

## The Tales of Two Sacred Buildings in Urban Pattern of a Transportation Hub: The Case of Üsküdar, İstanbul

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### Abstract

*Üsküdar is one of the oldest settlements in İstanbul dating back to the early Ottoman period and the primary transportation hub of the modern city. The area is at the intersection point of bulk sea transport and underground system besides heavy motor traffic and pedestrian movement. Being by-the-sea has supported the district's function in terms of transportation and recreation facilities. There is a great square, which is defined by significant historical monuments and underground stop entrances, allows considerable pedestrian flow through the area.*

*The aim of this study is revealing the changes in the urban form of Üsküdar throughout time and the effects of two constant sacred buildings as a significant role on users' daily lives today. For this purpose, firstly the morphological changes in the urban pattern of Üsküdar are demonstrated on the building and plot differences in the urban tissue and space syntax as a quantitative method is used to define the configuration of the urban structure in relation with the two monumental historical mosques. Secondly, the architectural structures of the two mosques examined as different systems from courtyard and surrounding of the buildings. According to this perspective, visibility graph analysis and related data sets on user behaviour are used. Moreover, the pedestrian movement pattern data in the area is collected in three different time periods during the weekday, weekend and also pray time on Friday. To conclude, this study combines different data sets, observations and analytical methods to explain the morphological character of the historic area and the influence of the Friday mosques on users' everyday life independent from their functional usage.*

**Keyword:** urban tissue, Ottoman Mosque, human perception, space syntax, İstanbul

### Introduction

This study examines the sacred buildings' configuration standing more than 3 centuries in rapidly changing urban tissue. It is valuable to understand where historical buildings positioning, not only in altering urbanization but also in users' cognition in everyday life. It is based on scrutinizing the usage of the two Ottoman mosques dated back to 16<sup>th</sup> and 18<sup>th</sup> centuries and their surrounding area in related with pedestrian movement and spatial configuration of the urban elements in Üsküdar. In order to accomplish this aim, the paper is divided into two parts. In the first part, the changes in the urban pattern of Üsküdar, in other words the street layout, and the location of the mosques in the urban grid demonstrated. The early years of Republican period maps used to explain modification of urban pattern since these are the most elaborate maps that show plot details and reflect late Ottoman period urban life. In the second part, the architectural structures of the two mosques examined as introverted systems and permeable cells. In both part, space syntax methods and tools used for addressing the scope of the study since space syntax is a theory of space

and a set of analytical, quantitative and descriptive tools for analysing the layout of space in different scales. By learning to control the spatial variable at the level of the complex patterns of space that shape the city, it is possible to gain insights into both the social antecedents and consequences of spatial form in the physical city or in buildings (Hillier and Hanson, 1984, pp.48-51). There is series of representation and modelling techniques has been developed for analysing spatial configuration and these techniques are mainly based on primary concepts, for instance, movement, visual perception and human occupation that provide a connection with physical space and users directly.

Üsküdar, the case area, is located in the Asian shores of the Bosphorus, İstanbul. It is well known with the shoreline, commercial zone and the structures such as old mansions, fountains and mosques from Ottoman period. Its critical position gives an opportunity to serve as a connection point between the waterway, roadway and railway transportation nodes and there is a vibrant commercial area with vivid pedestrian movement.

Üsküdar, named Chrysopolis in ancient period, is one of the historical cores and founded as an independent settlement from İstanbul around 7th century BC. Early settlers foresee its strategic location and build a port to keep the district as a link between hinterlands and the sea and also between Anatolia and Constantinople. Byzantines and Ottoman maintained this position and Üsküdar became an important commercial and residential centre (Dağtaş, 2010, p.30). Hence, Üsküdar's urban tissue is composed of a port, a square, commercial areas and living quarters that were started to form hundreds of years ago and transform until today.

