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Lulof, P.S.; Opgenhaffen, L.

DOI
10.1017/9781108955232.005

Publication date
2022

Document Version
Final published version

Published in
Architecture in Ancient Central Italy

5 Connecting Foundations and Roofs

The Satricum Sacellum and the Sant'Omobono Sanctuary

PATRICIA S. LULOF AND LOES OPGENHAFFEN

In this chapter we would like to emphasize the great potential of the combination of comparative analysis of both ground plans and roofs of archaic religious architecture, which involves the reconstruction of the entire construction of the building in such detail that its originally applied building modules can be identified.[1] This will be demonstrated by analysing the architecture and roofs of two concrete case studies of important archaic sanctuary sites in central Italy: the Sacellum of Satricum and the Sant'Omobono sanctuary in Rome.[2] In the light of new investigations at both sites, we might unravel a system of interactions and collaborations between terracotta craftsmen, architects, and local workmen in this enigmatic period at the dawn of the Roman Republic.[3]

[1] This paper was read by Patricia Lulof on 20 March 2018 at Somerville College, Oxford, during the 'Etrusco-Italic Architecture in Its Mediterranean Setting' workshop organized by Charlotte Potts. We are grateful for the invitation and the opportunity to publish our findings in this volume. This chapter emanated from a collaborative effort which started in early 2017. Loes Opgenhaffen was responsible for the 3D model of the Satricum Sacellum and underlying research into the general building materials, foundations, and ancient construction techniques. The 3D reconstructions of the roof and its decorative programme are solely based on the thorough research and reconstruction drawings by Lulof. All images were prepared for this chapter by Opgenhaffen, Figure 5.2 also based on the drone visualization by J. Waagen. Copyright Satricum Project, University of Amsterdam.

[2] New investigations at Sant'Omobono (Brocato et al. 2016) and Lanuvium (Santi 2016) have shown that many more early structures with a cult function existed. An overview is published by Potts (2015, 31–50). The importance of roofs for reconstructing often-unknown architecture has been underlined in the same publication (pp. 51–61). The work of Nancy Winter (2009) is groundbreaking in this aspect.

[3] The 'Deliciae Fictiles V' conference in Naples, 15–18 March 2018, aimed to discuss the networks between patron elites and specialized craft communities that were responsible for the sophisticated terracotta decoration of temples in Italy between 600 and 100 BC. It focused on the mobility of craft people and craft traditions and techniques, asking how images, iconographies, practices, and materials can be used to explain the organization of ancient production, distribution, and consumption. Among other themes, one focus was on the economy of production and sanctuaries, as well as the politics of architecture, temples, and the use of decorative systems. The conference intertwined with the Oxford workshop 'Etrusco-Italic

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The best way to explore this socio-economic aspect of ancient architecture while performing empirical analysis of its archaeological remains is technology. Hence, we propose a methodology for studying technology that combines *chaîne opératoire* – the method that allows analysis of the steps that unfold during the technological process of constructing a building within a social environment – and conventional (empirical) research methods and innovative research tools such as 3D modelling. These 3D tools and theoretical concepts act together to illuminate the construction process of Archaic architecture.

When used for reconstructing practice, craft, and construction, 3D modelling is an indispensable research tool, for it was previously impossible to visualize processes through time. The added dimension forces the archaeologist to consider every detail, every facet of a structure. This detailed approach combines separate research areas and compels archaeologists to move beyond traditional disciplinary boundaries, and to integrate both different analytical methods and data sets such as comparative and technological analysis of ground plans and roof construction, archaeological data, and information from scientific (fabric) analysis, for example. In this way, 3D modelling guides the interpretative processes for reconstructing architecture, generating a vast amount of new data that otherwise could never have been encountered.[4]

The Sacellum Project we present here is the latest in the series of architectural reconstructions carried out in the 4D Research Lab. In 2015, we concluded a group project at the Netherlands Institute of Advanced Studies (NIAS) called 'Biographies of Buildings', which focused on the preparation of data for the reconstruction and publication, both graphic and digital, of a selection of ancient buildings.[5] We collected traditional data (ranging from archaeologically excavated foundations and numerous terracotta roof decorations), written testimonies such as Vitruvius, and previous reconstructions – mostly technical drawings – with the aim of producing highly detailed digital 3D models. As a result, we will discuss the reconstruction of the first two sacred structures of the successive phases of the Temples of Mater Matuta in Satricum, traditionally dated to between the beginning (*c.* 580 BC) and just after the middle of the sixth century BC

Architecture' and created a fruitful base for discussion. The proceedings, published in 2019 as *Deliciae Fictiles V: Networks and Workshops*, were dedicated to the work of Nancy Winter.

[4] On the value of 3D modelling in reconstructing architecture: Barceló 2000; Hermon 2012; Lulof, Opgenhaffen, and Sepers 2013; Earl 2013; Opgenhaffen and Sepers 2015; Lulof 2016b.

[5] Lulof worked in the Satricum Research Project from 1985 to 1995 and is currently preparing the final publication on the roofs of Satricum, in collaboration with R. R. Knoop. Opgenhaffen has been working in Satricum as Principal Field Illustrator since 2005. Lulof was coordinator of the Theme group project 'Biographies of Buildings', carried out at NIAS in 2015.

