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A Reappraisal of the Genoese Walls of Galata (Fourteenth–Fifteenth Centuries) in Terms of Medieval Building Techniques and Masonry Traditions

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Abstract
While a number of fortifications have been attributed to the Genoese in Anatolia, the Walls of Galata are the only fortifications built entirely by them. Although the term "Genoese castle" is commonly used for most of these fortresses, even those without any trace of Genoese history, what is meant by "Genoese" architecture has not yet been fully identified or defined. This article investigates medieval building techniques and masonry traditions that the Genoese might have employed in their architectural practice. For this purpose, a comprehensive inventory of the surviving parts of the Walls of Galata to date has been created, and the building techniques of the surviving sections are investigated in detail. These techniques are analyzed through a comparison of other buildings in Galata and Genoa built by the Genoese and the Palaiologan buildings in Constantinople/Istanbul. Next, other "Genoese" fortresses in Anatolia and eastern Thrace and their building techniques and materials are similarly evaluated in the late Byzantine context. This research reveals that the Genoese essentially (re)used available building materials, adopting the building techniques and masonry traditions of the Palaiologan architecture in association with a collaboration with Byzantine masons. It concludes that the Genoese most likely introduced the use of pointed arches to Byzantine masons in Constantinople, and that the Walls of Galata are one of the earliest monuments in Istanbul where pointed arches were used.

Keywords: Galata Walls, Genoese, fortifications, medieval architecture, construction techniques and materials

Galata Ceneviz Surları'nın (On Dördüncü ve On Beşinci Yüzyıllar) Ortaçağ Yapım Teknikleri ve Gelenekleri Üzerinden Yeniden Değerlendirilmesi

Özet
Anadolu'da Cenevizler'e atfedilen çok sayıda kale bulunsa da, yalnızca Galata Surları tamamen Cenevizler tarafından inşa edilmiştir. "Ceneviz kalesi" terimi bu yapıların çoğu ve hatta Ceneviz dönemi olmayanlar için de yaygın olarak kullanılmakla birlikte, "Ceneviz" mimarisinin ne olduğu henüz tam olarak belirlenmiş veya tanımlanmış değildir. Bu makale, Cenevizlerin mimari uygulamalarında etkilenmiş veya kullanmış olabilecekleri ortaçağ yapım teknikleri ve geleneklerini araştırmaktadır. Bu amaçla, Galata Surları'nın günümüze kadar ayakta kalabilmiş parçalarının kapsamlı bir envanteri çıkarılmış ve yapım teknikleri detaylı şekilde ele alınmıştır. Bu teknikler, Galata ve Cenova'daki diğer Ceneviz yapıları ve Konstantinopolis/İstanbul'daki Paleologlar dönemi yapılarında kullanılan teknikler ile karşılaştırılarak incelenmiştir. Ayrıca, Anadolu ve Doğu Trakya'daki diğer "Ceneviz" kaleleri ve bu yapılarda kullanılan yapım teknikleri ve malzeme geç Bizans mimarlığı çerçevesinde değerlendirilmiştir. Bu araştırma, Cenevizlerin kolayca erişebildikleri yapı malzemelerini (yeniden) kullandıklarını ve Bizanslı yapı ustalarıyla işbirliği yaparak Paleologlar mimarisinin yapım teknikleri ve geleneklerini benimsediklerini ortaya çıkarmaktadır. Buna ek olarak, Konstantinopolis'in Bizanslı yapı ustalarının, sivri kemer kullanımını Cenevizlerden öğrenmiş oldukları ve Galata Surları'nın İstanbul'da sivri kemerlerin kullanıldığı en eski anıtsal yapılardan biri olduğu sonucuna da varılmıştır.

Anahtar kelimeler: Galata Surları, Cenevizler, sur, ortaçağ mimarisi, yapım teknikleri ve yapı malzemeleri

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Introduction

Galata is located across from the historic peninsula of Istanbul proper, on the northern shores of the Golden Horn (Haliç). Although the urban history of Galata goes back to antiquity, the settlement was mainly built after the establishment of the Genoese trading colony in

Constantinople in 1267, which was then called Pera.[1] As the Genoese were in constant conflict with the Venetian colony in Constantinople and the Byzantine Empire, they needed to fortify their new settlement as soon as they acquired it. Without the official permission of the Byzantine emperors, they gradually built the city walls, starting with their first concession in 1303, adding to them almost continuously until the siege of Constantinople by the Ottomans in 1453.[2] Although the walls lost their importance when Galata surrendered to the Ottomans following the takeover of Constantinople, they survived until their large-scale demolition as part of the urban modernization movement that followed the decision of the Sixth Chamber of Municipality (Altıncı Daire-i Belediye) in 1864.[3] Only a few sections of the walls survive today, including the well-known Galata Tower.

The walls were built over a one hundred fifty-year period, during which they were extended and renovated several times. They consist of five enceintes and exhibit different building techniques and architectural features. General and technical information relating to the walls comes mainly from Marie de Launay, the engineer of the Sixth Chamber of Municipality, in an article published in *Journal de Constantinople* before their demolition.[4] Other historical sources have not yielded information about the details related to the building techniques and materials of the walls; nevertheless, some possible dates of repair or reconstruction can be determined. Engravings and photographs from the nineteenth century also provide information, however mostly about the architectural features of the walls that were still visible at the time.[5]

During the twentieth century, scholars tried to identify and document the Walls of Galata with all their components, including towers, gates, and marble slabs with inscriptions and coats of arms, using existing material evidence and historical sources; some scholars also provided maps and photographs.[6] The scholarship on the urban history and heritage of Galata has usually neglected the walls in favor of the Galata Tower or conveyed inadequate and outdated information about the walls. In recent years, the architectural and technical characteristics of the surviving sections of the walls have been studied and inventories have been produced by several scholars within various contexts and capacities, including history of art and architecture and cultural heritage studies.[7] Nonetheless, all these studies missed some of the surviving sections of the walls, some added misidentified walls to their inventory, and none thoroughly or accurately analyzed the building techniques used in the walls within their historical context. This research thus aims to fill this lacuna in the scholarly literature.

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1 The official name of the colony was Pera. However, Galata, the other name for this part of the city, was embraced over time. Today, this area is known as Karaköy. The fortifications are still called the Walls of Galata; therefore, Galata is used to define the Genoese settlement throughout this paper. Although some scholars suggest that the Genoese were offered Pera by the Byzantine emperor Michael VIII Palaiologos in 1261, with the Treaty of Nymphaion, they only settled here in 1267 after returning from exile in Heraclea. See Georgios Pachymeres, *De Michaele et Andronico Palaeologis*, ed. Immanuel Bekker (Bonn: Impensis Ed. Weberi, 1835), 1:162–163, 167–168; Georg Heinrich Pertz, ed., "Annales Ianuenses," in *Monumenta Germaniae Historica* (Hannover: Impensis Bibliopolii Hahniani, 1863), 18:244–246, 249, 262; Cornelio Desimoni, "I quartieri dei genovesi a Costantinopoli nel secolo XIII," *Giornale Ligustico di Archeologia, Storia e Belle Arti* 3 (1876): 235–236.

2 Desimoni, "I quartieri dei genovesi," 244; Hasan S. Sağlam, "Urban Palimpsest at Galata & An Architectural Inventory Study for the Genoese Colonial Territories in Asia Minor" (PhD diss., Politecnico di Milano, 2018).

3 Esra Okur, "Galata Surlarının Yıkım Süreci" (master's thesis, Istanbul Technical University, 2011). More recently, Esra Okur Coşkunçay, "Galata Surlarının Yıkım Süreci," *Tasarım Kuram* 25 (2018): 33–58, https://doi.org/10.23835/tasarimkuram.534679.

4 Marie de Launay, "Notice sur les fortifications de Galata," *Journal de Constantinople*, November 19, 1864.

5 For a detailed analysis of the data from the historical sources, see Batuhan B. Erdoğan, "Galata Kent Surları ve Koruma Önerileri" (master's thesis, Istanbul Technical University, 2011); Selin Sur, "Orta Çağ Kent Surlarına Bir Örnek: Galata Surları ve Restitüsyon Sorunları" (master's thesis, Istanbul Technical University, 2015); Sağlam, "Urban Palimpsest at Galata."

6 Some fundamental references are Frederick W. Hasluck, "Dr. Covel's Notes on Galata," *Annual of the British School at Athens* 11 (1904–1905): 50–62; Joseph Gottwald, *Die Stadtmauern von Galata*, vol. 3, *Bosporus: Mitteilungen des Deutschen Ausflugvereins "G. Albert."* (Constantinople: Keil, 1907); Jean Sauvaget, *Notes sur la colonie génoise de Péra* (Paris: Librairie Orientaliste Paul Geuthner, 1934); Alfons Maria Schneider and Miltiadis Nomidis, *Galata, Topographisch-archäeologischer Plan mit erläuterndem Text* (Istanbul, 1944); Ernest Mamboury, *The Tourists' Istanbul* (Istanbul: Çituri Biraderler Basımevi, 1953); Semavi Eyice, *Galata ve Kulesi* (Istanbul: Türkiye Turing ve Otomobil Kurumu Yayınları, 1969); Celal Esad Arseven, *Eski Galata ve Binaları* (Istanbul: Çelik Gülersoy Vakfı Istanbul Kütüphanesi Yayınları, 1989).

7 Fatma Kuş, "Galata Surları" (master's thesis, Marmara University, 2009); Erdoğan, "Galata Kent Surları"; Okur, "Galata Surlarının Yıkım Süreci"; Sur, "Galata Surları ve Restitüsyon Sorunları"; Sağlam, "Urban Palimpsest at Galata"; Elif C. Tay, "Kent Arkeolojisi Yöntemiyle Mimarlıkta Zaman Kavramının Okunması: Galata Surları Örneği" (master's thesis, Yıldız Technical University, 2019).

After the reestablishment of the Byzantine Empire and the Treaty of Nymphaion in 1261, the Genoese obtained commercial privileges and rights to settle on some of the Aegean islands and coastal cities in Anatolia and eastern Thrace in exchange for their collaboration with Emperor Michael VIII Palaiologos (r. 1259–1282).[8] Today, numerous fortifications along the trade route temporarily held by the Genoese are generally referred to as "Genoese castles." In addition to the Galata Tower, the Tentative List of UNESCO World Heritage Sites includes the fortresses of Akçakoca, Amasra, Çandarlı, Çeşme, Foça, Güvercinada (along with the city walls of Kuşadası), Sinop, and Yoros, with the title "Trading Posts and Fortifications on Genoese Trade Routes from the Mediterranean to the Black Sea."[9] However, it has not always been easy to detect the Genoese interventions in the existing fortifications, especially in the absence of slabs with inscriptions or coats of arms.[10] The "Genoese castles" usually date to earlier or sometimes even to later periods, and the Genoese only made a limited contribution to these fortifications. Despite UNESCO's endorsement, recent studies have shown that the Genoese were not involved in construction work in the Black Sea region of Anatolia, except for Galata, and to a degree at Amasra (Amastris).[11] The Castle of Foça (Phocaea) on the Aegean coast also offers evidence of partial Genoese constructions.[12] Another castle partly constructed by the Genoese is the Castle of Enez (Ainos). Enez was not a Genoese trade post, but the Byzantine Empire granted it to the Genoese Gattilusio family in 1376 and it became one of the Gattilusio lordships.[13] Among these examples, the Walls of Galata represent the only fortifications known to have been built entirely by the Genoese.