### **The Changes of Spatial Configuration of Üsküdar**

A square and two intersecting main streets define the main axes of the neighbourhood. The one through the coastline called Paşa Limanı Street and the other from waterfront to the hinterlands called Hakimiyet-i Milliye Street (Figure 1). After the 1950s, even the rapid urbanization brought about by the industrial revolution interrupted the formation of old towns' foot traffic and one public area texture (Gehl and Gemzoe, 2001, p.13). As a result of the similar trends, the third artery called Selmani Pak Street extended and added into the area and creates a junction with previous two roads after 1930's (Figure 1). The urban pattern of the early year of the Republican period is shown in the Pervititch insurance maps considerably detailed. When compared with 1930 and the current situation, the square was enlarged and few buildings around it were demolished in time. On the other hand, the gardens and green grass fields in the inner parts of the area filled with residential blocks. Even the intervention to extend the square, the urbanized area is increased explicitly until today in the area. The area has a robust Islamic character since it is hosting several Friday mosques and religious buildings from Ottoman period (Figure 1). The most prominent mosques are namely Mihrimah Sultan and Yeni Valide Mosques.

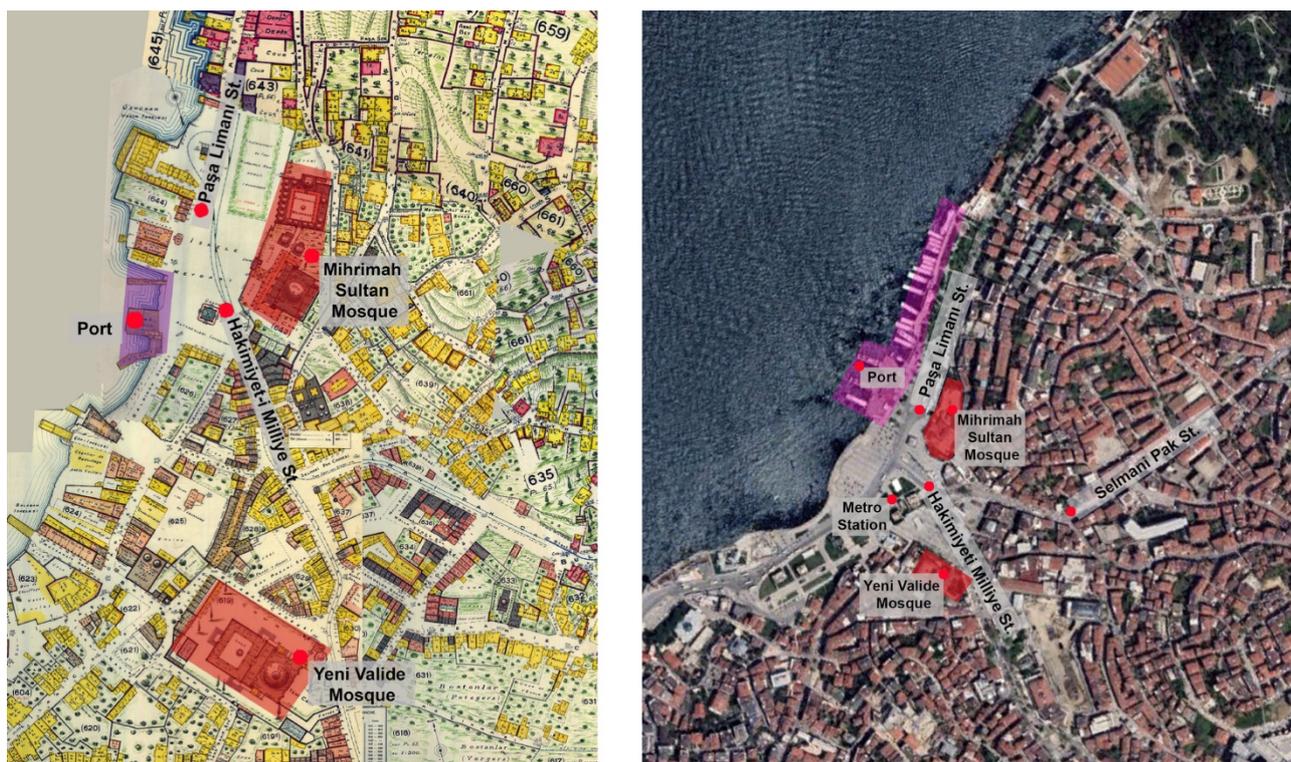


Figure 1. 1930 Pervititch map (left) and 2019 satellite image from Google Earth (right).

