

# KHIRBAT MARBAT BADRĀN: AN ARCHITECTURAL PATTERN OF AN AMMONITE PRODUCTION CENTER

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The Excavation results: Building site consists of two complexes called Production Center. *Mustaqarr* in Arabic, Site preparation: Coordinates: Pal. G. 23910-15275. 913.575m ASL. The site grid divides the ruins into four areas by X and Y coordinates and the surveyor set out each square according to the overall grid pattern established for the site (**Fig. 1: a and b**).

The excavated area was in the middle of western structures of complex A. These accumulated ruins were examined and removed to allow excavations progress. It is located beside the north of structures III and IV and among structures II and I which was designated Complex A. Here the landscape slopes towards a branch of a valley located to the south of the whole site where a water reservoir/cistern was found collecting water draining from the area of the complex. This branch joined with Marbat Valley in the southeast edge of the settlement. A Wine Press is located on the east bank of Marbat Valley (See **Fig. 7: b**) and the remains of Iron Age architecture represented good archaeological evidence of the settlement (*Mustaqarr*) (**Fig. 2: c and d**).

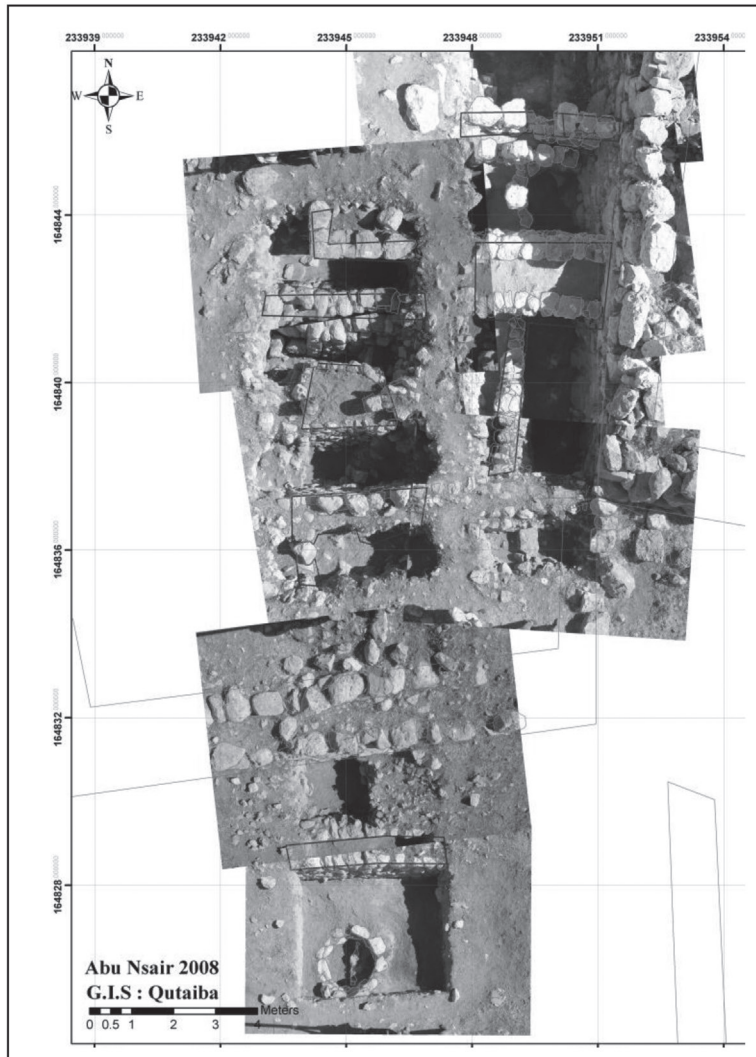
## Complex A

These buildings are located to the west of complex B on a flat area. From archaeological evidence, this position looks to have been the administrative sector for the whole center of *Mustaqarr*. Structures in both complexes are close together, designed as one unit of a workshop or factory. This indicates that Complex A and B are combined as a workshop or factory (Abushmais 2005).

This complex has four structures surrounded by courts. The walls of these buildings are 1.7m in height. Courts are used as stores or shelters (*Hawsh* in Arabic) without a roof, perhaps for seasonal work as in harvesting, dying or for any other material production. The walls were built from one row of rough-cut stones (1m to 80cm wide) built on the natural surface of the exposed bedrock. However, in some cases the bedrock was leveled to enable to be the foundation and the site was constructed on the virgin soil. (Structure II) (**Fig. 2: e and f**).

## Structure I

This structure is rectangular in shape 17.36×15.75m and the building has right angled corners of unorganized interconnecting stones. The top view shows four rooms examined from a new passage running from the north wall to the south wall. The middle part of the south wall has been damaged by human activities, its stones pushed into the structure and the entrance jambs laid between the collapsed stones area. The north wall had been destroyed from the middle sector, which looks like the main entrance of the building. The conservator reconstructed the upper course of the north wall to protect the structure/course from damage. Pottery sherds, found just under these stones, which removed, but to enable excavations going on, machinery will be required to remove the megalithic blocks scattered on top of the building. This structure has two courts located, one on the side of the west wall and the other on the side of the south wall, extending 5m alongside this structure (**Fig. 1: d**).