As there seems to be much confusion about what "Genoese" actually refers to, some questions come to mind: What makes a building Genoese? Are there any distinctive features of Genoese architecture in terms of building techniques and materials? Is it possible to assume a Latin influence from the Italian mainland, or more precisely from Genoa, that was transported to Anatolia and eastern Thrace, particularly to Galata? Or did they adapt to the architectural practices of their new settlements and adopt Byzantine building techniques and traditions? While some of these questions have been partly addressed in recent studies,[14] this research aims to investigate the building techniques and materials of the Walls of Galata in detail and identify the masonry traditions followed by the Genoese in a comparative context. With this in mind, current scholarly literature has been reviewed, and the inventory of the surviving sections of the Walls of Galata has been updated and remapped. Measurements have been taken from the walls, where possible, during the site survey. The building techniques and materials used in other

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8 "Item dedit et concessit in terris infrascriptis et qualibet earum ad liberum iure proprietatis et dominii. in anea. smirnis. in landrimitti et dei misericordia in constantinopoli . . . logiam palacium ecclesiam balneum furnum et iardinum. et domos sufficientes ad stallum mercatorum qui ibidem utentur causa negociandi. ita tamen quod ex ipsis aliqua pensio peti non debeat. nec exigi. et in predictis terris et insulis habere debent et possint ianuenses et in qualibet earum ad eorum uelle consules curiam et iurisdicionem." Pertz, "Annales Ianuenses," 18:242. Louis Mitler, "The Genoese in Galata: 1453–1682," *International Journal of Middle East Studies* 10, no. 1 (1979): 71–91.

9 "Trading Posts and Fortifications on Genoese Trade Routes from the Mediterranean to the Black Sea," Tentative Lists, UNESCO World Heritage Centre, accessed October 1, 2023, https://whc.unesco.org/en/tentativelists/6468/.

10 For a critical approach to UNESCO's decisions, see Hasan S. Sağlam, "Çeşme Kalesi'nin UNESCO Dünya Miras Geçici Listesi İlgisindeki 'Ceneviz' Dönemine Metodolojik Bir Yaklaşım," *Journal of Humanities and Tourism Research* 11, no. 3 (2021): 551–568; "UNESCO Dünya Miras Geçici Listesi Bağlamında Kuşadası Eleştirisi ve Var Olmamış Bir Ceneviz Kolonisi: Scalanova," *Kent Akademisi Dergisi* 15, no. 2 (2022): 452–480.

11 The castle of Güzelhisar (*Leontokastron*) in the Genoese settlement of Trebizond (modern Trabzon) may also be added to this list. However, this castle, with an ambiguous Genoese history, has never been studied in detail as it is now located within a restricted military zone and was partly demolished. Thus, it was not included in the present research. For this building, see Anthony Bryer and David Winfield, *The Byzantine Monuments and Topography of the Pontos* (Washington, DC: Dumbarton Oaks Studies, 1985), 197; Sağlam, "Urban Palimpsest at Galata," 303. For the historical background of the so-called Genoese constructions in Anatolia and eastern Thrace, see Sağlam, "Urban Palimpsest at Galata"; for Genoese constructions in Amasra, see Nurhilal Burak, "Amasra Kale Kenti: Ceneviz Ticaret Yolu'ndaki Karadeniz Surlu Yerleşimleri Bağlamında Değerlendirilmesi ve Koruma Önerileri" (PhD diss., Istanbul Technical University, 2021).

12 Ömer Özyiğit, "2010 Yılı Phokaia Kazı Çalışmaları," in *33. Kazı Sonuçları Toplantısı 23–28 Mayıs 2011 Malatya*, ed. Haydar Dönmez and Ömer Ötgün (Ankara: Kültür ve Turizm Bakanlığı, Kültür Varlıkları ve Müzeler Genel Müdürlüğü, 2012), 2:481–504; Sağlam, "Urban Palimpsest at Galata," 205–228.

13 Christopher Wright, *The Gattilusio Lordships and the Aegean World 1355–1462* (Leiden: Brill, 2014), 413–414; Sağlam, "Urban Palimpsest at Galata," 194–197.

14 Sur, "Galata Surları ve Restitüsyon Sorunları" makes a comparison between the Walls of Galata in Istanbul and those of Genoa to better identify the architectural features of the Walls of Galata. Sağlam, "Urban Palimpsest at Galata" studies all Genoese-related fortifications, concentrating on Galata, referring to historical sources and material evidence. His research also investigates other Genoese buildings in Galata as well as the fortifications themselves.

Genoese fortifications in Anatolia and eastern Thrace are briefly examined, along with other Genoese buildings.

Evaluation of the Building Techniques Used by the Genoese

When Michael VIII Palaiologos restored Byzantine rule in Constantinople, the city was in ruins due to plunder and neglect resulting from the Crusaders' siege in 1204 and the following fifty-seven years of Latin rule. Therefore, the city underwent renovation during the reigns of Michael VIII Palaiologos (1259–1282) and Andronikos II Palaiologos (1282–1328). This period, seen as a "revival" in the history of Byzantine architecture, witnessed both the repair and restoration of earlier buildings and the construction of new ones, with the development of its own architectural style, the so-called Palaiologan architecture, the influences of which can be observed in the surviving monuments from this period in Istanbul.[15]

The Walls of Galata were built piecemeal in this relatively dynamic architectural environment as the Genoese came to possess more lands and claimed rights on them. After several phases of construction over several decades, Galata consisted of five walled zones. The Genoese were given their first concession area by the Byzantine emperor Andronikos II Palaiologos with an agreement in 1303, which consisted of a precisely defined area, along the shores of the Golden Horn. They were permitted to enclose the area with a ditch only on condition that they should leave unoccupied a certain amount of land outside this ditch and around the Kastellion.[16]

The Genoese, however, took advantage of every possible situation to further fortify their new settlement. Despite the stipulations of the Byzantine Empire, they started the construction of the fortifications in 1304 and enclosed their first concession area. However, after the conflagration of 1315, they had to restore and reconstruct their walls and buildings. The first constructions were towers that looked like masonry houses; ramparts between the towers were added later.[17] Their lands expanded towards the north, and another construction phase began with the construction of masonry and "house-like" towers and the Galata Tower in 1348.[18] The quarter on the west, Spiga, was incorporated into the Genoese settlement in 1351. In 1352, the Genoese signed another treaty with the Byzantine Empire to include the so-called Kastellion in the southeast within their territory. Finally, another neighborhood on the east, Lagirio, was incorporated into the Genoese colony in 1376. The stone slabs, including coats of arms and inscriptions (now in the Istanbul Archaeological Museum), indicate that the walls enclosing the western section of the Galata Tower (eastern Spiga) date to 1387, whereas the westernmost part of the walls (western Spiga) dates to 1397 at the earliest. On the other hand, the wall constructions around Lagirio began around 1350–1360 and continued into the 1400s. The last construction on the walls occurred in 1452 when a semicircular wall was added around the Galata Tower.[19]

Despite the large-scale demolition of the walls after 1864, sections of walls and towers are still physically accessible today. Surviving remnants of each expansion stage enable us to assess the Walls of Galata in terms of their architectural characteristics and building techniques and materials, displaying a wide variety. Within the scope of this research, twenty-four sections of the walls, including both wall fragments and largely complete towers, have been identified, analyzed, and mapped (fig. 1).[20]

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15 Semavi Eyice, *Son Dönem Bizans Mimarisi. İstanbul'da Palaiologos'lar Devri Anıtları* (Istanbul: Istanbul Üniversitesi Edebiyat Fakültesi Yayınları, 1963); Alice-Mary Talbot, "The Restoration of Constantinople under Michael VIII," *Dumbarton Oaks Papers* 47 (1993): 243–261; Robert G. Ousterhout, *Eastern Medieval Architecture: The Building Traditions of Byzantium and Neighboring Lands* (New York: Oxford University Press, 2019), 595–618; Jessica Varsallona, "Reinventing the Capital: The Ideological Use of Monumental Architecture in Michael VIII Palaiologos' Constantinople (1261–1282)," *Eurasian Studies* 19 (2021): 155–177. See also Enrico Zanini, "Materiali e tecniche costruttive nell'architettura paleologa a Costantinopoli: un approccio archeologico," *L'arte di Bisanzio e l'Italia al tempo dei Paleologi 1261–1453*, ed. Antonio Iacobini and Mauro della Valle (Rome: Argos, 1999), 301–320.

16 Cornelio Desimoni, "I quartieri dei genovesi a Costantinopoli," 248–250.

17 Georgios Pachymeres, *De Michaele et Andronico Palaeologis*, 2:489, 495.

18 Nikephoros Gregoras, *Byzantina Historia*, ed. Ludwig Schopen (Bonn: Impensis Ed. Weberi, 1829), 1:526–527.

19 Sağlam, "Urban Palimpsest at Galata," 19–59.

20 The map comprising the surviving portions of the walls is the most comprehensive produced so far. Future studies

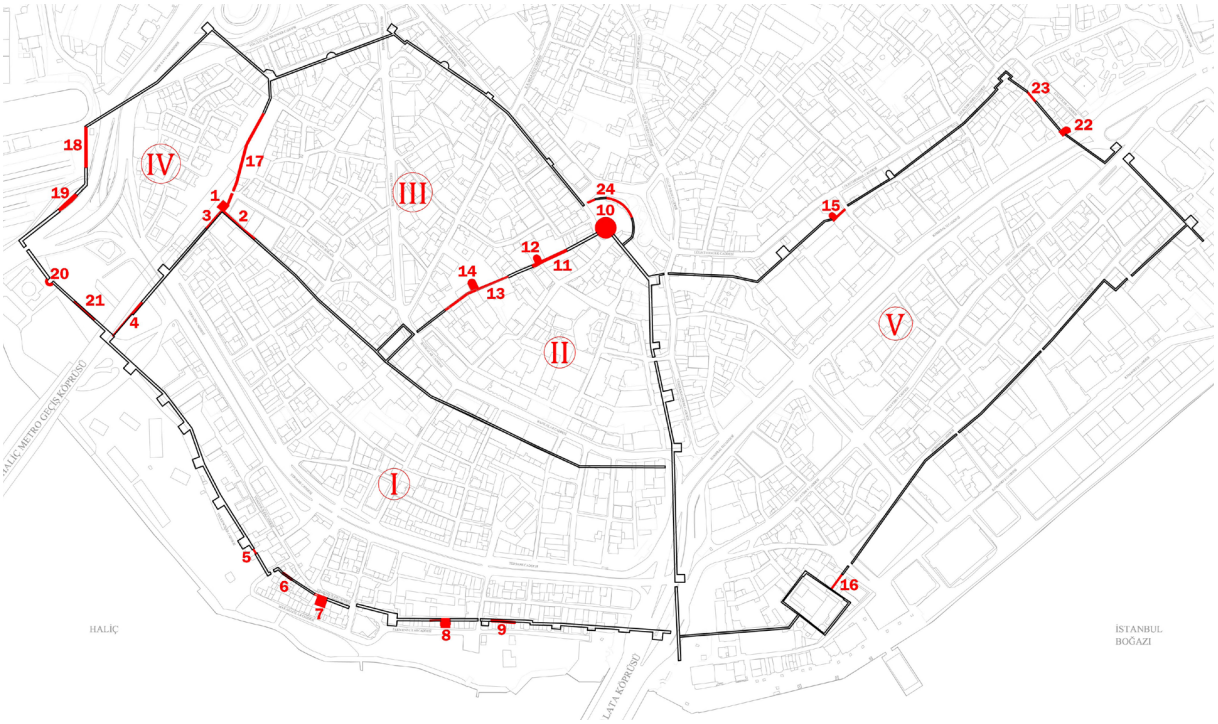


Figure 1: Istanbul, Galata Walls, construction periods and remaining sections. Map: Selin Sur, 2023.

