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Preliminary Results of an Integrated Geophysical Survey at the Villa of Cicero

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Mosaic Columns, it is one of only four known suburban villas in this area. Its location beyond the city walls provided easy access to Pompeii while commanding views over the surrounding countryside and the Bay of Naples. Although the building itself remains buried, and somewhat largely forgotten, its excavation profoundly influenced the development of archaeology, the study of Roman painting, and the emergence of Neoclassicism throughout Europe.

The Villa of Cicero Project is a collaborative project involving the University of Texas at Austin, the University of New Hampshire, the Edith O'Donnell Institute of Art History (EODIAH) at the University of Texas at Dallas, and the Custard Institute for Spanish Art and Culture (CISAC) at Southern Methodist University. It seeks to reexamine the archaeological context of the villa and its surrounding landscape by creating

a three-dimensional virtual reconstruction of the building in which the paintings and mosaics are restored to their original architectural contexts. With financial support from Loeb Classical Library Foundation at Harvard University and the Edith O'Donnell Institute of Art History, the first phase of investigation, completed in June of 2026, consisted of a multi-scale, non-invasive archaeological prospection employing an integrated multi-parameter geophysical and remote-sensing methodology conducted by the company Geostudi Astier. This survey combined ground-penetrating radar (GPR), electrical resistivity tomography (ERT), and magnetometry, to create a three-dimensional model of the buried remains of the villa. In addition, the project conducted a LiDAR survey of the site that will link the surface topography to the results of the below-ground survey. This article presents the

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preliminary results of this survey which continue to be elaborated and may change.

Excavations at the Villa of Cicero began in 1748–49 but were abandoned because *mofetta* (toxic trapped volcanic gases) threatened the workers. Work resumed under Francesco La Vega in 1763 and continued intermittently until 1778–79 (Fiorelli 1860 pp. 3-5, 102-110). As was typical of Bourbon excavations, the primary objective was the recovery of paintings, mosaics, sculpture, and other decorative elements rather than the preservation of archaeological contexts. Once the most valuable finds had been removed, the villa was reburied and the land returned to its owners. Because of this sequence of excavation with extensive pauses in the work and periods of leaving the remains open to the elements, we assumed that many parts of the Villa had collapsed and were left in a derelict state at the time of its reburial.

Despite the inconsistent excavations, few archaeological discoveries exerted a greater influence on the history of art than the early work of the Villa of Cicero. Among the first structures ever investigated at the site, the villa yielded some of the most celebrated Roman wall paintings and mosaics ever discovered (Ciardiello 2012; Ramage 2013). Johann Joachim Winckelmann praised its famous dancing figures as “[...] fluid as thought and beautiful as though executed by the Graces,” establishing them among the masterpieces of ancient painting (Winckelmann 1771, p. 38, Mattusch 2011, Ciardiello 2012). Through their publication in *Le Antichità di Ercolano Esposte*, the villa’s floating maenads, satyrs, centaurs, cupids, and dancers became some of the earliest Roman paintings to achieve widespread circulation across Europe. These engravings profoundly shaped European conceptions of classical antiquity and inspired artists, architects, and designers, while Pompeian motifs derived from the villa appeared on ceramics, furniture, textiles, wallpaper, silverware, porcelain, and interior decoration, becoming

central to the visual language of Neoclassicism (Ramage 2013; Moorman 2018, Thomas 2024).

Because access to the excavations was tightly controlled by the Bourbon monarchy, the published engravings became the principal means through which European audiences encountered Roman painting. Only much later did scholars recognize that these celebrated figures originally belonged to complete decorative wall schemes rather than isolated framed compositions. The paintings and other finds recovered from the villa, first transported to the Real Museo in Portici and now housed in the Museo Archeologico Nazionale di Napoli, transformed the study and reception of Roman painting, shaped the emergence of archaeology as a scholarly discipline and influenced the development of Neoclassicism throughout Europe.

Although lacking the rigor of modern excavation practices, the investigations generated a documentary record that was exceptional for its time. Our understanding of the monument relies largely on the excavation diaries preserved in the *Pompeianarum Antiquitatum Historia* (Fiorelli 1860), the already mentioned engravings published in *Le Antichità di Ercolano Esposte* (Baiardi and Carcani 1757), and Francesco La Vega’s survey plan, which depicts a large maritime villa arranged on two descending terraces overlooking the Bay of Naples (fig. 1). The upper terrace was organized around a spacious peristyle surrounded by residential rooms, while the lower level contained an extensive cryptoporticus and additional spaces only partially explored. Because the villa has never been systematically re-excavated, La Vega’s survey remains the principal architectural record of the monument.

La Vega’s plan and excavation notes also detail the provenience of several important finds. As indicated in fig. 1 several paintings and mosaics can be associated with specific rooms indicated on the plan. At the same time, the selective nature of the

