Archaeological Geophysical Survey of the Old Summit County Infirmary Cemetery at Schneider Park, Akron, Summit County, Ohio

by

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Abstract

The University of Akron, Department of Anthropology conducted an archaeological geophysical survey field school from June 19, 2017 to July 7, 2017 at an unmarked cemetery in West Akron. The survey area as confined to the north and west central portion of the park; this area was selected as the most likely to contain burials. The goal of the class was to teach students the methods and techniques of geophysical survey. The goal of the geophysical survey was to delineate the boundaries of a historic cemetery and to identify the minimum number of burials. The cemetery was originally part of the former Summit County Infirmary from 1849 to 1919. The field school was led by Dr. Timothy Matney of the Department of Anthropology at the University of Akron.

The University of Akron students conducted archaeological geophysical survey of the cemetery using two terrestrial subsurface techniques: magnetic gradiometry and electrical resistivity. The students also conducted visual surface survey. An additional aerial drone survey was conducted separately by Dr. Jerrad Lancaster, University of Akron, Department of Anthropology. The results of these four survey techniques were combined to identify possible graves and to rate the reliability of each identification. In total, 384 graves were confirmed by at least one survey method as a result of the 2017 field school. Of these, five graves were identified in all four survey methods of survey. An additional 89 were located by three of the techniques. Nineteen graves were located by two methods of survey while 271 graves were only documented by one of our survey methods.

Team leaders for the survey were graduate students Maeve Marino and Morgan Revels. The class participants were: Patricia Arnett, Sarah Burgess, Pennie Fordham, Emma Grosjean, Lucy Gustavel, Amanda Leach, Alyssa Perrone, Tim Schmucker, Klansee Stevens, Anthony Stover, Larry Tucker, and Stacy Young.

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Introduction

The cemetery in Schneider Park was first brought to the attention of Dr. Tim Matney and the Department of Anthropology in the spring of 2016 by Eric Olson, then a graduate student at Ball State University. In August 2016, Drs. Tim Matney (Department of Anthropology), Shanon Donnelly (Department of Geosciences), Jerrad Lancaster (Department of Anthropology), and Eric Olson (Stewards of Historical Preservation) conducted two days of preliminary electrical resistivity and drone survey. The results of this preliminary survey yielded inconclusive data due to dry soil conditions.

The project area is within Schneider Park, managed by the City of Akron, Ohio [figure 1]. Schneider Park is a 15 acre grass covered public park. There are a few large oak trees sparsely scattered throughout the edges and a few on the interior of the park. In the northwest portion of the park is a disturbed area of grass, with clear rectangular patches of thick vegetation and soil depressions. The macroscopically visible depressions were initially interpreted by Dr. Matney and Mr. Olson as grave locations for the historic Summit County Infirmary. Previous investigations (Price 2009; Whitman et al. 2008) had made reference to the cemetery of the old Summit County Infirmary in Schneider Park without any specific burial count or cemetery boundaries.

During a five week summer session class, Dr. Matney instructed University of Akron students in the use of electrical resistivity and gradiometry methods and techniques, and used the Schneider Park cemetery as a study location. The research and results of the survey were presented as a final project of the class to the public on July 7, 2017 at the Highland Square branch of the Akron-Summit County public library.

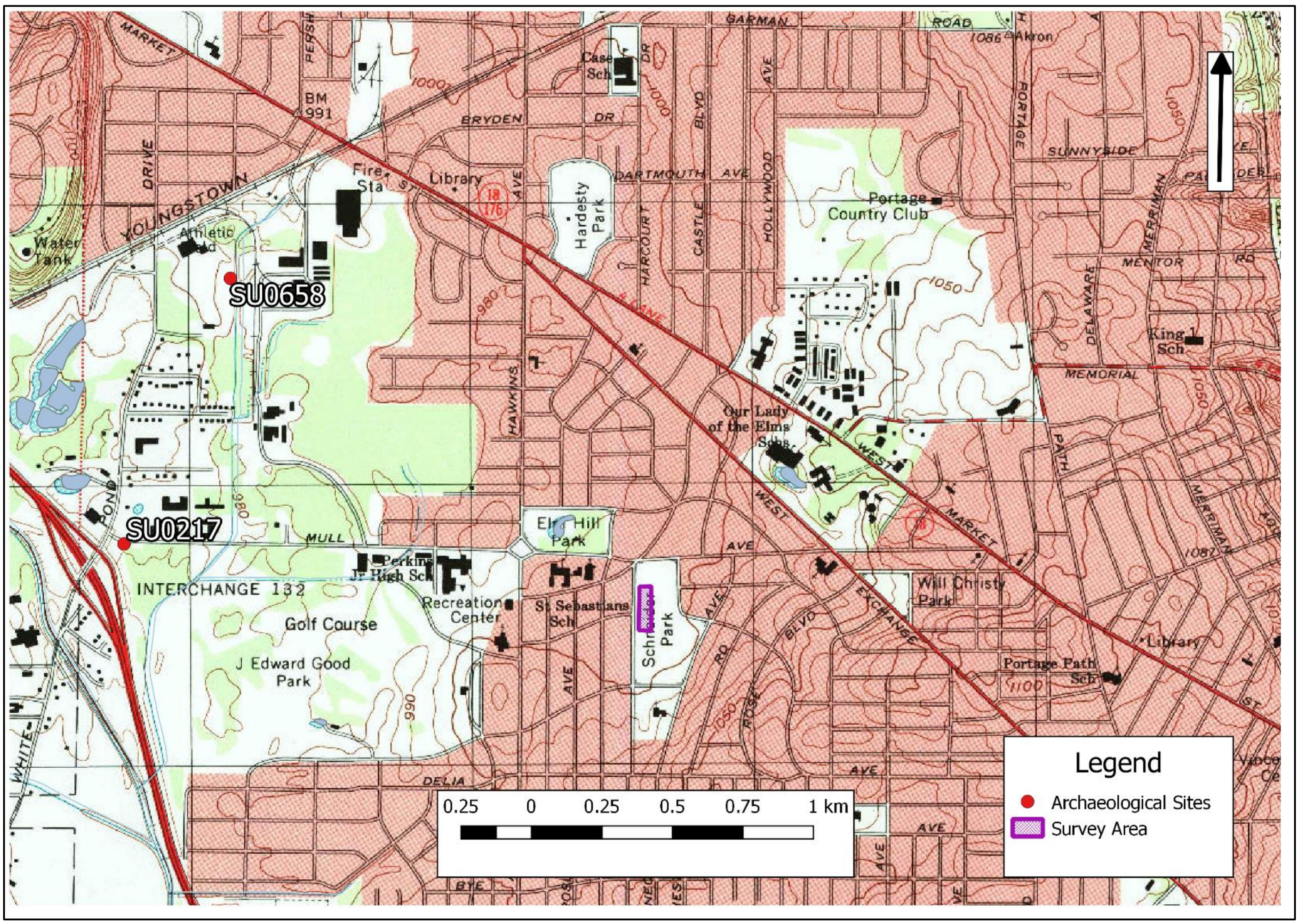

Figure 1: USGS 7.5' West Akron Quadrangle Map (1994) showing the location of Schneider Park in Akron, Ohio.

Research Design

The goal of the archaeological geophysical investigation was to train University of Akron, Department of Anthropology students in geophysical survey methods, and to delineate cemetery boundaries and burial counts. For the purposes of this report, cultural resources have been divided into *prehistoric* and *historic* resources. *Prehistoric* is defined here as cultural resources created or used prior to written accounts, while *historic* is defined as cultural resources create or used after written accounts. The historic period begins circa 1650 with the first accounts of southern Lake Erie in *The Jesuit Relations* (Brose 1984; Bush and Callender 1984; Wheeler-Voeglin and Tanner 1974).

Prehistoric Environment

Summit County bedrock consists of Denovian, Mississippian, and Pennsylvanian age rock (Bownocker 1981). The Denovian formations consist of Olentangy and Ohio Shales; these formations lie beneath portions of the Cuyahoga River Valley north of Boston Township.

Limestone, sandstones, and Waverly and Maxville shales constitute the Mississippian formation, which lies beneath the western half of the county. Intermingled with the Mississippian and Denovian deposits are Pennsylvanian age shales, sandstones, Allegheny coal and other similar aged rock. Pennsylvanian limestones are the source of the only chert within Summit County. Within the Pennsylvanian limestone is the Upper Mercer formation, located in the southeastern part of the county (Stout and Schoenlaub 1945) along streams eroding out as small to medium sized nodules.

The project area lies within part of the Glaciated Allegheny Plateau, on an Illinoisan age ground moraine (Brockman 1998; White 1982). Schneider Park consists of three different soil series: Chili urban land, Jimtown urban land, and Carlisle muck (Ritchie et al. 1978). The project area is part of the low areas of the Chili soil association, which is poorly drained (Ritchie et al. 1978:5). The soils of Schneider Park are so poorly drained that agricultural cultivation would have produced low yields; however, locating a cemetery on unproductive ground would free up more productive soils elsewhere.

The vegetation of the region is dominated by mixed oak forests (Gordon 1966; Forsyth 1970); the project area specifically is mostly mowed grass with oaks scattered throughout the park. The prehistoric fauna of the project area must be inferred from archaeological sites with recorded preserved faunal materials. The project areas ecological conditions were likely similar to the area around Krill Cave (33 SU 18), Mystery Cave (33 SU 644), and the Fairlawn Mastadon (33 SU 653). Based on the fauna recovered from these sites, Summit County suited woodland wildlife such as deer, raccoon, squirrel, chipmunk, wolf, bear, bobcat, woodchuck, vole, woodrat, bat, hawk, owl, turkey, passenger pigeon, ruffed grouse, and woodcock.

The project area is 304 m above sea level (USGS 1994) in the upland headwaters of the Tuscarawas watershed. According to the 1903 USGS 7.5’ Akron West Quadrangle Topographic Map, there was a tributary stream of Pigeon Creek approximately 250 meters to the north.

Prehistoric Cultural Resources

The prehistoric period spans over 10,000 years of human activity in northeast Ohio [Table 1]; the time periods are divided into broad cultural time periods listed below (Lepper 2005). The dates listed below are sometimes subdivided further, such as the various Whittlesey phases of the Late Prehistoric (see Brose et al. 1981). American Indians have been using the natural resources of the Cuyahoga Valley in response to social, economic, and climatic changes throughout the prehistoric period (Winstel 2000). Along the Cuyahoga River valley there are hundreds of prehistoric sites including camps, small habitations, hamlets, villages, cemeteries, burial mounds, earthworks, storage caches, and plenty of artifacts dropped in transit from one camp to the next.

