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Contents

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Research on the History, Function and Architectural Features of the Harran Saqiyas

MEHMET ÖNAL – SEVCAN ÖLÇER*

Abstract

The saqiya is a mechanical water lifting / raising device consisting of a wooden apparatus for the extraction and transfer of the water. These devices are spread over a wide geographical area and were pioneering technological inventions for centuries. They have been studied by many scholars in terms of their architectural features, cultural dimensions and artistic qualities. However, in Anatolia, there are no studies on saqiyas. Excavations in Harran between 2014-2018 have unearthed illuminating examples of these devices in recent years. Although they may seem less prestigious than many other architectural types, they formed the basis for our research. The archaeological finds and architectural components of the two saqiya apparatuses date from Late Antiquity up to the Middle Ages. In this study, the chronology, function and architectural features of the Harran saqiyas from various periods are discussed and compared with similar examples found in Syria, Jordan and Israel. With the data obtained, the relationship of the Harran saqiyas with structures such as baths, mosques, castles and palaces in the context of urbanization was examined, and their archaeological, iconographic and cultural dimensions were evaluated.

Keywords: Harran, saqiya architecture, Eastern Roman, Umayyad and Ayyubid periods.

Öz

Sakiya ahşap düzeneklerden oluşan, su çıkarma ve aktarmaya yarayan mekanik bir su kaldırma cihazıdır. Oldukça geniş bir coğrafyaya dağılan ve yüzyıllarca teknolojik buluşlara önayak olan bu cihazlar, pek çok bilim insanı tarafından mimari özellikleri, kültürel boyutları ve sanatsal nitelikleri açısından araştırılmıştır. Anadolu'da ise sakiyalarla ilgili herhangi bir çalışma bulunmamaktadır. Bu nedenle pek çok mimari anıttan daha az öneme sahip gibi görünen bu yapılar hakkında son yıllarda aydınlatıcı örneklerin açığa çıkarıldığı Harran, araştırmamız için zemin oluşturmuştur. Geçmişi Orta Çağ'dan geç Antik Çağ'a uzanan iki sakiya düzeneğine ait buluntular ve mimari yapı bileşenleri Harran'da 2014-2018 yılları arasındaki kazı çalışmalarıyla ortaya çıkarılmıştır. Bu çalışmada Harran sakiyalarının kronolojisi, işlevleri ve çeşitli dönemlerdeki mimari özellikleri saptanarak özellikle Suriye, Ürdün ve İsrail'de bulunan benzer örneklerle karşılaştırması yapılmıştır. Elde edilen verilerle Harran sakiyalarının kentleşme bağlamında hamam, cami, kale ve saray gibi yapılarla olan ilişkisi incelenmiş, bunların arkeolojik, ikonografik ve kültürel boyutları değerlendirilmiştir.

Anahtar Kelimeler: Harran, sakiya mimarisi, Doğu Roma, Emevi ve Eyyubi dönemleri.

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Introduction

Water is one of the most fundamental substances necessary for life. Since the Bronze Age (3200-1100 BC), water cisterns, canals and underground water wells were built to collect rainwater. Ancient civilizations lasting for thousands of years were established in water-rich geographical areas close to seas, rivers, lakes, and various stream sources. Civilizations established in terrestrial regions with high altitudes or far from water sources resorted to various ways to reach water, secure its existence, and consume it prudently. The saqiyas invented for this purpose not only ensured the survival of people in places where the water level was low but also increased their quality of life. Thus, the lands cultivated by these civilizations, whose main livelihood was agriculture-based, were able to be irrigated. And the water needs for public areas with hygienic requirements, such as places of worship, bazaars, and houses, were also met. Saqiyas, which spread especially through hot and dry regions and began to disappear with the invention of water engines, are still used in India, Egypt, and some parts of the Middle East today.

Saqiyas are hung over a water source such as a well, cistern or stream. They have two large wooden wheels, one of which is in a horizontal position while the other is in a vertical position; both have interlocking spiked teeth. Water-collecting pots made of earthenware, wood, or leather are tied to each other with a horizontal axis and bound to the main rope of the vertical-position wheel.[1] The rope to which pots are tied is then turned by the movement of the wheel. On the one hand, the pots that enter the water one after another are filled; on the other hand, they turn upside down upon reaching the top and pour the water into a vat. After this rotation, they are emptied and lowered into the water reservoir again (fig. 1). Saqiyas on rivers are powered by the force of the water itself, while those on wells are usually moved by strong beasts of burden such as camels, oxen, or mules.[2]

When the saqiya apparatuses are evaluated together with the surrounding structures, it is understood that they have a standard plan. These apparatuses, apart from wooden wheels, consist of a well, a quadrangular stone mass that serves as a podium (raised platform) for arches or walls arranged in a square around the well top, a square water tank, and sometimes a narrower tank accompanying it.[3] The depth of saqiya wells is 20 m on average, and the diameter of the path the animals walk varies between 5-7 m depending on the required force.[4]

The first tangible data about saqiyas date back to the Hellenistic period. In addition to the mention of saqiyas in many texts from this period,[5] vaulted rooms and aqueducts containing the saqiya system, which seemingly worked until the first century BC, were unearthed at Cosa in the Tuscany region of Italy. It is thought that these saqiyas were feeding a bath built around 150-125 BC and the cistern of the villa next to it.[6] A similar system, thought to bring water to Pompei's Forum Bath, Stabian Bath, public baths, and toilets, and dated to the second half

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1 Schiøler 1973, 16-26; Glick 1977, 645; Venit 1989, 219; Ayalon 2000, 218; De Miranda 2007, 23-36; Vibert-Guigue 2008, 148; Mitton 2009, 98.

2 Schiøler 1973, 16-25; Glick 1977, 645; Selin 1997, 282; Sezgin 2003, 23; De Miranda 2004, 105-6, 114; 2006, 48.

3 Schiøler 1973, 93; Vibert-Guigue 2008, 150.

4 Schiøler 1973, 79; Glick 1977, 645.

5 The definition and function of saqiyas are mentioned in the following books: *Peri Alexandreias* by Callixenus, *Pneumatica* by Philon of Byzantium, and *De arch.* by Vitruvius; see Oleson 2000, 234, 270-71; De Miranda 2004, 112.

6 Oleson 2000, 258-59.

of the first century BC, was also unearthed.[7] In the archaeological excavations made in Tel Ashdod, Yavne-Yam, and Jazeera, the remains of water-lifting devices such as columns and the base of the horizontal shaft, as well as reservoir and irrigation canals, along with water wells from the Late Roman and Byzantine periods, have been found.[8]

In the Islamic world, saqiyas are mentioned in various sources[9] from the ninth to the 13th centuries, and their ruins can be found, especially in the deserts of Syria and Jordan. The ruins of the bath and the villa in Quṣayr ʻAmra, which dates to AD 705-711, as well as the saqiya wells of the Late Roman-Byzantine and Islamic cultures in the Abu Mena sanctuary, are very significant examples.[10] In addition, the Ḥammām as-Sarāḥ saqiya,[11] three saqiyas of Qasr at-Tûba in the al-Ghadaf valley,[12] the Kubbet el-Bir saqiya,[13] and the Hallabiya-Zénobia saqiya[14] existed since ancient times in the deserts. The Umayyads developed this saqiya technology in connection with their water culture.[15]

Saqiyas contributed to urban life not only archaeologically, but also sociologically and ecologically. The rituals performed in the baths or that people gathered around the saqiyas to perform their routines of daily life diversify the functions of these structures. For example, a miniature scene in one of the al-Hariri's Maqamat copies from the 13th century authenticates that saqiyas, like baths, were preferred for gathering, making important decisions, relaxing, or having fun. The flowers and flora in the miniature reveal the significant role of the saqiyas in garden irrigation and landscaping.[16] These structures were also chosen as communication points, and associated with water clocks and astronomy.[17] They were also seen as a source of inspiration for literature and philosophy.[18]

Harran Saqiyas

The history of Harran, one of the most significant settlements of Mesopotamia, dates back to 6000 BC. It is located amidst the fertile plains irrigated by the Cullab and Deysan Rivers, tributaries of the Belih River. The city came under the rule of the Sumerians, Akkadians, Old Assyrians, Hurrians, Mitannians, Hittites, Neo-Assyrians, Neo-Babylonians, Medes, Greeks, Romans and Byzantines in antiquity. It was first brought under Arab rule in AD 639, and was

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7 Oleson 2000, 258-59.

8 Baumgarten 1999, 66; Ayalon 1999, 76; 2000, 219.

9 Al-Balādhurī's "Kitāb Futūḥ al-buldān" (Book of the Conquest of the Countries), al-Khuwārizmī's work "Mafātīḥ al-ʿulūm" (The Keys to the Sciences), Ibn al-ʻAwwām's "Kitāb al-filāḥa" (The Book of Agriculture), and Ibn al-Razzāz al-Jazarī's "Al-Jāmiʿ bain al-ʻilm waʾl-ʻamal al-nāfiʿ fīʾl-ṣināʿat al-ḥiyal" (A Compendium on the Theory and Practice of the Mechanical Arts) contain important information about saqiyas. See Schiøler 1973, 83, 168-71; Hill 1974, 182-83; Hill 1977; Glick 1977, 646; El Belâzürî 1987, 536; Farré Olivé 1998; De Miranda 2006, 78-79, 81; Akyol and Arslan 2019.

