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ARCHAEOLOGICAL SURVEYS OF ANAR COUNTY, KERMAN PROVINCE

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Abstract: Archaeological surveys are the first phase in archaeological studies. Identifying the historical works in a geographical area, in addition to knowing the historical-cultural evolutions of that area is also very important from the administrative and executive point of view in the face of construction plans, and urban and rural development. Having sufficient knowledge of the historical sites of a particular geographical area increases the possibility of preserving historical monuments in the face of construction projects. Kerman, the country's largest province, is located in the southeast of Iran. This province is considered one of the main historical-cultural centers and one of the richest archaeological regions of Iran. Due to the climatic and environmental diversity and the diversity of plant, animal, and human habitats, this region has attracted human groups since prehistoric times. Anar County in the north of Kerman province and adjacent to Yazd province is one of the driest and most desert parts of Kerman province where no coherent archaeological studies have been conducted before. In 2021, archaeological surveys of this city were conducted to complete the archaeological map of the country. During these surveys, 120 cultural-historical works were identified, of which the earliest works are related to the Epipalaeolithic period, and the latest works are related to the late Islamic era (Qajar/Pahlavi). The identified works are divided into 6 different groups including 6 sites, 49 aqueducts, 15 water structures, 7 religious buildings, 39 historical monuments, and 4 historical contexts. Among these findings, 17 works have been registered in the list of national works of Iran.

Keywords: Archaeological survey, Kerman, Anar County, Settlement pattern, Relative chronology.

چکیده: بررسی‌های باستان‌شناسی نخستین گام، مطالعات باستان‌شناختی است. شناسایی آثار تاریخی موجود در یک منطقه جغرافیایی علاوه بر شناخت تحولات تاریخی ـ فرهنگی منطقه، از لحاظ اداری و اجرایی نیز در مواجه به طرح‌های عمرانی، توسعه شهری و روستایی نیز بسیار حائز اهمیت هستند. داشتن شناخت کافی از مکان‌های تاریخی منطقهٔ جغرافیایی خاص در مواجه به طرح‌های عمرانی، امکان حفظ آثار تاریخی را افزایش می‌دهد. استان کرمان به عنوان پهناورترین استان ایران جنوب شرق ایران قرار دارد. این استان یکی از مراکز اصلی تاریخی ایران و از لحاظ باستان‌شناسی، یکی از غنی‌ترین نواحی ایران محسوب می‌شود که با توجه به گوناگونی‌های اقلیمی و محیطی و تنوع زیستگاه‌های گیاهی، حیوانی و انسانی، منجر به جذب گروه‌های انسانی از ادوار پیش از تاریخ تاکنون شده است. شهرستان انار در شمال استان کرمان و مجاورت استان یزد یکی از خشک و بیابانی‌ترین بخش‌های استان کرمان است که تاکنون مطالعات باستان‌شناختی منسجمی در آن صورت نگرفته بود. در سال ۱۴۰۰ خورشیدی بررسی‌های باستان‌شناسی این شهرستان با هدف تکمیل نقشه باستان‌شناسی کشور انجام شد. طی این مطالعات ۱۲۰ اثر فرهنگی – تاریخی شناسایی شد که از لحاظ گاهنگاری، قدیمی‌ترین آثار مربوط به دوره فراپارینه‌سنگی و جدیدترین مربوط به دوران متأخر اسلامی (قاجار/ پهلوی) است. آثار شناسایی شده به صورت کلی به ۶ کلاسه مختلف شامل: محوطه (۶ اثر)، قنات (۴۹ اثر)، سازه‌های آبی (۱۵ اثر)، بناهای مذهبی (۷ اثر)، بناهای تاریخی (۳۹ اثر) و بافت‌های تاریخی (۴ مورد)، تقسیم شده‌اند که از این میان ۱۷ اثر در فهرست آثار ملی ایران ثبت شده‌اند.

کلیدواژه: بررسی باستان‌شناسی، کرمان، انار، الگوی استقرار، گاهنگاری نسبی.

I. Introduction

Kerman Province, located in the southeast of Iran, with a population of 3,164,718 (according to the report of the Iranian Statistics Center in 2016) is the ninth most populated province in the country. Kerman with an area of 183,193 km2 (almost the size of Syria) covering more than 11% of Iran's area, is the largest province of Iran. Further, Kerman is one of the most important and historical provinces of the country. Kerman City is the most important city in the southeast of Iran. In addition, Kerman Province has more than 660 registered national works, of which 7 works have been registered in the UNESCO World Heritage (Fig. 1).

Anar County is located in the northwest of Kerman province. Anar District became a county in June 2009. Anar County (the central district of the county), Amin Shahr and Hossein Abad, Deh Raees, and Torab Abad districts are other parts of this county. Anar County borders Yazd Province from the north and northwest, Rafsanjan County from the east and southeast, and Shahr Babak County from the west and southwest. The occupation of the majority of the people of Anar County is agriculture, but due to the lack of water and

the poor quality of water, the only product that still resists and is cultivated is pistachio.

The Geography of Kerman Province during the Naseri period is the first book about the geography of Kerman, including the provinces of Kerman, Hormozgan, and Sistan and Baluchistan during the Qajar period. This book was written in 1824 by the order of "Naser al-Din Shah" under the supervision of "Etimad al-Saltaneh", and by "Khwaja Mohammad Amin Monshi Kermani". According to this book: "The Anar block is a block that is located 30 Farsangs from Yazd, 18 Farsangs from Bafq, and 18 Farsangs from Marvast, which is the border of Fars, and 18 Farsangs to Shahr Babak, and 9 Farsangs to the Dehaj village, one of the villages of Shahr Babak at the beginning of Shahr Babak (Monshi Kermani & Bastani Parizi, 2012: 241).

The book "Geography of Kerman" was written by Ahmad Ali Khan Vaziri during the Qajar period around 1871. According to this book: "Anar is located 36 Farsangs from the northwest of Gwashir (the old name of Kerman), in the west of Bafq and Zarand, in the north of Rafsanjan, in the east of Shahr Babak, and in the south of Yazd. Anar, from Bayaz to Zain al-Din, is 14 Farsangs from Yazd" (Vaziri, 1998: 295).

According to the Kerman villages, appendix to the book "Kerman Geography": There are many agricultural areas in Anar, between the west and the north of the city, Behesht-e Temthal - from the north, it is connected to Yazd, from the west to the block of Shahr Babak and Fars, from the south and the east to Rafsanjan and Zarand (Vaziri, 1998: 369). It is 40 Farsangs from Anar to Kerman City and 30 Farsangs to Yazd City. The size of Anar County is currently 2140 km2 and it is located at an altitude of 1409 meters above sea level. The climate of Anar is hot and dry and its average annual rainfall is 89 mm.

In the pre-Islamic era, the name of Anar City was Aban, meaning flowing waters, from the attributes of Anahita, a goddess of ancient Iran in the era before the advent of Zoroaster, which indicates the very ancient history of this region. Further, Bastani Parizi wrote in the book "Khatun Haft Qala" (1965: 308), that Anar is attributed to Nahid (Anahita). "I consider a village like Anar, located in the Lut Desert of Kerman, to be attributed to Venus [Nahid] because we know that the Pomegranate (Anar) tree and also fish were two symbols of Venus.

In the north of Anar, there is a desert region with several mountains called "Shamash" which means Babylonian Sun God. The castle of Shamash (the sun) was probably related to the Elamite god and was a temple belonging to Mithra worshipers (Vaziri, 1998).

There is a region called Kermanshah, 110 km north of Anar City, which was part of Anar until 1950, that is, before the approval of the country partition law during the Pahlavi period. According to Mostofi Bafqi (2006: 700), Kermanshah is one of the regions attributed to "Shapur bin Narsi bin Bahram bin Bahramian bin Hormoz bin Shapur bin Ardeshir Babakan". All these evidences indicate that Anar (the ancient city of Aban) was one of the cities of ancient Iran.

II. Anar Historical Geography

Historical books of the early Islamic centuries, such as "Al-Masalek al-Mamalek" (Istakhri), "Masalek and Mamalek" (Ibn Khordadbeh), and "Ahsan al-Taqasim" (al-Maqdisi) are the oldest sources until the end of the 4th century AH in which the name of Aban City is mentioned. The name of Anar City was also mentioned for the first time in the book "Hodud al-Alam men al-Mashriq ela al-Maqrib" (Unknown, 372 AH) belonging to the last decades of the 4th century AH and also in the book "Surah al-Arz" (Ibn Hawqal).

