Geophysical Survey Report
Mapping Historical Trauma in Tulsa 1921-2021

Historic Vernon AME Church
October 19-23, 2020

Report Prepared by
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Figure 1. Vernon AME Church (photo courtesy of Alicia Odewale)

Introduction

On October 19th, 2020, the Mapping Historical Trauma in Tulsa from 1921-2021 (MHTT) project, led by Dr. Alicia Odewale (Assistant Professor of Anthropology, University of Tulsa) and Dr. Parker VanValkenburgh (Assistant Professor of Anthropology, Brown University), conducted a geophysical survey on property owned by the Vernon AME Church. This survey was authorized via email on October 14th by Reverend Robert Turner, Pastor of the Vernon AME Church. The MHTT survey team consisted of Dr. Alicia Odewale, Ms. Nkem Ike (Ph.D. student in Anthropology at the University of Tulsa) and Drs. Amanda Reignier and Scott Hammerstedt of the Oklahoma Archaeological Survey (OAS). MHTT hired OAS to conduct the survey because of that organization's demonstrated excellence in archaeological and geophysical survey.

Background

The Vernon African Methodist Episcopal Church in Tulsa, Oklahoma has been part of the Historic Greenwood District since the church was established in 1895 (Ellsworth 1982). This one church building is the only structure in the city that has seen the initial formation of Greenwood in the early 20th century, the arrival of statehood in 1907, and both the catastrophic attack on the district in 1921 and the second attack in the form of urban renewal in the 1960s. This is a rare site where the pre-1921 original foundation is evident alongside rebuilt and more recently renovated parts of the church. Our survey plans covered both the church parking lot and grassy undeveloped land to the north and east of the parking lot. A Sanborn Fire Insurance Map from 1915 indicates that at least 10 structures existed under what is now the church parking lot to the north and church playground to the south (Figure 2). It should also be noted that the land

north of church parking lot, currently belonging to the Tulsa Development Authority, overlaps with the historical locations of two schools labeled as "Negro" schools on the 1915 Sanborn (Figure 3). Despite the separation on land ownership, these areas in close proximity offer an opportunity to explore both the religious and educational legacy within Greenwood. Vernon AME, nicknamed the Grandmother of Greenwood, has historically been and continues to be an important site of gathering, shelter, activism, and a repository of culture to complement its history as a site of mass destruction and anti-Black violence. Vernon AME represents the oldest structure in our survey and one of the only structures that remain standing and documented on maps of Greenwood consistently from 1911 (Sanborn sheet 7) to 2021, providing the most extensive consistent occupation timeline for all six phases in our survey to map historical trauma, capturing the rise, destruction, recovery, revival, second attack of urban renewal, as well as the renewed growth and reimagining that Greenwood is experiencing today. It is also important to note that Vernon is one of only 2 structures in Greenwood currently listed on the National Register as of 2018. We know from oral testimony that the story of Vernon during the massacre centers on the basement where a number of people hid as the church opened its doors to those seeking shelter from the violence on the night of May 31st. But oral testimony and recorded evidence from pictures taken at the time also indicate that the basement was the only part of the building that survived the violence and remained completely intact while being partially burned. The fortitude of this church is evident in not just the structural survival of the basement but that the Vernon congregation continued to hold their church services in that basement just days after the massacre, and Vernon was one of the first structures to be rebuilt in Greenwood. Whatever we find on Vernon property could add to this story.

