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Research

The Hidden Order of Hadrian's Villa, and the Order of Modern Architecture

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Abstract. The casual violence with which the various parts of the second-century Villa of Hadrian crash into each other seems to belie any possibility of a rational plan, although an overall master plan seems a necessity. Amazingly, in the twentieth century, Le Corbusier extolled Hadrian's Villa as the archetype of great planning. This paper will describe the clear, mathematically ordered process by which the Villa was planned, and the compositional principles of its design will be shown to be exactly those which underlie the theories of Corbusier, 1800 years later.

Introduction

In the words of William McDonald, architects of the classical tradition have for centuries "preferred to work within a relatively simple governing scheme that stressed axiality and a hierarchy of forms" [MacDonald and Pinto 1995: 275]. Yet one of the largest and most prominent monuments left to us from Roman antiquity seems to belie this characterization. The casual violence with which the various parts of the Tiburtine Villa of the emperor Hadrian crash one into the other seems to belie any possibility of a rational plan (fig. 1). It has been said that the plan seems "disordered" and, worse, "unclassical." The pre-existing structures and land forms of the site created strong constraints within which Hadrian's designers had to operate, not to mention the whims of a strong willed, peripatetic and supremely cultured patron. How could the Villa be anything but the result of picturesque composition and fortuitous happenstance? On the other hand, an overall master plan seems a necessity, given Hadrian's documented hands-on interest in architecture as well as the pattern of construction over the years of his absence from the construction site during his famous travels about the empire. Yet the principles of this master plan have remained opaque.

At least one great architect in the centuries since the rediscovery of the Villa has found evidence of guiding principles in its planning. In the twentieth century one of the greatest, Le Corbusier, extolled Hadrian's Villa as the archetype of great planning, using an image of the Villa plan as the leading illustration of the chapter entitled "The Lesson of Rome" in his influential book, *Vers une Architecture*.[1] He made it clear that to him, the Villa represented not the "tasteless" picturesqueness of Rome, but the "mathematical creation of [the] mind, ...the language of Architecture" [Le Corbusier 1927: 141]. The father of modern architecture and a second-century Roman emperor can hardly have been operating on the same set of assumptions, but how is it that Corbusier thought he saw evidence of mathematical order in the ruins?[2]

Metrology

The work that has been done to date on metrological studies at the Villa has focused on the individual structures that have generated the most interest architecturally. Of all the unusual structures at the Villa, there are four which stand out due to the ingenious juxtaposition of convex and concave curves in their ground plans: the Teatro Marittimo,

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the Small Baths (particularly the so-called *apodyterium*, or changing room, the octagonal room with curved walls),[3] the Reverse Curve Pavilion, or Belvedere, at the northern edge of the Accademia and the Piazza d'Oro (particularly the central chamber at the southern end).

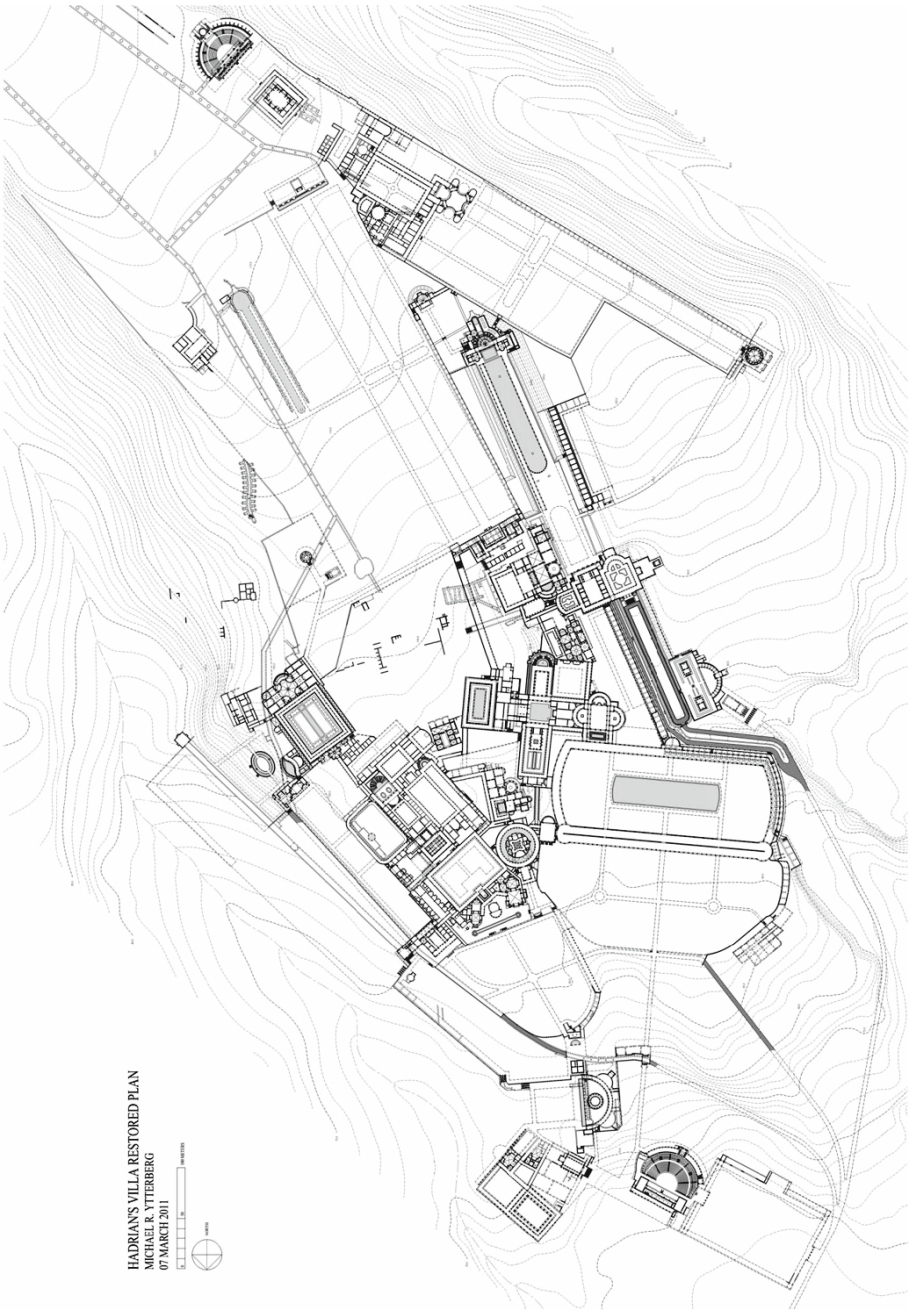

Fig. 1. Hadrian's Villa, Plan. Drawing by the author

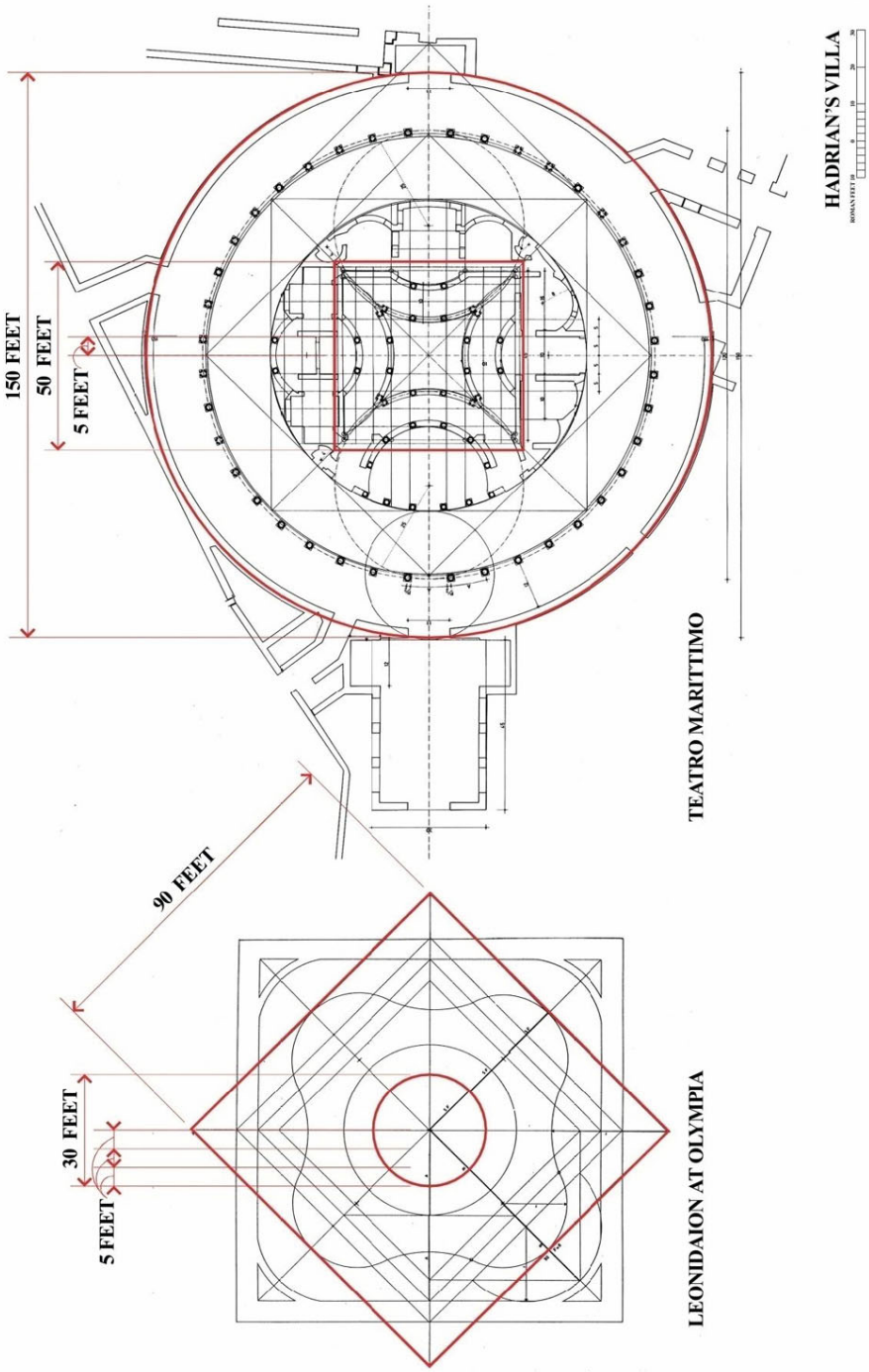

Fig. 2. Comparative analyses of geometries and modules.
Drawings by the author after metrological diagrams by Matthias Ueblacker