According to the geographical distances of Iranian cities recorded by historians of the early Islamic centuries, such as Istakhri in the book "Masalek al-Mamalek", the historical city of "Aban" is the same as today's Anar. Therefore, the name of this city was still Aban until the early decades of the 4th century AH. Istakhri stated that the distance between Aban City and Fahraj, Yazd is 25 Farsangs (111 km) and the distance between Aban and Rudan (around present-day Rafsanjan) is 18 Farsangs (80 km) (Istakhri, 1961: 117). During the reign of Iranian kings, Aban City was one of the subordinate cities of the Istakhr state of Fars. Istakhr was the largest and most important state of Fars and the Persian kings lived there.

According to historians of the early Islamic centuries, "the cities of Aban, Anas, Azgan, Khabar and Kabs" were among the most important cities of Rudan. Rudan, which is also recorded in historical sources as "Ruzan" was a part of the Istakhr state of Fars. Of course, this Rudan is different from today's Rudan in Hormozgan province.

According to al-Maqdisi (1982: 651-652): Rudan City has a beautiful mosque that can be climbed by stairs. This city is paved with pebbles. All its mosques are on high ground. There are many Skafians and Mu'tazilies. The hot springs are dirty and the center is full of gas. It is surrounded by beautiful gardens and a dignified cemetery with amazing domes. They have many milk products and many aqueducts, some of which enter the city. There is a spring to heal from its water. There are lookouts on the ramparts of the city. There are no suburbs outside the city. Its population has decreased and sand has covered the city around. In addition, al-Maqdisi has introduced Aban City as one of the Ruzan cities in Kerman.

Ibn Khordadbeh (1992: 65) also wrote in his book "Masalek and Mamalek" (third century AH) that Aban is a city in Kerman, Ruzan District. The name of Anar City is mentioned for the first time in the books "Hodud

al-Alam men al-Mashriq ela al-Maqrib" and "Soura al-Arz". In Hodud al-Alam, Anar is described as a city on the way of the Rudan to Fars with many blessings (Unknown, 372 AH: 291). It can be concluded that the name of Aban changed to Anar in the second half of the fourth century AH. In addition, in the book "Surah al-Arz", the name of Anar City is mentioned as a city that has a Jame Mosque (Ibn Hawqal, 1987: 36). Ibn Hawqal traveled to Iraq, Khuzestan, and Fars between 350 and 358 AH (AD 961 to 969) and his description of the historical geography of Anar City is related to these years.

Rudan City was located in the villages of Shahr Abad and Malek Abad and the surrounding lands up to the village of Lahijan located in the northwest of Rafsanjan. The exact location of Anas City was located in the lands of Gorgin Abad, Saadat Abad, and Faiz Abad after Sarcheshmeh three-way connected to the current city of Rafsanjan, and Aban City was in the location of the current Anar City (Bahrami Ahmadi, 1992: 40).

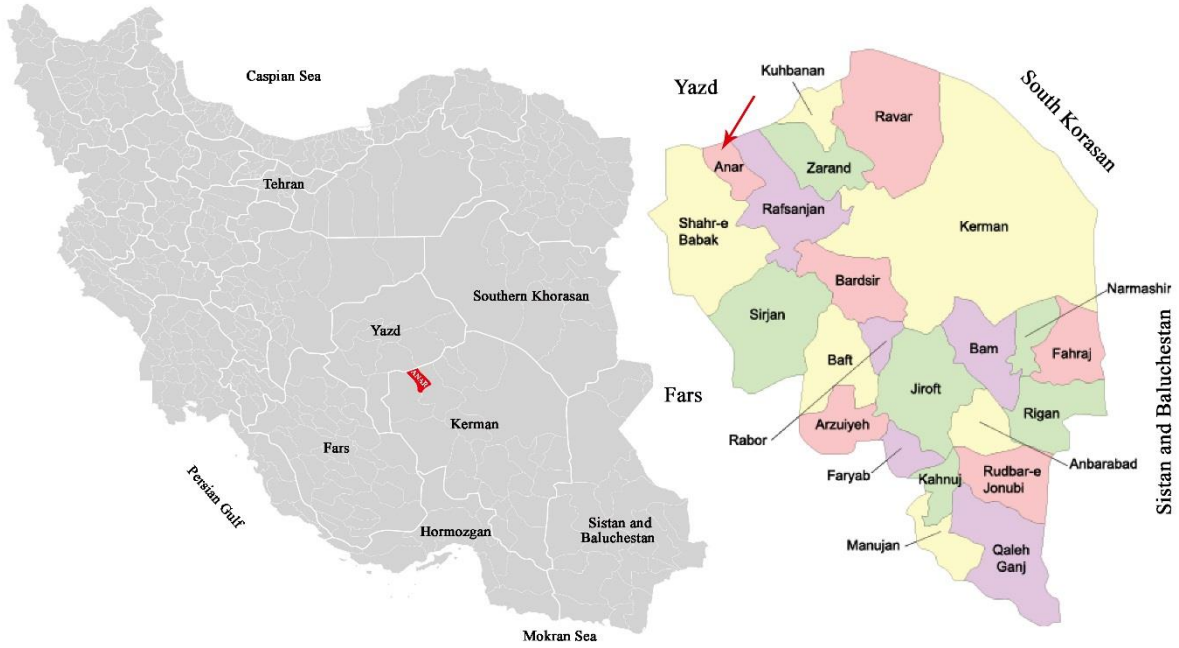

Figure 1: Map of Iran and the political divisions of Kerman Province.

III. Mountains and Rivers

Anar includes a large plain and two mountains. One is Station Mountain with a height of 1636 m located 12 km northeast of Anar, and the other is Gowd Chah Mountain with a height of 2484 m located 24 km southwest of Anar. Both mountains are from the central mountain range of Iran. Shour River, Anar River (Ishaq Abad River), Bayaz Seasonal River, Salt Lake, Farhang Abad Wetland, and Kaluts are among the rivers and natural attractions of Anar. Ishaq Abad River originates from Jozem Mountain in Shahr Babak and reaches Ishaq Abad Anar after traveling more than 50 km. Bayaz River also originates from the Mesinan mountains in Shahr Babak.

IV. Research Background

The southeastern region of Iran is very vast and covers about 20% of the total area of Iran. This region is limited to South Khorasan and Yazd provinces from the north, Fars province from the west, Hormozgan province and the Oman Sea from the south, and Pakistan and Afghanistan from the east. The first reports about the cultures of Southeast Iran were presented by an English tourist, Percy Sykes, in the 1910s. This information is the result of his observations around Kerman City and on the southwestern edge of the Lut Plain (Sykes, 1957). In Stein's archaeological investigations in the early 1930s, many ancient sites were identified, surface sampled, and recorded. These sites include Tepe Yahya, Tepe Iblis, Noor Abad, and Daqianus City in Kerman, Shahr-i Sokhta in Sistan and Bampur, Damin, Khorab, and Chah Hosseini in western Baluchistan. He excavated important sites such as Noor Abad, Damin, Khorab, and Chah Hosseini (Stein, 1937). In the 1960s, five archaeological expeditions conducted archaeological exploration in eastern Iran. The results illustrated that during the early third millennium BC, rural communities in eastern Iran were progressing toward the stage of urbanization with an equal growth rate with Mesopotamia (Madjidzadeh 1989: 140). These excavations were conducted at Bampur in Baluchistan (Decardi, 1967), Tel Iblis in Bardsir Valley (Caldwell, 1967), Tepe Yahya in Soghan Valley between 1967 and 1975 (Lamberg-Karlovsky, 1970), Shahr-i Sokhta between 1967 and 1978 (Tosi,

1968). and Shahdad between 1969 and 1977 (Hakemi, 2006). In the 1940s, a team of Iranian archaeologists headed by Ali Akbar Sarafraz conducted surveys in Kerman province. Their activities were mostly concentrated in the northwest and west of Kerman province (Sirjan and Bardsir cities). In the 1950s, a team of British archaeologists headed by Bivar and Fahruri identified evidence from the prehistoric period in the northern part of the Islamic city of Ghabira, Kerman. These works were comparable to those discovered in Tel Iblis and Tepe Ali Abad (Mousavi 1990: 188).

