EVIDENCE OF NABATAEAN OCCUPATION AT QAṢR AṬ-ṬILĀḤ IN THE NORTHERN ‘ARABAH VALLEY FROM EXPOSURES IN WĀDĪ AṬ-ṬILĀḤ

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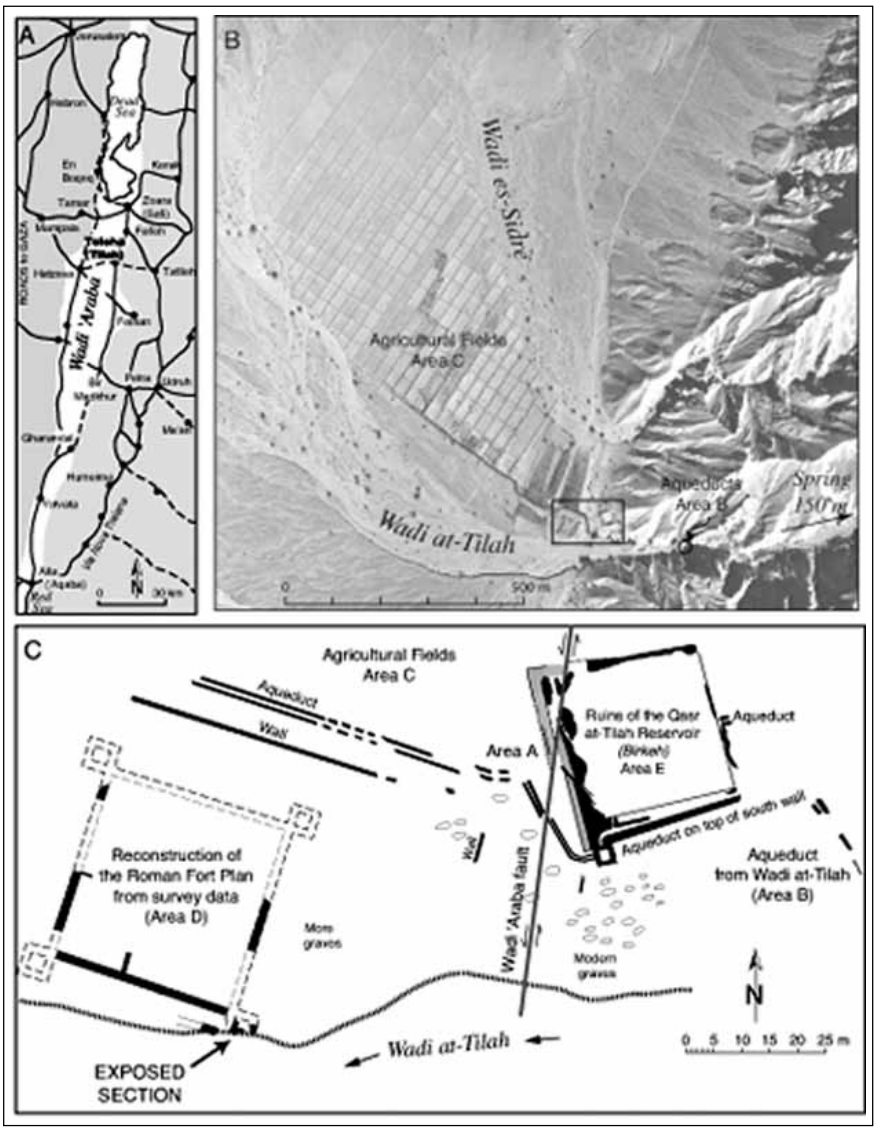
Introduction

The Qaṣr aṭ-Ṭilāḥ archaeological site is located in the northern Wādī ‘Arabah valley about 8km south of the escarpment to the Dead Sea Ghawr. The site is built on mid-Holocene alluvial fan sediments that were deposited from Wādī aṭ-Ṭilāḥ approximately 6,500 years ago (Zhang 1998; Klinger *et al*. 2000a; Niemi *et al*. 2001). The site contains a fort (caravanserai), a water reservoir with aqueducts leading to it from the adjacent Wādī aṭ-Ṭilāḥ, and aqueducts leading from the reservoir or *birkah* (**Fig. 1**). Another prominent feature of the site is the associated agricultural field system with its regular orthogonal plan.

