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Adaptive Reuse of Historic Buildings

Use of Space Syntax for Evaluation of Sustainability

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ABSTRACT

Adaptive reuse has been accepted as one of the practices of sustainable architecture. In some cases, reusing the buildings rather than demolishing, found to be economically beneficial for the shareholders, in terms of material, transport and energy consumption, and pollution (Langston, 2008). As this approach is increasingly becoming a common practice, preservation has become a part of a broader strategy for urban regeneration and sustainability (Bullen & Love, 2011). The selected high school building with its construction that lasted from 1884 to 1916 (Arslan, 2014) is one of the symbolic buildings of the early modernist movement of the late period of the Ottoman state and needed to be conserved with its cultural, historical, and architectural qualities. The education facilities in the building have continued until 2012 and the building was converted into the National Museum of Kayseri in 2016.

This study aims to evaluate if the adaptive reuse of a heritage building could meet the requirements of the new use, without losing its essence. After restoration work, the use of daylight for displayed objects, scenes, and especially the circulation schemes have changed considerably, as the partitioned spaces for classrooms were converted into more fluid spaces of the exhibition halls. The general analysis of the circulation schemes will be a key factor in showing the changes which took place in the spatial configuration. This research is expected to open a general discussion on the support of Space Syntax metrics in the evaluation of adaptive reuse of architectural heritage conservation projects.

KEYWORDS

Adaptive reuse, heritage building, school, museum, identity

1 INTRODUCTION

Historic buildings define the character of communities, enabling a unique identity which is linked to the past. In most of the countries, governments, NGOs and private entrepreneurs strive to preserve these historic buildings for future generations. In cases where redevelopment is needed, these cultural monuments and their immediate surroundings act as the anchors or cores of revitalization. Adaptive reuse is implementing a new use or function to an existing building that was not intentionally designed for this new use. This is the case especially if the building in question is a structurally sound one located on a relatively central or economically viable site. Adaptation of the existing buildings to new uses is considered as a component of the rehabilitation process in which with a variety of repairs or alterations, the building can survive in a contemporary society. Starting from the 1960's adaptive reuse has been accepted widely as one of the most referred practises of sustainable architecture, due to the growing concern for the environment, along with increasing construction costs and legal difficulties in land use permits. In some cases, reusing the buildings rather than demolishing, found to be economically beneficial for the shareholders, in terms of material, transport and energy consumption, and pollution (Langston, 2008; Bullen & Love, 2010). During this time, preservation of the historic buildings was also gaining attention not only in academia but throughout the society as well. For example, Jane Jacobs (1961) praised the vernacular or ordinary traditional buildings, even though they are in bad condition, along with monumental historic buildings of high architecture, emphasising their importance for vigorous streets and districts. On the other hand, seeing that abandoned and obsolescent buildings in city centres not only decrease the property values and discourage new investments, but they also attract vandals and many criminal situations, concerns on environmental quality necessitated new ideas. As this approach is increasingly becoming a common practice, means of transmitting the heritage buildings to the next generations have also changed as the building conservation mindset shifted from preservation to being part of a broader strategy for urban regeneration and sustainability (Bullen & Love, 2011).

However, when the initial concerns shift from preserving the unique identity of the settlement through the historic buildings, and transferring it to next generations towards getting rid of the costs of maintaining a historical building, we see that the broader definitions of sustainability have been finding voice in the society. When adaptive reuse is considered for a building, there is often a situation where the original function is not relevant anymore or the means of operating the original function cannot be maintained in that building or environment anymore. Of course in some rare situations, due to the land values or local politics, a sort of gentrification also may be seen. For example, Grodach (2008) emphasises the tendency of local governments to employ flagship museums and art centres to attract attention to city centres and therefore opening a niche for future investments to the redevelopment of the urban core. In the case of this research, a 19th century high school building was converted into a national history museum. Since the school function still applies and the location of the building still has enough population to preserve the original function, we see that due to local politics, a valuable historic building has been handed

over to municipality to be used as a museum and school function has been transferred to a new regular featureless building on the same site.

Therefore, with the comparison of two different uses in the same configuration, this study aims to evaluate if adaptive reuse of a heritage building could meet the requirements of the new use, without losing its essence, in terms of circulation routes, interior-exterior relationship, meaning and spatial identity. In this sense, through the syntactic analysis of a transformed 19th century high school building into a national history museum, the research helps to quantify the physical and visual accessibility changes that occurred in the spatial configuration of this building. Through the syntactic findings and interpretations, this research presents an example for adaptive reuse of certain types of buildings.

2 THEORY

There is a widely accepted opinion that museums are also a type of education building (Kaplan et al., 1993; Wineman and Peponis, 2010) and therefore, converting a school building into a museum is a valid adaptation. However, the term education itself is being defined differently according to disciplines; for example psychology prioritises the individual considering that education should develop the talents of each individual to the highest degree, to ensure the future success. On the other hand, from a sociological point of view that prioritises society, education is an action that should be implemented by adults on youth and children. Education enables inheriting the legacy of previous generations, acquiring ideas and traditions that allow them to better fit into the society. For example, according to John Dewey, the school should imitate society and the child should get used to the rules of the society in which he will live. Moreover, emphasising that a child becomes socialised before becoming individualised while growing up, Henri Wallon and Jean Piaget gave importance to the social dimension of education.

In this sense, when we think of the education operated in a school building, we are actually framing a social environment rather than the individual skills. School design layout relies on the interaction of the students (Ünlü et al, 2001; Ünlü et al, 2009) with one another and the exterior space, while the museum usually serves as an introverted space supporting interaction of the visitors with the displayed objects (Choi, 1999; Kaplan et al, 1993). On the other hand, the contemporary digital display techniques in the museums do not necessitate much natural light. However, considering that humans prefer visual access more, compared to physical access, the amount of natural light experienced from the vantage points in architectural space has a positive effect on the observers' semantic evaluations of spaciousness and openness (Ünlü et al, 2019). Therefore while blocking original natural light sources may serve the need for the digital representations of the new function of the building, it also changes the mood of the interior space, hinders the visibility of the building details, and even creates a loss of orientation.
Wineman and Peponis (2010) contribute to the theory of movement by adding the third option of spatially guided movement, as an intermediate stage between spatially dictated movement and

spatially random movement. Even though a school building may be classified as having certain rules for students to obey, and therefore the movement may be spatially dictated. We suggest that school corridors may also provide spatially random movement similar to that of urban space. Especially during the lunch breaks and short breaks, the central corridor of the building used to serve as free interaction zones other than being a mere circulation route. The students used this space rather randomly creating routes of movement and visibility nodes to observe interior and exterior space through the openings of the corridor walls. However, in museums, the spatial layout of the displays may necessitate some objects to be more accessible than others. For example, the observation order of exhibited objects may be important for curatorial purposes, and circulation may be restricted to a degree. As Choi (1999) reminds us, in classical museum design, arrangement of circulation has been a central issue for the exhibition spaces to function efficiently, conversion to a museum forces this free circulation axis of the school building to operate as a guided and even a dictated route deforming the symmetry and the perception of space.

