



THE GRID AND THE LABYRINTH:  
FROM ANCIENT ROME TO MODERN ARCHITECTURE<sup>1</sup>

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### Abstract

The use of a grid in architectural and urban planning, particularly at a large scale, would seem to be a rational procedure of obvious utility and without esoteric meaning, a means to control the design of complicated constructions that might otherwise seem labyrinthine in their complexity. But a labyrinth is not the antithesis of the grid and the two have a history that has informed architecture from prehistory until the present day. The ancient Romans built consistently on a large scale with a predilection for simple, regular ordering systems. Yet some of even their greatest monuments, such as the Tiburtine Villa of the emperor Hadrian, seem to belie any possibility of a rational plan. The plan of Hadrian's Villa seems labyrinthine in the extreme. Yet given the cultured Hadrian's extraordinary interest in architecture, an overall master plan seems a necessity, though totally opaque to even the learned observer. Amazingly, in the twentieth century Le Corbusier extolled Hadrian's Villa as the archetype of great planning, using an image of the Villa plan as the leading illustration of a chapter of his influential book, *Towards a New Architecture*. This paper will describe the clear, mathematically ordered process by which the Villa was planned. Moreover, the compositional principles of its design will be shown to be exactly those which underlie the theories of Le Corbusier, 1800 years later.

### The Grid and the Labyrinth

On the testimony of Aristotle, Hippodamus of Miletus, (active 5<sup>th</sup> Century BCE) is known today as the "Father of City Planning," and is identified with the grid plan, notwithstanding that the grid plan for urban settlements was already being used in Egypt and the Indus Valley two millennia prior. Though principles of the grid plan appear to have been learned by Hippodamus as a youth in the rebuilding of Miletus and were applied by him at Piraeus, the port city of Athens, Rhodes, and other cities, Aristotle himself was not totally convinced of the utility of a grid plan. According to Aristotle, the grid plan, though beautiful and convenient in times of peace, would not offer the security of the traditional unplanned city in which it was "difficult for strangers to make their way out and for assailants to find their way in." (*Politics*, 1330b17)

A traditional town or village plan developed over time typically has an irregular pattern of narrow streets that might reasonably be described as *labyrinthine*. Aristotle seems to be setting up a distinction between the free movement afforded by the grid and the obstacles to movement afforded by the labyrinth, certainly in the character of the labyrinth as suggested

by the related word *maze*. Yet the distinction between the two may not be so extreme, and consideration of this word labyrinth may offer insight into the planning of large complex constructions both now and in the past.

Grids seem obviously of utilitarian value, a means to organize complex constructions according to a rational procedure. When used to organize a network of streets, as in an ancient Roman town or a modern American city, the grid promotes ease of circulation by offering a multiplicity of potential routes to one's destination. This was Aristotle's understanding. In contrast a labyrinth or maze offers a multiplicity of dead end passages, making the one route through difficult to find. This is called a *multicursal* labyrinth. Yet the most common representation of a labyrinth in ancient Greece and Rome, not to speak of cultures before and since in Europe and around the world, is a *unicursal* labyrinth, in which there is only one path leading along a circuitous route to a central goal. (Matthews 1970, 17-53) A fine example is the mosaic floor in the appropriately named House of the Labyrinth in Pompeii, with an image of Theseus in his struggle with the Minotaur at its center. [Fig 1]

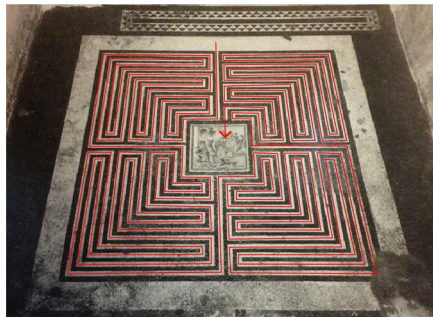


Figure 1

The unicursal labyrinth does not have the function of a maze, but rather directs the movement of the human subject to a goal along an extended, winding path. This defined path imitates a ritual dance, a pilgrimage to a center, a sacred source, or god. The city of Rome itself is a multicursal labyrinth as Aristotle suggested, but traversing the Via Appia through the teeming fabric of the city leading to the Via Sacra and thence into the Forum Romanum at the heart of the city is specifically a labyrinth of the unicursal variety.

