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AGRICULTURAL WATCHTOWERS IN AL-TIREH QUARTER AND 'AIN QINIA VILLAGE, RAMALLAH, PALESTINE

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Al-Tireh quarter and 'Ain Qinia village on the fringes of the city of Ramallah, Palestine, contains a remarkable variety of watchtower structures that are still standing within their landscape environment. This research project documented 167 watchtowers distributed on an area of approximately 3,000 dunums (1 dunum is 1000 m^2). Their deteriorating state is quite alarming, due to several factors, mainly the continuing Arab-Israeli conflict, the rapid modernization of the Palestinian community, the largely unorganized urban expansion seen on the area, lack of public awareness, and the declining importance of agricultural activity within the Palestinian society. As a result, a large number of the agricultural watchtowers in this area have been abandoned and destroyed over the past few decades. The main aim of this study is to discuss the case of the agricultural watchtowers as an existing architectural feature in the areas of Al-Tireh Quarter and 'Ain-Qinia Village. The methodology includes direct observations through site visits, fieldwork, and documentation of all existing watchtowers; interviews with owners and other residents of the study area; and selection of certain cases to be examined, surveyed, documented, and described, in addition to surveying of the existing literature related to the subject.

KEY WORDS: cultural heritage, watchtowers, agriculture, corbelled and ashlar stones, terrace walls, Palestinian Territories

1. INTRODUCTION

Throughout the Mediterranean region, where most countries possess ample amounts of stone, traditional dry-stone architecture was extremely common and gathering the material had the added benefit of producing clean, tillable fields for agriculture. Due to the profusion of different varieties of stone in these Mediterranean lands, the local peoples used this material for constructing their shelters, fences, and monuments, benefiting from each variety's particular aesthetic, physical, and geological characteristics.

The agricultural watchtowers in Palestine were connected with the origins of agriculture itself—the cultivation of grain crops and somewhat later the domestication of fruit trees. The towers' role was multifaceted: to watch over the cultivated land and protect it against animals and thieves, to provide a cool, shady nook for the field workers and herdsman during hot summer days, to protect people from wild animals and inclement weather, and to afford their owners an alternate living space for staying temporarily at a distance from their homes. Although many agricultural watchtowers are presumed to have existed

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from late prehistory into the early historical periods (9th to 4th millennia BCE), modern archaeological and survey work throughout Palestine have actually documented very few of these. The absence of these hypothetical constructions, however, would be due to the repeated, heavy use of the land throughout antiquity, not to mention natural forces like earthquakes and the decay or weathering away of the organic building materials.

The basic watchtower structure that evolved consisted of a circular arrangement of dry-laid stone, a form of construction often called *corbelled stone huts*, which have been found scattered throughout the Mediterranean countries. (In corbelling, each successive course of stone was offset toward the inside until the resulting opening could be spanned by a single slab, thus producing a simple kind of vaulting.) They originated mainly in southern Italy around the beginning of the Early Bronze Age (2300–1600 BCE) but are also documented in France, Malta, Spain, Croatia, Catalonia, Tunisia (Cassar, 1961, p. 65– 68) and in Palestine (Juvanec, 2001, p. 5). They were built either as freestanding structures or linked with stone-walled terraces bordering the fields (Walton, 1962, p. 33– 34) and originally constructed from limestone (Figure 1). According to these scholars, the use of the huts spread far beyond the Mediterranean region, reaching Ireland, England, and even the countries of southern Africa.

Besides the designation *corbelled stone huts*, these stone structures have been known by various other names, such as *farmers' shelters* and *watchtowers*. In some countries people use their own traditional names, for example, the *beehive hut* of South Africa, the

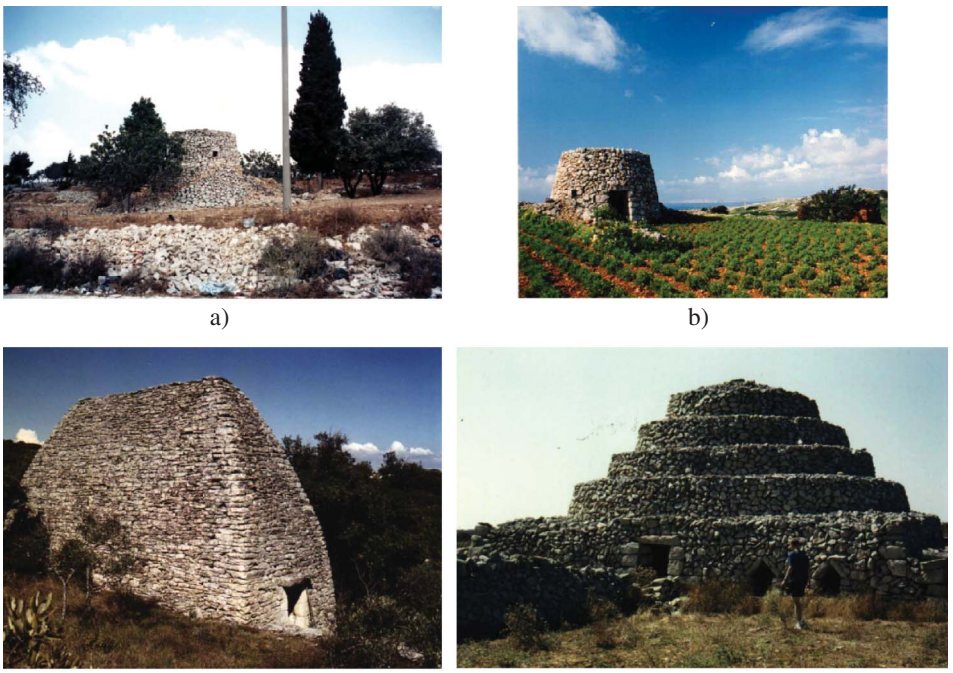


Figure 1. Photographs of typical manmade corbelled stone watchtowers in Mediterranean countries: a) agricultural watchtower in Sinjil, Palestine, b) a girna (agricultural watchtower) in Nadur, Malta (Juvanec, 2001), c) watchtower in Cabane, France (Juvanec, 2001), and d) Watchtower in Menorca (Baleares), Spain (Juvanec, 2001) (color figure available online).

girna of Malta, and *al-mantarah* (Juvanec, 2001, p. 5), *el-muntar* (watchtower) or *el-qasser* (palace), the three Arabic terms commonly used in Palestine.

Whether of Mediterranean origin or not, these vernacular structures dotting the Palestinian landscape embody much about the local peoples and cultures, their needs, mental processes, and knowledge base, stretching over many centuries. As such, the watchtowers have proven to be a key landscape and architectural element, one that reflects the earliest modes of living and ways of thinking about and utilizing the landscape.

In Palestine, the majority of these largely intact agricultural watchtowers date back to the late Ottoman-Turkish period (1750–1917 AD) and into the 20th century. These structures belong to one of two forms, according to their geographic location, structure, and building materials. One is the simple seasonal arbor (singular *'areesh*, plural *'urush*), which was well known in the coastal plain areas and the Jordan Valley. Its general form consisted of an elevated stone base topped by a framework of thin, irregular wooden posts at the corners and covered by tree branches, reeds, old clothes or hay (Figure 2a). It was connected mostly with summer cultivation of various crops. In the coastal areas, the elevated stone base was not a necessity due to the scarcity of stone and the horizontal character of the area. The second form is represented by the stone watchtowers (heaps, corbelled, and quadrilateral structures) broadly distributed throughout the Palestinian mountainous areas, from Ramallah district in the north through Hebron district in the south, very few of these have been documented in the northernmost parts of the West Bank, however, or along the western side of the Jordan Valley (Figure 2b). This form was the most popular one in the areas of Al-Tireh and 'Ain Qinia Village, which constitute the focus of the present fieldwork.

The area of Al-Tireh Quarter and 'Ain Qinia Village was selected to conduct this research. The study area is located approximately 5.2 km west of the Old City of Ramallah and covers approximately 3,000 dunums (1 dunum is 1000 m^2). It yields strong evidence of continuous and well-developed human activity dating back to the Iron Age (1200–332 BCE) right down to the present day. Still standing within the landscape environment of this area is a great number of diverse agricultural features, including a remarkable variety of watchtower structures.

a) b)

Figure 2. Photographs of forms of agricultural watchtowers in the Palestinian Territories, according to their geographic location: a) an ancient watchtower replica at Nazareth Village, reflecting the general form of a simple seasonal arbor, or *areesh* (Source: Ferrell Jenkins, http://ferrelljenkins.wordpress.com/2010/08/24/the-watchtower/.) and b) a typical stone agricultural watchtower of the West Bank hill country (color figure available online).

The aims of this research are to study the current situation of the agricultural watchtowers found in the study area, to discuss their role in the development of local agriculture and in the culture generally, to identify and describe their characteristics in terms of zoning, typology, structure, architecture, methods, and techniques of construction, to assess the value they hold in terms of cultural heritage, and to see how they might relate to the processes of preservation and development.