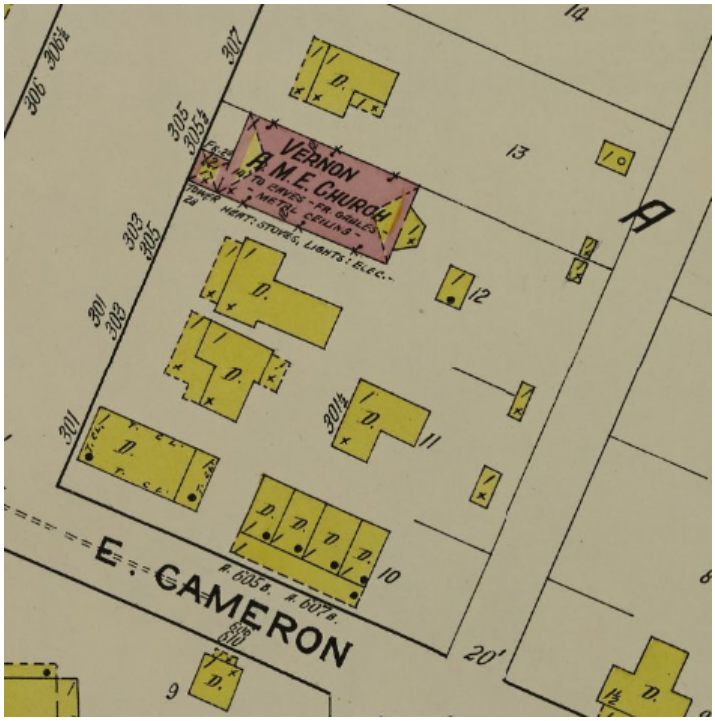

Figure 2. 1915 Sanborn Fire Insurance Map. Sheet 9. Map of Vernon AME Church and adjacent structures

Figure 3. 1915 Sanborn Fire Insurance Map. Sheet 9. Map of North Hartford Avenue and adjacent structures. Showing the two "Negro" schools behind Vernon AME Church

Methods and Technologies

Surveying and Mapping. We surveyed approximately 2,422.50 m^2 (2,897 yd^2) of the Vernon AME Church tract using Geophysical Survey Systems, Inc. (GSSI) UtilityScan ground-penetrating radar (GPR) system. 1542.5 m^2 (1,845 yd^2) was in the parking lot to the north of the church and 880 m^2 (1,053 yd^2) was in the yard/playground to the south of the church (Figure 4). Corner stakes were positioned using a laser total station for accurate measuring. Standardized ropes 20 meters in length and marked at 50 cm intervals were then used to guide the GPR operators. Grids were named according to the coordinates of their southwest corner.

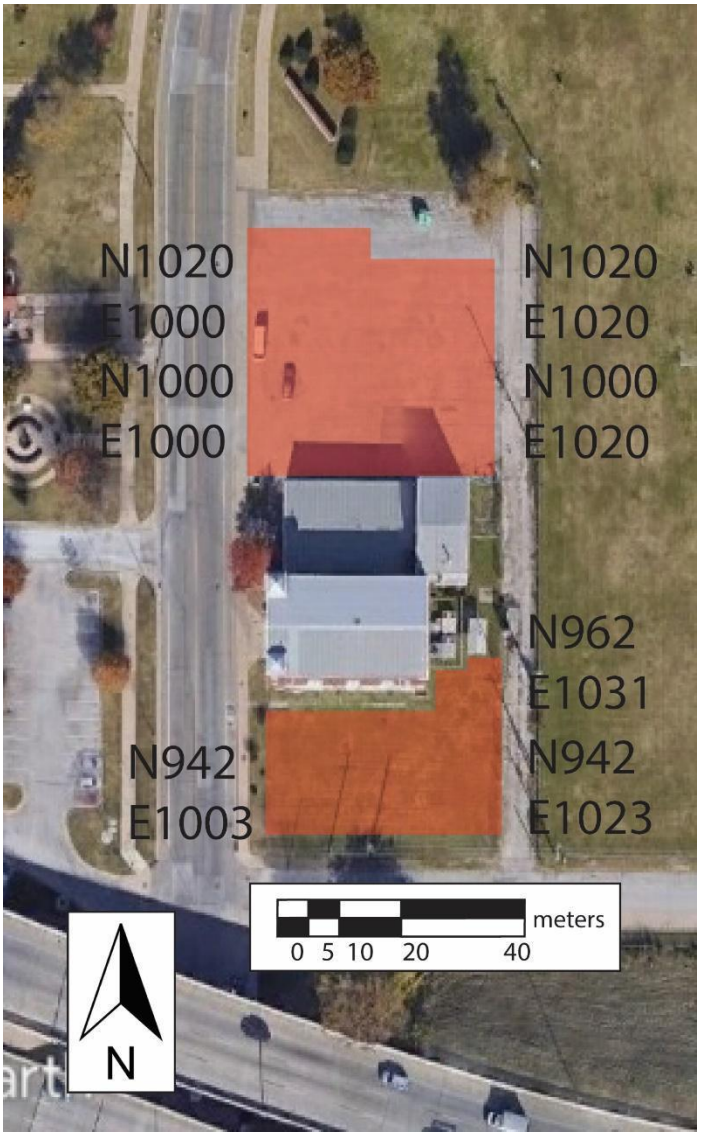

Figure 4. Vernon AME Church survey area (in orange) and associated grid numbers. Base map downloaded from Google Earth.

