Preliminary approach to the study of the 'Tappatino' area of Suasa

Francesca Bindelli

francesca.bindelli3@unibo.it - Università di Bologna

Abstract

This paper presents a reconstruction study of the 'Tappatino', a rustic farmhouse in the Archaeological Park of the Roman city of *Suasa* (Castelleone di Suasa, AN). As a multi-stratified site, a wide range of data from both archive sources and archaeological research has been analysed as a starting point for this study. In addition, topographic surveys and the stratigraphic analysis of the masonry were conducted. Finally, the paper describes the application of the Extended Matrix Framework (EMF) to the 3D reconstruction of this area and suggests a reconstructive proposal for the Roman imperial age.

Keywords

Suasa, stratigraphic analysis, Roman archaeology, Extended Matrix, 3D reconstructive process

Introduction

This paper presents a reconstruction study of the rustic farmhouse area known as 'Tappatino', in the Archaeological Park of the Roman city of *Suasa* (Castelleone di Suasa, AN) in the Italian Marche region. *Suasa* is located in the hinterland of Senigallia on a second-order alluvial terrace on the right bank of the Cesano river (Fig. 1). The establishment of this centre occurred during the extensive colonisation of the *ager Gallicus* that immediately preceded the battle of *Sentinum*. The city was initially founded as a *praefectura*, later becoming a *municipium* during the second half of the 1st century BCE and experienced a gradual decline by the end of the 3rd century CE (Dall'Aglio 1991; Destro 2010; Giorgi 2010; Giorgi 2020a; 2020b; 2021). The project for the historical-archaeological analysis of the 'Tappatino' area was born with the aim of developing specific reconstruction models for each chronological phase using the Extended Matrix (EM) method¹.

Methodology

Before exploring the world of archaeological reconstructions, it is important to acknowledge that any recreated model will only ever be a simulation of the ancient context. The ultimate goal of a reconstructive study is not to produce a definitive model, but rather to make the entire process transparent, readable, and replicable (Demetrescu 2015, 4).

The archaeological approach to 3D involves two categories of 3D models: *reality-based* and *source-based*. The first, also known as surveying, is a quantitative process used to document, interpret, and visualise existing archaeological contexts. The second is more closely related to computer graphics and is a non-synoptic and non-synchronic representation. It is useful

 $^{^1}$ I would like to thank prof. Enrico Giorgi, Alessandro Campedelli and Anna Gamberini for the opportunity they have given me to take part in this project, which has resulted in the Specialisation thesis discussed in 2023 at the University of Bologna.

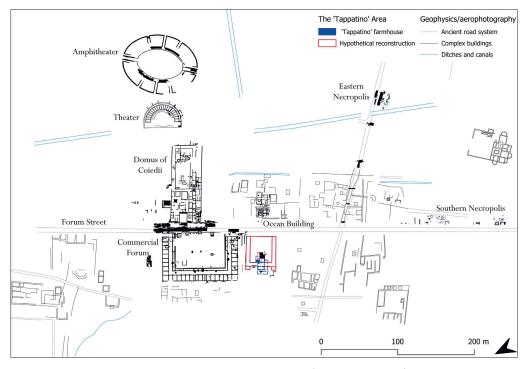


Figure 1 - Plan of the Roman city of Suasa (author's elaboration).

for documenting, interpreting, and visualising lost archaeological contexts (Remondino and Rizzi 2010; Demetrescu 2015, 43). The *source-based model* combines various sources and documentation, regardless of the granularity of the archaeological data or the discrepancy between the collected documentation and the visual representation of the proposed reconstruction. This mechanism can create misleading models that reinforce the idea of reconstruction as a purely aesthetic endeavour, rather than an analytical and accurate study (Beacham et al. 2006; Denard 2012; Cerato and Pescarin 2013, 290).

The area of the 'Tappatino' in *Suasa* is multi-stratified, which has hindered extensive investigation of the archaeological context and made interpretation of the unearthed evidence difficult at present day. The study of this area was divided into three phases. The first phase focused on analysing the rural buildings comprising the 'Tappatino' by examining their structures and the stratigraphy of the masonry in the central unit. The second phase involved examining data from archaeological research campaigns conducted in the area as part of the *Suasa Project* in 1996 and between 2018 and 2022. The third phase consisted in the post processing of topographic survey data conducted during the research campaigns. The findings contributed to the reconstructive study of this context from the Imperial Roman age to the contemporary age, which is presented here.

The EM method was chosen to assess the reconstructive study, considering the issues related to the development of *source-based models* in the study area (Demetrescu 2015; Demetrescu et al. 2016; Demetrescu e Fanini 2017; Demetrescu 2018; Demetrescu and Ferdani 2021; Ferdani et

al. 2020; EM Repository: Demetrescu, Emanuel, 'Extended Matrix Core Language Repository'. Zenodo. [DOI:10.5281/zenodo.5957132]). The EM is a formal language, developed by Emanuel Demetrescu (CNR-ISPC, Rome) that enables the recording of the sources employed and the set of analysis processes conducted to achieve the virtual reconstruction of an archaeological context. This methodology updates the stratigraphic basis of archaeology through the creation of a new SU, the Virtual Stratigraphic Unit (USV). Similar to Harris's Matrix, EM is not a representation of the physical chain of events, but rather a non-redundant chronological sequence. The EM graph is constructed from the bottom up, with each element connected by continuous lines to show stratigraphic relationships and dashed lines to indicate sources used to validate the USV. The graph is divided into structural (USV/s) and non-structural (USV/n) components. Structural units are based on SUs found in situ, while non-structural units are hypothetical reconstructions based on sources. Also included in the reconstructive workflow are Special Finds (SFs), which are objects found in secondary deposits. Once a SF is placed in the EM graph, a Virtual Special Find (VSF) can be created to reintegrate it. VSFs have a higher degree of certainty than non-structural USVs, but lower than structural USVs (Demetrescu 2015, 50-51).

The reconstruction of the 'Tappatino' area started with gathering information from various sources, such as excavation data, geophysical surveys, bibliographical and archive sources, and comparison with other contexts. This information was used to create the 'dossier comparatif' (Gros 1995, 322) and develop the preliminary eidotypes. The 3D model was the outcome of this comprehensive process. The dataset was organised within the EM graph to model the different life phases of the area.