When visitors are exposed to the displayed objects in the museum, they receive the messages of the exhibition, view the type of classifications, groupings, or events whether they are diachronic or synchronic in time, and this is a type of informal learning. On the other hand, Choi (1999) states the importance of exploring the museum building itself, because the visitors' experiences of the spatial arrangement of displayed objects are also valuable. According to Kaplan (1979) and Kaplan et al (1993) museums not only provide an educational function but also play a restorative role. They state that the four characteristics of museum buildings such as being away, extent, fascination, and compatibility apply mostly to frequent visitors, which implies the importance of experience and familiarity. However, their understanding of restorative function is related to the aesthetics, such as an art museum, where one can enjoy revisiting and spending time. In our case, the museum is converted into a national history museum, where the struggles and determination that led to the victory of the War of Independence have been portrayed. In this sense, patriotic pride and honour may be educative for youngsters, in terms of transmitting national heritage for their cultural and historical socialisation but it won't be restorative in the sense of wellbeing, at all.

It is possible to follow the positive and negative criticisms of the transformation of the historical buildings. Of course, we see examples of adaptive reuse in various parts of the world; and some of these historical buildings were also converted into museums (Elsorady, 2014; Djebbour and Biara, 2019). Among the examples of reuse, studies evaluating the issue in the framework of sustainability have discussions under the headings of form, function, community memory, environment, economy and management. In our research, environmental and economy and management related factors are of secondary importance. What we want to show is that, while preserving the form of the building, disregarding its function and especially community memory may not always prove to be the best solution. For example, conservation emphasises the necessity

of preserving the tangible and intangible values of the re-functioned building. Intangible cultural heritage is defined as "*Peoples' learned processes along with the knowledge, skills and creativity that inform and are developed by them, the products they create and the resources, spaces and other aspects of social and natural context necessary to their sustainability; these processes provide living communities with a sense of continuity with previous generations and are important to cultural identity, as well as to the safeguarding of cultural diversity and creativity of humanity*" (UNESCO, 2001). Therefore not only the selection of a new function but the type of that function also plays an important role in the spatial sustainability and identity.

3 DATASETS AND METHODS

The datasets used in this research are based on syntactic analyses of school and museum ground floor layouts. Case study building and the methodology used are explained in detail in the following sections.

3.1 Case Study Building

In this research, a 19th century high school building that was transformed into a national history museum is being evaluated in terms of adaptive reuse. As an important representative of the school buildings constructed in the late 19th early 20th century, the building also represented the modern education system that has changed within the scope of the westernisation movements. The school building, as the first high school (*idadi*) of the city of Kayseri, therefore named as the Kayseri High School, in central Anatolia region of Turkey, with its construction that lasted from 1884 to 1916 (Arslan, 2014; Eldek Güner, 2017) is one of the symbolic buildings of the early modernist movement of the late period of the Ottoman state. Apart from being the first high school of the city, the building was also the first modern education structure of Kayseri, similar to school typologies being constructed in different cities of Anatolia, in that period (Toptaş, 2020).

Because of the economic difficulties the state was facing, construction could only be completed in phases that took more than twenty years. For example, twelve years after the groundbreaking, because of the delays, the education had started in a nearby rented mansion in 1896. After three years of recess, construction of the basement and ground floor was completed in 1904 with the addition of a pitched roof (Figure 1). When the final construction was completed in 1916, the building earned the title of *sultani*, a boarding type of high school with longer years of better education and therefore deemed more prestigious. Because at one point during the Sakarya Battle, as one of the stages of Turkish Independence war, parliament in Ankara was planned to move to Kayseri that is located somewhat 350 km southeast. Since the selected building for the parliament to relocate happens to be the Kayseri High School, the first floor of the building was finally completed in 1921 (Figure 2).

Similar to the architectural configurations of its era, the building has a symmetrical layout where the classrooms and offices were once connected through a central corridor. Even though some examples of this typology had U and L shaped corridors having doors at both ends as well, all classrooms, offices, stairs, service units were accessed directly from these corridors. Therefore, this central corridor system was not only the spine of the circulation and permeability, but it also provided the views of exterior space from within.

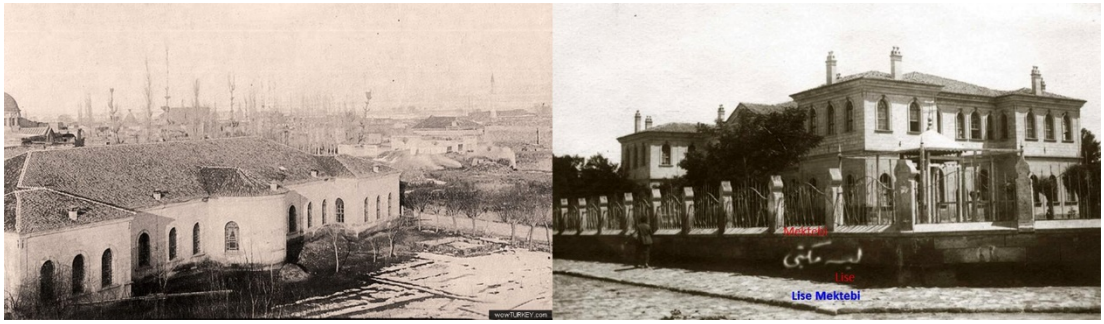


Figure 1: Kayseri High School from the 1910s and the 1925 (Kayseri Old Photographs - Wowturkey, 2014)

Figure 2: Kayseri High School satellite image (Google Earth, 2022)

After the declaration of the Turkish Republic in 1923, the education system has gone into renovations as well. Starting with additions to the site in 1927, labs were added in 1957, dorm building was added in 1966 and sports and conference hall was added in 1977. The education facilities in the building have continued until 2012. Eldek Güner (2017) describes the stages of transforming the Kayseri High School to a museum in detail. Following its restoration immediately after the evacuation of the building, which included the demolition of the additions to western facade, in 2016 (Figure 3), the building was converted into the National Museum of Kayseri, introducing new functions to the old structure.

When the building is converted to a museum, the school's main entrance in the centre is preserved and used as the museum entrance. One of the two other doors located at both ends of

the corridor, is converted to an emergency exit, while the other one was closed down (Figure 3). However due to contemporary regulations, a window opening next to the closed down door is employed as a disabled entrance with a ramp built in front of it. Also an elevator was added to the back of the building used from the exterior (Eldek Güner, 2017). On the other hand, economical sustainability of the museum building was provided by designing some service and recreation spaces, such as disabled friendly restrooms, cafeteria, souvenir sales desk and children's workshop section as a part of the contemporary museum layout.