Signboard



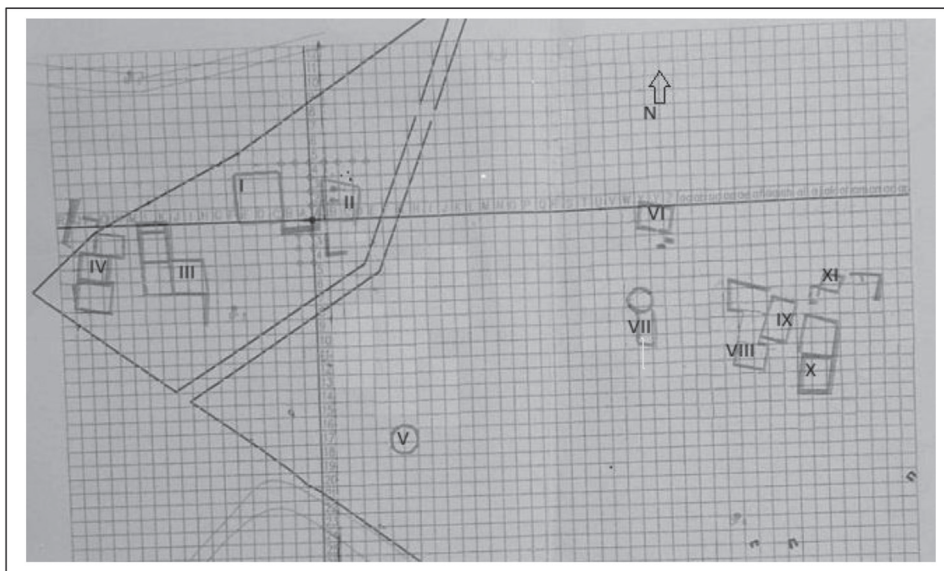
The excavated area:  
Complex A the western  
section of the site, part  
of structure II, silos and  
workshop rooms.

Structure VI

Fig. A

BELOW: Top Plan of  
site structures  
according to the grid  
point.

Fig.B

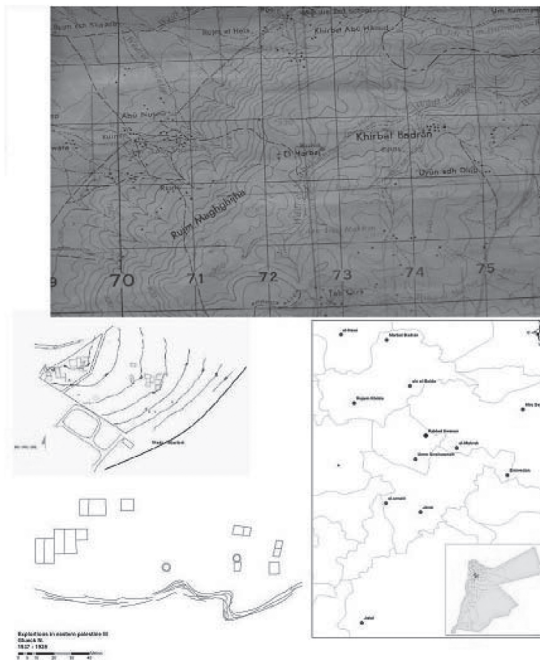


1. The grid points, the excavated sector and Site top plan.



C: Google earth. Site location

C: Geographical view of site location



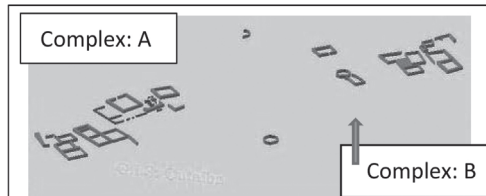
D: Reconstructed the upper part the east wall of structure I



E: Major sites of Ammonite culture, site top plan including counter. Glueck top plan 1937AD



F: Swaileh Geographical map, yellow mark is the site location. Above: map from Amman



G: The workshop in purple color the excavated section. Structures of the production center; group A and B.

3D Top plan

## Structure II

Structure II is a large rectangular shaped building, 13.22×12.7m and the plan. shows it has walls dividing it into rooms similar to structure I. Excavations revealed the two faces of the west wall (**Fig. 3: a**, squares A2, A3). In addition, in area B. sq. B2 includes part of this structure. Along the south side of structure II, a silo was recovered, and the layer looks to have been reused during 14<sup>th</sup> century, due to the Mamluk pottery (**Fig. 3: b**).

The exterior face of this wall consists of a row of large megalithic stones and the inside face of this wall was embedded with small and medium stones just to make regular façade to the rooms. The courses were built in an irregular pattern and the height of this wall was 3.86m indicating that these structures had two floors (**Fig. 4: a and b**).

The excavations revealed on the bedrock of square B: B2. an ashy layer 25cm thick containing an Iron II pottery jar sherd, few loom weights mixed with black soil and two sherds of Attic ware. This occupational *stratum* dated to late Iron II/Persian (**Fig. 4: c**).

The storehouse (basement) was constructed of parallel walls in the east-west direction and a 1.3m passage was discovered amongst them. Sq. A: A1: L2, A: A2: L4, B: B1: Obvious on the surface. **Fig. 4: a** in sq. B:B2:L2 it is constructed from medium rough-cut stones, without connection with the exterior walls of structures II, so this may have been added later. This distinctive location was prepared as a storeroom (**Fig. 4: b**).

The walls were standing on bedrock, and had pillars supporting the roof; the height of the walls is 2.3m. This building looks as it was belonging to one period of history. 85% of pottery sherds were found in *stratum* IIB. These rooms have been used as a storeroom or a workshop, gathering and storing produce, like oil or wine and clothes dyes. Production techniques flourished in the south Levant (Wright 1985). Finds of the same context and the design of the administrative production center supports the occupational and stratigraphic finds.

## Structure IV

Structure IV is a large, elongated building 20.56×13m (**Fig. 10**) with the wall's foundation,

lintels and entrance frame *in situ*, and made from rough-cut stone and erected on the surface of the exposed bedrock. The walls of this structure are 1.7m in height.

Square C: Q6 illegal digging has exposed part of a basement room being 1.1m in height. The roof is still preserved in a good condition, consisting of slabs 1.2×0.75×0.4m thickness. These slabs built in an accurate technical way to hold and support the upper floor as mentioned (**Fig. 4: b**). The structure itself seems to be a building for defensive purposes located at the edge of the complex, (the limited boundary of the site today), but part of this structures looks damaged.

