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Investigating the Great Hopewell Road with Photogrammetry

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Abstract

Development of a 320-acre parcel in Heath created an opportunity to examine sub-surface evidence for the Great Hopewell Road. The State Historic Preservation Office and the Ohio History Connection directed the excavation of three trenches bisecting the path of the road adjacent to the Van Voorhis Walls in November 2025. No clear signature of road construction was evident in meter-long profile drawings from any of the trenches. But examination of the entirety of each profile via photogrammetry revealed two features—an anomalously level B horizon across the center of the trenches and disturbances in the A/B transition near trench edges—that align with the trajectory of the roadbed and berms of the Great Hopewell Road. We propose that these features are products of mounding earth on either side of a roadbed and subsequent compaction of the road surface due to large numbers of people walking along the road.

Keywords: Hopewell culture, earthworks, roads, photogrammetry

Introduction

The Great Hopewell Road is the name given to a wide, straight avenue framed by low earthen embankments that extended from the southeastern gateway of Newark's Octagon Earthworks for an as yet undetermined distance along a trajectory with an azimuth of approximately 212 degrees (Magli and Lepper 2025). Processional ways or "roads" defined by parallel banks existed at a variety of Hopewell-era sites, including Portsmouth, Marietta, and Hopeton (Lepper 2025). Caleb Atwater brought attention to the Newark road in 1820. Charles Whittlesey, Ephraim Squier, and Edwin Davis (Squier and Davis 1848) published cross-section drawings of parallel-walled avenues that are part of earthworks at Newark and Marietta. James and Charles Salisbury defined traces across more than nine kilometers "over fertile fields, through tangled swamps and across streams, still keeping their undeviating course" (Salisbury and Salisbury 1862:15). In 1931, Warren Weiant Jr. (1931) identified remains of berms from aerial observation.

Lepper (1995) proposed that this road served as a connection between the Newark Earthworks and the concentration of monumental earthworks around the confluence of the Scioto River and Paint Creek often referred to as the Hopewell Core (Figure 1, inset). Lepper's conclusion was based principally on an extrapolation from the surveys and testimonies of Caleb Atwater (1820), James and Charles Salisbury (1862), Jesse Thompson (quoted in Park [1870]),

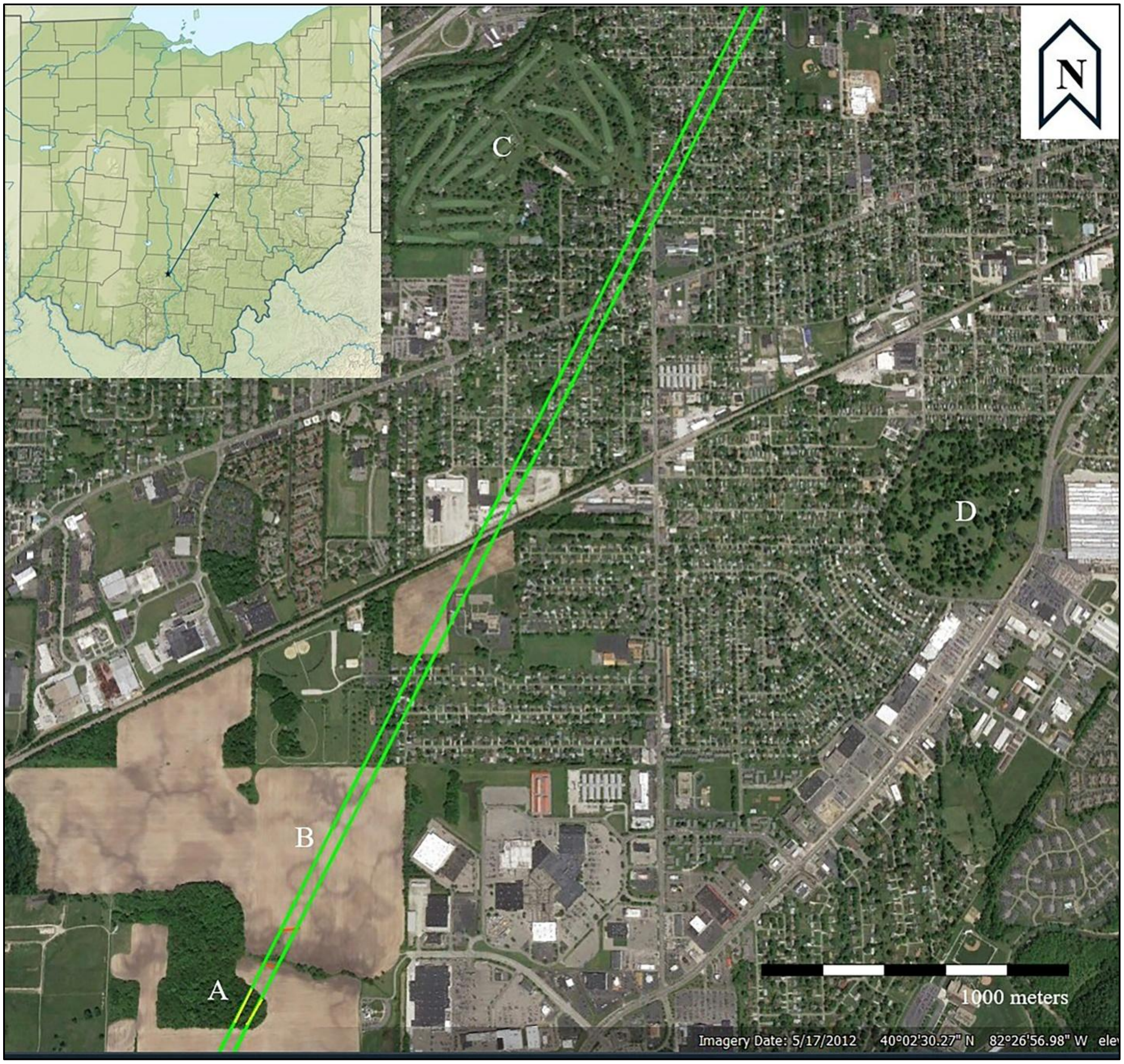

Figure 1. Map of proposed Great Hopewell Road trajectory between Heath and Chillicothe (inset), the location of the Van Voorhis Walls (A), and an extrapolation of the road trajectory based on the Van Voorhis Walls (B), the Newark Earthworks Octagon (C), and the Newark Earthworks Great Circle (D). (Image credit: Google Earth Image date 05/17/12; Inset map SANtosito, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons.

Warren Weiant, Jr. (1931), and James Marshall (1987). In addition, Lepper (1995) identified four localities that, based on aerial imagery, appeared to represent isolated traces of road remnants along the projected trajectory of the Great Hopewell Road. Lepper has since conceded that the three southernmost of these proposed remnants "represent subjective data selection and would require further investigation before they could be offered as valid evidence for the Great Hopewell Road" (Lepper (2024: 6). The fourth and northernmost locality is a set of distinct parallel linear crop marks situated west of Buckeye Lake and about 20 kilometers south of the Newark Octagon. These marks are along the predicted trajectory and are clearly evident in aerial infrared imagery from 1988 (Lepper 1996: 235).

The best documented remains of the Great Hopewell Road are 15 kilometers north of Buckeye Lake in the four-kilometer long zone between Ramp Creek and the Newark Octagon. Squier and Davis considered Ramp Creek the southern boundary of the "remarkable plain" on which the Newark Earthworks are situated (1848: 69). Just north of Ramp Creek, a small woodlot in the City of Heath contains the site known as the Van Voorhis Walls (Ohio Archaeological Inventory 33LI1401) (Figures 1 and 2).

When Lepper and several colleagues surveyed the area in 1991, the woodlot was largely free of undergrowth, and the walls were readily visible. Lepper calculated the maximum surviving height of the western berm to between 50 and 60 centimeters (Lepper 1991). In the intervening years, the site has become overwhelmed with small trees and brushy vegetation. Romain and Burks (2008) used LiDAR survey to confirm that two parallel berms remain evident and circa 50 meters apart within the Van Voorhis woodlot. They also emphasize a second feature: a shallowly excavated depression less than a meter deep running across the gap between the berms.

Since 2008, higher resolution LiDAR data have become available (Figure 3).
[1] In data from the Ohio Statewide Phase 2 2020 B20 LiDAR project, the roadbed and berms remain clearly present within the woodlot and extend northward into the adjacent field. To the south of the woodlot surface traces are more difficult to discern, although a swath of elevated soil height extending from the edge of the woodlot may indicate dispersed remains of the eastern berm. Other studies have identified additional features associated with the Great Hopewell Road, both north toward the Octagon and south beyond Ramp Creek (e.g., Davis, Aument, and Watkins 2024; Grooms 2025; Lepper and Magli 2025; Price 2004; Schwarz 2016; Simpson and Kvamme 2001).

While these studies identify key aspects of the Great Hopewell Road, the rarity of excavations along the road trajectory remains a significant impediment to confirming its existence. In November 2024, archaeologists from the Ohio State Historic Preservation Office, the Ohio History Connection Archaeology Department, the Ohio Department of Transportation, and Denison University took advantage of a unique opportunity to excavate in a 320-acre parcel set for development (Grooms 2025). The goal of the excavation was to determine if subsurface traces of berms and roadbed could be identified. Using the trajectory of the Van Voorhis Walls and evidence from aerial photographs (e.g., Reeves 1936 and Google Earth historical images), the team identified three areas intersecting the projected path of the Great Hopewell Road (Figures 2 and 3). Excavation and recording occurred over the course of two days. This paper focuses on two trenches transecting the width of the road: Trench 1 (71 meters long) and Trench 2 (58 meters long). Trench 2 was located 88 meters to the northeast of the Van Voorhis woodlot; Trench 1 was 125 meters farther to the northeast. The ground surface along this path is essentially flat with a slight dip downward across a creek bed. Trench 2 is located at the edge of the slightly lower and wetter soils associated with the creek bed (yellow and bright red zones in Figure 3). Trench 1 is more fully on the higher and drier soils farther from the creek.

