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Chicora Foundation, Inc.

Memo

To: Mr. Danny E. Belk, Agape Senior
From: Michael Trinkley, Ph.D., RPA
CC: Mike McMurphy, AIA, CJMW
Date: March 1, 2013
Re: Investigations at posited cemetery, York, SC

Background

In 2009 the Yorkville Historical Society erected a monument in memory of individuals who died of a 1909 smallpox outbreak at the York Cotton Mill. The only individual specifically mentioned on the monument was W.W. Williams (Figure 1). Apparently in anticipation of Agape's planned expansion on the site, the historical society enlisted the assistance of a search and rescue dog team in an effort to identify graves on the property. As a result of that effort we understand that 46 posited graves were identified and marked. A rough sketch map, with only the boundaries identified, was produced.

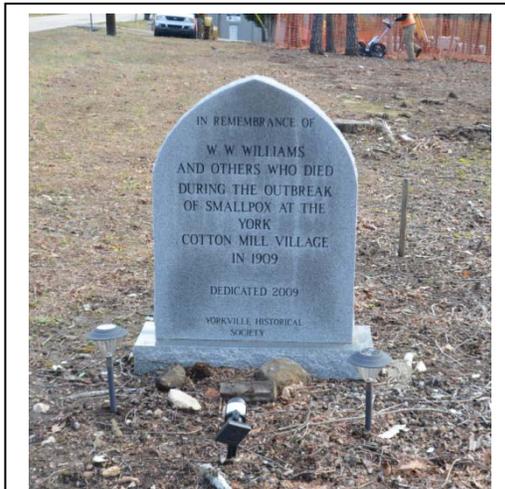


Figure 1. Monument erected by the Yorkville Historical Society at the project site.

The proposed expansion at the facility, primarily an access road, conflicted with the projected cemetery boundaries (Figures 2 and 3) and Chicora Foundation was contacted by the project architect, Mike McMurphy, AIA with CJMW. Chicora was requested to use ground penetrating radar (GPR) in an effort to more securely determine the number and location of graves present on the property. No additional historical research was called for by the agreement between

Chicora and Agape Senior.

The field investigation was conducted on February 28 by the author and Mr. Jamy Atkinson, representing GEL Geophysics, of Charleston, SC. Mr. Atkinson was responsible for the GPR investigations at the site. Both Mr. Atkinson and I were on-site for approximately 4 hours. We were met at the site by the contractor's surveyor, Mr. Matt McClain.

Site Setting

Upon arrival I found the project area to be immediately adjacent to SC 49 (N. Congress Street). The area about 30 feet parallel to the highway (and comprising a utility easement) is grassed. South of