The basement rooms prepared as the main storeroom for their production. Therefore, the same architect technique of constructions used in these centers of 'Ammān area, but the design varied from one structure to another within the same production center according to their requirement and environment (*Mustaqarr*, Umm *Suwaywīnah* center is the same type as this center) (**Fig. 5: a**).

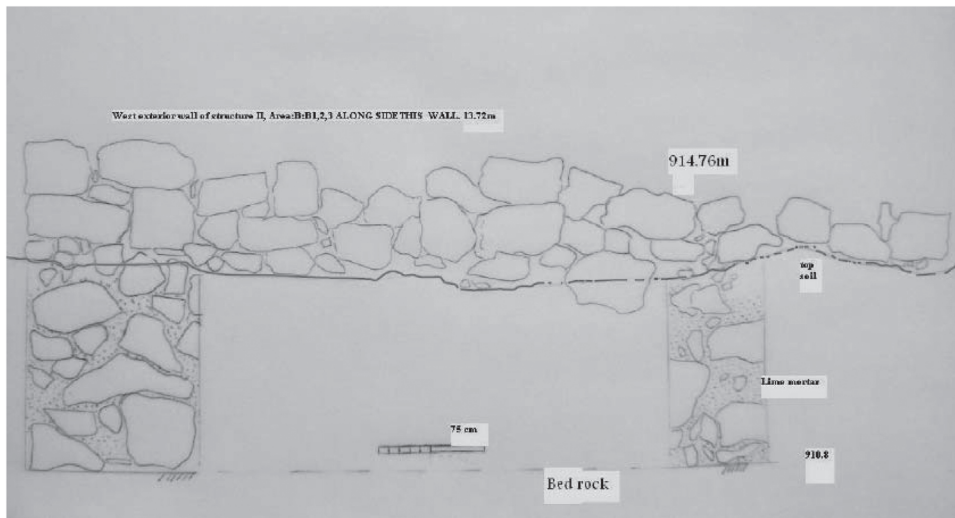
## Structure. V

Structure V is a circular building located in the center part of the complexes (Tower). It might be controlled the interior road between the two complexes, and overlooking the water collecting system, cisterns situated in this location to collect rainwater entered three reservoirs/cisterns carved into the bedrock. This watchtower guarded this position, standing on the south edge of the settlement (**Fig. 5: b**).

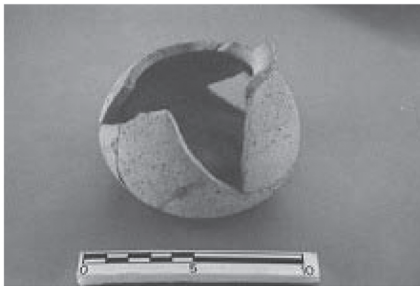
Structure VI is a rectangular building 12.43×9.69m whose walls are constructed from rough megalithic stones 1.8×1.3×0.8m. Two to three courses are still standing 2.1m high, the entrance 0.92m wide and 1.7m in height. A passageway divides the structure into four rooms or maybe two halls and the walls of this pathway have 10 stone pillars. This is parallel to the sites at Jāwā, Jalūl and Khaldā, which have pillared rooms within the rectangular structure (**Fig. 6: c, d and e**).

## Excavating Square C:

Q6. L. 1.25cm the topsoil contained a few pottery sherds, 3 pieces of carbonized branches mixed with terra Rosa soil. L2. A flagstone



A: One row of rough-cut stones built on the natural surface of the exposed bedrock.. The height of this wall is around 3.86m.



B: The walls were standing on the bedrock and it had pillars supported the roof of the basement. The deposit of the silo reused in Mamluk time: pottery 1300AD.

3. Excavation revealed elements of establishing the buildings, for example Structures II and I.

covered the entrance to the pathway, and a fragment of a rolling stone found *in situ* beside the doorjamb. This pathway ended by two pillars *in situ* and there are three more still *in situ* in another area, but the other pillars have collapsed in their position. In some areas, the bedrock is still visible.

This structure was reused at the later part of Ottoman period (*ca.* 1880-1916 AD), because its virgin soil without organic or deposited remains. The late occupational remains were reused as an animal fold. Seven pottery sherds were found, six of them dated to the late Ottoman period (heritage pottery type), and one sherd is a domestic offset rim dated to late Iron II b (Fig. 6: f, Ammonite, Mortaria).

### This Structure Represents The Following Characteristics:

1. The exterior walls consisted of natural megalithic rocks (the interior walls built from rough-hewn stones).
2. The surface of the location was prepared, but the structure in general founded on a natural flat land. This building stands alone like a ritual kind of house.
3. The structure reused as animal fold during the last century.
4. Excavations recovered the threshold and the jambs of the entrance *in situ*. Doorframe is set on the threshold vertically and almost consisted of hewn stones.
5. The passageway of the entrance paved by flagstones; rooms still have a few paved areas.
6. Ten pillars used to support the roof or the interior walls. Five of the pillars still standing *in situ* and the other have fallen beside their positions.
7. These pillars may have produced four room designs.

Natural caves used as tombs, (Fig. 7: a). The structures of complex B. on the top plan, only a few tests were done, but nothing excavated after structure VI. These structures built from rough-cut stones like complex A, it may have been used to clean the wool and/or to gather the animals, close to the water reservoirs. Cup holes presented here (near this complex), this could be means that the population continued to exploit this land probably for their requirements.

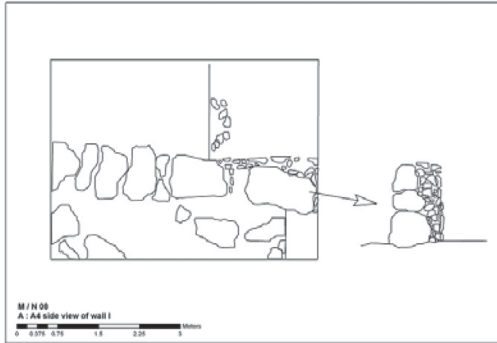
There are two wine presses on both banks of the *Marbat* valley, discovered by the survey team. Medium size basins cut into the flat areas of the natural rock surface of the site (workshop, see Fig. 7). These observations confirm how big the settled area belonged to the center (the workshop buildings, group B) (see Fig. 2: g).