The EM approach was applied to the multi-stratified context of the 'Tappatino', thus enabling the mapping of the entire reconstructive process and the organisation of information within a single interconnected environment. Furthermore, the direct link between the 3D environment and the EM graph facilitated the manipulation of geometry with digital tools and sharing both the 3D models and the stratigraphic and reconstructive information. The combination of EM with digital tools for 3D representation of virtual reconstructions and visual inspection of extended matrices is known as the Extended Matrix Framework (EMF) (Demetrescu and Fanini 2017, 500)

The history of the building

The 'Tappatino' building is a good example of 16th century rural architecture (Fig. 2). The epigraph on the architrave of a door, reading 'OCTAVIANVS VVLPELLVS', indicates that it was the residence of Ottaviano Volpello (fl. XVI), a jurisconsult at the Della Rovere court during the reigns of dukes Guidobaldo II and Francesco Maria II. His memory is still preserved in the valley floor's current name, Pian Volpello (CIL XI,775*; Cimarelli 1642, 160; Lanciarini 1985, 457; Dominici 1993, 214; Antolini 2000, 337–338).

Friar Vincenzo Maria Cimarelli's 17th century historical book provides evidence of the construction of the farmhouse. Ottaviano Volpelli chose to build his residence in the midst of a plain where numerous remains of Roman structures were still visible (Cimarelli 1642, 160). It is well-established that Volpelli's farmhouse was built using the remains of a large Roman structure. This is supported by documents found in the archives of the *Soprintendenza*

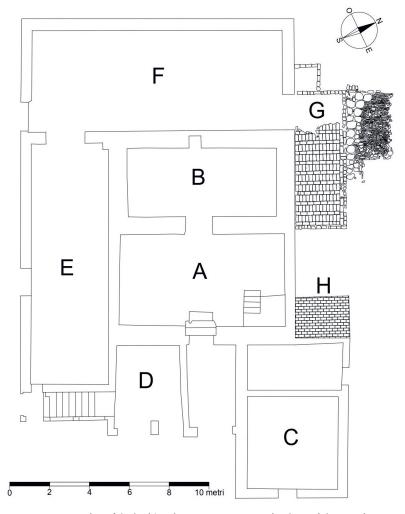


Figure 2 - Plan of the building known as 'Tappatino' (author's elaboration).

Archeologia Belle Arti e Paesaggio (SABAP) of the Marche region, which mention the presence of Roman walls in the cellar of the 'Tappatino'. However, there are no records of this property prior to 1600.

In 1621, Duchess Livia Della Rovere was granted the investiture for the estate of this feud by the Abbey of San Lorenzo. After the death of her husband Francesco Maria II, the duchess resided in the palace in Castelleone di Suasa until her passing in 1641. Following her death, a series of intricate events led to the transfer of the feudal estate to the Albani family (Polverari 1984, 226-237).

In 1779, after Alessandro Albani passed away, Castelleone di Suasa was inherited by his nephew Giuseppe. The property was leased to Crescentino Corradi, who had previously served as 'soprintendente generale' for Alessandro Albani, overseeing the Abbey of San Lorenzo

in Campo and the Castelleone farm, which included the Volpello estate. The earliest surviving cadastres, dating back to 1807, list the Volpello estate as property of the Abbey of San Lorenzo in Campo under Cardinal Albani. It is recorded as a 'farmhouse' with a pasture plot and the small Oratory of the Crucifix attached. The properties in Castelleone were acquired by the Ruspoli family in 1857. In the subsequent decades, the family made further purchases and transfers. It was likely during these years that the family acquired the 'Tappatino'. The area surrounding the farmhouse and the property itself belonged to Don Mario, the second prince of Castelleone. These areas were subject to restrictions by the *Soprintendenza*. The estate was owned by the Ruspoli family until it was inhabited around the 1930s by the Aguzzi family, who were landholders of Count Ruspoli. Alessandro Edmondo was the last member of the Ruspoli family to own the estate.

In 1972, the *Soprintendenza* carried out the expropriation of a large portion of the archaeological area, excluding the 'Tappatino' area, which remained in private ownership. In 1975, Alessandro Edmondo Ruspoli sold the property to Damiano Aguzzi, who retained ownership until 1990. At this time, the State exercised its right of pre-emption in the sale to Casagrande Alvaro, and the 'Tappatino' was transferred to the SABAP of the Marche region.

The current state of the building

The farmhouse's current appearance is quite complex (Fig. 2). The original core of the structure consists of a cube-shaped 3-floor main building unit (A), which was later joined by a similar volume (B) attached to the former on the western side. The ground floor volumes contain the cellar formed by two side-by-side rooms characterized by an internal floor level about a meter lower than the external one. The Roman structures are placed here, easily recognizable by their construction technique in *opus vittatum mixtum* (Adam 1994, 153-154; Bianchini 2010, 269, 271). These structures are present in both the dividing wall between the two rooms and throughout all the second room. Specifically, four interconnected wall structures have been identified, arranged in pairs with a north-south and east-west orientation. The maximum conservation elevation of these structures ranges from 2.57 m to a minimum of 1.02 m. Units A and B constitute the main core of today's farmhouse.

A three-arched access portico with a brick floor and a beam and joist arcade with a hollow tile floor (D) is attached to the eastern side of the original unit. The second-floor arcade has three openings corresponding to the lower arch, and a brick floor. The loggia is accessible by a side flight of stairs connected to both the southern volume (E) and the main structure (A).

A two-story volume with a double-pitched roof (C) is leaning against the same facade. To the west of unit B is a two-story volume with a double-pitched roof (F), while to the south of the main core is a single-level unit (E). All these structures, except for the portico, appear to be constructed of bare brick.

Through the examination of archival materials, particularly the ceased cadastres, it was possible to assign a chronological period to these building units. The construction of unit B is attributed to Volpelli's work during the 16th century. This is inferred from the inscription with his name on the architrave of a door on the perimeter of the unit.

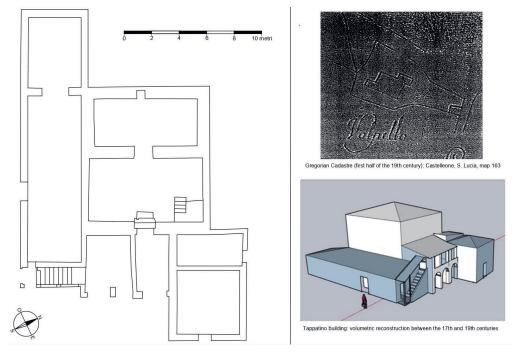


Figure 3 - The building of 'Tappatino' between the 17th and 19th centuries (author's elaboration).

Regarding the arcade and the volume attached to the eastern facade (D-C), it is known that they were built after Volpelli's intervention but before 1835. An excavation test conducted at the base of the pillar supporting the two arches of the arcade confirmed the presence of non-antique architectural elements, likely from the 16th century, cast at its base. These structures are also listed within the 1835 Gregorian Cadastre.

