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# Architecture and Field/Work

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# Drawing sites : : Site drawings

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The beginning of modern architectural practice is often traced to the fifteenth century when, following the introduction of paper to the west, architects left the construction site to work at drawing boards remote from building activity (Fascari 2007). In this book's title, the virgule slashing between 'field' and 'work' exemplifies the bifurcated condition between field construction and design work (Parkes 1993). This cleaving, which both joins and separates, is the chiasmus that occurs between the constructions of an architect at a drawing board and those at the building site. Current practice assumes that architectural drawings are created with marks conveying information by arbitrary conventions. However, examining the origins of site drawings shows them to be an index of construction, which allows architects to use drawing to imaginatively project themselves into building. This study reveals three levels of the relationship between field/work and site/drawing: the literal drawing on the site, the analogical site on the drawing and the anagogical drawing beyond the site (Gadamer 1989).

## Drawing on site

### *Plots and plans*

Since early in the ancient world, plans of buildings were meaningfully inscribed on the earth through stretching cords and driving pegs into the ground (Rossi 2004). The construction of sacred altars following these practices in India has been identified as the 'ritual origin of Greek geometry' (Seidenberg 1963). The architect worked on site so that drawings of design, full-scale details, layouts on site and the marking of stones for carving were all closely interconnected activities (Wu 2002).

Vitruvius's first-century BCE use of the word *ichnographia* for plans – literally 'foot-marks' – emphasizes that this earlier notion of plan is not the current Cartesian idea of a horizontal section, rather a weighty footprint that is impressed into the earth (Vitruvius 1999: I.II.1). While uncertain, many believe Vitruvius was describing the

full-scale marking of the earth on the construction site with the word *ichnographia*. Cesare Cesariano, Milanese architect and the first to prepare a translation and commentary of Vitruvius published in 1521, equates *ichnographia* with the Latin word *vestigium* or 'vestige' – a word Vitruvius uses to describe the footprints of philosopher Aristippus and the geometrical tracings he found on the sandy beach of Rhodes after a shipwreck (Cesariano 1521: I.XIIIv). In this way, the footprint is joined with the geometrical drawing, both of which provide a sign of human presence. Cesariano clearly included site marking as part of his understanding of *ichnographia*, describing the practice of laying out the site by using stakes and ropes, drawing on site in dirt and plaster and walking a snowy site to mark out the future building's plan (Krinsky 1965: 100).