10 For more information see Jaussen and Savignac 1922, 78-95; Schiøler 1973, 92-95, 131-36; Almargo et al. 1975, 45-48.

11 Bisheh 1989, 225; Vibert-Guigue 2008, 156-57; Arce 2016, 67, fig. 5.

12 Jaussen and Savignac 1922, 47-48, figs. 5-7.

13 Vibert-Guigue 2008, 161.

14 Lauffray 1991, 271.

15 Vibert-Guigue 2008, 148.

16 Schiøler 1973, 78-79; De Miranda 2007, 43; Vibert-Guigue 2008, 168.

17 Vibert-Guigue 2008, 170; Özbay 2012, 66.

18 Özbay 2012, 67-68, 76-77.

briefly the capital city during the reign of the last Umayyad caliph Marwan II period (AD 744-750). Then it came under the rule of the Abbasids, Hamdanids, Numayrids, Seljuks, Zengids and Ayyubids. It was burned down by the Mongols in 1272 and conquered by the Ottomans in 1516.[19] It is understood from the present-day ruins that Harran lived its brightest period during the time of the Umayyads (AD 750) and Ayyubids (AD 1182).

Cuneiform Akkadian tablets from the Neo-Assyrian period (911-609 BC) are among the most significant archaeological finds for our research on the saqiyas of Harran. These tablets, particularly about the Harran region, contain words thought to correspond to a water cabinet type of device, such as "carry," "plow," "cupbearer," "water-lifting," "irrigation," "knob" (*karru*), and "wooden wedge" (*sikkatu*).[20] The phrase *lb, ma ahi buri* in passage IV R 52 of the tablets translated by C. H. W. Johns is related to the saqiya apparatus. According to Johns's interpretation, this object was placed near a well or cistern. This water well was probably located in a stream or canal bed, or was a well dug in a wasteland fed through canals and deep enough for dipping buckets.[21] The words *sunnu, rubu, sudusu* and *summunu* in the texts are thought to be related to different water levers working with ox power whereas the word *maialtu* is thought to relate to oxen and wheels.[22] The occurrence of these words in the text indicates the existence of water cabinets with buckets in Harran since the Neo-Assyrian period and sheds light on the chronology of the saqiyas.

Thanks to the archaeological excavations carried out in Harran, new finds that illuminate the historical and cultural past are unearthed every day. These show that the city had a predominant medieval identity as well. As a result of the long-term archaeological work carried out in Harran Höyük, Harran Ulu Cami and its surroundings, and Harran İçkale, important structures exemplifying the architecture of homes, shops, bazaars, mosques, palaces, and baths have been found. The wells, canals, and vaulted structures related to the saqiyas allocated water to them and were designed in connection with the surrounding architectural elements. They were encountered for the first time during the excavations carried out in the east of the mosque in 2014. In the same year, a bath, a water well with a podium, toilets, and places for ritual ablution (*al-wudu*), and shops belonging to a bazaar were identified on this site. The second saqiya structure was unearthed in 2018 - very close to the first one - a little further south of the first saqiya structure (figs. 2-3).

Harran's saqiyas were destroyed, repaired, or altered over the centuries due to earthquakes, wars, or other reasons. These structures are located in the city center and were actively used since they were permanently located in the settlement area and later modified with additions and removals at different periods. During the excavations, working in the well and vaulted rooms far below today's floor level made our fieldwork difficult in terms of transportation and security. The wooden parts of the structures were probably destroyed in fires, but the architectural integrity, stone canals, animal walkways and saqiya pots made of terracotta have survived to the present day.

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19 Özfırat 1994, 15-19; *Türkiye Diyanet Vakfı İslam Ansiklopedisi* 16 s.v. "Harran". Bakkal 2008, 8.

20 Johns 1901, 19.

21 Johns 1901, 19.

22 Johns 1901, 19; Schiøler 1973, 166; De Miranda 2007, 47-48.

Saqiya Structure no. 1

Structure no. 1 is located on the south side of the Harran Bazaar Bath (figs. 4-5).[23] It was defined as a water well with a podium when it was initially found. Later, a vaulted room, a vaulted passage, and the well's front room were identified as a result of studies carried out in 2015.

Well: The water well in the saqiya structure is in the form of a podium raised 2.75 m above the rooms around it. Situated in an east-west direction, the saqiya has a rectangular plan and measures 3.15 x 1.65 m. The podium part of the well is 4.60 m high and 8.65 m wide. The soil in the well, which is masoned with cut stone blocks and covered with partly preserved plaster, was cleaned to a depth of 5.90 m. And an elevation of +363.95 was reached. The water in the well is estimated to be 6 m below this level. A large iron piece was found on the east wall at +365.82 level, and this piece of iron was at the same level as a second iron piece found on the north wall. In addition, another iron object, nailed to the wall, was found 0.77 m below this piece of iron. There are niches on the well's north and south walls that were designed for garland post. It is noteworthy that the north wall, which is plastered with lime mortar, is designed with zigzag-like patterned embossments.[24]

There are two cut stone blocks placed opposite each other at the well top, and there are hollows on the blocks that are not very deep (fig. 6). It is understood that the wheel shafts were placed in these hollows and the water was drawn to the upper floor by the wheel-bucket system. Above the well in the eastern part, there is a stone water canal with a width of 21 cm and a depth of 11 cm. Here the water from the wheel was emptied. The canal here contributed to the water of the bath with two concrete pipelines connected to the Harran Bazaar Bath. The partially unearthed stone canal on the eastern edge of the podium is connected to the stone canal on the south wall of the warm room by passing over the vault of the hall leading from the podium to the dressing room. Thus, the water was dispersed in various directions through the concrete pipes and also discharged into the bath.

Vaulted Passage: A vaulted passage 2.25 m below the upper level of the well provides access to the water well from the well's front room. This rectangular-planned space is covered with a cradle vault (fig. 7). Its walls and roof were built of smoothly cut stones. It is 2.90 m long, 1.80 m high, and 1.90 m wide. There are ornamented niches on the north and south walls and whose floor is made of compacted hard soil (fig. 8). There are geometric and floral motifs in these niches with mouldings and garlands. The cog rows and floral patterns of the arched niches are quite similar to the ornaments on the arches of Nusaybin's Mor Yakup Church[25] and in the Church of Saint Simeon Stylites.[26] Both date to the Eastern Roman / Byzantine period. Oyster motifs in the arches are seen in the House of Saints (Beth Kadishe) in the Deyrulzafaran (Mor Hananyo) Monastery in Mardin.[27] The niche design here is generally reminiscent of the apse's arches found south of the tomb in Al-Ruṣāfa.[28]

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[23] The Harran Bazaar Bath (Harran Çarşı Hamamı) resembles a basilica-planned church in its current form and has hot and warm rooms running in a north-south direction. There are dressing rooms on the west and south sides. There is a hot water tank, furnace, cold-water tank and water distribution pool on its east side. As a result of the excavations, the bath structure was understood to have existed during three periods: the Umayyads, Zengids and Ayyubids; see Önal 2016, 4-7; 2019, 325-60.

[24] Önal 2019, 352.

[25] https://kulturenvanteri.com/tr/yer/mor-yakup-kilisesi-nusaybin-mardin/#16/37.06691/41.215115 (Retrieved on 14.03.2023).

[26] Strube 1993, 208, 247, 251 and pl. 110.

[27] Keser-Kayaalp 2021, 197, fig. 3.3.7.

[28] Musil 1928, 171, fig. 60.

The northern niche is 1.65 m wide, 50 cm deep, and 50 cm high. The southern niche is 1.36 m wide, 32 cm deep, and 52 cm high. The western entrance of this passage was closed by masonry using spoliated stones during the Zengid-Ayyubid periods. The ornaments on the niches in the vaulted passage along with the fact that the ground level is much lower than the dressing room of the Harran Bazaar Bath, as well as a Roman coin found inside, dates the passage back to the Eastern Roman period (fifth-sixth centuries AD).

Well-Front Room: It is situated next to the changing room (southern side) of the Harran Bazaar Bath. This structure, which is located between the water well with podium and the street, has the dimensions of 3.50 x 4.80 m. Six steps descend to the floor from an entrance with a width of 95 cm. This room was changed by making new additions in different periods. A fountain pool dates from the Eastern Roman period; however, the pool was removed during the Islamic period when the cold room of the bath was being built. After the earthquake of the 12th century AD, the room was filled with soil up to the level of the third step while the ground level ascended to the floor level of the cold room. The hearth, understood to have been built after the Mongol invasion, was found in the middle of the room. The brick-built vault cover had collapsed on the hearth here.