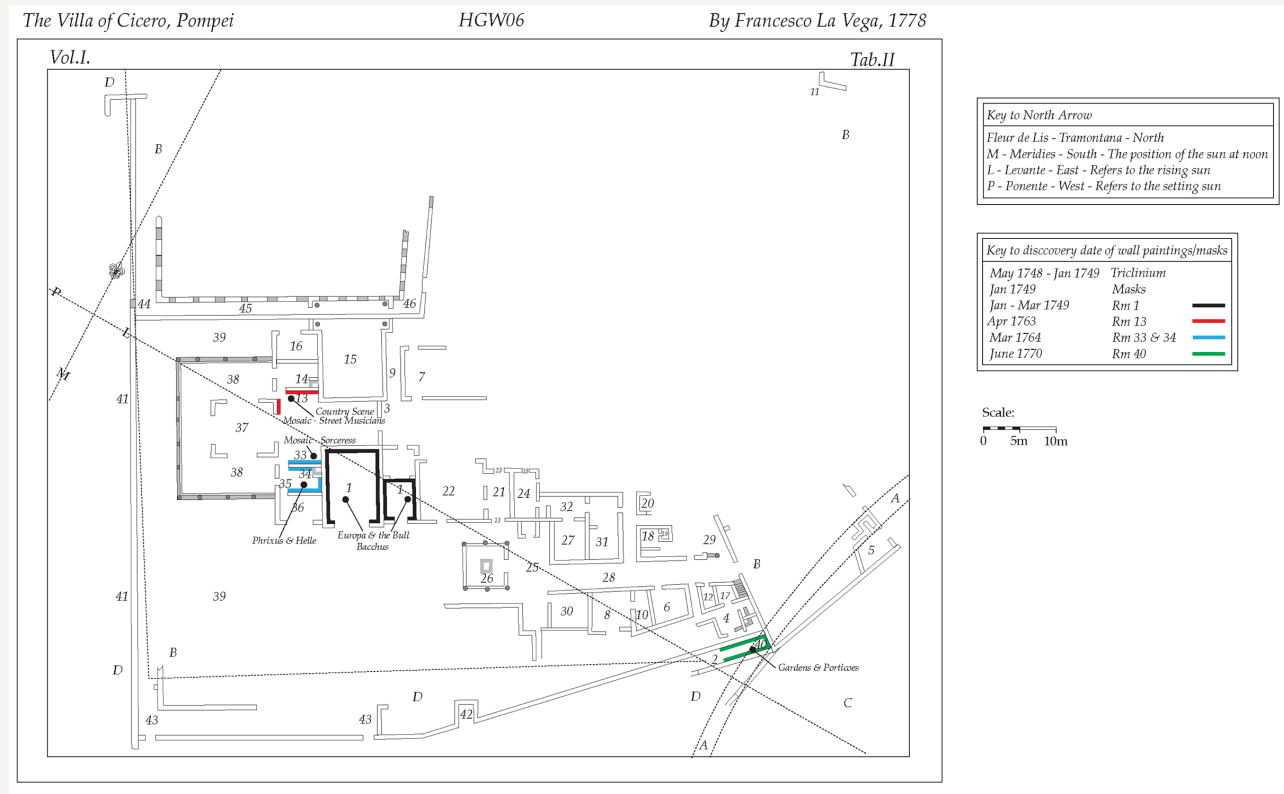


fig. 1

Bourbon archaeology and the absence of detailed stratigraphic records make it difficult to reconstruct the architectural sequence of the complex or to establish the original context of many of the objects removed from the site. The surviving plan provides only a basic framework for relating the recovered material to the architecture of the villa.

Modern scholarship on the Villa has focused on attempts to reconstruct the original decorations and reading the layout of the building from the plan. Mazois described the entrance on the southeastern side with its smaller rooms as a *pars rustica* whereas the highly ornamented spaces functioned as the luxury spaces dedicated to *otium*. The cryptoporticus may have also worked as part of a production area (Mazois 1824, Kockel 2013). The plan also points to multiple phases of construction. As Paolo Mingazzini demonstrated, the Villa of Cicero, together with the Villas of Diomedes and the Mysteries, was aligned with the earlier *Via Superior* rather than the later *Via*

Herculanensis, indicating that these villas predated the construction of the newer road (Mingazzini 1949).

As the full results of our survey continue to be processed, the initial findings indicate that, counter to our initial reservations, the buried remains of the villa are preserved remarkably well. The geophysical survey corresponds closely with La Vega's 1778 plan, particularly within the central residential complex, the cryptoporticus, and the southeastern wing. The clearest architectural responses are visible in the GPR slices at depths of 0.5, 1.0, and 2.0 m (figs. 2–4), where dense rectilinear anomalies in red reproduce the orthogonal arrangement of walls recorded during the eighteenth-century excavations. Many walls appear to lie only 0.5 m below the modern surface, indicating that substantial portions of the villa remain preserved *in situ* and are standing.

The strongest responses are concentrated within the central architectural core, encompassing