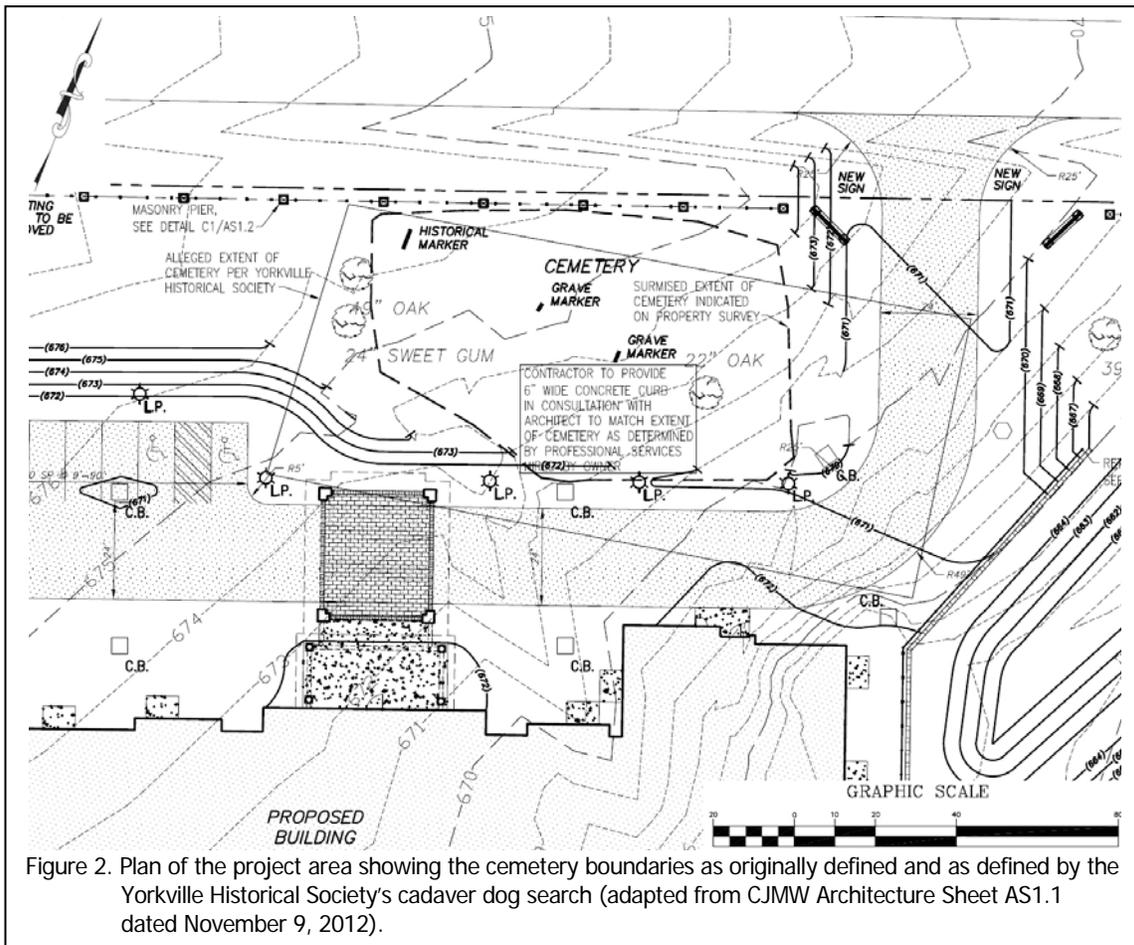


Figure 2. Plan of the project area showing the cemetery boundaries as originally defined and as defined by the Yorkville Historical Society's cadaver dog search (adapted from CJMW Architecture Sheet AS1.1 dated November 9, 2012).



Figure 3. Overview of the area looking west. The red construction fence outlines the posited cemetery.

the grassed easement area for an additional 70-80 feet there is a lightly wooded area with an entirely open understory. Just beyond the cemetery there is a berm and evidence of push piles associated with the extant buildings from an earlier construction episode. This area is grassed and landscaped.

There are a small number of primarily hardwoods in the cemetery area. The soils are Iredell sandy loams, 2-6% slopes (Camp 1965:Map 31). This soil typically exhibits an

A horizon of very dark grayish-brown sandy loam to a depth of 0.8 foot overlying a yellowish-brown plastic clay to a depth of 1.5 feet. Below this is a red clay and parent material is found at a depth of about 2 feet. Bedrock is typically encountered at a depth of 4 feet. There are abundant rocks exposed on the surface, some consisting of small cobbles, others larger boulders. Although the soils are not

classified as eroded, York County is in Trimble's High Antebellum Erosive Land Use Area with Postbellum Continuation (Trimble 1974:Figure 6). He projects a loss of from 4 to 7 inches. In addition, the vicinity of York falls into what was identified as having "severe sheet erosion [with] occasional gullies" (Lowry 1934) and several gullies are found just east of the study area.

The search by a cadaver dog resulted in setting a number of flags, many of which could no longer be found. Those that remain are faded to white and brittle (Figure 4). Some pins, without flags, were also



Figure 4. Flags showing "hits" by a cadaver dog used by the Yorkville Historical Society.

observed. The only plan I have been shown is a sketch map of where these flags were placed.

Visible Grave Evidence

Upon arrival I identified three areas where commercial grave markers were present. The most notable was the marble tab in socket marker for W.W. Williams (Figure 5). This monument appears to be well set and undisturbed. The matching footstone was found out of the ground and leaning against a tree about 20 feet to the southeast.

