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Construction Techniques and Materials of the 19th Century Military Buildings of İstanbul

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ABSTRACT: After the Janissary Regiment and other regiments in the Ottoman army were disbanded in 1826, quite a number of military buildings were constructed for the varied functions of the newly created military units. The number of military buildings built in Istanbul after 1826, which was the First Army's headquarters, totals to 68. The plan organizations, architectural styles and construction techniques of these buildings reflected Ottoman westernization. In the last quarter of the 19th century particular measures and some technical specifications were created for the construction of military buildings. 47 of the 68 military building / building groups have come down to us today while 44 of them that were registered as of cultural assets at various times still face with some preservation problems. It is clear that in buildings where inappropriate materials and techniques are used, it results in permanent damage and the loss of the building's architectural characteristics.

1 INTRODUCTION

After the Janissary Regiment and other regiments in the Ottoman army were disbanded in 1826, quite a number of military buildings were constructed for the varied functions of the newly created military units. The reforms made in the military field influenced in large measure the modernization of the Ottoman State and society. The number of military buildings built in Istanbul which was the First Army's headquarters after 1826 totals to 68. These buildings were built to serve different functions such as 1 administrative building, 14 barracks, 11 schools, 12 hospital, 17 police stations, 4 factories, 4 armories, 2 depots and 3 bakeries. The plan organizations, architectural styles and construction techniques of these buildings reflected Ottoman westernization. 47 of the 68 military building / building groups have come down to us today while 21 have not.

2 CONSTRUCTION TECHNIQUES AND MATERIALS

2.1 Information related to construction technique in the 19th century documents

Prior to the 19th century a large section of the military buildings made of wood were damaged in the fires that broke out in the city and state authorities ordered that from the end of the 18th century buildings be more durable, thus built by masonry (Denel 1982, Çelik 1996, Kuzucu 2000, Cezar 2002). In the imperial decrees of Ottoman Sultans Selim III (r. 1789-1807) and Mahmud II (r. 1808-1839), specific considerations on the building of the military architecture are included (Çiftçi 2004).

In the last quarter of the 19th century particular measures and some technical specifications were created for the construction of military buildings. At the end of the 19th century and beginning of the 20th century in the books written in Ottoman on the military architecture published at

the "Mekteb-i Harbiye" (War Academy) Press, there are detailed and original technical information on where military buildings had to be built and in what form. Most of these books are translations of books published in France. The students studying at the "Mühendishane" (Engineering School) established at the end of the 18th century and at the War Academy opened in the middle of the 19th century, were given an education on military architecture and benefited much from these books. It is understood from the registers of the books printed at the War Academy that the books were completely published for the architectural education of the officers who studied here (Çiftçi 2004).

Upon examination of the position, plan, façade design, construction technique and material characteristics of the military buildings built in İstanbul after 1826 - benefiting from the personal observations and measurements made in those extant - it was clear that these buildings were built consistent with the technical qualifications of the period.

2.2 Bearing walls

It was clear that the main outer bearing walls of all the military buildings made after 1826 were massive masonry, the thickness of the walls varied according to the number of floors and when going from the basement floor to the upper floors the main wall thickness was reduced. The basement floor walls that are 183 cm on the south wing of the Selimiye Barracks are the thickest main walls. In the upper floors that make the cantilever that is carried on marble columns in two story military buildings, the outer wall thickness is narrower than all the other wall sections.

On the "Kırmızı Kışla" (Red Barracks), the Selimiye and Rami Barracks and the Çinili Police Station that were built in the first half of the 19th century the outer main walls are built in alternating technique with stone/brick material and the wall facades are not plastered. On these buildings the fill brick is 10-12 × 22-27 × 2-3.5 cm in size, and as for the other buildings constructed in the last quarter of the 19th century, the fill brick was thicker, 10-11 × 22-23 × 5.5-6.5 cm in dimension. At the Maçka Police Station dated to the last quarter of the 19th century, it has been shown that the inner side of the main wall of the basement floor is rough stone and the exterior side of it has been plastered over a brick weave. On some of the bricks there are some marks, text and forms that belong to the manufacturing firm. In one part of the Rami Barracks the stamp is dated "١٣٢٨" (1327/1909-1910), in the Topçu Police Station is the stamp "Chahbaz" ("Şahbaz") is in Armenian, Ottoman and French, see Fig. 1, and at the Topkapı Palace Police Station (3) with fill bricks stamped "M. Pierre Salomon Briqeterie De Toutes Qualités," "Büyükdere" has been shown to have used specially curve cut corner bricks.