In the Gregorian Cadastre, the southern unit (E) has a projecting room to the west that is no longer visible today due to its elimination during the construction work of the western unit (F) (Fig. 3). Archaeological excavations carried out inside unit F in 2020 confirmed this assumption, revealing two levelled walls of the original perimeter of unit E. This unit is likely to be later than the arcade on which it rests, and its presence in the first half of the 19th century is certain. The western unit (F) can be dated between the second half of the 1800s and the first half of the 1900s. This volume does not appear in the Gregorian Cadastre of 1835, but it is present in the Ceased Cadastre of the mid-20th century.

Two small units (G-H), leaning against the northern facade of the main core, were added after the mid-1900s. Plans and photographs sent to the *Soprintendenza* by Damiano Aguzzi in 1977 show their presence, while the roof of the western room was identified in a photograph included in a local history study by Gello Giorgi (Giorgi and Grazzi 1981). Currently, only the floors of these rooms are preserved, and it is unclear whether they were intentionally demolished by Aguzzi or naturally collapsed before the State purchased the property.

A stratigraphic analysis of the masonry was carried out on the external facades of the main unit. A total of ninety-seven stratigraphic units were identified, based on the discontinuities

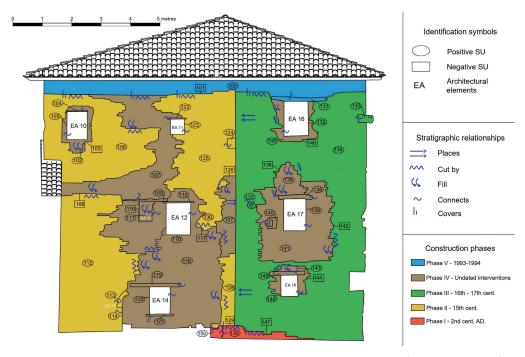
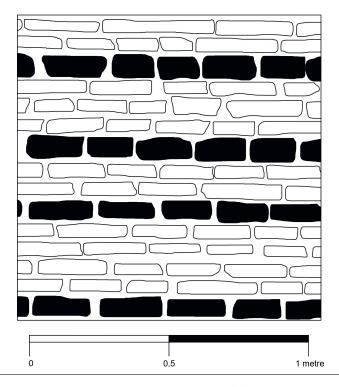


Figure 4-Stratigraphic eidotypes of the north facade of the main unit of the 'Tappatino' (author's elaboration).

in the physical-structural features present in the different masonries analysed. Orthophotos obtained by drone photogrammetric survey were used as a graphical basis, and the different stratigraphic relationships were noted using a predetermined symbology (Urcia 2011; Brogiolo and Cagnana 2012; Fiorini 2019, 19-25). This process established stratigraphic eidotypes of the four exterior elevations of the unit. Furthermore, a preliminary absolute chronology sequence divided into five building phases was proposed and illustrated through chronological diagrams and stratigraphic phase eidotypes (Fig. 4). The sequence can be divided as follows.

Roman imperial age: ca. 2nd century CE

This phase is only visible above ground in the north facade. The SU 130 is a fragment of masonry that is oriented in an east-west direction. It is identifiable at about the height of today's floor level and visible for up to six courses. The facing is made of *opus vittatum mixtum* and is characterized by the presence of a course of *vittae* of white-pink limestone alternating with three courses of bricks. This pattern of alternation, consistent in height, is only changed near the base folds. Moving from the fold toward the elevation, two courses of bricks alternate with one course of *vittae*, four courses of bricks alternate with one course of *vittae*, and, finally, two courses of bricks alternate with one course of *vittae*, and then resume with the alternating rhythm of three and one (Fig. 5). The SU 150 is a wall structure with a north-south orientation viewed in section, specifically the wall that extends outward from the interior of the building's cellar. The two Stratigraphic Units are connected.



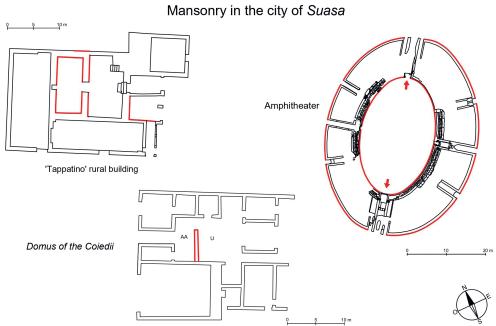


Figure 5-Eidotype of the Roman masonry in opus vittatum mixtum (author's elaboration).

The excavation conducted behind the northern facade during the 2019 research campaign located outside the northern perimeter of the 'Tappatino' the continuation of the wall visible in the cellar and confirmed its chronology to be dated to the Roman phase (SU 130 = USM 1519; SU 150 = USM 1555). This was initially only assumed on technical analysis basis.

The masonry construction technique used in these structures is evident in all the contemporary walls within the complex, as well as in two other buildings excavated in the Roman city of Suasa. One of these buildings is the Domus dei Coiedii complex, where the same construction technique was employed for a wall attached to 'Edificio S' (Ed. S) (Fig. 5). During the initial research campaigns in Suasa, it was discovered that it created a division in the original entrance system of the Domus (Antolini 2013). The partition wall, which is preserved up to a maximum height of 0.65 m, is leaning against the northern perimeter of Ed. S. Based on the iconographic chronology of the mosaic of the building it is leaning against, the wall has been dated to the 3rd century CE. However, it is important to note that the walls of Ed. S reuse structures from the early 2nd century CE interventions, as evidenced by the careful building technique of the facing of the northern and eastern structures of the room. The same facing, made up of bricks, many of which are triangularly cut, arranged in regular courses and with homogeneous thickness, is typical of other structures of the *Domus* that can be traced back to the early 2nd century CE. Confirming this, the alignment of the north and east walls of Ed. S is also uniform to that of other rooms in the building (De Maria and Dall'Aglio 1988, 102; 136).

It is worth noting that a masonry technique similar to that found in the 'Tappatino' complex can also be identified in the lower walls of the city amphitheatre (Fig. 5). After reviewing the archival material stored in the SABAP, specifically the documentation of the excavation and restoration operations carried out at the end of the last century, references to the presence of masonry in *opus vittatum mixtum* with limestone blocks were found for the podium walls, the northeast and southwest entrances, and the *circuitus*. However, the alternation of brick courses with those of the *vittae* in these masonries appears quite different from that visible in the 'Tappatino' area. This monument has been dated to the 1st century CE based on old excavation data. It is worth noting that the use of *opus vittatum*, particularly with brick levelling, is rare in amphitheatre masonry and is typically found in monuments dating from the late 1st century BCE to the early 2nd century CE (Golvin 1988, 101-104).

Based on these considerations, it is possible to suggest a dating from the mid-2nd century CE for the partition structure of the *Domus* and the structures of the 'Tappatino'. As mentioned earlier, this reconstruction appears to be confirmed by the materials found during the digs in the farmhouse, which date back to the second half of the 1st century and the beginning of the 2nd century CE. More details on this topic will be provided in the section on archaeological research.