Huckride, a German geologist, succeeded in discovering two ancient sites belonging to the Mesolithic period and the early Neolithic on the eastern bank of the Kuhbanan River (Huckride, 1961). Geological research has also been done on the side of the Fahraj River (DeHeizelin, 1974). Investigations by Martha Prickett (1976) from Harvard University in the Yahya research project in the Kushk River basin led to the identification of the Gaz Tavileh site belonging before the Yahya VII period. Based on this, the early settlements in Kerman date back to the mid-sixth millennium BC (Voigt and Dyson, 2003: 96). From 1975 to 1985, Sajjadi investigated five areas: Jiroft Plain, Rudbar Plain, Kahnuj Region, Blok Region, and Anar region (Eskandari, 2012).

After the Revolution of 1979, the survey and identification of the Bardsir area by Sajjadi (1987), the surveys and excavations of the Konaro, Esfandah, and Qarqutiye areas in Jiroft by Rahbar (1991), and the surveys of Sajjadi in Kerman are among the first archaeological investigations in this area. In addition, Kaboli explored the Shahdad site in 1990 to determine the buffer zone of the western part of the site. After that, he also conducted six seasons of excavations at the site between 1994 and 2002 (Kaboli, 1997). In 1998 and 1999, following the discovery of artifacts from the southeastern region of Jazmurian in the village of Rameshk Kahnuj, Chubak surveyed and explored this area and introduced the Jazmurian cultural area (Chubak, 2004). Another research in this cultural area was started after the unauthorized excavations in Jiroft in 1380. During this year, rescue excavations were carried out in Rig Anbar and Konar Sandel Jiroft by Chubak. Extensive and systematic excavations of Jiroft have been conducted for six seasons since 2001 by a team of Iranian and foreign archaeologists and experts under the supervision of Madjidzadeh at South Konar Sandal, North Konar Sandal, and Mahtut Abad Cemetery (Madjidzadeh and Pittman, 2008). Other archaeological investigations in this area were carried out by Abyan on the banks of Halilrud, Tofighian at the source of Halilrud, and Soleimani in the Raber region. Further, in the eastern part of this area in Bampur, surveys and excavations have been conducted in recent years by Rahbar and Sajjadi (Chubak, 2004: 13). Garazhian's surveys in Daristan Bam and excavations at the Qale Atashi site led to the identification of evidence from the Neolithic period (Garazhian, 2009). Khosrowzadeh conducted archaeological surveys in Bardsir during two seasons (Khosrowzadeh, 2004, Khosrowzadeh and Aali, 2005). Besides, Alidadi Soleimani's investigations in Esfandagheh are among other research carried out in recent years (Alidadi Soleimani, 2009).

Despite the long history of archaeological research in Kerman province, the northern areas of this province have received less attention from archaeologists due to their desert nature and lack of identification of large sites. Except for Huckride, a German geologist who introduced a small number of ancient sites in Kuhbanan in his geological surveys, there is almost no archaeological information from the northern counties of this province. In 2021, with the necessary credit allocation by the Research Institute of Cultural Heritage and Tourism, two counties of Kuhbanan (Sardari and Khanipour, 2021) and Anar (Azizi Kharanaghi and Jamshidi, 2021) were archaeologically investigated. This article presents the information obtained from the archaeological survey of Anar County.

V. Archaeological Surveys of Anar County

Archaeological research was carried out in Anar County, Kerman Province in June 2020 with the permission of the Cultural Heritage and Tourism Research Institute. During these investigations, all districts and villages of this county were visited and many areas were surveyed. Before conducting the archaeological survey in each part, maps and Google Earth images of the area were reviewed and all the specified places were visited. In addition, the help of guides and local officials from different regions was used in all stages.

120 cultural/historical artifacts were identified during the investigations that took place in Anar County for almost a month. Chronologically, the oldest works were related to the Epipalaeolithic period, and the newest belonged to the late Islamic era (Qajar/Pahlavi). The identified works are generally classified into 6 different groups (Fig. 2), including (1) 6 sites, (2) 49 aqueducts, (3) 15 water structures, (7) 4 religious buildings, (5) 39 historical monuments, and (4) 6 historical contexts (Fig. 3). In the following, these groups are introduced and some important works are explained.

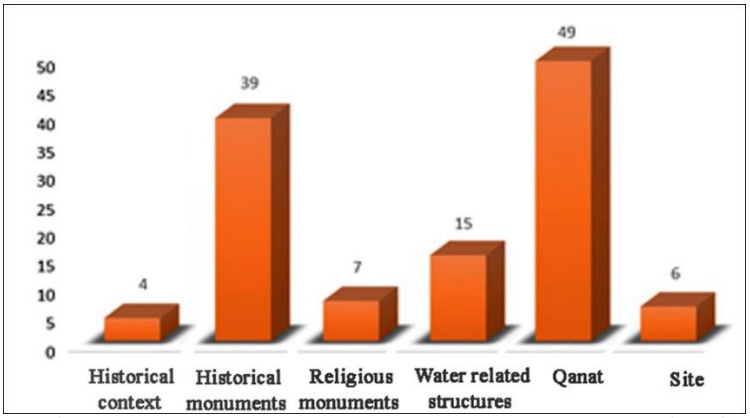

Figure 2: Classification of the works identified in the archaeological survey of Anar County.

VI. Historical Monuments

In the archaeological survey of Anar County, 39 historical monuments were identified, which can be dated from the historical era (Parthian/Sasanian) to the Pahlavi period (Fig. 4). These works are classified into 8 groups and each work is introduced separately. Most of these works have been destroyed or are being destroyed and unfortunately, there is no protection and restoration plan to prevent their destruction. In addition to natural erosion and destruction, some of these works, such as the historical Citadel of Anar, have also been intentionally destroyed. The deliberate destruction of historical monuments of Anar County by the owners and lack of attention by the authorities, especially in the outskirts of cities and villages due to the expansion of pistachio orchards, is very worrying.

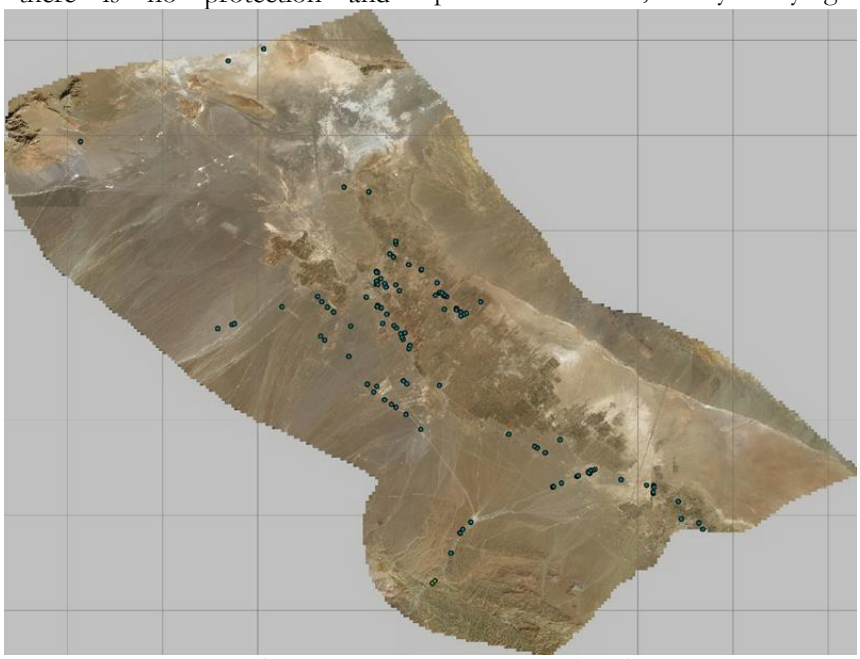

Figure 3: Distribution of identified works in Anar County.