Geophysics. Geophysics has become a common tool in archaeology and consists of a number of non-invasive methods to find and analyze subsurface features (Clark 1996; Conyers 2012; Kvamme 2001; Weymouth 1986). Cultural features are usually recognized by contrasts or other differences between the feature and undisturbed surrounding soils. Human activities alter soil texture in many ways, including compaction, stratigraphy, moisture retention, and burning, among others. Geophysical technologies allow us to measure and locate variations of the physical characteristics of the soil. These instruments operate near or at ground surface. The use of the ropes described above allow for spatial control and the subsequent accurate location of soil anomalies detected with geophysical technologies. In many cases, the use of multiple

geophysical techniques on the same project has proven useful (e.g., Clay 2001; Hammerstedt et al 2017). However, since the survey area was partially within a paved parking lot and partially in areas containing large quantities of nearby metal (which adversely affects instruments like magnetometers), we were limited to the use of ground-penetrating radar.

Ground-penetrating radar (GPR). GPR is commonly used in cemeteries and in other archaeological applications (Conyers 2006, 2012). It is an active technology, meaning it introduces an artificial field to measure response. GPR works by sending pulses of radar into the ground, which are reflected, absorbed, or otherwise deflected by these buried features. The return time of these pulses indicates the depth to the anomaly. Data are collected in sequential profiles, which can then be combined in proprietary software (in this case, RADAN 7) to create three-dimensional views. Data can then be viewed vertically and horizontally to search for anomalies.

Soil properties and the frequency of the GPR antenna determine both the depth that the radar pulse will penetrate and its resolution. Higher frequencies will not go particularly deep, but can detect smaller objects. Lower frequencies will go deeper and can detect larger objects (Conyers 2004). The speed of the pulse depends on the composition and moisture levels of the soil through which the signal travels (Conyers 2004, 2012).

Archaeological features appear in the data as multiple types of anomalies. These are generally caused by the deflection/reflection of the radar pulse created by the contrast between a feature or grave and the surrounding soil (Bevan 1991; Conyers 2004, 2012). Hyperbola-shaped anomalies often appear directly over archaeological features. These can mark pits, hearths, burial vaults, air pockets created by coffins, coffin furniture, or buried foundations such as headstones and stone outlines (Bevan 1991; Conyers 2004, 2006, 2012; Gaffney and Gater 2003). However, tree roots, rocks, and rodent burrows can cause similar hyperbolas, thus requiring careful mapping of the survey area and care in interpretation of the data. Generally, if an anomaly appears in the same place in multiple sequential profiles, it is more likely to be archaeological than a naturally occurring feature.

A GSSI Utility Scan with a 350 MHz antenna was used for this project (Figure 5). It was moved in a sequential zigzag pattern across the survey area and the antenna constantly remained on the ground surface during data collection. Data was collected at 100 readings per meter with 0.5 meter spacing between transects. Signal strength was good to a depth of roughly 2 meters, well within the depth of historic buildings. Data were downloaded into RADAN 7 for processing.

Figure 5. GSSI UtilityScan GPR.

Figure 6. GSSI UtilityScan GPR being operated by TU graduate student Nkem Ike.

Results and Interpretations

The parking lot area has likely been modified a number of times, but several anomalies of interest are still visible. The first is a series of five linear anomalies in N1020E1020 (Figure 7). These were faintly visible on the asphalt during field work. They are primarily restricted to the top 20 cm of the GPR profile, but #3 extends much deeper. We do not think that these are relevant to the study of historic Greenwood; they are more likely related to parking lot construction or use.