Analysis of Building Techniques and Materials in the Walls of Galata: The Constantinopolitan Context

All the surviving sections of the walls are examined in detail in the appendix of this paper, and the building techniques and materials, including measurements of bricks used in the surviving parts, are given in table 1. Briefly, the Walls of Galata are built of stone masonry, varying from rubble to roughly cut stone, including bricks used in different patterns. The use of finely cut stone is not common and can only be seen in the arches of two towers (sections no. 12 and 15) and in the arch of a gate in section no. 13. The stone colors include all shades of grey, yellow, pink, brown, and black. In the Walls of Galata, the color and characteristics of the mortars used are not easily distinguishable due to color changes caused by weathering, material loss in the mortar joints, and several interventions and additions to the walls. The colors can be generalized as creamy white, grey(ish), and pink(ish).

The poor texture of the majority of the walls gives the impression that most of the material was collected from the immediate surroundings and (re)used with little care. The practice of reusing materials was a common one in Constantinople (and elsewhere) at the time, and did not only include construction materials removed from ruined buildings but also those that were still in use.[21] Galata, once the thirteenth region of Constantinople, must have had some ruined buildings when the Genoese settled there,[22] as spoliated blocks of marble can be found in eight of the surviving sections of the walls (fig. 2). Although limited in number, marble spolia were generally incorporated into the upper levels of the walls, and, apparently, were carefully selected for the towers. As a matter of fact, medieval builders usually selected the best quality materials, both in terms of strength and decoration, particularly so when constructing castles and fortifications intended to intimidate, as much as impress, through their visual impact and sense of permanence.[23] Here, a rectangular marble slab with geometric

may bring to light new wall sections.

21 Klaus-Peter Matschke, "Builders and Building in Late Byzantine Constantinople," in *Byzantine Constantinople: Monuments, Topography and Everyday Life*, ed. Nevra Necipoğlu (Leiden: Brill, 2001), 327.

22 Otto Seeck, ed., *Notitia Dignitatum accedunt Notitia Urbis Constantinopolitanae et Laterculi Prounciaurum* (Berlin: Apud Weidmannosi, 1876), 240.

23 Ufuk Serin, "The Byzantine 'City' in Asia Minor," in *Routledge Handbook of the Byzantine City: From Justinian to*

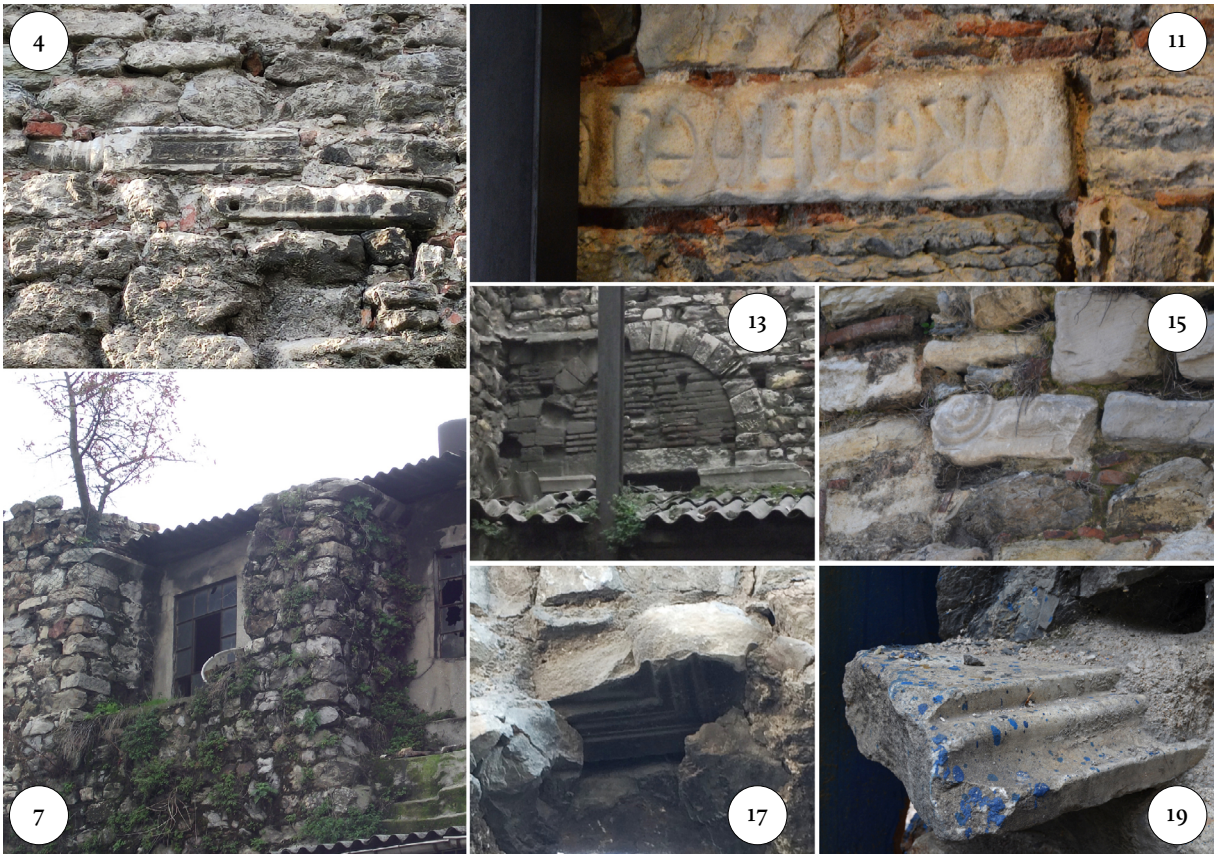


Figure 2: Marble spolia on the Walls of Galata. Photograph: Selin Sur, 2014 (sections no. 7, 13, 17); Selin Sur, 2022 (no. 4); David Hendrix, 2020 (no. 11); David Hendrix, 2021 (no. 15, 19).

decoration can be distinguished on the south façade of a semicircular tower (section no. 12; fig. 3). It is worth noting that this structure is located close to the Galata Tower. As previously noted by Hasan S. Sağlam, this panel might either belong to a parapet block or was part of an architrave ceiling (rarely encountered in early Byzantine architecture).[24] Architectural elements, mainly closure slabs with similar geometric patterns, were found in the nearby Arap Camii.[25] The Church of Hagia Sophia (Ayasofya Museum/Mosque) also includes numerous examples of similarly decorated blocks of both types of architectural components.[26] It is worth noting that part of an architrave ceiling, removed from an early Byzantine context, can be seen reused in the Byzantine Castle of Yoros on the Bosporus; this block is a close parallel to the architrave ceilings found in situ in the churches of Hagia Sophia and Saints Sergius and Bacchus (Küçük Ayasofya Camii).[27] With the exception of

Mehmet II (ca. 500–ca.1500), eds. Luca Zavagno and Nikolas Bakirtzis (London: Routledge, forthcoming), 155. The ideology and practice of spolia and spoliation, producing an extensive literary corpus, are complex and cannot be attempted here. For the use of spolia, with structural and aesthetic concerns, in fortifications in particular, to cite but some, see Michael Greenhalgh, "Spolia in Fortifications: Turkey, Syria and North Africa," in *Ideologie e practiche del reimpiego nell'alto Medioevo*, Settimane di studio del Centro italiano di studi sull'alto medioevo 46 (Spoleto: Centro italiano di studi sull'alto medioevo, 1999), 785–932; Jon M. Frey, *Spolia in Fortifications and the Common Builder in Late Antiquity* (Leiden: Brill, 2016). For the political message of spolia, especially of marble, in fortifications and public buildings, see also Michael Greenhalgh, *Marble Past, Monumental Present: Building with Antiquities in the Medieval Mediterranean* (Leiden: Brill, 2009), 221–224, 248–250. For Constantinople (Istanbul), see Neslihan Asutay-Effenberger, *Die Landmauer von Konstantinopel-Istanbul: Historisch-Topographische und Baugeschichtliche Untersuchungen* (Berlin: De Gruyter, 2007), 147–181, esp. 182–203, with a catalogue of spolia.

24 Sağlam, "Urban Palimpsest at Galata," 60–62. For architrave ceilings, see Asnu Bilban Yalçın, "Boğaziçi Topografyası: 2005 Yılı Araştırmaları," in *24. Araştırma Sonuçları Toplantısı Çanakkale 29 Mayıs–2 Haziran 2006*, ed. Fahriye Bayram and Birnur Koral (Ankara: Kültür Bakanlığı Anıtlar ve Müzeler Genel Müdürlüğü, 2007), 2:302, with bibliography.

25 Jean Ebersolt, *Mission Archéologique de Constantinople* (Paris: Edition Ernest Leroux, 1921), 38–44, plates 36–39; Sağlam, "Urban Palimpsest at Galata," 60–62, with other similar examples.

26 Alessandra Guiglia Guidobaldi and Claudia Barsanti, eds., *Santa Sofia di Costantinopoli: L'arredo marmoreo della grande chiesa giustinianea* (Vatican City: Pontificio Istituto di Archeologia Cristiana, 2004), with detailed catalogues of closure slabs/parapets (*plutei*) and architrave ceiling components (*soffitti*) from different sections of the building.

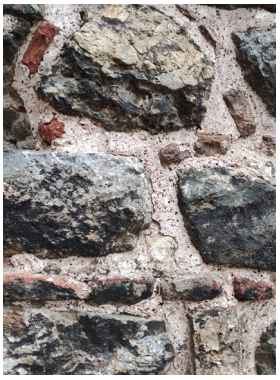
27 Yalçın, "Boğaziçi Topografyası," 302, 308.

Figure 3: Marble spolia panel on section no. 12. Photograph: Selin Sur, 2014.

this piece, and a few others, the limited use of spolia in the Walls of Galata, makes it difficult for us to comment further on its ideology and practice at the present time.[28]

With regard to the use of brick in masonry, three different techniques can be identified: the most frequently used wall technique is stone masonry with brick pieces in the mortar joints throughout all periods of construction.[29] Brick-banded stone masonry with courses of brick varying from one to four is not very common and does not appear in the last two construction periods (late fourteenth/early fifteenth centuries). Bricks inserted in the mortar joints[30] are the least frequent and can be found in the second enceinte (mid-fourteenth century) and the semicircular wall section around the Galata Tower (mid-fifteenth century) (fig. 4).

The Genoese, who worked on the construction of the Walls of Genoa in the twelfth century, used regular stone masonry (*opus quadratum*) and finished the construction rapidly (fig. 6).[31] This type of masonry consists of rectangular stones with little mortar and certainly requires a good on-site organization and extensive labor. On the other hand, the Walls of Galata are mostly built of rubble or roughly cut stone masonry with brick pieces in the mortar joints. This may be because the Walls of Galata had to be completed quickly. However, given that the Genoese did extensive work in Genoa in a short period, it is quite possible that they had insufficient labor resources for such work in Galata, and they possibly worked with the locals. The use of ashlar with little or no mortar was replaced in the Middle Ages by mortared rubble set in irregular courses in defensive architecture, both in the Byzantine East and medieval West.[32] For example, in the Theodosian Walls of Constantinople, most of the repairs in the late Byzantine period (1261–1453)[33] in the inner and outer circuits were made using rubble or roughly cut stones, with brick pieces in the mortar joints, similar to the Walls of Galata.[34] This particular type of masonry has been identified as "Palaiologan" and is thought to have remained in use in the fourteenth and fifteenth centuries.[35] Thus, this suggests that the Genoese built the Walls of Galata in the local architectural style of this period.