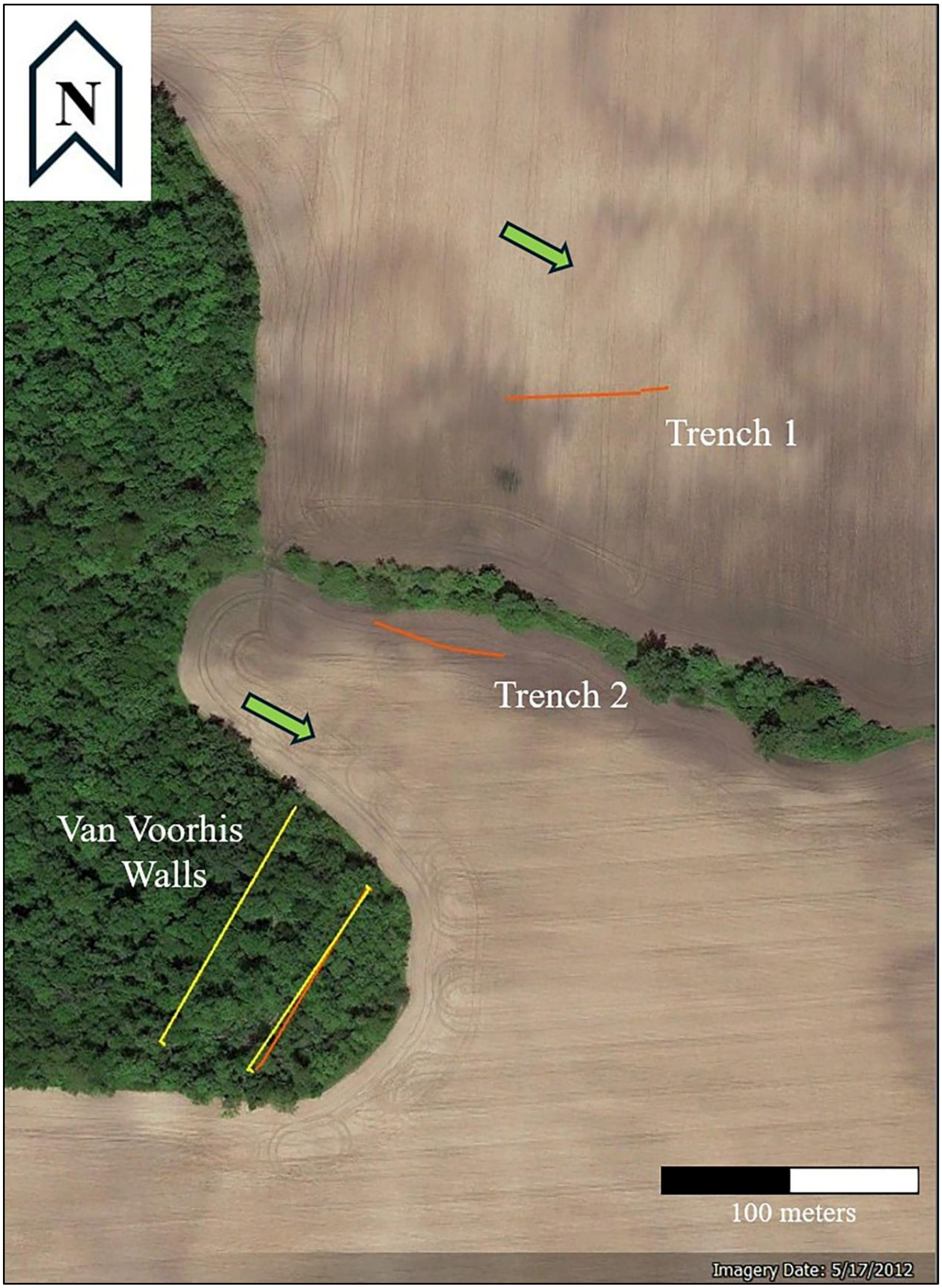

Figure 2. 2012 Google Earth image of excavation area with field marks of Great Hopewell Road berms (green arrows). Red lines show location of Trenches 1 and 2; yellow lines show the location of Van Voorhis Walls (based on GPS data).

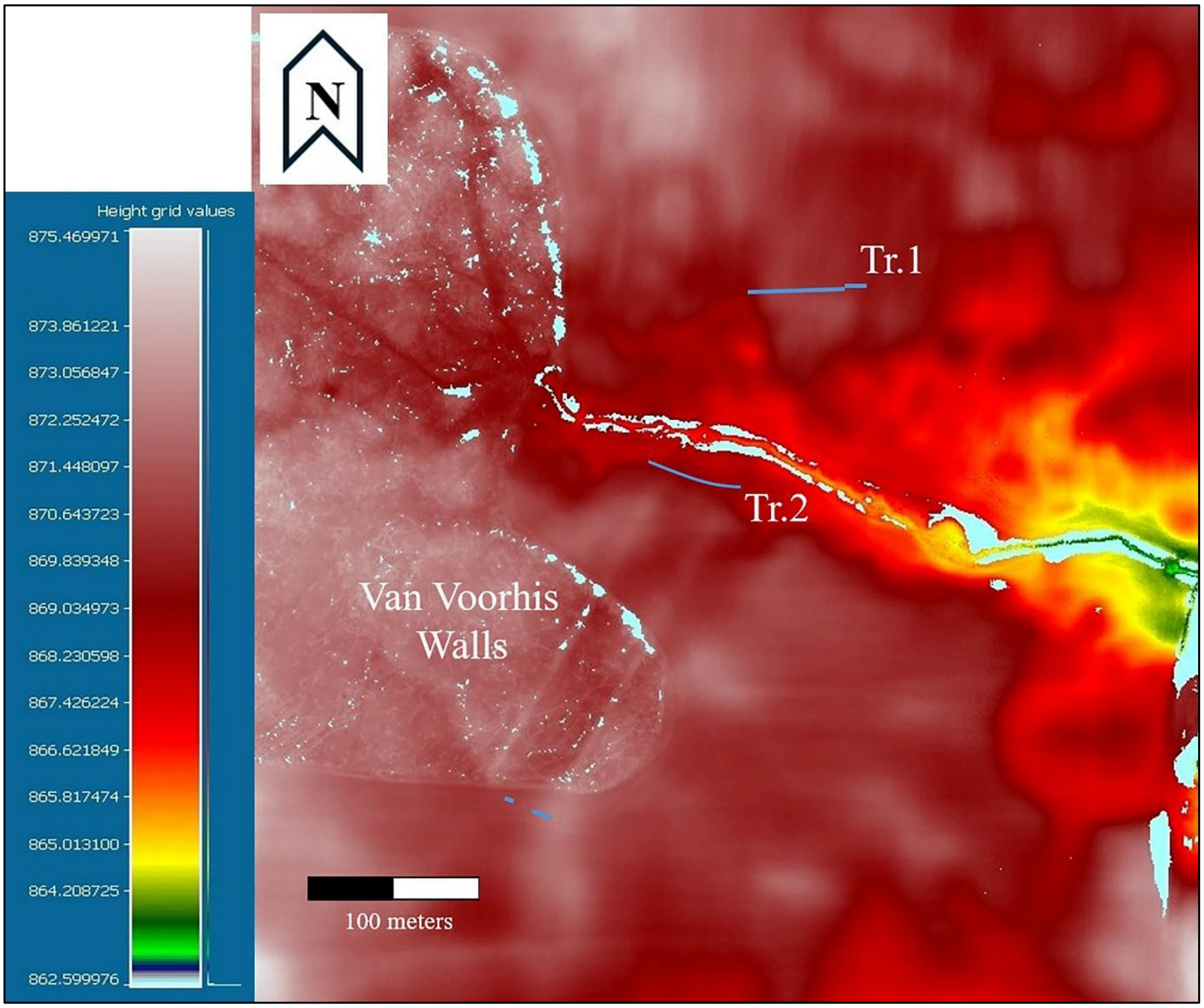

Figure 3. LiDAR map showing ground surface elevation via color spectrum and the location of Trenches 1 and 2 (GPS data). Note that LiDAR captures the berms and roadbed in the Van Voorhis woodlot and north-east toward Trench 2. Produced in CloudCompare v.2.

Excavations extending across more than 50 meters present significant challenges for stratigraphic interpretation (Figure 4). Challenges are particularly acute when excavation operates within a short time frame. Photogrammetry provides a means of quickly recording exposures at high resolution, creating the possibility for robust post-excavation analysis. The resulting fine-grained records of an entire exposure can also be made publicly available, allowing others to substantively assess the validity of interpretations. The goal of this paper is to assess the value of photogrammetric models of the exposed soil profiles for defining subsurface signatures of the Great Hopewell Road.