The age of the ruins at Qaṣr aṭ-Ṭilāḥ was estimated to be predominantly Nabataean-Roman, with minor Late Byzantine occupation, on the basis of the surface scatter of potsherds (MacDonald 1992). However, charcoal collected from the mortar of the interior of the south wall and upper wall, above a repair, reveals that the extant water reservoir at this site was built in the late sixth or early seventh centuries (Niemi 2000; Klinger *et al*. 2000b), indicating its use in the Late Byzantine to Umayyad period. This is in agreement with the nearby *khirbat*, or village, of Late Byzantine age (MacDonald 1992). Abundant Nabataean surface pottery clearly indicates occupation at this site in the first century AD. The fort at the site is also identified as *Toloha*, which is recorded in the forth century *Notitia Dignitatum* as a base for a Late Roman cavalry unit (*Ala Constantiana*). *Toloha* is also recorded in the Beersheva edict (Kennedy 2004: 214).

The Wādī ‘Arabah Earthquake Project (WAEP) has conducted research at the Qaṣr aṭ-Ṭilāḥ archaeological site over the course of five field seasons (1999, 2001, 2002, 2003 and 2007), each lasting between one and three weeks in duration (Niemi 2000, 2002 and 2004). The main object of WAEP is to document the geological and cultural history of earthquakes along the southern Dead Sea fault in Jordan. WAEP uses geological and geophysical field methods, as well as archaeological excavations, to map and date the evidence of past earthquakes from faulting and from seismically-induced damage to ancient structures. Through this research, we seek to resolve major seismic hazard parameters such as the epicenter location, rupture length, fault slip, seismic intensity and magnitude of the large, historical (yet often textually undocumented) earthquakes that have had a profound effect on the cultural history of the region.

Archaeological sites that are built over active faults are unique because of their potential to yield the precise date and magnitude of individual historical earthquakes. The Qaṣr aṭ-Ṭilāḥ archaeological site is built across the seismically active Wādī ‘Arabah fault. Our research efforts have largely concentrated on mapping the *birkah* and aqueduct that are left-laterally offset by coseismic slip across the northern Wādī ‘Arabah fault (Haynes 2005; Haynes *et al*. 2006; Niemi 2007). The site plan map of Qaṣr aṭ-Ṭilāḥ shows the relationship of the structures to the fault (**Fig. 1C**). Two aqueducts that originate in the adjacent Wādī aṭ-Ṭilāḥ feed the *birkah* at the south-east corner and in the middle of the east wall. The south wall has a channel along the top that exits into a settling pool located at the south-west corner of the *birkah*. A short, NW-trending aqueduct connects the settling pool at the base of the *birkah* with a W-trending aqueduct that appears to extend to the field system. The NW-trending aqueduct has been ruptured



1. Location and site maps. (A) Map of some the Roman and Byzantine period roads and paths connecting forts and towns along and across Wādī ʻArabah. The figure is modified from that Parker (2000: 368). (B) 1978 aerial photograph showing the Qaṣr aṭ-Ṭilāḥ site and surrounding physiographic features (Royal Geographic Center of Jordan). Note the ancient agricultural fields represented as a grid on the mid-Holocene alluvial fan surface. Wādī aṭ-Ṭilāḥ, which flows from the spring east of the image, has eroded the south side of the archaeological site. The box shows the area detailed in **Fig. 1C**. *The circle shows the area of* **Fig. 4**. *(C) Site plan map of some of the structures at the Qaṣr aṭ-Ṭilāḥ site. The Wādī ʻArabah fault, the main seismically active structure of the Dead Sea fault system, trends NNE across the site. The location of the incised section shown in* **Figs. 2 and 3** *is marked in Wādī aṭ-Ṭilāḥ.*