About 20 feet to the northwest of the Williams marker was the base of a

second marble tab in socket stone, as well as a number of fragments (these are shown on Figure 2 as a "grave marker" and are illustrated by Figure 6).

As these fragments were sorted and measured, I determined that they represent two markers. One is the base of a marble tablet measuring $2\frac{1}{8}$ inches in thickness. The break is along a verse and the top portion of the marker (which would include the name of the deceased and dates) is missing. Three fragments are present.

The second stone measures $1\frac{3}{4}$ inches in thickness. This stone has an arched top and includes the inscription, "gone but not forgotten." Present are at least 16 fragments. The size and description of this stone suggests that at one time it likely was associated with the extant base.



Figure 5. Monument for W.W. Williams, looking west.

These stones suggest the presence of at least three graves, although only one marker is still *in situ*. The amount of disturbance, including the extent of the movements and the degree of fragmentation, suggests some previous damage, perhaps as a result of the efforts to clear the cemetery of undergrowth. Also suggestive of disturbance is the absence of any discernible evidence of graves, such as grave slumps or mounding.



Figure 6. Scatter of broken stone and intact tab in socket base.

Archaeological Remains

While there is only limited evidence of graves, there are abundant archaeological remains scattered across the site, including old brick, manganese glass, clear glass, milk glass, plain and decorated whitewares, and various iron fragments. These materials appear to have a mid-19th to early-20th century date. For example, the sponge decorated whiteware has mean ceramic date of 1853 (but continued to be produced until 1870), while the manganese glass is suggestive of dates between the

last quarter of the nineteenth century and WWI.

I am not aware of an archaeological survey of the property.

Use of Cadaver Dogs to Locate Burials

While the use of scent detection dogs (commonly known as cadaver dogs) is common, especially in search and recovery operations, their use is not without considerable ambiguity. For example, Komar and Buikstra comment, "the level of training and accuracy of both the dog and the handler fluctuates dramatically, and excessive claims of ability or success should be viewed with caution For example, the ability of dogs to differentiate human from animal bone has likely been untested, and so remains must be examined by the consulting anthropologist" (Komar and Buikstra 2008:96).

The reputation of scent detection dogs was dealt a significant blow when one of the best known handlers, Sandra Anderson, was sentenced in 2004 for planting evidence and making false statements to authorities. For a number of years she had planted human remains, fibers, and items stained with her own blood, representing the items as evidence.

Komar (1999) has analyzed and interpreted the effectiveness of eight dog and handler teams using "blind searches" (trials in which the handlers did not know how many items to search for or where they were hidden). The study revealed considerable variation, with success rates ranging from 55% to 95%.

A more recent study by Lasseter and his colleagues at the University of Alabama using four teams to identify 10 fresh and skeletonized remains buried from 1 to 2 feet below grade found overall poor results. Only two alerts correctly signaled the location of remains. In contrast there were six false alerts and 22 no alerts, suggesting problems in detection (Lasseter et al, 2003).

The Institute for Canine Forensics (ICF) certifies dogs, called Historical Human Remains Detection (HHRD) dogs, specifically trained to find only "old" remains. Their website, however, provides no information on the training protocols, testing, or blind test results.

While it is possible that some dog and handler teams may be successful at identifying "old" burials, I am familiar with no tests that would document this ability. The studies that are available reveal considerable variation. Previous studies clearly reveal that weather, soil conditions, training, and dog-handler communication all affect accuracy and reliability. In the case of the current study, I have no

information regarding any of these issues at this particular job. It seems likely that burials 100+ years old, buried in rather impervious clay, are likely to be present very difficult detection conditions.

As a result, I have low confidence in the results of the Yorkville Historical Society study.

Ground Penetrating Radar

The GPR work was conducted by GEL Geophysics out of Charleston, South Carolina. This work used a RAMAC ground penetrating radar (GPR) system configured with 250 MHz and 500 MHz antenna arrays. The field operator was Mr. Jamy Atkinson, Director of South Carolina Operations.

GPR is an electromagnetic method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna, which houses a transmitter and receiver; a profiling recorder, which processes the received signal and produces a graphic display of the data; and a video display unit, which processes and transmits the GPR signal to a color video display and recording device.