15th century CE

The phase of construction in the late Middle Ages concerns only the eastern sector of the building (A). It can be identified by the cantonment stones that can be seen on the northern and southern facade. This phase comprises three wall structures, which have

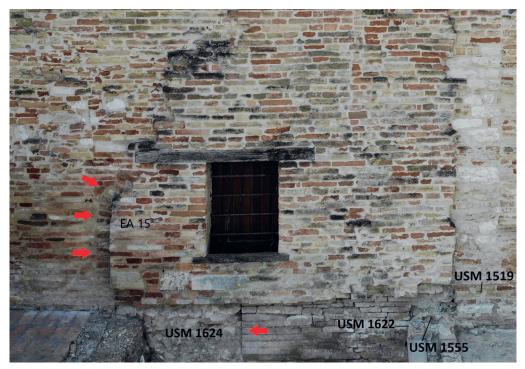


Figure 6 - Indication of the segmental arch opening visible in the northern facade of the 'Tappatino'.

been more or less affected by later restorations. Two parallel structures are oriented eastwest, and a connecting structure between is oriented north-south. The masonry is uneven and comprises bricks, locally hewed stone, and several reused elements from the Roman period on irregular mortar layers. Unfortunately, further study of this masonry is not possible due to the presence of later whitewashing.

At the entrance of the farmhouse cellar, there is a low arched opening from this phase. The north and south facades contain a partially visible arch that has been plugged and notched by later phases (Fig. 4; EA 15, SU 13 and SU 14). It is not possible to determine with certainty whether there is a blind arch or any remaining opening from this phase due to later reworkings on the south facade.

The dig conducted in 2019 was useful in describing the second phase. It revealed the right arch shoulder, SU 113 belonging to EA 15, partially visible in the north facade (Fig. 6). This arch appears quite similar in elevations and measurements to the one located at the entrance to the cellar (interior width about 1.22 m, intrados 0.50 m) and of the same type as the one walled in the south facade. The structure can be identified as a 15th century CE tower-house associated with sharecropping, based on the presence of segmental arches, brick module, and wall texture.

16th-17th centuries CE

The study of this construction phase is limited to the western sector, identified by the prominent cornerstones on the north and south facades. This sector comprises three wall structures, which have been subjected to varying degrees of restoration. Two of these walls run parallel to each other in an east-west direction, while the third wall links them in a north-south direction. The structures' facades are uneven, consisting of irregular mortar layers, bricks, and locally quarried medium-sized stones, as well as several reused elements from the Roman era. In the drainer of the northwest corner of the 'Tappatino', Gello Giorgi identifies a stone duct belonging to an aqueduct (Giorgi and Grazzi 1981, 146). The building features a drainer located in the southwest corner, which Giorgi did not mention. However, further study of this masonry is not possible due to the presence of later whitewashing.

This phase is attributed to Volpelli, who did not use exclusively Roman structures to build his palace, contrary to Cimarelli's report (Cimarelli 1642, 160-161). The inscription on the architrave of the above-mentioned opening and the toponym of this part of the valley floor are an addition to Cimarelli's testimony.

Contemporary age (unidentifiable)

This phase is characterized by a relatively uniform wall texture, with intact brick walls arranged in regular rows and set in thin mortar layers. The walls are considered to be part of salvage and restoration efforts, and no specific dating elements are present, making it only possible to define a contemporary period prior to the 1980s. A precise chronology of this phase can be determined through analysis of archival documents or archaeometric investigations of the materials used.

1993-94

The masonry from this phase is visible on all four sides of the building, mainly in the upper part. It is characterized by regular rows of intact bricks with banding arrangement on thin and regular mortar layers. Evidence of this construction work can be found in the SABAP's archival documents, and it was carried out in the years following the purchase of the 'Tappatino,' between 1993 and 1994².

Archaeological research in the area

The research area is located south of the so-called 'via del Foro,' main road of *Suasa* (Fig. 1). It is separated by a road from the Forum square. The research campaigns allowed the identification of the public nature of this urban sector, the comprehension of its layout and the development of interpretative hypotheses (Fig. 7).

The 1996 excavation campaign uncovered some evidence of the complex that had been obliterated by the farmhouse. However, no further research was conducted in this area at

² The pertinent documentation is kept in the *Archivio Perizie* of the SABAP of the Marche region (Report No. 23/89 dated 04/24/1989; first variant Report No. 14/90 dated 06/25/1990; second variant Report No. 41/93 dated 11/29/1993).

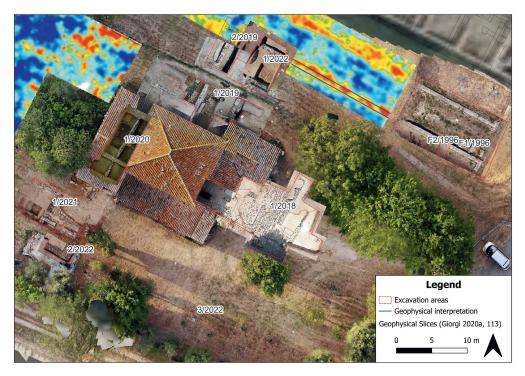


Figure 7 - Location of the excavation trenches in the 'Tappatino' area (author's elaboration).

that time. Subsequently, during the campaigns from 2018 to 2022, multiple sectors of the farmhouse area were explored. During renovation works in 2018, promoted by the SABAP to repurpose the 'Tappatino' as a functional building for the fruition of the archaeological area, remains of a republican public building the mosaic floor structures were discovered. These structures were later obscured during the imperial age with the construction of a large public building on a podium, known as 'Edificio 10' (Ed. 10), situated in the middle of a square. In 2019, an investigation was carried out on the area behind the northern elevation of the building. This was encouraged by some anomalies identified through georadar prospecting conducted the previous year. The data collected during this excavation campaign aligned perfectly with those of the previous year, revealing levels and structures likely associated with a republican public context that had been obscured by later imperial phases in this sector as well. The discovery of two parallel wall structures that create a narrow and elongated space closed on the western side and open on the opposite side supports the hypothesis of an imperial public complex. It is possible that a colonnade or a series of pillars once existed in this area, framing a large open space with the building on a podium at its centre. In 2020, as part of the renovation works of the 'Tappatino' led by the SABAP, a trench was excavated in the western part of the farmhouse. The excavations revealed a wall structure belonging to a building complex presumably symmetrical to Ed. 10. However, it is not possible to establish any structural or functional connections between the two complexes based on the data collected so far. The 2021 campaign focused on the southern sector of the farmhouse, documenting a situation characterized by the presence of a Renaissance phase and a Roman phase. The 2022 campaign revisited areas previously investigated in 2019 and 2021, conducting a new campaign of

geophysical surveys and opening trenches in continuity with the previous ones. Only the first and third trenches, opened in 2022, are relevant to the area occupied by the imperial complex of Ed. 10. The entire 'Tappatino' building was surveyed via photogrammetry and laser scanning to facilitate its study and the inspection of its walls.