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Table 5.1 *The different sacred buildings and roofs at Satricum and their chronologies*

Temples	Chronology (BC)	Dimensions	Roofs
Sacellum I	590–570	6 x 10.4 m	Early archaic
Sacellum II	550–530	9 x 14 m	Caeretan
Temple 1	530–500	12 x 24 m	Campanian
Temple 2	500–480	21 x 34 m	Late archaic

(Table 5.1).[6] The creation dates of these roofs have been much disputed and, in addition, research on architecture and roofs has always been at cross-purposes as separate entities.[7]

The First Phase: Sacellum I (590–570 BC)

We started the reconstruction on the basis of the plan known from the excavations in 1896 and restudied by de Waele in the 1980s and since then rediscussed by several scholars.[8] In Fig. 5.1, the small rectangular building (with traces in blue) is located (outlined in red) within the larger structure of later Temples I and II. A digital reconstruction of the landscape has been modelled, too, based on the reconstruction of the ancient landscape published by Guaitoli.[9]

Data for the blocks have been extracted from section drawings made by de Waele, showing the heights of the smaller foundation walls belonging to the earliest building phase in the sanctuary, in combination with the original detailed ground plan produced by Mengarelli and redrawn by de Waele. The blocks were *c*. 40 cm high and not founded on *terra vergine*.[10] Colonna already noticed on the old excavation photographs that the separate wall east of the rectangular plan had a double row of blocks, levelling the sloping terrain

[6] For an updated summary of the study and chronology of the Sacellum from Satricum: Potts 2015, 145, P3.

[7] Knoop and Lulof 2007, 32–4; Winter 2009, Roof 6–1, 398–400; Lulof 2016a, 343–65.

[8] De Waele 1981, 24–8; Colonna 1984, 396–401; Knoop and Lulof 2007, 32–5; Van't Lindenhout 2014, 83–90, 136–7 with fig. 10 showing different reconstructions of the plan; Potts 2015, 40, 55–6, 145. Bouma (1996, 55–7) discusses the foundations in depth and includes the fifth wall (de Waele's wall no. 22) in the plan as a *temenos* wall around the archaic votive deposit, as suggested by Maaskant-Kleibrink 1992, 11. Barnabei and Mengarelli (1896, 191) also describe this particular wall as the enclosure of a votive deposit.

[9] Guaitoli 2003, 283–7, fig. 519. All digitized maps and geographic data were imported and integrated into the 3D software Cinema4D.

[10] De Waele 1981, fogli 1–3, 19, tav. 5; Colonna 1984, 398.

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Fig. 5.1 Satricum. Plan of the remains of the temples with Sacellum I in red. (Drawing by L. Opgenhaffen)

(Fig. 5.1).[11] With this information, and after closely studying the plans and photos of the 1896 excavation, we could start to reconstruct the earliest phase of the Satricum Sacellum. The then-known structure was a simple rectangular *oikos*, *c.* 6 x 10.4 m, set on a metre-high podium with a shallow torus moulding.[12] Having reconstructed the landscape, we were able to confirm the hypothesis of Colonna and Potts: the Sacellum included a raised podium to meet the sloping terrain, which is clearly visible in Fig. 5.2.[13]

The walls/upper structure of the Sacellum, with a central entrance facing west, would have been a panelled, timber-framed construction with principal roundwood posts[14] secured by sole beams. Between these

[11] Colonna 2005, 111–12. Also, when analysing the section drawings by de Waele, it is clear that there is a difference in height of at least 40 cm (one row of blocks) between the western and eastern walls.

[12] Potts 2015, 145; Edlund-Berry (2008, 442–3) claims that this moulding is, in fact, a round block protruding from a set of vertical blocks, as suggested by Colonna (2005, 112, fig. 1 (left)), based directly on Barnabei and Mengarelli 1896, 32. The use of the word *oikos* was introduced by Colonna (1984, 40) and further used by Maaskant-Kleibrink (1992, 126); see Potts 2015, 31, 34 for the latest discussions.

[13] Colonna 2005, 111–12, fig. 1 (right).

[14] The round, unworked poles were probably of pine wood, as pollen analysis in the region indicates that this type of wood was widely available: Joolen 2003.

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Fig. 5.2 Satricum. Sacellum I on top of the remaining foundations. (Image by L. Opgenhaffen and J. Waagen. Copyright Satricum Project University of Amsterdam)

posts a mid-rail and upright staves with horizontally woven wattles covered with daub formed the panels, the so-called the wattle-and-daub technique (Fig. 5.3). Abundant remains of accidentally burnt daub with wattle and timber imprints have been found throughout the site and are related to the earliest building phases on the acropolis.[15] Each set of posts carried a truss of sawn wood, reinforced by – although structurally unnecessary – vertical struts. The subsequent layering of the roof construction consisted of roundwood purlins and light rafters on top, which may have been covered with wattled mats of reed, themselves covered with a layer of clay, in order to provide an even surface for the rows of

[15] Maaskant-Kleibrink 1992, 129, fig. XLIV. Opgehaffen has observed numerous fragments of wattle-and-daub during excavations in the Poggio dei Cavallari area of Satricum (2005–18). These fragments have imprints of posts (20–5 cm in diameter), studs, and wattlework.

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Fig. 5.3 Satricum. Sacellum I: wattle-and-daub-panelled timber-frame construction. (Image by L. Opgenhaffen)

tiles.[16] The early archaic roof tiles had a sandy underside to prevent sliding, and therefore could not have been meant to be visible from below. Since the tiles were tapering, they did not fit directly positioned on the light and straight rafters, and they must have been placed on a flat and even surface provided by thin slabs. As sawing with handsaws or splitting wood to cover the many square metres with planks to receive the tiles must have been too labour-intensive and expensive, and moreover did not necessarily create an even surface, we propose wattle mats covered with clay.[17] Reed is also known from tomb architecture where some ceilings are chiselled to give the impression of a reed covering.[18] The roof was known to have had a system of simple, dark red fired tiles and imbrices (cover tiles), painted red on top, excavated on site and stratigraphically connected to this built structure.[19]

[16] Suggested by Turfa and Steinmayer 1996, 19–20, fig. 3. Sapirstein (2009, 313–14) suggests this method for the protocorinthian rooftiles. See also Miller 2017, 173–4 and 198–200 for the rejection of this system.

