

# **Ground Penetrating Radar Survey Report:**

**Tell es-Safi, Israel  
Area A**

**Data Acquired March 28, 2006**

**Report compiled July 20, 2006**



**Survey and Report Published by Mnemotrix Systems, Inc.**

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## **Introduction**

On March 28, 2006, a Ground Penetrating Radar (GPR) survey was completed at Tell es-Safi Archaeological site located in the Judean Shephelah, Israel. GPR is a non-invasive geophysical technique that produces images of the sub-surface with many applications, one of which is archaeological. Archaeogeophysical work has been being acquired at the site since 2003 by Mnemotrix Systems, Inc., Chief Surveyor Jessie Pincus Ben-Avraham and under the archaeological guidance of Chief Excavator Aren Maeir since the beginning.

Previous fieldwork and research has been focused on the location of the continuation of a siege trench that surrounds the tell on the eastern, southern, and western sides. During the 2005 season part of this data was ground-truthed through excavation with the successful location of the continuation. During the 2006 season questions arose as to what significant features may lie in the sub-surface in the northern expansion of Area A where it has not yet been excavated. If specific areas can be targeted ahead of the digging season, the work can be more efficient. In response, during March 2006 GPR data was acquired. What follows in this report are the results of this survey of Area A at Tell es-Safi, Philistine Gath.

## **Actions Taken**

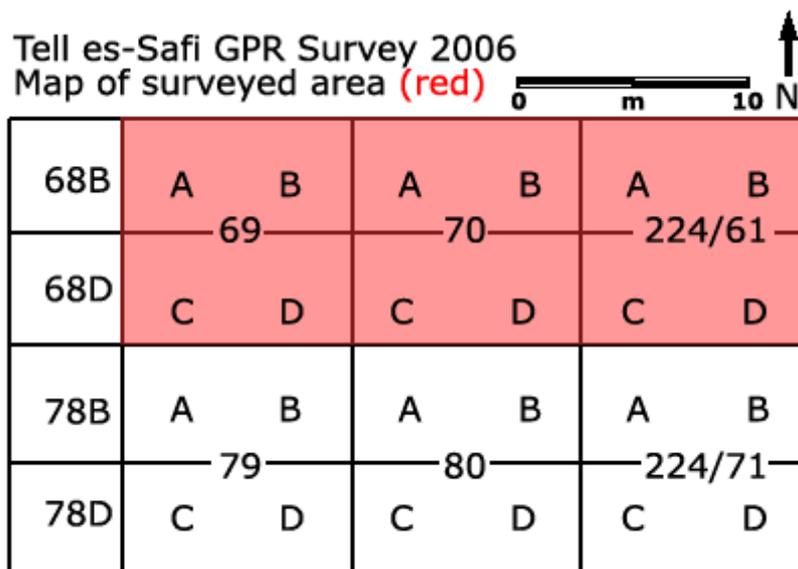
Area A is located on the eastern side of the tell, adjacent to Area E. These two areas have been the main focus of the excavation to date. Iron Age remains have been found just below the surface.

As mentioned above, the GPR survey was completed on the northern expansion of Area A, seen in Figures 1 and 2 below. GPR data was acquired in alternating east to west directions, 0.75 meter apart. Standard field methods were used as we set up a grid to survey 3 full squares, thus covering an area of 300 square

meters (see Figure 2). A standard depth analysis was also completed. We used a 400 MHz antenna in the hopes of "seeing" to a depth of 4 meters. Because it was the spring season, the area was much more green and wet than the previous seasons for acquisition, which are during the summer (see Figure 3). This is important to note as the added moisture presented a different scenario as well as a possible source of attenuation in the GPR data.



Figure 1: Northern extension of Area A at Tell es-Safi. GPR data was acquired here.



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Figure 2: Map of 2006 GPR survey at Tell es-Safi.



Figure 3: The "greener side of life" at Tell es-Safi.

### Observations and Post-Processing

During post-processing the data was appended into a 3D data file. This file was then filtered to remove noise and attenuation, possibly caused by radar or even cellular phones, in addition to particular sediments in the ground itself. Special filtering of the data was done to enhance the view of vertical anomalies/features within the data.

What stands out overall can be seen as four major anomaly areas which are shown in Figure 4.