Table 1: Timeline of prehistoric periods in Northeast Ohio.

Period Name	**Years (BC and AD)**	**Overarching trends**
Proto-historic	AD 1500—1650	European trade goods, Beaver Wars
Late Prehistoric	AD 1000—1500	Fortified villages, local resources
Late Woodland	AD 400—1000	Hopewellian collapse, nucleation, maize agriculture, bow and arrow
Middle Woodland	AD 1—400	Hopewell culture, trade networks, earthwork construction, ceremonialism
Early Woodland	1000 BC—AD 1	Adena culture, Ceremonialism, mound construction, plant domestication, trade
Late Archaic	3500—1000 BC	Plant domestication, tool diversification
Middle Archaic	6500—3500 BC	Deciduous forest resource exploitation, climate change
Early Archaic	8000—6500 BC	Big game hunting/climate change
Paleoindian	12000—8000 BC	Big game hunting

The first people to migrate into the Lake Erie watershed are known as the Paleoindians (Lepper 2005). Most of the Paleoindian in Ohio is represented by a small handful of excavated sites, with the majority of sites discovered as isolated projectile point finds (Brose et al. 1981:108). Substantial Paleoindian sites include Nobles Pond in Stark County, Paleo-crossing in Medina County, and Sheridan Cave in Wyandot County (Lepper 2005). Unfortunately, no significant Paleoindian site has been discovered or recorded within Cuyahoga Valley National Park (CUVA).

The Archaic Period, sub-divided into Early, Middle, and Late, encompasses the largest time period in American Indian prehistory (Purtill 2009). Throughout the Archaic, the climate was changing, Lake Erie's water levels were fluctuating (Holcombe et al. 2003), and new floral and faunal resources were establishing populations in Northeast Ohio (Brose et al. 1981:106-108; Purtill 2009). Even the level of the floodplain was fluctuating significantly during the Archaic (Szabo et al. 2011). Within the region, there are many Archaic sites, but they are small in size and artifact scatter.

The Woodland Period, sub-divided into Early, Middle, and Late, encompasses one of the most popular time periods in the public eye. The Hopewell culture flourished during the Middle Woodland Period (Lepper 2005; Finney 2002:24). The Cuyahoga Valley provides a unique opportunity to understand the collapse of Hopewell social networks, since most of the earthworks constructed in the Valley post-date the Hopewell period (AD 1—400). The woodland period is the period of the most intense earthwork construction. Some of the most famous prehistoric sites in the valley have been studied and known since the first European settlers arrived to the area (Whittlesey 1871).

The Late Prehistoric and Proto-historic Periods represent a significant shift towards settled village life, intensive maize cultivation, and nucleated family life (Brose 2000; Finney 2002:28-32; Lepper 2005; Redmond 2000; Winstel 2000:6). American Indians continued building earthen embankments, historically called "hilltop forts," (Murphy 1968); however, these hilltop forts were not forts at all. Some served as habitation locations (Redmond 2000, 2008), and others as a sacred space (Belovich and Brose 1992). The most well-known prehistoric sites are the large, multi-family villages scattered throughout the valley. These include the South Park Site (Brose 1994), the Staas Site (Belovich 1986; Ochsner 1986), Terra Vista (Brose et al. 1981), Vaughn Village, the Doubler burial ground, Lee Village, and Barker Village (Finney 2002). These sites have produced thousands of artifacts, and many burials, over decades of private collecting episodes and professional investigations. The large villages of this time period are along rises in the floodplain or terraces of the Cuyahoga River.

There is only one previously recorded prehistoric archaeological site within one mile of the project area, the Frank Farm Collection (33 SU 658). The 22 acre Frank farm was located northeast of the project area, just south of Frank Boulevard. The artifacts collected on the farm were donated to the Ohio History Connection in the 1920s (Olson 2017). The site consists of a small collection of Archaic and Late woodland/Late Prehistoric points, and a slate celt [figure 2].

Figure 2: Artifacts from the Frank Collection, 33 SU 658 (from Olson 2017).

Historic Cultural Resources

In 1849 Summit County purchased farmland from Joseph McCune to establish a County poor farm [figure 3], later called both a “poor house” and an “infirmary” (Lane 1892:1087). Once the land was purchased the Summit County commissioners used the existing farmhouse buildings on the property, located on Market Street, to begin housing inmates by September of 1849 (Akron Beacon Journal 1849; Lane 1892:1087). “Inmate” was the term used for paupers and those who were physically or mentally disabled who ended up living and working at the Infirmary. The goal was to have a self-sufficient farm where all of the inmates that were able to were expected to work the farm (Special Collections Division 2006:1).

The housing being provided was eventually deemed inadequate for the needs of Summit County and in 1864 a new brick Infirmary was built using the inmates as labor to do so [figure 4] (Special Collections Division 2006:3). The building stood on the corner of Exchange St. and Mull Ave where the present day Westminster Presbyterian Church stands [figures 5-6] (Lane 1892:1089). The 1892 Sanborn Fire Insurance map [figure 7-8] shows the layout of the Infirmary and its associated outbuildings, which post-dates the major additions to the original 1864 building (Lane 1892:1089-1090).

In 1886, people were becoming concerned with the conditions of burials and practices at the infirmary (Akron Beacon Journal 1886). In 1887, a full investigation was opened by the Ohio Board of Health to determine the truth of accusations of selling corpses by Dr. Alvin Fouser, and the mistreatment of inmates by staff while alive (Akron City Times 1887; Hagelberg 2010). The doctor and superintendent resigned from their positions, but nobody employed at the infirmary was formally charged (Hagelberg 2010). Burials prior to 1887 are likely eschewed by the lack of burial records; the rate of burial was likely lower as a result of illegal corpse purchases brokered by Dr. Alvin K. Fouser.

Death records of individuals buried at the original Summit County Infirmary cemetery have been compiled over the years by retired special collections librarian Michael Elliot. In the fall of 2016, Mr. Elliot's paper copies of the death certificates were transcribed by Eric Olson into an excel spreadsheet [Appendix A]. After 1908, death records were managed by the Ohio Department of Health. Death Records between 1867 and 1908 were the responsibility of the county. Mr. Elliot's compiled list of death certificates includes only death records with burial locations of "infirmary" or "county home." The oldest death records coincide with the resignation of Dr. Alvin K. Fouser, 1887 [Appendix A]. In total, there are 308 death records associated with the cemetery in Schneider Park.

In 1903, there were 45 men reported living in the insane ward (Akron Beacon Journal 1903); the superintendent demanded more room for inmates. Inmates were being admitted at increasing rates in relation to the exponential population growth of Akron during the early 20th century (Grismer 1952:376). By 1912, urban sprawl had surrounded the infirmary [figure 9], and at least one buyer was interested in purchasing the property with the stipulation that the cemetery be moved (Special Collections 2006:3). Though the buyer is not specified, it was likely Philip H. Schneider, who was county commissioner from 1911 to 1913 (Grismer 1952). In 1916, Summit County sold the land to P.H. Schneider of Central Realty Co. for a total of $300,000 (Akron Beacon Journal 1916). Land was purchased and a new infirmary built in Munroe Falls (Whitman et al. 2008). The Infirmary at West Exchange Street continued operating through 1919, when the new county home was finished (Special Collections Division 2006:3; Whitman et al. 2008). The new infirmary graveyard is located between Heather Knoll Nursing Home and the Summit County Fairgrounds on Darrow Road (Whitman et al. 2008).

When Schneider died in 1935 (Akron Beacon Journal 1935), he deeded the cemetery area to the City of Akron whose officials dedicated the park in his honor. Records of what happened at the cemetery during Schneider's ownership are sparse. While many cemeteries in Ohio were mapped by the Works Progress Administration (WPA) during the 1930s, especially with the goal of locating the graves of US military veterans, no such map has been found for the Schneider Park cemetery. Informal oral histories collected (but not recorded) from residents who came to inquire after the class while doing fieldwork included stories of the Works Progress Administration (1935-1943) moving graves. One woman reported that bodies from Schneider Park were moved in 1936, although we have no way of corroborating this story. The city constructed an east-west path crossing Schneider Park, put up utility poles and lines along the edges of the park, and in 2005 put in a storm sewer system in the southern half of the park to drain the clayey soils.

According to Joe Freya, a local resident and visitor of Schneider park, the city pulled up the sewer line a few years ago and put a new one in since they were old (Joe Freya, personal communication, June 26, 2017). This was confirmed to have happened in 2004 by John Moore, City of Akron head engineer (John Moore, personal communication, June 27, 2017).

Approximately 2 km to the west is the only historic archaeological site (33 SU 217) reported within one mile of the project area. The Sullivan site, 33 SU 217, consists of a scatter of early 20th century kitchenware and trash associated with the Sullivan house that was razed on the property.