The word labyrinth itself is of pre-Greek origin, possibly Minoan. Of course the most famous labyrinth in history was that at Knossos on Crete, designed by Daedalus to hide and contain the Minotaur. The Minotaur was killed by Theseus, the future founder of Athens, who successfully negotiated the labyrinth with the help of Ariadne's thread. Here it seems clear that a labyrinth, or maze, is a construction of walls with the purpose to confuse and entrap. But Homer tells us, when describing the scenes on the shield of Achilles, that the labyrinth was actually the dancing floor in the courtyard of the palace. (*Iliad* 18, 590-606) This passage strips away the walls that conceal the true meaning of the term and leaves the path or dance as its generating principle – the human movement around which walls may or may not be formed. The bull dance pictured in the frescoes at Knossos seems to reinforce this interpretation, as do the many references in antiquity and later to the *troua*, or Game of Troy, as described by Virgil,

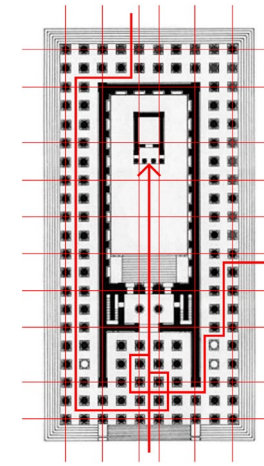


Figure 2

which may or may not be the same as the *geranos*, or Dance of the Crane, which Theseus performed on Delos to describe his experience of the labyrinth, as described by Plutarch.<sup>2</sup>

The labyrinth as a choreographed route to a goal through complex constructions is not at odds with a grid. Designers of complex constructions can use the grid as an organizing device for the elements which define the path. Hippodamus came from Miletus, an Ionian city. The temples and other large scale constructions of the Ionians were built on grids in a way that Doric temples were not. The plans of the archetypal Ionic temple, such as that of Artemis at Ephesus or of Apollo at Didyma, are laid out on a modular grid.<sup>3</sup> [Fig 2] The celebrants would meander through the forest of columns enacting a ritual dance to reach the hidden hut or goddess within, with the promise of rebirth and the continuation of life which the god or goddess could bestow. The column bases from Ephesus that depict the meandering procession would seem to corroborate this understanding. Could Hippodamus, despite his rationalism, have channeled this sense of the divine in his proselytizing for the grid as the enabling device for the everyday movements of the social body in its urban environment, the dance of the quotidian?

### Hadrian and Le Corbusier

In the words of the historian of Roman Architecture, William McDonald, architects of the classical tradition have for centuries "preferred to work within a relatively simple governing scheme that stressed axuality and a hierarchy of forms." (MacDonald and Pinto, 1995, 275) Certainly the famous towns established for veterans throughout the empire evidenced the influence of Hippodamian planning through the rational principles of the army camp, or *castrum*. Yet Rome itself never achieved such regularity. And one of the largest and most prominent monuments left to us from Roman antiquity by one of the greatest patrons of architecture in history seems to belie this characterization as well. The casual violence with which the various parts of the Tiburtine Villa of the emperor Hadrian (76-138 CE) crash one into the other seems to belie any possibility of a rational plan. [Fig 3] 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



Figure 3



years of his absence from the construction site during his famous travels about the empire. Yet the principles of this master plan remain 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 Lessons of Rome" in his influential book, *Towards a New Architecture*.<sup>4</sup> 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 not just a model of planning for the twentieth century, but also evidence of mathematical order in the ruins?

