



Mapping the Moundville Community: A GIS Analysis of the Moundville Roadway

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Introduction

The Moundville site is a large, multi-mound Mississippian civic-ceremonial center in the Black Warrior Valley of west-central Alabama. Over a century of archaeological research in the region has advanced our understanding of Moundville's culture history and laid the groundwork by which to explore detailed issues of power, economy, and ideology. However, there are still basic gaps in our understanding of Mississippian lifeways in the Black Warrior River Valley. How were Mississippian households organized at Moundville, and how did they articulate with larger residential and social groups at the site? How did different households vary in terms of size, composition, production, consumption, and exchange? And, did this variation correspond with community-level differences in social identity and power? The creation and use of a new GIS map of Moundville featuring the 1939 and 1940 Roadway excavations is providing answers to these questions.



Aerial view of Moundville, showing the modern roadway around the plaza and mounds.

Creating a Geographical Information System (GIS) for Moundville

The construction of a GIS map for the 1939–1940 Roadway excavation is part of a larger project to create a geographical information system for Moundville. This system is being developed using ESRI ArcView, a software package which allows the integration of georeferenced raster and vector images (e.g., topographic maps, excavation plans, aerial photographs, satellite imagery, etc.) with tabular data. The rationale for developing such a system is that, when completed, it will: (1) provide a uniform framework for organizing the results of nearly 100 years of research at the site; (2) permit multiple researchers to access and build upon a common dataset; and (3) foster greater cooperation among those researchers.

Bringing the Roadway excavation plan into ArcView required several steps. First, each of the 147 maps which comprise the overall excavation plan was photocopied and scanned at 150 dpi. Each map then was loaded into DesignCAD, a vector drawing program, and manually traced. Different kinds of entities (e.g., excavation outlines, burials, hearths, wall trenches, postholes, and piece-plotted artifacts) were traced separately and in different colors so that their identities would be preserved when exported to ArcView (see below).



Three views of Roadway excavation section 4+50 to 5+00 (West of Mound P): field drawing (left), CAD drawing (center), and GIS representation (right).

Because of the unusual manner in which the separate maps articulate with one another, it was necessary to create a master drawing in DesignCAD that depicted an accurate centerline for the entire roadway before we could piece together the maps. This was done by georeferencing the Fosters, Ala. 7.5-minute USGS quadrangle map (1969), which contains the Moundville site (Mound State Monument), and then tracing the modern roadway and the location of the old administration building. Along the entire 2.4 km length of the serpentine roadway, the administration building was the only landmark shown on the USGS topographic map which could be used to provide a reliable starting point for placing the individual excavation maps along the roadway centerline.

Once the centerline was established, individual excavation maps were brought into the master map and fitted onto the roadway's centerline. When completed, the total accumulated error along the entire length of the roadway was found to be less than two meters. In order to provide an additional check on the placement of maps along the centerline, a 1935 aerial photograph of Moundville, showing an earlier roadway, was digitized and superimposed on the CAD drawing. This exercise showed that several gaps in the Roadway excavation (presumably caused by the existence of this earlier road) matched the alignment of the 1935 road. The completed map also was compared to one drawn by Christopher Peebles in 1969. The Peebles map, drawn without benefit of the modern topographic map, deviates only slightly from our map.

The final step in constructing the GIS map was to export the CAD drawing to ArcView and create individual shapefiles for excavations, burials, hearths, wall trenches, postholes, and artifacts.

Household and Community Organization at Early Moundville

The construction of the GIS map for the Moundville Roadway excavations facilitated the identification of a variety of household and community organizational trends. One of the most important discoveries is that Moundville's early Mississippian residential population was divided into numerous multi-household groups. These groups roughly correspond with broader social and political divisions at the Moundville site—divisions that are represented in the distribution of mounds around the central plaza. The identification of these discrete residential groups was accomplished by calculating the ratio of postmold density to excavation area for each of the 50 x 50 ft blocks comprising the Moundville Roadway. Differences in postmold density per excavation block were then visually represented by a graduated color scheme (see top, far right).

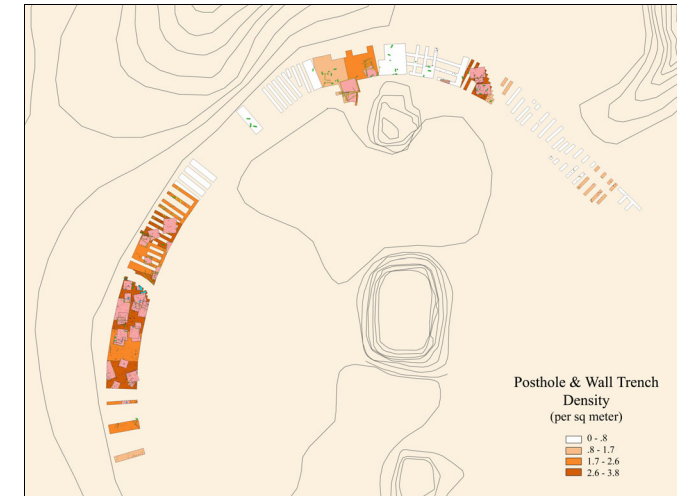


GIS map of Moundville, showing the 1939–1940 Roadway excavation.