The main criteria used for the selection of this study area are diverse:

1) the richness of the area with agricultural watchtowers, which reflects various socioeconomic conditions during the late Ottoman Period,
2) the remarkable variety of watchtower's categories, mainly the category of quadrilateral watchtowers that are available only in this area and more less in the area of Beit Jala, next to Bethlehem,
3) the diversity of building techniques used in the construction process,
4) the existence of a reasonable number of still standing intact watchtowers,
5) the easy and free access to the whole area that is presently under the Palestinian control,
6) the quite alarming physical conditions of the majority of the existing watchtowers, and
7) moreover, the rapid and largely unorganized urban expansion seen since 1994 within the area that seriously threaten the traditional watchtower's structures.

It is worth mentioning that several constrains occurred throughout the fieldwork, such as: the absence of people with direct visual contact with the entire process of foundation of these structures; the lack of documented evidences relevant to the subject; the huge risk that the fieldwork team was exposed to facing dangerous insects, snakes, and scorpions found in a large number of the surveyed watchtowers; and the risk of collapse of several watchtowers due to their bad condition.

2. HISTORICAL BACKGROUND

Ramallah is a city located in the Palestinian mountainous area along the watershed line separating the Jordan Valley from the Palestinian coastal plain (Nayrouz, 2004, p. 12–21) and it has an average elevation of 850 m above sea level. The city's historic core and the surrounding hilly area have a temperate Mediterranean climate and a diverse landscape rich in both natural and manmade features, including numerous springs, making it an attractive place for human settlement activity and cultivation, especially fig and olive trees, grapevines, and pastureland.

Like many other Palestinian provinces, Ramallah underwent a slow process of modernization beginning in the mid-19th century, due particularly to the Ottoman land reforms introduced in 1839–1840. Thereafter, Ramallah was increasingly exposed to Western culture and technology and the nature of its society and traditional culture experienced fundamental changes reflecting a new matrix of needs, desires and modes of living (Ghadban, 2008, p., 225–238; Al-Houdalieh and Sauders, 2009, p. 3–8).

One result of these processes was that a new economic and political elite of urban notables was established, a class seeking its aesthetic archetype in the art of so-called noble society. Thus, by the end of the 19th century an innovative architecture of various new and mixed styles was being imported and implemented on the fringes of Ramallah's "Old Core". This process of development required the adoption of new architectural forms, the use of new materials, features, details, methods of construction, and imported elements and influences, which were now being integrated within the various building activities. This new

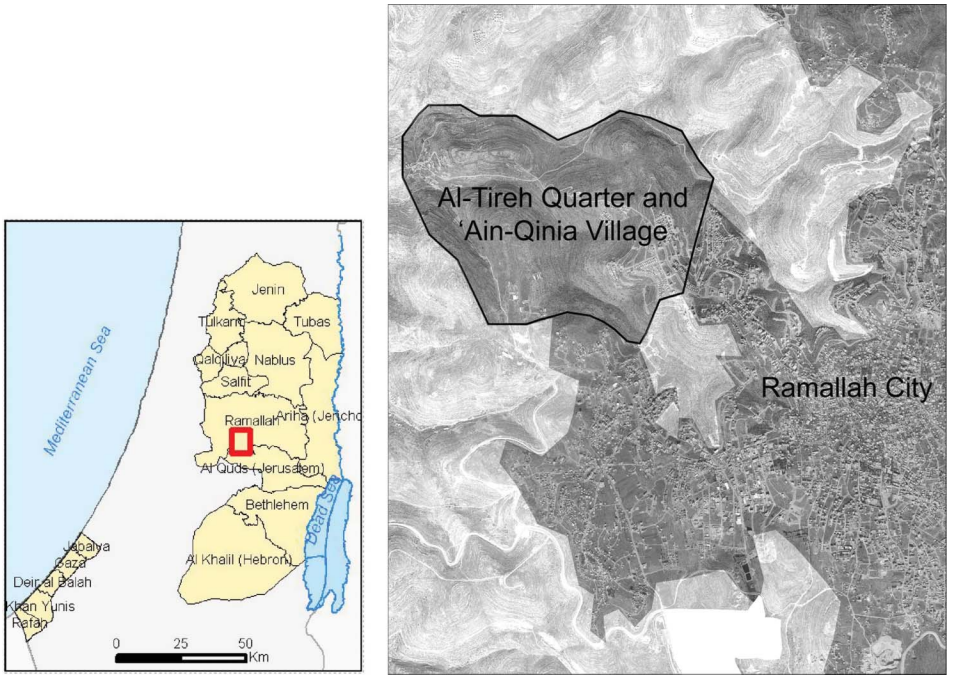


Figure 3. Maps of the location of Al-Tireh quarter and 'Ain-Qinia village within their Palestinian and local contexts: a) map Showing Ramallah area (box) in its Palestinian context, and b) aerial photograph showing the location and boundaries of the study area. Source: Authors, based on a 2010 aerial photograph obtained from the Municipality of Ramallah (color figure available online).

architecture, beyond satisfying the owners' basic human requirements, became a tangible symbol that both expressed their personalities and reflected their aspirations toward greater social and cultural prestige (Ghadban, 2000, p. 71).

Due to this economic enhancement, residents of Ramallah started expanding their property holdings by buying new plots of land in the areas of Al-Tireh and 'Ain Qinia (Figure 3). This process of expansion, and the growth of Ramallah generally, had an impact the landscape and its agricultural terraces on the outskirts of the city. The watchtowers, as a key element within this landscape, experienced innovative modernization in terms of shape, structure, methods, and technologies of construction; however, they maintained their role as watchtowers and even expanded that role, being used now as summer houses in certain cases. According to Ron (1977, p. 214–217), in Ramallah area the density of these structures was remarkable, with their number in the year 1967 reaching 2,004 documented watchtowers—a ratio of 1.1 watchtowers per family.

Up until the 1948, Arab-Israeli War and the resulting division of historic Palestine, watchtowers in this area were frequently occupied and well utilized. After that year, however, the situation changed, and many agricultural lands were abandoned due to socioeconomic and political forces. For one, the importance of agriculture as the key economic resource started to decline, and a large number of area residents found themselves facing an uncertain political present and an equally ambiguous future. At that time an increasing

number of Palestinians began emigrating to the United States, Europe, and the Arab Gulf countries, seeking work or higher education in order to improve their status.

3. RESEARCH METHODOLOGY AND STAGES

The authors have been in contact with Al-Tireh Quarter and ‘Ain-Qinia Village since 1980, when they started visiting it for hiking and recreational purposes. Then in 1999, both authors took up residence in Al-Tireh Quarter, allowing them to constantly monitor the deterioration of the cultural landscape in this area. These longstanding and personal connections have led the authors to conduct the current research.

The present landscape of the area consists of numerous hills and intervening valleys. The topography is characterized by the steep-sided hills ranging in elevation from 520 to 860 m above sea level. The summits of the hills provide expansive views across the surrounding areas and down to the Mediterranean coastal plain to the west. The hillsides are covered with a thin layer of earth, composed mainly of red clay, silt, and scattered stony topsoil, while the lower slopes are often characterized by relatively deep layers of fine silt and gravels deposited from rainwater erosion. However, the earth deposits that have been eroded from the upper terraces, ridges, and hills are mostly absent from the adjacent valleys, but have been carried downstream by seasonal streams.

The area under discussion can be divided into three zones according to the present patterns of land use:

1) The built-up area consists of Al-Tireh Quarter on the northwestern outskirts of Ramallah city and the separate village of ‘Ain Qinia a few kilometers further west. Al-Tireh, which makes up the eastern part of the study area, was established as a modern neighborhood in the 1970s (and the process of building development is very much ongoing), while the settlement and building activities in ‘Ain Qinia stretch back over several centuries,
2) The cultivated fields, which constitute approximately two-thirds of the study area, are mostly planted in olive trees, however currently about half of these cultivated areas are either partially or completely abandoned and therefore, many of the trees on these terraced fields are partially withered and their roots are exposed, and
3) The uncultivated wasteland, is characterized by the growth of several kinds of wild plants.

The methodology implemented in studying the area includes components derived from various resources:

1) site visits that includes observations, filling of inventory sheets and photographing of all available watchtowers,
2) interviews with a number of watchtower’s owners and other residents of the study area,
3) a typology of the existing watchtowers to be created to select the most representative and distinctive watchtower structures, which will in turn be comprehensively surveyed, documented and analyzed,
4) surveying of the existing literature related to the historical and ethnographic development of this area; the few studies that have been produced by scholars on Palestinian traditional architecture (Arraf, 1985; Hamdan, 1996; ‘Amiry & Rahhal, 2003; Ghadban, 2008) or on the watchtowers (Ron, 1977) and any data available from Palestinian institutions.

