



## **A documentary study of the excavations of Al-‘Abed Castle in Rosetta**

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### **Abstract**

In 1987, I made the scientific documentary of thirteen castles (fort) on the Mediterranean coast between the two ports of Rosetta and Abu Qir, all dating back to the era of Muhammad Ali, The castles were in a deplorable state, given that the British army destroyed them when they invaded Egypt in (1881). Most of these castles are surrounded by sand dunes, and then, I immediately began preparing for excavations in one of these castles, which resulted in the discovery of the castle and the identification of its architectural elements.

In 1989, we began excavating the first of these castles, the Al-’Abed Castle, through which it was possible to uncover all parts of the castle, including the southern façade, the two towers on both ends, the entrance, rooms and shooting holes with cannons, and then, a number of sketches were made that will be shown during the study. The Al-‘Abd Castle and other castles in Rosetta, starting from Qaitbay Castle and the castles on the Mediterranean coast from the mouth of the Rosetta branch to Abu Qir, are among the most important indications of the historical and architectural importance of the military fortifications in Rosetta. The stages of excavations in this castle and its architectural elements.

The excavation work carried out by the researcher was the beginning of the road to uncover the secrets of this castle as a model for the castles of Muhammad Ali, and it helped highlight the fortifications and define their features, solve all their mysterious symbols, and define all their architectural and defense elements. The study dealt with the description of the castle, and the excavations helped to show all the elements that were focused on by developing a descriptive study of it as one of the models of castles dating back to the era of Muhammad Ali, and it is known that there was a fundamental similarity between the castles of Muhammad Ali in terms of the basic elements with some differences in the internal details.

The researcher was the head of the excavation expedition that discovered this castle, and these excavations have had a wide resonance, as it is the first time that a fortress dating back to the era of Muhammad Ali has been uncovered.

**Key words:** Al-‘Abed Castle, the forts of the Mediterranean, Boghaz of Rosetta, the era of Muhammad Ali, excavations.



## **Introduction**

When Muhammad Ali took over the rule of Egypt, he took care of some urban aspects that serve his emerging country, so he set up castles to defend the frontiers and the country's capital[1], and he also built a lighthouse to guide ships in Ras El-Tin in Alexandria[2]. He was also concerned with building palaces and the role of the government, and he established a caravan to keep government documents, and a house for antiquities after he issued an order to prevent the exit of antiquities from Egypt, and he paved trade routes, organized the movement of mail and made stations for him to rest the horses[2].

Muhammad took great care in erecting castles and fortifications to defend the country's outposts and its capital, so he repaired the Citadel of Salah al-Din in Cairo and shipped it with cannons. He built another fortress near it on the Mokattam mountain to supervise the first, repaired the castles of Alexandria and established others, and he also began building a wall around the city of Rosetta and towers outside, and fortified the floors surrounding their edges[2-3]. And summoned from France a military engineer in the art of military entrenchments called Monsieur Galice, and bestowed upon him the rank (Bey). He was entrusted with choosing the coasts of Egypt and developing a project for its fortifications and fortifications and making him the "bash engineer" of the fortifications[2-3].

Colonel Galice began studying the country from the military point of view, then he presented to the governor a comprehensive report in which he presented his own views on the lines of defense and the necessary forts. About him and repel the attacks of enemy ships that threaten the country. The second: It does not need anything because it is reinforced by natural obstacles such as swamps and lakes in it, which are the Manzala, Burullus, Idku, Rosetta, Abu Qir and Mariout lakes. And the third: It can be defended when necessary by erecting some light fortifications on the routes between the aforementioned lakes, which connect the coast line to Lower Egypt and within the country, from which the enemy can be repelled if it succeeds in reaching the coast[1].

Galice mentioned that some forts must be built on the eastern borders in Al-Salihiya regions because they are located on the Syria road, the Wadi Aqaba road that connects Egypt to the Arab countries and the Suez destinations because it is the port of Egypt on the Red Sea, and other destinations on the Red Sea such as Al-Tor, Al-Qusayr, and other destinations on the coast of Adab and Aqaba. When Muhammad Ali was informed of this report, he approved it and began to fortify Alexandria[4-5-8] and the other coasts on the



Red and Mediterranean seas.

And until the year (1840), Jalice Bey had built a large number of these forts on the shore of Alexandria, which are al-Silsila fort, the graves of the Jews, Kom al-Dikka, Nadora, Qaitbay, al-Ata (al-Qatta), Ras al-Tin, Ras al-Tin lighthouse, Salih Agha, Umm Qubeiba, The moon, the old navigation, the new navigation, the Dekheila, the island of Al-Ajami, the circle of the wall[5], and the number of forts of Alexandria in the year (1848 AD) reached (25) fortresses that were equipped with (617) large cannons and (96) mortars[4-7]. As for Abu Qir, he built eight castles: Kom al-Shusha fort, Al-SaddNamira (3), Al-SaddNamira (4), Al-Maadiya, Kum Al-Ajouz, the old Abu Qir castle, Al-SaddNamira (1) and Al-SaddNamira (2), there were (225) guns in these berths[5]. Between Rasheed and Burullus, which contained swamps that represent natural barriers, and there were no embankments in them, but in Burullus there were two castles in the east and west, and next to the Burullus lighthouse, a third forts. Number 35) and to the east by about (4000 m), tower (2), and to its east, tower (1) [4-5-8-9], and there are two schools protecting the Bogaz of Damietta. As for the area between Damietta and Port Said, there were two schools, the first known as al-Dibeh al-Bahariya fort, located 33 kilometers east of Damietta Bogaz, about (33) kilometers on the sea and in its south, and at a distance of (200) meters, al-Qibliyah fort was located on the isthmus separating Lake Manzala from the sea, and in the east of it al-Jamil fort and Eastern fort[5].

Muhammad Ali established a large number of coastal castles that were undergoing renovation during the reign of Ismail Pasha, the most important of which were the castles located between Damietta and Alexandria, the most important of which were the eastern and Boughaz western castles in Damietta, and the eastern and Boughaz western castles in Rosetta.

As for the area between Boughaz of Rosetta and El Ma'adeya, many towers were established on it, which start at al-Ma'adiya fort, and in the east of it al-Kaleh (al-Libani) and distance (2,300 km) from the first and in the east al-Kaleh (al-Kalakh)fort at a distance of (2,500 km) then HilaliyyaIdku (Algeria)fort, TabiaIdku, Hilal al-Alayim (al-Nawa)fort, al-Alayimfort, Hilal al-Thaghr (al-Farsh)fort, al-Thaghr (Al-'Abed)fort and al-Boghaz al-Gharbifort. Eastern Boughaz, the distance between them is (800) meters[4-5].As for the castles that existed before that, and which Muhammad Ali took care of and fortified, they are Qaitbay fort in Rosetta, Ezbet Abu Mandour and Fanar Tower (Qaitbay fort in



Alexandria), Abu Qir, Mahmoudia Dam Battery, Farsi Battery east of Qaitbay in Rosetta, Ezbet Al Burj in Damietta, and Umm Faraga and Al-Arish, as well as the walls of Rosetta and its forts, which are al-Abbasi and the place of al-Sharkha (the company, Light artillery placed at the front of the army to attack the enemy).

On 20 Rabi` al-Awwal 1247 AH (1831 AD), Muhammad Ali ordered the governor of Rosetta to build a quarantine (Sanitary quarry) in in the port of Rosetta by Ahmed Effendi, the headmaster of Alexandria's buildings, and the construction would be outside al-Boghaz (outside the city) according to the drawing of the engineer Stirzen. On 7 Dhu al-Hijjah 1247 AH (1831 CE), he issued an order to the Governor of Rosetta to establish mills in the Bougaz region, and he sent mill's man, carpenters, and mills' stones to him, so that the two Alaies (A military division corresponding to the infantry brigade), present in Rosetta would suffice [10].

He took great care in fortifying Rosetta and the adjacent coasts, so he ordered the strengthening of its defense force [2], so he placed six cannons in Tabiyat al-Nawa, al-Abbasi six cannons, al-Tobajiya five cannons, the home of three guns, the shop of al-Sharkha (the company) one cannon, Rosetta tower (Qaitbay) fourteen guns, al-Bughaz (Al-'Abed) Eighteen cannons, ten cannons in the Eastern Tabiyeh, as well as ten cannons were placed in the Western Tabiyeh, and there was a jukana with each pillar except for al-Manzali and the shop of al-Sharkha.

The work on fortifying the coasts continued until the reign of Abbas the First, and his fear of the Sublime Porte and his attempts to distance him from the rule prompted him to take great care of fortifying the Egyptian coasts, he ordered the restoration of the fittings and the bays, according to what was drawn by the head of the reservoirs engineering (Jalice Bey), and he passed by the coasts of the Mediterranean from Alexandria to Al-Arish [11-12].

The arbitrations were supervised by the engineering department office headed by an officer with the rank of general and assisted by two great officers, three officers at the rank of Youzbashi (captain), three lieutenant officers, and four clerks with the rank of non-commissioned officer, and this department is concerned with the construction of forts and fortifications in different regions of the country and work on their maintenance, as well as the purchase of all building materials And the equipment needed for the inspections and for the services of the Corps of Engineers. It is also responsible for the first review of the accounts of the officers assigned to the work of the Corps of Engineers.



### **Al-'Abed Castle**

Before (1989) the features of the castle were not clear enough to study its architectural elements, and the researcher was director of the Rosetta monuments area and head of the mission of the Islamic and Coptic Antiquities Sector, which discovered this castle. One of the forts dating back to the era of Muhammad Ali, which was destroyed by the English army during attempts to occupy Egypt in (1881).As the choice to conduct excavations in this castle was due to its historical and architectural importance as a model for the coastal castles in the era of Muhammad Ali[1].

