

1. SMALL SCALE GEOARCHAEOLOGICAL INVESTIGATIONS OF EARTHEN WALL CONSTRUCTION AT THE HOPETON EARTHWORKS (33RO26)

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Several geoarchaeological and geophysical investigations have been conducted at the Hopeton Earthworks (33RO26) and met with good success (Figure 1). As such, soil cores excavated in the summer of 2007 were studied using a two-pronged methodology of soil profile characterization and magnetic susceptibility testing. These techniques were employed to closely examine three sections of earthen wall at different locations at Hopeton as a means of understanding the soil composition of the walls and assessing possible uniformity in wall construction across the site. The following focuses solely on the geoarchaeological study of the selected locations.

The present study was conducted to achieve two goals: 1) to better understand how the earthworks at Hopeton were constructed and, 2) to describe Hopeton's architectural grammar. "Architectural grammar" is a term defined by Connolly (2004) and is related to the morphology of earthen enclosures (i.e., geometric shape, alignments, gateway placement, and the presence or absence of mounds at an earthwork site), the placement of earthen enclosures across a landscape, and the modification of earthen enclosures through time, possibly to meet changing cultural ideologies. Further subdivision of this term into design grammar and interpretive grammar is necessary. Design grammar controls and directs the construction of earthen enclosures while interpretive grammar standardizes the meaning associated with earthen enclosures and directs behaviors and cultural events at these sites.

As mentioned previously, three sections of the earthen enclosures at Hopeton were selected for magnetic susceptibility testing and soil characterization (Figure 2). The first section is located in an area northeast of the rectangular enclosure's northeast corner and was selected to examine a buried soil identified during trench excavation in 2005. Six cores were excavated in this area, comprising Core Set 1. Core Set 2, also containing six cores, was excavated at the confluence of the rectangular and circular enclosures to explore how this section was formed. The last set of cores, Core Set 3, was excavated to determine how a segment of earthen wall was terminated. To accomplish this, eight cores were excavated in the southwest corner of the rectangular enclosure.

Geomorphologic investigations at Hopeton have revealed two things essential to interpreting the data presented below. First, prior to the initiation of earthwork construction, the A horizon (topsoil) was stripped off the site, exposing and slightly truncating the B horizon (subsoil) and providing a foundation for wall construction (Lynott and Mandel 2006). Probably, the removed soil was used to construct the parallel walls that extended from the western wall of the rectangular enclosure, southwest toward the Scioto River. In order to build the earthwork walls, relocated and modified soils were carefully laid down, creating a discrete boundary between wall fill (those soils used in earthen wall construction) and subwall (*in situ* soils). The wall fill contains features filled with charcoal, burned earth, and artifacts such as mica, lithics, and burned logs, which are likely associated with wall construction events such as the