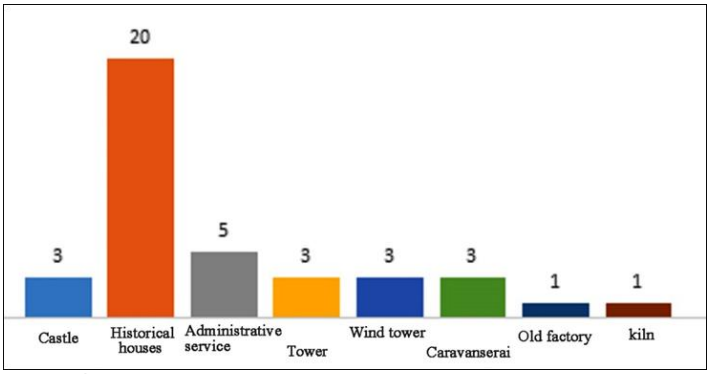

Figure 4: Classification of historical monuments and their number in each group.

Anar historical citadel is located in the center of the current city of Anar, with an area of about 1.5 hectares, and it was registered in the list of national monuments of Iran in 2010. Currently, the 8 towers of this building and the ramparts of the city are almost standing (Fig. 5). The tower and ramparts of this complex have been restored, but the central part and its buildings have been destroyed. The satellite images of 1963 show this citadel almost intact, but according to local people, it was destroyed in 1982 by the order of one of the officials. The thickness of the walls of the citadel fence is about 2 m and the diameter of the towers is about 4 m. The remaining evidence shows the existence of architecture up to 3 floors in different parts of the citadel. The materials used in this building are mud-brick, mud, mud-straw, and one of its towers has brick decorations. The citadel is built on a natural hill, which allows it to overlook the surrounding plains. The destructions caused the loss of the details and plans of the internal architectures, and for this reason, until extensive excavations and debris removal of this section, information on their characteristics cannot be obtained. However, based on the old satellite images taken before the demolitions, it seems that the inner space of the citadel is divided into several different parts, including the royal palace surrounded by towers as well as residential spaces. In the satellite images of 1963, there is evidence of the existence of another space on the northern side of the citadel, which was known as the old citadel. Today, the evidence of this building is buried under the park and green space (Fig. 6). Among local people, this citadel is known as a Sassanid citadel, but no cultural materials from this period were found during a superficial survey. Based on the available evidence such as pottery, the age of this building can be considered to be related to the middle and late Islamic centuries (Fig. 7).

The building of the Toroq (roads) Department belongs to the Pahlavi period (built in 1938) with an area of about 300 m^2. This department is a subset of the Roads and Streets administration, which was established to monitor and rebuild the roads built during the Pahlavi era (Reza Khani Roads). Among the actions of this department were the construction and improvement of a part of Rafsanjan, Bafq, and Yazd roads (Fig. 8). The building of this department is known as the only building of the Department of Roads registered in the list of national monuments of Iran. The entrance to the surrounding area of the building is from the northwest side. The main entrance of the building is from the southeast side and there is another entrance on the northeast side as well. The main corridor of the building is located along the entrance to the northwest, which intersects in the middle of the building with a corridor that runs from the northeast to the southwest. At this intersection, there is an octagonal geometric skylight on a dome-shaped space. There is a staircase leading to the roof at the end of this corridor.

The plan of the building is square and includes seven covered rooms (Fig. 9). On the sides of the main corridor, there are two rooms on the right side and two rooms on the left side, which are symmetry. The rooms on both sides of the entrance to the courtyard also had a way. The rooms at the end of the main corridor also lead to the northwest corridor. There are three rooms on the northwest side. These rooms connect to each other as well as to the northwest corridor. All the rooms have a vaulted ceiling.

The historical context of Bayaz is a large mud-brick and clay architectural complex with an area of 18 hectares located 25 km southeast of Anar and 1 km northeast of modern Bayaz. Access to this complex is possible through the Bayaz-Shahamabad asphalt road, which passed through it and destroyed parts of it. This complex includes a large number of buildings, including residential houses, mosques, warehouses, castles, hosseiniyeh, reservoirs, manor houses, cemeteries, and alleys and passages that have formed the historical context of this village. For the construction of this complex, clay, and brick were used, and in some parts, including the walls enclosing the gardens and outdoor spaces, mud layers were used (Fig. 10). Buildings have different dimensions according to their use and importance. However, their construction pattern is mostly based on northeast-southwest or northwest-southeast directions and building houses with verandas around the yard. The construction technique of most of the buildings is based on the use of the toizeh arch and the barrel vault in the form of a trestle and a crescent. In every street or alley, traces of simple small mosques can be seen, which were mostly used as family and clan prayer rooms. There is a part of the gardens of this context enclosed in its southern part. The manor house, which is built in the form of 4 regular porches, is also located in the southern part of the context. A mud-brick castle, partially destroyed by the road, still exists in the center of the context. The drinking water of this historical context was supplied from the old Bayaz aqueduct and the twin reservoir, which is located on the northern edge of the context. The cemetery and Jame Mosque are also located on the northeast edge of the context. It seems that the settlement in this part took place after the destruction of the old structure of Bayaz City, which today is a flat area in the northern part of the context. This historical context was still inhabited until 20 years ago, but today it is abandoned and under destruction (Fig. 11). According to the cultural materials found, it seems that this historical context belongs to the Middle Islamic centuries (Fig. 12).

Figure 5: Aerial images of the Anar historical citadel.

Figure 6: 1963 satellite images of the city and the historical citadel of Anar before the complete destruction of the Citadel's interior. On the left side, the remains of the old citadel are visible.

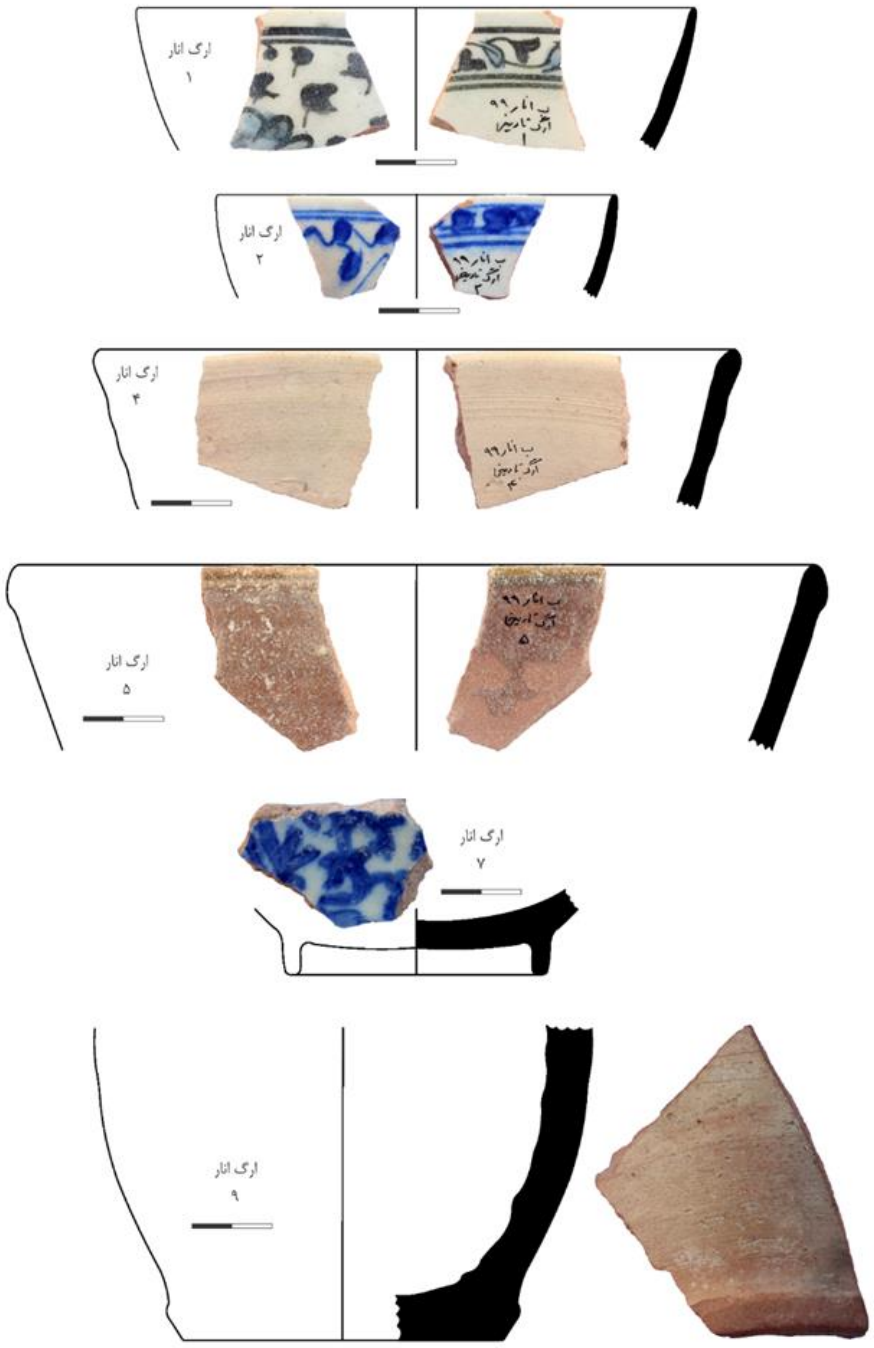

Figure 7: The design of Pottery found in the Anar historical citadel.