The transmitter radiates repetitive short-duration EM signals into the earth from an antenna moving across the ground surface. Electromagnetic waves are reflected back to the receiver by interfaces between materials with differing dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant at the interface, the conductivity of the material that the wave is traveling through, and the frequency of the signal. Subsurface features that may cause reflections include natural geologic conditions such as changes in sediment composition, bedding and cementation horizons, voids, and water content; or man introduced materials or changes to the subsurface such as soil backfill, buried debris, tanks, pipelines, and utilities. The profiling recorder receives the signal from the antenna and produces a continuous cross section of the subsurface interface reflections, referred to as "reflectors" or "reflection events."

The maximum GPR system penetration at the site varied from 4-6 feet below land surface. Any subsurface objects below the depth of penetration were not detectable during this investigation. The extensive root networks, abundance of rock at or near the surface, along with the presumed deterioration and condition of the burials all contributed to less than ideal conditions for identification using geophysical technologies.

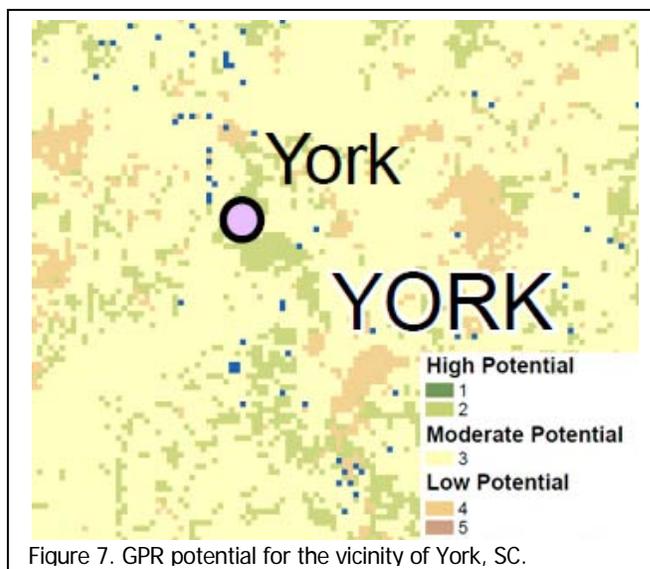


Figure 7. GPR potential for the vicinity of York, SC.

The *Ground Penetrating Radar Soil Suitability Map of South Carolina* produced by the Natural Resources Conservation Service, shown here as Figure 7, reveals that much of the area northeast of York has only moderate GPR potential, largely the result of the clay soils.

The GPR work began by examining the area immediately surrounding the W.W. Williams monument under the assumption that the marker was likely associated with a grave. Afterwards, the GPR unit was operated across the area enclosed by the construction fence (identified on the construction plan as the "surmised extent") and continued

outward from there to incorporate the additional area identified on the plan as the "alleged extent" (see Figure 2).

It is critical to point out that GPR simply detects anomalies – variations in soil reflections. If these are consistent with a posited grave shaft – rectangular, straight sided, oriented approximately east-west, and of an appropriate depth, then they are viewed as possible graves. GPR is not capable of identifying the anomalies graves – such an effort requires "ground-truthing" or archaeological investigations.