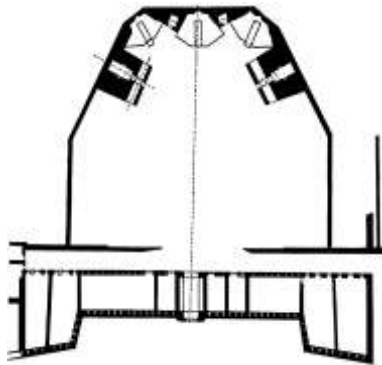
The researcher developed a plan for excavations in this castle, which were conducted during the years (1989-1990), with the aim of revealing its architectural details. Excavations were the beginning of the road to uncover the secrets of this castle, and they helped highlight the architectural planning and delineation of its features, solve all its mysterious symbols, and define the time periods that go back to it[1].

This castle was distinguished by its superior architectural and warfare characteristics, which helped to identify the architectural and war development and the evolution of the architectural and war elements according to the development of weapons and the development of their use, and to keep track of the developments and modifications that it underwent in the era of Ismail, and this was due to the development of the defense means and the weapons used, in particular the development it witnessed Cannon industry. It was necessary to refer to the various sources and references that deal with the war history of Rosetta and the Islamic entrenchments in general and the Rosetta bases in particular, and the war and architectural elements and the weapons of the fortifications[5].

Excavations were carried out in this castle during the season 1989-1990 AD, with the aim of revealing its architectural details. Through these excavations, it was possible to reveal the outer walls of the castle, the entrance in the middle of the southern façade, the entrance hallway, as well as the gravels that adjacent to the southern façade. The southeastern and southwestern towers were revealed, and the eastern and western rooms were revealed, as well as the three turrets and cannons that operate them. The following are the results of the excavations conducted at the castle.

## **Southern Wall**

The length of this wall is (47.30 m), and on its ends are the southeastern and southwestern towers (Fig.1), and in the middle of it is the entrance leading to the castle, which has a width of (5.30 m) mass, and the wall extends east and west of the entrance to the two towers with a length of (21.0 m) on each side Its thickness is 1.20 m.



*Fig. 1. Al-'Abed Castle in Rosetta*

The wall was built with impure stones, and its face was covered from the inside and outside with carved bricks, with the use of masonry<sup>1</sup> as a bonding material consisting of lime, red and burnt linen, and the façade was covered with a layer of mortar whose effects appear in separate areas. And stones were used when the two towers meet with the façade, as well as when it meets the entrance blocks, and the front of the entrance block was built with stones, as well as the arch that crowned the entrance as well, (figs. 2-3).



*Fig. 2. Facade of Al-'Abed Castle*

The façade is provided with twenty-eight shooting holes with Guns, of which fourteen are located on each side of the façade between the entrance and the tower, and each of these chutes is 0.10 m wide and 0.90 m long, and each of them is topped by a stone lintel 0.27 m long. Its height is (0.15 m), and the height of the hatches from the sidewalk that surrounds the façade, as well as from the floor of the entrance hall, is 1.85 m. Note that the floors of the latches slope towards the outside, where their height inside the entrance hall and the sidewalk is 2.15 m. The distance between each shooting hole and the other adjacent to it is (1.28 m), and it is noted that it widens in the interior to reach (0.55 m), and its floors also rise to a height of (0.60 m) after it reached (0.90 m) outside.

### **Entrance to the castle**

It was noticed during the excavation and during cleaning the surface of the southern wall that there were remnants of wood pieces, as well as the presence of voids in the surface of the fence indicating the positions of the trusses that formed the roof of the crops, and these trusses were extended from north to south where they rested on the southern wall, and each of them was inside with a surface The fence is (0.90 m), and the section of each bartum reaches 0.25 m in height and 0.15 m in width, and the distance between these trims is 0.30 m, which is of wood.

Thus, these features helped to determine the height of the ceilings and the height of the southern facade of the castle, as it was found that the height of the façade is (4.30 m), including (1.85 m) up to the lathes, (0.90 m) the height of the lintels, (0.15 m) the height of the stone lintels, and (1.0 m). The height of the buildings above the lintels and (0.40 m), the thickness of the roof consisting of the trims is a sector (0.25 m) and a layer of bricks and mortar (0.15 m), for the total to be (4.30 m). We will see later that the height of the ceiling above the floors of the rooms is (2.75 m), as the floors of the rooms rise from the outside floor and the floor of the entrance hall is (1.15 m).

### **Entrance to the castle**



*Fig. 3. Entrance to Al-'Abed Castle*



*Pl. 1. Entrance to the Al-'Abed Castle*

All the architectural details of the entrance block have been revealed (pl. 4: 1 Fig. 3), as its length is (5.30 m) and it is prominent from the southern façade by (0.50 m), and it was erected with stone and in the middle of the entrance block is the door opening, which is 2.50 m wide, and has Two shoulders on both sides, each width (0.30 m) and length (0.20 m), where the width of the entrance after these two shoulders is (2.90 m), and on the sides

there are two shoulders of each length (0.45 m) and its prominence (0.10 m) and the mass of the entrance extends after that and on both sides By (0.75 m).

The entrance is defined by a stone lintel width (0.35 m) and height (0.15 m), and the entrance leads to a small hall, length (2.90 m) and depth (1.35 m), which opens onto the large hallway. It protrudes from the pillar by (0.10 m), and the shoulders of the entrance (pl. 2) are equipped with two capitals that protrude by (0.10 m) each. Sashes and rugs made of beveled and grooved lines, each of which is 5 cm wide, have been executed.



*Pl. 2. Entrance to Al-'Abed Castle*



*Pl. 3. Details of the entrance to the Al-'Abed Castle*

The architecture took into account that the stone piece was long and extended through the entrance block so that it was considered a strong link to it, and as a prelude to implementing a stable base for the arch, which was based on the top of the entrance pillars and directly above the crown, but not as protruding from the pillar but with the shoulder. Only two knot stones were uncovered on each side, the first of which is located on each side at a height of (2.55 m) from the floor of the hallway and (2.40 m) from the lintel, which indicates that the top of the arch was raised by (3.80 m) from the floor. This is equal to the height of the beginning of the nodes and half the breadth of the entrance opening.





Pl. 4. Details of the entrance of Al-'Abed castle

The remains of the wooden door of the castle (pl. 4) were uncovered and it was made of two cherished wood, each of which was 1.35 m wide, and each one consisted of two cylinders and a number of heads, and a number of dipped nails were found that were supported by them, as they were individual The door opens on both sides of the hallway, which is 1.35 m in width as well, and the door turns on its heels and a saddle for each of them. This entrance is similar to many of the entrances of industrial facilities in Rosetta (Fig. 4).



Fig. 4. Entrance to a rice mill in Rosetta

#### Entrance lobby



Pl. 5. Entrance lobby at Al-'Abed Castle

The entrance to the castle leads to the hallway (pl. 5-6), which is 5.0 m wide in the north and south, and 6.30 m long in the east and west, and on either side of it are two staircases

set up with broken stone and brick, each of which is 1.00 m wide and 0.70 m high, from the floor of the hallway, walking along the east and west walls. As for the floor of the hall, it was built with stone, brick and mortar shattering, and this is the type that prevailed in the floors of the castle in all of it except for the lapis, as we will see later. At a height of 1.15 m from the two levels, there are arrow slits openings (pl. 61) that overlook the hallway in the east and west, and the number of these openings is six on each side, and each one is 0.90 m long, and each of them is topped by a stone lintel of 2.75 m high. Lobby floor.

The distance between the first hole and the southeast corner or the southwest corner is 0.65 m. The distance between the sixth shooting hole and the north eastern corner and the northwest corner is 0.50 m. The distance between the first hole and the second hole and the distance between the fifth hole and the sixth hole is 0.93 m. The distance between the other openings is 0.90 m, and each of these openings is surmounted by a stone lintel.

The thickness of the eastern and western walls of the lobby is 0.50 m, while the northern wall is 1.0 m. The eastern and western walls are revealed at a height of 3.25 m. In the middle of the northern wall is an entrance opening to the space to the north, and the width of this entrance is 2.90 m. And he revealed the remains of an arch that used to top this entrance (pl. 67) and this arch is 0.40 m thick, the same thickness as the other ceilings and vaults of the castle.

It was noticed that the architect had created the contract using a template (pl. 6), where he created the frame, and then he filled the gap between it and the wall after that, and this method caused the frame to become separated from the wall, and if part of it fell, that would cause the entire contract to fall. It is also noted that the height of the two arches from the floor of the lobby is 2.35 m plus half the width of the entrance, which is 1.45 m, so that the height of the apex of the arches becomes 3.80 m, which is the same as the height of the arch of the main entrance to the castle.



*Pl. 6. The second entrance at Al-'Abed Castle*



### **Southeast tower outside**

The details of this tower were revealed and it is prominent from the southern facade of the castle by (6.35 m), and it extends to the east by a length of (14.0 m) forming a southern façade, then it diverges again towards the north to form the eastern façade with a length of (13.0 m). The corners of the tower were supported by stones, while the building was of bricks. The tower was provided with twelve shooting holes with guns, four of which are on the western side and eight on the south side. Each of these chambers is 0.90 m high and 0.10 m wide, and it is surmounted by a stone lintel.

The distance between the opening of the first mazghal of the western corner and the area of contact with the southern wall is (0.50 m), and the distance between the opening of the fourth shooting hole and the southwest corner is (1.62 m). The first one is 1.30 m away from the southwest corner, and the distance between each opening is 1.28 m, and the distance between the eighth hole and the southeast corner is 1.62 m.

The thickness of the outer wall of the tower in the west and south is (1.20 m), while the eastern wall is 0.90 m thick, and this wall deviates from the east with a length of (3.65 m), then again towards the north with a length of (7.40 m) and a thickness of (0.60 m), where it extends to the west after This ends with the specified wall of the corridor that runs north of the southern corridors and is 0.90 m thick.

The halls of this tower are similar to their counterparts on the southern façade, as they descend towards the outside to enable aiming at the enemy, and the floor surrounding the castle rises by 1.85 m. The physical evidence found from the remnants of the walls confirms that the height of the first floor of the tower from the floor outside the castle was It is 4.30 m, the same height as the first round of the southern terminals.

