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### Article

## Water supply of the Topkapı Palace kitchen complex: Review and interpretation based on new findings

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### ABSTRACT

Topkapı Palace's kitchen complex consists of the cooking units (kitchens), dorms, masjids, baths, storages, storerooms and cellars and is where the outer services (Birün) served the inner ones (Enderün). These units required water for drinking, cooking, cleaning and watering purposes. The water was supplied from Halkalı and Kırkçeşme. Water towers and wells then transmitted that to the kitchens' fountains, alongside baths, ablutions and restrooms. If the Halkalı and Kırkçeşme water were insufficient, water from the city of Terkos was delivered to the palace, as well. Channels disposed of wastewater into the Marmara Sea. It has been determined that the findings obtained in the literature review do not review a holistic view of the whole study area. In order to fill the gaps, the new documents were provided from the Ottoman Archives of the Turkish Republic Presidency State Archives, archives from the Institute of Ekrem Hakkı Ayverdi, the National Library of France, and The Harvard Map Collection. To prove the accuracy of some of the new documents and to establish spatial relations, surface research and excavations are required within the study area. The aim of this article is to try to search for a context for the whole water supply of the palace kitchens by evaluating all available resources, spatial functions and connections.

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### INTRODUCTION

Topkapı Palace was constructed during the Mehmed II period (r.1451–1481) in Sarayburnu, İstanbul. Five hundred years' worth of classical, western, and Turkish republican influences are reflected in the palace's architecture. Its kitchen complex consists of cooking units (kitchens), dorms, masjids, baths, storages, storerooms, and cellars (the main units), which are located in the second courtyard with auxiliary buildings nearby (Eldem & Akozan, 1982). Over time, the palace units had been expanded and repaired, non-

functional spaces being removed, while others were added. Therefore, considering diversities and transformations, water was provided for various purposes in different ways. For instance; the water was supplied from Beylik Water of Halkalı via the water tower until the 17<sup>th</sup> century (Necipoglu, 2013), due to the repairs of the kitchens after the damage of the fire in 1574 (Selânikî, 1999), afterwards, it was supplied from Kırkçeşme via a horse-drawn water wheel until the 19<sup>th</sup> century (Tezcan, 1989). Eventually, the palace was supplied with electricity (BOA, 1336) and coal gas (BOA, 1344), and

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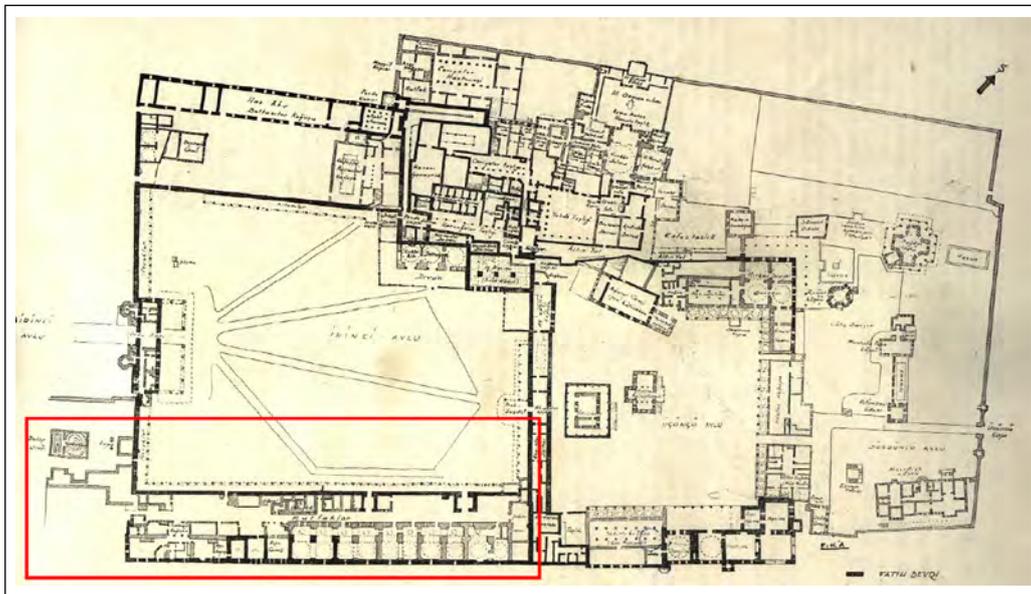
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the wheel was replaced with a water pump; the old haystack and barn became redundant henceforth. In 1918, water supply line from the city of Terkos city – in addition to Kırkçeşme – was used by a French-run company, *Dersaadet Su Şirketi* (Istanbul Water Company), at that point the use of the water pump was temporarily suspended (BOA, 1344). Following a slew of renovations, the wells, the water pump, and the water supply lines were all used together (Öz, 1991). Meanwhile, water was distributed to the water tank of the bath, restrooms and fountains of the kitchen complex. Likewise, apart from the restrooms and fountains found in situ (Eldem & Akozan, 1982), there were also fountains used for dish washing (BOA, 1285) and ablution (BOA, 1291). The wastewater from all of these units was collected in an underground drainage channel beneath the kitchen courtyard (Pouqueville, 1805), and flowed out to sea (Kömürçüyan, 1988). However, including the unknown architectural elements, the literature and on-site surveys only provide us with partial data about the water system overall. We otherwise do not know fully about how the water wheel worked, its water capacity, and why there was an unused water tower (Necipoğlu, 2013). Likewise, we also know little about the areas used for washing the dishes and ablution, how the water was discharged, or how many fountains – or, for that matter, restrooms – there were

compared to the kitchen's diversity. This study will set out to answer all of these questions (and more) by analysing the water distribution lines, thus filling in the gaps in the current literature.

## TOPKAPI PALACE KITCHEN COMPLEX

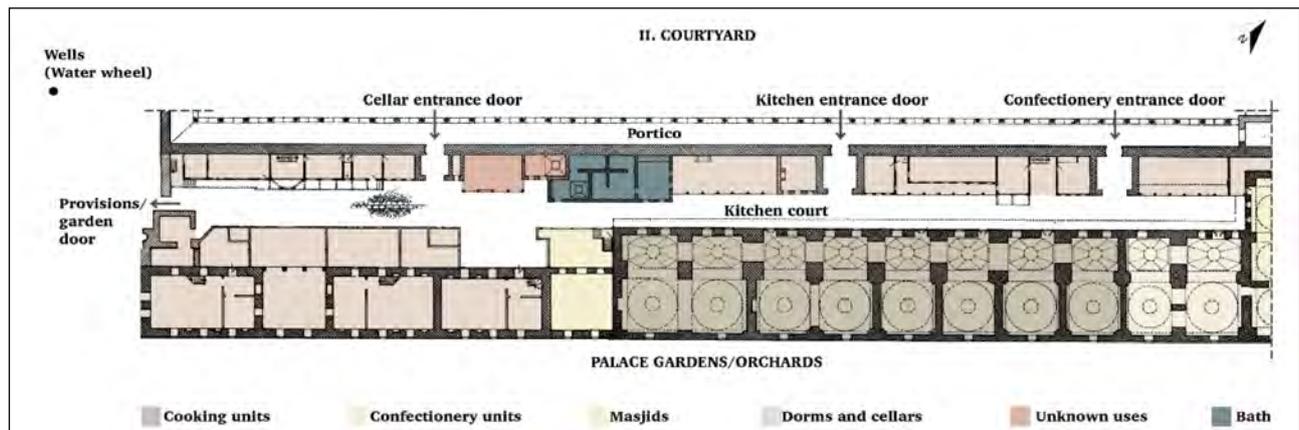
After the conquest of Istanbul in 1453, and after residing at Blakharnai Palace for a while (Tezcan, 1989), Sultan Mehmed II built himself a palace, the *Old Palace*, in the heart of Istanbul – just north of Forum Tauri – consisting of living, administrative, and harem units (Kuban, 1996). However, it was so close to the city's crowded residential area that there was no way that it could be expanded further. Hence, the Mehmed II began scouting out a new administrative palace. He eventually erected the New Palace (Topkapı Palace) on the site of the ancient Byzantine acropolis. It was surrounded by sea walls and land walls which were connected to sea walls built in Mehmed II period (r.1451–1481). By doing so, Topkapı Palace was guarded against possible attacks. Topkapı became the Sultan's administrative office, whereas Old Palace served as his home and harem (Sakaoglu, 2002).