Figure 1 : Bricks of Topçu Police Station.

Figure 2 : "I" profile beams used in the jack arches.

In the main walls made of solid masonry the horizontal ties were made of wood or brick. On the brick weave masonry walls of the Selimiye Barracks' provision stores dated to the first half of the 19th century wooden posts and wooden horizontal ties are observed. In a number of military buildings built in the last quarter of the 19th century the horizontal ties are made of metal beams like the Topçu Police Station. The interior bearing partition walls of the military structures are generally of masonry and the material is either brick or stone. However in the first pe-

riods of the Selimiye Barrack that was constructed at the beginning of the 19th century there is information that the partition walls were timber framed (Ramazanoğlu 2003).

2.3 Floors

According to written and visual documents, the floors of the military buildings were generally made of wooden beams. The Selimiye and Davutpaşa Barracks and the Gümüşsuyu Hospital in the Maçka Armory, built in the last quarter of the 19th century, the basement and entrance floors were made of vaults. The ceiling of the foundry at the Zeytinburnu Factory is also a vault.

In the Pazarbaşı Police Station built in the last quarter of the 19th century, the Zeytinburnu Hospital and the "Mekteb-i Tıbbiye-i Şahane" (Imperial School of Medicine) applied jack arches. The parts of the sections of the "I" profile beams used in the jack arches ranges between 5.5-9.5 × 16.5-22.3 cm, see Fig. 2. On the beams used in the Imperial Medical School there is the "Burbach 22 NP" mark. In the period when the Selimiye Barracks were first built wooden beams were used but in the second half of the 19th century they were renewed as jack arches.

In the military buildings like the depot and weapons depot that were especially built in the last quarter of the 19th century, the floors are carried by wooden or metal posts. At the Gülhane military depots, the carriers of the mezzanine floors are made of wooden posts in 17 × 16 cm section. As for the Maçka Armory the planning office that carries the floors has a structure made of round cast iron columns. In the gymnastics building of the War Academy the floor is carried by "U" profile joists, 10 × 24 cm in section.

It seems that in two buildings dating from the last quarter of the 19th century masonry piers are used as the carrier, that are different from the others. The first basement floor of the Maçka Armory has been crossed over with large carrying piers. In the military depots at Gülhane there are wooden spars that carry the roof on stone bases 106 × 106 cm in section.

At the level of the floorings of the buildings, at the points where the partition walls and the main walls meet, and at the corners of the buildings metal ties have been used as fasteners. The length of these elements where they can be measured ranges between 58 and 60 cm, see Fig. 3.

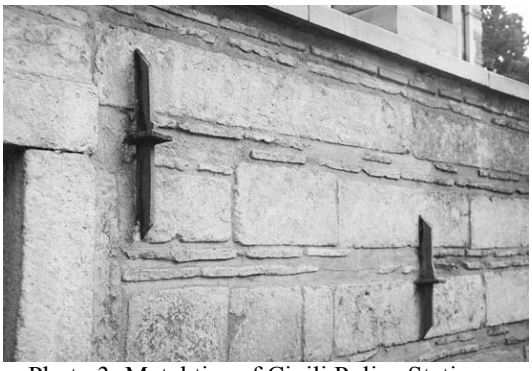

Photo 3: Metal ties of Çinili Police Station

Photo 4: Metal staircase gallery of the Imperial Medical School

The metal ties on the façade of the water depots at the Zeytinburnu Factory and Yıldız Palace Police Station (1) which are 154 and 190 cm in length are among the longest seen. The staircases that provide access between floors were masonry or wood up to the last quarter of the 19th century. The large staircase in the entrance hall of the Imperial Medical School whose construction began at the end of the 19th century and the staircases between the floors are of metal construction, see Fig. 4.

2.4 Roofing

The tops of the military buildings were generally covered hipped or gabled roofs of timber frames and the ceilings have wooden cladding. However in building groups where there were

large spans like the factory and the depot wooden or metal structures that carried the roof are exposed.