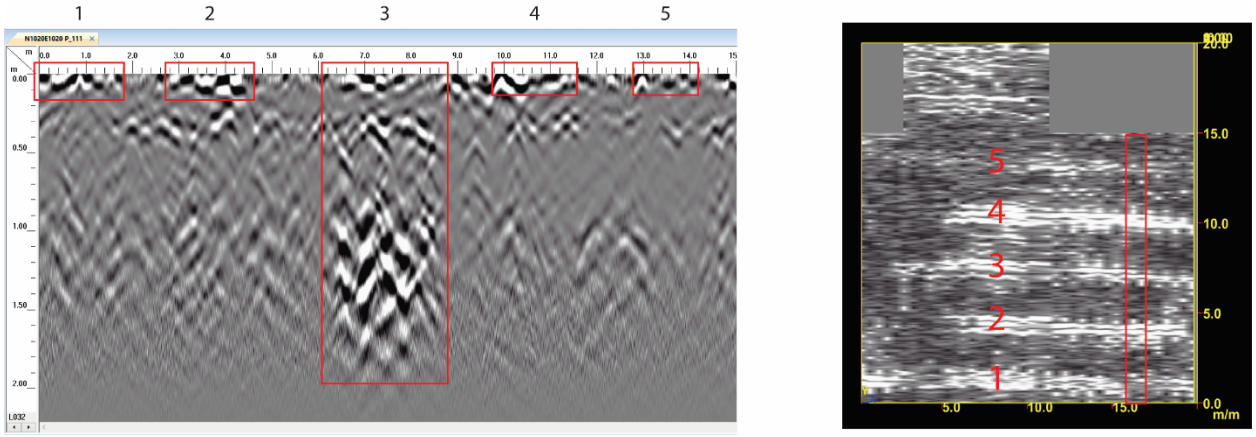

Figure 7. N1020E1020 profile (left) and time slice 6 cm below surface (right). The location of the profile is shown by the vertical red box on the slice and numbers show the corresponding locations of features.

A more promising anomaly can be seen in the northwest corner of N1020E1000 (Figure 8). This measures approximately 12 x 10 m. It is faintly visible as a rectangle in the horizontal time slice shown in Figure 8 but has a more pronounced profile. It's size and location match well with a building depicted on a 1915 Sanborn map (Figure 9), suggesting that the anomaly could be the remnants of this structure, but this is difficult to determine without further work.