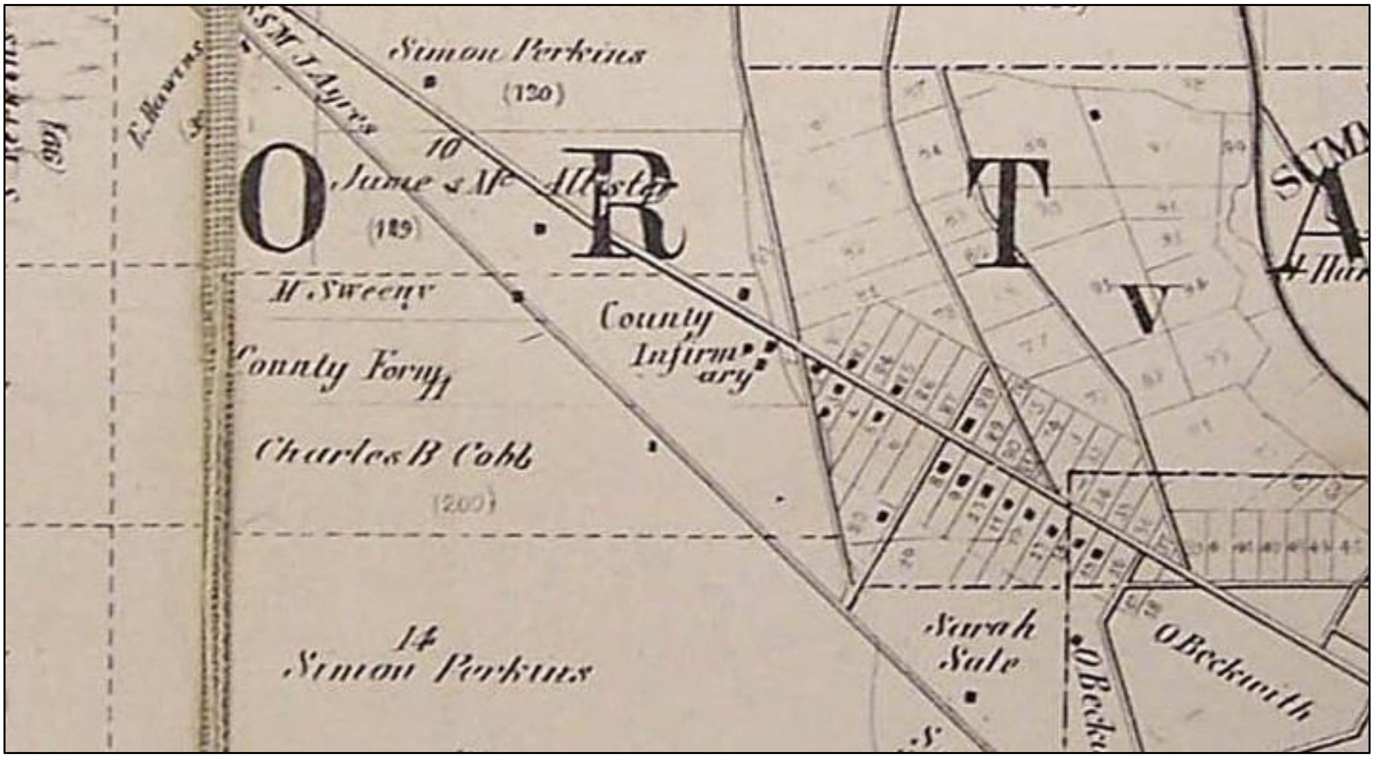

Figure 3: General location of the infirmary, 1856 (Matthews and Taintor 1856).

Figure 4: Photograph of the Summit County Home, facing west (W. H. Parish Publishing Co. 1898)

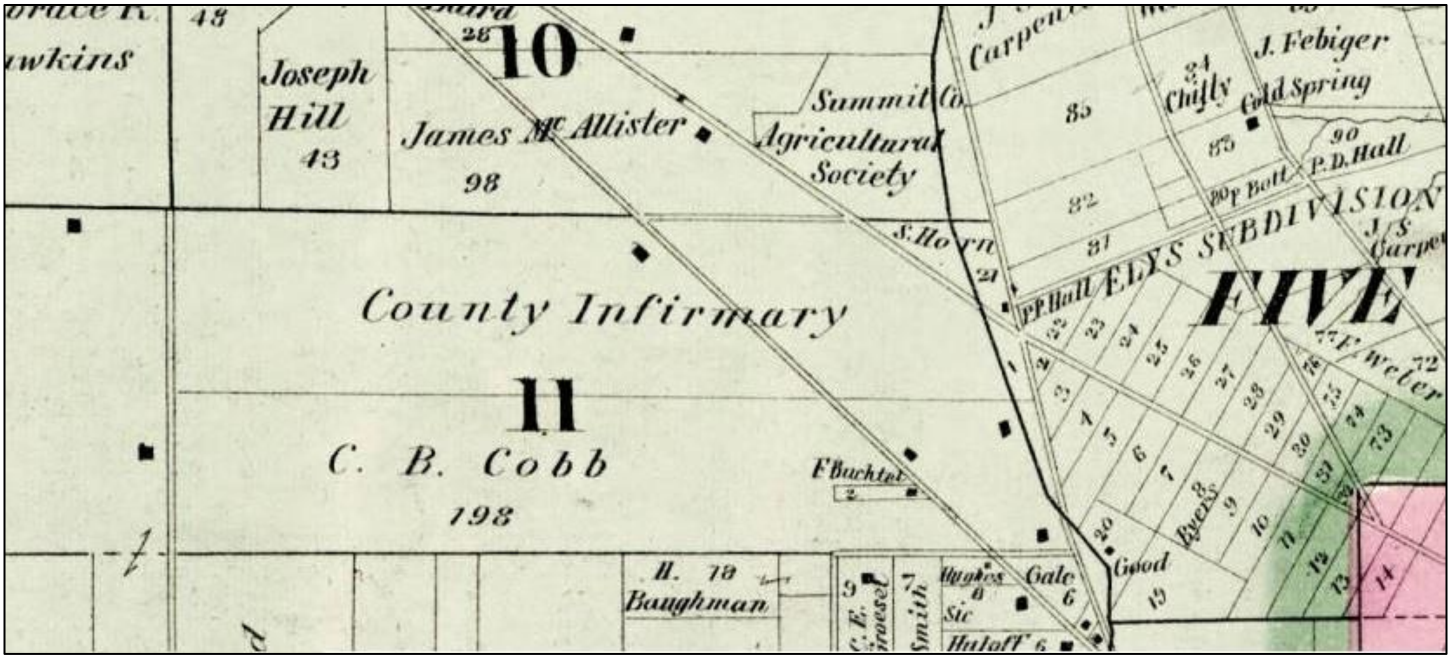

Figure 5: General location of the infirmary, 1874 (Tackbury, Mead, and Moffett 1874).

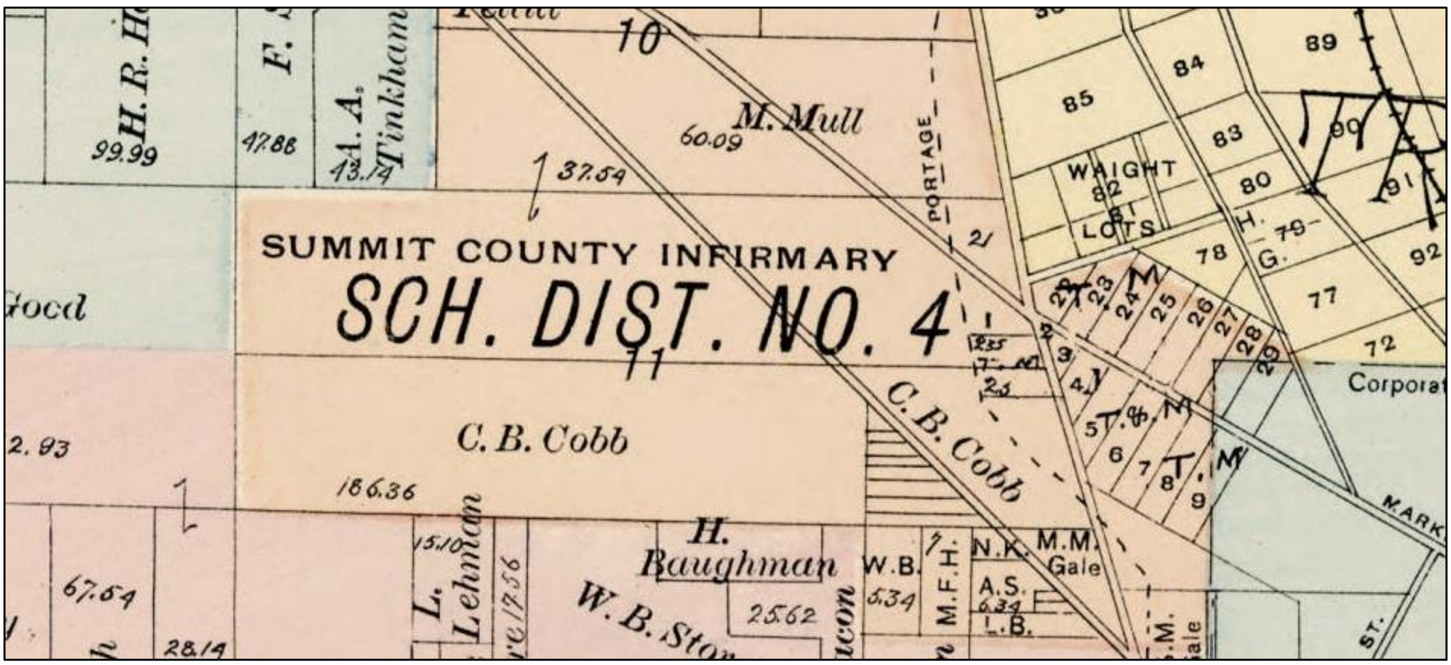

Figure 6: General location of the infirmary, 1891 (Akron Map and Atlas Company 1891).

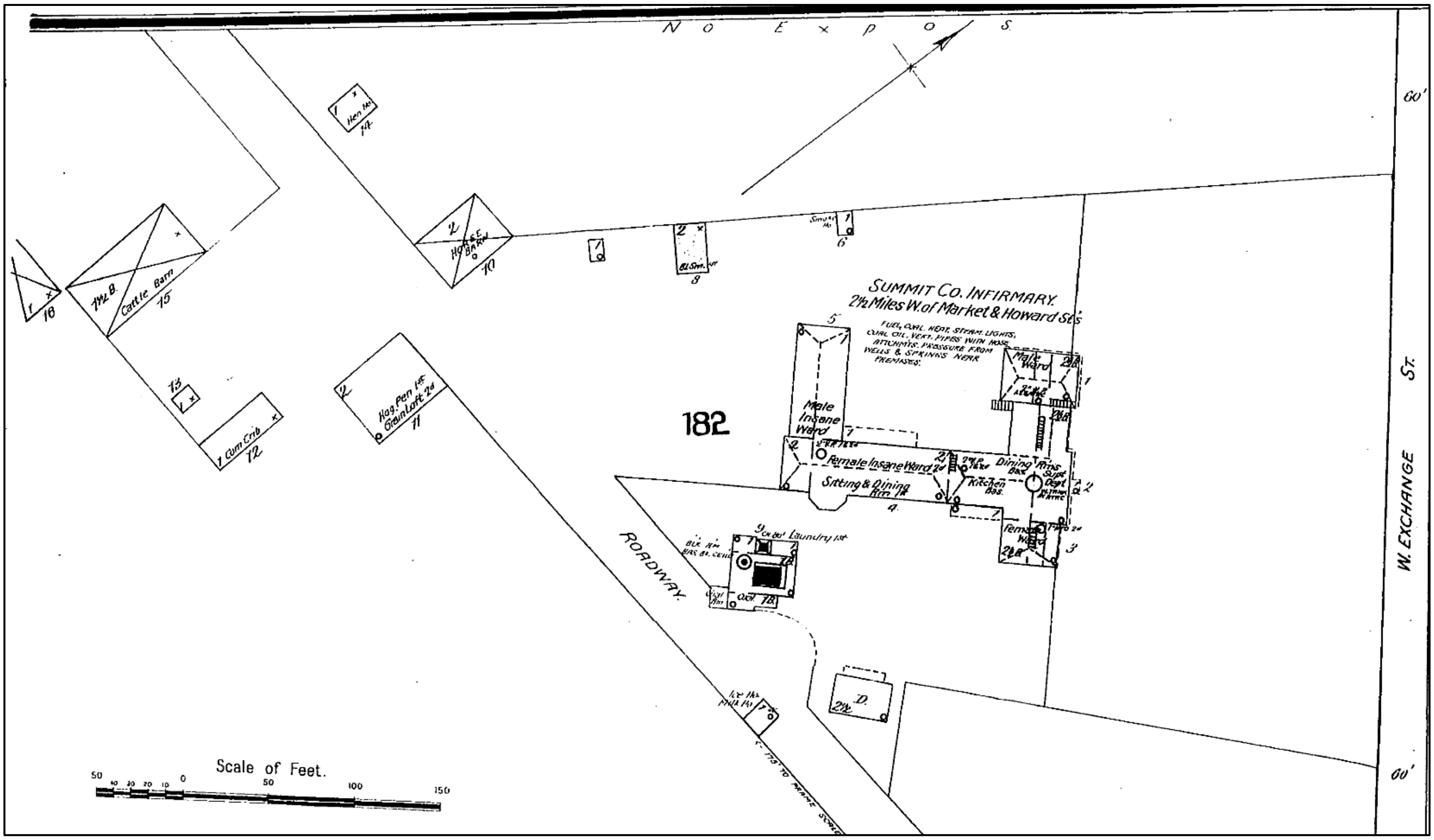

Figure 7: Sanborn fire insurance map of the Summit County Infirmary, 1892.

