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A MULTI-LAYERED ANALYSIS OF URBAN TOPOGRAPHY: GALATA DISTRICT, ISTANBUL

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Abstract

The article investigates '*urban topography*' as a multi-layered structure by referencing two studies performed by *John Ruskin (Modern Painters, Volume IV of V, 1856)* and *Eugene Viollet-le-Duc (Mont Blanc, 1876). Modern Painters Volume IV of V and Le Massif du Mont Blanc* were focused on the structural anatomy of the mountainous landscapes of the Alps in Switzerland. The main idea of these studies was *'the necessity of analyzing anatomy to understand the surface form of the earth*'. In this article, the viewpoint generated on the structural anatomy of mountains is applied to urban topography in two categories: '*The natural topography*' and '*the human topography*' to be analyzed in three layers regarding the complex nature of the city: '*the ground, the underground and the underwater*'. The aim is to reach a comprehensive urban topographical depiction of the city as a whole in the 21st century, together with its overlooked physical realities. Galata district in Istanbul (Turkey) is decided as the case area due to its multi-layered urban structure that is in a continuous accumulation since ancient times. Analyses are performed with topographical mapping, urban sections and urban diagrams by overlapping of current satellite images, historical maps and urban plan of Galata.

Keywords: Urban Topography, Galata, Istanbul, Ruskin, Viollet-le-Duc

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INTRODUCTION

Urban topography is an interdisciplinary study of the form, fabric and layout of cities, drawings on documented history, cartography, geography, urban planning, architectural history and archaeology. Geographers often refer to it as urban morphology, or more simply as urban form ("Urban Topography"). In urban planning and design, landscape architecture and architecture disciplines, urban topography generally considered as a complementary instrument in research and practice. Although there has always been a continual production on urban and topography relationship, '*urban topography*' as a research interest has never been a mainstream focus as urban transformation, urban sociology or urban economy.

The relationship between *urban* and *topography* relates back to the cosmic interpretations of ancient cities that topography was the most important criterion regarding location, orientation and construction. Settlements were generally built on southern slopes of hills and organized as harbour cities according to the social and economic productions that provided between seas and rivers. In the Medieval Age, the radio-centric settlement system was typical with converging lines and circular borders. Defensive walls, church towers and spiral streets were basic elements of this age as a reflection of the heavenly world view imposed by the church. Between the 15th and 18th centuries, the uniform and centralized perspective of baroque effect left its mark on cities as a reflection of the authority and power of worldly rulers. Contours of terrain were levelled and transformed into straight street plans, geometrically arranged gardens, infinite boulevards and quadrangle squares (Mumford 1961). With the French Revolution, republican ideas began to have an impact on the city. Urbanization was organized due to the relationship between topography, traffic, monuments and public buildings. However, the emergence of new powers, industries and overseas colonization led to an uncontrolled expansion of the city. At the same time, the rise of capitalism was turned the city into a commodity by ignoring its character, topography and socio-cultural structure. With the 19th century, railway transportation, factories at the city centre, suburbs and patchwork lands became the most important urban issues. In addition, the invention of the elevator allowed skyscrapers to be built and the city began to grow vertically too. The industrialization also created the underground city with electricity, gas and plumbing installations. But the most important contributions were underground tunnels and subways (Mumford 1961). Then with the 20th century, alongside post-war utopias, iconic built structures of modernism, ecological approaches, tectonics and studies on urban form; topography was a supportive instrument for the mainstream urbanization agenda. There were studies that generally based on building-topography-landscape relationship (i.e. *Pikionis, 1989, Sentimental Topography. Leatherbarrow, 2004, Topographical Stories*) but not specifically in urban context. With the beginning of the 21st century, a tendency towards 'a multidisciplinary understanding from information to urban scale and mapping of geographies' has started (Guallart 2008). Today, there is a multidisciplinary interest in urban scale with increasing use of digital modelling techniques, mapping and geographical data (i.e. Cartographic *Grounds, Desimini & Waldheim 2016*). Specifically, for urban topography, studies usually focus on one single component such as solely the cultural layers of the city, land formations, organization of iconic buildings or two dimensional urban plans with use of different cartography and mapping techniques to indicate and verify data in a conventional way. However, these studies do not depict a comprehensive urban topography of the 21st century city as a whole with its all extensions.

Today, at the age of Anthropocene; cities are formed with various constructions, networks, infrastructures, superstructures and digital technologies that are

considered as needs and signs of a civilized life. This way of living brings a multi -layered expansion with new urbanized areas towards the ground, the underground and the underwater layers of the city in its given landscape. Then, what is the topographical depiction of a 21st century city? Is it still the structural theme of hills, valleys and rivers or is there a more complex structural whole? What kind of a structure does a constructed earth fragment display in the 21st century as an integrated and a complicated physical reality with human impact? While mainstream urbanization agenda currently dealing with a global pandemic, urban transformations, renewals, climate change, smart technologies, ecological issues and so on, these questions may give another point of view to look at our constructional relationship with the earth fragments we settled and articulated as human beings.

In this article, *urban topography* is depicted as a multi-layered structural whole like an anatomical description of the city. The main approach is generated from two studies performed in the late 19th century. These were treatises on anatomy of the mountainous landscapes of the Alps: *Modern Painters Volume IV of V (1856)* performed by the critic John Ruskin and *Le Massif du Mont Blanc (1876)* performed by the architect Eugene Emmanuel Viollet-le-Duc. John Ruskin studied the Alps through the eyes of a geologist as well as a painter and described surface of landscape anatomically (Gamble 1999). He offered a clearer conception of the real look and anatomy of the Alps in *Modern Painters Volume IV of V*. He used perspectives and sections in different angles by depicting the structure together with its geological and plant cover texture in a detailed way (Figure 1). Then completed the structure like a template of an anatomy. He also explained the role of mountain in the organization of cities with Greek and Italian intellectual lead that mountains are always form the principal feature of the scenery in cities like Sparta, Corinth, Athens, Rome, Florence, Pisa and Verona. For example, Greeks' placing the shrine of Apollo under the cliffs of Delphi, and his throne upon Parnassus Mountain, was a testimony to all succeeding time that they themselves attributed the best part of their intellectual inspiration to the power of the hills. However, for Ruskin, the mountains were out of the way of the intellectual pursuits (best schools, best society) that rise and flourish with the position of a city, within its walls and distinction of its streets.

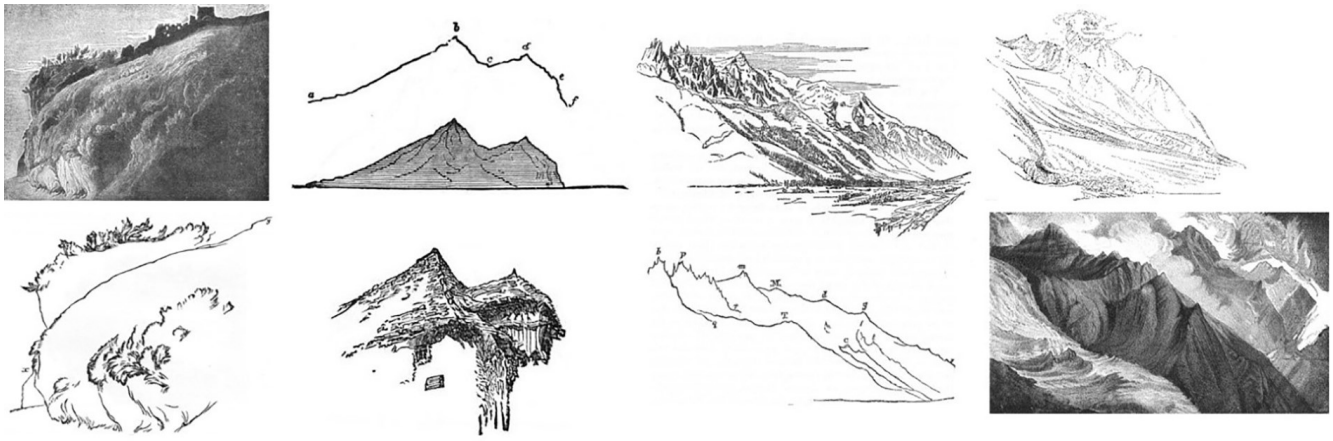


Figure 1. Sample drawings on forms and sculpture of Chamonix and Mont Blanc. Ruskin, 1856, *Modern Painters, Volume IV of V.*