**Figure 1.** Kitchen complex (mutfaklar) is located at the south west direction of the Topkapı Palace (marked in red rectangular). Remains from the Mehmed II period (r.1451–1481)<sup>2</sup> (Ayverdi, 1953) are indicated in bold.

<sup>1</sup> According to Ottoman historian Gelibolulu Mustafa Âli (b.1541, d.1600), it would be inappropriate for the sultan to live in the city centre. After residing in the Old Palace for 2 years, he moved to the Topkapı in 1462, which took 8 years to build (Âli, 1997). Ramazanzâde Nişancı Mehmed Çelebi points out that the Topkapı was built in 1463 (Nişancı, 1983). Another Ottoman historian, Hezârfen, indicates that the palace was completed in 882 AH (1467/1468 CE), and that fortification walls were added the same year; also noting that Fatih had declared this spot as a headquarters and centre administration (Hezârfen, 1998). Byzantine historian Kritovoulos (b.1410, d.1470) states that the Topkapı was completed in 1459. Between 1459 and 1465, towers, wards for male and female staff, bedrooms, recreation rooms, passages, halls, doors, porches, ovens, baths, and gardens filled with fruit trees and various animals to roam were added (Kritovoulos, 1954). In light of these findings, the year 1459 seems like a ground-breaking date since the first courtyard was not mentioned until 1478. Kritovoulos gave us the earliest date (Necipoğlu, 2007).

<sup>2</sup> After the fire of 1574, two and a half *zirars* of space were added from the second yard onto kitchen sections during repairs made by Sinan the Architect (Selânikî, 1999). The main wall of the kitchen's portico (facing the second courtyard) should appear lighter in Ayverdi's restitution plan.



**Figure 2.** A revised design of Eldem's restitution project circa the beginning of the 20<sup>th</sup> century (Eldem & Akozan, 1982) by Ece Uysal Engüdar. This drawing shows the units of the kitchen complex.

The palace was built over two phases.<sup>1</sup> In phase one (1459–1468) the second and third courts were constructed. In phase two (1470–1478) the land walls, outer gardens, and kiosks were completed (Seçkin, 1990). As such, we estimate that the palace kitchens in the second court were built during phase one as well. That said, even if the first two units of the kitchens (Figure 1) are attributed to the Mehmed II period (r.1451–1481) (Ayverdi, 1953), dating them leaves us with question marks, and for two reasons. Reason one is that there was no harem in the Mehmed II period (r.1451–1481), even if one assumes that the palace kitchen scheme should be similar to its predecessor, Edirne Palace (Bozkurt, 2016), in other words, there was no need for space or diversity. Reason two is that kitchens were repaired and rebuilt multiple times due to two earthquakes – 1509 (Çelebi, 2003; Necipoğlu, 2007), 1894 (Ürekli, 1990) – and two fires – 1574 (Selânikî, 1999), 1700 (Topal, 2001). We only know that the architect behind the first two units of the kitchens (15<sup>th</sup> century) is Ayas Ağa (Bayrak, 1996).

Topkapı's kitchens took on their unique forms after a fire had broken out in the Old Palace. Likewise, that is also

when the harem moved out of the New Palace as well. As such, Topkapı Palace became where the sultan lived his private life alongside conducting all of the state's official affairs (Sakaoğlu, 2002). That move also evoked the palace's population to grow in the 16<sup>th</sup> century. Although we do not know what the kitchens' original architectural plan would have been like, we do know that one would have entered the kitchen courtyard through a cellar door; the kitchen and confectionery doors were located in the porticoes on the right side of the second courtyard. Along these doorways, there are a confectionery dorm, a bath, a place presumed to be a tin house, cooks' dorms and cellars. On the other side, there are oil, sugar and rice warehouses/pantries, a cooks' masjid next to it, cooking areas, a confectionery, and a confectionery masjid (Eldem & Akozan, 1982; Figure 2).

The increase in the palace population rendered the dorms and storage areas insufficient; thus, the kitchen sub-units overflowed from the second into the first courtyard. The first courtyard contains dorms (Kömürçiyân, 1988), cellars, warehouses, a masjid (BOA, 1285) and a water wheel (Tezcan, 1984), or *dolap ocağı*, in Turkish (Figure 3).