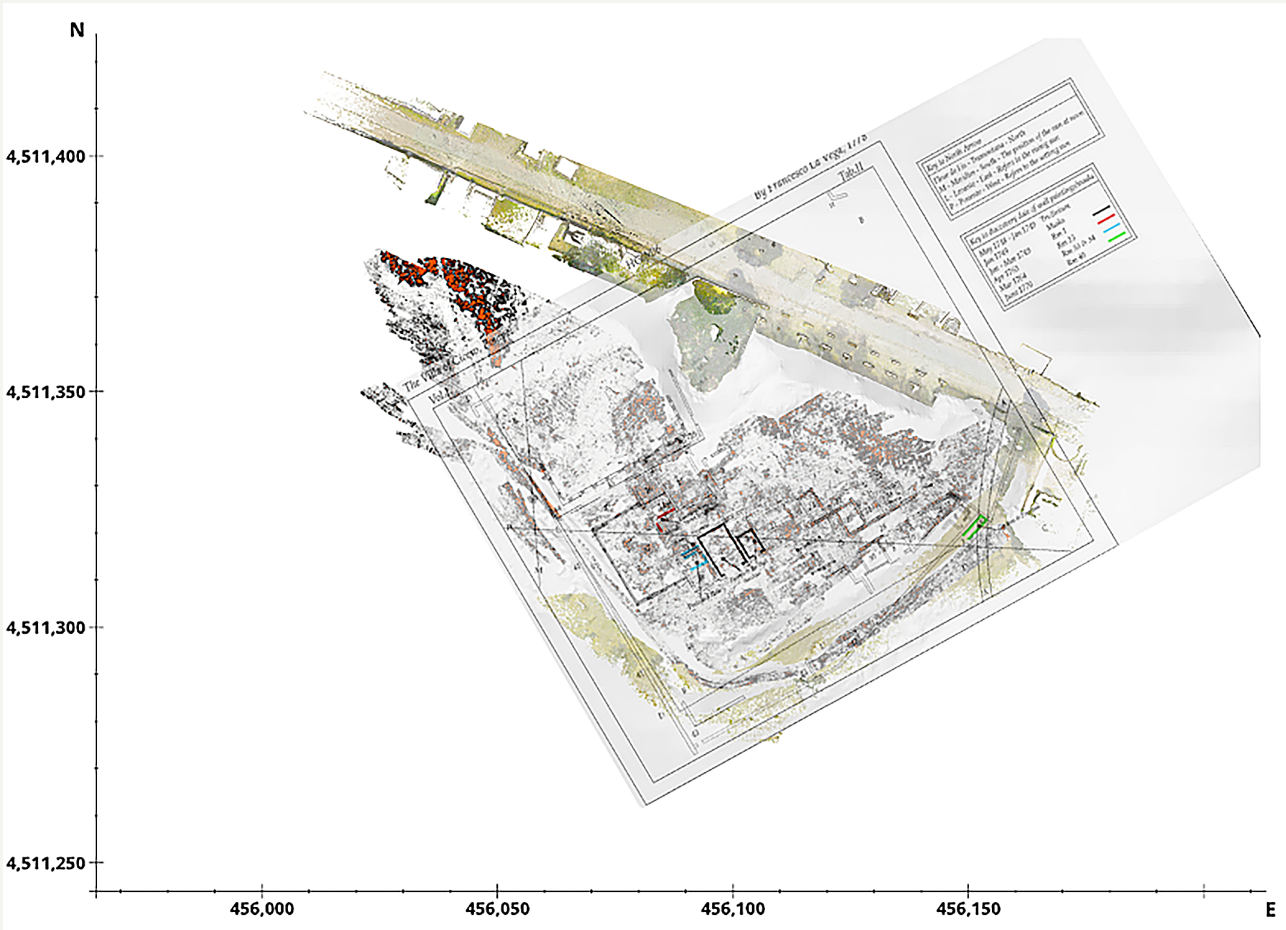


fig. 2

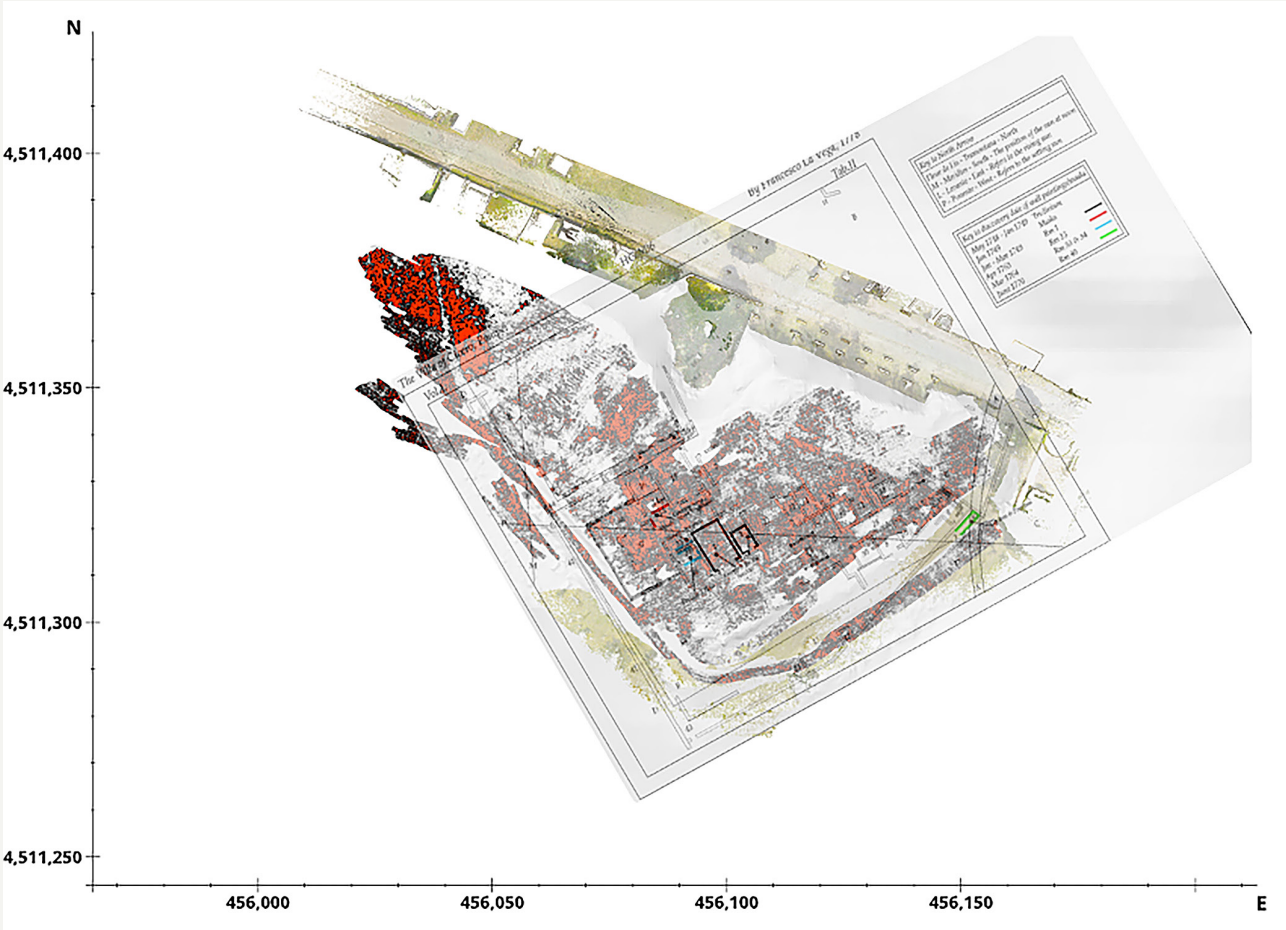


fig. 3

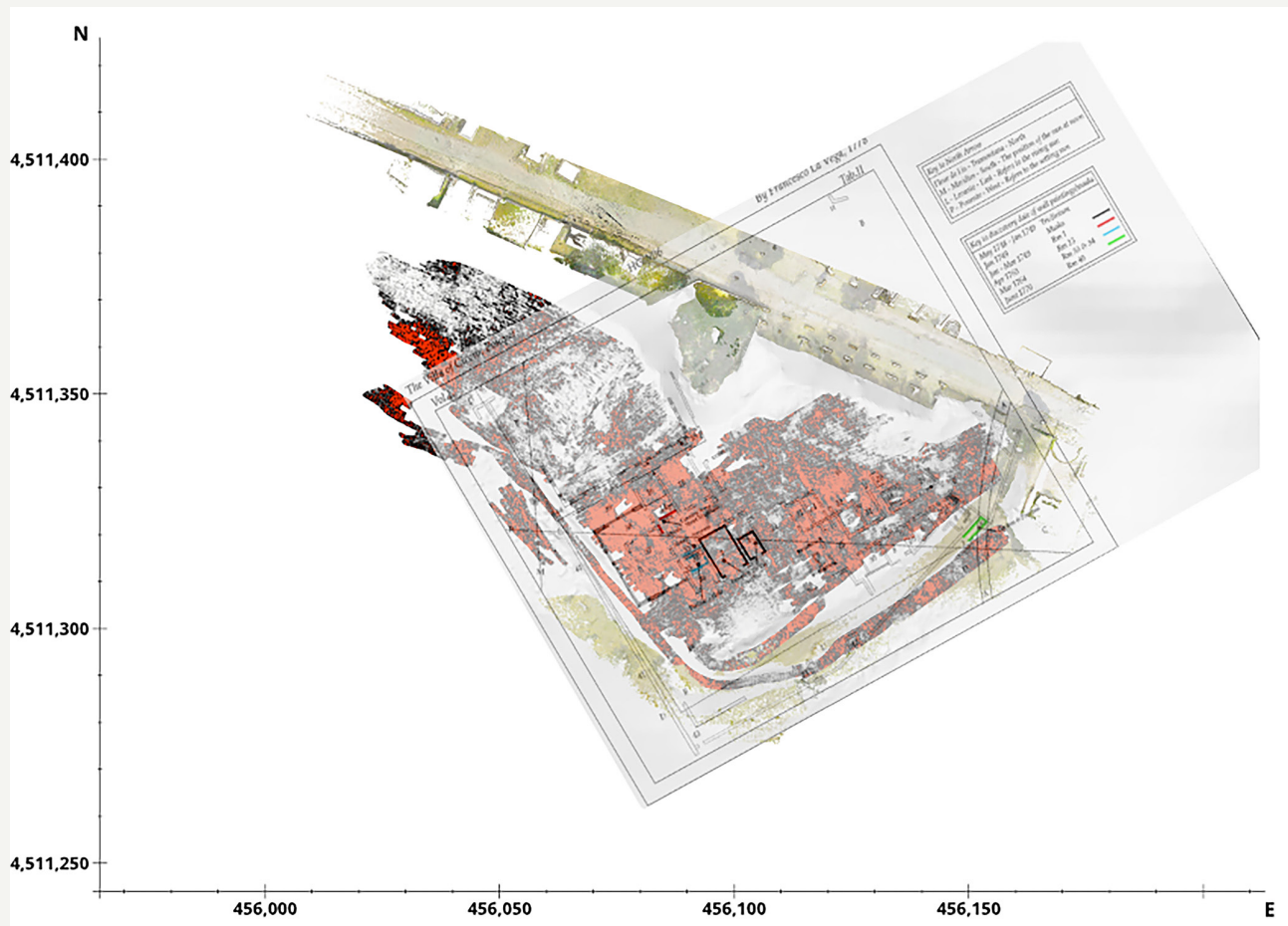


fig. 4

Rooms 1, 13–16, and 22–37, together with the adjoining southeastern block (Rooms 2–12). Their regular geometry, repeated right angles, and closely spaced parallel alignments closely mirror the room-by-room layout documented by La Vega, while also revealing the remarkable extent of the surviving masonry. Particularly prominent anomalies coincide with Room 1 and the adjoining decorated apartments, where the Bourbon excavations recovered celebrated mosaics and wall paintings depicting *Europa*, *Bacchus*, the *Country Scene*, and the so-called *Sorceress*. The high-amplitude responses in this area probably reflect the substantial wall foundations, floor preparations, and architectural embellishment associated with the villa's principal reception rooms, suggesting that significant portions of these spaces remain preserved beneath the modern surface.

Architectural features are most clearly defined

between 0.5 and 1.0 m below the present ground level. At approximately 2.0 m depth, the radar signal becomes markedly stronger, probably reflecting the original surface of A.D. 79 or less likely an artificial surface created following the eighteenth-century excavations when the area was left open to the elements before being backfilled. The geophysical data thus suggests that the surface associated with the A.D. 79 eruption lies approximately 2.0–3.0 m below the modern ground level. Local variations in signal strength across the central complex may further reflect the heterogeneous fills deposited during the eighteenth-century reburial.