In the military depots at Gülhane and in the Zeytinburnu Factory wooden poles carry the roof. It was shown that the sections of wooden spars are 20 × 35 cm, 24 × 24 cm, 26 × 27 cm and 36 × 3 cm. As for the roof of the "Feshane" (Imperial Fez Factory) textile salon 274 cast iron columns were imported from Belgium's "Fokkeril" Company (Batur 1994) and were marked "Providence Marchienne Belqique" and were 25 cm in diameter, see Fig. 5. The body of the columns in the entrance corridor of the building was fluted. At the Zeytinburnu Factory metal columns 21 cm in diameter were used as carriers. The wooden truss of the military depots at Gülhane and Küçükyalı and the buildings of the Zeytinburnu Factory and the metal truss roofing systems of the Zeytinburnu Factory and the Imperial Medical School can be seen still today, see Fig. 6.

Figure 5 : Cast iron columns of Fez Factory.

Figure 6 : Cast iron columns and wooden truss roofing system of the Zeytinburnu Factory.

At the roofs, tiles were used as the cladding material. It has been determined that some part of the tiles was imported from Marseille and Thessalonica and there are figures and marks that have the date and manufacturer on them. For example the roof of "Taşkışla" has been covered with tiles imported from five separate companies carrying the marks of "Arnaud Etienne Cie 1890 Marseille St Henri," "Saccoman Frères St Henri Marseille," "Guichard Carvin & Cie Seon St Andre Marseille", "Guichard & Pierre Frères Seon St Henry Marseille", and "Fratelli Allatini Salonicco". On the roof of the Topçu Police Station tiles marked "Marseille 1890" have been found as well, see Fig. 7. It was proven that the roof on the Topkapı Palace Police Station (3) was covered with tiles belonging to two separate firms "Grande Ecaille Pour Toiture, Brevetes S.G.D.G. St. Henry-Marseille, Roux-Frères" and "Fratelli Allatini Salonicco", see Fig. 8.

Figure 7 : Roof of the Topçu Police Station.

Figure 8 : Tile of Topkapı Palace Police Station.

3 CONLUSIONS

44 of the 47 military building / building groups that were registered as of cultural assets at various times still face with some preservation problems. The masonry outer main walls and the partition walls inside were generally preserved. However the fact that the timber frame system was in a ruinous state and after a change of function because of the interference of the plan, the floor coverings and stairs were renewed as concrete. These systems that were created out of concrete beams and columns from place to place damaged the bearing walls. In some buildings, although it was proved that jack arches were sounder compared to timber, were removed. The one building that could still preserve the wooden flooring and the staircases is the Yeniköy Police Station. Also, the ceilings, with their chasing decoration of the restaurant building of the War Academy that was restored and the ceilings of the Orhaniye Barracks' mosque and the sultan's office were preserved and reached our day. However after the İstanbul earthquake in 1999, in some buildings like the Gümüşsuyu Hospital what was done as to strengthen them, still affected negatively the original architectural identity and the construction system.

The Imperial Medical School and the factories at Zeytinburnu and the Fez Factory and the military depots at Gülhane and Küçükyalı are buildings that have been able to preserve their original timber and metal structure that still carry the floors and roofs. However just as happened at the Zeytinburnu Hospital and "Taşkışla" while the recently made roofs were turned into floors, at the Pazarbaşı and Mesarburnu Police Stations they were completely changed into a flat roof system. It has been observed that aluminum panels were used instead of the original Marseille type tiles in the depots at Gülhane. While the original tiles imported from Europe like at Taşkışla and the Topkapı Saray Police Station had been thrown out, even though they were sound, new tiles were laid down. However on the renewed roof of the Topçu Police Station pains were taken to use the original wooden elements and tiles.

In the repair of the military buildings as in other buildings using the correct technique in the original colors, attention must be paid to the use of original materials, especially while plastering the walls inside and out. After samples of the original plaster were examined in laboratories, new plasters that matched the original mixture as the experts recommends should be prepared for application. It is clear that in buildings where inappropriate materials and techniques are used, it results in permanent damage and the loss of the building's architectural characteristics.

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