Archaeological Investigations on Monticello's Northern Slope: The North Wing Utility Vault and Plank Kiln Projects

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February 2022

Thomas Jefferson MONTICELLO

Monticello Department of Archaeology Technical Report Series Number 8

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ACKNOWLEDGEMENTS

Many thanks are due to all of those who helped see the North Wing Vault project to completion. Director of Archaeology Fraser Neiman provided guidance and support throughout excavations and analysis. Field Research Manager Crystal O'Connor directed fieldwork. Archaeological Field Assistants included Catarina Conceicao, Catrina Cuadra, Eva Falls, Elliott Jones, Craig Kelley, Aryel Rigano, Courtney Williams, and Peter Yaworsky. Kelley digitized site maps, and O'Connor and Kelley generated graphics for the report. Curator of Archaeological Collections Beatrix Arendt oversaw artifact processing and cataloguing. Her team included Lab Analysts Katelyn Coughlan, Chris Devine, Caitlin Hepner, and Beth Sawyer. Lab volunteers included Dave Harrel, Kathleen Jockel, Laura Leavitt, Caroline Lowry, Denise Wald, and John Wilkinson. They helped to wash and bag artifacts collected during excavations and were an important part of the process. Devine, Mueller, and Sawyer took photographs for this report. This work was funded through a generous donation from David M. Rubenstein.

INTRODUCTION

This report describes and synthesizes two archaeological excavation projects conducted on the northern slope of Monticello Mountain, not far from Jefferson's mansion. The first project was a salvage excavation, designed to mitigate the adverse effects on Monticello's archaeological record of the impending construction of utility lines and a subterranean vault. The lines and the vault were infrastructure to service the restrooms and a gift shop to be installed in the North Wing of Jefferson's mansion. The project area lay just north of the First Roundabout (Figure 1). The archaeology department explored the impacted area in the winter of 2015 and 2016, excavating a total of 47 five-foot quadrats. In what follows, we refer to this work at the "North Wing Vault Project."

The second project, henceforth the "Plank Kiln Project", was conducted in 2015 to mitigate unanticipated impacts of utility line construction on Jefferson’s Plank Kiln, which documents suggest began operation in 1799.

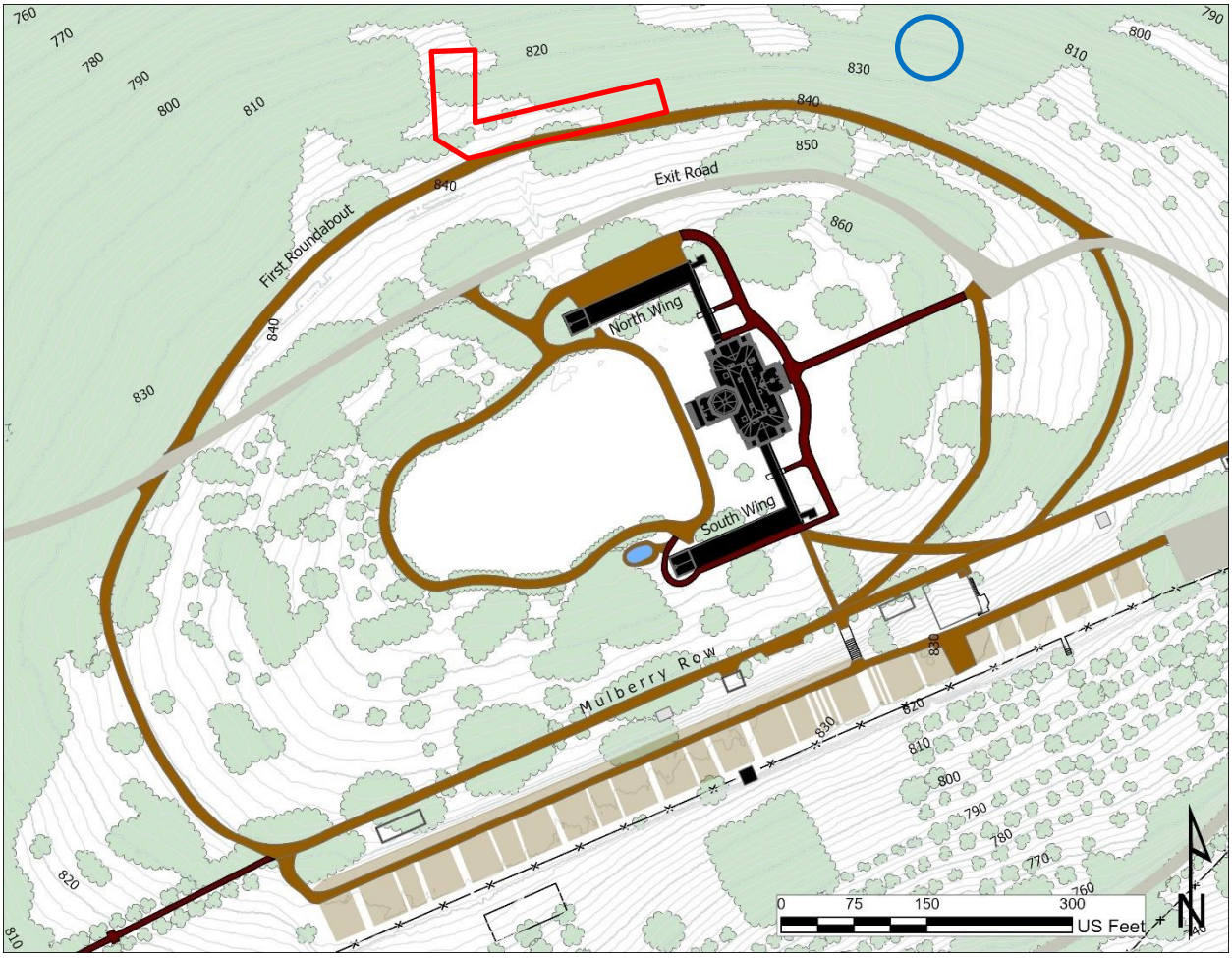

Figure 1: Monticello mountaintop with the North Wing Vault and Plank Kiln sites outlined in red and blue, respectively.

Lasting between 2013 and 2017, Monticello's Mountaintop Project was a multi-year effort to restore parts of Thomas Jefferson's mansion house and the surrounding landscape. Major components of the work included modernizing aging utilities on the mountaintop and installing new ones, where these were required by new restoration projects and new visitor amenities. As an added benefit, all utilities were placed into a common trench where possible to protect the archaeological record from episodic destruction due to the replacement or repair of individual utility (water, sewer, electrical, etc.) lines.

One such utility trench was designed to update the electrical and firefighting water lines, and, for the first time, bring water, sewer, and heating and cooling services to the North Wing of Monticello mansion. These utilities would serve the new restrooms and a new retail shop that were to be installed in the North Wing. The trench connected the North Wing to a new subterranean utility vault north of the First Roundabout and to the main water, sewer, and electrical lines on the south side of the mountain. It also linked to the geothermal field well lines for heating and cooling (Figure 2).

Figure 2: Routes for utility trenches installed in 2016.

The closest point to link with existing utility lines was in the southwestern corner of the North Orchard, roughly 85 feet northeast of the Mulberry Row Stone Stable. The path for the utility trench to the North Wing followed a Thomas Jefferson Foundation-period paved exit road

abandoned in 1983 after the replanting of the North Orchard and the restoration of the First Roundabout made it anachronistic to the restored landscape.

Due to the aggressive timetable for the Mountaintop Project, archaeologists were unable to test fully the proposed utility trench route. Shovel test pit survey of the area, conducted in 2008 and 2009 as part of the department's ongoing Plantation Archaeological Survey, showed varying densities of Jefferson-era artifacts along the route of the trench (Figure 3). Artifact densities were low where the trench traversed the eastern and northeastern slopes on the mountain. Many of the shovel test pits excavated along these portions of the trench route contained pieces of asphalt, suggesting the installation and later demolition of the paved road had destroyed the integrity of all Jefferson-era deposits. On the other hand, the shovel test pits that had been dug where the trench ran along the northern slopes, north of the North Wing, showed artifact higher densities. Higher densities extended into the area where the vault was to be installed. Faced with budget and time constraints, archaeologists prioritized the latter areas, along the northern slope, for more intensive sampling using five-foot quadrats. They opted to monitor mechanical excavation of the trench on the northeastern and eastern slopes.

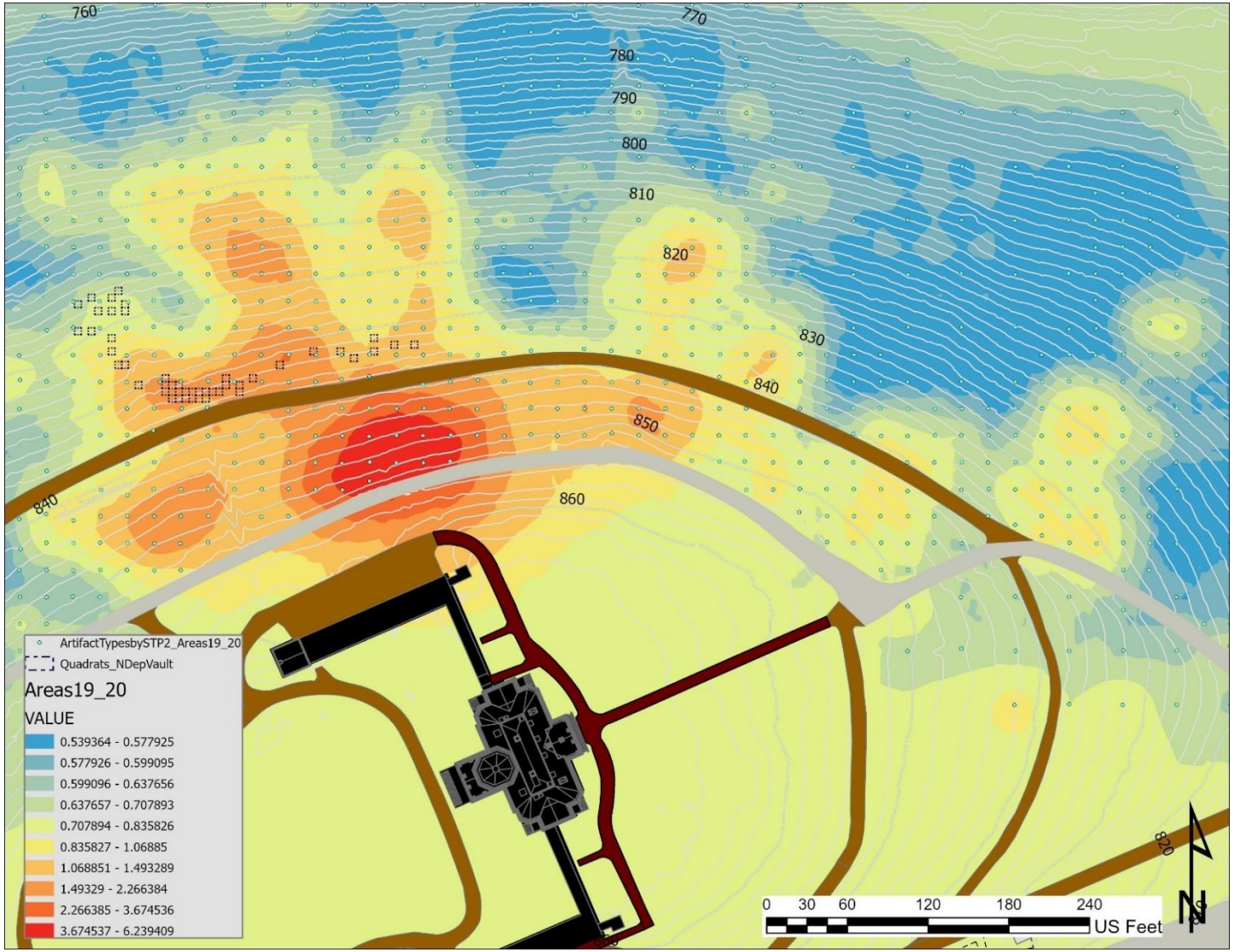

Figure 3: Distribution map of historic artifacts with shovel test pits on Monticello's north and northeast slopes. Counts include the sum of historic ceramics, wrought and cut nails, bottle and window glass, pipe stems, and copper alloy buttons. Quadrats from the North Wing Vault project are included in this map as a point of reference.

NORTH WING VAULT EXCAVATIONS

DOCUMENTARY EVIDENCE

Thomas Jefferson sketched at least one plan for the landscape north of the house. In a drawing that likely predates 1790 for what he eventually called his ferme ornée, or ornamental farm, Jefferson drew fields of cover crops such as clover and timothy (Jefferson before 1794, Figure 4). He included a spiral comprised of shrubs or trees and plotted honey locust trees represented by dots along the First Roundabout. He recorded their spacing in a margin of the drawing: "the honey locusts on the upper roundabout are 18 feet apart measuring across the road, and are opposite to points taken in the middle of the road 25f apart." The plan also shows what appears to be a path running south to north between the First and Second roundabout. The major axis of this feature intersects the mansion. It lies in the same location as a path to the north spring, shown on later Jefferson drawings. Traces of this path can be seen in the microtopography below the Second Roundabout. This feature may be relevant to the archaeological findings described below, if it served as a path along which refuse generated in the mansion, its basement, and the North Wing was disposed. Most artifacts were found west of this path, although there is an increase on either side of the path's projected footprint.

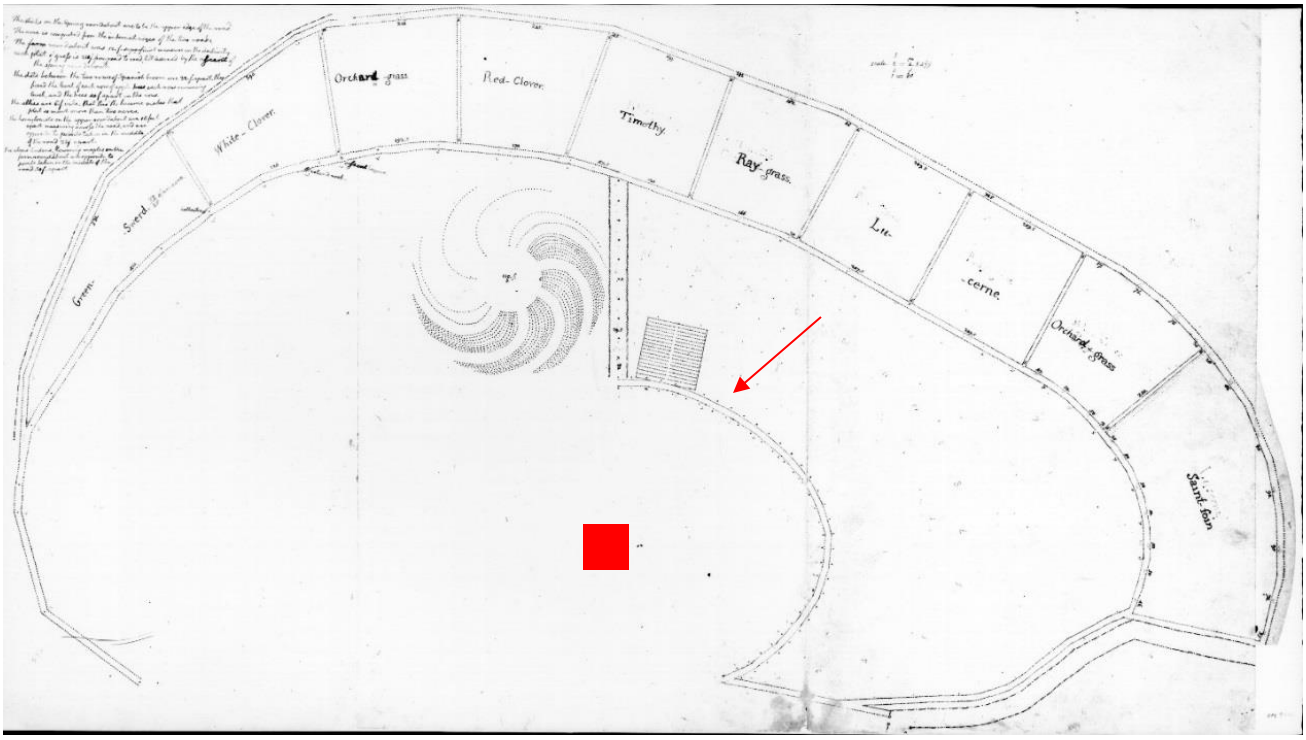

Figure 4: N197 (Jefferson before 1794). Jefferson's ferme ornée. The red arrow points to honey locusts plotted along the First Roundabout, and the red square represents the location of the mansion house.

FIELDWORK

Shovel Test Pits, 2008

As part of ongoing the Archaeology Department's Plantation Survey efforts to test the entire Monticello property using a systematic shovel test pit survey, archaeologists dug this area on 40 foot intervals in 2008 and followed with 20 foot radials off of positive holes (Figure 5). A typical STP's soil profile included two strata, including an incipient A-horizon and a layer of plowzone (Figure 6). A few shovel tests encountered asphalt from the road which had been removed in 1983 (Figure 7). Most artifacts were concentrated in the just north of the ha-ha across the First Roundabout (Figure 8). Artifacts recovered from this area included wrought nails, brick/daub, wine bottle glass, and a few pieces of refined earthenware including creamware, pearlware, and whiteware. The results of the survey, including the low number of artifacts and absence of intact historic strata and features, in addition to the lack of historic documents

indicating activities taking place in this area, supported the Archaeology Department's approval for the recommended location of the new vault, although given the higher densities of historic artifacts on the north slope, archaeologists wanted the opportunity to excavate and document the presence of any historic features.

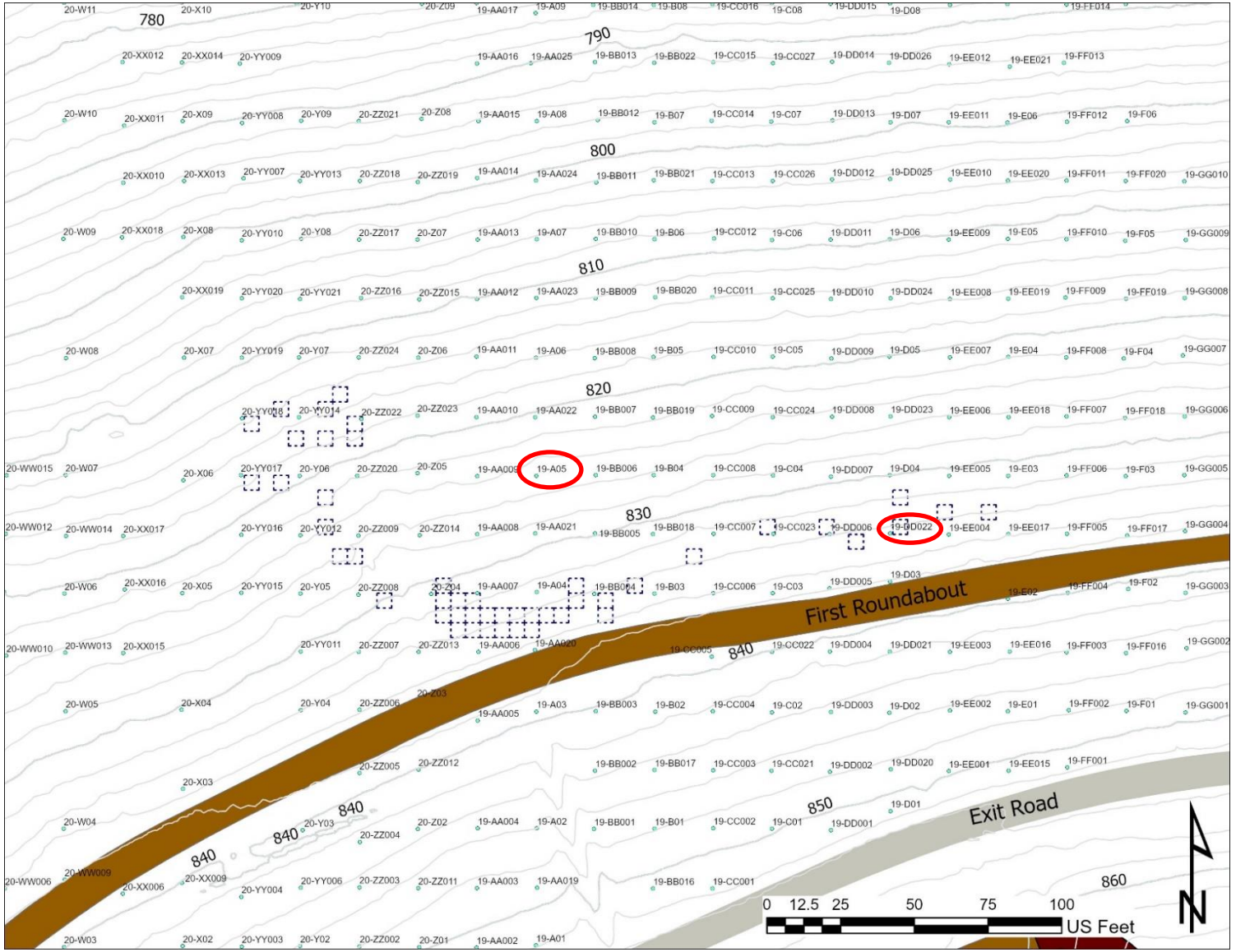

Figure 5: Shovel test pit survey in the North Wing Vault project area. Quadrats are included in this map as a point of reference. The STP profiles shown in Figure 6 and Figure 7 are circled in red.

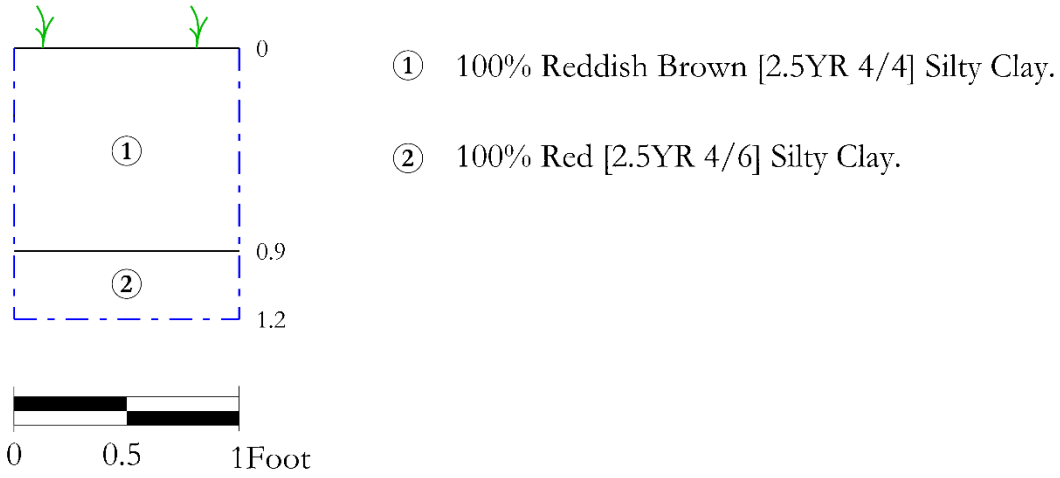

Figure 6: Shovel test pit 6-19-A05 profile.

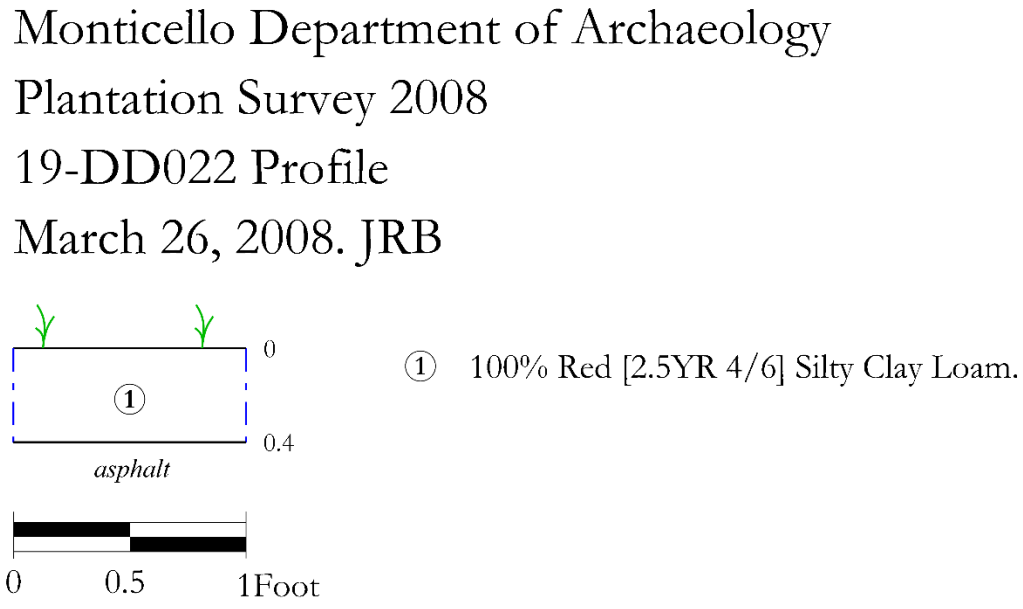

Figure 7: Shovel test pit 6-19-DD022 profile.

