

# Studies in Conical Form

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Master of Architecture

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## Abstract

The design of a conical room for experiencing a fleeting moment was developed through a series of demonstrative studies. The desired effect of a momentary appearance of a ray of light striking a reflective surface in a room based on the predicted relative position of the sun at set times determined the form, shape, proportions, and surface conditions of the room.

## Introduction

*"Monsters demonstrate the architectural project where the arrow of premonition is shot by the image of the body; this is a corporeal construing of the constructed world."* (Frasconi 1991, 13)

The body of drawings in architecture includes demonstration, description, and illustration. Though all three were employed, the following pages present more demonstration than description or illustration.

The poetic of an architecture of a moment is explored through designs of a conical room that demonstrate rhythm, eurhythmy and proportion in the space/time dimensions of place and the relative motion of earth and sun bodies. The reverie of a moment, shown through sunlight striking a geometric surface at particular dates and times in the cyclical year, is presented through the monstrous framing of architecture. The articulated relationships of the sun rays on the walls of the room and a reflecting pool are shown using the demonstrative and constructive means of descriptive geometry as both a design generator and a poetic expression.

The demonstrative basis of these studies is a play of rectilinear logic through circular constructions. Physical models demonstrate surface conditions in light and shadow, including striking light on the interior surface focused through an oculus atop the conical form. A hemispherical body of water reflects, refracts, and magnifies the direct rays of the sun as demonstrated through models and photography.

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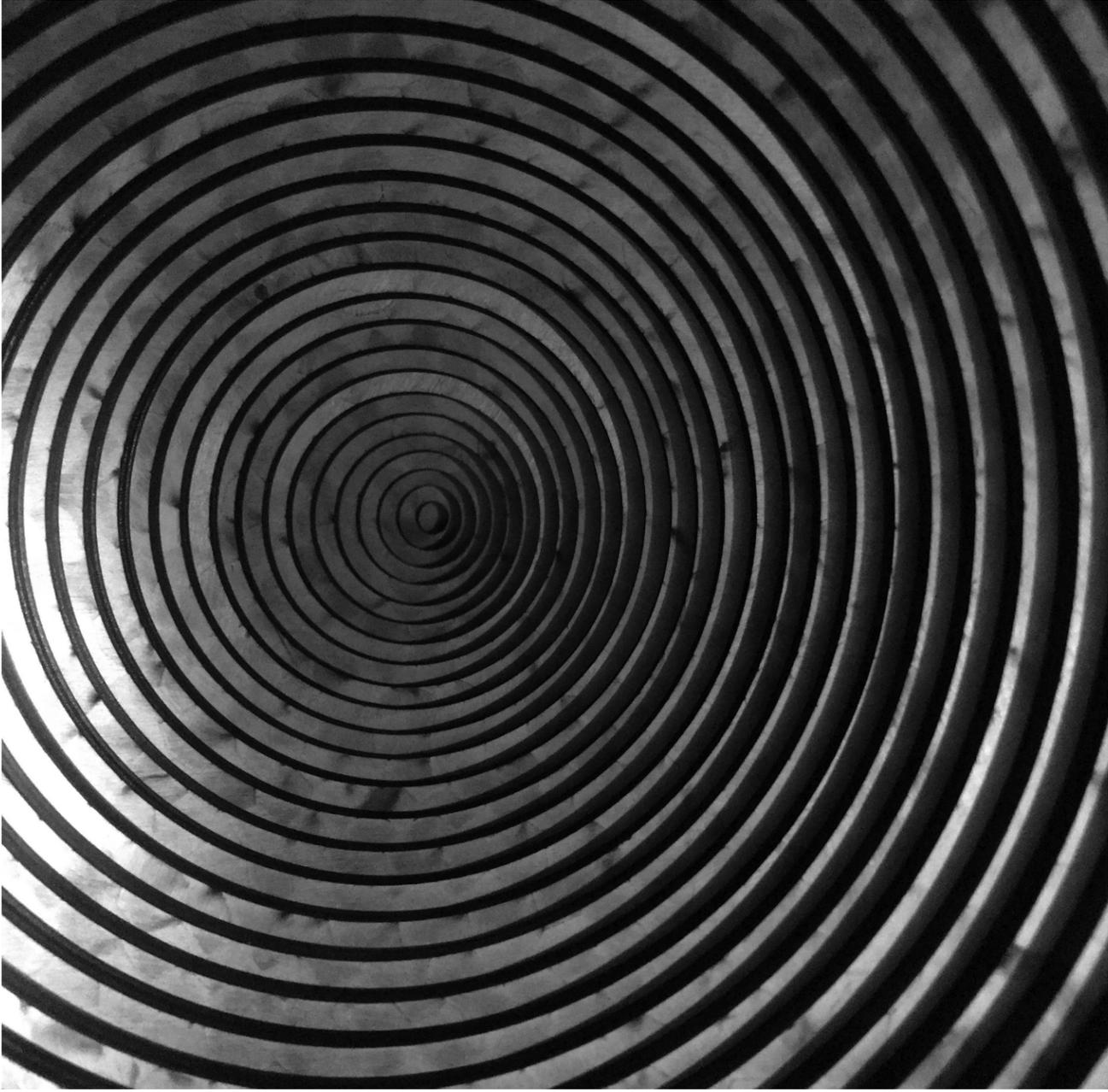