This methodology is realized through the following successive stages:

1) In January 2010, an aerial photograph and a master plan for the study area were obtained from Ramallah Municipality. The two authors carried out a 5-days preliminary survey to delineating the borders of the study area. According to the basic topography, the study area was divided into eight subareas with boundaries that coincide with the topographic lines of the existing valleys and roads. This division was done to facilitate the coordination and management of the fieldwork.
2) After the study area was defined, a core fieldwork team of nine persons was formed: an archaeologist, an architect, two junior architects, a draftsman, a photographer, and two students, one from the Department of Architectural Engineering at Birzeit University and the other from the Institute of Archaeology of Al-Quds University. In addition, a volunteer with a special interest in archaeology and cultural heritage joined in the project.
3) From February through June 2010, the fieldwork team walked over the entire area parcel by parcel in order to document all the aboveground archaeological sites and historic features, concentrating on the agricultural watchtowers. Each of the identified watchtowers was given a number, marked on a site map, and photographed from several angles. All the relevant data, including the present condition of each watchtower, were recorded on a separate inventory sheet according to the following parameters: exact location in relation to the aerial photo; shape and category; number of stories; size of the entrance; thickness of the external walls; internal dimensions; building's height; type of ceiling; number and dimensions of windows, small holes and niches; composition of the floors; building materials used and the surface treatment of walls; the overall physical condition; and any other notable features.
4) In the same period, interviews were carried out with a total number of 19 informants (three women and 16 men) all are living in the study area, with ages ranging between 53 and 75 years. Each of them self-reported owning at least one watchtower in the study area. A standard set of questions was prepared and given to the interviewees, and the authors recorded their responses on site. The main questions were:

    - When your watchtower(s) was/were built?
    - From where and how you got the building materials?
    - For how long time yearly, you used to inhabit the watchtower(s)?
    - What was/were the function(s) of the watchtower's space(s)?

5) Also, within this period, several visits were paid to other places in Palestine as Hebron and Bethlehem regions to monitor the existing watchtowers there and to check various aspects of their development and architecture.
6) For the purpose of the research, in addition to the international sources, the authors also made benefit from the available local literature, where most of the scholars (mentioned elsewhere in this study) discuss the watchtowers as a general phenomenon without concentrating on their specificity within a certain region.
7) Starting from July to December 2010, the fieldwork team worked on studying and analyzing the gathered information. Twelve examples representing all categories of watchtowers in the study area were carefully selected, analyzed and a complete set of architectural drawings were prepared for each one of them.

4. DATA COLLECTION AND FIELDWORK RESULTS

Our fieldwork indicates that the study area includes two archaeological sites, several hundred terrace walls, 40 water cisterns, hundreds of rock-hewn features of various sizes and shapes, and approximately 167 watchtowers.

4.1. Sites: Khirbet Khalet el-'Adas (in Al-Tireh) and 'Ain-Qinia Village

The two archaeological sites are Khirbet Khalet el-'Adas (in Al-Tireh) and the historic core of 'Ain-Qinia Village itself. Khirbet Khalet el-'Adas is located between newly constructed residential units on the western slope of a large natural hill approximately 2 km west of the Old City of Ramallah. The site covers an area of approximately 3,000 m^2 at an average elevation of 810 m. The site is planted with olive trees, and numerous wild plants grow all over its plots. The visible architectural remains of Khirbet Khalet el-'Adas include a large number of walls, several rock-cut tombs, caves, and a fortification system. The fieldwork conducted by Nayrouz (2004, p. 160) and Al-Houdalieh (2008) indicated that the site was inhabited throughout the Iron Age, and the Roman and Byzantine eras. The second archaeological site, 'Ain Qinia Village, lies approximately 5.2 km west of the Old City of Ramallah and approximately 18 km northwest of Jerusalem. According to Finkelstein and Lederman (1997, p. 337), the village sits at an average elevation of 520 m, with the uninhabited part devoted mainly to various kinds of dry and irrigated cultivation activities. The report from a regional survey conducted in the 1990s by the Israel Antiquities Authority includes an entry for the village: "Hellenistic, Umayyad, Abbasid, Mamluk and Ottoman periods".

4.2. Agricultural Terrace Walls

The agricultural terrace walls were of various dimensions, as shown in (Figure 4a). They were built in order to convert the steep slopes into productive agricultural plots, to prevent run-off and erosion during the rainy season (and thus retain maximum moisture in the soil throughout the summer), and, finally, to visually identify the boundaries of the various parcels of land. The terrace walls are built in irregular courses using unworked fieldstones of different sizes. Approximately 87% of the individual walls are partially destroyed due to erosion suffered during the winter rainy season, the year-round grazing of animals on the terraces, and the abandonment of necessary maintenance by the owners over at least the past four decades. It is believed that the construction (and repeated rebuilding) of the terrace walls spanned many periods. The walls may have appeared originally in the Iron Age (1200–332 BCE), increased during the Byzantine period (332–627 AD) and flourished at the beginning of the Ottoman Period (1516 AD).

4.3. Under Cisterns

The surveyed area also includes 40 water cisterns, of which 17 are located within the built-up area of 'Ain Qinia Village and the remainder scattered throughout the surrounding mountains (Figure 4b). From antiquity, and up until the present day, many inhabitants of the land relied on collecting rainwater and storing it in cisterns to ensure the greatest possible supply of water throughout the year, while others depended primarily on the several springs located in the study area to fulfill their need for water, particularly during the dry summer

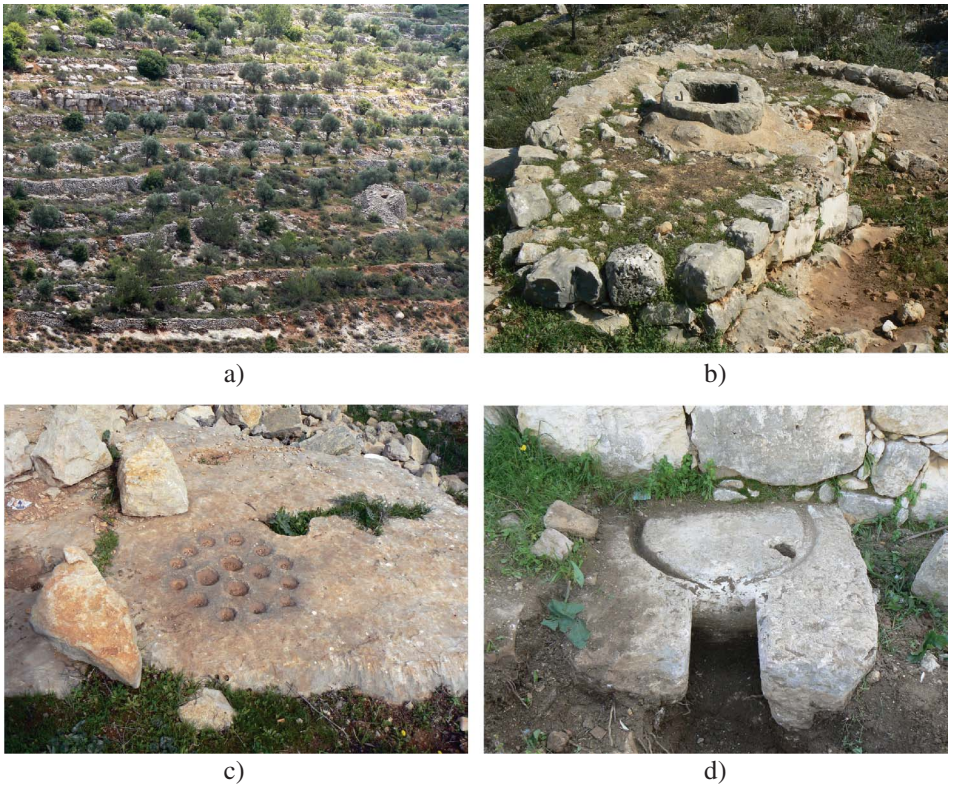


Figure 4. Photographs of typical manmade landscape elements found in Al-Tireh quarter and 'Ain-Qinia village, used by the local populace for various agricultural activities: a) agricultural terrace walls, b) water cistern with capstone, c) rock-hewn cupmarks, and d) oil press (stone press-bed with circular drainage groove) (color figure available online).

months. All of these cisterns were documented; they were of two basic types based on the cross-sectional profile: bell-shaped *versus* rectangular. They were hewn into the bedrock, their capacity ranging from 9 to 20 m^3. The internal surfaces were always coated with multiple layers of traditional hydraulic plaster in which pottery shreds and gravel were embedded or coated with a thick cement layer. A large number of the cisterns located in the study area became abandoned during the last few decades.

4.4. Rock-Hewn Marks

Hundreds of rock-hewn marks of different sizes and shapes were found in the study area (Figures 4c and 4d). A few of these are located in or around the existing archaeological or historical sites; however, the majority are randomly scattered throughout the area. Most of these rock-hewn marks are carved into the bedrock, with a few others cut into separate, detached pieces of stone. Table 1 shows the surveyed rock cuttings details.