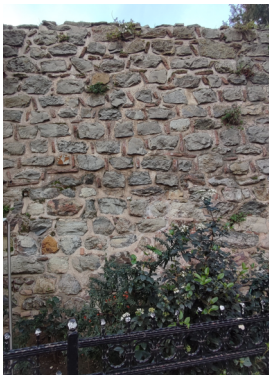


Figure 4: Galata Walls, brick pieces in the joints (left), brick banded stone masonry (center), and bricks inserted in the joints (right). Photograph: Selin Sur, 2021 (center); Selin Sur, 2022 (left, right).

28 Further research by the present authors into the spolia used in the Walls of Galata is in progress.

29 Hereafter, the term "brick pieces in the mortar joints" is used to indicate large pieces of broken bricks used randomly in the mortar joints.

30 The term "bricks inserted in the mortar joints" is hereafter used to indicate irregularly divided bricks inserted vertically or horizontally in the mortar joints. This technique resembles the "brick-filled mortar joints" technique. See Robert G. Ousterhout, *Master Builders of Byzantium* (Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology, 2008), 174–179. However, bricks in the joints here were not concealed by the mortar. The technique here also resembles *cloisonné* masonry, but differs from it, as the bricks do not necessarily frame the stones or follow any order (fig. 5).

31 Aurora Cagnana, "L'introduzione dell'opera quadrata medievale a Genova: aspetti tecnologici e contesto sociale," *Arqueología de la Arquitectura* 4 (2005): 23–45.

32 Clive Foss and David Winfield, *Byzantine Fortifications: An Introduction* (Pretoria: University of South Africa, 1986), 25–28; Nikos D. Kontogiannis, *Byzantine Fortifications: Protecting the Roman Empire in the East* (Yorkshire: Pen & Sword Military, 2022), 207.

33 On the periodization of the Byzantine Empire, see, among others, Alexander P. Kazhdan, "Byzantium, History of," *The Oxford Dictionary of Byzantium* (Oxford: Oxford University Press, 1991), 1:345–347.

34 The Walls of Constantinople were repaired in 1317, 1344, and, finally, between 1425 and 1448 in the late Byzantine period. See Alexander van Millingen, *Byzantine Constantinople: The Walls of the City and Adjoining Historical Sites* (London: William Clowes and Sons, 1899), 103–104. For building techniques and materials used in the walls and the interventions in the Palaiologan period, see Asutay-Effenberger, *Die Landmauer von Konstantinopel-Istanbul*, 147–181.

35 Foss and Winfield, *Byzantine Fortifications*, 59.

Figure 5: Latmos, İkiz Ada, Katholikon (thirteenth century), wall technique with *cloisonné* and "brick-filled mortar joints" (left). Photograph: Ufuk Serin, 2003. Arta (Greece), Church of Panagia Parigoritissa (thirteenth century), displaying rich varieties of the *cloisonné* and *champlevé* techniques in masonry (right). Photograph: Ufuk Serin, 2010.

Figure 6: Genoa (Italy), city walls; regular stone masonry of the walls near Porta Soprana. Photograph: Selin Sur, 2013.

Some of the earliest sections of the Walls of Galata from the first and second enceinte are built of alternating courses of stone and brick—a wall technique common from late antiquity (fourth to mid-seventh centuries)[36] through to the Byzantine Middle Ages.[37] A typical "Byzantine" wall is made of three to five courses of stone reaching ca. 65 cm and three to five courses of brick ca. 35 cm in height.[38] In the late Byzantine period, however, the use of four courses of stone with four courses of brick became widespread.[39] In the Palaiologan buildings of Constantinople, the frequency of alternation can be even more noticeable. In the first enceinte of the walls, section no. 1 and the eastern part of section no. 2 (fig. 14) are built of five courses of stone and four courses of brick, in alignment with the Byzantine practice; however, the stone courses reach 1 m in height. Section no. 4 has only one course of brick positioned in the middle of the wall height, and section no. 5 has highly deteriorated brick bands of two courses at irregular intervals. In the second enceinte of the walls, brick bands of two to four courses were used in sections no. 10 (fig. 14), 11, 12, and 14 (fig. 15). They exist only on one face of the walls, as described in detail in the appendix. No

36 The chronological distinction between late antiquity and Byzantium is debatable and may refer to identical or different chronological periods in different contexts and/or regions. For further discussion, see Serin, "The Byzantine 'City' in Asia Minor," 140, nn. 11–13, with bibliography.

37 The variations of the masonry with alternating courses of stone and brick, including quantities of spolia, appear in a variety of buildings, mainly including churches and fortifications, in Byzantine Anatolia (and elsewhere) over a large chronological span extending at least from the third through to ninth centuries (and later). Foss and Winfield, *Byzantine Fortifications*, 129, 162–163. See also Clive Foss, *Survey of Medieval Castles of Anatolia*, vol. 1, *Kütahya* (Oxford: BAR, 1985), 82, 92.

38 Ousterhout, *Master Builders*, 169.

39 Ahmet Ersen, "Erken Osmanlı Mimarisinde Cephe Biçim Düzenleri ve Bizans Etkilerinin Niteliği" (PhD diss., Istanbul Technical University, 1986), 19.

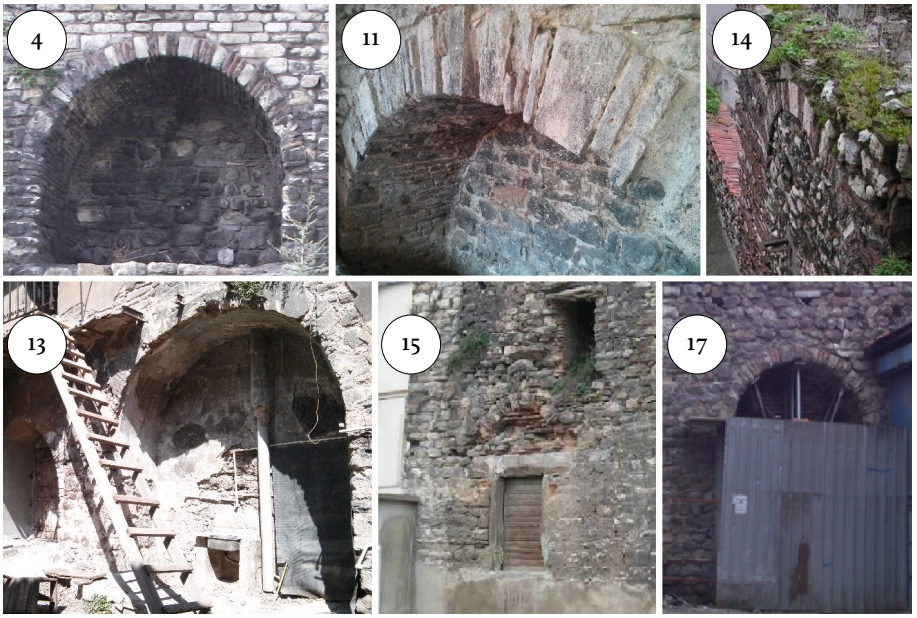


Figure 7: Galata Walls, arches composed of stone and brick. Photograph: Selin Sur, 2014 (sections no. 4, 11, 13, 17); Erdoğan, "Galata Kent Surları," 129, 93 (no. 14, 15).

brick bands can be found in the surviving sections dating to the other periods. Therefore, one may reasonably assume that the Byzantine construction technique with alternating courses of stone and brick was followed by the Genoese, sometimes with variations, at least until the mid-fourteenth century.

Figure 8: Galata Walls, arches composed of stone and brick in a demolished tower. Photograph: Pascal Sébah, ca. 1870. Suna and İnan Kıraç Foundation Photography Collection, İAE, FKA_003035.

Alternating courses of stone and brick are also seen in the semicircular arches of the casemates and some openings of the towers, with one course of stone and two or three courses of brick, in the first and second enceinte (early and mid-fourteenth century) (fig. 7). These can also be observed in the earlier photographs of demolished sections (fig. 8). The alternating use of two to five courses of brick and one course of stone in the masonry emerged in the late Byzantine period and became the typical characteristic of Palaiologan architecture in Constantinople after 1300.[40] This technique was applied particularly to the arches. The bicolor pattern on the façades was widespread in Mediterranean architecture during the Middle Ages.[41] Another Genoese building in Galata—namely, the Communal Palace (Palazzo Comunale/Bereket Han)—also has this arch type. Previous research on the Walls of Galata has identified these arches as a typical and unique feature of Genoese buildings in Constantinople and an influence from Northern Italy, where bichrome arches were commonly used, therefore, a Genoese feature.[42] However, the same technique was also used in the arches of some Byzantine churches in Istanbul, such as the Chora Church (Kariye Camii) and the Monastery of the Theotokos Pammakaristos (Fethiye Camii), the Palace of the Porphyrogennetos (Tekfur Sarayı), and the Land and Sea Walls during the Palaiologan period.[43] According to Ioannes VI Kantakouzenos, who witnessed the construction of the second enceinte of the Walls of Galata, both Genoese men and women participated in construction activities.[44] It can thus be assumed that the Genoese employed the building techniques

40 Richard Krautheimer, *Early Christian and Byzantine Architecture* (Harmondsworth: Penguin Books, 1965), 298.
41 Alireza Naser Eslami, "Assimilazione, appropriazione e ricerca di un'architettura di 'Stile Internazionale' nel Mediterraneo medievale: La *Porta Ianuae* e l'architettura in Ablaq a Genova," in *Genova, una capitale del Mediterraneo tra Bisanzio e il mondo islamico: Storia, arte e architettura*, ed. Alireza Naser Eslami (Milano: Pearson Italia, 2016), 165–194.
42 Sağlam, "Urban Palimpsest at Galata," 176.
43 Robert G. Ousterhout, *Eastern Medieval Architecture: The Building Traditions of Byzantium and Neighboring Lands* (New York: Oxford University Press, 2019), 595–618. A distinctive example, namely, a pointed arch made of stone and brick, can be seen at Silivrikapı (the Gate of Pege) on the Land Walls. This gate was almost completely reconstructed during the Ottoman period after the earthquake of 1509 by reusing the original building materials. See Asutay-Effenberger, *Die Landmauer von Konstantinopel-Istanbul*, 73. Thus this pointed arch must be a product of Ottoman architectural practices, as it was uncommon in Byzantine architecture.
44 Ioannes Kantakouzenos, *Historiarum: Libri IV*, ed. Ludwig Schopen, Corpus Scriptorum Historiae Byzantinae 20 (Bonn: Impensis Ed. Weberi, 1832), 3:70–71.

of Palaiologan architecture in the construction of the Walls of Galata, perhaps under the supervision of Byzantine builders. The walls with this type of arch in the first enceinte could also be from this period, given that the towers were built first while the ramparts between the towers were erected later.

The alternating courses of stone and brick are also used in other surviving Genoese buildings in Galata, specifically, the aforementioned Communal Palace and the Dominican Church of Saint Paul (Chiesa di San Domenico e San Paolo/Arap Camii). The Communal Palace was probably built after the great fire in 1315, with masonry of one course of finely cut stone and three or four courses of brick observed in the original northern section of the building.[45] As mentioned above, it has the same type of bicolor semicircular arch as in the Walls of Galata, which were damaged by later interventions. The original masonry is in accordance with the general lines of Palaiologan architecture. For the Dominican Church of Saint Paul, while the history of the building goes back to the sixth century, the Genoese church was built in the 1330s and converted into a mosque under Ottoman rule in the fifteenth century.[46] Later interventions make the building difficult to read, but it still bears some of its original features. The fourteenth-century masonry character of the building has been identified as two courses of stone and three courses of brick.[47] Although this technique is slightly different from that of the Communal Palace, it is seen in the remains of the western part of the Tekfur Sarayı, together with the arches of one course of stone and three courses of brick. Recent studies and restoration work have demonstrated that the Genoese worked with Byzantine masons and artists to construct the church, creating a Gothic edifice in a Byzantine architectural style in its masonry and decoration.[48] Therefore, it is safe to assume that this also happened in the construction of the Communal Palace and the Walls of Galata.