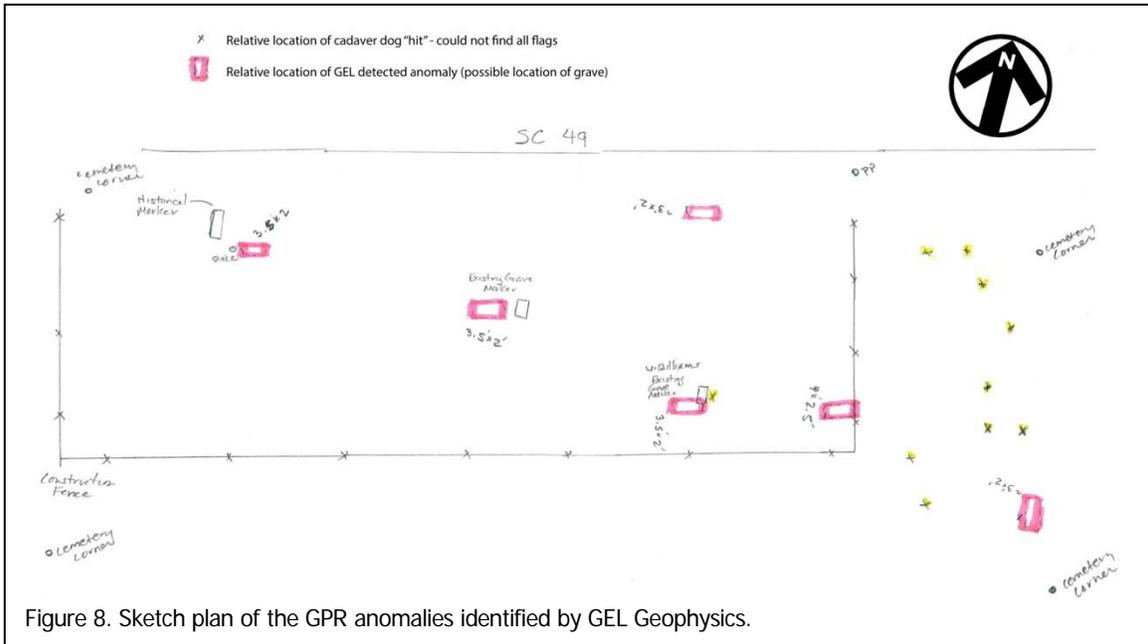


Figure 8. Sketch plan of the GPR anomalies identified by GEL Geophysics.

The GPR work identified six anomalies that are consistent with graves. Five of these six are within the construction fencing. One is clearly associated with the W.W. Williams monument and a second is associated with the debris identified as belonging to two different stones. Only one of the anomalies is identified outside the construction fence and it appears to be oriented north-south, rather than east-west. The location of these finds are shown in Figure 8 produced by GEL. The contractor's surveyor created an accurate recording of the anomaly locations.

Given the site conditions and the age of the burials, it is possible that additional anomalies that were not detected with the geophysical methods deployed exist at the site.

Historical Overview

With the identified anomalies and the extent of disturbance in the posited cemetery area, I thought it prudent to conduct limited historic research, even though such work is not called for by the agreement.

On March 16, 1909 a local paper reported the first smallpox death, Kirby Pugh, in the York Cotton Mill settlement. He was an "operative who had been sick about two weeks" ("Within the Town," *Yorkville Enquirer*, March 16, 1909, pg. 2). While it appears that Kirby Pugh was Patient 0, the source of his exposure is unknown, although it would have occurred about two weeks prior to his obvious symptoms, probably mid-February. The death caused significant alarm in the area; the mill houses were "fumigated," but there was no immediate effort to quarantine the mill village (*Yorkville Enquirer*, March 26, 1909, pg. 2).

By March 30, two additional deaths were reported, Mrs. Robert Price (sister of Kirby Pugh) and Mack Thompson, and seven additional cases had been identified, "all originating directly from that of Kirby Pugh, who died on March 14" (*Yorkville Enquirer*, March 30, 1909, pg. 2). The additional patients included Mr. Robert Price, Mrs. Kirby Pugh, two of Mrs. Pugh's children, Miss Julia Williams, Hiram

Name	Approx Death Date
Kirby Pugh	March 14, 1909
Mrs. Robert Price, sister of Kirby Pugh	March 28, 1909
Mack Thompson	By March 30, 1909
Hiram Alexander	March 30, 1909
Miss Pugh, daughter of Kirby Pugh	April 3, 1909
Jane Williams, daughter of Jeff Williams	April 4, 1909
Peter McFadden	April 9, 1909
W.W. Williams	April 14, 1909

Alexander, and Peter McFadden. The last two were not living in the mill village, although Alexander "was about the mill village a great deal" and McFadden was an African American who worked at the mill and "waited on Kirby Pugh during the early stages of his illness". The account also explains that Alexander was in a "pest house that the county board of commissioners has just caused to be erected at the county home" (*Yorkville Enquirer*, March 26, 1909, pg. 2). By this time the mill village was under a strict

quarantine and the board of health had begun "a vigorous campaign of vaccination."