On the other hand, being aloof from the scientific developments in engineering and architects' drawing inspiration from scientific fields in the 19th century, the architect Emmanuel Viollet-le-Duc was inspired by the structural network of Mont Blanc to develop an architecture based upon crystal forms, employing lifelong observations into mountain forms as his chosen method of research Viollet-le-Duc 1877). According to him, an analogy can be drawn by drawn between architecture and the laws of nature ("The vision of an architect"). He

measured the non-measurable Mont-Blanc, like an anatomist examining the human body by providing a structural physiology (Bressani 2003). He analysed Alpine topography and explored the structure by showing the surface with his observations, drawings, 112 sketches, mappings and a map of Mont Blanc (Gamble 1999) (Figure 2). He as the architectural theorist did not only employ geographical concepts and methods, but also practiced as a geographer in documenting natural phenomena (Gissen 2008). According to Viollet-le-Duc, the cities were constructed ex novo and his perception on cities possessed precision and methodological rigor (Rossi and Eisenman 1982). Both Ruskin and Viollet-le-Duc used observation method in their studies. They draw maps, sketches, sections, perspective views to learn how to observe objects with precision and exactitude, and to discover the deep structure of things as a discipline in which anatomy and drawing overlap, in which science and art are in harmony. Their drawings and paintings of the Alps provided a historical, geological and anatomical record of mountain landscape of the 19th century (Gamble 1999).

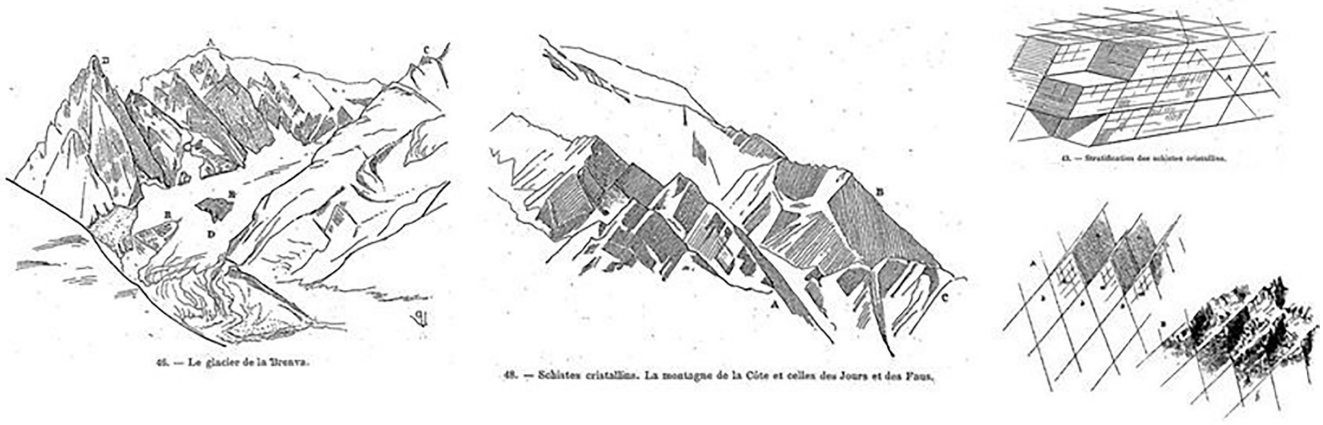


Figure 2. Sample drawings on glaciers, crystallines, rhombohedric compositions and stratification of Mont Blanc. Viollet-le-Duc, 1876, *Le Massif du Mont Blanc*.

It may be unusual to apply these studies on mountainous landscape of the Alps in the 19th century to the multi-layered structure of today's urban topography. However, their distinguishing ideas that *'the necessity of analysing anatomy to understand the surface form of the earth*' and 'discovering the deep structure of things' can form the basis of this study with drawings of maps, urban sections and perspectives. Then with completion of the urban topography like a template of an anatomy just as Ruskin and Viollet-le-Duc did, the applicability of these ideas from mountainous landscapes to urban topography can be tested. The aim is to depict a multi-layered urban topography of the 21st century city as a whole by extracting new topographical information and exploring the overlooked characteristics of the city.

The mountainous landscape of the Alps was studied as a one single natural phenomena by Ruskin and Viollet-le-Duc. But in this article; the multi-layered structure of urban topography studied in two parts as '*the natural topography'* and '*the human topography'*.

The '*natural topography'* comprises depiction of the bare physical conditions of a settlement in terms of countries, geographies, regions, landscapes and settlements which displays multi-optional layouts and potentials for settling. It helps to understand the deep structure of the natural conditions of a settlement and its internal logic for settling. The '*human topography'* comprises constructed formations formed with built structures in the city such as buildings, streets and transportation networks that processed during the creation of urban pattern and a cutting-linking relationship between different layers of the city. Both the *natural topography* and the *human topography* are analysed in three layers as

'ground, underground and underwater (undersea)'. Because today, in addition to the ground layer, also the underground and the underwater layers of settlements are urbanized too.

For the case study, Galata district in Istanbul is chosen due to its multi-layered urban topography which is in a continuous accumulation since ancient times.

THE CASE: URBAN TOPOGRAPHY OF GALATA DISTRICT IN ISTANBUL

Galata is one of the ancient settlements of Istanbul. It is a part of Beyoğlu district at the European side of the city and positioned next to the Historical Peninsula, opposite to Kadıköy, Üsküdar and surrounded by the Golden Horn and Bosphorus.

Galata was an important harbour and trade centre in the Mediterranean world during the ancient Byzantium, Byzantine and Ottoman Empires. It started to develop as a small ancient settlement next to Byzantium and in time, transformed into a well-developed urban settlement by Genoese as the 13th Regio of Constantinopolis (see *the map of Christoforo Buondelmonti, 1422, the Notitia Urbis Constantinopolitanae, 5th century*; Seeck, 1876 and *the map of Matrakçı Nasuh 1522*). Until the end of the 19th century, Galata was a well-preserved urban settlement with its neighbourhoods and housing typology divided into five parts by the subsequently added inner and surrounding walls (Eyice 1969). In the 20th century, serious demolition and fillings were carried out to open wide streets for pedestrian and vehicle traffic. These actions caused strict changes in the topography of Galata. Some important urban spaces such as Tophane Square and its harbour were vanished. Only Karaköy International Seaport and its surroundings were left in use for sea trade and touristic functions (see *the maps of Goad 1905, Pervititch 1927, Müller 1977*). After 1988, the harbour area was closed to cargo ships and Karaköy International Seaport continued to function only as a touristic maritime business. In this case, some of the buildings lost their function over time and the neighbourhood is isolated. With the 2000s, there is an increasing vivacity in the neighbourhood is seen in parallel with an ongoing urban transformation process which is a controversial debate based on the recently finished Galataport Project. Today Galata has a cosmopolitan identity with its restaurants, cafes, art galleries, mosques, orthodox and catholic churches, schools, hospitals, contemporary exhibition centres, museums, international seaport, fish bazaar, hardware bazaar, craft shops, small industry, red light district, wharfs, sea trade and banking business.

Topographically, Galata has the same pattern with other parts of Istanbul: A graded order from sea to coastline, then to valleys and the hilltop. Buildings, streets and transportation networks contribute and modify this configuration as human components. Specifically, there are two properties of Galata giving it a unique character. One is natural, the other is human: The *natural harbour* characteristic and the *tower-centered radial settlement structure*. Galata is a typical Mediterranean harbour settlement built by Genoese and expanded in centuries with buildings, defensive walls, constructions, demolishment and sea fills. This structure forms the current urban topography of the settlement today.

This article will discuss the relation of these two characters in respect to original settlement structure of Galata by tracking footprints and remains of the defensive walls.

The Natural Topography of Galata

The centre of Istanbul is a specific location at the sea which is the intersection point of Marmara Sea, Bosphorus and the Golden Horn (Yürekli, n.d.). It is surrounded by four land pieces and one of them is Galata.