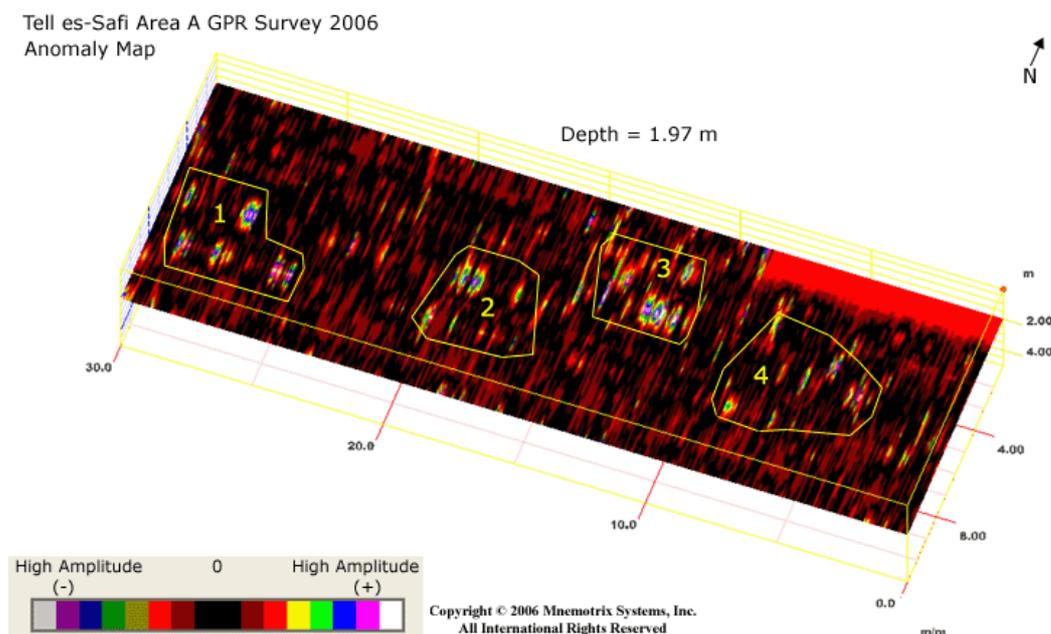
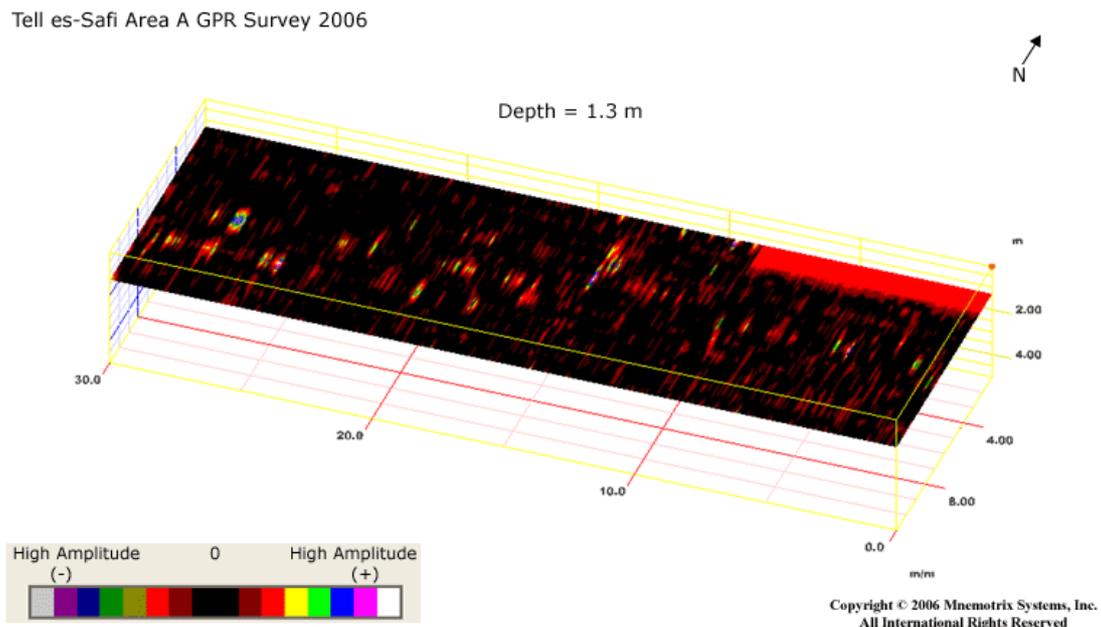


Figure 4: Anomaly Map showing the four major focus areas.