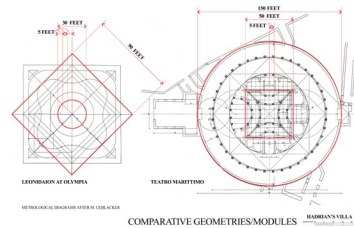


Figure 4

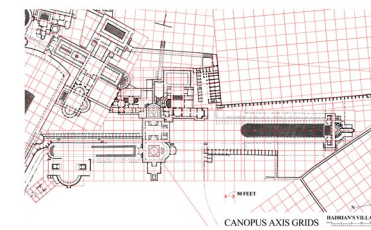


Figure 5

### Modules and Grids at Hadrian's Villa

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 Maritime Theater, the Small Baths, the Vestibule of the Academy, and the so-called Piazza d'Oro. 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.<sup>5</sup> A number of authors have examined these four buildings and have come to similar conclusions. As an example, **Figure 4** reproduces the geometric diagram of M. Uebliacker for the Maritime Theater, as well as for a contemporary plan of similar curvilinear interest at Olympia, the Leonidaion. 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.<sup>6</sup> Key dimensions are found that repeat the module of five feet, and at the center of the Maritime Theater there is a fifty foot square. 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.<sup>7</sup>

**Figure 5** shows an enlarged plan of the axis of the Canopus, which contains a large water basin extending south from the Central Vestibule. This is one of the longest axial compositions in the overall Villa plan. Overlaid on this plan is a grid of squares fifty Roman feet to a side, taking the fifty Roman foot square that Uebliacker proposed at the center of the Maritime Theater as a planning module for the entire site. It is immediately apparent that many points on the plan correspond to the fifty foot grid.

**Figure 6** extends this grid to the entire site by reorienting the grid locally to the geometry of each building complex. 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. At the center of the plan the Residence, or Imperial Palace, adapted from a preexisting Republican era villa, has the least number of correspondences, as one might expect, but elsewhere the situation is very convincing.

Again, none of this is surprising. There is compelling evidence that decimal based planning systems using modular dimensions were used by Roman builders both in modern scholarship and in ancient texts. "Roman surveyors are famous for the practice of centuriation, the

Figure 6

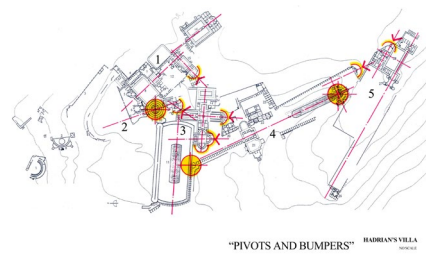
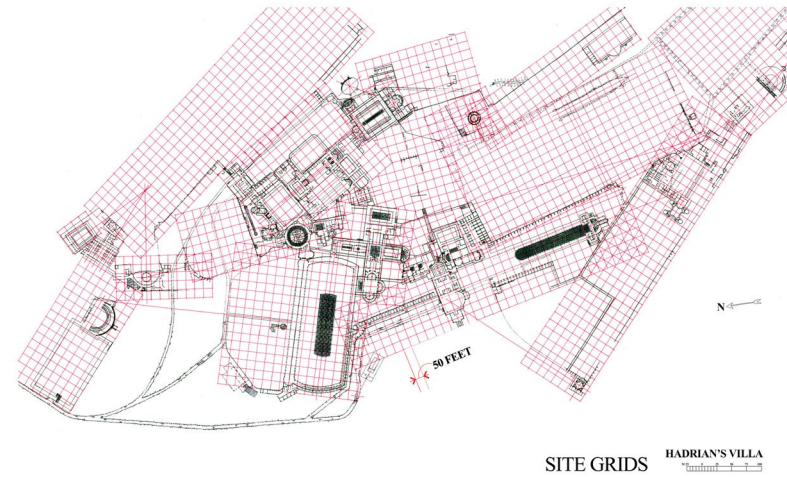