### *Heaven-sent plans*

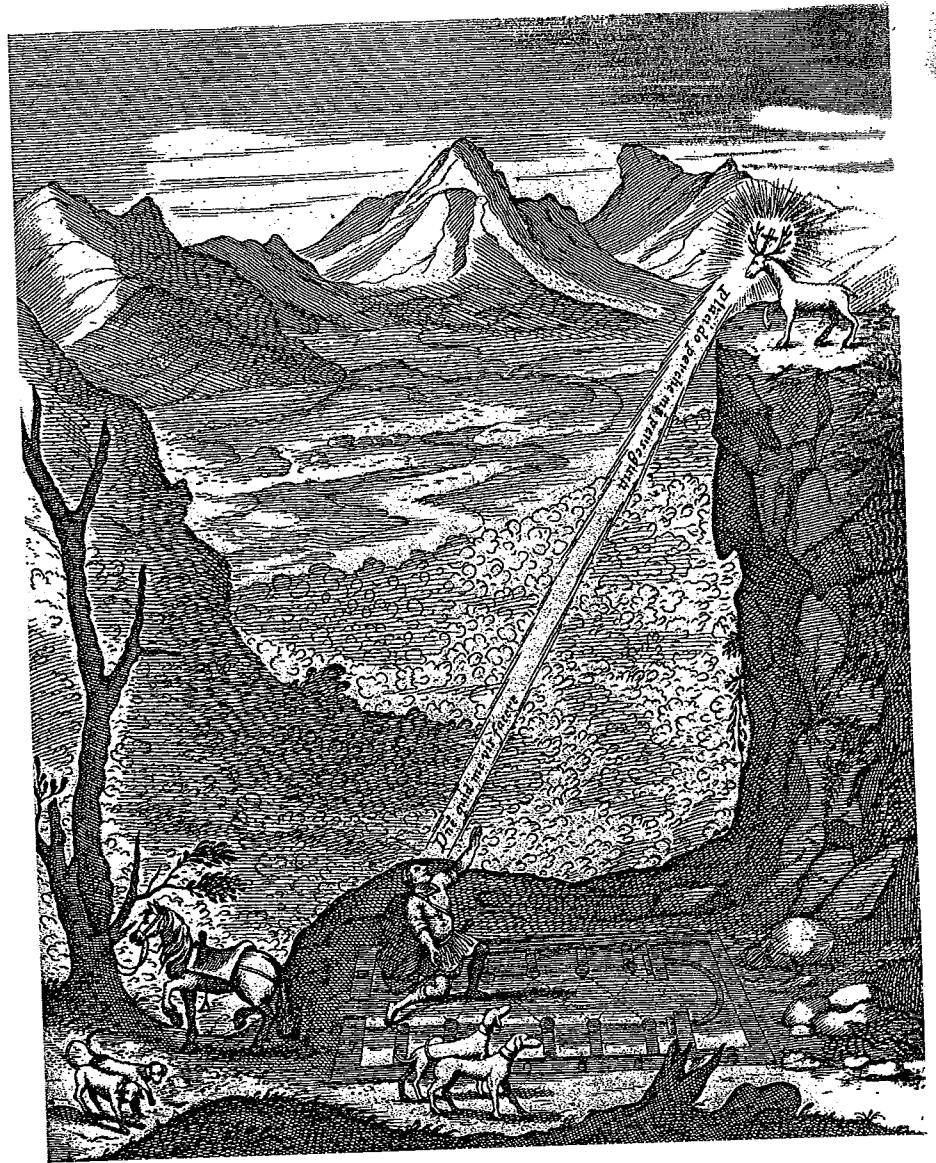
Cesariano's description of plans as footprints in the snow directly recalls the foundation legend of Santa Maria Maggiore, known as the 'Miracle of the Snow'. Reportedly, during the August heat in Rome in the fourth century, one night the Virgin Mary visited the Pope in a dream asking him to build a church for her where the snow falls. The next morning, upon finding the miraculous snow, Pope Liberious used a hoe to inscribe the plan of the future church into the ground (Strehlke 1987). Masolino's painting of the event (c.1428–1432) shows Mary with Christ reaching down, out of the circular clipeus of heaven, to explain divine action in casting snow down to earth. Otherwise painted in tempera, the snow is in oil, used perhaps for the first time south of the Alps, with bold strokes thickly applying the pigment to render a soft, luminous layer of snow with an otherworldly presence (Bellucci 2002: 60).

Numerous medieval religious structures have foundation legends of miraculously outlined plans in snow or frost, often by the footprints of a large beast such as a deer, bear or bull, as proof of the divine origin of the plan (Remensnyder 1995). This circumambulation to describe a plan parallels the ritual consecration of shrines, and defines it as an area set off from the mundane world (Durand 2007: 62). One divinely directed plan was said to be created by an angel drawing a reed through the dew on the ground. An eleventh-century miniature shows the angel's staff extending down from heaven to draw out the ground plan with the future building pictured beyond (Carty 1999: 50). Like architectural drawings, miraculous plans begin to make present an immaterial image, as a meeting place between the visible and the invisible.

### *Drawing in dirt*

Stories of divinely drawn plans probably reflect the actual practices of inscribing full-scale plans on construction sites. For example, the founding legends of the Zurich Fraumünster tell of a stag with flaming antlers leading the founders to the site and later a rope stretched by angels was sent from Heaven to mark the bounds of the building. The rope was preserved in a chest near the high altar until the Reformation (Abegg 2005: 7). The pulling of ropes was commonly used to outline a plan onto the ground

**Figure 1** Conversion  
of St. Eustace.  
Athanasius Kircher,  
*Latium* (1671: 186).



prior to building. As Cesariano compared drawing a plan on paper to outlining the building on site in dust or plaster, so Alberti notes that among the ancients 'it was customary to mark out the line of the intended wall with a trail of powdered white earth' (Alberti 1988: 101). In the Middle East, plans were first drawn on a gridded board in scale and subsequently measured out onto the ground and drawn with plaster or whitewash (Necipoglu-Kafadar 1986: 231). In 401, the architect of Antioch used gypsum to mark out the 'holy church according to the form of the plan' (Creswell 1969: 110). These sort of practices joined practical with ritual significance. When Alexander founded the city of Faro, he directed that flour be used to lay out the plan on the ground, allowing diviners to interpret the future of the city based upon if birds were