### **Southwest tower on the outside**

The details of the first floor were revealed, whose corners were supported with stones, and the length of the eastern façade of the tower is (6.35 m), and the length of the southern façade is (13.55 m). At most, as is the case in the southeastern tower. The tower is equipped with the shooting holes of the eastern and southern walls, and the eastern side is provided with four angles, each of which is 0.90 m high and its opening is 0.10 m wide. As for the distance between each shooting holes, it is 1.28 m, and each of these shooting hole

be surmounted by a stone lintel. As for the southern façade of the tower, it is equipped with eight shooting holes, the first of which is 1.50 m away from the southeast corner, and the distances bounded between them are 1.28 m each.

As for the western façade of the tower, it begins at the southwestern corner with a prominent wall to the west with a length of (2.80 m), and the western wall continues to the north with a length of (8.77 m), and the width of the western wall reaches (1.0 m), and then deviates towards the west with a length of (3.58 m). ), And its width reaches (0.80 m), then turns towards the north with a length of (11.65 m) and its width (0.60 m), then it deviates again towards the east with a length of (4.85 m) and its width (0.70 m), and then increases its width (0.90 m) Where it is turned back by (0.35 m) to continue a length of (8.10 m) to the western wall of the castle, and then to determine the northern wall of the corridor that leads to the southern corridors and ends with the southwestern tower.

It is noticeable that the western walls are all erected by stone fractures, unlike the two façades of the tower in the east and south, as they are built with bricks on the outer face, as is the case in the inner walls of the two towers and all southern lines, which confirms that all the walls do not go back to one construction period, but rather the buildings built with bricks are due to The first period, and the building in stone goes back to a second period, as well as some of the walls built with bricks inside, and this will be clear later.

### **Southern rooms**



*Pl. 7. The southern rooms of al-'Abed castle*

The southern rooms are located along the southern wall (pl. 7) between it and the corridor leading to the southeastern and southwestern towers (pl. 8). These rooms were especially for housing soldiers and were equipped with shooting holes. Its roof was made of wooden trusses that extend from north to south, and these rooms have doors with semicircular arches that open to the north, and the walls separating them are of brick, as is the wall



overlooking the corridor, and they are all covered with mortar, and the floors are a bench by breaking bricks and mortar, as is the case on the floor of the entrance hall.

As for the room located in the east of the entrance hall, there are three rooms. As for the first room, its length is in the east and west (6.60 m) and its width is in the north (3.80 m) and in the south (3.90 m), and there is a door at the western end of the northern wall that leads to the sum of Its breadth is (1.22 m) on it is a semicircular arch of bricks around which a frame of horizontal brick rotates that protrudes by (5 cm) from the face of the wall, and the door widens to reach (1.42 m), where the thickness of the knot is (0.20 m), and the width of the inner section from the inside (0.40 m), to allow movement and fixation of the wooden door. This area was covered with a wooden roof.

As for the floor of the sum, we find two levels with a separation between them (0.50 m), where the entrance leads to the lower level in an area with a length in the east and west (4.55 m), and a width in the north and south (1.75 m), where we find a mastaba that occupies the high area, and this terrace extends to form The letter L is aligned with the eastern and southern walls of the room, while the eastern part is 2.05 m wide, and the southern part is 2.05 m wide. This terrace was built with bricks and mortar.

There is a shooting hole two in the northern wall of the room, and the distance between the first and the northwest corner of the room is (1.88 m), the distance between the first and the second is (0.60 m), and the distance between the second and the northeast corner of the room is (0.22 m), and the breadth of each of these two shooting hole It reaches (0.55 m), and each of them has a stone lintel. In the southern wall of the room there are three shooting holes, the first of which is 0.40 m away from the western wall, and the second is 0.15 m away from the eastern wall, and the distance between each of these shooting holes is 0.85 m, and the breadth of each is 0.55 m) and it has a stone lintel.

In the western wall there are six shooting holes overlooking the entrance hall, and the breadth of each is (0.55 m) and each has a stone lintel, and the distance between the first shooting hole is north and the northwest corner of the room is (0.50 m) and the distance between the sixth shooting hole and the southwest corner is (0.40 m) The distance between each of these two shooting holes is (0.50 m), and each is topped by a stone lintel. The height of these shooting holes is (0.60 m) and they slope outward, and it is noticed that all shooting holes were established at a height of (0.90 m) as is the case outside, and the lower section was blocked with a height of (0.30 m) in a triangle shape that slopes towards the



outside, so the height became (0.60 m ) Just.

As for the second room, it is entered with a vaulted entrance with a width of (1.22 m) and with a semicircular arch of brick width (0.20 m), followed by a wooden lintel of width (0.40 m), where the width of the entrance increases to reach (1.42 m), and the arch is surrounded by a frame of Brick protruding by (5 cm). The length of the room is from east and west (6.60 m) and its width in north and south (3.65 m), and in the northern wall there is a two shooting hole, the distance between them is (0.55 m), and the distance between the first shooting hole and the northwest angle is (1.80 m), and the distance is Between the second shooting hole and the northeast corner (0.20 m), the breadth of each of the two shooting holes was (0.55 m) and each had a lintel.

As for the southern wall, it has three shooting holes, the distance between the first and the southwest corner is (0.15 m), the distance between these shooting holes is (0.83 m), the distance between the third and the eastern wall is (0.34 m), and the breadth of the shooting holes is (0.55 m). It is noticeable that the walls of this room are covered with mortar, and the shooting holes are surmounted by stone sills. They are also surmounted by mortar.

As for the floor, it is of bricks and mortar, and a mastaba has been established adjacent to the eastern and southern walls with the letter (L), and the width of the mastaba is along the southern wall (1.95 m) and its width is along the eastern wall (2.0 m), and the lower part facing the entrance is 4.55 m long in the east and west ) And its width in the north and south (1.60 m). It is noticed that the shooting holes were raised after the construction of this terrace, so its height became (0.60 m) after it was (0.90 m).

As for the third room, which is entered from the first room from the southeastern tower, through an entrance at the northern end of the eastern wall, it has a breadth of 1.20 m, and the length of this room in the north and south is (10.90 m) and its width in the east and west (6.50 m). In the southern wall there are eight shooting holes, the first of which is adjacent to the western wall, while the distance between each shooting hole and the other shooting hole is (0.83 m) and the width of the shooting holes is (0.55 m), and the distance between the eighth and the eastern wall is (0.70 m), and above both These shooting holes are lintel.

There are also eight shooting holes in the northern wall of the yield, the first of which is adjacent to the western wall, and the width of each shooting hole is (0.55 m) and the distance between them is (0.83 m), and the distance between the eighth and the northern



angle of the yield is 70 cm, and the height of the shooting hole is (0.60 m) , And each is surmounted by a stone lintel.

The second and third rooms represented one outcome, and the evidence is that the separation wall between them is added, and the sizes of the two outcomes together are approximately equal to the dimensions of the second room of the rooms west of the entrance hall, and the distance between the third of the second room and the first of the third room is (0.83 m), which is the same distance Between shooting holes, and if this third room were independent by itself, a door would not have been opened to the southeastern tower, but this door was opened after the construction of the separation wall.

As for the two outcomes on the left of the hallway, the first entrance is to the left of the entrance leading to the courtyard, and this entrance is 1.65 m away from the entrance to the hall, and the door window is 1.22 m wide and 0.20 m deep, and is crowned by a semicircular arch around which a prominent frame The bricks are (5 cm), and the entrance then widens to (1.42 m) with a width (0.40 m). This door leads to a rectangular product with a length in the east and west (6.70 m) and its width in the north (3.90 m) and in the south (3.80 m), The thickness of the eastern and western walls is (0.50 m), while the northern wall is (0.60 m).

The northern wall of the product is provided with two shooting holes, the first of which is 1.95 m away from the northeast corner and the width of the shooting hole is (0.55 m), the second is distance from the first by (0.75 m) and the breadth of its opening is also (0.55 m). The distance between this shooting hole and the northwest corner is (0.10m) and each shooting hole is above a stone lintel.

As for the eastern wall of the room, it has six shooting holes that open to the entrance hallway and expand from the inside to (0.55 m), and each has a stone lintel, and the distance between the first is north and the northeast corner of the room is (0.50 m), and the distance between the sixth and the southeast corner is (0.40 m). The breadth of each of these shooting holes is (0.55 m), and the distance between each of the two shooting holes is (0.50 m), while the height of these shooting holes is (0.60 m).

As for the southern wall, there are three shooting holes, each of which is 0.55 m wide and 0.60 m high, and each is topped by a stone lintel. The distance between the first and the eastern wall is 0.40 m, and the distance between the third and the western wall is 0.15 m. Between each of the three shooting holes, they are (0.85m) each.



A mastaba in this room was found in the shape of an (L), adjacent to the western and southern walls, and the area leading to the entrance, which is the low-lying area, is 4.50 m in length in the east and west and 1.90 m wide in the north and south, while the mastaba was displayed next to the western wall (2.0 m) and its width next to the southern wall (2.15 m). This mastaba is raised by (0.50 m) and it is built with bricks.

In the west of this room there is another room that has an entrance at the eastern end of the northern wall. Its breadth is (1.22 m) from the outside, and it is knotted with a semicircular arch width (0.20 m), and the entrance opening widens after that to reach (1.42 m) with a width (0.40 m) and above it in the inner section a wooden ceiling. The length of the room is in the north (15.30 m) and in the south (15.42 m) and its width in the east (6.85 m) and in the west (6.65 m), and on the southern side there are eleven shooting holes, the first of which is 0.15 m from the eastern wall), and the distance between the eleventh and the western wall is (0.90 m), and the distances between the shooting holes are (0.83 m) each. The breadth of each of these shooting holes is (0.55 m), and they are topped by stone lintels, and the height of each one is (0.60 m).

And in the northern wall of the yield of ten shooting holes, east of them is 1.88 m from the northeast corner and 0.46 m from the entrance, and the tenth is 0.20 m from the northwest corner, and each shooting hole is 0.55 m wide and high. 0.60 m) and a stone lintel topped by, as for the distances between these shooting holes, they are (0.85 m) each, except for the distance between the fifth and sixth, they reach 0.91 m. As for the floor of this room, it is of two levels, the first level facing the entrance and its length in the east and west 4.55 m, and its width in the north and south 1.60 m, and the second level rises by 0.50 m, which is an L-shaped terrace with the western and southern walls. .