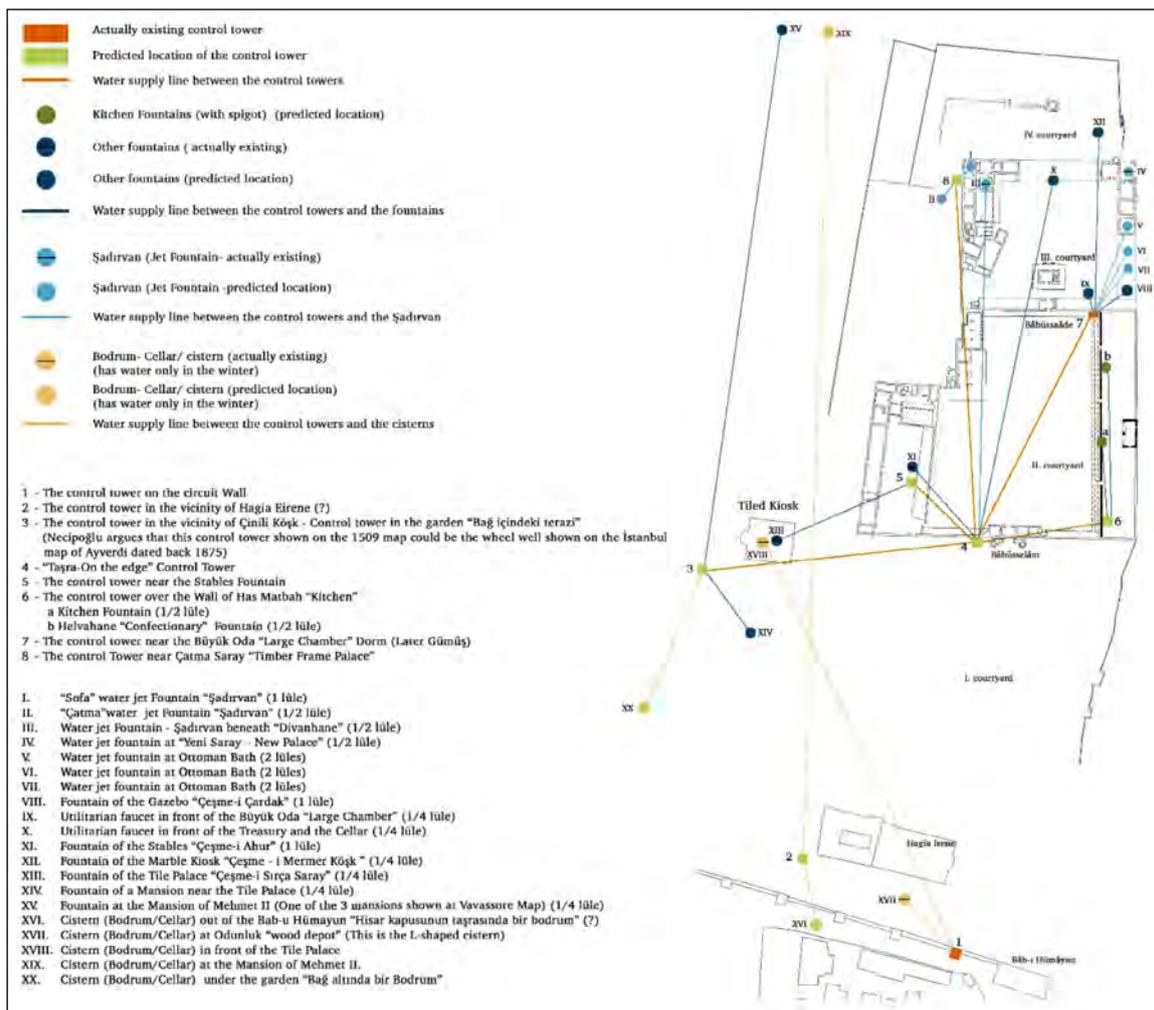
**Figure 3.** Units of the kitchen complex in the first courtyard from an anonymous photo dated 1875 (Anonymous, 1875).

The kitchen’s wooden dorms were repaired at different times during both the Ottoman and in the Republican (Modern Turkey) periods; however, they collapsed in the early 1900’s due to a lack of budget (Eldem & Akozan, 1982). Today, only the kitchen’s cooking unit, the confectionery, the cellar door, the kitchen door, the confectionery door, the water tank, the bath, and the pump room (where the water pump used to be) still stand. At different points in time, unrelated buildings were erected in place of destroyed ones; this makes it difficult to fully comprehend everything as a whole. Nevertheless, certain documents allow us to make inferences about the water supply lines, which is the main focus of this article.

### THE WATER WHEEL

Supplying water to Topkapı Palace was difficult in the Ottoman period. Because it was built on a steep slope, and hence rainwater flowed away before it could be collected.

So, water was supplied from the Halkalı-based Beylik and Kırkçeşme water supply lines. Beylik water was closer to the surface and was sent to the upper levels by water towers. Conversely, the Kırkçeşme water supply line was connected to the lower levels of the palace and sent through the wells (Özkan Aygün, 2014; Özkan Aygün, 2015). Document TSMA D. 10137 found by Necipoğlu shows the past repairs made in the palace’s water supply lines. She predicts the document’s date as just after the earthquake in 1509 (Çelebi, 2003) which caused heavy damage to the whole system. She illustrates the connections between water towers, partial fountains, şadırvans, and cisterns; hence, we can infer that the source of the water ought to be the Halkalı water supply line, indicating that “the existing system could be used”. This suggests that the water towers were not new. Neither of the two towers nearby the Bâbüselâm fed the kitchen (1/2 lüle) and the confectionary fountains (1/2 lüle); exist today (Figure 4). Necipoğlu claims that the place of this water tower should be the water tank (Figure 5) – which is next



**Figure 4.** A schema demonstrating the repair of the water supply of Topkapı Palace after the 1509 earthquake. Designed by Ece Uysal Engüdar on the basis of Necipoğlu’s article (Necipoğlu, 2013). Special thanks to Çiğdem Özkan Aygün (İTÜ) for advice.



**Figure 5.** The water tank in kitchen complex, next to the main wall of portico (Uysal Engüdar, 2021).

to the provisions gate today (Necipoğlu, 2013). Next to that gate are the wells that date back Byzantine era; they were discovered and repaired by Sinan the Architect during the *Kanûnî* period (1520–1566) to provide water for the palace (Tezcan, 1989).

In 1574, a fire destroyed the cellar and confectionery. Sinan repaired and rebuilt them adding two and a half *zirâs*<sup>3</sup> of the area from the second courtyard for the new kitchen units (Selânikî, 1999). Given that the wells were already in use, Sinan most likely had cancelled the water tower during the expansion and then built a water tank instead. A document from 1886 claims that, presumably after the expansion, four *lûles* of water had been sent from the wells to the kitchens (BOA, 1303), as the standard one *lûle* of water was deemed insufficient. Hereby, the water for the kitchens began to be supplied from the Kırkçeşme water supply line.

There are three maps dated 1584 (Bilge, 1969), 1607 and 1748 indicating the Beylik water supply line. The part of the 1584 map (about Topkapı Palace) is ripped. The map of 1607 shows that the water arrived at the Bab-ı Hümâyün, palace hospital, and water tower next to Bab-ı Hümâyün (all in the first courtyard) as well as to Bâbüsselâm, the palace barn, the dorms of baltadjis, and the water tank in the second courtyard. The 1748 map is more or less the same as the 1607 map (Çeçen & Kolay, 1997). All three maps, however, do not comprise any of the wells where Beylik water arrives at the upper level (Aygün & Kaçan, 2014; Özkan Aygün & Eğilmez, 2015). There is no mention about kitchens, which implies that between 1584 and 1748, they used water supplied by water wheels. A report from

1886 addressed to the ministry (BOA, 1303) states that the kitchen is having problems preparing meals because the water pump is supplying one *lûle* of Kırkçeşme water supply line rather than four *lûles*.<sup>4</sup> Before that, the water from the wells would have been retrieved by horse-drawn water wheels. For instance, a document from 1907 (BOA, 1325) indicates what the horses need: panniers, shovels, shackles, halters, saddles, rope, horseshoes, barley, sackcloth, and straw. Later on, the palace was supplied with electricity and coal gas, the water wheel respectfully was converted into a water pump. One source from 1925 (BOA, 1344) consists of documents written on different dates (listed below in chronological order; some abbreviated) about various repair made in the palace's water supply lines:

- July 4, 1905: From Hagia Sophia distribution line to Dolap Ocağı at Topkapı Palace 597 m tile pipe lines are not repaired, so more than half of the flowing water perished. To prevent that, a sack of stones is in poured every day, the stones remain in the pipes; however, the water has become muddy over time, spoiled its taste, and rendered it unhealthy.
- May 26, 1906: The water flowing into the palace has been completely cut off for a while – even the wells are empty; the kitchens in particular are having major difficulties. The water supply line between the Hagia Sophia distribution line and the *Dolap Ocağı* has perished completely; only one-fifth of the water still flows. Despite the Sultan's orders, the water supply line has yet to be repaired.
- July 16, 1910: Ten thousand kuruş has been spent from the treasury for the repair of the water pump and pumps.
- March 26, 1913: The tank of the water pump had suffered burns, thus becoming unable to keep the water. Excessive coal gas is fed into the pump to compensate for the damage. The water tank needs to be repaired.
- October 10, 1918: Some reports claim that there is no water left in any of the water supply lines flowing to Topkapı Palace. Guests and Enderûn officials reside in the palace. As such, there is a great need for water. Unfortunately, no urgent measures have been taken other than sending water from Terkos to the palace via nearby sources.
- November 12, 1918: Water is supplied to the palace by the Istanbul Water Company; the water pipes have been laid along the existing coal gas pipeline. The gas fumes from the pipes, mixes with the water, causing the water to stink. Moreover, the joints of the gas pipes cannot

<sup>3</sup> *Zirâ*, which is the Arabic word for Arşın is a unit of measurement that describes the length from the fingertip to the shoulder by marking the finger sections on materials such as wood, steel and iron. In this unit of measure, which has different types, the architect's *zirâ* (*zirâ-î mimârî*) corresponds to 75.8 cm (Sönmez, 1997). Thus, 2.5 *zirâs* is equivalent to 189.5 cm.

<sup>4</sup> As proof of that, the kitchens were expanded, ½ *lûles* of water had been being transmitted to the kitchen and confectionary fountain (Necipoğlu, 2013). According to a document from 1886, the amount of the water had been increased to four *lûles* (BOA, 1303).

withstand the pressure of the water and burst. Two hundred and fifty meters of new pipes are required (but cannot be found); however, water cannot be supplied from them because the main pipe drips. As such, water from the Terkos water supply line has been pumped into to abandoned Halkalı water supply line, which used to flow to the palace and but is now interrupted. That said, until now, there has been no need to lay an iron pipe from the tap in Çemberlitaş to the palace. Given that it is possible to pump water to these pipes from the main pipe, we request to authorise the Istanbul Water Company to lay iron pipes laid from Çemberlitaş and pump water from Terkos through them.

- August 21, 1922: The accumulator in the electricity storage in Dolap Ocağı is transferred to Yıldız Palace.
- November 12, 1925: The General Directorate of Antiquities and Museums in Istanbul reported to the mayor that the Kırkçeşme water supply line (that normally flows to the Topkapı Palace Museum) has been cut-off a week due to the bad roads. In it, he also stated that there is a great need for water, at least for 4–5 hours a day.

In Istanbul, the first urban lighting with electricity happened in 1888 with the electricity produced at Golden Horn shipyards (Engin & Gülsoy, 2016). The earliest document relating to electricity that we can find in the Ottoman Archives regarding Topkapı Palace is dated 1899, and show us how much electricians were paid on a daily basis (BOA, 1316). There is also a document from 1918 regarding the electrical operation of the water pump (BOA, 1336). Even though we know that electricity was supplied to the palace at the end of the 19<sup>th</sup> century, we cannot determine when exactly the water wheel was converted into an electric water pump. The Istanbul Water Company had been pumping water to the city from Lake Terkos since 1873. It was expropriated and transferred over to the Istanbul Water Administration in 1933 in favour of the concessions given by the Ottoman Empire (Yurdakul, 2010).

Coal gas, on the other hand, was obtained by distilling coal from gasworks. This method led to coal gas being supplied in Istanbul at the end of the 19<sup>th</sup> century, and coal gas was used for heating and illumination (Mazak & Kon, 1999). A document from 1894 demonstrates that coal gas came to Topkapı Palace at the end of the 19<sup>th</sup> century (BOA, 1312). According to a document from 1925 (BOA, 1344) water used to be extracted by horse-drawn water wheels from wells repaired by Sinan<sup>5</sup> before it was converted into a water pump at the end of the 19<sup>th</sup> century, upon the supply of electricity and coal gas. Since horses were no longer needed, the stables where the water horses were fed and allowed to rest were

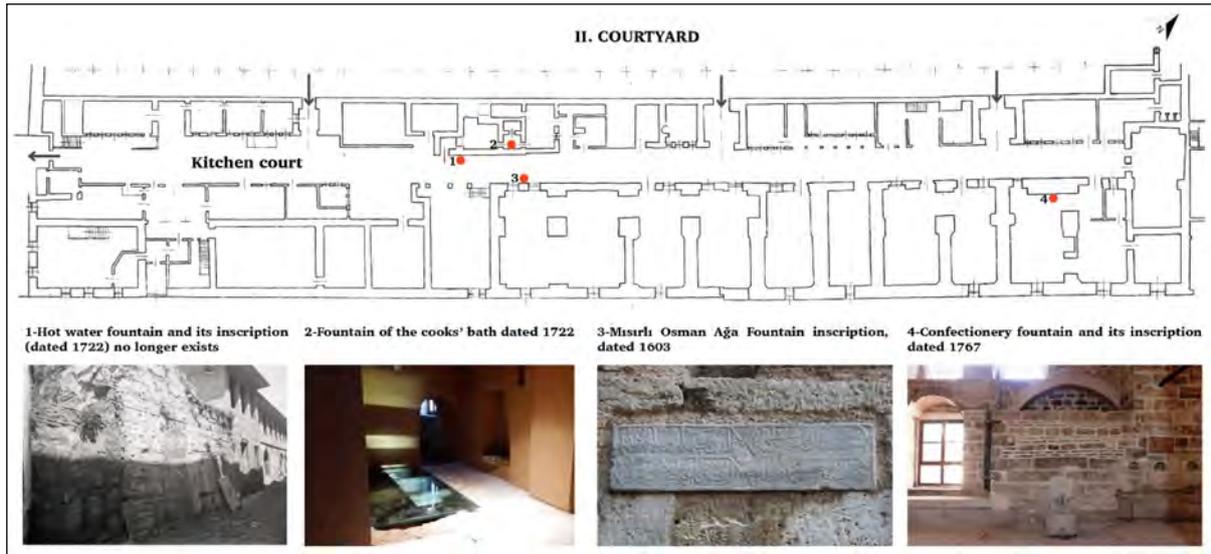
torn down. Even though there were officials still working in the palace and given that the water supply lines were not repaired, the amount of water pumped in was not sufficient for the kitchens' needs. Many considered Terkos water to be an alternative; as such, water pipes were laid down along the existing coal gas line by the Istanbul Water Company in 1918. The document mentions that the water pump was temporarily taken out of use and that during that time, the Terkos water supply line worked in place of the Kırkçeşme only (BOA, 1344). According to Tahsin Öz, Topkapı Palace Museum's former director (1928–1952), Kırkçeşme water was pumped from the wells using a motor. Later on, both Kırkçeşme and Terkos water supply lines would be used together for the museum's fire extinguishing system (Öz, 1991). The *Dolap Ocağı* – where wells and water wheels were present – remained intact until 1979 (Tezcan, 1989).