These complexes (monumental structures) could have been tribal territories. Settled societies, like farmers, surround the administrative centers, as in ‘Ammān, KHirbat As Sūr, KHirbat Al Hajjār, Jāwā, Rujm Al Kursī, Al ‘Umayrī and Umm Ar Rujūm (‘Ayn Al Baydā), which all had a similar structures. Therefore, the domestic complex was just for industrial preparations (Storage pottery pots; oil and wine jars, potter’s marks as Aramaic impressions or ostrakon, and pieces of Attic ware imported in the late sixth century to the fifth century BC).

### A Summary of the Excavated Artifacts.

Several layers of debris, 2.2m in depth accumulated on top of *stratum* IIb (*stratum* IIb consisted of hard beaten soil inserted in the bedrock gaps). These layers in A: A1:16-17, A: A2:15-13, A: B4:20, 9 B: B2:9 contained fill soil mixed with a fair number of rocks, especially unhewn stones (distributed walls). This material represents the remains of the destruction.

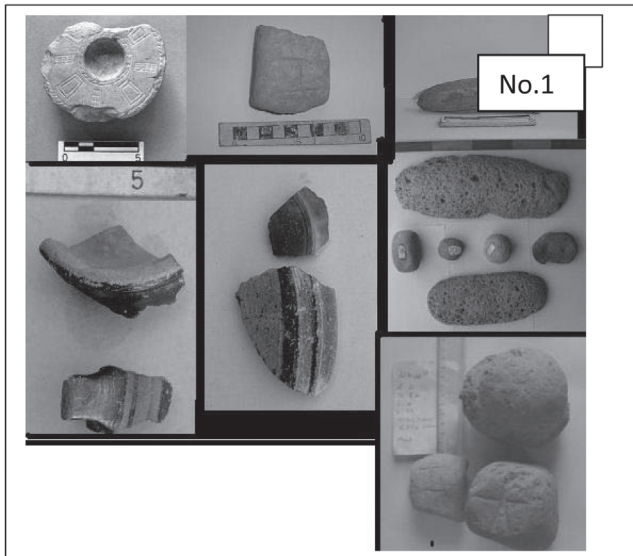
The varied artificial material within this fill includes loom weights (Abu Shmais 2005), fragments of scale armor, fragments of stone vessels (mainly basalt millstones, pestles, mortars, the upper part of a millstone, weights and stone pendants). A fragment of soft limestone with a depression in the center, a type of mortar, used for grinding, but unfortunately it was in a bad condition. The second type of mortars have shallow bowls with three legs and made of basalt. The third type is made of basalt with a shallow nicely smoothed bowl with a curved wall, offset rims and with a ring base. Also discovered were fragments of bronze (ring shape), cosmetic discs, figurine fragment, potter’s mark (Aramaic letters: *Alef* and *Zain*), animal bones and carbonized grain seeds. Everything was recorded. In addition, these layers yielded pure late Iron II/Persian pottery. Pottery sherds included a few black burnished ware 6<sup>th</sup> to 5<sup>th</sup> century BC, found in



A: The exterior face of this wall consisted from a row of a large megalithic stones



B: structures have two floors. Here Illegal excavation. The left picture Pillars constructed from stones



C: These finds from the same occupational level. A destruction strata among structures II and I .there are a Greek pottery sherds, this connected to the powerful of administrative production center.

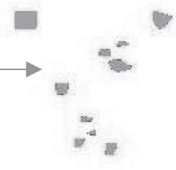
A: archaeological center (Mostaqar), a production center consisted of 10 structures and occupied plateau looking over fertile plain located south of Amman today. Reused in Roman and Islamic period; Especially Mamluk period. The watchtower excavated by Yazeed 'Olayan



Top plan of Umm Suwayweneh structures, the location of watch tower, removed after rescue excavation.



Tower location



B: Structure V: Watchtower location where the reservoirs area founded. 9m in diameter, unexcavated. Looking over the main road where the weak part of the settled center.



Watchtower looking over the natural valley



See: Plate 1. Figs.G



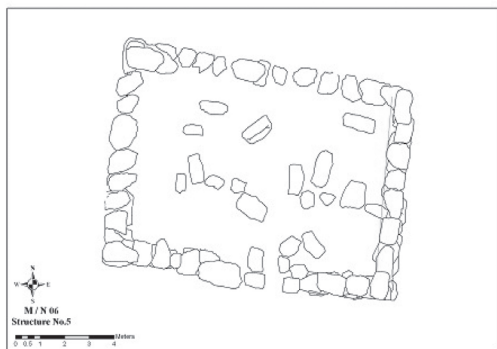
C; StructureVI, before excavated



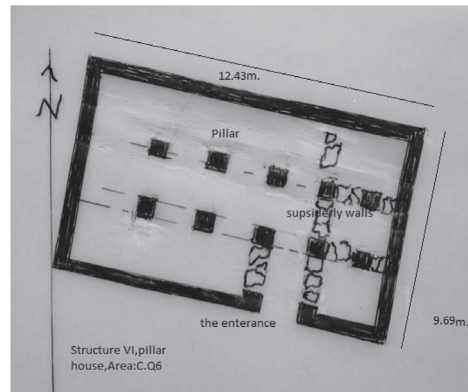
C; StructureVI, before excavated



D; Top plan of structureVI



D; Pillar house Recostruction and sketch



E: flagstone pavement used in the passage way leded to the rooms, the door lentil reconstructed. Black painted on a rim of Ammonite mortaria



F: Mortaria

the foundation trench of A: B4:20 the rocky sediment, wheel burnished bowl rims found almost in *stratum* BII. Parallel of this found in *Hisbān*, Al ‘Umayrī, Jalūl and ‘Ammān citadel (see **Fig. 7: c**).