### **The northern façade of the southern rooms**

The entrance to the castle leads to the open courtyard in the middle of the castle, and on it the corridors with a façade that includes the entrances to the harvester, and overlooked by the crops with shooting holes exactly like the shooting holes of the southern façade, and this façade extends towards the east and west to end with the facades of the southeast and southwestern towers, and the corridor in the north determines two walls, the first in the east and it extends from west to east and the second in the west and extends from east to west, and the height of the two walls starts from the level of the courtyard floor up to the floor





opposite to the position of the cannons, and these two walls have become separating the level of the crop and the corridor and the entrance hall and the floor outside the southern façade and the upper level that extends between the shooting area holes in the northern part of the castle, east and west of the courtyard, which will be discussed later.

As for the corridor, it is wide at its beginning towards the entrance leading to the courtyard (3.80 m) and its width at its end (3.60 m). It is noticed that the wall specified for the corridor in the east has a thickness at its beginning (0.50 m) and then increases in thickness to (0.85 m) at a distance of (9.05 m) from the eastern wall of the castle, while the western wall of the corridor is (0.50 m) thicker and increases to (0.85 m). At a distance of (7.70 m) from the western wall of the castle. The height of the upper level of the floor north of these two walls (3.60 m) is a brick and mortar deck.

In the middle of its southern facade is the entrance whose breadth is (2.90 m) and was topped by a semicircular arch, and on each side of it four entrances, two of which are located on each side, while the two eastern entrances lead to the first and second yields in the east, and the two western entrances lead to the western yields. The corridor ends with the southeastern and southwestern towers, where each tower overlooks it with two entrances flanking two windows each. The crops oversee the corridor with twenty-four shooting holes, two with the first room on the east, two with the second room, and eight with the third room, while on the western side there are two shooting holes with the first room and ten with the second room.

As for shooting holes in the first room, east and west, the first is 0.95 m away from the entrance, the second is 1.20 m away from the first, and the second is 0.33 m away from the end of the room and 0.90 m away from the adjacent room entrance. As for shooting holes, the second room in the west and the eastern yields, the first is 0.88 m away from the entrance to this room, while the distance between shooting holes is (1.05 m), and the distance between the latter is east and west and the end of the room is (1.22 m).

### **The south-eastern tower from the inside**

Two holders overlook their entrances to the corridor, and extend from north to south, as for the first room from the west, the width of its entrance is 1.30 m, and it is knotted with a semicircular knot surrounded by a prominent frame as well, and the width of the two windows is 0.75 m, and the distance between each of them The entrance is 1.15 m, and it



has been observed that the thickness of the arch above the entrance and the two windows is 0.20 m thick, while the inner part behind the arch is with a flat wooden ceiling and has a wooden block in which the knots for the door and the two windows are fixed. Wooden remains have appeared from the wooden ceiling confirming this. .

As for the western room, it has a length in the east (13.20 m) and in the west (13.00 m) and it is divided into two parts, the first in the south with a length of 6.45 m and the second in the north with a length of 6.55 m and adjacent to the third of the southern room, and the southern part runs a deviation towards the east. The northern wall is 6.15 m long and the southern wall 5.35 m. As for the southern part of the western wall, it is equipped with four shooting holes, each topped with a stone lintel, and the first is 1.40 m away from the wall deviation and its width is 0.54 m. The second is 0.90 m away from the first and 0.52 m wide, and the third is 0.87 m far from the second and 0.62 m wide, while the fourth is 0.90 m away from the third and 0.35 m from the southwest corner. Its width is (0.53 m), and the height of these shooting holes is (0.60 m). There is an entrance to the western wall located at the northern end of it with a width of (1.20 m) leading to the third room, and it is likely that this door was developed after the construction of the wall that led to the division of the large sum into two outcomes, as it contradicts in its details the other entrances with rooms. In the southern wall of the yield there are four shooting holes, each of which is topped by a stone lintel, and the first is away from the southwest corner by (0.40 m), and away from the southeast corner by (0.25 m), and the distances between the four shooting holes are (0.90 m) each. Each shooting hole is 0.50 m wide, each topped with a stone lintel and is 0.60 m high.

As for the second room of the tower, it overlooks the corridor with an entrance knotted with a semicircular arch of 0.20 m thick surrounded by a prominent frame of bricks, and it is likely that the width of this entrance is the same as the entrance to the first room from the tower, which is 1.30 m, and is surrounded by two windows the breadth of each (0.77 m).

The length of the room in the west is (13.20 m) and in the south (5.50 m) and the length of the northern and eastern walls is not determined, the thickness of the western wall is (0.50 m), and there are four shooting holes in the southern wall, the first of which is located from the southwest corner by (0.50 m). The width of each shooting hole is (0.50 m), and the distances between them are (0.90 m), and the fourth is away from the southeast corner by

(0.20 m), and the lintel appears above the third shooting hole, which is of stone. The height of these shooting holes is 0.90 m, while sloping outward.

It has been confirmed that the windows surrounding the two doors rise by (1.70 m) each, and their wooden lintel is above the level of shooting holes from the top by (0.45 m), thus the window sill becomes higher than the level of the floor of the hallway of the castle entrance by (3.0 m) considering that the doorway The shooting holes rise by (2.75 m), that is, they rise from the floor of the crop by (1.85 m), and thus the lower sills rise by (0.15 m) from the floor of the crop, and it was observed that a beam of wood was placed above the nets and the door with a width (0.15 m) and height (7.5 m), and as for the area confined between the arches and the wooden beam, a wooden lintel of length (1.90 m) was placed on the basis of an increase of (0.40 m) on both sides. The lintels were executed with a circular opening in which the knots were fixed.

#### **The south-west tower from the inside**

The corridor leads to the tower (pl. 8), which consists of four hollows, two of which are entered by two doors facing the corridor in the west, and the other two outcomes are entered by two doors in the northern wall that extends with the coves wall (10.75 m).



*Pl. 8. The southwestern tower at Al-Abed Castle*

The façade of the first room is occupied by an entrance that is 1.45 m wide and is knotted with a semicircular arch of bricks, 0.33 m thick, surrounded by a raised frame of bricks. 0.80 m) of it on each side has a window width of (0.75 m) and the first window is away from the eastern wall by (0.30 m), and the second window is west from the western wall by (0.35 m). It has a prominent frame of bricks and the width of this section is (0.33 m). As for the inner section, it is (0.42 m) wide, and it is roofed with a wooden ceiling in which the nets are located.

It was noticed that the lintel of the door and the windows went on one level, where a long beam was placed along the wall, then the ceiling of each part was then independent from



the adjacent section, and the remnants of the treasured wood nets were revealed consisting of two columns and heads fastened to each other half by half and was rotating with the butt and the saddle, and reaching a height The nets are (1.70 m) for the session, which is 0.15 m high.

The length of the first room is in the east (13.25 m) and in the west (13.50 m), and there is a fracture of the eastern side at a distance of (6.65 m) from the north-eastern corner, while the northern wall is 5.20 m long and the southern wall is 4.36 m. Overlook this room with four shooting holes to the east and three to the south.

As for the eastern shooting holes, the first of them is 1.40 m away from the fracture in the eastern wall, and the distance between the fourth and the southeast corner is 0.35 m. The distances between the shooting holes are 0.90 m each, and the breadth of each shooting hole is 0.55 m, and on each of them a stone lintel. As for the southern shooting holes, the first one is 0.33m away from the southeast corner, and the third one is 0.72m away from the southwestern corner. As for the distances between the shooting holes, they are 0.83m each, and each shooting hole is above a stone lintel.

As for the second room, it has an entrance on the corridor that is exactly like the previous one, as its width is (1.54 m), and on both sides of it are two windows, each located at a distance of (0.80 m) and the breadth (0.75 m), similar to the entrance in their architectural details, the entrance and the two windows with the first room.

The length of the eastern side of this sum is (13.50 m), the length of the western side is (14.25 m), the length of the northern side is (5.05 m), and the length of the southern side is (4.35 m). The southern wall has three shooting holes, the distance between the first and the southeast corner is 0.64 M), the distance between the third and the southwest corner is (0.40 m), the distance between the shooting holes is (0.83 m), the breadth of each is (0.50 m) and its height (0.60 m), each of which is topped by a stone lintel. The wall separating the two crops, as well as the western wall of the second outcome, caused two shooting holes, with openings emerging from the outside, which confirms that modifications were made to the tower in a later period represented in the construction of these two walls.

The corridor ends in the west with two entrances, each of which leads to a room. As for the first door, its width is 1.0 m. It is topped by a semicircular arch in the outer section and a straight lintel in the inner section, which is the second entrance. Due to the limited space allocated to each of the two entrances - in the case of the implementation of this protruding



frame that is above the entrance contract by (0.40 m), this calls for the entrance to be an average area of the wall of (1.90 m), and since the face of the handlers is (3.60 m) long. It is necessary to deduct the thickness of the wall separating them also, so the remaining distance becomes insufficient. Therefore, the architecture dispensed with the protruding frame and was satisfied that the face of the nodes is directly facing the wall.

As for the southern room, its length is in the east (6.55 m), in the west (6.50 m), and its width is in the north (3.20 m) and in the south (2.90 m), and there, at a distance (2.45 m) from the northern wall, we find a projection of (0.50 m) to become a thickness. The eastern wall (1.00 m) after it was (0.50 m). As for the northern room, its eastern side length is (2.90 m), its western side length is (3.10 m), its northern side length is (3.30 m), and its southern side length is (3.25 m).

### **Eastern room**

A wall extending north of the southeastern tower and towards the north has been revealed, and this wall begins at the specific wall of the corridor to the east, where with the eastern wall of the exposed courtyard, it has a width in the north and south (9.0 m) and its length in the east and west (18.0 m). To this outcome, it was taking place through an entrance to the corridor, and we were based on developing a vision of this outcome, whose features were lost as a result of building a modern military barracks, by uncovering the remains of its eastern wall and comparing it with the Citadel of El-Maadeya and Idku.

