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# The Pagetown Works (33MW422): A Newly Recorded Pair of Precontact Earthen Enclosures in Bennington Township, Morrow County, Ohio.

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## Abstract

While reviewing remote sensing data in Morrow and Knox counties, the author identified a pair of topographic anomalies consistent with precontact earthen enclosures found throughout much of southern Ohio. These anomalies were first identified in the National Elevation Dataset (NED) Light Detection and Ranging (LiDAR) raster while surveying along perennial streams. Following initial identification, additional publicly available remote sensing datasets, including the Ohio Geographically Referenced Information Program (OGRIP) III 2019 LiDAR, were reviewed. These data confirmed that these topographic anomalies are more than likely precontact earthworks. Despite their pronounced topography, these enclosures were never recorded in the Ohio Archaeological Inventory (OAI) maintained by the Ohio State Historic Preservation Office (SHPO). This paper summarizes a review of various remote sensing datasets including old and new LiDAR data, historical aerials, and plat maps that resulted in the identification of Morrow County's newest-recorded earthworks.

Keywords: LiDAR, earthwork, superellipse, squircle, remote sensing.

## Introduction

In late 2025, as part of a larger, on-going study of Ohio earthworks, the author conducted a review of superellipse, or square and rectangle with rounded corners, also commonly known as 'squircle', earthworks recorded in the State Historic Preservation Office's (SHPO) Ohio Archaeological Inventory (OAI). While the objective of this effort has primarily been to review remote sensing data at recorded earthwork sites, a total of five previously unrecorded earthworks have been identified. These sites include earthworks in Highland, Knox, Licking, and Morrow counties. Beginning with the SHPO data, filtered by earthwork sites, the author reviewed the National Elevation Dataset (NED) data in the immediate area. Because the SHPO locational information is often imprecise, a maximum buffer of 1 km around each OAI centroid was reviewed. While reviewing NED data between the Lutheran Memorial Camp Mound and Enclosure (33MW225) in Lincoln Township, Morrow County, and the Liberty Township Works (33KN14) in Knox County, the author stumbled upon a pair of topographic anomalies that form the Pagetown Works (33MW422) (Figure 1).

## Site Setting

The Pagetown Works sit near the east bank of Big Walnut Creek, not far from the unincorporated community of Pagetown in Bennington Township, Morrow County, Ohio. Hence,

this site has been dubbed the Pagetown Works. The site sits on a high point in the Wisconsin End Moraine within the Galion Glaciated Low Plateau (Brockman 1998; Ohio Division of Geologic Survey 2005). The entire site is comprised of Amanda silt loam which is common along streams and ground moraines in the region. The Amanda silt loam is characterized by 12-18% slopes and is well drained. The original surface of this soil unit is typically removed via erosion, leaving a clayey subsoil near the surface in most settings (United States Department of Agriculture and Ohio Department of Natural Resources 1986). The site sits at an elevation of 341.99 m AMSL, 12.19 m above Big Walnut Creek about 90 m to the southwest.


**Figure 1. Overview of the Pagetown Works (33MW0422) with most-current OSIP III aerial imagery and the NED LiDAR data.**

## Remote Sensing Review

Following the initial identification of these anomalies, a review of readily available historical maps, aerial photographs, and additional LiDAR data was conducted. This review is presented chronologically by order of source data collection or publication.

The Pagetown Works were not recorded in any of the reviewed county plat maps (Buck 1901; Harwood and Watson 1857; Lake 1871). These sources are worth reviewing because many earthwork and mound sites were recorded in Ohio centennial-era county atlases (see Caldwell 1872; Lake 1875). Mills' *Archaeological Atlas of Ohio* does not include the site and, further, includes no sites within Bennington Township (Mills 1914). According to Ohio Department of Transportation (ODOT) aerial photographs, the site has been maintained in deciduous tree cover since at least the 1950s.

Although the earthworks were initially identified in the NED data, they are far better defined in the Ohio Geographically Referenced Information Program (OGRIP) III 2019 LiDAR data (Figure 2). For reference, the NED raster is available via the 3D Elevation Program, known as 3DEP, and can be streamed into any Geographic Information System (GIS) as a Representational State Transfer, or REST, Service. This data is derived from multi-resolution Digital Elevation Models (DEMs) but is available at 1 m (3.28 ft) resolution as a seamless DEM across most of North America. While it is a useful dataset to begin reviewing an area of interest, it should not be used for archaeological site interpretation. The OGRIP I LiDAR for Morrow County, collected in 2007, at a resolution of 2.5 ft (0.76 m) does not clearly show the earthworks (Figure 2). In 2019, OGRIP III LiDAR was collected across Morrow County at 1.25 ft (0.38 m) resolution, recording the earthworks in great detail (Figure 2).