Bones found in *stratum* IIa (A: A1:14-15, and A: A2:11 included cattle, sheep, goats and horn of wild imported deer (European Dama and Persian fallow deer, Dama from Mesopotamia. Heltenorth 1959). Sheep and goats continued to dominate the assemblage of their products, (wool, milk and meat) assuming as part of their industry. This information seems to indicate the occupational level of the site at this period had a high intensity of a commercial production system (LaBianca 1995a).

The presence of fallow deer would seem to indicate a relatively heavy grass habitat and balanced approach to the removal of the forests for agricultural purposes (Younker 1989a).

**Note:** Bones of fallow deer traced as holy relics during the Iron Age and Roman era (Heltenorth 1959).

### Analysis of Characteristic Pottery Vessels and Sherds.

The data presented from the cultural remains indicates that this center inhabited during the late Iron II/Persian period. Therefore, there are no good remains to indicate any other period.

Pottery sherds developed slowly through this phase of Iron Age. The excavated areas revealed 1,870 of the pottery sherds dated to Late Iron II/Persian and few to the early Hellenistic era. A few Roman and very few Mamluk sherds were also found.

*Stratum* IIa and IIb in areas A, B, and C considered a destruction *stratum*, has a great quantity of mixed pottery sherds. Jars, oval, with a round base, short vertical ridged neck and narrow opening, with incision lines on the shoulder, buff to reddish color, wheel made and a whitish slip. Triangular rim profile was common too and some stoppers for the jars made of clay. This market refers to the quantities of wine and oil jars in production.

The second style of jar has straight walls, two thickened loop handles attached to the body jar, round base and folded thick rims with low neck. The surface color pale brown.10YR7/3. Sausage jar (Yassine 1988), whitish color and

courseware (see **Table 1**).

Recovered from area A: C4:9, coarse and grey core. Storage jars, without neck, black core 10YR5/3, round base with a straight body.

One whole mouth krater jar, decorated with wedge impressions on the rim. It looks like slightly curved jar with handles. Parallel to that at ‘Ayn Ghādī (Stern 1982) (**Fig. 7: c**). There were many various styles of whole mouth jars (kraters), some with inverted rims and others with elongated and thin round rims. The interior was black, and some were ridged, open mouth and grooved outside rims (**Fig. 8: a**).

Sherds of vats (deep bowls), coarse ware, and number of pierced sherds were found indicating the repair and reuse of these sherds.

There are two styles of bowls, mostly have wheel marks inside, indicating a fast wheel was used. The main characteristic is the offset rims, this appears to be the common surface treatment, with a red burnished surface, but there are a few black wares poorly burnished. The earliest styles of bowls have black painted bands, late Iron IIb, and double disk base, hemispherical in shape, which are black burnished to a high standard. There are a few sherds of Attic wares, dated to sixth century BC, one of which has a white band near the base (See **Fig. 4: c**)

Another style of bowls called *mortarium* is a shallow circular bowl, blackish ware with disk base (**Fig. 9: a**). This looks like an imitation of the basalt ones (the end of 7<sup>th</sup> century BC). Red burnished pottery, *mortarium*, and another sherd looks like fish scales, which had open incurved rims, this type appeared in Persian period.

Cooking pots, with folded out rims, loop handles attached to the rim. Bad firing coarse ware 5YR6/4 light reddish-brown, having chert and limestone inclusions and a round base (Sauer in *Hisbān* after 25 Year 1994; Dornemann 1983; Herr 1994).

### Interpretations

The short knowledge of the Ammonites, their territory, culture and history, was based on ancient Biblical texts. This means that more excavations and research are required to increase the knowledge of their history and culture. This study will bring new evidence to the historians and added to the Biblical knowledge already

**Table 1:** The Corpus of this Pottery Sherd is 6<sup>th</sup>/7<sup>th</sup> century BC. Light red, wheel burnished few black ware L. Iron II- Persian, storage Jars have over lapped rims, However, there were a few Early Roman/Hellenistic pottery sherds.

Area Sq. L.	Jar	Storage	Krater	Bowl	Cooking	Lamp	Jug	Juglet	Strainer	Cup	Decenter	Plate	Mortar	Others	Remarks
A:A1:1	11	16		11		1					1				L.IrII
A:A1:3	2	27		10		3	1			1					L.IrII L.Hell/ER
A:A2:7		7		6		3									L.IrII L.Hell/ER
B:A1:22		3			1		1								IrII
B:A2:1	2			3									1		ER
B:A2:2	1	4		3											ER.IrII
B:A2:4	1	6		2											L.IrII
B:A2:6		7			1	1									L.IrII
B:A2:9	4	8			2										L.IrII
B:A2:11	6	2			2										L.IrII
B:A2:13		4			3										L.IrII
B:A2:10		9		2		1									L.IrII
B:A2:17	3	7			2	1		1							L.IrII
	55	80	2	96	28	17	6	3	2	0	2	0	2		L.Ir/II
	16	15	0	7	11	0	1	0	0	2	0	0	0	1 0tt.	Hell/ ER

known will enhance the history and culture of the Ammonites<sup>1</sup>. The archaeological evidence of the Ammonites at the *Mustaqarr* production centers was not seen in use elsewhere. (called Ammon Towers).