Figure 1



Figure 2

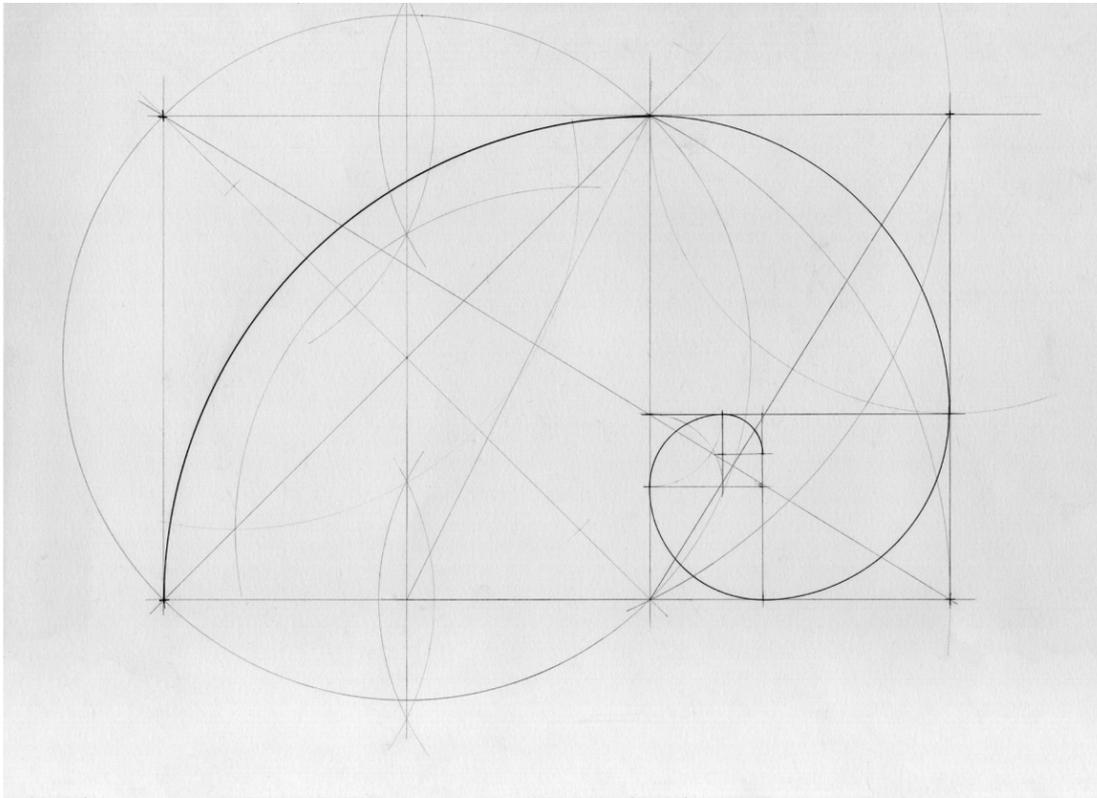


Figure 3

#### What is Proportion

"Rhythm is in time what symmetry is in space." (Ghyka, xi)