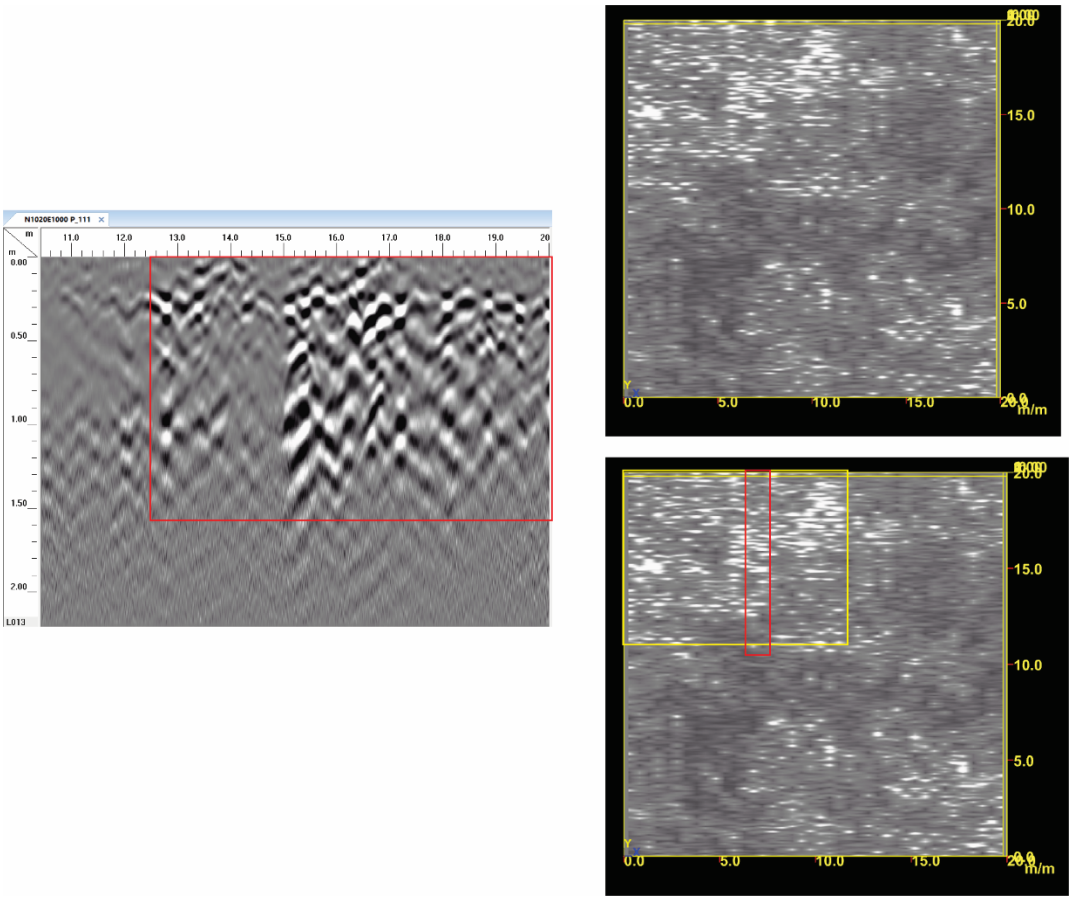

Figure 8. Large anomaly in N1020E1000. Profile at left; clean time slice at 25 cm below surface at top right; time slice at 25 cm below surface at bottom right showing the horizontal extent of the anomaly in yellow and the location of the profile in red.

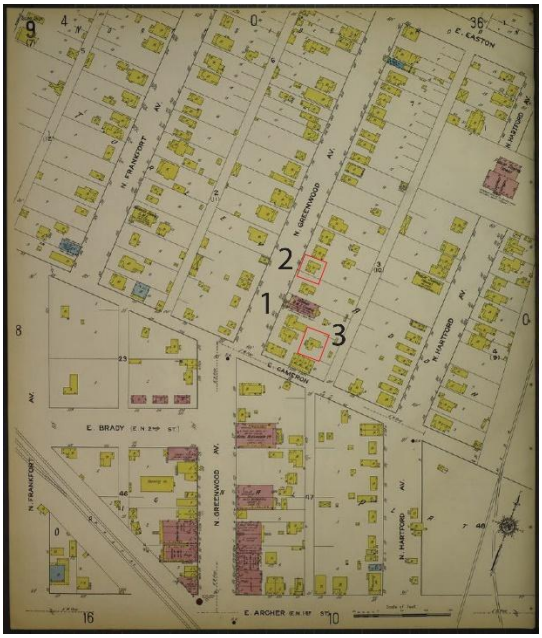

Figure 9. 1915 Sanborn map showing the locations of: 1. Vernon AME Church; 2. N1020E1000 anomaly; 3. N942E1023 anomaly. Downloaded on November 5, 2020 from https://www.loc.gov/collections/sanborn-maps.

The final anomaly of interest lies in the yard/playground to the south of the church. This is a roughly 12x8 m rectangle with what appear to be clearly defined walls and a protrusion extending to the west. Figure 13 shows its location within the entire yard for easy comparison to the Figure 9 Sanborn map and Figure 10 horizontal time slice. Figures 11 and 12 are at a smaller scale and show profiles of the western edge and center of the anomaly, respectively.

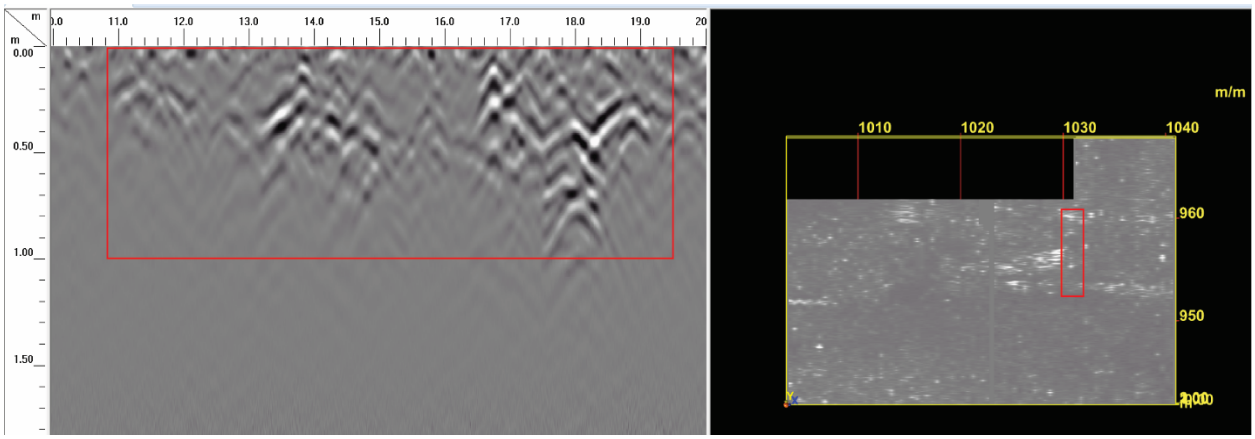

Figure 10. Composite of the yard/playground south of the church. Profile (left) and horizontal time slice at 35 cm below surface. Note the well-defined rectangular shape that may depict walls.