The southeastern edge of the survey is defined by a long, strong linear anomaly. This feature probably marks a major boundary element—perhaps a terrace wall, the edge of a road, or another substantial retaining structure. Its position corresponds closely to the ancient approach road shown near the lower right of La Vega's plan,

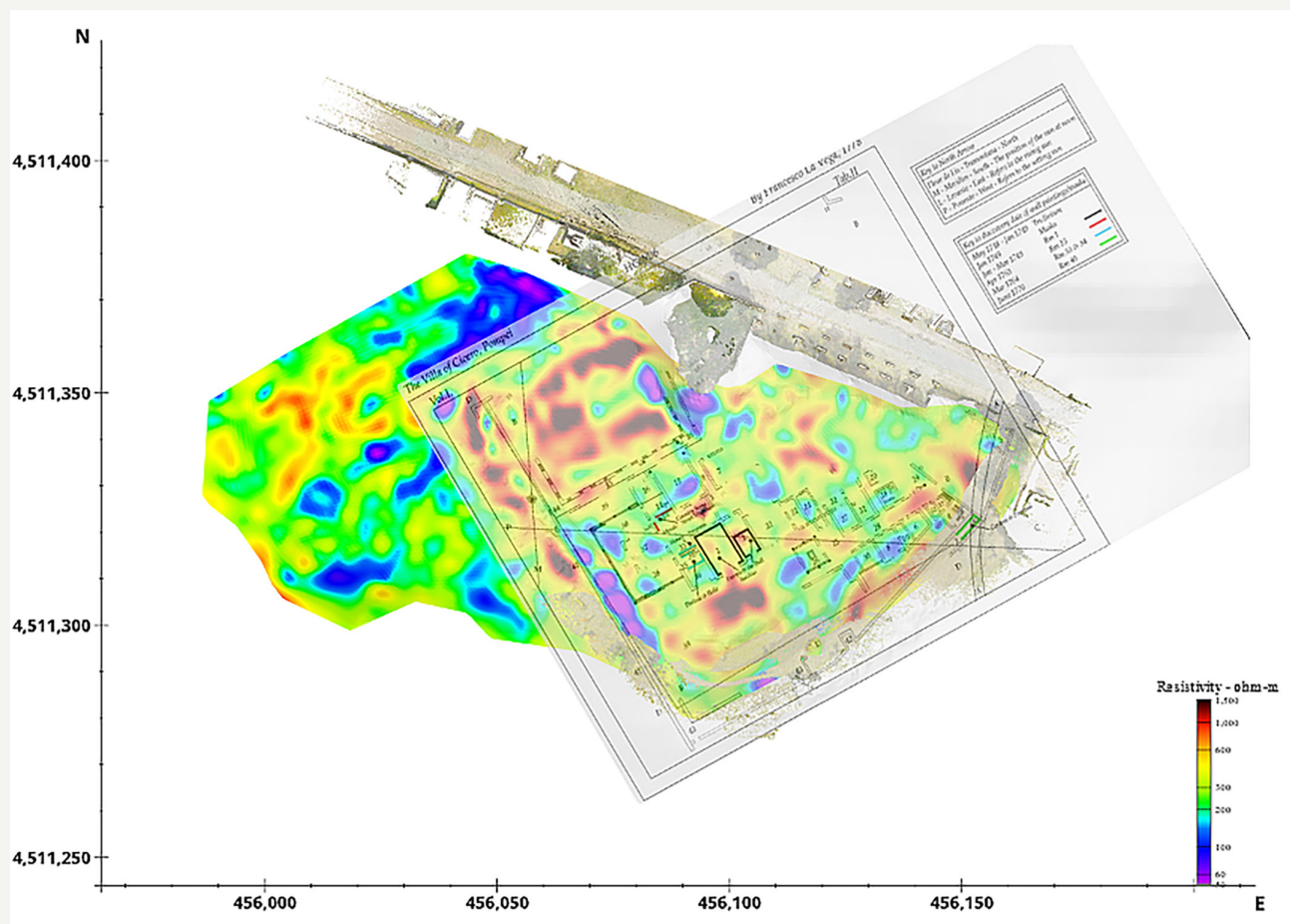


fig. 5

adjacent to the area labeled *Gardens & Porticoes*. Its precise nature is uncertain, and it might form the edge of the Bourbon excavation that workers reinforced to prevent collapses or an access road/route and platform for visitors to view the exposed remains below.

A particularly dense concentration of linear anomalies occupies the southeastern sector of the survey, corresponding closely to the southeastern wing depicted on La Vega's plan. These anomalies broadly match rooms 2–12 together with the adjoining portico and spaces 25–27, forming a coherent architectural complex organized around open courtyards rather than an isolated structure. Variations in anomaly density likely reflect the transition between enclosed rooms, colonnaded porticoes, and landscaped gardens, where foundations, stylobates, drainage features, and other buried architectural elements produce distinct geophysical responses.

The ERT data records strong resistivity variation, roughly from 50 to 1500 ohm-m. Higher-resistivity anomalies probably represent masonry, rubble, dry backfill, voids, or compact volcanic material, whereas lower-resistivity zones may represent soil-filled cuts, wetter earth fills, or less consolidated deposits (fig.5). The horizontal ERT depth slices show that many of the strongest anomalies persist through multiple levels, supporting their interpretation as substantial structural remains.