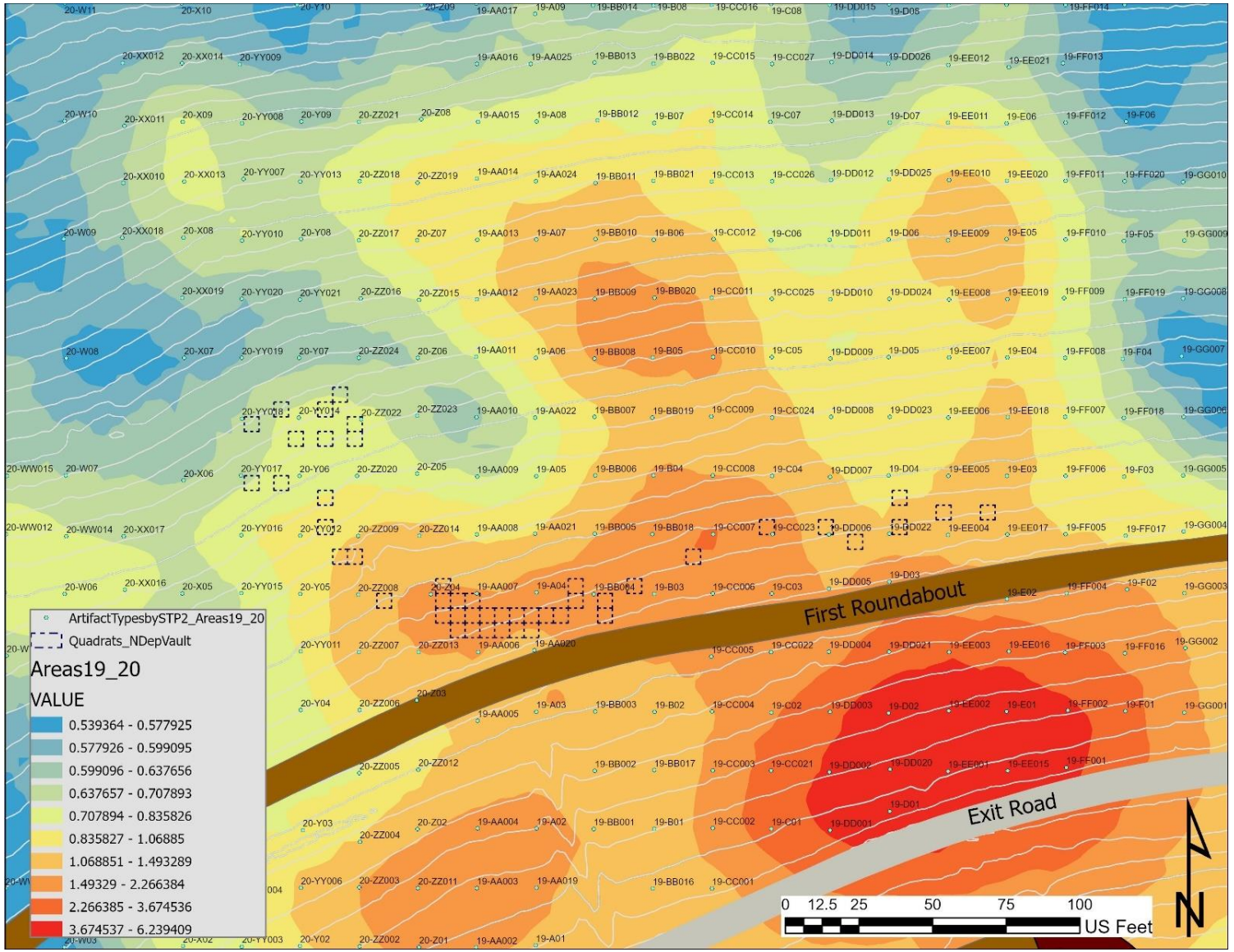

Figure 8: Distribution map of historic artifacts with shovel test pits on Monticello's north slope in parts of Areas 19 and 20. Counts include the sum of historic ceramics, wrought and cut nails, bottle and window glass, pipe stems, and copper alloy buttons. Quadrats are included in this map as a point of reference.

2015-2016 Excavations

Fieldwork of the North Wing Vault Project was conducted during the winter of 2015 to 2016. The project aimed to document any subsurface stratification, including archaeological features. A second aim was to more precisely measure spatial patterning in the distribution of artifacts across a zone that the shovel test pit survey had suggested contained high densities. A third aim was to collect larger samples of artifacts. The goal was to use the resulting data on stratigraphic and spatial patterning in assemblage content to elucidate how the space was used in the past.

Field and Laboratory Methods

A total of forty-seven quadrats were excavated (Figure 9, Figure 10). The initial sampling method was a stratified random sample, in which the area to be impacted by the trench and vault was gridded off into twenty-foot squares (Figure 11). We randomly selected one five-foot-by-five-foot test square to excavate within each twenty-foot block in our first pass. We dug a second random five-foot-by-five-foot quadrat on the second pass over the site and then focused our remaining work on an area with the highest concentration of historic artifacts in the southwest portion of the project area just north of the First Roundabout. Because of the location outside of the First Roundabout, the Virginia State Plan coordinate system was used (whereas a local grid is used within the First Roundabout).

Figure 9: Excavations just underway on the north slope. Note the North Pavilion in the center left of the picture. View south.

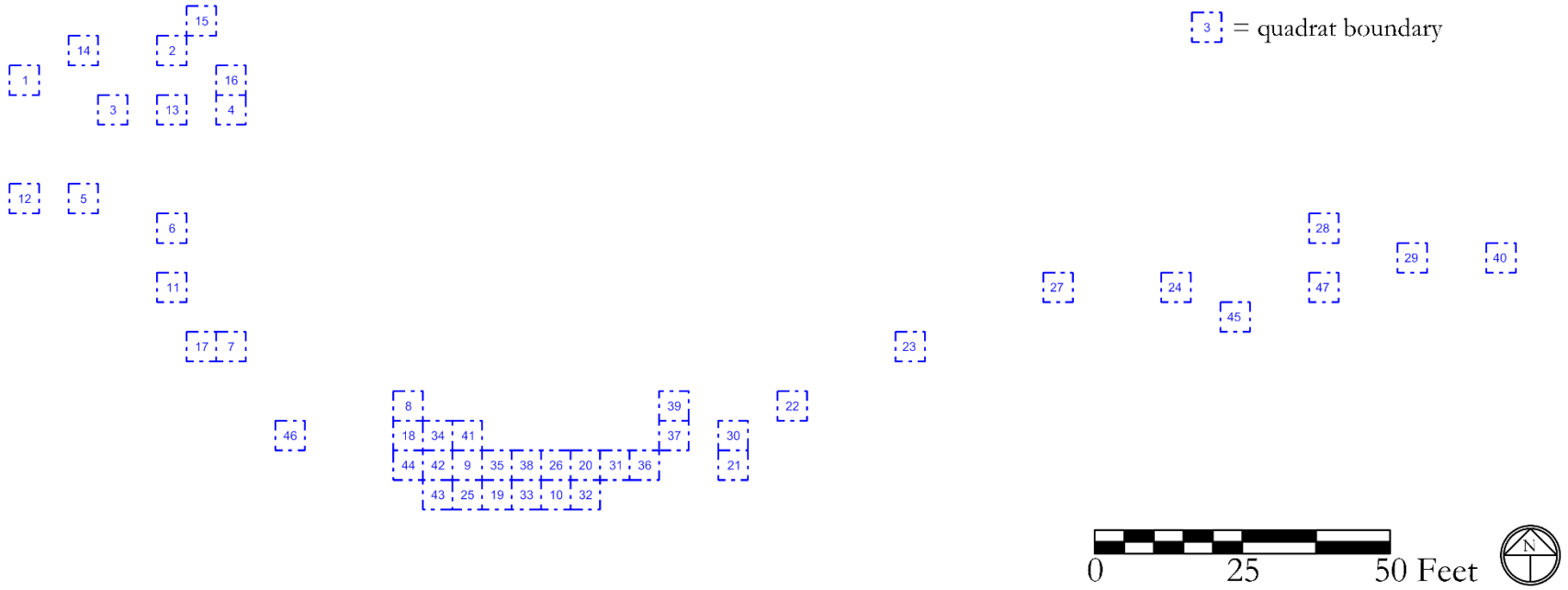

Figure 10: Quadrat map of the North Wing Vault excavations.

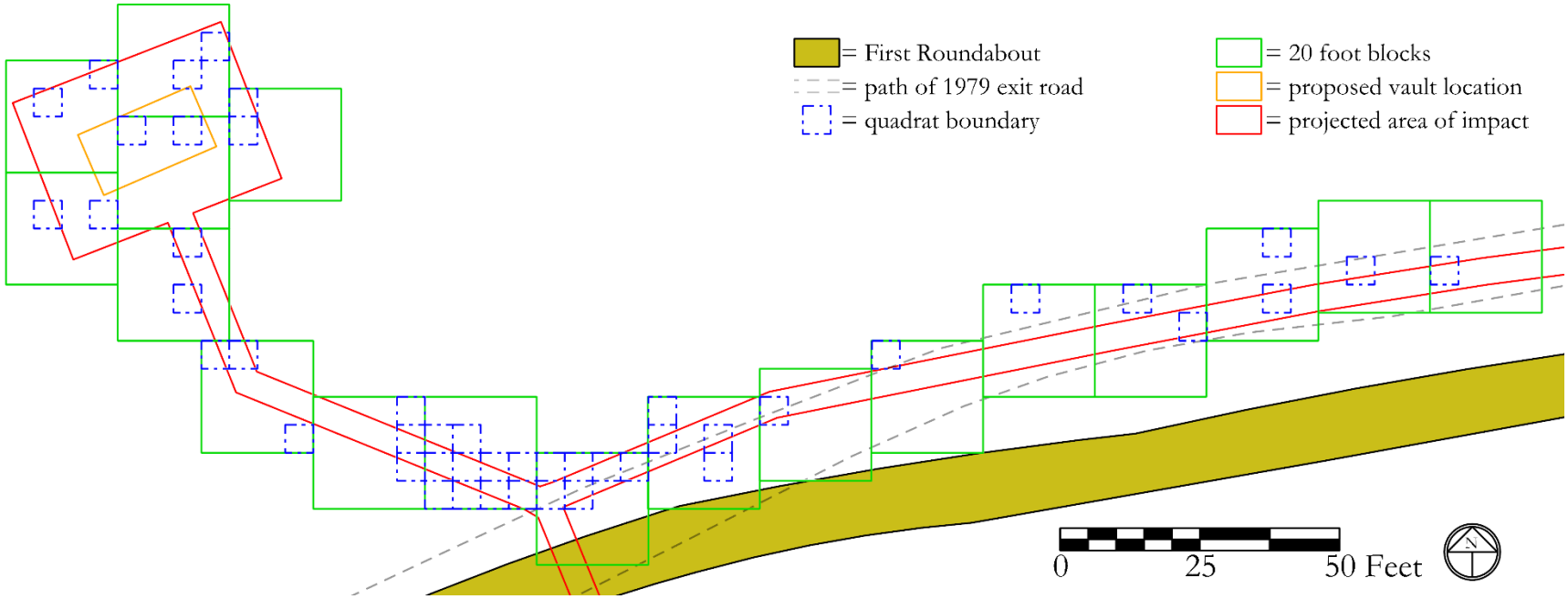

Figure 11: Quadrat map of the North Wing Vault excavations with 20-foot grid block (green squares), approximate path of the 1979 exit road (grey dashed lines), First Roundabout (brown path), proposed vault location (orange rectangle), and projected area of impact (red polygons).

Quadrats were 5’x5’ in size and numbered from 01 to 47. Numbers were assigned in the order in which quadrats were opened. Layers and features within quadrats received consecutive letter designations. Quadrat locations and elevations were recorded using a total station shot in from a temporary station. Appendix 1 includes a complete list of datums and temporary stations.

Paperwork accompanying each quadrat included a Context Index, Context Records, Sediment Sample Log when column samples were taken, a Drawing Log, plan views and wall and feature profiles, a Survey Log when elevations were recorded from local datums, and an Excavation Summary. Figure 12 indicates the location of wall profiles. Drawings of sediment column samples were added to a copy of the profile drawing and accompany the appropriate quadrat paperwork. All drawings were done at a scale of 1-inch equals 1 foot. Digital photographs were taken of each quadrat at the end of excavations, and any wall profile that was drawn was also photographed. Additional paperwork for the site includes the site Photo Log, Quadrat Register, and Feature Register.

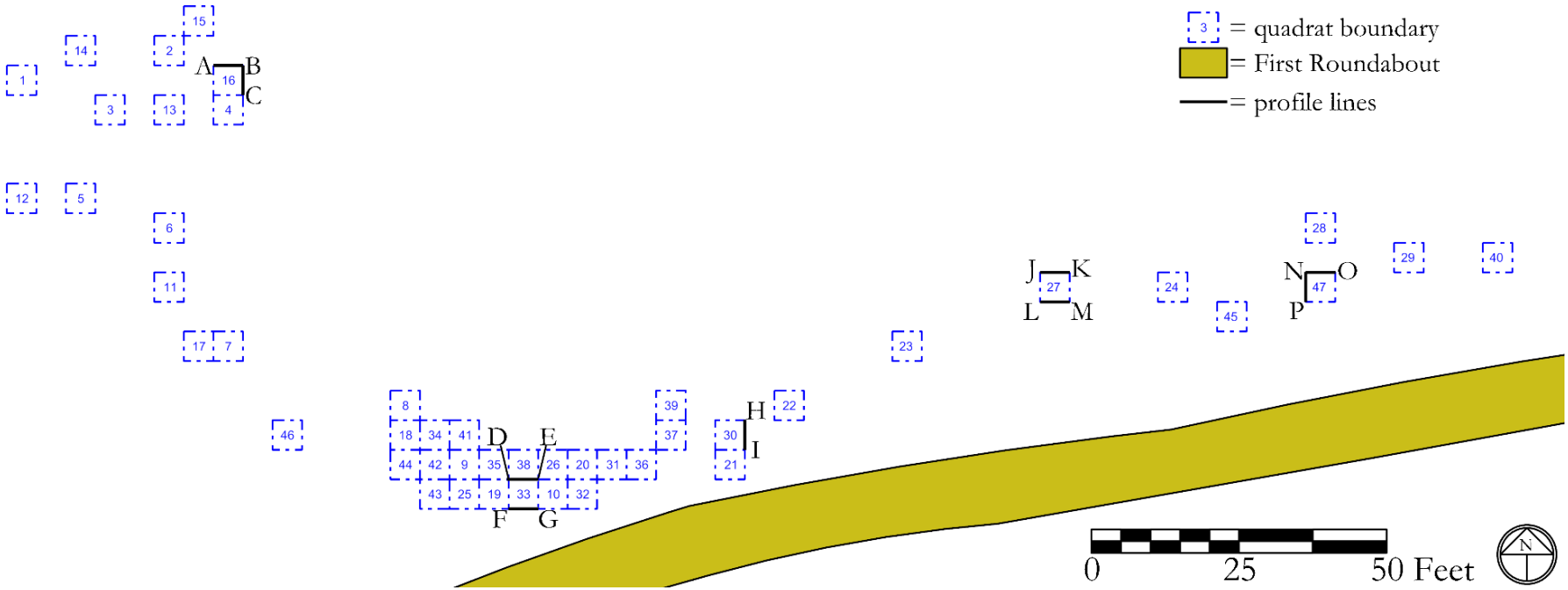

Figure 12: Quadrat map of the North Wing Vault excavations with profile lines indicated.

Excavation took place in the reverse order of deposition, with the most recently deposited stratigraphic unit removed first. All quadrats were excavated stratigraphically by shovel and trowel, and sediment was screened through ¼" steel mesh. Two column samples were taken from two quadrat profiles (29, 31) to test for the presence and identification of pollen.[1] Artifacts were bagged in the field according to context. Context Records were entered into the Digital Archaeological Archive of Comparative Slavery (DAACS) database, an online, relational (SQL) database. The DAACS project number is "53", and the project's name in the database is "North Dependencies Vault." Artifacts collected in the field were brought into the Monticello archaeology lab to be cleaned, labeled, and cataloged into DAACS. All artifacts are housed in the archaeology lab at Monticello. Entered data systematically describe both artifacts and the archaeological contexts from which they were excavated. The data are recorded by Departmental staff using a single set of classification and measurement protocols. For more information on specific cataloging protocols, visit www.daacs.org.

Select site maps, plan views, and profile drawings for the North Wing Vault and Plank Kiln were digitized into Bentley Systems' CAD program MicroStation. Digitized maps were saved in AutoCAD format, and graphics for this report were produced in MicroStation. Distribution maps were created with ArcGIS Pro. Maps were generated with a grid based in Virginia State Plane. The point data exists within Virginia State Plane.

[1] As of the time of printing, these samples have not yet been sent out for processing.

THE SITE THROUGH TIME

The archaeological record in the footprint of the North Wing Vault reflects an area including concentrations of discarded late 18th- and 19th-century artifacts. Every quadrat had been affected by plowing, with several quadrats in the southern and eastern portions of the site impacted by the installation and removal of a modern roadbed. The following section reviews, in order of deposition, the deposits and features archaeologists encountered.

Lithostratigraphic Groups

A major goal of our analysis is to reconstruct the history of the major depositional events responsible for the sediments and stratification that the excavators encountered at the site. A first step in doing this is to group individual contexts into lithostratigraphic groups (stratigraphic groups, or SGs, for short), when there is evidence that the contexts were part of the same depositional or formational event (Stein 1987). We used several criteria to aggregate contexts into SGs. The first is lithological homogeneity, assessed in terms of sediment attributes such as grain size, Munsell values, and the presence, frequency, and size of inclusions, such as brick, charcoal, mortar, and stone. Contexts with similar lithologies that extended continuously across quadrat boundaries were assigned the same SG. We also combined contexts within a quadrat into the same SG if we could not see a distinct stratigraphic contact between them in the quadrat's profile. In other words, we used stratigraphic profiles as a *conservative* check on initial assessments made by excavators as they removed sediments in plan.

Stratigraphic groups correlate with major depositional events that in turn relate to site formation, use, and abandonment. SGs were numbered in the order in which they were deposited with lower numbers representing earlier deposits. For instance, SG01 is the oldest stratigraphic group on the site representing the transition to subsoil. The most recent deposit, SG06, represents

A-horizon, or modern ground surface as of 2015. A list of each stratigraphic group and feature and their interpretations are listed in Table 1.

Harris Matrix

A Harris Matrix offers a schematic summary of a site's stratigraphy in the form of an acyclic graph in which nodes represent deposits, lines connecting them (technically "edges") represent *non-redundant* stratigraphic relationships, and the vertical position of nodes that are connected to one another represents temporal order. The Harris Matrix is the key to visualizing and understanding the depositional history of the site. To build the site-wide Harris Matrix, we started with the contexts for each quadrat and the stratigraphic relationships among them, as recorded by the excavators. Building a Harris Matrix for each quadrat is an iterative process, as inconsistencies are exposed and then resolved using context records, profile drawings, and photographs. Once a matrix is built for a quadrat, relationships among contexts in different quadrats are established. Where warranted, contexts were assigned to stratigraphic groups. We left contexts that represented deposits that could not be identified in more than one quadrat unassigned to an SG. Stratigraphic groups are identified by their numeric designations (e.g., SG01) followed by interpretations (e.g., transition to subsoil).

We then used the site's Harris Matrix to construct a relative stratigraphy of chronology of the site. We assigned sets of nodes in the matrix diagram to one of several temporally successive stratigraphic periods when they were linked directly to one another and where the spatial or architectural relationships amount the deposits represented by the nodes attested to their contemporaneity. We then portrayed the phase assignments on the Harris Matrix. The phased Harris Matrix offers a complete stratigraphic chronology for the site. The result is shown in Figure 13. The nodes represent both contexts and stratigraphic groups.

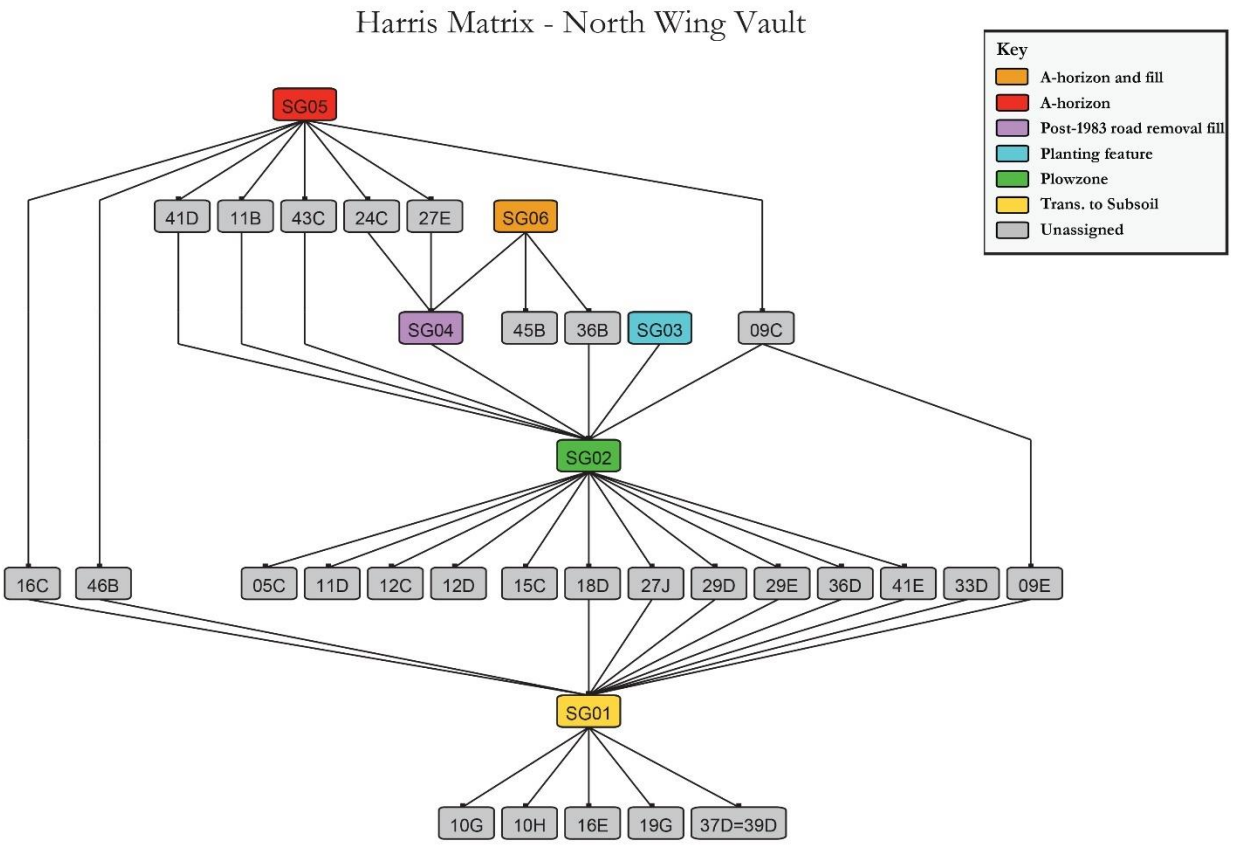

Figure 13: Harris Matrix of the North Wing Vault quadrats

Table 1: Stratigraphic Groups, Features, and Contexts from the North Wing Vault excavations.

Feature number	Stratigraphic Group (SG)	Contexts	Description	Interpretation	Dimensions (feet)	Depth (feet)
--	SG06	26A, 29A, 30A, 32A, 33A, 36A, 37A, 39A, 40A, 45A, 47A	Reddish brown silty clay	A-horizon AND fill. Post-1983 road removal.	--	--
--	SG05	01A, 02A, 03A, 04A, 05A, 06A, 07A, 08A, 09A, 10A, 11A, 12A, 13A, 14A, 15A, 16A, 17A, 18A, 19A, 19B, 20A, 21A, 22A, 23A, 24A, 25A, 27A, 28A, 31A, 34A, 35A, 35B, 41A, 42A, 43A, 44A, 46A	Sod / A-horizon	A-horizon	--	--
--	SG04	10B, 10C, 10E, 19C, 19D, 20B, 20C, 21B, 21C, 21D, 21E, 22B, 23B, 24B, 24D, 24E, 26B, 27B, 27C, 27D, 27G, 28B, 31B, 35C, 38C	Roadbed removal fill	Post-1983 road removal fill	--	--
F15	SG03	34C, 34D, 34F, 42C, 42D	Olive brown sandy silt and dark reddish brown	Planting feature	2.20 x 2.10	0.9
--	SG02	01B, 02B, 03B, 04B, 05B, 06B, 07B, 07C, 07D, 07E, 07F, 07G, 08B, 08C, 09B, 09D, 10D, 11C, 12B, 13B, 14B, 15B, 16B, 17B, 18B, 18C, 19E, 20D, 22C, 23C, 24F, 24G, 25B, 26C, 26D, 27F, 27H, 28C, 29B, 29C, 30B, 31C, 32B, 33B, 34B, 34E, 35D, 36C, 37B, 38D, 39B, 40B, 41B, 41C, 42B, 43B, 43D, 44B, 44C, 47B, 47C	Reddish brown silty clay loam	Plowzone	--	--

--	SG01	07H, 09F, 10F, 11E, 16D, 17C, 18E, 19F, 20E, 22D, 23D, 24H, 25C, 26E, 27I, 27K, 28D, 29F, 30C, 31D, 32C, 33C, 34G, 35E, 36E, 37C, 38E, 39C, 40C, 41F, 42E, 42F, 44D, 46C	Reddish clay with greenstone	Transition to subsoil	--	--
F06	--	10H	Red clay loam	Root intrusion	0.90 x 0.80	0.51
F07	--	11D	Dark red clay loam intrusion	Root intrusion	3.40 x 1.30	0.37
F08	--	15C	Reddish brown with greenstone	Root intrusion	3.30 x 1.80	0.54
F09	--	16E	Red intrusion with saprolite	Root intrusion	1.25 x 0.70	0.3
F10	--	18D	Dark reddish brown circular intrusion	Root disturbance	0.50 x 0.50	0.78
F11	--	19G	Reddish brown intrusion	Root intrusion	1.60 x 0.30	0.21
F12	--	27J	Reddish brown intrusion	Pipe trench - Levy period	5 x 1.10	0.49
F13	--	36D	Reddish brown	Plow scar	2.70 x 0.64	0.27
F14	--	33D	Round loose silty loam intrusion	Stake-hole	0.40 x 0.30	0.35
F16	--	37D, 39D	Dark reddish brown silty clay loam with charcoal intrusion	Tree root intrusion	5 x 4.4	0.42

F17	--	41D	Dark reddish brown silty clay intrusion	STP, 19-AA007	0.65 x 0.40	0.38
F18	--	41E	Dark reddish brown intrusion	planting feature	1.50 x 0.80	0.55
F19	--	16C	Reddish brown circular intrusion	STP, 20-ZZ022	0.65 x 0.40	0.12
F20	--	24C	Reddish brown half-circular intrusion	STP, 19-DD006	0.60 x 0.20	0.15
F21	--	27E	Dark reddish brown half-circular intrusion	STP	0.40 x 0.30	0.74
--	--	45B	Mottled red and brown clay	Modern fill not seen elsewhere, below roadbed fill	--	--
--	--	36B	Reddish brown and red	Roadbed AND plowzone	--	--
--	--	43C	Red clay lens	Fill (not road fill but may be overspill from road fill, as it is 5 feet away from a quad with road fill)	--	--
--	--	46B	Colluvium	Colluvium	--	--
--	--	11B	Red clay	Redeposited subsoil (possibly associated with drainage ditch to east)	--	--

--	--	29D	Charcoal rich intrusion	Root intrusion	--	--
--	--	29E	Charcoal rich intrusion	Root intrusion	--	--

Since this area was plowed, the stratigraphy is relatively straightforward. Typically, three layers (SGs 05, 02, and 01) were present in quadrat profiles (Figure 14, Table 2). An incipient A-horizon (SG05) was present across the entire site and was typically a reddish brown [2.5YR 4/3] or dark reddish brown [5YR 3/4] silty clay loam or silty loam containing about 2-3% unmodified greenstone granules and pebbles. This sod layer sat on top of plowzone (SG02), which Munselled as reddish brown ([5YR 4/4] or [2.5YR 4/4]) silty clay loam or silty clay. This stratum was uniform in color and texture, with a small amount of greenstone inclusions ranging in size from granules to boulders. A gravel road installed in the mid-20th century intruded plowzone. The roadbed fill deposit ran southwest to northeast just north of the First Roundabout (SG04, Figure 15, Table 3; Figure 16). These human-deposited fill contexts consisted of heavily disturbed red silty clay loam mottled with reddish brown silty clay loam, a large presence of pea gravel and bluestone gravel, and 20th-century artifacts such as cement, asphalt, whiteware, porcelaneous, wire nails, and light bulb fragments.