by earthquake faulting (**Fig. 1**). Using paleoseismic and archaeological evidence collected from trenches excavated across this aqueduct and fault zone (Area A), we identified evidence for four ground-rupturing earthquakes. Radiocarbon dating from key stratigraphic horizons and relative dating using potsherds brackets the dates of the four earthquakes to some time between the sixth and 19th centuries. Individual earthquakes most likely occurred in the seventh, ninth and 11th centuries. Evidence for pre-seventh century earthquakes are likely at the site, but can not be deciphered from the extant aqueduct and *birkah* system as these date to the Late Byzantine and Early Umayyad periods.

Owing to our research priorities, our excavations at this complex multi-component site have been limited to those areas of the site that directly relate to the fault. In previous field seasons of the WAEP, archaeological excavation focused mainly on the area around the *birkah* at Qaṣr aṭ-Ṭilāḥ (Area A). However, in order to understand the context of the *birkah* and aqueducts, several surveys were conducted in the environs of Qaṣr aṭ-Ṭilāḥ to determine the relationships between the various water transport features and to understand the phases and types of occupation at the site. This included mapping the aqueducts within Wādī aṭ-Ṭilāḥ (designated Area B), surveying the agricultural fields to the west (Area C), investigating the south-east corner tower of the fort exposed in the incision of the wadi (Area

D), and mapping the *birkah* (Area E). In this paper, we describe evidence for the earlier periods of occupation of the archaeological site of Qaṣr aṭ-Ṭilāḥ from exposures in Wādī aṭ-Ṭilāḥ.

Cutback Exposure of the Fort and Earlier Structures

As part of our surveying for the site plan map of the Qaṣr aṭ-Ṭilāḥ site, we collected data points on the Roman fort. Although its wall alignments are not completely visible, the structure is a small *quadriburgium* with internal dimensions of 34m square and external dimensions of 38m square (**Fig. 1C**). The southern wall is well preserved, where a 2m-wide wall thickness is measured. The exact relationship of the corner towers to the curtain walls is not clear. The corner towers appear to protrude *ca*. 4-5m from the curtain wall, and the corner tower walls seem to align with the perimeter walls of the fort (see reconstruction of corner towers in **Fig. 1C**).

A stratigraphic section through the south-east corner tower of the fort and underlying structures was created by erosion in the incised bed of Wādī aṭ-Ṭilāḥ. We took advantage of this fortuitous exposure to document the stratigraphic relationship of structures in Area D. As we cleared away loose rubble and vegetation, it became apparent that the structure visible in the incised section, while underlying the fort, was in fact an earlier structure on a slightly different alignment. **Fig. 2** shows a photograph of the section and our drawn interpretation of the exposed stratigraphy.