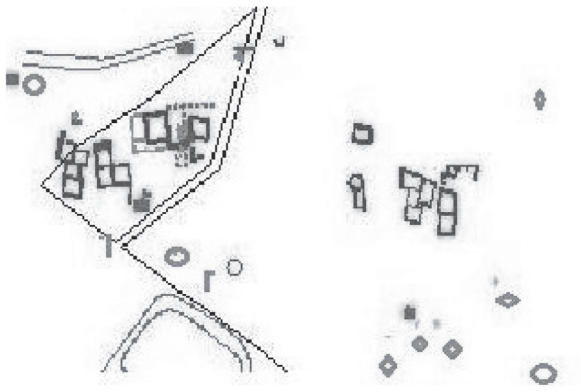
The building technique and architectural features, which are present at this site reveal good evidence for the Ammonite era (*Mustaqarr*, KHirbat Marbat Badrān). This center characterized by the use of megalithic stones, and the architecture looks like a fortification system, the major style of the workshop structures *rujum*. The native population of the central plateau of Jordan, used these types of building materials, construction technique and building designs. They embedded during cultural periods and presented architectural interaction, which spread in the south Levant through the ages (Jordan, Palestine and south Syria). This means it was a peaceful time with good relationships between the people. Culture produces a tradi-

tional design of regional architecture. The study produced a description of the specific techniques of construction that was evident from the excavated site and the correlation of these techniques with the building diagram, and the patterns of divisions arranged in the complex buildings. In addition, expression of their culture with group builders, the rules and the classification of building style, stones used in this style of fortifications, the variation of buildings and the comparisons of these centers.


Limestone and chert boulders were used to construct these buildings and rooms. The exterior walls of the fortification styles consisted of large boulders and large chert slabs. These stones range in size from 2.0m to 1.4m and such large stones were most common in these tower-like structures. The stone shape brought limited evidence of which coarse forms they were. Chert also used as the capstone over the basement (storeroom). It was lying flat to form the floor of the second room, some slabs had been prepared.

Most of the boulders were unhewn, nothing dressed, but they flattened the outer face of the stone to form the exterior face of the



1. Temple structure embedded to the Ammonite structure of Rujm Al Kursī which has the moon carved on both side of the entrance dated to 5<sup>th</sup> century BC, this produce the traditional design of regional deity. it is consisted of hewn limestone. Therefore, this is not just interaction, this religion spread in all parts of the region/Levant (see Fig. 10).



A: Cleaned and reused in 1967-1973. 5 caves  
One press on the other bank of Marbat valey





Green shapes: circles; presses. lines; reservoirs. lozenges; caves.

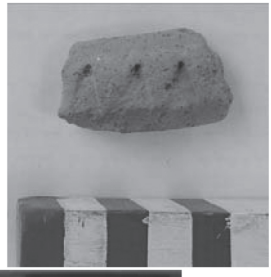




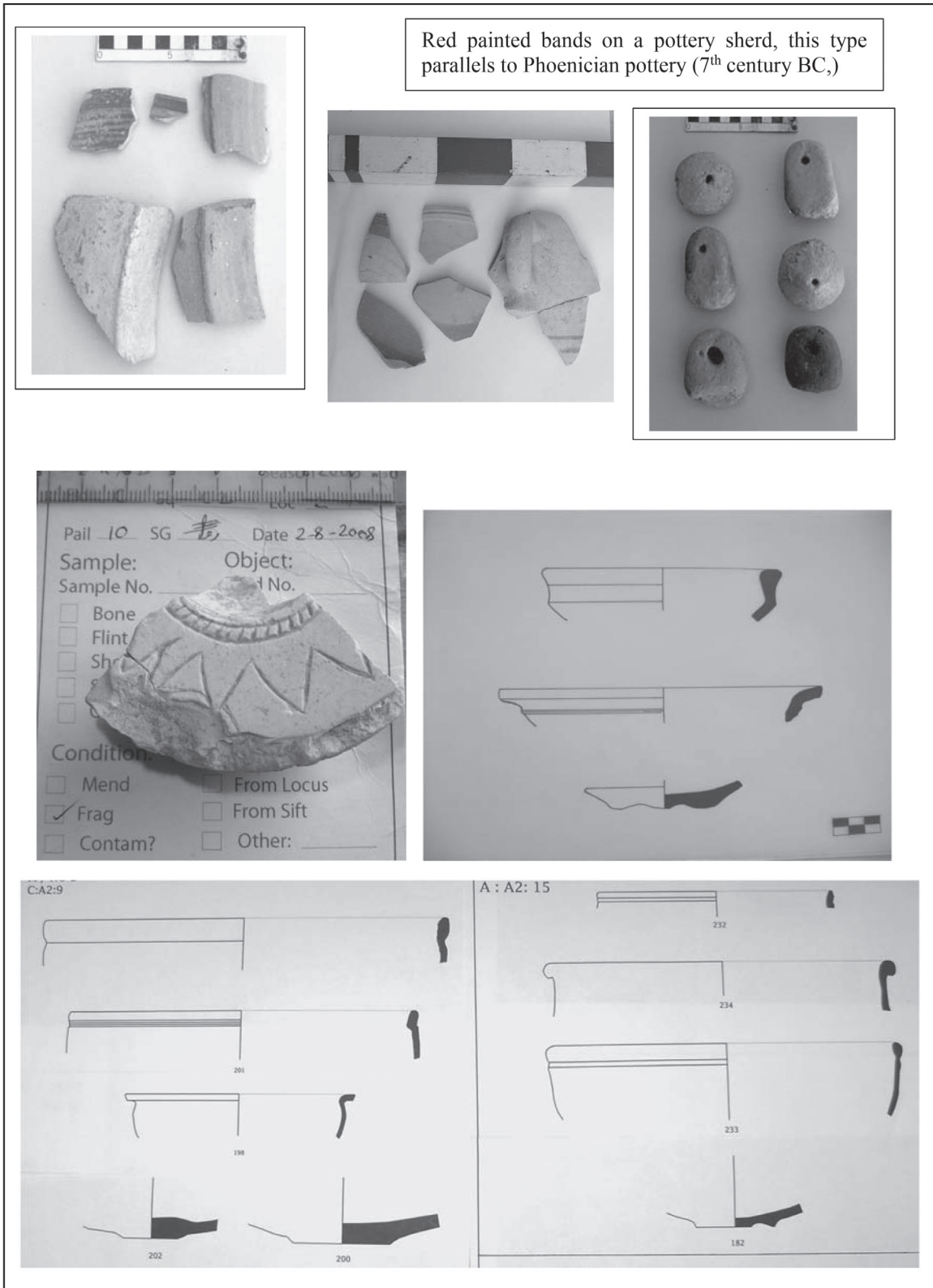
B: types of presses.