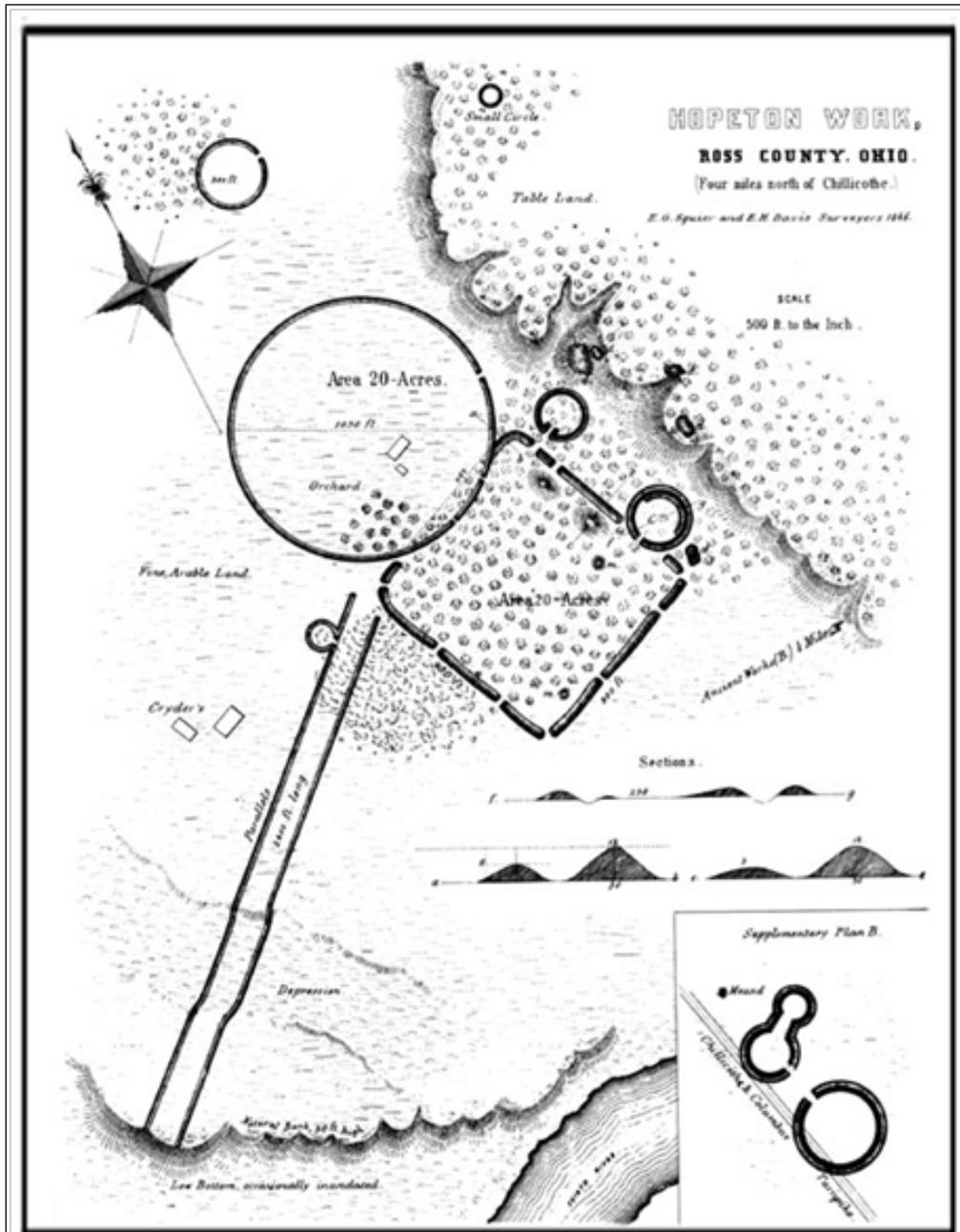


Figure 1. Squier and Davis (1848:50) map of the Hopeton Earthworks.