attracted by the edible plan, which, they concluded, 'foreshadowed that the city would abound in provisions' (Alberti 1988: 381). Perhaps the most vivid example of drawing a plan on the earth at full size was in 762 for the new cosmological circular city of Baghdad. The plan was traced upon the ground with lines of ashes and cotton seeds soaked in naphtha. Then the caliph Al-Mansur entered the city plan through each of its four gates at the cardinal points in turn and, as he reached the location of his future palace at the very center, ordered that the lines be set on fire in order to enable him to see the three-dimensional form of the city (Al-Tabari 1995: 246). The plan on site, elevated into volume by flames, was literally inhabited by the patron. These sorts of ritual layouts of plans in the field inspired later drawing practices.

## Site as drawing

### *Drawing board as site*

Direct marking on the site was complemented by scaled drawn architectural plans. The Roman architect Frontinus described plans (*formas*) of aqueducts that could 'have the works before one's eyes, so to speak, at a moment's notice, to consider them as though standing by their side' (Frontinus 1961: 359). This intimacy between the architect's body and the drawn image reinforces the close imaginative relation between earthen plot and drawn plan. In addition to understanding Vitruvius's description of *ichnographia* as full-size site marking, others posit it as scale drawing. Perhaps the ambiguity itself is its clearest meaning – that *ichnographia* cleaves both plot and plan. Cesariano clearly wrote that *ichnographia* includes both markings on site and drawings on paper by comparing the architect walking the compass legs on paper to the architect physically walking the plan on site.

When design drawing first moved off-site, a deep analogical relationship to field construction was maintained. The Florentine architect Antonio Averlino, known as Filarete, wrote in his fifteenth-century treatise: 'As it is necessary to have a site in order to build and to dig the foundations, so too we will first make the site in which we wish to make our drawing' (Averlino 1965: 177r). Leveling the site to prepare for construction is reflected in the preparation of the surface for drawing (Leatherbarrow 2004). Renaissance cotton-fiber paper had an uneven surface that first required flattening by rubbing it with bone or pumice and, like laying gravel for a foundation, benefited from a preliminary dusting 'with a hare's foot' of 'powdered' bone, just as Cesariano wrote of sites (Cennini 1954: 6). This sort of practice continued into the first half of the twentieth century, when drafters prepared tracing linen with powdered chalk (Spiers 1888: 13).

The geometrical drawing of lines on paper is directly analogous to drawing ropes on site. Stretched ropes with knotted measures on stakes at the building perimeter became 'strings' of dimension lines on drawings. Foundation rites related to cutting the earth for building walls are paralleled by drafting practices where stylus-made 'dead lines' incise the paper prior to laying down ink onto the grooves. Drawn

vertical lines are equated with construction plumb lines and horizontal lines with levels (Bion 1972: 1). These sorts of similarities are so close and the language between the two almost identical, making distinguishing them sometimes problematic. Geometrical drawing instruments originate in construction tools. The T-square and drawing triangle derive from worksite squares (Shelby 1965). Showing the interrelation of drawing and site tools, Cesariano recommended 'a compass, ruler (*regula*), plumbline, level and measures or squares (*normae*)' for making plans (Cesariano 1521: I.XIIIv).

### The drawing table

A key element to flesh out the link between field and work is the architectural drawing table as a building site. From the Latin *tabula* for a flat board, 'table' meant only the top separate from supporting legs (Gloag 1966). In addition to drawing on tracing house

**Figure 2** Typus Geometrie. Gregor Reisch, *Margarita philosophica* (Basel, 1517 [1504]). Frontispiece Bk. VI, Geometry.



floors, medieval master masons used a trestle table in their lodges for making drawings and templates (Coldstream 1991: 31). The modern beginnings of the architectural drawing board is the Renaissance library table where the orthography of writing and drawing took place in the study, demonstrating in practice the claim made in Renaissance treatises that architecture is a liberal art. The scholar's table provides the broad, flat surface most amenable to the instrumented geometrical drawing of designers and diviners. The desk, appearing in the fifteenth and sixteenth centuries, began as a portable wooden box to hold writing materials and, when set on a flat table, its slightly angled top was used as a writing surface. Later, like the table, the desk box began to be attached to a frame as a standing desk. Modern drafting tables developed from eighteenth-century mechanical writing desks with adjustable tops (Morley 1999: 277).