4.5. Watchtower Structures

As for the watchtowers, the focus of this study, the fieldwork documented a total of 167 such structures in the study area (Figure 5). In their origins and function, the

Table 1. Basic types of rock–hewn marks within the study area

Type	Shape	Dimensions (cm)	Depth (cm)	Function	Figure of reference
1	Isolated cup-shaped holes	8–13 Φ	5–9	To held the ends of wooden poles that were a part of an arbor for grapevine.	—
2	Isolated medium or large-size, bowl-shaped cuts	35–60 Φ	20–40	Vats for pressing grapes by hands, pounding and crushing cereal grains, or as water containers for domesticated birds	—
3	Large, isolated quadrilateral rock-hewn basins	40 × 55	30–35	Watering larger animals	—
4	Set of mall holes arranged in circles	10–12 Φ	8–9	Game board	Figure 4C
5	Two or more large depressions	200–300 Φ	40–150	Wine or olive oil presses	Figure 4D

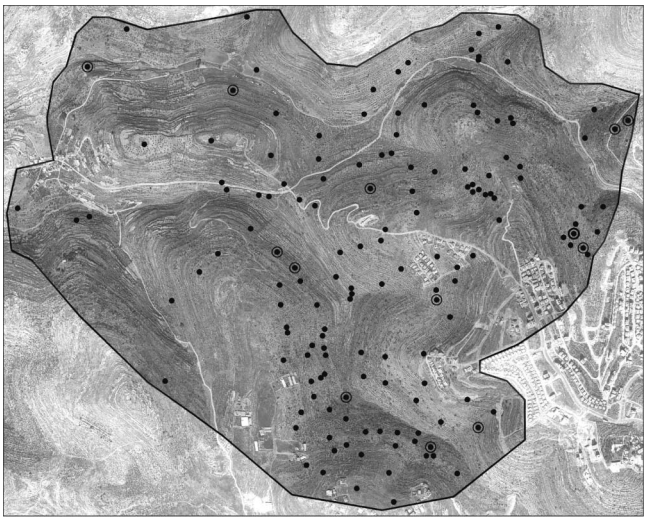


Figure 5. Aerial photograph showing the density and the specific locations of the agricultural watchtowers identified in the Al-Tireh quarter and ‘Ain-Qinia village. Each black dot represents a watchtower; circled dots indicate the watchtowers that were fully surveyed and documented. Source: Authors, based on a 2010 aerial photograph obtained from the Municipality of Ramallah.

watchtowers are seen as strongly related to the traditional agriculture of the area and a main component in the complete model of the local landscape and its dry-stone architecture (the other basic elements being the peasant house and the agricultural terraces and terrace walls). The materials used for the watchtowers include unworked fieldstone, earthen mud, mortar (a mixture of earth with lime, ash, gravel, and grog), plaster, cement, iron bars, I-beams (*dawamer),* and wood. The building materials employed depended both on the intended style and shape of the watchtower and the financial means of the owner. The construction of the watchtowers lasted from several months to more than 1 year, depending on the manpower, time, and other resources available for the project. The peasants would usually collaborate in the building of their watchtowers, in which case the owner typically

Table 2. Current physical condition of floors in the study area*

No.	Floor levels	Current Floor condition		
		Intact	Partially destroyed	Total number
1.	Stone heap level	5	8	13
2.	Ground floor level	93	61	154
3.	Upper floors	16	111	127
	Total	114	180	294

*Not all of the upper level ceilings survived.

provided the helpers with food and drink during the course of the work. Sometimes, however, the volunteer laborers brought their food with them, in order to minimize the cost of the project to the owner. In cases in which the owner opted to hire paid labor, especially to secure a master-builder, the cost of construction could be considerable. The owner might pay either in cash or in kind, i.e. with a certain quantity of cereal-grain, olive oil, sheep, or goats. Table 2 illustrates the present physical condition of the surveyed watchtowers. One of the quadrilateral watchtowers was subjected to extensive renovation in 2005 by the owner (Figure 6). The work altered the watchtower's original appearance, thus causing it to lose its historic authenticity and the renovation process is not completed and the site is deserted.

The fieldwork documented three categories of stone agricultural watchtowers found in the study area:

1) the very simple, round stone heap, which is assumed to be the oldest version of these structures (Figure 7a),
2) the corbelled stone watchtower (Figure 7b) and is well known throughout the central mountains of Palestine, and even in some other Mediterranean areas such as Malta and North Italy, and
3) the quadrilateral watchtower built of regular courses finely dressed ashlar masonry (often laid with mortar), a style commonly found in the Bethlehem region and reflecting the western influence on local building know-how, which began approximately 1850 AD (Figure 7c).

It is worth noting that the area around Hebron features its own distinctive style (different from the Ramallah and Bethlehem regions), where the watchtower tends to be an upper room above the main living space within a manor (Figure 8). For the purposes of our architectural analysis, 12 of the watchtowers found within the study area are comprehensively surveyed, documented and analyzed (Figure 9).

5. ARCHITECTURAL TYPOLOGY AND ANALYSIS

The criterion followed in this fieldwork for the definition of a *watchtower* was *a freestanding stone structure that imitates tectonically the typical vernacular house, but with different articulation of function and details*. Usually they are located in the fringes of urban and rural fabrics, at a moderate height on the slope of the hills, among vine-arbors, fig and olive trees, and pastures. The watchtowers can vary in the vertical dimension

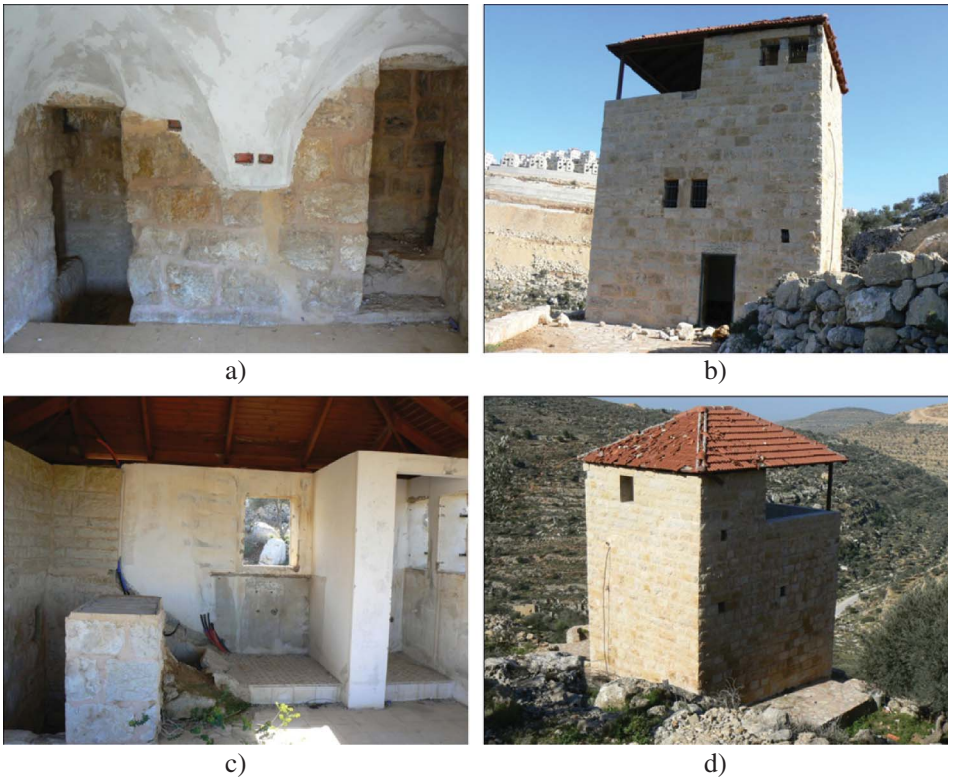


Figure 6. Photographs of four different views (interior and exterior) of a watchtower in the study area recently subjected to extensive renovation (color figure available online).

from one to three levels, according to the structural, functional, and aesthetic needs of the owners. A typical three-level watchtower consists of a ground floor for livestock and storage, a first (upper) floor for living, and a second (top) floor in the form of an open roof-terrace used for various other activities. In all cases the various levels are accessible via an internal staircase (or in a few cases, external) (Ghadban, 2008: 225–238). 'Amiry and Rahal (2003, p. 33–78), in their survey of watchtowers, arrived at a more elaborate classification with seven categories: round stone heaps, round, round retained, organic, organic-retained, square, and pyramidal.

