

Greater Megiddo Not Seen Before (for *In Situ*, the newsletter of the Standing Committee on Archaeology, Harvard University - Fall 2019)

The traditional methods of terrestrial archaeological survey are limited by what is seen on the ground, when visible, and limited surface collection and periodic testing. The discussion which follows presents several case studies from historic sites around Megiddo in northern Israel which span known occupations from late Roman through Late Ottoman and Mandate eras. The advent of remote sensing technology has radically enhanced the capabilities of field survey to locate both surface and subsurface features dating from the present to many millennia in the past. Specific focus was directed at validating LiDAR imagery compared to what had previously been recorded on site locations and the prevailing ground conditions of the current landscape. The fieldwork was conducted as part of the Jezreel Valley Regional Project ([JVPR](#)) directed by Matt Adams, Director of the Albright Institute of Archaeological Research in Jerusalem ([AIAR](#)). The LiDAR and current terrain images are those of the author, while others are from the sources noted.

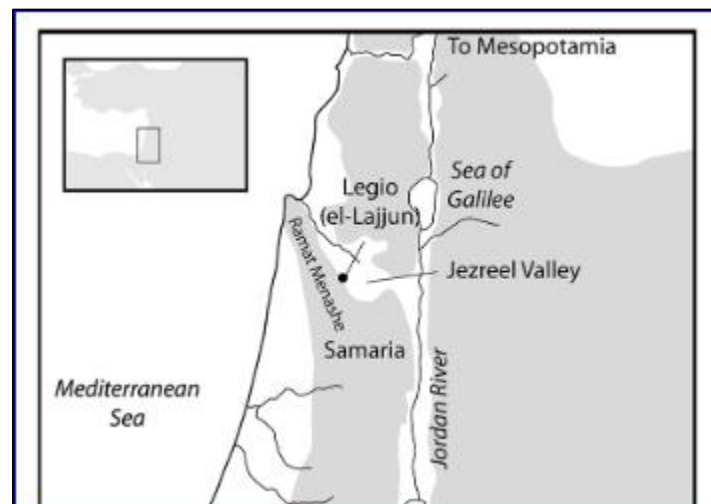


Figure 1 - General Project Location

(from [Ground Penetrating Radar ... at the Roman Legionary Camp at Legio, Israel, Pincus, Smet, Tepper & Adams 2013](#))

The geographic location of Megiddo and surrounding sites place them at a strategic crossroads between the eastern Mediterranean coast and inland Jezreel valley, which for millennia was a thoroughfare for trade and war from the Mediterranean coast to Mesopotamia.