### *Union of horizontal surfaces*

The table's planar origins are reflected in the almost interchangeable use of the phrase 'drawing board' with 'drawing table'. Through the drawing board, the table unites with drawing surface to become the site of the drawing. That twentieth-century handbooks advise soft wood for drawing boards because of the way it allows paper to receive pencil and ink shows that the architect's drawing surface is not merely a neutral 'support' awaiting the appearance of meaningful marks (French 1947: 7). The drawing sheet is an active participant that already presents itself as propitious, or, as Li Yang-ping, a mid-eighth-century Chinese calligrapher wrote, it is 'generative paper' in that even when unmarked, it is not empty because fine paper is 'endowed with life like fertile soil' (Hay 1985: 98). Beneath the final drawing surface a multiplicity of planes participate together. In the twentieth century, an underlayment of linoleum or sheet vinyl on the board made a floor for the drawing. This multiplication of horizontal surfaces imparts sacredness to the altar-like drawing board. The presence of many horizontal levels also reinforces the drawing's connection to the world by merging the levels of paper, board, floor, site and ultimately the horizon of the world.

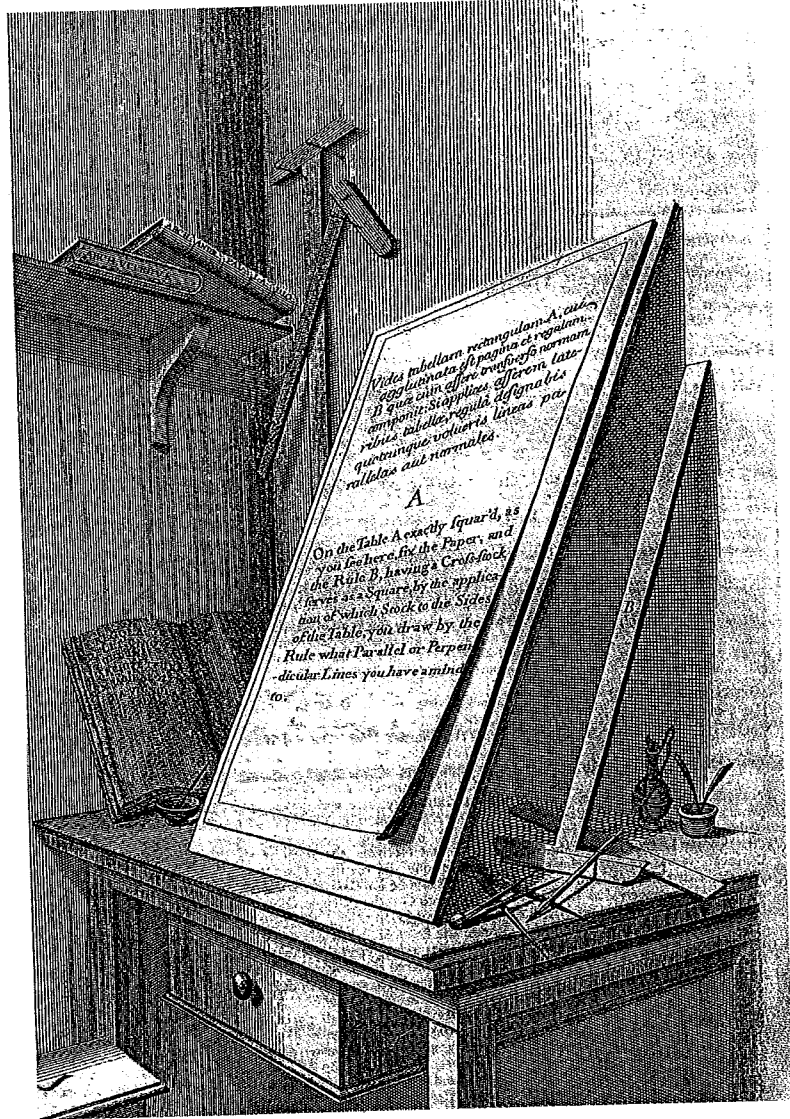
Modern handbooks emphasize the importance of aligning the drawing sheet with the drawing board. In various ways, architects have been admonished for hundreds of years to carefully fix the paper to the table. In 1660, Sir Roger Pratt described 'the manner of designing' as beginning with paper 'laid upon some most smooth table, firmly stretched out, and so fastened to it at each corner, as it can no ways be apt to be moved' (Gunther 1972: 21). The ritual of anchoring drawing paper was achieved over time variously by weights, wax, tacks, glue, staples and tape. The unity of paper and drawing board is so complete that at least since the sixteenth century, the drawing board provided the horizon of the paper by using a T-square against its edge to draft lines (Dickenson 1949-1951). The frontispiece of Andrea Pozzo's 1693 treatise states in part: 'on the Table [*tavola*] exactly squared fix the Paper and having a cross-stock serves as a square by the application of which Stock to the Sides of the Table, you draw' (Pozzo 1989: 13). The T-square and, more recently, the parallel rule entirely unify table, board and paper into a singular construction system. The paper is square with