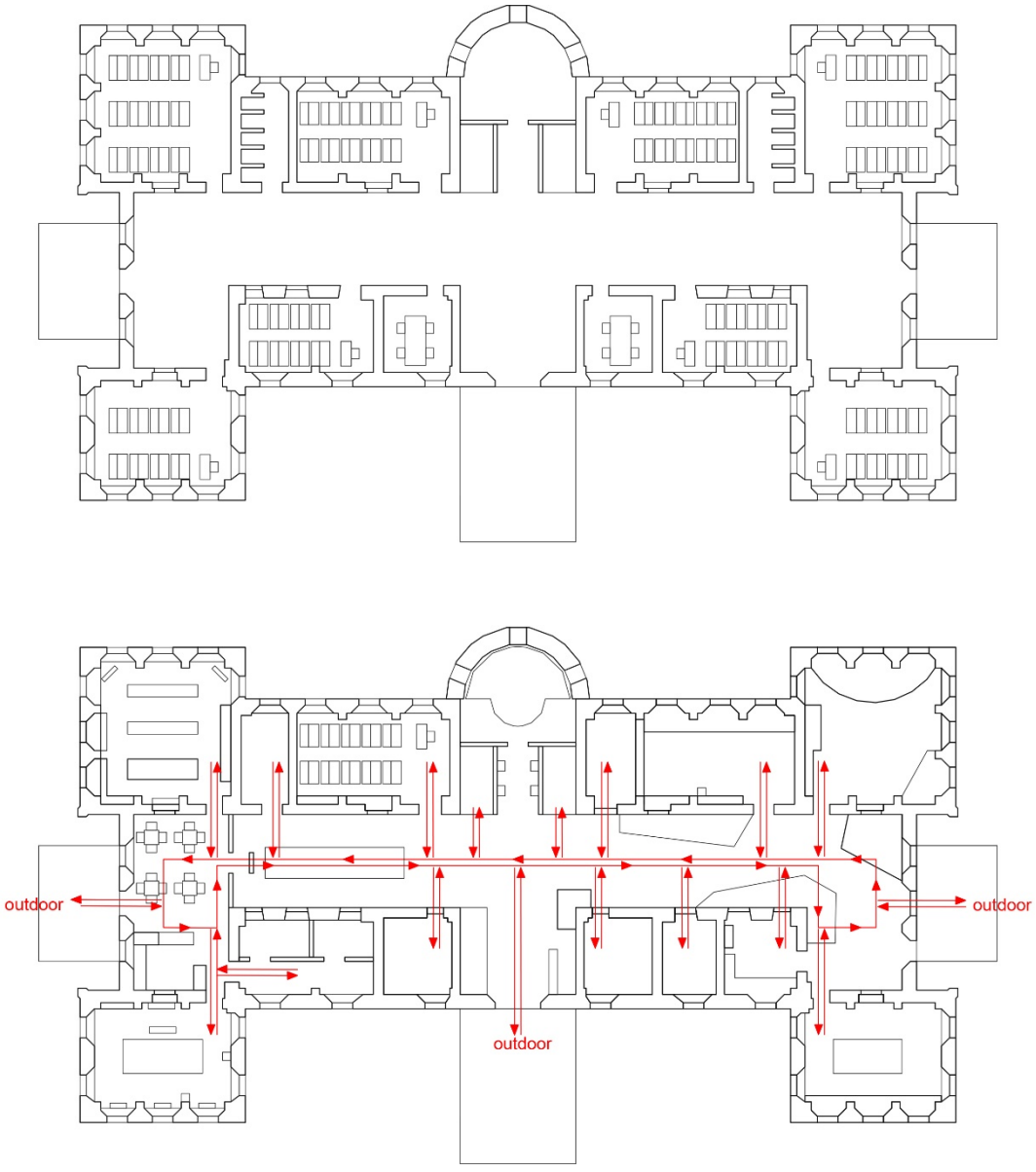


Figure 3: Kayseri High School (top) and Kayseri National Museum (bottom) ground floor circulation diagram

The exhibition in the museum is focused on Turkey and Kayseri during the War of Independence. Therefore using the changing exhibition techniques the events are discussed in the framework of the difficulties of the war, the situation of the city during the war, the tragic stories of the students who became martyrs and could not graduate. The exhibition route starts with the right side of the entrance which is used for the national and local narrative of the years of the National

Struggle, and continues counter clockwise towards the classrooms around the corridor. As mentioned before, the possibility of the relocation of the capital from Ankara and also the parliament building was among the revived situations in the exhibition and displayed interactively. On the other hand, the history and educational background of Kayseri High School were displayed at the left of the main entrance with its focus on the preserved classroom layout. The semicircle space located under the landing of the main staircase, which was used both as prayer room before the declaration of republic, and school principal's office afterwards, is converted into a children's workshop. Figure 4 shows scenes from the museum function of the building.