Figure 7

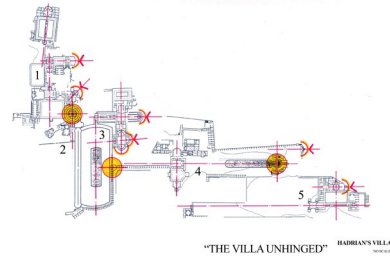


Figure 8

marking out of property in square or rectangular parcels (*centuriae*) by dividing balks and roadways (*limites*) according to a simple dimensional system, while unitary dimensions like the *actus* (120 feet) often regulate town planning grids too.”<sup>8</sup>

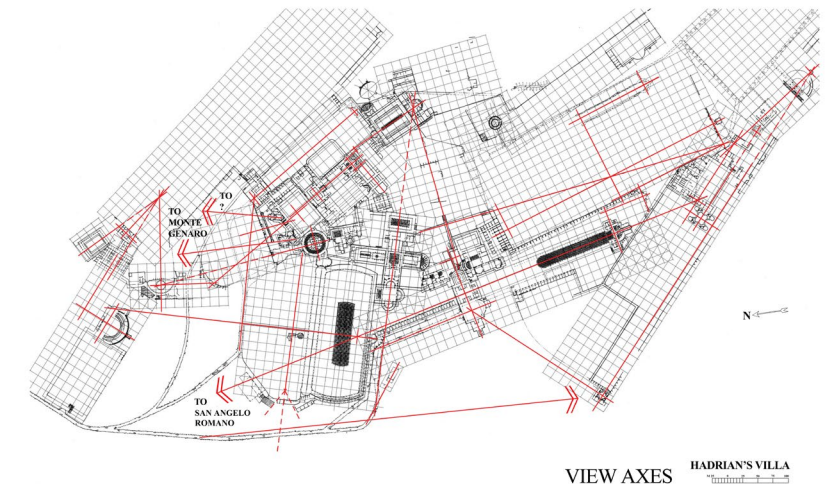
**A Formal Plan Aesthetic**

Figure 6 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 above discussion began with complex curvilinear constructions and moved to rectilinear grids. The presence of curved forms within the shifting grids appears to have a formal rationale for their disposition. Figure 7 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, 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

Figure 9



location of potential conflict another rounded form acts as a “bumper,” a mitigating form that accommodates the change in orientation. The trailing edges, or tails, at the extremes of the plan to the south end in curved forms as well.

The plan in Figure 8 clarifies 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 that married initial design concepts with complicated site conditions. 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 at the Villa**

It appears that at Hadrian’s Villa the alignment of buildings and complexes across orientations is not just an abstract planning exercise, but is based on the experience of the user, 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 Figure 9 the site plan overlaid by fifty foot grids is repeated from Figure 6 with axial relationships picked out in red. 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,



Figure 10





Figure 11



Figure 12



Figure 13



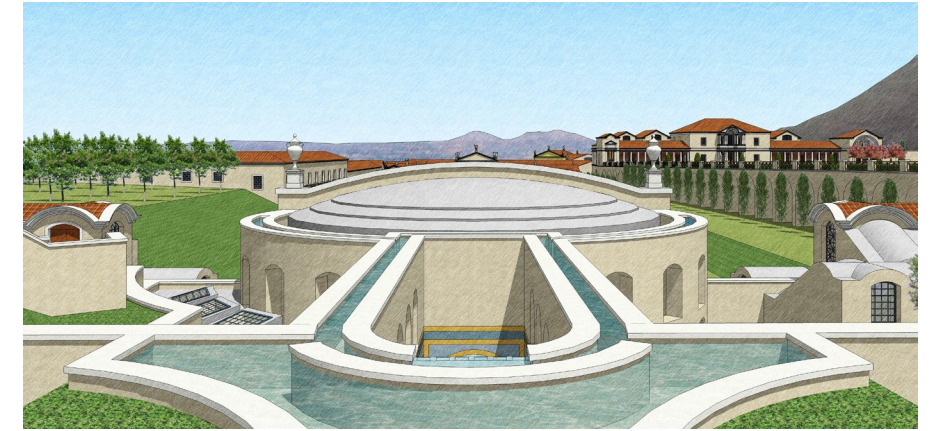
Figure 14

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.