## FOUNTAINS

Today, there is one fountain inscription and three fountains (still) in Topkapı's kitchen. That inscription (dated 1603) belongs to the Mısırlı Osman Ağa Fountain which is not extant today and is located on the kitchen's walls (Tanışık, 1943). The first fountain is referred to as the hot water fountain and connects to the water tank where the cauldron of the cooks' bath is located. One can make out an inscription of the hot water fountain in a photograph dated between 1940 and 1943 from the Archive of the Institute of Ekrem Hakkı Ayverdi alas, it no longer exists today. The second one is the cooks' bath and has a marble basin. The fountains and baths were built in 1722 by Nevşehirli Damat İbrahim Pasha during the reign of Sultan Ahmet III (Sakaoğlu, 2002). Considering the architecture of a bath, having more than one fountain is necessary. The water from the wells should first reach the water tank; next, the heated water in the furnace should then be transmitted to the fountains of the bath. The third fountain (dated 1767) is located at the entrance of the Confectionery on the right side. The flower motifs in the vase at its basin reflect the traces of Westernisation; neither of these motifs do not exist (Figure 6). This fountain would have been added to the confectionery after the 1766 earthquake (Genç & Mazak, 2000). One more fountain is located in a dorm restroom, next to the cooks' bath, and was set for the museum exhibition only.

However, there were more than four fountains in the kitchen complex. Some were fed by the water towers and are included in a document dated 1509 according to Necipoğlu (Necipoğlu, 2013). Another document from 1825 shows how the kitchen fountains are arranged; the floor in front of the fountain was dilapidated, and later paved (BOA, 1240). Yet

<sup>5</sup> The water extracted from the wells was distributed without accumulating. However, the extracted water was gathered in a tank situated atop the Dolap Ocağı gate (according to a Topkapı Museum Guide dated 1933) (Topkapı Sarayı Müzesi Rehberi, 1933). As there is no entrance to the tank, it is impossible to research it further.



**Figure 6.** Complete fountains of the kitchen complex on an anonymous plan (Anonymous, 1894-1912) shown by Ece Uysal Engüdar. No 1: hot water fountain and its inscription (dated 1722); it no longer exists (EHAEA, 1940-1944). No 2: the fountain of the cooks' bath dated 1722 (Uysal Engüdar, 2017). No 3: Mısırlı Osman Ağa Fountain inscription, dated 1603 (Uysal Engüdar, 2021). No 4: confectionery fountain and its inscription, dated 1767 (Altınbıçak, 2012).

another document, this time from 1868, shows that the wall side of the kitchen's vegetable pantry was removed. Water was carried by placing walls, using existing fountain faces and faucets on the land-side, and laying lead pipes from the old location of the fountains to the newly built area. On the other side sits a covered sewer with walls on both sides, for dirty dishwater to flow into. In that same document, the wall side may, in fact, refer to the intermediate wall separating the kitchen units, while the land side may refer to the courtyard side (BOA, 1285). Likewise, another document refers to the seaside walls of the kitchens facing the Marmara Sea (BOA, 1323). It is not clear which unit in the kitchen served as the vegetable pantry at that time. That noted, the only part that fits the description in a contemporary context seems to be the fountain along the courtyard side, located next to the Confectionery; of that, only the marble fountain face



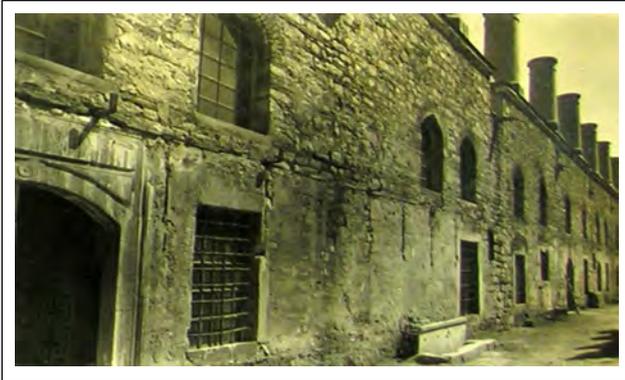
**Figure 7.** Fountain face located at the kitchen unit, next to the confectionery (Altınbıçak, 2012).

remains (Figure 7). Three things show us that the number of fountains had increased: (1) removing the old fountains from their places in 1825, (2) transferring the water to a new place, and (3) adding a fountain in 1868. The location of the sewer cover on the other side cannot be determined because there is no clear description; however, it must be connected to the canal passing through the kitchen court (Figure 8).

Another fountain on the kitchen facade would have been used for ablution. Since there is no shadirvan in the kitchen complex, the kitchen staff would have performed their ablution using the fountains scattered throughout the courtyard. According to a document from 1874, a lead-covered new porch eave was built with the wooden painted ceiling above the ablution fountains of the confectionery (BOA, 1291). During restoration work in the 1940s, there was (still) a fountain on the court side of the confectionery – just as the 1874 document mentions (Figure 9). The



**Figure 8.** Vaulted drainage underground channel at the kitchen court (Özbersan İnşaat ve Ticaret Ltd. Şti., 2013).



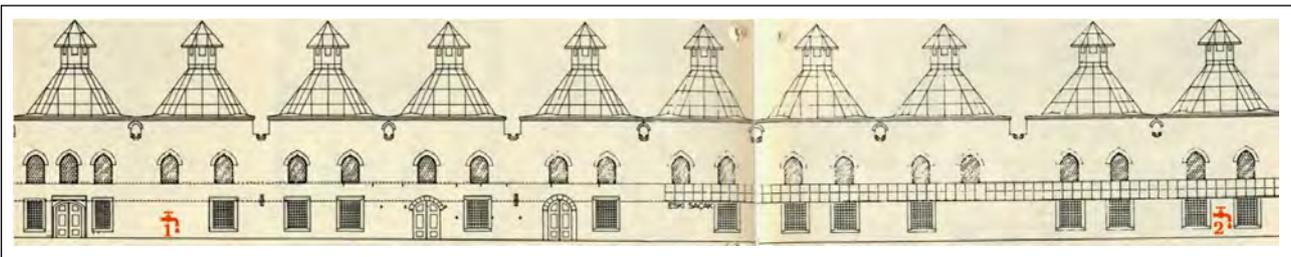
**Figure 9.** The fountain assumed to be used for ablution on the kitchen main wall (TSMA, 1940). Traces of the porch are obvious.

Mısırlı Osman Ağa Fountain (dated 1603) might have been used for the same purpose, due to its location as well. Furthermore, Penzer also describes (1939) the presence of