In addition to these techniques, whole or half bricks are used in the arches of the loopholes, casemates, openings, and so forth. These are investigated in this research to understand if they had specific or regular dimensions; however, the length differences may be as much as 10 cm within the same feature (e.g., section no. 1). The lengths of the bricks vary between 25 and 38 cm, while the thicknesses differ from 3 to 6 cm. However, on average, 28–30 x 4–5 cm whole bricks and 14–15 x 4–5 cm half bricks are the most frequently used in all periods (table 1).[49] The dimensions of Byzantine bricks used in Constantinople, diminishing in thickness over time, vary between 30–40 cm in length and 3–6 cm in thickness. In the late Byzantine period, the most frequently seen brick length is ca. 30–34 cm, although it varies between extremes of 28.5 and 37 cm, while their thicknesses range less at 3.5–4.5 cm.[50] A study on the dimensions of bricks of Palaiologan architecture in Constantinople confirms the above observations concerning brick thickness; however, it identifies two different groups of bricks, with a length of 30–32 cm and 36–37 cm. The 30–32 cm-long bricks have been recorded in the Chora Church (Kariye Camii), the Monastery of the Theotokos Pammakaristos (Fethiye Camii), and in a few other buildings. The same study also suggests that the 36–37 cm-long bricks were probably reused, while those with a length of 30–32 cm were produced contemporaneously.[51] In Galata, brick dimensions are 30–32 x 4 cm at the Communal Palace and 30–32 x 3.5–4 cm in the Dominican Church of Saint

45 Sağlam, "Urban Palimpsest at Galata," 96–110. The building was partly demolished during urbanization activities in the nineteenth century, and its original structure only partially survived in the northern section.

46 Haluk Çetinkaya, "Arap Camii in Istanbul: Its Architecture and Frescoes," *Anatolia Antiqua* 18 (2010): 171–172, https://doi.org/10.3406/anata.2010.1309; Sağlam, "Urban Palimpsest at Galata," 114–119.

47 Ibid., 119–121.

48 Haluk Çetinkaya, "Byzantine Masters at the Service of the Catholic Church at Constantinople," *Porphyra* 16 (2011): 53–65; Rafał Quirini-Popławski, "Greek Painters for the Dominicans or Trecento at the Bosphorus? Once Again about the Style and Iconography of the Wall Paintings in the Former Dominican Church of St. Paul in Pera," *Arts* 8, no. 4 (2019): 131, https://doi.org/10.3390/arts8040131; Silvia Leggio, "Genova a Costantinopoli: la colonia di Galata, la chiesa di S. Domenico e il suo 'perduto' ciclo murale," *Arte Medievale* 11 (2021): 89–140.

49 Since the bricks could be measured only from the surface of the walls, the dimensions provided here indicate the length per thickness of the bricks.

50 Yegân Kahya, "Istanbul Bizans Mimarisinde Kullanılan Tuğlanın Fiziksel ve Mekanik Özellikleri" (PhD diss., Istanbul Technical University, 1992), 20–24. For a synthesis, see also Kahya, "Istanbul Bizans Mimarisinde Tuğla Boyutları Üzerine," in *Prof. Doğan Kuban'a Armağan*, ed. Zeynep Ahunbay, Kutgün Eyüpgiller, and Deniz Mazlum (Istanbul: Eren Yayıncılık, 1996), 171–182.

51 Zanini, "Materiali e tecniche costruttive," 301–320.

Paul,[52] in accordance with the brick dimensions thought to be used in that period. The bricks used in the Walls of Galata slightly differ from these bricks, frequently reaching 5 cm in thickness and diminishing to 28 cm in length. Table 1 shows that the majority of the presumably reused bricks belong to the first enceinte since brick dimensions are larger than the average sizes of this period in the surviving sections. In the later phases, the average brick dimensions are ca. 28–30 x 4–5 cm for whole bricks and 14–15 x 4–5 cm for half bricks, as mentioned above. If Byzantine bricks were ca. 30–32 cm (ca. one Byzantine foot [31.23 cm]) in length in this period and were also used in other Genoese buildings, the reduced dimensions of bricks used in the Walls of Galata require an explanation. Bricks with a thickness of over 4.5 cm in the Palaiologan period were previously suggested to be carefully selected reused materials or new products exclusive to certain uses.[53] Given that they were used in the arches, they could have been produced for the construction of the walls. If so, why were they shorter than the average dimensions of the period? This could be associated with inconsistencies that might occur during processes of firing and/or drying, or the use of different molds by several different teams working together.[54] Or these bricks could simply be products of later interventions; however, it is impossible to determine the underlying factors within the limits of this research since the numbers of surviving sections where the measurements are taken from are insufficient to reach any specific conclusion, making this the subject of further investigation.

Other Genoese-Related Fortifications

A better understanding of the building techniques used by the Genoese and defining "Genoese" characteristics requires investigation of the other castles in Anatolia and eastern Thrace with alterations from the Genoese period mentioned above, namely the castles of Amasra, Enez, and Foça. These castles show partial resemblances to the Walls of Galata, characterized by rubble or roughly cut stones of reduced dimensions.

The Castle of Amasra is an early Byzantine fortress, originally dating from the Hellenistic period (323–31 BCE).[55] The Genoese began to settle there in 1270; they probably only started to control the area in the mid-fourteenth century and continued to dominate for about a century until the Ottomans captured the town.[56] The earliest Genoese building within the castle is thought to have been constructed in 1421.[57] The Genoese building in the southeast of İç Kale (the inner citadel) on the mainland is still referred to as the Cenova Şatosu (Castle of Genoa) (fig. 9). The rubble or roughly cut stones used here are much smaller than in earlier Byzantine constructions, and brick pieces are sporadically used in the mortar joints. The Genoese interventions are "consistently executed in uncoursed rubble set in a hard white mortar."[58]

The exact date for the first construction of the Castle of Enez is unknown, but its walls were raised in the sixth century, and it is considered mainly a Byzantine structure.[59] Three slabs from the Gattilusio period on the walls might indicate repairs during their time at Enez from 1376–1456. Furthermore, two slabs found in the churches of Theotokos Chrysopege and Agios Nikolaos in the same town include inscriptions bearing the name of a Byzantine master builder Kostantinos, hired for the construction works by the Gattilusio family.[60]

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52 Sağlam, "Urban Palimpsest at Galata," 111, 131.
53 Zanini, "Materiali e tecniche costruttive," 305.
54 Kahya, "Istanbul Bizans Mimarisinde," 21.
55 James Crow and Stephen Hill, "The Byzantine Fortifications of Amastris in Paphlagonia," *Anatolian Studies* 45 (December 1995): 251–265.
56 Sağlam, "Urban Palimpsest at Galata," 283.
57 Burak, "Amasra Kale Kenti," 190.
58 Crow and Hill, "The Byzantine Fortifications of Amastris," 258.
59 Procop., *Aed.* 4, 11; Frederick W. Hasluck, "Monuments of the Gattelusi," *Annual of the British School at Athens* 15 (1909): 250.
60 Hasluck, "Monuments of the Gattelusi," 248–269; Robert Ousterhout and Charalambos Bakirtzis, *The Byzantine Monuments of the Evros/Meriç River Valley* (Thessaloniki: European Center for Byzantine and Post-Byzantine Monuments, 2007), 34; Sağlam, "Urban Palimpsest at Galata," 185–197. The name of Kostantinos also appears in two castles, possibly built or repaired by the same family, on Samothrace. Sağlam, "Identifying a Late Medieval Maritime Defense Network: Tower of Büyük Maden Island, Tower of Mardaliç Island and Castle of Çandarlı," *European Journal of Post Classical*

Figure 9: Amasra, "Castle of Genoa" ("Cenova Şatosu," Batı Karadeniz Turizm Master Planı, Batı Karadeniz Kalkınma Ajansı).

Although the extent of the Genoese alterations is unclear, the upper part of the walls of Enez Castle is of stone masonry, including rubble and roughly cut stones, smaller than those used in the lower sections. Brick pieces and bricks inserted in the mortar joints, packed with a creamy white mortar, were used in the masonry. On the other hand, the lower parts, which might date from the same period, are faced with larger, rectangular stones (fig. 10). This type of masonry is seen in a few other defensive buildings in the northern Aegean, possibly built or repaired by the Gattilusio family, and could be the work of the same master builder who restored the Castle of Enez.[61] Nevertheless, the masonry of Enez can be distinguished from the other examples in the Gattilusio lordships by the abundant use of bricks in the mortar joints, probably in close association with the availability of the material to be reused or the existence of brick workshops in the vicinity.

The Castle of Foça is much earlier, dating to the sixth century BCE, with interventions in the Roman, Byzantine, Genoese, and Ottoman periods; Genoese rule in Foça lasted from 1275 to 1455.[62] The monument has been heavily restored in recent years and the castle excavations have confirmed three different periods of wall construction; the Genoese restorations date to the thirteenth century and have a "wall texture that is particular to the Genoese" bound by pink *cocciopesto*.[63] The walls attributed to the Genoese period seem to include stone masonry with relatively small, roughly cut, irregular stone courses in one section and somewhat larger ones in another (fig. 11). Therefore, the term "Genoese texture" remains ambiguous since it has not been well explained and consists of different kinds of masonry in this case. Also, unlike other castles, no brick pieces or bricks inserted in the mortar joints can be seen here.

Comparisons of these castles and the Walls of Galata reveal that the Genoese fortifications had no distinctive building methods and thus a typical "Genoese" technique cannot be identified in Anatolia and eastern Thrace in terms of masonry. The similarities and differences in the wall textures of these castles may have both a chronological and geographical dimension.

Archaeologies 12 (2022): 279.

61 Sağlam, "Identifying a Late Medieval Maritime Defense Network," 278–281.

62 Sağlam, "Urban Palimpsest at Galata," 205–228.

63 The Genoese interventions in the Castle of Foça are characterized by *cocciopesto*, while Byzantine repair and restorations appear to include an earth-like mortar. Özyiğit, "2010 Yılı Phokaia Kazı Çalışmaları," 488. *Cocciopesto* was widely used in Byzantine architecture, a building tradition (known as *Horasan harcı* in Turkish) followed by the Ottomans.

Figure 10: Enez Castle, southern breakwater, dated to the thirteenth–fifteenth centuries. Photograph: Selin Sur, 2017.

Figure 11: Foça Castle, the Genoese tower and a wall section (Özyiğit, "2013 Yılı Phokaia Kazı Çalışmaları," 159, 160).

Moreover, regardless of the presence of "Byzantine" builders, local building techniques of the late Byzantine period were used with available materials; thus, it is not surprising that the Walls of Galata were built with the same methods used in the same period in Constantinople. The above comparison also shows that using brick pieces in the mortar joints was a superior choice, depending on the availability of the material, either to be reused or newly produced.

The Genoese Influence

Pera was the most important colony in the Eastern Mediterranean and significantly resembled its "mother" city, Genoa, both topographically and architecturally. In fact, the Genoese settlements were built similarly: Genoese colonies aspired to look like their mother city, which they managed to do to some extent in Pera,[64] except for the significant influence of the Palaiologan architecture. If this was the case, can we find anything specific to the Genoese in these walls? Pointed arches are probably the most original feature, seen in the casemates and towers of the Walls of Galata. Section no. 4 has three rows of pointed brick arches in the lower section of the casemates (fig. 14). Sections no. 7, 8, 12, and 14 are towers with pointed arches surmounting wide openings at the ground level (fig. 12). The

64 Rafał Quirini-Popławski, "Pera-Galata: etapy rozwoju urbanistycznego 'nowej Genui,' " in "Mare apertum: przepływ idei, ludzi i rzeczy w świecie śródziemnomorskim," ed. Danuta Quirini-Popławska, special issue, *Portolana: Studia Mediterranea* 3 (2007): 195–213.