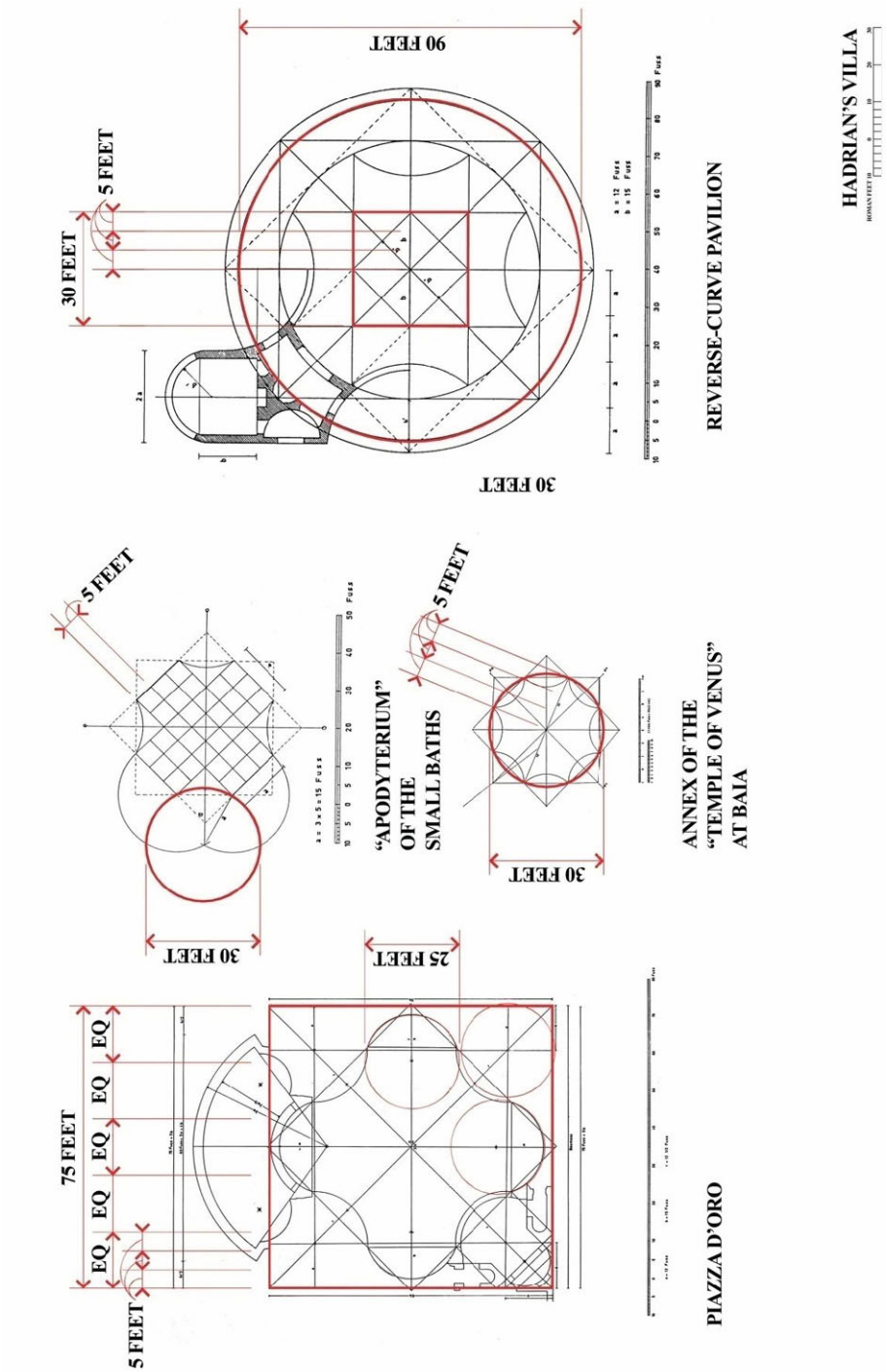

Fig. 3. Comparative analyses of geometries and modules.
Drawings by the author after metrological diagrams by Friedrich Rakob

The advanced curvilinear design found in these buildings was the result of the exploitation of the plastic freedom implicit in the development of concrete vaulted architecture. This tendency reached its apogee during the reign of Hadrian, likely under the stimulation of his personal connoisseurship. The four buildings mentioned here, plus the contemporary annex of the so-called Temple of Venus at Baia, are most likely the production of a single workshop in the employ of the Emperor [Rakob 1983: 220]. Another, similar, contemporary design is the courtyard of the rebuilt Leonidaion in Olympia. The "avant garde" tendencies found in this group of buildings were never again a major factor in the architecture of antiquity. It remained for the architects of the Roman Baroque, inspired by the ruins of Hadrian's Villa and other monuments, to advance once again architecture of comparable and ultimately greater curvilinear complexity.[4]

A number of authors have examined these six buildings and have come to similar conclusions. Figs. 2 and 3 reproduce the geometric diagrams of Mathias Ueblacker and Friedrich Rakob for these structures. In each case a circle or circles can be identified which control the plan. Each of these circles has a diameter equal to a multiple of five Roman feet.[5] From this point each author reconstructs the geometric process by which the remainder of the plan is generated in similar ways, though different in detail. Key dimensions are found that repeat the module of five feet, though in some cases modules of four feet are discovered as well. The authors do not always agree on which modules are found in which buildings, but what is of interest here is that key dimensions seem to have a modular basis, and that the module is shared from system to system and from building to building.[6]

Ueblacker draws a five foot grid at the center of the Teatro Marittimo, and William MacDonald believes that the whole is planned on a five foot module [MacDonald 1993: 395]. It can be seen that the plan of the central court, or atrium, is drawn into a square of ten modules to a side, a fifty foot square. The number fifty occurs as well in the Small Baths. Rakob draws a five foot grid into the apodyterium of the Small Baths. Elsewhere MacDonald has shown that the four major centralized plan rooms share diameters divisible by five feet, and their centerlines are fifty feet apart.

Given what is known of Roman practice elsewhere, none of this is surprising. It has long been noted that major measurements in Roman buildings are often multiples of five Roman feet. And this has been noted in elevation as well as in plan. Heights were ruled by the same principle. According to Mark Wilson Jones, "Roman architects were apparently incapable of conceiving a project without a simple dimensional premise, unless some overriding factor argued to the contrary."[7]

Canopus axis

Let us now examine the plan of Hadrian's Villa as a whole for evidence of organizational principles similar to those that have been found in these individual buildings. A likely candidate in which to test the productivity of these ideas is the axis of the Canopus, a valley with a long canal lined by a colonnade; it is terminated on the south by a structure called the Serapeum. This is one of the longest axial alignments at the Villa, and information is available for this area that promises reasonable accuracy as to its plan.[8]

