	abstract reference	Determining the urban area where urban furniture will be placed	To improve the functions of facilities with technological means, and optimize the experience
Featuring a style that is able to convey a thought or experience	intentional opposition	List the deficiencies and seek solutions to replace these deficiencies,	To abide by the sustainable development design principle
Bearing elements that represent the features of the historical fabric		Form and function of urban furniture with respect to the problem and highlighting the identity of the urban area.	
Being original and impressive while having all these features			
(cheshirewestandchester.gov.uk, 2022)	**(Historic England, 2022)**	**(Maidstone Borough Council, 2022)**	**(Grosvenor's London Estate, 2011)**
Furniture should relate to and complement the function of buildings and spaces	Compile an inventory of historic Street furniture and its condition.	Particular regard will be paid to scale, height, materials, detailing, mass, bulk, articulation, and site coverage	Where possible-historic street furniture should be retained in-situ.
Combine elements of street furniture with signage, for example in order to minimise clutter	Encourage the preservation and maintenance of historic Street furniture	Create high quality public realm	Care must be taken to ensure replications are of high quality Issues of functionality must also be considered
Group street furniture elements together in zones away from heavy pedestrian flows and in parallel to the main direction of flow	Identify and conserve Street furniture that contributes to the area's significance	Provide a high-quality design, which responds to areas of heritage, townscape and landscape value	
(ACT Goverment, 2012)			
Original furniture should be retained and conserved in-situ	New furniture should be in harmony with its surroundings	Changes in furniture should be in accordance with the original.	Traffic signs should be kept to a minimum.
New furniture should be placed in harmony with the surrounding trees	New utility services should be incorporated along existing overhead routes or be routed underground in a manner that does not impact on built or major landscape elements.		

ments can be decreased. In environmental organizations, there are also time, meaning, and communication organizations along with space (Rapoport, 1977, p.15). Urban street furniture especially reflects the corporeal culture of the city as well as the degree of civilization and spiritual quality of the city. Every city needs a certain amount of urban furniture to achieve reciprocal integration and experience with the space. The penetration and integration of culture and technology into urban furnishings will help increase the sense of belonging and place of urban space and increase the attractiveness of the city (Xia, Yang, 2018). The increase in the experience of historical environments would in turn enhance and promote the cultural value, and that the urban equipment element may have a major contribution to the foregoing. Adopting of the principle of ensuring continuation of contemporary life is necessary to conserve the historical environment. The fact that urban equipment elements are designed and mass produced based on easy and fast assembly and replacement features without considering the historical characteristics of the environment in which they will be placed, makes it difficult to comply with the principle of being in harmony with historical environment.

2. Materials and Method

Case Study Area

Cities with a deep-rooted past of 10,000 years back in history feature an intensive and diverse cultural accumulation (Güneş, 2013:3.4). The first settlement in Istanbul was in Chalcedon (Kadıköy), subsequently, a Greek colony established on a hill dominating the Golden Horn and Marmara, in an area suitable for maritime trade, enjoyed the trade and topographic advantages, which contributed in the increased importance of the city that became a metropolis today. Indicated as the most hospitable and memorable places by the visitors to Istanbul, the top three destinations in Istanbul were the Bosphorus Strait, Sultan Ahmed Mosque (the Blue Mosque) (64.3%), and Hagia Sofia (76.7%) (Istanbul Directorate of Culture and Tourism 2016, p.19). The surroundings of Hagia Sophia and Sultan Ahmed Mosque located in the historical peninsula, a center of all the cultures lived on since the establishment of Istanbul, were selected with an aim to investigate the historical environment and urban equipment. Accordingly, the fieldwork on the said historical site, which was included in the UNESCO World Heritage List, would contribute to the solutions adopted in cultural centers of this variety across the world. The study was conducted in a special region with a number of cultural assets, including Sultan Ahmed Complex, the Hippodrome/Atmeydanı (with Serpent Column, Walled Obelisk, Obelisk of Theodosius, and German Fountain inter alia), the Museum of Turkish and Islamic Arts, Great Palace Ruins (Byzantine), Basilica Cistern, and routes to Topkapı Palace along with Hagia Sophia Mosque and Sultan Ahmed Mosque.