## Earthworks Description

As part of the state-wide survey of superellipses, a variety of metrics from each enclosure have been derived from the OSIP III LiDAR and analyzed in QGIS 3.44.7. Area metrics include area enclosed by outside of embankment (exterior), inside of embankment, outside of ditch, and inside of ditch (interior) (Tables 1-2 and Figure 3). Elevation metrics include the difference between interior, the ditch, the embankment, and exterior (Tables 3-4 and Figures 4-6). For the purposes of the following analysis, the inside of the ditch is equivalent to the inside flat space within the center of the enclosure and is thus referred to as the interior. Conversely, the area outside the embankment is referred to as the exterior.

## North Enclosure

The north enclosure is approximately circular with a maximum exterior embankment diameter of 38.00 m and a minimum of 37.40 m, a discrepancy of 0.60 m. The exterior of the embankment encloses an area of 1134.95 m². The interior encloses 235.70 m², or 20.77% of the total enclosure area. The embankment itself covers an area of 413.12 m² while the ditch covers

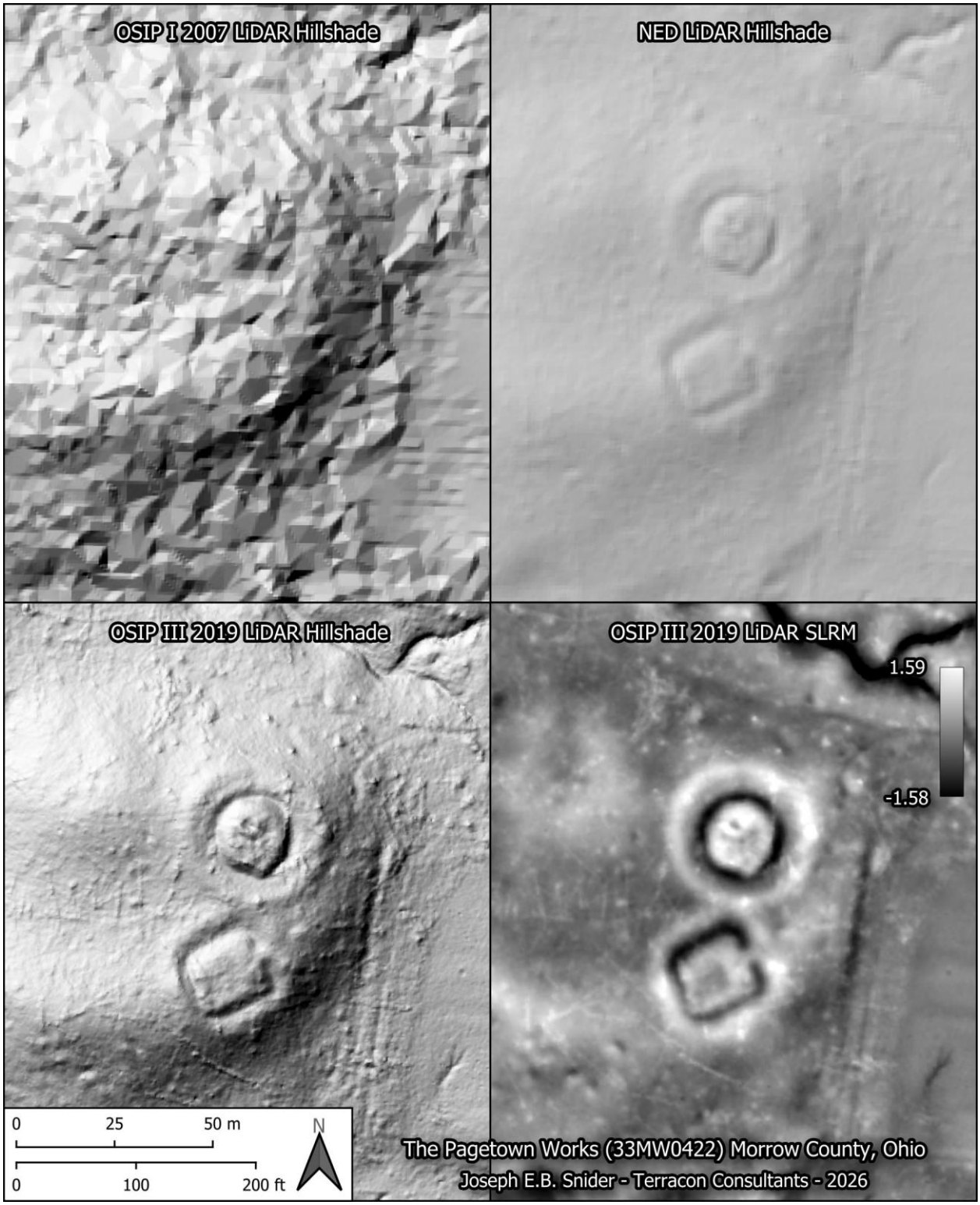


**Figure 2. The Pagetown Works (33MW0422) c 2007 OSIP I LiDAR, NED LiDAR, and 2019 OSIP III LiDAR data.**

206.77 m² for a total of 619.89 m². The embankment and ditch constitute 54.62% of the total enclosure area. The maximum embankment width is 6.4 m, and the minimum is 2.3 m. The maximum ditch width is 3.8 m while the minimum is 2.4 m.

The average elevation in the ditch is 0.76 m less than the interior and 0.01 m greater than the exterior. The average elevation of the embankment is 0.40 m greater than interior, 0.77 m greater than the ditch, and 0.38 m greater than the exterior. The average interior elevation is 0.78 m greater than the average exterior elevation.