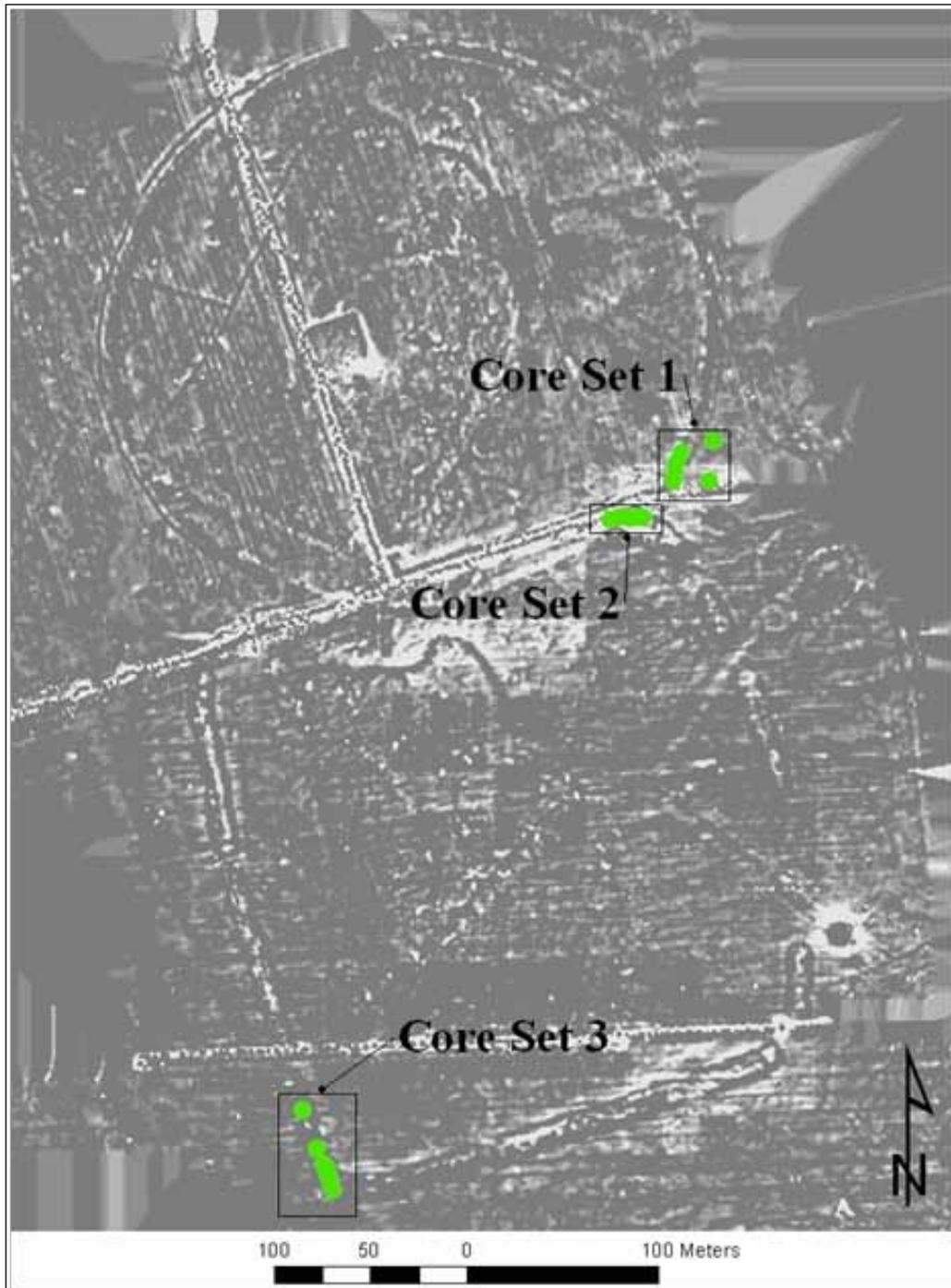


Figure 2. Locations of Core Sets 1, 2, and 3.

initiation or termination of construction for a day or season. Because of this method of construction, most of the cores excavated for this study contain a wall fill unit that directly interfaces with the subwall unit. Also, because only a few of the cores exhibit A horizon development between the bottom of the wall fill and the subwall, it is clear that, for the most part, no significant period of time elapsed between topsoil stripping and the construction of the earthwork walls. A “typical” core soil profile was developed using generalized soil stratigraphic data from the three core sets (Figure 3).

Second, as at most Hopewell and other earthwork sites, color appears to have been a key criterion in determining soil placement. Hopeton’s earthen walls are comprised of soils in three colors: yellow, red, and brown (Figure 4). Generally, yellow soils form the inner core of the wall, topped with a red soil cap only on the exterior. A gray-brown soil was then laid over the yellow and red soils. This sequence does not pervade the site and appears to have been utilized only in certain areas. Additionally, soils of various textures were utilized in earthen wall and were probably considered carefully during construction. Soil texture placement, like that of soil color, does not occur consistently across the site.