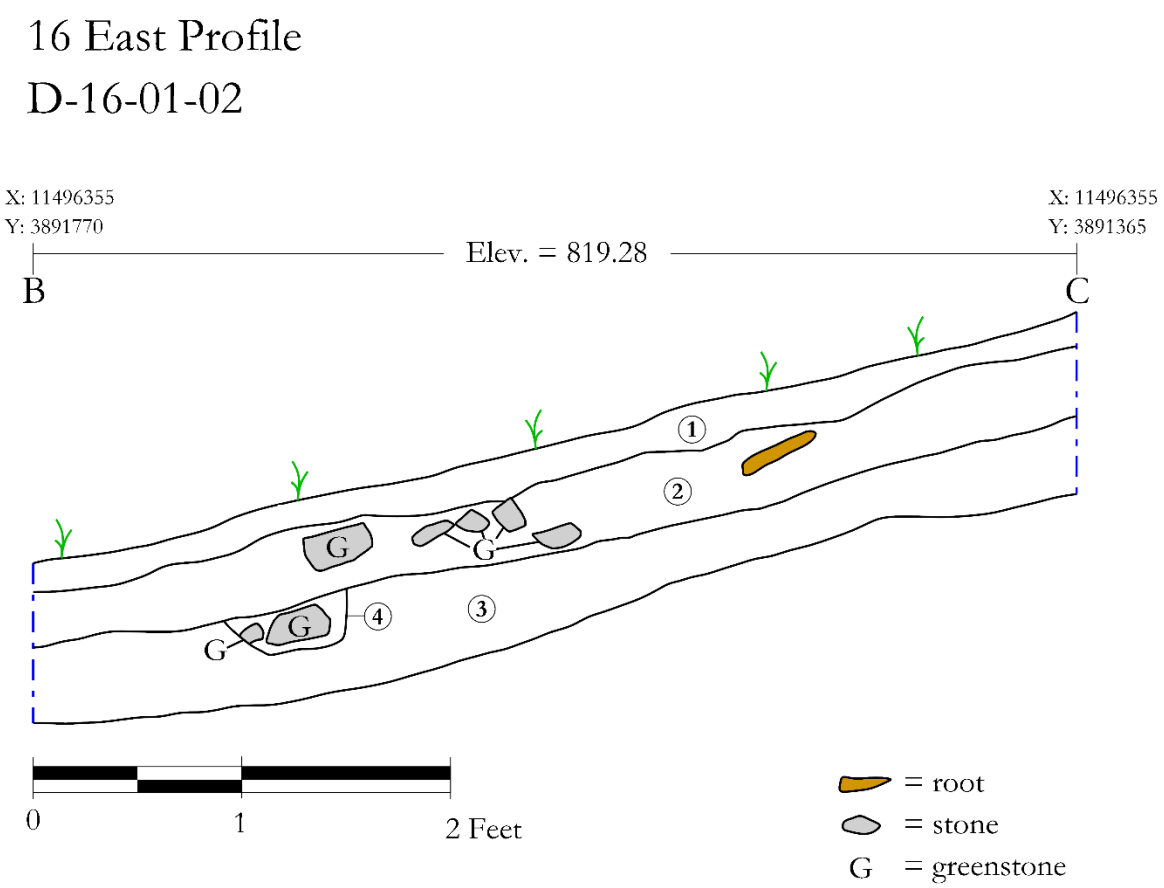

Figure 14: D-16-01-02, east profile

Table 2: Contexts, sediment descriptions, SGs, and interpretations for Figure 14.

Number	Context(s)	Munsell	SG	Interpretation
1	16A, 16B	Reddish Brown (5YR 4/4) Silty Loam, 2% Unmodified Greenstone [2-64mm].	05	A-horizon
2	16B, 16D	Reddish Brown (5YR 4/4) Silty Clay Loam, 29% Yellowish Red (5YR 4/6) Silty Clay Loam, 1% Greenstone [2-64mm].	02	Plowzone
3	16D	Red (2.5YR 4/6) Silty Clay Loam, 20% Reddish Brown (2.5YR 4/4) Silty Clay Loam, 1% Decaying Greenstone [2-64mm], <1% Quartzite [4-64mm].	01	Transition to subsoil
4	16C	Reddish Brown (2.5YR 4/4) Silty Clay Loam, 5% Red (2.5YR 4/6) Silty Clay, 75% Greenstone [Not Recorded].	--	STP, 20-ZZ022

30 East Profile

D-30-01

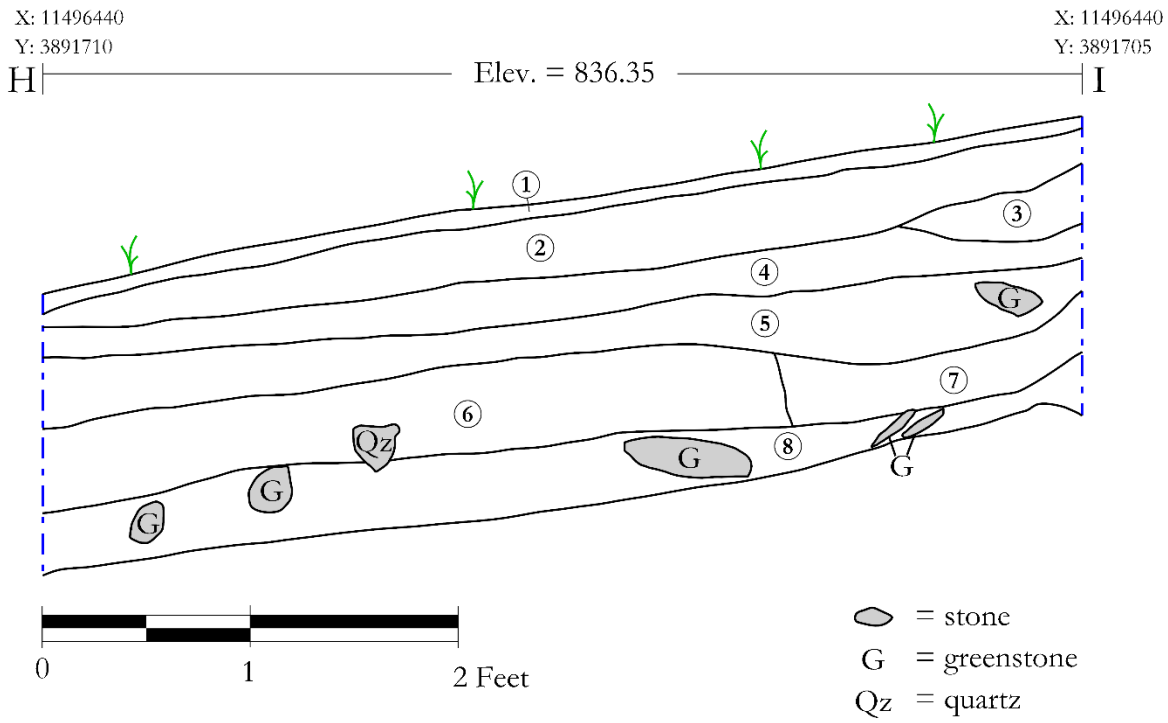

Figure 15: D-30-01, east profile showing the fill that replaced the roadbed after it was removed in 1983

Table 3: Contexts, sediment descriptions, SGs, and interpretations for Figure 15.

Number	Context(s)	Munsell	SG	Interpretation
1	30A	Reddish Brown (5YR 4/4) Silty Loam, 2% Unmodified Greenstone [2-64mm].	SG06	A-horizon and roadbed
2	30A	Reddish Brown (5YR 4/4) Silty Clay Loam, 29% Yellowish Red (5YR 4/6) Silty Clay Loam, 1% Greenstone [2-64mm].	SG06	A-horizon and roadbed
3	30A	Red (2.5YR 4/6) Silty Clay Loam, 20% Reddish Brown (2.5YR 4/4) Silty Clay Loam, 1% Decaying Greenstone [2-64mm], <1% Quartzite [4-64mm].	SG06	A-horizon and roadbed
4	30A	Reddish Brown (2.5YR 4/4) Silty Clay Loam, 5% Red (2.5YR 4/6) Silty Clay, 75% Greenstone [Not Recorded].	SG06	A-horizon and roadbed
5	30B	Red (2.5YR 5/4) Clay, 17% Reddish Brown (5YR 4/4) Clay Loam, 2%	SG02	Plowzone

		Unmodified Greenstone [1-2mm], 1% Charcoal [1-2mm].		
6	30B	Dark Reddish Brown (2.5YR 3/4) Silty Clay Loam, 2% Red (2.5YR 4/6) Clay Loam, 3% Unmodified Greenstone [1-64mm].	SG02	Plowzone
7	30A	Reddish Brown (5YR 4/4) Clay Loam, 30% Red (2.5YR 5/4) Clay, 5% Unmodified Greenstone [1-64mm], 4% Bluestone Gravel [1-4mm], 1% Charcoal [1-2mm].	SG06	A-horizon and roadbed
8	30C	Red (2.5YR 4/6) Clay, 5% Reddish Brown (5YR 4/4) Clay Loam, 1% Charcoal [1-2mm], 1% Greenstone [1-2mm].	SG01	Transition to subsoil

Figure 16: Quadrat 30, east profile. Note the four layers: the top layer represents A-horizon (SG05), which is on top of the fill replacing the road after it was removed in 1983 (SG04), which seals plowzone (SG02), on top of a transition to subsoil (SG01).

Archaeologists excavated several natural and human-made disturbances, most of which were beneath plowzone intruding into subsoil. At the eastern edge of the excavated area, we found a dark reddish brown clay loam linear intrusion, which was likely a Levy-era utility trench (Feature 12; Figure 17, Table 4; Figure 18, Table 5; Figure 19). Additionally, several tree root disturbances intruded into subsoil. One received an SG (SG03/Feature 15), which was present in Quadrats 34 and 42.

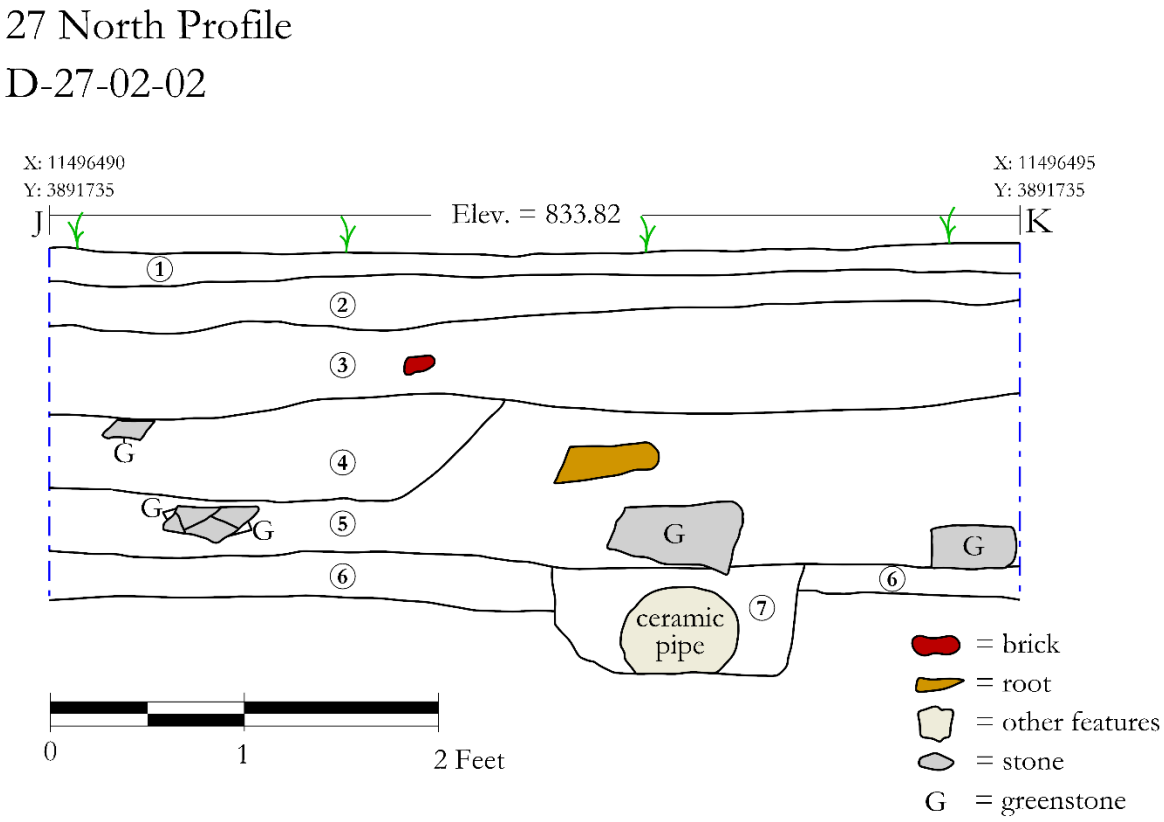

Figure 17: Quadrat 27 North Profile. The layers which seal the pipe trench (Layer 7) include 27F and H, which were interpreted as plowzone. The pipe trench intrudes 27I and K, which were the transition to subsoil. Layers 2-4 were interpreted as post-1983 road removal fill.

Table 4: Contexts, sediment descriptions, SGs, and interpretations for Figure 17

Number	Context(s)	Munsell	SG	Interpretation
1	27A	Reddish Brown (5YR 4/4) Silty Loam, 2% Unmodified Greenstone [2-64mm].	SG06	A-horizon and roadbed
2	27B, 27C	Reddish Brown (5YR 4/4) Silty Clay Loam, 29% Yellowish Red (5YR 4/6) Silty Clay Loam, 1% Greenstone [2-64mm].	SG06	A-horizon and roadbed
3	27D	Red (2.5YR 4/6) Silty Clay Loam, 20% Reddish Brown (2.5YR 4/4) Silty Clay Loam, 1% Decaying Greenstone [2-64mm], <1% Quartzite [4-64mm].	SG06	A-horizon and roadbed
4	27G	Reddish Brown (2.5YR 4/4) Silty Clay Loam, 5% Red (2.5YR 4/6) Silty Clay, 75% Greenstone [Not Recorded].	SG06	A-horizon and roadbed
5	27F, 27H	Red (2.5YR 4/8) Clay, 3% Reddish Brown (2.5YR 4/4) Clay Loam, 9% Greenstone [1-4mm].	SG02	Plowzone
6	27I, 27K	Dark Reddish Brown (5YR 3/4) Silty Clay Loam, 7% Greenstone [2-64mm], 1% Quartzite [2-4mm], 1% Charcoal [1-4mm].	SG01	Transition to subsoil
7	27J	Yellowish Red (5YR 4/6) Silty Clay Loam, 5% Red (2.5YR 4/6) Clay, 2% Greenstone [2-64mm].	--	Pipe trench – Levy era

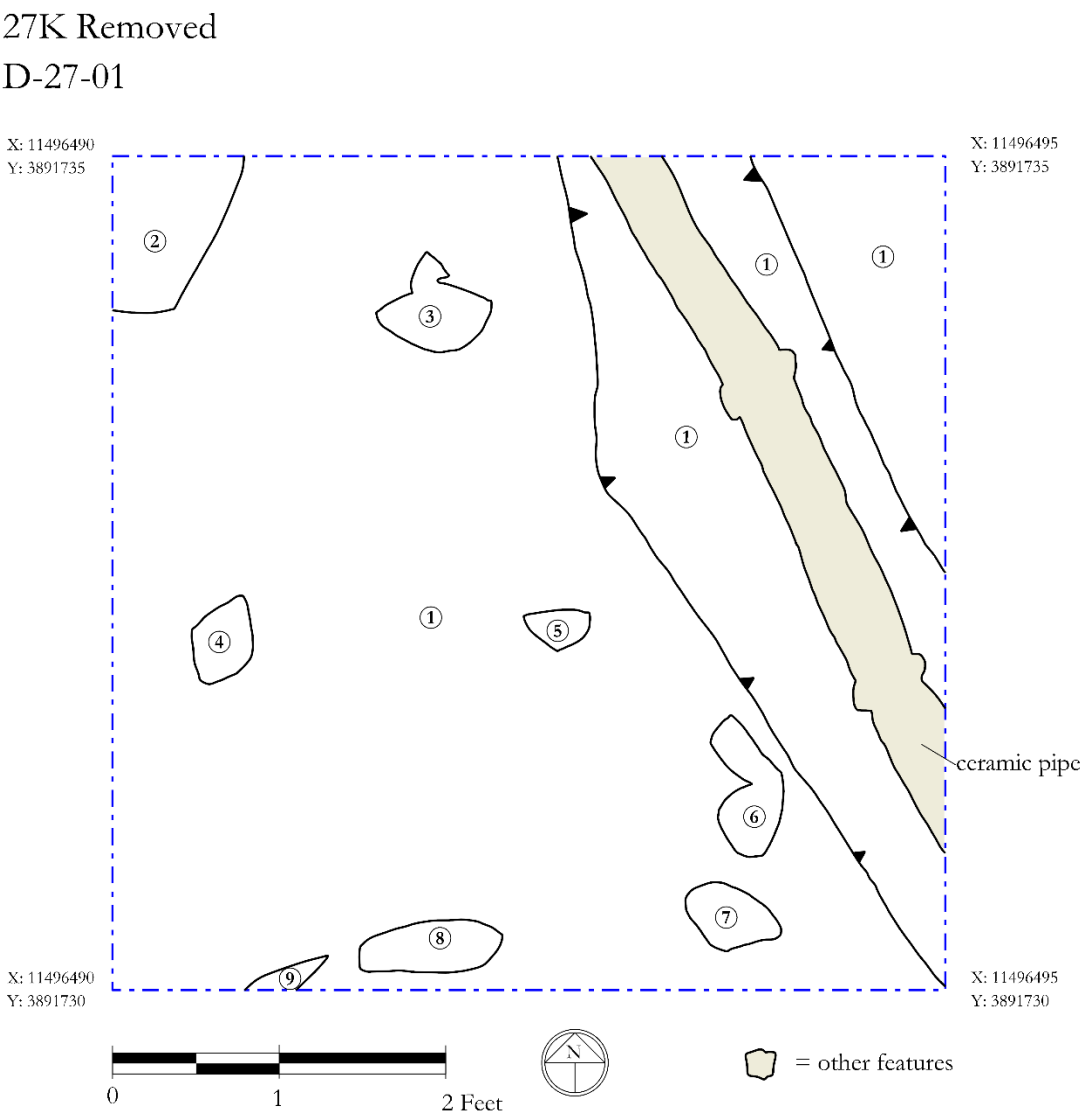

Figure 18: Quadrat 27 plan view, end of excavation

Table 5: Contexts, sediment descriptions, SGs, and interpretations for Figure 18

Number	Context(s)	Munsell	SG	Interpretation
1	--	Red (2.5YR 4/6) Clay, 5% Greenstone [1-4mm].	--	Subsoil
2	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 15% Red (2.5YR 4/6) Clay, 5% Charcoal [1-4mm].	--	Not excavated further
3	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 2% Red (2.5YR 4/6) Clay, 3% Charcoal [1-4mm].	--	Not excavated further
4	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 40% Red (2.5YR 4/6) Clay, 5% Charcoal [1-4mm].	--	Not excavated further
5	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 10% Red (2.5YR 4/6) Clay.	--	Not excavated further
6	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 5% Charcoal [1-4mm].	--	Not excavated further
7	--	Reddish Brown (5YR 4/4) Silty Clay Loam.	--	Not excavated further
8	--	Reddish Brown (5YR 4/4) Silty Clay Loam, 5% Red (2.5YR 4/6) Clay.	--	Not excavated further
9	--	Reddish Brown (5YR 4/4) Silty Clay Loam.	--	Not excavated further

Figure 19: Quadrat 27 end of excavation, view north

As plowzone transitioned into subsoil (SG01), sediment became redder, and the percentage of clay increased. Excavators Munselled the transition to subsoil layer as a red or reddish brown (ranging from [10R 4/8] to [2.5YR 4/4]) with a texture that ranged from silty clay loam to clay. Subsoil was a cross-site stratum that was a red clay ([2.5YR 4/8] or [2.5YR 4/6]) with about 5% of unmodified greenstone granules, pebbles, and cobbles.

ARTIFACTS

A total of 16,198 artifacts were collected and catalogued from this project. By far, majority of the artifacts (n=11,682, 72%) were recovered from the plowzone layer. The

following sections provide counts and relative frequencies for various artifact types. Appendix 2 is an artifact catalog providing counts of artifacts recovered from the project.

Ceramics

A total of 2,728 ceramics were found during excavations (Table 6, Figure 20). Most of them date to Jefferson's lifetime. The assemblage is dominated by pearlware (n=1,273) and creamware (n=613), which account for 47% and 22%, respectively. Chinese porcelain also has a fair presence, consisting of 15% of the assemblage (n=418). The remaining ware types in the assemblage include post-Jefferson ceramics such as yellow ware, ironstone, and porcelaneous.

Table 6: Ceramic ware types and their mean ceramic dates found during the North Wing Vault excavations.

Ceramic ware	MCD ranges	Sherd Count	Relative Frequency
Pearlware	1775-1830	1273	0.4666
Creamware	1762-1820	613	0.2247
Porcelain, Chinese	1660-1860	418	0.1532
Refined Earthenware, unid.	NA	129	0.0473
Porcellaneous/Hard Paste	1820-2000	77	0.0282
Ironstone/White Granite	1840-2000	69	0.0253
American Stoneware	1750-1920	67	0.0246
Whiteware	1820-2000	42	0.0154
Redware	1700-1900	9	0.0033
British Stoneware	1671-1800	6	0.0022
Porcelain, unid.	NA	6	0.0022
Buckley-type	1720-1775	4	0.0015
Bennington/Rockingham	1830-1900	2	0.0007
Black Basalt	1750-1820	2	0.0007
Coarse Earthenware, unid.	NA	2	0.0007
White Salt Glaze	1720-1805	2	0.0007
Astbury Type	1725-1775	1	0.0004
Canary Ware	1780-1835	1	0.0004
Native American	NA	1	0.0004
Porcelain, English Bone China	1794-2000	1	0.0004
Refined Earthenware, modern	NA	1	0.0004
Stoneware, unid.	NA	1	0.0004
Yellow ware	1830-1940	1	0.0004

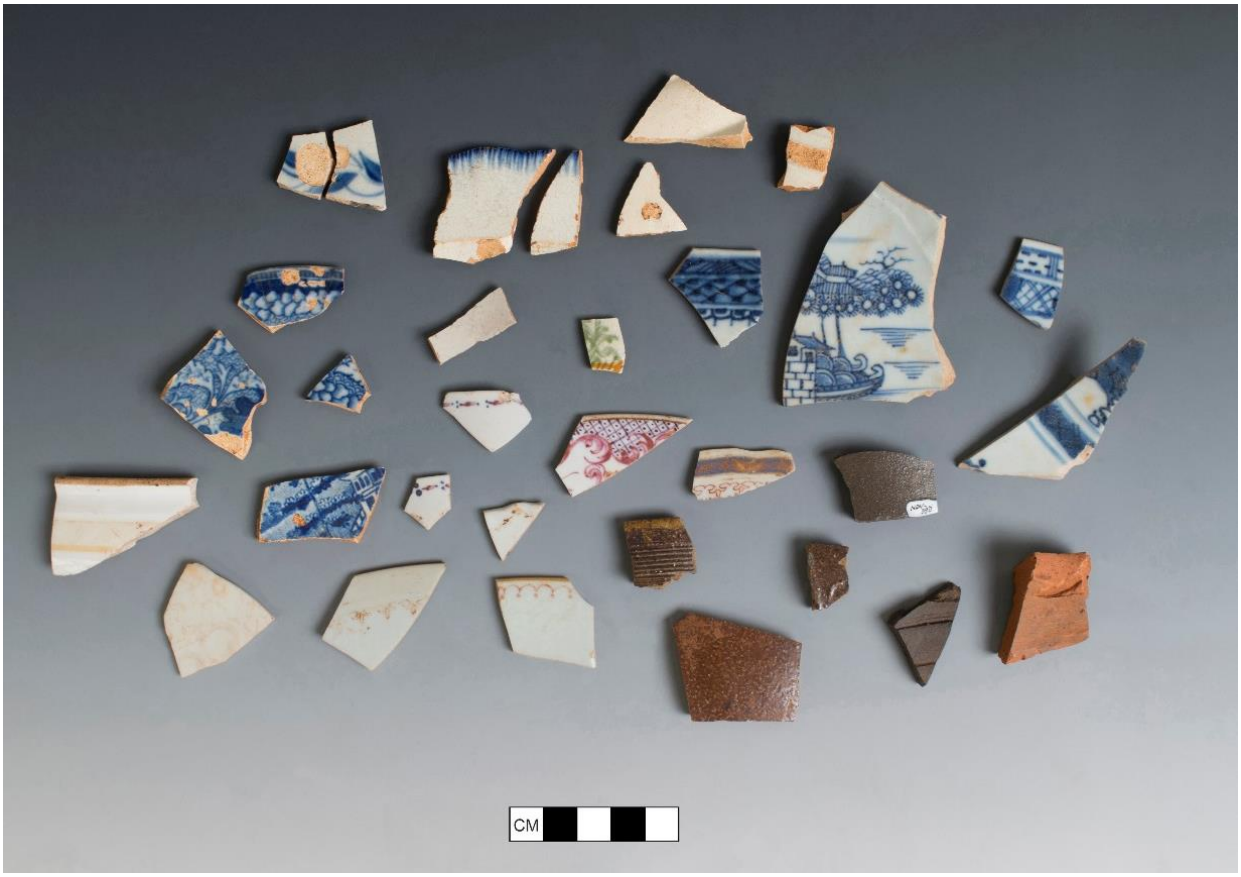

Figure 20: A selection of ceramics from various contexts in SG02 (plowzone), including contexts 08B, 08C, 09B, 12B, 18B, 20C, 27D, 29B, 29C, 35D, and 38D.