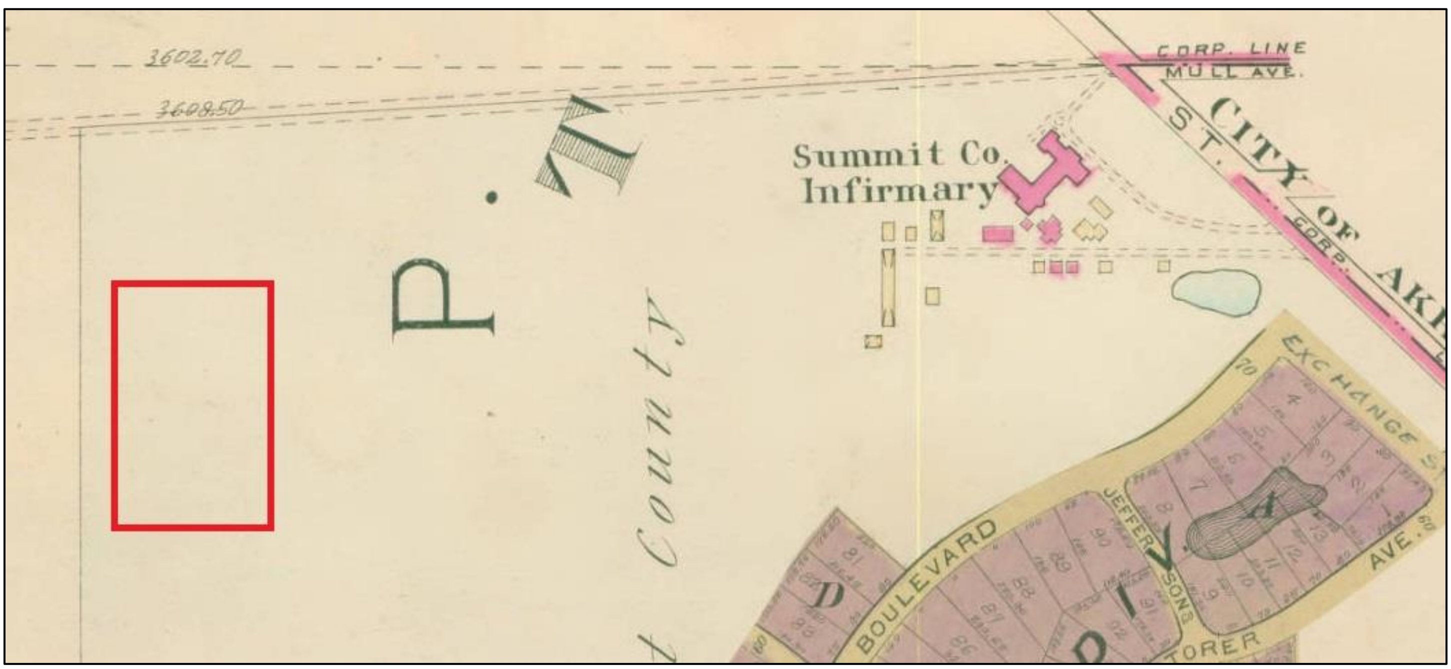

Figure 8: Infirmary with outbuildings and general location of cemetery [red], 1915 (G. M. Hopkins and Company 1915).

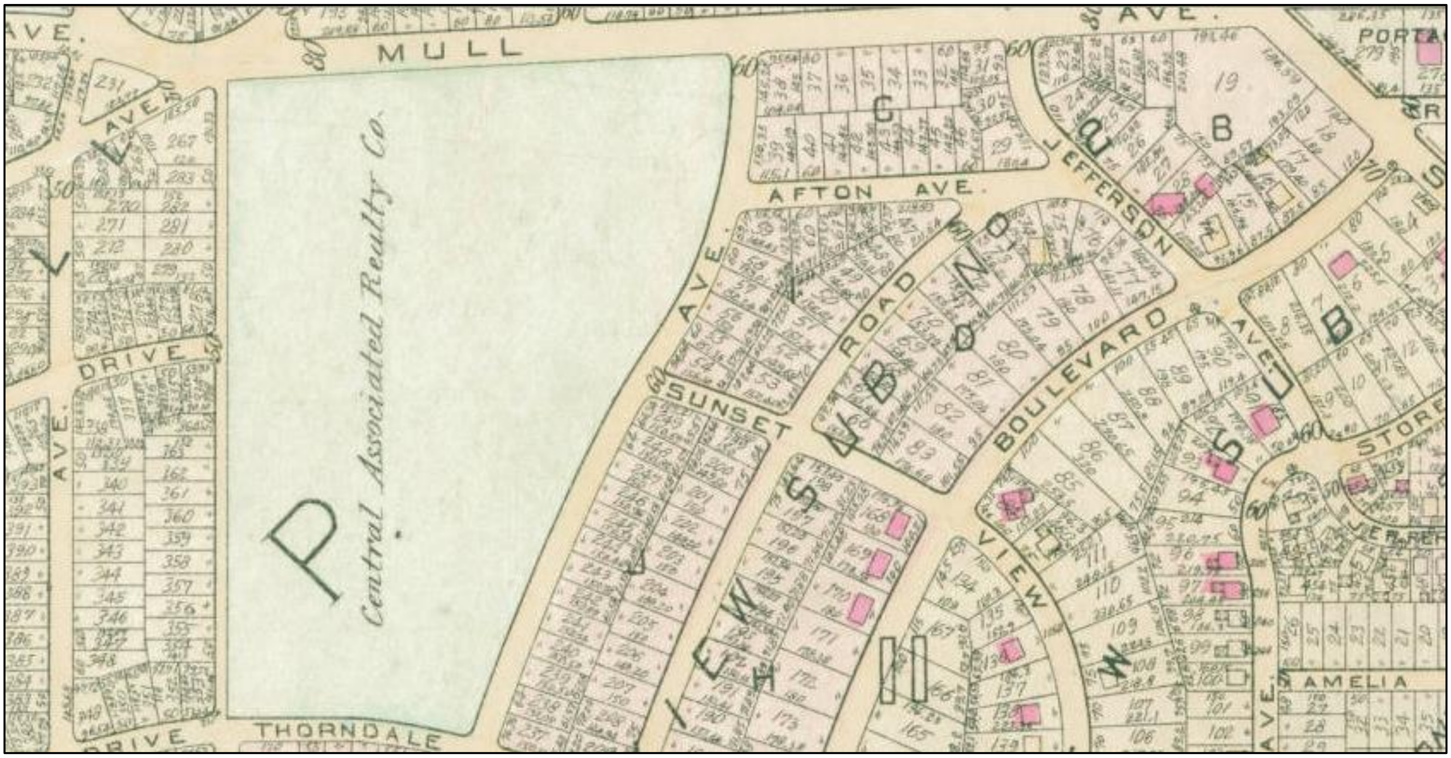

Figure 9: Schneider Park, 1921 (G. M. Hopkins and Company 1921).

Field Methods and Techniques

Prior to the University of Akron geophysical field school, aerial drone photography was carried out by Dr. Jerrad Lancaster. His aerial maps showed the location of a number of possible burials. His drone images mirrored other remote sensing maps, such as Google Earth satellite images [figure 10] and historic aerial photographs, all of which show slightly irregular rows of rectangular surface features near the northwestern edge of the park [figure 11]. Survey by the students began with a visual surface survey of the northern area of Schneider Park to determine the visible edge of the graves. Possible graves at the time of the surface survey were clearly visible as there was differential growth of grass and other plants immediately above the rectangular features. The greener grass plots are approximately one meter by two meters and likely signify a place where the soil has been disturbed, by activity such as digging a grave. Plant growth is facilitated by breaking up the soil, allowing air, water, and nutrients to reach deeper into the soil.

These rectangular features are all likely graves and were treated as such by the research team. Once the edges of the visible graves were determined, the students set out a survey area for geophysical survey roughly 10m meters beyond those visible graves [figure 12]. This additional buffer around where surface features could be seen on the ground, we hoped, would allow the team to define the edges of the cemetery. The extent of the survey area for the class project was 140m north to south and 80m east to west. Alignment followed magnetic north. This area was subsequently subdivided into a 20m by 20m meter grid system for magnetic gradiometry and ten by ten meter grid system for electrical resistivity.

Thus, in total the survey area comprised 28 gradiometry grids and 112 overlapping resistivity grids. A grid system is used in archaeology to be able to keep data in order according to where it has been collected. Provenance is very important in any archaeological research as it adds vital spatial information. Each square within the grid is numbered by reference to the southwestern corner of the survey area; this reference point is called the “site datum”. In our case, we designated the site datum as N100E100. The “N” and “E” refer to a northing and easting, while the number is a measurement in meters. So, N120E160 is the point 20m north and

60m east of the site datum. This system allowed the team to place the data in their correct spatial location and to easily overlay different data sets.