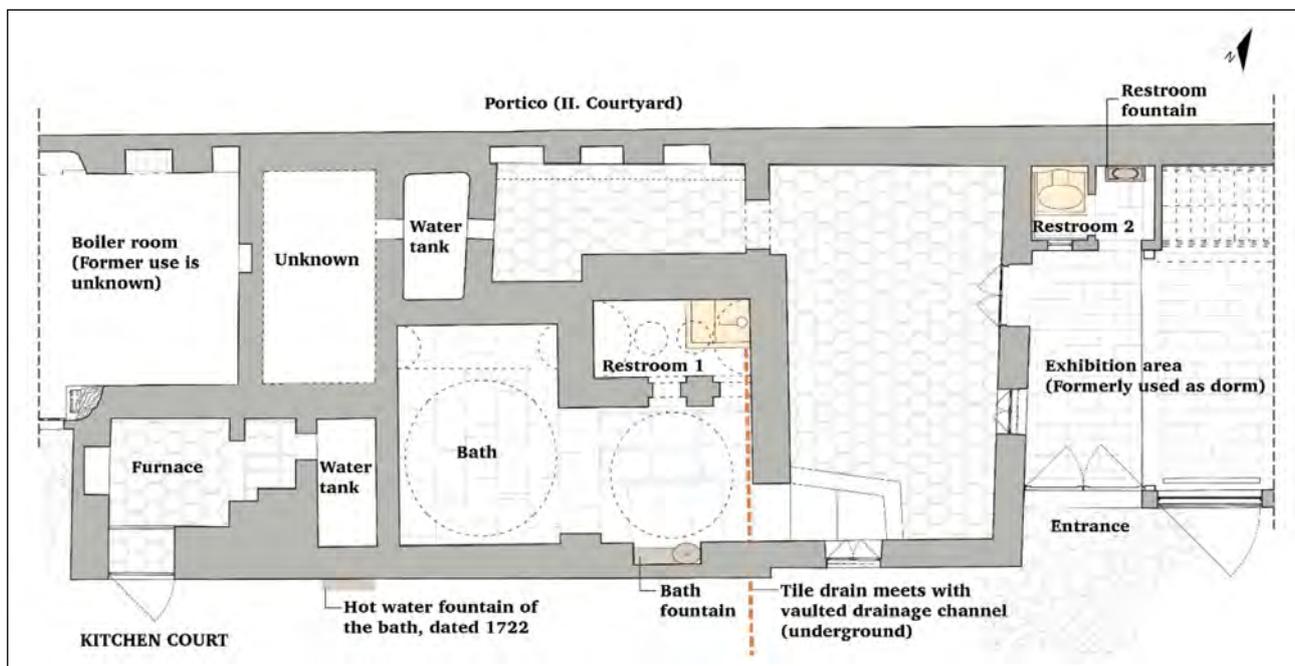
ablution fountains (Penzer, 1967). Traces of the porch are still visible today (Figure 10). The other probable fountains must have existed in the restrooms of the dorms, which one can detect from their plan that they date to the beginning of the 20<sup>th</sup> century (Figure 12).

## RESTROOMS

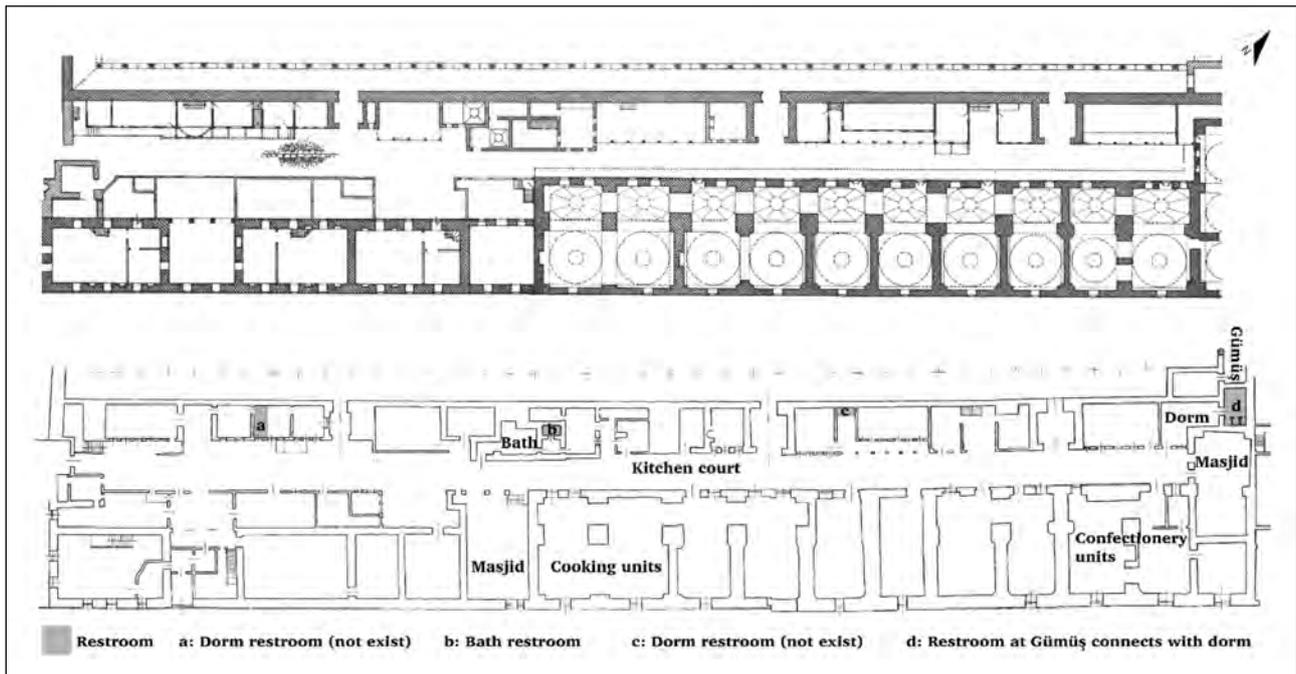
There are two restrooms in the palace kitchens that can still be identified today. The first one is located in the bath; the wastewater from it would have been disposed of via a tile drain to a vaulted underground channel beneath the kitchen courtyard.<sup>6</sup> The second one facing the qibla<sup>7</sup> is located at the dorm next to the bath and would have been built for decoration during 1940's restorations (Figure 11 – Restroom 2). On the other hand, the other restrooms were located in the dorms where kitchen servants lived – at least, according to the design. The space referred to as the control



**Figure 10.** Demonstration of the fountains on the kitchen main wall assumed to be used for ablution on the elevation of Eldem's restitution (Eldem & Akozan, 1982); 1 for the fountain which is currently not existing, 2 for the Mısırlı Osman Ağa fountain dated 1603 revised and edited by Ece Uysal Engüdar.



**Figure 11.** The cooks' bath on the partial plan of TÜRES Turizm Planlama ve Restorasyon San. ve Tic. Ltd. Şti. revised and edited by Ece Uysal Engüdar.



**Figure 12.** The restrooms of the kitchen complex are demonstrated both on the elevation of Eldem's restitution above (Eldem & Akozan, 1982) and an anonymous design below (Anonymous, 1894–1912) revised and edited by Ece Uysal Engüdar.

tower – in a document from 1509 (Necipoğlu, 2013) – was converted into a water distribution centre. Half of it was used as storage, while the other half was used as a restroom for visitors at an unknown date. Referred to as Gümüş (Çeçen & Kolay, 1997), the second half was connected to the dorm. This restroom sits next to the Confectionery Masjid, and would also have been used for ablution purposes. Beyond that, such a dual cellar-restroom feature placed next to the Cooks' Masjid is very unique – given that there were also restrooms for each ward unit (Figure 12).

A document of repair costs from 1840 mentions the repairs of the restrooms (BOA, 1255). Another document from 1868 highlights repair work done on the roof of the restrooms around the cooks' dorms; it involved removing old tiles and panels, renewing the rafters and panels, and replacing the old tiles with new ones (BOA, 1285). According to a document from 1884, the rotten roof of the confectionery dorm restrooms had collapsed. It was rebuilt out of its own debris; repairs were also made inside using plaster and white wash, marble paving stones were also laid down, and the old door was refurbished (BOA, 1291). The roof of the restrooms under the kitchen was also repaired with French bricks; however, the kitchens lack a lower floor. The stone pavement of the restrooms in the Kilerli Masjid (in the first courtyard) no longer exists, as it was

eventually changed later on. Another document from 1884 (BOA, 1302) indicates that panels beneath the lead of the restrooms of the Confectionery dorms were removed and replaced as well.