Another paper, on April 1, provided a very similar account, reporting that, "All who have developed cases, as well as all suspects, have been segregated, and all others living in the village have been vaccinated and a quarantine is being maintained against the village by the Yorkville board of health. There are no cases inside the corporate limits of Yorkville, and those who are keeping in touch with the situation seem to think it is improbable that there will be any" ("Smallpox at Yorkville," *Fort Mill Times*, April 1, 1909, pg. 2).

On April 2 it was reported that Hiram Alexander had died, although "all the other cases mentioned are getting along nicely." In addition, the paper noted that "the mill is running night and day and there is no scarcity of help" ("Smallpox Situation," *Yorkville Enquirer*, April 2, 1909, pg. 2).

The April 4th edition reported two additional deaths, in spite of their earlier rosy predictions of recovery. One of the two deaths was Jane Williams, an African American, and the paper reported that,

Chairman Montgomery of the Yorkville board of health had considerable difficulty in having the body . . . buried. All the local negroes to whom he applied promptly declined. Finally he went in the country, picked up two negroes he knew and remained with them until the work was done. As people along the road were warned of the coming coffin they gave it a clear right of way. The burial was in a deep grave on the county home land (*Yorkville Enquirer*, April 4, 1909, pg. 2).

A few days later it was reported that Williams "had been washing for parties in the mill village and ... husband helped bury Pugh" ("Two More Deaths From Smallpox," *Fort Mill Times*, April 8, 1909, pg. 3). It seems far more likely that the washer woman died of exposure to dirty linens than from her husband.

The following day it was reported that both Mr. and Mrs. W.W. Williams, the parents of Julia Williams who previously died, were now sick ("Smallpox Situation," *Yorkville Enquirer*, April 9, 1909, pg. 2). By April 13 one of the papers reported the death of Peter McFadden, an African American. While his death was technically listed as pneumonia, it was "superinduced by the smallpox." Again local health authorities reported a significant problem having McFadden buried, succeeding only "at a cost of nearly \$50." It was not clear if this money was used for a sealed casket or whether it represented the pay to the burial party (*Yorkville Enquirer*, April 13, 1909, pg. 2).

The April 16 edition listed the death of W.W. Williams, identified as the ninth victim. The paper reported, in an ironic twist, that Williams refused the vaccine, saying that he was more fearful of being vaccinated than he was of smallpox (*Yorkville Enquirer*, April 16, 1909, pg. 2). By April 20 the disease had run its course and the quarantine was lifted ("Quarantine Raised," *Yorkville Enquirer*, April 20, 1909, pg. 2).

Unfortunately only one article mentions a burial location – with Jane Williams, an African American, being buried on the county home property. York, like many communities, had a town cemetery, Rose Hill, but it was limited to white citizens. It seems unlikely, however, that Rose Hill would have accepted even whites who died of smallpox. Thus, it is possible that the county home received all of the smallpox deaths.

In summary, this brief overview reveals eight documented deaths attributable to smallpox in early 1909, with at least one of these burials at the York County Home, probably in proximity to the newly erected pest house. We can also document W.W. Williams as one of those dying from smallpox. Unfortunately, we have not identified where the County Home was situated.

Both 1937 (PL-3-86) and 1941 (PL-4F-33) aerial photographs of the study area were examined. Both are very similar, showing the study area to be an open field. No evidence of the cemetery can be seen on the aerials, although the quality of Soil Conservation Service aerials is not adequate to detect small monuments. There were, however, no extant buildings by 1937, suggesting that whatever was on the site had been razed by that time. The presence of a field, whether agricultural or pasture, may explain the presumed erosion at the site.

A review of the York County records held by the S.C. Department of Archives and History reveal no holdings for the county home or for the county board of health. The agency does hold records for the county council covering this time period (L 46111). A review of the municipal records held by Archives and History also reveals that city council records covering this period are available (L1027001).