A magnetic gradiometer is a machine used to measure minute fluctuations in the Earth's magnetic field caused by features buried immediately below the surface. Typically in archaeology, magnetic gradiometry can easily detect ferrous metal (especially iron), burnt features such as hearths, and features in which there are significant contrasts in the magnetic properties of juxtaposed materials. Due to its sensitivity, such contrasts can include the differences between soil conditions caused by pitting or other anthropogenic activities. In this survey, a GeoScan FM-256 gradiometer was used in this survey and 27 out of the 28 grid squares, each 20m by 20m were surveyed with gradiometry. The one remaining grid square had too much modern metal (most notably a modern park bench) and large trees for meaningful survey. Any information that could have been learned from that grid would be obscured by these disturbances. The survey comprised an area of 10,800m^2 (116,250ft^2). The FM-256 employs a passive measurement of the earth's magnetic field, that is, it requires no energy input from the machine itself. The gradiometer is a handheld device which takes readings along a walking transect in which the distance between measurements is timed [figure 13]. The operator walks at a measured pace and the instrument measures as records readings automatically.

Figure 10: Aerial photograph of Schneider Park (USDA 2015).

Figure 11: Photogrammetry image of the northern part of Schneider Park. (Courtesy Dr. Jerrad Lancaster).

Figure 12: Location of the survey grid in the northern part of Schneider Park.

Figure 13: Students using the FM-256 magnetic gradiometer.

Electrical resistivity is used to measure the resistance of the soil to the passage of a subsurface electric current generated between two probes. Soil that has been packed down, disturbed in digging or filling areas, or replaced with a different soil will have different levels of resistance and can be detected with the resistivity machine. This is due to differences in water content, salt content, temperature, and other factors. For this survey a GeoScan RM15-D resistance meter was used [figure 14]. In the survey area, 40 out of 112 grids, each 10m by 10m were completed. The survey comprised an area of 4,000m^2 (43,055ft^2). Using the RM15-D is a far slower process than using the gradiometer, causing less data to be collected during the short survey time. Electrical resistivity is an active technique, requiring energy to be put into the ground (in this case electricity) using a pair of probes, which a second set of probes measures the resistance of the soil to the passage of electricity in ohms (Ω). Depth of current flow is determined by the spacing between the probes. In our survey, the probes were spaced such that the bulk of the current flow was within the top 50cm of the soil. The speed of the survey is dictated, in part, by the need to reset the probes after each reading. Thus, a smaller area of Schneider Park was surveyed using electrical resistivity than through the use of magnetic gradiometry.

Figure 14: Student employing the RM-15D electrical resistance meter. The mobile array shown here has two metal probes inserted into the ground. One probe forms part of a pair of probes (the other is approximately 25m away, not shown) that generate a subsurface electrical field. The other probe (and its partner also 25m away) measures the resistance locally to the flow of electricity.

In mapping the geophysical dataset, each reading (a numerical value of units representing either nT or in Ω) is treated as a pixel in a digital image. The size of the pixel is determined by the sample density collected in the field. Data were collected along transects, that is north-south lines following the grid system established at the beginning of the project. The *sample interval* is the distance between each reading along a transect. *Traverse interval* refers to the distance between each transect. For the magnetic gradiometry, we collected readings with a sample interval of 12.5cm and traverse interval of 50cm. Over a 20m by 20m grid, then, we collected 6,400 readings using magnetic gradiometry (8 readings/m x 20m = 160m x 40 transects/grid square). Over the 10m by 10m electrical resistivity grid square we collected 400 grid points (20 readings/transect x 20 transects/grid square). Each pixel in the resulting images represents either an area of 12.5cm x 50cm for magnetic gradiometry or an area of 50cm x 50cm for resistivity.

After the data was collected it was downloaded to a laptop computer and were processed using a GeoScan, Inc. proprietary software application called Geoplot 3.0. Geoplot is used to process the raw data collected in the field in order to increase the signal-to-noise ratio in the data where the "noise" are modern artifacts and features such as ferrous metal (esp. iron) trash, utility lines, subsurface drainage systems, etc., as well as data defects caused by operator error and machine error in data collection. In short, the processing process allows us to highlight the target of interest – here the possible burials – through mathematical manipulation of the dataset. By using different processing algorithms within Geoplot, it was possible to enhance the imagery for both the magnetic gradiometry and resistivity results.

In a map of the raw magnetic gradiometry [figure 15], the large, strong black/white features represents modern metal than needed to be removed. Most of them were probably buried immediately beneath the surface, as we removed obvious interfering features while surveying. These large data spikes render other, more subtle magnetic signals less visible in the data and may distort our interpretation. By using a function in Geoplot called "Clip" those modern metal spikes are removed in the data, seen by the blue squares where the modern metal data was previously seen. By removing that 'noise' from the data other fluctuations in the magnetic field are clearer. In the northwestern part of the map in figure 16 more rectangular plots have become visible after clipping the modern metal. These same processes were used in electrical resistivity as can be seen between Figure 17 (before clipping) and Figure 18 (after clipping). Another filter called "Despike" was applied to the data to further minimize noise spikes. To further enhance the final map, we used a function called 'Edge Match'. The edge match filter is used to match the values at the edges of each individual grid. Each of these processes was repeated for both magnetic gradiometry and electrical resistivity data. One additional step was used with magnetic gradiometry data, the "Zero Mean Traverse" function removed horizontal line differences within the individual grid that represented operator error while walking transects in the field. Finally, the processed numerical readings are then displayed by assigning either a color value or grey scale or grey scale value to each data point [figures 19-20]. Each geophysical map presented in this report shows a key that reports the values of the readings (nT for gradiometry, Ω for electrical resistivity) and notes the corresponding color or shade of grey.

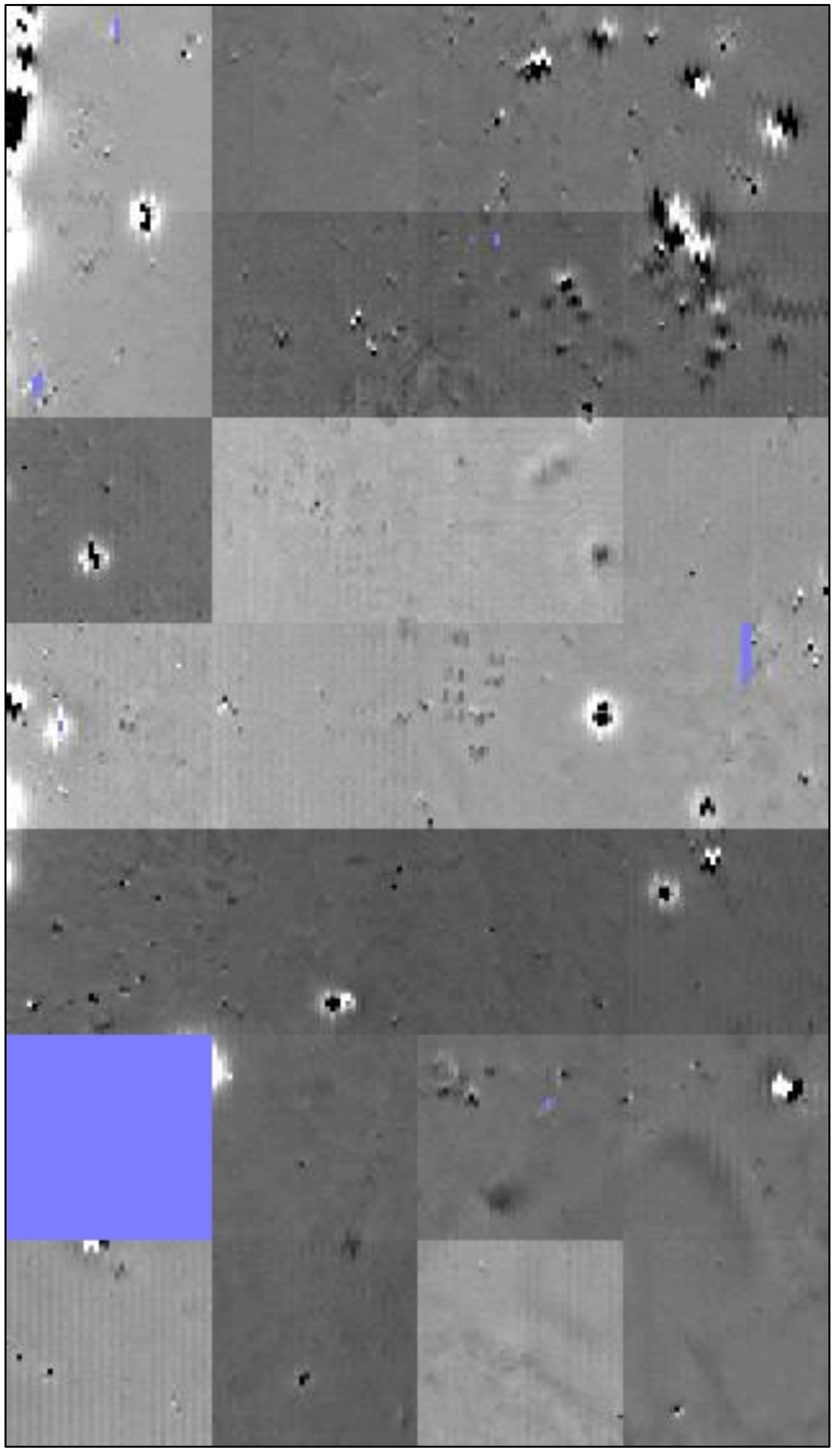

Figure 15: Raw magnetic gradiometry data.