Methods

Photogrammetry involves taking overlapping photographs of a target. For this study, Soderberg used a Canon GX7 Mark II camera (20 megapixels) to capture 537 photos of Trench 1 and 544 photos of Trench 2. The next step is identifying matching pixels among photographs and triangulating the relative location from which each photograph was taken. These data are used to calculate XYZ coordinates for locations appearing across multiple photographs. In Agisoft's Metashape software, those XYZ points are called *tie points*. Their precision depends on the number of matches among different photographs. Effective modeling requires elimination of low-quality tie points. Metashape identified 203,772 high-quality tie points from 511 photos of Trench 1 and 155,004 from 512 photos of Trench 2.

Figure 4. Excavation of Trench 1 (photo by Brad Lepper).

In this study, the photographs—and consequently tie points—are not evenly distributed across trenches, meaning that the resolution varies across different parts of models. Due to lighting considerations and time constraints, the south wall of each exposure was chosen as the primary record of stratigraphy and so was photographed more intensively than other segments.

The next step in model development is utilizing algorithms to extrapolate additional points to capture topography across the spaces between tie points. Metashape calculated over 58 million points to account for the topography in each of the trenches. Since human eyes have difficulty reading topography via individual points, the software generates a "wireframe" surface by connecting sets of three points into triangular faces (triangulated irregular network). These connected "faces" are then given user-defined color and reflective properties to create a "hillshade" model useful for visualizing topographic details.

Metashape offers two options for adding photorealistic color to models. One uses pixel values from the original photographs to determine color for each of the faces (shaded mode). In this mode, individual faces are equivalent to pixels in the original photographs. Metashape can also create a "texture" from the original photographs, which is a means of projecting 2D images on a 3D surface. The result is something like a skin draped over the model.

Archaeologists recognized the value of photogrammetry before computer-based automation existed (Anderson 1982). As late as 2007, commercially available software required manual identification of tie points. At that stage, Soderberg needed days to model a box of detergent. Now, models for 70 meter-long trenches take only minutes. Such dramatic improvements have made photogrammetry pervasive in archaeology. But, ironically, recent studies of 3D modeling in archaeology cite the same problem that Anderson saw over forty years ago: limited engagement among non-specialists (see Hostettler et al. 2024). Realizing the full potential of photogrammetry and other forms of 3D analysis in archaeology will only occur when results are available in forms that engage non-specialized users.

This study is based on two such products. We converted the south wall of each trench into an orthomosaic (an orthorectified 2D map-like image built from the original photographs). Since orthomosaics are produced in familiar image formats (e.g., tiff and jpg) and require no specialized software to access, they provide an easily accessible means of examining trench stratigraphy. Figure 5 shows the orthomosaics for Trenches 1 and 2.[2] We also created movies panning along the south wall of each trench, using Metashape's animation function to create a camera track. We then used Adobe Premier Pro to produce shareable video clips: <https://youtu.be/3RvghlfA2Fg> <https://youtu.be/YEY9SdYr_M0>.

Our results are based on examination of the trench faces on a 98-inch monitor, which presented them at full scale (or more) and facilitated collaborative discussions of potential interpretations. The experience of working with these records is not equivalent to working from the actual trench wall. But, over the course of three or four meetings, three researchers with divergent proclivities were able to sort through a variety of interpretations and arrive at consensus about patterns that were not apparent when the trenches were open or when we began reviewing the photogrammetry data. Orthomosaics and videos are available with this publication, with the hope that others will evaluate our results and build additional interpretations.

While examination of orthomosaics is the foundation of our study, interpretation of that data is more robust if intersection points with the estimated path of the Great Hopewell Road are known. Since the Van Voorhis Walls are less than 100 meters from Trench 2, they provide an opportunity to reconstruct the road path across the trenches with confidence. The primary challenge is registering the photogrammetric models of the trenches onto maps of the local landscape. (The software used to create them does not automatically geo-locate the models.) For this study, GPS data for the centerline of each trench and the Van Voorhis berms were used to position trenches onto the LiDAR map shown in Figure 3.

One additional challenge is that the eastern berm is more damaged than the western berm, creating uncertainty in defining the trajectory for the eastern side. As is evident in Figure 2, the eastern GPS line has a trajectory that diverges from the field marks evident in 2012 Google Earth image. Consequently, we chose the western berm as the indicator of the road's trajectory. The eastern path in all figures is a copy of the west berm path shifted to the location of the east berm. As shown in Figure 1, when this trajectory is extended north to the Octagon, it matches the expected intersection near the south-eastern corner of the Octagon. Figure 6 shows the berm path across the excavation area as two green lines. The white "blobs" labeled Tr. 1 and Tr. 2 are photogrammetric models embedded in the LiDAR map.

Figure 7 is a detail from the map in Figure 6 with the ground surface removed so that intersections between berm paths and excavation trenches are easier to see. Each cylinder is ten meters wide: our estimate of a reasonable zone of confidence for the centerline of each berm. This figure shows trench models in a "hillshade" mode that emphasizes topography. Figure 8 shows them with a photorealistic texture and as viewed from a few meters above ground height. The green lines in Figure 8 represent the interior and exterior edges of the berm paths.

Figure 5. Soil profiles from the south wall of Trenches 1 and 2 (orthomosaics extracted from photogrammetric models).

Results

The Newark Earthworks and the associated Great Hopewell Road were developed on the high late Wisconsinan outwash terrace near the confluence of the North Fork and South Fork of the Licking River (Forsyth 1966). This area is Squier and Davis's "remarkable plain." It is comprised primarily of deep glacio-fluvial deposits that led to the infilling of the "deep stage"

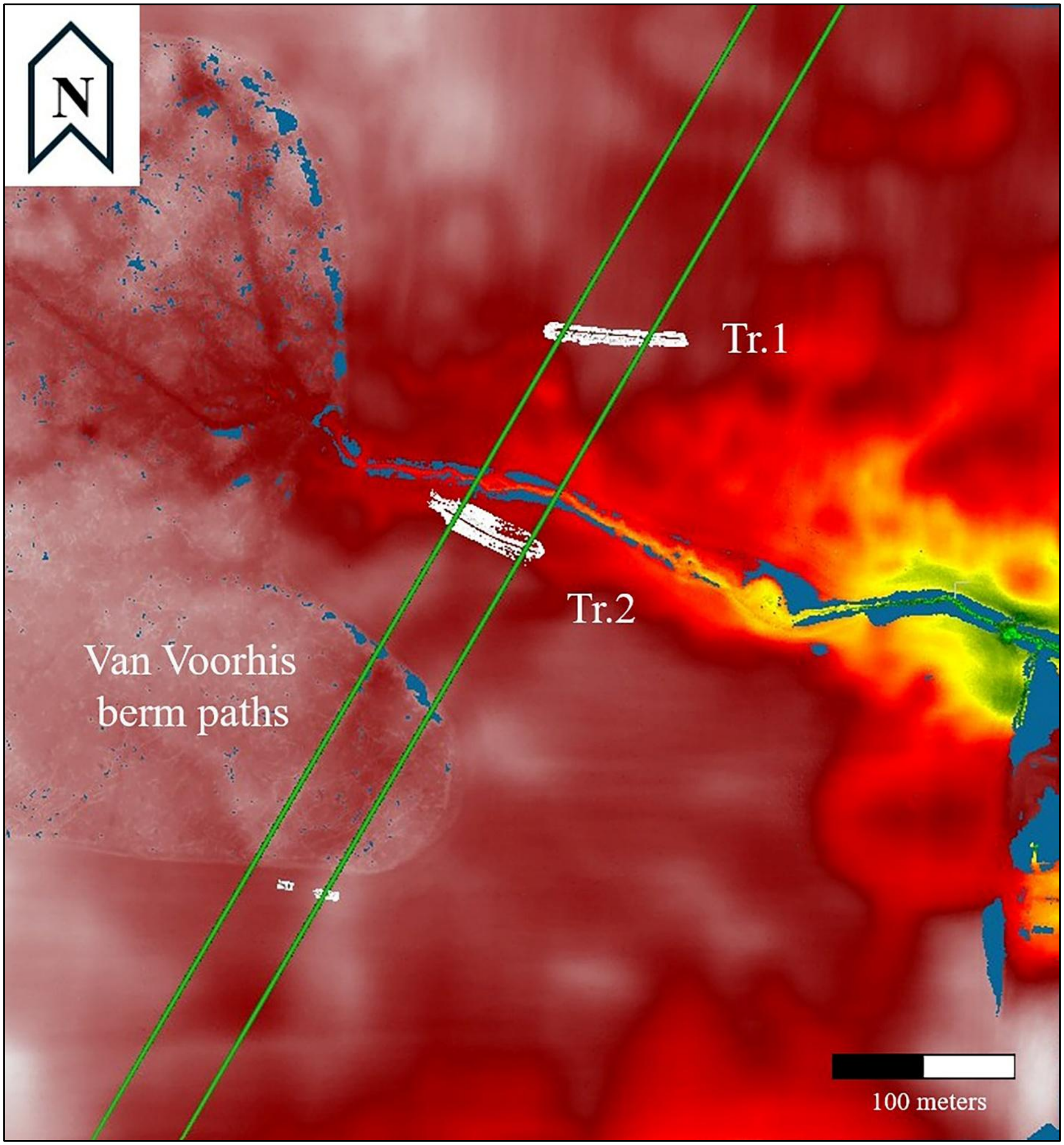

Figure 6. LiDAR map showing ground surface elevation with the berm trajectory (green lines) and photogrammetric models of Trenches 1 and 2 registered to LiDAR data (white rectangular areas). Produced in CloudCompare v.2