Figure 1. Hagia Sophia and Sultan Ahmed historical environment (İstanbul Büyükşehir Belediyesi, 2022) (improved by authors). (Latitude: 41° 0' 26¨ N Longitude: 28° 58' 41¨ E)

Figure 2. Hagia Sophia Square (Guillaume Berggren, 1870) (photographed by authors, 2021)

In Istanbul, spaces/squares were left in the circumference of religious structures, including Hagia Sophia Mosque and Sultan Ahmed Mosque. Those squares were utilized generally in an unplanned fashion throughout history. Until the 19th century, the fountain buildings and their front façades were the most frequently used locations inside the squares. Although there is a concept of urban square around these buildings, there are no urban furniture or equipment elements in support of urban life. Examples such as the Fountain of Sultan Ahmed III can be defined as the first type of structures intended for meeting the functional and aesthetic requirements of the unoccupied space inside the city (Kuban, 1998, p.157). Upon a review of the surveys conducted in the region, majority of the respondents reported that the city furniture failed to reflect the fabric of the city (Doğan, Altuncu 2021).

1.1. Method of the Study

A literature review was conducted for the purposes of the study, covering the policy makers, decision makers, planners, officials, architects, and practitioners and professionals working on the relevant designs, who worked for or in a way related to the fields of architecture, urbanism, and urban furniture with regard to historical environment and cultural assets. There is a wide range of literature on theory and practice of conservation. The relevant articles of the international standards, principles, and bylaws from past to present were reviewed. Previous studies in the field of contemporary architecture on the historical site in question were also reviewed and made use of. A literature review was conducted with a view to the definition of the urban equipment concept, urban furniture, and urban objects. Tables intended for the classification of the urban equipment used in the historical site and the relevant design criteria were developed for the purposes of the present study. The historical surroundings of Hagia Sophia/Sultan Ahmed Square were investigated on-site during 2021-2022 and the urban equipment captured by means of photography were assessed on the basis of classification and design criteria. Descriptive tables were developed for the results of the literature review and the criteria for urban equipment's function, settlement and harmony with historical surroundings in the historical site. The auxiliary criteria for the design of urban equipment intended for historical environment were reviewed.

3. An Assessment of Urban Equipment in the Historical Surroundings of Hagia Sophia - Sultan Ahmed Square

Table 2 shows the classification of urban equipment designs by type of function based on the explorations and photography by the authors around the historical Hagia Sophia - Sultan Ahmed Square.

Table 2. An analysis of the urban equipment around Hagia Sophia - Sultan Ahmed Square based on the classification criteria developed as a result of literature review (improved by authors).

CULTURAL HERITAGE OBJECTS
Monument, statue, historical elements, cultural assets, clock tower
There are Cultural Heritage Monuments/Objects, including obelisks and fountains in the Hippodrome site.

Obelisk of Theodosius, Snake column, German Fountain

FLOORING ELEMENTS
Concrete, stone, wood, asphalt, brick material, pavement, raised ground, crossings, curb
Frequent use of cut stones and/or cobblestones and use of pattern designs in the definition and coordination of the area for the purposes of cobblestone application with patterns forming grids at certain scales in the areas, with an aim to preserve the historical appearance and to be compatible with historical buildings/elements.

Cobblestone flooring

FLOORING SYSTEM ELEMENTS
Loopholes, manholes – infrastructural covers

Die cast covers, which are adopted as a standard throughout the city, are used.

LANDSCAPE CONSERVATION ELEMENT
Flower pots, receptacles, tree trunks and floor protectors

No harmony between the use of elevated wooden plant frames, the function of the seating elements in the elevated sites, alternative elements with metal cutting grids aligned with the ground, and greenery elements and between the foregoing and the historical site.

SEATING ELEMENTS
Table-chair, bench, group seating elements

Use of wooden boards with traditional die cast bearers and seating area in sequential alignment, where both mosques can be watched near to the Sultan Ahmet Mosque courtyard.

LIMITING ELEMENTS
Separator systems, deterrents, barriers, fences

Use of limiting urban equipment made of die cast and wrought-iron inspired by historical and cultural forms in the historical vicinity of Hagia Sophia-Sultan Ahmed Square.