The ERT slice at a depth of 2 m (fig. 6), together with the magnetometry conductivity data (fig. 7), provides a clearer definition of the northern courtyard. The ERT image shows broad areas of low-resistivity (blue and violet) responses, consistent with wetter fills, while the high-resistivity (red) anomaly to the north follows the line of the unexcavated perimeter of the sunken courtyard. Low-resistivity signals also reappear along the eastern edge of the survey, in an area now

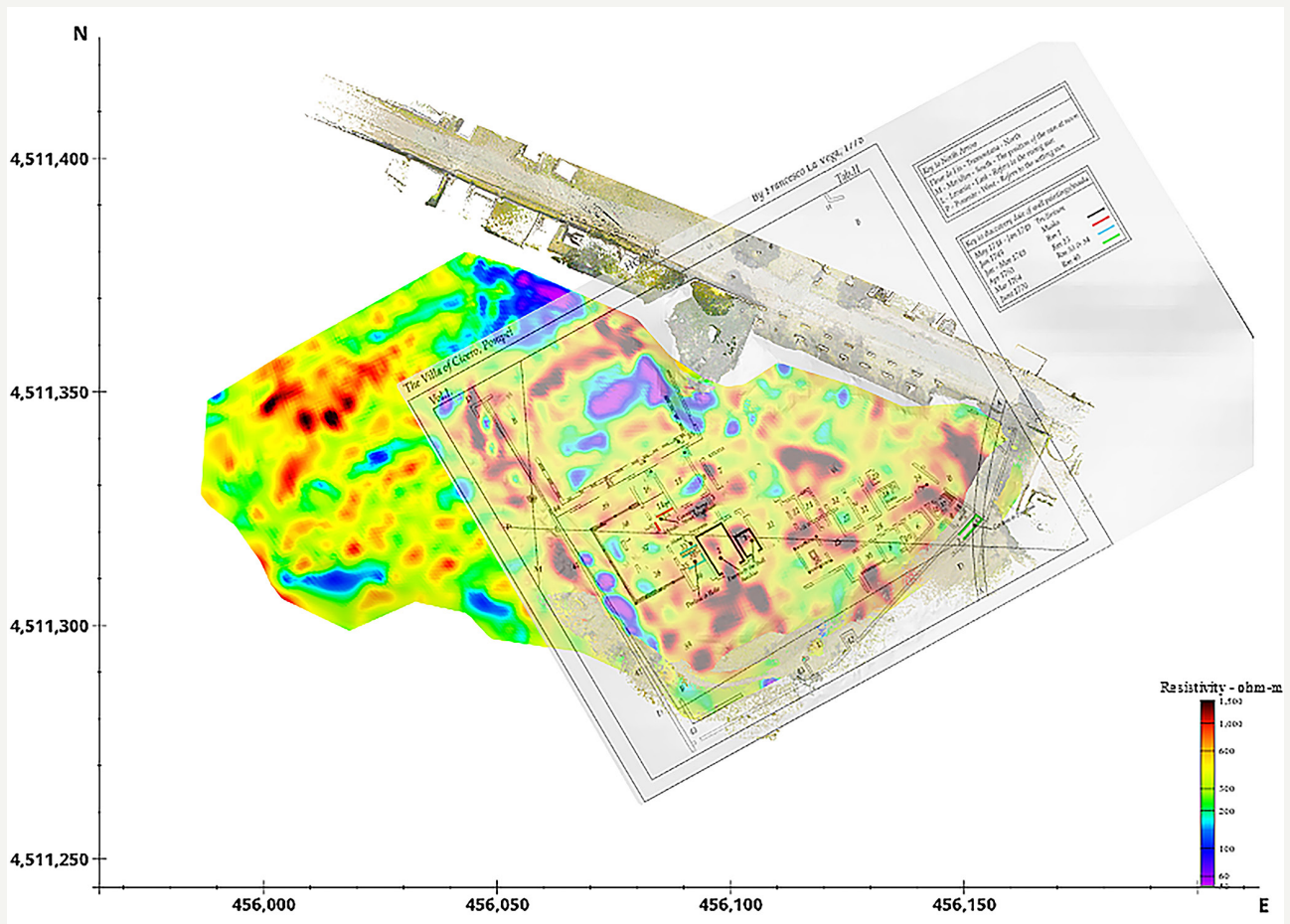


fig. 6

marked by a collapsed ridge. These anomalies may indicate that a comparable collapse occurred during the Bourbon excavations, potentially contributing to the decision to abandon excavation of the lower portico.

Similarly, the ERT and magnetometry data define a J-shaped anomaly along the western edge of the survey area. Its nature remains uncertain and will require targeted ground-truthing to determine its origin. Given its location and orientation, it may represent the reinforced edge of the Bourbon excavation, constructed to prevent the collapse of the excavation trenches. Alternatively, it could mark the course of a road, either ancient or more recent. Notably, the anomaly appears to coincide with a track that provided access to the surrounding farmland and remained in use until the early 2000s (fig. 8).

In contrast to the dense architectural signatures observed in the central and southeastern areas,

the northwestern portion of the survey is characterized by weaker, more diffuse anomalies with comparatively little rectilinear organization. These responses correspond broadly with Rooms 38–41 and 44–46 on the La Vega plan, an area interpreted as containing gardens, porticoes, and more open architectural spaces. The lower density of anomalies is consistent with a landscape in which built structures occupied only part of the available area, while open courtyards, planted gardens, and colonnaded walkways dominated the remainder. The survey therefore reflects a transition from the compact residential core to a less intensively built sector that integrated architecture with landscaped open spaces. The resistivity data likewise indicate moisture-rich soils associated with gardens, and, possibly, water features such as the fountain suggested by a circular anomaly in space 39.