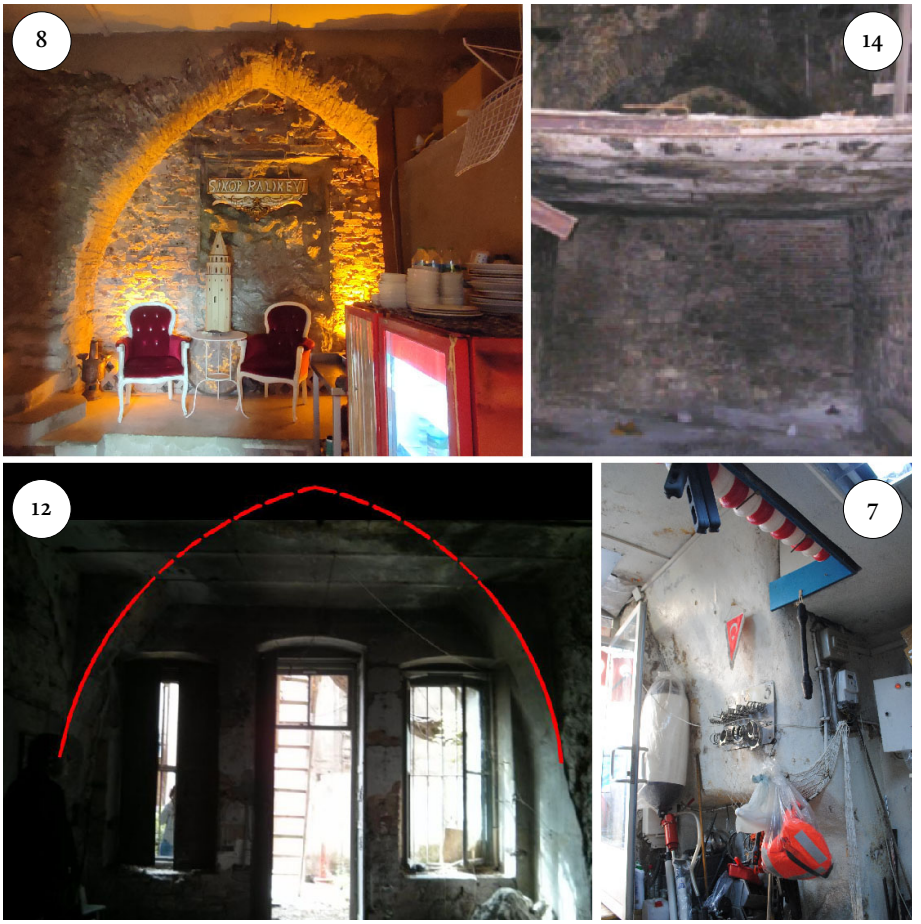

Figure 12: Galata Walls, pointed arches in the surviving towers. Photograph: Selin Sur, 2014 (sections no. 7, 12); Selin Sur, 2022 (no. 8); Erdoğan, "Galata Kent Surları," 123 (no. 14).

arches in sections no. 8 and 14 are built of brick; however, the material of sections no. 7 and 12 cannot be identified. Although "slightly pointed arches" can be seen in some buildings from the eighth century, pointed arches were not a feature of later Byzantine architecture—the typical type of arch used in this period was semicircular.[65] The pointed arch was a staple of Islamic and medieval Latin architecture and was already used in Anatolia during the Seljuk (eleventh–thirteenth centuries) and Beylik periods (from the eleventh through to the first quarter of the fifteenth century).[66] Some questions concerning cultural interactions emerge at this point: Is it possible that Anatolian Islamic architecture influenced Genoese architecture in Galata, or was the use of pointed arches the result of medieval Latin masonry traditions and influences?

Given the fact that the encounters between the Genoese and the Seljuk Turks were limited in terms of time and space, and that the Genoese were allowed to set up colonies only in Byzantine territories, it seems unlikely that the Genoese were influenced by Islamic architecture in Anatolia. Pointed arches had already been used in Latin medieval architecture when the Genoese arrived in the region. As a matter of fact, the Genoese employed these in the Walls of Genoa itself (at Porta Soprana) in the twelfth century (fig. 13).[67] Previously, it has been suggested that Gothic architecture originated in Jerusalem, where the Crusaders encountered the Ayyubids. According to this theory, the Crusaders appreciated the masonry traditions of Islamic architecture and adopted certain architectural elements, such as pointed arches, ribbed vaults, and flying buttresses. After Salah al-Din Ayyub captured

65 Osterhout, *Master Builders*, 208.
66 Ayşıl Tükel Yavuz, *Anadolu Selçuklu Mimarisinde Tonoz ve Kemer* (Ankara: Kelaynak Yayınevi, 1983).
67 Sur, "Galata Surları ve Restitüsyon Sorunları," 131.

Figure 13: Genoa, city walls, Porta Soprana, pointed arches in the gate and the towers. Photograph: Selin Sur, 2013.

Jerusalem, the Crusaders left the Holy Land through Cyprus, where they created the first examples of Gothic architecture.[68] Similarly, it is thought that the use of *opus quadratum* in the Walls of Genoa resulted from an eastern influence in association with the Crusaders.[69]

As mentioned above, pointed arches are found in the surviving sections of the first and second enceinte where the Genoese community worked during their construction. Therefore, it is highly possible that they practiced their own architectural culture, adapting it to the local construction techniques (e.g., the use of bricks). For example, section no. 4 probably consisted of two phases (see appendix, section no. 4). The lower part, with casemates surmounted with pointed brick arches, was most likely built directly by the Genoese (early fourteenth century), while the upper part is presumably a later construction (mid-fourteenth century), with Byzantine influences seen in the semicircular arches of alternating stone and

68 Alessandro Camiz, "Gothic, Frankish or Crusader? Reconsidering the Origins of Gothic Architecture," in *Proceedings of the Workshop: Architecture, Archaeology and Contemporary City Planning; Reformation, Regeneration and Revitalisation (Turku, Finland 15–18th May 2017)*, ed. Liisa Seppänen, Giorgio Verdiani, and Per Cornell (Raleigh, NC: Lulu Press, 2018), 147–158.
69 Cagnana, "L'introduzione dell'opera quadrata medievale a Genova," 43.

brick. It is known that the Genoese used pointed arches in their churches in Galata, such as the Dominican Church of Saint Paul (Arap Camii), and these arches are considered a direct influence of Gothic architecture.[70] The Church of Saint Benoît in Galata was originally a Byzantine structure that came under Benedictine order in the fifteenth century. The pointed arches in the frieze of the bell tower and the demolished entrance gate made of ashlar were previously thought to be the results of either Seljuk or Latin influences, comparing these components to the slightly pointed arches from the Palaiologan period in the Chora Church (Kariye Camii) and the Monastery of the Theotokos Pammakaristos (Fethiye Camii).[71] This approach somehow overlooks the strong presence of the Genoese adjacent to the Church of Saint Benoît when it was being built in the early fourteenth century. The emergence of pointed arches in Constantinople in the Palaiologan period may well have been the influence of the Genoese and a result of the Genoese cooperation with Byzantine masons in the early fourteenth century. The Genoese might not have been the first to use pointed arches in their architecture in Constantinople; there were other Latin communities there, such as the Venetians and Pisans. Regardless, the Genoese were certainly the most active in terms of construction work, especially after settling in Pera and being involved in urbanization activities. Therefore, the pointed arches on the Walls of Galata constitute possibly the earliest surviving examples of their kind in Istanbul.

Conclusion

The "Genoese castle" remains a general term employed for many coastal fortifications in Anatolia and eastern Thrace held by the Genoese for a certain period, although precise identification of Genoese architectural characteristics remains ambiguous. This research has revealed that the construction techniques and materials used in the Walls of Galata and other fortresses, whose renovation by the Genoese is recorded, were all essentially associated with the particular circumstances of the late medieval period (ca. thirteenth–mid-fifteenth centuries), local conditions, and the architectural practices of the time of their construction. The Genoese renovations of the fortresses of Amasra, Enez, and Foça display similarities to the Walls of Galata in terms of construction techniques and materials. Since the Walls of Galata are an original Genoese construction, they would normally be expected to display original architectural features. However, the surviving parts of the walls have essentially lost their integrity, having been renovated, and/or modified several times throughout history into the present day. Even so, the surviving sections reflect, to a certain extent, the building traditions that the Genoese might have been expected to follow.

The influence of the late Byzantine, namely Palaiologan, architecture is easily recognizable in the Walls of Galata. The primary building technique used in the walls is rubble and/or roughly cut stone masonry, with large brick pieces in the mortar joints. This is seen in almost all the surviving sections, together, in some cases, with other techniques. It must be kept in mind that the Genoese built the Galata Walls contrary to the commands of the Byzantine authorities. Therefore, the construction had to be finished as quickly as possible by (re)using all available construction materials. This research has demonstrated that this was a characteristic of Palaiologan architecture, especially in the construction of defensive buildings. The wall technique with alternating courses of stone and brick, typical of the late antique and Byzantine periods, was seldom used in the Walls of Galata, and even then, without following any particular or regular order. On the other hand, the Genoese did use the arches of Palaiologan architecture, composed of stone and brick, without changes. The masonry tradition of alternating rows of stone and brick was utilized in other Genoese buildings in Galata, where Byzantine masons were likely to have worked. Since the dimensions of bricks used in the Walls of Galata are compatible with those of Byzantine bricks (with exceptions), a direct association with Byzantine brick producers and masons

70 Seda Sicimoğlu Yenikler, "The Cultural Transformation of Genoese Galata from the Byzantine to the Ottoman Rule and Its Reflection on the Church of San Domenico," in *Multiethnic Cities in the Mediterranean World: History, Culture, Heritage*, ed. Marco Folin and Rosa Tamborrino (Turin: AISU International, 2019), 45–60.

71 Philipp Niewöhner, "Saint Benoît in Galata: Der byzantinische Ursprungsbau," *Jahrbuch des Deutschen Archäologischen Instituts* 125 (2010): 155–242; Niewöhner, "The Discovery of Byzantine Galata: The Case of St Benoît," in *From Istanbul to Byzantium: The Path to Rediscovery, 1800–1955*, ed. Brigitte Pitarakis (Istanbul: Pera Müzesi, 2021), 178–191.

appears irrefutable. Furthermore, if Byzantine masons were employed for the construction of other significant Genoese buildings, such as churches and palaces, it is reasonable to conclude that they also worked on the wall construction.

A definitive element of Genoese construction could well be the types of mortar used, which are not well known, having never been analyzed in any detail. Therefore, research into Genoese architecture would also benefit from a detailed characterization and chemical analysis of the mortars they favored. Their mortar mixtures in Anatolian fortresses are unknown, and a classification based mainly on mortar color is inconclusive. Further research on Genoese architecture in Anatolia and eastern Thrace will also prevent misleading and erroneous interpretations and designations, as exemplified in the UNESCO nominations, where constructions with ambiguous or nonexistent Genoese histories are listed among their fortresses. The characterization of mortars used by the Genoese, and comprehensive research into the architecture of this period, is also crucial if we are to avoid inappropriate and incompatible conservation interventions in the future.