LIGHTING ELEMENTS
Road, area, facades, decorative lighting items

Classic-looking lighting posts with decorative items associated with historic sites.

TECHNICAL EQUIPMENT
Transformer, installation, safety, air conditioning equipment, fire hydrant, warning signs

WASTE COLLECTION ELEMENTS
Trash bins, garbage containers

Same designs with those in use across the city.

WATER ELEMENT

There is a show pool with fountains in the middle of the historical area. They are operational historical fountains around Hagia Sophia - Sultan Ahmed Square. There are no modern service alternatives.

INFORMATION ELEMENT
Routers, locators, information boards, signboards

There are differences between totems with access from four sides in a form inspired by obelisk, auxiliary standard panels for additional information, transparent panels and warning panels.

TOILET MODULE *Automatic or modular toilet units*

There is only one single module to meet the toilet requirement around the historical area of Hagia Sophia - Sultan Ahmed Square.

PLAYGROUND ENTERTAINMENT ELEMENTS
There is no space around the historical area of Hagia Sophia - Sultan Ahmed Square dedicated to meet this need.

TRANSPORTATION PARKING ELEMENT
Public transport stations, bike park, parking meter

Parking space is reserved for personal bicycle transportation around the historical Hagia Sophia - Sultan Ahmed Square. Electric scooters are also available.

COMMUNICATION ELEMENT
Tourism information kiosk, mailbox, phone booth, Wi-Fi coverage

Urban equipment designs used throughout the city for the purpose of communication are also in use around Hagia Sophia - Sultan Ahmed Square.

SALES MODULE
Kiosks, exhibition pavilions, buffets, souvenirs, tall booths, vending machines

Mobile units are more prevalent compared to immobile units in the historical vicinity of Hagia Sophia - Sultan Ahmed Square.

Table 3. Comparison matrix (improved by authors) based on the characteristics of the urban equipment used in the historical vicinity of Hagia Sophia/Sultan Ahmed Square and the visual and experience relationship with the historical vicinity.

		User Type			Duration Of Use			Infrastructure Use			Material						Assembly Technique			Harmony (H) vs. Contrast (C) Visual Association				Relationship of Experience with Historical Environment	
	Genre Category	Local	Visitor	Employee	Permanent	Temporary	Functional	Not Used	Water	electrical	Stone	Concrete	Metal	Wood	Glass	Plastics	Immobile	Semi mobile	Mobile	Form	Color	Material	Texture	Yes	No
	Cultural Heritage Objects		•			•		•			•						•			H	H	H	H	•	
	Flooring Elements	•	•	•		•		•			•	•					•			H	H	H	H	•	
	Flooring System Element			•			•		•	•			•				•			C	C	C	H		•
	Landscape Conservation	•	•			•		•					•	•			•			C	H	C	C		•
	Seating Elements	•	•		•			•				•	•	•			•	•		H	C	C	H		•
	Limiting Elements	•	•	•		•		•					•		•		•			H	C	H	C		•
	Lighting Elements	•	•			•	•			•			•		•		•			H	H	H	H	•	
	Technical Equipment			•			•		•	•			•			•	•			C	C	C	C		•
	Waste Collection Element	•	•			•		•				•	•			•	•	•	•	C	C	C	C		•
	Information Element		•			•		•		◦			•		•		•	•		H	H	C	C		•
	Water Element		•			•			•	•	•	•	•			•	•			C	C	C	C		•
	Transportation Parking E.	•	•		•			•					•				•			C	C	C	C		•
	Communication Element	•	•		•					•			•		•	•	•			C	C	C	C		•
	Sales Module	•	•		•			•	◦	•			•	•	•	•	•		•	C	C	C	C		•
	Toilet Module	•	•		•				•	•			•	•		•	•			C	C	C	C		•
	Entertainment Elements	◦	◦		◦			◦					◦	◦		◦	◦								

4. Discussion of Urban Equipment in the Historical Vicinity of Hagia Sophia - Sultan Ahmed Square

All functional types of urban equipment are in use around the historical environment of Hagia Sophia - Sultan Ahmed Square. Majority of the equipment are identical with the standard designs preferred throughout the city.