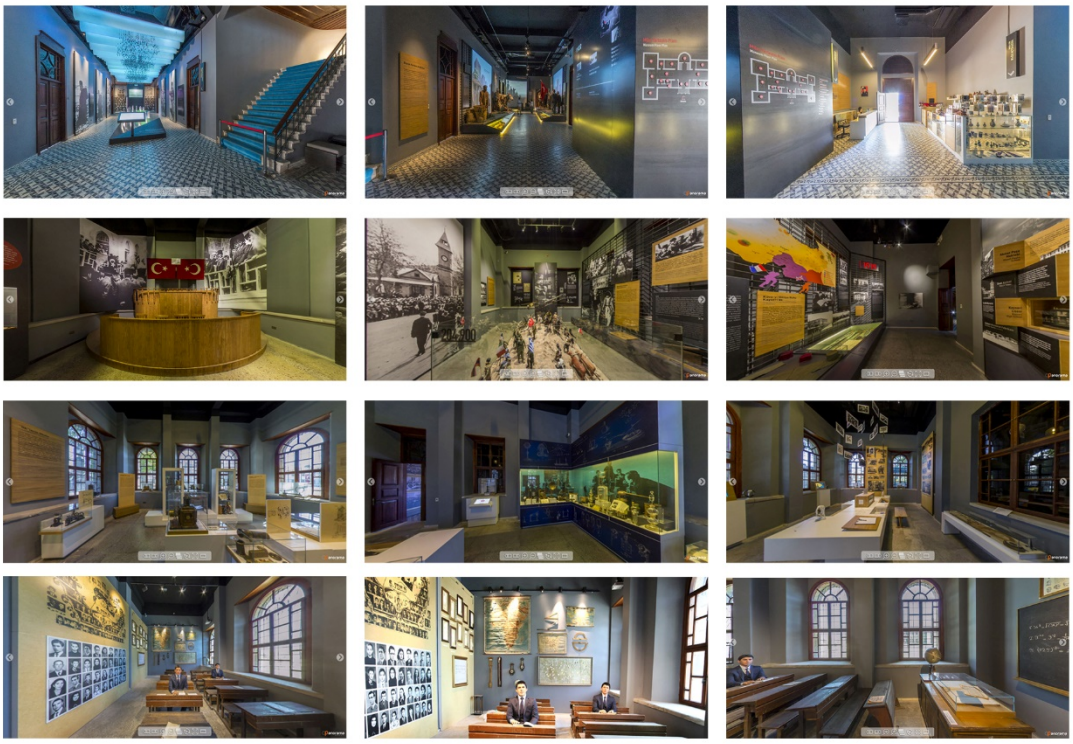


Figure 4: Scenes from the National Museum of Kayseri (adapted from the virtual tour on official web site (http://www.millimucadelemuzesi.com/; https://www.panoramakayseri.com/360/millimucadele/)

3.2 Definition of Methodology

The syntactic aspect of the research relies on the comparison of spatial configurations based on physical and visual accessibility of the ground floors of the building before and after the functional change. We believe that depth or shallowness of spaces, related to the functional changes; show the determinants of functional sustainability and building identity. Therefore exploring the different uses of the spaces especially in circulation routes help us to examine the validity of adaptive reuse. Turner et al. (2001) defined the relationship between "what we can see" as visibility, and "where we can go" as permeability (Turner et al., 2001). On the other hand, Stamps (2005) differentiates the visual and physical accessibilities in terms of materials used in the medium. For Stamps range of vision is limited to surface qualities such as being opaque or

translucent; while a glass surface does not limit vision, it can limit movement; or, being in a coal mine at night may allow locomotion, although it may affect vision (Stamps, 2005). Based on the displayed objects in the museum layout, we may also consider the notion of occlusivity, which is the portion of the perimeter of the isovist polygon that does not coincide with wall lines. Being one of the six geometric measures of isovist defined by Benedikt (1979), occlusivity is the length of occluding boundaries within the isovist (Batty, 2001). Any occlusivity value that is larger than 0, shows uncertainty about the space. Moreover, high values of occlusivity may necessitate extra caution in terms of visual perception.

The general analysis of the circulation schemes is a key factor in showing the changes which took place in the spatial configuration. These can be identified and supported by various analysis methods, such as the comparison of the deep and shallow spaces and their permeability and visibility factors. Some syntactic measures such as connectivity and circularity present movement schemes especially in local scales, affecting the perception of the space. Therefore, not just available movement routes through the central corridor, but also the perception of the building layout are important to understand the degree of conversion. In this research, we employed the University of Michigan's Syntax 2D software's grid analysis to calculate the syntactic values to understand the spatial relations (Figures 5 to 8). The grid intervals were set to be 60 cm, enabling a single person to stand on each grid and visualise the surroundings. Since the analyses cover the ground floor and entrances, a rectangular boundary representing the exterior space is drawn around the building that is 200 cm from the corners of the building.

For permeability analysis of the school layout, only the doors are employed, but for the museum layout, any display that prevents walking is considered an obstacle and counted as a physical barrier. For visibility analyses, on the other hand, all of the doors and windows of the school layout that enable visual access, including the ones in the classrooms that were facing the corridor, were considered open. However, for museum layout, visibility analysis is operated by differentiating between the heights of the displays. If the displayed object was lower than the eye level, it was considered a free space for visual access, but if it was higher such as the window coverings for digital displays, then it was considered an object that is blocking the vision. As for the main staircase, in the school layout, it enabled both visual and physical access, but in the museum layout, since the first floor was reserved for administration and prohibited for visitors, it was only accessible visually. Thus, in the school layout while visual access and permeability barriers were completely separated, in the museum layout some barriers overlapped according to their position compared to eye level.

On the other hand, four specific nodes from the two layouts were compared to see if the conversion of the building met the functional requirements of a museum as expected (Figure 9). These four nodes of isovists are selected as 1- being from the main entrance threshold, 2- being located on the geometrical centre of the building connecting main entrance and main staircase, 3-

being located on the threshold of right hand side door, and 4- being located on the central axis of the left hand side connection. We have to note that while the first two nodes are the same, the other two are slightly relocated. The reason for this is that for museum layout, the door at the right end of the corridor has been shifted from the central space towards the side to serve as a disabled entrance with a ramp and also preserving more space in the interior for displays. Similarly, while the fourth node is a free standing one marking the wall axis in the school layout, it is blocked by a display in the museum layout.

4 RESULTS

In this research, both the original school layout of the ground floor and its converted version are analysed according to permeability and visibility characteristics. In school layout visibility range of the exterior space was also helping the perception of the school building as a whole. In this layout we see that especially use of interior windows in classrooms, brings the daylight in and the connection of the classroom to the central corridor follows the design rule of service spaces and the spaces that are being served. The unobstructed width and overall size of the central corridor shows the capacity and need of student free circulation. In Figure 5, the permeability analysis of the school ground floor layout shows that the school's main entrance is also the node of surveillance, which although is not a part of this research, explains the location of the principal's office on the first floor. As the central staircase and secondary entrances seem to be shallow compared to classrooms, this typical school organisation clearly shows the public and private division of the functions.