Galata is an ancient settlement of Istanbul positioned at the edge of a body water. It is reached along the deep and wide valley structure of the Bosphorus (Figure 3). It has a hilly topography with steep slopes towards sea in west, south and east directions. Characteristically, it has a *'natural harbour structure'* due to the underwater topography in here which is quite suitable for big ships to dock. Also, Galata is the only place in Istanbul with an adequate width for big ships to manoeuvre and its open connection with Marmara Sea. This characteristic shapes the settlement structure and daily urban life on the ground that displays itself with an international seaport, wharfs, fish markets and restaurants, fishing activities both on the coastline and Galata Bridge, city line ferry ports, maritime business and Galata Tower that based on coastline, slopes, valleys, ridges and hilltop.

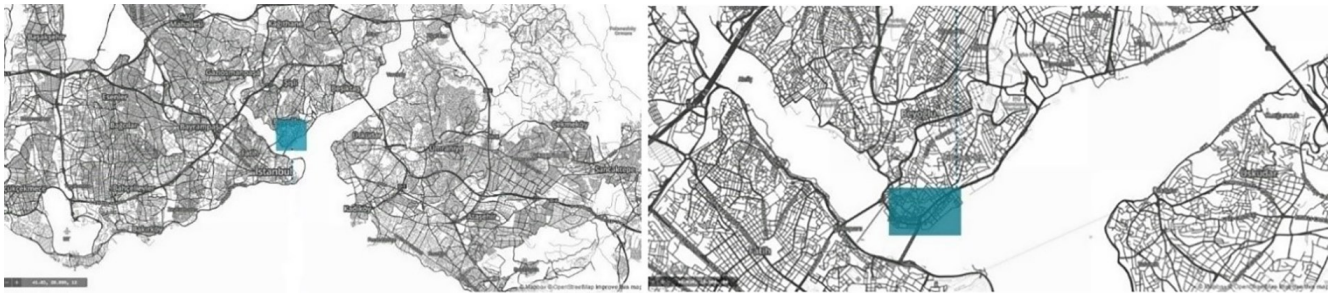


Figure 3. Galata, 2021 (source: Open Street Map).

In *Le Massif du Mont Blanc* (1876), Viollet-le-Duc depicted innumerable gorges, valleys, and basins which extend from the Alps to the Mediterranean, the North Sea and the Adriatic, as an area of influence. This was his configuration to explore the mountainous landscape of Mont Blanc from the summits of mountains to the sea level in different geographical directions. By referencing to his depiction, the natural topography of Galata is depicted from its hilltop to the underwater in a detailed way:

Galata is commonly perceived as a land formation which ends when it meets with Bosphorus and the Golden Horn. However, it is a multi-layered topographical formation that receives some of its physical references from outside of its borders, from the hilltop to the undersea. According to bathymetric researches, the underwater topography of Galata is formed with ridges, hollows and valleys (Artüz et al. 2007). The maximum depth of the water reaches 40 meters (the intersection point of Marmara Sea, Bosphorus and the Golden Horn). The area provides open connection to the sea (Alpar, Burak, and Doğan 2005) (Figure 4). The hilly formation on the land can be traced under the sea, down to 40 meters deep. The underwater layer has natural harbour characteristic as there are not any cliffs preventing ships from docking. From the wide plains and hollows of 40 meters depth a rhythmic increase starts with valleys and ridges towards coastline.

The ground and the underground topography of Galata start with a convex coastline curve. Here, the land juts out into the body of water and there is no boundary circumscribing the water that surrounds it, so the line of vision is continually directed outward (Ashihara 1983) (Figure 4). The length of the original coastline curve reaches 2 kilometres according to the measurements performed

with overlapping of the topographical map of Schneider and Nomidis (1944) over current satellite images and urban plan of Galata. On the coastline, the slope reaches to 5 meters in maximum smoothly from sea level according to the contour lines in urban plan of Galata. This appropriateness of the slope and being at the edge of the sea makes the coastline of Galata a place of many interactions such as continuous transformations, constructions and fills. Towards the hilltop, the slope starts to increase and three ridges become more apparent. The ridge on the west side has more upward slopes according to the east side. While the slope reaches 7% until 15 meters from the coastline, it changes between 10% and 20% from 15 meters to 48 meters (Galata Tower) (Figure 5). This increase towards the hilltop create unique viewpoints on the natural landscape of Galata, especially towards the entrance of Marmara Sea and the Historical Peninsula.

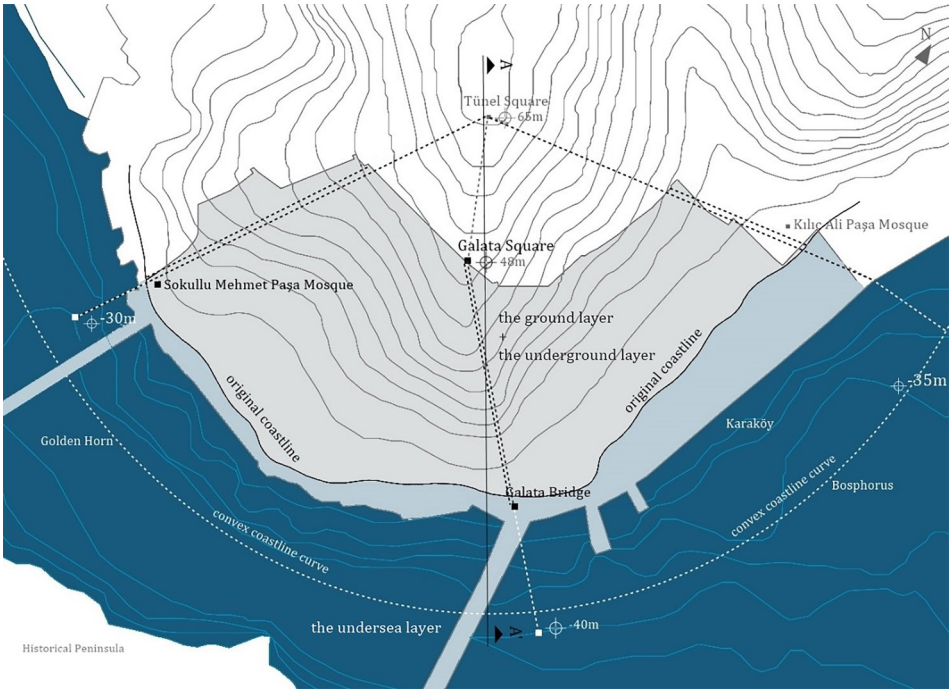


Figure 4. Mapping of the natural topography of Galata. Scale: 1/10000. The contour lines of the underwater topography are provided from 'Environmental and Hydrological Management of the Golden Horn Estuary, Istanbul', Alpar, Burak, and Doğan 2005.

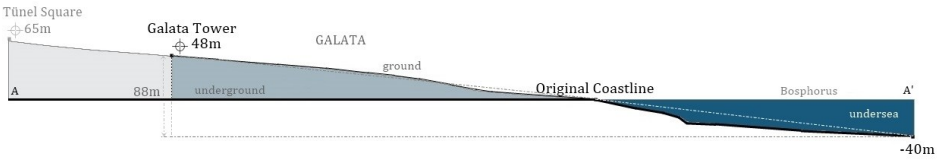


Figure 5. AA' section (shown in Figure 4) depicting the layers of the natural topography of Galata.

On the hilltop, three ridges merge by forming a curvy plain at the 65th meters. The hilltop constitutes a reference point at the north as the study area is limited with Galata Tower at 48th meters (Figure 4). Together with 40 meters bathymetric depth, there exists a complete hilly structure reaching 88 meters which is not considered for the natural topography of Galata so far. In the case of Mont Blanc, Viollet-le-Duc depicted a higher plateau as a bossed surface supported by the slopes, more or less abrupt. This depiction is also valid for Galata: The hilltop and the 48th meters (the location of Galata Tower) are dominant features of the landscape with ridges, valleys and slopes. This condition gives possibility to bird's-eye and panoramic views of Galata and its environment.

In general, the natural topography of Galata depicts a truncated cone structure based on three spinal ridges from the hilltop to the lowest point in the

underwater layer. The main spine at the middle follows a ridge connecting the highest point (the hilltop, 65 meters) to the lowest (underwater, -40 meters). In this defined area, Galata occupies the middle part between the hilltop and the underwater, the north and the south. The two other spines form the natural borders both at the east and the west (Figure 6). Here, is a highly elevated but not a compelling place for settling. It has an open topography both in proportions and perspectives. Suitable areas to consider urbanization of Galata exist in the underwater, on the coastline, on the location of Galata Tower and on the hilltop. These areas are linked with each other via valleys and they have suitable conditions to be considered for dynamic uses such as underground metro stations, public places or maybe even for an underwater use during urbanization processes.