[17] Indeed, conventional reconstructions demonstrate wooden planks, sawn. Contemporary shipwrights needed flat wooden boards from the earliest period onwards, which must have been sawn; Hodge 1960, 92–6.

[18] Naso 1996, fig. 25 (Tomba Cima) and 174 (Tomba del Sole e della Luna).

[19] Wikander 1993, Type 1A; Winter 2009, 22–7, 29, 38 with the precise dimensions and mentioning red paint.

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A fragment of a *kalypter hegemon* (large ridge tile covering the ridge pole) could have been part of this roof system, and a handmade central acroterion attributed to a nearby (secular) building on the acropolis, excavated by the Groningen team indicates the presence of similar decoration on religious architecture as well. This acroterion has been used as a stylistic example in the reconstruction of this phase of the temple, its sole purpose to indicate that such architecture must have been adorned. Therefore, the dimensions have been adapted to correspond to the *kalypter hegemon*; the disc corresponds to the diameter of the *kalypter*, which in turn corresponds to the dimensions of the roof elements. As a result, the acroterion is three times larger than the example excavated by the Groningen team.[20] No architectural terracottas attributed to this phase have been found, although two fragments of handmade antefixes or appliques, excavated near the temple area, may have connections to a type of decoration found at Poggio Civitate that dates to around 580 BC. On the basis of the parallels used (*kalypter*, acroterion), we place this phase at 590–580 BC, in accordance with the chronology suggested by de Waele and Colonna and followed by others.[21]

The roof system was supported by trusses (four in this reconstruction, but three could also have been possible), capable of carrying the weight of the tiled roof, spreading and dividing the thrust evenly.[22] Figure 5.3 represents the first phase of the Sacellum as interpreted on the basis of the above-mentioned data: a small rectangular building with a slightly overhanging roof, somewhat more at the front to protect the perishable plastered walls from rain and weathering.[23] The slope of the roof is not proven. However, contemporary roofs from Acquarossa and Rome show a regular slope of 21 to 25 degrees.[24]

The back side would have been closed, as votive models show. The interior of the building would have needed light sources, and again the comparison with votive models and tomb architecture suggests small openings just under the roof.[25] The mats of reed must have been clearly visible from below

[20] *Kalypter Hegemon*, Inv. SA07335/11/2T7 unpublished; fragments of acroterial decoration: Gnade 2007, 124 (cat. nos 159–60).

[21] De Waele 1997, 70; Colonna 2005, 111; and Potts 2015, 145 (with references).

[22] Hodge 1960, 17–40; see also Hopkins 2016, 55 and 104.

[23] On the construction of wattle-and-daub walls and their carrying strength, see Turfa and Steinmayer 1996, 1–5; Ward-Harvey 2009, 13–21.

[24] Winter 2009, 69, 79 (Acquarossa), 190 (Sant'Omobono I). It has been noted that the pitches decrease over time, and this tendency has been tentatively ascribed to the slow transition from 'huts' (with steep thatched roofs) to 'houses', with shallow pitches. Modern tiles, as opposed to flat ('Roman') tiles are placed – or literally cling – to battens, and need a pitch of at least 45 degrees.

[25] Staccioli 1968, tavv. XXXVIII–XXXIX (Velletri) and LXIV.2 (Salerno).

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Fig. 5.4 Satricum. Interior of Sacellum I. (Image by L. Opgenhaffen)

(Fig. 5.4). The width of the roof, including the overhanging eaves, measured 7 m and the total weight came roughly to 5,300 kg.[26]

The Second Phase: Sacellum II (550–530 BC)

The idea to deploy 3D modelling as a research tool to assist in solving construction and interpretation difficulties concerning the Sacellum originated while working on the reconstruction of the Caeretan Roof of Satricum, dated stratigraphically to the end of the archaic votive deposit (generally thought to be 535 BC) and attributed to a Caeretan workshop; indeed, the entire roof was imported from Caere. Its date is somewhat disputed.[27] It has always been suggested that the plain roof of the Sacellum

[26] The roof was covered with 168 tegulae and 161 imbrices on each side, and 24 ridge tiles, for a total of 353 terracotta roof elements (excluding the acroterion). Considering the average weight of a tile was about 15 kg, the whole would have weighed 5,295 kg (which would have increased to *c.* 7,060 kg in wet weather). The added weight of woodwork, mats, and mud is estimated to have been at least 800–1,000 kg.

[27] Colonna 1984, 402–4 (540 BC); Knoop 1987, 13–71 (*terminus ante quem* 540), mostly followed by Lulof; Colonna (2005, 111–12), however, introduced a new chronology, based on the dates from the stratigraphic excavations by the Groningen team: 550–540 BC; see also Lulof 2016a, 133.