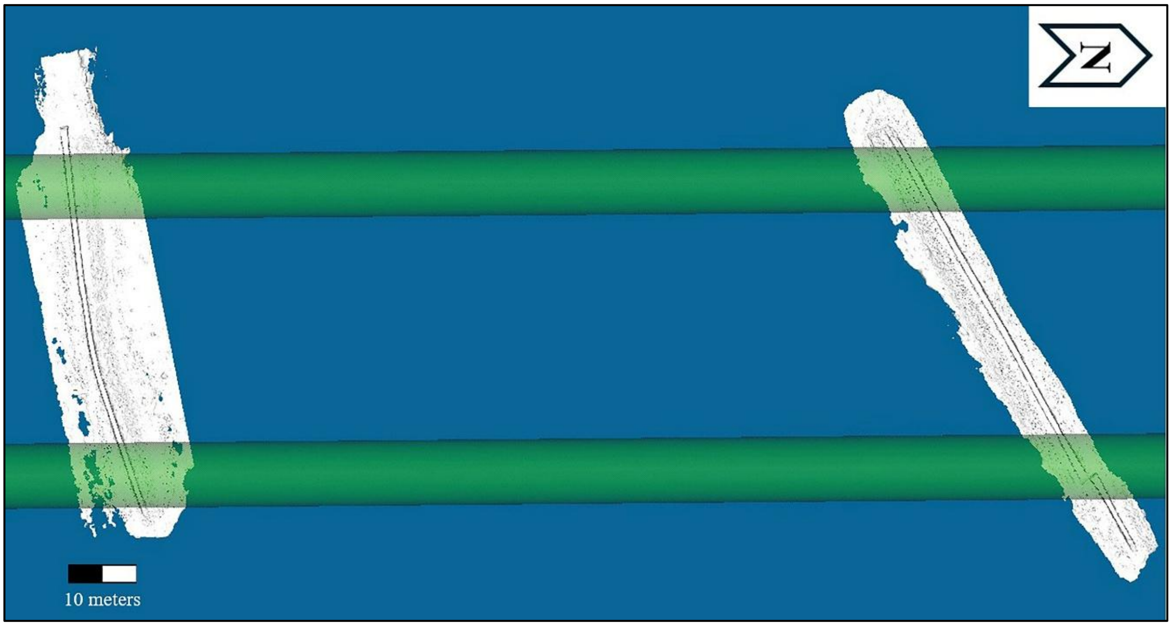

Figure 7. Detail of the map from Figure 6 with ground surface removed, showing the intersection of the berm pathway with Trenches 1 and 2 (hillshade version of photogrammetric models). Produced in CloudCompare v.2

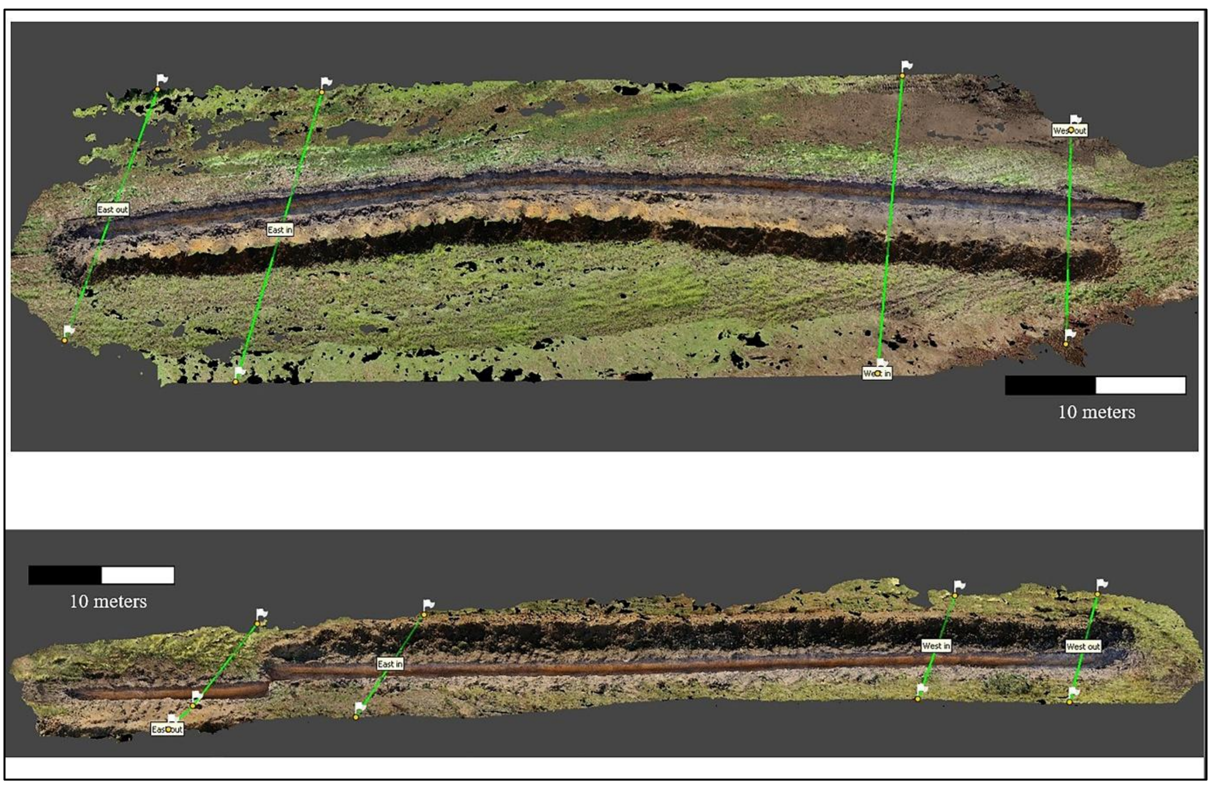

Figure 8. "Aerial" views of colorized photogrammetric models for Trench 2 (above) and Trench 1 (below) with internal and external margins of the berm intersection zones marked with green lines.

drainage of the Newark River during repeated glacial episodes through the late Pleistocene. The dominant soil of the terraces is Ockley silt loam, a deep well-drained forest soil formed in a mantle of silty loess, typically between 20 and 50 cm thick, which extends downward to an irregular contact with a gravel to cobble-rich loam. Examination of the orthomosaics for the south wall of each excavation trench confirms that exposed soil is Ockley silt loam - fine-loamy, mixed, active, mesic Typic Hapludalf (Figure 9).

The widespread Ockley soils and the generally flat terrace surface would have been a Middle Woodland road-builder's dream. Even with the hand tools of the period, stripping away the silty topsoil to create berms on either side of the roadbed would have been a straightforward task. Excavating down to the rockier cohesive zone of the upper Ockley B horizon would yield a durable and well-drained walking surface. Based on the assumption that the roadbed is 50 meters wide, scraping a half meter of soil along a 1-meter-wide strip would yield 12.5 cubic meters of soil for building each berm. A quarter meter depth would yield 6.25 cubic meters. Both are more than sufficient to yield the volume of soil needed to account for the height of the berms Salisbury noted in 1862 (between 0.6 and 0.9 meters). Heavy pedestrian traffic and weathering would compact soils and lower roadbeds farther. After about 400 CE, the use of such roads would have declined and windblown leaves, sediment, and other material would have accumulated on the roadbed leading to the development of an A horizon.

The terrace surface has been under the plow since European settlement of the Newark area. This would have led to rapid filling of the already partially filled depressed roadbed with earth from the berms being redeposited into the wide depression. With plowing a well-defined AP surface horizon formed from mixing the former A and E horizons of the forest soil. This AP horizon is clearly marked in all trenches. The transition from the loess silt cap to the underlying gravel zone is highly variable in terms of both depth and degree of mixing of the eolian silt with the coarser glaciofluvial deposits reflecting the irregularity of the late-glacial outwash surface. Nearby glacial kames are present on the high terrace suggesting the presence of stagnant glacial ice during the late stages of terrace deposition.

No evidence of anthropogenic disturbance is evident below the AP/BE transition in any of the trenches. This result matches the expectation that the Great Hopewell Road was formed by scraping topsoil laterally into berms. But linking exposed stratigraphy with Woodland era activity requires distinguishing archaeological evidence from post-contact plowing. Two aspects of the stratigraphy in Trenches 1 and 2 merit further consideration as sub-surface evidence of the Great Hopewell Road.

The first is an anomalously level and sharply defined AP/BE transition in areas corresponding to the roadbed. Figures 10 and 11 show segments of the orthomosaics for Trench 2. AP intrusions resulting from burrows, root casts, and/or tree falls are evident. But, otherwise, the AP/BE transition is a tightly defined and nearly flat division running across the entire central region of Trench 2. Trench 1 essentially shows the same pattern, with fewer AP intrusions (Figures 12 and 13). In both trenches, the transition is essentially flat and sharply defined across the central portion of both exposures.