Scattered throughout the survey are several irregular zones characterized by unusually high-amplitude

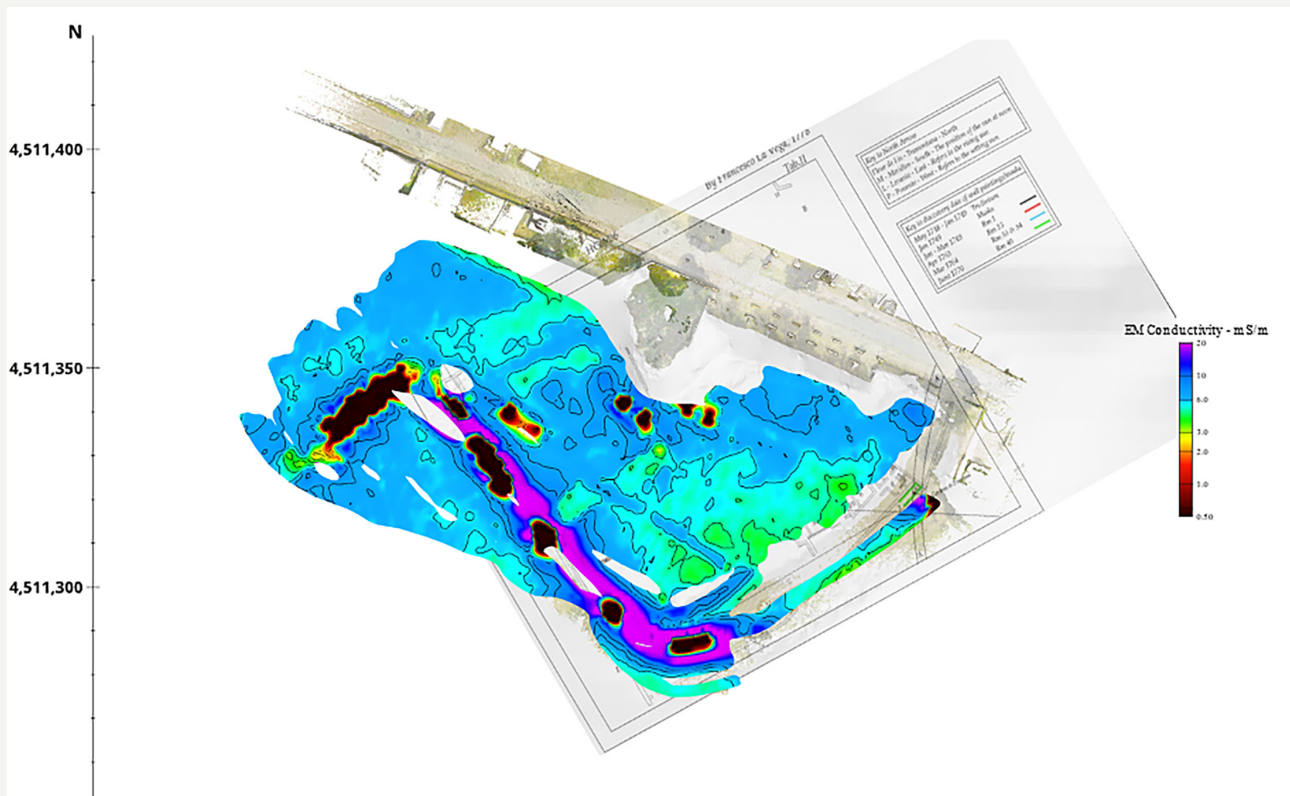


fig. 7

and heterogeneous geophysical responses that differ markedly from the orderly rectilinear pattern of the villa's architecture. These anomalies are best interpreted as the archaeological signature of the eighteenth-century Bourbon excavations documented during the original exploration of the site. Collapsed tunnels, excavation shafts, rubble-filled backfill deposits, and areas where masonry was removed or disturbed would all create the complex subsurface contrasts observed in the geophysical data. Identifying these disturbances is essential since distinguishing Bourbon interventions from intact Roman architecture will be critical for accurately reconstructing the surviving extent and preservation of the villa.

At the same time, in unexcavated areas on the western side of the plateau, a series of rectilinear patterns have emerged in the E.R.T. survey. Although their precise nature cannot be determined without excavation, their pattern strongly suggests the presence of additional structures that remain largely undisturbed. These anomalies may represent further buildings, and

possibly even another villa situated between the villas of Cicero and Diomedes.

The geophysical survey thus identifies three areas of particular archaeological significance for future investigation. The first is the central residential core, encompassing room 1, room 13, and the adjoining decorated apartments. Here, the dense concentration of rectilinear anomalies indicates substantial surviving architecture beneath the modern surface, including the principal reception spaces from which the Bourbon excavations recovered many of the villa's most celebrated mosaics and wall paintings. Selective excavation in this area offers the greatest opportunity to assess the preservation of these rooms, refine the eighteenth-century documentation, and clarify the organization and chronology of the villa's luxury residential core.

A second priority lies within the southeastern wing (rooms 2–12, 25–27), where a large block of orthogonal anomalies indicates the survival of an extensive architectural complex incorporating residential rooms, service areas, and adjoining



fig. 8

portico. Investigation of this sector would clarify the relationship between enclosed buildings, the residential and service areas, and landscaped spaces while substantially improving our understanding of the villa's overall layout, circulation, and functional organization.

The third priority is the long, continuous linear anomaly extending across the southern and southeastern margins of the survey. Its scale and coherence suggest a major architectural feature, possibly the villa's perimeter wall, a terrace retaining structure, or a boundary associated with an adjacent roadway or formal approach. Determining its nature would help define the extent of the archaeological complex and clarify how the villa related to its surrounding landscape, including its terraces, gardens, access routes, and the wider suburban setting.

The non-invasive investigations conducted by the Villa of Cicero Project have successfully relocated and documented the architectural remains encountered during the Bourbon excavations while also identifying substantial portions of the

villa that were never explored or only partially investigated in the eighteenth century. The results refine our understanding of the villa's layout and state of preservation, demonstrating that the surviving architecture is considerably more extensive than previously assumed.

These findings establish the foundation for a new phase of research integrating non-invasive surveys, targeted archaeological excavation, and digital documentation. Rather than exposing the entire complex, selective excavation can focus on strategically chosen areas where the geophysical evidence raises specific questions concerning the villa's chronology, organization, and preservation. Such an approach would maximize the scientific value of excavation while minimizing disturbance of the architectural remains.