There is a high arch 3.55 m wide that completely covers the entire northern facade of the room (fig. 9). The south wall was preserved to a height of 3.15 m. The lower part of this wall was made of smoothly cut stones, and the upper part was masoned with bricks and mud mortar. There are six shallow square hollows burrowed side by side on the western wall with similar characteristics. These hollows are thought to be slots left for wooden girders. The west wall of the water well with the podium forms the east wall of the room. There was a cradle-vaulted passage on this 4.20 m high wall masoned with cut stones. Moreover, finding pieces of bricks and lime mortars in the room, as well as the presence of the arch in the north, indicate that the upper cover is a barrel vault. The ground floor, where the water stood, can be accessed from the well-front room. The presence of low brick-masoned walls on the northern side of the room, as in the dressing room, indicates that wooden benches may have been used in this room as well. The well-front room and the well's vaulted passage were later covered with spoliated stones.

The ground level differences, the presence of cradle vaults, the ornaments on the niches, the coins, and the wooden finds from various periods suggest that there are four periods in the structure. Its complex appearance evidences these four periods: Eastern Roman, Umayyad-Abbasid, Ayyubid and post-Mongol invasion. The first period shows a high arch on the north wall. The second period has the arch opening in the north wall closed with cut stones and bricks, leaving only one doorway. The floor of the dressing rooms of the bath was raised, and parallel to this, a mezzanine floor was built by opening wooden plank slots on the west wall of this room. In the third period the interior of the room was filled with soil up to the level of the first step level, and the cradle-vaulted entrance was closed with spoliated stones. During the fourth period a simple hearth was built from bricks on the compacted soil. It is thought that the water well with a podium was built in the earliest Eastern Roman period, and then changed according to the reconstruction plan made in the Islamic period.[29]

Cradle-vaulted Room: This room is situated in the podium and adjacent to the northern side of the well. It measures 3.26 x 2.40 m in an east-west direction and is 2 m high (fig. 10).

[29] Carbon 14 analysis of a wood sample taken from the unit in the well-front room dates it to the seventh-eighth centuries AD.

The room floor has hard compacted soil from the Islamic period, and 0.40 m lower than this, the Eastern Roman floor is paved with smoothly cut stones. No mortar or plaster remains were found in the cradle-vaulted room, which was masoned and aligned with neatly cut stones. The original state of the structure, which is hidden inside the podium, resembles an iwan. The 1.75 m wide entrance opening to the west was scaled down to 0.50 x 0.70 m when it was converted into a dressing room. The dressing room was raised 1.70 m from the original floor. On the right and left sides of the entrance, there are two 0.70 m long brick walls, like the ones in the dressing room. Two rows of brick masonry have been preserved. The opening here is too small for an adult person to easily enter this room.

The cradle-vaulted room has small windows facing each other. The window on the south wall measures 0.38 x 0.22 m and is 1.10 m high from the ground. Ventilation and light must have been provided through this window, which opens to the vaulted passage of the water well. Another window, measuring 0.38 x 0.25 m, was placed in a rectangular niche that opens to hall no. 2 of the dressing room. On the east wall, there is a water canal measuring 0.14 x 0.16 m carved vertically into the wall. In the original phase, there must have been concrete pipes inside these canals; however, they have not survived to the present day. In this canal nested stoneware pots were found 0.85 m above the room floor. The water of the canal must have been supplied from the concrete pipeline we detected over the podium.

The cradle-vaulted room, along with the podium well, must be the oldest building in this area dating to the Eastern Roman period. From the ground-level differences and the changes made in the structure, the well and the room inside the podium predate the bath architecture. Because during the Umayyad period, while the dressing room of the Harran Bazaar Bath was constructed, the floor here was raised about 1 m. With this change, the wide entrance at the western side of the room was closed, leaving a narrow entrance from the dressing room floor. Thus, saqiya structure no. 1 was built in the Eastern Roman period together with the vaulted room, the vaulted passage, and the well-front room within the podium, and included in the water needs and cleaning area of the people. The reconstruction plan was made in the Umayyad period.

Spherical-conical pots and their ceramic fragments, two stone canal pieces, and two basalt tub fragments were found in the ashy soil of the cradle-vaulted room. It is not possible to say anything certain about this room, which is quite open to interpretation in light of today's data. Many opinions come to mind regarding its function due to the special location and plan of the room. Its window facing the well and its connection with water reminds us of Jacob's well, located outside Harran's city walls. There is also a room next to Jacob's well thought to be a cool room used by the notables of Harran to alleviate the heat of summer. The fact that many fragrance containers and spherical-conical bottles were found in the room also shows the importance attributed to hygiene and smelling good by the people who used this space. The stoneware pots connected to the concrete pipeline in the eastern side of the room also suggest that a kind of water ritual may have been performed in this place. Considering that purification with water is very important in Sabianism (Mandaeism), it is possible that this place, hidden near the bath, was also used by the Sabians.

Saqiya Structure no. 2 and Maksem Building

Saqiya no. 2 and the Maksem - a specific building from which water is distributed - are located at the south of the well with podium (figs. 11-12). These structures are separated from each other by a corridor extending to the courtyard with a shadirvan, that is, a water tank with a

fountain. It consists of a well, platform, and water canals. The presence of canals and concrete pipes running in the makem's four different directions suggests that the water was gravity fed.[30] However, vertical quarter-circular niches found on the well's narrow walls indicate the presence of a water cabinet. Therefore, the water was generally conveyed to the canals by gravity, but from time to time by the wheel-bucket system, as in Saqiya structure no. 1. In addition, the flat platform on the well's east is considered suitable for turning the water cabinets with the help of a force (e.g., a donkey).

Well: The rectangular well running in a north-south direction measures 3.00 x 1.70 m; its depth is 6.40 m. The upper part of the well was masoned with 4.20 m high cut stone blocks. The lower part, with an oval plan 3 m in diameter, was masoned with brick walls 2.20 m high (fig. 13). The stone row at the top has been partially destroyed. These curved set walls border the east and west sides of the building. On these walls, there are symmetrically built arches 2.20 m in height and width (fig. 14). The interior parts of the arches, whose dimensions are standard, were closed by masoning with bricks later (fig. 15). Lime mortar was used as the binder. On the north and south walls, there are continuous, symmetrically designed quarter-circle niches with a diameter of 35 cm and a height of 4.20 m. These niches were designed for the pot-garland, that is, the water cabinet apparatus. The niche in the south wall is not as deep as the niche in the north wall. The canals directed to the northern niche have survived *in situ* to this day.

Platform: A semi-circular platform measuring 8.60 x 8.57 m surrounds the well. There is a saqiya well running in a south-north direction in the middle of the platform. This is 1.30 m higher than the corridor of the shadirvan courtyard (ablution room). The well's north wall is masoned with bricks, and the other walls are masoned with stones. These walls are preserved to a height of 0.45 x 0.70 m. During the excavations, clay was found in places, and the base of the well is made of compacted soil.

Canals: There are stone canals on the north, east and west sides of the maksem, and concrete pipeline to the south of it. The stone canals in the north and east provided the water of the courtyard with shadirvan, where also the public toilets are located. The stone canal on the west provided the fountain's water in the sanctuary of Harran's Great Mosque (fig. 16). The concrete pipes to the south of the maksem provided the water for the bazaar and the musk shop. The stone canals in the east are 0.16 m wide and 0.18 m deep. The stone canal in the north measures 0.25 x 0.16 m, while the canal in the west measures 0.10 x 0.9 m. The concrete pipeline, which is 20 m north of the eastern stone canal and running parallel to it, is partially preserved.

Harran's saqiya structures, which draw attention with their designs, were made clear by the saqiya pots found in and around the wells. As a result of our research, we know that the interestingly shaped containers coming from inside and around the saqiya wells are saqiya pots that are tied to the ropes to extract water.[31] Typically, the pear-shaped bodies of saqiya pots expand downward and are attached to a 2-3 cm diameter knob-shaped base. The knob-shaped base of the saqiya pots and the protrusions on the top of them (lip parts) are designed to be attached to the apparatus. However, it is very difficult to date the saqiya pots, whose

[30] The city's water was supplied from the rivers during the Abbasid period too. For this reason, we think that there were maksems in Harran at intervals of about 300 m.