An analysis of the urban equipment in the historical vicinity of Hagia Sophia/Sultan Ahmed Square by functional type indicated that differences in design criteria were required. Urban equipment was more prevalently used by the temporary user type (visitors), including tourists, compared to the locals and employees. Temporary users need more information about and a relationship of sense-making with equipment in common use. The duration of temporary use was longer compared to the permanent and functional uses. Although there was a number of equipment independent from the infrastructure, there was a requirement for a more advanced design approach utilizing new energy technologies. Metal was the preferred material in the urban equipment. Similar use of stone, metal, and wood was effective as regards harmony with the buildings and artifacts in the historical vicinity. Notwithstanding above, new technology composite materials that can concurrently meet visual adaptation and change requirements should be taken into consideration. There was a tendency for using immobile (fixed) installations in the placement of urban equipment. Nevertheless, movable or flexible/mobile elements would be more effective in using the space and conserving the historical environment. It can be said that as long as the urban equipment around Hagia Sophia/ Sultan Ahmed Square were in visual harmony with the historical environment, an experience relationship with the

users was also promoted. On the grounds that the experience of the historical region is important for the transfer of cultural heritage, the urban equipment could have been more extensively in the area in question. It is important to use form-color-material-fabric specific to the historical region, which is able to reflect the cultural heritage in order to establish visual harmony with the historical environment. Cultural heritage objects and flooring elements are generally a natural part of the historical environment. There was original experimentation intended for harmony with historical environment in the lighting elements, obelisk-form information elements, and wrought-iron limiting elements, which failed to ensure a sufficient impact. It is important to use original forms in harmony with the historical environment in the design of the equipment intended for the setting. Therefore, visual harmony and experience relationship can be established between the temporary users (tourists) and the historical environment, which would contribute in sustaining cultural heritage. There was no urban equipment associated with playground entertainment function in the historical site in question. Nevertheless, playground entertainment elements can be used very effectively to provide an experience of the historical vicinity.

As seen in Figure 3, the lighting provided by classical lighting poles with prominent decorative elements was inadequate around the historical vicinity of Hagia Sophia - Sultan Ahmet Square. Technical-looking additional lighting equipment was used to improve coverage and power of lighting. This led to visual disharmony between both the lighting elements and the historical environment. Even though the lighting equipment designed with an aim to ensure decorative harmony with the historical vicinity (classic lighting pole), the same, however, contributed to an eclectic appearance along with other equipment in the area. Lighting elements with decorative elements around the historical vicinity of Hagia Sophia - Sultan Ahmed Square failed to perform their function as visual adaptation to historical vicinity, despite their design priorities, due to extra lighting requirements or additional technical and communication equipment. Standard technical equipment were used to lighten the artifacts of cultural heritage.

Figure 3. Lighting elements around the historical vicinity of Hagia Sophia - Sultan Ahmed Square (photographed by authors)

Left: Fountain of Mehmed IV, Right: Osaka/Japan fountain

Figure 4. Compatibility of fountain, the urban equipment, with historical environmental experience
(photographed by authors)

Fountain of Mehmed IV, a cultural heritage, serves the function of water element around Hagia Sophia-Sultan Ahmed Square. Nevertheless, there are no contemporary fountains in the historical vicinity. Providing an experience of historical environment by means of visual harmony is necessary for the sustainability of cultural heritage. Addition of urban equipment in the form of fountains would be effective with a view to provide an experience of harmony with history, culture, and environment.

Table 4. Functional distribution of urban equipment used in the historical vicinity of Hagia Sophia/Sultan Ahmed Square (improved by authors).

	Genre Category																Number of functions that can be added
	Cultural Heritage Objects						•				•						02
	Flooring Elements			•	•		•	•			•	•	•				•	08
	Flooring System Elements		•	•	•		•	•			•							06
	Landscape Conservation Elements					•	•	•			•		•				•	06
	Seating Elements				•		•	•			•		•	•	•		•	08
	Limiting Elements		•	•	•	•		•		•	•	•	•	•	•	•	•	13
	Lighting Elements			•		•	•			•	•	•	•	•	•		•	10
	Technical Equipment																	00
	Waste Collection Element			•			•	•			•				•	•		06
	Information Element		•	•	•	•	•	•		•		•	•	•	•	•	•	13
	Water Element		•		•		•									•		04
	Transportation Parking Element		•		•	•	•	•			•			•				07
	Communication Element					•	•	•			•		•		•			06
	Sales Module					•	•	•		•	•		•	•				07
	Toilet Module						•			•		•	•	•				05
	Entertainment Elements		•			•	•	•			•	•	•					07