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. **Figure 10** shows the reconstructed 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 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. **[Fig 11]** Today the apsidal, cupping form of the Serapeum terminates the view, and vegetation obscures the ruins beyond. **[Fig 12]** But in antiquity a two story tower in the Academy complex to the south rose behind the Serapeum and gave final termination to this axis. **[Fig 13]**

The axis of the Canopus was extended beyond its immediate confines in the opposite direction as well. **Figure 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 the last half century by a large tree which mimics the height of the Central Vestibule which would have obscured the view from the ground in antiquity. Before the tree grew in this location Le Corbusier made a sketch from the ground in front of the Serapeum during his visit to the Villa in October of 1911. (Tedeschi and Denti, 1999, 12) For him there was no question of this relationship which is now invisible to the visitor. **Figure 15** shows the corresponding view in antiquity from above the Serapeum. The hill is a prominent and characteristic feature of the Roman *compagna* and is known as the Monti Corniculani. The town of San Angelo Romano occupies the westernmost peak, and is the likely site of the ancient town of Corniculum, previously thought to have been Montecelio on the next peak to the right. 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 his mother-in-law, similar to the circumstances of Hadrian's ascension.

Figure 15



There are numerous other such visual alignments across building complexes at the Villa. And not all of these alignments link monumental formal arrangements. An alignment can invoke meanings that belie monumentalization. As can be seen in **Figure 9**, there is a long axis not quite parallel to that of the Canopus directly to the east that leads from the Winter Palace through a covered promenade and stair leading up to a large rectangular park area. This visual axis crosses this park on a diagonal and is aligned with an entry to, or actually, possibly the exit from, the great Underground Galleries at the southwest corner of this Upper Park. This is the largest access point to these Galleries, an unusual feature of the Villa that comprises a vast trapezoidal circuit of underground tunnels, the purpose of which is obscure. (This circuit of tunnels with multiple circular skylights runs off the plan to the southeast.) Some scholars suggest functional explanations for this unusual feature, which is much larger than the many other tunnels which underlie the Villa buildings and which clearly met service functions. Others suggest a ritual explanation, related to Hadrian's many interests. MacDonald has speculated that these tunnels along with other linked structures enabled Hadrian and his guests to participate in a version of the ancient Greek mystery rites. (MacDonald and Pinto, 1995, 132-138) The mystery rites, believed by the Greeks to have been adapted from ancient Minoan practice, were an aspect of Greek religion parallel to but distinct from the worship of the Olympian gods which focused on our mortal condition and offered the possibility of a life thereafter. This was communicated in dramatic and emotionally wrenching all night rituals. Hadrian was obsessed with all things Greek and took his religious duties seriously. The Villa would surely have reflected that. And the only surviving ancient text which describes

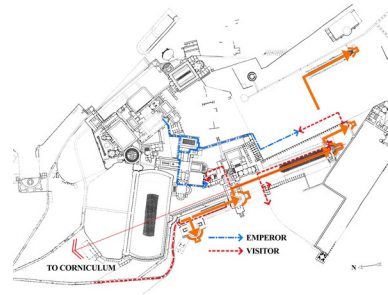


Figure 16



Figure 17

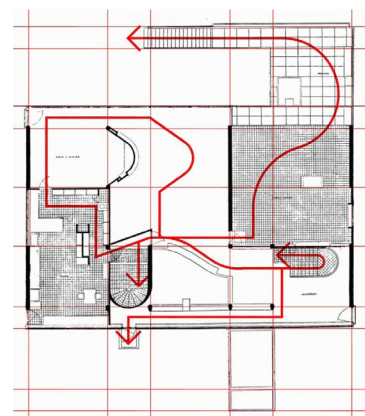


Figure 18

the Villa states that, “in order not to omit anything,” Hadrian “even made an underworld.” (*Scriptores Historia Augusta, Hadrian, 26.5*)