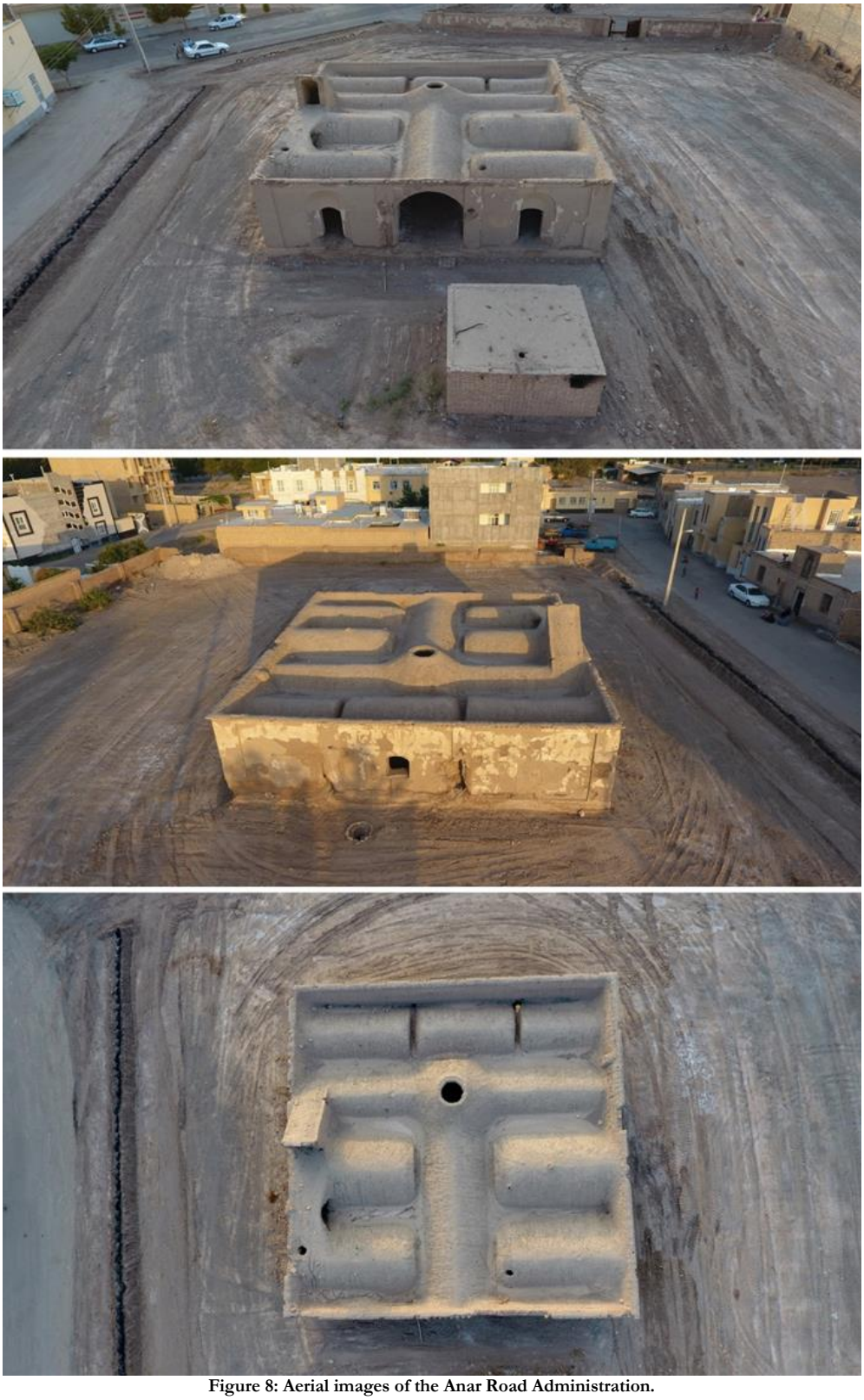

Figure 8: Aerial images of the Anar Road Administration.

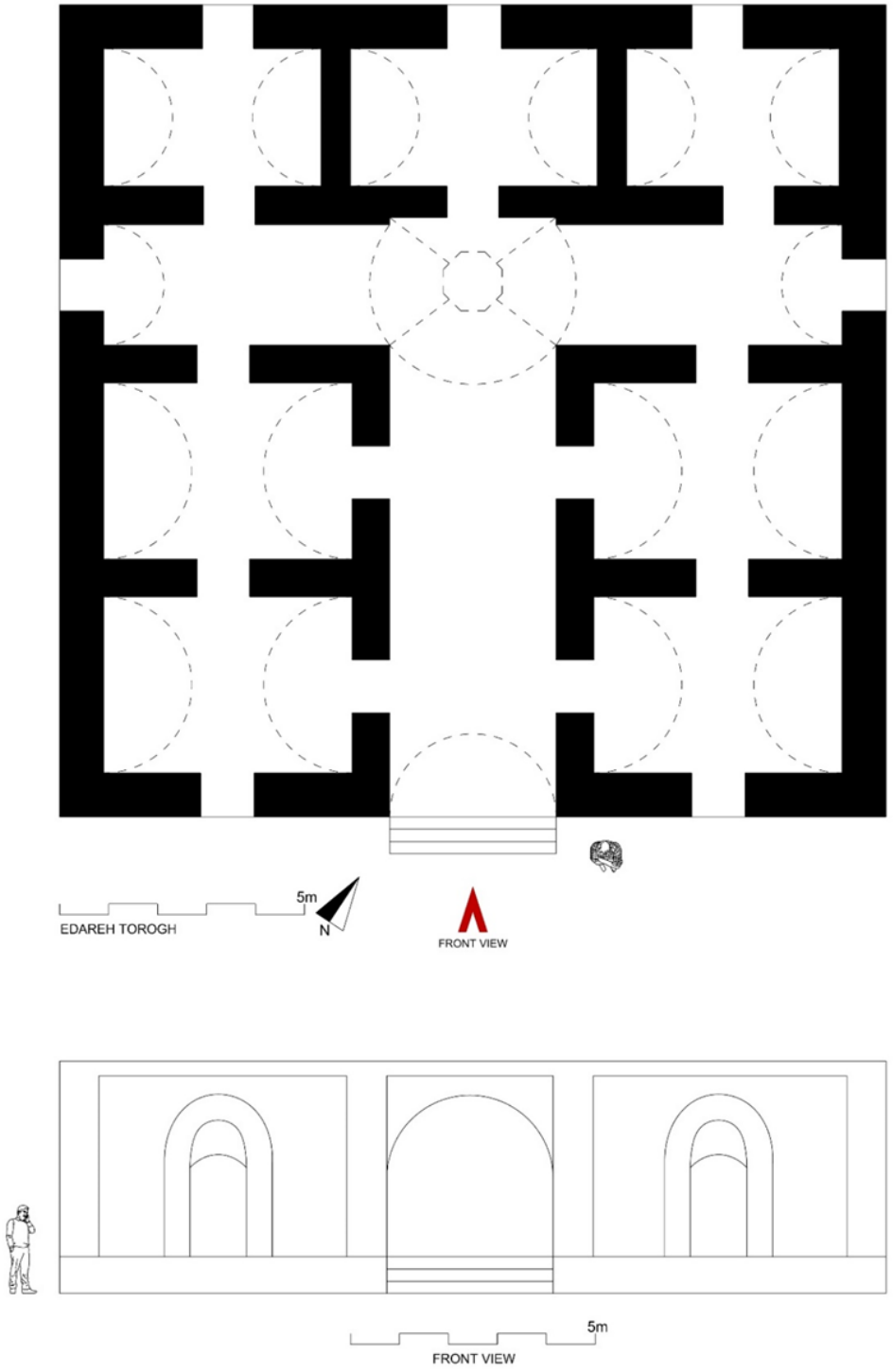

Figure 9: Plan of the Anar Road Administration.