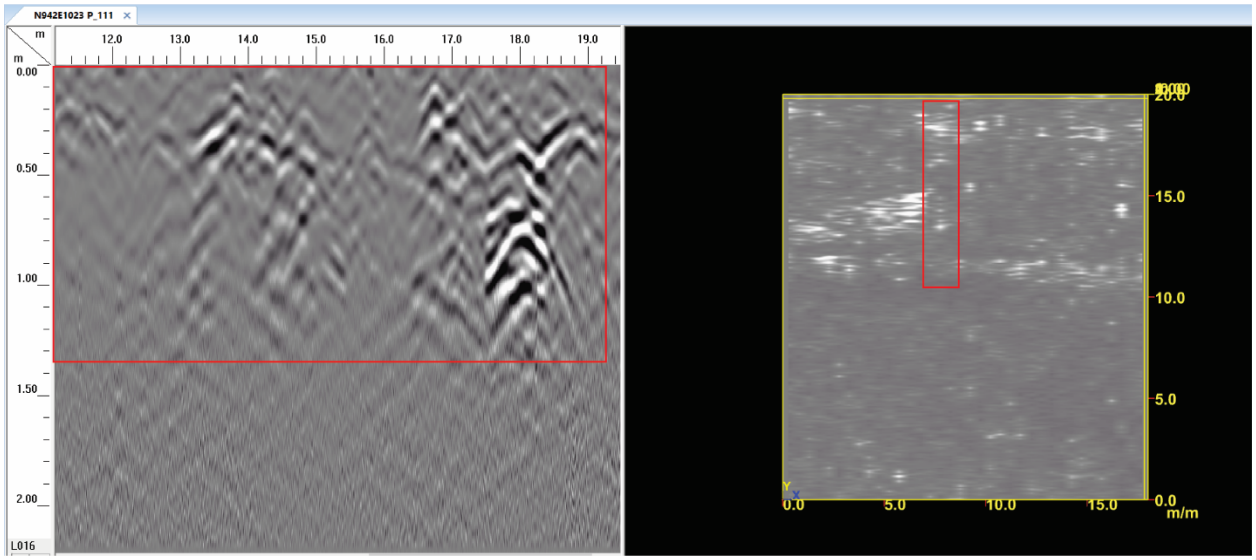

Figure 11. N942E1023. Profile of western edge of anomaly (left), horizontal time slice at 35 cm below surface (right). The red box to the right shows the location of the associated profile. Note the regular rectangular shape and empty interior.