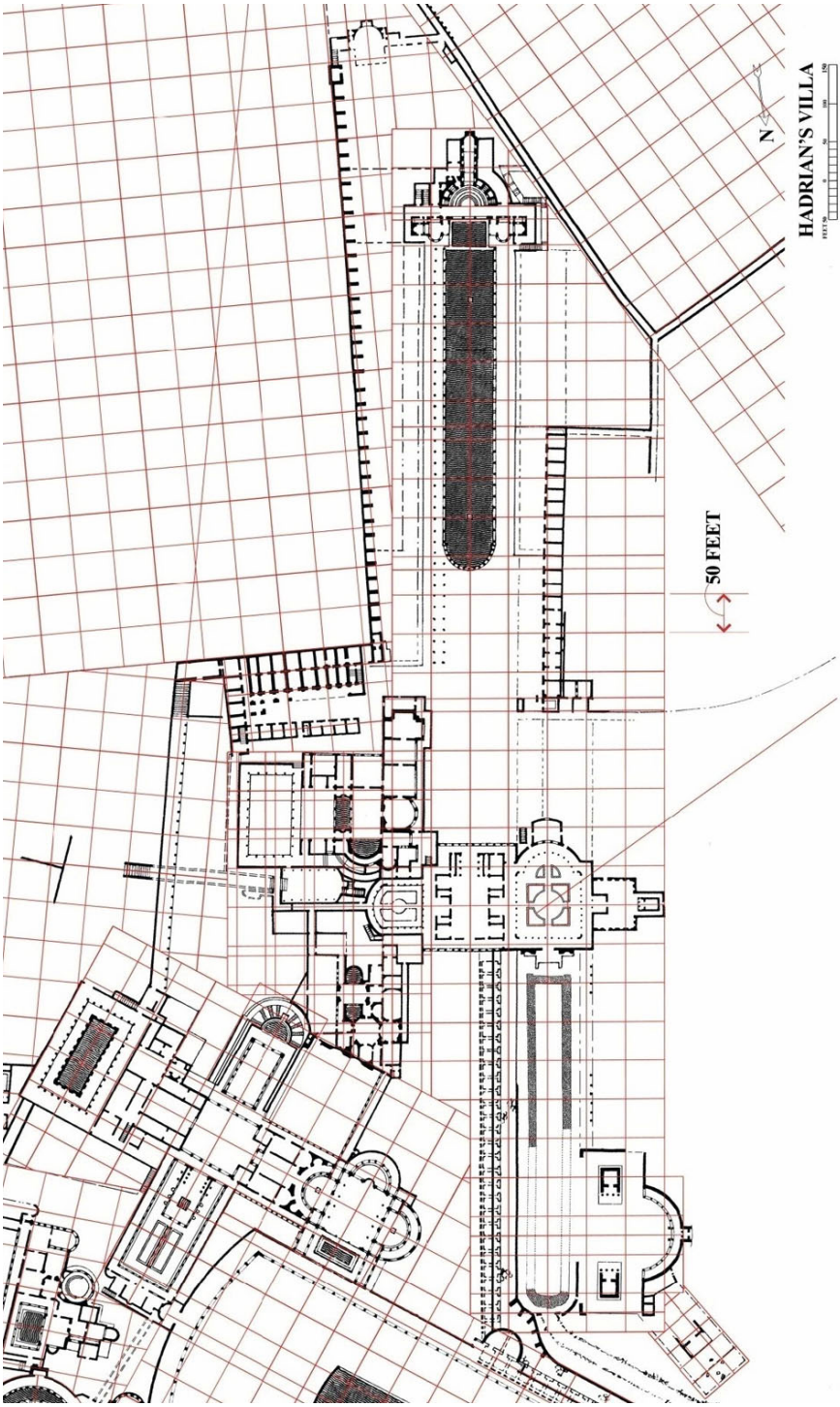

Fig. 4. Analysis of Canopus axis grids. Drawing by the author

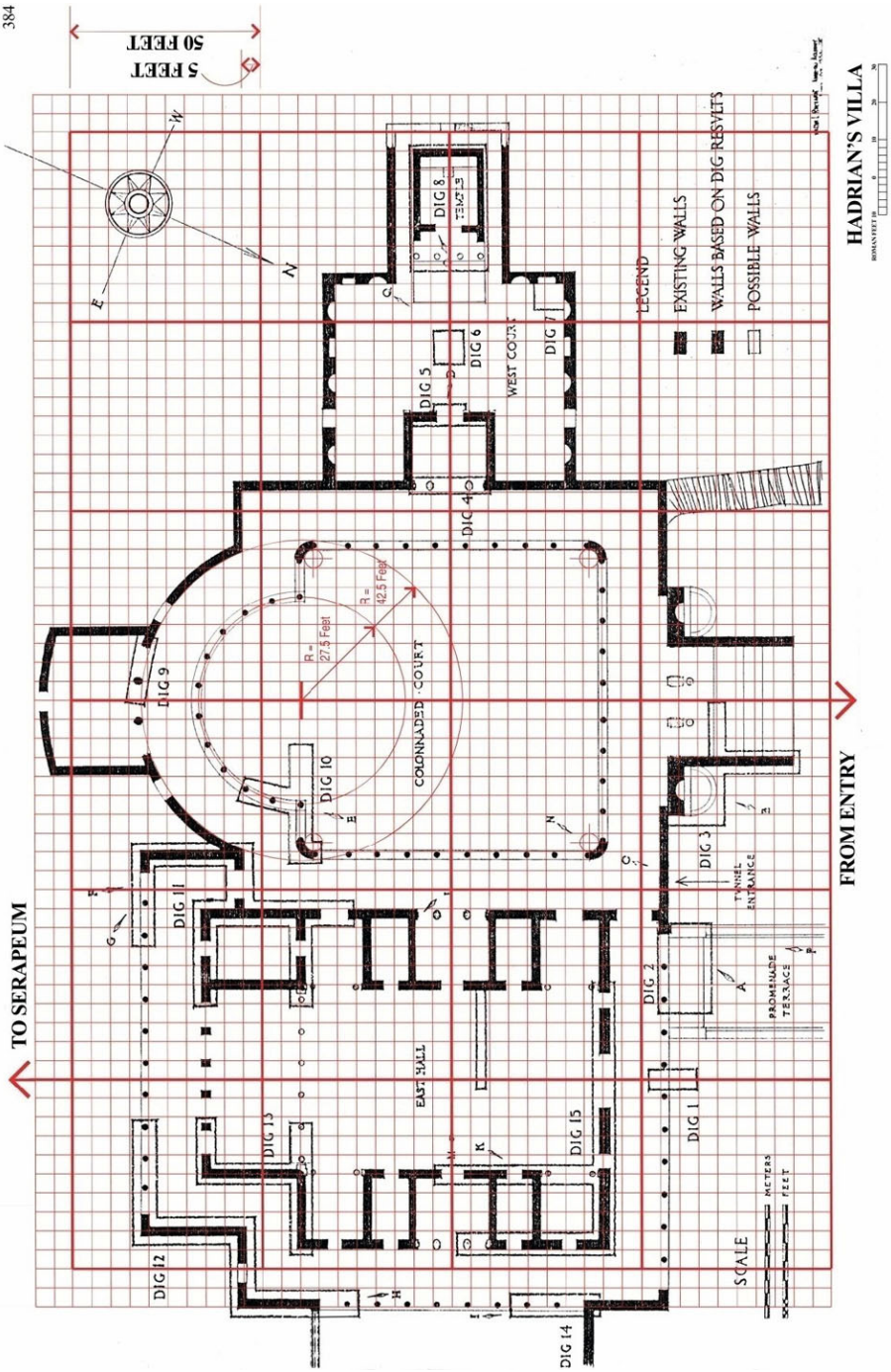

Fig. 5. Analysis of central vestibule grid.
Grid overlay by the author on a plan by Walter Louis Reichardt

A first step is to measure along the Canopus axis on the survey made in 1906 from the transverse axis of the Central Vestibule to the center of the radii of the plan of the Serapeum, using the graphic scale in meters given on that plan. The result suggests that the dimension could be exactly 900 Roman feet, a multiple of fifty feet. This discovery, along with the presence of the number fifty in the Small Baths, suggests the possibility that the fifty Roman foot square at the center of the Teatro Marittimo could be a planning module by which the entire site was organized. Fig. 4 shows an enlarged plan of the Canopus axis overlaid with a grid of squares fifty Roman feet to a side. The Central Vestibule complex lies across this axis at the center of the plan.

It is immediately apparent that many points on the plan correspond to the fifty foot grid. The offset within the Central Vestibule complex between the centerline of the Forecourt to the west and that of the Canopus appears to be exactly 100 feet. To the south the plan of the Central Service Building corresponds to the fifty foot grid rotated to align with the retaining wall east of the Canopus. The Apsidal Pavilion to the south of the Serapeum at the far right of the plan falls neatly into this rotated grid alignment. At the other end of the Canopus axis the Small Baths were distorted to meet another angled alignment. The grouping of the Building with Three Exedras, the Stadium Garden, and the Peristyle Pool Building, or Winter Palace, form an integrated cross shaped composition, identifiable within the overall plan of the Villa as a planning unit. The grouping around the Stadium Garden fits precisely within a consistent fifty foot grid, 450 feet by 550 feet. The centerline of the Building with Three Exedras to the west is 200 feet from the longitudinal centerline of the Stadium Garden which is 200 feet from the centerline of the peristyle of the Peristyle Pool Building to the east.

Building and site

It remains to be seen whether the fifty foot grid has equal validity at the scale of the individual building on one hand and at the scale of the site as a whole on the other. Leaving aside the buildings of complex curvilinear design discussed above, a more consistently rectilinear candidate for testing the validity of a gridded approach is the Central Vestibule itself. Fig. 5 shows the plan of the Central Vestibule as drawn by Walter Reichardt overlaid with the fifty foot grid subdivided into five foot squares. At this scale printed plans are likely to be more accurate than at the scale of the whole.

In this case the results are encouraging, though not without ambiguities. On one hand the expectation would have been that in a grid-based design most walls would be placed with the centerline of the wall aligning with a grid line. The great majority of walls on this plan are placed with one or the other face of the wall placed against a grid line. This is exactly what Ueblacker found to be the case at the Teatro Marittimo. The very few walls or other elements that do not adhere to this rule are centered on a grid line. On the eastern site of the peristyle, the centers of the longitudinal walls of the east hall are exactly fifty feet apart. The north and south walls of this hall also appear to fall on centerlines, as do the corresponding sides of the colonnade of the central peristyle.

Fig. 6 extends the grid to the entire site. The result is encouraging because the centerlines of virtually every major space appear to occur on a fifty foot grid or its modular subdivisions drawn according to the dominant orientation of each particular building complex. Most convincingly of all, perhaps, is the placement and the dimensions of an underground series of chambers highlighted in the enlarged area shown in fig. 7. This series of chambers, possibly an underground kitchen [Salza Prina Ricotti 2001: 396], fits within a fifty foot square, and lies slightly skewed from the grid of the plan.