Figure 10: Aerial image of the historical context of Bayaz.

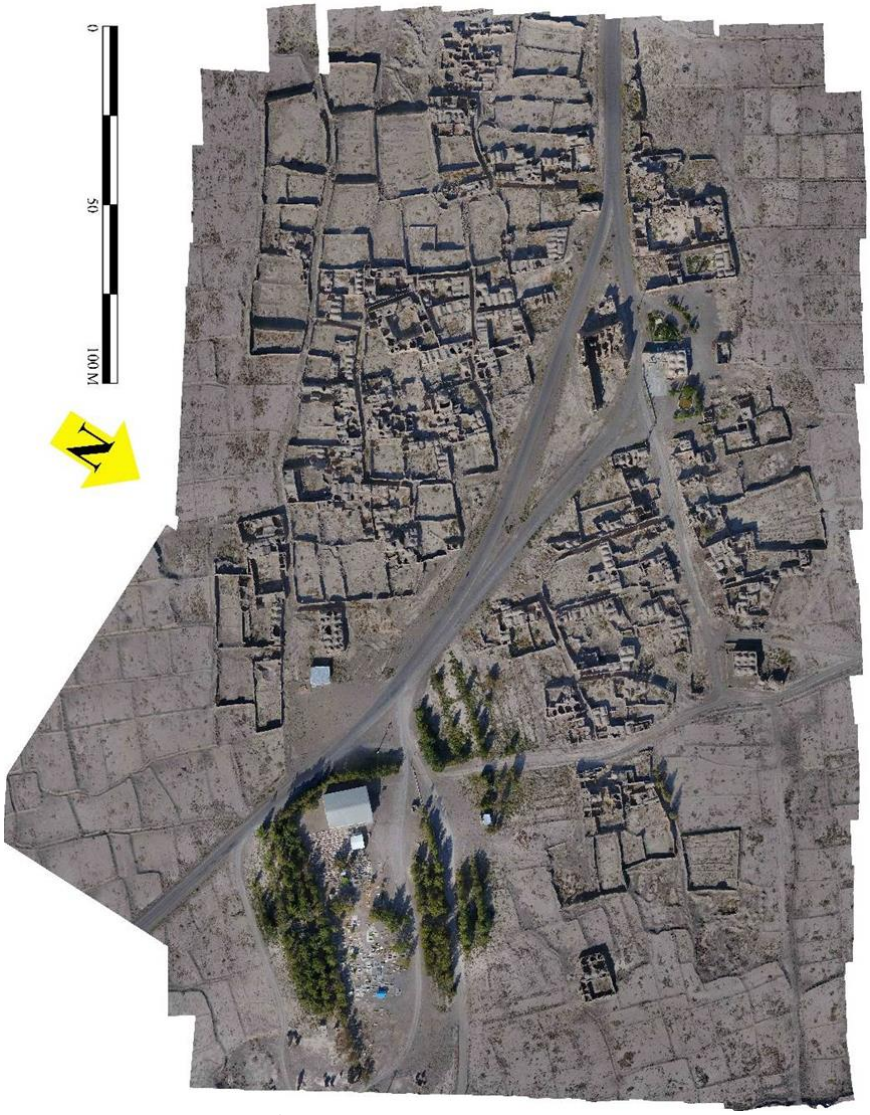

Figure 11: Aerial image of the historical context of Bayaz.

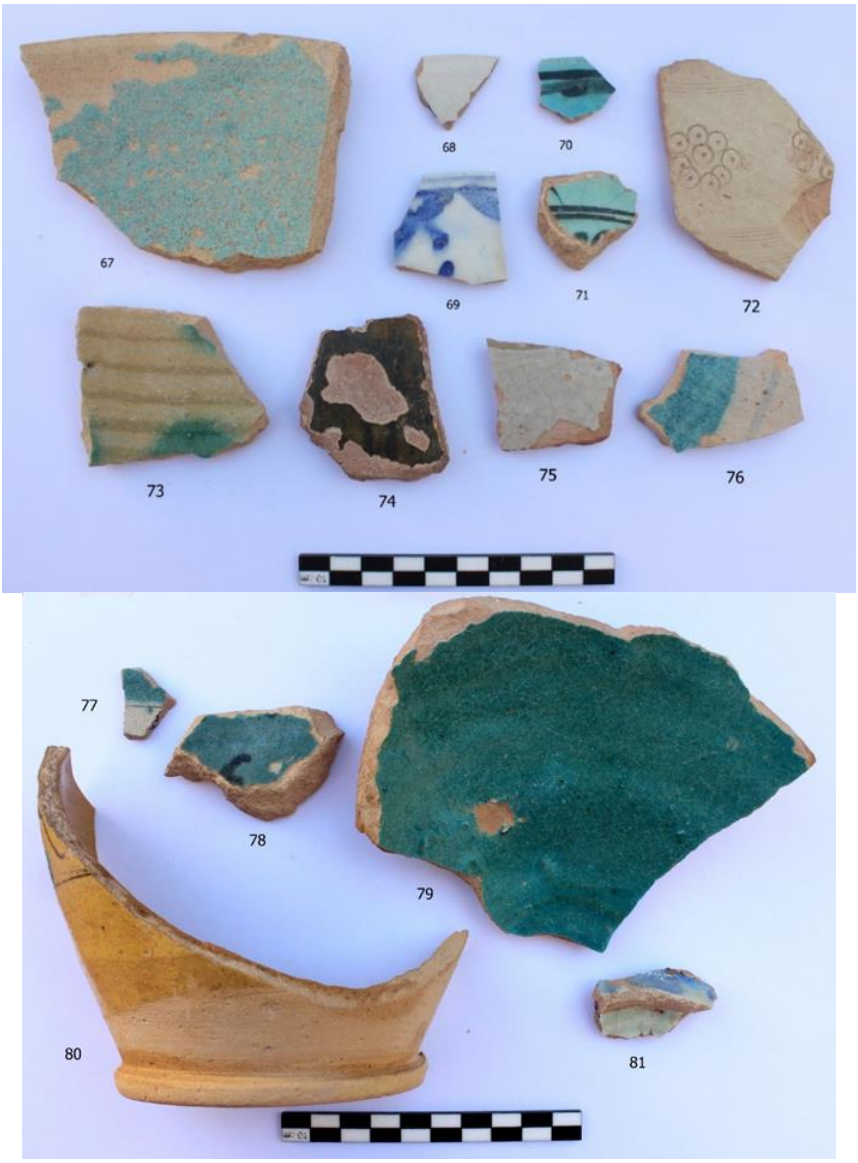

Figure 12: Pottery obtained from the historical context of Bayaz.

VII. Historical Sites

During the archaeological survey in Anar County, six historical sites were identified. Chronologically, the oldest sites belong to the historical era (Parthian/Sasanian) and the newest ones belong to the late Islamic era (Qajar/Pahlavi). The largest area identified in this survey is the old city of Bayaz, which has an area of about 57 hectares. According to local people, the old city of Bayaz was destroyed due to a great flood, and then people decided to change their residence and build a new city next to the old city. Like other monuments of Anar County, archaeological sites and cemeteries have been severely destroyed and subjected to unauthorized excavations, so that the possibility of conducting archaeological research in some of them has been lost.

The old city of Bayaz with an area of about 57 hectares, is a flat area in the north of the old city of Bayaz and on the edge of the old mosque (Fig. 13). This area is located at a distance of 24 km from Anar City and 1 km northeast of the Bayaz village, and it can be accessed through the Bayaz-Shahamabad asphalt road and the dirt road next to the old Bayaz cemetery. This is the only part of this site that today is in the shape of a pentagon outside the pistachio orchards and northern fields of this area. A part of it may be buried under the gardens. According to local traditions, this site was the old city of Bayaz, which was destroyed during a flood and then was leveled and plowed by farmers in the past decades. On the surface of the site, there are no traces of the architectural remains, but there is a very high concentration of cultural materials, including pottery. Based on the evidence and cultural materials found on the surface, the age of this site can be estimated in the Middle Islamic centuries.