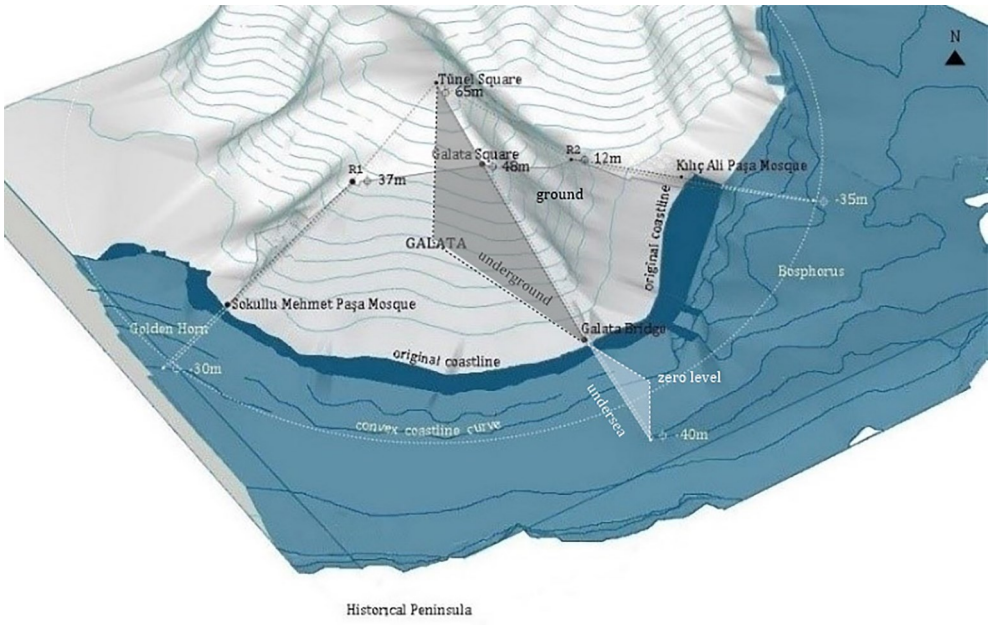


Figure 6. The natural topography of Galata and its layers in 3d view.

The Human Topography of Galata

The human topography of Galata is based on its 'natural harbour characteristic' and structured with 'constructions, excavations and fills in the inner parts of valleys, coastline and other lowlands' (Artüz et al. 2007). The spatial structure and organization of the human topography of Galata have determined by its natural topography as a geomorphological structure. Galata has a sea oriented and a 'tower-cantered settlement structure' that spreads with a linear disperse from the hilltop to the sea and the underwater layer in a conical formation. Three spinal ridges form the main skeleton of the settlement and main transportation routes with staircase narrow streets. While the floors of valleys are used for economical purposes (banking business, sea trade), the slopes are used for residential uses. All spatial and organizational functions of Galata open towards Bosphorus and the Golden Horn. Buildings, remains of the defensive walls, coastline, Galata Bridge, Haliç Bridge, Galataport (former Karaköy International Seaport), cruisers, wharfs and daily boat traffic form the current settlement structure in three layers:

The underwater topography of Galata does not have an urbanized character. However, it forms the basis of an animated (or a non-permanent) urban topography on the sea surface that cruisers, ferries and fishing boats can dock, come and go. At this point, the underwater layer has a conveyor function for that animated urbanization on the sea surface. Sometimes, cruisers in front of the

international seaport dominate urban topography of Galata and this situation creates a new scale (Debold-Kritter 2010). If conditions of the underwater topography would not be suitable, this kind of an animated urbanization would not be possible for the sea surface and the coastline.

The ground topography of Galata starts with the coastline: Wharfs, streets parallel to coastline, infills, maritime buildings, Galata and Haliç Bridges, Galataport (former Karaköy International Seaport), Karaköy Square and 6-8 floored buildings stretch up to Tersane Street. Here, streets and passages which open towards sea create both a spatial and a visual relation with the sea and let the sea breeze permeate through the inner parts of the settlement. By referencing the original coastline contour in the topographical map of Schneider and Nomidis (1944), today's coastline is an infill structure stretching towards the Golden Horn and Bosphorus, in which the distance with the sea varies, reaching to 120 meters at some places (Figure 7). Unfortunately, these infills have distanced the original coastline contour and its former references which were consciously built to accent the coastline topography such as harbour gates, ports, wharfs and mosques. Now, these elements are disconnected from the sea because of infills and subsequently added building blocks. The infills have also advanced Galata into the sea and increased its area. So the filled coastline of Galata today is accented by city line ferry ports, Haliç Bridge, Galata Bridge, Galataport and a green void area.

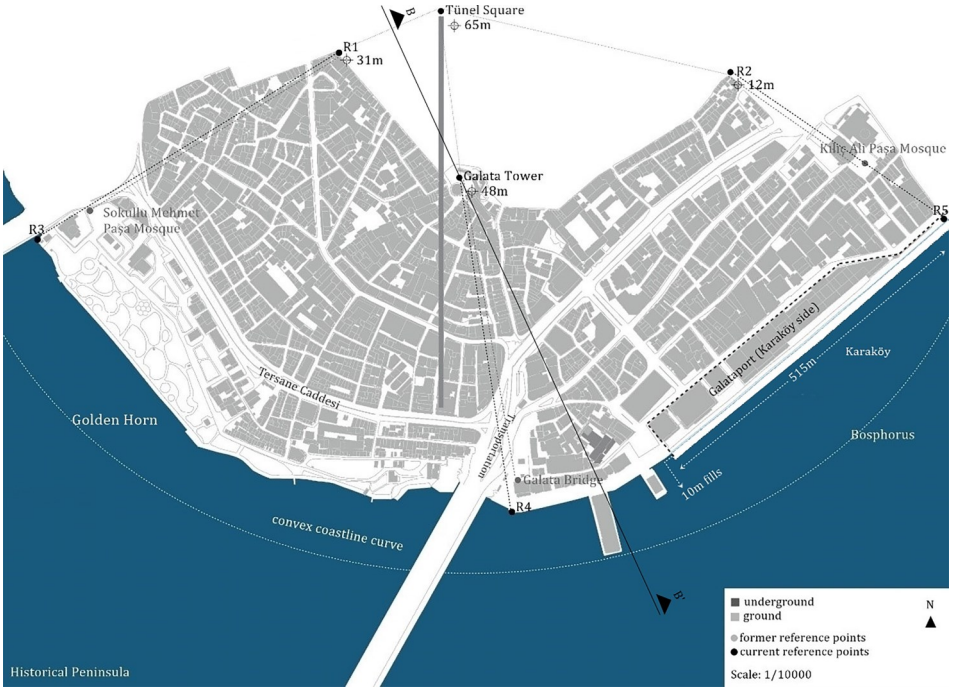


Figure 7. Figure-ground analyse of the human topography of Galata. Scale: 1/10000.

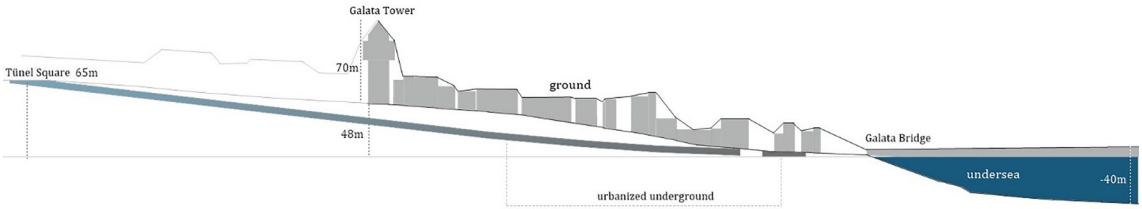


Figure 8. BB' section (shown in Figure 7). Scale: 1/5000.