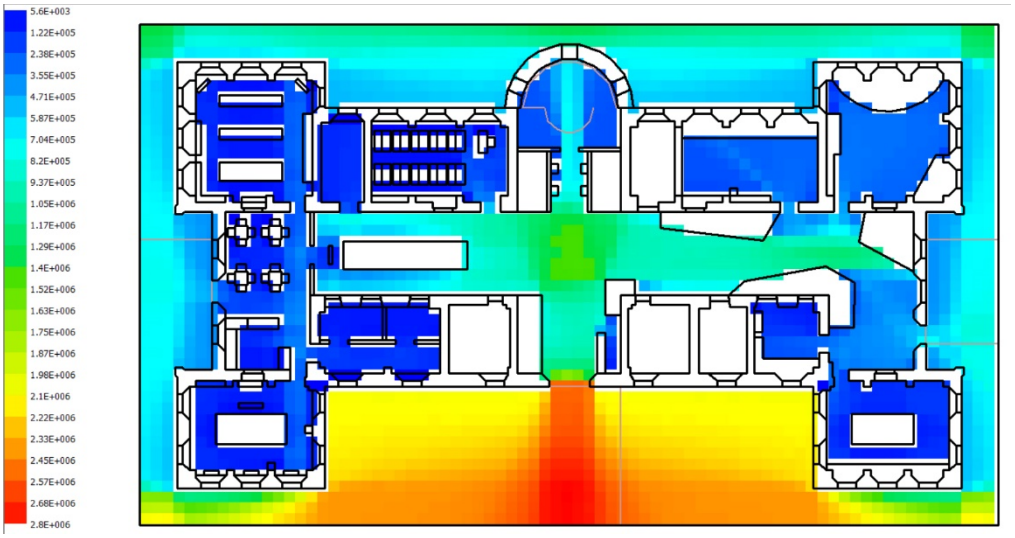


Figure 5: Permeability analysis of the school ground floor layout

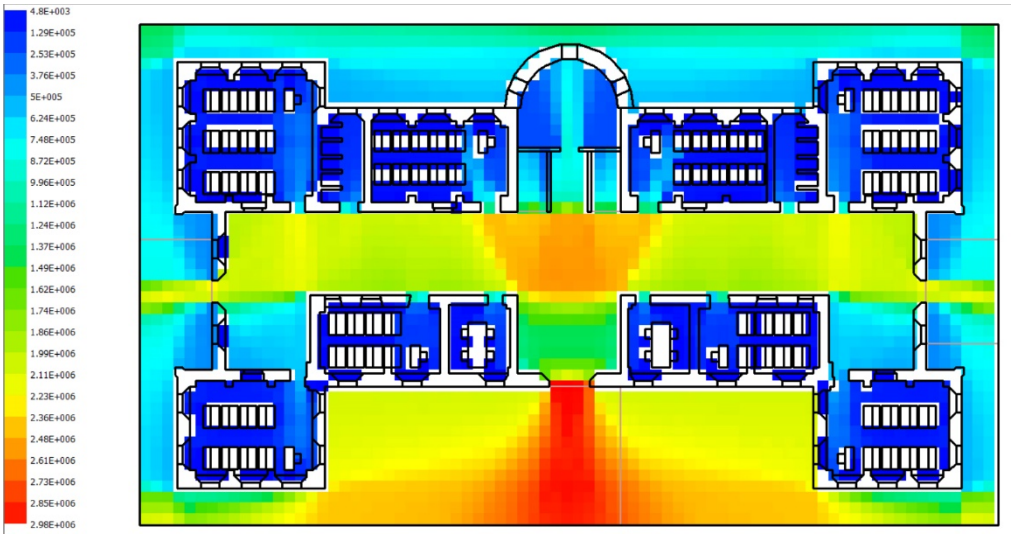


Figure 6: Permeability analysis of the museum ground floor layout

Figure 6 not only shows the permeability analysis of the museum ground floor layout, but it also shows how the integration values of the building dropped compared to the school layout. In this system, we see that the interior and exterior of the building is almost separated from one another, clearly showing disintegration. While the front of the central staircase is the most integrated interior space, it shows little effort in guiding and orienting visitors towards the exhibition areas. The staircase can be seen but not used by the visitors. In this configuration, visitors are expected to intuitively find their routes towards the right, but they will have to rely on the signs, anyway. Especially the two exhibition rooms on the left end of the building are almost hidden behind partition walls. The exemplary classroom exhibition located across the left of the main entrance can only be realised through its door; with the covered up corridor windows the essence of the school building is neglected and lost. As seen in Table 1, although the mean depth values are the same, the local integration for permeability measures had dropped almost by 50% with 2.33×10^5 for school layout and 1.20×10^5 for the museum layout.

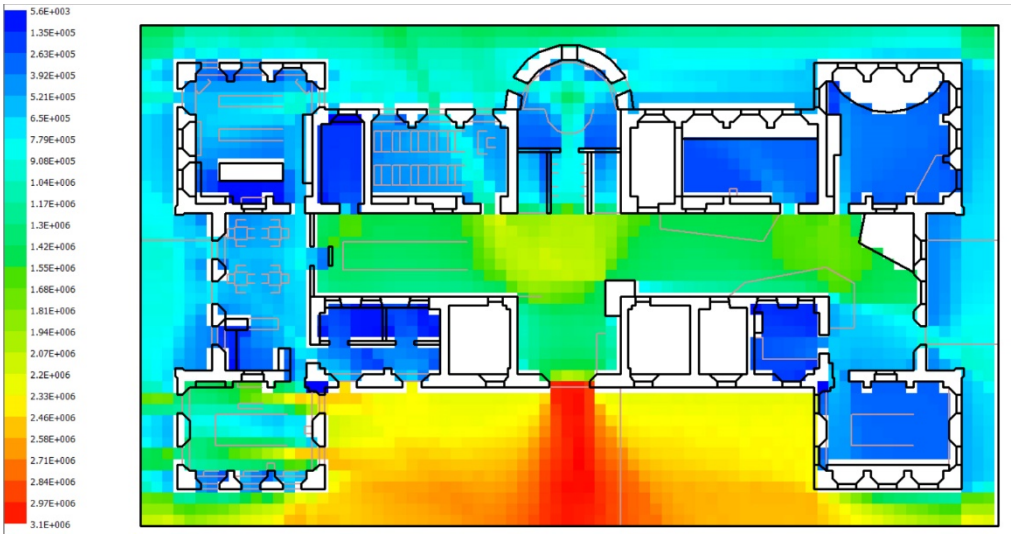


Figure 7: Visibility analysis of the school ground floor layout

Figure 7 shows the visibility analysis of the school's ground floor layout. Similar to the permeability analysis, the designed interior space is in accordance with exterior, enabling a wider perception of the environment. School functions present the deepest spaces to be the restrooms and some offices, while circulation routes, classrooms and staircase are presenting visibly shallow outcomes. In this configuration the presence of daylight and its amount seems to be one of the top priorities of design, while surveillance on the main entrance, front garden and also the classroom is also clearly seen.