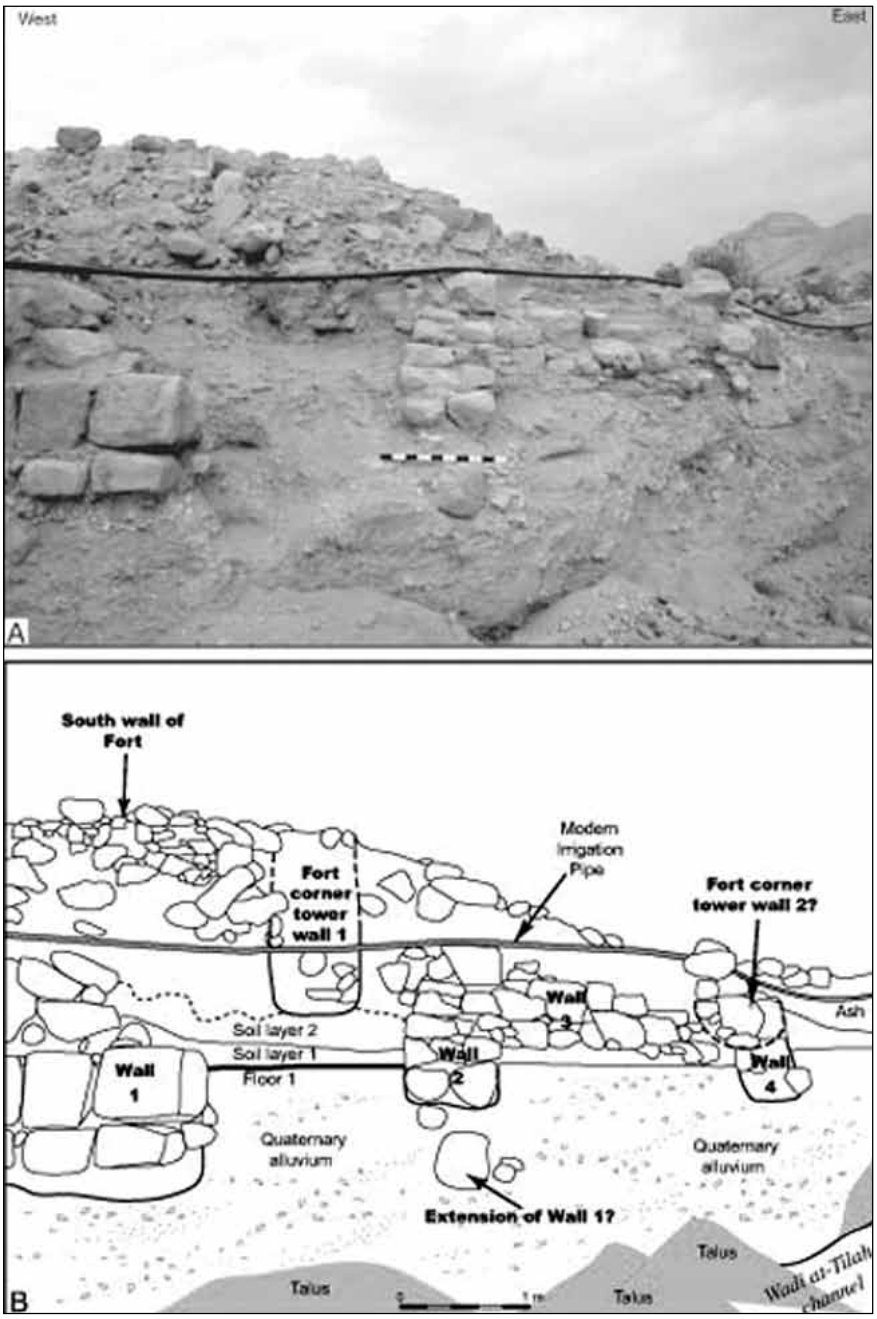
The structures visible in the wadi section consist of four lower walls labeled Walls 1 to 4, and upper walls and rubble from the Roman fort. In the lower section, two walls (2 and 4) are exposed predominantly in cross section and two walls (1 and 3) are exposed in longitudinal section. Between walls 1 and 2 there is an apparent floor or activity surface capped by soil layers composed mainly of decayed mud mortar and ash. Above these lower structures are the walls and collapse rubble of the fort. Two walls that are probably part of the south-east corner tower are exposed in the section.