It was confirmed during the digging of this result that its foundations are not at the level of the foundations of the southern culprits, but the foundations were laid at a depth of (1.0 m) from the upper level, which goes with the level of the eastern and western parts of the courtyard, separated by the northern wall of the corridor, and thus separates it from the two levels of the castle that The difference between them is (3.60 m). We will find that all the foundations of the northern part of the castle were built in connection with this level, and this is logical, as it is not reasonable that the foundations of the two parts be equal at a time when the northern floor of them rises by 3.50 m from the other in the southern section.

### **The courtyard in the middle of the castle**

Entry is made through the northern entrance of the hallway to the open courtyard, part of which the corridor cuts with a width of (3.80 m) plus the thickness of the two walls, which

is (0.50 m), as these two walls begin to rise gradually towards the east and west, reaching a height of (3.50 m) from the floor of the entrance hall and reach The width of the two walls is (0.85 m), then it meets the two walls defined for the courtyard in the east and west, each of which has a width of (0.70 m).

There is a separation between the wall facing east or west and between the two walls specified for the courtyard due to the difference in the height of the foundation of each of them, although they are due to one period, which confirms that the foundation excavation was done taking into account the level of the floors first and whatever their height, and this confirms that the construction of the southern part of the castle, which includes The two towers, the southern façade, the entrance and the southern corridors were completed first, and then the wall specified for the corridor was built at the same level as the foundation of the southern section, and the rubble was placed north of this wall at a height (3.50 m) from the southern part, then the foundations of the northern section were dug after that (Fig.5).



*Figure 5. A sector from south to north of al-'Abed castle*

The northern wall of the corridor used to extend past the eastern and western walls of the courtyard with a length of (8.45 m) in the east and (8.10 m) in the west, so that its total length in the east became (18.20 m) and in the west (16.50 m) until the borders of the high area of the floor, where it emerges again By (0.35 m), then each of them extends again until the eastern one meets the eastern wall of the southeastern tower and the western extends to meet the western wall of the southwestern tower.

As for the two walls defined for the courtyard, it extends from the east to the north with a length of (20.50 m), then turns left to the north-eastern room by a length of (10.0 m), and the western wall of the courtyard extends towards the north with a length of (15.35 m), then deviates towards the northwest room with a length of (10.50 m ), Where the northeastern wall extends after that behind the north-eastern and the north-eastern shooting hole to reach its total length (23.50 m), and the northwestern wall extends behind the northwestern room and the northwestern shooting hole to reach a length of (24.0 m).

The breadth of the two yards is the eastern and western walls (52.0 m), and the height of the floor next to these two walls is 3.50 m. The courtyard is also supervised in the northeast and northwest, as well as in the north it is supervised by three holes for cannons each with an Armstrong cannon. It was noticed that the upper floor adjacent to the eastern

and western walls had been raised by half a meter in a later period when two layers of debris were found.

### The northern section of the castle, north of the courtyard

#### Northeast room



Pl. 9. The northeastern façade of Al-'Abed castle



Pl. 10. The northern entrance to the northeastern room at Al-Abed Castle



Pl. 11. The north-eastern room at Al-'Abed Castle

This room (pl. 9-10-11) overlooks the courtyard with two fronts, the first in the southeast and its length (8.30 m) and the second in the southwest and its length (8.25 m). It extends from the southwest to the northeast. As for the south-eastern façade, on its southwestern tip is an entrance arched with a semicircular arch, its breadth (1.65 m) and its height (2.25 m) and its lintel of stone width (0.40 m) and height (0.15 m). It leads inwards. As for the northwestern façade, it ends at its southern end with another entrance of its width (1.65 m) with a semicircular arch leading to the corridor vaulted with a semi-



cylindrical vault leading to the interior, which is the same height as the southeast entrance (2.25 m) and has a stone lintel height (0.15 m) and width (0.40) M).

As for the south-western façade (pl. 65), in the middle of it is the entrance made with a circular arch of 1.05 m wide and 1.75 m high. It was surrounded by courses of tooth stone, and the knot cymbals continued with these stones, and they fell, and only four of them remained on each side of the entrance. The lower stone is 0.64 m in length, 0.39 m in height and 0.33 m in width, 0.33 m in length and 0.39 m in height and width at the entrance to 0.64 m. These stones have been placed to support the two sides of the entrance. The third stone has the same sizes between them. The fourth stone is 0.36 m long, 0.30 m high and 0.20 m wide, and this stone represents the beginning of the man of the necklace that crowns the entrance and was composed of seven stones, the middle of which represents the key to the knot and that was similar to the entrance leading to the sum Southwest, which will be mentioned later.

You may notice that the architecture followed in the construction of these walls the method of building the two sides of the wall with regular carved bricks and filled the space between them by breaking bricks, stone and mortar, and the façade was supported by tooth stones at its ends, which represent the two legs of the arch that leads to the interior from the southeast and northwest. These two entrances are supported by stones, but the length of the stones is less than at the southwestern entrance, where the sizes of stones are (0.45 x 0.24 x 0.30 m).

The southwestern entrance leads to the interior of the room, which is preceded by a square area topped by a shallow dome of diameter (1.0 m) resting on four spherical triangles and the height of the dome (2.20 m), while the height of the legs is 1.80 m, which is the same height as the vault of the two corridors leading to the outside. The floor of this area is 0.40 m lower than the floor preceding the entrance and 0.55 m from the lintel, and the architect has implemented a staircase at a distance of 0.20 m from the face of the wall with a width of (0.50 m) and a height of (0.15 m).

The dome-covered hall leads to two corridors on the right and left, ending with the two aforementioned entrances, and the height of the basement of each of these two corridors is 1.80 m from the floor from the inside and 2.10 m from the outside, and the corridor rises from the outside by 2.50 m from the floor of the lobby Where the man ascended the basement towards the outside and became inclined (pl. 11), and the hallway leads to

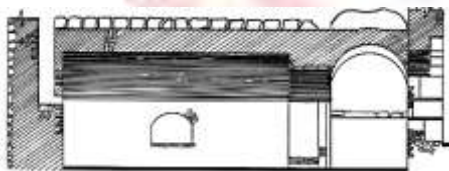


another entrance facing the southwest entrance and has a width of (1.0 m) and a height (1.85 m) and heads a semicircular arch with a thickness of (0.25 cm), and the floor that leads to this entrance is The floor of the lobby is 0.40 m lower than the floor outside the main entrance to the room and the other two entrances, and there was a wooden lintel for the entrance leading to the room, its thickness is (7 cm) and its height (5 cm).

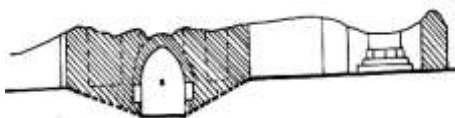
This entrance leads to the room (pl. 67), which has a length of the southeast and northwest sides (4.50 m), while the length of the north-eastern and southwestern sides is 2.05 m, and it has a semi-cylindrical vault rising from the floor by (2.20 m) and a thickness of (0.40) As for the southwestern wall of the room in which the entrance is located, it is 1.0 m thick and in the middle of both the northwest and southeast sides with an entrance, the floor of which rises from the floor of the room by (0.30 m), and the breadth of this income is (0.80 m) and its height (0.85). M) and its depth (0.40 m), which is knotted with a semicircular knot.

The basement man rises from the floor by (1.20 m) and is located at this level in the middle of the northeast wall, with a square opening of 0.15 m in length and 0.20 m deep, leading to a ventilation channel running through the northeastern wall, and each of its ribs is 0.30 m long. Its depth is 1.40 m from the surface of the basement, and its mouth rises from the top by 2.60 m from the floor of the room. The architect has executed the two walls of the room on which the basement is based, with a thickness of (0.90 m) occupying the basement (0.40 m) on each side, and he also filled the gap that was created between the southeastern and northwestern façades due to breaking stones, bricks and mortar between the walls of the room and the two walls defined for the facade.

### **The northwest room**



*Fig. 6. A section with the northwest room from east to west*



*Fig. 7. A sector with the northwest room from north to south*



*Pl. 12. The northwestern façade of Al-'Abed Castle*



*Pl. 13. Part of the northwestern room of Al-'Abed Castle*

This room (Fig. 6-7, plate 12-13) overlooks the courtyard with three facades, the first of which is the southwest and its length is (8.30 m) and ends at the southeastern end in an entrance arched with a semicircular arch that leads to a vaulted corridor with a semi-cylindrical vault of 1.60 m in width. This arch is 2.25 m higher than the floor before it, and it represents an entrance with a lintel of stone width (0.40 m) and height (0.15 m), and this corridor leads inwards, and the two sides of the entrance were supported with tooth stones, and the knot was also established with stones. As for the northeastern destination, it overlooks the third shooting hole, its length is (6.75 m) and at its southeastern tip there is a vaulted entrance leading to the inside of the room with a width of (1.60 m), and it rises from the floor by (2.20 m) and has a lintel width (0.40 m) and height 0.15 m).

The two vault extends towards the interior to meet in front of the entrance to the room, as the corridor slopes inclined (pl. 69) inward also to reach the entrance area, which is a height above the floor outside the room (0.40 m). The height of the outside area is with the floor only, as for the basement, it runs inclined and parallel to the inclination of the floor and its height from the outside (2.20 m) as well from the inside as well, and the façade ends with tooth stones, and the entrance arch was also stone.

As for the southeast façade, it is 7.85 m in length, with the middle entrance leading to the meeting point of the two corridors, and the breadth of this entrance is 1.05 m, and it has a semicircular arch with a height of 1.75 m and is made of stone. The third and fifth stones



are 0.25 m, and the height of each is 0.30 m. As for the second and sixth stones, each is 0.40 m long and 0.30 m high, and the key to the necklace is 0.46 m high and 0.20 m wide. The arches are based on the two sides of the stone entrance on the outer front only, where we find three stones below each leg of the necklace, while the lower one is 0.60 m long, 0.35 m high, 0.33 m wide on the inner face, and the second stone is 0.33 m long and high (0.35 m) and its width on the inner face (0.60 m). The third stone is similar to the first stone in its dimensions.