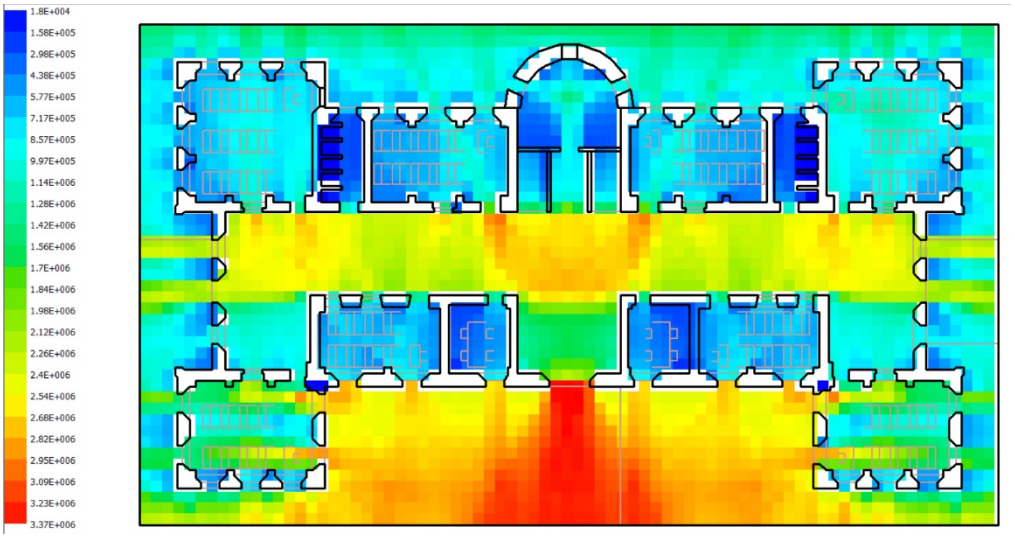


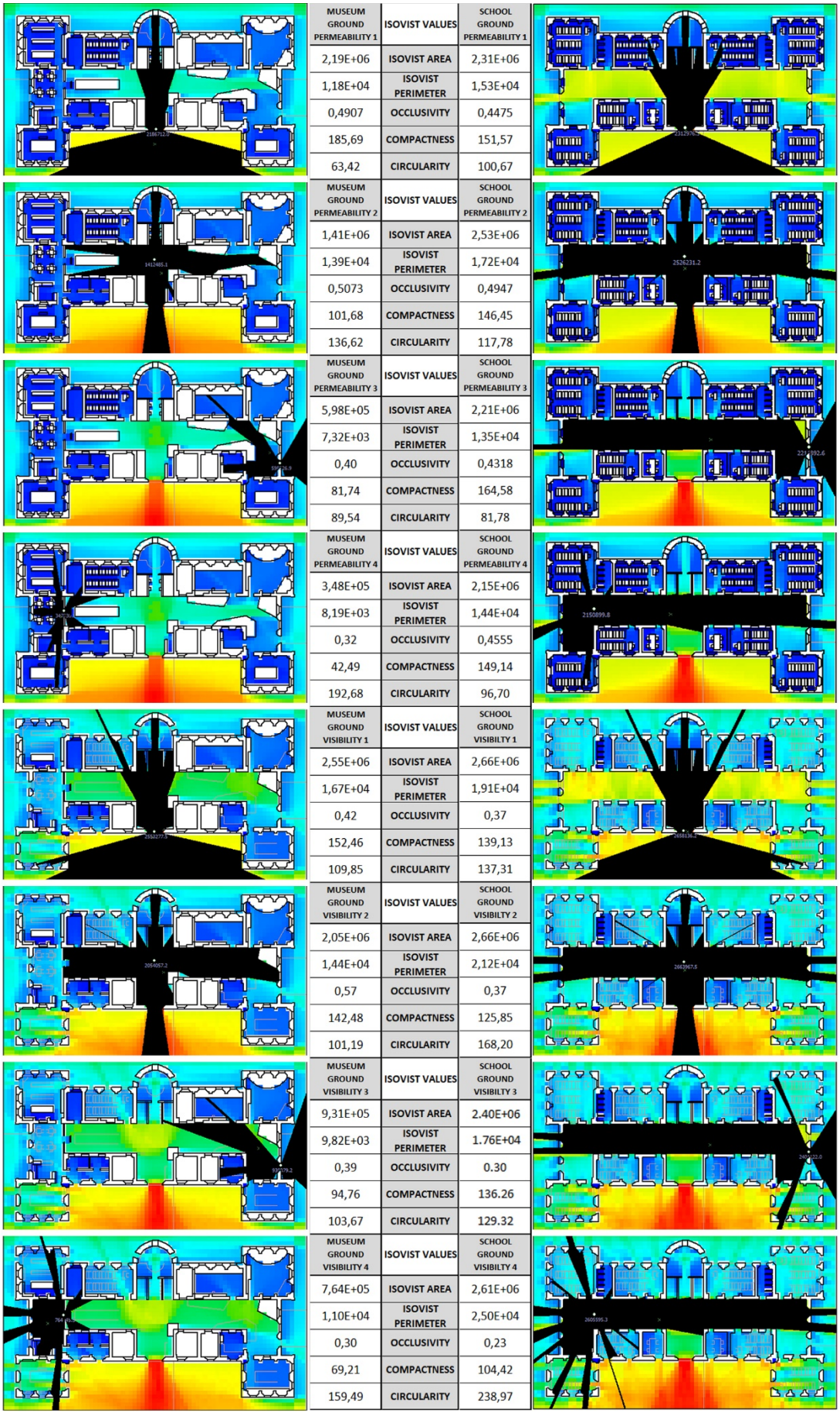
Figure 8: Visibility analysis of the museum ground floor layout

On the other hand, visibility analysis of the museum layout emphasises the central corridor displays, while most of the exhibition halls cannot be perceived visually (Figure 8). It is clear that after the conversion of the building, the use of daylight about displayed objects, scenes, and especially the circulation schemes have changed considerably. With the help of the partitions in the corridor, a guided movement or even a more fluid space for exhibitions can be seen. However we also see that the changing locations of the side doors and even a partition in front of the left one, disturbs the perception of symmetry and orientation. As mentioned before, even the classroom layout that is supposed to display the previous education medium cannot be perceived from the centre of the corridor because of the blocked windows for poster displays that used to be open to the corridor. This situation not only hinders the display of the actual situation of the

classroom, but for museum circulation prevents visual access to displays as well. Similar to the permeability values, the local integration drops from $5.98x10^5$ for school layout to $2.55\ x10^5$ for the museum layout. School visibility layout also presents the highest isovist area and isovist perimeter values, along with highest circularity, connectivity and global integration measures, that are all pointing to the congruence of the layout with its function. (Table 1).