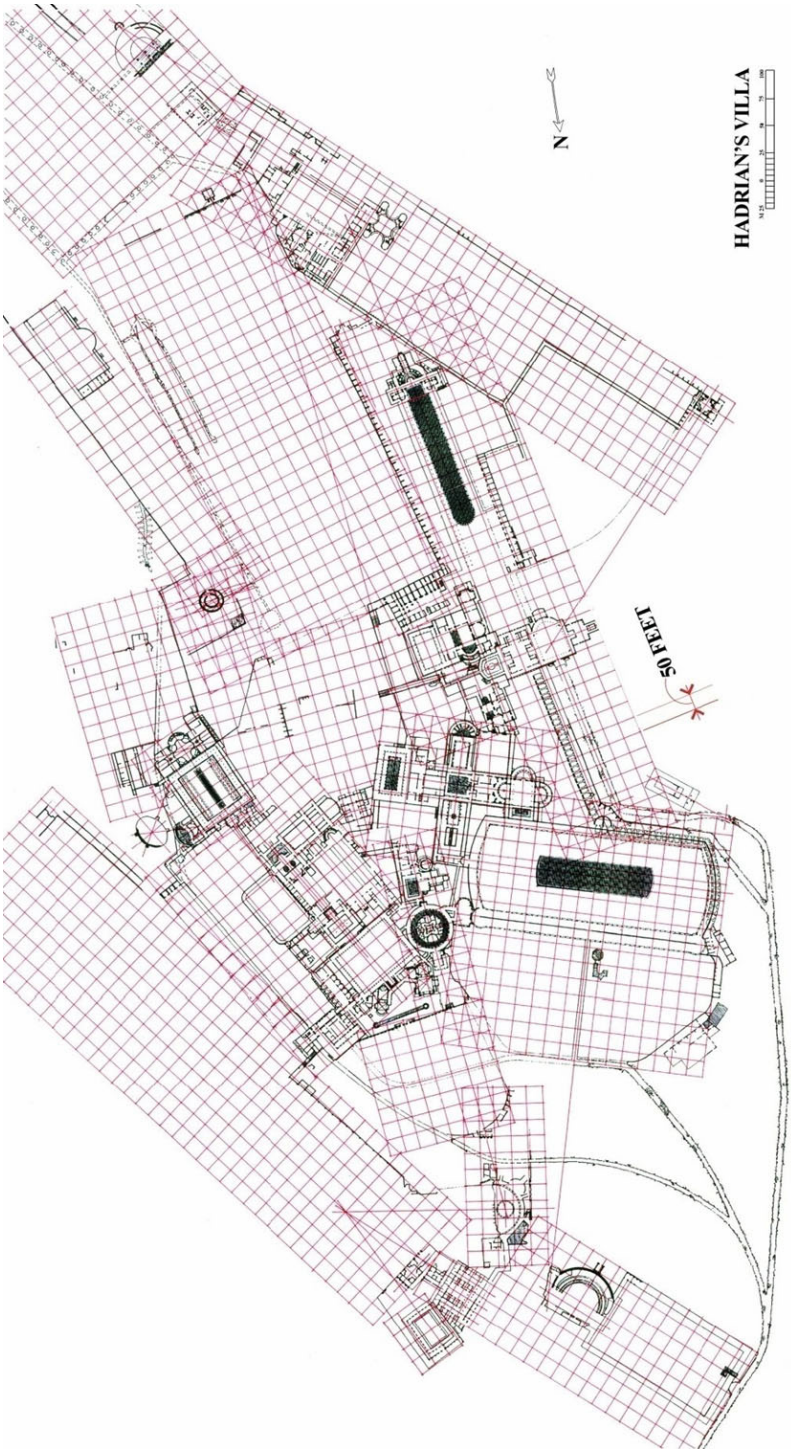

Fig. 6. Analysis of grids of entire site. Drawing by the author

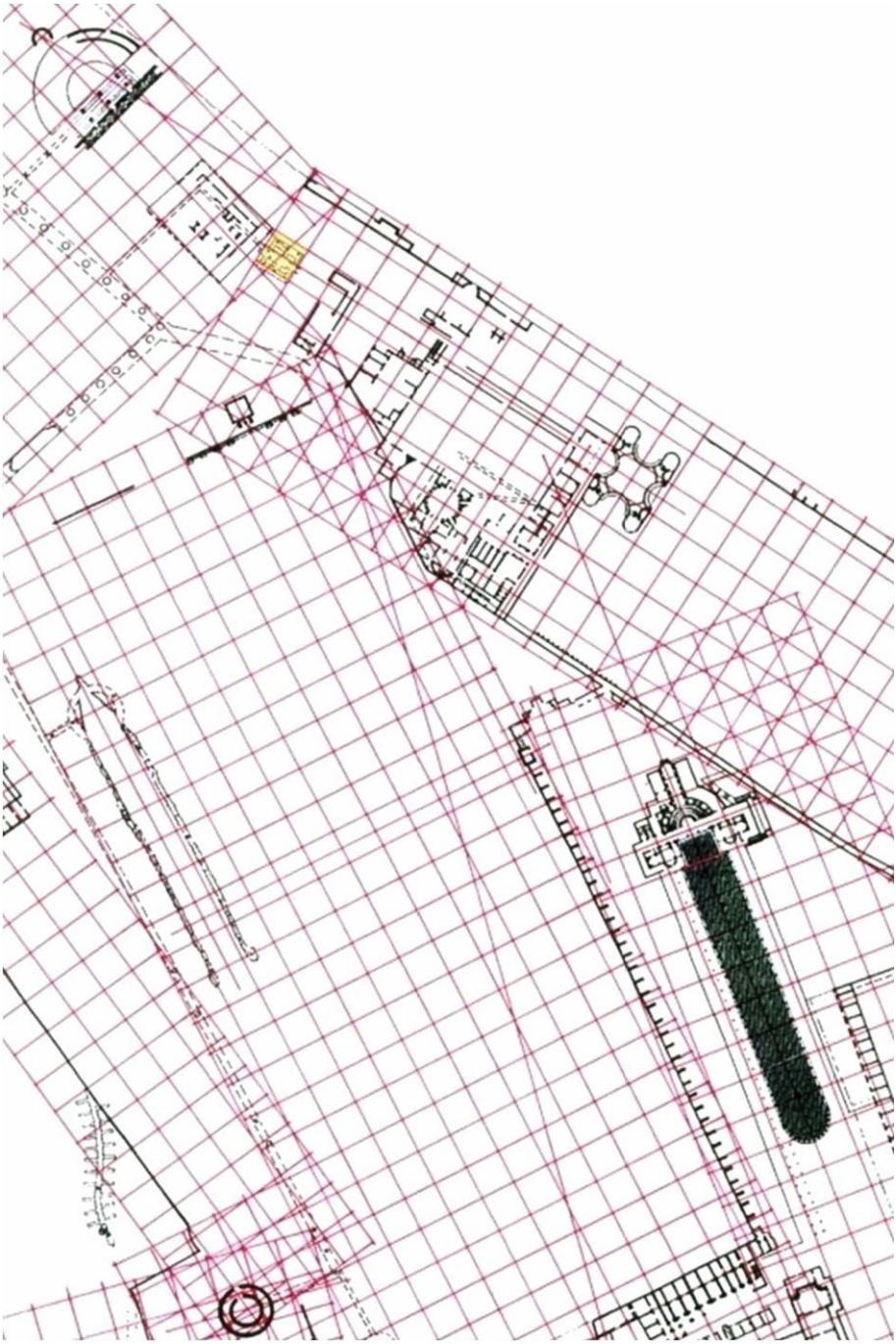

Fig. 7. Detail of analysis of grids of entire site. Drawing by the author

If the plan is correct, it is a testament to Roman engineering that this subterranean structure could be placed so close to its intended position without the ability to directly measure to adjacent structures.

Formal plan aesthetic

The plan of the Villa with its overlapping grids gives the appearance of scraps of grid paper pasted down helter-skelter across the drawing board of the site, as if each complex had been drawn independently on an actual drawing board and then moved into place. What this suggests is a working method: after an initial sketch of the whole, the individual complexes might have been worked out separately and then assembled into their final position like a giant collage.

The overlapping of grids suggests clashes that would have compromised the purity of the plans of the individually drawn complexes. Yet there is an aesthetic explicit in the plan which shows that no compromises were made in the execution of this process. The discussion above began with complex curvilinear constructions and moved to rectilinear grids. The presence of curved forms within the shifting grids appears to indicate a formal rationale for their disposition. Fig. 8 highlights curved forms within the plan that have potentially one of two compositional roles: that of pivots or bumpers. Each time a major axial shift occurs in the assembled composition (five alignments are numbered on the plan), there is a point about which the angled grids could be said to have been pivoted. The pivots occur at the center points of curved constructions. The pivoting of grids means that there would have been the potential for violent clashes of geometry. These potential conflicts have been resolved in the executed plan, for at every location of potential conflict another rounded form acts as a "bumper," a mitigating form that accommodates the change in orientation.

Fig. 9 deconstructs the plan into the pieces as they might have been originally conceived on the drawing board, the result of swiveling each complex about its pivot point until all angles become 90°.[9] This is absolutely not intended to suggest that there existed an "ideal" plan for Hadrian's Villa that was compromised in application to an uncooperative site. There were some obvious actual mistakes in alignment, due to unforeseen site constraints, which are rare: most obviously the Piazza d'Oro at the upper left hand corner slides off that of the Residence, or Palace, below (alignment number 1). The angling of the so called Latin Library off the axis of the Teatro Marittimo on the other hand (alignment number 2), is clearly intentional, presumably done to align the building with views to a distant landscape feature.

The relationship with the pre-existing topography appears not to have been simple. There is not an exact correspondence between land form and axes. The existing site was transformed into a series of more or less level platforms. About half of these correspond to complexes unified by orientation, while half do not. At least half the time common orientation unifies complexes across level changes, sometimes very large ones. It would be simpler if each "piece of paper" corresponded to a flat area of ground, but the reality is more complicated. As often as individual complexes are separated by level changes they overlap them, further binding the site into a unified whole.

The intention is not to suggest that the unfolded plan in fig. 9 ever existed on paper. The plan is meant solely to clarify a working process that empowered the designer's imagination by breaking down the process needed to create a final plan, but dimly imagined at the beginning, into discrete and achievable steps.