On the Golden Horn side of the Galata Bridge, buildings positioned with 10 to 120 meters distances to the sea. These distances form a spatial openness at this part of the coastline. For Karaköy side of the Galata Bridge, coastline fills reach 20 meters at most. In contrast to the Golden Horn side, buildings start just at the edge of the sea with 24, 18, 9 and 12 meters heights. This sudden increase in height at the edge of the sea blocks physical interaction and visual relation with the sea and penetration of sea breeze into the inner parts of the settlement in contrast to the Golden Horn side. This situation also points an evident change in proportions and the complete topography of Galata (Figure 8). The levelled ground between the sea and Bankalar Street - Kemeraltı Street line functions as a busy transfer point for several modes of public transport. Transportation routes are adjusted according to the footprints of the defensive walls and contour lines, as streets parallel to the coastline that connect Galata to Beyoğlu and Historical Peninsula. Towards the hilltop, the settlement pattern is entirely fitted to the condition of the natural topography. On each one of the three ridges, streets run uphill in the north-south direction. Yüksek Kaldırım Street is the major street connecting the coastline with the hilltop, passing by Galata Tower and Square. The slope of the street is 24% and the width varies between 4 and 6 meters (Kayaoğlu et al. 2014). Upper contours of Galata do not have strict changes in the existing topography due to high slope that makes construction and transportation difficult. Dense settlement structure with narrow streets and dominant building heights with subsequently added upstairs create closure and block some of the viewpoints in here. However, rooftops display unique views of Istanbul's urban landscape. At the 48th meters slope, Galata Tower and its square positioned as the urban limit of the study area at the north. Galata Tower as one of the important urban landmarks of Istanbul commands not only to Galata but also Istanbul's very strategic geography that controls Marmara Sea, Bosphorus and the Golden Horn like a watchtower by befitting to its harbour settlement character. It defines an evident verticality in its environment. It has 70 meters constructional height and reaches to 118 meters from sea level together with the landform. Despite not being positioned on the hilltop; it forms a topographical peak with this height overshadowing the hilltop at 65 meters slope. It also constitutes the centre of the radio-centric settlement structure and connects with coastline and sea via narrow staircase streets. The tower is surrounded with Galata Square, defined by buildings and narrow streets. Because of the conical form of the hill the buildings display a very tight knit pattern that they form narrower building blocks than the buildings on the coastline. So that a 4.5 meters wide street that surrounded by buildings in 18m high and 4.5 meters wide, forms the typical pattern here (Galata Kulesi Street) in comparison to a 15 meters wide street on the coastline that defined by buildings in 25 meters wide (Bankalar Street) (Figure 9). In this narrow pattern, Galata Square constitutes an important public space towards the hilltop and depicts a typical Italian square characteristic (Figure 10). It has a half-circle shape with 18 meters radius from the tower to the encircling buildings.

The underground layer of Galata includes two urbanized spaces that extend the settlement's structure: Yeraltı Mosque and Karaköy Tunnel. Yeraltı Mosque is the only building constructed approximately 6 meters underground of Galata on the coastline. Originally it was a citadel positioned just at the edge of the sea to protect the entrance of the Golden Horn. It was an important topographical reference on the coastline but now it is 50 meters inland from the sea because of the infills for streets, wharfs and new building plots related with the port (Erkal 2011). Today Yeraltı Mosque has no connection with the sea and surrounded by buildings. The other component; Karaköy Tunnel is a railway transportation network that passes on a ridge by connecting coastline to the hilltop with 10% slope and 550.80 meters length. The railway station is 1.15

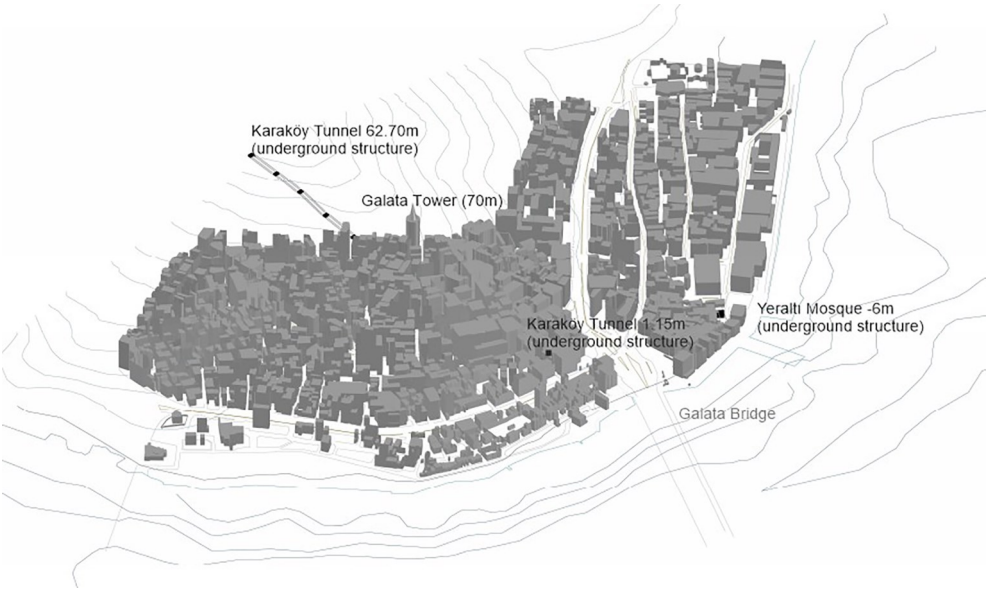


Figure 9. The human topography of Galata in 3d view.

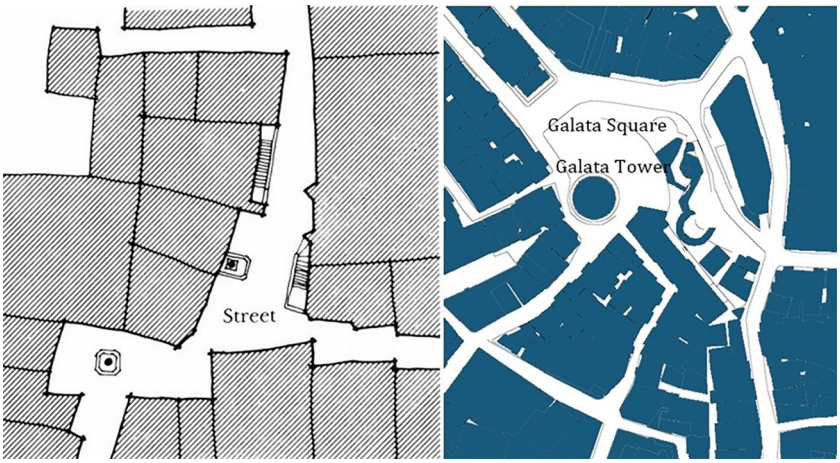


Figure 10. (left) Italian townscape with no leftover space between streets and buildings (Ashihara 1983). (right) Urban pattern of Galata Square, İstanbul.

meters above sea level at Karaköy Station and 62.70 meters above sea level at Tünel Beyoğlu Station. Slope difference between the two stations is 51 meters (Kayaoğlu et al. 2014).

In general, the settlement structure of Galata has developed according to its natural topography that unavoidably orients the settlement towards sea. The organization of the settlement is mainly based on three spinal ridges. These ridges form the transportation network and connect upper contours of Galata with the sea level. Due to the fact that the land sloping to the sea has hard geological formations, it is seen that the streets sloping to the sea are arranged as staircase streets (Çöl 2011). The main ridge in the middle forms the basis of Yüksek Kaldırım Street as one of the main arteries of the settlement. It connects Galata Tower (highest point) to Galata Bridge and to 40 meters depth in the undersea layer by acting as the geomorphological spine it is (Figure 11). Built structures dominate the landscape and create evident changes on the complete structure of the settlement. For example, Galata Tower constitutes the new hilltop, the underground constructions and the coastline fills increase horizontality and verticality of the settlement. There are no convenient transportation axes and monumental architectural structures in Galata because of the hardness of topography. Nevertheless, a busy transportation route and a settlement pattern that parallel to the sea encircle Galata in a convex curve due to suitability of slope. These changes modify the anatomy of the settlement in general by increasing slope and density in a multi-layered way (Figure 12).

