



August 15, 2019

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Subject:

GPR survey, Bradford Site
Bradford Road
Kingston, MA

On June 19, 2019, we conducted a GPR survey at the location referenced as the "Bradford Site".

Using a 400MHZ antenna and a GSSI Radar transmitter, a survey grid measuring 74 feet x 27 feet was defined and scanned to a depth of 7 feet.

The images, data, and interpretations are presented in the following pages.

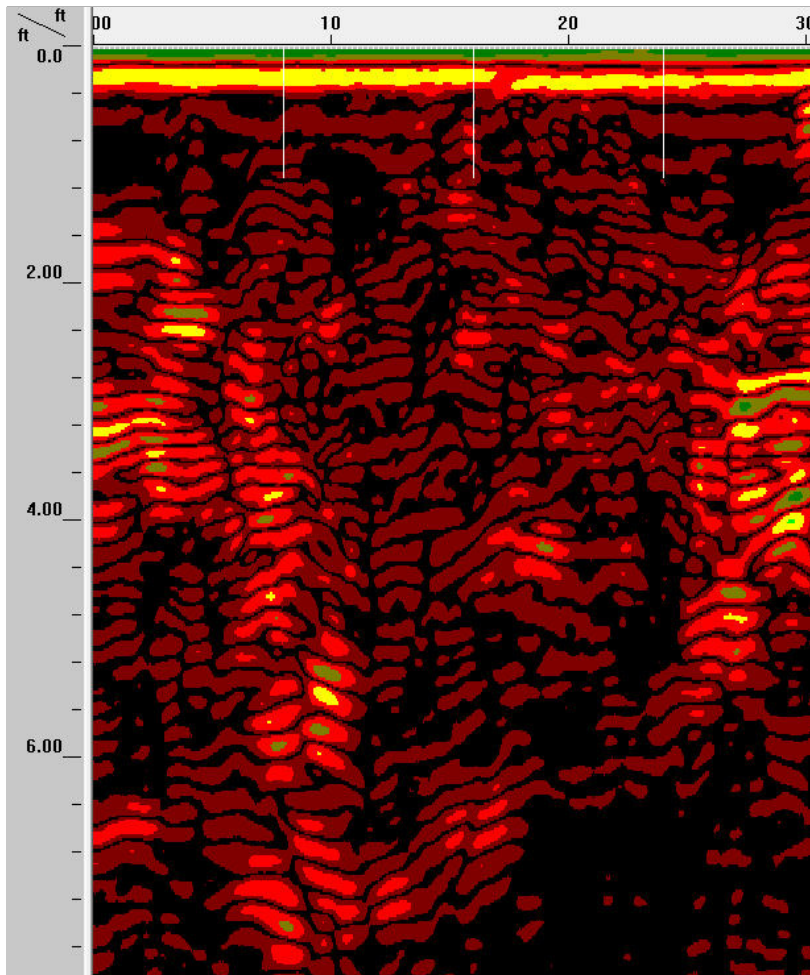
A DJI Survey Drone was used to image the defined area.

We start with that image:



Bradford Site, Grid area = 74 feet x 27 feet.