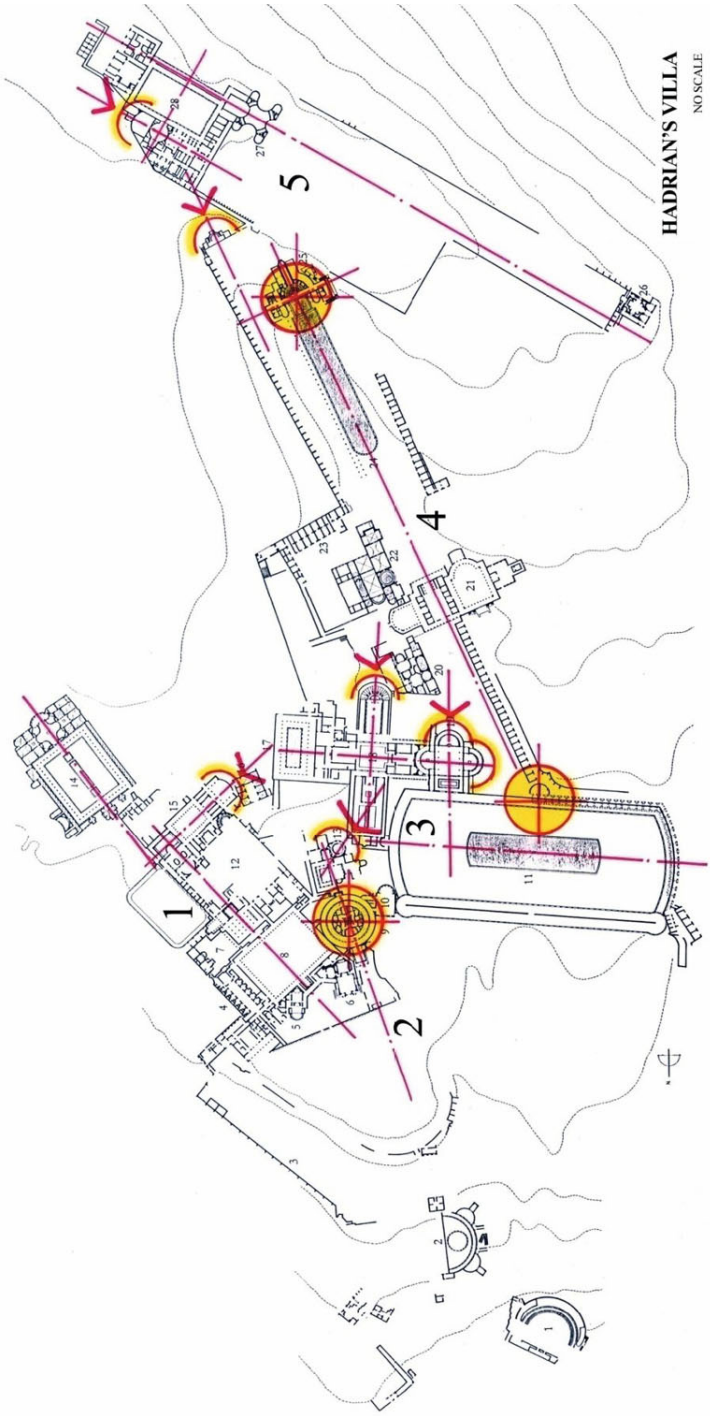

Fig. 8. Formal role of curved elements within plan: "pivots" and "bumpers". Drawing by the author

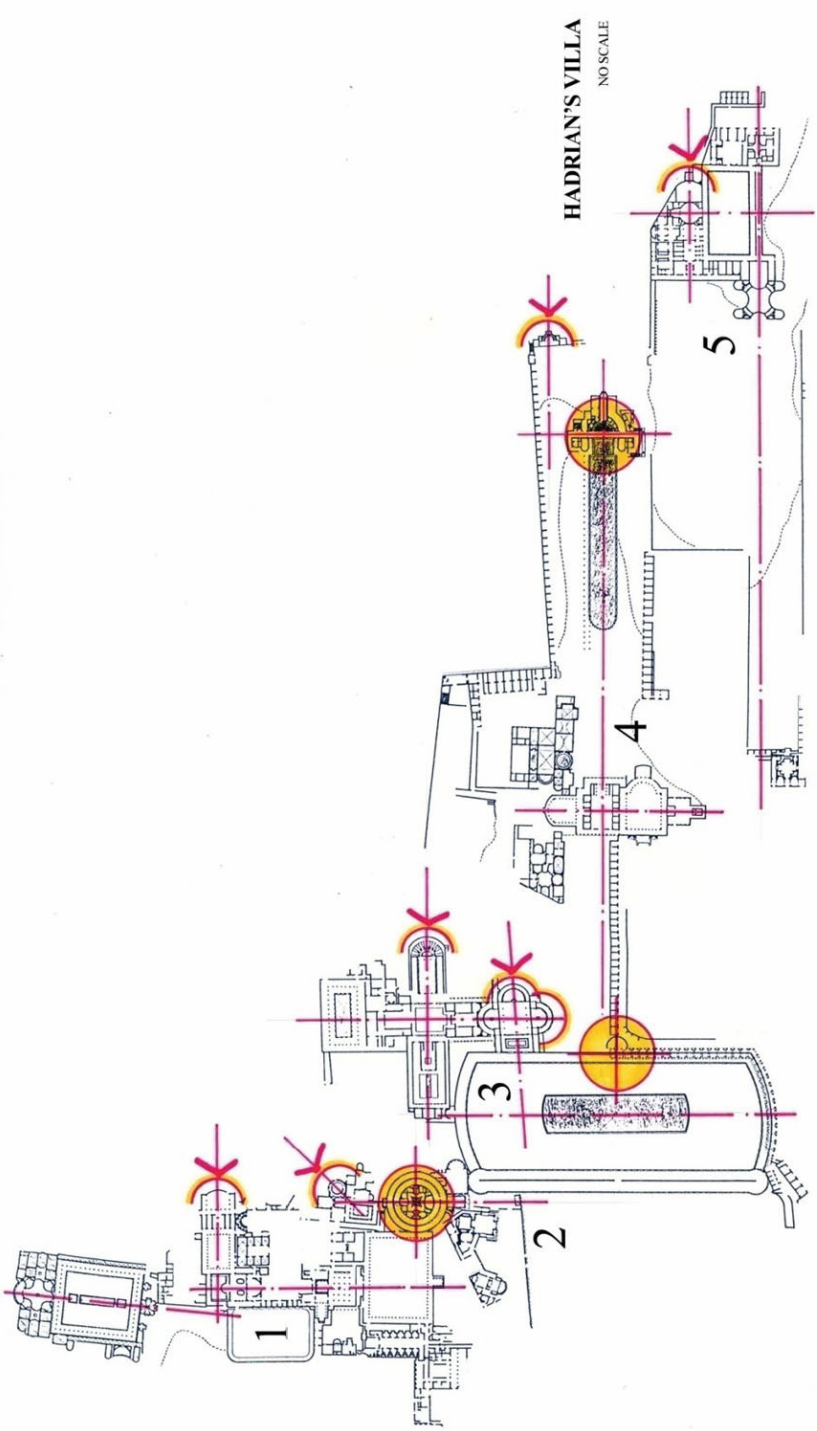

Fig. 9. Analysis of possible original design studies: "the Villa unhinged". Drawing by the author

What is revealed is a rational process in the pursuit of the irrational, in the sense of an artistic, emotional goal: the seamless fit of an elaborately planned villa of many individually significant incidents with an undulating site.

View axes

There appears to be a further element which serves to bind together the raft-like grids each carrying their internally consistent complexes. It appears that at Hadrian's Villa the alignment of buildings and complexes across orientations is not just an abstract exercise, but is based on experience, and thus is frequently based on what the eye can see on the ground. These axes do not pass blindly through solid walls but only through openings and across open distances. In fig. 10 the site plan overlaid by fifty foot grids is repeated with axial relationships made evident. It appears that each plan section was rotated until an alignment was reached between major elements of adjacent sections, though the overall effect does not produce the ordered layout typically associated with axial systems. A few of these axes, shown with dashed lines, are clearly alignments of the drawing board variety which could not be perceived in person. Most of them, however, delineate relationships that would have guided the observer through the maze of structures and shifting grids and changing levels.

Let's focus again on the axis of the Canopus. The main axis of the Canopus passes through the east hall of the Central Vestibule. The parallel arrangement of walls and columns at the southern end of this hall seem like a focusing device, framing an important view. Fig. 11 is a reconstruction of that view. Indeed, from the hall looking south one is presented with what is probably the most familiar axial view found at the Villa, through the arched entablature of the column screen at the north end of the canal of the Canopus[10] towards the Serapeum at the other end, nestled into the slope at the southern end of the natural hollow out of which the Canopus was formed.

Though the apsidal, cupping form of the Serapeum terminates the view, close inspection of fig. 12 reveals that there is something generally unnoticed but visible on the hill beyond that is on axis with the Serapeum. This white tower is an eighteenth-century columbarium that was built on top of the central chamber at the northwestern side of the center peristyle of the Accademia. It appears slightly off axis, and looking at the tower from within the Accademia peristyle in fig. 13 shows that it was indeed built slightly off the axis of the central room of the north flank of the peristyle. There was originally a second story at this point. The sill and one jamb of a second story window can be seen. The second floor was accessed by way of a stair, the remains of which are to be found at the right in the photograph. Given the importance of this element as now understood in terms of the visual linkage of one complex with another it seems likely that the second floor would have reflected the important axial relationship which depended upon it.

The axis of the Canopus was extended beyond its immediate confines in the opposite direction as well. Fig. 14 shows the view now to be had from the high ground behind the Serapeum to the south. The Canopus axis was clearly aligned precisely with the westernmost peak of a multi-peaked hill on the horizon to the north, anchoring the Villa in the wider landscape. From the ground level of the Serapeum this relationship has been obscured for most of the past century by the large tree that has grown south of the Central Vestibule. That this was an alignment that was important visually from the ground is confirmed by the sketch of Le Corbusier, made during his visit to the Villa in October of 1911 [Tedeschi and Denti 1999: 12]. Here there is no question of this relationship, which is now invisible to the typical visitor.