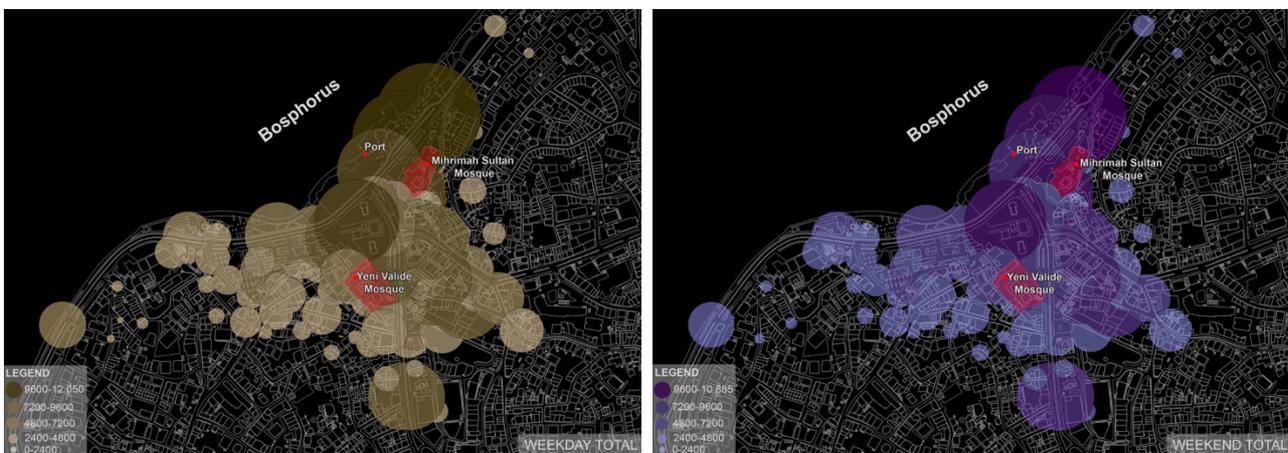
Üsküdar Square Project was started in 2004 in relation to the new underground line, called Marmaray, which links to the Asian and European side (Mega Projects İstanbul). The square enlargement project had been part of the transportation development plan that led by the İstanbul Metropolitan Municipality, turning the port and surroundings into a transportation hub. The project was very controversial since it compromises archaeological excavations, building demolishes and the coastline extension by filling area to add new bus stops, metro entrances and pedways. Moreover, the land-use units between Mihrimah Sultan and Yeni Valide Mosques were demolished to create a space for pedestrian movement.

The theory of the movement economy, built on the concept of natural movement, proposes that thriving space organisation in settlements first generates the distribution pattern of busier and quieter movement pattern flows, which then influence land use choices, and these in turn generate multiplier effects on movement with further feedback on land-use choices and the local grid as it adapts itself to more intensive development (Hillier, 2007, pp.125-127). The axial map is drawn by a set of intersecting lines through all the spaces of the urban grid so that the grid is covered and all rings of circulation were completed by GIS program then In DepthmapX software, axial lines are broken at their intersections to create a segment map (Figure 2). Segment angular choice measures used to demonstrate configurational changes of the area. It explains how many least angular paths lie between every pair of segments within a given distance and gives the angular distance is defined as the cumulative amount of angular change between all adjacent segments along the path (Hillier et. al., 2005, pp.475-490).



**Figure 2.** 1930 Space syntax analysis (NACH) and current space syntax analysis (NACH)

Collective activity of people gives rise to a pattern of use and movement that is independent of the intentions of the individuals. To demonstrate the movement pattern of Üsküdar, gate count technique was used which is suitable for recording observations of moving people in urban environment. To obtain an accurate picture of the pattern of movement, the gate locations were selected to be representative of differing spatial hierarchical qualities like well-used, moderately used and poorly used spaces. Pedestrian densities were observed in 95 gates within the area. Users passed from selected points were counted systematically in the morning (08:00-10:00), in lunchtime (12:00-14:00) and in the afternoon (18:00-20:00) during the weekday and weekend. According to movement flow data, the most used spaces are the port area and the two main axes called Hakimiyet-i Milliye and Selmani Pak Streets that go towards the inner parts of the district. The shoreline is also heavily used area. Marketplace is less intensive space when compared with the square but the results show more than the average trends. The map demonstrates that the mosques located in the densest part of the study area both during the weekday and weekend (Figure 3).