A novelty for Constantinopolitan architecture is the use of pointed arches in the Walls of Galata. These arches are seen only in a single wall section but appear in most of the surviving towers. Since this is not a Byzantine tradition, the Genoese might have introduced this technique to Byzantine masons. Interestingly, the use of pointed arches in Constantinople and Galata seems to be a consequence of an originally Eastern influence adopted from the medieval West. As discussed above, earlier scholarship and material evidence suggest that this technique originated in the East, was disseminated throughout Latin lands by the Crusaders in the twelfth century and was introduced to the Byzantine masons of Constantinople by the Genoese as late as the fourteenth century. Apparently, Galata was the scene of a cross-cultural architectural environment in the early fourteenth century, as it was in the following centuries. The Walls of Galata thus emerge as a significant monument that displays very early examples of this practice in Istanbul.[72]

72 It is worth noting that the influence of the Latins on Anatolian architecture has not yet been the subject of any comprehensive research.

Figure 14: Galata Walls, sections no. 1–10. Photograph: Selin Sur, 2014 (sections no. 2, 4, 7, 8); Selin Sur, 2022 (no. 1, 3, 5, 10).

Section no. 1 includes a rectangular tower at the northwestern corner of the first enceinte. It survives through modern interventions and additions, but its original characteristics can still be observed. The walls are of alternating courses of stone and brick. Stones show variety in terms of shape, size, and color. Notably, the brick rows begin ca. 4 m above the ground on the western façade. Above the first brick band, the wall continues with five courses of stone and four courses of brick (fig. 14). The alternating courses measure 0.97 m stone and 0.3 m brick. The horizontal mortar joints between the bricks are 4.5 cm thick. A creamy white mortar with small pebbles was used in the joints.[73] The loopholes, built in two rows, are made of stone on the outside, with brick arches surmounting the loophole on the inside. The brick dimensions are given in table 1.

Section no. 2 consists of the remnants of the wall of the northern part of the first enceinte, which is connected to section no. 1 to the east (fig. 14). This wall fragment consists of two parts with different construction techniques. The eastern part of the wall is similar to section no. 1 and consists of an irregular stone coursing with four rows of brick bands and brick pieces in the mortar joints. The western part of the wall, however, is thicker and consists of irregular stone courses with brick pieces in the mortar joints and abundant white mortar. This section is finely finished where it joins the eastern one, suggesting it is possibly a later infill between the eastern section and section no. 1.

73 This tower has recently been repaired using *cocciopesto* in the mortar joints.

Section no. 3 is a surviving section of wall of the western border of the first enceinte; it adjoins section no. 1 from the south (fig. 14). The wall of the stone masonry structure is 2.2 m thick, with sporadic use of bricks in the mortar joints. As a result of partial demolition, vegetation, weathering, modern interventions, and material loss, the original characteristics of the wall are largely nonextant. It is known that the casemates survived at least until 1975.[74]

Section no. 4 continues from section no. 3 to the south (fig. 14). This wall fragment, which extends ca. 44 m, is built of stone masonry in irregular courses, with sporadic use of brick pieces and bricks inserted in the mortar joints. A single brick band divides the wall horizontally, displaying slightly different wall textures on the western side of the wall. Rectangular, light-colored stones above this band, and roughly cut, dark-colored stones below it, can be seen. On the eastern side, the wall has casemates with two rows of arches; most are demolished, but their traces are visible. The arches on the upper level are semicircular and built of brick, faced with two or three courses of brick and one of stone, thus acquiring a bichrome appearance. The pointed arches on the lower level are also of brick. The arches begin with stone courses on the springing line and continue with brick courses. The level of the brick band on the western side corresponds with the level where the casemates with pointed arches terminate and those with semicircular arches begin. The difference between the lower and upper levels on both sides of the wall might indicate two different construction phases (for brick dimensions, see table 1). The careless brickwork is probably the result of the rapid construction of the Walls of Galata. This wall fragment includes three pieces of marble spolia, one resembling a balustrade post (fig. 2).

Section no. 5 includes the remains of a wall in the southern part of the first enceinte (fig. 14). The severe interventions to the wall and deterioration prevent us from commenting on its original characteristics. Although the wall has a stone masonry structure of irregular rubble courses, bands of two brick courses are seen on the upper levels; brick pieces in the mortar joints have a thickness of 4 cm.

Section no. 6 consists of a recently discovered wall, which is thought to belong to the Walls of Galata.[75] Since it is hidden behind buildings, it is impossible to identify its features.

Section no. 7 includes a rectangular tower, now used as a shop (fig. 14). The building materials and techniques are visible only on the tower's upper level due to the modern interventions on the façade and the interior of the ground level. A fragment of a large arch can be seen at the shop's entrance (northern façade of the tower); this is covered with plaster and its features cannot be determined. An examination of the upper level of the tower indicates that it is a stone structure with stone courses of similar height and with brick pieces, 4 cm thick, set in the mortar joints (table 1). Imposts of marble spolia can be seen in the openings on the northern façade, whereas only a tiny fragment of a brick arch is visible. A wall fragment with a casemate surmounted by a semicircular arch adjacent to the west side of this tower survived until the end of the 1960s.[76]

Section no. 8 is comprised of a partly demolished rectangular tower and a wall fragment on its west side (fig. 14). The remains of the wall consist of stone masonry and brick pieces in the mortar joints. The tower has an opening on its eastern façade with a semicircular brick arch, and the wall fragment includes the traces of a semicircular brick arch that belonged to the casemate. A pointed arch made of brick, 3.30 m high and 3.60 m wide, can be seen on the northern wall of the interior and was possibly the entrance (fig.12; table 1)

Section no. 9 consists of the remains of a wall recently discovered and thought to belong to the Walls of Galata.[77] The eastern end of this wall (fig. 14) can still be seen; it is a stone masonry construction, 1.45 m thick, with brick pieces and bricks inserted into the mortar joints.

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74 Sur, "Galata Surları ve Restitüsyon Sorunları," 32.
75 Hasan S. Sağlam, "Galata'da İhmal Edilmiş Ceneviz Yapılarına Dair Bazı Keşifler," *International Congress of Academic Research* (Elazığ: Asos Yayınevi, 2020), 547.
76 Sur, "Galata Surları ve Restitüsyon Sorunları," 45–46.
77 Sağlam, "Bazı Keşifler," 547.

Section no. 10 represents the well-known Galata Tower itself (fig. 14). There are several different theories about the construction phases of the tower, as well as its demolition and reconstruction under Sultan Mehmed II (r. 1444–1446; 1451–1481). The most recent study on the tower suggests that it was undoubtedly built by the Genoese and repaired or partly reconstructed by the Ottomans, as opposed to previous theories suggesting that it was a sixth-century Byzantine structure.[78] The tower is built with roughly cut stones of irregular size and brick pieces in the mortar joints, and with bricks inserted into the mortar joints vertically or horizontally. The bricks in the mortar joints at the tower's lowest level are 3 cm thick. A brick band of three courses can be seen at a height of ca. 13.20 m.[79] The color of the stones above this level is slightly lighter, and the use of brick in the mortar joints is less frequent. Another brick band of four courses is set at 17.17 m.[80] On the southern façade, this band turns into a meander-like geometric brick patterning. Given the change in this brick band, the windows with Ottoman-style pointed brick arches, and another brick band with geometric patterning over the windows, scholars have generally agreed that this tower was an Ottoman construction above the level of the band at 17.17 m, namely above the second floor.[81] The texture of the stone masonry changes above this level and brick pieces cannot be observed in the mortar joints.

The dimensions of the bricks used in the tower show a range of sizes (table 1). To summarize, the length of bricks varies between 22 and 31 cm and their thicknesses from 2.5 to 5 cm. A creamy white mortar is used in the joints throughout the tower.

Section no. 11 consists of a wall fragment from the western part of the second enceinte (fig. 15). This wall shows characteristics at variance with the others examined so far. It has a series of semicircular casemate arches made of bricks and faced with alternating courses of three bricks and one stone. Each casemate has a loophole in the middle, whose embrasures are entirely made of brick. The walls are built of irregular stone courses, and two or three courses of brick bands are seen in some spandrels. Brick pieces are inconsistently used in the mortar joints. Two blocks of marble spolia, one with an inscription, are observed on the lower levels of the wall. In the uppermost part, bricks are inserted in the mortar joints, both vertically and horizontally. None of these characteristics are observed on the western side of the wall, where irregular stone masonry is visible.

Section no. 12 includes a tower with a U-shaped plan adjoining section no. 11 on the southwest (fig. 15). It underwent heavy interventions over the centuries, resulting in changes to its architectural characteristics. As a result of such interventions, the tower displays different characteristics on different façades and levels.

The southeastern façade has lost its original openings, and adding new ones damaged the original arches. The arch on the ground floor level was plastered and is no longer visible. Another semicircular but smaller arch on the second floor level has been damaged and was cut by a later window opening; yet it is clearly an example of finely cut stone, as opposed to the irregular rubble masonry used in the tower.

The ground floor level is plastered on the northeast, northwest, and southwest façades, and their features cannot be identified; however, the rest of the tower is of brick-banded stone masonry. The brick bands consist of three rows and are placed at irregular intervals. However, they are not consistent on the southeastern façade. Brick pieces are used in the mortar joints.

Inside the tower, stone masonry can be seen on the ground floor and does not contain brick bands. There are three loopholes similar to those in section no. 11. There are three more loopholes on the upper level; they are only visible from the outside, as they are covered by

78 Hasan S. Sağlam, "Galata Kulesi'nin Ceneviz Dönemine Yönelik Bir Yeniden Değerlendirme," *YILLIK: Annual of Istanbul Studies* 2 (2020): 53–80.
79 Köksal Anadol and Ersin Arıoğlu, "Galata Kulesi," in *Geçmişten Günümüze Beyoğlu*, ed. Sinan Genim, Yücel Dağlı, Ebru Karakaya, Müslüm İstekli, and Dila Çakıl (Istanbul: Türkiye Anıt Çevre Turizm Değerlerini Koruma Vakfı, 2004), 1:170.
80 Ibid.
81 Semavi Eyice, "Galata Kulesi," in *Türkiye Diyanet Vakfı İslâm Ansiklopedisi* (Istanbul: Türkiye Diyanet Vakfı, 1996), 13:313–316; Sağlam, "Galata Kulesi'nin Ceneviz Dönemi," 70–77.

the later addition of a vault. The upper-level arrow slits are made of stone on the exterior.

A distinctive characteristic of this tower is that it bears a marble molding dividing the façade in half and includes a marble panel of spolia with a geometric decoration on the southwestern façade, ca. 10 m above the ground level (fig. 3).

Section no. 13 consists of a wall fragment, basically an extension of sections no. 11–12 towards the southwest (fig. 15). The northern part of the wall has suffered from structural and physical deterioration. Traces of buildings once attached to the wall prevent the analysis of this wall in any detail. Two blocked loopholes can be distinguished. The stone masonry shows the sporadic use of bricks in the mortar joints.

The southern part of the wall consists of two different techniques. The lower part of the wall is built with roughly cut stones, with brick pieces in the mortar joints. The upper part, on the other hand, is made of rubble. The gate in this wall, probably a later addition, is now hidden behind the building built against the wall.[82] The gate is next to the tower and has a finely cut stone arch, a stone lintel laid on marble imposts of spolia, and a brick tympanum.

Section no. 14 is another U-shaped tower in the middle of section no. 13 (fig. 15). The tower is of stone masonry with brick pieces in the mortar joints on the northeast, northwest, and southwest façades. The upper part of the southeastern façade consists of one course of stone and three courses of brick. A semicircular arched opening on the façade was blocked with rubble stones at an unknown time. The arch is also built of one course of stone and three courses of brick.