Exposed both longitudinally and in section, Wall 1 consists of very large, hewn ashlar blocks, some as long as 80cm, with mud mortar and small chink stones in between. Wall 1 can be traced along the ground surface for 8m. It is clear that the wall was originally constructed within the alluvial fan deposits and not along a wadi exposure. Thus, the wadi has meandered to the north and cut through this structure. Wall 1 is preserved four courses high with the lower course apparently stepped outward. It is not entirely clear that this is the original configuration due to potential shifting in the exposure. Wall 1 is founded in a substantial foundation trench that was excavated 85cm into the gravel alluvium. The width of Wall 1 is 90-100cm. A boulder approximately 1.5m to the east in the exposure may represent the original extension of Wall 1 (**Fig. 2**). When a large boulder fell from the exposure (**Fig. 2C**), it was apparent that this rock was not part of Wall 2 as alluvial gravel is located between them. The relationship between Walls 1 and 2 therefore remains unclear. Wall 1 appears to be founded to a deeper level than Wall 2. The 90cm-wide Wall 2 is composed of two faces, one course wide and with a rubble core. The stones of the wall faces are square hewn on their outer sides. Wall 2 may have abutted Wall 1 or was added in a later phase.

Floor 1 located between Walls 1 and 2 is an ashy plaster surface that is approximately 2cm thick. Floor 1 apparently abuts both Walls 1 and 2. Overlying Floor 1 is a 15cm-thick soil layer (Layer 1) consisting primarily of decayed mud mortar. Abundant pottery sherds and near-complete vessels, including a Nabataean bowl dating from 20-70AD (S.T. Parker, pers. comm.) were found in association with the floor and soil layer. Layer 2 is a soil layer with abundant ash up to 30cm thick overlying soil Layer 1. It contains abundant pottery dating to the first-second centuries AD (S.T. Parker, pers. comm.).

Wall 3 is exposed in a longitudinal section and runs between Walls 2 and 4. It abuts Wall 2, but stops approximately 60cm short of Wall 4. Several long flat stones apparently more or less *in situ* across the thickness of the wall tentatively suggest that Wall 3 is part of a staircase. Wall 3 seems to be founded on two courses of small closely laid stones set in mud mortar, which themselves rest on the Quaternary alluvial surface. The original width of this wall/staircase is unclear due to lack of exposure of its north side.

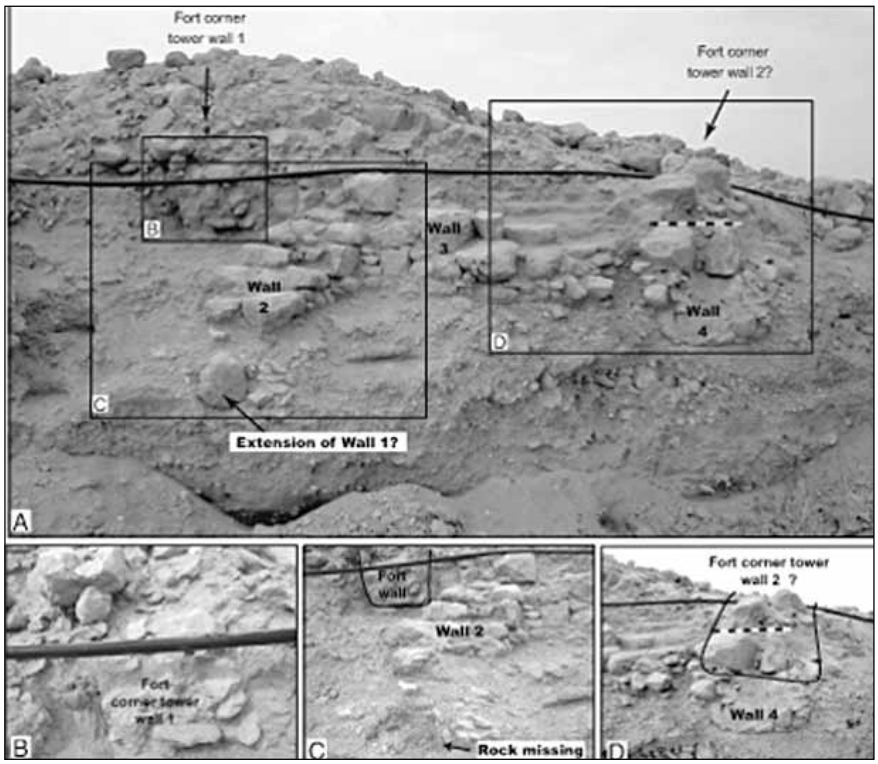
Wall 4 is exposed in cross section and has a similar construction to Wall 2. It is constructed