**Figure 3.** Pedestrian movement flow map of weekday total (left) and weekend total (right)

## The Role of Mosques' Courtyards on Movement Flow

In Ottoman period, Friday mosques were built for religious rituals as well as community purposes and affiliated with a foundation to serve (Kuban, 2017). Mihrimah Sultan Mosque was built in 1547 by Architect Sinan and it is a kind of Islamic social complex that includes a madrasah, hospice, primary school and fountain (Figure 4). The mosque has a narrow layout and it is sitting on a platform due to topographic obstacles. These features give a great advantage to the mosque to have a panoramic view over Bosphorus, thus makes the mosque yard a view terrace and a socializing area (Orman, 2005). Yeni Valide Mosque was built in 1710 with a relatively large circular courtyard (Figure 4). This makes it ideal for community to socialize and interact in an open space (Orman, T.S., 2013).

As cities modernize, social space moved from mosque yards to large, open spaces like squares. Hence, the mosque yards are always considered as a public space within the city, a place belonging to society and a property every community has equal right to use (Kostof, 1992, pp.125-128). Nonetheless, these spaces can be considered as nodes of the square and nodes that participate in urban life as transitional systems or used for direction finding, even become focal centres as meeting places, gathering places, crossroads or reference points (Lynch, 1960, p.47). These two mosques are like two systems in the Üsküdar square that work as all those urban elements stated by Kostof (1992) and Lynch (1960). In Ottoman times, these courtyards were considered as the main socializing spaces of the local community, since public squares would not often exist in Islamic cities' urban sphere so that the mosque yards functioned for it (Dağtaş, 2010, p.11).

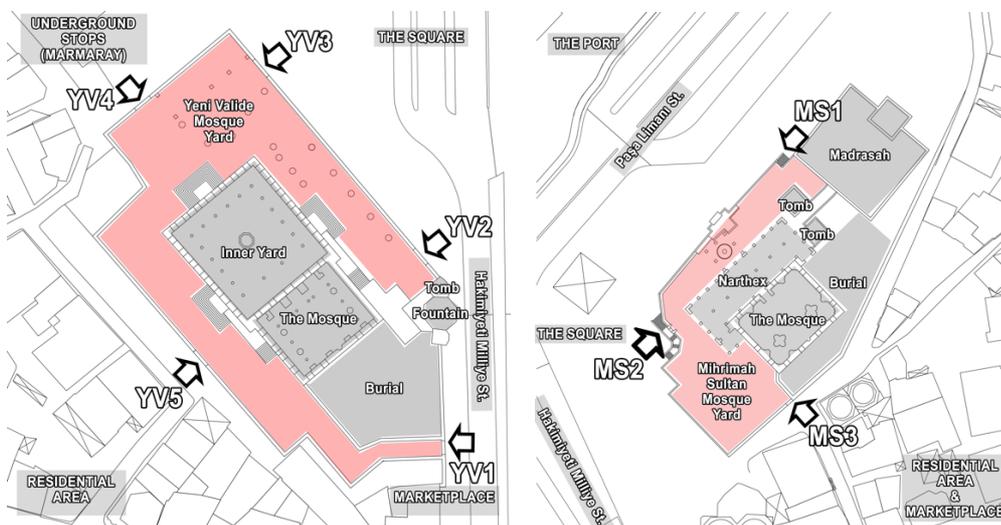


Figure 4. Plans of Yeni Valide Mosque (left) and Mihrimah Sultan Mosque (right)

Aforementioned mosques hold crucial socio-psychological and functional positions in Üsküdar Square today. Apart from being a social public place for hundreds of years, they are used as a transition point in users' everyday lives. To discover the way of these monuments' integration to urban life, isovist analysis and gate count method were applied. Isovist is defined as a set of all points visible from a given vantage point in space and with respect to an environment (Benedict, 1979, p.47). The shape and size of an isovist change with the

viewpoint's position. A set of isovist measures quantitatively defining when and at what rate different parts of the environment become visible to the observer, which parts are obstructed (ibid). In this research isovist maps generated by DepthmapX software. Gate count method demonstrates the socio-psychological pattern of pedestrians and the density of the movement. The data collected from mentioned methodologies for this study was analysed to understand the correlation between pedestrian density, user perception and spatial configuration. Choice analysis, isovist maps and gate count data analyses were brought together to observe how integrated the mosque gates are between each other and with their surroundings.