The presence of a gateway in the north enclosure is not apparent. Though variable, elevation data within the ditch is scarcely greater than the exterior. This is largely due to the landform upon which the enclosures were constructed. The topography inside is variable, suggesting historical or modern disturbance. Although the relatively low data density makes it difficult to say with any certainty, it is possible that there was once a central mound or earthwork inside the enclosure.

**Table 1. Enclosure Area Metrics.**

| Enclosure | Area in m² (% of Total Work Area) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Area Enclosed by Outside of Embankment | Area Enclosed by Inside of Embankment | Area Enclosed by Outside of Ditch | Area Enclosed by Inside of Ditch | Embankment Area | Ditch Area | Total Embankment and Ditch Area |
| North | 1134.95 (100) | 722.34 (63.65) | 442.60 (39.09) | 235.70 (20.77) | 413.12 (36.4) | 206.77 (18.22) | 619.89 (54.62) |
| South | 1004.55 (100) | 554.02 (55.15) | 463.21 (46.11) | 257.87 (25.67) | 435.61 (43.36) | 195.99 (19.51) | 613.60 (61.08) |

**Table 2. Enclosure Dimensions.**

| Enclosure | Enclosure Dimensions in m | | | | | |
|---|---|---|---|---|---|---|
| | Embankment Outside Max/Min Dimension | Ditch Inside Max/Min Dimension | Embankment Width Max/Min | Ditch Width Max/Min | Embankment Perimeter | Inside Ditch Perimeter |
| North | 38.00/37.40 | 17.60/16.67 | 6.4/2.3 | 3.8/2.4 | 121.68 | 55.73 |
| South | 34.31/33.30 | 34.31/33.29 | 5.6/3.3 | 4.2/1.3 | 115.38 | 61.48 |