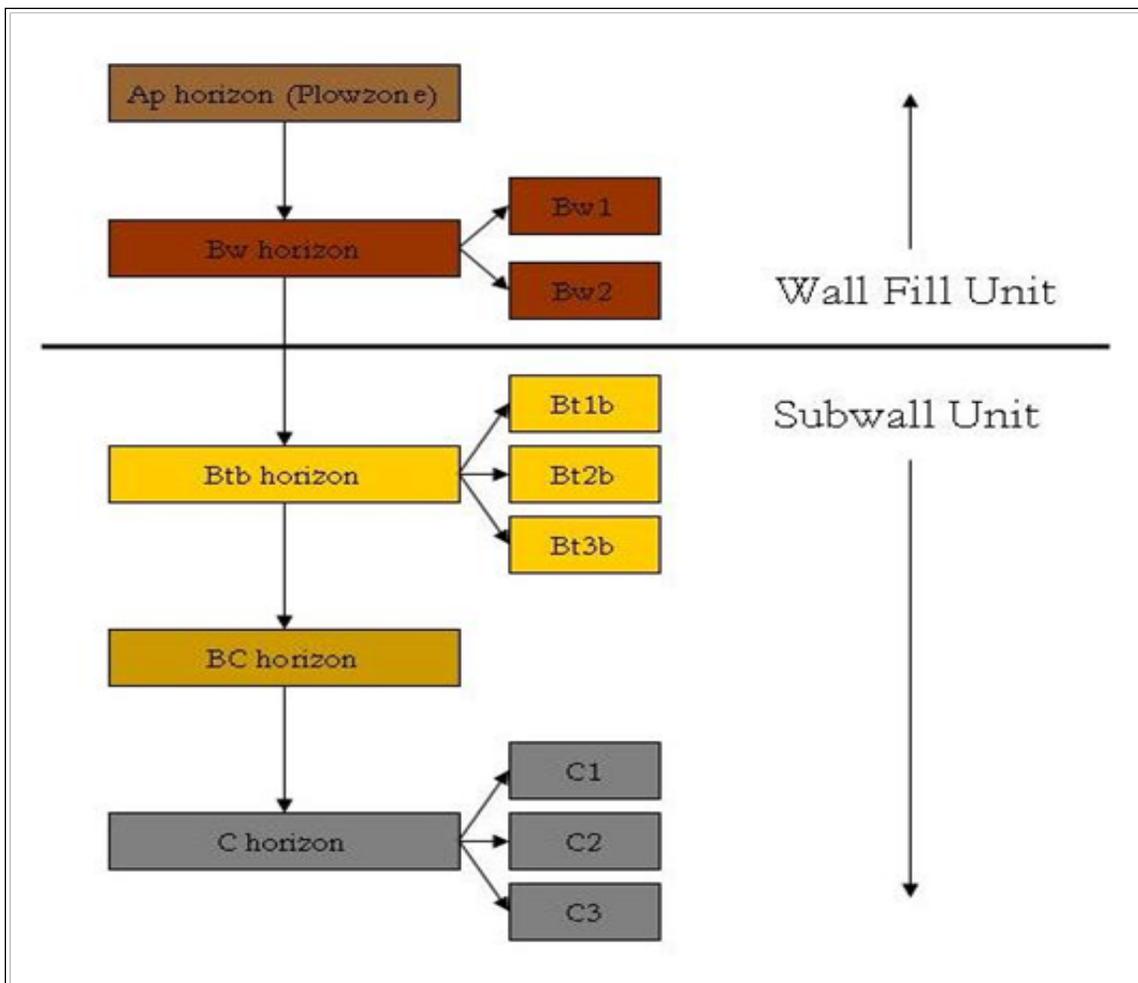


Figure 3. Typical soil stratigraphy seen in earthwork walls at Hopeton.



Figure 4. Soil stratigraphy in Trench 1 showing discrete soil units (courtesy of Mark Lynott).

Core Set 1 (Figure 5)

Important to understanding the stratigraphy in each core is the location of the cores in relation to the earthen enclosures. Core 1 and 2 were placed near the north-northeastern wall of the rectangular enclosure. Core 3, 4, and 5 were located within the circular earthwork wall. Core 6 came from slightly east of the circular enclosure and north of the rectangular enclosure. The stratigraphy in the six cores from Core Set 1 follows a general pattern. The wall fill unit progresses from an Ap horizon to a Bw horizon before interfacing with the subwall, although Cores 1 and 6 deviate from this slightly: Core 1 exhibits C horizon development below the Bw horizon and Core 6 contains a transitional AB horizon below the Bw horizon. The subwall stratigraphy generally begins with two buried Bt horizons (Bt1b and Bt2b), followed by a buried BC horizon, and finally, a C horizon. Cores 1 and 2, which are closest to the rectangular enclosure, are exceptions to this as they contain Ab and ABb horizons at the top of the subwall.