"We generally associate the terms of 'rhythm' and 'eurhythmy' with the Arts working in the time dimension (Poetry and Music) and the notion of Proportion with the 'Arts of Space' (Architecture, Painting, Decorative Art). The Greeks did not care for these distinctions; for them, for Plato in particular, Rhythm was a most general concept dominating not only Aesthetics but also Psychology and Metaphysics. And Rhythm and Number were one. (Rythmos and Arithmos had the same root: rheîn = to flow.)" (Ghyka, 5)

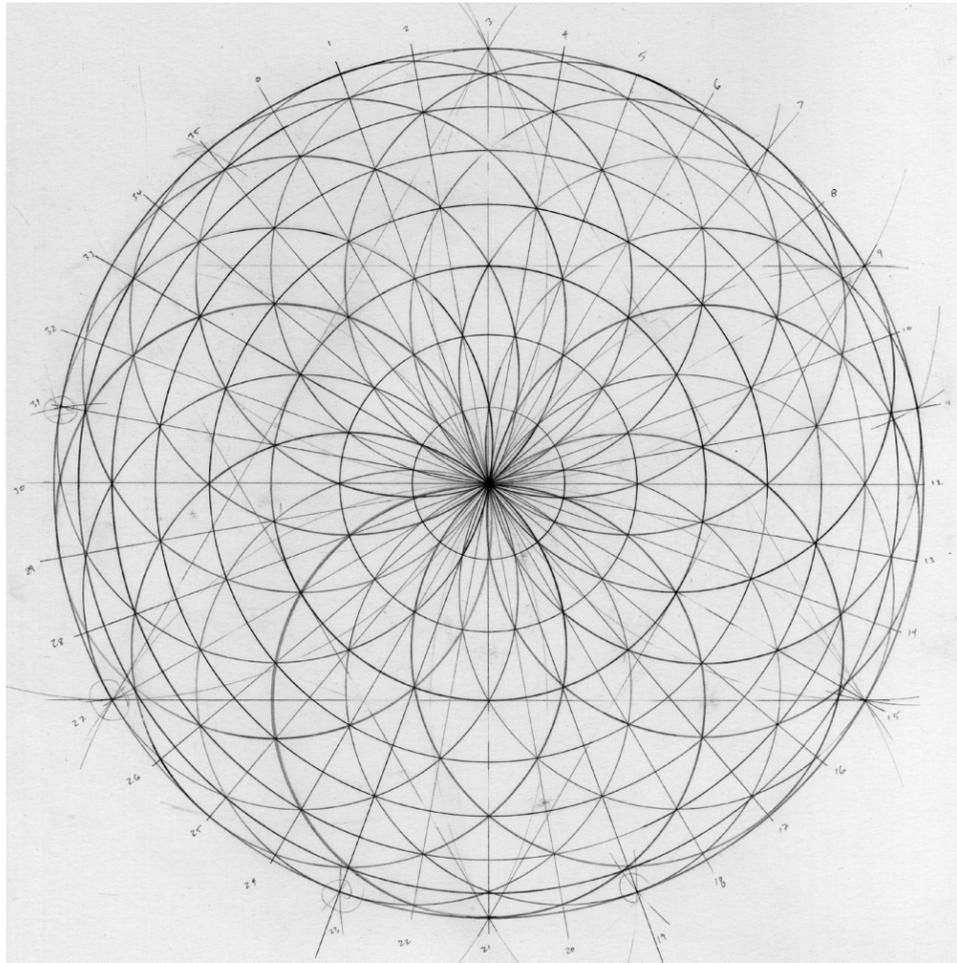


Figure 4

#### Geodetic

"Ancient dimensioning systems combined human and geodetic measure, so that a building embodied, quite literally, characteristics of its occupants and the world" (Hale, 59)