## DISPOSING WASTEWATER

Various sources tell us that the wastewater from the kitchen and the palace would have been pumped under the sea wall around the Sinan Pasha Kiosk.<sup>8</sup> A little further onwards, palace rubbish was thrown into the sea through a hole (Kömürçiyen, 1988; İnciciyan, 1956). In that case, the wastewater of the kitchen complex should have been collected in a single centre and disposed of to the sea via channels separate from the palace. Jean-Claude Flachet stated (around 1740–1755) that the drainage channels of the kitchen were easy to use and clean (Flachat, 1766). French diplomat Pouqueville, upon describing the palace's gardens (1798–1800), wrote that the wastewater from the palace kitchens accumulated in a sewer to be thrown into the sea. He noted that the sewer started at the bottom of a road connecting the hospital in the first courtyard with the fortification walls, and ended at the western wall (Pouqueville, 1805). The only available information we have about the wastewater path from the kitchens is the

<sup>6</sup> Detected on-site during the restorations in 2017.

<sup>7</sup> In Ottoman architecture, restrooms do not face the qibla direction due to the requirements of Islam.

<sup>8</sup> People used to parse the waste in the hope of finding gold, silver, precious stones, rings and earrings from the seaside; some even sold what they found. The parsed waste would have been transported on midden boats to an offshore dump (Pul, 2008).

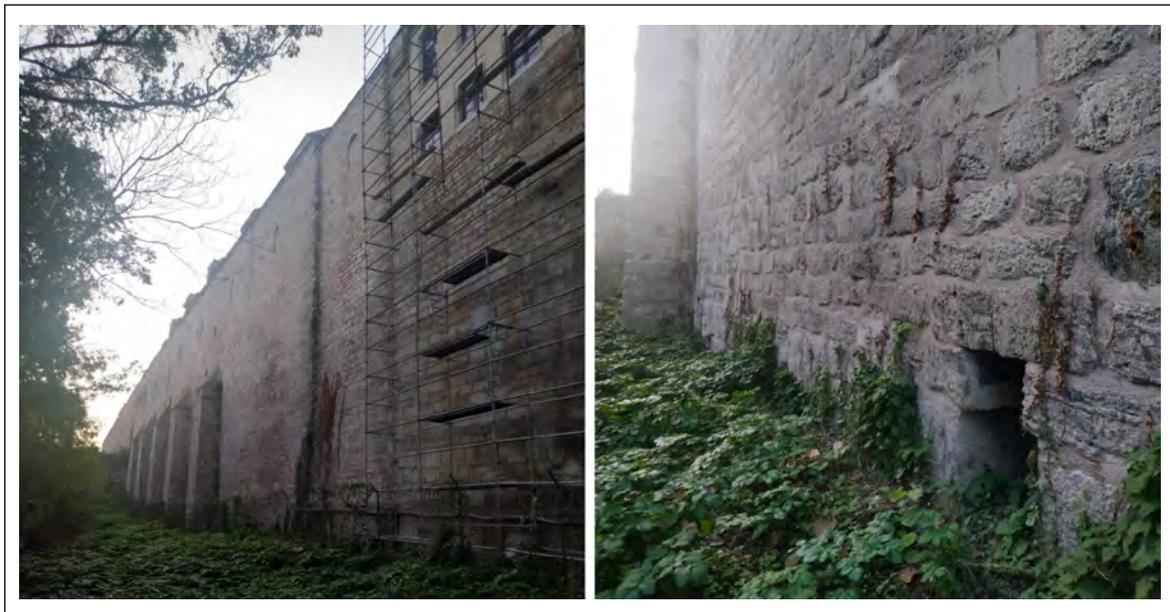
vaulted channel in the kitchen courtyard. Yet, where the channel connected and continued to before it ended up at the Marmara Sea still remains unknown; surveys and excavations are needed to clarify this. Moreover, another point to consider is the addition of Kennedy Street outside the sea walls which complicates the research.

### UNKNOWN ARCHITECTURAL ELEMENTS

All of the kitchen units are supported by a retaining wall featuring buttresses, as there is an elevation difference between the upper courtyard and the lower seaside gardens where they are located. Similarly, there also are still traces of barbicans that would have prevented the retaining wall from taking on

an additional load of rain water that may accumulate, and that would have helped filter the water from the soil, without being collected under the kitchen (Figure 13).

There is a photograph from the Archive of the Institute of Ekrem Hakkı Ayverdi, which houses the personal works of Ayverdi, the person in charge of the restorations of the palace kitchens in the 1940's. In the photograph, we can see an architectural element of which only the top part is visible. It could possibly be vaulted adjacent to the retaining wall, and it extends towards the Cooks Masjid. Alternatively, it might be a water tank or used as a warehouse due to its proximity to the cellar. Whether it belongs to the Ottoman or the Byzantine era is debatable, given that Topkapı was built over Byzantine structures (Figure 14).



**Figure 13.** Left: general view of the kitchen complex's retaining wall with buttresses facing the Marmara Sea. Right: a barbican located on the retaining wall (Uysal Engüdar, 2021).



**Figure 14.** Left: the kitchen complex's retaining wall facing the Marmara Sea where the unidentified vaulted element is located. Right: a close-up view unidentified vault element (EHAEA, 1940-1944).

In another photograph from the Archive of Ayverdi, we see a vault at the bottom of the retaining wall continuing towards the palace bath next to the kitchen might and this may have been used to dispose of wastewater from the palace bath.<sup>9</sup> Despite that, similar channels do not exist on the same level of the kitchen alignment (Figure 15). In that case, the wastewater of the kitchens should have been collected in a single channel extending towards the hospital, and then extending out towards the sea, as Pouqueville suggested (Pouqueville, 1805). As it stands, the slope direction of the vaulted channel at the kitchen courtyard already extends towards the palace hospital. The drainage channels of the kitchens and palace bath should have been separate, as K m rciyan (K m rciyan, 1988) and  nciciyan ( nciciyan, 1956) mentioned.

There is a masonry mass – presumably a water tank – in the palace garden between the retaining wall and the sea wall (Figure 16). However, it is overgrown with wild flora, and thus not suitable for architectural examination at the

moment. The same point is also demonstrated in Rocque’s map (dated 1752) (Figure 17); he, too, claimed that it is a water tank supplying water to the entire palace (Rocque, 1752). However, this mass is located at least 15 m below the kitchen’s level. Pumping water from a lower-level water tank to upper-level buildings is not convenient; hence, this water tank – if it, indeed, is one – may very well have been used for irrigation.

Another water tank that is difficult for us to analyse is located in the kitchen courtyard next to the main wall of the portico. As has been mentioned above, one of Beylik water supply line maps (1584) is ripped (Bilge, 1969) and there is no information about kitchen sections on the maps from 1607 or 1748 ( e en & Kolay, 1997). We can thus infer the water should have been supplied from the Kırk e me water supply lines via wells leading to the water tank. This water tank is located on the ground floor of the wooden dorms for kitchen staff (Eldem & Akozan, 1982) which no longer exists. All units of the palace had a function; therefore,



**Figure 15.** Left: A presumed vaulted drainage channel under the bath’s retaining wall, facing the Marmara Sea, next to the kitchens. Right: a close-up view of the channel (EHAEA, 1940-1944).