Whichever interpretation of the Underground Galleries might prove to be true, the alignment of the access point with the route from the Winter Palace is another example of axial, visual relationships that were established over great distances and correlate to processional routes from one significant Villa experience to the next. Visual alignments near and far are a perceptual device to establish the unity of a series of experiences and to give meaning to the resultant movement. The experience of curved and straight similarly 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) For example, an analysis of the movement of a visiting official from the main visitor entry of the Villa to a meeting with the emperor in the Upper Park, prior perhaps to proceeding together to the Underground Galleries, alternates axial alignments towards apsidal hollows and shifts to the left that are negotiated at the curved forms of the plan. [Fig 16] Planning grids organize the physical structure within which each of these elements of this promenade are located and are thus important conceptually even though they are not immediately apparent to the untrained observer of the actual construction.

The movement of bodies through grids in the context of a possible celebration of religious ritual (and not to mention the rituals of the state which may parallel those of the sacred), recalls the discussion of the labyrinth with which this paper began. Few would disagree that the plan of Hadrian's Villa seems labyrinthine, but the grids which underlie this apparent disorder constitute a planning device that introduces mathematical precision into the organization of functional elements according to patterns of user circulation that achieves functional as well as symbolic goals. This appears to be the lesson of Rome which so inspired Le Corbusier.

### 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 other structures that had been erected in the intervening eighteen centuries. This is the museum complex known as the Getty Center, constructed in the 1990's 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.” (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 that results in a composition where no one structure dominates. The architecture and site do appear to “lock into each other” in a mutually supportive way. 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. Here at last, perhaps, has a major architect actually taken to heart the advice of Le Corbusier to heed the “Lesson of Rome” as the master so admonished us in *Towards a New Architecture*. Yet the Getty Center does not simply follow Le Corbusier's directive to imitate Hadrian's Villa and mimic its ancient model in obvious ways, albeit with a palpable, powerful experience of natural and architectural beauty. The Getty Center fulfils 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 Le 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, which form the basis for Figure 17. The extremely fragmented character of the architecture



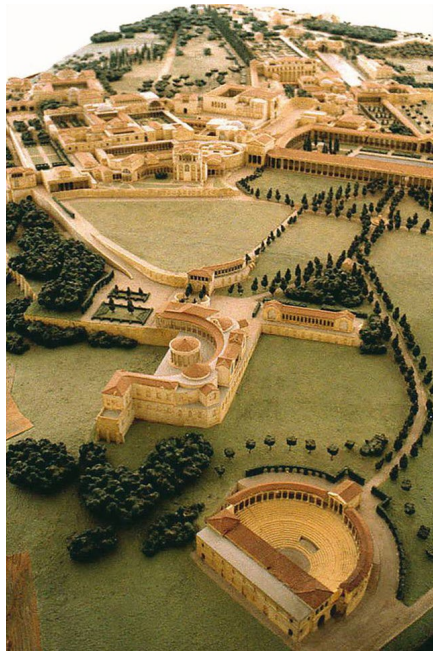


Figure 19

is held in its precarious order by the presence of two overlaid planning grids, one rotated from the other, both based on a thirty foot module. 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 degrees, which corresponds to the angle of the adjacent freeway as it bends out of Los Angeles through the Sepulveda Pass." (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, it's 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. At the time of Meier's work on the Getty Center the collage effect of this compositional technique was important in the work of a number of leading architects. It had become almost a Post Modernist trope.<sup>9</sup> The argument here, however, is not only 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 one from the other at visible curved elements.

Le Corbusier wrote often 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. 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. It is commonly assumed that Le Corbusier's theory of the architectural promenade was inspired by his experience of the Acropolis in Athens and to a lesser extent the ruins of Pompeii. Yet in the same passage in *Towards a New Architecture* that proclaims the principle of visual axes, sketches of Hadrian's Villa are intermixed with those of the other two sites.