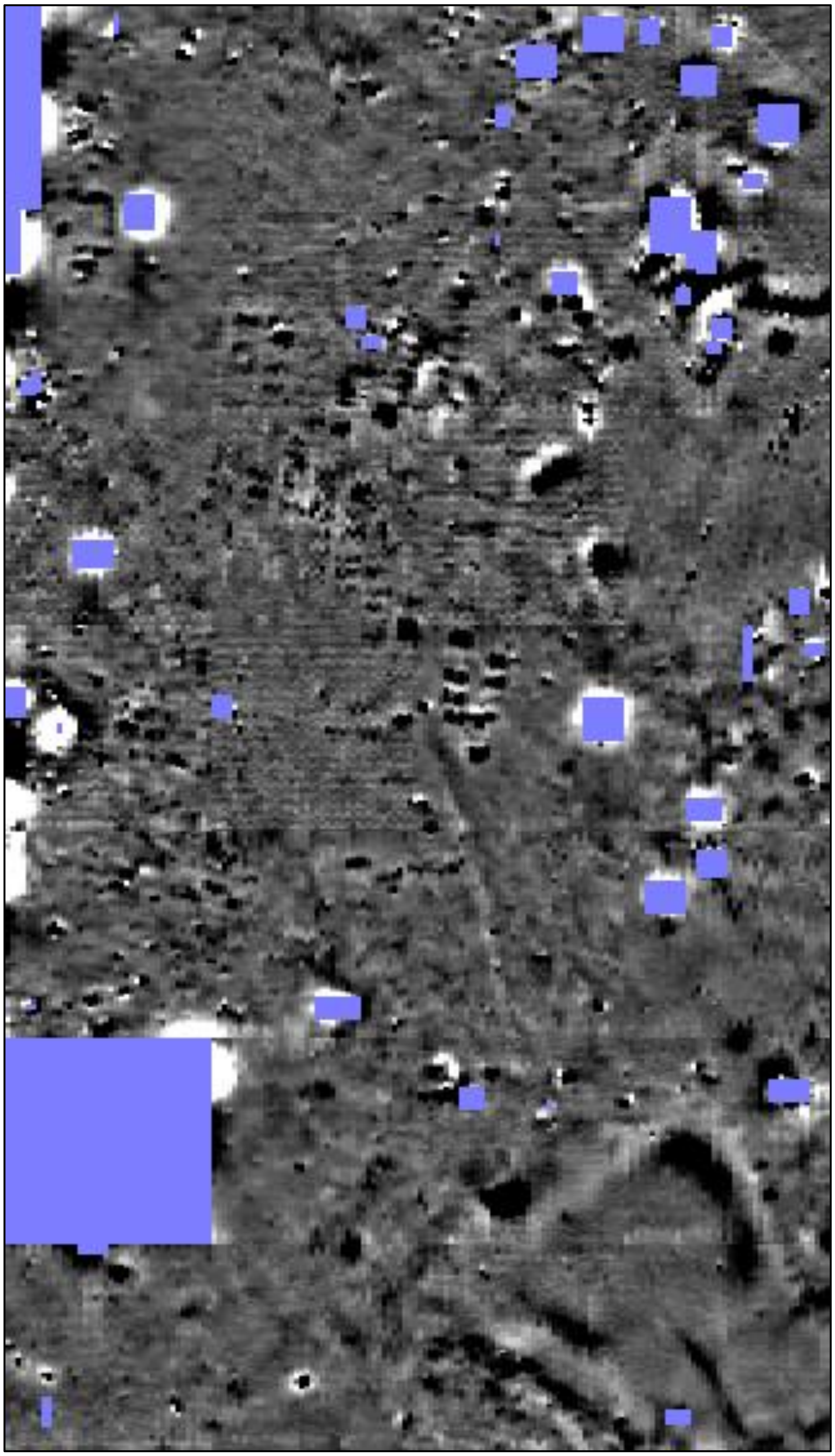

Figure 16: Processed gradiometry data.

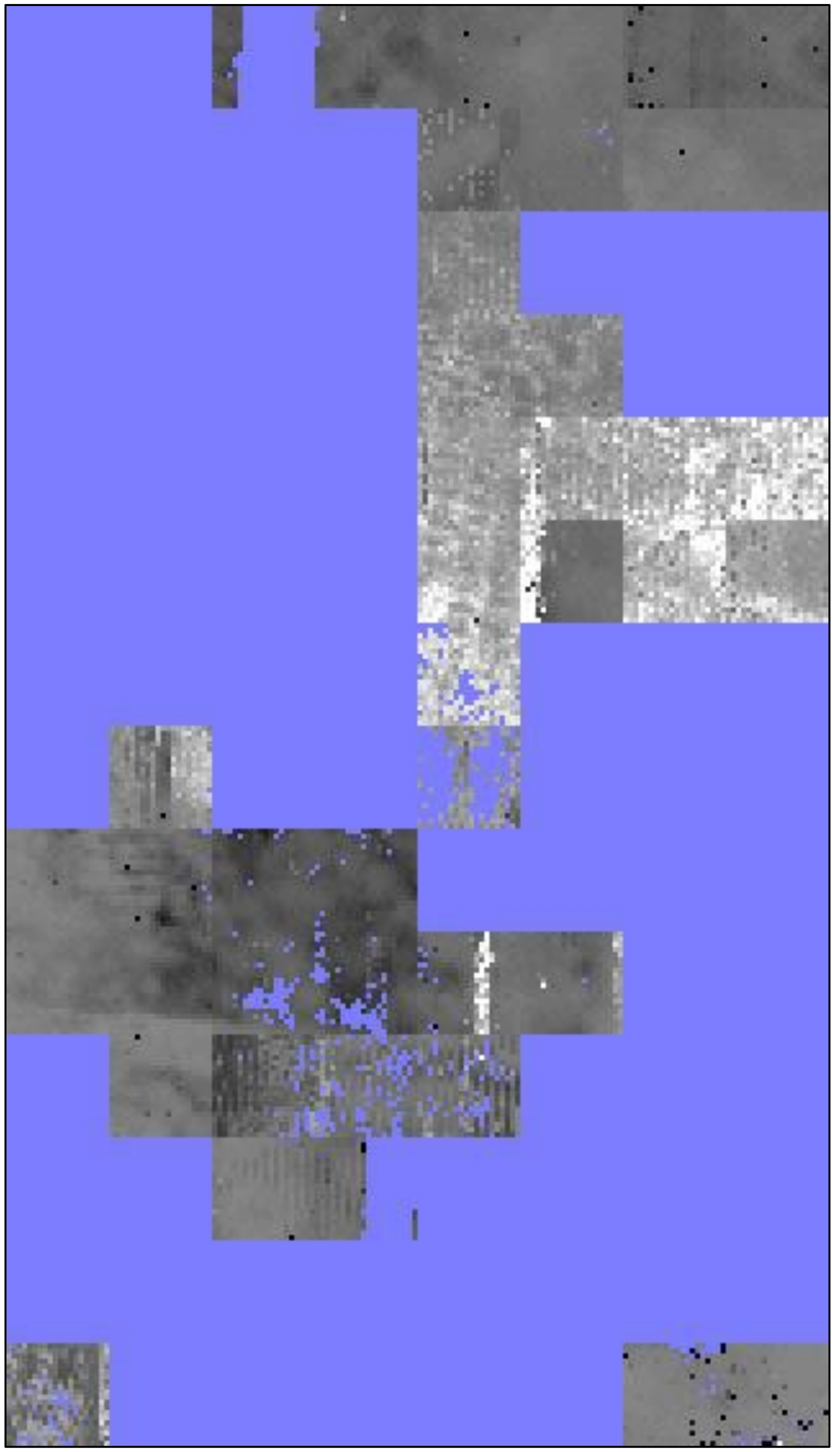

Figure 17: Raw resistivity data.

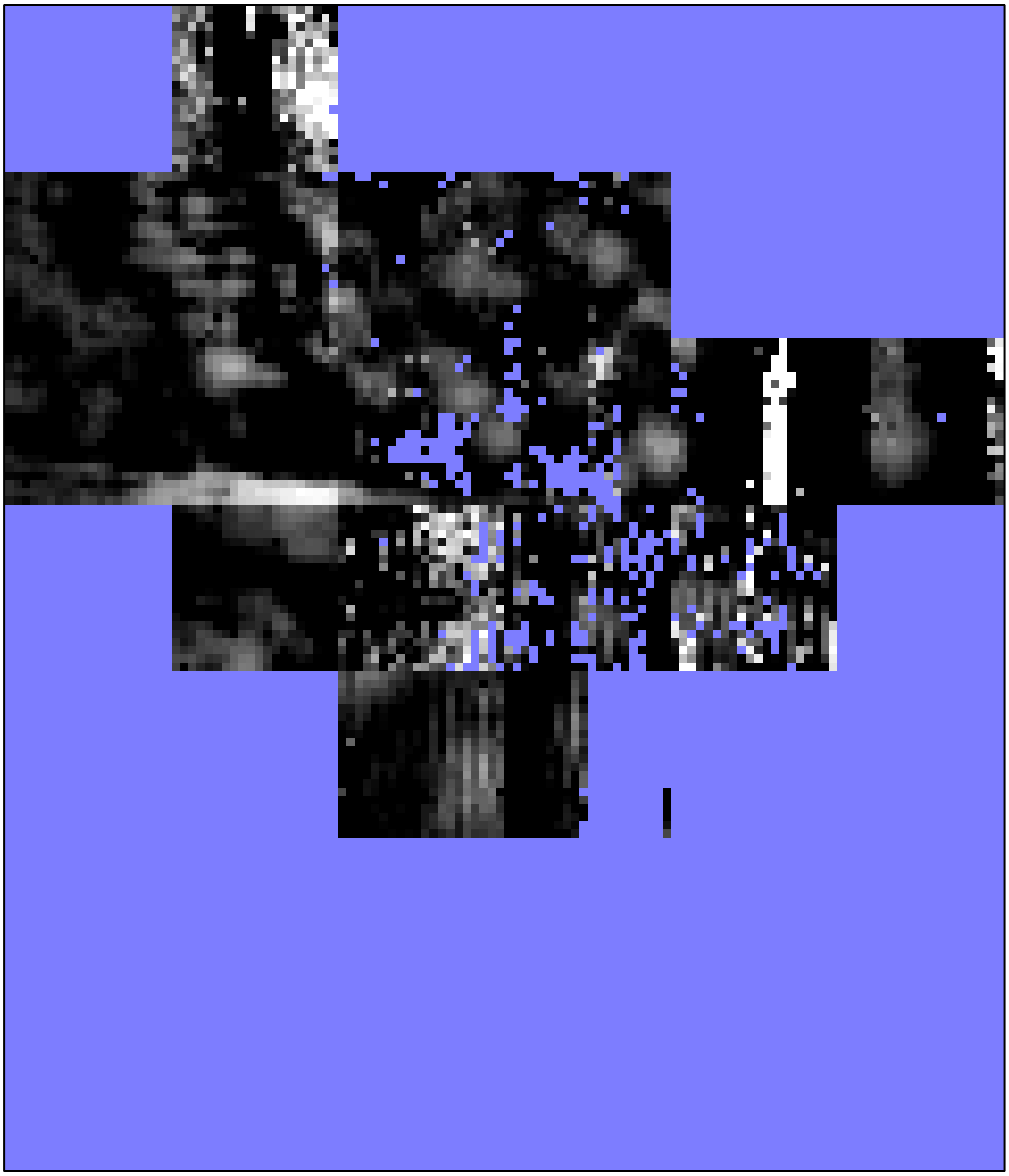

Figure 18: Processed resistivity data.