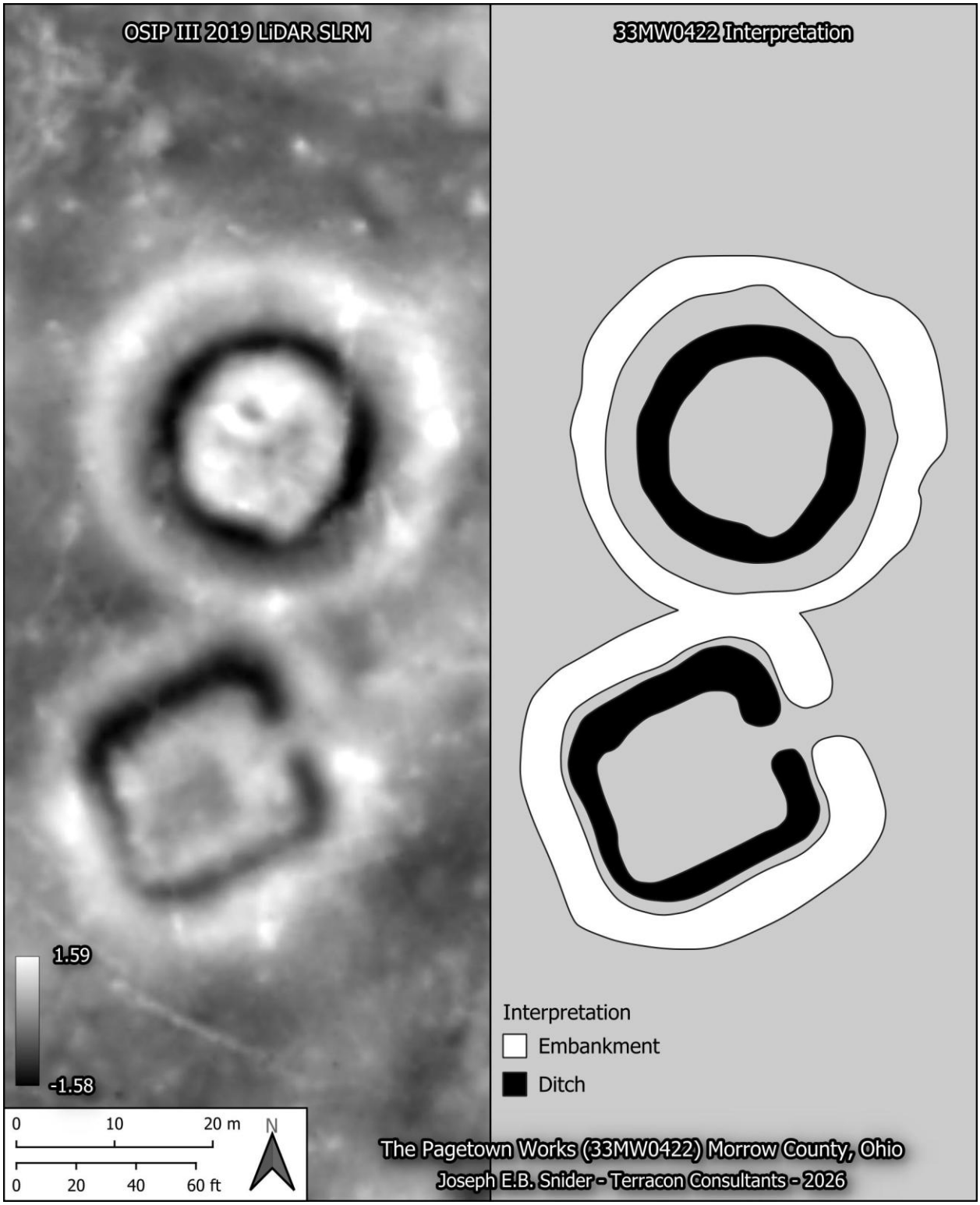


**Figure 3. Interpretation of the Pagetown Works (33MW0422) embankments and ditches.**

**Table 3. Enclosure Elevation Averages.**

| Enclosure | Elevation Averages in m (AMSL) | | | |
|---|---|---|---|---|
| | Interior | Ditch | Embankment | Outside |
| North | 343.26 | 342.49 | 342.86 | 342.48 |
| South | 342.55 | 341.9 | 342.45 | 342.09 |

**Table 4. Enclosure Elevation Differences.**

| Enclosure | Elevation Differences in m | | | | | |
|---|---|---|---|---|---|---|
| | Interior | Outside-Ditch | Embankment-Interior | Embankment-Outside | Interior-Outside | Embankment - Ditch |
| North | 0.76 | -0.01 | -0.4 | 0.38 | 0.77 | 0.37 |
| South | 0.65 | 0.18 | -0.1 | 0.37 | 0.47 | 0.55 |

## South Enclosure

The south enclosure is approximately square with a maximum exterior embankment diameter of 34.31 m and a minimum of 33.30 m, a discrepancy of 1.01 m. The exterior of the embankment encloses an area of 1004.55 m². The interior encloses 257.87 m², or 25.67% of the total enclosure area. The embankment itself covers an area of 435.61 m² while the ditch covers 195.99 m² for a total of 613.60 m². The embankment and ditch constitute 61.08% of the total enclosure area. The maximum embankment width is 5.6 m, and the minimum is 3.3 m. The maximum ditch width is 4.2 m while the minimum is 1.3 m.

The average elevation in the ditch is 0.65 m less than the interior and 0.18 m less than the exterior. The average elevation of the embankment is 0.10 m greater than interior, 0.55 m greater than the ditch, and 0.37 m greater than the exterior. The average interior elevation is 0.47 m greater than the average exterior elevation.