Anomaly Area 1 is present in the data from about 1- 3.5 meter depth and is about 2x3.5 meters large. Anomaly Area 2 exists mid-way in the gridded area from 1.4 – 2.55 meters depth. This anomaly appears as a semi-circle shape. Anomaly Area 3 was the most prominent throughout the survey and was present from 1-3.0 meters depth, showing very strongly at 2.81 meters. Note also the high amplitude/high contrast of this anomaly in relation to its surrounding matrix. Finally, Anomaly Area 4 begins about 1.9 meters depth and continues down to 3.95 meters, losing strength as it descends until 4.3 meters depth. This anomaly appears to be located deeper than the others so perhaps it reflects a deeper habitation layer or different geological sediment type. At its strongest the anomaly looks like a circle of features, each about 10-20 cm wide. Figures 5-9 to follow are views of the sub-surface grid with change in depth. There is also a horizontal reflection that runs across the entire grid at 2.3 meters depth. This is most likely a change in limestone type (i.e. soft to hard limestone) at the site discussed in previous reports.



**Figure 5: View of grid at 1.3 meter depth.**

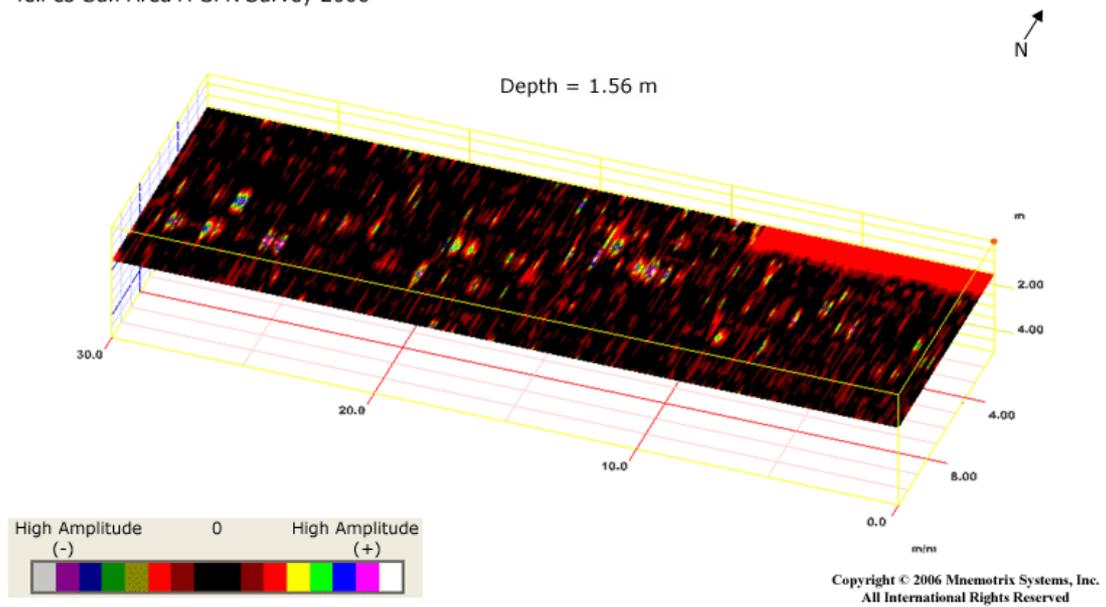


Figure 6: View of grid at 1.56 meter depth.