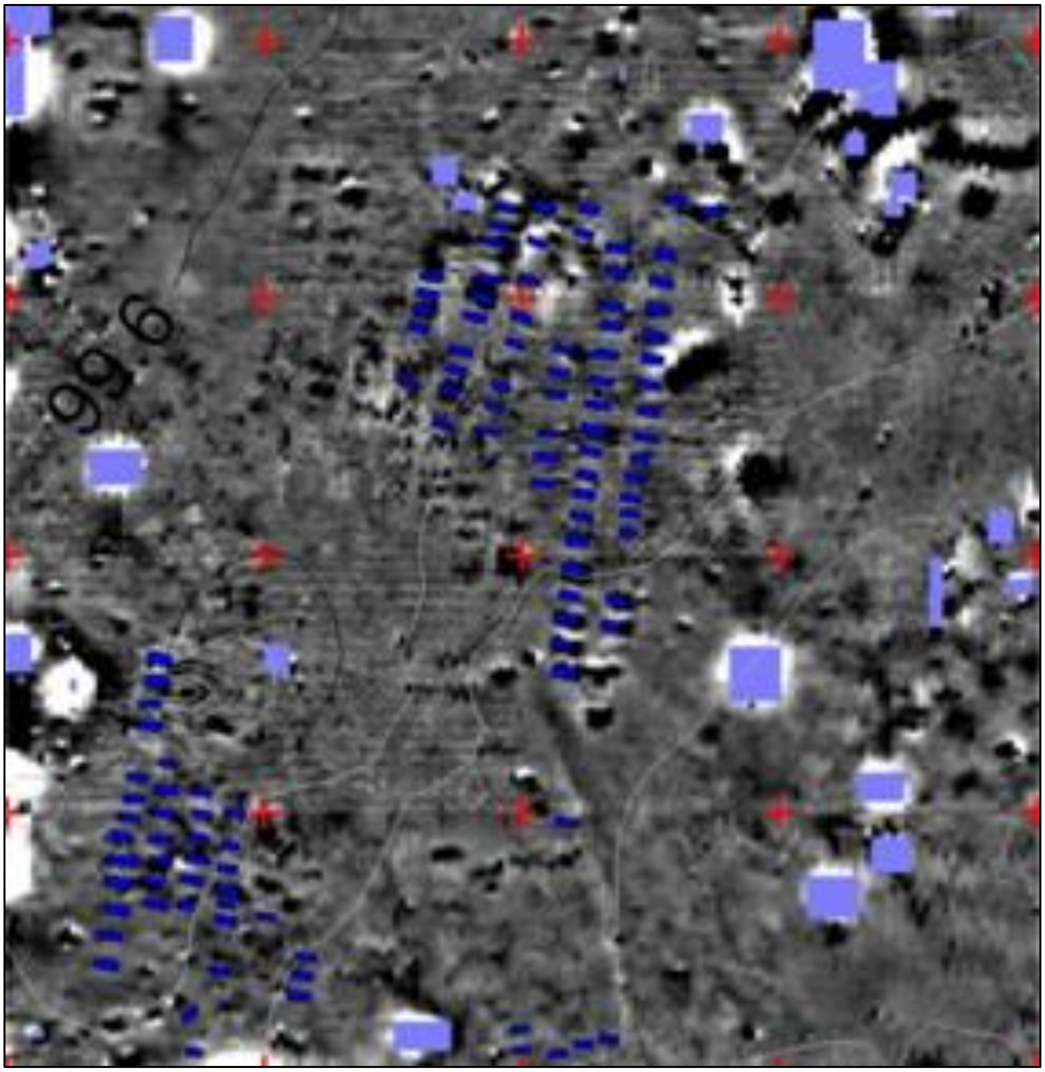

Figure 19: Map of graves seen in the gradiometry survey.

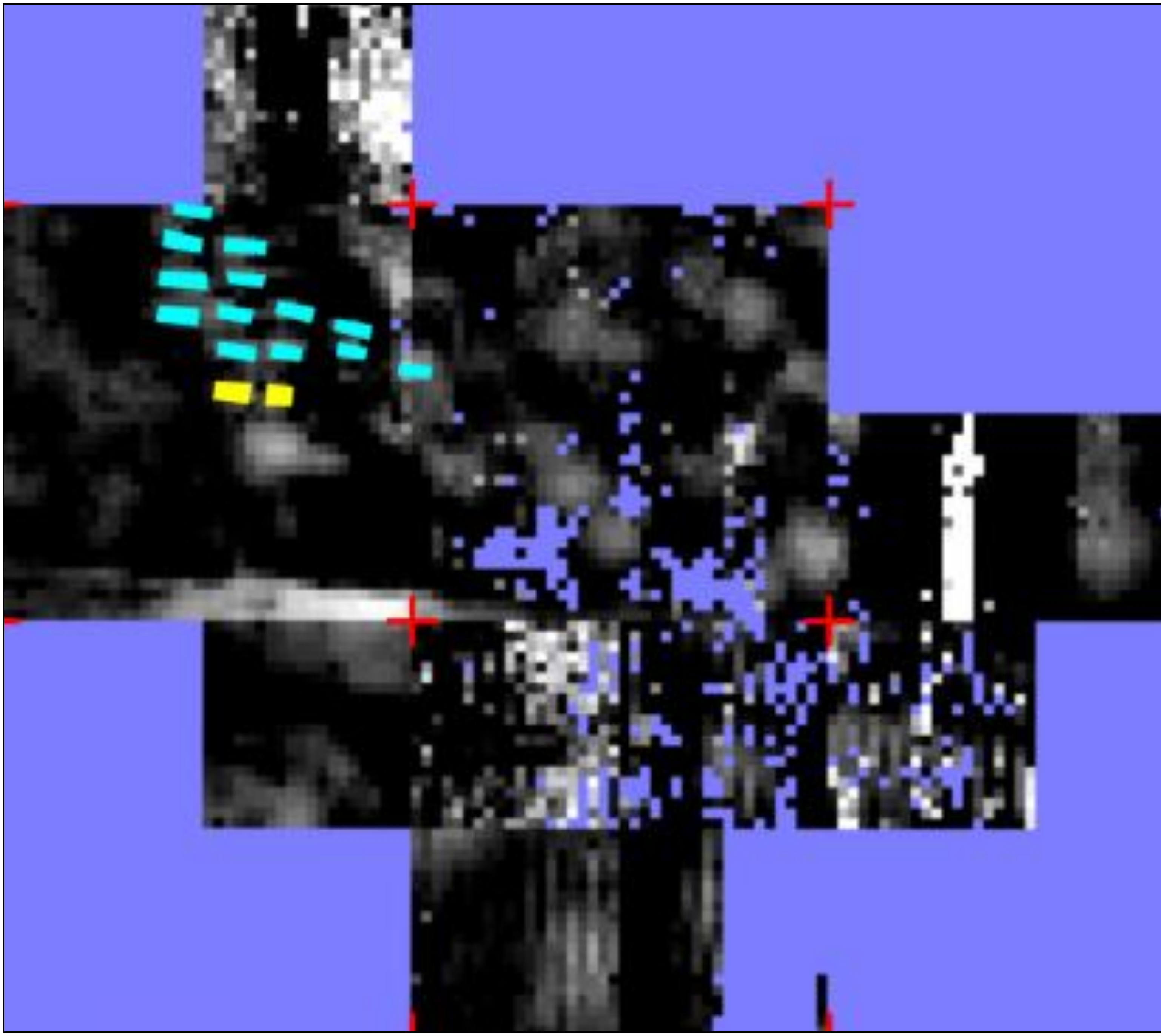

Figure 20: Map of graves seen in the resistivity survey.

Analysis

As noted above, our interpretation of the data involved examining all four types of survey data collected by the class and prior drone survey. By examining and identifying all potential graves in each of the four survey types [figures 21-23], we established a scale to evaluate the likelihood of each potential burial actually being a burial. If a grave was visible on three or four types of survey it was deemed “probable”, if on two types it was deemed “likely” and if on one type of survey it was deemed “possible”. As each technique looked at different properties of the earth (i.e., visible surface indicators from both the ground and the air, electrical or magnetic properties), it stands to reason that those places in which positive identifications overlapped are more likely to actually represent graves.

Through the visual ground survey conducted by the students, 114 graves were located. These were each precisely mapped using an electronic total station. Using the drone map provided by Dr. Lancaster, 156 graves were visible; many of these were the same as those identified by surface survey. Through magnetic gradiometry 311 graves were recorded, again with considerable overlap with the first two techniques. Finally, electrical resistivity was the least effective technique given the field conditions (the dry summer soils were not ideal for conducting subsurface electrical currents, hindering interpretation) and only 15 graves were detected.

When combined we found that 94 graves were visible in either 3 or 4 of the datasets and are here labelled “probably”. Nineteen graves were seen in two of the methods and were labelled “likely”. Finally, 271 graves were located only in one technique, usually magnetic gradiometry, and these are labelled as “possible” graves. Of the 271 possible graves 207 were visible on gradiometry, 3 on a visual surface survey and 61 on the drone survey. A total of 384 graves were visible in at least one survey method. The two survey methods that yielded the most identified graves in combination were drone and gradiometry surveys [table 2]. Of all graves identified during survey, drone and gradiometry survey identified 94.5% (n=363) of all graves.