The south enclosure includes a gateway that is evident in both the ditch and embankment. The gateway appears at an approximate azimuth of 066.76°. The topography inside is variable with slightly higher elevations around the inside of the ditch and gateway while the elevation in the southwest center of the interior is slightly lower and more uniform. This may suggest the presence of a diminished internal embankment.

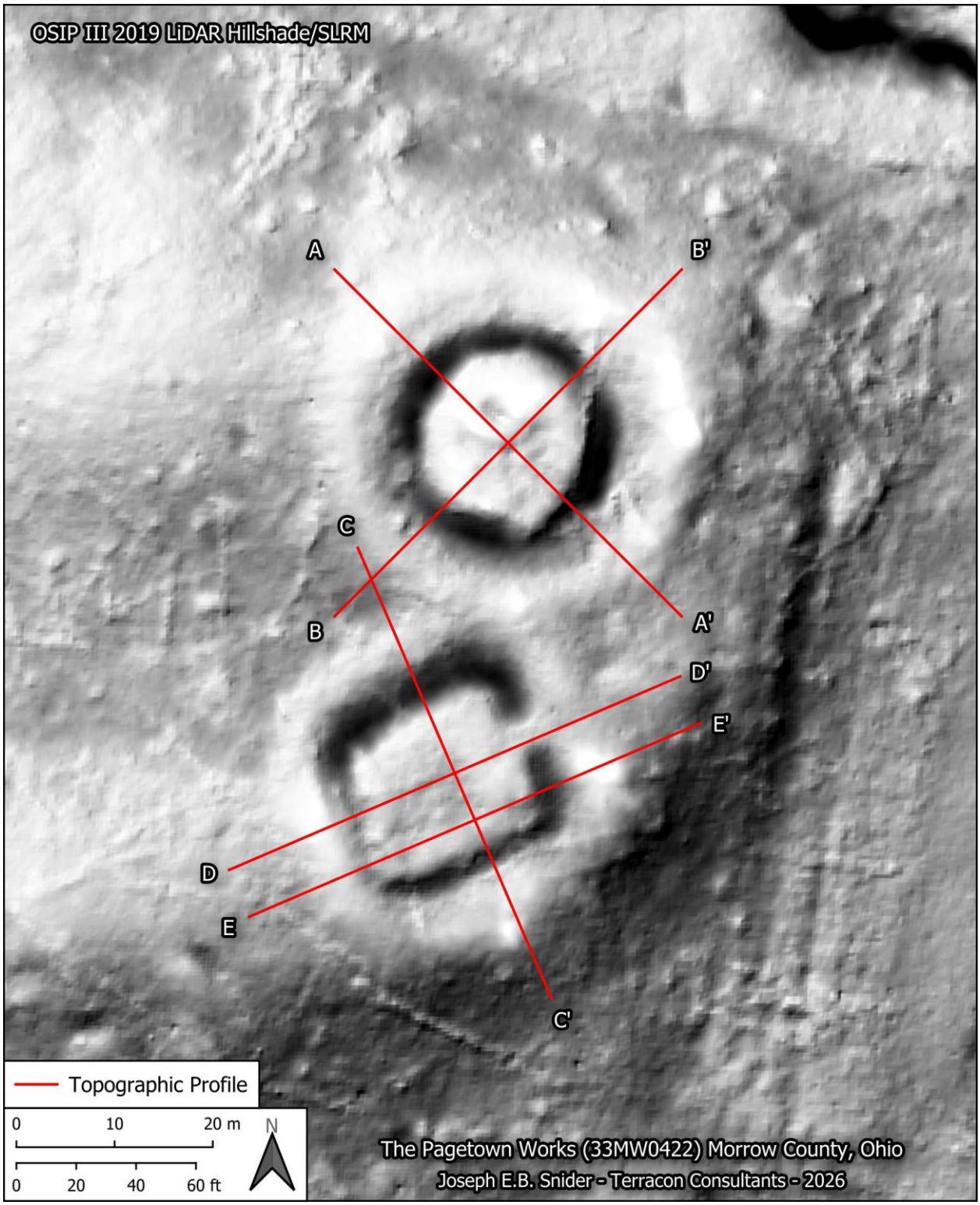


**Figure 4. Overview of the Pagetown Works (33MW0422) topographic profiles presented in Figure 5 and Figure 6.**

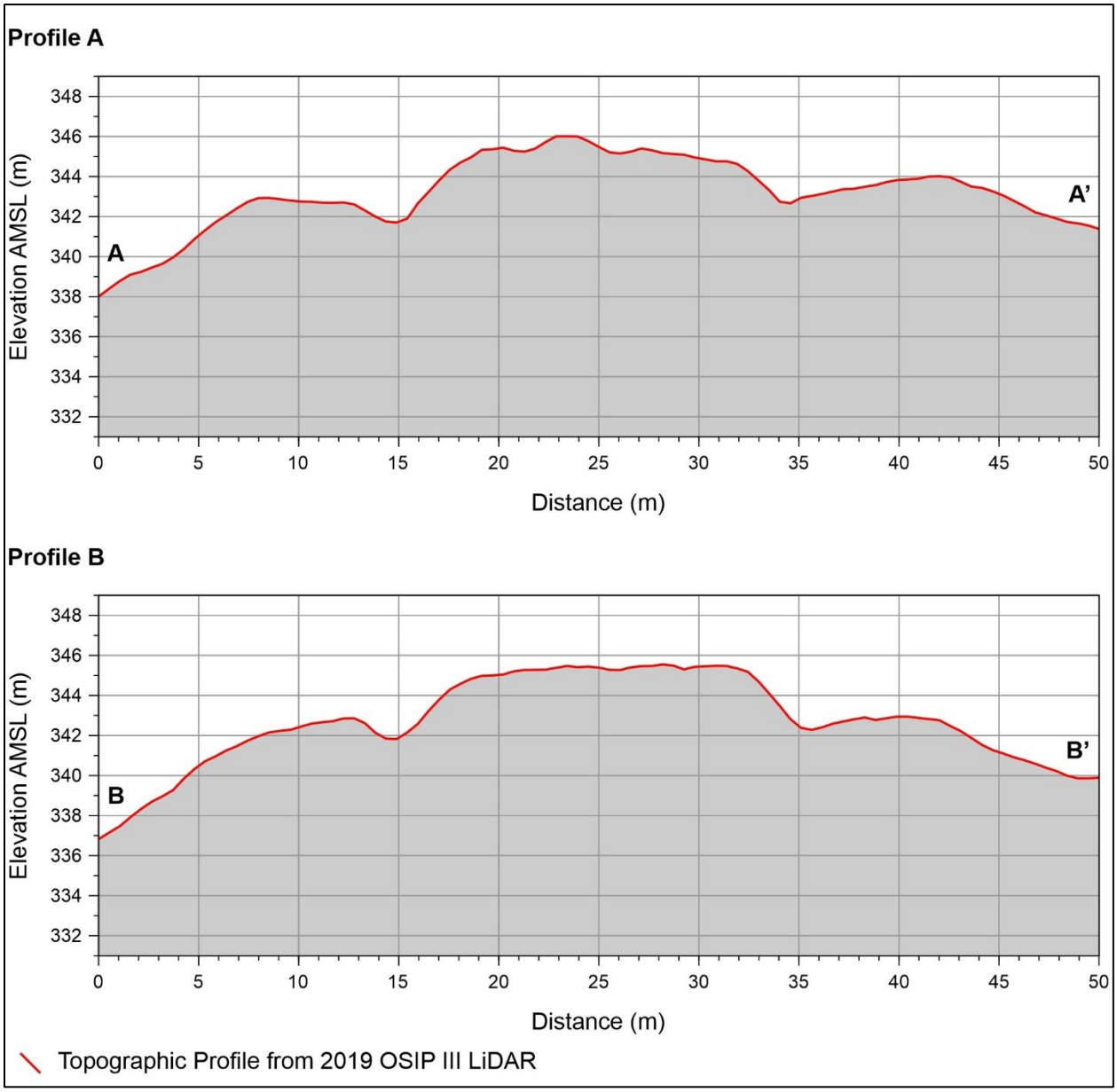