Table 1: Syntactic values of the two layouts of permeability and visibility analyses

SYNTACTIC VALUES	SCHOOL GROUND PERMEABILITY	MUSEUM GROUND PERMEABILITY	SCHOOL GROUND VISIBILTY	MUSEUM GROUND VISIBILITY
ISOVIST AREA	9,42E+05	6,84E+05	1,37E+06	9,50E+05
ISOVIST PERIMETER	6,56E+03	5,05E+03	1,36E+04	7,95E+03
OCCLUSIVITY	0,48	0,44	0,30	0,39
COMPACTNESS	93,34	80,14	82,83	85,82
CIRCULARITY	57,70	47,52	145,93	75,62
CONNECTIVITY	251,47	182,41	367,83	253,07
MEAN DEPTH	2,23	2,23	1,84	2,00
INTEGRATION	2,33E+05	1,20E+05	5,98E+05	2,55E+05
INTEGRATION-N	1,29E+06	5,81E+05	3,92E+06	1,66E+06



MUSEUM GROUND PERMEABILITY 1	ISOVIST VALUES	SCHOOL GROUND PERMEABILITY 1
2,19E+06	ISOVIST AREA	2,31E+06
1,18E+04	ISOVIST PERIMETER	1,53E+04
0,4907	OCCLUSIVITY	0,4475
185,69	COMPACTNESS	151,57
63,42	CIRCULARITY	100,67

MUSEUM GROUND PERMEABILITY 2	ISOVIST VALUES	SCHOOL GROUND PERMEABILITY 2
1,41E+06	ISOVIST AREA	2,53E+06
1,39E+04	ISOVIST PERIMETER	1,72E+04
0,5073	OCCLUSIVITY	0,4947
101,68	COMPACTNESS	146,45
136,62	CIRCULARITY	117,78

MUSEUM GROUND PERMEABILITY 3	ISOVIST VALUES	SCHOOL GROUND PERMEABILITY 3
5,98E+05	ISOVIST AREA	2,21E+06
7,32E+03	ISOVIST PERIMETER	1,35E+04
0,40	OCCLUSIVITY	0,4318
81,74	COMPACTNESS	164,58
89,54	CIRCULARITY	81,78

MUSEUM GROUND PERMEABILITY 4	ISOVIST VALUES	SCHOOL GROUND PERMEABILITY 4
3,48E+05	ISOVIST AREA	2,15E+06
8,19E+03	ISOVIST PERIMETER	1,44E+04
0,32	OCCLUSIVITY	0,4555
42,49	COMPACTNESS	149,14
192,68	CIRCULARITY	96,70

MUSEUM GROUND VISIBILTY 1	ISOVIST VALUES	SCHOOL GROUND VISIBILTY 1
2,55E+06	ISOVIST AREA	2,66E+06
1,67E+04	ISOVIST PERIMETER	1,91E+04
0,42	OCCLUSIVITY	0,37
152,46	COMPACTNESS	139,13
109,85	CIRCULARITY	137,31

MUSEUM GROUND VISIBILTY 2	ISOVIST VALUES	SCHOOL GROUND VISIBILTY 2
2,05E+06	ISOVIST AREA	2,66E+06
1,44E+04	ISOVIST PERIMETER	2,12E+04
0,57	OCCLUSIVITY	0,37
142,48	COMPACTNESS	125,85
101,19	CIRCULARITY	168,20

MUSEUM GROUND VISIBILTY 3	ISOVIST VALUES	SCHOOL GROUND VISIBILTY 3
9,31E+05	ISOVIST AREA	2.40E+06
9,82E+03	ISOVIST PERIMETER	1.76E+04
0,39	OCCLUSIVITY	0.30
94,76	COMPACTNESS	136.26
103,67	CIRCULARITY	129.32

MUSEUM GROUND VISIBILTY 4	ISOVIST VALUES	SCHOOL GROUND VISIBILTY 4
7,64E+05	ISOVIST AREA	2,61E+06
1,10E+04	ISOVIST PERIMETER	2,50E+04
0,30	OCCLUSIVITY	0,23
69,21	COMPACTNESS	104,42
159,49	CIRCULARITY	238,97

Figure 9: Syntactic comparison of selected permeability and visibility nodes in both layouts

Figure 9 shows the comparison of the isovist values of the four specific nodes derived from the two layouts. First node taken from the main entrance threshold for permeability presents a relatively free movement for school layout while it is hindered in museum layout, even though they present similar isovist areas for visibility analysis. This may be an advantage for museum entrance for it promises a view but visitors have to get a ticket to explore that promised view as for the second node, we definitely see the difference of free flowing school corridor with the guided movement within the circulation routes. While visibility analysis of this node directs the movement towards the semi hidden lower right corner, it decreases the need of exploring the left side and barely directs movement towards the children's workshop area.

As it was mentioned before the location of the third node is different in school and museum layouts. Therefore, while the original side door at the right end of the corridor could present a wide perspective, shifting of the door towards the end of the wall prevents access both visually and physically. The fourth node on the other hand, shows the results of installing partitions without putting much thought about it. While the fourth node is a free standing one marking the wall axis in the school layout, and presents a wide accessibility, it is blocked by a display in the museum layout. This partition reserved for digital display not only blocks the fire escape, but also blocks the entrance to the upper left and lower left exhibition halls, which happen to be facing the exterior space with ample amount of natural light.

5 CONCLUSIONS

As the research focuses on a school structure with a typical plan scheme, of which we can see many examples in a certain time period in the 19th century, when the modern education system in the Ottoman state was adopted and new institutions were built, it is expected to open a general discussion on the support of Space Syntax metrics in the evaluation of adaptive reuse of architectural heritage conservation projects. These typical school buildings, after a century of use, are subject to renovation/restoration/reuse studies in order to keep up with today's conditions. Some of them can continue their original function as educational buildings, while others are undergoing functional changes. We are trying to draw attention to the fact that the spatial characteristics should be taken into account in the decisions to be made regarding the new function of the building, especially when it comes to functional changes. As the case study area is a valuable heritage site, it needs to be conserved with its cultural, historical, and architectural qualities. In this framework, we think that this study is important as an example of many historical school buildings in Turkey, and how they will continue to live.

As a result of population growth, changes in cultural values and society, the education systems have changed in time, not only in Turkey, but worldwide. New uses, functional and technological requirements and such, create difficulties in the utilisation of the old buildings. In this case, the need to improve historical buildings according to modern living conditions and needs is clear. However, while working on the reuse decision of old buildings, creating special design solutions

for conserving both the tangible and intangible assets of the culture are crucial. In this research, we emphasise the concerns on identity, memory and sustainability in the form of continuity as the intangible assets. A school building that served its purpose for a century also displays the cultural heritage and social memory, which cannot be despised.

The economical aspect of sustainability, unfortunately, plays a big role, especially in developing countries. High maintenance costs of the historic buildings, lead to inadequate privatisation and functional uses that are expected to attract tourism and economical benefit. Therefore, conversion to cultural buildings such as museums seems like an optimal solution. However, as Grodach (2008) states that the flagship museums are dependent on the development of their surrounding context, therefore, they do not determine the development themselves. Mix use of urban space supported by retail, restaurants and other cultural activities such as art galleries is the necessary ignition for development.