[31] Ölçer 2020, 323-36.

profiles have not changed much from the Roman period to the end of the Middle Ages, without establishing a stratigraphic relationship with the saqiya structures.[32] Therefore, even if the saqiya pots can be dated, they may not be sufficient to illuminate the chronology of the saqiya structures. For instance, most of the saqiya pots dated to the Late Roman and Early Byzantine periods have a pear- or oval-shaped body and a knob base. These pots are almost identical in form to the pots produced in the early Islamic period or the Middle Ages Islamic period. In order to distinguish them from each other, it is necessary to highlight the profile details and carefully examine the material properties.[33]

Pots are an integral part of saqiya architecture or saqiya apparatuses. They are also found in and around the oval-shaped water well excavated in 1985 at Harran Höyük. The well, for which deepening works were carried out in 1986, measures 2.80 x 2.10 m. Its area is 10.15 m in a north-south direction and 9.20 m in an east-west direction. The top and interior of the building, described as a city square well, are designed in an oval shape by masoning with 24 x 24 cm double brick rows (fig. 17). We detected an entrance to the north of the well, which was deepened up to 20 m. Subsequently, with the continuation of the work, a 6.50 m long wall was found that could not connect with any wall, but was thought to be related to the entrance. The south-facing entrance of the building, that is, the city square, opens into a 3.50 m wide room covered with irregular paving stones.[34] It is thought that the section with a width of approximately 2.80 m and situated on the east of the entrance and the well may be the continuation of a road extending in a north-south direction. The room, whose entrance was found north of the well, and the other surrounding rooms belong to the house complex.[35] With this in mind, studies were terminated at the level of the 12th-13th century Islamic period, and the excavation of other trenches in the area continued.

The destruction of Harran Höyük and the fact that the trenches around the well have been filled with soil over the years make it hard to interpret this area as a saqiya complex. Nevertheless, the oval-shaped water well, the presence of a broad surrounding area on which the animals can go round, and the saqiya pots found inside indicate that a saqiya mechanism was installed on the well. However, the building components related to the saqiya architecture could not be fully revealed in the archaeological works conducted in the past. Apart from this well, the most attention-grabbing thing at Harran Höyük is the saqiya pots found in different and unique forms. Unlike the common pear-bodied and knob-base pots, these pots were manufactured with a conical-spherical body with double holes and an open base. The open base of the pots is designed to be tied slightly oblique to the saqiya by threading a rope or reeving a string through holes on the body and made to evacuate the trapped air when the pots are dipped into the water.[36] These pots, found in a room during the excavations in 1984, were independent of the water well and found together with other kitchen containers. This suggest that, although these were produced for a saqiya, they were later used for a different purpose. Some of the saqiya pots with a knob base or a body hole were also found in the places to the east of Harran Höyük and the Harran Grand Mosque (fig. 18). Therefore, it is understood that the pots were suitable for daily use and served many purposes other than saqiyas.

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32 Lauffray 1991, 271.

33 Ölçer 2020, 329.

34 Yardımcı 1987, 289.

35 Yardımcı 1987, 289.

36 Ölçer 2020, 330.

During the restoration works in the Harran Grand Mosque in 2019, a water basin was found adjacent to the eastern wall of the mosque, and several saqiya pots were found *in situ* at the bottom of the basin (fig. 19). It is obvious that the pots found together with metal nails have a connection with the concrete pipe pieces and the water basin. In addition, saqiya pots were found *in situ* in a basin found in the Harran Castle Bath too. The presence of saqiya pots on both basins, but the absence of a saqiya well and structures related to saqiya architecture, suggests that the pots may have been brought here later for a different use. The pots here may have been used later by the students of Darul Qurra - the madrasa department that teaches the methods of reading the Qur'an - in the Grand Mosque or for cleaning in the Harran Castle Bath. However, there must be a saqiya structure that stores and distributes water very close to or above the Harran Castle Bath, as in the Harran Bazaar Bath. The water basin adjacent to the eastern wall of the Ulu Mosque is open to interpretation. Perhaps there was a small saqiya mechanism operated by people over the basin. This structure, which was also unearthed in the Harran Castle Bath, may also be a fountain whose basin panel was destroyed. In addition, there is a saqiya well in the northwest of the shadirvan in the courtyard of the Harran Grand Mosque. The structures here will be clarified in the studies to be carried out in coming years.[37]

Discussion and Conclusion

In the Middle Ages, the water of moats not only was the most significant line of defense for cities and castles, but it also met the water needs of various structures such as the bath or kitchen located in the city center and the inner part of the castle. This water were brought from the rivers by means of water cabinets and distributed to various places with the help of saqiyas. Therefore, the water brought to the city by digging deep canals from the rivers was transferred to cisterns, wells and pools with water cabinets. The Cullab River runs approximately 100 m east of the eastern city wall of Harran, while the Deysan River flows 300 m west of its western city wall. As far as we can confirm from ancient sources, both the water for the moats surrounding Harran's city wall and the water for civic use were supplied from the Cullab River and distributed to maksems and wells in the city.

Two saqiya structures have been identified in Harran up until today. These structures, probably more in number within Harran and its surroundings, give an idea about the saqiya architecture with their current form. Similarities have been detected between Harran's saqiyas and the preserved or documented saqiya samples found especially in Jordan, Israel and Syria. For instance, the Roman-style bath in Quṣayr 'Amra, which is dated to 705-711 AD, has a saqiya connected with its water tank.[38] This is 1.70 m above the ground and located approximately 6 m away from it. The Harran Bazaar Bath and saqiya structure no. 1 next to it is similar to this Roman-style bath and its saqiya, which has survived to this day in Quṣayr 'Amra.

In addition, the saqiya structure unearthed with the square cradle-vaulted rooms in Kubbet el-Bir[39] and the vaulted room and the well-front room detected in saqiya structure no. 1 in

[37] We think that there are more than two saqiya mechanisms in Harran. Ibn Shaddad states that Harran was established between the Deysan and Cullab rivers and that the water brought from the Cullab river reached the workshops, the Grand Mosque, the fountains and even inside some houses in the city. In addition, it is explained that the water of the city's wells is salty, so these wells are filled with fresh water in January and remain unmixed with salty water for use by people in the summer; see Rice 1952, 37; Özfırat 2005, 87.

[38] Schiøler 1973, 92-95; 94, fig. 64; 95, fig. 65; Vibert-Guigue 2008, 149, fig. 64; 154, fig. 16 (right).

[39] Vibert-Guigue 2008, 161.

Harran are closely related. The Kubbet el-Bir saqiya structure compares with the Harran example in terms of its vaulted room being in the shape of an iwan, without any entrance, and with a pipeline on its walls. A question posed about this room in Kubbet el-Bir is whether it was converted from a Byzantine bath during the Umayyad period, especially with the addition of a saqiya.[40] For the Harran example, our examinations and resulting data indicate that a bath from the Byzantine period was modified during the Umayyad period and included in the saqiya area.

Moreover, the 3.10 x 1.60 m rectangular and platformed saqiya structure in Hallabiya-Zénobia is very similar to the 3.15 x 1.65 m rectangular platformed water structure found in saqiya structure no. 1 in Harran. In the Hallabiya-Zénobia sample, the water is initially transferred to a small drainage pool in the toilet, then to a large pool in the corridor, and finally to the bath's hot room with a canal going in another direction.[41] In the Harran sample, there are canals leading to the baths, toilets and shops.

Saqiya structure no. 2 of Qasr at-Tûba has common features with saqiya structure no. 2, unearthed in 2018 east of Harran Grand Mosque. The niches on the north and south walls of this saqiya are similar to those found on the east and west walls of saqiya no. 2 in Qasr at-Tûba.[42] As in the example of Harran, one of the niches is narrower than the other. In fact, the depths of the wells, the heights of the walls, and the dimensions of the arch spans are also quite similar. There are canals around the well that distribute the water in various directions.

Saqiya structure no. 2 in Harran is also similar to the four saqiyas detected in the Abu Mena sanctuary belonging to the Late Roman-Byzantine and Islamic cultures, located 75 km west of Alexandria.[43] The excavations made at Abu Mena have unearthed water wells with an average depth of 20 m. Also found are a circular walking platform designed for the beasts of burden, masonry structures suitable for supporting the wheel assembly, and vertical niches carved for the pots on the well walls. These were converted into water cabinets powered by humans after a while without removing the bucket chain that rotated on the pot-garland wheel. This transformation is based on the fact that half of the circular walking platform on which the animals rotated was destroyed, and that a ditch-shaped pit had been dug enough to set a treadwheel near the well top.[44] Saqiya structure no. 2 in Harran was also used by making various modifications over time without changing its function.