2. Photograph and section drawing of the cutback exposure across the south-east corner tower of the fort and underlying structures (facing NNE).

of two courses of facing stones, square-hewn on their outer faces, with a rubble core. Wall 4 is approximately 110cm wide and is founded in a foundation trench filled with mud mortar and cobble chinking. The foundation trench was excavated 50cm into the gravel alluvium. One of the stones from this wall displays typically Nabataean diagonal dressing. The upper courses of Wall 4 appear to be oriented on a different alignment and are associated with the later fort construction.

The relationship between the ruins of the fort and the lower structures can be seen through close examination of the upper strata exposed in the incised section (**Fig. 3**). The upper exposure is covered with slope wash and is more difficult to interpret. It seems that the foundations of the south wall of the fort lie above Wall 1 and about 2.5m above the channel of Wādī aṭ-Ṭilāḥ. The section exposes what appears to be the south-east corner tower of the fort. Fort corner tower wall 1 is founded on ashy soil layer 2 (**Fig. 3B**) and lies above Wall 2. It is about a meter



3. (A) Photograph of the exposure in Wādī aṭ-Ṭilāḥ showing location of detailed images below (facing north-northwest). (B) Close-up photograph of the fort corner tower wall 1. (C) Photograph showing the relationship of the fort wall with underlying Wall 2. (D) The fort corner wall 2 appears to be built on Wall 4.

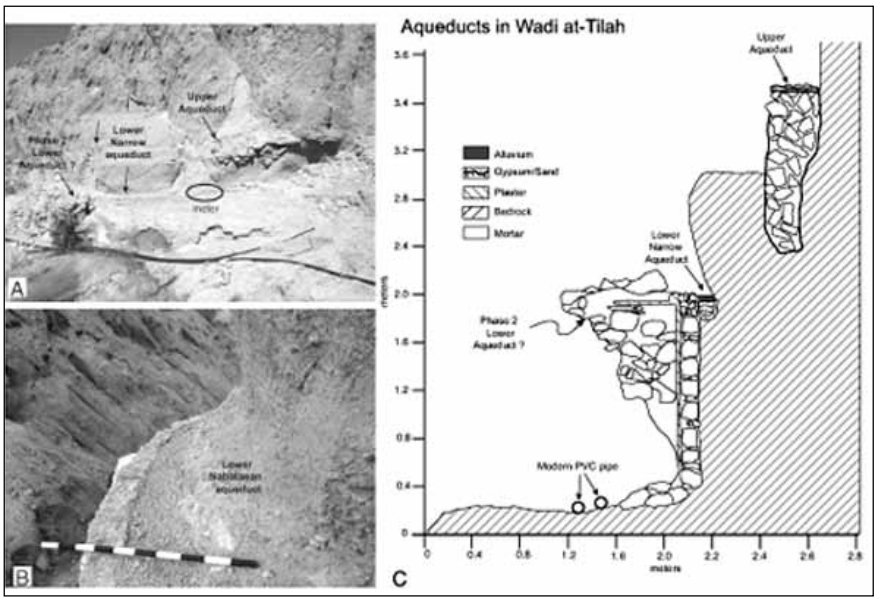
in width and constructed of undressed limestone boulders. Approximately 4m to the east along the exposure, a second wall alignment that we interpret as the fort corner tower wall 2 is exposed. Fort corner tower wall 2 is founded on top of the underlying Wall 4. A thick ash layer abuts and extends to the east of the corner tower wall 2. Pottery sherds from the upper layers indicate that the ceramics are mixed, ranging from Early Roman-Nabataean to Early and Late Byzantine (S.T. Parker, pers. comm.).