There are certain designs which incorporated a number of functions of urban equipment into one single product. Reducing the number of installed equipment may contribute to visual harmony with historical environment. Furthermore, a comparatively small number of equipment, which can accommodate multiple requirements would also reduce the assembly procedures undertaken in the historical environment. There are different types of urban equipment intended for each requirement, as can be seen in the types categories listed in Table 4. Therefore, an urban equipment design approach, which would incorporate similar-complementary functions in a relatively small number of equipment, can be preferred in projects specific to historical environments. The design of information and limiting elements allows sharing functions with a majority of other types of equipment. And thus, common designs in which certain function groups are combined can be introduced. Concurrently, most equipment can function as a limiting element, when installed in the historical environment. Lighting elements can also provide many functions of urban equipment. Although technical equipment is not recommended for the purposes of functional share, visual harmony should be considered in the design thereof.

Figure 5. Examples of urban equipment with combinations of various functions around the world, from left to right Berlin, Venice, Karlsruhe, Malaga, Sevilla, Munich (photographed by authors)

Design examples incorporating various functions can be used in historical environments. In the case of Berlin, the seating element, which has a mobile feature, meets the information function along with providing a flexible space for use." In the case of Venice, the flooring elements provide a harmonious visual complement to the landscape conservation element and the seating element functions. The flooring elements in the Karlsruhe example can be used more effectively for the information function. In the example of Sevilla, there is a harmony between the flooring element and the flooring. The Malaga example is characterized by incorporation of limiting and landscape conservation functions. The informative element design for the location and area sketch in the Munich example can be given as an example of harmony with the historical vicinity.

5. Conclusion

The principles of conservation of the historical environment and respect for cultural assets are also suggested by authorities and the relevant literature. It was emphasized that within the scope of the urban built environment the historical environment is also surrounded by urban equipment and those products collectively contribute to an effective whole. As a result of the increasing population in metropolitan areas, the city is more intensively used by its inhabitants. This suggests the increased value of the urban equipment. Historical environments are one of the most cosmopolitan regions thanks to the contribution of tourism activities as well as the demographic human diversity in the metropolis. Although the conservation of historical environments is supported by reputable institutions, including ICOMOS and UNESCO, and there are a number of relevant studies, the designing urban equipment without considering the characteristics of the historical environment, their mass production, diversity, and rapid change complicates the efforts to check their harmony with the historical environment.

Historical environments are also touristic destinations, and therefore, there is a higher rate of circulation of temporary visitors. Therefore, urban equipment in the historical environment should contain more information by design and should be easy to understand. Infrastructure-independent solutions are preferred. New technology materials can be considered with an aim to meet the requirements of visual harmony with the historical environment and change. The opt for flexible/mobile urban equipment would be more effective in terms of use of space and the conservation of historical environment. Experiencing the historical environment is important for the transfer of cultural heritage. Urban elements which ensure visual harmony relationship with their historical environment allows users to experience the historical environment and share cultural heritage. Even if the urban equipment elements in the historical environment are designed in harmony with the historical environment, they can create a complex contrast with other equipment in the same area. Therefore, the equipment intended for use in the historical environment should be designed with an original approach that includes attributes, which are in harmony with the historical environment. In addition, reducing the amount of equipment in the historical environment can prevent the chaotic appearance. Therefore, combination of functions and the joint design of the equipment elements can prove to be a part of the solution. In particular, limiting, information, and lighting elements can be designed with an aim to accommodate other functions. In conclusion, urban equipment elements in historical environments should have a consistent design across the setting and feature an original appearance in harmony with cultural heritage. In this way, such equipment would contribute in the experience of the historical environment and the sharing and transfer of culture. In addition, incorporating multiple functions in urban equipment may help with decreasing visual chaos in the historical environment and contribute to visual harmony.

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