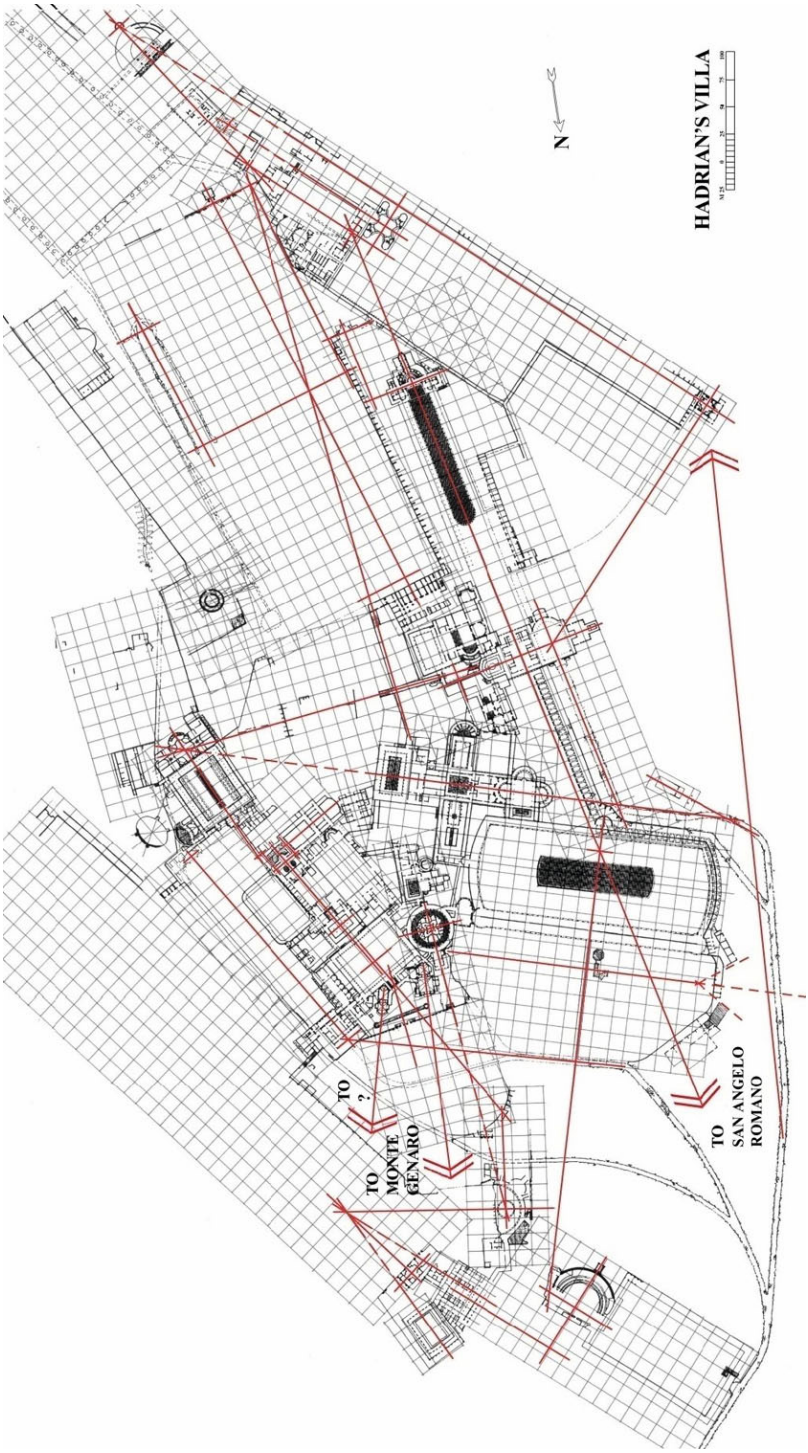

Fig. 10. Analysis of view axes. Drawing by the author

Fig. 11. Reconstructed view from central vestibule to Serapeum. Drawing by the author

Fig. 12. The Serapeum at the southern end of the Canopus. Photo by the author

Fig. 13. he northern end of the central courtyard of the Accademia. Photo by the author

Fig. 14. The view of San Angelo Romano from above the Serapeum. Photo by the author

The hill is a prominent, characteristic feature of the Roman *compagna* and is known as the Monti Corniculani. The town of San Angelo Romano occupies the westernmost peak, and I believe is the likely site of the ancient town of Corniculum, previously thought to have been Montecelio on the next peak to the right.[11] Corniculum would have been meaningful to Hadrian, who consciously sought meaningful historical role models, because of its association with the sixth legendary king of Rome, Servius Tullius. Besides being one of the best of the early kings, Servius Tullius had gained the throne at the contrivance of the widow of the previous king, a situation similar to that of Hadrian's ascension, though why he would want to bring attention to that fact is puzzling (see Livy 1.39-41[Livius 1905]).

This discussion has described only one of the axial, visual relationships picked out in fig. 10 that were established over great distances and correlate to processional routes from one significant Villa experience to the next. But these relationships do not exhaust the potential principles behind the alignment of the various structures of Hadrian's Villa. Some complexes are open on a side and are clearly oriented to landscape features near or far. Other complexes, however, are closed and internally oriented. These may have solar or celestial orientations, and indeed a recent study by Marina De Franceschini and Giuseppe Veneziano [2011] presents exciting discoveries concerning the orientation of the Accademia complex to the rising sun.

Visual alignments near and far are a perceptual device to establish the unity of a series of experiences. Similarly, the experience of curved and straight elements directly impacts the movement of the body through space and is perceivable in three dimensions. Ultimately, it is experience on the ground that is the organizer of the plan of Hadrian's Villa [MacDonald and Pinto 1995: 37].

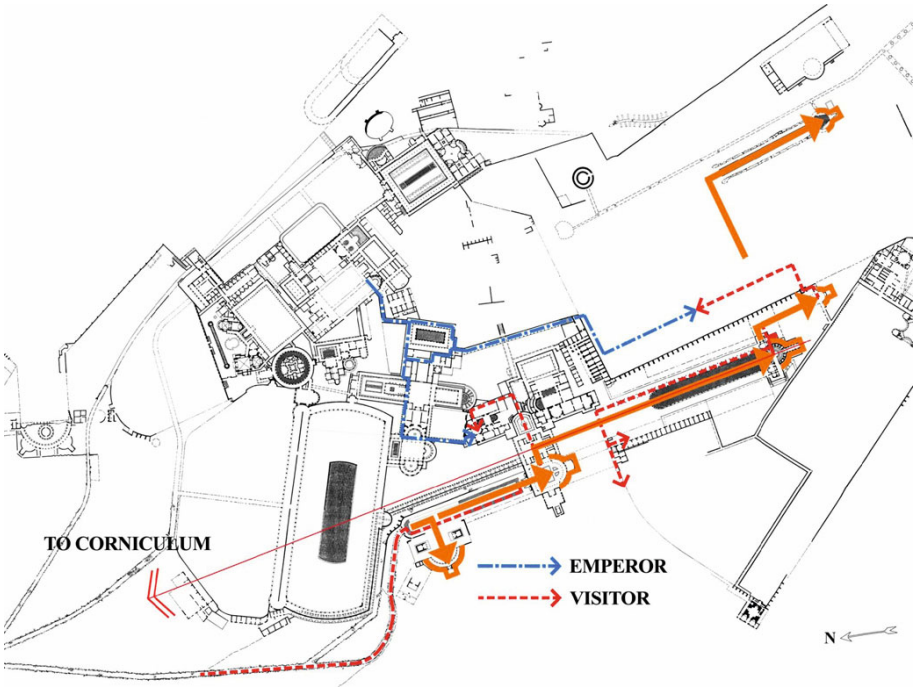

Fig. 15. Apsidal plan forms along canopus axis route from entry to park grotto.
Drawing by the author

For example, fig. 15 shows an analysis of the movement from the main visitor entry of the Villa to a Park Grotto that alternates axial alignments towards apsidal hollows and shifts to the left that are negotiated at the curved forms of the plan. These represent design moves that can be directly perceived. The use of planning grids that locate each of these elements of this promenade within this physical structure can be an aid in the process of design but is not immediately apparent to the untrained observer of the actual construction. The modular character of the grid, however, had meaning for the ancients that such matters have ceased to hold for us moderns.

The experience of the human body controls the design of the Villa in two senses, both related to the organizing grids of the plan: as the dimensional model for the conceptual control of the fabric, expressed by the idea of Vitruvian Man (fig. 16), and as the living subject around which the form of the architecture concretizes, transmuting movement into brick and stone.

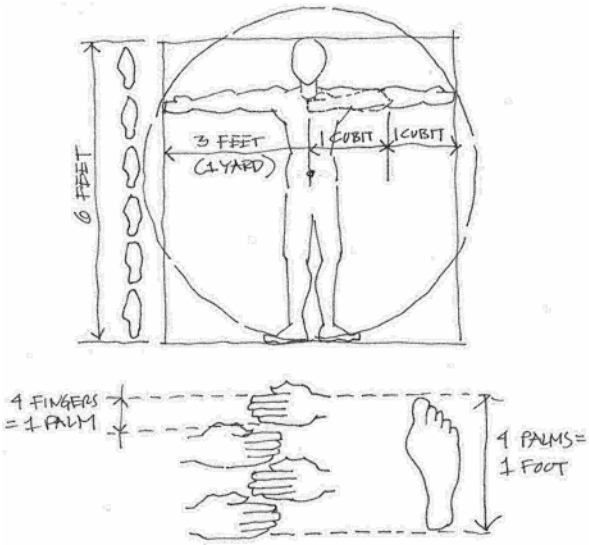

Fig. 16. The sacred modular basis of the human body according to Pythagorus, Polykleitos and Vitruvius. Drawing by the author

The modules previously discussed, which invoked the numbers 4, 5 and 6, though seemingly reasonable to us, were not arbitrary to the ancients. Vitruvius, in his treatise, tells us that the first step in the architectural design process is the selection of a module. He then goes to some length to describe the model the gods have given man to follow: their most perfect creation, the human body (Vitruvius II, 1). To repeat on earth the modular character of the body is only to work according to the divine plan. The fact that, in practical terms, in traditional, pre-modern societies without fixed dimensional standards, the body is the most convenient standard at hand, shared by all workmen, does not dilute the sacred origin of the practice. Even today, who has not been to the fabric store to buy ribbon and seen the clerk measure out the yards with her body?

The grid which these modules form also seems like the result of a reasonable, practical, even modern, design procedure. The relationship to the idea of the labyrinth and its attendant meanings is long forgotten. Few would disagree that the plan of Hadrian's Villa seems labyrinthine, but there is another, deeper way in which the concept of a labyrinth is invoked. Deep in prehistory, the idea of the labyrinth was first invoked

by the twisting path down the cave passage into the cavern, the womb of mother earth.[12] In the cave secret rites were performed, and images of bulls and other horned animals were painted onto the surfaces of the womb-like cave to encourage the earth mother to make more of the horned animals, the hunting and eating of which were the basis of human survival (fig. 17).