The concerns about whether the school spaces are suitable for exhibition and circulation in the museum have been questioned through concrete heritage concepts such as the change of spatial qualities. The restoration, renovation, reuse works to be done should have a meaning far beyond protecting the outer shell of the building. In this framework, from the day it was built until recently; spatial layout, social and cultural backgrounds should be carefully considered in the design processes of these buildings, which respond to a need as an educational structure. Preserving the intangible heritage values of the building and conducting measurement-based studies maybe future research subjects. Additionally, graduates of the school can be interviewed about their previous experiences when they were students and their present experiences in the new museum layout. This comparison, along with further syntactic analyses can provide data for future adaptive reuse strategies and shed a light on the survival of the heritage building with the continuation of its spatial identity.

REFERENCES

Arslan, A. S. (2014). “The Earliest Modern Educational Building In Kayseri: Kayseri High School”, (Kayseri’nin İlk Modern Eğitim Yapısı: Kayseri Lisesi) [in Turkish], *Erciyes University Journal of Social Sciences Institute,* 1(36), pp. 1-33. Retrieved from https://dergipark.org.tr/tr/pub/erusosbilder/issue/23770/253397

Batty, M. (2001). Exploring isovist fields: space and shape in architectural and urban morphology. *Environment and Planning B: Planning and Design*, 28(1), 123-150.

Benedikt, M. L. (1979), To take hold of space: isovists and isovist fields. *Environment and Planning B,* 6(1), p. 47-65.

Bullen, P. A., & Love, P. E. (2010). “The rhetoric of adaptive reuse or reality of demolition: Views from the field” *Cities*, 27(4), pp. 215-224. doi: 10.1016/J.CITIES.2009.12.005

Bullen, P. A., & Love, P. E. (2011). “Adaptive reuse of heritage buildings”, *Structural Survey*, 29(5), pp. 411-421 DOI: 10.1108/02630801111182439

Choi, Y.K., (1999). The morphology of exploration and encounter in museum layouts. *Environment and Planning B: Planning and Design,* 26(2), pp.241-250.

Djebbour I., Biara R. W. (2019), "Sustainability Comparative Assessment of Adaptive Reuse of Heritage Buildings as Museums: A Case of Tlemcen", *Journal of Environmental Research, Engineering and Management,* 75 (3), pp. 7-20, DOI: 10.5755/j01.erem.75.3.22133

Eldek Güner, H. (2017). "From Hıgh School To Museum, From Education To Consumption; Transformation of Kayseri High School To War of Independence Museum", (Liseden Müzeye, Eğitimden Tüketime; Kayseri Lisesi'nin Milli Mücadele Müzesi'ne Dönüşümü) [in Turkish], *TÜBA-KED Turkish Academy of Sciences Journal of Cultural Inventory,* (16), pp. 13-34. doi.org/10.22520/tubaked.2017.16.003

Elsorady D. A. (2014). "Assessment of the compatibility of new uses for heritage buildings: The example of Alexandria National Museum, Alexandria, Egypt", *Journal of Cultural Heritage,* 15 pp.511–521 http://dx.doi.org/10.1016/j.culher.2013.10.011

Grodach, C., (2008). Museums as urban catalysts: The role of urban design in flagship cultural development. *Journal of Urban Design,* 13(2), pp.195-212.

Google Earth (2022). Satellite image of Kayseri Highschool, *https://earth.google.com/web/@38.71683576,35.48895039,1056.20327006a,461.19909002d,35y, 21.85534017h,0t,0r*, (Accessed at: 30.01.2022).

Jacobs, J., (1961). "The Death and Life of Great American Cities" (*New York and Toronto: Random House*), 187.

Kaplan, S., (1979). "Perception and landscape: conceptions and misconceptions", *Proceedings of Our National Landscape.* (USDA Forest Service), pp.241-248, Nevada, USA, April 23-25, 1979.

Kaplan, S., Bardwell, L.V. and Slakter, D.B., (1993). "The museum as a restorative environment" *Environment and Behavior,* 25(6), pp.725-7 https://doi.org/10.1177/0013916593256004

Kayseri Old Photographs, (2014 a). *http://wowturkey.com* http://wowturkey.com/t.php?p=/tr641/Taskin_Cahit_10348224_10152918500623135_343743879 .jpg, (Accessed: 10 January 2022)

Kayseri Old Photographs, (2014 b). *http://wowturkey.com* http://wowturkey.com/t.php?p=/tr648/Mustaf29_Burhanettin_Akbas_eski_kayseri_04syf47270.jp g (Accessed: 10 January 2022)

Kayseri Old Photographs, (2014 c). *http://wowturkey.com* http://wowturkey.com/t.php?p=/tr412/Taskin_Cahit_ eski_001.jpg (Accessed: 10 January 2022)

Langston, C. (2008). "The sustainability implications of building adaptive reuse", *International Research Symposium on Advances of Construction Management and Real Estate* (In Proceedings of Criocm 2008) pp. 1-11, The Hong Kong Polytechnic University, Beijing, China, 31 October - 3 November 2008.

Milli Mücadele Müzesi 360 Virtual Tour (2022). *https://www.panoramakayseri.com/360/millimucadele/* Accessed at 30.01.2022.

Stamps, A., E. (2005). Isovists, enclosure and permeability theory. *Environment and Planning B: Planning and Design,* 2005, volume 32, pages 735-762.

Toptaş, R. (2020). *High School Structures During The Period Of Abdulhamid II. (With Examples From Turkey),* [in Turkish], Ph.D. Thesis, Pamukkale University, Pamukkale.

Turner, A., Doxa, M., O'Sullivan, D., & Penn, A. (2001). From isovists to visibility graphs: A methodology for the analysis of architectural space. *Environment and Planning B: Planning and Design,* 28, 103-121.

UNESCO (2001). *International Round Table on 'Intangible Cultural Heritage – Working Definitions'.* 14-17 March 2001, Turin, Italy.

Ünlü, A., Özener, O.Ö., Özden, T. and Edgü, E., (2001). An evaluation of social interactive spaces in a university building. *In Proceedings of the 3rd International Space Syntax Symposium* (Vol. 46).

Ünlü, A., Edgü, E., Cimşit, F., Salgamcioglu, M.E., Garip, E. and Mansouri, A., (2009). Interface of indoor and outdoor spaces in buildings: A syntactic comparison of architectural schools in Istanbul. *In Proceedings of 7th International Space Syntax Symposium (p. 132).*

Ünlü, A., Edgü, E., Şalgamcıoğlu, M.E., Çanakçıoğlu, N.G., Yılmaz, E.A., (2019). "Isometric Measurands On Perceived Spaciousness: Exploring volumetric isovist", *in 3D Perception, Proceedings of the 12th International Space Syntax Symposium,* Beijing Jiao Tong University Press, Beijing, P. R. China

Wineman, J.D. and Peponis, J., (2010). Constructing spatial meaning: Spatial affordances in museum design. *Environment and Behavior*, 42(1), pp.86-109.