Table 3 illustrates the geographic situation of the 167 existing watchtowers in the study area, while Figure 5 provides visual information regarding the location of the watchtowers and the topographic contours. Moreover, the distribution of the watchtowers is not uniform throughout the area. In one regard, their placement reflects differences in the size of the various parcels of land, since each discreet property, regardless of its size, usually contained a single watchtower; in other words, the distances between the watchtowers reflects to a large degree the size of the individual properties. Placement of the watchtowers was also affected by considerations of the local terrain, for example, situating the watchtower on a slope that faces the prevailing winds ensured the desired ventilation. Nevertheless, issues of ownership, protection from various natural and man-made threats, proximity to a watercourse, or the desire for social contact (versus the value

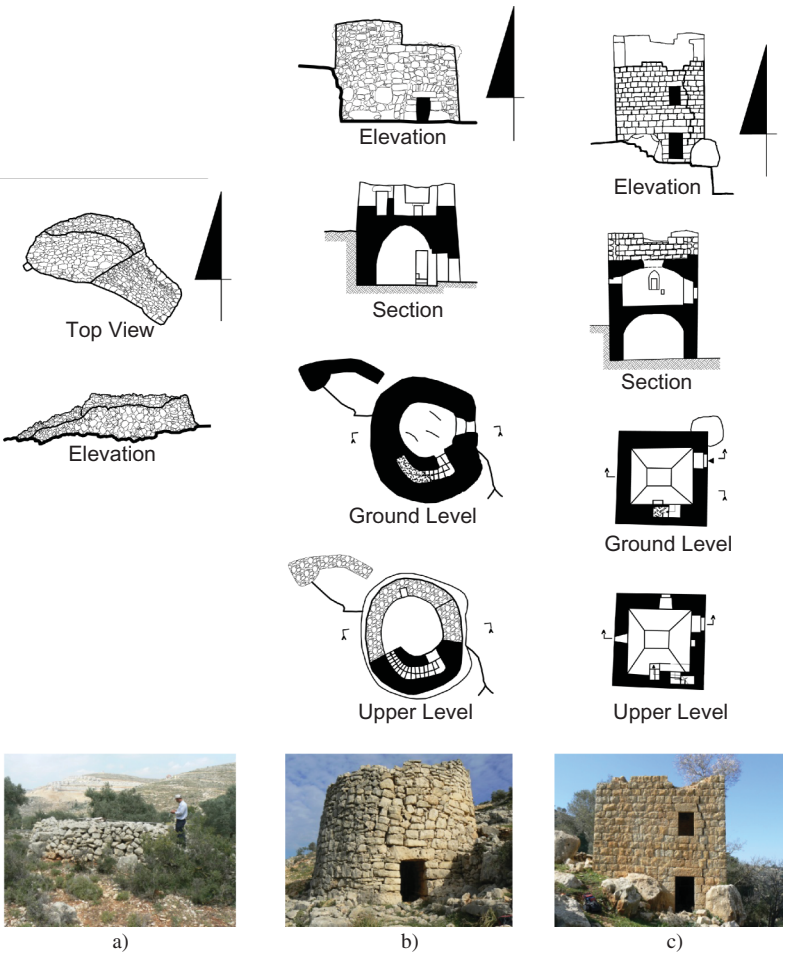


Figure 7. Photographs and drawings showing the three main categories of agricultural watchtowers in the study area. Each is illustrated by an elevation view, cross-section (except c) and top-plan (one for each level), with a photograph: a) a round stone heap, b) a corbelled stone watchtower, and c) a quadrilateral dressed ashlar stone watchtower (color figure available online).

of privacy) were the major motivations behind the setting of 145 of the watchtowers. The fieldwork results suggested three categories of the watchtowers according to the extent of their original construction (Table 4).

This study identified 41 watchtowers consisting of one floor only (including the stone heaps), 125 that have (or once had) two floors, and only one watchtower with three floors. All of the round watchtowers and the solid stone heaps were constructed of unworked fieldstone of different sizes and shapes and without the use of mortar, while the quadrilateral watchtowers were constructed with medium and large, well cut, and dressed ashlar stones laid with mortar. The personal interviews with several residents of Ramallah and ‘Ain Qinia indicated that the fieldstone required for construction of the round towers and solid stone heaps was gathered from the immediately surrounding land. However, if the owner failed to collect enough stones for the new construction, then the owner would quarry the surrounding bedrock in order to produce the needed quantity, using thick, pointed iron bars

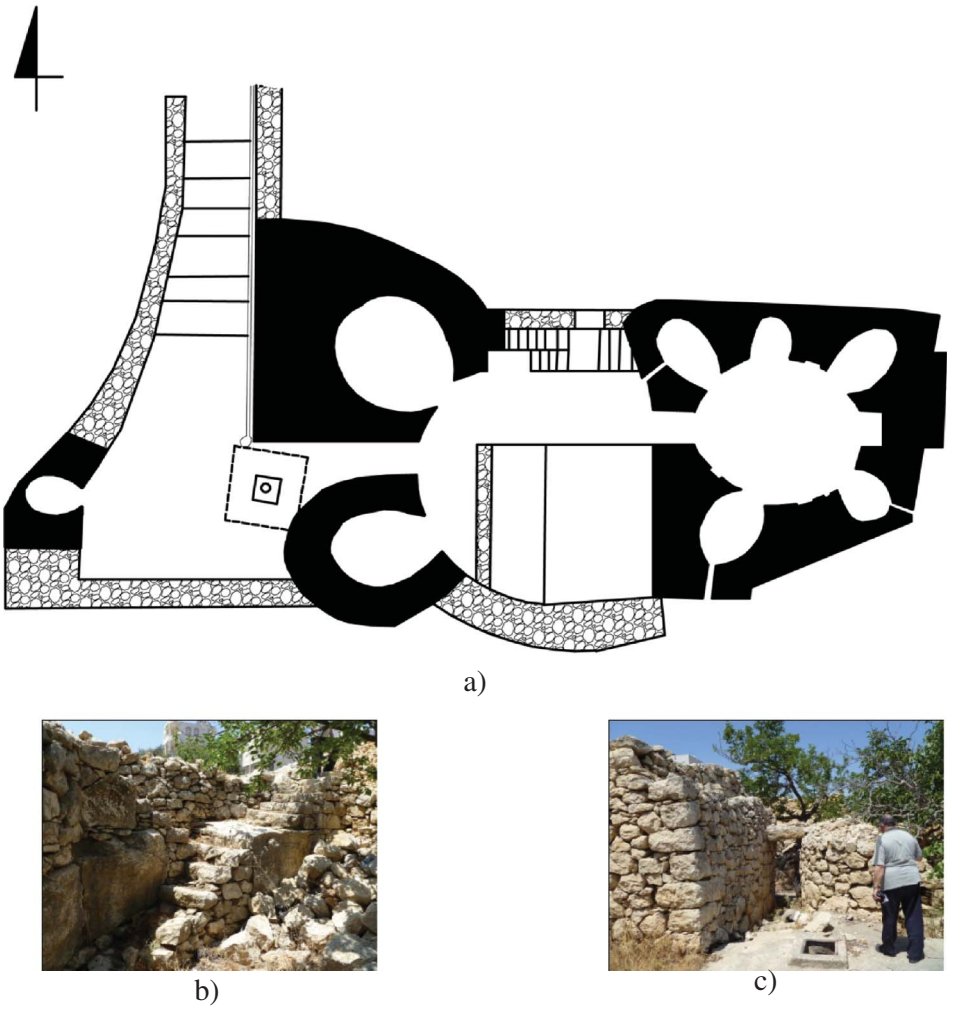


Figure 8. A drawing and photographs showing a manor from the Hebron area, where the observation level is part of a larger complex, situated as an upper floor above the main space: a) plan for the manor, b) internal staircase to the upper level, and c) lower level: cistern opening and doorway (color figure available online).

(*nukhul*), chisels, and heavy hammers. The well cut, dressed ashlar stones were obtained from local quarries, located either in the immediate area (four of these were documented in the study area) or from distant quarries from which the stones were transported by camels. Furthermore, the interviewees stated that the lime and ash for mortar were obtained from *latateen* (kilns in which pieces of limestone were burned), also located in the immediate vicinity.

5.1. Site Location

The majority of the surveyed watchtowers (159) were constructed directly on exposed bedrock, while only eight of them were built atop natural earth deposits. This choice of the

Figure 9. Photographs showing views of the twelve watchtowers that were fully surveyed and documented to facilitate the analysis of watchtower architecture in the study area (color figure available online).

rocky spots for the construction of most of the watchtowers reflects the owner's desire for a solid base capable of withstanding the weight of the construction, and also to preserve as cultivated land the spots with soil accumulations. Furthermore, most of the owners chose to incorporate the vertical bedrock scarps into the watchtower construction, thus economizing on the required building materials, as well as the time and effort needed to complete the construction. After the construction spot for the watchtower had been defined, the surrounding site was divided into the necessary additional external functional zones: an open terrace, the kitchen, an animal shed, storage areas, oil and/or winepress installations, and other facilities as needed for carrying out the daily activities. It was observed that in the majority of cases all these elements, besides being arrayed around the main entrance of the watchtower, were situated on the eastern or southeastern side of the tower, precisely for

Table 3. Geographic location of the existing watchtowers within the study area

No.	Location of watchtowers	Number
1	On the summits of the mountains	16
2	At intermediate level on the slopes of the mountains	145
3	In flat areas in the valleys	6
Total		167

Table 4. Number of watchtowers of each category within the study area

Type	Watchtower category	Number
1	Round, corbelled-stone watchtowers	107
2	2a. Rectangular quadrilateral watchtowers of dressed ashlar stones	15
	2b. Square quadrilateral watchtowers of dressed ashlar stones	32
3	Solid stone heaps with oval or rounded shape	13
Total		167

environmental reasons, including protection from the prevailing western and northwestern winds and for the benefit of both the warming morning sunshine and afternoon shading.