Exposures of the Aqueduct System in Wādī aṭ-Ṭilāḥ

Several aqueducts of various constructions and elevations lie parallel to the course of Wādī aṭ-Ṭilāḥ. These aqueducts were studied collectively as Area B. Two prominent aqueducts were traced along the northern bank of Wādī aṭ-Ṭilāḥ for a distance of 0.3km east of the Qaṣr aṭ-Ṭilāḥ *birkah*. These aqueducts were fairly continuous except across several tributary drainages where the aqueducts have been completely eroded away. The last evidence of what may be an aqueduct was noted approximately 0.6km to the east. The spring in Wādī aṭ-Ṭilāḥ is about 0.75km from the site. In the region where fluvial terraces lie parallel to Wādī aṭ-Ṭilāḥ (between 0.3-0.6km), an ancient aqueduct may have been excavated into the alluvial sediment making it easily buried by subsequent colluvial processes. This is also the case near the Qaṣr aṭ-Ṭilāḥ reservoir (*birkah*) that is built in part on the Quaternary alluvial fan sediments. Here, only the upper aqueduct is evident. The lower aqueduct located in the alluvial fan sediments may have been buried at this location, or was eroded away, or may have had a significantly different trend.

At a point approximately 0.3km east of the *birkah* (designated Area B.5), the bedrock walls of the Wādī aṭ-Ṭilāḥ canyon narrow to a width of about 2.3m at the elevation of the channel. It is at this location that three phases of aqueduct construction are preserved on the northern bedrock ledge, starting about 2m above the wadi channel floor (**Fig. 4**). Mortar from each of the aqueduct wall phases contains lime with charcoal and gravel aggregates. Ceramics and other artifacts were extremely scarce.

The lower aqueduct is a channel that is 20cm in width and about 20cm in depth. In places the lower aqueduct is cut into the bedrock along the north wall and along the small channel bot-



4. (A) Photograph showing three phases of aqueduct construction along the north bedrock bank of Wādī aṭ-Ṭilāḥ (facing north-west). The location of site is shown on Figure 1B. (B) Detailed photograph of the lower 20cm-wide aqueduct that was cut into the conglomerate bedrock. The construction style is suggestive of Nabataean engineering. (C) Drawing showing the relationship between the lower, narrow aqueduct, a lower Phase 2 aqueduct, and the upper aqueduct.

tom. Both the channel and the bedrock wall are coated with a layer of plaster. The south wall is constructed of a narrow, 20cm-wide wall that in one location stands 1.8m in height. The exterior of the wall is plastered (**Fig. 4**). The width of the channel and the bedrock construction is suggestive of Nabataean technology. The small channel was filled with sand and gypsum, and capped by a thin layer of alluvium.

An apparent second phase of construction appears to be a widening of the lower aqueduct at the same elevation. Evidence for this phase is found only at the B.5 location, where the wadi narrows dramatically. The interpretation of this construction as a new phase is very uncertain as it is not corroborated elsewhere. It is possible that most of the evidence for this lower Phase 2 aqueduct is either completely eroded or completely buried. Alternatively, the structures preserved at this elevation may have been built to provide additional support for the upper aqueduct at this location. Radiocarbon dating of charcoal within the mortar of the lower wall yielded an age of 1380 ± 40 yrs BP (CAMS #100535). This corresponds to a two-sigma calendar age of AD 582-694.