Harran saqiyas are very close to the Bazaar Bath. The same is true for the saqiyas in Quṣayr 'Amra,[45] Ḥammām as-Sarāḥ[46] and Kubbet el-Bir.[47] The proximity of baths to the water well and the saqiyas may have arisen, of course, out of necessity. However, the use of saqiyas in connection with baths is a tradition dating from Roman times.[48]

According to a coin find, the Hallabiya-Zénobia saqiya sample can be dated back to the Eastern Roman period (sixth-seventh centuries AD). On the other hand, the saqiyas at Qasr

40 Vibert-Guigue 2008, 161-62.

41 Lauffray 1991, 125.

42 Vibert-Guigue 2008, 150.

43 Schiøler 1973, 130, fig. 90; 132, fig. 93; Oleson 1984, 181-83.

44 For more information see Schiøler 1973, 131-36.

45 Creswell 1969, 391, fig. 450.

46 Arce 2015.

47 For Quṣayr 'Amra, Ḥammām as-Sarāḥ and Kubbet el-Bir saqiya plans see Vibert-Guigue 2008, 156, fig. 21.

48 Schiøler 1973, 96.

at-Tûba and Quṣayr ʻAmra are dated back to Umayyad period (seventh-eighth centuries AD). It is possible to say that the saqiyas unearthed in the Harran East Bazaar were built during the Eastern Roman period (fifth-sixth centuries AD) at the earliest and were used in the Umayyad-Abbasid period with the additions made. Carbon 14 analysis of a burnt piece of wood recovered from the well-front room in saqiya structure no. 1 in Harran indicates the seventh-eighth centuries AD, thus supporting this dating. Saqiya structure no. 2 in Harran was built during the Umayyad period, when the Bazaar Bath, courtyard with shadirvan, and the Harran Grand Mosque were also built and then used until the Ayyubid period.

The saqiya pots found collectively near the basin (fountain) in the Harran Grand Mosque sanctuary and the saqiya pots found in the hot room and basin of the Castle Bath must have remained under the Mongolian wreckage during the Ayyubid period. Even though no structures related to the saqiya well and its architecture have yet been found in the Harran Castle, we think that saqiya apparatuses are inside the castle walls or in some of the tower bastions, as in the Aleppo Castle[49] (AD 1200) and Joseph's Well[50] in Cairo (AD 1176-1190). As a matter of fact, a water well detected in the middle of the southwestern bastion of the castle during 2021 supports this idea and sheds light on our research.

In conclusion, detecting the saqiyas in some of the Umayyad settlements in the Near East and unearthing these structures for the first time in Harran, one of these settlements, is a significant discovery. Various data obtained regarding the saqiyas in Harran help us answer questions about these interesting mechanisms and contribute to our knowledge about saqiya architecture. The Harran saqiyas reveal not only the Umayyad period but also the importance the city attributed to water distribution in the Middle Ages as well as the urbanization that developed with water. Although the Harran saqiyas, as well as similar examples unearthed before, present various architectural features, they also show that the cogged wheel system remained unchanged for centuries in their geographical area. The saqiyas in Harran were situated within a highly developed urban landscape, unlike the saqiyas that have only a bath nearby or are built alone in the desert. Buildings such as baths, mosques, bazaars and madrasahs were deliberately placed around the saqiyas, which were actively used with urbanization. Thus progress was made in the fields of sanitation, prayer places, shopping, education, culture and art. The artifacts found in the excavations going on for years and the advanced architecture unearthed impressively prove this progress in Harran. In this context, saqiyas enable the development of societies and the greening of their geography. They also contain tangible and intangible cultural heritage, and create new study areas that should be examined with their archaeological and sociological dimensions.

[49] Schiøler 1973, 90-91.

[50] Creswell 1940, 5; Schiøler 1973, 91.

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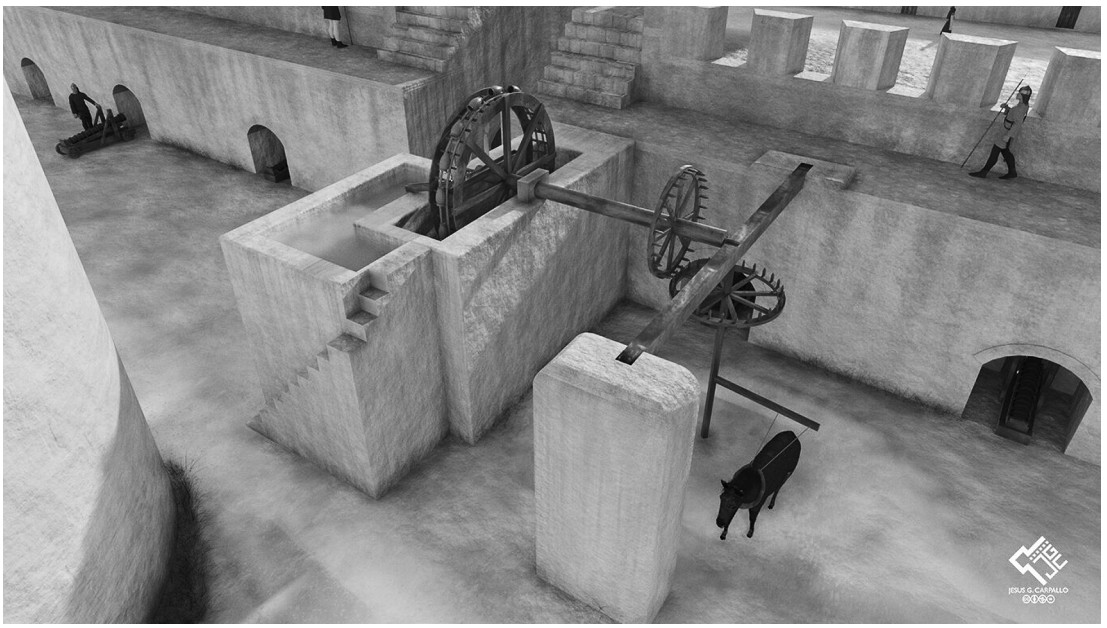

FIG. 1 Virtual reconstruction of the water wheel; Niebla Castle, Spain (https://www.artstation.com/artwork/ykGWlR) (Retrieved on 05.03.2023).

FIG. 2 Saqiyas nos. 1 and 2 in Harran East Bazaar.

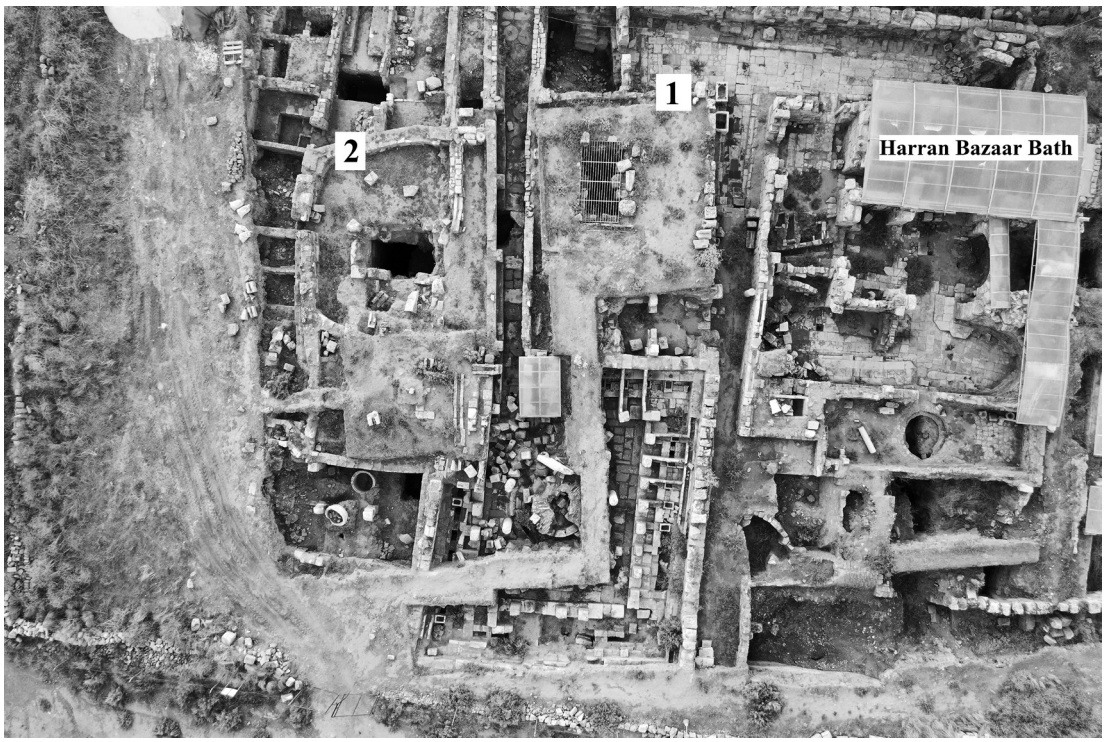

FIG. 3 Western view of the Harran Saqiyas and the Bazaar Bath on their north, 2019.