As it can be examined from the analysis on Figure 2, two main arteries of Üsküdar - Hakimiyet-i Milliye and Paşa Limanı Streets - are emphasized as the most integrated segments of the square. Paşa Limanı Street with a coastal path that has an alluring view of Bosphorus, and Hakimiyet-i Milliye Street with wide sidewalks and attractive shops, support the pedestrian movement and therefore support the analysis. The square's gate count map of total pedestrian movement on weekday and weekend consolidates this statement as square and surroundings are most dense areas (Figure 3).

The analyses demonstrate that the both mosques positioned in the core of pedestrian movement. Thus, to be able to understand the spatial relationship between the mosques and the square, gate count method was used on the 8 gates of the mosques and isovist maps are created. According to the gate count between 08.00-10.00, the general pedestrian density of the square seems low (Figure 5). Hence, the amount of pedestrians that use the mosques to have a through movement is low. This condition is accurate for all the three days. Although the general pedestrian traffic is low in the morning hours, few of the gates come into prominence according to the distribution of the overall number of pedestrians. Gate MS3 of Mihrimah Sultan Mosque and gate YV4 of Yeni Valide Mosque are used more frequently than other gates. At this juncture, it is essential to point out the position of the gates. If a pedestrian is approaching to the port from the east of Hakimiyet-i Milliye Street, Mihrimah Sultan Mosque is an impediment on their path. Pedestrians either need to make a circuit of the mosque or pass through it. The gate MS3 provides a passageway for the users and functions as threshold between hinterlands and port area. When users enter the mosque from MS3, they either choose MS2 to use Marmaray or MS1 to use the ferries or buses. Furthermore, according to isovist map (Figure 8) gate MS3 has a visual over MS2, so pedestrians more likely exit from here. Likewise, YV4 gate is located right next to one of the Marmaray stops. Thus, if pedestrians use this stop to exit Marmaray, they do not have to, but they can pass through Yeni Valide Mosque in order to reach the marketplace and the residential area in a short way. Pedestrians that enter from YV4 disperse to the gates YV1, YV2 and YV3 which are located on Hakimiyet-i Milliye Street and use the mosque as a shortcut. As it can be seen from the Figure 8, gate YV4 has the widest aspect over the yard, so this gives great advantage to the user to choose a direction.

In regard to Figure 6, the usage of the gates is fluctuating between 12.00-14.00. It was expected for noon hours to be excessive, especially on Friday due to the praying time, but the total number of pedestrians that

use the mosques is surprisingly the lowest. As the day of the week change, pedestrians' choice differ that they prefer one gate over the others. Nevertheless, the gates which located on the main artery of the square -YV1, YV2, YV3 and MS2- are the most occupied.

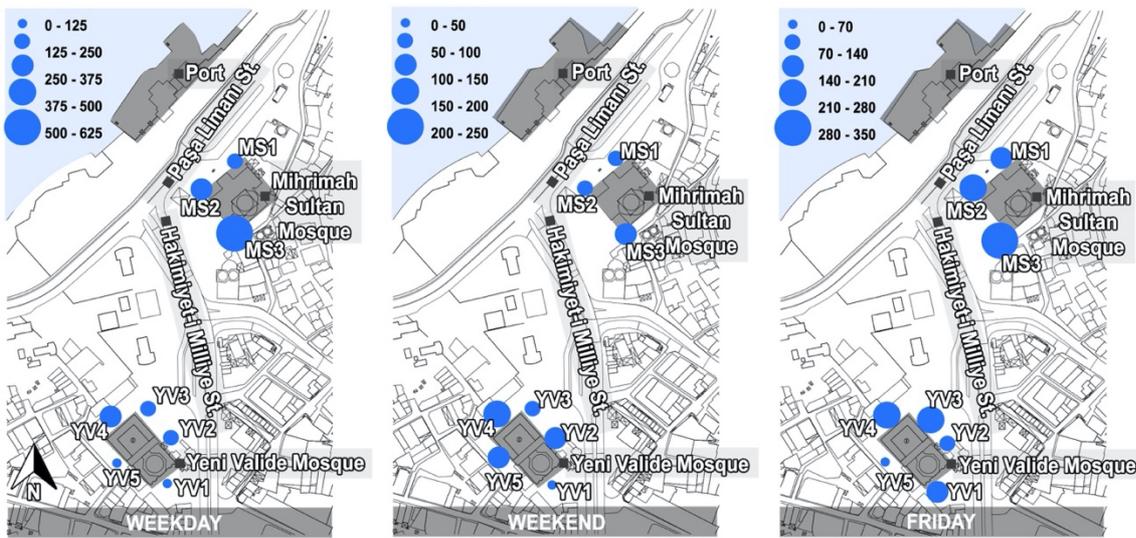


Figure 5. Gate count map of pedestrian movement of the mosques between 08.00-10.00