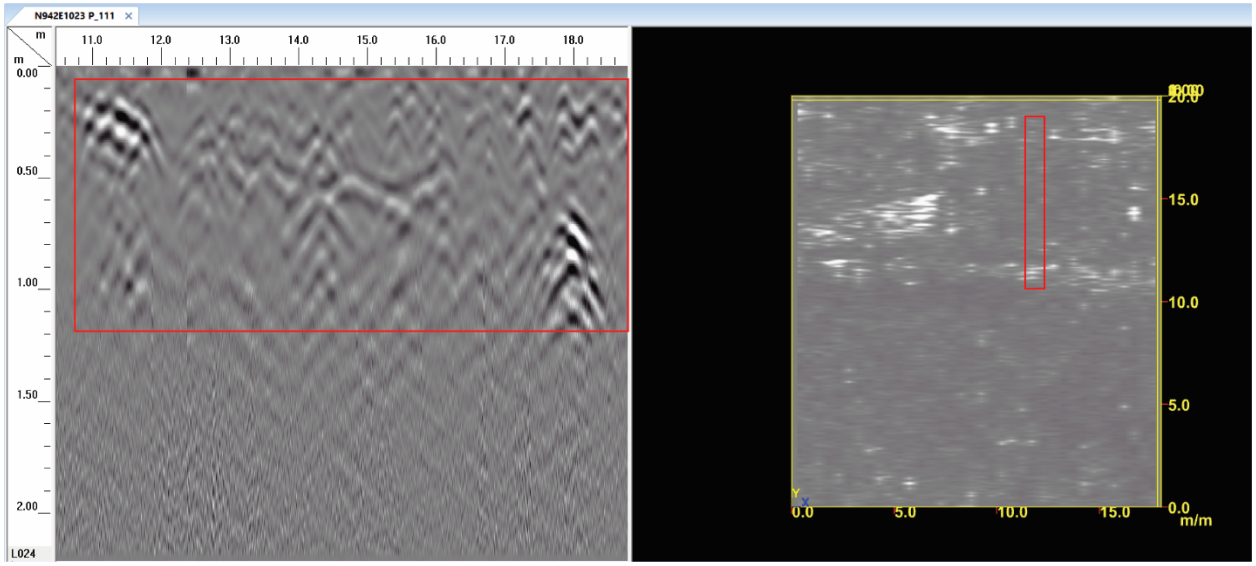

Figure 12. N942E1023. Profile of the center of the anomaly (left), horizontal time slice at 35 cm below surface (right). The red box to the right shows the location of the associated profile. Note the regular rectangular shape and two parabolas in the profile that show the south and north edges of the rectangle.

While in the field, we noticed rectangular patterns of differentially colored grass in N962E1023. Examination of historical aerial images from Google Earth from September 2016 indicates that these markings can be seen from the air (Figure 13). The overall size and shape of the markings match the GPR findings. The 1915 Sanborn map of this area shows a building in roughly this location (Figure 9). The combination of the GPR results, the aerial images, and the Sanborn map makes a strong case that this anomaly may be the foundation of a building that stood in this location pre-dating the 1921 Tulsa Race Massacre.

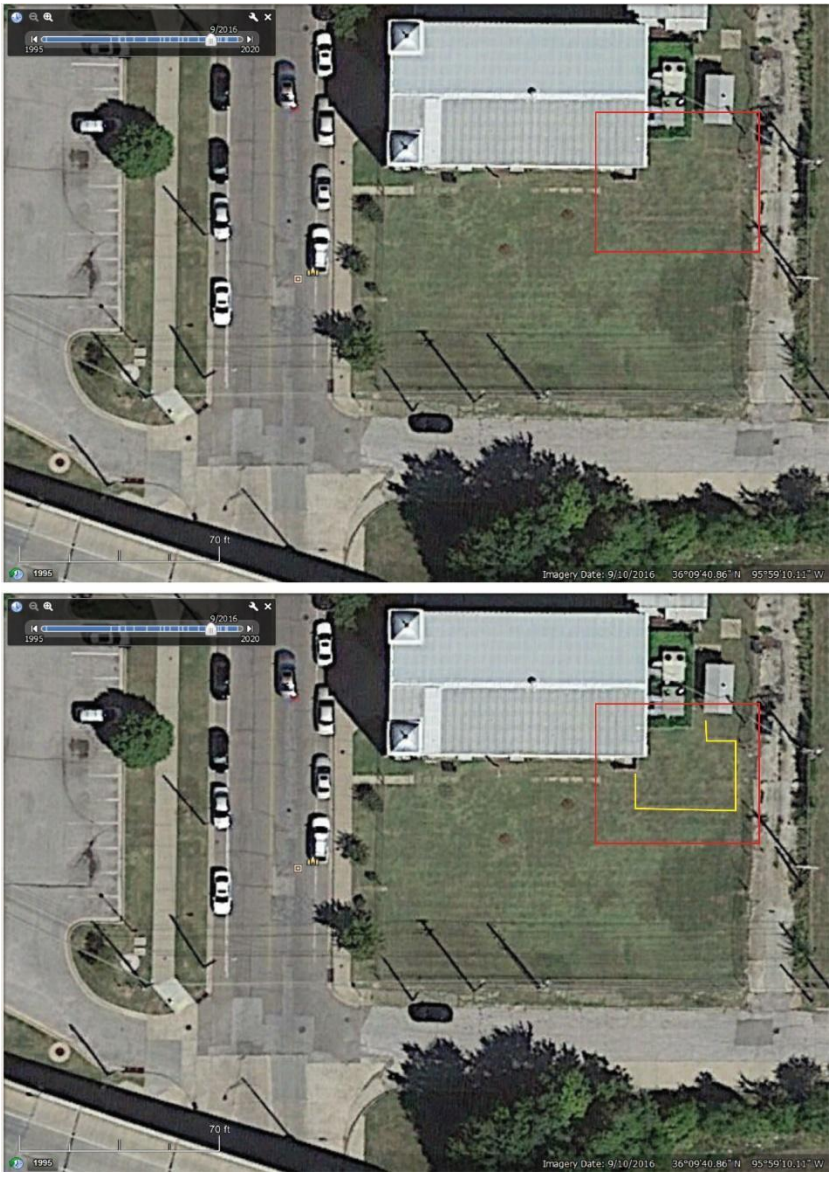

Figure 13. Google Earth image from September 10, 2016 showing the outline of a possible foundation. The area is highlighted in red in both views and we have outlined what may be walls in yellow on the bottom. Downloaded December 16, 2020.