The survey of the structures and the application of the EMF

Before beginning the reconstruction process, all photogrammetric and laser scanning surveys conducted during the research campaigns were processed and georeferenced. The area was covered with 44 scans with the *Leica P30* laser scanner. The scans were processed using *Leica Cyclone* software and the *Cloud Compare* environment. The recorded point clouds have an average overlap of 58%, an average robustness of 69%, and a mean error of 0.7 mm.

All photogrammetric processes were conducted using *Agisoft Metashape Pro*. The dataset consisted of 3709 images with an average resolution of 4056 x 3040, including the excavation trenches and elevations of the farmhouse. Georeferenced ground control points (GCPs) were used to merge the dataset across the entire area under investigation. The average total position error for both the GCPs and the control points in the various photogrammetric surveys was determined to be 0.02 m.

The photogrammetric models of the area, through the '3D Survey Collection' (3DSC) add-on [DOI:10.5281/zenodo.4459453], were optimised to improve their visualisation process, then used to perform a semantic interpretation of the archaeological context according to the principles of the EM approach, and finally used as a basis for organising and developing the entire reconstruction proposal.

Data collection was aimed at advancing the reconstructive project after setting up the 'virtual terrain' (Berto et al. 2021, 4). Archaeological data, including information on stratigraphic units, Harris' Matrix, drawings, and images, were extracted from excavation records. Extensive literature research was also used for gathering comparisons and ancient structural standards. All this information was gradually incorporated into the EM graph within the *yEd* graphics editor (Fig. 8).

The photogrammetric mesh was subject to semantic analysis, which involved modelling all proxy geometries in *Blender* related to the identified stratigraphic units. This phase enabled the visualization of archaeological remains in the area through a red-coloured mesh. The second phase of the reconstructive process involved adding virtual structural stratigraphic units in blue and non-structural units in green (Fig. 9-10). The proxy models act as a link between *Blender* and *yEd*, communicating via the 'Extended Matrix Tools' (EMTools) add-on [DOI:10.5281/zenodo.4459272] for local representation of the data, and via the web application *EMviq* (Extended Matrix visual inspector querier) (http://osiris.itabc.cnr.it/scenebaker/index.php/projects/emviq/; Demetrescu et al. 2023) for their online representation. For this reason, proxies did not require a high quality of modelling detail, as they are only a means of visually representing the reconstructed dataset and highlighting the 'representation models' (RMs) with texture information. The use of USV/s was limited to contexts where the existing remains were suitable to guide the reconstruction process. In contrast, USV/n was used when the reconstruction proposal was linked to the use of external sources.

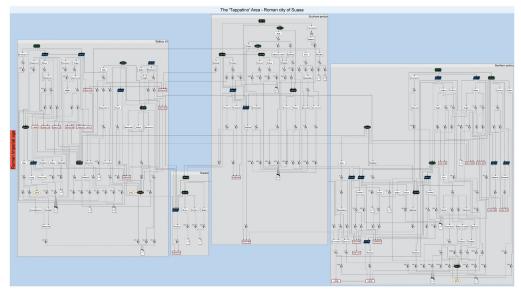


Figure 8 - Extended Matrix of the 'Tappatino' area in the Imperial Roman Age.

The EM of the 'Tappatino' area comprises eight chronological phases, based on the Harris Matrix of the building and excavation areas. A virtual reconstruction has been proposed for five of these phases: the Roman imperial age, the medieval age, the 16th-19th centuries, the 19th-20th centuries, and the second half of the 20th century. The Roman Republican Age phase has been excluded from the reconstruction due to insufficient data. Until a comprehensive reconstruction of all phases will be possible, the following paragraphs propose the EM reconstruction for the imperial Roman period only. The granularity of the archaeological record was organised into activities into which the various EM nodes were grouped as, for example, for the construction of Ed. 10, the two side porticoes and the square.

Reconstructive proposal of the 'Tappatino' area in the Roman imperial age

Based on the discussion in this paper, it is possible to reconstruct a building from the Roman imperial age. This building includes a porticoed square measuring $28.39 \times 33.30 \, \text{m}$, at the bottom of which stood a monumental podium building (Fig. 9-10).

The complex may have been directly accessible from the so-called 'via del Foro' through one or more openings in the eastern wall. This was only partially indicated by the presence of a wall septum discovered during the 1996 campaign in the area where the northern arm of the portico closed off and was reconstructed through USV/s 36 and USV/n 34. The discovery of a fragment of pavement made of large fictile hexagonettes with a mosaic tile in the middle, found at an elevation of 137.92 m asl, has allowed for the proposal of a reconstruction of the pavement plan of the square (USV/s 21). The square appears to have been bordered on the north and south sides by two L-shaped columned porticoes that met at the building at the bottom, intersecting it. The arcaded arms were 4.40 m wide (15 feet) and 38.86 m long (134 feet) in the east-west direction. In the north-south direction, they measured 15.14 m (52 feet). The

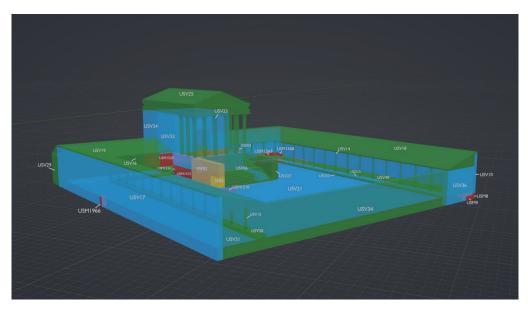


Figure 9 - Northern bird's-eye view of the proposed Imperial Roman reconstruction of the 'Tappatino' area. EM colour scale (author's elaboration).

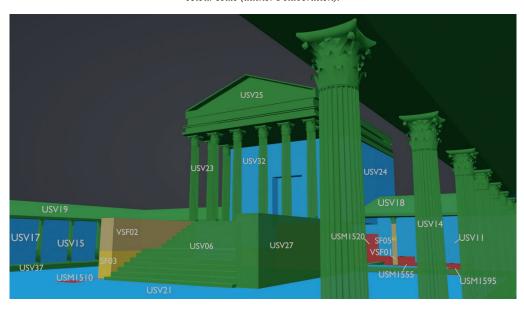


Figure 10 - Proxy representation of the reconstructive proposal for the Roman imperial age of the 'Tappatino' area with view from the interior of the northern portico. EM colour scale (author's elaboration).

northern sector of the complex, where excavation operations were concentrated, provides the most information for reconstruction purposes. The reconstruction of the southern portico was based on the principle of Vitruvian symmetry (Vitr. I, 2, 4) with reference to the northern portico.