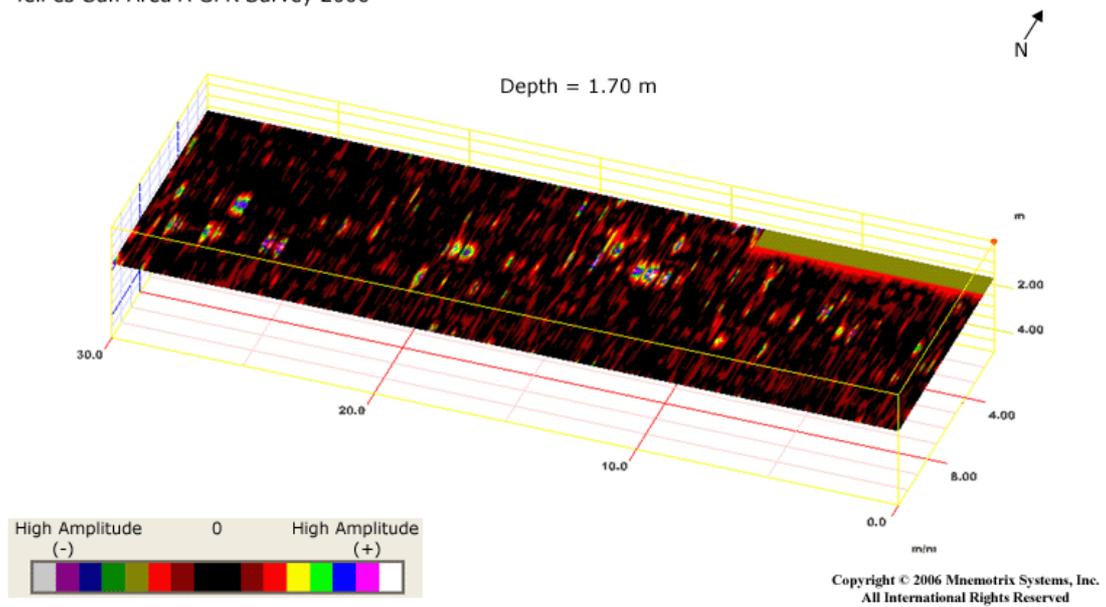


Figure 7: View of grid at 1.70 meter depth.

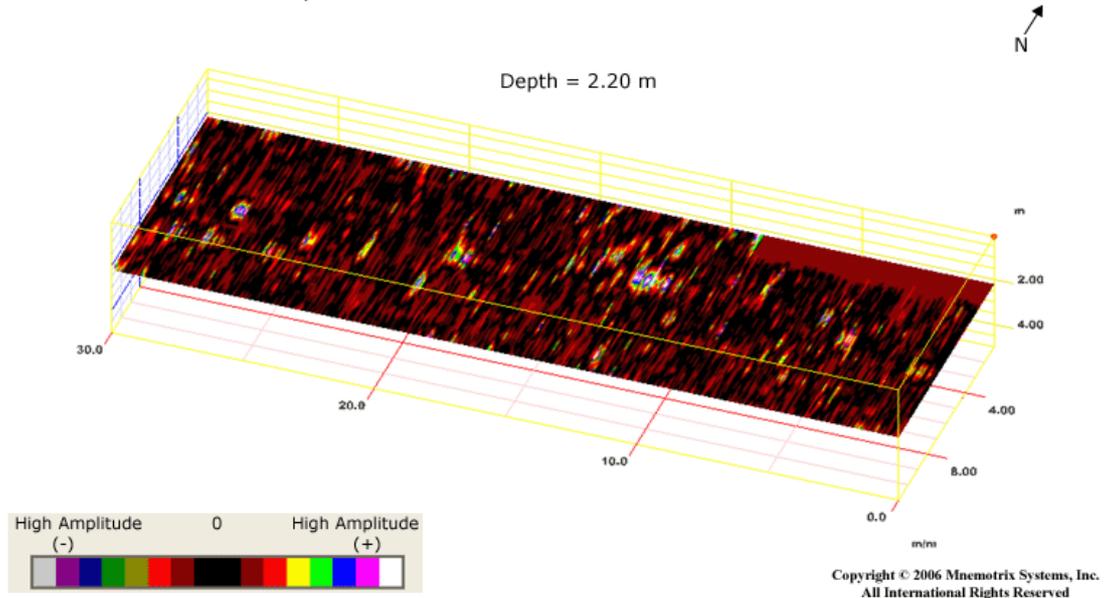


Figure 8: View of grid at 2.20 meter depth.