Fig. 17. Tintagel maze, Bronze Age petroglyph, Cornwall, England, with circulation diagram overlay. Drawing by the author

At the famous labyrinth at Knossos on Crete, designed by Daedalus, the first architect according to Greek myth, the same images reoccurred in quasi-historical time. Theseus negotiated the maze with the help of Ariadne and killed the dreaded Minotaur, half bull and half man. But Homer tells us, when describing the scenes on the shield of Achilles, that what Daedalus built was the dancing floor in the courtyard of the palace [Homer 1946-47: 18, 590-606]. This passage strips away the walls that conceal the true meaning of the term and leave the path or dance as its generating principle – the human movement around which walls may or may not be formed.

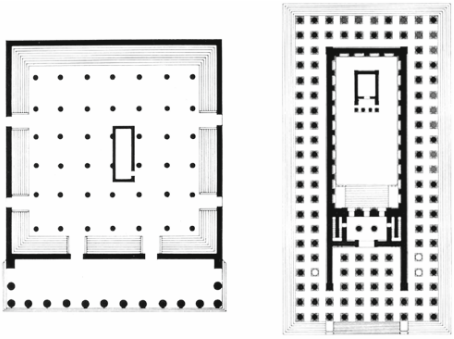

Fig. 18. Grids and the labyrinth: left) Telesterion, Iktinos, Eleusis, fifth c. B.C.E; right) Temple of Apollo, Didyma, ca. 300 B.C.E.

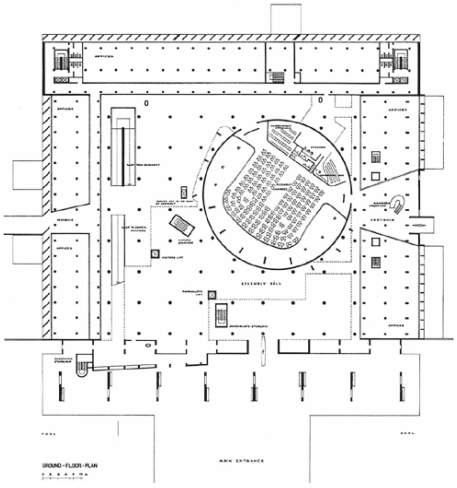

Fig. 19. Grids and the labyrinth: Chandigarh, India, Palace of Assembly, Le Corbusier, 1953-1963

Later grid-based religious structures, the plans of two of which are shown in fig. 18, repeat the labyrinthine dance to the hidden source of life – the womb of the earth mother. The Telesterion was the site of the all night rituals of the Eleusinian Mysteries. At the Temple of Apollo at Didyma celebrants too would meander through the forest of columns to reach the hidden hut within the central clearing. But what significance can these rituals of rebirth have in a twentieth-century building like the Palace of Assembly in Chandigarh, designed by Le Corbusier? (fig. 19). Here representatives meander through a hypostyle hall and congregate in an inner sanctum where the laws that define and sustain the people, a state, are enacted. And bursting through the roof, rising to the heavens above, the chamber carries a mysterious form that indicates the passage of the sun while mimicking the ancient symbol of the horns. It is Le Corbusier, the most modern architect, strangely obsessed with the past and with Hadrian's Villa, to whom we will return.

The lesson of Rome

At the end of the twentieth century of the Christian era there arose outside a city far from Rome a complex of buildings that paid homage to the creation of Hadrian like few structures that had been erected in the intervening eighteen centuries, notwithstanding the acknowledged glory of the pastoral vision of the eighteenth-century villas erected in Europe with Hadrian's creation specifically in mind. This is the museum complex known as the Getty Center, constructed in the 1990s on a hilltop in the Brentwood section of Los Angeles. That Hadrian's Villa, among other precedents, was an influence on the architect, Richard Meier, is acknowledged by the architect himself: "While designing the Getty I kept recalling Rome, particularly Hadrian's Villa... for [its] thick-walled presence and figurative spatial order in which building and landscape lock into each other" (quoted in [Frampton and Rykwert 1999: 355]).

The complex of the Getty Center, though unremittingly modern, recalls Hadrian's Villa in obvious ways. The complex is a scattered arrangement of pavilions organized around courtyards in a rural setting, resulting in a composition where no one structure dominates. The architecture and site do appear to "lock into each other" in a mutually supportive way. In fact at the Getty as at the Villa, the cohesion of the architectural framework is pushed to the limit, appearing at every point on the verge of falling into chaos without ever doing so. An amazing complexity of the overall plan and an extraordinary variety in the form of the individual structures within a consistent aesthetic combine to recall the Villa. So does the sense of serene gardens and courtyards encountered on negotiating a labyrinth, interspersed with extraordinary internalized architectural episodes and external views to the distant landscape. The signature white metal panels of the architect are grounded on a base of honey colored Roman travertine set within a verdant green landscape that intentionally plays on the memory of the masonry ruins of Hadrian's Villa within the overgrowth of its site, while the travertine was actually obtained from Italian quarries within a few miles of the Villa.

The Getty Center recalls as well the formal origin of Meier's signature style: the work of Le Corbusier, the greatest of twentieth-century architects. Sculptural lightweight white forms, inspired by the early Corbusier, float above the travertine-clad walls which anchor the complex to the ground. Here at last, perhaps, a major architect has actually taken to heart the advice of Corbusier to heed the "Lesson of Rome" as the master so admonished us in *Vers une Architecture*.

Yet the point I wish to make here is not that the Getty Center follows Corbusier's directive to imitate Hadrian's Villa and therefore brings to mind its ancient model in an

obvious way, albeit with a palpable, powerful experience of natural and architectural beauty. Specifically, the Getty Center fulfills Le Corbusier's vision of a planning methodology that lies at the basis of his vision of a "true" architecture, invoked when he said, famously, that "the plan is the generator," and that "to make a plan is to determine and fix ideas. It is to have ideas" [Le Corbusier 1927: 45, 165]. It is the planning of the Getty complex that is specifically the fulfillment of Corbusian ideas in a way the master was unable or unwilling to do himself, and this planning methodology has, according to Corbusier's own account, Hadrian's Villa as one of its outstanding applications and antecedents.

Accompanying the publication of the Getty Center in the standard monograph on the architect's work are the explanatory diagrams Meier has used to explain his work throughout his career, reproduced in fig. 20.

Fig. 20. Architect's conceptual diagrams, the Getty Center, office of Richard Meier. After [Frampton and Rykwert 1999]

The extremely fragmented character of the architecture is held in its precarious order by the presence of two overlaid planning grids, one rotated with respect to the other. These grids are a response to various site features, and specifically address the tension that

lies between the urbanity of architecture and its natural setting, already present at Hadrian's Villa. According to the architect,

> The Getty Center is both in the city and removed from it. It therefore has to evoke simultaneously a sense of urbanity and remote contemplation. This dual nature is partly expressed by the organization of the complex along the axes of two hilltop ridges that meet at the angle of 22.5°, which corresponds to the angle of the adjacent freeway as it bends out of Los Angeles through the Sepulveda Pass (R. Meier, quoted in [Frampton and Rykwert 1999: 327]).

Joseph Rykwert commented that "marrying the superimposed grids with the site contours... is the animating core of the Getty Center, its essential nexus and binder" [Frampton and Rykwert 1999: 22].

This use of overlapping of grids has been shown to possibly have been a useful device in the planning of Hadrian's Villa, eighteen centuries before. The argument here, however, is not simply about the use of a grid as a compositional device in antiquity as in modern times, as interesting as that may be. The grid is present because of the relationship between objects which it controls and its role in the articulation of the experience of a place. What is present in both the twentieth-century museum and the second-century villa is the use of a planning grid to suggest a field for potential human movement in which the observer is guided along an axial route to a visible goal created by the strategic placement of curved and straight elements within the framework of the grid. Additionally, the interacting of the various grids is organized by their rotation with respect to each other at visible curved elements. In the case of the Getty Center, the pivot point is the curved element at the center of the crossed axes at the research library.

Le Corbusier often wrote about the role of architecture in guiding human movement. He was clear about the need for view axes as found in the plan of Hadrian's Villa as the necessary motivating factor in the experience of a place. He believed that the most fundamental aspect in the act of arrangement that lies at the heart of planning architecture,

> is based on axes... the line of direction leading to an end... A bird's eye view as given by a plan on a drawing board is not how axes are seen; they are seen from the ground, the beholder standing up and looking in front of him [Le Corbusier 1927: 45, 165].

These axes are at the basis of the notion of the architectural promenade that was a constant concern of the architect.[13] Nowhere was this principle more clearly stated than in *Une Petite Maison*, the work he published on the small house he built for his parents in 1924, which examined at length the route through a tiny house and its relationship to the greater landscape beyond [Le Corbusier 1954]. The book takes the form of a walk through the house and its immediate environs and documents the views thus obtained. The route is clearly indicated in the diagram of circulation which appears on the cover (fig. 21). His own large-scale work may not illustrate these principles as clearly as does the Getty Center, but these principles are clear from his early house plans such as that of the first floor of the Villa Stein of 1927 (fig. 22). In this plan the use of angled and curved walls guides the occupants through the grid of the house. The architectural form is intended to capture in concrete and steel the ephemeral "dance" of human activity in the course of the day. And in the grids on which the house is planned is the beginning of Le Corbusier's own attempt to link the dimensions of building to that of man, the Modulor.[14]

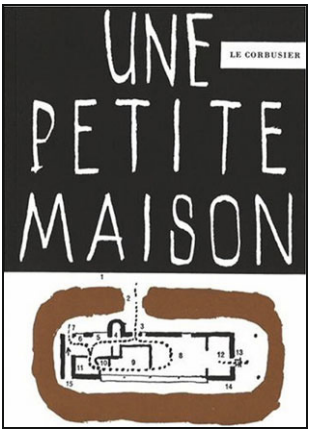

Fig. 21. The cover of *Une Petite Maison*, by Le Corbusier [1954]