C: Objects: Deer horn, bronze sickle. Assyrian; Sausage jar, grinders & Persian impression on jar

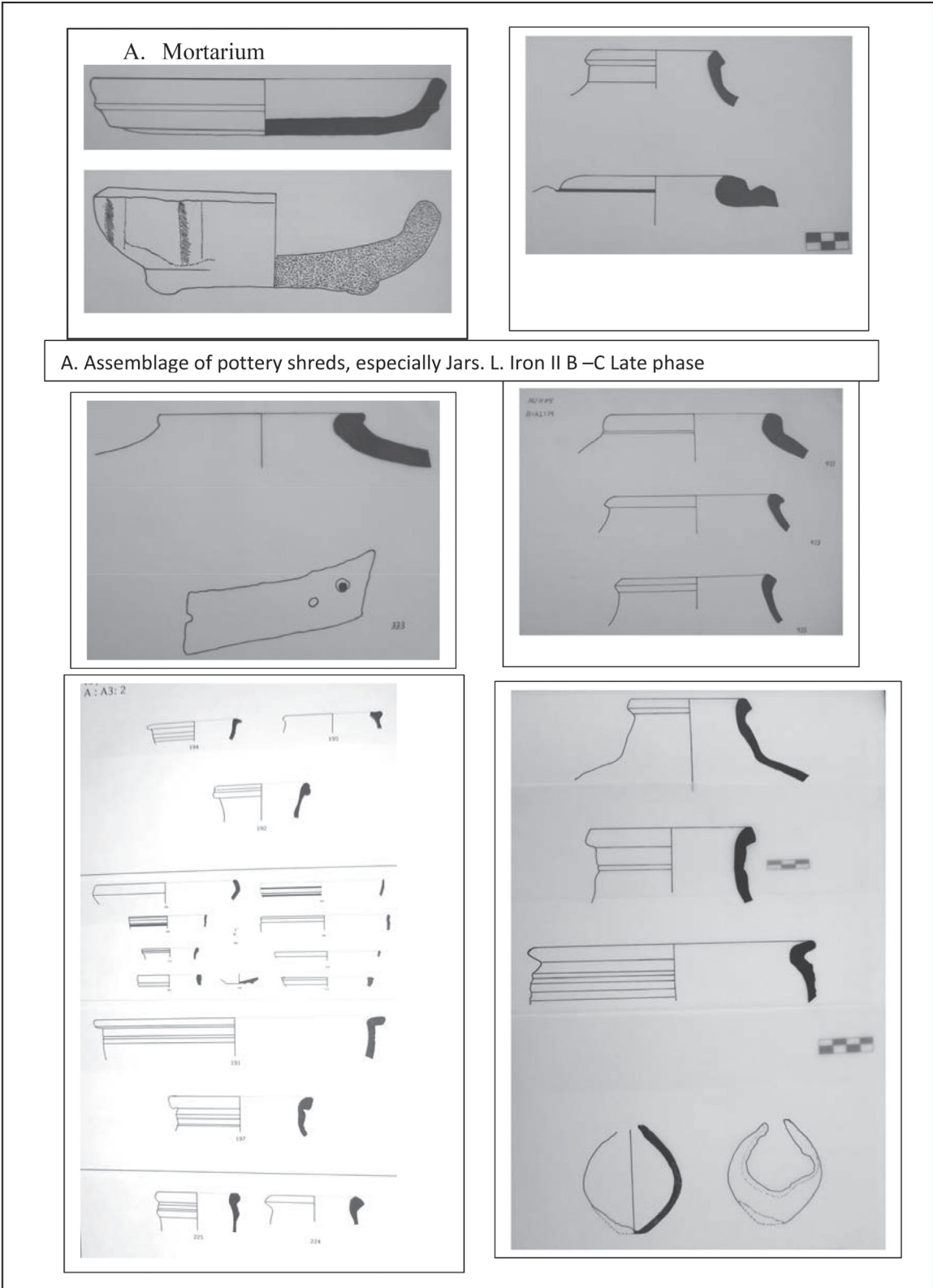


C: Discoveries

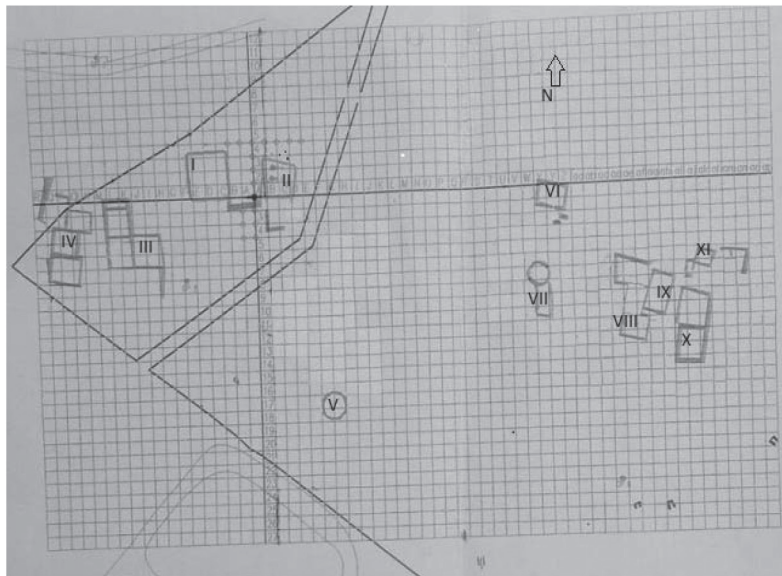




8. Pottery sherds with drawing. Loom weights.



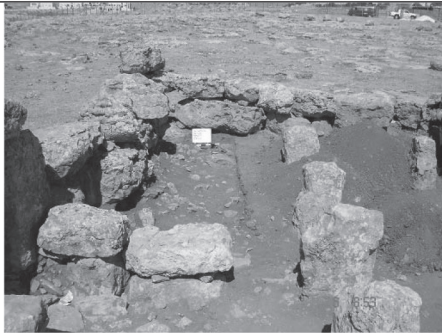
9. Assemblage of pottery shreds.