Figure 13: Aerial image of the site of the old city of Bayaz.

Figure 14: Pottery obtained from the site of the old city of Bayaz.

VIII. Water Structures

During the survey of Anar, 15 works have been identified and classified in the group of water structures. These works are divided into 4 categories: (1) icehouse/ice storage, (2) historical water path, (3) reservoir, and (4) water mill (Fig. 15). Reservoirs have generally restored or changed use. The historical water path has been abandoned and many parts of it have been destroyed, and a path has been created next to it, which still carries water to Bayaz. Icehouse, which is the only work of this group in Anar City, has been restored, but the originality of the work has not been preserved, so a new form has been created. The water mills are all abandoned and under destruction.

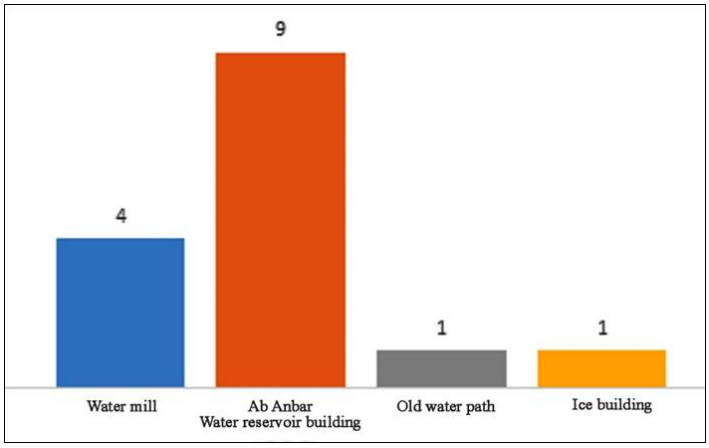

Figure 15: The variety of water structures identified in the archaeological survey of Anar City, Kerman.

The icehouse belongs to the Qajar period; it is built with a circular plan and in the form of a stepped cone with a corbelled dome with a diameter of approximately 15 m and a height of approximately 13 m. The entrance of the building is from the northwest side and the shading wall extends in the northeast-southwest direction of the building. The shade wall is a long and tall wall with a height of 7 m, which prevented the sun from shining on the ice during the day. In the northeast direction of the building, there is a row of stairs to access the upper space of the icehouse, which is placed as a segment of a circle between the building and the shade wall (Figs. 16 and 17).

The ice pond inside the icehouse is filled and no traces of it can be seen. The depth of the ice pond depends on the amount of humidity and cold. The materials used in the building are mud-brick and mud-straw mortar but in today's restoration, brick has been also used. Mud-brick and mud straw mortar are the best insulators to prevent the penetration of heat from the outside to the inside and cold from the inside to the outside. The water source of this building was the Hormozabad aqueduct, which has now dried up and there is no trace of it.

Figure 16: Icehouse of Anar.

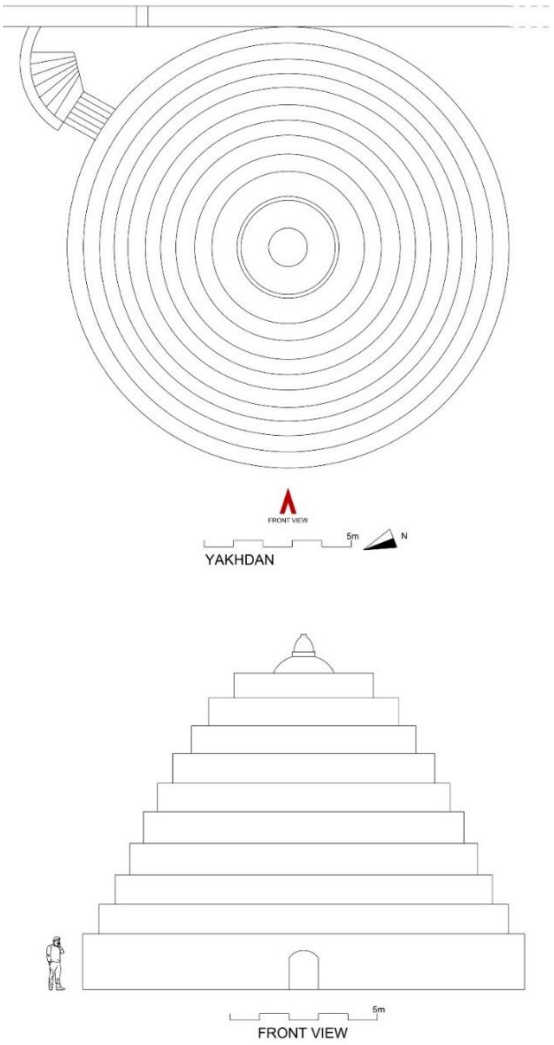

Figure 17: Plan and view of the Anar icehouse.

The Reservoir of Amin Shahr City is located 5 km northeast of Anar City. The building was built next to the main street of the city, attached to the Amin Shahr Mosque, and today there are residential buildings around it (Fig. 18). The Amin Shahr Reservoir dates back to the Pahlavi period. This building is still standing and restored. The reservoir is not used today, but it still has water. The Amin Shahr Reservoir has a dome with a height of 3 m and three windbreaks in the northwest direction. The length of the reservoir is 18 m, its width is 17 m and its area is 140 m^2. The height of the wind deflectors is 5 m, their plan is square and they have openings in four directions on which there are brickwork decorations. The entrance door of the reservoir is located in the northeast direction and there are two platforms on both sides of the entrance door of the reservoir. A space can be seen in the upper part of the entrance, which was probably the place of decorations that have disappeared today. The material of the reservoir is brick, lime, sand, and wood (Fig. 19).

An aqueduct is a channel with a gentle slope that is created almost horizontally and is excavated to a depth that breaks the underground water table. With the construction of the aqueduct, underground water penetrates the canal flows along its gentle slope, and flows as a stream on the surface of the earth. Diggers must have access to the outside space while digging these canals and transfer the materials (rocks and soil) resulting from digging outside. The dug channels are connected to the ground by rods that are placed every 50 to 150 m along the aqueduct route. The ends of these rods are surrounded by the mass of excavated soil to create well rings on the surface of the ground.

This water supply network was widely used in deserts for various reasons. (1) The aqueduct does not need any source of power other than gravity to continue the flow. (2) Water can travel significant distances in these underground channels with minimal evaporation or risk of contamination. (3) The water flow in the aqueduct is proportional to the water in the underground aquifer, and if these channels are properly maintained, the water infiltration tunnels provide a reliable source of water supply for centuries.

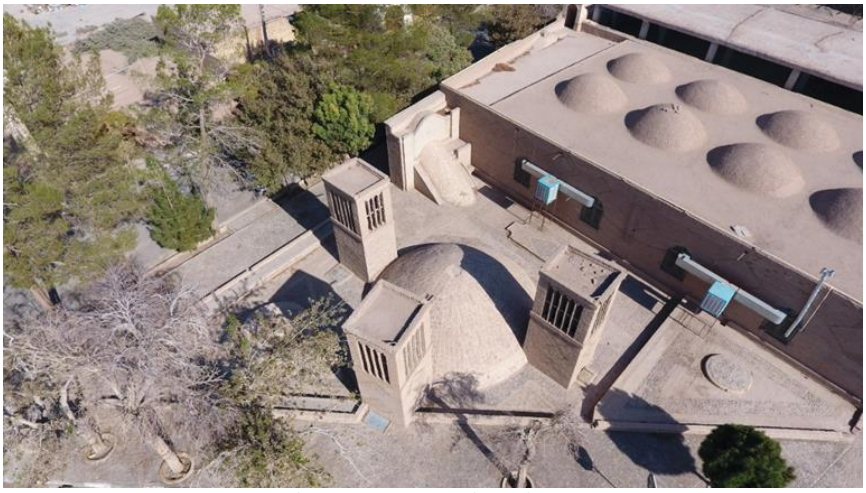

Figure 18: Aerial image of the Amin Shahr Reservoir.