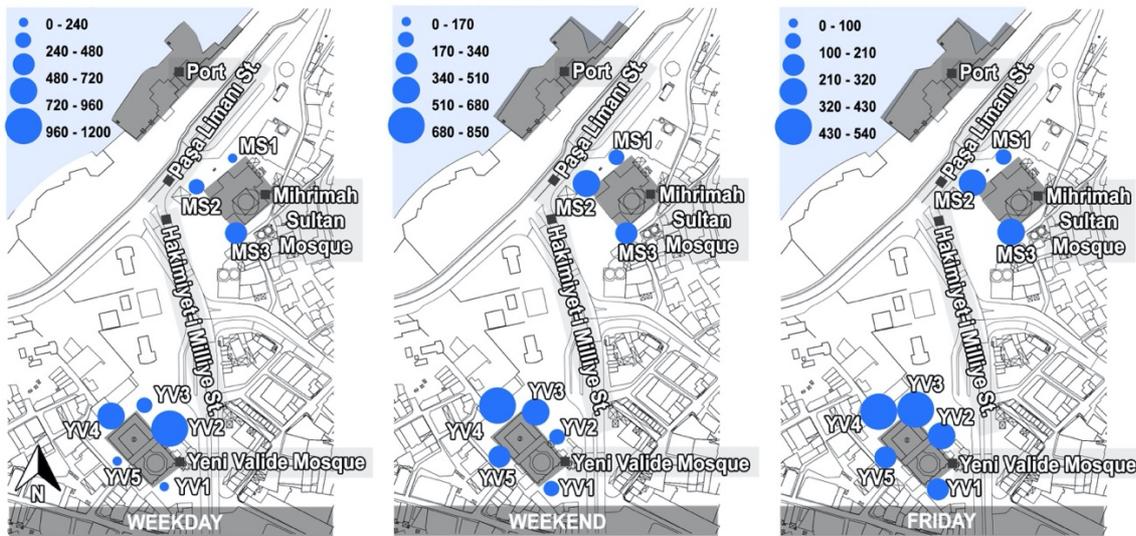


Figure 6. Gate count map of pedestrian movement of the mosques between 12.00-14.00

It is clearly seen on the gate count map that evening hours are the most engaged time of the day (Figure 7). Almost all gates are actively used. The gates YV1, YV2, YV3 and MS2 are frequently used because they are legible from Hakimiyet-i Milliye Street. Here it is important to point out that walking behaviour of pedestrians determines the density of usage of the gates, because pedestrians only use these gates if they already know which gate to exit. If they approach from the south of Hakimiyet-i Milliye Street, they either exit from gate YV4 to reach the Marmaray stop and west of the coast line or from gate YV5 to continue their walking through back streets of the square. According to the isovist map of Yeni Valide Mosque (Figure 8), all gates have a broad view over the court yard except YV1. So, the trail from YV1 is created from the experimented walk and

this condition clarifies that pedestrians using the YV1 assuredly know their destination gate. On the other hand, if pedestrians are using the gates YV2 and YV3, they would either know where to exit or they would be influenced by other pedestrians. In addition to this, gates YV2 and YV3 are positioned on the most integrated areas of the mosque yard, so the pedestrians manage to route themselves instantly. As the isovist maps explain as in the Üsküdar case, the two mosques' gates offer different lines of sight for the pedestrians and also create new possibilities for their through movement.