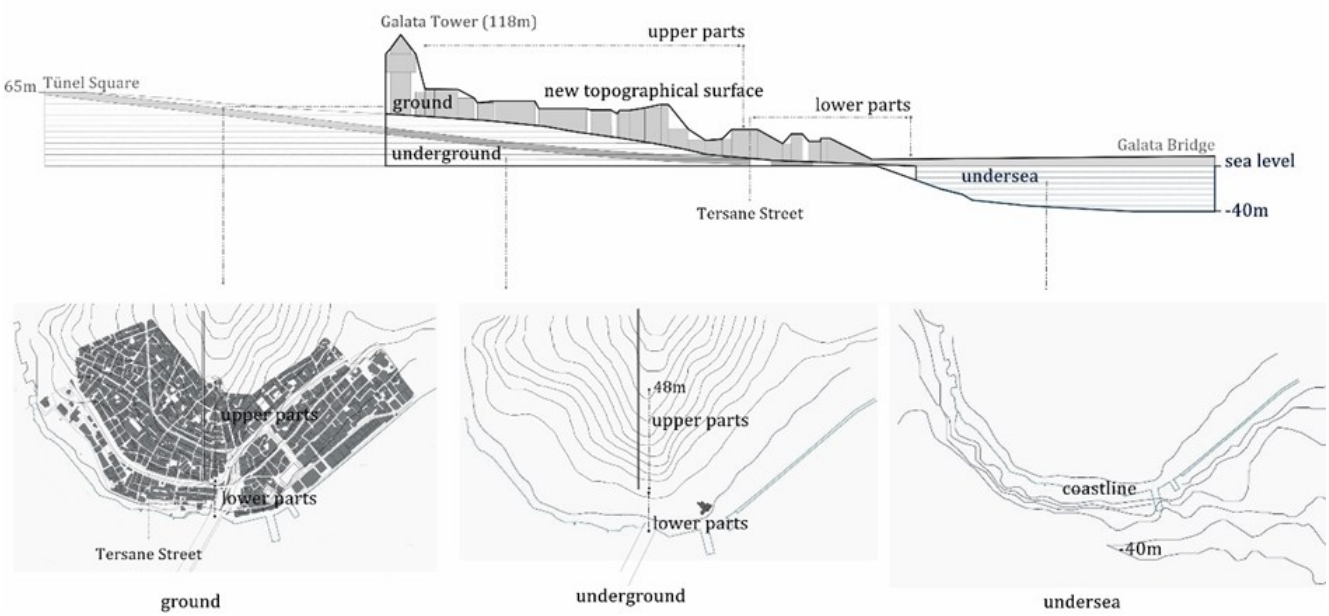


Figure 11. The layering of the urban topography of Galata.

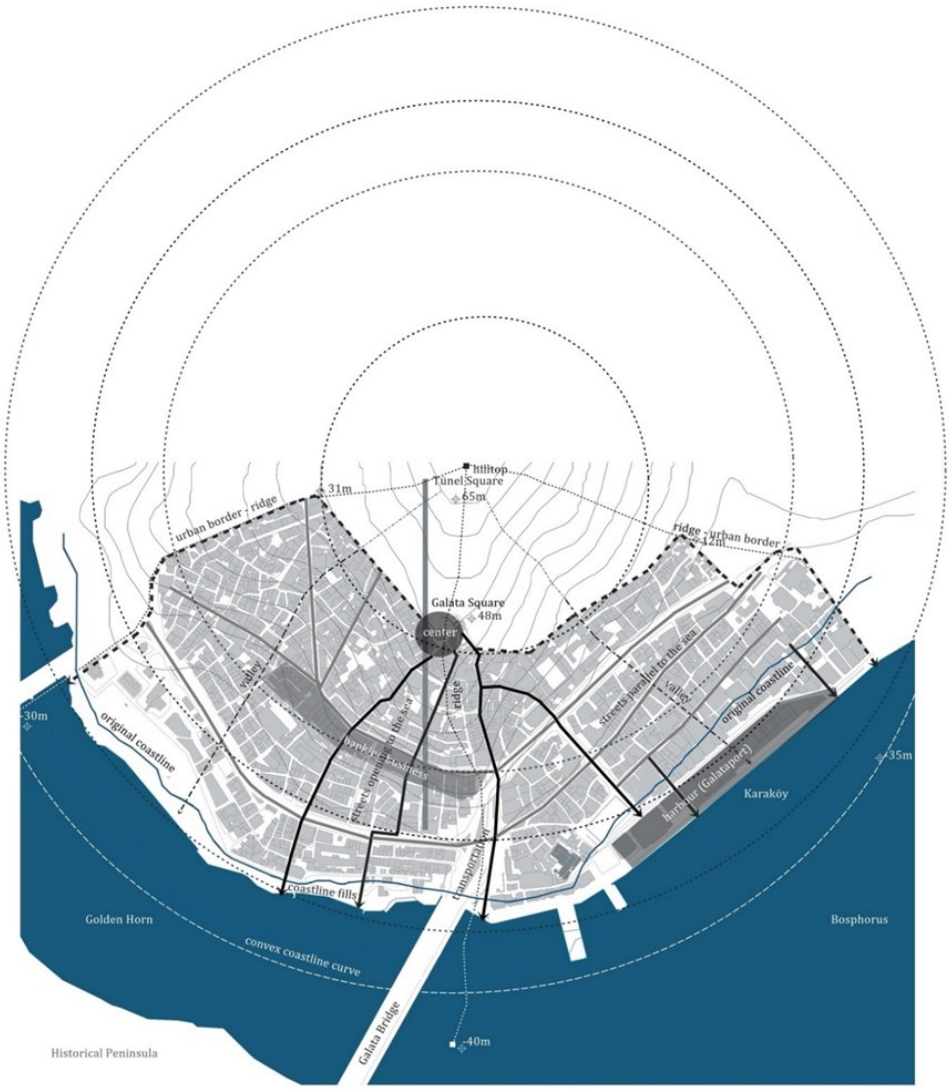


Figure 12. A diagram showing the radial settlement structure, harbour characteristic and organization of Galata according to its natural topography.

RESULTS

Analyses on the natural and the human topography of Galata are overlapped to reach a complete urban topographical depiction of the settlement. At this phase, the height of a specific point is measured together with its all heights and depths that can be replaced with slope due to which layers it is positioned (Figure 14). The results revealed an articulated urban landscape that some of the geographical coordinates defined previously have moved to different points (Figure 15):

- Urban borders of Galata were determined according to the three ridges, the hilltop and the coastline. The spines of three ridges continue their function. However, the hilltop has moved from Tünel Square (65m) to Galata Tower (118m) due to the multi-layered analyse. So the hilltop came closer to the sea. At the same time, the coastline has moved towards the sea with infills (Figure 13, Figure 14).
- The medieval radial settlement structure, the natural harbour characteristic and the original convex coastline curve of Galata are deformed because of constructions and coastline fills. This deformation continues with the recently finished Galataport project that the coastline has moved towards sea with 10m fills in 515m line (Figure 13).
- The original valley structure between ridges are partly deformed because of constructions and levelling of some locations.
- Constructions and fills at the coastline have distanced the city with the sea by cutting its relation with the sea gradually in time.
- Some of the former reference points that were stressing the original coastline topography of Galata such as Sokullu Mehmet Paşa Mosque, Yeraltı Mosque and Kılıç Ali Paşa Mosque have lost their relation with the sea because of infills on the coastline.
- Infills increased the distance between the centre (Galata Tower) and the sea. This situation makes it difficult to reach the coast from the centre of Galata. Thus, the sea breeze is less accessible to an individual living at the centre.