the table, the table square with the window wall to light the working surface, the building square with the cardinal directions and thereby orienting the entire endeavor with the world's horizon. In this way, the paper is fixed to the earth and projectively cleaves together drawing and building site.

It is not an accident that architectural drawing boards are almost exclusively horizontal with only a slight pitch to acknowledge the presence of the drafter's body (Neufert 1936: 168). The plan's priority in architecture and its horizontality ensures the orientation of the architect to the board like that of the site and makes both locations a process of building up an edifice. The horizontal site of the drawing as an analog to the earth invites designers to project their imaginal bodies onto the drawing *as if* actually on site.

**Figure 3**  
Frontispiece. Andrea  
Pozzo, *Perspective in  
Architecture and  
Painting* (1707  
[1693]).





## Rituals of drawing lines

### *Drawing the invisible*

Cesariano concludes his discussion of Vitruvian *ichnographia* by comparing tracing a building plan to the mythical founder of Rome, Romulus, using a magical staff (*lituus*) to trace the templum of its foundation. Derived from Etruscan rites, a templum or cross of the sky was projected onto the earth to inaugurate a human abode and, by reading the signs disclosed within it such as the flight of birds, ensured that it is amenable to the gods. The spatiality of the human body known through front/back and left/right was oriented with the four cardinal directions of world space: north/south and east/west (Rykwert 1976: 45). Ancient Roman augurs marked out the quadripartite division of the heavens onto the ground, the templum, with the *lituus*. As Marco Frascari (Frascari 2007: 9) has written, for Cesariano, architect/diviners took mental journeys across the image on the paper with the compass legs as the *lituus* staff.

Renaissance site layout practices began with pulling two ropes that bisect the site at right angles to each other to form a cross, not unlike the ancient Roman augurs. Alberti explained:

Our usual method of defining the foundations is to trace out ... baselines in the following manner. From a midpoint at the front, we extend a straight line to the back of the work; halfway along it we fix a stake into the ground, and through this, following the rules of geometry, we extend the perpendicular. Then we relate all measurements to these two lines.

(Alberti 1988: 62)

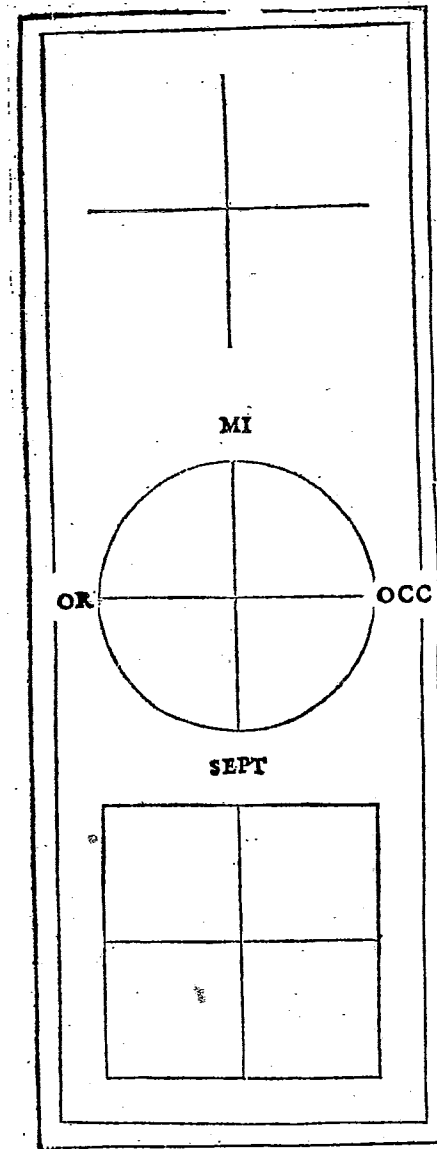
This same method of beginning with quadrature occurred in Renaissance drawing. The uneven deckled edges of handmade paper sheets precluded starting from the edge. As Vincenzo Scamozzi wrote in his 1615 treatise: 'we first square up (*quadrato*) the sheet of paper tracing right angle lines lengthwise and widthwise' (Scamozzi 1615: 46). This was a precise analogous relation between physical ropes in the field and drawn lines at the table.