**Figure 16.** The remain assumed as a water tank is located at the palace garden behind the kitchens. The photo on the left was taken by Ayverdi in 1940’s (EHAEA, 1940-1944). The photo on the right shows its current condition (Uysal Eng dar, 2021).

<sup>9</sup> Topkapi Palace was built on Byzantine structures (M ller-Wiener, 2001), hence, these canals could also be the continuation of another structure.



**Figure 17.** Rocque, the Seraglio & Gardens of the Grand Seignior, 1752 (Rocque, 1752). Number 10 is marked in red square.



**Figure 18.** The brick arch on the kitchen's wall during restoration between 1940 and 1944 (EHAEA, 1940-1944).

this one, too, should have been used until the palace was converted into a museum. Although there is no trace of an

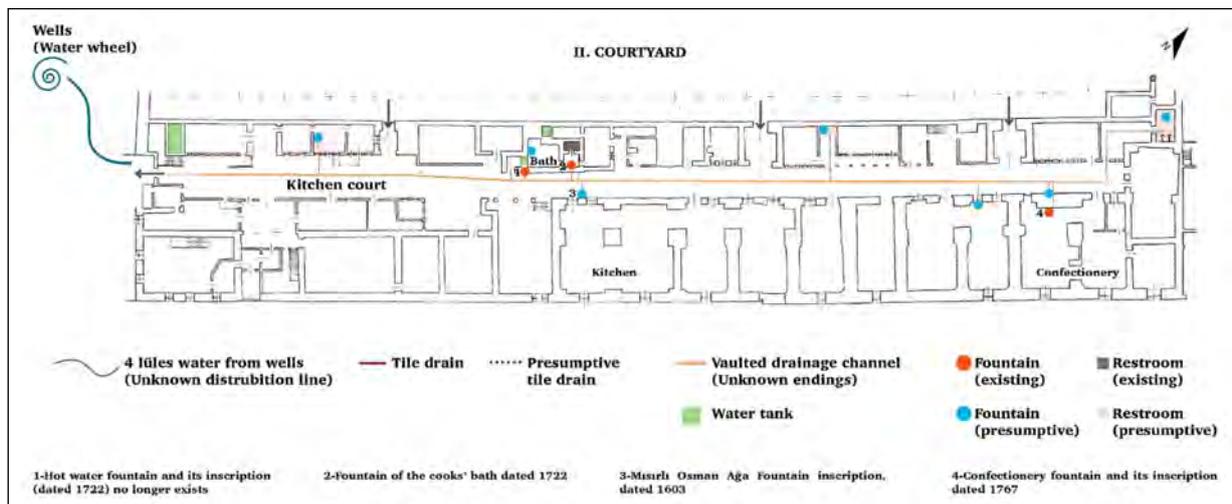
exit point for *lûles*, there are some small niches presumably for glasses (Figure 5). However, we have no information about this water tank in any studies.

Another photo from Ayverdi Institute depicts a brick arch located by the wall of the kitchen units that was partially buried in the ground under the ashlar – it hailed from the Mehmed II period (r.1451–1481) (Figure 18). This arch, too, might be related to the water supply line. The wastewater may have been disposed of from the arch to the vaulted drainage channel in the kitchen courtyard.

### CONCLUSIONS

The Topkapı Palace kitchens were located in the palace's second courtyard; but, their annexes overflow into the first courtyard (Eldem & Akozan, 1982). In sum, the water was used for drinking, cooking, and cleaning purposes.

The water had been pumped into kitchens from the Beylik water supply line by a water tower (one *lûle*) until the fire of 1574 (Necipoglu, 2013). Sinan the Architect added two and a half *ziras* from the second courtyard into kitchens; at that point, the water tower may have been removed, leaving the water to come from wells instead – also repaired by Sinan during the *Kanûnî* period (Tezcan, 1989) – fed from the Kırkçeşme water supply line (Çeçen & Kolay, 1997). The water tower might have been replaced with a possible water tank located on the ground floor of the wooden dorms; it too, no longer exists (Necipoglu, 2013). According to a document from 1886, four *lûles* worth of water was supplied from wells to the kitchen (BOA, 1303). The Dolap Ocağı used to have a horse-drawn water wheel until the 1800's; it was converted into a water pump after the palace was hooked up to electricity (BOA, 1336). Coal gas was partially used to pull up the water from wells given that the perished Kırkçeşme water supply line between Hagia Sophia and the



**Figure 19.** Complete water way elements of the kitchen complex on an anonymous plan (Anonymous, 1894-1912) shown by Ece Uysal Engüdar.

Dolap Ocağı was left in disrepair around the beginning of the 20th century. The *ocak* was taken out of order between 1918 and 1925 (Öz, 1991); during that time, Istanbul Water Company pumped water to the palace from the city of Terkos. After the water supply lines were eventually repaired, the water pump was used again, feeding directly from the Kırkçeşme water supply line (BOA, 1344). Back when Tahsin Öz ran the museum, the system was reused to extinguish fires and dually drew from the Terkos water supply line as well via a pump (Öz, 1991).

The water supplied from wells was transferred to the cooks' bath (on-site), alongside a hot water fountain, the inner fountain, a water tank of the bath, and the inner fountain of the kitchen. It also was pumped into the ablution fountains outside the kitchen (BOA, 1291) and the inner fountains of the kitchen dorms (Eldem & Akozan, 1982).

Wastewater from the kitchen units was disposed of via a vaulted underground channel beneath the kitchen court (Figure 19). It may have poured out into the sea from a different channel via the palace hospital. The varied channel ways are mentioned in multiple sources (Pouqueville, 1805).

The photos from the archives demonstrate that the channels beneath the bath (adjacent to the kitchen sections) do not continue under them. Additionally, we have also identified an architectural element whose top is visible only next to the retaining wall, a masonry mass in the garden and a brick arch (EHAEA, 1940-1944). The function of the architectural element is unknown but may be a vault. The masonry mass is most likely a water tank that might have been used for irrigation, instead of supplying the water to the whole palace (Rocque, 1752). It seems impossible to allocate the water towards up. As we have mentioned already, it is unclear whether the mass belongs to the Byzantine or Ottoman eras. Lastly, the brick arch might have been built as a discharging arch to carry a wall load, with a bare chance, or as an exit point for one of the channels to dispose of wastewater.

Before arriving at any conclusion in the evaluation, one should keep in mind that Topkapı Palace was founded in a Byzantine region (Müller-Wiener, 2001); moreover, the palace has been repaired multiple times throughout its life (Eldem & Akozan, 1982), and restoration work still continues to this very day. This study can only offer inferences upon compiling the findings. Excavations and surface surveys still need to be carried out in the working area. Likewise, more research needs to be done to study how each of the underground spaces were related to another, as well as to analyse when they would have been built, in order to offer any straightforward conclusion. The palace has undergone multiple changes. As such, even if we do not expect to arrive at a clear result, future fieldwork will help us confirm our data/findings, or even propose a different – possibly contrary – hypothesis altogether.

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