The discovery of tile foundations for the installation of marble slabs has allowed for the reconstruction of their layout (USV/s 12; USV/s 13; USV/s 22) and the proposal of a hypothesis regarding the presence of a colonnade (USV/n 14) facing the square. The rhythm of the columns was established based on a pink marble slab found intact *in situ*. The width of the slab is known to be 0.60 m. According to Vitruvius' assumption that foundation structures should have a thickness equal to one and a half times the diameter of the columns above (Vitr. III, 4, 1), columns with a diameter of 0.40 m were reconstructed. During the 2019 excavation activities, a column rubble (SP 05) was discovered, which allowed for a proposal of virtual restoration (VSF 01) of one of the columns of this portico arm. The dimensions and placement of the marble slab indicated the existence of a column at the inner corner of the portico. A colonnade was reconstructed with an intercolumniation of three slabs (1.05 m) and a height of 8½ diameters (3.40 m) (Vitr. III, 3, 4; 10). The closing wall of the northern portico, examined in various sections, had a course that was perfectly parallel to the slabs and an elevation in *opus vittatum mixtum*. This was supplemented by USV/s 10 and 11, based on data from both excavation campaigns and geophysical prospecting in 2018 and 2022.

The available data for the southern arm only allowed for the assumption of an analogous situation to the northern one based on the principle of symmetry and planimetric comparisons. The enclosing wall was divided into two structures, distinguished by their orientation, to highlight their varying degrees of certainty (USV/s 17 and USV/n 16). The presence of a wall septum identified in trench 3 of the 2023 campaign confirms the existence of the east-west septum. Trench 3 is also significant for the discovery of a fragment of a pelte floor. Based on the evidence, it can be assumed that the floor covering of both porticoes was at an elevation of 137.92 m asl (USV/s 31 and USV/n 49). Thus, in this context, the square and porticoes were on the same level and were separated by a slightly elevated row of columns.

At the bottom of the square there was a probably hexastyle building on a high podium with a front staircase and a pronaos leading to a covered quadrangular room (Fig. 11). The podium (USV/s 24, USV/s 32), with its highest point of preservation visible in the cellar, is 2.88 m high above the square level. In ancient times, this structure probably reached a height of about 3 m (1 pertica), as can be deduced from the absence of any traceable signs of vaulted pillars or entablature housings, and by comparing with the Roman high podium temple in nearby Ostra, which shows structural and chronological similarities to the Suasa structure (Dall'Aglio and Franceschelli 2020, 153-163; 532-533).

Based on the height of the *podium*, the heights of all its structures and the end wall of the portico that crosses it seamlessly in a north-south direction were adjusted to divide its substructures into two different rooms. Access to the upper part of the structure is provided by a double flight of stairs, the first of which leads to a terrace without a roof of approximately 2.20 m in width, while the second leads directly to the pronaos. Thus, two different elevation levels were to be defined within the same building to accentuate its verticality and monumentality. The 14 steps were reconstructed based on the overall height difference that needed to be bridged, the traces present on the conglomerate, and the position of the retaining wall. Both ramps were designed to have an odd number of steps, seven for each ramp, with treads of 0.43 m and rises of 0.25 m, in accordance with Vitruvian rules (Vitr. III, 4, 4.). The building's casements were to be framed and part of them were found collapsed (SF03) and virtually integrated via VSF 02. At the end of the rise, at least three m from the plaza below, the interior

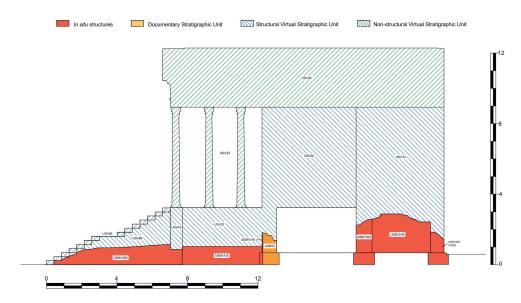


Figure 11 - Reconstructive proposal of the E-W section of 'Edificio 10' (author's elaboration).

of the building (9.32 x 13.09 m, about 35 x 45 feet) could be accessed at the end of the rise. The internal dimensions of the pronaos and the covered room were established by placing the line of the front colonnade (USV/n 23) at the negative trace left by the housing of a large stone block within the conglomerate. The pronaos measures 7.61 x 4.33 m (26 x 14 feet) and the covered room measures 8.66 x 4.33 m (approximately 29 x 14 feet). Based on the known width of the recess for housing the colonnade's foundation stone block and the previously mentioned Vitruvian assumption, the columns can be estimated to have a diameter of 0.60 m (Vitr. III, 4, 1). The front of the columns was hexastyle, with two columns on the side flaps of the pronaos and intercolumniums of approximately 1.20 m, creating a systyle rhythm for the facade (Vitr. III, 4, 1). According to the Vitruvian canon, the columns were intended to be 5.70 m high. The reported building measurements also suggest a reconstruction of a tetrastyle front with wider columns and *intercolumnium*. However, due to issues with the building's statics, this hypothesis seems less likely. The roof and entablature of the structure were identified as USV/n 25 and reconstructed by comparing it with the *Ostra* case mentioned above (Dall'Aglio and Franceschelli 2020, 533).

Discussion and conclusion

The 'Tappatino' area during the Roman imperial phase must have appeared as a public area separated from the so-called 'Commercial Forum' by a road axis. The reconstructed plan for this area and its location within the topography of *Suasa* is similar to the case of *fora adiecta* in the smaller centres of Cisalpine Gaul (Villicich 2000, 61–63). In these contexts, the duplication of collective public spaces is associated with the presence of additional public areas with religious character. Useful comparisons for the *Suasa* case were identified, such as the case of *Alba Pompeia*. This is a perfect example of addition to the urban interweaving, despite its strictly

religious character. It is located in close proximity to both the Forum and Theatre areas and appears to be inspired by the scheme of *Vespasian's Templum Pacis* (Filippi 1997, 69–70; Maggi 2000, 69). The mentioned scheme, despite significant differences in monumental appearance, was widely used in both Cisalpine and the other transalpine regions. This is evident in the case of *Avenches* and the public complex B at *Alba Helvorum* (Béal et al. 1989, 122–133). The plan of the latter is the most comparable to the case under study. It consists of a quadrangular square with a sacred building at the back, two L-shaped portico arms passing through it and small open exedras along the perimeter wall of the portico. The overall orientation of the structure also appears identical to the *Suasa* case. All these complexes have only been partially investigated, and their religious function appears to be based solely on assumptions related to the presence of a central building with a frontal staircase. In the city of *Suasa*, a sacred area from the imperial age has not yet been identified, and according to Cimarelli's words (Cimarelli 1642, 160-161), just below the 'Tappatino' there is a temple dedicated to Jupiter. Therefore, it is probable that the sacred complex mentioned by Cimarelli could be Ed. 10.