Bradford Site
June 2019
GPR Excavation Profile



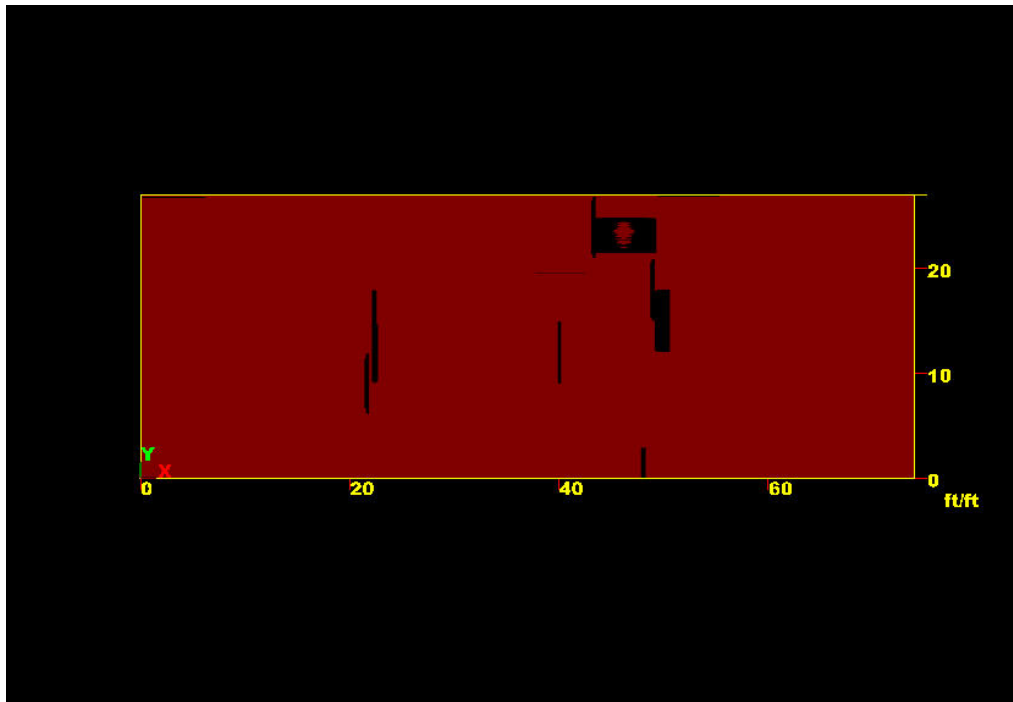
Cross-section image of subsurface soils and the area of mechanical excavation in the center of the grid marked by Plymouth Archaeology – see Drone images.

This is a profile of mechanical excavation – a probable backhoe. The excavator would be positioned on the right of the image, digging down to a little more than 6 feet in depth. As the soils are removed there would be a sloped surface created as seen on the right of the image.

Excavation reached a depth of a little more than 6 feet at a point and upward to around 5 feet.

The excavated area was backfilled with the same soil. There does not appear to be any indication of compacting soils back into the excavated area.

Bradford Site
June 2019
GPR Surface scan, 4" to 1' depth



Ground Penetrating Radar scan, grid area as defined by Plymouth Archaeology and Drone images.

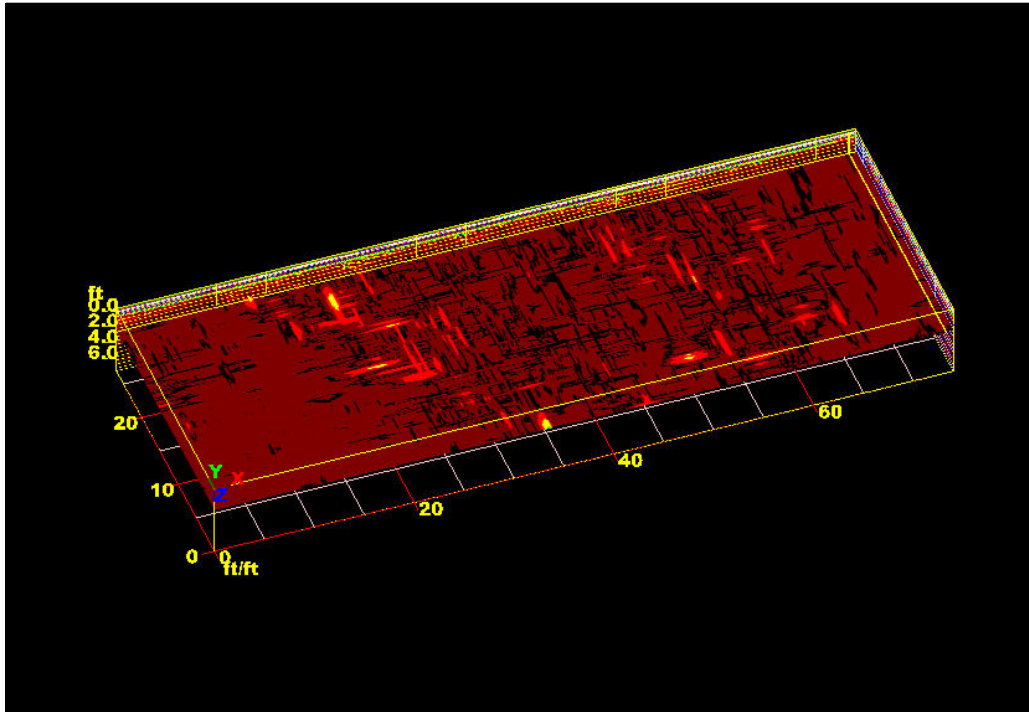
Depth of scan is 4" to approximately 1'.