One other notable feature was found immediately adjacent to the southeast corner of the church in N962E1031 (Figure 14). It is a high-amplitude reflection that is most pronounced at roughly 90 cm below surface, but it is first seen between 60-70 cm. Our assumption is that this represents a feature directly associated with the church, perhaps a septic tank.

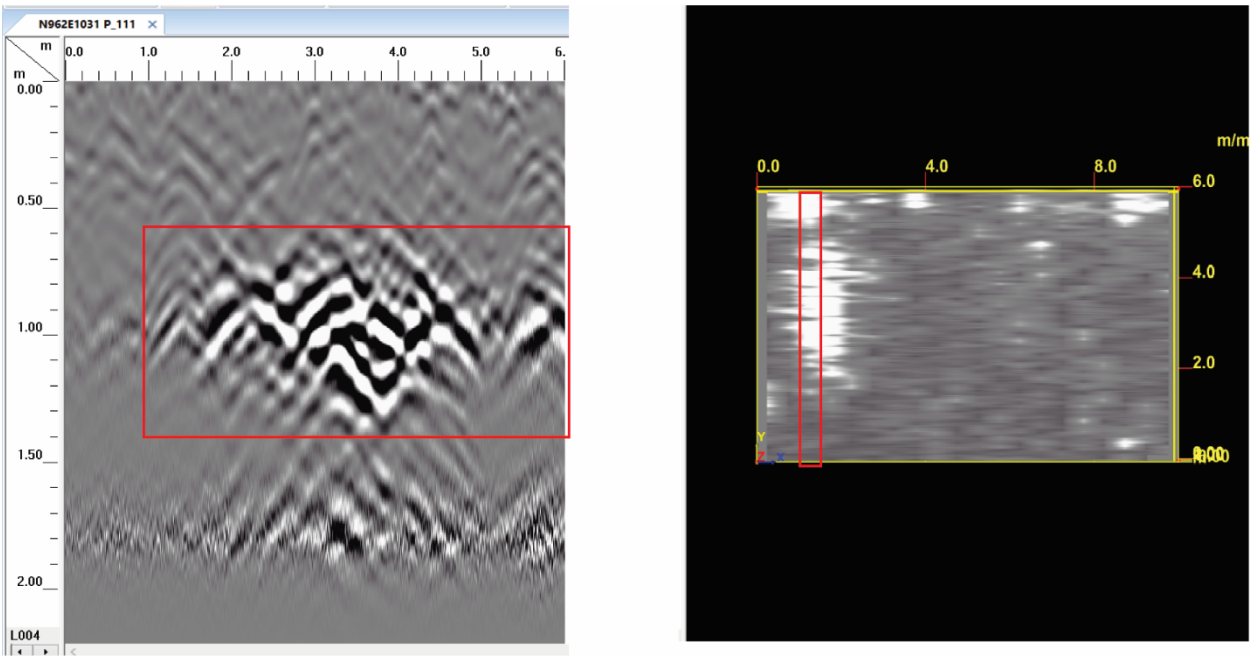

Figure 14. High-amplitude reflection in profile (left) and horizontal time slice at 90 cm below surface (right). The location of the profile is marked by the red box on the right.

Conclusion

GPR survey revealed several anomalies in the immediate vicinity of Vernon AME Church. Of these, we argue that two may be related to features associated with historic Greenwood. One, located in N1020E1000 (the northwest corner of the parking lot) has a rectangular (albeit not well defined) shape in horizontal view but a higher amplitude profile. It is the right size and shape to potentially be the remnants of a building marked on the 1915 Sanborn map. The other is located in N942E1023, which is located in the northeast corner of the yard/playground to the south of the church. It is likely the foundation of a building that stood until at least 1915 and probably later. It has a well-pronounced rectangular shape and is corroborated by both Sanborn maps and aerial imagery. Both features are good candidates for further archaeological investigation.

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