5.2. Construction Techniques

Once the watchtower spot was identified and laid out, the building materials were gathered, the spot cleared, and the foundations of the different elements marked out. In the actual construction of the various categories of watchtowers, three distinct building techniques were identified.

5.2.1. Solid stone heaps The first technique is associated with the solid stone heaps. In this process, a single ring of large stones was used to outline the outer boundary and then the entire internal area was filled solid with stones of various sizes; these were mostly gathered from the site in the course of preparing the land for cultivation. This technique was repeated—a round course of facing stones, which was then backfilled—until the required height was reached. The external profile of these structures featured a slight inward slant proceeding upward, to ensure the necessary stability of the heap (Figure 10a).

5.2.2. Round watchtowers The second technique is associated with the round watchtowers. After clearing and sometimes leveling the building spot, the circular layout of the construction was usually marked by forming two concentric rings of earth 1 to 1.5 m apart, taking into account the placement and dimensions of the external entrance. Then, a bottom course of large stones was laid on top of each of the two earthen rings, thus outlining the inner and outer faces of the watchtower's foundation. In the next step, the space between the two rings of large stones was filled with medium and small-size stones mixed earth and other debris, all collected from the adjacent area. The two faces of this *rubble-core* wall (external and internal) were built of different sizes of unworked fieldstone laid in an irregular pattern. Proceeding upward toward the ground-floor roof level, a slight inward slant was introduced to the outer face of the wall, in order to achieve greater stability and

Figure 10. Photographs of the three categories of watchtowers in the study area, showing especially the texture of the stonework and the dimensions of the stones in each; the distinctive styles are most evident in the lower courses and around the door openings: a) a rounded stone heap, b) a corbelled stone watchtower, and c) a quadrilateral dressed ashlar stone watchtower (color figure available online).

to minimize the weight borne by the foundation (for more information, see Juvanec, 2003). The internal faces of the same walls likewise incline gradually toward the center; however, beginning approximately 0.8 to 1.0 m above floor level, ultimately forming a vaulted (or domed) ceiling; this ordinarily had the shape of a barrel-vault or cross-vault (or, in a few cases, a hemisphere). Once the ground floor was complete and roofed, this procedure could continue upward in the same manner until reaching the desired number of floors and overall height. Note that here it is hard to speak about *courses* of laid stone, since the stones are unworked and irregular in form, making it difficult to lay them in regular, horizontal courses or layers. Instead, they are simply fitted together according to their natural shape, but with the stones of the lower parts generally of larger size than those of the upper (Figure 10b).

5.2.3. Quadrilateral watchtowers

The third and final technique is associated with the quadrilateral watchtowers. The process started with leveling the building spot, i.e., cutting off the protrusions of the bedrock surface or filling the cavities with stones and mortar. Then the boundaries of the external and internal walls faces were marked off with two thick cords; the walls thus delineated usually

had a thickness of 0.80–1.0 m. Quantities of water were then poured over the foundation areas in order to fully clean them of any accumulations of dirt that might interrupt the seal between the bedrock and the mortared stone foundation. Next, a layer of mortar was laid down, and on top of it parallel running courses of ashlar stones around the perimeter, defining the inner and outer wall faces and taking into account the placement and size of the external entrance. Once the lowest courses were laid, the space in between was filled with a combination of earth with lime, ash, and straw, and small to medium stones, all collected from the adjacent area. Proceeding upward, this method was repeated course by course until reaching the level of the ground floor roof. The exterior wall face was built with a relatively vertical profile, while, again, the internal faces inclined gradually inward beginning at a height of 0.8–1.0 m above ground level. At the top, the inclined wall face formed a vaulted ceiling, which ordinarily had the shape of a barrel-vault or cross vault or in few cases a hemisphere or dome. Subsequent storeys would follow the same steps, proceeding upward, until the building was completed. The masonry of these constructions (in contrast to the round towers above) consists of large, well cut and sometimes nicely dressed ashlar stones, laid in regular, horizontal courses, but which sometimes varied in height from one course to the next, dictated mostly by the available stone material (Figures 9 and 10c).

5.3. Organization of Indoor Spaces

The internal space of the watchtowers is organized according to the number of floors and the specific needs and activities of the owners. The floor area is determined by the category and shape of the watchtower. In the case of round watchtowers, the outside diameter of the buildings varies from 4.5 m to 5.7 m, while the internal diameter of the floor space is from 2.4 m to 3.7 m. For the quadrilateral watchtowers, the outside dimensions vary between 5 m $\times$ 5 m and 6.5 m $\times$ 6.5 m, and internally between 3 m $\times$ 3 m and 4.5 m $\times$ 4.5 m, as the difference between the internal and external dimensions represents the thickness of the external walls, plus the stairwell. It is worth noting, too, that the walls of the upper floors are not as thick as those of the ground floor, which provides additional space for the upstairs living areas. The floor-to-ceiling height of the internal spaces depends on the design and materials employed in constructing the roof (and ceiling). For the round watchtowers, the internal height varies from 1.9 m to 3.9 m and for the quadrilateral ones between 2.5 m and 3 m. As for function, the ground floor was usually devoted to economic activities, regardless of the total number of storeys, and the upper floor(s) used for living and sleeping. The roof might have multiple functions: as an observation point, for the drying of agricultural products, or for sleeping during warmer weather. The owners showed great ingenuity in adapting the available space for their daily needs, taking advantage of the watchtower spaces' inherent flexibility. The built-in interior elements included long benches for seating and sleeping; areas for storing everyday utensils and other belongings; and niches constructed within the thick walls for various purposes, mainly as cupboards. Three of the surveyed watchtowers even featured a fireplace; these were integral to an external wall and measured 1 m high, 85 cm wide, and 55 cm deep, on average. Narrow shelves were installed above the fireplaces in order to hold various containers for daily use and oil or kerosene lamps. The insulating quality of the massive stone construction, allowed the farmers to preserve their olives, grapes and other fruits until their transportation to market. Ron (1977, p. 77) measured the indoor-outdoor temperature differential in several watchtowers at various locations and constituted that it varies between 8° C and 15° C depending on the time of day.

5.4. Building Elements

Major architectural elements within the documented watchtower's buildings were studied and analyzed.

5.4.1. Entrances The entrances of the watchtowers: the doorways in principle are oriented to the east or southeast, away from the prevailing north and northwest winds. They are mostly rectangular in shape, with dimensions varying according to the category of the watchtower (Table 5). The lintels of the door openings consist of a crudely hewn, rectangular slab of stone, with the interior face shaped in the form of an arch. The doorjambs in the round, corbelled watchtowers are made from large stones, but in the quadrilateral towers the stones are of the same size as those in the adjacent wall courses (Figures 10A and 10B). The doorjambs are all shaped with lateral coves to contain the pivot holes (10 cm deep and 8 cm in diameter) for hinging the door leaf, ensuring tight closure of the opening. This same doorway configuration was documented in 90% of the surveyed entrances. Approximately two-thirds of the existing entrances also include a low stone sill across their outermost edge, designed to prevent dust and rainwater from reaching the ground floor inside. Several of the actual door leaves are still intact, and the available examples show that they are constructed of wooden planks covered on the exterior with metal plates and joined with metal nails. The fieldwork results show that a total of 143 watchtower entrances still exist in some form, either completely intact or partially destroyed, while only 11 entrances are entirely destroyed or covered by fallen stones from the upper floors.

5.4.2. Vertical circulation The access to the upper floors in the great majority of the documented watchtowers is provided via an internal staircase, which according to the usual pattern, is inserted into the wall of the watchtower's southern elevation (Figure 7 and Figure 11). Its placement there is for environmental reasons—to protect from the cold winds and also to avoid deep penetration of the sun's direct rays. Several staircases include one to three holes of 30 × 30 cm through the external wall to provide necessary lighting and ventilation. The width of the staircase is identical for all floors, measuring approximately 60 to 70 cm; however, the stairwell height varies according to its location within the building, averaging 160 cm for the ground floors and 180 cm for the upper floors. The steps of all staircases are made of flat stone slabs 26–28 cm deep and 26–40 cm high. The two ends of each step are tightly embedded in the adjacent walls, and the pavements of the landings are made of medium-size stone plates. The form of the stairwell ceilings generally follows the stepped form of the stairway itself, but in some cases the overhead ceilings, mainly in the quadrilateral watchtowers, are arch-shaped. Among the documented watchtowers, two different designs were noted regarding the configuration of the stairwell. In the majority of the watchtowers (including all of the quadrilateral towers), the stairwell provides direct access to the roof of the building from inside, while in a few cases the stairwell ends at the

Table 5. Dimensions of doorways according to the category of watchtowers within the study area

No.	Watchtower category	Height (cm)	Width (cm)
1	Solid stone heaps with oval or rounded shape	—	—
2	Round, corbelled-stone watchtowers	85–160	50–90
3	Quadrilateral watchtowers of dressed ashlar stones	160–185	75–100