Just over a third of the ceramics have decoration (n=1,022, or 37%). Genre types among decorated sherds include but are not limited to transfer-printed and polychrome painted pearlware, and both hand painted (Figure 21) and overglaze hand painted Chinese porcelain (Figure 22).

Figure 21: Chinese porcelain base and body sherd from 09B. The scene shows hills, trees, a body of water, and part of a wall and a structure. The ceramic is from SG02 (plowzone).

Figure 22: Overglaze Chinese porcelain rims from 09B, 18B, 27D, 29B, and 29C. Stylistic elements on the rims include hand-painted spearheads, scalloped edges, both star and plain bands, and fruit with botanical leaves and twigs/sprigs.

Table 7: Ceramic wares and genres from North Wing Vault project.

Ceramic Ware	Stylistic Genre	Count	Relative Frequency
Pearlware	Not Applicable	756	0.2771
Creamware	Not Applicable	587	0.2152
Pearlware	Transfer Print Under, blue	385	0.1411
Porcelain, Chinese	Hand painted Blue	198	0.0726
Porcelain, Chinese	Not Applicable	116	0.0425
Porcelain, Chinese	Overglaze, hand painted	104	0.0381
Refined Earthenware, unidentifiable	Not Applicable	83	0.0304
Ironstone/White Granite	Not Applicable	69	0.0253
American Stoneware	Not Applicable	67	0.0246
Pearlware	Hand painted, Polychrome Warm	51	0.0187
Porcellaneous/Hard Paste	Not Applicable	51	0.0187
Refined Earthenware, unidentifiable	Transfer Print Under, blue	36	0.0132
Whiteware	Not Applicable	29	0.0106
Pearlware	Hand painted Blue	24	0.0088

Porcellaneous/Hard Paste	Overglaze, hand painted	24	0.0088
Pearlware	Shell Edge, blue	22	0.0081
Pearlware	Shell Edge, green	13	0.0048
Pearlware	Slipware, factory made	12	0.0044
Creamware	Molded Edge Decoration, other	11	0.004
Creamware	Slipware, factory made	9	0.0033
Redware	Not Applicable	9	0.0033
British Stoneware	Not Applicable	6	0.0022
Pearlware	Molded Edge Decoration, other	5	0.0018
Whiteware	Transfer Print Under, black	5	0.0018
Whiteware	Transfer Print Under, blue	5	0.0018
Buckley-type	Not Applicable	4	0.0015
Creamware	Royal Pattern	4	0.0015
Porcelain, unidentifiable	Molded Edge Decoration, other	4	0.0015
Refined Earthenware, unidentifiable	Molded Edge Decoration, other	4	0.0015
Refined Earthenware, unidentifiable	Slipware, factory made	4	0.0015
Pearlware	Shell Edge, unid.	3	0.0011
Bennington/Rockingham	Not Applicable	2	0.0007
Black Basalt	Not Applicable	2	0.0007
Coarse Earthenware, unidentified	Not Applicable	2	0.0007
Creamware	Overglaze, hand painted	2	0.0007
Porcelain, unidentifiable	Not Applicable	2	0.0007
White Salt Glaze	Not Applicable	2	0.0007
Astbury Type	Not Applicable	1	0.0004
Canary Ware	Not Applicable	1	0.0004
Native American	Not Applicable	1	0.0004
Pearlware	Hand painted, Polychrome Other	1	0.0004
Pearlware	Transfer Print Under, black	1	0.0004
Porcelain, English Bone China	Overglaze, hand painted	1	0.0004
Porcellaneous/Hard Paste	Decalcomania	1	0.0004
Porcellaneous/Hard Paste	Molded Edge Decoration, other	1	0.0004
Refined Earthenware, modern	Not Applicable	1	0.0004
Refined Earthenware, unidentifiable	Overglaze, hand painted	1	0.0004
Refined Earthenware, unidentifiable	Shell Edge, blue	1	0.0004
Stoneware, unidentifiable	Not Applicable	1	0.0004
Whiteware	Hand painted Blue	1	0.0004
Whiteware	Overglaze, hand painted	1	0.0004
Whiteware	Sponge/Spatter	1	0.0004
Yellow Ware	Not Applicable	1	0.0004

The forms of the majority of the ceramic fragments recovered are unidentified due to fragmentation: of the 2,728 ceramics, 1,923 sherds were unidentifiable (70%) (Table 8). Most of the identifiable forms are tableware (n=592, or 22%) and include items such as plates, platters, bowls, and mugs. Tea wares, such as teabowls, saucers, and teapot fragments, are also present, but at a much smaller percent (4%, n=107). Utilitarian wares, including milk pan fragments and storage jars, total 82 fragments (3%).

Table 8: Ceramic forms from the North Wing Vault project.

Form	Count	Relative Frequency
Unidentifiable	1923	0.7049
Unid: Tableware	592	0.217
Unid: Tea ware	107	0.0392
Unid: Utilitarian	82	0.0301
Saucer	9	0.0033
Flowerpot	7	0.0026
Plate	4	0.0015
Serving Dish, unid.	2	0.0007
Bowl	1	0.0004
Gastrolith	1	0.0004

Of the 2,728 pieces of ceramics, most sherds could not be assigned to a hollow ware or a flatware (n=1,901, 70%). Flat wares account for just under a fifth of the assemblage (n=501; 18%). Just over a tenth of sherds were assigned to a hollow ware (n=326, 12%) (Table 9).

Table 9: Ceramic vessel categories from the North Wing Vault project.

Ceramic Vessel Category	Count	Relative Frequency
Unidentifiable	1901	0.70
Flat	501	0.18
Hollow	326	0.12

Glass

The varieties of glass vessels range from case bottle glass (n=2, .04%) to mineral/soda bottle glass (n=9, .2%) to pharmaceutical bottle/vial glass (n=9, .2%) to tumblers (n=2, .04%) to stemware (n=6, .12%) (Table 10, Figure 23). The assemblage, however, is dominated by wine bottle glass (n=3,697, 72%). While less precisely datable than ceramic ware types, the majority of these wine-bottle glass fragments also date to Jefferson's lifetime (Figure 24). A small percentage of the shards from the entire assemblage were leaded glass (n=135, 3%).

Table 10: Glass vessel forms from the North Wing Vault project. Note that forms listed as "Not Recorded" were catalogued as such when glass sherds of possibly mixed forms were batched.

Form	Count	Relative Frequency
Bottle, Wine style	3697	0.7236
Not Recorded	525	0.1028
Unidentifiable	353	0.0691
Bottle, Unidentifiable	261	0.0511
Tableware, unidentifiable	131	0.0256
Container, unidentifiable	112	0.0219
Bottle, Mineral/Soda	9	0.0018
Bottle/Vial, Pharmaceutical	9	0.0018
Stemware	6	0.0012
Bottle, Case	2	0.0004
Tumbler	2	0.0004
Drinking Glass, unidentifiable	1	0.0002
Jar	1	0.0002

Figure 23: Leaded glass stemware base. Botanical leaves are engraved in a circle around the underside of the foot. The base is unprovenienced and was a surface collection.

Figure 24: Green wine bottle glass from various contexts.

General artifacts

The variety of general artifacts recovered from the north slope document artifacts discarded from the 1770s through the 20th century. Architectural elements recovered from the project area included mortar fragments (n=8, 39.3 grams); brick in various forms (including bats, brick/daub, fragments, and specialty, totaling 1,247 and weighing 32,204.7g); window glass fragments (n=5,012); wrought nails (n=100); machine-cut nails (n=53); and wire nails (n=33) (Table 11).

Table 11: Select general artifacts from the North Wing Vault project.

Form	Count	Weight (g)
Brick Bat	12	8561.5
Brick/Daub	970	4284.1
Brick Fragment	264	19263.5
Brick, specialty unid.	1	95.6
Mortar	8	39.3
Wrought/Forged nail	100	--
Machine-cut nail	53	--
Wire nail	33	--
Window Glass	5012	--

A variety of notable artifacts from the north slope capture life at Monticello from the late 18th century to the present (Figure 25). Artifacts recovered included one wrought iron buckle; one glass wound barrel bead; two copper alloy buttons; four ball clay tobacco pipe fragments (one bowl fragment, one bowl and rim, and two stems); and two pieces of writing slate. Post-Jefferson artifacts recovered during excavations included plastic spherical bead, screws, tar paper, foil, stoneware and earthenware drainpipe, road paving, and lightbulb glass. Native American artifacts were also found during excavations: one ceramic sherd, 48 flakes, and 46 pieces of lithic shatter.

Figure 25: Various small finds. Larger copper alloy button (35D, SG02 plowzone), smaller copper alloy button (35B, SG05 A-horizon), tobacco pipe stem (19E, SG02 plowzone), lead bullet (36B), gastrolith (12B, SG02 plowzone), wound blue glass bead (40B, SG02 plowzone), slate (37A, SG06 A-horizon and post 1983 road removal), and iron buckle (39C, SG01 transition to subsoil). The caliber of the bullet is unable to be determined, as the bullet is somewhat flattened and damaged from being fired, so the diameter could not be measured.

Seriation Chronology

Correspondence analysis (CA), a multivariate ordination method, offers a way to visualize the statistical similarities among assemblages in ceramic ware type frequencies (Neiman et al. 2003). Correspondence analysis allows us to better place layers in time and date phases of occupation, use, and abandonment of a site. Of the 2,728 ceramics catalogued, 2,577 are used in the CA analysis; SG, Features, or Contexts with sample sizes less than five and ceramic ware types with no manufacturing dates were removed from the data set, including Native American pottery, both modern and unidentifiable refined earthenware, unidentified coarse earthenware, unidentified porcelain, and unidentifiable stoneware.

The CA summarizes variation among assemblages by plotting their locations or scores on two underlying dimensions. The resulting plot captures 87% of the variation (Figure 26) among the assemblages, so we can reliably consider just these two variables.

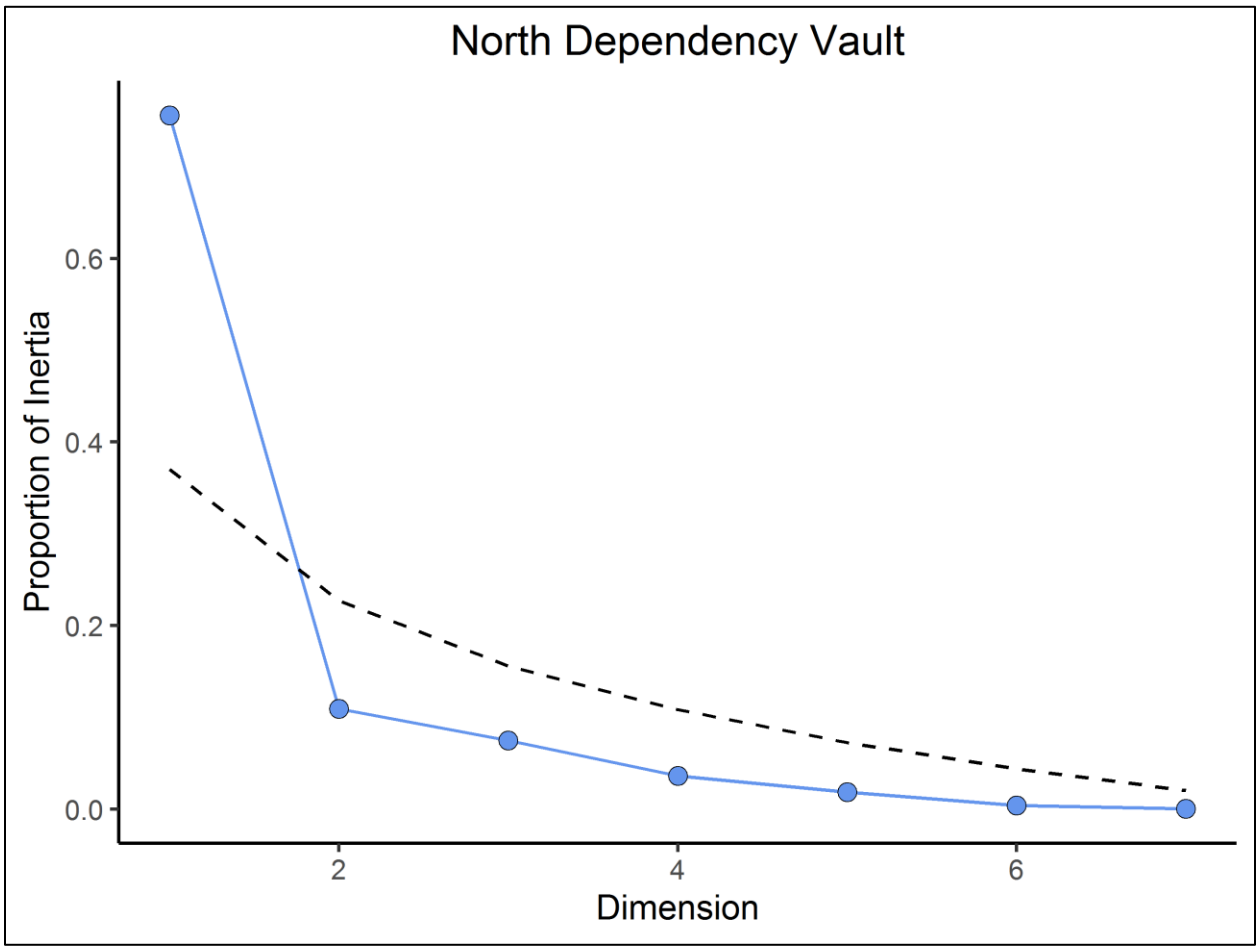

Figure 26: The inertia plot slows that Dimension 1 and Dimension 2 account for 87% of the variation. Dimension 1 accounts for 76% of the variation, and Dimension 2 accounts for 11%.

The CA plot shows that time plays an important role in structuring variation in the composition of these assemblages (Figure 27) and the corresponding variation among ware type in which assemblages they occur (Figure 28). In the assemblage plot, each dot represents an assemblage, and assemblages that are closer together have the more similar ware type relative frequencies. The pattern of similarity among assemblages revealed on the plot is roughly

correlated with stratigraphic relationships among the layers from which they were derived. Later deposits have high Dimension-1 scores, earlier deposits have low-Dimensions 1 scores. SG05 is an outlier because it has much more yellowware that the other assemblages.

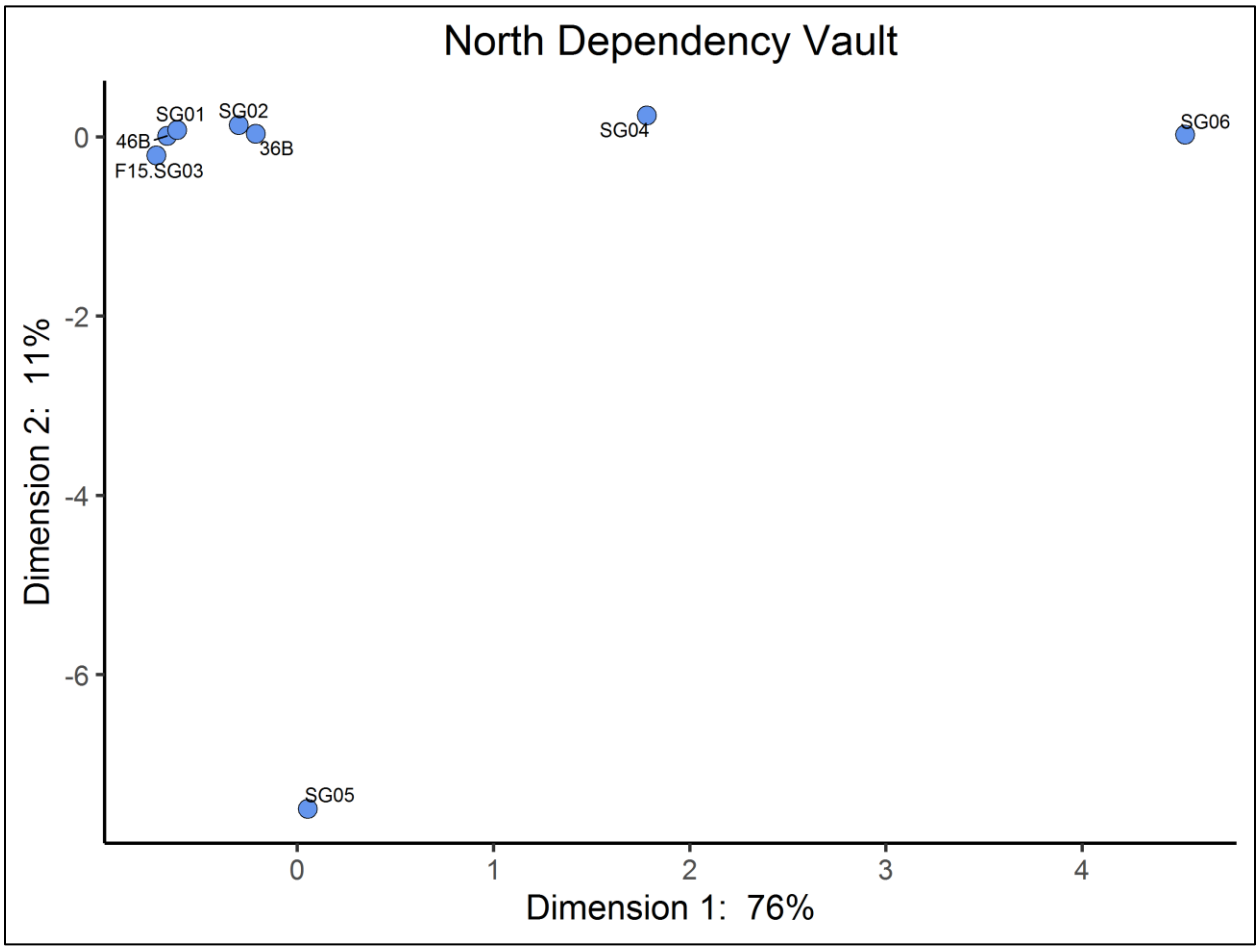

Figure 27: Correspondence analysis. Dimension 1 versus Dimension 2 scatter plot. Note SG05 (A-horizon) as an outlier because it contains high frequencies of yellow ware.

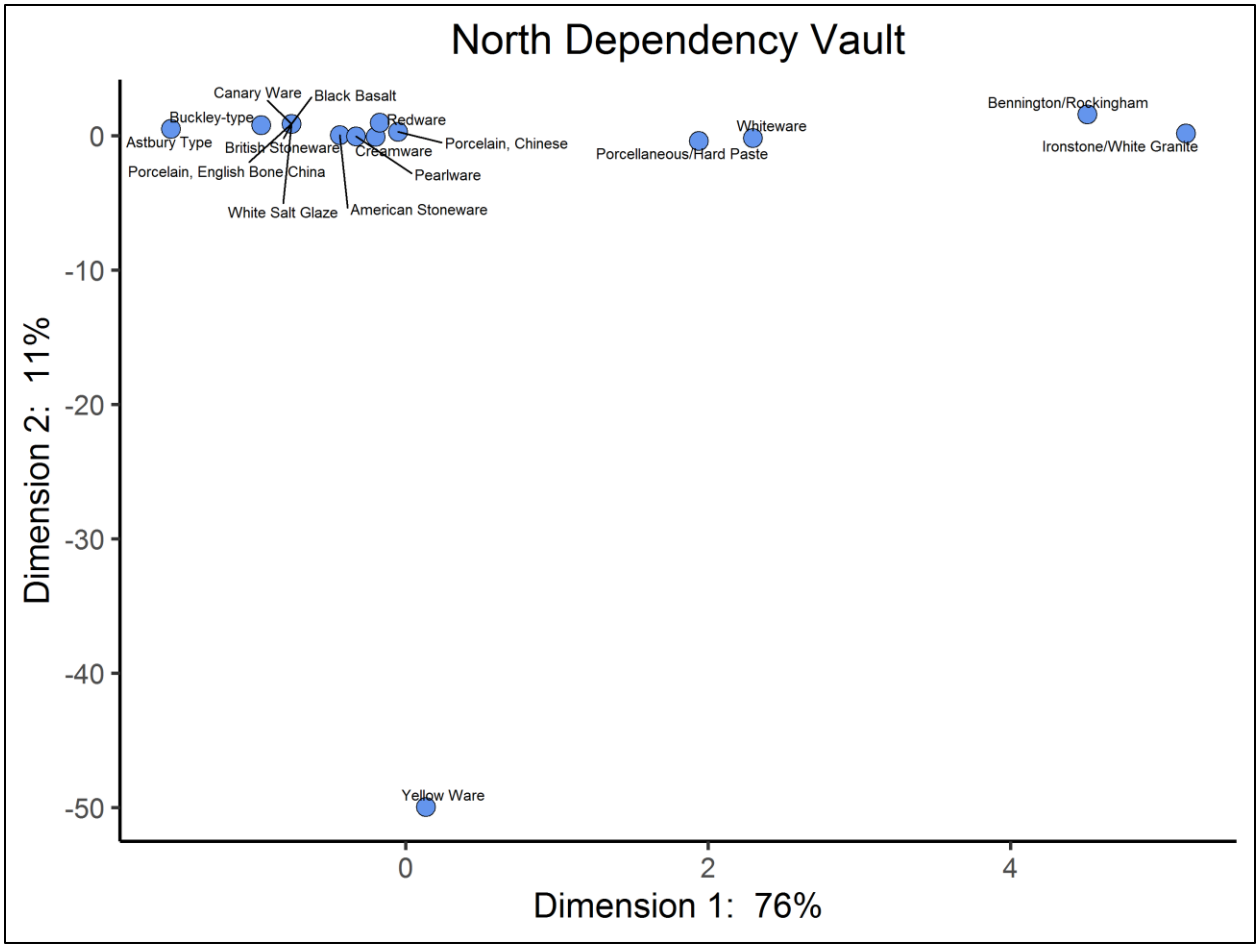

Figure 28: Dimension 1 versus Dimension 2 with Ware Types

In addition, a BLUE MCD (Best Linear Unbiased Estimator Mean Ceramic Dates) was calculated for each stratigraphic group or context. BLUE MCDs are weighted MCDs, which take manufacturing date ranges into consideration with weight placed on ware types that have tight production dates over wares like Chinese Porcelain. In plotting the Dimension-1 scores against each SG's BLUE MCD date, we see a distinct linear pattern emerge (Figure 29). This linear pattern clearly shows that time, as represented by the BLUE MCDs, is the primary factor affecting Dimension-1 scores. Deposits with earlier dating ceramics are at the bottom left of the plot, and deposits with later dating ceramics are towards the top right of the plot. These deposits

are aligned in stratigraphic order, for the most part, except for SG05, which is the 2015 sod and A-horizon. Feature 15/SG03 is a planting feature, 46B is colluvium, and 36B is roadbed that was mixed with plowzone.

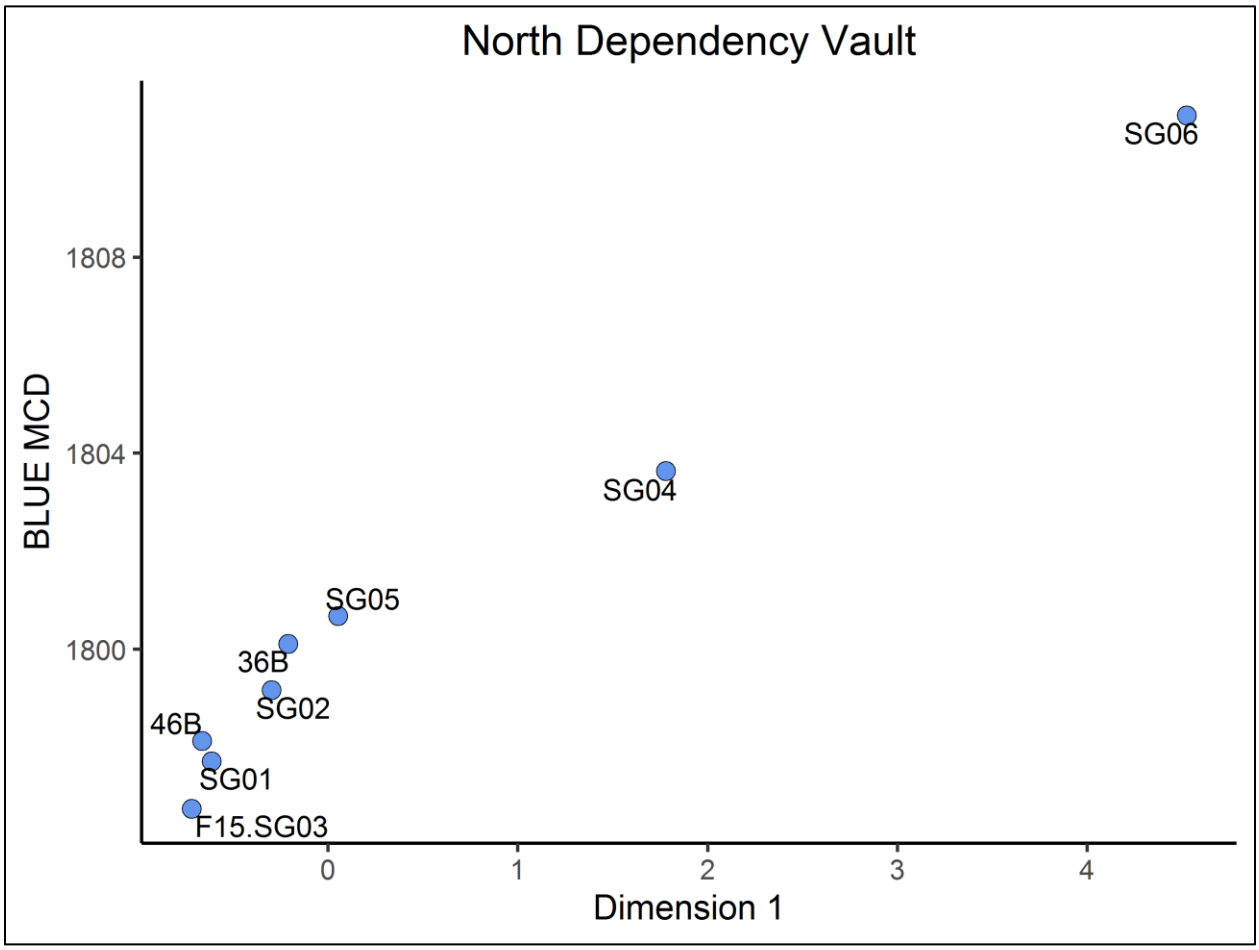

Figure 29: Dimension 1 versus BLUE MCD plot

The frequency seriation plot (Figure 30) tests the goodness of fit of the model when the assemblages are ordered on the Dimension-1 scores. The seriation shows that deposits with later dating ceramics are near the top of the diagram, and deposits with earlier dating ceramics are

near the bottom. The battleship shaped curves are particularly noticeable with pearlware, creamware, Chinese porcelain, and Ironstone/White Granite.