The project likewise lays the foundation for the digital reconstruction of the villa and its decorative programs. By integrating the La Vega documentation with the new geophysical evidence, reconstructing the villa in virtual and augmented reality would restore paintings, mosaics, and

other decorative elements to their original architectural settings, transforming them from isolated museum objects into components of coherent architectural and decorative programs. In turn, this would allow scholars to investigate patterns of visual experience, circulation, patronage, and domestic display that have remained inaccessible for more than two centuries. At the same time, digital reconstruction would once again make the villa open to the public while protecting its fragile remains from further exposure to the elements.

Analysis of the eighteenth century backfill brought in to cover the area after its excavation offers a rare opportunity to investigate eighteenth-century excavation and collection practices through the lens of modern archaeological techniques. These deposits constitute an archaeological archive, preserving evidence of the methods, priorities, and decision-making processes of some of the earliest large-scale excavations undertaken at Pompeii. Their systematic study has the potential to reveal what the Bourbon excavators chose to recover, what they deliberately discarded, and what they simply overlooked.

The significance of this work extends well beyond the architecture of a single Roman villa. Renewed investigation of the site offers a rare opportunity to reconstruct the villa while critically reassessing early excavation practices and the development of eighteenth-century antiquarian scholarship. It promises to restore the Villa of Cicero to its rightful place among the most important monuments uncovered during the early excavations while offering new perspectives on both the Roman past and the origins of archaeological research.

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Didascalie

Fig. 1 Plan of the Villa of Cicero by Z. Schofield, after La Vega.

Fig. 2 G.P.R. slice of the terrain at 0.5 meters depth.

Fig. 3 G.P.R. slice of the terrain at 1.0 meter depth.

Fig. 4 G.P.R. slice of the terrain at 2.0 meters depth.

Fig. 5 E.R.T slice at approx. 3.0 meters depth.

Fig. 6 E.R.T slice at approx. 2.0 meters depth.

Fig. 7 Electromagnetic Conductivity.

Fig. 8 Satellite Image of the Terrain in Use as Farmland in June 2013 (after Google Earth).

Immagini

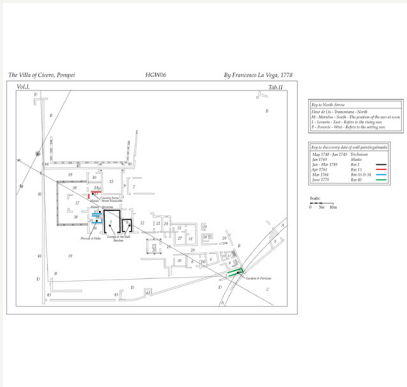


fig. 1

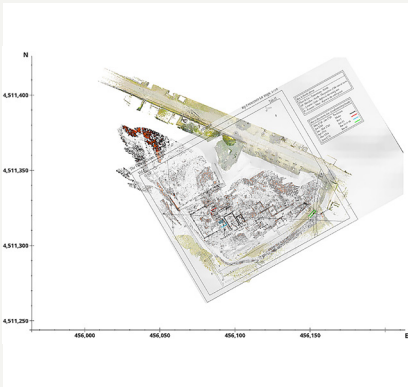


fig. 2

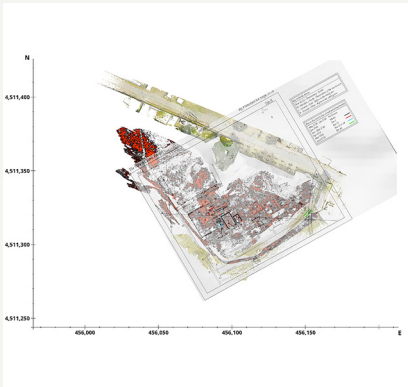


fig. 3

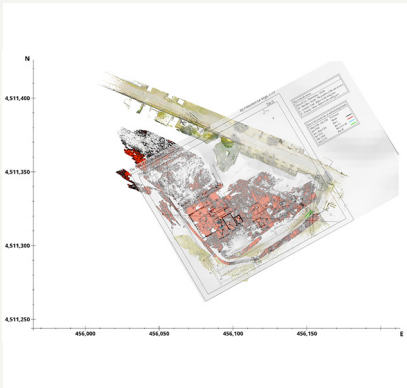


fig. 4

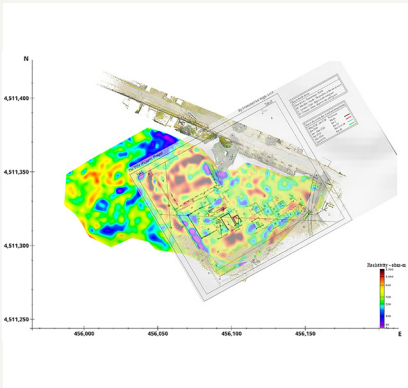


fig. 5

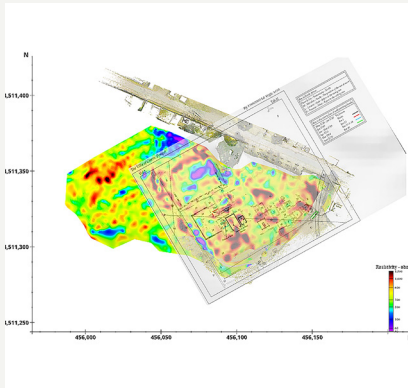


fig. 6

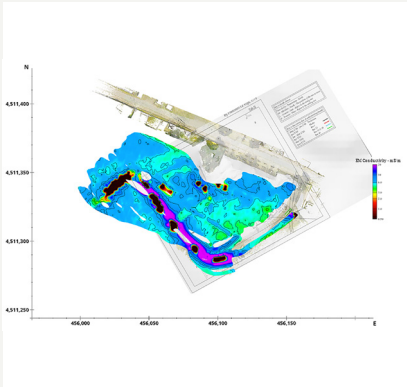


fig. 7



fig. 8