Caravanserais or Khan

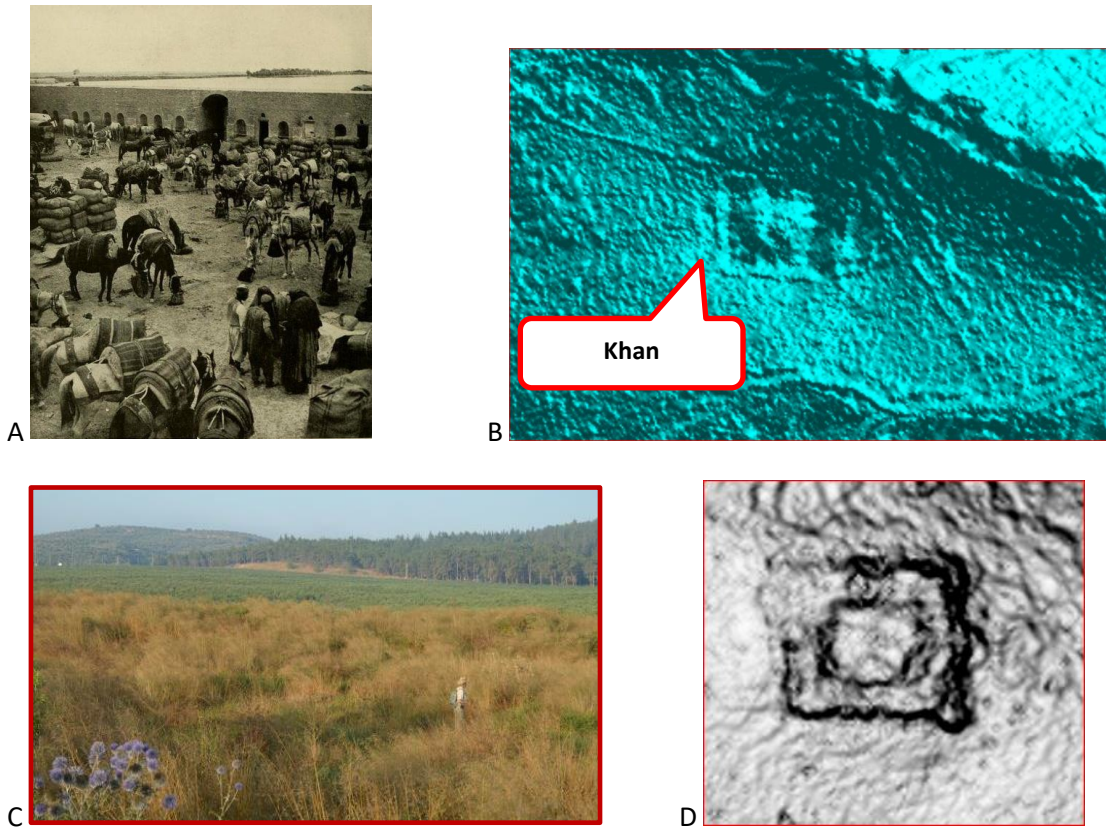


Figure 2 – Khan (Image A - Wikipedia, others by the author)

A caravanserais or Khan (a Near East term) was an enclosed courtyard where travelers and traders with their pack animals could rest, get water and be protected *en route* to their destination. They were also places where imported or exported goods were taxed by local authorities. Typically they were walled enclosures square in shape. Figure image 2C on the left presents a view of a Khan from the top of a rampart, whereas the LiDAR image in Image 2D clearly reveals the outline of the structure. Also disclosed is the significantly damaged northwest corner of the Khan's rampart, which is completely obscured on the ground. The historic road, no longer evident from ground observation, also is displayed leaving the main gate on the north side of the structure.

Roman Hill Fort



Figure 3 - Existing Ground Terrain vs. LiDAR Image of Roman Fort Site (by author)

Above the four millennia-old trade route (now Israel Route 65) that passes through the Central Hills (just before entering the Jezreel Valley from the west) is a hilltop overlooking the route. Approaching the hilltop from the west, a forested area (some of it planted 50 or more years ago) is a heavily vegetated terrain with only a few discernable features that include small limestone caves and concrete remnants of a Mandate Era observation post. Prior survey work conducted more than 100 years ago suggest a Roman era occupation of the hilltop. As control of who passed along the route was often critical, the hilltop affords a commanding view of trade route from both the east and west, direct line of sight for communication with the camp of the Roman 6th Legion to the north. The LiDAR imagery clearly delineates multiple platform areas both bounding the steepest slopes and crossing the highest portions of the hill. These are the foundations and terraced areas for the buildings that occupied this most visible location afforded views not only on the trade route from the east but also the Jezreel valley to the west. The rectilinear platforms and structures are clearly defined, as well as the general layout of the hilltop and its fortifications become evident with the LiDAR imagery, which is not possible from ground survey alone.

Al Lejjun



Figure 4 – Al Lejjun Field Patterns – photos by author

Roman legion camps (*Castra*) required a substantial number of workers for logistical support and general labor. Some soldiers sometimes had families who lived outside of the camp. As a result, villages became associated with individual camps. To the west and south of Legio, the nearby camp of the 6th Roman Legion, the village of al Lejjun (the Arabic equivalent of 'Legion') became established with the arrival of the legion ca. 192 CE. There were at least two, and possibly three, areas which comprised the village. Al Lejjun West (Lajjun Gharbia) was located on a basalt mound flanked by fields to the north,

east and south. Aerial imagery from 2012 suggested there may have been extensive boundary walls constructed throughout the settlement and within the fields – see Figure 5, upper left panel.