Viability of Smallpox in an Archaeological Setting

Galloway and Snodgrass examine the hazard of smallpox in skeletal analysis, noting that it is "highly unlikely that smallpox will be readily transmissible from dead tissue" (Galloway and Snodgrass 1998:942). Scabs from infected individuals revealed little virus after only 30 days and another study revealed the destruction of the virus in scabs after a year. There is a single case where smallpox was revived in the laboratory after over a year at room temperature. Nevertheless, there seems to be little potential for viral transmission from an earth burial 100+ years old. Healing and his colleagues make a similar case, observing "the risk that smallpox might re-emerge if the remains of smallpox victims are disturbed appears to be remote," although they do report smallpox scabs have survived for at least 13 years in envelopes in a laboratory setting (Healing et al. 1995:R64). They also report that while morphologically intact orthpox virus was observed from tissue over 100 years old from a crypt setting, "the virus could not be grown and was not thought to be infective."

Research by Morgan reveals that while pathogen retention is greater in clay soils – such as those at the project site – survival is hindered by high soil pH. In addition, "pathogens retained in the soil will eventually die off due to lack of nutrients, and die-off increases with reduced soil moisture, increased temperature (die-off rates double with every 10°C), and soil pH outside the range of 6 to 7" (Morgan 2004:310). He also notes that the disturbed nature of burial soil promotes rapid aerobic decomposition.

In sum, while some risk may be present in dealing with crypt remains, it seems that most organisms, such as smallpox, do not survive well outside living hosts and are unlikely to withstand the intense microbial competition and hostile environmental conditions found in earth burials.

Summary of Findings

- The GPR work at the project site identified six anomalies both within and outside the construction fence area. Each of these produced features or signals that are consistent with grave shafts and two are in the immediate area of commercial grave markers.
- The soil conditions are not as conducive for GPR work as we would prefer, so it is possible that additional anomalies exist and fail to have been identified by these investigations.
- Three commercial marble grave markers are present, although only one is sufficiently intact to document the burial marked – that of W.W. Williams.
- The dispersed nature of the identified anomalies is inconsistent with a typical burial arrangement, but is entirely consistent with poor soil conditions masking many of the anomalies present and allowing only the most obvious to be identified.
- At present, anomalies consistent in most regards with burials are found over an area measuring about 160 by 80 feet, extending beyond the limits of the construction fence.
- The use of cadaver dogs to identify 100+ year old graves is of uncertain validity. Blind tests have produced highly variable results. In addition, we have no information on the training or certification of the team used.
- Historic research documents eight smallpox deaths, six whites and two African Americans, in York during 1909. At least one was buried at the County Home and W.W. Williams was buried at the project site.
- There is a possibility that the project site represents the County Home. Documentation of this will require additional historic research. If the project site is the county home, it is possible that additional burials – not related to the smallpox outbreak – may be present.
- The presence of archaeological remains in the study area is consistent with activities taking place on the property from the late 19th century through the early 20th century. By the late 1930s the property was a field based on aerial images.

Recommendations and Options

The best interpretation possible given the available evidence is that the project site contains a number of burials. At present it is not possible to estimate the number or their spatial limits.

Option A is to green space the investigation area, treating it as a probable cemetery. This would require redesign of the building footprint as well as access. It will also be necessary to ensure utility easements avoid this area, including future utilities along SC 49. Under such an arrangement, the area should be fenced and landscape activities should be limited to the upper 6-inches of the soil.

This option involves no additional research costs, although there will certainly be costs associated with developing new designs.

Option B involves additional investigation, including historic research to determine if this location is the county home, as well as review of county and city records in an effort to determine additional history of land use. Depending on the findings, it may then be appropriate to open areas subject to development activities in a search for evidence of grave stains. If such stains are present, it will become necessary to

remove the remains using archaeological techniques according to S.C. Code of Laws, Section 27-43-10 et seq.

Additional historical research is estimated to be \$2,080. This work is anticipated to require two days of research and two days of report production. Archaeological investigation (not including burial removals) is estimated to be \$3,100 with the owner providing a track hoe with a toothless bucket (or a toothed bucket onto which a cutting bar has been welded). This work will require about 1½ days on-site after the research is conducted.

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