However, the dimensions of the podium of this structure deviate from the usual Vitruvian ratio of 1:2, and the so-called cella has an almost square shape (9.72 x 9.32 m, 33 x 32 feet). Consequently, comparisons can also be drawn with the typology of the curia on a high podium from the imperial age (Balty 1991). The case study of the Verona curia (Frothingham 1914, 128-145; Marconi 1937, 35-38; Cagiano De Azevedo 1940, 34; Beschi 1960, 444-456; Cavalieri Manasse 1987, 12-15; 24-29; 1990, 579-616) provides an interesting point of reflection for a different approach to understanding the Suasa context. It is important to note that this is not a direct comparison, as the 'Tappatino' complex has evident structural differences. Mistakenly identified as the Capitolium by Frothingham (Frothingham 1914, 128-145), this structure comprises a U-shaped, vaulted perimeter ambulatory that can be accessed at the end of the long arms. It encloses three interconnected vaulted rooms in the northern part. The rooms at the level of the podium supports likely had complementary functions to those of the curia. In a monumental typology generally lacking a podium, the construction of this element in such monumental terms and its related internal structures must have served a specific purpose (Cavalieri Manasse 1987, 27). Based on the chronological indications from excavation tests, the entire complex appears to date back to the Tiberian age. The hypothesis that this area was associated with the imperial cult cannot be dismissed. In fact, the strong connection between this cult and the curia is well known (Gros 1984, 125; Hänlein-Schäfer 1985, 55-56; 64; 67-68; Balty 1991, 279-286). The identification of Ed. 10 as a curia raises concerns from a topographic perspective, since the typical relationship between curia and basilica is completely absent. Moreover, the absence of information regarding the topographical positioning of the Capitolium and the basilica in Suasa currently impedes the study of this area of the city in relation to its spatial arrangement and the structural pathways (Grassigli 1994). However, the unique nature of Ed. 10 should not be surprising, considering the topographic and structural peculiarities found in Suasa's civic complexes, such as the so-called 'Commercial Forum' and the amphitheatre.

The digital reconstruction project of the 'Tappatino' represents a significant step forward in studying and communicating the construction history of this site. By using the EM approach, it was possible to analyse the discovered archaeological structures and provide the necessary tools for creating a comprehensive reconstruction. This method has allowed for equal emphasis to be placed on all stages of the reconstruction process, offering new ways to interact with

the reconstructions, both from a research and enjoyment perspective. As research in the field advances and new data from geophysical surveys and targeted excavations are incorporated, this study will either confirm or refine the existing models and develop 'representation models' for each of the recognized phases and publish them on the web app *EMviq*. In addition, these new data will open up the possibility to investigate the relationship between the complex of 'Edificio 10' and the surrounding complexes of the Forum and the so-called 'Ocean Building' (De Maria and Giorgi 2013, 87; Giorgi 2010, 371-378; 2020a, 101), in order to place the proposed reconstruction within a broader frame of the ancient *Suasa* landscape.

Bibliography

Adam J.P. 1994. *L'arte di costruire presso i romani: materiali e tecniche*. Translated by Guidobaldi M.P. 3 ed. Milano: Longanesi & C.

Antolini S. 2000. 'Suasa'. Supplementa Italica, 18: 317-94.

Antolini S. 2013. 'Una fistula iscritta da Suasa'. Picus 33: 299-307.

Balty J. Ch. 1991. Curia Ordinis: recherches d'architecture et d'urbanisme antiques sur les Curies Provinciales du monde Romain. Vol. 2. Memories de la Classe des Beaux-Arts, T. XV. Bruxelles: Palais des Academies.

Beacham R., H. Denard, and F. Niccolucci. 2006. 'An Introduction to the London Charter'. In The E-Volution of Information Communication Technology in Cultural Heritage: Where Hi-Tech Touches the Past. Risks and Challenges for the 21st Century, edited by M. Ioannides, D. Arnold, F. Nicolucci, and F. Mania, 263–69. Budapest: Archeolingua.

Béal J.C., J. Dupraz, and E. Boucharlat. 1989. 'Architecture et urbanisme antiques d'Alba (Ardèche): Documents Nouveaux'. *Revue Archéologique de Narbonnaise* 22: 99–145.

Berto S., E. Demetrescu, B. Fanini, J. Bonetto, and G. Salemi. 2021. 'Analysis and Validation of the 3D Reconstructive Process through the Extended Matrix Framework of the Temple of the Roman Forum of Nora (Sardinia, CA).' *Environmental Sciences Proceedings*, 10(1), 18. https://doi.org/10.3390/environsciproc2021010018.

Beschi L. 1960. 'Verona Romana'. In *Verona e il suo territorio*. Vol. 1. Verona: Istituto per gli studi storici veronesi.

Bianchini M. 2010. Le tecniche edilizie nel mondo antico. Roma: Dedalo Edizioni.

Boschi F., F. Vermeulen, and E. Giorgi. 2020. Picenum and the Ager Gallicus at the Dawn of the Roman Conquest. Landscape Archaeology and Material Culture. Oxford: Archaeopress.

Bridel Ph. 1982. Le Sanctuaire de Cigognier. Lausanne: Association pro Aventico.

Cagiano De Azevedo M. 1940. *I Capitolia dell'Impero Romano*. Città del Vaticano: Tipografia Poliglotta Vaticana.

Cavalieri Manasse G. 1990. 'Il Foro di Verona: recenti indagini'. In La città nell'Italia settentrionale in età romana, 579–616. Roma: Publications de l'École Française de Rome.

Cerato I. and S. Pescarin. 2013. 'Reconstructing Past Landscapes for Virtual Museums.' In *Good Practice in Archaeological Diagnostics: Non-Invasive Survey of Complex Archaeological Sites*, edited by C. Corsi, B. Slapšak, and F. Vermeulen, 285–96. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-01784-6_17.

Cimarelli V. M. 1642. Istorie dello Stato d'Vrbino da' Senoni detta Vmbria Senonia e de Lor Gran Fatti in Italia, delle città, e luochi che in essa al presente si trouano, di quelle che distrutte gia furono famose et di Corinalto che dalle ceneri di Suasa hebbe l'origine. Brescia: Opere storiche Fontana, Bartolomeo eredi.