Structures measurements:

Complex A Structure  
 one=13.22X12.56.m.  
 Two=17.30X15.57m  
 three=26.30X22.87m.  
 Four=20.56X13m.

Complex B Structure  
 five=diameter 9.28m.  
 Six=12.47x9.23m. Seven=  
 (11.44x6.83m) +dia9.23m.  
 Eight=10.97x9.55m+15.42x11.  
 39m. Nine=15.74x9.16m.  
 Ten=25.83x12.49m.  
 Eleven=7.66x6.83m



Excavated the north section of structure VI



East façade of structure VI



Fig.No. 6,  
 native temple,Levant  
 This temple found in Rujum el-Kursi site/ Amman area, where they reused  
 Iron II Structure

wall structure. Therefore, the boulder seems rectangular from the first glance. Most of the fortification buildings here have a second room (so-called Ammonite Towers, late Iron II/Persian). However, it is completely of Iron IIB-Iron IIC buildings with a second roof, of which structures at Jalūl, Al ‘Umayrī and Umm Suwaywīnah are examples. These structures founded on the natural bedrock, (the small rooms) which served as a base. Squares; A: A1. A2. B: A1. A2. A3 and B2. (Yunker 1999; Herr 1995a. Daviau 1992).

The exterior walls were bonded at the corners; however, it was not only bonded, but also in some cases tied together with diagonal stones. This function was clearly seen in structures II and I. This style was also seen in contemporary late Iron II age outside Ammon region.

### Variation of Buildings.

The style of the outline of the structures has the same forms in most of ‘Ammān centers. This means that each center has a pattern complex established on an open field to protect the agricultural productions and looks over surrounding land which ensures a special location to guard the complex, the road and local production. In addition, what is interesting is the tower building (usually circle style) built as a guard overlooking the trade road and the structures of the complex. Therefore, the complex contained a watchtower guarding the weak points of the settled central area, the water resource, the trade road and the store buildings.

The complex consisted of circular and rectangular fortified structures, varied in size (Structure Measurements Written Down) and the most significant fact is that it not built on a previous ruin, but it is built on a virgin soil.

### Notes

#### *First Technique*

1. The fortified building is divided into rooms by interior pillared walls, connected with partition walls. Pillars served as foot support, raised above floor level (1.5-1.7m). Rooms have various shapes from one structure to another.

This is contemporary building in the regional sites, but the patterns of upper floor rooms are unknown, and it might be bigger than

the basement rooms. There is evidence of ceiling material found in square B: A2 and structure IV *in situ*. Excavation revealed wooden carbonized branches mixed with packed mud fallen on the floor of the room used for daily living. (Nothing dated by Carbon 14). In structure, VI a roof roller was excavated, mixed with the debris. It is used to press the roofs earthen surface after each rainy season. Examples are recorded in Al ‘Umayrī, Khaldā, Jāwā and Jalūl.

2. The second style in late Iron Age was the doorjamb entrance, standing upright, regular in shape and hewn, used to reinforce the doorway (See Fig. 6: e). parallel example Qasr ‘Ayn Al Baydā or Umm Ar Rujūm site.
3. The third style the structures connected with the open courts. It may have used as an assembly area for the camel caravans, oven production place or collecting crops or animals.
4. The fourth style was the division of the rooms inside structure II, square B: S2. The function of the sandy stonewall was used as a part of the oven structure, for boiling or smelting. The stones here were shattered from heating, and there was a large quantity of ash, 1.3m thick, found on the floor. It is a workshop room, which could be used for dying textile. A great number of loom weights discovered. In addition, there was no evidence of organic material mixed with this ashy layer, but only pottery sherds of jars.
5. In the fifth style, small and medium stones to regulate the inner face of the room walls had covered the inside of the exterior walls of this structure. The whole structure stands on flattened bedrock. It is the common typology of the excavated centers in the late Iron II era. Domestic rooms found outside structures II and I, silos in C: C2: 7 and in C: C4:3 discovered south of these structures and outside of courts. The excavated portion of structure II in sq. B: D2 and B: B2 exposed more than 85 percent of this structure, which was covered with modern debris, so the view of the structure raised above the ground about 0.7-1.2m, but excavation exposed another 2.40m, so the walls were preserved around 3.75m in height.
6. The sixth style was fortification type of



buildings, which adds and provides stability to these centers. This indicates that:

- 1- This society has a good economic situation.
- 2- The center had powerful and organized leaders.
- 3- They protected their local production.
- 4- The style of narrow entrances 97cm. wide was a good function to protect the agricultural-industrial productions instead of casemate wall or city wall; it is a way of defense. In addition, the regulatory of style buildings referred to an administrative leaders.
- 5- These structures not intended for defensive purpose nor represented the border for Ammon Kingdom. (There were no weapons or evidence of any military action. What is important was the watchtowers used to protect these centers). They were satiable from long time, and this referred to their culture. In was not solely an Ammonite feature. In Omari and Tabqet Phahel, late Bronze Age structures produced the prototype of Iron II L Iron II structures.
- 6- The measurements of all structure recorded in Plate 6.

### Acknowledgements

This project succeeded under the encouragement of General Director, friends of the Dept. of Antiquities Abu-Deiyeh, Dept. team: Dasoqi. Q. surveyor and draft's man, Sarhan M., Zaben I. Archaeologist, Photographer and Researcher of Ammon State/late Iron II period, Adeeb Abushmais. Note: this article continued the architectural style, which called Ammonite towers.

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