Another important discovery relates to the composition of these multi-household groups. The creation of a histogram plotting the distribution of building floor areas revealed a tri-modal distribution of building sizes (see far right). Multi-household groups identified in the GIS map of the Moundville Roadway consist almost exclusively of the smallest size-mode of buildings, although three residential groups also include a small number of intermediate-sized buildings. With one exception, the largest Mississippian buildings identified within the Moundville Roadway lay outside of residential areas or are associated with a small subset of domestic structures. These oversized buildings probably served as public facilities of some kind. The presence of ritual items (e.g., turtle-shell rattles and an overrepresentation of serving wares) in the vicinity of these structures suggests that they were areas of ceremonial activity.



Close-up views of selected portions of the Moundville Roadway excavations.



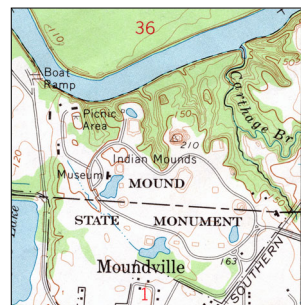
GIS view of the Roadway excavation west of Mound P, showing density of architectural features per excavation block.

Acknowledgments

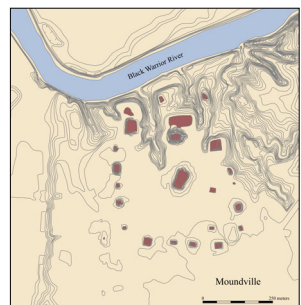
We would like to thank Eugene Futato for providing access to the original maps and artifact assemblages from the Moundville Roadway excavations. Anna K. Bauguess, Catherine V. Brooks, Tara Miranda, and Jessica Newman are acknowledged for their help in digitizing portions of the Roadway map. A special thanks goes to C. Margaret Scarry and John Scarry for funding transportation to and lodging at Moundville, Alabama, where the early stages of this research were conducted. Vernon J. Knight provided digital files for various topographic and photogrammetric surveys at Moundville, and these were used to construct the overall topographic map of the site. The Office of Archaeological Services in Moundville, Alabama and the Research Laboratories of Archaeology in Chapel Hill, North Carolina provided institutional support. Finally, we would like to thank Tony Boudreaux, Hunter Johnson, Chris Rodning, Vin Steponaitis, and Amber VanDerwarker for their advice on mapping and Mississippian architecture. Financial support for this research was provided by the National Science Foundation, Grant #0003295.

References Cited

- Peebles, Christopher S. 1973 *Excavations at Moundville, 1905–1951*. Unpublished manuscript on file at the Research Laboratories of Archaeology, University of North Carolina, Chapel Hill.
- Steponaitis, Vincas P. 1998 *Population Trends at Moundville*. In *Archaeology of the Moundville Chiefdom*, edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 26–43. Smithsonian Institution Press, Washington, DC.



USGS topographic map of Moundville, showing the roadway.



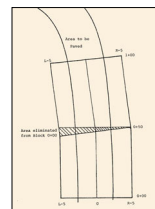
GIS topographic shapefile of Moundville, with mounds highlighted.

Excavation and Mapping of the Moundville Roadway

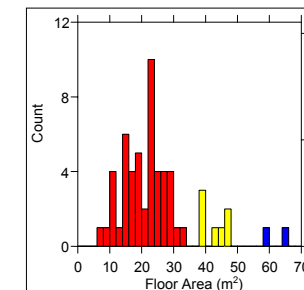
The 1939 and 1940 Civilian Conservation Corps excavations of the modern Moundville Roadway recovered a substantial body of information about Moundville's residential community (Peebles 1973). These excavations were conducted at portions of the site that were to be disturbed by the path of a 50-ft wide and 1.5-mile long road that now encircles portions of the Moundville plaza and areas east, west, and south of the mounds. In addition, several large block excavations were conducted prior to the construction of an entrance building and site museum. These excavations uncovered structures, pits, and other features, and the majority of these date to the late Moundville I phase (Peebles 1973; Steponaitis 1998).

The Roadway excavations were divided into 147 50 x 50-ft square blocks. Each block was subdivided into ten 5 x 50 ft blocks. In several areas where archaeological remains revealed by these excavations were especially dense, work crews opened up larger blocks to expose complete house floors and adjacent artifact-rich midden deposits. While most ceramic artifacts were assigned to these general excavation units, many nonceramic artifacts (e.g., copper, shell, bone, pigments, greenstone celts and pendants, projectile points, discoidal, and nutting stones) and large pottery vessel fragments were piece-plotted on the original excavation maps.

Maurice Goldsmith supervised the Moundville Roadway excavations and devised the mapping system for the project. Essentially, this system involved overlaying a series of square excavation blocks along the winding path of the Moundville Roadway. In the case of a left-hand curve, Goldsmith began by laying down one block along the curve. The next block was placed above the first such that its bottom-right corner fit flush with the top-right corner of the first block. The bottom-left corner of the second block was then set to create a thin triangular area of overlap with the top-left portion of the first block. This triangular area of overlap was then eliminated from the first or lower block, giving it a beveled top (see right).



Drawing of the relationship between the excavation blocks and the roadway (from Peebles 1973).



Floor area of Mississippian structures from the Moundville Roadway.