The variations in each core's stratigraphy can be attributed to their proximity to either of the enclosures since staging and construction of the two enclosures probably resulted in differential levels of disturbance. It is possible that the buried A horizon in Cores 1 and 2 developed when the topsoil was stripped from the footprint of the rectangle and the area was left exposed. However, the more likely scenario is that this A horizon was inverted and redeposited during cultivation. The upper portions of Cores 3-5 were truncated by cultivation but otherwise follow the expected earthen wall soil

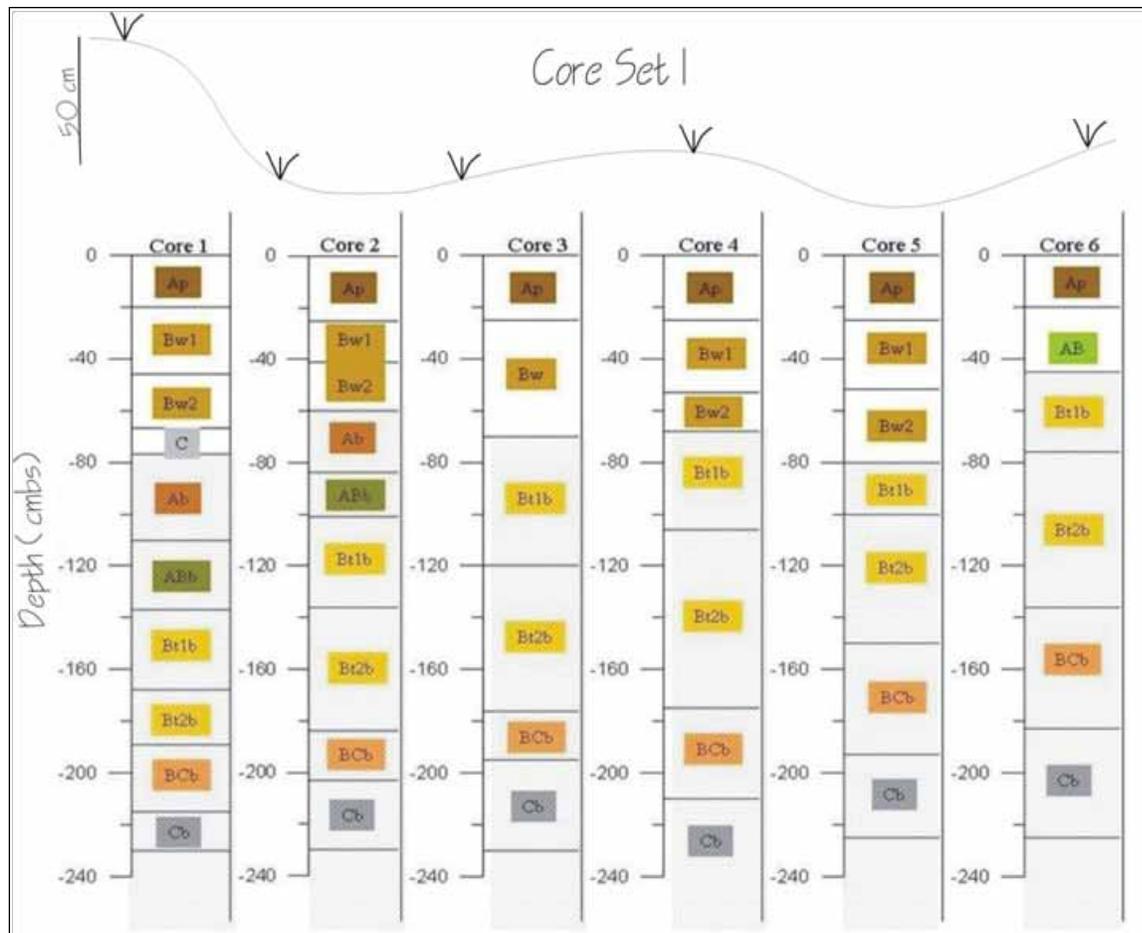


Figure 5. Soil horizons from Core Set 1. The shaded area indicates subwall soils.

profile. Core 6 is anomalous in that it does not contain a wall fill unit and though this area was probably subjected to topsoil stripping, it was largely unaffected by earthen wall construction-related disturbance.