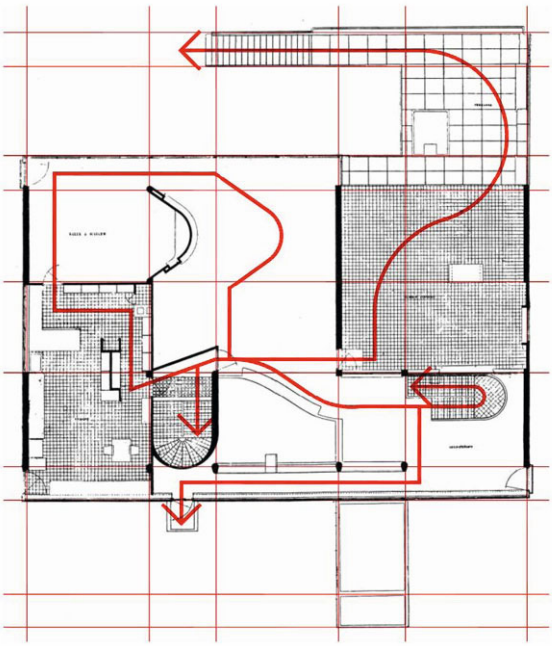

Fig. 22. The Villa Stein, Garches, Le Corbusier, 1927, plan with analytical overlay. Drawing by the author

The Getty Center is typical in the work of Richard Meier in that it takes this Corbusian idea of the architectural promenade as a basis for the development of architectural form, though the sheer scale of the museum complex means that the result there is of greater formal sophistication than generally found in a small domestic commission. It takes the ideas present at the smallest possible scale in Corbusier's *Une Petite Maison* and translates them into monumental architecture of lasting significance, architecture which might aspire to still be influential eighteen centuries from now.

Despite the great difference in architectural expression and the tremendous gap in time, many of the same principles were present in the design of Hadrian's Villa, which was based on human movement as the primary organizing principle of its design, with some similar formal results (fig. 23). This is not to say that ancient Romans anticipated twentieth-century modernism, or that twentieth-century modernism is less innovative than it has claimed. Corbusier experienced Hadrian's Villa as a young man and that experience was crucial in the development of the architectural theory behind his seminal work. The Villa has influenced the development of contemporary architecture in perhaps unanticipated ways, not just as a question of forms but of methods.[15] Yet something universal is involved as well. On this earth, whenever men set out to build in a way that takes special notice of the processes by which humans experience their world as the productive basis for architectural design, certain constants reoccur. The body is a constant, and while the interaction of the body and its environment admits of many shades of meaning imposed by ever changing human cultures, acknowledgment of the body will produce parallels across the ages as has occurred in this case of the twentieth-century museum and the second-century Villa of the Emperor of the Roman world.

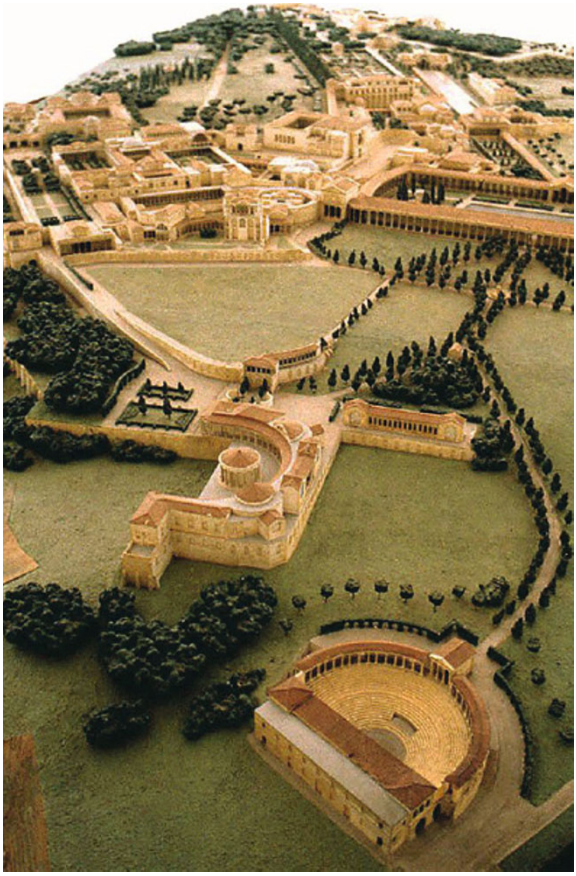

Fig. 23. The model of Hadrian's Villa at the site. Model by Italo Gismondi, photo by the author

Notes

1. The plan used in Le Corbusier's book was taken from a contemporary Baedeker guide book, which he may well have used on his first visit to the site; see [Tedeschi and Denti 1999: 27-29].
2. Le Corbusier famously promoted a mathematical, proportional basis for modern architectural design more often associated with the classical tradition which he was instrumental in displacing. His theory was outlined in his books *Modulor* and *Modulor II*, published originally in 1948 and 1955.
3. Though this room is most often referred to as such, MacDonald doubts that it is one. There are too many doors to be a locker room; it is most likely a circulation space [MacDonald and Boyle 1980: 25].
4. Relevant publications related to this group of buildings on which the following discussion is based include [Brown 1964]; [Hansen 1960]; [Hansen et al. 2011]; [Jacobson 1986]; [MacDonald and Boyle 1980]; [MacDonald 1993]; [MacDonald and Pinto 1995]; [Nielsen et al. 2011]; [Rakob 1961, 1967, 1973, 1983]; [Ueblacker 1985]; and [Wilson Jones 2000]. All of these structures include "pumpkin domed" rooms with the exception of the Teatro Marittimo. There are additional buildings at Hadrian's Villa with somewhat less complicated plans which also contain rooms with scalloped domes. They include the Residence with its triclinium, the vestibule of the Piazza d'Oro, the Serapeum, and possibly the Apsidal Pavilion.

5. The length of the Roman foot has been found to vary from building to building and even within a given building, the value tending to fall within the range of 294 to 297 centimeters [Wilson Jones 2000: 72; Jacobson 1986: 75]. Rakob uses values ranging from 294.2 to 295 for his analysis of Villa structures, while MacDonald suggests 296 for the Villa [MacDonald and Pinto 1996]. Salza Prina Ricotti reproduces a dimensional standard originally set up in the forum of Lepcis Magna and indicates its length as 296 millimeters as well [2001: 408, fig. 148]. Previously MacDonald [1982: 200] had proposed the use of 295 for monuments in the city of Rome.
6. The number 4 as a module occurs in some of these buildings less often than the number 5. Rakob [1983: 224, 227] finds dimensions of 3 x 4 = 12 ft. as well as 3 x 5 = 15 ft. in the Piazza d'Oro and the Reverse Curve Pavilion. David M. Jacobson [1986: 84] does not find 4 ft. modules in either of these buildings but does in the apodyterium of the Small Baths, which he says is based on a 8 x 4 = 32 ft. circle. Both Jacobson and Wilson-Jones [2000: 94] emphasize a 36 x 4 = 144 ft. internal diameter to the outer wall of the Teatro Marittimo instead of the 30 x 5 = 150 ft. outer diameter emphasized by Ueblacker [1985] and MacDonald and Pinto [1995: 82]. In any measurement system based on the human body both 4 ft. and 5 ft. modules are bound to occur. In Vitruvius's account of the basic principles of proportion (II.I.1-9), two numbers are "perfect:" 6, the height of a man in feet, and 10, the number of fingers (and perfect for other reasons as well. When combined they make the third perfect number, 16). The use of 6 leads to duodecimal systems which are naturally divisible by 4 (and 3), as decimal systems are divisible by 5. By way of example, both can occur in a modern office building in the United States, where a human body centered measurement system remains in effect (the English Imperial system of feet and inches). A sheet of plywood or gypsum wall board comes in a standard size of 4 x 8 ft., whereas office space and therefore windows are typically planned on a 5 ft. module. The standard structural bay of 30 ft. is divisible by 6 and 5. The use of these modules in the twenty-first century in the United States may have no intentional symbolic function, but they implicitly relate to the absolute size of the human body and therefore are a means of its representation (mimesis) in architectural form.
7. [Wilson Jones 2000: 82]. That premise consistently recalled the human body through the use of the numbers five and six.
8. The 1906 Survey provides the basis for the whole. Claudio Tiberi published dimensions for the Serapeum at the south end in 1961 [confirm date for reference]. In 1933 Reichardt produced an elegant but perhaps slightly less scientifically minded publication on the Central Vestibule (its Beaux Arts reconstructions give rise to the doubt), but parts of Reichardt's plan can now be corroborated with the publication in 2002 of the recent excavations of the Forecourt of the Central Vestibule, where accurate plan information is now provided all the way to the arched entryway at the northern end of the axis.
9. Compare the diagram in Ueblacker [1985: insert 29], which also shows how the plan of the Villa could be hypothetically regularized into a square one that mimics the plan of a Roman house, repeating at the largest possible scale the planning concept of the Teatro Marittimo.
10. The arched entablature is itself a "proto Baroque" Hadrianic motif that introduces curvilinear complications into elements of the classical orders that according to tradition should only be straight. The Baroque aspects of ancient Roman design, now a commonly accepted notion, were first examined by Margaret Lyttelton [1974], and discussed by McDonald [1986: chap. 8].
11. See entry on Montecelio in [Coarelli 1982]. Also see http://www.montecelio.it/Cenni_storici.htm (last accessed October 21, 2010).
12. Vincent Scully movingly described the symbols of Neolithic religion that form a prehistory to classical architecture in his seminal work, *The Earth, the Temple, and the Gods* [1979].
13. Discussing the architectural promenade at the center of his most seminal work, the Villa Savoye, Le Corbusier invoked the example of "Arab architecture" as an example of architecture experienced by walking about [Le Corbusier and Jeanerret 1964: 24].
14. [Le Corbusier 1955]. See [Wittkower 1960] for a brief, insightful discussion of the history of proportion and the contribution of Le Corbusier.

15. The Getty Center, under construction at the time, is not included in MacDonald and Pinto's survey of the influence of the Villa in contemporary architecture; see [1995: 316-325].

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