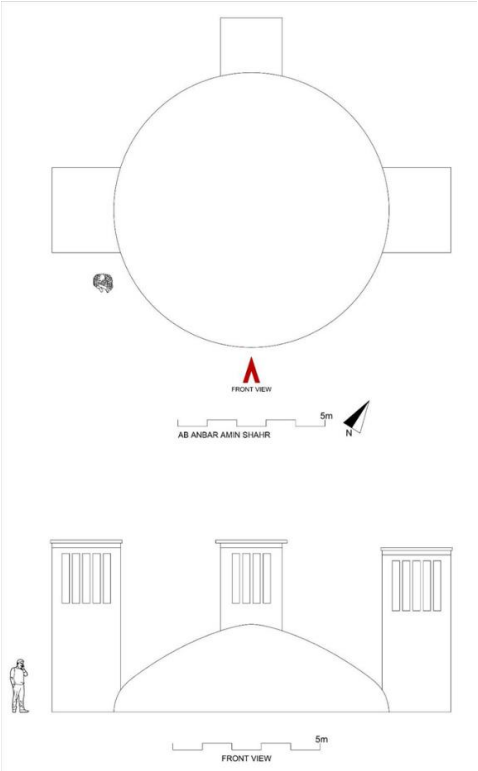

Figure 19: Plan and view of the Amin Shahr Reservoir.

The sizes of the aqueducts are different. Aqueducts in mountainous areas are usually short and shallow channels only a few meters deep and in some cases deep and long, which absorb surface water from alluvium. Aqueducts are engineering masterpieces that supply water to cities like Kerman, Yazd, and Birjand in Iran. In Kerman, the aqueducts extend for more than 50 km to the south to penetrate the underground table at the bottom of Jopar mountain. The Kerman plain is full of thousands of vertical bars, the deepest of which is between 100 and 125 m deep. These bars mark the route of a large number of series of aqueducts that bring water to the city. The deepest recorded aqueduct is located in the Gonabad village near Birjand. This aqueduct is 27 km long and the mother of its wells has a depth of more than 300 m (English, 2015).

In the archaeological survey of Anar City, 49 aqueducts were identified. The geographical location and dry climate of Anar, the presence of mountains around this city, and the fertile lands located in the center of the plain have caused the construction of aqueducts to supply water from ancient times to before the Islamic Revolution in the region. The large number of aqueducts built in this area shows the prosperity of this profession (Fig. 20). The identification of these aqueducts in this county indicates the tireless efforts of

the people living in the desert in this part of the country to provide water needed for agriculture. Unfortunately, after the revolution, with the construction of deep wells and excessive exploitation of underground water, most of these aqueducts have dried up, and only 5 of them still provide part of the agricultural water in the region.

An aqueduct is considered one of the most complex water supply structures in the world, the construction of which requires very high technology and knowledge regarding the geology of the region, subsurface water flows, vegetation, and understanding and accurate calculation of the length between the well mother and the aqueduct outlet. Unfortunately, a large part of this knowledge has been lost in many central areas of Iran due to the loss of experts in digging canals. The digging of deep wells, which increase in depth every year, has led to the abandonment of the irrigation system by aqueducts, which for thousands of years contributed to the prosperity of all the central cities of Iran.

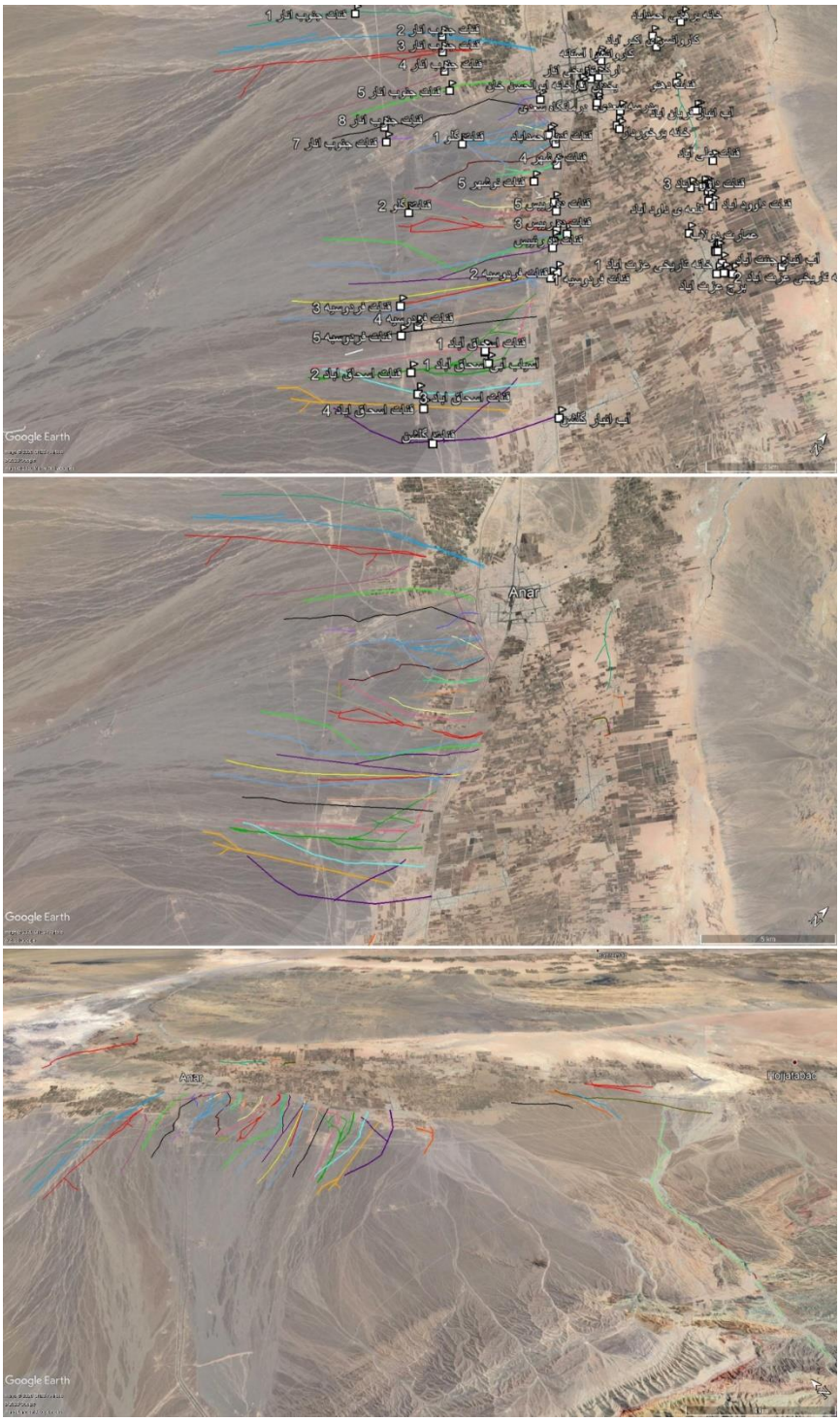

Figure 20: Density and number of aqueducts in the Anar Plain.

IX. Conclusion

Archaeological investigations in Anar County, Kerman Province led to the identification of 120 cultural-historical works. Despite the long history of archaeological studies in Kerman, the northern areas of this province have received less attention from archaeologists because of the desert environment. Due to special climatic and environmental conditions, Anar County has been inhabited more than the historical period, with the usage of aqueduct construction technology, like other central regions of Iran. Unfortunately, due to extensive destructions or repeated reconstructions in the Islamic era, except for the historical citadel of Anar City and a small number of ancient sites, many historical works were not identified in this county. The peak of settlement in the central areas of Iran goes back to the late Islamic era and Qajar period. In this period, with the formation of villages and the digging of canals generally by feudal lords, agriculture in these areas became very widespread and led to the attraction of the population to this area. The identification of 49 aqueduct rings indicates the flourishing of this technology, the widespread transfer of water for agriculture, and the expansion of villages. Water has been very vital in this part of Iran, and the people in the past used various techniques to maintain and use water optimally. Identifying different types of water structures, especially water reservoirs indicates this importance. Unfortunately, in recent years, due to the increasing growth of industrial pistachio cultivation and its high income, the works, buildings, and historical structures of Anar have been severely destroyed and leveled, so that in Anar city, except for a few historical monuments that could not be destroyed, there is no historical context left. The continuation of archaeological research activities in Anar County will bring valuable results regarding the establishment of human societies in the central regions of Iran and how humans and the environment have interacted since long ago.

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