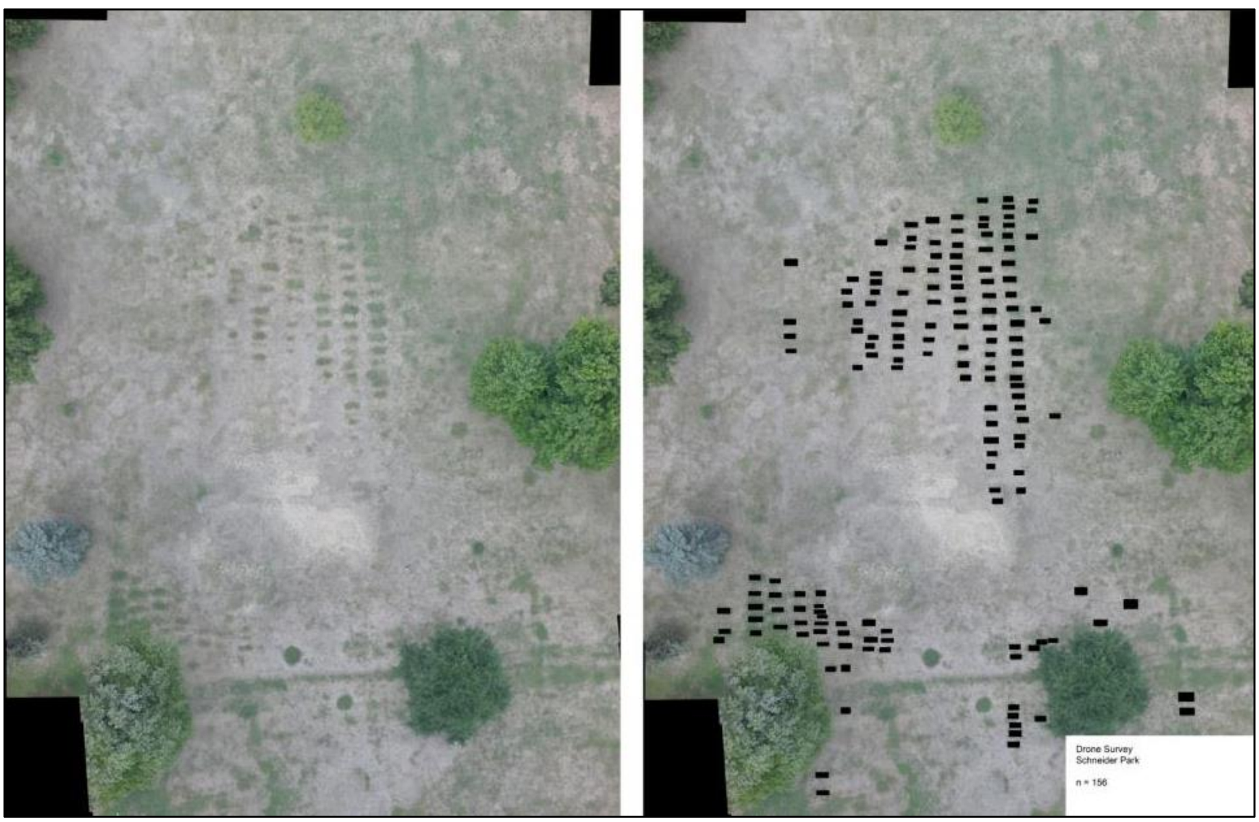

Figure 21: Map of graves seen in the drone survey.

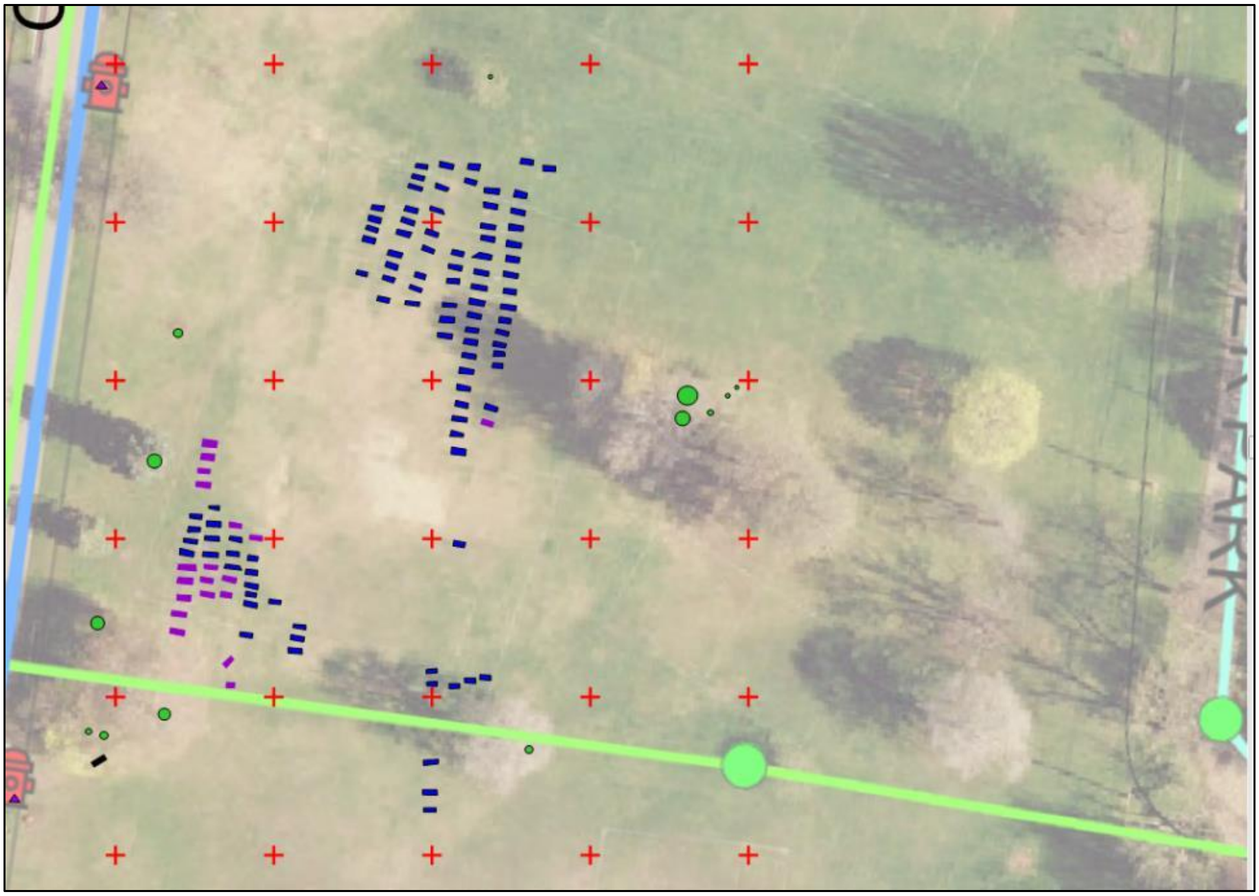

Figure 22: Features in blue were seen in the drone survey and the surface survey. Those shown in purple were only seen in the surface survey.

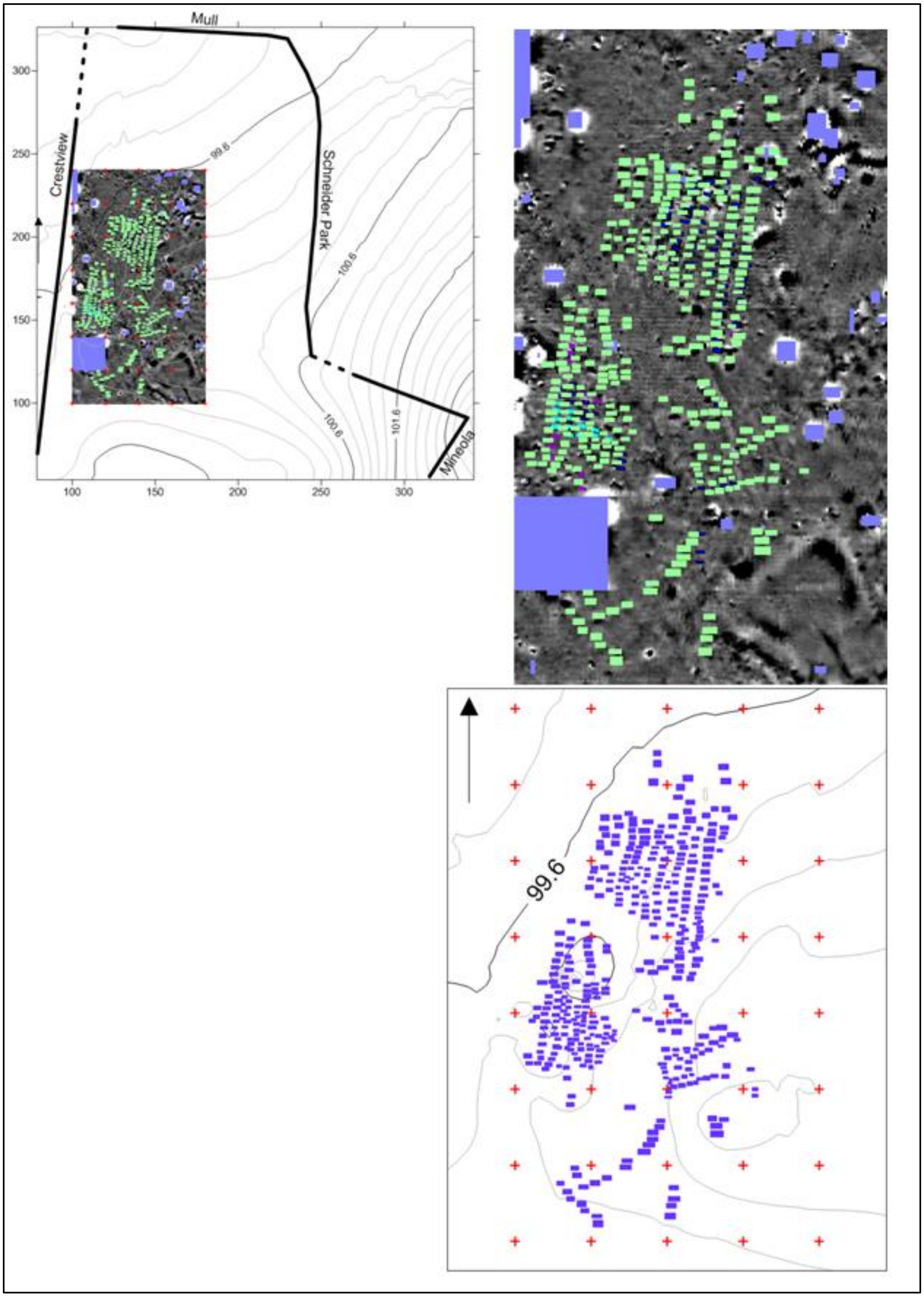

Figure 23: Composite map of all the graves found at Schneider Park.

Table 2: Cross-validation of survey methods.

	Surface	Drone	Gradiometry	Resistivity
Surface	114	175	321	114
Drone	175	156	363	156
Gradiometry	321	363	311	311
Resistivity	114	156	311	15

Recommendations and Conclusion

Further work in Schneider Park is recommended. Part of the goal of the research project was to identify the edges of the cemetery, which was unable to be accomplished in the three weeks. Graves were identified until 5 meters from the southern edge of the grid and be expanding the grid southward more graves may be identified or a conclusive southern boundary would be possible to define. By expanding the edges of the grid it becomes more likely to establish boundaries to the cemetery.

Part of our recommendations are technical additions and changes to the equipment used. By using a different geophysical prospection technique – ground penetrating radar (GPR) – it would be possible to further solidify our interpretation of where the graves are within Schneider Park through the use of another independent method.

Further work with the RM15-D and FM-256 is also recommended. By using extended probe spacing the data collected with the RM15-D could allow for a better understanding of the graves. It allows for more data points to be taken by having more probes attached to the machine, as well as different probe spacing allowing for different depths to be reached and recorded that best suit the type of information we are trying to collect. By using a stacking function in the data collection of the FM-256 the data becomes more accurate and clearer in the raw data, which means we would be able to better locate graves and dismiss anomalies that may otherwise be misinterpreted as potential graves.

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Appendix A

Summit County Infirmary

Death Records Index