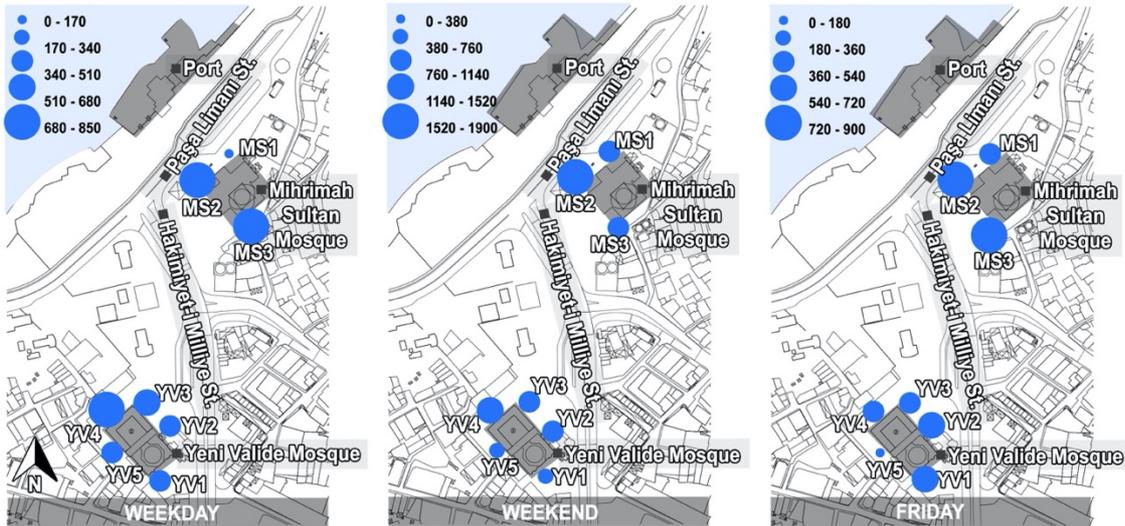


Figure 7. Gate count map of pedestrian movement of the mosques between 18.00-20.00

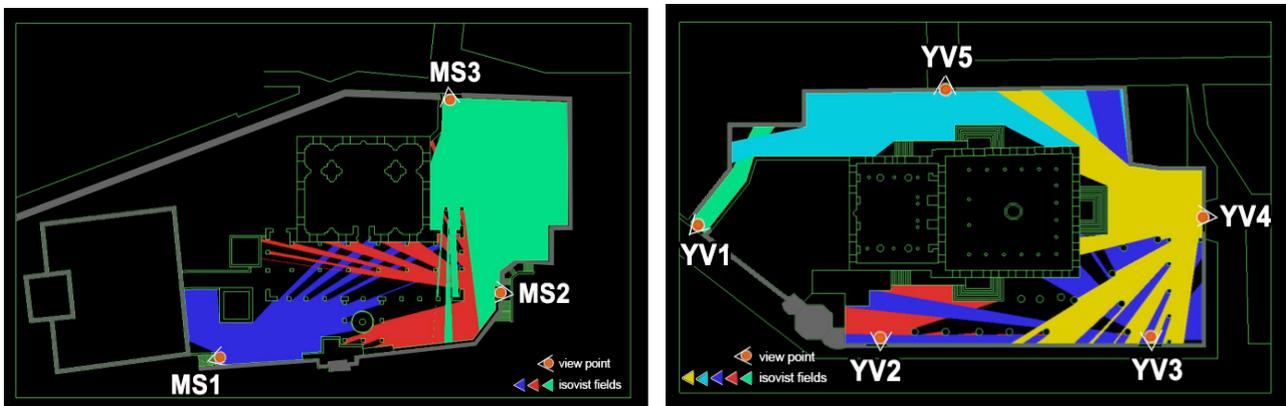


Figure 8. Isovist fields from the gates of Mihrimah Sultan Mosque (left) and Yeni Valide Mosque (right)

## Conclusions

This study evaluates the historical buildings, apart from their primary functions, as a part of the daily lives of the users and as an important element on urban pattern through quantitative analysis. It is believed that the findings and all the numerical data that had been gathered contribute to understand not only the permeability of the introvert monuments such as mosques, but also the connection between pedestrian perception and space syntax methodology. Thus, in this project it is shown that the architecture of the building; in this case, the gates of the mosques by creating shortcut possibilities, are serving the movement

patterns of the area and shaping the form of their close environment. This shows that when analysing the morphological structure of an area, it is also essential to consider the architecture of the characteristic buildings that shape the human behaviour and environment. Buildings with proper typology like mosques with a yard, become part of urban pattern and serve to mobility of pedestrians. That is to say, architecture and urban design cannot be separated from each other, and historical buildings can gain a seat in contemporary urbanization plans. The findings of this study establish nonconventional point of view to the sacred buildings and could open new horizons on future research into spatial configuration and pedestrian perception. For further studies, the perception of the gates, that offer shortcuts through the mosque yards, from the square, the metro stops and the port can be observed.

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