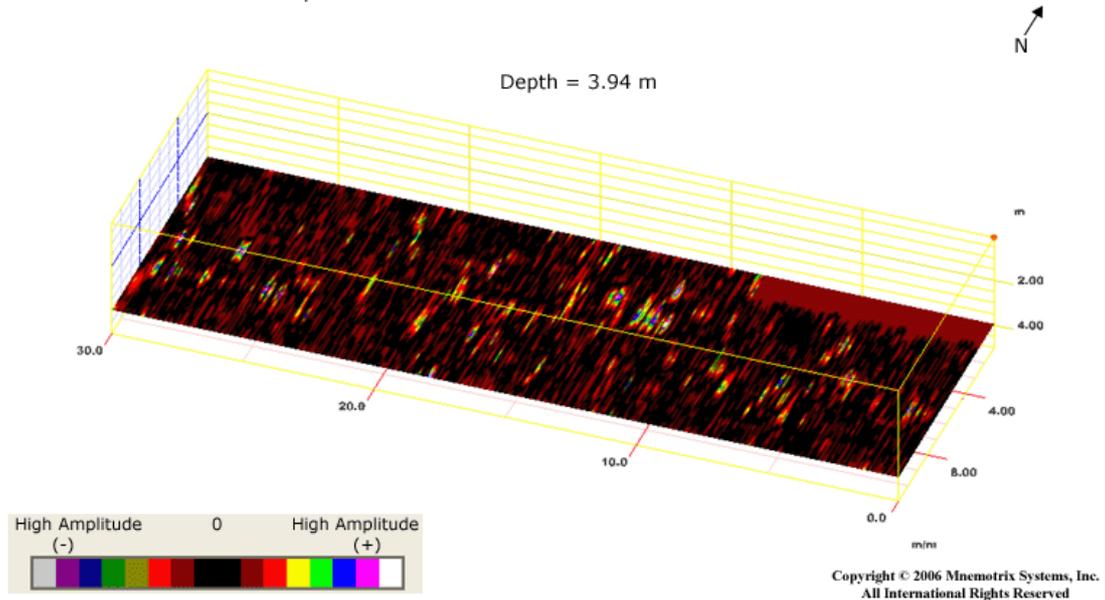
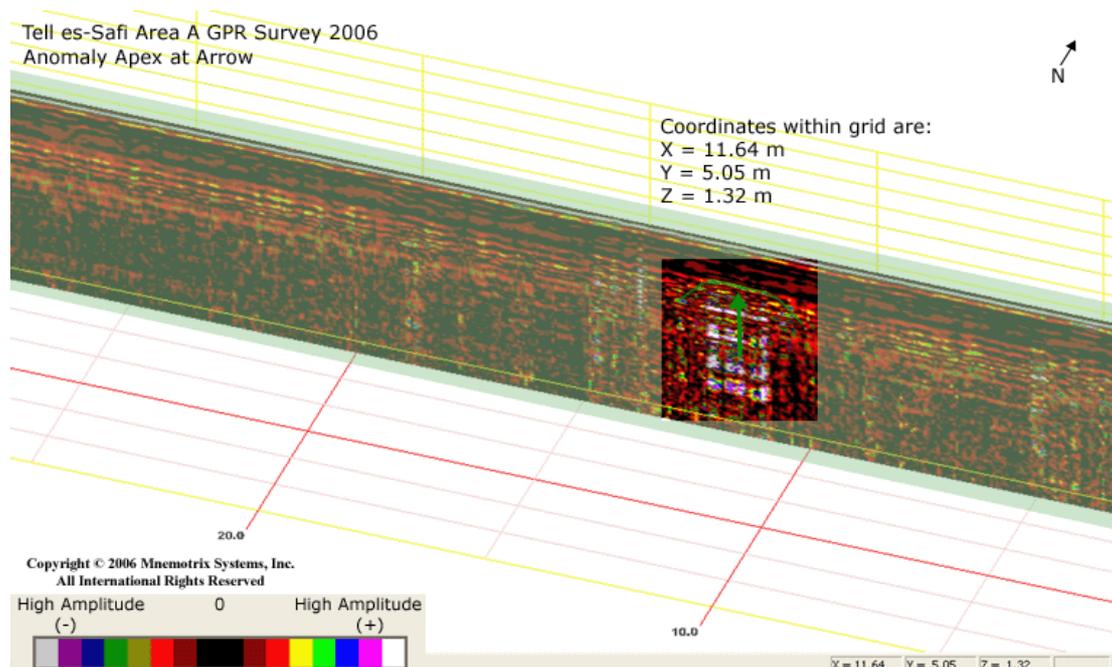


Figure 9: View of grid at 3.94 meter depth.

Finally, in Anomaly Area 3 we had a very strong reflection (the green line indicated by the arrow in Figure 10). This anomaly appears to be one of the strongest features in the scans and is about 1.5x1 meter wide.



**Figure 10: Anomaly Reflection seen in Anomaly Area 3.**

### **Summary and Recommendations**

In surveying the northern side of Area A we found at least four areas of anomalies which indicate that excavation in this area is worthy of attention. We intend to come to the site during the excavation season currently in progress and mark the anomaly areas clearly so that they may be investigated.

We look forward to ground truthing the areas to see what the anomaly areas reveal. This will add to our understanding of the site as well as how to correlate our GPR view of this area to what has been discovered there.