At the two ends of the façade there are stones to support the two corners of the tooth stone, where there are five courses placed in the easy-to-carry manner, each one has a height (0.30 m) and a length of the courtyard (0.26 m) and the other side (0.52 m), while the second course is opposite to the first, and the third is like the first and so on.

The entrance in the middle of the southeast façade leads to the square hall topped by a shallow dome, 2.20 m high from the floor, which is 0.50 m lower from the third shooting hole floor and 0.40 m from the floor in front of the entrance, and the dome is built on spherical triangles at the corners. As for the floor, it rises outward from the two corridors leading to the two side entrances by 0.40 m, and the basement continues with the same height outward, as is the case in the north-eastern room.

It is noted that the height of the key nodes from the top is 2.60 m, which is the same as the surface of the dome, which is 0.40 m thick. We will also find that the height of the room's vault is the same height, which indicates that the room's surface was running at one level and the thickness of the nodes is equal in that. With the thickness of the dome and the thickness of the basement, the architecture was forced to raise the level of the two outside entrances to the corridors so as not to cause confusion due to the difference in the levels of the floors, and therefore a tilt occurred in the two vaults towards the outside and the height of the vaults was kept, regardless of the height of the floors.

As for the door leading to the room, which is facing the door of the room, it turns from the sides by 0.10 m and to it is a semicircular arch of 0.25 m thickness and has shoulders of each of them (0.10 m) wide, and then the breadth turns to 1.20 m after it was 1.00 m.

As for the room to which the door leads, it is length in the northeast and southwest (4.50 m), and its width in the southeast and northwest (2.0 m), and in the middle of the north-eastern and southwestern sides are two entrances, each with a height of (0.40 m), depth (0.40 m) and height (0.60 m) and its breadth (0.80 m). They are knotted with two

semicircles. The room is topped by a semi-cylindrical vault that starts at a height of (1.20 m) from the floor of the room and reaches at its top to (2.20 m) and in the middle of the northwest wall of the room, and at a height of (1.20 m) a square opening has a side length (0.15 m) and depth (0.17 m) It leads to a vertical channel in the northwestern wall, measuring 0.35 m in length, 0.27 m in width and 1.40 m in height, while the height of its opening from the outside from the floor of the room is 2.60 m.

The excavation was carried out in the north-eastern and southwestern walls of the room, and it turned out that it has two covers, the first which is defined by the room and its width (1.05 m), while the outer one is 0.70 m wide, and the space between them was filled by breaking bricks, stone and mortar.

### **The northern shooting hole**

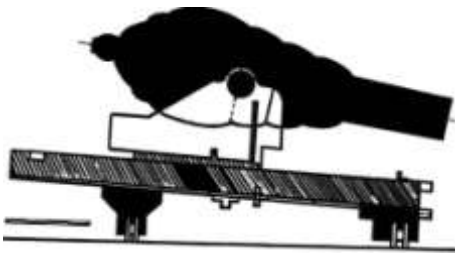


*Fig. 8. A sector in the north of Al-'Abed Castle*



*Pl. 14. The northern shooting hole at Al-'Abed Castle*

It is the main shooting hole and is located on the axis of the entrance and the lobby (Figure -98 panels 14-15-16) and is equipped with a huge cannon (10 inches). The detection of this shooting hole and other shooting holes showed the extent of the architectural development of the shape of The shooting hole was free from the presence of an upper lintel and was located outside it a bench that allowed the soldiers to stand to put the projectiles into the muzzle of the cannon, as well as the shooting holes were attached to the chambers in which the soldiers hid during the beating to avoid the huge sound of the launch of the projectile. The shooting holes and the outer wall of the castle.



*Fig. 9. Armstrong cannon 10-inch*



*Pl. 15. Armstrong's 10-inch cannon at Al-Abed Castle*



*Pl. 16. Two Armstrong 10-8-inch cannons at Al-Abed Castle*

The shooting hole overlooks the yard with an opening wide (8.85 m) and defined by two walls, the first in the northeast and the second in the northwest. The length of the first wall is (3.30 m) and the length of the second wall (3.90 m) and each of the two walls ends towards the north with a deviation of (0.45 m). The distance between the eastern deviation and the western deviation is (4.52 m). As for the northern wall of the shooting hole, which is at the same time part of the north wall of the castle, it is 4.45 m long, and in the middle of this wall is the shooting hole.

It is noticed that the shooting hole (pl. 73) was executed by this wall, which represents a rectangular entrance, its depth (0.45 m) and length (4.45 m), and the shooting hole was made of stones each of which is 0.45 m high and 0.40 m wide. One of them remained on the right, and the firing hole also made a lintel of stone, its length (1.60 m), height (6 cm) and width (0.60 m), below it a bend in a trapezoidal shape that narrows inward to reach its width outside to (1.37 m) and its height (0.35 m) Its depth is (0.35 m), and with this recess an iron cylinder fixed in the stone is used to fix the cannon.



It revealed two semicircular steps attached to the wall of the shooting hole. The first step is 3.0 m long, 0.30 m wide and 0.20 m high, and a second step is topped by 2.40 m long, 0.30 m wide and 0.13 m high. And the creation of these two steps was to fix the cylindrical shaft for the entrance as well as the soldiers to climb into the shooting hole when placing projectiles in the barrel of the cannon.

As for the shooting hole floor, it is of stone and it consists in the south of three sides, the middle side is from the north wall by (6.30 m) and the length is (3.41 m), while on the east it is (3.66 m) and its length in the west (4.0 m) and this floor consists of A row of stone with a width of 0.45 m, followed by rows of bricks with a width of (0.55 m) numbering (20) rows, then we see after that two rows of stones with a width of 0.25 m for one row are trapped between them by the bar for the movement of the cannon from the front, and the stone floor continues until the bar The front at a distance of (3.10 m), and the width of the bar is (0.30 m). As for the part on which the cannon moves, its width is (5 cm), as the cannon was running on four wheels, each with a groove equal to the width of the bar.

As for the height of the shooting hole, it is equal to the height of the floors that precede the north-eastern and northwestern rooms, which rise by (3.50 m) from the floor of the entrance hall and (0.40 m) from the floor of the two aforementioned rooms, and it is also lower by (0.10 m) from the floors of the shooting holes first and third.

### **The northeastern shooting hole**

He revealed the architectural details of this shooting hole (pl. 71), which was equipped with a 7-inch cannon, while the shooting hole overlooked the northeastern side, and the shooting hole broadened towards the courtyard (8.45 m) and its ribs differed in its angles and sizes due to the consideration of the external wall reinforcement and the clear deviation. In it, along with the adjacent sections, both the northeastern room and the shooting hole itself, and therefore the shooting hole became irregular, so we find that the southeast wall, which represents the front of the room's northeastern shooting hole, extends a length (6.40 m) where it is located leading to the room.

Then this wall deviates to the north with a length of (2.45 m) to go with the wall in the same direction for a distance of (2.10 m), where it meets the wall facing the shooting hole in which the firing hole is located, and this wall extends towards the north with a length of (4.50 m) and then deflects towards the southwest with a length of ( 2.0 m), where it turns



back by (0.10 m), and then continues in the same direction for a distance (4.80 m) until it meets the middle shooting hole, and the length of this northwest wall is (7.38 m), and there is an entrance that leads to a room confined between the first shooting hole and the third.

In the middle of the north-eastern wall of the shooting hole an apse is in a trapezoidal shape similar to the apse in the middle shooting hole and is 1.30 m wide, 0.30 m high and 0.35 m wide inside. An iron cylinder is attached to it to install the cannon. This apse is topped by a 1.60 m stone lintel. M), height (0.60 m) and width (0.90 m), and on the sides of the apse are two pieces of stone, each of them height (0.30 m) and length (0.40 m).

The firing hole was above the large stone that was located in front of it from outside the castle, a bench that helped the soldiers to stand to supply the cannon, and this bench and the top of the stone were climbed with two steps of ladder, the first rising from the floor of the shooting hole by (0.25 m), its width (0.25 m) and its length (2.25 m) The second is 0.22 m in height, 0.64 m in width, and 1.75 m in length. As for the floor of the shooting hole, it is made of stone and bricks and has three sides starting from the front of the tower and the length of its middle side facing the northeast wall (3.35 m), the length of its right side that meets the northwestern wall of the northeastern room (3.90 m) and its left side that meets the wall Northwestern, is 3.60 m in length.

At the beginning of this floor we see a row of tooth stone with a width of (0.45 m), followed by a floor of seven courses of brick stacked next to each other, followed by a row of stone width (0.15 m) interspersed with five stones width (0.45 m), and this row corresponds to another row Of the stone with a width (0.25 m) and interspersed with five other stones forming with the previous row a recessed channel with an iron bar on which the cannon rotating on four wheels moves, and the width of this bar is (0.10 m), and after that we find (27) rows of bricks followed by a row of The stone, 0.15 m wide, is facing another row of stone, and between them is another channel with a bar on which the front wheels of the cannon.

As for the room, which is located between the first and middle shooting holes, it is preceded by a slope of brick width (1.50 m) in length (0.85 m) on either side of the area leading up to the entrance to the room, its width (0.65 m) by length (1.50 m), and the floor in front of the room is lowered from the floor of the shooting hole. A wall of width (0.30m), height (0.35m) and length (2.85m) separates this floor from the shooting hole on the opposite side of the entrance, and the slope is from the rows of bricks as well as the

partition wall between the shooting hole floor and the floor of the room.

The architecture took advantage of the resulting space between the first and middle shooting hole and the northern wall of the castle to create the room as a storage room for cannons' missions or to hide the soldiers while the gunpowder was fired away from the influence of sound and smoke.

The room occupies a triangle whose length is in the southeast towards the first shooting hole (7.38 m) and in the northwest towards the middle shooting hole (4.25 m), while the base of the triangle is represented by the northern wall of the castle with a length of 10.50 m. The room was built inside the triangle and the resulting voids were filled in around This room is built for the purpose of fortifying the area.