The LiDAR imagery (upper right panel) dramatically highlights the extensive rectilinear pattern that characterized the walls surrounding the domestic structures, as well as those walls that defined the field boundaries. The dense vegetation of the dome area prevents any ground inspection. However, the LiDAR highlighted the field pattern surrounding the dome that at first proved elusive to identify, as the rectilinear pattern is very clear in the imagery, but not so visible when standing on the ground. What became apparent when carefully examining the open field soil surface was that the scattering of white limestone rock chips spread to a width of several meters represented the prior limestone walls that were shattered by the deep gang plows pulled by tractors of the neighboring kibbutz in their field preparations. Under certain daylight conditions, the scattering of the rock walls becomes evident, as shown in the lower right panel of Figure 5.

Abu Shusha

Approximately 5 km north of Megiddo is the much smaller Tel Abu Shusha, which also faces east across the Jezreel Valley. On the west side of the Tel and extending across the ridge is the site of the Palestinian village of Abu Shusha.

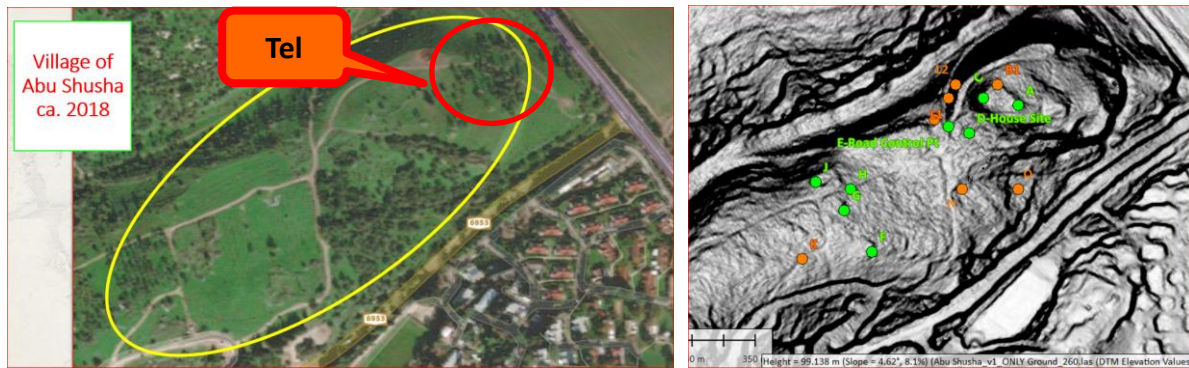


Figure 5 – Aerial imagery (Bing) displaying the terrain of Abu Shusha village (left) and the bare ground LiDAR (right)

This Palestinian village was occupied until 1948, after which it was abandoned. The village was selected for study in part because of the foundations of previous buildings and structures are still evident from terrestrial survey. In addition, the much earlier occupied area of the tell is directly adjacent to the east. Together this landscape provides a diversity of features which LiDAR could disclose.

Terrestrial survey confirmed that not only were building foundations well represented in the LiDAR imagery, but even cisterns and ancillary village structures. On the highest terrain of the tell, successive platforms which could serve as building areas were evident in LiDAR and confirmed by field survey. Surface indications suggest that these platforms may be related to a possible Roman-era have or Late Ottoman/Mandate era use by the village, as well as much earlier by occupants of the tell.

Future Directions

These case studies highlight the significantly different conditions in which LiDAR imagery can provide essential data on the context and structure of archaeological sites which span millennia of occupation. Future analysis future will include comparison of aerial imagery from 1946 with what was found from the LiDAR. There are areas of Abu Shusha which were subject to intensive terrestrial archaeological survey several years ago which may support what the LiDAR imagery discloses. Clearly, the LiDAR imagery, together with known sites, provides a context for the historic landscape which was previously unavailable.

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