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was replaced at a certain point by the Caeretan roof.[28] We had reasons to doubt the application of this highly sophisticated roof to the relatively small and modest structure of the *oikos*.[29]

Close re-examination of the original plans of the overlapping temple foundations, as well as old photographs from the earliest excavations, revealed the possibility of a structure that enlarged the original Sacellum foundations by 1.4 m on each side with a surrounding row of foundation blocks of an equal height of 40 cm (Fig. 5.5).[30] The original Sacellum was transformed into the *cella* of the new enclosure, which now measured 9 x 14 m. Parts of these walls were covered (or reused) by the *cella* walls of the later Temple I. Close analysis of old photos and drawings revealed the possibility of an earlier phase under the foundations of the *cella* walls of Temple I, coinciding in distance (1.4 m) exactly with the parallel wall running east of the rear wall of the Sacellum of the first phase. The foundation blocks of the *cella* of Temple I thus followed the external walls of the second phase of the Sacellum on the western, northern, and southern sides.[31] This explains the riddle of the debated parallel, 'floating' wall east of the Sacellum, which can now be attributed to its second phase.

The new structure had a podium ranging in height from 1.10 to 1.40 m because it followed the sloping terrain. The podium was again adorned with a moulded torus,[32] forming a base of 9 x 14 m around a *cella* measuring *c*. 6 x 10 m, corresponding to the plan of the earlier phase, but extending to the east (Fig. 5.5). The podium would have been equally high; a stack of at least three blocks of 40 cm each has been identified in photos and

[28] The Caeretan roof of Satricum has been the subject of ample study: see Lulof 2016a for references. Winter (2009, Roof 6–1, 398–400) sets the roof in context for the first time. See also Winter 2013, 156–7. On the import of the roofs by sea, see Lulof 2006. The difficult compatibility of the Caeretan roof and the *oikos* structure was never discussed previously.

[29] For this phase we reject the term *oikos* and tend to deal with this building as the first 'temple' on the acropolis of Satricum. There is strong discussion and confusion in terminology. 'Sacellum' was introduced by de Waele (1981, 24–9) and followed in most publications; Colonna (1984, 40) used the term 'temple in the shape of an *oikos*' for the first time; Maaskant-Kleibrink (1992, 8) introduced 'Temple 0', which was denounced by Colonna (2005, 111), who dubbed the structure Temple I and as a result changed the numbers of the later Temples II and III. This is, of course, confusing and difficult to change in the bibliography. We prefer Sacellum I (*oikos*) and II (Temple 0) above all other suggestions. We agree with Colonna that 'Temple 0' as a term is of dubious significance, since it is not a number, and therefore we do not use it in this chapter.

[30] De Waele 1981, foglio 1, section H-G; Chiarucci and Gizzi 1985, fig. 79; Colonna 2005, 112; Potts 2015, 145.

[31] De Waele 1981, foglio 1; Chiarucci and Gizzi 1985, fig. 79. Old excavation photos can be found in Colonna 1984 and de Waele 1981. Barnabei and Mengarelli (1896) also discerned several phases; however, they clearly connected several phases that were later corrected and separated.

[32] Barnabei and Cozza 1896, 32, fig. 4; Edlund-Berry 2008, 443, fig. 2; Colonna 2005, 112.

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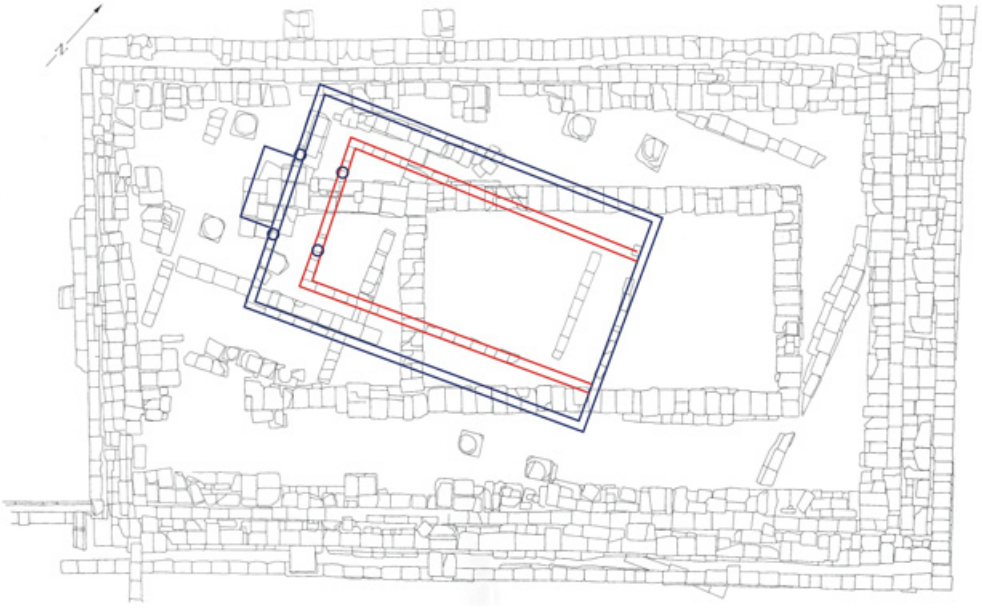

Fig. 5.5 Satricum. Plan of the remains of the temples with Sacellum I in red and Sacellum II in blue. (Drawing by L. Opgenhaffen)

drawings.[33] A stepped entrance must have had a slightly wider staircase than the earlier building phase, in balance with the wider dimensions of the façade.[34] In agreement with other scholars, we reconstructed the presence of four columns at the entrance space of the building.[35]

The upper structure would have been executed with a wooden framework of roundwood posts subdivided into square panels by mid-rails, staves and woven wattles covered with daub (that is, wattle and daub), and plaster (Fig. 5.6).[36] Each set of posts carried a truss of sawn, squared wood, reinforced by vertical struts. Alternative options for the erection of the walls are mud bricks or the *pisé* (rammed earth) technique. It is known that these techniques have strong carrying capacities.[37] The subsequent

[33] De Waele 1981, foglio 1, section H-G; Chiarucci and Gizzi 1985, fig. 79; Colonna 2005, 112; Potts 2015, 145.