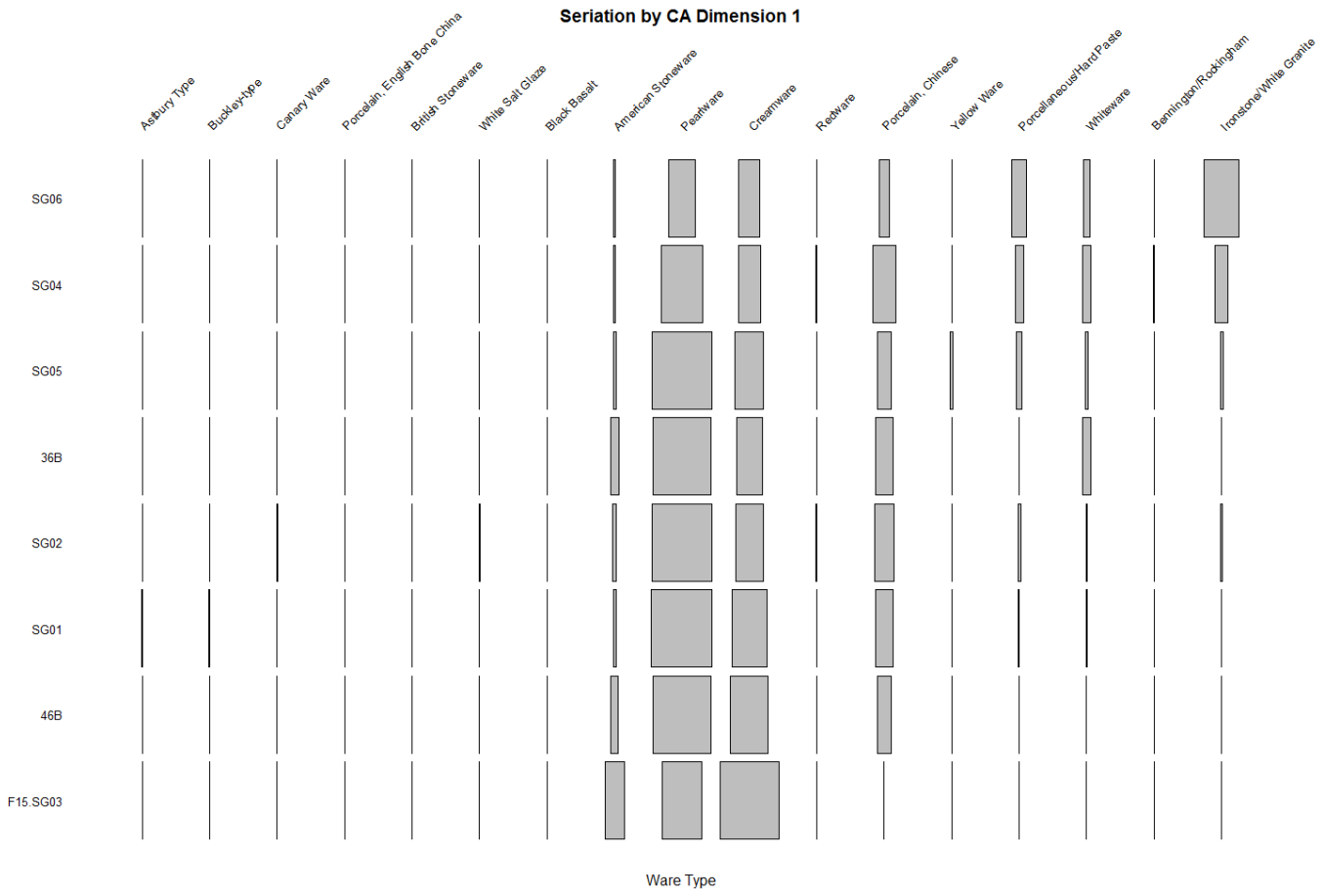

Figure 30: Frequency seriation ordered by CA scores

This analysis helps us establish that the uppers layers associated with the modern A-horizon and roadbed contain distinctively later ceramics, but the question remains whether there is any spatial patterning that might also be chronologically significant. To explore this, we ran the CA aggregating assemblages by Quadrat rather than Stratigraphic Group. At other plowzone

sites when we analyze by quadrats, the result may register how the location of deposition (and the location of houses) changes over time.

We plotted Dimension 1 versus Dimension 2 scores based on Quadrat as the unit type to see if we could detect any sort of spatially distinct signature. The resulting plot captures 61% of the variation (Figure 31) among the assemblages, so we can reliably use these two variables.

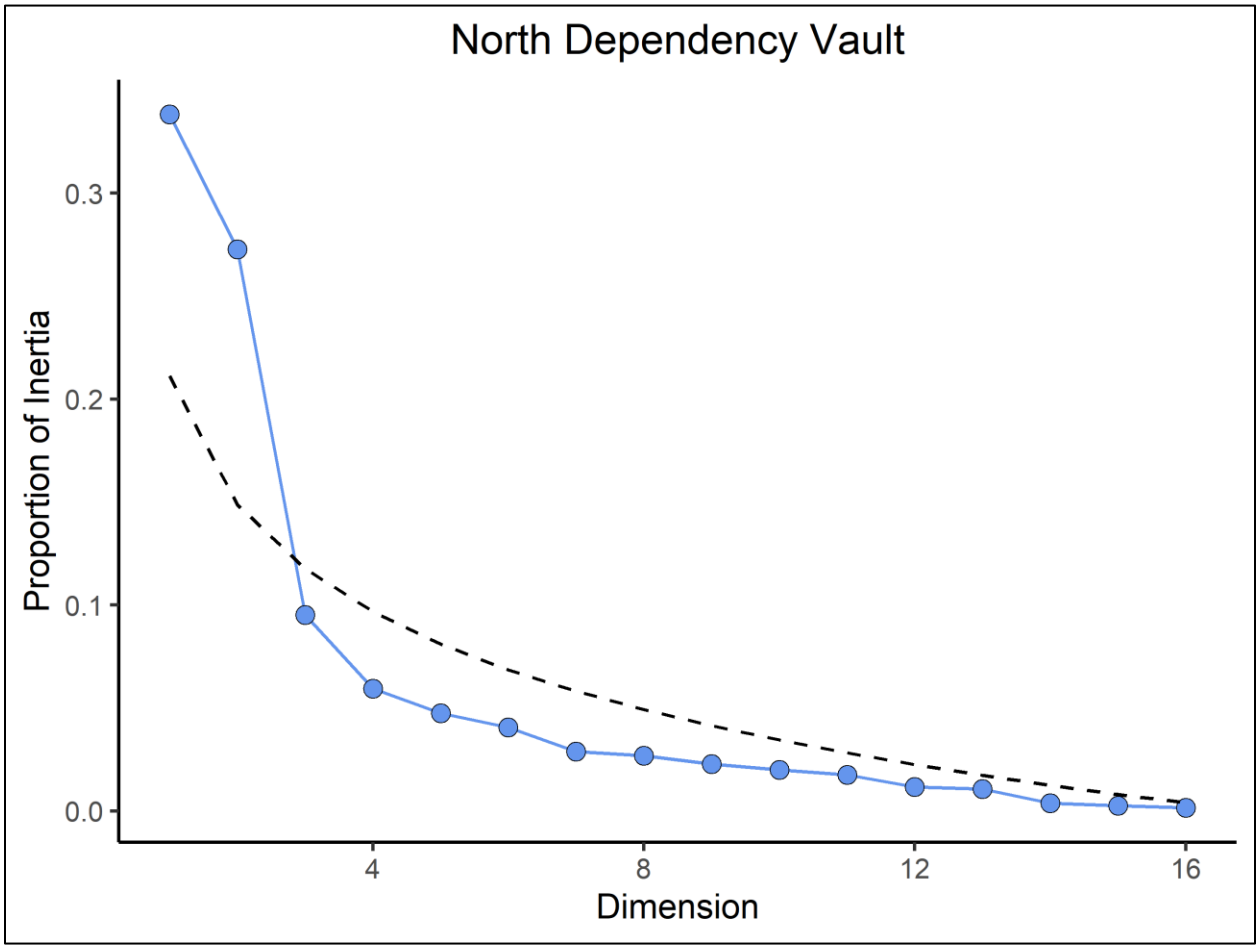

Figure 31: The inertia plot shows that Dimension 1 and Dimension 2 account for 61% of the variation. Dimension 1 accounts for 34% of the variation, and Dimension 2 accounts for 27%.

Removing the same ware types as before because of a lack of date ranges, units with less than five sherds, unprovenienced sherds, and features drops the assemblage count to 2,561. After

running initial analysis (Figure 32), we can see that quadrats containing ware types with later production dates (Figure 33) appear in the bottom left and top right of the plot. Quadrat 39 had 47 pieces of porcelaneous; Quadrat 47 had 21 pieces of Ironstone/White Granite; and Quadrat 04 contained a piece of black basalt and two pieces of porcelaneous. Quadrats 21, 27, 29, and 45, also each contained ironstone. These quadrats above the main cluster in the plot (21, 27, 29, 45, and 47) are all on the eastern portion of the site. This means that members of the Levy household used this part of the north slope as a midden for trash from the main house.

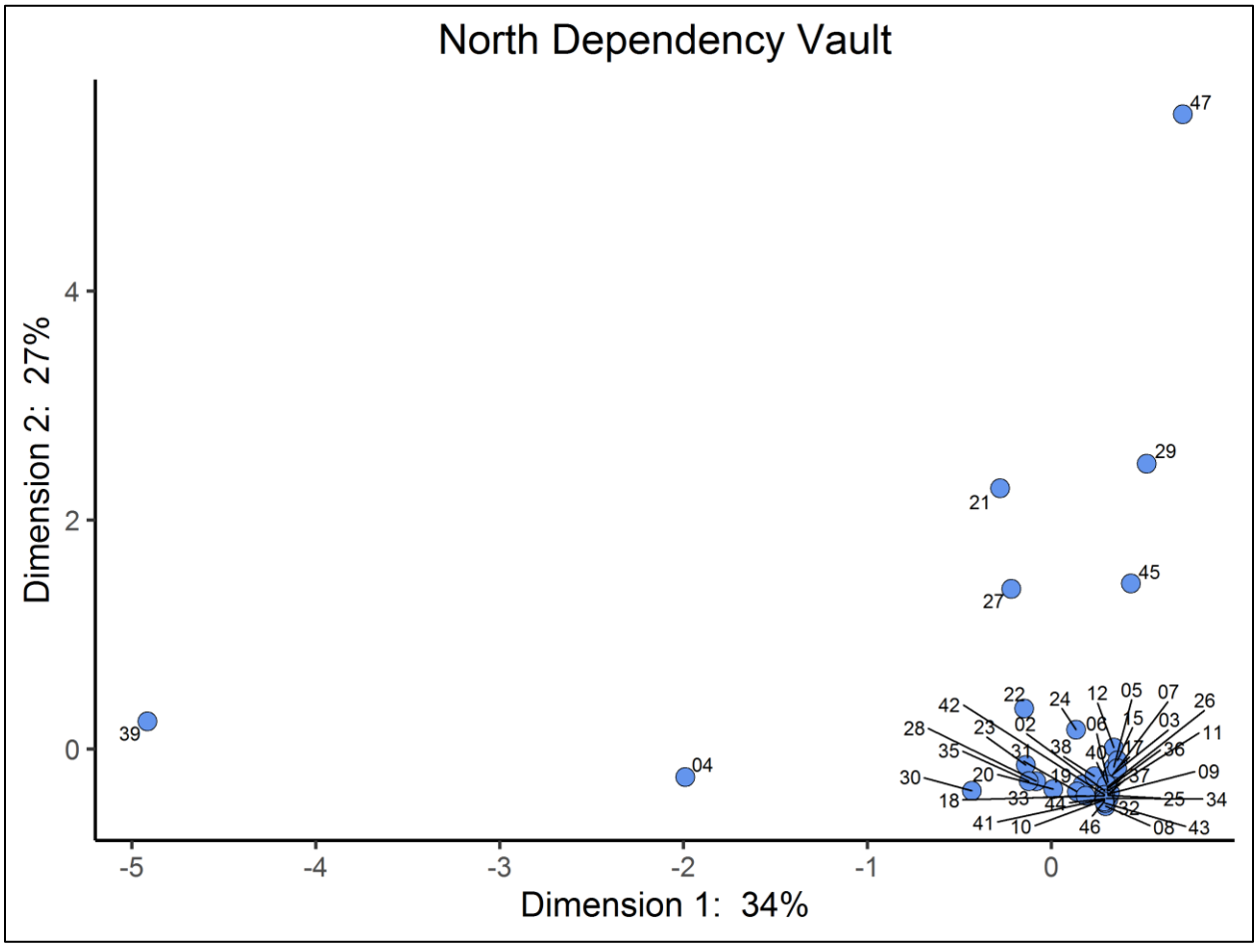

Figure 32: Correspondence analysis based on Quadrat as the unit. Dimension 1 versus Dimension 2 scatter plot. The inertia totals 61%, with Dimension 1 at 34% and Dimension 2 at 27%.

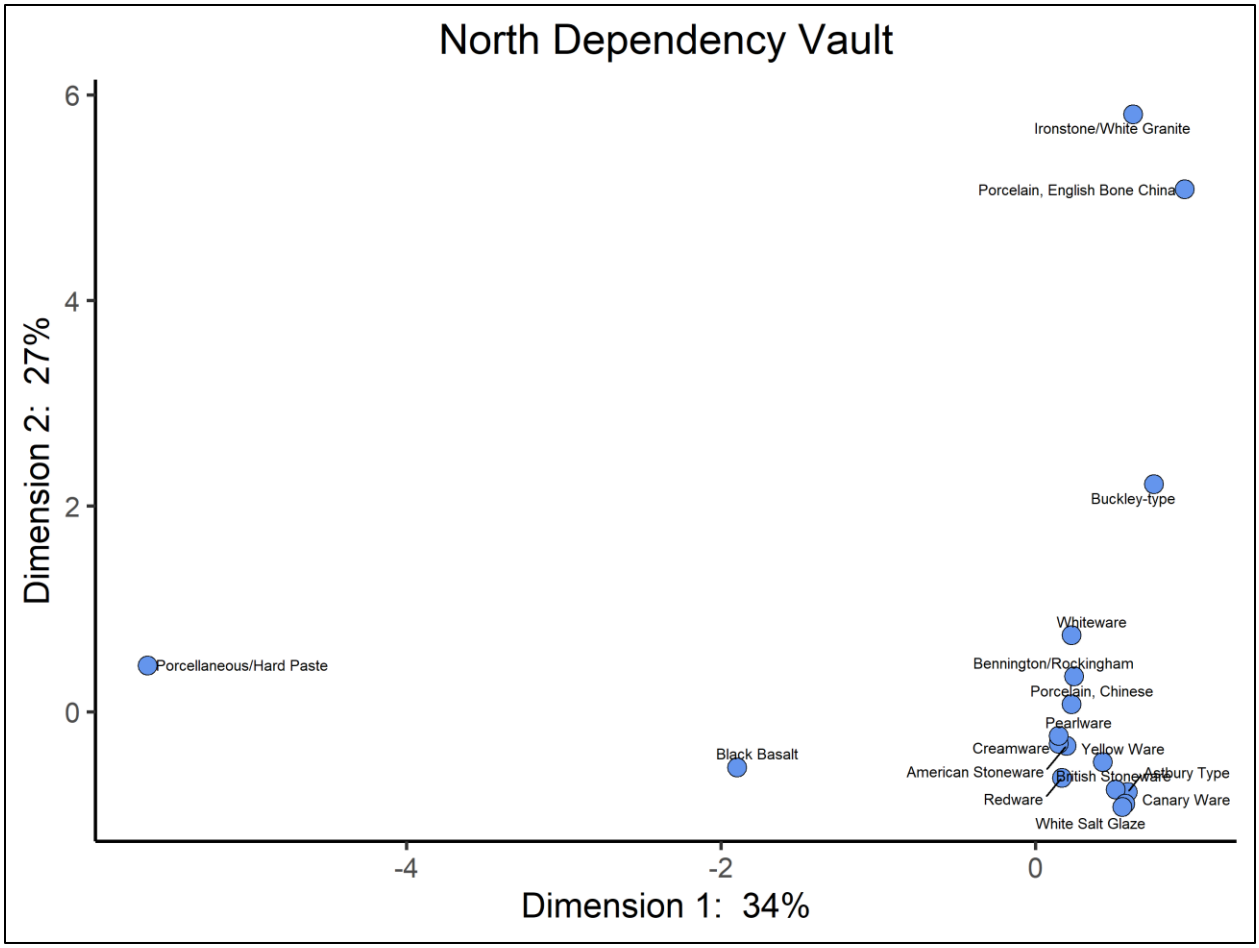

Figure 33: Dimension 1 versus Dimension 2 with Ware Types.

Since Quadrats 04, 39, and 47 were such outliers, we removed them from the analysis, which dropped the sherd count to 2,410. However, even after this trimming, different assemblages are now new outliers (Figure 34, Figure 35, Figure 36).

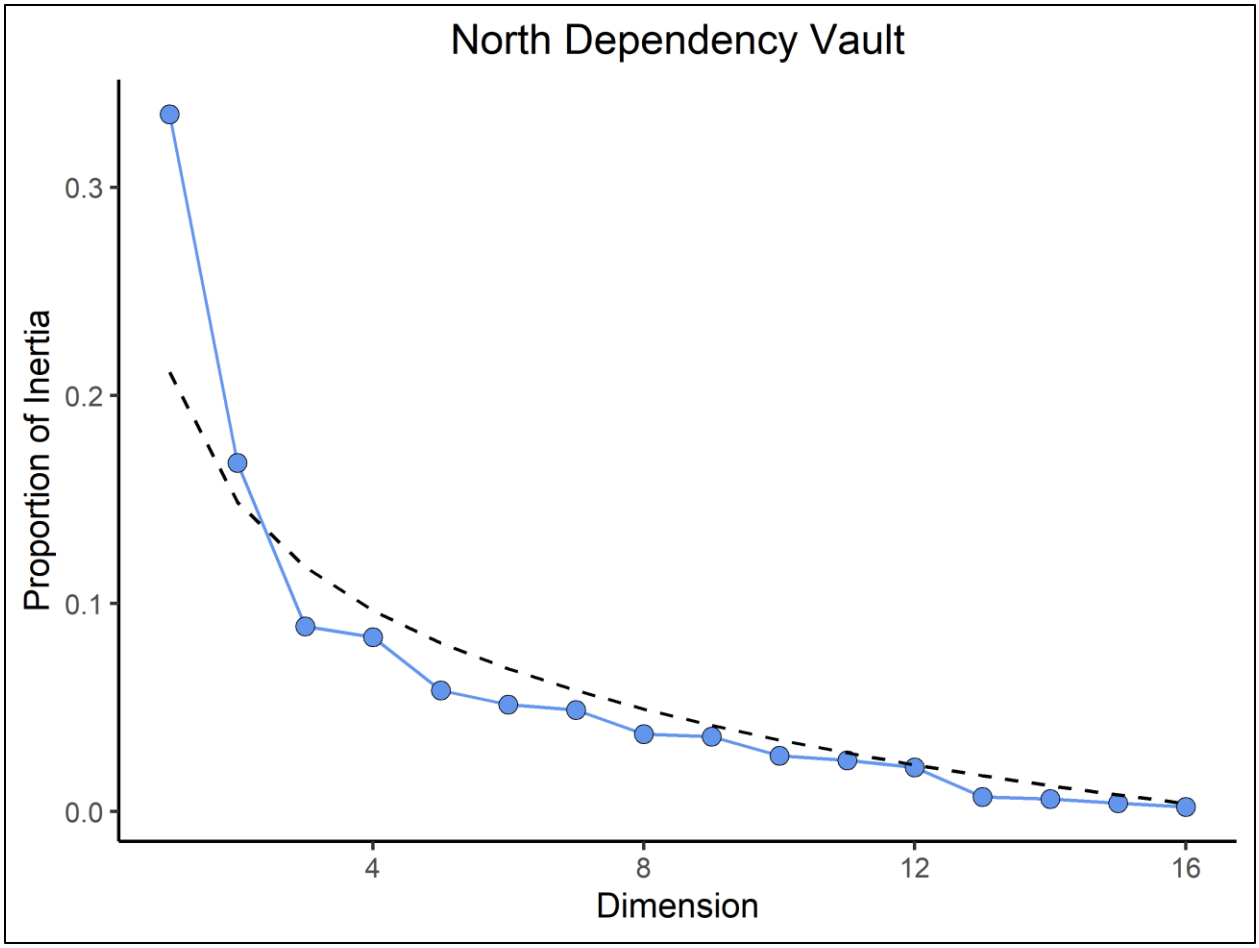

Figure 34: The inertia plot shows that Dimension 1 and Dimension 2 account for 51% of the variation. Dimension 1 accounts for 34% of the variation, and Dimension 2 accounts for 17%.

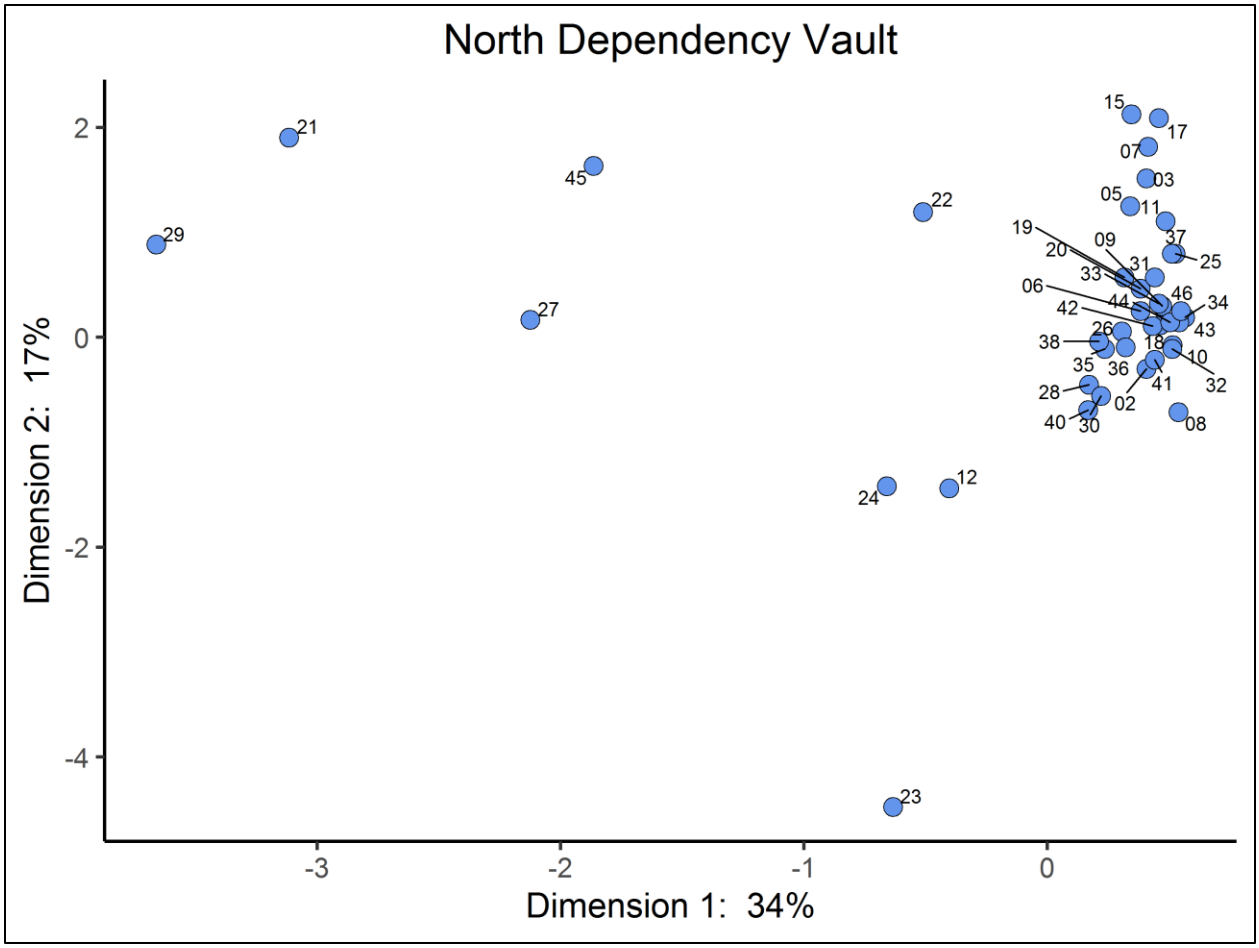

Figure 35: Correspondence analysis based on Quadrat as the unit. Dimension 1 versus Dimension 2 scatter plot. The inertia totals 51%, with Dimension 1 at 34% and Dimension 2 at 17%.