Core Set 2 (Figure 6)

This core set did not follow as generalized a stratigraphic sequence as Core Set 1. In most of the cores in Core Set 2, the wall fill unit begins with an Ap horizon, which grades into an AB horizon, and then a Bw horizon. The exception is Core 7, which looks more like Core 1. In all of the cores, the base of the subwall is similar to that in Core Set 1 with two buried Bt horizons transitioning into a buried BC horizon and ending in a C horizon. Core 8 and 9, however, have a BC horizon that grades into a buried Bw horizon before transitioning into the Bt1b horizon. Core 7, 10, and 12 all have buried A horizons at the top of the subwall, and although it is possible that this is a construction-related anomaly, it is more likely redeposited wall fill.

Two possible scenarios for the construction of this portion of the site were identified before the core set was excavated. The first scenario postulated that the northern wall of the rectangular enclosure crossed over the top of the southern arc of

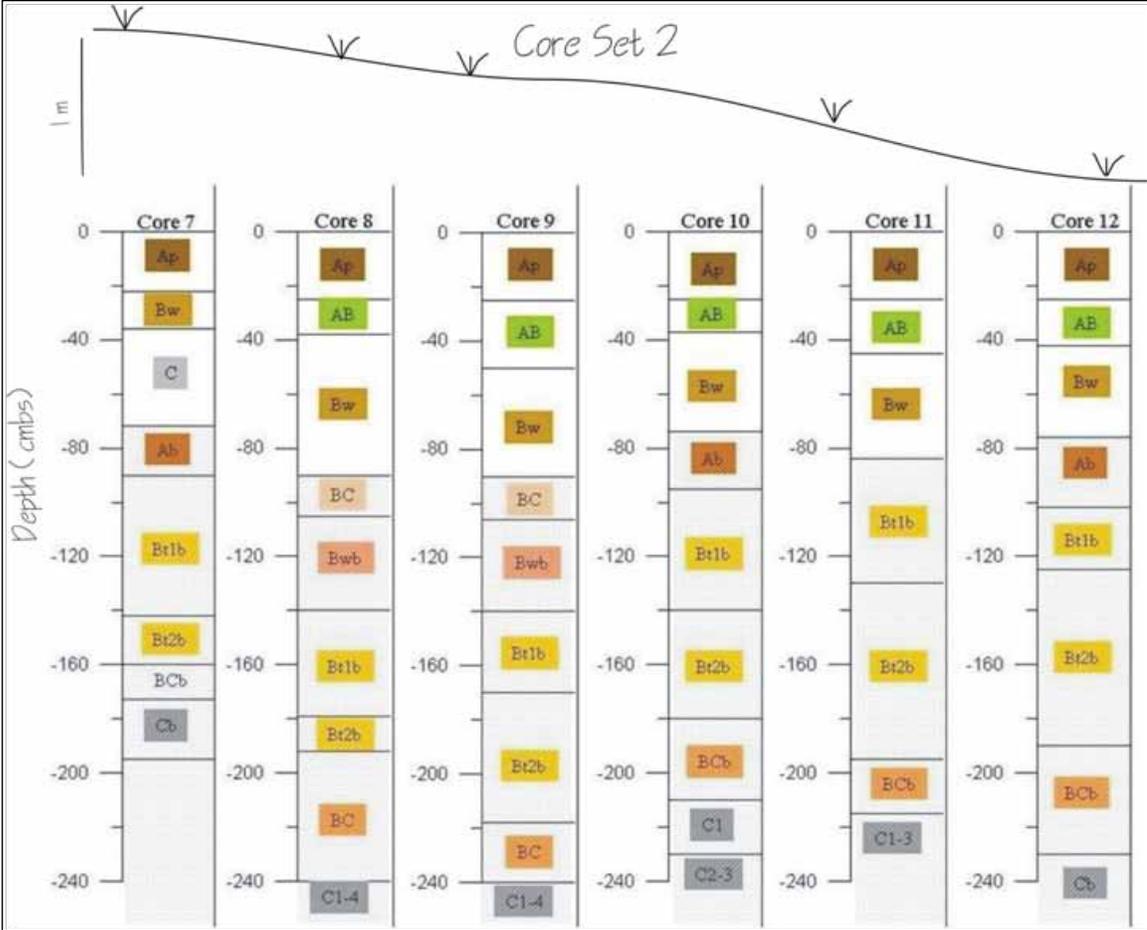


Figure 6. Soil horizons from Core Set 2. The shaded area indicates subwall soils.