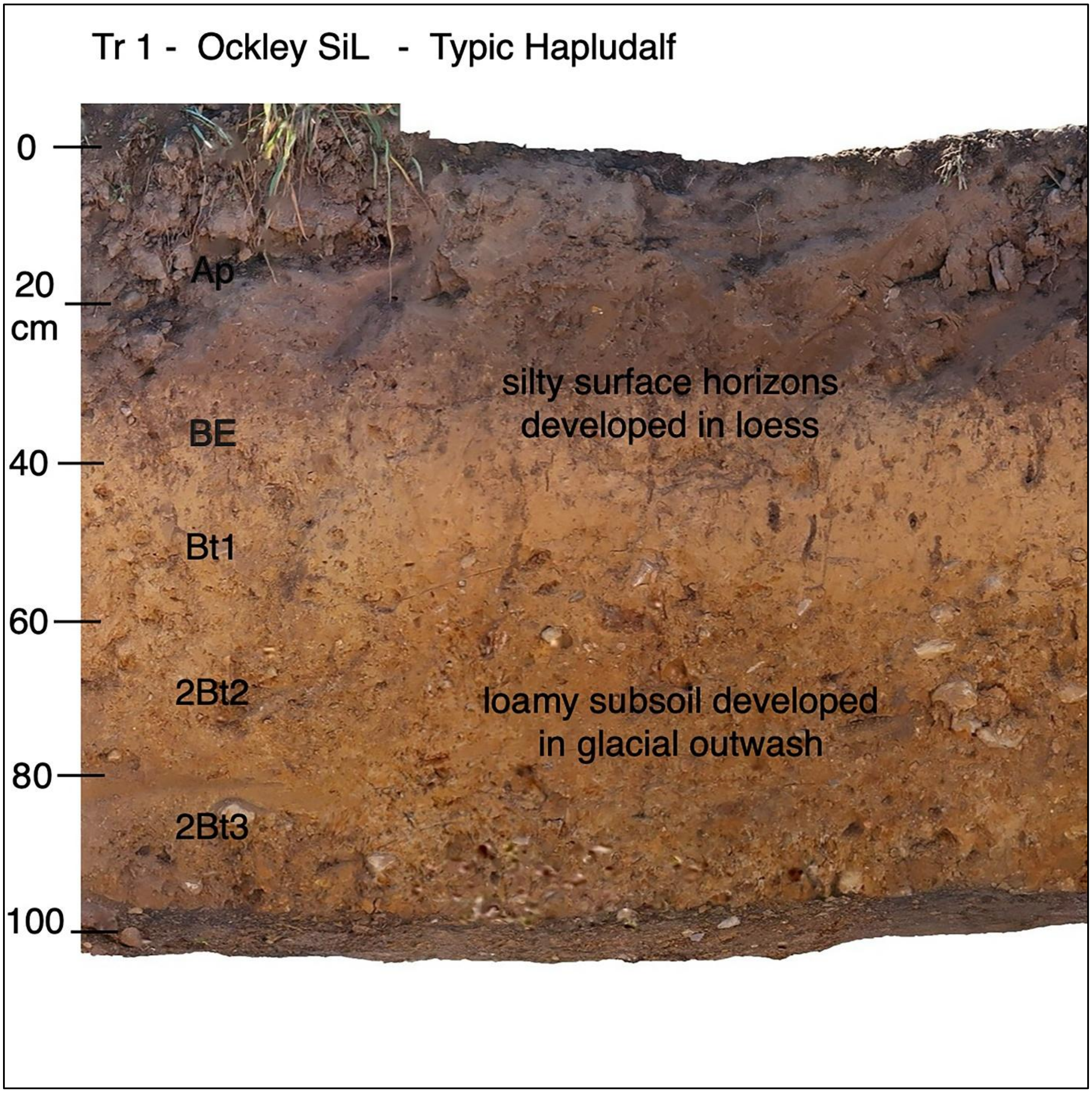

Figure 9. Annotated soil profile from Trench 1 (from orthomosaic of the south trench wall).

The possibility that these patterns result from precontact road building gains strength from two additional points. First, the central portion of Trench 2 is clearly in line with the roadbed depression running northeast from the Van Voorhis woodlot (Figure 3). Second, as is discussed below and shown in Figure 18, where the trenches extend well beyond the berms, the AP/BE transition is a more diffuse zone, rather than a sharp line. Such evidence does not prove that the level and sharp AP/BE transition in central zones is archaeological, but at minimum, it indicates the value of additional testing to determine if the pattern is a common feature along the path of the Great Hopewell Road. Future research could also involve testing if soils below the AP/BE transition in the middle of the pathway are exceptionally compact.

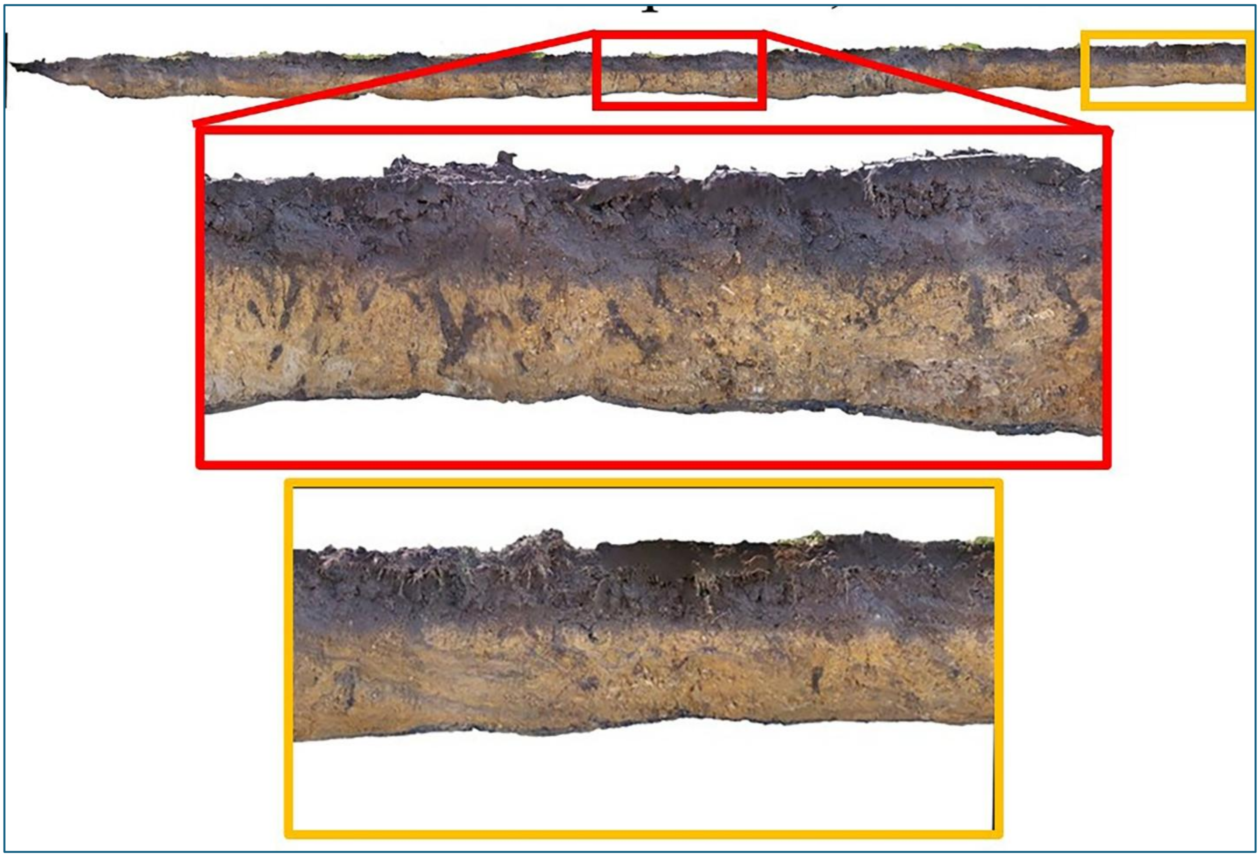

Figure 10: Orthomosaic for the eastern half of Trench 2 (background) with detailed views of two segments along the path of the roadbed (foreground).

Figure 11: Orthomosaic for the western half of Trench 2 (background) with a detailed view of a segment along the path of the roadbed (foreground).

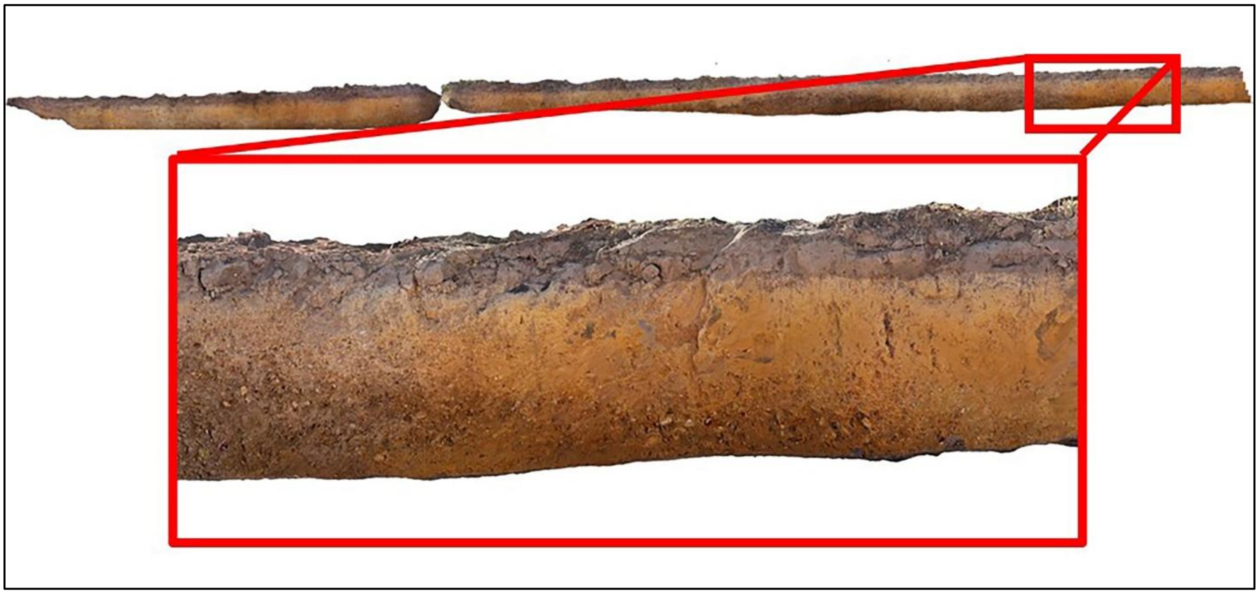

Figure 12: Orthomosaic for the eastern half of Trench 1 (background) with a detailed view of a segment along the path of the roadbed (foreground).