As for the room door, its breadth is 1.0 m, with a depth of 0.38 m, and the entrance opening is above a semicircular arch with a height of 1.70 m from the floor, and this opening leads to an irregular-sided room, the length of the western side is 2.25 m. 0.95 m) from the southwestern corner, its income is knotted with a tapered arch, its breadth (0.40 m), depth (0.24 m) and height (0.44 m), while the northern side is (1.75 m) long, and the length of the eastern side is (1.45 m). 0.58 m) from the southeast corner, there is an entrapment arched with a tapered arch, its breadth (0.48 m), depth (0.24 m) and height (0.44 m), while the southern side is (1.75 m) long, with the entrance at a distance (0.40 m) from the southeast corner And (0.35 m) from the southwest corner.

As for the ceiling of this room, it is a tapered vault running from south to north and starts below the level of the beginning of the entrance arch by (0.25 m) and the height of its legs is (0.75 m). The height of this vault is (1.20 m) and rises by (0.25 m) from the entrance arch. It is also raised from the floor by (1.95 m).

### **The northwestern shooting hole**



*Fig. 10. A sector northwest of Al-Abed castle*

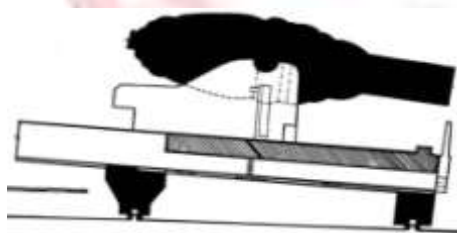
This shooting hole is confined between the northwest room and the middle shooting hole (Figs. 10-11 Pls. 17-18), and its ribs are irregular as well. Its layout is multi-angled, and the architecture has taken advantage of the area between this shooting hole, the middle shooting hole and the north wall of the castle in building room to be used as a shelter for



soldiers during the war, or as a warehouse for artillery supplies. As for the southwest side, it is divided into three sections, the first of which is the northwestern front of the room and its length is (6.75 m), and at its southeast start there is the entrance to the room with a cylindrical vault, and the middle side on this side is 2.85 m long, and it heads towards the north and then turns towards the northeast along the length (1.75 m).

As for the right wall of the shooting hole, it extends (4.85 m) long, then protrudes (0.20 m) and then extends (2.60 m), until it reaches the northwest wall of the shooting hole, which is 4.10 m long, and in the middle is a special arch for the gun mounting cylinder, which is Its breadth is (1.30 m) and it narrows in the interior to (0.35 m), while its height is (0.33 m), and it is topped by a stone lintel of length (1.40 m), height (0.55 m) and width (0.60 m), and this apse is preceded by a two-step stairway of the first length ( 2.70) and its width (0.35m) and its height (0.25m), while the second step is (2.0m) in length, width (0.70m) and its height (0.27m).

As for the shooting hole, it is built with stone and overlooks the courtyard with three sides. The length of the middle side is (3.0 m), the length of the right side (3.20 m) and the length of the left side (3.70 m). The floor is determined from the outside by a row of stone with a width of (0.40 m), and the distance between the two bars reach (2.70 m) and the width of one bar is (0.15 m). Rows of bricks have been stacked, and the distance between the first bar and the stairs is (0.20 m). It is worth noting that the architect used stone and bricks in the shooting holes so that the rows of bricks absorbed the vibrations of cannons and the stones helped to strengthen the floors.



*Fig. 11. Armstrong cannon 8-inch*



*Pl. 17. The Northwest Shooting Hole at Al-'Abed Castle*



*Pl. 18. Armstrong's cannon 8-inch at Al-'Abed Castle*

As for the room that occupies the space between the first shooting hole and the third shooting hole, it is preceded by a wall of height (0.35 m) separating the floor of the shooting hole and the floor in front of the room and is 0.35 m in depth and 3.30 m in length, and the entrance is preceded by a low area of 1.55 m. M) and its width (0.90 m) leads to the door of the room, and leads to the floor of the shooting hole and the middle hole with a sloping floor of brick rows that go up to the top with a width of (1.50 m). This room occupies an irregular area of construction sandwiched between the northern wall of the castle and the northern shooting hole and the northwestern shooting hole. The length of the first side (8.39 m), the length of the second side (4.43 m) and the length of the third side (7.45 m).

As for the entrance to this room, its width is (1.0 m) and its height is (1.75 m), and it has a tapered arch, while the depth of the entrance is (0.39 m) on the right side and (0.34 m) on the left side, as for the room, its southern side length is (1.74 m) and the length of its side The northern side (1.60 m), the length of its eastern side (2.32 m) and the length of its western side (1.51 m), and in the middle of the eastern wall there is a vaulted entrance that rises from the floor by (0.25 m), its breadth (0.37 m) and its depth (0.30 m), as for the height of this entry So it reaches (0.60 m), and in the middle of the western wall another apse rises (0.25 m) from the floor as well, its breadth (0.37 m), depth (0.22 m) and height (0.10 m), and above the room a tapered vault running from south to north starting at a height of (1.20 m) and its height from the floor (1.95 m) and from the top of the entrance arch (0.25 m). A sloping floor around the castle was executed on the outside from the north, east and west, to suit the elevated area inside.

As for the planning of the Al-'Abed Castle in the era of Muhammad Ali[1] - which he called this name as a result of the deposition of black sand - Muhammad Ali established a large number of coastal castles, the most important of which were the castles located



between Damietta and Alexandria, the most important of these were the eastern and western Boughar castles in Damietta, and the eastern and western Boughar castles at Rosetta, as well as Al-'Abed Castle, Al-Farsh Castle, Al-Alayim Castle, Al-Nawa Castle, Sheikh Idku Castle, Algeria Castle, Kalakh Castle, Al-Maadiya Castle, Burj Castle (4), Tower (3), Tower (2), Tower (1), and Abu Qir Castle (Kusa Pasha).

The entrance to the castle is characterized by the fact that it resembles the entrances to the castles that were established later, and which is surmounted by a triangular round (Fenton). The upper floor is defined by a wall equipped with shooting holes of a height of 1.0 m. This role is accessed by stairs that start in front of the entrances to the towers to meet at the middle of the wall above the entrance.

As for the planning of coastal castles, we will find the meeting of the ancient Byzantine elements and the European elements that began in the 15th century AD and were derived from the old elements as well, but developed as a result of weapon changes, as well as the elements that began to appear in Egypt during this period that came with the French campaign and then with the engineers. The French, in addition to the continuation of the ancient Egyptian elements that began to lose their military importance due to the change of weapons, and although they were not used defensively, they continued to show evidence of the development of war architecture.

We will suffice to study the planning of the castles of the coast and the types of designs that were used in this period, with a group of castles in the area between Damietta and Abu Qir due to the large number of them as well as the similarity of their plans to some extent, and they were called the crescent because its northern section takes the shape of a crescent and this method has already been mentioned. He found the castles of Europe[13-14].

The façade, as it is now, extends in length (47.30 m) and in the middle of it is the entrance block, which is 5.30 m in length and 1.20 m in thickness. As for the shooting holes, each one is 0.90 m high and 10 cm wide and widens outwards to reach its breadth. It also rises to (0.55 m) and its height (0.90 m) as well, as it rises from the floors from the outside by (1.85 m) and from the inside (1.15 m), meaning that the rooms had a height of (0.70 m) from the outside and from the entrance hall. To the era of Muhammad on also the corridor and the two stables located in it.

The southeastern and southwestern towers date back to the era of Muhammad Ali, as each of them protrudes from the façade by (6.35 m) and the length of the southern side is (14.0



m) and the length of the eastern side (13.0 m). And the wall connected to the south side of the two towers has four shooting holes each, and the south wall has eight shooting holes.

As for the southern rooms, there are two on each side between the hall and the tower. The length of the first room is in the east, with the east and west walls (6.60 m) and its width in the north (3.80 m) and the south (3.90 m), and with the shooting hole in the north, three in the south and six in the west, and the room The second is in the East, so its length in the north and south is (15.05 m) and its width in the east and west (6.50 m), and with this room ten shooting holes in the north and eleven in the south. The breadth of the shooting holes in these two rooms is (0.55 m) and its height (0.90 m), and it rises from the floor by about (1.15 m).

As for the two rooms, the two areas to the west of the hallway are similar to the first in the east, while the western room is in length in the north (15.30 m) and in the south (15.42 m) and in width in the east (6.58 m) and in the west (6.65 m). In terms of number and sizes, the separation walls of the rooms are 0.50 m thick, the northern façade is 0.60 m thick, and the northern wall of the entrance lobby is 1.0 m. The rooms lead a corridor leading to the two towers and the room entrances, and to the north of it the floor rises, where the cannon area is 3.0 m from the floor of the lobby. Each tower of the two towers consists of two rooms, each of which opens on the corridor with an entrance and in the eastern room, four shooting holes in the south, and there are eight shooting holes in the western room, four of which are in the west and four in the south, and there is similarity between the two towers in the number of shooting holes and in other details.

Each of the entrances to the four rooms is surrounded by two shooting holes that overlook the passage and are similar to other shooting holes. The thickness of the wall separating each room is (0.50 m). The wall facing the tower on the corridor is (0.70 m) thick.

The entrance is to the courtyard, which is 52.0 m wide and defined by the thickness of each of them (0.70 m), and the floor rises by (3.0 m) towards the east, west and north where the areas of cannons, shooting holes and rooms in the northern section.

The north-eastern room and the northwestern room overlooked the courtyard with two entrances each (2.25 m) high, topped by a necklace of tooth stone, as well as the shoulders. The entrance opens onto a corridor leading to the room leading to the right and left, where the south leads to the courtyard and the other leads to the shooting hole of the northern and eastern shooting holes. Or northwest, and the corridor meets the front entrance in a square



area topped by a shallow dome based on spherical pendentives. The height of the dome is 2.25, as is the height of the vault.

As for the room, it has an entrance on the corridor and is topped by a semi-cylindrical brick basement with two entrances on either side and an air hole in the back wall.