The upper aqueduct leads into the standing *birkah* at the Qaṣr aṭ-Ṭilāḥ site (**Fig. 1**). It is approximately 1.9m above the lower aqueduct channel floor. The construction of the upper aqueduct was also studied at other locations along Wādī aṭ-Ṭilāḥ where erosion has provided a complete cross section of the feature (**Fig. 5**). The upper aqueduct channel is constructed of two walls with a 65cm-wide channel in between, tapering slightly over its depth. The width of each wall is approximately 80cm, resulting in a total aqueduct width of approximately 2.3m. Each wall is two courses wide and stands at least four courses high. Large roughly hewn and undressed boulders of local limestone have been used in the wall construction. In between the boulders, mortar and cobbles are used as chinking blocks. The channel is about 70cm in depth. The channel is lined with 8cm of plaster flooring, which extends up the sides of the channel. Beneath the channel plaster floor is a 60cm-thick layer of mortared rock rubble that supports the base of the channel. Many of the characteristics of the upper aqueduct were also

5. Photograph of a cross section through the upper aqueduct, as exposed in a tributary wadi of Wādī aṭ-Ṭilāḥ. The aqueduct leads into the Late Byzantine-Early Umayyad period birkah at the Qaṣr aṭ-Ṭilāḥ site.

observed where it was exposed in Area A in trenches west of the *birkah* (Haynes *et al*. 2007).

Along Wādī aṭ-Ṭilāḥ where the upper aqueduct is preserved, the central channel has been completely in filled with sediment. Immediately above the floor plaster is an approximately 2-2.5cm thick layer of travertine. This is overlain by 20cm of alluvial gravel. The upper 30cm of fill is gravelly silt deposited as slope-derived colluvium. This indicates that water continued to flow in the aqueduct for a period of time when it was not being maintained since sediment filled the lower part of the channel. The aqueduct then ceased to carry water and it filled with slope wash deposits.

Conclusions

Numerous 20th century visitors to the site of Qaṣr aṭ-Ṭilāḥ have noted the abundance of Nabataean sherds scattered on the surface. Glueck interpreted them thus: "In places, as in other sites in the 'Arabah which were occupied by Roman garrisons after the collapse of the Nabataean kingdom, Nabataean potters continued to furnish all or much of whatever pottery was necessary" (Glueck 1935: 13). We now recognize that there have been various phases of occupation at the site that are separated by periods of abandonment. Furthermore, illicit grave robbing and looters' pits at the site have brought sherds from lower stratigraphic levels to the surface.

Our data show that in the first century there was a significant Nabataean presence at the Qaṣr aṭ-Ṭilāḥ archaeological site. Structures exposed in the incised Wādī aṭ-Ṭilāḥ section suggest that there was major architecture, probably representing at least a large farmstead, on the site in the first to second centuries. Typology of the narrow aqueduct excavated into the north bedrock canyon wall of Wādī aṭ-Ṭilāḥ further indicates that the water structures at the site were first engineered by the Nabataeans. Whether or not the extant field wall system at Qaṣr aṭ-Ṭilāḥ is Nabataean remains uncertain.

Identification of the site as *Toloha* seems straightforward given the linguistic similarity between the names of aṭ-Ṭilāḥ and *Toloha*, and its geographic relationship with other identified ancient sites in the region. In the *Notitia Dignitatum*, the site of *Toloha* is clearly associated with a Roman military presence around 400AD. However, the effects, if any, of the devastating earthquakes that occurred on 18 and 19 May 363AD are unclear at this site. It is possible that the site experienced severe damage in the 363AD earthquakes. Epitaphs recovered from Safi demonstrate that the earthquake destroyed structures with fatal results (Meimaris *et al.* 2005). Whether or not the fort at this site sustained damage and remained viable after 363AD is a question for future research.

Our previous research (Haynes 2005; Haynes *et al*. 2006; Niemi 2007) showed that the extant structures at Qaṣr aṭ-Ṭilāḥ are predominantly late sixth to early seventh century in age. Radiocarbon dating of the aqueduct system in Wādī aṭ-Ṭilāḥ confirms this interpretation. The site history between the Nabataean-Roman and Late Byzantine periods is at present poorly understood. Further excavations would help resolve many questions regarding occupation at the site and the history of earthquakes that have affected it during the Nabataean, Roman, and Byzantine periods.

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