This procedure operates anagogically as the third level of relation between field and work by leading the architect to manifest the invisible within the visible. The drawing of lines, whether ink on paper or rope on site, are not only practical, they also form part of the ritual of architectural creation. Drawing rites consecrate place on paper by inviting the architect to imaginatively inhabit the drawing. In this way, the plan is not an object viewed at a distance or an abstract horizontal section, but a place that the architect's body imaginatively moves within. This is why, when birthing a design, the building's main entrance is almost always at the bottom of the sheet, closest to the belly of the architect. By orienting one's physical body with the drawing, the architect imaginatively steps into the site of the plan and establishes greater meaning in the work itself.

### Levels of meaning

The sixteenth-century French architect Philibert de l'Orme not only followed these practices but also theorized them in his 1567 *Premier Tome de l'Architecture*. De l'Orme, emphasizing the importance of drawings and models, described the architect as a specialist in precognition (*précogiter*) or forecasting (Schneider 2008). After describing how the architect creates drawings and models, he discusses a diagram showing three crosses. Regarding the first cross, de l'Orme writes that the work on the drawing as well as on the construction site should begin with the same quadrature described earlier:

**Figure 4**  
Squaring the site:  
Diagram of three  
crosses, Philibert de  
l'Orme, *Premier tome*  
*de l'architecture*  
(1567).



We say that Architects and Master Masons are not to start a good work, or to make a plan as they wish, or models, or to begin tracing and marking the foundations, if they do not first draw a straight line, and another perpendicular, to 'trace the square' (as the workmen call it).

(de l'Orme 1567: 31v)

This lowest cross in the diagram is shown in a square emphasizing the literal presence of the building site and in a larger sense the fixity of the earth as a square. In addition to describing quadrature as the practical beginning of drawing and building, he next connects this act to the spiritual order of the world in the squaring of the heavens in the second cross of the diagram. They relate, like Romulus's ancient divination, to the cardinal directions and he extends it to the heavenly order of planetary alignments with the earth. De l'Orme cites Marsilio Ficino's neoplatonic philosophy where the astrological influences on the mundane world are focused by the powerful alignment of planets with the lines of the cross, concluding: 'When the stars are at the extremes of the cross of the world, ... they have miraculous and incredible effects [below on the earth]' (de l'Orme 1567: 32v). This statement implies both that a well designed building can bestow celestial powers onto its occupants and that the astrological timing of foundation rituals is crucial. Centered in the diagram, this cross is in a circle to represent the heavenly order and the four winds identifying the four cardinal directions to locate it in the cosmos. Third and finally, he compares the crosses of the building and the world with the heavenly cross of Christ as 'the figure of life and salvation'. Unusual for this time, de l'Orme extends this transcendental relation comparatively across religions asserting the crosses' use also among 'Arabs' and the 'ancient Egyptians' (de l'Orme 1567: 32v). This uppermost cross in the diagram has no other markings and does not take on the form of a Christian cross but instead continues the Greek cross of the two figures below it. The diagram, although composed of minimal lines, organizes a hierarchy of three levels of existence: physical (earth), spiritual (heavens) and transcendent (divine) and suggests through their close similarity the possibility of movement between them. In this way, the ordinary activity of construction through the design drawings of the architect is raised up to a presencing of the spiritual and ultimately the invisible. According to de l'Orme, the right angle of the architect's drawing derives its ultimate authority from the cross of the divine architect (de l'Orme 1567: 2r). Restating this in more modern language, the architect's drawing rituals at the board invite the thinking through of relationships to building on site, relating to the horizons of the greater world, and even to infusing profound meaningfulness.

Through the cleaving of field and work described above, the practices of design in the construction of a plan appear at all three levels: literal, analogous and analogical. By these acts, subtle speculation is incarnated and theory and practice are connected by the substantial uses which arise from bare contemplation. Architectural drawings are not merely conventional signifiers, they are meaningful manifestations meeting at the intersection of the real and the possible.