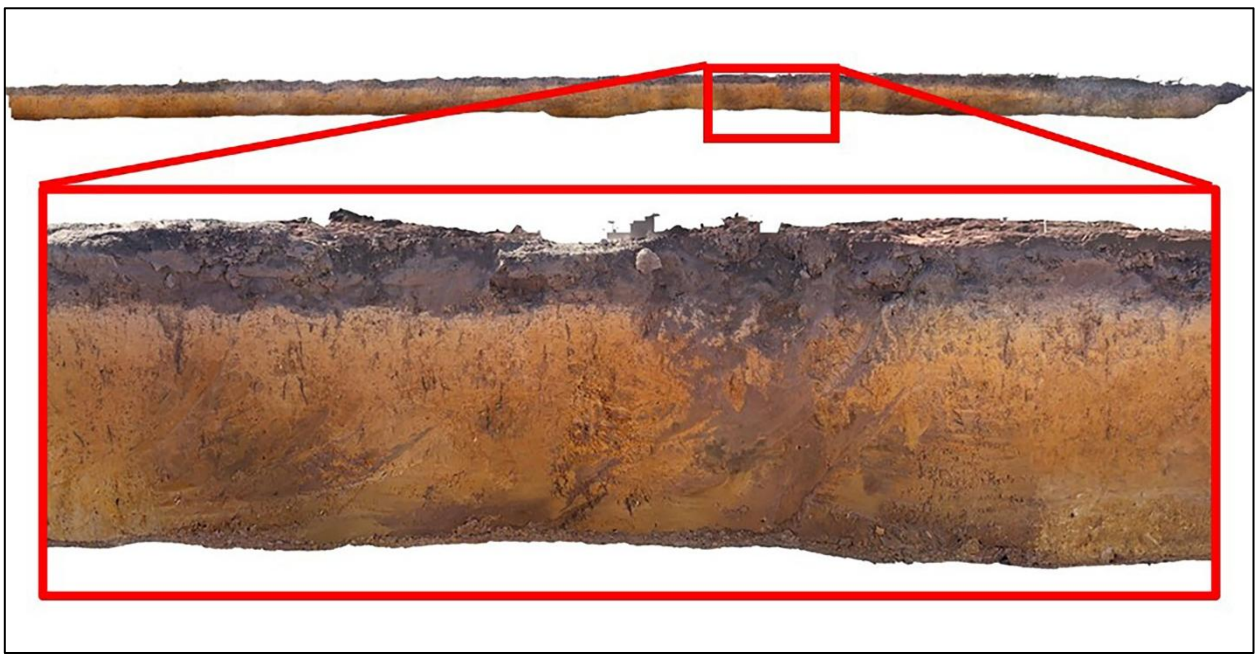

Figure 13: Orthomosaic for the western half of Trench 1 (background) with a detailed view of a segment along the path of the roadbed (foreground).

The second pattern identified via photogrammetry is associated with the location of the berms. Where trenches intersect the path of the berms, the AP/BE transition has a very different character from the flat and sharp transition within the path of the roadbed. In Trench 2 near the interior margin of the east berm path, the AP/BE transition dips down and becomes diffuse, i.e., characterized as a band of mixing rather than a line of division (Figures 14 and 15). Toward the exterior margin of the path, the division becomes more defined but at a lower level than associated with the roadbed. Beyond that point to the eastern terminus of the trench, the division remains quite diffuse. At the western end of Trench 2, the dip is less pronounced, but some drop exists and the transition in the western intersection zone is as diffuse as in the eastern intersection zone (Figures 16 and 17). In sum, in contrast to the central area of Trench 2, the AP/BE transition dips down and becomes murky in the zone where Trench 2 intersects the berm paths. The same change occurs in both the east and west sides of the trench.

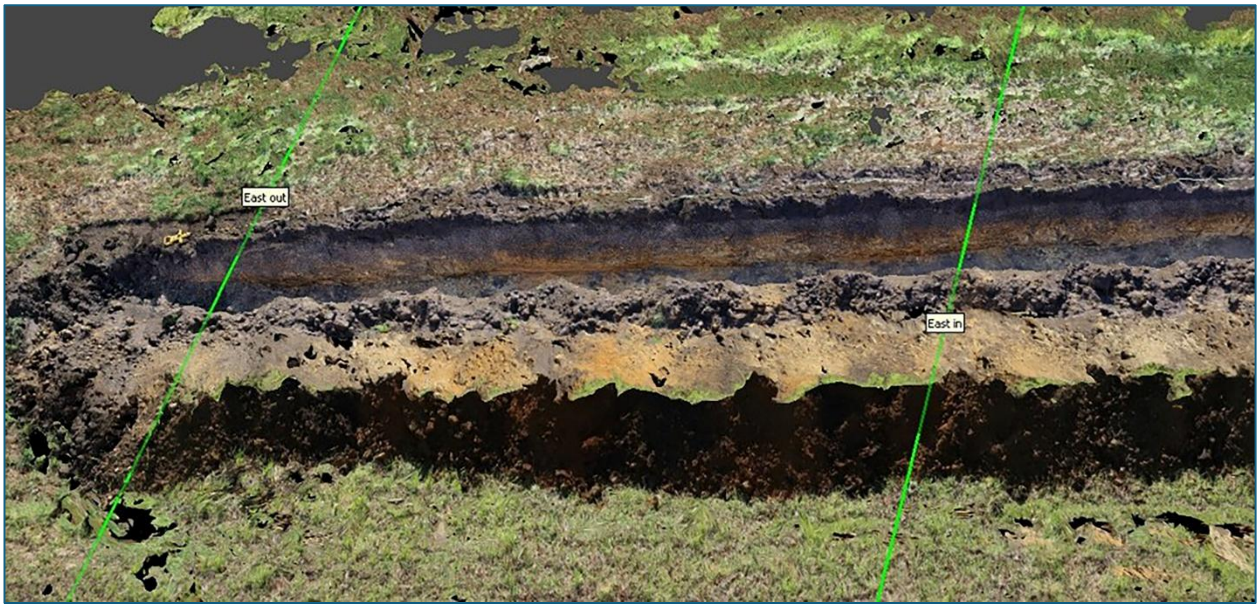

Figure 14. Trench 2 eastern berm intersection zone ("aerial" view of colorized model).

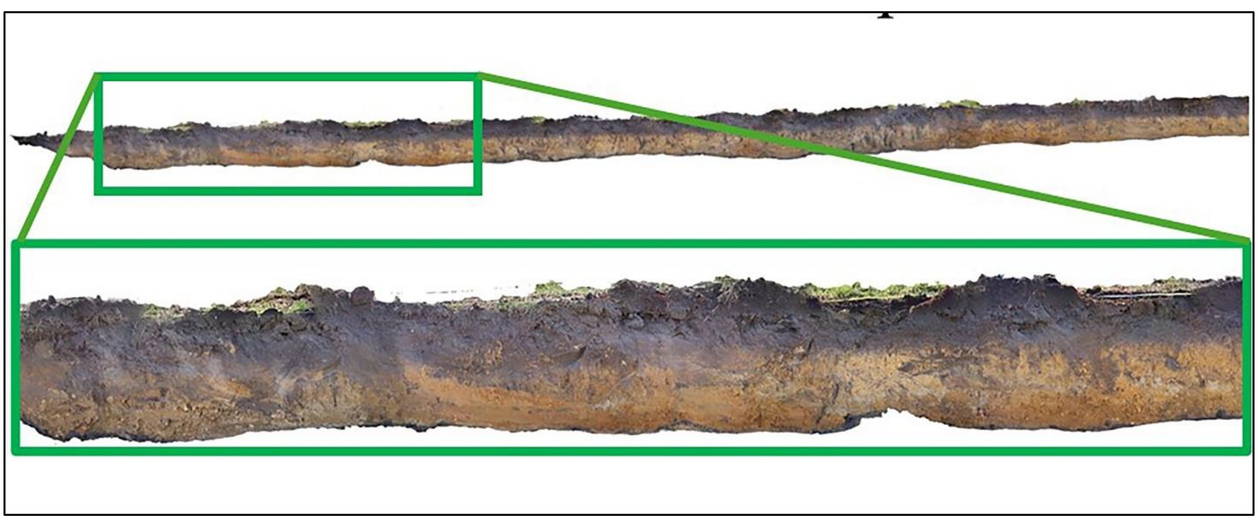

Figure 15: Orthomosaic for the eastern half of Trench 2 (background) with a detailed view of the berm intersection zone (foreground).