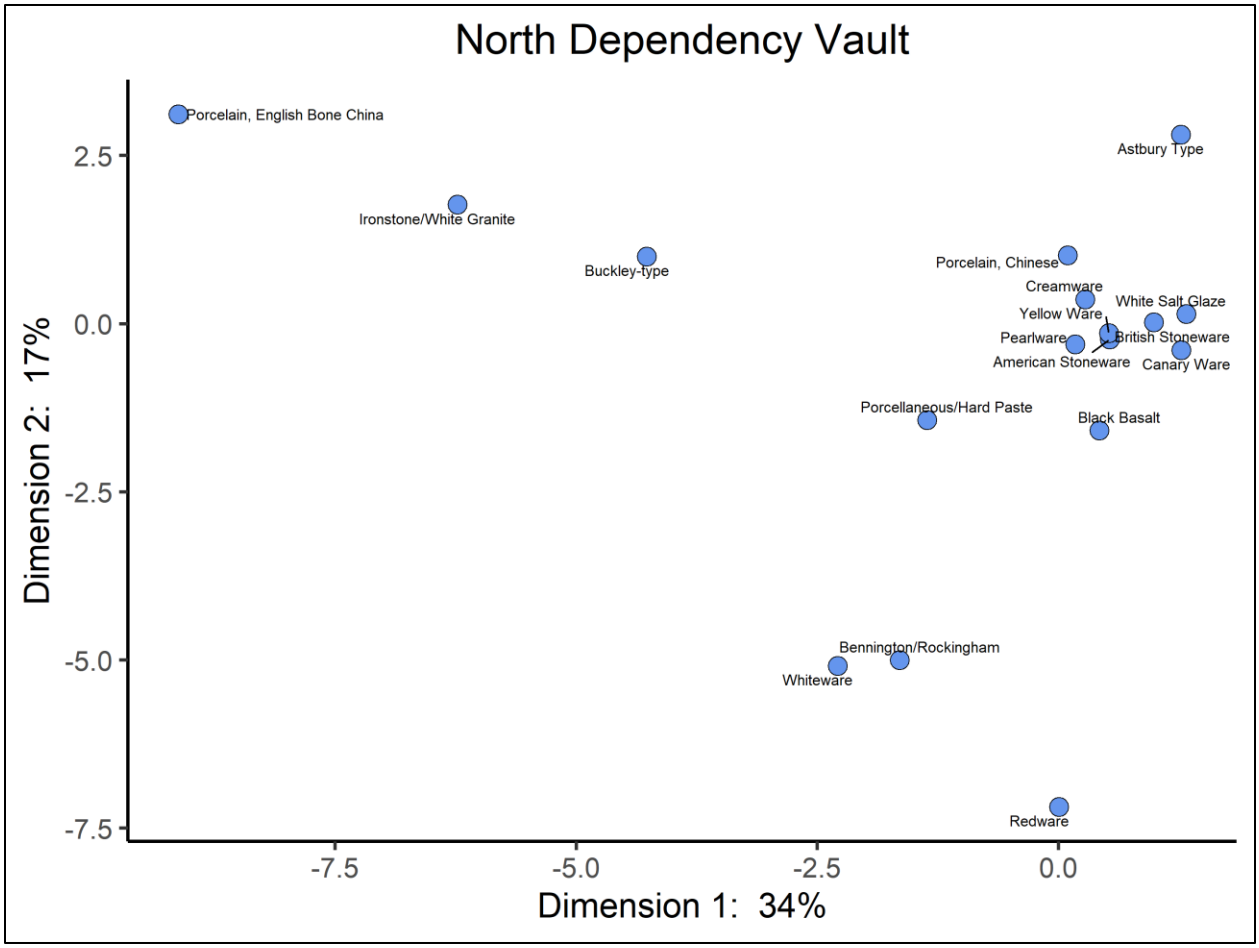

Figure 36: Dimension 1 versus Dimension 2 with Ware Types.

Despite the effects of disturbance caused by plowing, the Dimension 1 scores and the BLUE MCD dates suggest that the deposits on the north slope retain a temporal signal from ceramic deposition and accumulation during the Jefferson and Levy tenures on the mountaintop (Figure 29). The location of ceramic deposition changed over time. As we can see from the CA plot based on quadrats (Figure 32), quadrats containing later-dating ceramics such as ironstone and Porcelaneous/English Bone China are on the eastern portion of the excavated area. Quadrats containing earlier ceramics are more centrally located within the project area, just north of the ha-ha's turn west at the First Roundabout. It seems, then, that while most of the area in the

project boundaries is part of a large midden, the concentration shifted east during the Levy ownership of Monticello.

Where did all this trash come from? There at least two possibilities. The first is that these artifacts were broken in the mansion -- both on the upper floors and the basement level -- then transported down the North Covered Passage and across the First Roundabout. The second is they represent refuse from one or more houses -- perhaps the homes of enslaved people -- located along the northern leg of the First Roundabout. The spatial distribution of different artifact classes across the site may offer clues.

The artifact distribution map based on STPs (Figure 3) suggests that the high-density zone investigated here is part of a much larger high-density zone whose density peak lies just north of the North Covered Passage, along the path from the Passage to the North Spring. That location points to the first hypothesis. A map of the density of all historic artifacts recovered from the sampled quadrats on the north slope confirms that the high-density zone runs along the north side of the Roundabout in the westerns two thirds of the study area (Figure 37). This mirrors a pattern seen on the STP map. It may be the result of people transporting trash down the north path to the Roundabout and then turning left to distribute the trash north of the road. Note that within the eastern high-density zone, there is a low-density patch where the north path crossed it.

The four artifact classes that we mapped separately more or less followed this general pattern: window glass, ceramics, wine bottle glass, and nails (Figure 38, Figure 39, Figure 40, Figure 41). On each map, we see low densities of artifacts where we think the north path ran. However, there are subtle differences. The most distinctive pattern is window glass which seems to have been transported the furthest west along the Roundabout. Could this be an indication that

much of the glass was deposited in a small number of episodes in which large amounts of glass were disposed of? It would make sense to transport trash deposited in bulk a greater distance out of the way. The high-density peaks for both wine-bottle glass and nails lie roughly 75 feet further to the east, closer to the path. The map for ceramics shows two density peaks, one coincident with the window glass peak and one overlapping the nail and wine bottle glass peaks.

The patterns revealed by the distribution maps are consistent with the idea that high artifact densities in the excavated quadrats represent deposition of artifacts used and broken in the mansion. But they do not rule out the alternative hypothesis that the artifacts are from one or more domestic sites located along First Roundabout. We need to look at additional evidence.

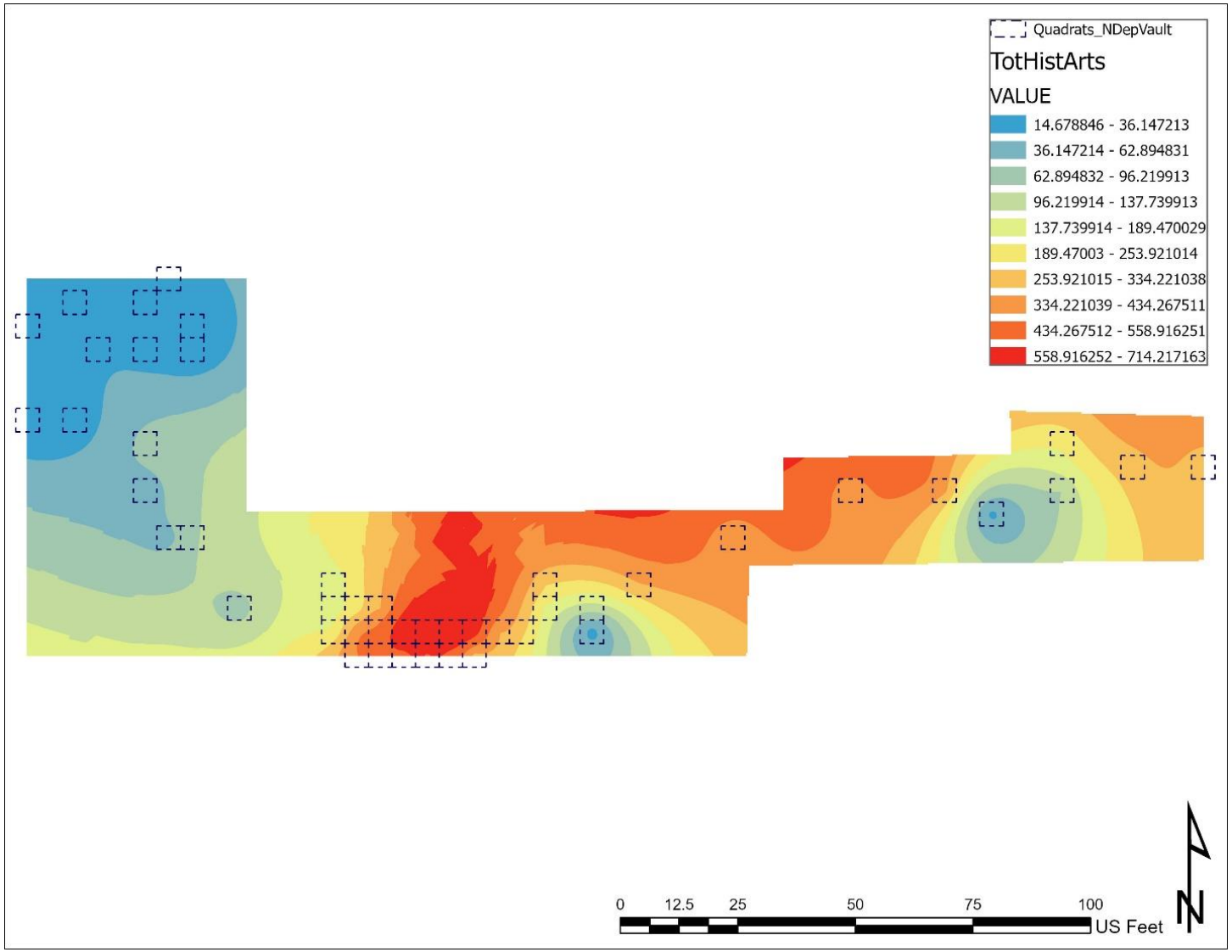

Figure 37: Distribution of Total Historic Artifacts from the project. Artifacts include ceramics (White Salt Glaze Stoneware, Whieldon ware, Westerwald, Delft, Tin Enameled, Black Basalt, Creamware, Pearlware, Whiteware, Chinese Porcelain, American Stoneware, British Stoneware, Staffordshire Brown Stoneware, Redware, Coarse Earthenware, Wrought Nails, Cut Nails, Window Glass, Wine Bottle Glass, Pipe Stems, and Buttons.

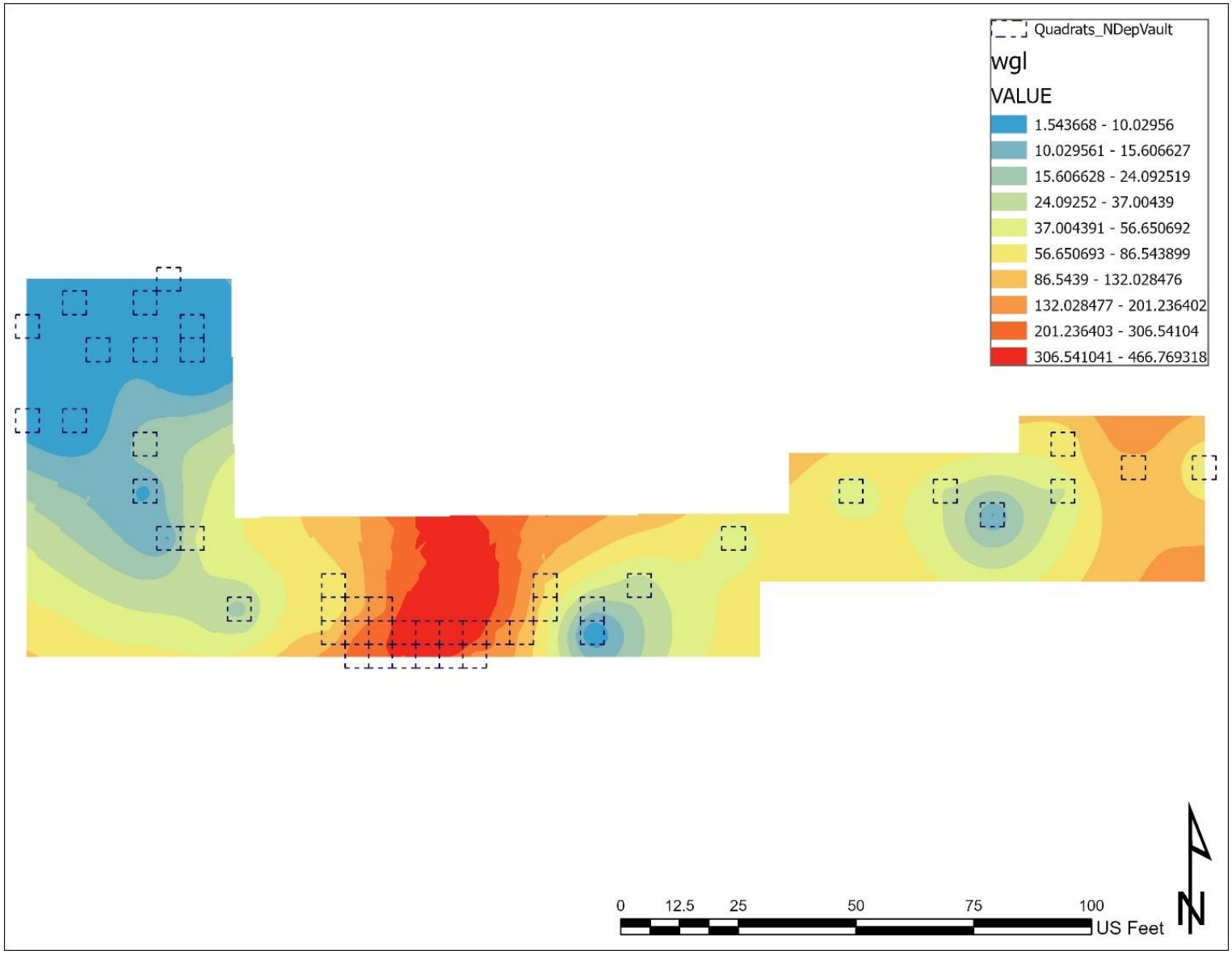

Figure 38: Distribution of window glass from the project.

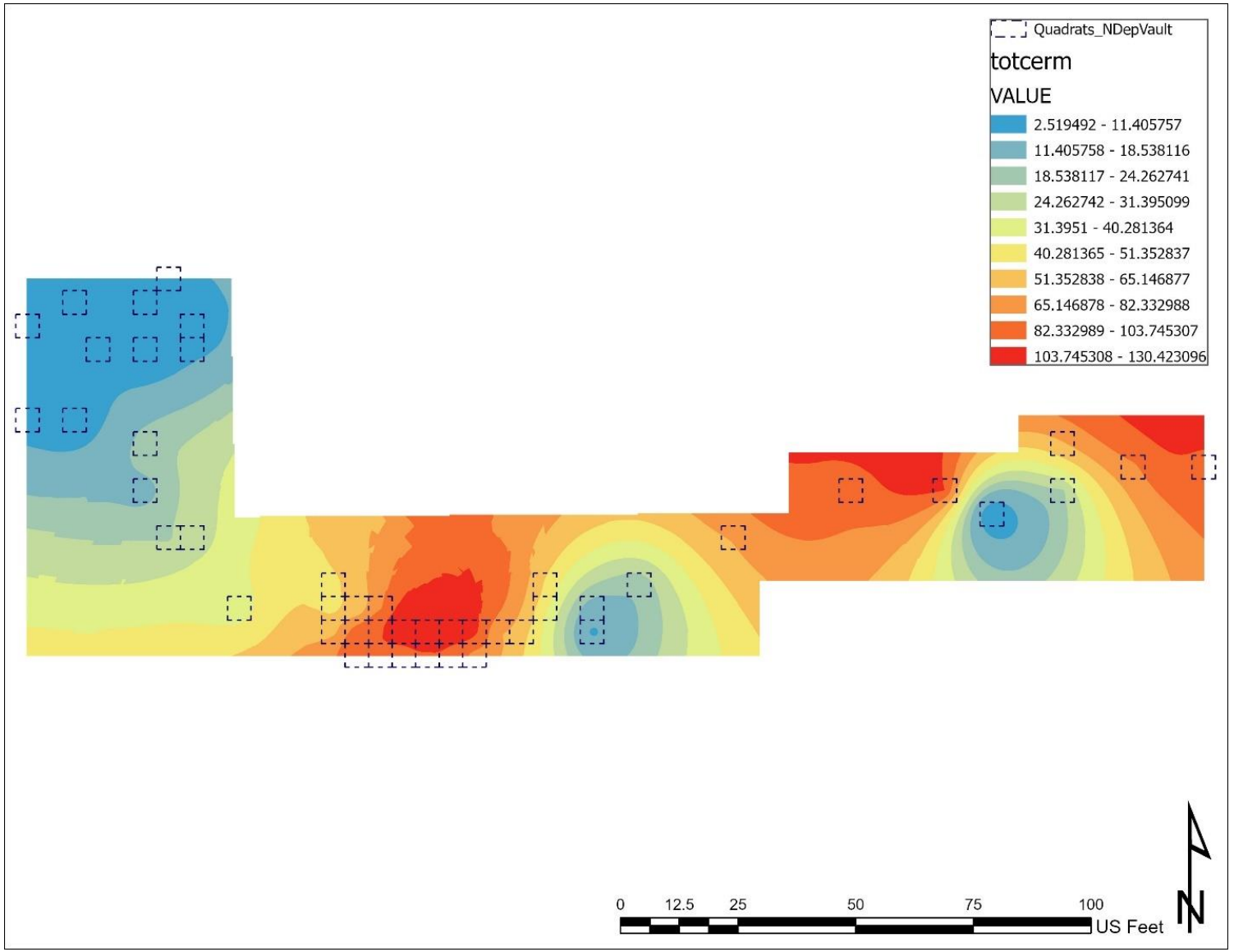

Figure 39: Distribution of ceramics from the project. Ceramics include White Salt Glaze Stoneware, Whieldon ware, Westerwald, Delft, Tin Enameled, Black Basalt, Creamware, Pearlware, Whiteware, Chinese Porcelain, American Stoneware, British Stoneware, Staffordshire Brown Stoneware, Redware, and Coarse Earthenware.

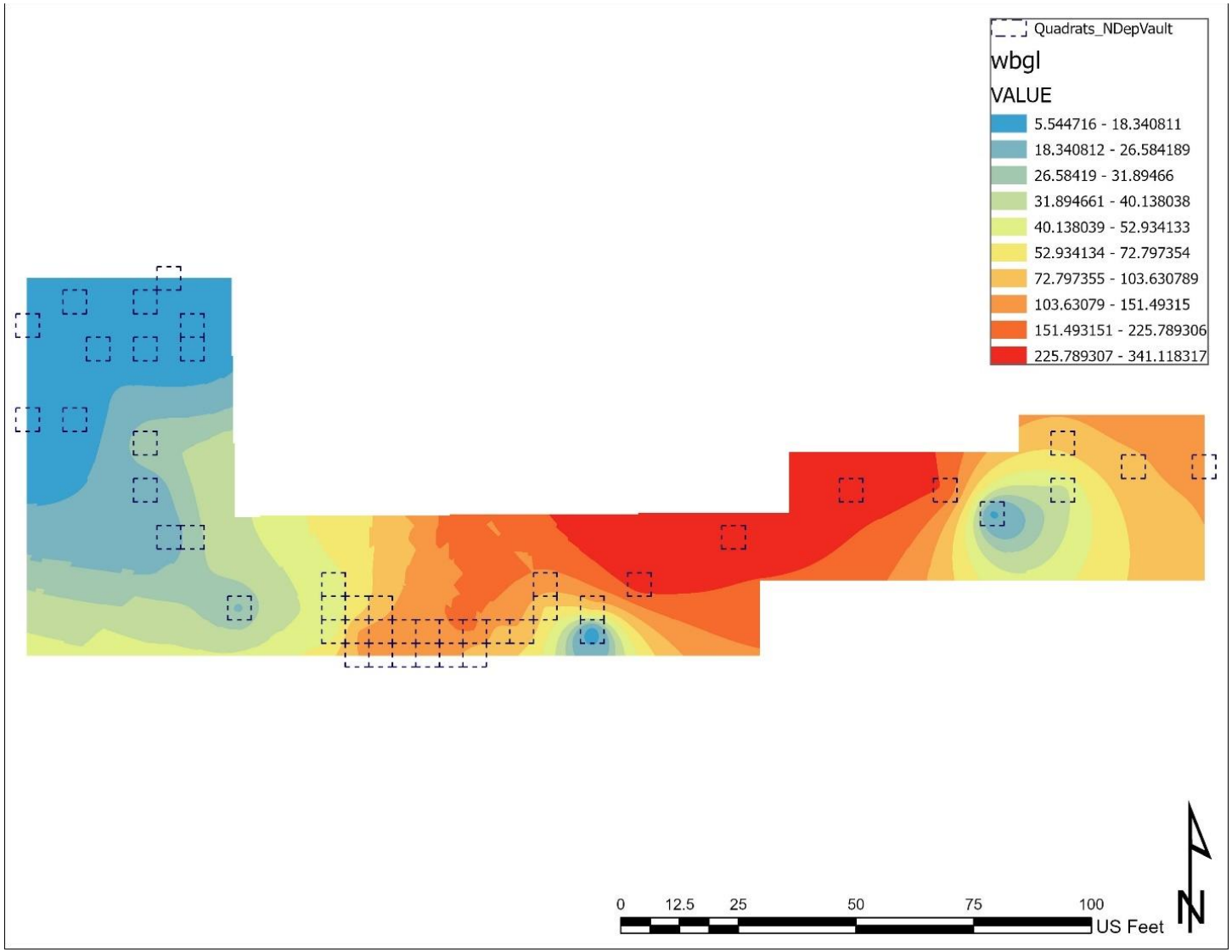

Figure 40: Distribution of wine bottle glass from the project.

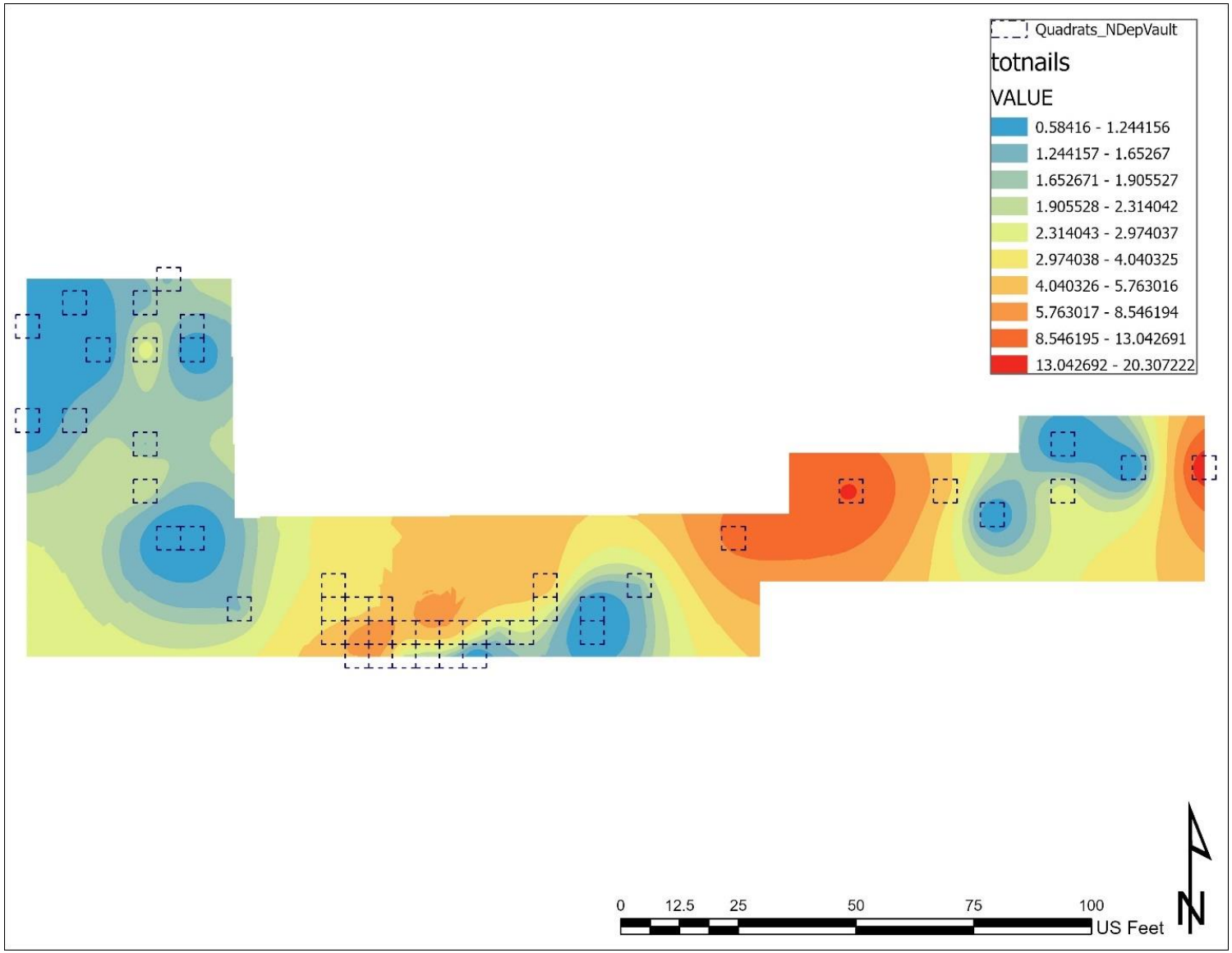

Figure 41: Distribution of nails (wrought and cut) from the project. Note how the peaks are at least 50 feet east of the central high concentration and how relatively few nails are in the central portion.

That evidence can be gleaned by comparing relative frequencies of artifacts in four classes (nails, ceramics, bottle glass, and window glass) from the excavated quadrats with frequencies of the same classes from known domestic sites occupied by enslaved people. The motivation here is that domestic sites occupied by enslaved people might generate similar proportions for these classes: abundant nails from the construction and repair of wooden (log) houses, modest amounts of window glass from small glazed and in some cases unglazed windows, and variable amounts of ceramics and wine bottle glass, depending on the length of the occupation and number of residents. On the other hand, artifact assemblages transported from the mansion should have very high frequencies of window glass because the mansion has many, very large windows. Additionally, nail frequencies should be very low since the mansion is masonry. We might expect high frequencies of ceramics and especially wine bottle glass as a result of frequent stylish dinners for family members and guests.

We chose two domestic sites for the comparison: Building *o* and Site 6. Building *o* was occupied from about 1770 to 1810 by enslaved workers and was located on Mulberry Row. Site 6 was an early 19th-century domestic site that was home enslaved field laborers. There were three distinct households at Site 6. The results, shown in Table 12, indicate that relative frequencies are similar at Building o and Site 6, the two known domestic sites. The table reveals differences in window glass and nails: more of the former and less of the latter at Building *o*. The likely explanation is that Building *o* had glazed windows, while window glass was rare at Site 6. Lower nail proportions at Building *o* may be an arithmetic consequence of this difference, because proportion values are constrained to sum to 1.

However, the differences between Building *o* and Site 6 are swamped by the differences between them and the assemblage from the quadrats on the north slope. Proportions of wine

bottle glass and especially window glass are markedly higher on the north slope, and proportions of ceramics and especially nails are much lower than Building *o* and Site 6. Radically higher proportions of window glass and lower proportions of nails are what we expect for refuse from the mansion. Higher proportions of wine bottle glass may attest to large numbers of people consuming lots of wine. The closed-sum constraint may be responsible for the lower proportions of ceramics in the north slope assemblage.

The pattern of difference is strong evidence that the artifacts recovered by the North Wing Vault project were broken in the mansion and transported for discard north of the First Roundabout.