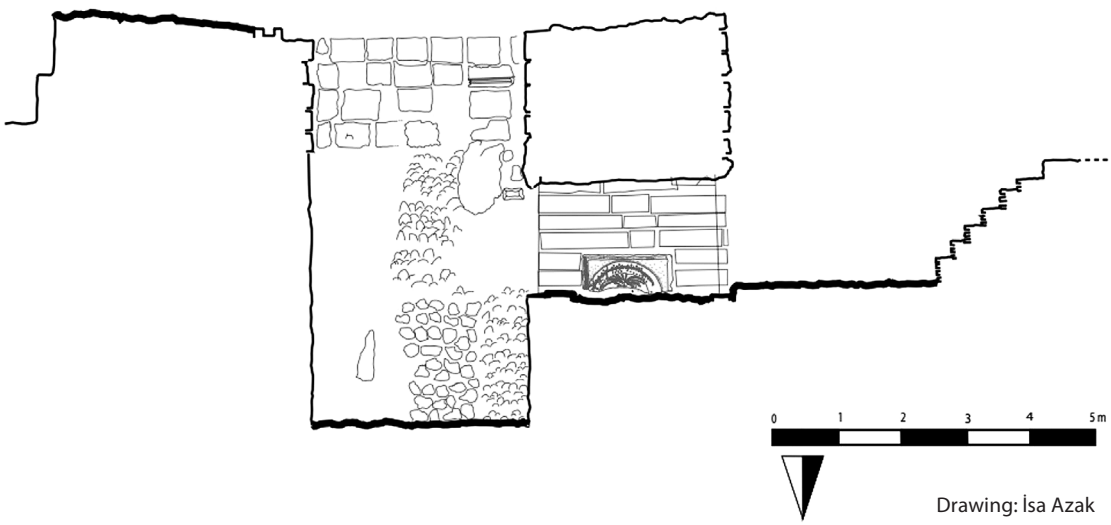

FIG. 4 AA section of Saqiya structure no. 1.

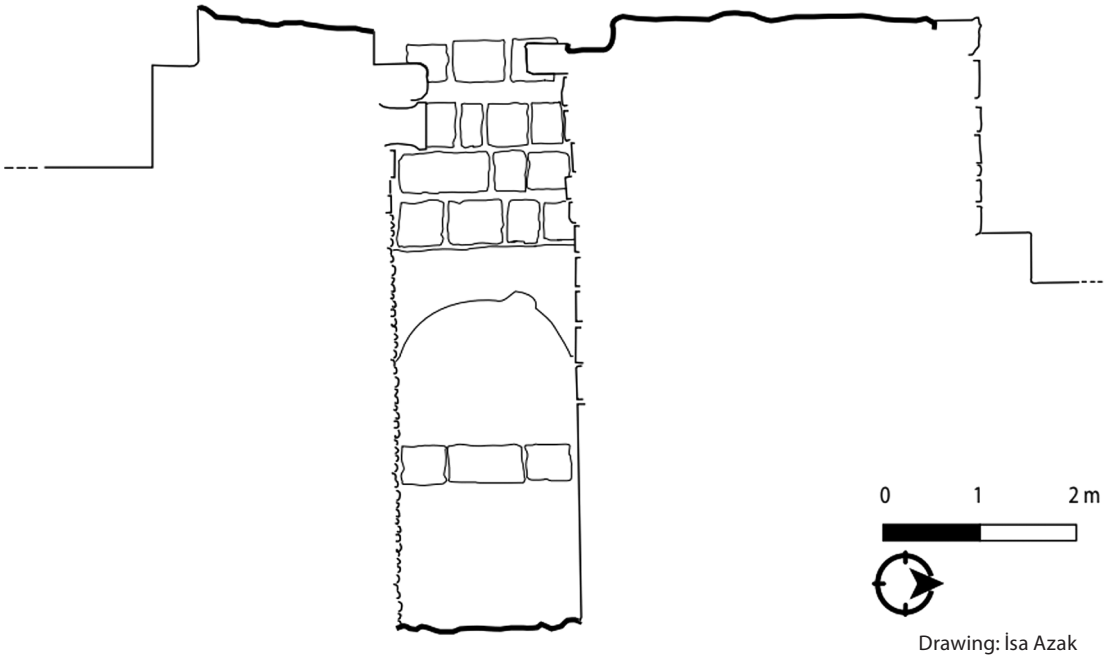

FIG. 5 BB section of Saqiya structure no. 1.

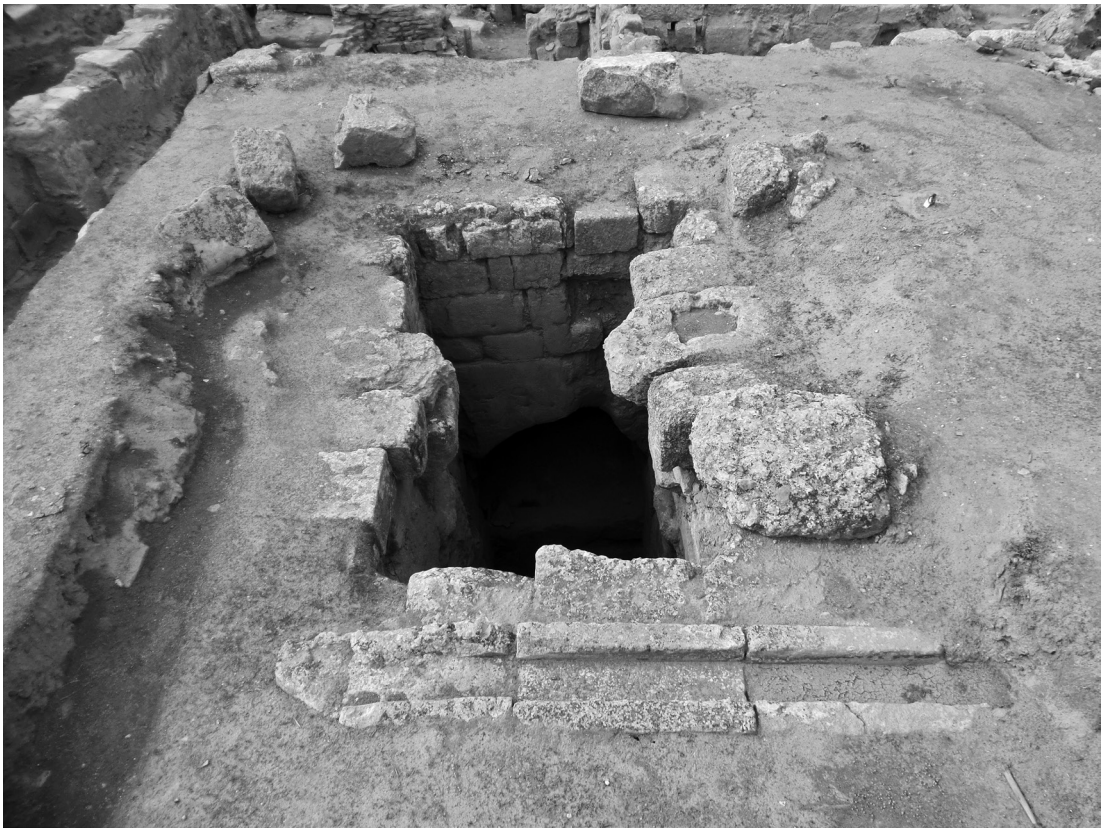

FIG. 6 Eastern view of the water well with podium in Saqiya structure no. 1, 2015.

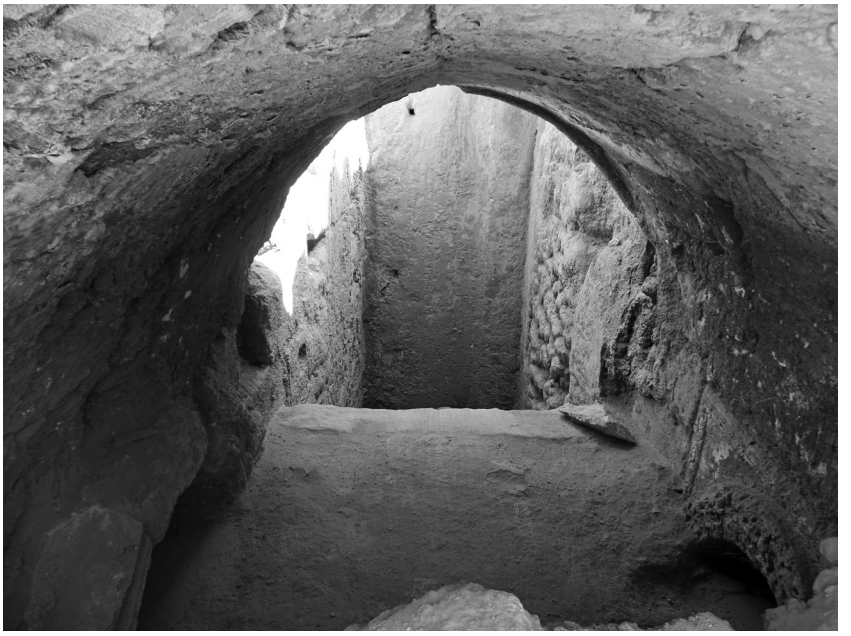

FIG. 7
View of the vaulted passage and well in Saqiya structure no. 1, 2015.

FIG. 8a-b
North and south decorated niches of the vaulted passage in Saqiya structure no. 1, 2015.