In Le Corbusier's own work, this principle was forced to find expression in small scale constructions, as small as the house for his parents which he painstakingly described in *Une Petite Maison*, published in 1924, which examined at length the route through a tiny house and its relationship to the greater landscape beyond. (Le Corbusier, 1954) His own large scale work may not illustrate these principles as clearly as does the Getty Center, but these principles are clear from the early house plans such as that of the first floor of the Villa Stein of 1927. [Fig 18] 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. This plan fairly constitutes a manifesto of his technique which was only applied to truly large scale constructions by followers such as Richard Meier. And the placement of curved and straight walls within a grid to create view axes and to guide human movement Le Corbusier learned at Hadrian's Villa, not the Acropolis or Pompeii.

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. It takes the ideas present at the smallest possible scale in Le Corbusier's parent's house or the Villa Stein 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, the same principles were present in the design of Hadrian's Villa [Fig 19], which, like the later work, was based on human movement as the primary organizing principle of its design, with some similar formal results. Le Corbusier experienced Hadrian's Villa as a young man and used that experience in the development of the architectural theory behind his revolutionary work. Thus the Villa has influenced the development of contemporary architecture in perhaps unanticipated ways, not just as a question of forms but of methods.<sup>10</sup> Yet something universal is involved as well, that has its origin in the depths of prehistory. 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 and its movement 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.

#### Notes

1. This paper is based on a doctoral dissertation by the author, *The Perambulations of Hadrian: A Walk through Hadrian's Villa*, 2005. Some of this material appeared in somewhat different form in Ytterberg, 2013, "The Hidden Order of Hadrian's Villa, and the Order of Modern Architecture," *Nexus Network Journal*, 15,11, 127–154.
2. These mysterious and provocative references reoccur in other sources down into the Middle Ages, always with the suggestion that the labyrinth in Crete was being invoked. Cf. Leeuw 2006, 47 and Matthews, 1970, 156–163.
3. Vincent Scully, in *The Earth, the Temple, and the Gods*, provided a powerful if somewhat speculative account of the development of the forms of the Doric and Ionic temples in response to their landscape settings and the related heritage of prehistoric religious practice that underlie Greek religious belief. The labyrinth features prominently in his account.
4. This plan was taken from a contemporary Baedeker guide book, which Le Corbusier may well have used on his first visit to the site. Cf. Tedeschi and Denti, 1999, 27–29.
5. Relevant publications related to this group of buildings on which the following discussion is based include Brown, 1964; Hansen, 1960; Jacobson, 1986; MacDonald and Boyle, 1980; MacDonald, 1993; MacDonald and Pinto, 1993; Rakob, 1961, 1967, 1973, 1983; Ueblacker, 1985; and Wilson Jones, 2000.
6. 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 and Salza Prina Ricotti suggest 296 for the Villa. (MacDonald and Pinto, 1996, x, and Salza Prina Ricotti, 2001, 408, Fig. 148) Previously MacDonald, 1982, 200, had proposed the use of 295 for monuments in the city of Rome.
7. Wilson Jones, 2000, 74, examines the evidence for even foot modules in buildings in Rome itself.
8. Wilson Jones, 2000, 83. Cf. his bibliography on surveying and rectilinear town planning.



9. Already in the eighteenth century G.B. Piranesi, whose plan and numerous etchings of the Villa did so much to spread knowledge of the ruins and their mysterious allure, used a collage technique learned at the Villa to create his Campo Marzio plan. It was Lois Kahn, thanks to his Beaux Arts education, who introduced this technique into modern architecture, notwithstanding works such as the Florida Southern College plan of Frank Lloyd Wright. The technique was common amongst the Post Modern architects who followed Kahn, such as Peter Eisenman as well as Richard Meier. C. Rowe and F. Koetter's *Collage City* theorized the collage technique as an urban planning procedure with positive social utility.

10. 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. (MacDonald and Pinto, 1995, 316–325)

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