[34] Moulds and podium: Colonna 2005, 112, fig. 1; Edlund-Berry 2008; Potts 2015, 145.

[35] Columns would have been necessary to support the entrance under the roof overhang. Close comparison with the Sant'Omobono temple, as reconstructed in Hopkins (2016, 66–7, figs 37–8), allowed the assertion of the presence of columns; an alternative has been suggested by van't Lindenhout 2014, fig. 10. Also votive models of temples indicate the presence of columns: Staccioli 1968, tavv. VIII–IX, XLV, and LV.

[36] See nn. 15 and 23.

[37] Turfa and Steinmayer 1996, 5. Ward-Harvey (2009, 14) claims that walls should be a minimum of 30 cm wide for single-storey buildings. For the most recent studies on this building material,

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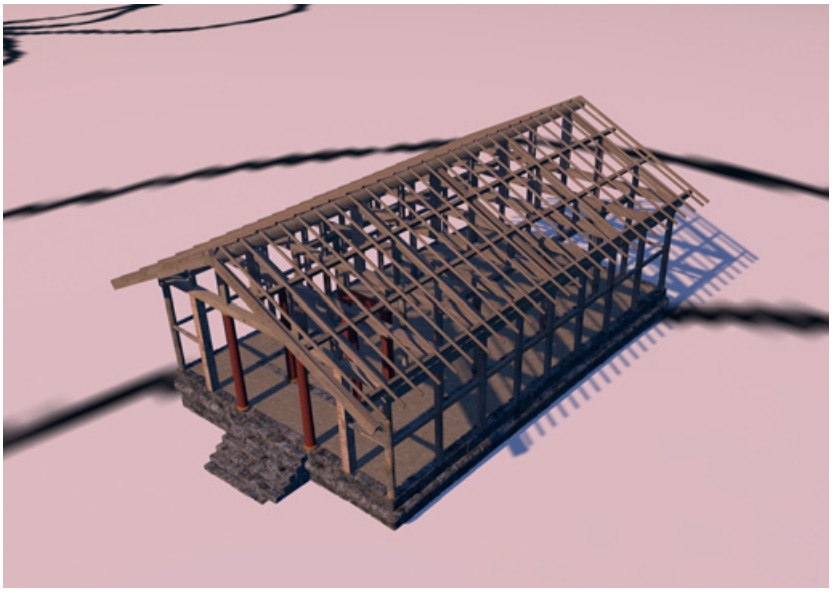

Fig. 5.6 Satricum. Sacellum II: structure of walls in wood. (Image by L. Opgenhaffen)

layering of the roof construction consisted of sawn or cleaved squarish purlins with light rafters of roundwood on top, which may have been covered with a plaited mat of reed and then a thin layer of clay, in order to provide an even surface for the rows of tiles.[38]

The roof system was supported by five trusses; every other set of posts received one. As Turfa discusses elsewhere in this volume, trusses were widely used in combination with large purlins and ridge beams in this period.[39] The solid triangular shape, with its rafters firmly anchored in the tie beam, spread and divided the thrust caused by the weight of the tiled roof evenly. The light construction of the podium walls, executed in rows of blocks stacked on top of each other with no indication of a solid fill other than earth and rubble, leaves no other possibility than the application of a truss system with an even division of the thrust; if a post-and-lintel system were applied, the vertical

see Russell and Fentress 2016, 131–45, and Miller 2017, 146–58. The walls were reconstructed up to 3.20 m high, which is consistent with the height-width relationship shown in temple models and Vitruvius' formula for a Tuscan temple.

[38] Turfa and Steinmayer 1996, 19–20, fig. 5; some very good examples come from tomb architecture: Naso 1996, 286, fig. 2, 293, figs 218–19. For a discussion about the roof layering, see above, n. 16.

[39] Above, n. 22. Turfa and Steinmayer 1996, 21–2. Poggio Civitate provides the precedent, dating from 580 BC: Hopkins 2016, 104–5.

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pressure would lead the podium walls to collapse and another, more solid, construction would have been required, for which we have no evidence.

With this 3D model, we propose a second building phase for the Sacellum, known as Temple 0, that was large enough to receive the sophisticated Caeretan roof with its multiple complex elements: antefixes, sima blocks, revetment plaques, tiles and imbrices, and a large central acroterion. The new phasing can be easily shown to match the well-known roof and its dimensions.[40]

The ultimate challenge was finally to visualize years of painstaking research and the reconstruction of hundreds of small scattered terracotta fragments in a 3D model, in order to re-enact the sheer logic and technical abilities of the artisans and craftsmen, and simulate the process of manufacture and construction, tile by tile. It was the present reconstruction of the terracotta roof that formed the actual point of departure for the development of the 3D model, instead of the remaining foundations.[41] Our knowledge of decorative roof systems in pre-Roman Italy has come to a point that we only need a few fragments to reconstruct an entire roof because they were highly standardized and almost prefabricated.[42] Another interesting feature of the decorative system is that the dimensions of the architectural terracottas often reflect measurements used in the architecture. In the case of the second phase of the Sacellum, the module must have been 38–40 cm, as is recorded in the width of the foundation blocks and the width of the tiles.[43]

The slope of the roof is indicated by one of the preserved keystones of the terracotta roof decoration: 26.5 degrees.[44] The raking sima consisted of a painted slab with a top bent forward and a flat tile attached to the back. The size is two modules, *c*. 0.78 m, and corresponds exactly to the known

[40] Measurements of the roof elements: Knoop 1987, 13 (tiles), 47–8 (eaves tiles), 52 (friezes); detailed in Winter 2009, 406 (sima), 435 (antefix), 446 (friezes), 467, 477 (acroterion), 482 (eaves tiles, not 50 but 40 cm).