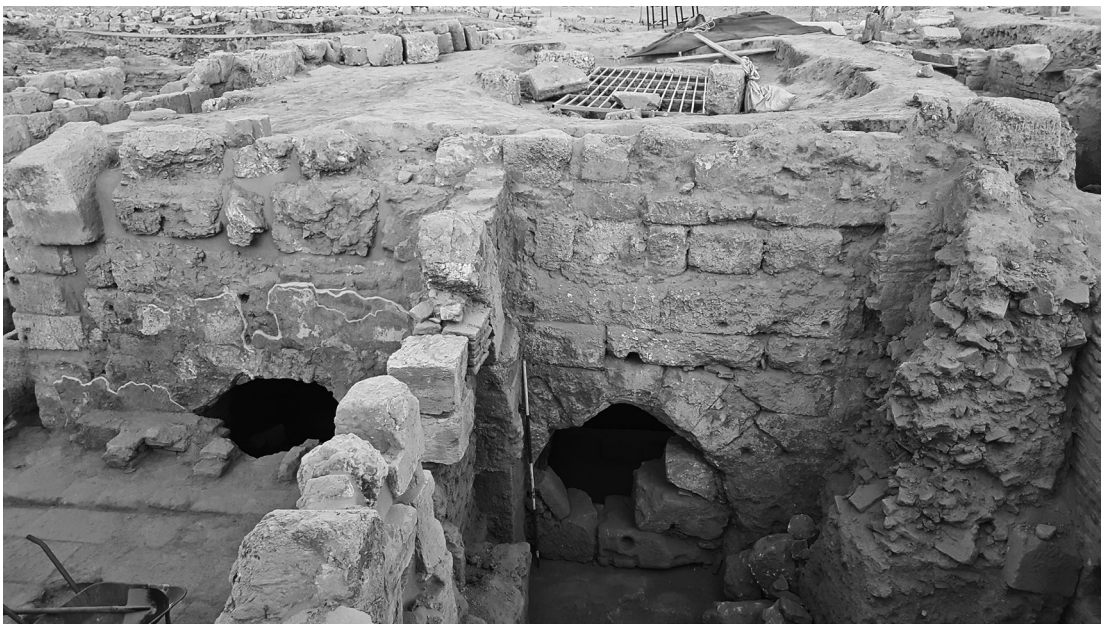

FIG. 9 Northern view of Saqiya structure no. 1, 2018.

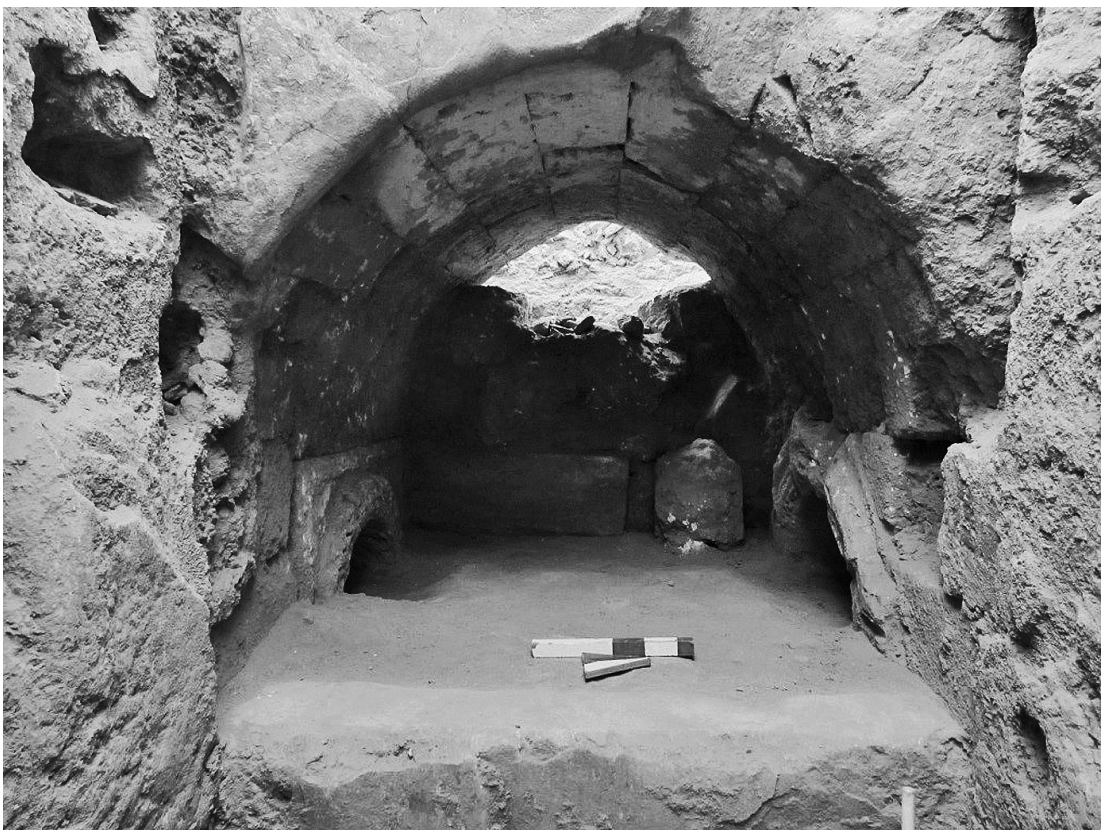

FIG. 10 Eastern view of the cradle-vaulted room in Saqiya structure no. 1, 2015.

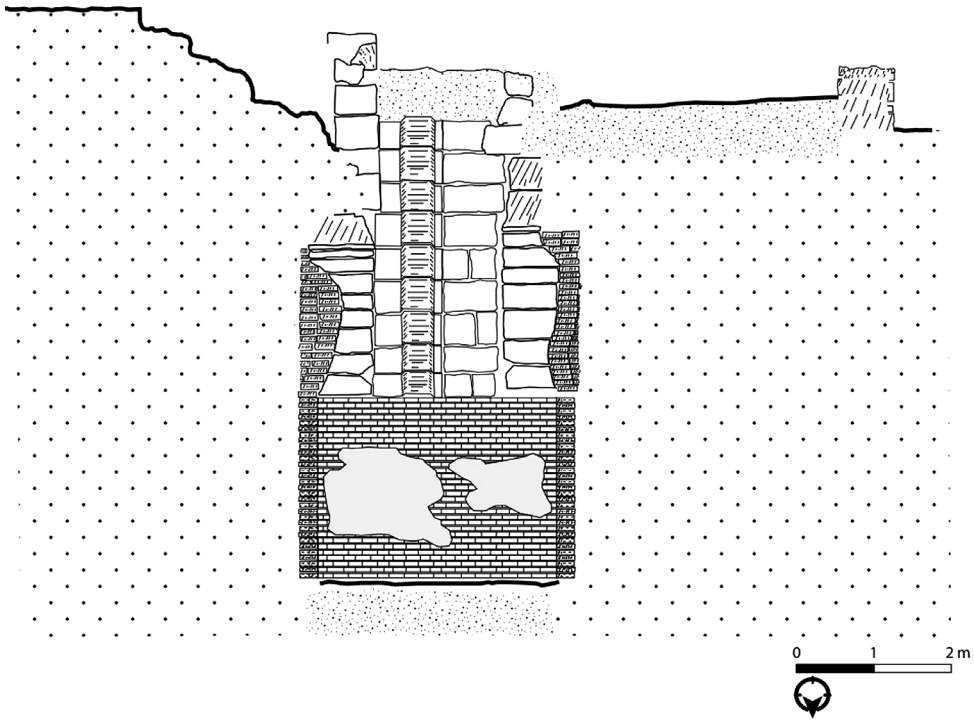

FIG. 11 AA section of Saqiya structure no. 2 and the maksem.

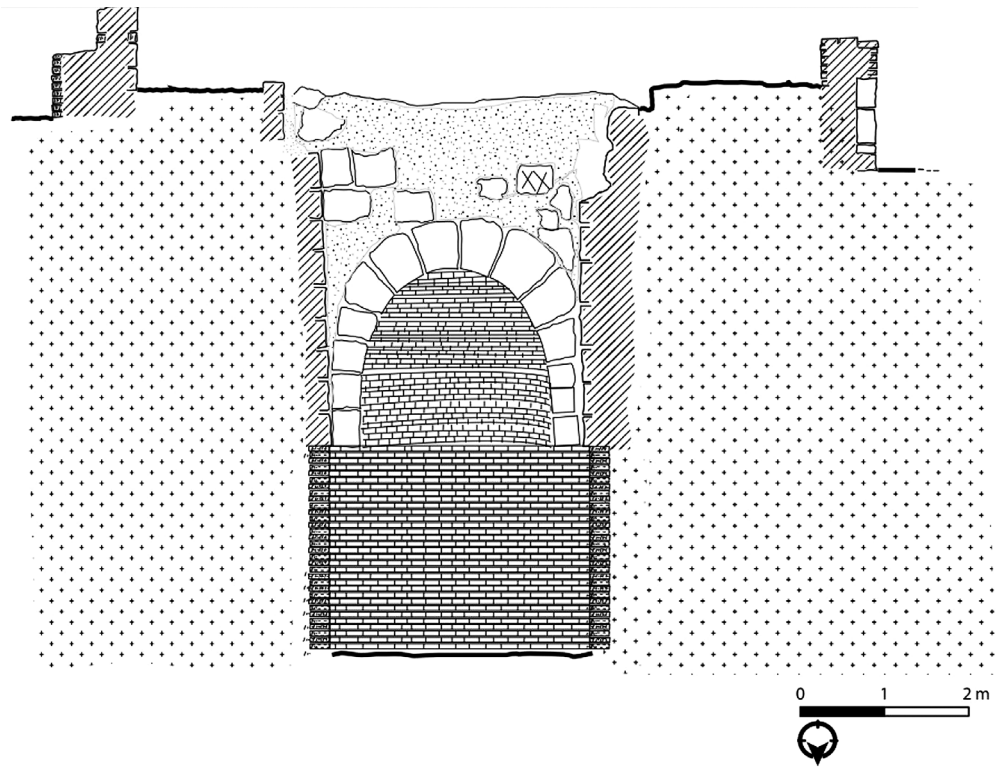

FIG. 12 BB section of Saqiya structure no. 2 and the maksem.