As was noted above, the western end of Trench 2 also provides an opportunity to assess the transition in areas outside the berm path (Figure 18). Beyond the berm's exterior margin, the AP/BE transition returns to approximately the same height as the roadbed, however, the transition does not regain the sharpness found along the interior. As was noted above, it is possible that this area indicates the nature of the AP/BE transition in non-archaeological areas, but this single example is of limited utility for making such an assertion.

Figure 16. Trench 2 western berm intersection zone ("aerial" view of colorized model).

Figure 17: Orthomosaic for the western half of Trench 2 (background) with a detailed view of the berm intersection zone (foreground).

Figure 18: Orthomosaic for the western half of Trench 2 (background) with a detailed view outside the berm intersection zone (foreground).

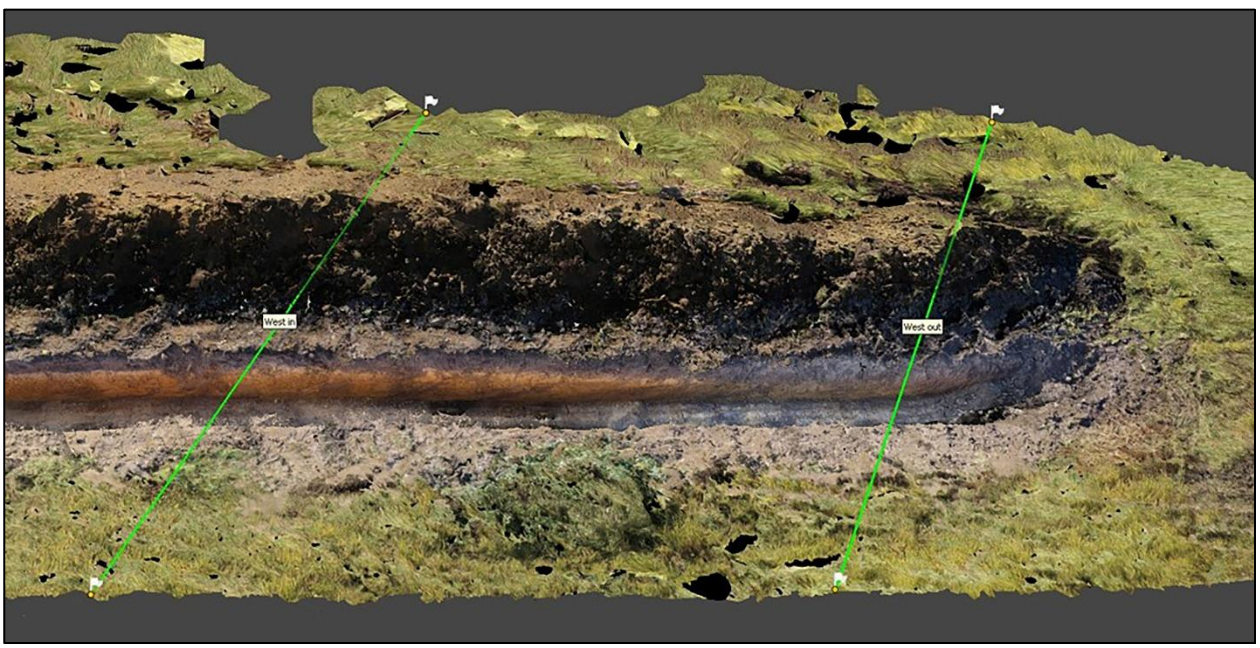

Figure 19. Trench 1 western berm intersection zone ("aerial" view of colorized model).

In Trench 1, the western end matches the pattern in Trench 2 closely: the AP/BE transition begins to dip downward near the interior edge of the berm path and remains diffuse across the width of the path (Figures 19 and 20). At the eastern end of the Trench 1, interruptions in the otherwise sharp division are present, but they do not extend across the full berm path as at other locations; nor is any dip in the height of the transition present (Figures 21 and 22).

The absence along the eastern end of Trench 1 of the changes seen at all other berm intersections is not a result of the trench being too short. Excavators extended Trench 1 to ensure coverage of an area well beyond the road path. The agricultural potential of the soil is a better explanation. This area is beyond the lower and wetter zones associated with the creek (Figure 2). The west end of Trench 1 and both ends of Trench 2 are more fully in the lower and wetter zone. More intensive plowing over the east end of Trench 1 may have more fully obliterated evidence of the berm and any intact soil surface that had been buried by the construction of the walls.

Whatever explains the unusual features along the eastern end of Trench 1, the soil profiles in Trenches 1 and 2 indicate significant and highly consistent changes in the berm intersection zones. The flat and stark AP/BE division associated with the roadbed gives way to a lower, more disturbed, and less defined transition in three of the four areas where the berm trajectory crosses excavation trenches. As drawn by Whittlesey, Squier, and Davis in 1848, the transition from roadbed could include a lowered channel just inside the berm. The dips at three of the four intersection points evoke that pattern with remarkable consistency.

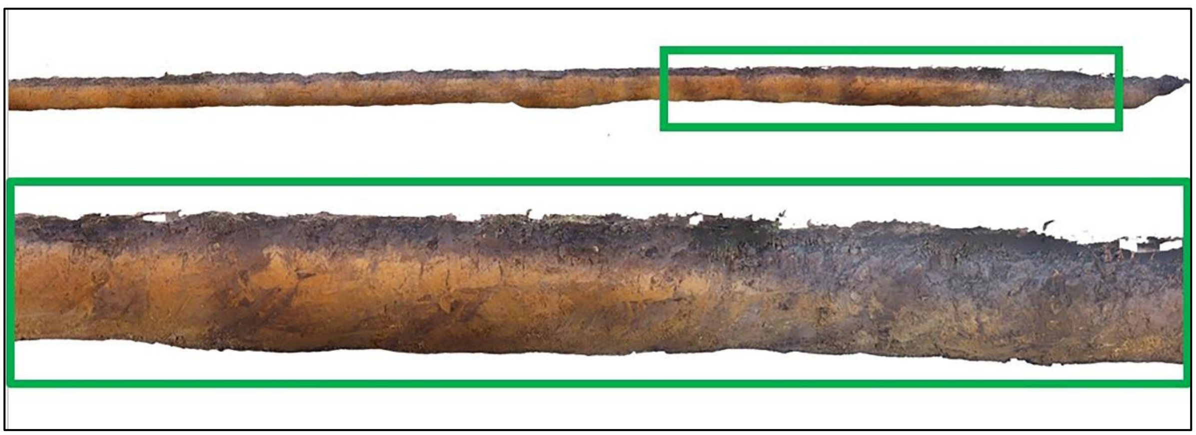

Figure 20: Orthomosaic for the western half of Trench 1 (background) with a detailed view of the berm intersection zone (foreground).

Figure 21. Trench 1 eastern berm intersection zone ("aerial" view of colorized model).

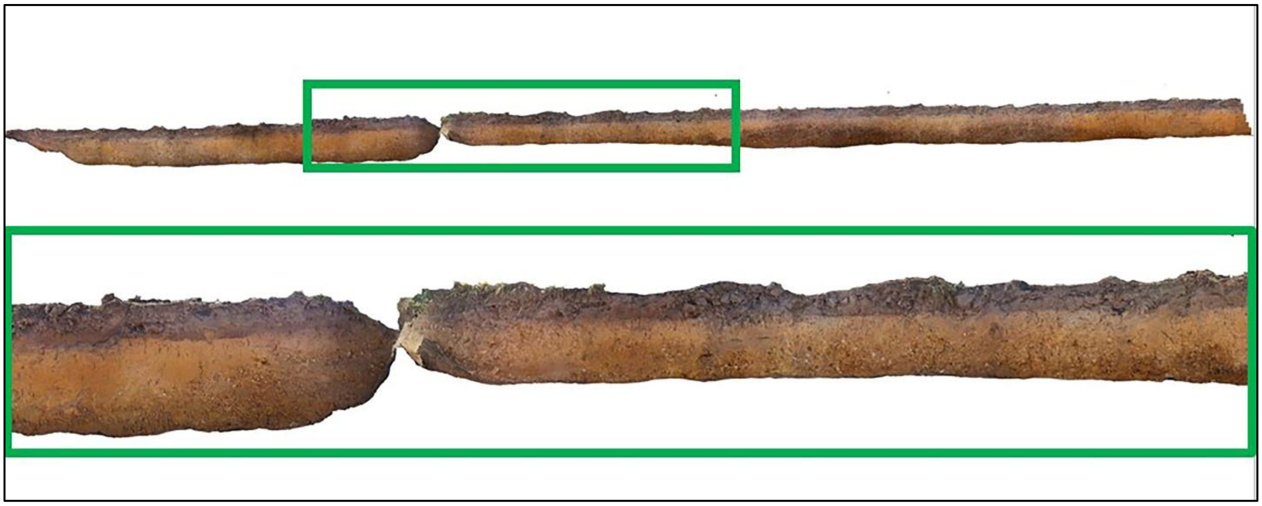

Figure 22: Orthomosaic for the eastern half of Trench 1 (background) with a detailed view of the berm intersection zone (foreground).

Figure 23. Location of trench discussed in Schwartz (2016) with berm path from the Van Voorhis Walls extended southwest (2012 Google Earth Photo. Trench location based on Schwartz's Figure 12).