The tower has undergone serious interventions, resulting in the loss of its original architectural features, and now has five stories following the modern additions. The tower's interior displays different wall techniques from the exterior on the upper floor levels. Nonetheless, brick bands that consist of three courses are seen from the first floor to the top. While the bricks in the bands have a length of 15 cm,[83] the distance between the bands could not be recorded. Between the first and third floors, the interior of the southeastern wall is built of brick and surmounted by a pointed arch. The depth of the arch, consisting of one whole and one half brick, is ca. 0.46 m; therefore, the whole bricks are probably 30 cm long.[84] The thickness of the bricks could not be documented here, as this section remains within the boundaries of private property and is not accessible. The tower itself also remains inaccessible because of the collapse of the upper floors, making it difficult for us to investigate the wall technique in the upper levels.[85] No loopholes are found in the tower, but there is a blocked door opening on the first floor that seems to have been enlarged from a loophole. Its arch and abutments, halfway down the arch, are built of bricks 15 cm long.[86]

Section no. 15 also consists of a U-shaped tower that belongs to the fifth enceinte (fig. 15), although it dates to 1350–1360,[87] and a wall section following it to the east. The building technique of the tower features roughly cut stone masonry with brick pieces in the mortar joints. There are five openings on the façades with different characteristics. The northwestern façade has a door opening surmounted by a semicircular brick arch, whose bricks measure nearly 15 x 4 cm.[88] A window opening at the upper level has a finely cut stone arch on a lintel, and the tympanum is made of brick. Likewise, in the southeastern façade, another, and probably original, door opening has an arch over a lintel with alternating courses of stone and brick. Its tympanum is also made of brick. The opening at the upper

82 This gate, with dimensions indicating a doorway, has never been mentioned in the sources as one of the gates of the Galata Walls. See, for example, Schneider and Nomidis, *Galata*; Mamboury, *Istanbul*; Eyice, *Galata*.
83 Erdoğan, "Galata Kent Surları," 120.
84 Ibid., 122.
85 Ibid., 122–128.
86 Ibid., 109–129.
87 Sağlam, "Urban Palimpsest at Galata," 54.
88 Erdoğan, "Galata Kent Surları," 105.

Figure 15: Galata Walls, sections no. 11–18. Photograph: Selin Sur, 2012 (no. 13–14); Selin Sur, 2014 (no. 11, 12, 16, 17); Erdoğan, "Galata Kent Surları," 92 (no. 15); David Hendrix, 2021 (no. 18).

level of this façade is a contemporary addition. There is a loophole made of stone in the northeastern façade. A spoliated block of marble is observable above this loophole (fig. 2).

A section of wall in the east extends from the tower for ca. 8 m. It was briefly mentioned in earlier studies without describing its characteristics, probably because it was plastered on one side.[89] Yet, its cross section, viewed from Revani Street, reveals a rubble wall with brick pieces in the mortar joints.

Section no. 16 is the wall attached to the northeastern wall of the Kastellion tou Galatou (Castle of Galata, now Yeraltı Camii) from the east, and it should be a fifteenth-century Genoese construction; however, its characteristics cannot be made out due to heavy weathering (fig. 15).

Kastellion tou Galatou is an early Byzantine castle from where the chain across the Golden Horn extended.[90] Although the history of the building has been documented in earlier studies, it has always been included in the inventory of the Walls of Galata. Moreover, it could never be studied in detail since it is surrounded by buildings.[91] It is not included in the inventory of the surviving sections within the context of the present study since it is not a late medieval construction.

89 Ibid., 62–64; Sağlam, "Urban Palimpsest at Galata," 42–43.
90 Eyice, *Galata*, 10.
91 For a recent evaluation of its building materials, see Sağlam, "Bazı Keşifler," 550–552.

Figure 16: Galata Walls, sections no. 19–24. Photograph: Selin Sur, 2014 (no. 22, 23); Selin Sur, 2022 (no. 20, 21, 24); Google Earth, 2022 (no. 19).

Section no. 17 consists of a wall fragment from the third enceinte (fig. 15). The only surviving gate of the walls, Harup Gate, is located in this section. A marble slab with coats of arms and floral decorations can be seen in situ over the gate. The rampart is well preserved until the parapet level, and its battlements can still partially be seen. The core of the wall, consisting of mortared rubble, is visible due to the surface loss, whereas the facing is irregularly sized, roughly cut stone. The semicircular arch on the eastern façade of the gate is made of one course of stone and three courses of brick. The semicircular arch on the western façade of the gate, now destroyed, was made of stone. The wall section to the north of the gate is 1.70 m thick and has loopholes that are 1.20 m wide. They are built of stone until the springing line, and the arches surmounting the loopholes are made of bricks (table 1). A spoliated block of marble was used as a lintel above the arrow slit opening of the loophole on the northern end of the west façade (fig. 2). The stone courses run parallel to the slope of the terrain. The irregular use of the stones must be the result of the repeated reuse of materials. Brick pieces were rarely used in the mortar joints and are 3.5 cm thick in the northern section. The thicknesses of the brick pieces used on the south of the gate vary between 2 and 6 cm.

Sections no. 18 (fig. 15) **and 19** (fig. 16) include two wall sections recently discovered and thought to belong to the Walls of Galata.[92] These are the western borders of the walls, built of rubble-like, irregularly sized stones. A marble block of spolia can be seen on section no. 19 (fig. 2).

Section no. 20 is the remains of a recently discovered U-shaped tower from the fourth enceinte (fig. 16); it survives at the foundation level, located under a ramp in the courtyard of the Sokollu Mehmed Paşa Mosque.[93] The foundation can be examined to a limited extent; it consists of rubble with brick pieces in the mortar joints, 3.5–4 cm thick.

Section no. 21 consists of a wall fragment with an in situ marble slab bearing three coats of arms and an inscription, indicating that the wall was built by Podesta Stefano De Marini in 1435 (fig. 16).[94] Due to the heavy interventions, the original pattern of the wall is not visible. The wall is made of stone masonry with brick pieces in the mortar joints. A loophole, surmounted by a semicircular arch, is on the northern side; however, the characteristics of the arch cannot be determined since this part of the wall is plastered. The loophole is hardly distinguished on the southern side of the wall.

92 Sağlam, "Bazı Keşifler."
93 Tay, "Mimarlıkta Zaman Kavramının Okunması," 108.
94 Sağlam, "Urban Palimpsest at Galata," 404.

Section no. 22 is the remains of a U-shaped tower, largely demolished and now used as the terrace of a café. The building is of stone masonry with brick pieces in the mortar joints (fig. 16).

Section no. 23 is a wall fragment considered part of the ramparts.[95] This section of the wall resembles the rest of the walls and consists of irregularly sized, roughly cut stones (fig. 16). The original wall pattern cannot be observed today, covered as it is with artificial stone cladding.

Section no. 24 consists of the remains of a semicircular wall from 1452, connecting the walls on the eastern and western sides of the Galata Tower (fig. 16).[96] The eastern end of the semicircular wall and the straight wall continuing in a line towards the east are of rubble masonry with fabricated bricks of the late nineteenth century at the earliest. The linear section does not appear in some earlier maps, such as Gaitan d'Ostoya's 1:2000 scale *Plan Général de Galata, Pera et Pancaldi* from 1858–1860. Although the "late" wall technique could be interpreted as repair work, it is unlikely that this fragment belongs to the original walls. However, previous studies included it in the inventory of the Walls of Galata. The western end of the circular section is at the foundation level. After a short hiatus, the wall continues as roughly cut stone masonry with a rubble core and bricks inserted into the mortar joints, mostly vertically.

95 Sur, "Galata Surları ve Restitüsyon Sorunları," 55.
96 Sağlam, "Urban Palimpsest at Galata," 53–59.

Table 1: Building techniques and materials used in the surviving sections of the Galata Walls.

Period	Section			Building Technique					Architectural Features			Brick Dimensions		
	No.	Date of Construction	Type	Stone masonry	Brick pieces	Bricks inserted in the mortar joints	Brick bands	Use of Spolia	Element	Arch Type	Arch Material	In the arches	In the mortar joints (Thickness)	In the wall structure
I (Early 14th C.)	1		Rectangular Tower	Roughly cut stone			4 courses		Loophole arch	Semicircular	Brick	25–26–30 x 4.5–5 cm		30–36–37 x 4.5–5 cm
	2		Wall (East)	Rubble	Yes		4 courses							
			Wall (West)	Rubble	Yes									
	3		Wall	Roughly cut stone	Yes				Casemate arch	Semicircular	Brick			
	4		Wall	Roughly cut stone	Yes		1 course	Yes	Casemate arch	Semicircular	1 Stone + 3 Bricks		3–4–4.5–5–6 cm	
									Casemate arch	Pointed	Brick	34–35–36–38 x 3–4–5–6 cm		
	5		Wall	Rubble	Yes		2 courses						4 cm	
	6		Wall	Unidentified	NOT APPLICABLE									
	7		Rectangular Tower	Roughly cut stone	Yes			Yes	Door/ Window arch	Semicircular	Brick	28 x 5 cm, 14 x 5 cm	4 cm	
									Entrance arch	Pointed (?)	NOT APPLICABLE			
	8		Rectangular Tower	Roughly cut stone	Yes				Entrance arch	Pointed	Brick	30 x 3–4 cm		
			Wall	Unidentified	Yes				Casemate arch	Semicircular	Brick			
	9		Wall	Rubble	Yes									
II (Mid-14th C.)	10	1348	Circular Tower (Galata Tower)	Roughly cut stone	Yes	Yes	3 courses, 4 courses, geometric patterning		Loophole arch	Semicircular	Brick	14 x 3.5–4–5 cm, 28 x 4–5 cm (1st floor) 28 x 4 cm, 14 x 4 cm (upper floors)	3 cm (exterior)	
	11		Wall	Roughly cut stone	Yes (Lower section)	Yes (Upper section)	Upper section (2–3 courses)	Yes	Casemate arch	Semicircular	1 Stone + 3 Bricks			
									Loophole arch	Semicircular	Brick			
	12		U-Shaped Tower	Roughly cut stone	Yes		3 courses (Exterior)	Yes	Loophole arch	Semicircular	Brick			
									Entrance arch	Pointed (?)	NOT APPLICABLE			
									Window arch	Semicircular	Finely cut stone			
	13		Wall (North)	Rubble	Yes									
			Wall (South)	Roughly cut stone (Lower section) + Rubble (Upper section)	Yes			Yes	Gate arch	Semicircular	Finely cut stone			
	14		U-Shaped Tower	Roughly cut stone	Yes		3 courses (SE Façade + Interior)		Entrance arch	Pointed	Brick	30 cm (?)		15 cm
									Loophole arch	Semicircular	Brick	15 cm		
									Window arch	Semicircular	1 Stone + 3 Bricks			
	15	1350–1360	U-Shaped Tower + Wall	Roughly cut stone	Yes			Yes	Entrance arch	Semicircular	1 Stone + 3 Bricks			
									Entrance arch	Semicircular	Brick	15 x 4 cm		
									Window arch	Semicircular	Finely cut stone			
	16		Wall	Unidentified	NOT APPLICABLE									
III (Late 14th C.)	17	1386–1387	Wall (+Gate)	Rubble	Yes			Yes	Gate arch (Destroyed)	Semicircular	Stone		2–3.5–4.5–6 cm	
									Gate arch	Semicircular	1 Stone + 3 Bricks			
									Loophole arch	Semicircular	Brick	14 x 4 cm		
IV (Early 15th C.)	18		Wall	Rubble	Yes									
	19		Wall	Rubble	Yes			Yes						
	20	1435	U-Shaped Tower	Roughly cut stone	Yes								3.5–4 cm	
	21	1435	Wall	Unidentified	Yes									
V (Mid-15th C.)	22	1445	U-Shaped Tower	Roughly cut stone	Yes				Door/Window arch	Semicircular	Brick			
	23		Wall	Roughly cut stone										
	24	1452	Wall	Roughly cut stone		Yes								

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