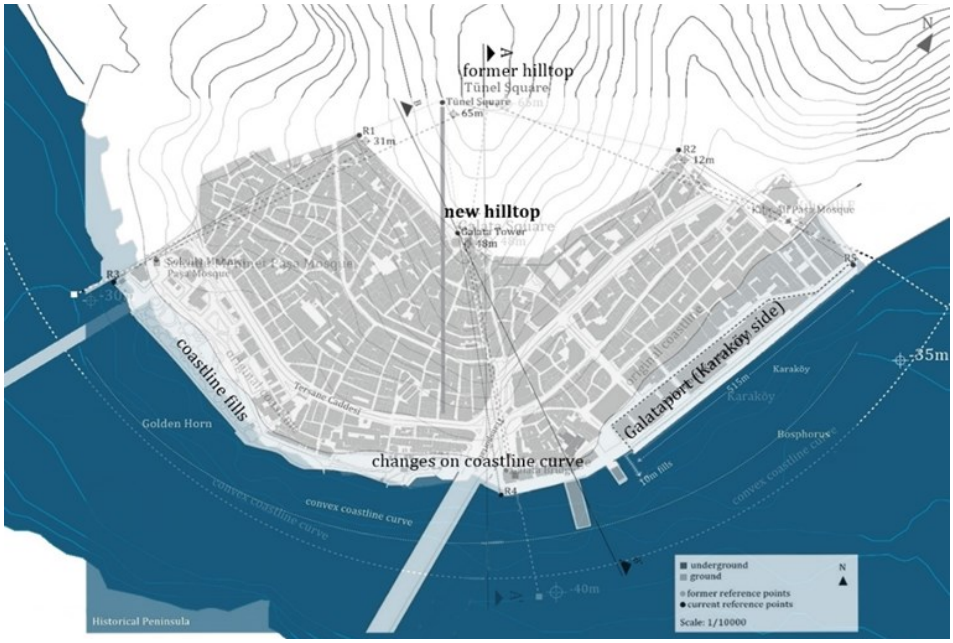
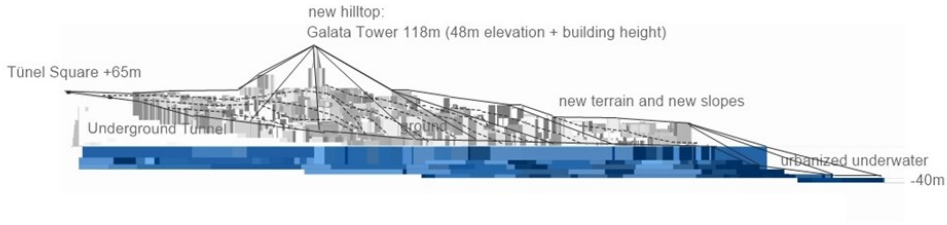


Figure 13. Urban topography of Galata: Overlapped analyses of the natural and human topography show changes on the structure of settlement. Scale: 1/10000.



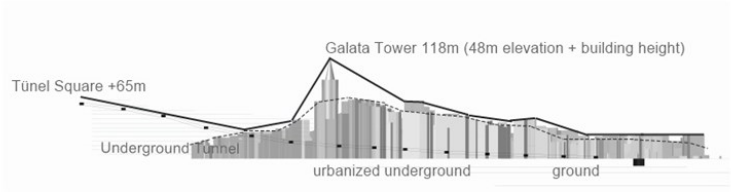


Figure 14. Front and section views of the urban topography of Galata: Changes on the structure of the settlement.

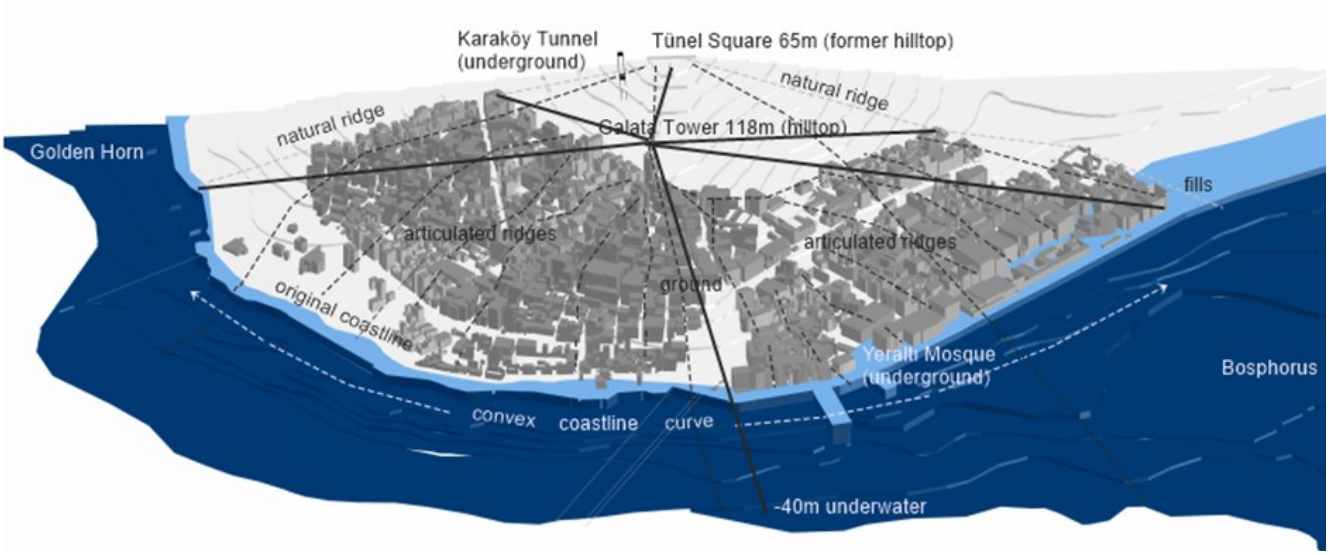


Figure 15. Urban topography of Galata with its all extensions in 3d view.

DISCUSSION

In general, the multi-layered analysis of urban topography suggests a comprehensive depiction of the city. Results of the Galata (Istanbul) case indicate that urbanization takes place not only above ground, but underground and underwater layers of the city today.

The results revealed that there are certain shifts, deformations and articulations on structure of the city. Changes on specific locations, geographical features, orientations, angles, perspectives and scales form a different kind of topography contrary to the general perception. So, the results indicate that;

- Today's cities have multi-layered structures and the urban topography is no longer a reality that can be explained solely with landforms, two dimensional urban plans or buildings.
- Each construction articulates the existing topography of the city and create a topography that has not been considered or evaluated before.
- Urban topography has reached a structure that has penetrated more than one layer of the earth.
- As seen in the Galata case, dominance of human effect causes some natural characteristics of the settlements to be vanished. For example, an original harbour settlement turns into an urban area whose relationship with the sea decreasing day by day and destroying the given landscape.

- As Galata does not have an urbanized undersea layer, in this study its contribution to animated urbanization on the sea surface and spatial organization on the land are explained. However, for in-depth analysis of underwater layer as an effective part of urban topography, cities with underwater constructions can also be illustrated for further researches (For example: an urban fragment of Istanbul including Marmaray Undersea Tunnel).
- As an evaluation specific to the Galata case, the multi-layered analysis could lead further researches with the inclusion of historical cisterns in the underground layer.
- Compared to reference studies (*Ruskin, 1856, Modern Painters Volume IV of V,* and *Viollet-le-Duc, 1876, Le Massif du Mont Blanc*) that provide a historical, geological and anatomical record of mountain landscape of the 19th century (Gamble 1999), this study, reveals the multi-layered structure of urban topography in the 21st century.
- Since the 21st century is the age of Anthropocene, topographies, contours and reliefs created by human effect should also be included in the topography of the city and examined.

CONCLUSION

The multi-layered analyse of urban topography is an attempt to understand the structure of the city as a constructed fragment of the earth in the 21st century. It searches for extensive topographical information in order to arrive a comprehensive anatomical depiction of the city by referencing Ruskin's Modern *Painters Volume IV of V* (1856) and Viollet-le-Duc's *Le Massif du Mont Blanc* (1876) that are based on anatomy of the mountainous landscapes of the Alps. The main idea of these studies that '*the necessity of analysing anatomy to understand the earth surface*' has been adapted to today's urban topography. This adaptation investigated the urban topography with the *natural* and the *human* phenomena to explore hidden or overlooked characteristics between different layers (ground, underground and underwater) and the urban relief formed by buildings and infrastructures. The results are preliminary but it promises constructive contributions to urbanization processes in order to fully understand the structure of the city, to benefit from the existing conditions of topography, to extract new topographic information, new layers to the city and restoring the damaged ones.