the circular enclosure. The second scenario held that the two enclosures were built at approximately the same time and one enclosure’s wall was simply modified to fit the other’s. Instead, this study found that the confluence of the circular and rectangular enclosures was built as a single unit. This is corroborated by a close look at Squier and Davis’ (1848) map of the site, which shows the southeastern portion of circular enclosure’s embankment wall as a continuous unit and the northeastern corner of the rectangular enclosure intersecting it. This said, it is important to consider that cultivation practices at the site have immensely disturbed the earthwork soils as evident by the buried A horizon in three of the six cores in this set.

Core Set 3 (Figure 7)

The earthen wall segment the cores in this set were excavated from is located in the southeastern corner of the rectangular enclosure and runs north to south. The cores run down the center of the segment, through and past its termination. In all but Core 20, the wall fill unit is an Ap horizon that grades into a Bw horizon. Core 20 begins with an Ap horizon underneath which there is an AB horizon, followed by a Bw horizon. The subwall stratigraphy is similar to that seen in the other core sets, beginning with two buried Bt horizons, followed by a BC horizon, and ending in a C horizon (although

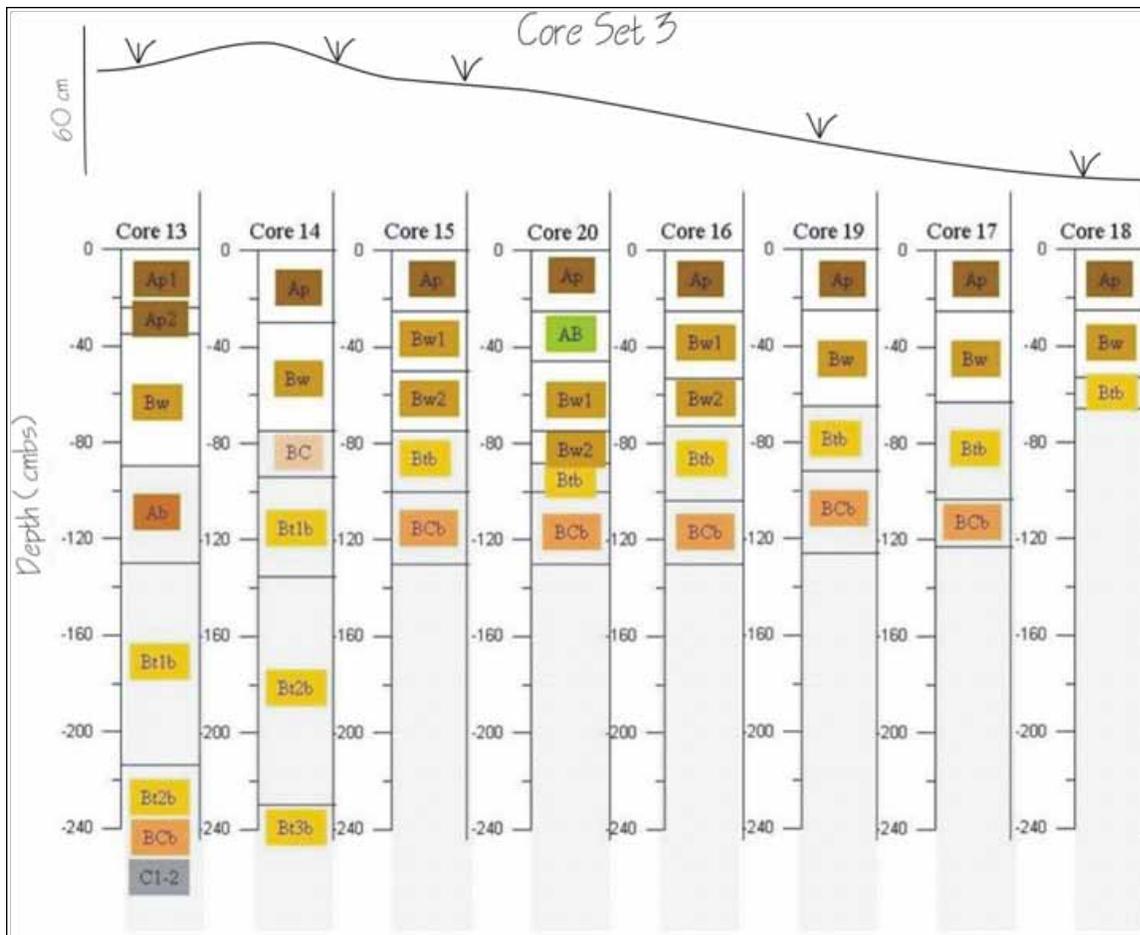


Figure 7. Soil horizons from Core Set 3. The shaded area indicates subwall soils.

only Core 13 was excavated to a depth where the C horizon was encountered). Moving south through the cores, the wall fill unit becomes shallower, indicating a sloping wall termination rather than an abrupt, square termination. However, other wall segments may terminate in different manners, especially in the gateways that occur in the centers of the earthen walls.

Earthen Wall Construction at Hopeton

Sequencing the construction of the large earthen enclosures at Hopeton is difficult to achieve. The data from Core Set 3, however, indicate that the two large enclosures were constructed at approximately the same time. Either they were built simultaneously or one was built directly after the other. Given the stratigraphy encountered in the confluence of the circular and rectangular enclosures, it is likely that the circular enclosure was built first and the rectangular enclosure built soon after. Unfortunately, though a robust radiocarbon sequence is available for the site (Lynott 2008), the dates are too coarse for understanding construction events that most likely took place within a few years or decades of one another. A lack of evidence of A horizon development within the wall fill unit means that soil layers were not left exposed for extremely long periods; A horizons take approximately 30 to 40 years to

develop depending on environmental factors. Instead, various soils were laid down and subsequently covered within a relatively short time.