**Figure 5. Topographic profiles (A-A' and B-B') of the north enclosure of the Pagetown Works (33MW0422).**

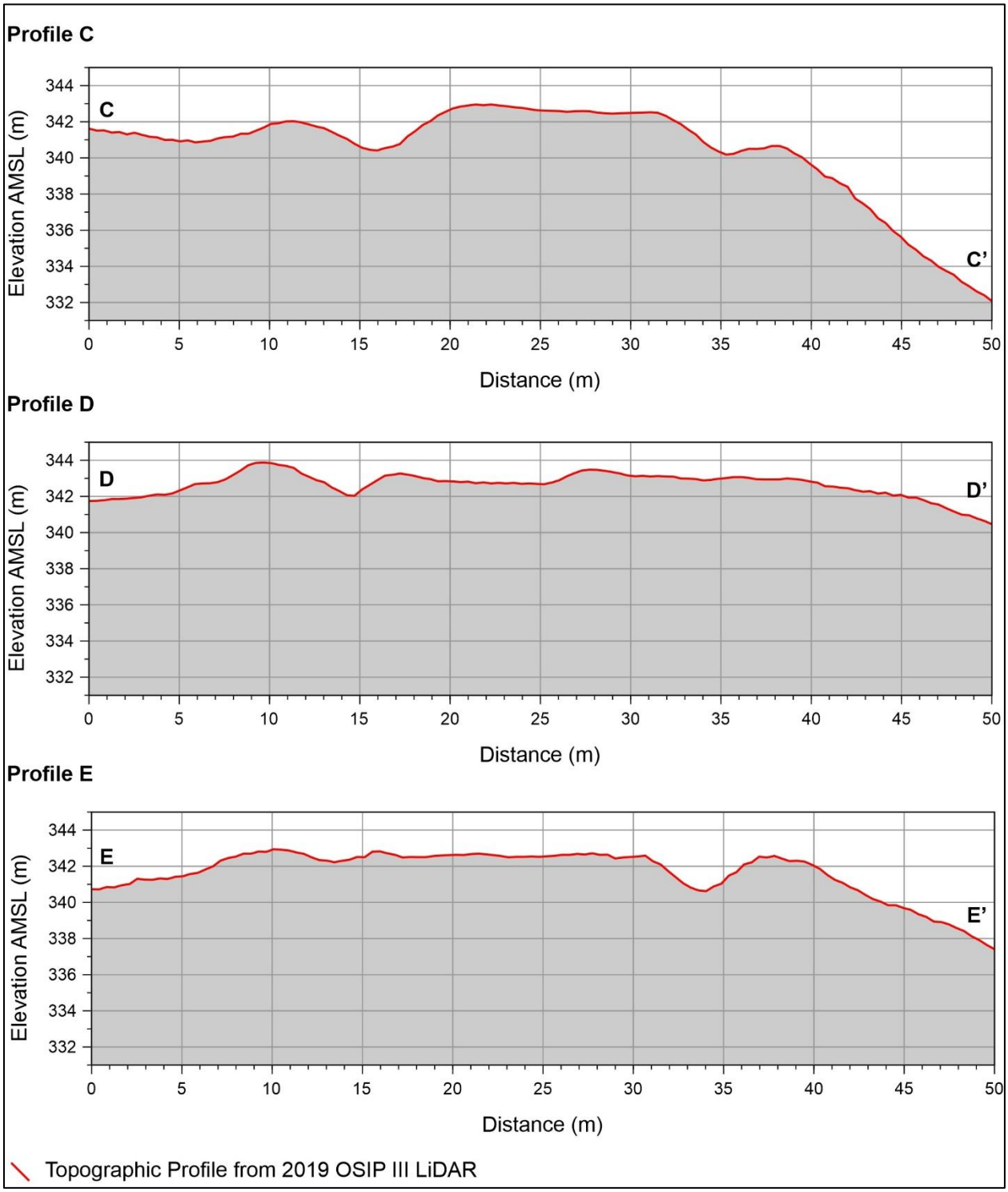


**Figure 6. Topographic profiles (C-C', D-D', and E-E') of the south enclosure of the Pagetown Works (33MW0422).**

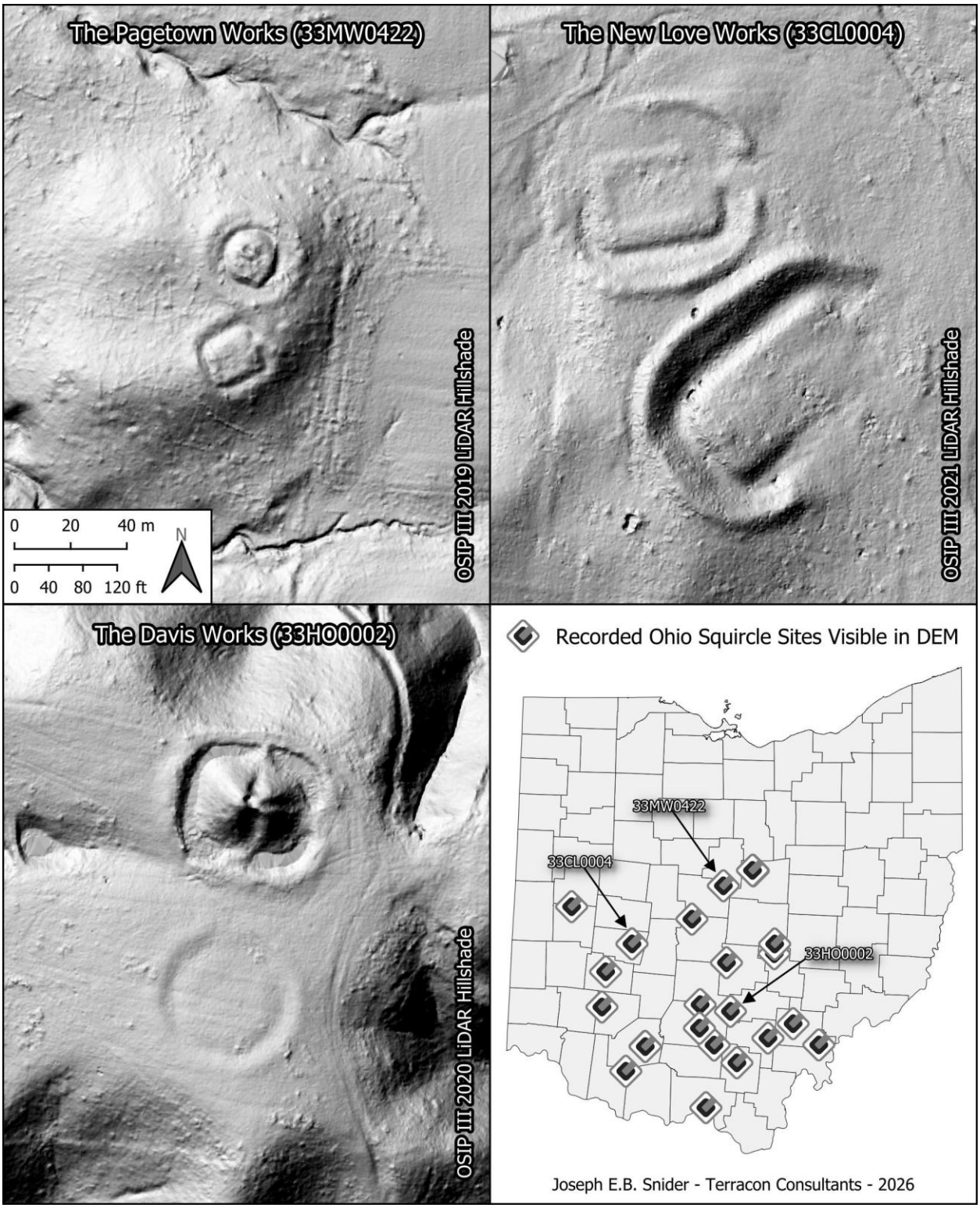


**Figure 7. Comparison of the Pagetown Works (33MW0422) to other paired enclosures that include superellipses, New Love Works (33CL0004), Clark County, and the Davis Works (33HO0002), Hocking County, Ohio.**

## Discussion and Conclusion

The Pagetown Works bear a striking resemblance to other 'paired' enclosures such as the New Love Works in Clark County, Ohio (Figure 7). However, a spatial review of the New Love Works indicates that they are much larger than the Pagetown Works. The north superellipse of the New Love Works, is 78.05 m by 72.47 m while the southern superellipse is 108.99 m x 80.45m. Similarly, the Davis Works are also larger than the Pagetown Works with the north superellipse measuring in at 65.43 x 60.65 m while the southern circle measures 58.49 m in diameter. From this humble comparison, and preliminary results of in-progress review of Ohio superellipses, it is clear that there is considerable variability in enclosure geometry and scale. This review has also demonstrated that there remain many unrecorded and/or poorly understood earthwork sites throughout Ohio.

Finally, it is extremely unlikely that these earthworks were previously unknown. However, they remained unreported to the SHPO. It is recommended that anyone who identifies sites, including earthworks, via remote sensing, report their findings to the SHPO so that all practitioners may be made aware in the future.

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