[41] Lulof, Opgenhaffen, and Sepers 2013, 333–7; Lulof 2016b, 331–42 describes the process of 3D modelling as a research tool.

[42] Here the work of Nancy Winter is of high importance. The Caeretan roof and its elements have been published on several occasions and in several forms of reconstruction. The most important are: Knoop 1987, ch. 2 and App. C-1 and C-5–6; Winter 2009, Roof 6–1, 399–400 (with references); and Lulof 2016a.

[43] On the use of the module of the foot in interpreting the layout of architecture: de Waele 1981, 31–5; described in Satricum 2007, 32–3. We are very sceptical about the use of defined measurement units like feet. It has also been the case in the reconstruction of other roofs that the module simply appears at a certain moment and that it can be adapted to both roof elements and architectural units.

[44] Keystone published in Knoop 1987, 240, pl. 77, showing the roof slope of 26.5 degrees. The slope can also be found in other contemporary roofs from Caere: Winter 2009, Roof 6–2, 401–3.

length of the tiles belonging to this roof. The dimensions of the larger plan of the second phase in the foundations enables us to reconstruct the width of the roof meticulously, entering seven complete sima blocks and seven friezes at each side at the front, creating, together with the cut keystones, a span (with overhang) of 10.5 m.[45]

The frieze plaques with pairs of horse riders facing left belonging to this particular roof are exceptional. They are not mould-made but modelled manually in high relief and only paralleled in Caere (in fragments, discovered recently).[46] Close examination provided reconstructions of the galloping pairs in Phrygian outfits, based on the restored pieces now in the Villa Giulia Museum. It is beyond doubt that the craftsmen producing these superb pieces of high relief had their roots in Ionia.[47]

The restored friezes and antefixes have been submitted to 3D scanning in the museum, and as such these 'originals' could be placed back in context in the 3D model.[48] Every frieze plaque differed in colour and detail, creating a high variety of imagery once attached to the roof. Traditionally in Caeretan roof systems, but also in the later systems of the so-called first phase in roof decoration, the right side of the façade always figured pairs of horse riders. The left side invariably had horse-drawn chariots in a procession. At Satricum only one small fragment has been found, but it is nevertheless enough to reconstruct, albeit with enormous lacunae, the left side of the façade.[49]

The lateral sides of the building had elaborate decoration as well. Eave tiles protruded from the roof showing lotus-palmette chains in bright colours, which could be seen when walking underneath. The only parallels come from Caere, Pyrgi, and Punta della Vipera.[50] Most of the antefixes that adorned the lateral sides of the roof have been well preserved because of their sturdy manufacture. They were all drawn from the same mould, but

[45] The new foundation structure measures (35 x 0.40) x (22.5 x 0.40) = 14 m x 8.93 m and corresponds to the dimensions of the roof, counting 780 tiles (tiles and imbrices), 26 ridge tiles, and 52 antefixes on both sides in total. The reconstructed width of the roof is 10.5 x 15.6 m.

[46] Kästner 2006, 77–82 and Bellelli and Maggiani 2006, 89 published old and new fragments that clearly belonged to the same type of friezes. The horse friezes of Roof 6–2 (Winter 2009, 400–2) are very similar but created with moulds, except for the horses' heads.

[47] Winter 2013, 156; Winter 2017, on the relations between workshops in Ionia and Caere. See also Lulof 2016a; cf. the chapter by Winter in this volume.

[48] The final reconstruction of the horsemen friezes will be published separately, as they were subject to a thorough investigation in the 4D Research Lab. The problem here was that the scans made it virtually impossible to place three pairs of horsemen on one plaque, but there was evidence of significant overlap. Two pairs of horses are unparalleled, as is a width of 60 cm for revetment plaques of this type. We need to restudy the fragments without the restorations made in the 1900s in gypsum.

[49] Winter 2009, 445–6 (with references).

[50] Winter 2009, 482–3 (with references).

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each received unique painted details.[51] The antefixes from the Caeretan roof in Satricum belong to the earliest type of female-head antefixes from Caere. The facial details are articulated in paint only (the so-called 'painted style'), and no details of eyes or ears are executed in relief, a clear sign that the same hand was responsible for both the antefixes and the horse riders in high relief.[52] The total weight of the roof covering, including the overhanging eaves, is calculated to have been approximately 13,500 kg.[53]

In this phase the Sacellum was embellished with a central acroterion representing the apotheosis of Heracles, similar to the archaic Sant'Omobono temple in Rome and at least ten other sanctuaries.[54] Fragments of a female figure, part of the *leonte* (Heracles' lionskin) as well as a large fragment of an acroterion base – which most probably carried these figures – have been preserved in Satricum. The head of Athena was drawn from the same mould as the antefixes, a practice that it is well known from other examples.[55] Using the female-head antefix as the point of departure was very helpful in the reconstruction of the acroterion of the Satricum Sacellum, together with well-known profiles of the 'Sarcofago degli Sposi' from Caere.[56] Not only were the dimensions of the antefix head in perfect balance with the fragment of the head of Heracles, but the overall statue was also in balance with the whole roof. Traditionally the pair of Athena and Heracles is set between volutes. A small piece of a volute has been preserved in Satricum, and a beautifully preserved specimen was discovered in Caere in 2013.[57]