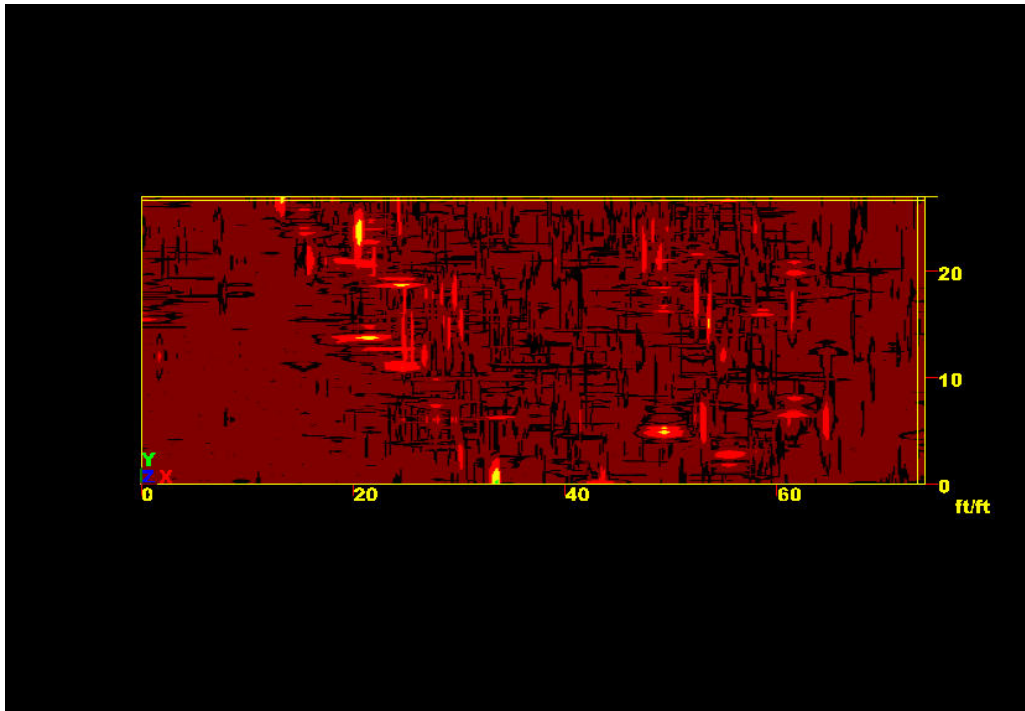
A couple of rectangular images are revealed. There are many possibilities as to what they may represent. Among them are iron markers, a flat stone marker or series of markers, or perhaps a reflective Fe-rich clay. The images present as rectangles but might be more physically irregular in shape.

Bradford Site

June 2019

GPR subsurface scan, 1.1' to 1.3'





Ground Penetrating Radar scan, grid area as defined by Plymouth Archaeology and Drone images.

Depth of scan is 1.1' to 1.3'