Table 12: Proportions of wine bottle glass, ceramics, nails, and window glass for Building *o* (Project 1000), Site 6 (Project 106), and the North Wing Vault (Project 53). Counts from all three cabins at Site 6 are combined. Note the relative lack of nails and ceramics from the North Wing Vault project in addition to the high proportion of wine bottle glass and window glass.

	Bottle, Wine style count	Bottle, Wine style proportion	Ceramic count	Ceramic proportion	Nail count	Nail proportion	Window Glass	Window Glass proportion
1000	3177	0.183	6453	0.372	5440	0.313	2284	0.132
106	1134	0.101	4332	0.385	5523	0.491	267	0.024
53	3697	0.314	2728	0.232	331	0.028	5012	0.426

MONTICELLO'S PLANK KILN

While monitoring the construction of an eight-foot-wide utility trench that followed the path of a 1970s and early 1980s paved road running through the North Orchard, Monticello archaeologists identified a collapsed and filled-in stone-lined tunnel or shaft (Figure 1). Jefferson's maps indicate that a plank kiln on the First Roundabout was situated in the area where the collapsed tunnel was found. It is likely that this feature was part of the plank kiln: an air tunnel or flue used to transport heated air from a wood or charcoal fire into the kiln to facilitate the wood drying process (Figure 42). The utility trench bisected the collapsed shaft almost perpendicularly, allowing Monticello archaeologists to pinpoint the shaft's location and to photograph and draw profiles.

The south wall of the utility trench exposed in section an almost five-foot-wide feature filled with greenstone cobbles and compacted sediment (Figure 43). With construction halted, further review revealed a similarly sized feature in the north profile of the utility trench indicating that approximately eight feet of the feature had been mechanically removed. The feature aligned with the northern end of an artificially leveled platform abutting the First Roundabout where Jefferson's plank kiln once stood. The alignment leaves little doubt that the feature was related to that structure.

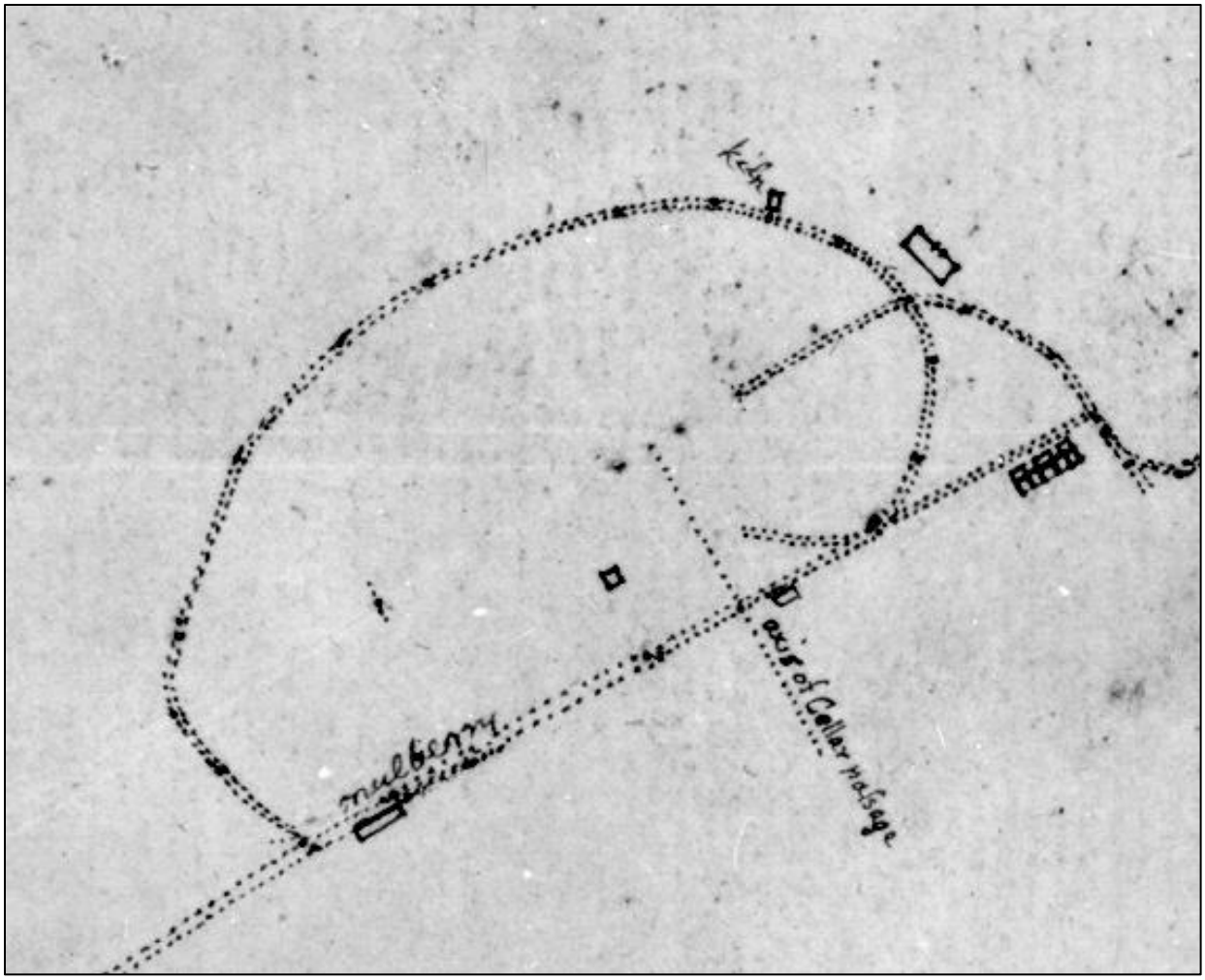

Figure 42: Detail of Jefferson map of First Roundabout (N204) noting the location of the Plank Kiln (middle top) (Jefferson 1806b). From 1806.

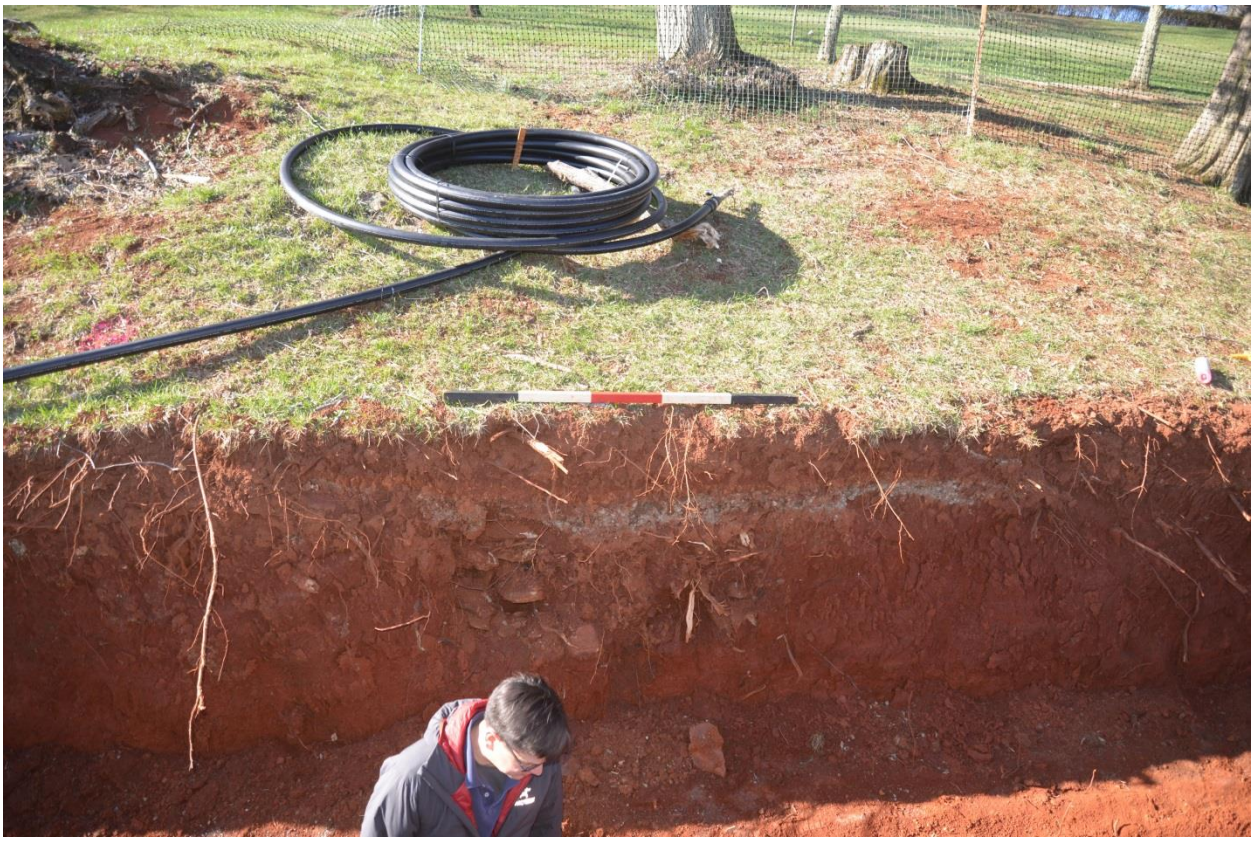

Figure 43: View of utility trench with filled-in Plank Kiln trench/tunnel visible under ranging pole in the south profile.

DOCUMENTARY EVIDENCE

Jefferson first mentioned a plank kiln at the end of 1799 when he sent a memorandum to his overseer Richard Richardson. He stated that newly purchased plank was to be brought to Monticello and sorted. Richardson was to "store at once in the kiln in a proper manner for kiln-drying" the wood that was suitable for flooring (Jefferson 1799). It appears that the directive was not carried out, as Jefferson repeated the order to Richardson in a subsequent document dated March 31, 1800 (Jefferson 1800).

The kiln was likely constructed out of wood, as a January 21, 1804, letter by Jefferson's granddaughter informs the President that the kiln burned down while full of flooring for the entrance hall and "Music gallery" (Randolph 1804). A week later, Jefferson directed his master

joiner James Dinsmore to construct a new plank kiln that incorporated a brick arch. He wrote the "gable ends may be closed with stone, leaving the Southern one a smoke hole as is shewn in this drawing, so that stopping that and the firehole at the bottom of the other end, a fire may be extinguished in a moment for want of air" (Jefferson 1804) (Figure 44).

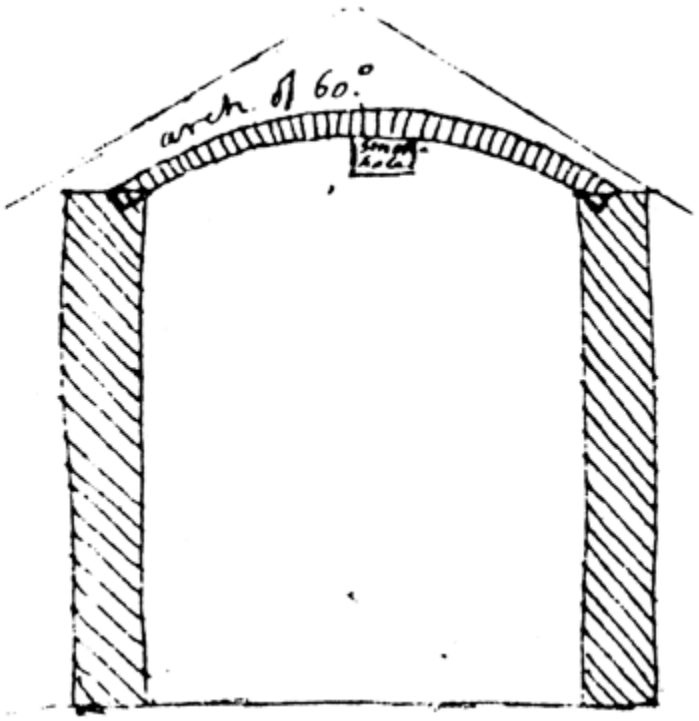

Figure 44: Jefferson's sketch of the southern gable end of the Plank Kiln (Jefferson 1804). Note the words "smoke hole" in the small box, which was Jefferson's solution for cutting off air in the event of a fire.

On August 3, 1806, Jefferson surveyed the route of the Upper or First Roundabout, being "very exact" (Jefferson 1806a:2). Starting on the edge of the West Lawn, Jefferson headed west to the middle of the First Roundabout and then followed the path clockwise. At the end of his seventh course, he stated that this stop is "opposite [the] plank kiln" and noting that it was eight feet to the building (Jefferson 1806a:2). The First Roundabout is 10 feet wide, meaning that the front of the building was three feet from the edge of the road. Jefferson plotted this survey along with a second one finished a few days earlier on a single map. Of all the buildings shown, only

the plank kiln is labeled, perhaps due to it being newly constructed (Jefferson 1806b) (Figure 42, Figure 45). It is not known if this new plank kiln was rebuilt in the same place as the earlier one that burnt down. Due to the combustible nature of plank kilns, they are generally built away and downwind from other structures suggesting why it was isolated with a stone metalworking shop on the northeast side of the mountaintop away from Mulberry Row and the mansion house. Later maps of the plantation also show the plank kiln, albeit unmarked, with the latest being N209 (Figure 46). This plat dates to circa 1809 since it shows a stone house on Mulberry Row constructed in that same year.

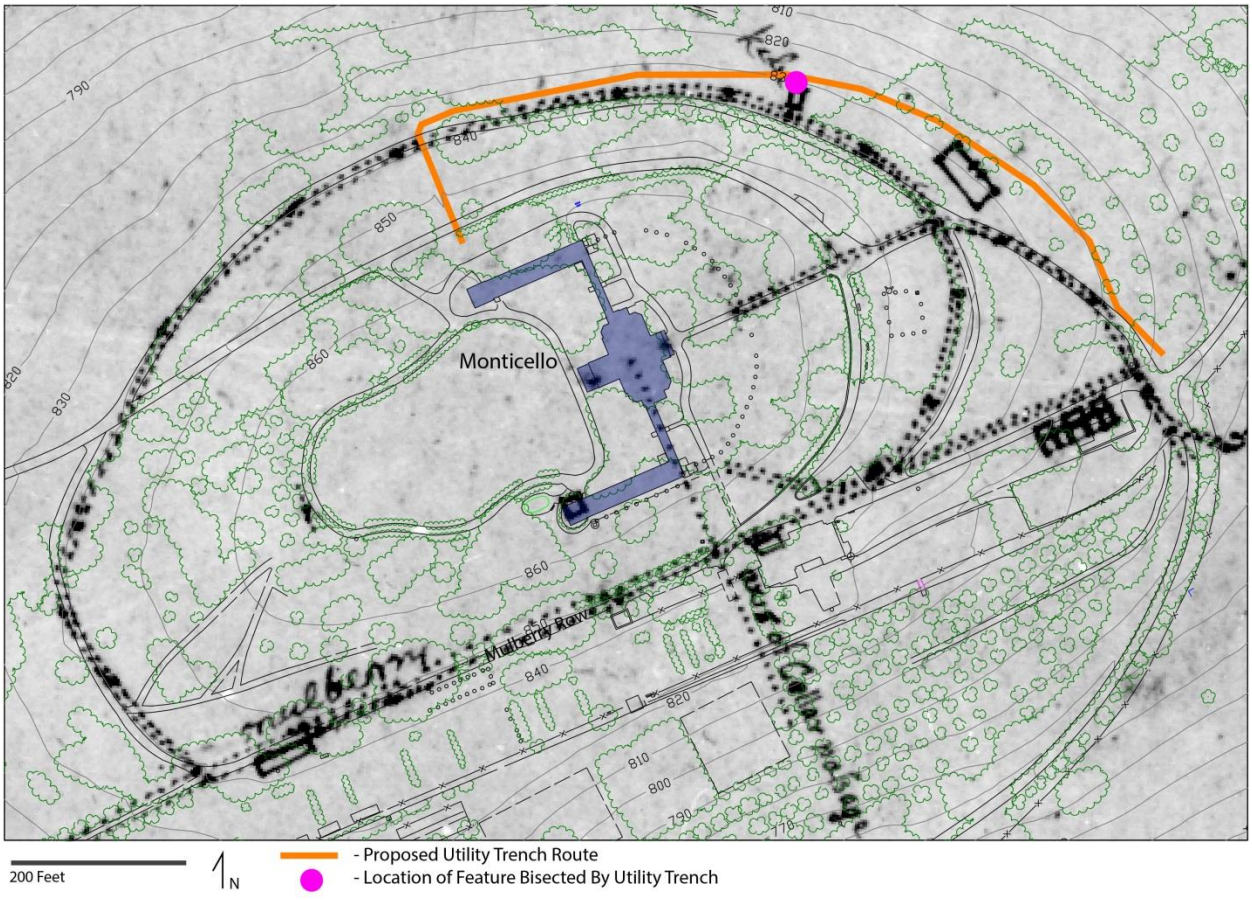

Figure 45: Location of feature cut by utility trench superimposed on Jefferson's 1804 survey (N204) showing location of the Plank Kiln.

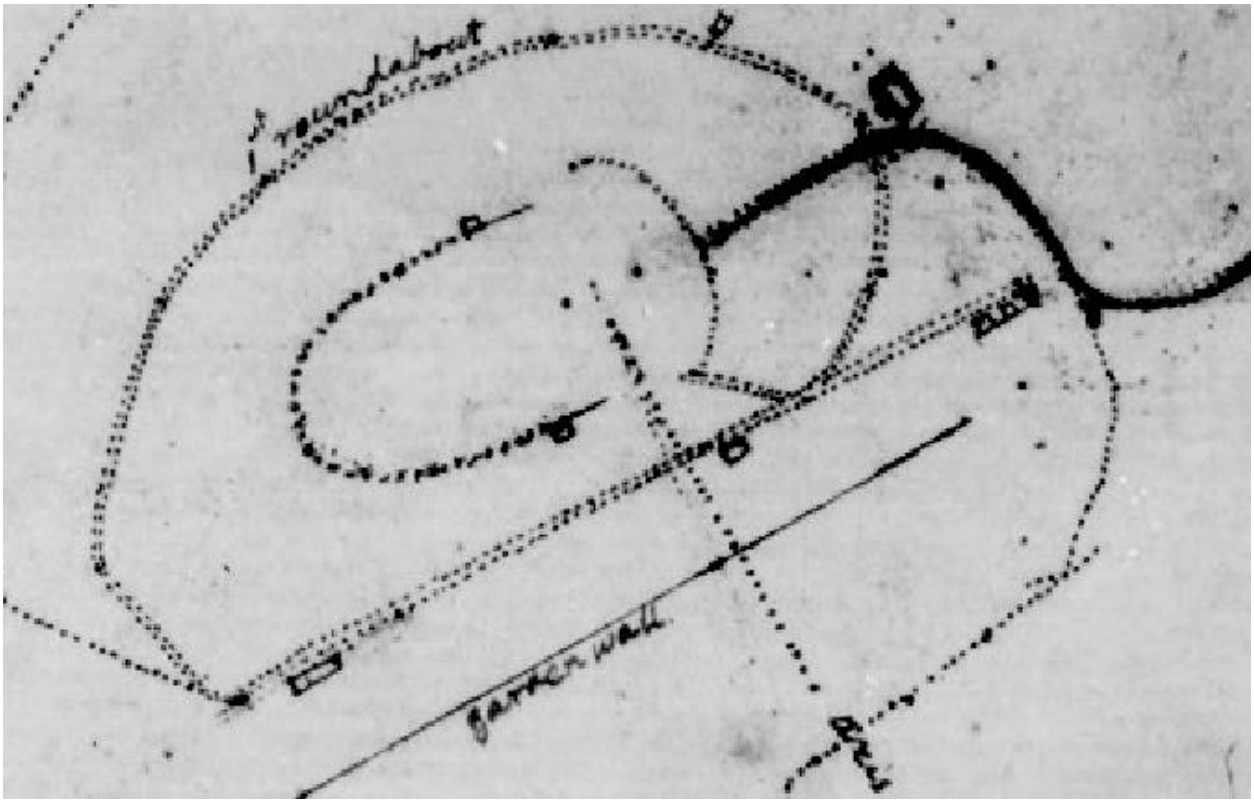

Figure 46: Monticello: estate lands (plat) N209 (Jefferson 1809). The plank kiln is marked by a small box in the middle top.

FIELDWORK

Previous Archaeology

Starting in the mid-1930s, architect Milton Grigg was associated with many Monticello restoration projects over the ensuing decades. At some point, he conducted an exploratory examination of the Plank Kiln (Hill 2002). Very little information remains about this investigation except a brief mention in an interview and a single photo (Figure 47). It shows a cut into the north edge of the artificial terrace exposing an intact stone lined tunnel leading southward uphill and into the terrace. The apparent base of the tunnel is at ground level, due to a cut made for a paved road passing immediately to its north. From the amount of stone seen in the back-dirt piles on either side of the excavation, Grigg seems to have cleared a segment of the

collapsed tunnel that continued to the north (toward the photographer). However, it is not clear if the tunnel had been cut through when the exit road was installed.

The only documented paved road in the area was an exit road built shortly after 1970 and removed in 1983. We know that because the paved road does not appear on a 1970 aerial photo and it was removed in 1983 when the first roundabout was restored. If that is right, then the photo also falls within this time range of between 1970 and 1983.

Figure 47: Milton Grigg's investigation of the Plank Kiln showing a stone-lined tunnel built into an artificially leveled platform just downhill of the First Roundabout (Monticello c.1970). View south. Unknown date but after 1970 and prior to asphalt road (foreground) removal in 1983.

2015 Monitoring

What is the relationship between the intact tunnel photographed by Grigg and the segment of the collapsed tunnel found to the north that is under the old roadbed and discovered

in the utility trench in 2015? The tunnel photographed by Grigg is uphill and south of the collapsed tunnel under the old roadbed; are they a continuation of the same tunnel, or are they two features in close proximity but otherwise unrelated? A key piece of the puzzle lies in the design process that determined the course of the utility trench. On the advice of TJF archaeologists, the trench was engineered to follow the course of the paved exit road that had been removed in the 1980s. The construction crew was briefed that the utility line was to follow the abandoned paved exit road and that they were to deviate from the designed drawings if the road took an unexpected turn. Much of the paved road had been removed in the 1980s restoration; however, large chunks of asphalt remained as well as sections of the road base consisting of crushed gravel. The old road was easily discerned and followed by the experienced construction crew.

By early April 2015, excavation of the utility trench had progressed to a location just north of the plank kiln where archaeologists observed a roughly five-foot wide by two-foot deep feature in the southern face of the utility trench cut. Remains of a stone wall were visible along the eastern side of the feature and possibly the base of a wall along the western side. The fill consisted predominately of redeposited clay subsoil along with a few rocks similar in size to those used in the wall construction. Archaeologists drew profiles of the feature on either side of the utility trench and shot in their locations with a total station (Figure 48, Table 13; Figure 49, Table 14).

The road cut for the abandoned paved road impacted the feature as the crushed gravel sat directly on top of the rock and sediment filled feature that cut into subsoil indicating that an unknown amount of the top of the feature was removed by road construction. The gravel was only found above the intact portion of the feature showing that the feature was filled in prior to

road construction. Comparing the location of the trees from the Grigg excavation photo with those in 2015, it is apparent that the feature exposed in the utility line cut is in the same location as the tunnel photographed by Grigg.

The discovery of the feature was surprising. The Grigg photo appears to show the entirety of the tunnel above the paved road and possibly ending before it reached the road surface, whereas the feature revealed in the utility trench extended at least 2 feet below and completely under the roadbed. Consequently, the eight-foot-wide utility trench destroyed an equally long section of the tunnel feature.

Is the tunnel exposed by Grigg and the filled in feature one and the same? A comparison of Figure 43 and Figure 47 hints they are. There are a number of possibilities to explain the discrepancy between the tunnel in the Grigg photo appearing to be completely above the paved road and the discovery that within the utility trench the tunnel shaft extended at least two feet below the roadbed. One possibility is that only the top half of the tunnel was exposed by Grigg and the tunnel was, in reality, at least twice as tall. Another possibility is that the tunnel was stepped in nature. The tunnel exposed by Grigg was a horizontal section that once had a vertical shaft connecting it to a second horizontal shaft that continued at a lower elevation under the roadbed. A third possibility is that the exposed shaft is not horizontal but is rather on a sharp incline (much steeper than the current slope of the mountain which is twelve degrees). The steep incline of the shaft allowed for the lower portion of the tunnel shaft to survive (albeit filled in) underneath the roadbed.

The profiles drawn in 2015 provide evidence that the third possibility is not likely. The excavated utility trench was roughly eight feet wide, and yet the base of the tunnel shaft on the north side of the utility trench was only 0.58 feet below the tunnel shaft feature on the south side.

This shows that the feature declined at an angle slightly greater than four degrees, which is substantially less than the slope of the surface and inadequate to allow for the tunnel to descend at a rate that would allow for it to extend two feet below the old roadbed. Further excavation may reveal if either the first or second hypothesis are correct.

If the feature exposed in the utility trench is not a collapsed portion of the tunnel feature exposed in the Grigg excavation, then the feature may be associated with the earlier plank kiln that burned down in 1804. Further excavation will be needed to make any firm conclusions.