At the same time, the article aims to fill a gap of study based on the direct relationship between urban and topography in addition to studies on building-topography, landscape-topography relations and urban studies performed with use of digital modelling techniques, mapping and geographical data. Considering this article as an essay, as a preliminary study, the multi-layered analyse of urban topography may pave the way for further researches in urbanization literature to reveal more information about the city. Because it directly focuses on the anatomy of the city with an effort to understand its internal logic as a whole structure. It may also be interesting for studies that explore urbanization processes through the layers of the earth, through topography. In the context of Galata (Istanbul) case which has only been studied on the organization of its iconic buildings and two-dimensional urban plans until now, this article may contribute to the studies specific to the site's itself.

Although the multi-layered analyse of urban topography is a research focus in its own right, it can also provide supportive data for other researches areas such as urban transformation, urban renewal, landscape preservation, sustainability of cities, climate change, archaeology and so on.

For the spirit of our time that human effect is the main determinant on the earth, taking references from studies on mountainous landscapes for urban topography can be beneficial in terms of evaluating the way we settle on the earth in a prudent way in the age of Anthropocene.

In conclusion, this study offers a perspective for the comprehensive evaluation of cities in order to understand the constructional relationship with the topography of the settled geographies.

References

"The vision of an architect". Accessed September 20, 2021. https://www.domusweb.it/en/architecture/2014/12/01/viollet-le-duc_thevisionsofanarchitect.html

"Urban Topography" (overview). Accessed September 20, 2021. http://www.oxfordreference.com/view/10.1093/oi/authority.20110803114911292

Alpar, B., S. Burak, and E. Doğan. 2005. "Environmental and hydrological management of the Golden Horn Estuary, Istanbul." *Journal of Coastal Research* 21(4): 646-654.

Ashihara, Y. 1983. *The Aesthetic Townscape*. MIT Press.

Artüz, M. L., I. A. Okay, B. Mater, O. B. Artüz, G. Gürseler, and N. Okay. 2007. *Bilimsel Açıdan Marmara Denizi*. Türkiye Barolar Birliği Yayınları.

Bressani, M. 2003. "Viollet-le-Duc's Optic." In *Architecture and the Sciences: Exchanging Metaphors*, edited by Antoine Picon and Alessandra Ponte, 118-139. Princeton: Princeton Architectural Press.

Buondelmonti, C. 1824. "Map of Constantinople, 1422." In *Liber insularum Archipelagi*, L. 42, GRL de Sinner éd.

Çöl, N. 2011. "Galata Kent Dokusu İçerisinde Saliha Sultan Sebil Çeşmesi'nin Değerlendirilmesi." *Turkish Studies* 6(3): 645-659.

Debold-Kritter, A. 2010. "Threats to the World Heritage in the changing metropolitan areas of Istanbul." In *Heritage at Risk: ICOMOS world report 2008/2010 on monuments and sites in danger*, 175.

Erkal, N. 2011. "The Corner of the Horn: An Architectural Review of the Leaded Magazine in Galata Istanbul." *METU Journal of the Faculty of Architecture* 28(1): 197-227.

Eyice, S. 1969. *Galata ve Kulesi*. İstanbul: Türkiye Turing ve Otomobil Kurumu.

Gamble, C. 1999. "John Ruskin, Eugène Viollet-le-Duc and the Alps." *Alpine Journal* 104: 185-196.

Gissen, D. 2008. "Architecture's geographic turns." *Log* 12: 59-67.

Goad, C.E. 1905. "Plan d'assurance de Constantinople. Vol. II - Péra & Galata." Accessed September 20, 2021. https://archives.saltresearch.org/handle/123456789/99240

Guallart, V. 2008. *Geologics: geography, information, architecture*. New York: Actar.

Jill, D. and W. Charles, ed. 2016. *Cartographic Grounds. Projecting the landscape imaginery*. Princeton Architectural Press.

Kayaoğlu, E., A. Candaş, Y. Z. Kocabal, and C. E. İmrak. 2014. "Early Application of Underground Funicular 'Tunnel'in Istanbul.." In *Proceedings of ELEVCON 2014*, 103-113.

Leatherbarrow, D. 2015. *Topographical stories: studies in landscape and architecture*. University of Pennsylvania Press.

Matrakçı Nasuh. 1537. "Miniature of Istanbul." In *Süleymannâme*.

Mumford, L. 1961. *The city in history: Its origins, its transformations, and its prospects.* Vol. 67. Houghton Mifflin Harcourt.

Müller-Wiener, W. 1977. "Lieux d'inhumation dans Istanbul Intra-Muros." Carte extraite de W. Müller-Wiener, Bildlexikon Zur Topographie Istanbuls, Wiesbaden, Ernst Wasmuth. Accessed September 20, 2021. https://archives.saltresearch.org/handle/123456789/102345

Pervititch. J. 1927. "Rehber Plan. Galata - Yeni-Djami. Moustafa Pacha. Kemeraltı. Bereketzade. Karabache. Tchoukour Bostan. Kemeraltı. Sultan Bayazıd." Accessed September 20, 2021. https://archives.saltresearch.org/handle/123456789/93769

Pikionis, D. 1989. Dimitris Pikionis, Architect 1887-1968: A Sentimental Topography. London: Architectural Association.

Rossi, A., and P. Eisenman. 1982. *The architecture of the city*. Cambridge: MIT Press.

Ruskin, J. 1856. *Modern Painters*. Volume 4. Part V, Of Mountain Beauty. Cook ET & Wedderburn A., Works of John Ruskin, Library Edition, 6.

Seeck, O. 1876. "Notitia urbis Constantinopolitanae." In *Notitia Dignitatum*, 227-244.

Schneider, A. M. An M. I. Nomidis. 1944. "Galata'nın Topografik ve Arkeolojik Planı - Galata Topographisch-Archaologischer plan mit erlauterndem text von A.M. Schneider und M. Is. Nomidis [İstanbul] - Topographical and Archaeological Plan of Galata." Accessed September 20, 2021. https://archives.saltresearch.org/handle/123456789/102336

Viollet-le-Duc, E. E. 1876. *Le massif du Mont Blanc: étude sur sa constitution géodésique et géologique sur ses transformations et sur l'état ancien et moderne de ses glaciers*.

Viollet-le-Duc, E. E. 1877. *Mont Blanc: A Treatise on Its Geodesical and Geological Constitution*. S. Low, Marston, Searle & Rivington.

Yürekli, H. n.d. "Zaman İçinde İstanbul Topoğrafyası ve Hareket." Urban Topography Course Notes, Istanbul Technical University.

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Kent Topoğrafyası Üzerine Çok Katmanlı Bir Değerlendirme: Galata - İstanbul Örneği

Yasemin KÜBLÜ*

* Bağımsız Araştırmacı

Özet

Bu çalışma '*kent topoğrafyası*'nı çok katmanlı bir yapı olarak, John *Ruskin (Modern Painters, Volume IV of V, 1856)* ve *Eugene Viollet-le-Duc (Le Massif du Mont Blanc, 1876)* tarafından gerçekleştirilen iki çalışmayı referans alarak incelemektedir. *Modern Painters Volume IV of V ve Le Massif du Mont Blanc*, İsviçre Alpleri'nin dağ peyzajının yapısal anatomisi üzerine odaklanmıştır. Bu araştırmaların ana fikri '*yeryüzünün yüzey formlarının anlaşılabilmesi için, öncelikle anatomilerinin incelenmesinin gerektiği*' düşüncesidir.

Dağların yapısal anatomisi yapısı üzerine belirtilen bakış açısı, bu çalışmada kent topoğrafyasına aktarılarak, '*doğal topoğrafya*' ve '*beşeri topoğrafya*' bölümleri altında ve kentin karmaşık yapısına ilişkin olarak üç katman halinde incelenmiştir: 'yer, *yeraltı ve sualtı*'. Amaç, kentin 21. yüzyılda, göz önünde bulundurulmayan fiziksel gerçeklikleri ile birlikte, bir bütün olarak kapsamlı bir kent topoğrafyası tasvirine ulaşabilmektir. Çalışma alanı olarak, antik dönemlerden itibaren süregelen çok katmanlı yapısından dolayı İstanbul'un Galata yerleşimi seçilmiştir. Analizler topoğrafik haritalamalar, kentsel kesitler ve diyagramlar üzerinden gerçekleştirilmiş olup, güncel uydu görüntüleri, tarihi haritalar ve Galata kent planı ile desteklenmiştir.

Anahtar Kelimeler: Kent Topoğrafyası, Galata, İstanbul, Ruskin, Viollet-le-Duc

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