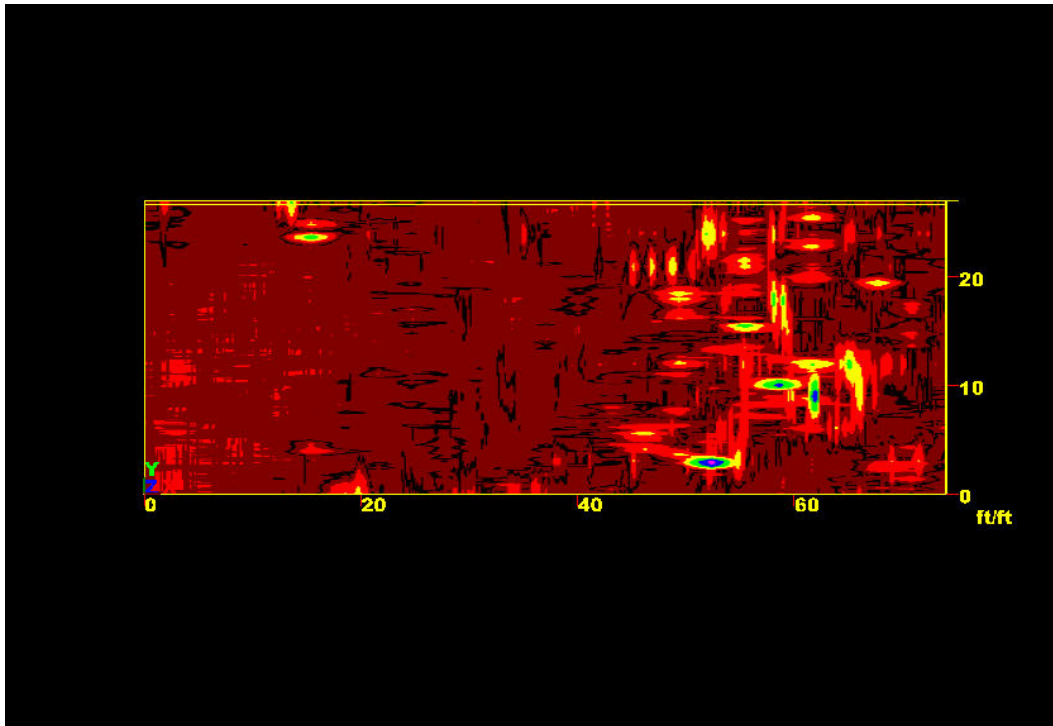
This is a "thin slice" of data beginning at 1.1' to 1.3'. The previously excavated area is defined as a roughly circular area in the center. Note that all shallow reflections are not present in the excavated area.

These reflections are mostly artifacts of metal or Fe-rich mineralogy. However, if it were Fe-rich mineralogy then some of it would have been redeposited back into the excavated area and would have been detected by radar as reflections. The absence of reflected targets in the excavated area argues more for metal artifacts than mineralogy.

Bradford Site

June 2019

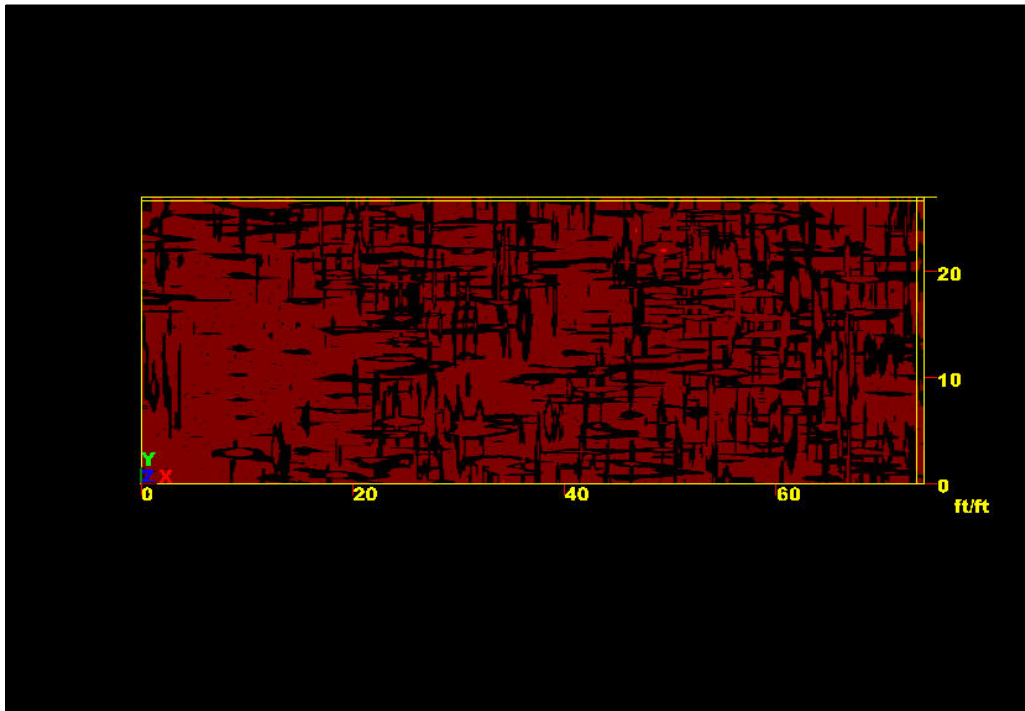
GPR subsurface scan, 1.65 to 2'



Ground Penetrating Radar scan, grid area as defined by Plymouth Archaeology and Drone images.
Depth of scan is 1.65 to 2'

The previously excavated area is in the center, there is an absence of reflected targets to the left of the excavation and an abundance to the right. A controlled, hand-excavation in this area should provide meaningful artifacts.