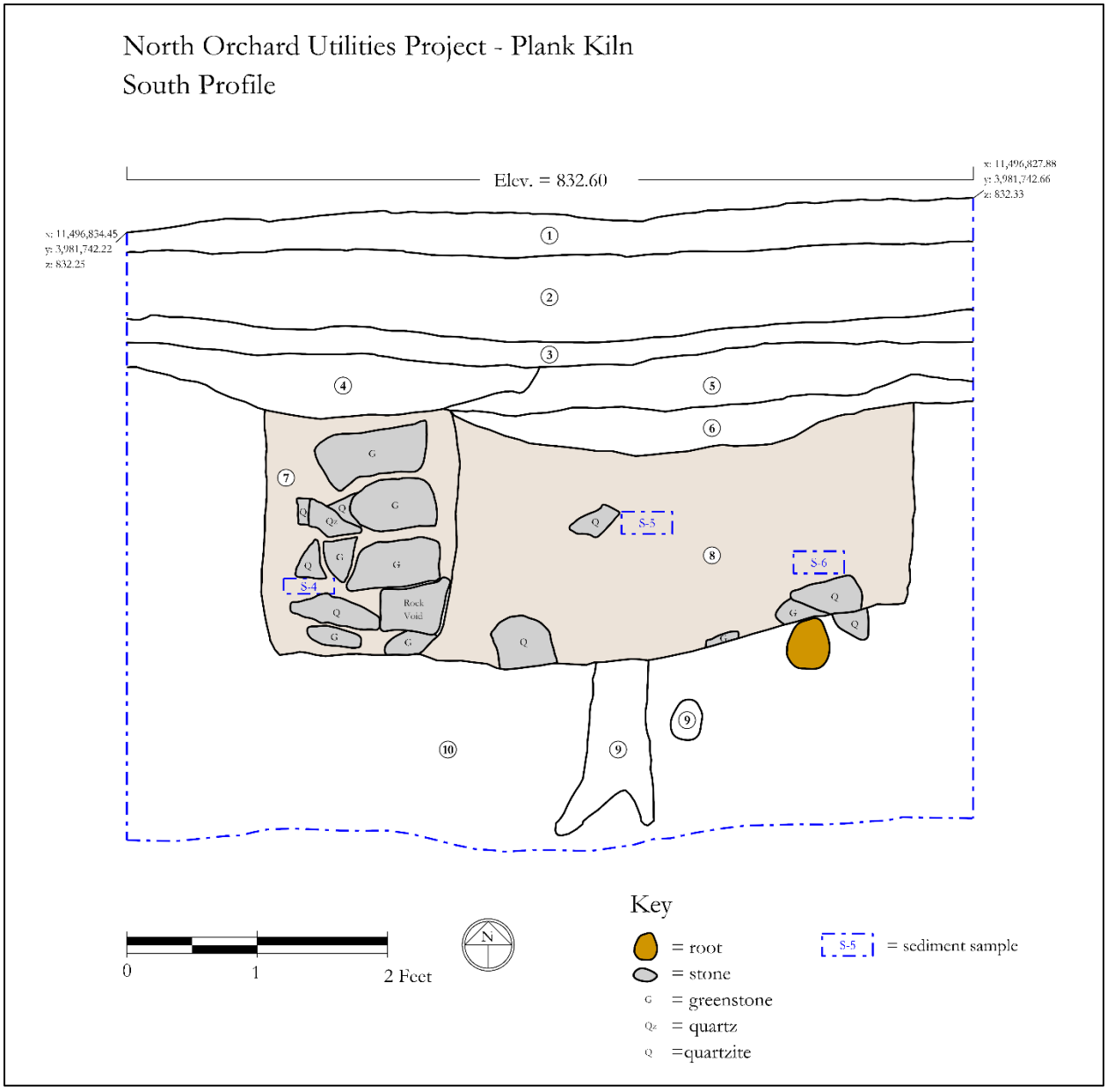

Figure 48: South profile of Plank Kiln flue (shaded) exposed by utility line trench cut. The stacked greenstone and quartz cobbles show that the feature was once rock lined.

Table 13: Sediment descriptions and interpretations for Error! Reference source not found.Error! Reference source not fo und..

Number	Munsell	Interpretation
1	Reddish Brown [2.5YR 4/4] silty clay loam with 3% gravel (2-4mm).	20th-century roadbed
2	Red [2.5 YR 4/6] clay with 1% gravel (2-4mm).	20th-century roadbed
3	Red [2.5YR 4/6] clay.	--
4	Reddish brown [2.5YR 4/6] clay loam with 1% charcoal.	--
5	Greenish roadbed gravel with 40% dark red [2.5YR 3/6] clay.	20th-century roadbed gravel
6	Red [2.5YR 4/6] clay with 3% greenstone (3) and 2% quartzite (4-64mm).	--
7	Greenstone (4-5), 25% quartzite (3-4), 5% quartz (4-256mm) with 5% reddish brown [2.5YR 4/4] silty clay.	--
8	Red [2.5YR 4/6] clay with 15% greenstone (2-64mm) and 15% quartzite (2-4).	--
9	Reddish brown [2.5YR 4/4] silty clay with 5% decomposing wood/root/charcoal.	--
10	Red [2.5YR 4/8] clay.	--

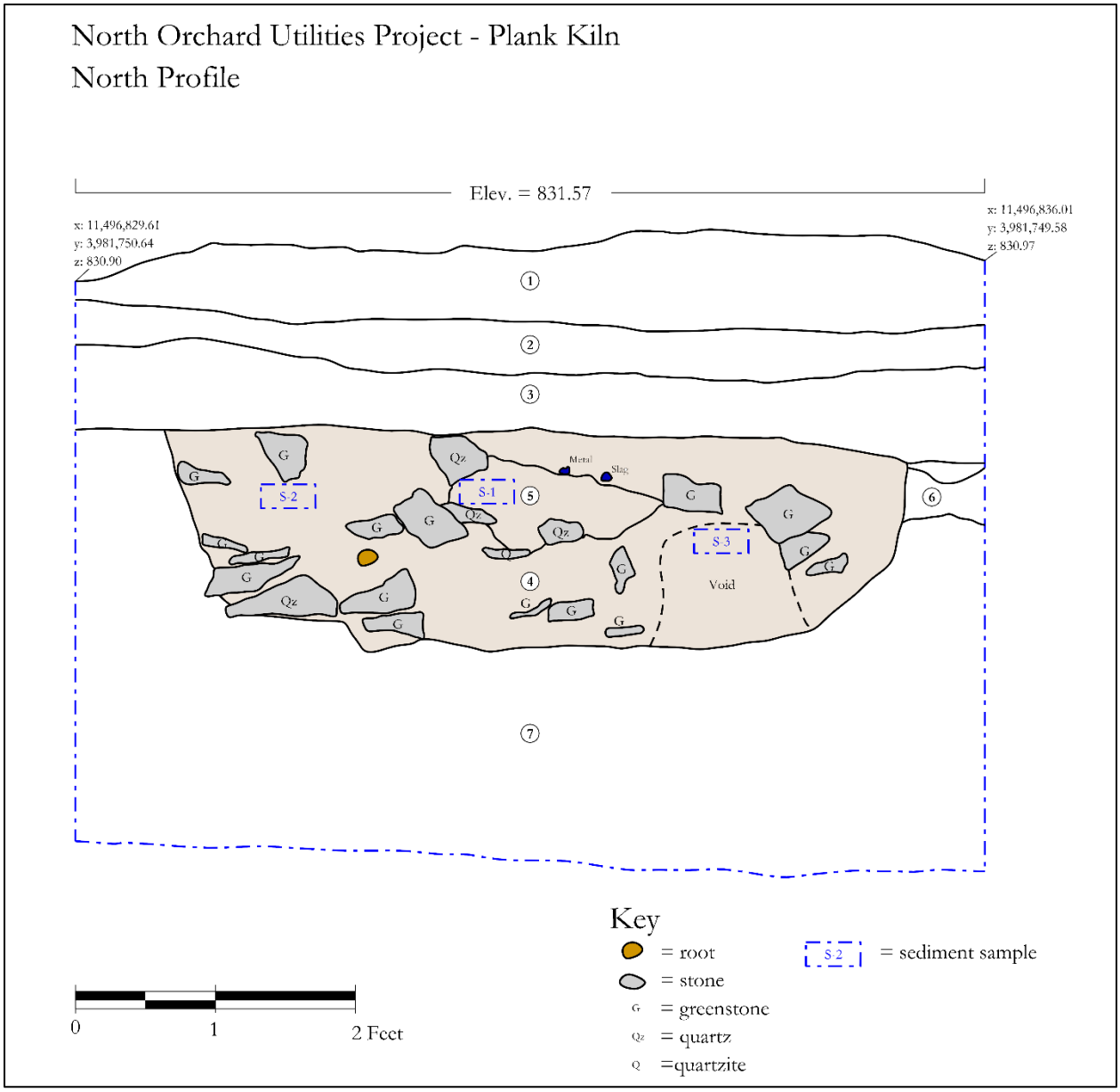

Figure 49: North profile of Plank Kiln flue (shaded) exposed by utility line trench cut.

Table 14: Sediment descriptions and interpretations for Error! Reference source not found.

Number	Munsell	Interpretation
1	Red [2.5YR 4/6] clay with 5% decomposing greenstone (1-64mm).	20th-century roadbed
2	Reddish brown [5YR 4/4] silty clay with 3% stone (2-64mm).	20th-century roadbed
3	Greenish grey [Gley 1 7/1] sand with 80% gravel (2-64mm) and 5% dark red [2.5YR 3/6] clay.	--
4	Dark reddish brown [5YR 3/4] silty clay loam mottled with 10% dark red [3.5YR 3/6] silty clay with 50% greenstone (4-256mm) and 20% quartzite (3-4).	--
5	Dark brown [7.5YR 3/4] silty clay loam mottled with 15% light yellowish brown [10YR 6/4] sand with 20% quartzite (2-256mm), 10% greenstone (2-3), 4% charcoal (1-64mm), and 1% brick (1-4mm).	20th-century roadbed gravel
6	Reddish brown [2.5YR 4/4] silty clay with 3% charcoal (1-4mm) and 1% decomposing greenstone (1-64mm).	--
7	Red [2.5YR 4/6] clay with 1% decomposing greenstone (1-64mm).	--

DISCUSSION

A plank kiln's primary function is to speed up the drying process of timber so that the wood may be used in construction in a matter of days or weeks as opposed to months or years if open-air dried. Many Jefferson family members living at Monticello while the house was constructed and then remodeled. They must have looked upon kiln dried favorably, as it facilitated the completion of crucial architectural elements (such as the flooring) of the main house. Kiln-dried wood is also preferred in fine furniture making, as kiln drying is used to lower the water content of wood beyond that which can be accomplished by air drying alone.

Was Jefferson's kiln design unique? Research on the layout of an early nineteenth century Virginia plank kiln yields little information. Their proclivity for catching fire may have caused workmen to construct them quickly and therefore leaving little to no archaeological evidence. The lack of documentary references may also be due to their minimal presence in Virginia during Jefferson's lifetime. James Oldham, a woodworker who worked on various projects at Monticello, including the construction of many of Monticello's doors, noted in 1804 that "There is no such thing as a Kiln for drying of Lumber in Richmond [Virginia]" (Oldham 1804). Besides Jefferson's personal plank kiln, only one other instance was found. A kiln was used in the construction of the University of Virginia (Treasurer's Annual Report 1823:3).

With comparative evidence for plank kilns lacking, other types of kilns were researched to find an example that contained the same type of features of Jefferson's plank kiln – namely a structure for holding material that was destined to be dried and a tunnel/flue for directing the flow of heated air into the building. Two examples were found. Grain drying kilns within the British Isles appear to be comparable and are described as tobacco pipe or keyhole shaped. Figure 50 shows the archaeological evidence and a reconstruction for a grain drying kiln in Ireland that is like the features found at Monticello. Second, excavations in 1973 of a 17th-

century pottery kiln in Westmoreland County, Virginia, revealed a roughly similar configuration. However, in this case there were four tunnels, reflecting the need for higher temperatures required to fire pottery successfully (Figure 51, Figure 52). These two examples and Jefferson's plank kiln all seem to be convergent design solutions to a common general problem: how to get heat to a material without subjecting it directly to the fire. In all three cases, the tunnel configuration emerged as a smart solution.

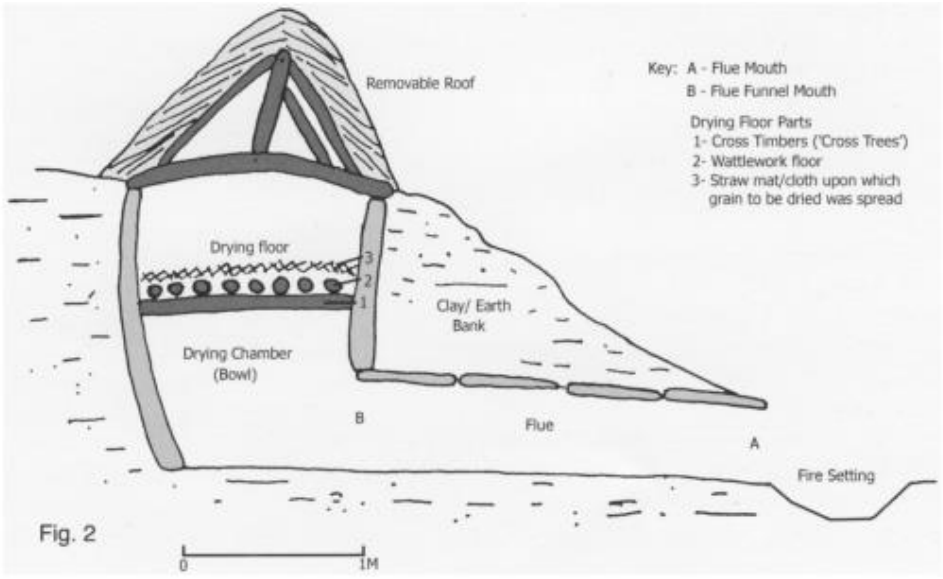

Fig. 2—Cross-section of tobacco-pipe/keyhole-shaped kiln (after Knox 1907, pl. XX).

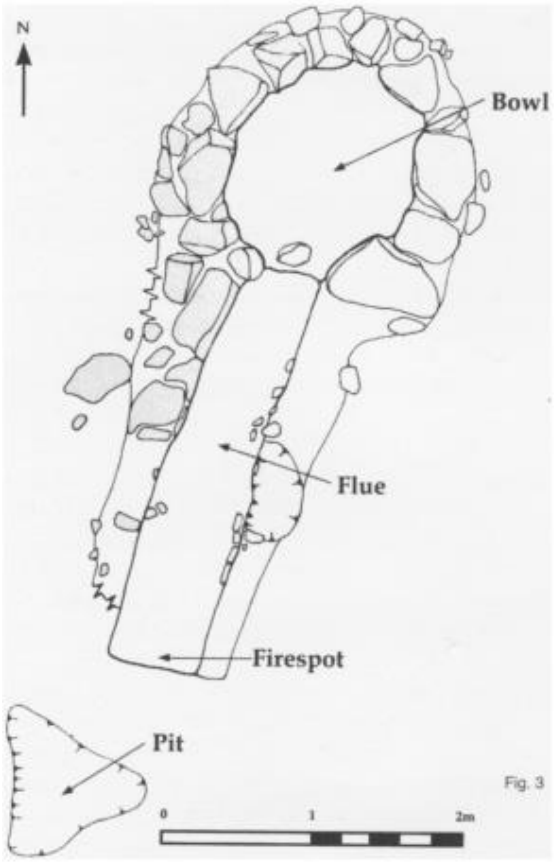

Fig. 3—Plan of Ballysimon keyhole-shaped kiln (courtesy of Tracy Collins and Tony Cummins, Aegis Archaeology Ltd).

Fig. 4—The Ballysimon keyhole-shaped kiln (courtesy of Tracy Collins, Aegis Archaeology Ltd).

Figure 50: Schematic and archaeological plans of tobacco pipe or keyhole grain drying kilns (Monk and Kelleher 2005:80). Kiln plans are like Jefferson's plank kiln.

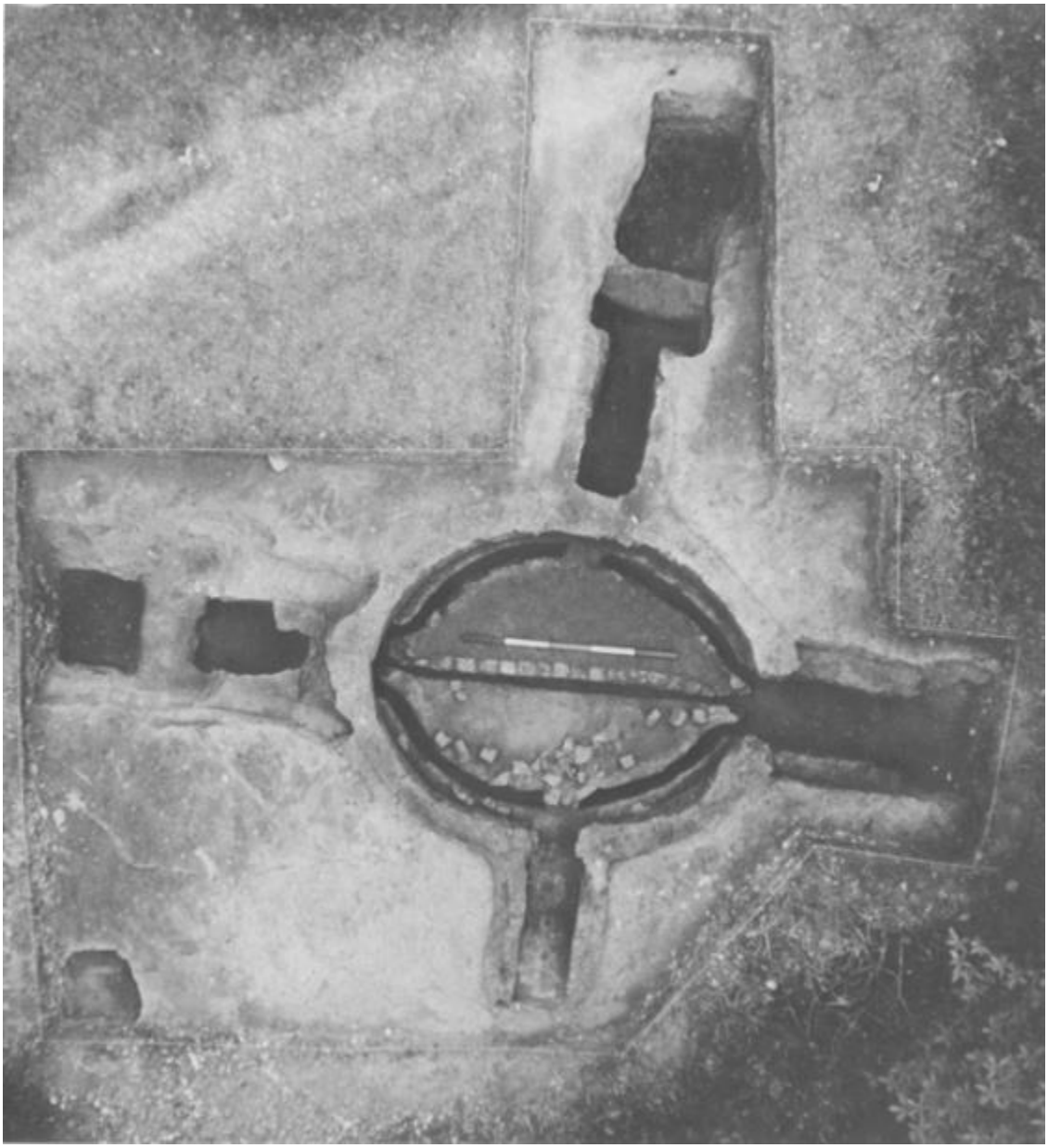

Figure 51: Overview of the Morgan Jones pottery kiln site located in Westmoreland County, Virginia (Kelso and Chappell 1974:54).

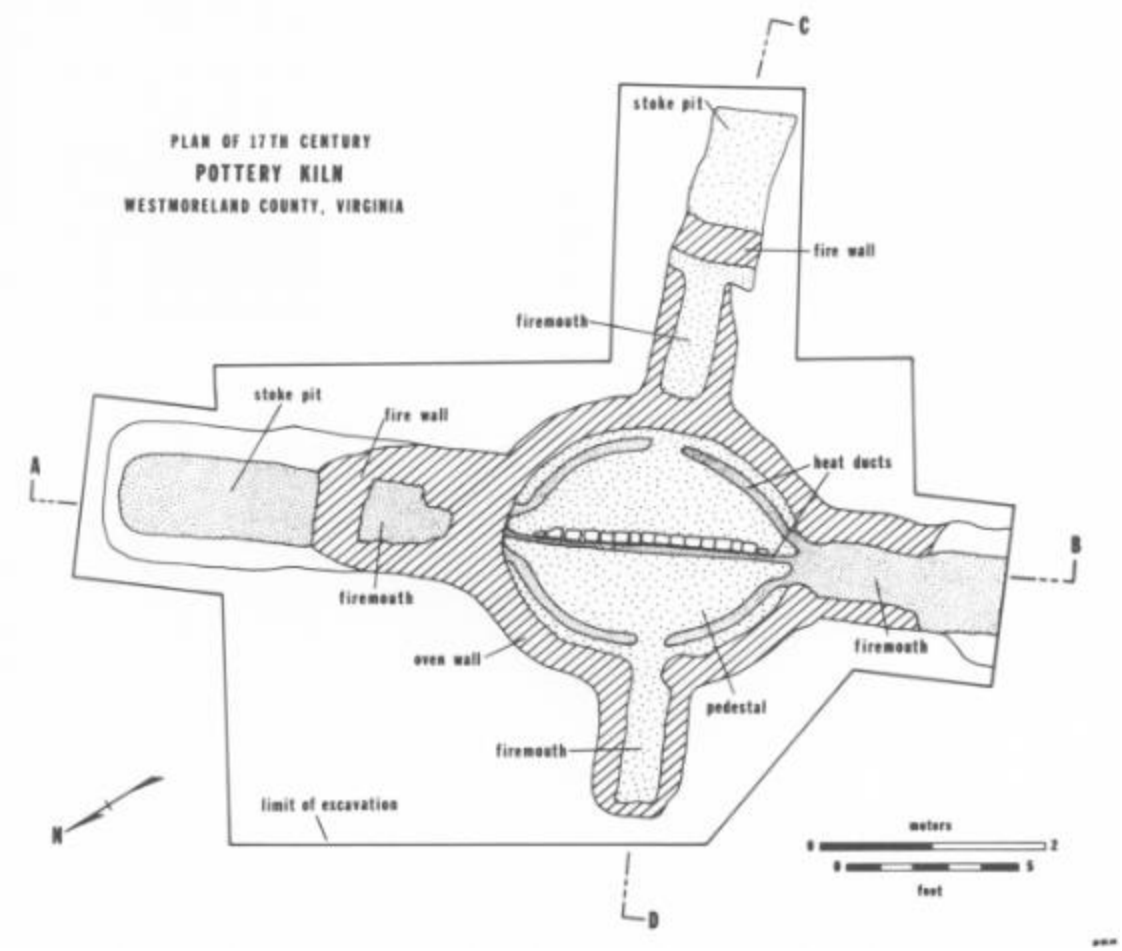

Figure 52: Kiln site plan from Westmoreland County, Virginia (Kelso and Chappell 1974:56).

APPENDIX 1: DATUMS AND TEMPORARY STATION LOCATIONS

Name	X	Y	Z
KelsoDatum	11496521.05	3891375.688	867.55
KelsoBacksight	11496291.6	3891278.698	867.19
NDepRebar	11496512.26	3891586.042	858.132
NDepVaultDatum	11496336.74	3891687.776	831.858

APPENDIX 2: ARTIFACT CATALOG, NORTH WING VAULT

Total Count	Artifact Type	Artifact Category
1	Bead, Barrel	Bead
1	Bead, Spherical	Bead
1	Buckle, Unid: Harness/Util.	Buckle
2	Button, Flat Disc	Button
67	American Stoneware	Ceramic
1	Astbury Type	Ceramic
2	Bennington/Rockingham	Ceramic
2	Black Basalt	Ceramic
6	British Stoneware	Ceramic
4	Buckley-type	Ceramic
1	Canary Ware	Ceramic
2	Coarse Earthenware, unidentified	Ceramic
613	Creamware	Ceramic
69	Ironstone/White Granite	Ceramic
1	Native American	Ceramic
1273	Pearlware	Ceramic
418	Porcelain, Chinese	Ceramic
1	Porcelain, English Bone China	Ceramic
6	Porcelain, unidentifiable	Ceramic
77	Porcellaneous/Hard Paste	Ceramic
9	Redware	Ceramic
1	Refined Earthenware, modern	Ceramic
129	Refined Earthenware, unidentifiable	Ceramic
1	Stoneware, unidentifiable	Ceramic
2	White Salt Glaze	Ceramic
42	Whiteware	Ceramic
1	Yellow Ware	Ceramic
2	Mammal	Faunal
10	Other Vertebrate	Faunal
7	Architecture, unid.	General Artifacts
1	Bolt	General Artifacts
1	Bracket	General Artifacts
12	Brick Bat	General Artifacts
970	Brick/Daub	General Artifacts
264	Brick Fragment	General Artifacts
1	Brick, specialty unid.	General Artifacts
2	Bullet	General Artifacts
5	Can	General Artifacts

3	Cement, unidentified	General Artifacts
6	Charcoal	General Artifacts
12	Cinder/Coke	General Artifacts
286	Coal	General Artifacts
1	Cobble (64-250mm)	General Artifacts
1	Comb, unidentified	General Artifacts
1	Corrosion/Rust	General Artifacts
13	Drainpipe	General Artifacts
6	Foil	General Artifacts
97	Glass, plate	General Artifacts
2	Hardware, unidentified	General Artifacts
1	Hardware, vehicle	General Artifacts
1	Insulator	General Artifacts
1	Lamp Chimney	General Artifacts
68	Lamp, globe	General Artifacts
6	Light Bulb	General Artifacts
1	Marble, architectural	General Artifacts
1	Minie Ball	General Artifacts
61	Modern Artifacts	General Artifacts
8	Mortar, architectural	General Artifacts
331	Nail	General Artifacts
8	Nail Rod	General Artifacts
3	Nail Rod Binder	General Artifacts
1	Nut, hardware	General Artifacts
2	Nutshell, unid.	General Artifacts
97	Pebble (4-64mm)	General Artifacts
1	Pencil, lead	General Artifacts
2	Pit, unidentified	General Artifacts
3	Plaster	General Artifacts
2	Pull Tab	General Artifacts
51	Road Paving	General Artifacts
2	Rope	General Artifacts
9	Scrap/Waste	General Artifacts
1	Screw, unidentified	General Artifacts
16	Sheeting	General Artifacts
1	Shingle	General Artifacts
69	Slag	General Artifacts
2	Slate, writing	General Artifacts
5	Strapping	General Artifacts
1	String	General Artifacts
9	Tar Paper	General Artifacts
1	Tube	General Artifacts
39	Unidentified	General Artifacts

5012	Window Glass	General Artifacts
24	Wire	General Artifacts
2	Bottle, Case	Glass
9	Bottle, Mineral/Soda	Glass
261	Bottle, Unidentifiable	Glass
9	Bottle/Vial, Pharmaceutical	Glass
3697	Bottle, Wine style	Glass
112	Container, unidentifiable	Glass
1	Drinking Glass, unidentifiable	Glass
1	Jar	Glass
525	Not Recorded	Glass
6	Stemware	Glass
131	Tableware, unidentifiable	Glass
2	Tumbler	Glass
353	Unidentifiable	Glass
23	Cobble (64-250mm)	Lithics
48	Flake	Lithics
694	Pebble (4-64mm)	Lithics
46	Shatter	Lithics
1	Tobacco Pipe, Bowl Fragment	Tobacco Pipe
1	Tobacco Pipe, Bowl, Rim	Tobacco Pipe
2	Tobacco Pipe, Stem	Tobacco Pipe

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