Discussion

The construction of the Great Hopewell Road involved scraping earth from what would become the roadbed and piling it into berms with no use of soil materials obtained from elsewhere. Remains of the road would have experienced reforestation of the landscape over the subsequent two millennia with occasional displacement of soils through tree falls and other bioturbation; then the region saw centuries of land clearing and intensive cultivation practices, including the deep plowing that followed hard upon European pioneer settlement. Remnants of the Great Hopewell Road outside extraordinary preservation environments such as the Van Voorhis woodlot will be subtle at best.

The results presented here provide evidence—at least for areas with Ockley soils—of two sub-surface patterns associated with the Great Hopewell Road: sharp and level A/B transitions in roadbed zones and disturbed transitions with dipping heights for the A/B transition in berm zones. The murky soil zones with jumbled remains of intact soil surfaces within the berm path are well explained as the result of soil from the roadbed piled into a berm with interior drain channels, all of which was subsequently plowed flat. Evidence from two excavation trenches cannot fully confirm signatures of the Great Hopewell Road, but when the consistency of patterns in Trenches 1 and 2 is paired with their locations less than 150 meters away from known evidence of the Great Hopewell Road, they certainly merit testing via additional research.

There has been only one comparable excavation of a long trench exposing possible berm and roadbed remnants of the Great Hopewell Road. This is from a Cultural Resource Management project conducted by ASC Group approximately 1500 meters south-west of Ramp Creek. Kevin Schwarz monitored and documented excavations along the projected alignment of the road at a location where a water main was to be installed (Schwarz 2016).

Schwarz produced a profile of "a 124-m section" of the trench (see Figures 14 and 15 in Schwarz 2016: 23-24). Due to "financial constraints and project-related contention" the decision was made to locate the trench where a "water main trench" was to be excavated. Based on the Google Earth image in his Figure 12, we verified that our GHR trajectory crosses this excavation trench when extended south from the Van Voorhis walls (Figure 23).

We were unable to corroborate Schwarz's observation of a possible Hopewell roadbed comprised of "flecks of white decaying limestone … in a distinct lens within the soil profile … The limestone flecks were powdery and did not appear to be natural. At the time, it was thought perhaps the flecks were related to Hopewell pavement or top dressing for the road" (Schwarz 2016:22). One possible reason for why such a lens of decaying limestone pavement is absent in the zone around the Van Voorhis Walls is that the pooled water that seems to have been present in abundance in what appears to have been one of the Salisburys' "tangled swamps," resulted in the dissolution of the limestone due to the carbonic acid in those swamps. It is also possible that construction techniques vary along the pathway as subsurface conditions change. Little limestone is present locally.

This difference aside, however, the anomalies that Schwartz documented match our results from the region north of the Van Voorhis Walls. Schwartz's (2016:21) description of the stratigraphy of his test trench is quoted here in full:

> The profile showed what appeared to be fairly standard plow zone and B horizon soils, which were underlain by glacially derived clays... However, closer examination of the profile identified anomalies clustered around the 60-m mark of the profile, which was projected to be the center line of the hypothesized Hopewell Road as it crossed the water main trench. For example, at 85E a noticeable dip was visible in the B3A and B4 horizons, which was not seen elsewhere in the profile and appeared to be artificial ... The dip levels out at 86E and thus forms a trough approximately 1 m in width. It is possible this was the stratigraphic irregularity that could be related to the plowed-down embankment wall and ditch. To the west at 80E-85E, thickened and disturbed B horizons were noted and a slight rise was detectable in the putative location of the eastern wall ... Within the hypothesized road segment, it was notable that caving earth was present from 37E-51E, due to poor drainage. This area could not be profiled. [The enclosure framed] by the walls of the Hopewell Road, which would have been separated by about 44 m - 47 m, could have created a poorly drained interior section over time.

Schwarz found noticeable dips extending into the B horizon that "appeared to be artificial," and which Schwarz concluded "could be related to the plowed-down embankment wall and ditch" (2016:21). We also encountered poorly drained areas that could represent wetter topographic depressions and/or water impounded by the walls of the Great Hopewell Road. These similarities strengthen the suggestion that both excavations are exposing features associated with the construction, use, and destruction of the Great Hopewell Road.

Surviving subsurface traces of the Great Hopewell Road are subtle. To an extent, challenges to identifying signatures of earthen berms or the roadbed are due to plowing and other recent disturbances. But they also reflect Woodland-era practices. Middle Woodland people moved earth to shape how people move through landscapes. Archaeological excavations often yield vivid testament of ways that such work moved soil across substantial distances and radically altered soil profiles. But building earthen landscapes can take a variety of forms. Some places shout transformation so clearly that they remain obvious thousands of years later. Others speak more quietly—although not necessarily less powerfully—from their beginning. If the archaeological signatures suggested here are supported by additional research, the subtlety of sub-surface evidence for the Great Hopewell Road reflects more than post-contact destruction. It also points toward important insights about roles the road had in landscapes originally.

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References Cited

Anderson, Richard
1982 Photogrammetry: the Pros and Cons for Archaeology. *World Archaeology* 14(2): 200-205.

Atwater., Caleb
1820 Description of the Antiquities Discovered in the State of Ohio and Other Western States. In *Archaeologia Americana*, pp. 105-267. American Antiquarian Society, Worcester, Massachusetts.

Davis, Jamie, Bruce Aument, and Jason Watkins
2024 Geophysical Survey in the City of Heath, Licking County, Ohio. Letter Report on file at the Ohio State Historic Preservation Office.

Forsyth, Jane
1966 Glacial Map of Licking County, Ohio. Report of Investigation No. 59. Ohio Department of Natural Resources, Division of Geological Survey.

Grooms, Thomas
2025 Excavations at the Great Hopewell Road in the City of Heath, Newark, Ohio. Report on file, Ohio State Historic Preservation Office, Columbus.

Hostettler, Marco, Anja Buhlke, Clara Drummer, Lea Emmenegger, Johannes Reich, and Corinne Stäheli
2024 *Digital Archaeology Between Hype and Reality: The Results of a Survey on the Use of 3D Technologies in Archaeology*. Cham, Switzerland: Springer Publishing.

Lepper, Bradley T
1991 Ohio Archaeological Inventory Form for Van Voorhis Walls (33LI1401). On file, Ohio Historic Preservation Office, Columbus.

1995. Tracking Ohio's Great Hopewell Road. *Archaeology* 48(6):52-56.

1996. The Newark Earthworks and the Geometric Enclosures of the Scioto Valley. In *A View From the Core: a Synthesis of Ohio Hopewell Archaeology*, edited by P. J. Pacheco, pp. 225-241. Ohio Archaeological Council, Columbus.

2024 The Great Hopewell Road: A Biased Assessment Thirty Years On. *Journal of Ohio Archaeology* 10: 1–37.

2025 Cultural routes among the Hopewell Ceremonial Earthworks. In *Terra 2022: Proceedings of the 13th World Congress on Earthen Architectural Heritage, Santa Fe, New Mexico, USA, June 7–10, 2022*, edited by Leslie Rainer, Luis Fernando Guerrero Baca, Frank Matero, and Lauren Meyer, pp. 525-532. Getty Conservation Institute, Los Angeles, California.

Magli, Giulio and Bradley Lepper
2025 Going Straight in a Sacred Landscape: The Great Hopewell Road. *Studies in Digital Heritage* 9(1): 37-54.

Marshall, James A.
1987 An Atlas of American Indian Geometry. *Ohio Archaeologist* 37(2):36-48.

Park, Samuel
1870 American Antiquities. In *Notes of the Early History of Union Township, Licking County, Ohio* edited by O.J. Smith, pp. 35-56. Terre Haute, Indiana.

Price, Timothy
2004 *The Great Hopewell Road: GIS solutions towards pathway discovery*. Unpublished Master of Arts Thesis, Ohio University, Athens.

Reeves, Dache
1936 A Newly Discovered Extension of the Newark Works. *Ohio State Archaeological and Historical Quarterly* 45:189-193.

Romain, William F. and Jarrod Burks
2008 LiDAR imaging of the Great Hopewell Road. *Current Research in Ohio Archaeology*, https://ohioarchaeology.org/file_download/e7d988bd-5691-4381-b567-08edbc7907d2; accessed 9-22-2025.

Salisbury, James and Charles Salisbury
1862 Accurate Surveys and Descriptions of the Ancient Earthworks at Newark, Ohio. Manuscript on file. American Antiquarian Society, Worcester.

Schwarz, Kevin R
2016 The Great Hopewell Road: New Data, Analysis, and Future Research Prospects. *Journal of Ohio Archaeology* 4:12-38.

Simpson, Duane, and Kenneth L. Kvamme
2001 Geophysical Investigations of the Great Hopewell Road, Cynthia Street Park, Heath, Ohio. Archaeo-Imaging Lab, Department of Anthropology, University of Arkansas, Fayetteville. On file, Ohio History Connection, Archaeology Collection Facility, Columbus.

Squier, Ephraim and Edwin Davis
1848 *Ancient Monuments of the Mississippi Valley*. Smithsonian Contributions to Knowledge, Vol. 1. Smithsonian Institution.

Weiant, Warren S.
1931 Letter to Emerson Greenman Dated 2 January 1931. On file, Ohio History Connection, Archaeology Collections Facility, Columbus, Ohio.

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[1] Tiles used: BS19780737, BS19780738, BS19800737, BS19800738. Source: https://gis1.oit.ohio.gov/geodatadownload

[2] See detailed photomosaic images at https://ohioarchaeology.org/what-we-do/research/research-articles-and-abstracts/articles-and-abstracts-2026.html