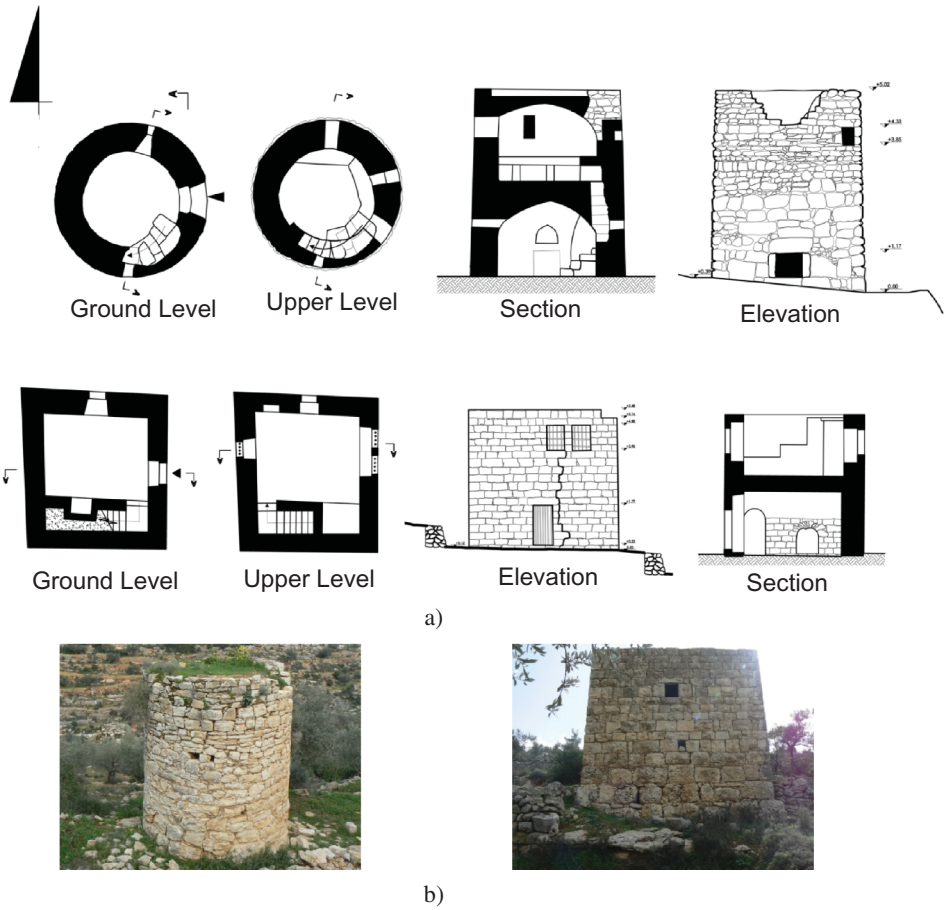
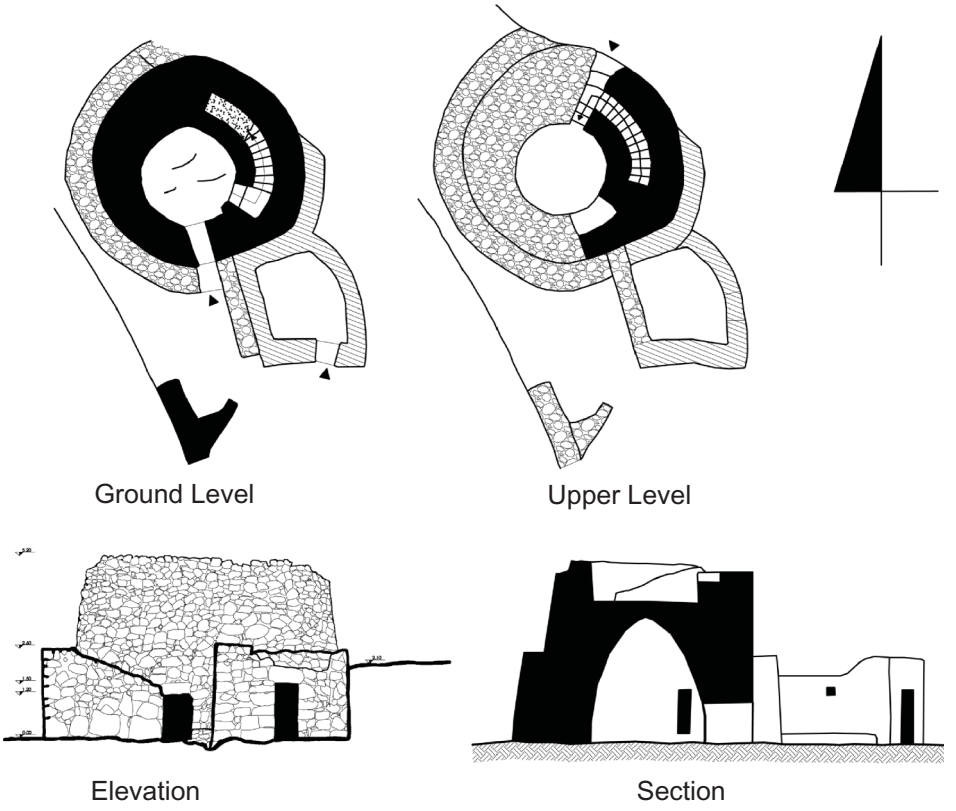


Figure 11. Drawings and photographs of two of the fully documented watchtowers, one round and one quadrilateral, which featured ashlar stone and mortar construction. The drawings illustrate the design and treatment of the window and door openings on all levels: a) plans (lower and upper levels), elevations, and sections, and b) two watchtowers—cylindrical and quadrilateral—built of finely dressed ashlar stone set in mortar (color figure available online).

first floor and access to the roof is by a small opening of 60 × 60 cm inserted in the intersection area between the southeastern elevation and the roof. In some cases, the watchtower roof has a completely separate access from the outside, via additional stairs connecting to the surrounding terrain (Figure 12).

5.4.3. Floor and roof surfaces Despite widespread destruction and the thick accumulations of debris on the sites, the fieldwork revealed considerable variety in terms of floor composition. The survey examined and documented the floor surfaces of 131 ground levels and 118 upper storeys visible in the watchtowers of the study area; the distribution of these according to the type of floor material (Table 6). Most of the documented cement floors had actually been laid over plastered surfaces; thus they represent repairs of older floors. The bedrock surfaces were left unsmoothed, but with any hollows in them filled in with soil to level them.



a)

b)

Figure 12. Drawings and photographs showing a watchtower with entrances on two levels: an upper, northern entrance gives access to the open-air top level directly from the adjacent hillside, via five steps; this passage also connects midway with the curved, interior staircase from the lower level: a) plans (lower and upper levels), elevation and section of the corbelled stone watchtower, and b) corbelled watchtower with two entrances (southern exposure), showing the lower-level entrance (on left) and an attached, outdoor enclosure and its doorway (right). The upper-level entrance is from the slope of the hill (far right) (color figure available online).

Table 6. Distribution of documented floor surfaces according to their finishing material*

	Floor location according to level	
Finishing floor material	Ground level	Upper level
Bedrock	70	—
Lime plaster	27	65
Cement	14	34
Stone pavement	12	10
Earthen mud	6	7
Decorated traditional tiles	2	2
Total	131	118

*Not all of the upper level floor surfaces survived.

Meanwhile, the outer roof surfaces are hard-packed with stone chippings, or in other cases covered by a layer of solid, beaten earth (a mixture of lime, gravel, and grog). These surfaces are relatively impervious to water and were fashioned so as to allow easy drainage of rainwater. Furthermore, several small drainage holes coated with lime plaster were identified passing through the exterior walls, at the level of floor surfaces inside; these were observed on all levels of the quadrilateral watchtowers but on the upper floors only of the round watchtowers.

5.4.4. Windows and niches All of the watchtowers in the study area had a number of windows, niches, and other recesses distributed throughout the building, at different levels. Generally, the windows of the ground floors are both fewer in number and smaller in size than for the upper storeys, due to the typical ground-floor activities and the need for greater security and privacy at that level. The windows can face in various directions and are used for observing the surrounding landscape and also to provide light and ventilation, functions, which together determine the windows' placement and dimensions. In the majority of the windows, the internal opening is larger than the external one, which allows for better lighting and ventilation. Seven of the round watchtowers had additional small ventilation holes in the walls of the ground floor, the holes measuring 40 × 30 cm on average and situated 1.0 to 1.5 m above floor level. The remains of the upper floors of 35 round watchtowers include traces of wide windows, niches, benches, and cupboards. The quadrilateral watchtowers were found to have one or two single windows on the ground floor, measuring approximately 50 × 50 cm each, while the windows of upper storeys were larger than for the ground floors and sometimes configured as double rather than single windows. All of the ground-floor windows of the quadrilateral watchtowers are covered on the outside by metal bars fixed into the stonework. Furthermore, several pivot holes were observed at the edges of the external windowsills, which apparently once accommodated metal shutters to close the opening. Inside the quadrilateral watchtowers small arched niches, cupboards and large, deep arched recesses are evident, where blankets, mattresses and other sleeping material and household items would have been stored.