[51] Only two counterparts outside Satricum are known, one from illegal excavations in Caere and another in a private collection in Japan: Winter 2009, 435–6 (with references). Same mould: Caere/unknown Winter 2009, Roof 6–2, 400–2, 436 n. 101; Japan: unpublished, private collection, on show in the Miho Museum exhibition 'The Greek World: The Heroes of Olympia', summer 2007: www.miho.jp/booth/html/doccon/00004696e.htm.

[52] The antefixes find very little comparison in style to other series of antefixes from Caere. The closest comes from Ficana: Winter 2009, 436 (with details in relief). The best parallels are the heads of the statues of the 'Sarcofagi degli Sposi', also from Caere and now in the Villa Giulia, Rome and Louvre, Paris: Gaultier 2013, 185–7. It is highly plausible that the same master coroplast was responsible. However, measurements and close comparisons with 3D scans suggest that the same mould was used and the products were retouched before the clay was fired. This is a future project of the 4D Research Lab: www.4dresearchlab.nl.

[53] See above, n. 45.

[54] On acroteria representing Athena and Heracles, their diffusion, and the implications for artisans' networks between Rome and other cities in the Archaic period: Lulof 2014, Lulof and Smith 2017, and Smith 2019, pp. 1–5 (all with ample references).

[55] The acroterion, albeit fragmentary, has been thoroughly studied and analysed in Lulof 2016a (with references). See also Winter 2009, 466–7 and 477 (base).

[56] For the stylistic reference, see n. 51.

[57] The Satricum fragment is unpublished. The magnificent specimen from Caere was published by Rizzo 2011, 139, figs 4–7.

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Fig. 5.7 Satricum. Sacellum II: full reconstruction. (Image by L. Opgenhaffen)

The roof of Satricum Sacellum II has been carefully reconstructed in all its splendour (Fig. 5.7), fit for an important and unique temple in the region. The only known competing contemporary temple is at Sant'Omobono, which we will now submit to a careful comparative analysis of similarities and differences.

The Sant'Omobono Sanctuary and the Satricum Sacellum Revisited

The relationship between Rome and Satricum has always been an interesting one. Only a handful of examples of this type of small temple (and, in some cases, their house-like predecessors) are known from the seventh and early sixth centuries BC: Gabii, Velletri, Veii, Lanuvium, Tarquinia, and Gravisca stand out.[58] A thorough investigation comparing characteristics of these early temples would be a very interesting project but lies beyond the scope of this chapter. We intend to look closely at the temples of the

[58] The best overview has been given by Potts 2015, ch. 3, and cat. 131–9, 143–8, with abundant references and discussion on p. 125; see esp. p. 38, table 1, with a list of possible religious architecture, not defined as temples, from the earliest period. The introduction of podia is regarded an important criterion for temples in central Italy: Potts 2015, 38–42. See also Brocato et al. 2019, 114–36.

https://doi.org/10.1017/9781108955232.005 Published online by Cambridge University Press

archaic sanctuary of Sant'Omobono, close to the Forum Boarium in Rome, because at first sight they present similarities in sequence and date to the building phases and to the dimensions of the Satricum Sacellum structures. The first temple was erected in Rome around 580 BC, showing a 1.7 m moulded podium, with a plan measuring almost 11 m^2 with a single *cella*, two columns in antis, and a narrow frontal staircase. Between 540 and 520 BC, alterations were made to the plan, incorporating the rear and sides of the previous temple, keeping the original *cella* walls, but adding a new moulding and extending the front by two metres, with four columns in antis, which was structurally necessary.[59]

The chronology of the first phase seems to coincide: *c.* 580 BC. While the plan of the first-phase Sant'Omobono temple (10.3 x 10.3 m) differs profoundly in width from Sacellum I (10.4 x 6 m), the second phase (13.20 x 11.54 m) also seems to show a difference in width to Sacellum II (14 x 8.9 m), which appears to have been narrow in comparison – a possible prototype with a 2:3 ratio (9 x 14 m) that could be regarded as a forerunner of the Etrusco-Italic temple type.[60]

The first phases of the two temples (Satricum and Rome) have different roof systems. The one in Sant'Omobono is famous for its rich 'Corinthian' theme with a running Gorgon with two flanking felines in a closed pedimental space.[61] The one in Satricum is very modest at first sight, although perhaps parts of this roof have never been excavated.[62] The roof decoration in Rome, however, fundamentally changed in the second phase, with the first version of the so-called Veii-Rome-Velletri system, including Athena and Heracles between volutes.[63] The second phase of the Sacellum has the same figurative elements and images: female-head antefixes, friezes with chariots, and

[59] The temples of Sant'Omobono have been studied extensively. See Potts 2015, 40–2, 144–5; Hopkins 2016, 53–60 (Phase I) and 66–74 (Phase II) with references. Since 2014, new excavations have been carried out and published: Brocato et al. 2016; new insights into the chronology and foundations of the building have been published recently: Brocato et al. 2019, 114–36 and Brocato and Terrenato 2019, 41–6.

[60] On the typology of early central Italic religious architecture, see Potts 2015, 119–21 (with references).