The castle was equipped with three shooting holes looking out towards the Mediterranean, and these shooting holes surrounded the spaces in which the first rooms were built between the first, middle and second shooting holes between the third and middle shooting holes, and each of them had a half-cylindrical basement.

During the reign of Ismail Pasha, some modifications were made to the elements of the castle to increase the defensive strength when the Armstrong cannons were used. Instructions were issued regarding the restoration work in the forts on Muharram 5 1284 AH (1867 AD) “to restore the douches with the bricks and the height of the floor by half a meter and flush with the concrete. Necessary to present and present the most important things about what is important”[5].

This necessitated the addition of new rooms due to the inability to add rooms in the northern part of the castle, as the rooms were added in the southern section, where the rooms and the towers in the southeast and southwest, and the first of these additions was the addition of a wall in the second room east of the hallway where the room was divided into two rooms of the length of the first in the north And the south (3.65 m), while the second room is in length in the north and south (10.90 m) and the thickness of the wall separating the two rooms is (0.50 m), and the first room becomes pale of shooting holes in the north and three in the south, and the second room has eight shooting holes in the north and south .

In view of the construction of the wall separating the two rooms, which connects with the northern and southern walls between the second and third shooting holes in the north and between the third and fourth shooting holes in the south, an entrance has been opened in the eastern wall leading to this room that is entered from the southeast tower and is 1.20 m wide, The evidence for the addition of this wall is that it separates from the façade wall and the northern wall of the rooms, and the distance between the two shooting holes between which the wall is located is (0.83 m), which is the same distance between each of the two shooting holes, and the wall may block part of the first shooting hole west by the south wall and the first west by the north wall.



The floors of the rooms and the towers were raised by (0.50 m) with bricks and mortar (concrete), which necessitated the raising of the shooting holes by (0.30 m), so their height from the modern floor became (0.95 m) and the height of each of them was (0.60 m), thus the ceiling height became more than Floors (2.75 m).

The two shooting holes surrounding the entrance to each room in the tower were opened to two windows each widening (0.75 m), the distance between each of them and the entrance is (1.15 m), the window height is (1.70 m), and the lower lintel rises from the floor by (0.15 m) Where this lintel rises from the floor of the lobby by (3.05 m) and rises (0.40 m) from the upper steps of the shooting holes, and the height of the buildings is higher than the lintel of the windows (0.90 m) and the height of the ceiling of the rooms was until this period (3.25 m) when the shooting holes were high By (1.15 m) from the floors, each shooting hole is 0.90 m long and has a building height of 1.20 m. The thickness of the roof was 0.40 m. The entrance hall was the beginning of the roof vault in it (3.95 m) where the shooting was The holes rise 1.85 m from the floor and the shooting hole is 0.90 m long. It has a building with a height of 1.20 m.

As for the southwestern tower, the width of the two rooms that make up the tower was reduced, so the width of the first room in the north was reduced to (5.20 m) and in the south (4.36 m). As for the second room, its breadth in the north (5.05 m) and in the south (4.35 m). The wall separating the two chambers was made of bricks with a thickness of (0.50 m) and the wall located to the west of the second room with a thickness of (0.90 m). This caused the blocking of two shooting holes looking towards the south.

Two windows have been implemented in each of the two rooms, two of which are surrounded by an entrance from the two entrances leading to the two rooms. The width of each of the four windows is (0.75 m) and its height is (1.70 m), while the height of the window from the floor is (0.15 m). Two rooms have been added at the end of the corridor in the west, while the southern room is length in the east (6.55 m), in the west (6.50 m), in the north (3.20 m) and in the south (2.90 m) and its entrance is in the east and its breadth is 1.0 m. Its length in the east (2.90 m), in the west (3.10 m), in the north (3.30 m), and in the south (3.25 m), its entrance is located in the east, and its breadth is (1.0 m).

A room was added in the east, measuring 9.0 m in width and 18.0 m in length, and it was bordered in the east and north by a wall of stone, 0.50 m thick. This room was topped by a semi-cylindrical basement extending from south to north, and it had a ventilation hole



adjacent to the western wall. This room is entered from the east corridor to the north of the rooms and the southeastern tower.

The floor of the northern section and the area adjacent to the eastern and western walls were also raised by (0.50 m) after the introduction of modern cannons. The raising of the floor around the north-eastern room and the northwestern room led to the reconstruction of the two vaults above the corridor leading to the room, and the entrance to the courtyard, which In the middle of the main façade, the floor in front of it was raised, its lintel was raised, and the height of the arch that crowns this entrance was 1.75 m. As for the two vaults, they were rebuilt in order to be able to raise them after raising the floor that leads them outside to compensate for the value of raising the floor, which is 0.50 m. Then the two vaults were rebuilt inclined, each of which rises from the outside and from the inside by 2.25 m. Thus, there was a union between the heights of the two vaults, inside and outside, and the vault above the room.

A ground for shooting holes of a height (0.50 m) was executed. As for the northern shooting hole, a ground of tooth stone was executed alternating with rows of bricks. Two rods were fixed on them to which the cannon placed with the shooting hole was installed. Likewise, the first and third shooting holes were also rebuilt. Throwing holes to match the cannons that were added to the shooting holes. As for the room, which is sandwiched between the shooting holes, their floor was kept after the surrounding floors were raised, but a slope of bricks, width (1.50 m) long (0.85 m) long, was executed on both sides of the area leading the entrance to the room 65 cm wide. With a length of (1.50 m), a wall was built advancing this room with a width of (0.30 m) to separate the old level that leads the shooting holes and the modern level with the shooting holes, and the sloping floor outside the castle was raised from the east, west and north to suit the height that occurred inside. As for the cannons discovered in the castle, three of them were found, and Muhammad Ali took great care in fortifying Al-Abed Castle, where he placed eighteen cannons in it, as it contained three shooting holes in each of the two cannons. The Armstrong Shashkhana guns were 7-8-9-10 inches[15].

The cannons were manufactured with a sliding bolt and this type of cannons struck many types of projectiles, such as cylinders (cartridges) filled with lead balls (chratil) or explosive or incendiary dunks. The manufacture of cannons began to organize and set the rules and principles for their construction, for example the caliber of the cannon became



determined by the diameter of the barrel, but rather was determined by the weight of the projectile in pounds, and the rule was that the ratio between the diameter of the projectile and the diameter of the barrel was in a ratio of 7 to 29 of its diameter[16-17].

In the era of Muhammad Ali and Ismail, two types of cannons were used, the first of which is the cannons made in Egypt, and the second is the Armstrong type guns that Ismail imported from England. The size is to accommodate large quantities of gunpowder sufficient to increase the thrust of the shells, and a large number of Egyptian and English cannons were found in the castles of the coast of different calibers, and each cannon consists of these cannons of two parts: the first is the barrel and the second is the base that is based on four wheels running on bars Iron, and the cannon was equipped with means of raising and lowering the barrel and adjusting the direction, as well as the missile lever that lifted the iron and stone shells to place them in the barrel, and the operation of the cannons was done by placing gunpowder inside the fire house through a hole at the top, and the shell was placed from the front. These cannons were used in Egypt along with Egyptian wooden or iron cannons. It was noticed that the upper floor adjacent to the eastern and western walls had been raised by half a meter in a later period when two layers of debris were found.

The main shooting hole located on the axis of the entrance and the lobby was equipped with a massive 10-inch cannon, and the detection of this shooting hole and other shooting holes showed the architectural development of the shape of the gunholes where the shooting hole was free of an upper lintel and was located outside it with a paddle Allows soldiers to park and project projectiles into the barrel of the cannon. It is noted that the shooting hole with a lintel of stone below it is in a trapezoidal shape that narrows inward, and with this arch an iron cylinder fixed in the stone is used to fix the cannon. It revealed two semi-circular steps attached to the wall of the shooting hole, for the soldiers to climb into the shooting hole when placing the projectiles in the barrel of the cannon.

As for the shooting hole, it is made up of rows of bricks and stones, between which the bar for the movement of the cannon is confined from the front, and the stone floor continues until the front bar. The gun was driven on four wheels, each with a cavity equal to the width of the bar.





## **Conclusions**

- The excavations conducted for the Al-‘Abed Castle had a great impact on showing the architectural details of this castle, reaching its architectural origins, and excavations were carried out up to the ancient foundations and determining the developments that passed on it.
- Excavations proved that the entrance to the castle is similar to the entrances of the castles that were built in the era of Muhammad Ali, and that the upper floor is defined by a wall equipped with shooting holes, and this role is accessed by stairs that start in front of the entrances to the towers to meet at the middle of the wall above the entrance.
- The excavations confirmed the convergence of the ancient Byzantine elements and the European elements that began in the 15th century AD and were derived from the ancient elements as well, but developed as a result of changes in weapons, as well as the elements that began to appear in Egypt during this period that came with the French campaign and then with the French engineers, as well as The continuation of the ancient Egyptian elements that began to lose their military importance due to the change of weapons. Although they were not used defensively, they continued to show evidence of the development of war architecture.
- The castles in the area between Damietta and Abu Qir were called the crescent because their northern part takes the shape of a crescent, and this method was previously found in the castles of Europe. The castle was equipped with three shooting holes looking out towards the Mediterranean, and these shooting holes surrounded the spaces in which the first, middle and second shooting holes were built between the first, middle and second shooting holes, and each of them was topped by a half-cylindrical basement.
- Stone was used to support the corners, while the walls were erected with stones and the facades were covered with bricks.
- Some modifications occurred to the elements of the castle during the reign of Ismail Pasha to increase the defensive strength when the Armstrong cannons were used. This necessitated adding new rooms due to the inability to add rooms in the northern part of the castle. The floors of the rooms and the two towers were raised, necessitating the raising of the shooting holes, and the various modifications made to the architectural and defensive elements of the castle.
- In the era of Muhammad Ali and Ismail, two types of cannons were used, the first of



which was the cannons made in Egypt, and the second was the Armstrong type cannons that Ismail imported from England.

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**It is a mortar made of red dirt and lime with the remnants of burning furnaces (ashes) in certain proportions, and it was used in walls built of natural stone or bricks, and it has poor durability as well.**