5.4.5. Ceilings Despite the widespread destruction, the ceilings in a large number of the surveyed watchtowers are still at least partially intact, with the varied ceiling shapes and building materials closely linked to the category of watchtower and its layout. In the round watchtowers, all ground-floor ceilings are built of stone and have a domed shape, but this

Table 7. Distribution of documented ceiling types in 47 quadrilateral watchtowers in the study area*

	Ceiling location according to level	
Type of ceiling construction	Ground level	Upper level
Barrel-vaulted	16	5
Cross-vaulted	12	10
Domed	17	16
Flat	2	4
Total	47	35

*Not all of the upper level ceilings survived.

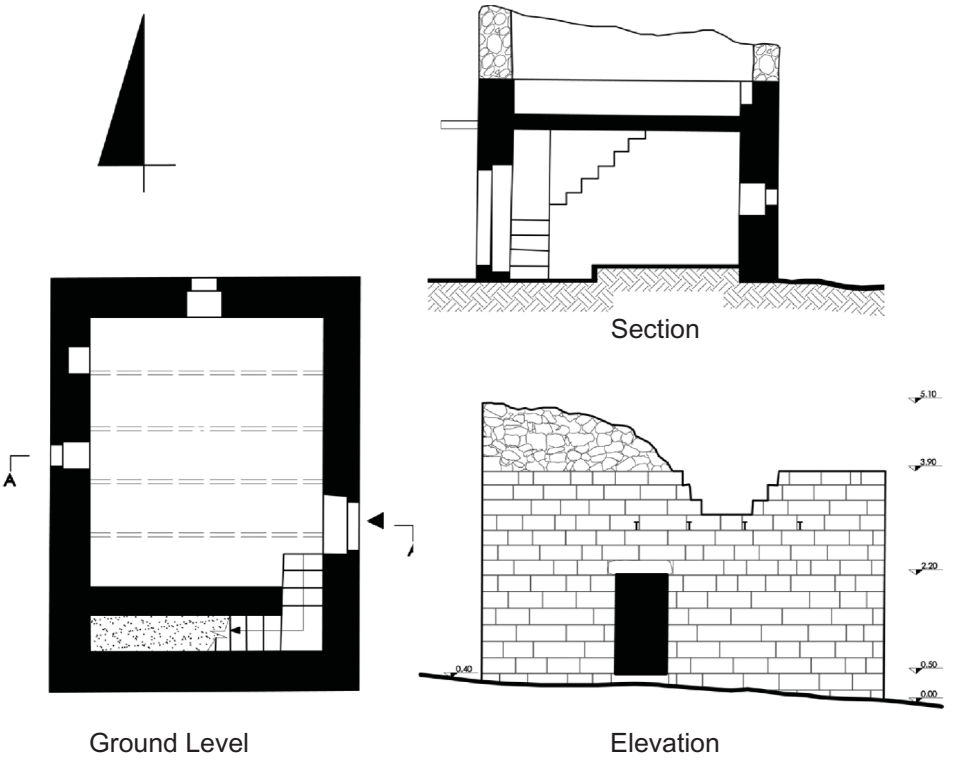
same method is visible in only one upper-floor ceiling. Of the other upper-floor ceilings, two exhibit a square, flat shape produced by cement and iron bars added during the Jordanian period (1948–1967) to be used for military purposes, while the rest of the upper-storey ceilings (of the round watchtowers) are likewise flat in shape but built of wood and tree branches. For the 47 quadrilateral watchtowers, the ceiling types break down as shown in Table 7. It is worth noting that the barrel-vaulted, cross-vaulted and domed ceilings are built of stones and mortar, while the flat designs (except for the few of wood, as noted previously) are constructed of cement and iron I-beams (Figure 13).

The process of ceiling construction was elucidated by the personal interviews with several elders among the ‘Ain Qinia residents, who indicated that any one of three different techniques might be used: gradually filling the internal space of the watchtower with earthen material, until achieving the desired height and shape of the ceiling; constructing a wooden framework, which was then covered with branches, brushwood and worn-out clothes in order to form the shape of the ceiling; and constructing the ceiling without any kind of internal, temporary support. Once the construction of the ceiling was finished, any supporting earthen material or wooden framework would be dismantled and removed via the door opening. The third (unsupported) technique is linked with the corbelled stonework of the round ones covered by wood, reeds, old clothes or hay and tree branches. The predominant shape of the outer roofs of these watchtowers is flat, while a few exhibit a domed profile on the outside.

5.4.6. Plastering Of all the surveyed watchtowers, approximately 25% of the internal wall and ceiling surfaces were plastered, either partially or completely; this technique, however, was not observed on the external surfaces of any watchtower. In the round watchtowers, these plaster layers consisting of either lime or cement are documented on the internal wall surfaces of four ground floors and 18 upper floors. In the quadrilateral watchtowers, only three interiors had been plastered, with thick cement layers on their walls and ceilings, while the rest were coated with layers of white lime on the ceiling only. The surfaces of all niches and recesses on the upper floors of the vast majority of the watchtowers were plastered and smoothed.

6. CONCLUSIONS

The analysis of the agricultural watchtowers in the Al-Tireh Quarter and ‘Ain-Qinia Village shows that the construction of these structures developed architecturally over time,



a)

b)

Figure 13. Drawings and a photograph showing a watchtower with a flat ceiling constructed of iron I-beams and cement: a) plan, elevation and section for a quadrilateral watchtower, with dressed ashlar stone and mortar and b) front view, with main entrance. Note the protruding iron beams, which probably supported a small upper–level balcony (color figure available online).

in order to accommodate the farmer and his family. They were closely related to the development of agriculture and the varied activities of the agricultural seasons. A review of what is known of the watchtower stone structures—their history, development, functions, forms, construction, for example—makes possible a better understanding of how the Palestinian

watchtower (*mantarah)* relates to the traditional stone structures found elsewhere, among other lands and cultures in the Mediterranean basin. Whether demonstrably Mediterranean in origin or not, these vernacular structures are a result of complex mental processes, which were shaped by the prevailing culture, the available knowledge, and the everyday needs of people, and thus embody much about those who built them. As such, they have been shown as a key architectural element that reflects the earliest modes of thinking of the local people and their way of life. The distinctiveness of the building technology, the remarkable understanding of the environment, the manner in which the building spot was selected, the placement of the watchtowers vis-a-vis the topography and climatic conditions, the keenness for maintaining social interaction with neighbors through continuous visual contact and easy physical access, the simplicity of form, and the open system of spatial integration, all are qualities that speak to the authenticity of this built environment.

It is believed that the surveyed solid stone heaps and round watchtowers date from the 18th century through the first three decades of the 20th century, while the quadrilateral watchtowers date from the second half of the 19th to the middle of the 20th century. This fact shows that there was a period of overlap in the developmental phases of the watchtower categories, dictated by the socioeconomic, cultural, and political events that took place in Palestine at that time.

Just as traditional agricultural practices are disappearing from the present-day life of the area villagers, so the importance of such constructions, and the attention paid to them, are also waning. All these watchtowers (besides the one noted exception) are completely abandoned, and the majority of them are either partially or totally destroyed. Several factors will continue to influence this current situation of watchtowers, such as:

1) the ongoing Israeli practice of confiscating large amounts of Palestinian agricultural land and, especially, expanding the settlement's activity,
2) the continuing Israeli policy of maintaining Palestine's dependency on the Israeli economy,
3) the incessantly declining importance of agricultural activity, and the involvement of more people, including farmers, in administrative and governmental jobs and
4) the constantly rapid sprawl urban expansion that still consuming more agricultural land and contributing to the destruction of more and more traditional structures in the area, including watchtowers.

The watchtowers in Al-Tireh and 'Ain-Qinia constitute excellent examples of the traditional local architecture, reflecting a now largely lost way of life and conveying a sense of the day-to-day activities associated with those places. Put another way, they were—and still are—a unique representation of a particular cultural heritage. Possessing a genuinely iconic quality within the Palestinian landscape, the watchtowers effectively symbolize the distinctive flavor of that once-vibrant rural society and, indeed, embody a whole host of social, economic, architectural, aesthetic, symbolic meanings, and values. Therefore, it is essential in the present day not only to study and document these structures throughout the entire country, but also to raise public awareness of their existence and their cultural importance. Specifically, these structures should be listed among the important heritage features, which are designated and mandated to be protected, maintained, and regenerated. Representing as they do a fundamental component of Palestinian cultural heritage, the watchtowers well deserve this protection and rehabilitation. Moreover complete restoration is needed for exemplary types, in order to integrate them once again into the Palestinian

landscape and encourage their reuse for various modern functions, such as tourism, education, and agricultural festivals. But, this matter requires more thorough debate to define the appropriate way to reuse and restore these structures. This should be done at national level and to include stakeholders, officials, and other institutions working in the cultural heritage field

Finally, the authors hope that the outcomes of this fieldwork will stimulate the development of further in-depth research. Such explorations might address the many agricultural watchtower structures to be found in other parts of Palestine, and also the development of these constructions across the Mediterranean basin. These additional understandings might allow us to set a clearer distinction between the watchtowers' more primitive, ancient elements and those thought to be later inventions.

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