That the site was stripped of its topsoil prior to construction and that several sections of earthen wall reveal yellow-red-brown soil and textural sequences are the two main components to understanding Hopeton's architectural grammar; the findings presented here support this. In examining the soil stratigraphy of the three sections of earthen wall chosen for this study, it would seem that the soils used to construct these areas were placed somewhat randomly, with little regard to uniformity. Though the aberrant nature of these sections of earthen wall could be an additional component of the site's architectural grammar, it is difficult to fit these areas into our understanding of Hopeton's construction.

Some alignment issues are present at Hopeton that are not normally seen at other earthwork sites. A cesium gradiometer survey conducted across the site reveals that the circular and rectangular enclosures are not very well aligned; the circular enclosure sits slightly east of the axis it should share with the rectangular enclosure. Squier and Davis (1848) found that the circular enclosure extends down into the rectangular enclosure, something not seen at other sites. In addition to this, the southeast corner of the rectangular enclosure is not entirely square. Thomas (1880) found that the circular enclosure's north-south and east-west diameters are dissimilar and its curvature is imperfect. These facts may indicate that Hopeton was built either without the detailed planning exhibited at other earthwork sites or before precision in construction was implemented. Interestingly, radiocarbon dates place Hopeton's construction somewhat earlier in time than earthwork sites in the vicinity. These factors may help explain why the internal structure of the earthen wall sections studied here appear lacking in uniformity or standardization.

Conclusion

It should be noted that the magnetic susceptibility data not provided in this article shows that the wall fill and subwall interface differently than that inferred from the soil stratigraphic profile. A closer examination of the geophysical data from this study is warranted and will be completed in the near future. Once these data are rectified, greater clarity about Hopeton's construction should be achieved. Though the soil stratigraphy does not fit the idea that Hopeton was constructed in a regimented manner, it does support two components that have been identified as comprising the site's architectural grammar, soil placement based on color and texture and topsoil stripping as an initial step in earthen wall construction. The variations observed in Hopeton's earthen wall stratigraphy may be due to its early position in the chronology of earthwork construction in the Scioto River valley. Further investigations need to identify the location and stratigraphy of the parallel walls, which may prove difficult if the stripped topsoil really was used to construct these walls.

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