[61] Winter 2009, Roof 3–6, 149–50, with previous bibliography; Hopkins 2016, 56–60.

[62] We could think of a Poggio-Civitate type of roof from the end of the Orientalizing period: Winter 2009, roofs from Poggio Civitate or Acquarossa Phase 1C or 2A, 63–9, like Roofs 2–22 to 2–25. Roof 2–26 (Satricum) belongs to the same group.

[63] Winter 2009, Roof 5–4, 316–18 (with references); Hopkins 2016, 66–74; Di Giuliomaria 2016, 47–75, for new interpretations and reconstructions of the volutes and their bases. The recent excavations in the Sant'Omobono area in Rome yielded many new terracotta elements of roof decoration: they have been published recently in the exhibition catalogue *Il Roma dei Re*, notably Timpano and Di Giuliomaria 2019, 65–82, and Piccione 2019, 83–93. New implications for the reconstruction, decoration, and chronology of the archaic temple have been given by Parisi Presicce 2019, 47–58.

galloping riders, and last but not least Athena and Heracles between volutes. There is no sign of sphinxes as corner acroteria in Satricum, but they could have been there: some of the female-head antefixes could have been sphinx heads. However, the system of Sant'Omobono II in Rome is different. Here, we have the system that is in high fashion around 530 BC, with mould-made revetment plaques instead of handmade high reliefs, and especially the lateral simas with female-head antefixes and lion-head spouts, which are absent in the Satricum system. The roof of Sacellum II was made by craftsmen with a Caeretan background, and is Caeretan in system, style, clays, material properties, and date (around the middle of the sixth century BC). It was literally imported from Caere to Satricum, probably by ship.[64]

Studies by Nancy Winter and myself have pointed out this difference in chronology, which can surely be accepted given all the stratigraphic evidence from both Sant'Omobono and Satricum (the Roman Network System now includes 22 temples, and it is highly probable that it originated in Veii).[65]

According to John Hopkins, the Sant'Omobono first-phase temple would change the history of Italic temple architecture and decorative roof decoration with a strong international style.[66] We agree with him that Greek influence in Rome was very important in this early period. However, for the later period, it is clear that the Etruscan influence in Rome is not to be underestimated, at least for arts and crafts, and possibly also architecture. The example from Satricum shows that their craft networks reached far south of Rome, or may have been coming in, via Campania, from Sicily.[67] According to Charlotte Potts, art and architecture were employed to give Etrusco-Italic temples a distinct monumental character in the course of the sixth century BC. Rome seems to be the forerunner in its need to differentiate itself. This phenomenon has, according to Potts, no Etruscan origin.[68] As tentative and innovative as this hypothesis may be, it should be reconsidered once more knowledge and scientific results have been collected through the study of the artistic networks of craftsmen and workshops responsible for the construction and decoration of the sixth-century temples from archaic Italy. It seems most probable that the centre of internationally based development in arts and crafts was Caere, with its highly developed international craft community, just

[64] See above, n. 28.
[65] For the latest on this subject (Roman Network System): Lulof and Smith 2017 (with references).
[66] Hopkins 2016, 53.
[67] Winter (2009, ch. 3) has shown these connections in the Rome-Campania-Northern Etruria Decorative System; see also Winter 2009, 578–9.
[68] Potts 2015, 119.

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around the middle of the sixth century BC with the incoming flux of immigrants from Ionia.[69] Innovations, new artistic motifs, technical systems, and brought a completely new approach to architecture and its decoration. Rome adopted this new mode eagerly, but not before it was welcomed first by cities like the Etruscan communities in Caere and Veii, contemporaneously adopted in Satricum, by importing a fully fledged Caeretan roof along with Caeretan specialists. As we have shown before, no roof fitted a temple without the help of an architect, hence architects and roofers must have worked closely together, since measurements were certainly balanced and adjusted, leaving us wondering whether the architects adjusted their modules to the roof elements, or if the terracotta roof specialists were aware of the modules adopted by the architects.[70]

Conclusion

The newly discovered Sacellum II from Satricum seems to have a special place in the context of early temple building in central Italy. Although it seems that there are clear overlaps with the situation at Sant'Omobono, there are also sharp differences. The Satricum Sacellum remains, however, one of the earliest temples that we know of with well thought-out architecture and a sophisticated temple roof. Its dimensions seem to point to a certain prototype for later Etrusco-Italic temples. Both the truss and the roof seem to reflect Ionian and/or Sicilian backgrounds. It could very well have been possible that Ionian craftsmen, when fleeing from Persian rule, passed Sicily and adopted the incredible truss system to support increasingly complex terracotta roof decoration, and then travelled further to Caere where they established workshops in collaboration with the Etruscan locals. In doing so, they also instigated close connections with architects and builders of sacred monuments, using each other's technological knowledge and skills. As Nancy Winter has proposed in her latest work, there are clear interconnections and craft networks between the different eastern Mediterranean roof specialists, Sicily, and Italy in this outstanding period at the birth of the Etrusco-Italic temple.[71]

[69] Lulof 2016a; Winter 2017. [70] Lulof 2016b.

[71] Winter 2017. For a discussion on the development of the tie-beam truss as an Etruscan/Italic development, see Turfa's chapter in this volume. Although Turfa applies a similar technological approach, the *chaîne opératoire* method in combination with a stylistic approach to technology (specifically considering the terracotta decoration of Poggio Civitate and Acquarossa) strongly points to an East Greek origin and not an Etruscan invention.

https://doi.org/10.1017/9781108955232.005 Published online by Cambridge University Press

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