- Dall'Aglio P.L. 1991. 'La viabilità romana'. In Archeologia delle valli marchigiane: Misa, Nevola e Cesano, edited by P.L. Dall'Aglio, S. De Maria, and A. Mariotti, 12–23. Perugia: Electa/Ed. Umbri.
- Dall'Aglio P.L. and C. Franceschelli. 2020. Ostra: una città romana e il suo territorio nelle Marche centrali (Scavi 2006-2019). Bologna: Ante Quem.
- De Maria S. and P.L. Dall'Aglio 1988. 'Nuovi scavi e ricerche nella città romana di Suasa (AN). Relazione Preliminare.' *Picus* 8: 73–156.
- De Maria, S., and E. Giorgi. 2013. 'Urbanistica e assetti monumentali di Suasa. Novità dalle ricerche recenti'. In *Epigrafia e Archeologia*, edited by M. Giuliodori and G. Paci, 79–142. Ichnia 13. Tivoli: Tored.
- Demetrescu E. and B. Fanini. 2017. 'A White-Box Framework to Oversee Archaeological Virtual Reconstructions in Space and Time: Methods and Tools.' *Journal of Archaeological Science: Reports* 14: 500–514. https://doi.org/10.1016/j.jasrep.2017.06.034.
- Demetrescu E., B. Fanini, and E. Cocca. 2023. 'An Online Dissemination Workflow for the Scientific Process in CH through Semantic 3D: EMtools and EMviq Open-Source Tools'. *Heritage* 6 (2): 1264–76. https://doi.org/10.3390/heritage6020069.
- Demetrescu E. and D. Ferdani. 2021. 'From Field Archaeology to Virtual Reconstruction: A Five Steps Method Using the Extended Matrix.' *Applied Sciences*.
- Demetrescu E., D. Ferdani, N. Dell'Unto, A.M. L. Touati, and S. Lindgren. 2016. 'Reconstructing the Original Splendour of the House of Caecilius Iucundus. A Complete Methodology for Virtual Archaeology Aimed at Digital Exhibition.' SCIRES-IT-SCIentific RESearch and Information Technology 6 (1): 51–66.
- Demetrescu, E. 2018. 'Virtual Reconstruction as a Scientific Tool'. In *Digital Research and Education in Architectural Heritage*, 102–16. Springer.
- Denard H. 2012. 'A New Introduction to the London Charter.' In *Paradata and Transparency in Virtual Heritage*, edited by A. Bentkowska-Kafel, H. Denard, 57–72, London: Ashgate.
- Destro M. 2010. 'L'età Tardoantica e la fine della città'. In *Archeologia nella valle del Cesano da Suasa a Santa Maria in Portuno*, edited by E. Giorgi and G. Lepore, 93–98. Bologna: Ante Quem. Dominici L. 1993. *La regale San Leo*. San Leo: Associazione Pro San Leo.
- Ferdani D., E. Demetrescu, M. Cavalieri, G. Pace, and S. Lenzi. 2020. '3D Modelling and Visualization in Field Archaeology. From Survey To Interpretation Of The Past Using Digital
- Technologies'. Groma: Documenting Archaeology 4. https://doi.org/10.12977/groma26.
 Filippi F., 1997. Alba Pompeia: Archeologia della città dalla fondazione alla tarda antichità. Alba: Famija albeisa.
- Frothingham A. L. 1914. 'Discovery of the Capitolium and Forum of Verona.' *American Journal of Archaeology* XVIII: 129–45.
- Giorgi E. 2010. 'Suasa alla luce delle ultime ricerche'. In *Archeologia nella valle del Cesano da Suasa a Santa Maria in Portuno*, edited by E. Giorgi and G. Lepore, 39-46. Bologna: Ante Quem.
- Giorgi E. 2020a. 'Suasa. Genesi e sviluppo di un municipio romano dell'Agro Gallico'. *Atlante Tematico Di Topografia Antica. Roma*, 30: 95–114.
- Giorgi E. 2020b. 'The Cesano Valley at the Outset of the Roman Conquest and the Genesis of Suasa.' In *Picenum and the Ager Gallicus at the Dawn of the Roman Conquest. Landscape Archaeology and Material Culture*, edited by F. Boschi, E. Giorgi, and F. Vermeulen, 61–79. Oxford: Archaeopress Access Archaeology.
- Giorgi E. 2021. 'L'appoderamento agrario suasano alla luce delle nuove ricerche'. *Agri Centuriati* 18: 9–26.

PRELIMINARY APPROACH TO THE STUDY OF THE 'TAPPATINO' AREA OF SUASA

- Giorgi G. and L.A.Grazzi 1981. Suasa Senonum e l'Ager Gallicus nella valle del Cesano. Con catalogo dei reperti archeologici. 2nd Edificio Parma: Centro saveriano azione missionaria.
- Golvin J.C. 1988. L'amphitheatre Romain: Essai sur la theorisation de sa forme et de des fonctions. Paris: Diffusion de Boccard.
- Grassigli G. L. 1994. 'Sintassi spaziale nei fori della Cisalpina. Il ruolo della curia e della basilica'. Ocnus. Quaderni Della Scuola Di Specializzazione in Archeologia 2: 79–96.
- Gros P. 1995. 'Hercule à Glanum. Sanctuaires de transhumance et développement urbain.' *Gallia* 52: 311–31.
- Gros P. 1984. 'L'augusteum de Nîmes.' RAN 17: 123-34.
- Hänlein-Schäfer H. 1985. Veneratio Augusti: Eine Studie Zu Den Tempeln Des Ersten Römischen Kaisers. Roma: Giorgio Bretschneider.
- Lanciarini V. 1985. Il Tiferno Mataurense e la provincia di Massa Trabaria: memorie storiche. Vol. II. Roma: Tip. Failli.
- Maggi S. 2000. 'Le sistemazioni forensi nelle città della Cisalpina romana: dalla tarda repubblica al principato augusteo (e oltre)', *Revue belge de Philologie et d'Histoire*, 78(1): 270-272
- Marconi P. 1937. Verona Romana. Bergamo: Istituto italiano d'arti grafiche.
- Polverari A., 1984. *Castelleone di Suasa I. Vicende storiche*. Castelleone di Suasa: Amministrazione comunale.
- Remondino F. and A. Rizzi. 2010. 'Reality-Based 3D Documentation of Natural and Cultural Heritage Sites—Techniques, Problems, and Examples'. *Applied Geomatics* 2 (3): 85–100. https://doi.org/10.1007/s12518-010-0025-x.
- Villicich R. 2007. I complessi forensi nei centri minori della Cisalpina romana. Bologna: Ante Quem.