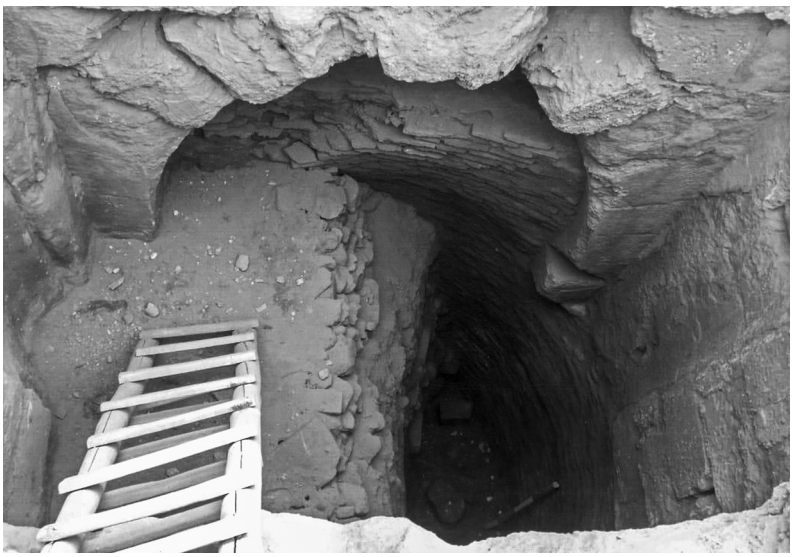

FIG. 13
Well of Saqiya structure no. 2, 2018.

FIG. 14
Arches of Saqiya structure no. 2, 2018.

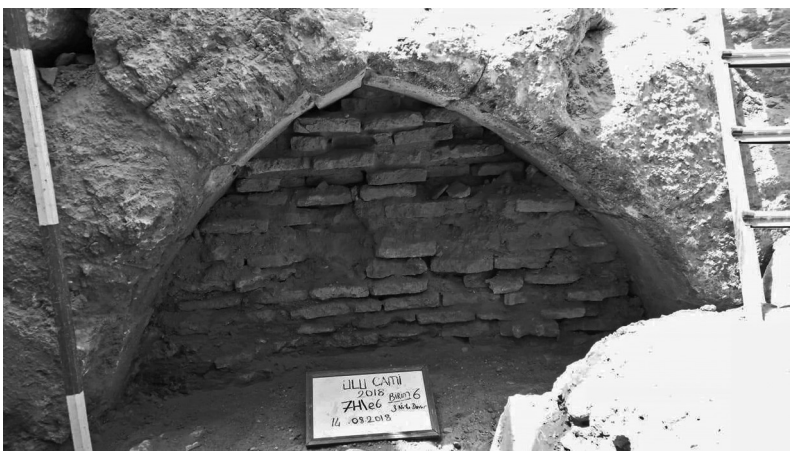

FIG. 15
Arches covered with bricks in Saqiya structure no. 2, 2018.

FIG. 16 Canals extending to the west of Saqiya structure no. 2, 2020.

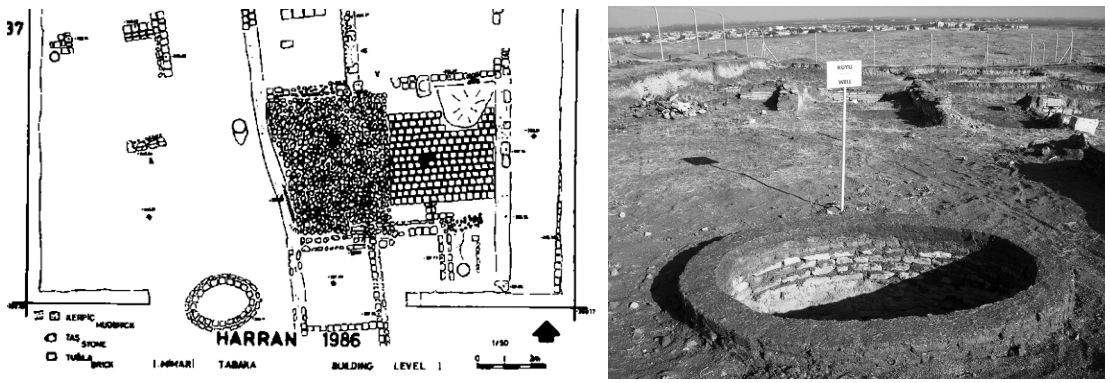

FIG. 17 Oval-shaped water well of the Harran Höyük (Yardımcı 1988, 150).

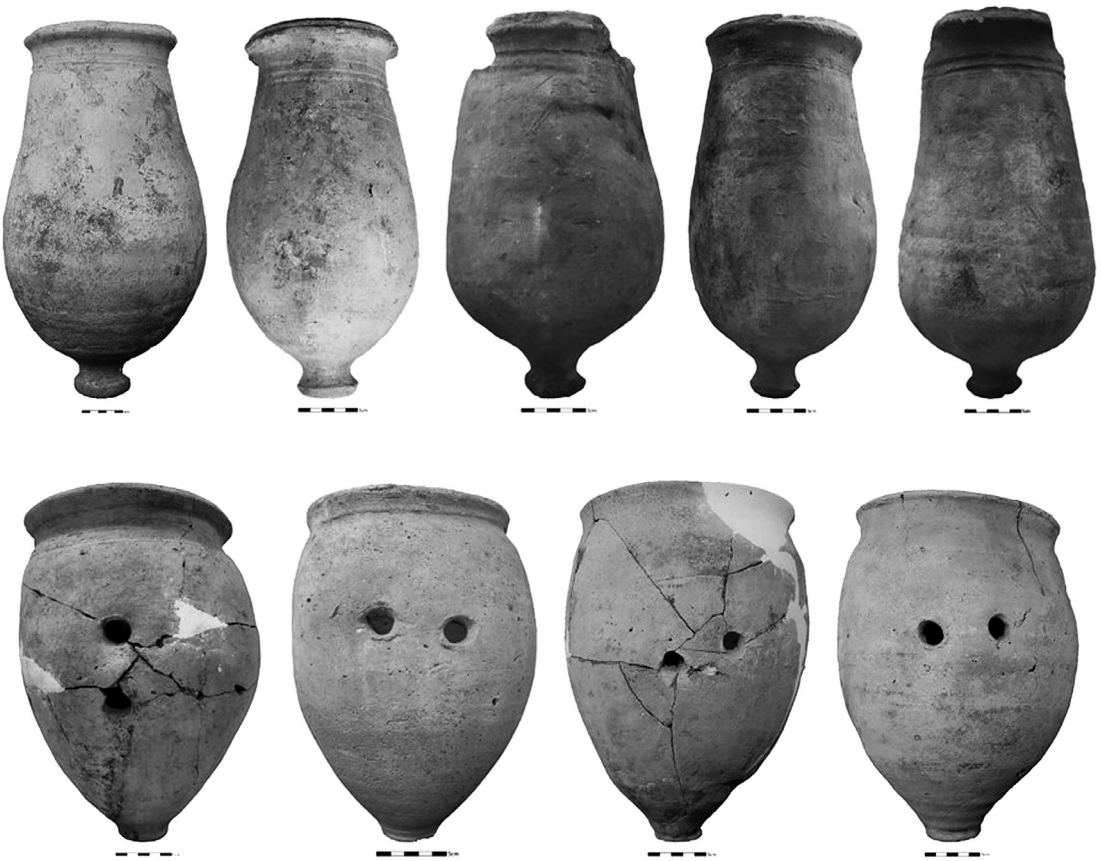

FIG. 18 Saqiya pots unearthed in the Harran Höyük and East Bazaar.

FIG. 19 Saqiya pots found at the bottom of the water basin adjacent to the east wall of the Harran Grand Mosque, 2019.