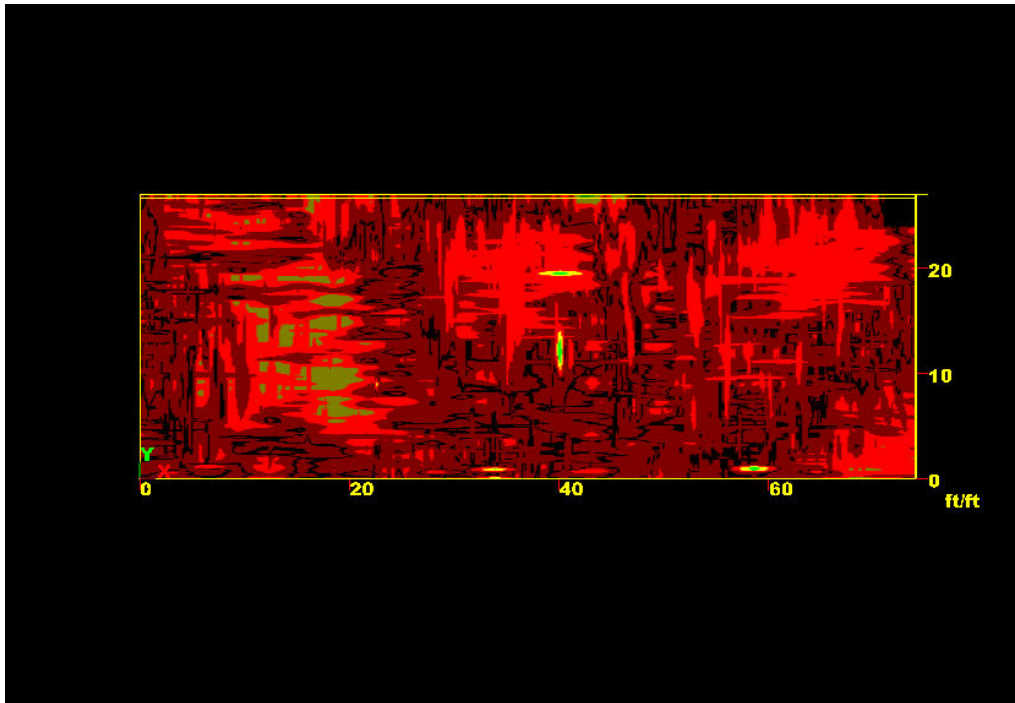
Bradford Site
June 2019
GPR subsurface scan, 6'2" depth



Ground Penetrating Radar scan, grid area as defined by Plymouth Archaeology and Drone images.
Depth of scan is 6' 2"

At this depth, the entire grid is featureless, the soil stratigraphy is mostly undisturbed. The soils are basically sandy, not water-saturated, and boulder free.

Bradford Site
June 2019
GPR subsurface scan 6" to 3.5'



Ground Penetrating Radar scan, grid area as defined by Plymouth Archaeology and Drone images. The scan depth is 6" to 3.5'

GPR software and data processing is continually being refined. There are many ways to filter data by removing objects and reflections that may confuse rather than clarify critical information that may be overlooked.

This scan is filtered to look at the soils for similarities – deposits of like-kinds of soil, like-kinds of compaction levels, etc.

In this image we are looking at a "layer" of soil, beginning at 6" down to 3.5 feet.

The center of the image is the known excavated area. The size (area) is constrained as it is known. There is a similar-sized area to the right of the known area that is very similar in size – and, soil type. There is a differing area of soil and compaction between the two. I think an argument could be made to question if there was a second structure there at some time in the past, only to be covered by a later debris "field" seen in "GPR subsurface scan 1.65 to 2' ".

The area to the left of the known center excavation is a normal, random presentation of soils.

Conclusion:

All the data that can be collected by high-end, remote sensing technology, has been acquired in this scan. However, based upon what has been presented here, there may be new questions.

I would be happy to address these. From them, perhaps, additional useful information may be further distilled from the collected data.

Thank you for the opportunity to conduct this GPR survey.

R. Kempton
New England Geophysical