"Our twelve-inch foot is . . . 1/360,000 of 1/360 (one degree) of the circumference of the earth, accurate to 99 percent." (Hale, 60)

"The geodetic numbers were conventionalized to represent human dimensions, all of which fit into a duodecimal system: the twelve-inch foot, the eighteen-inch cubit (length from elbow to the tip of middle finger); and the six-foot man, whose midpoint is three-feet, the English yard." (Hale, 60)

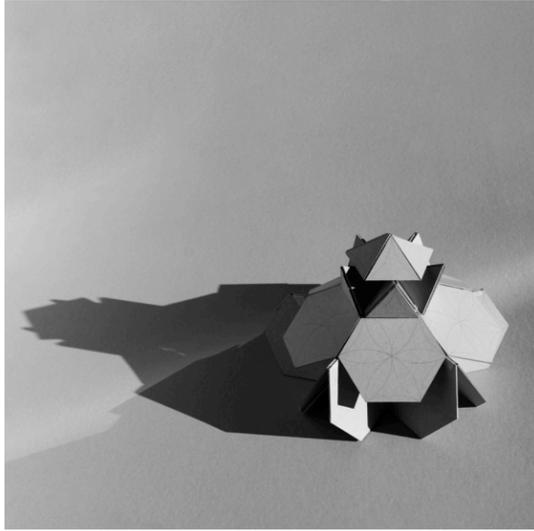


Figure 5

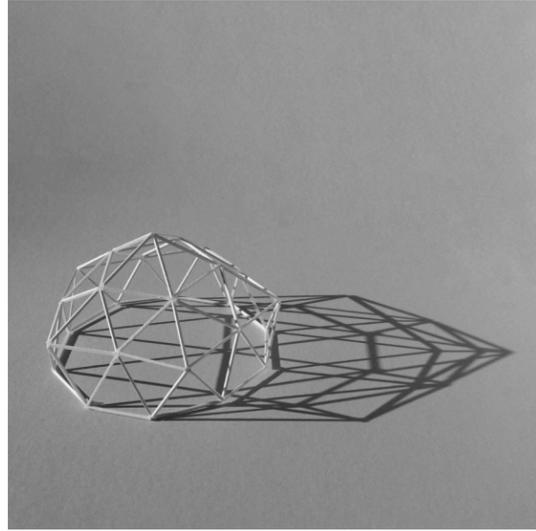


Figure 6



Figure 7

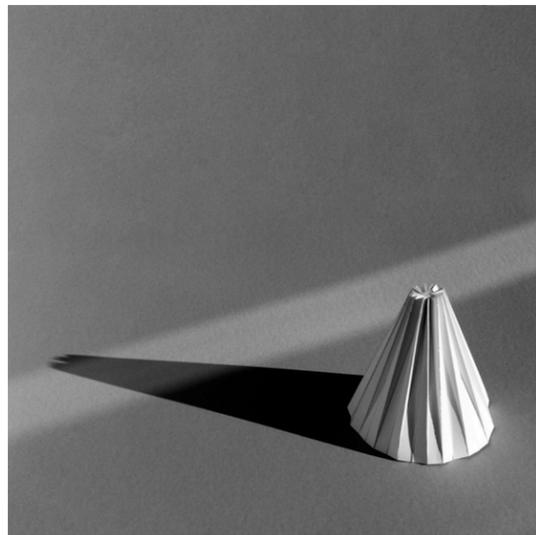


Figure 8

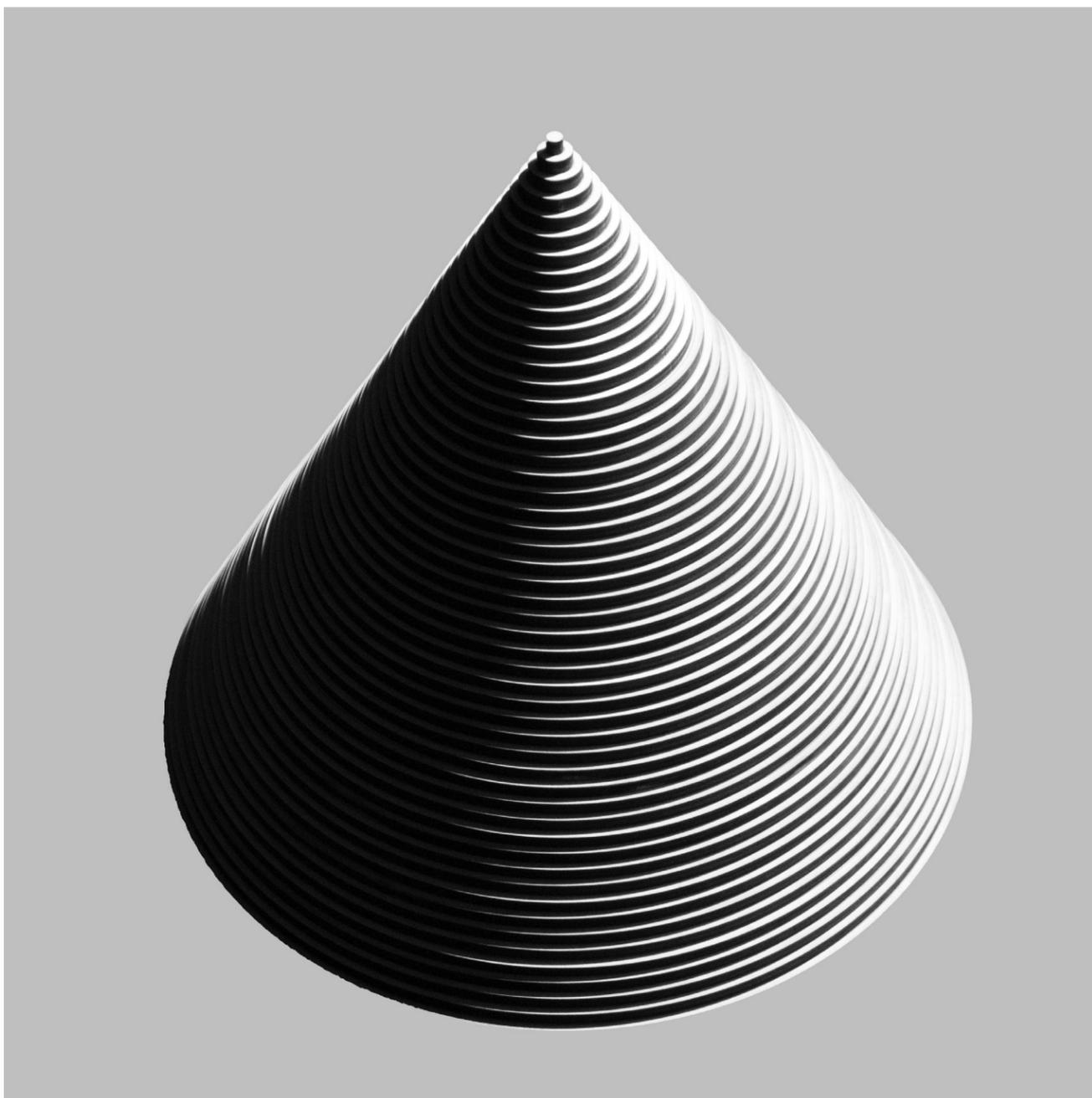


Figure 9



Figure 10



Figure 11



Figure 12



Figure 13

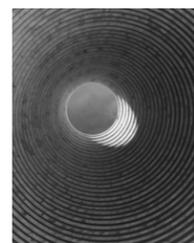


Figure 14

Tyranny of the Center

Oculus

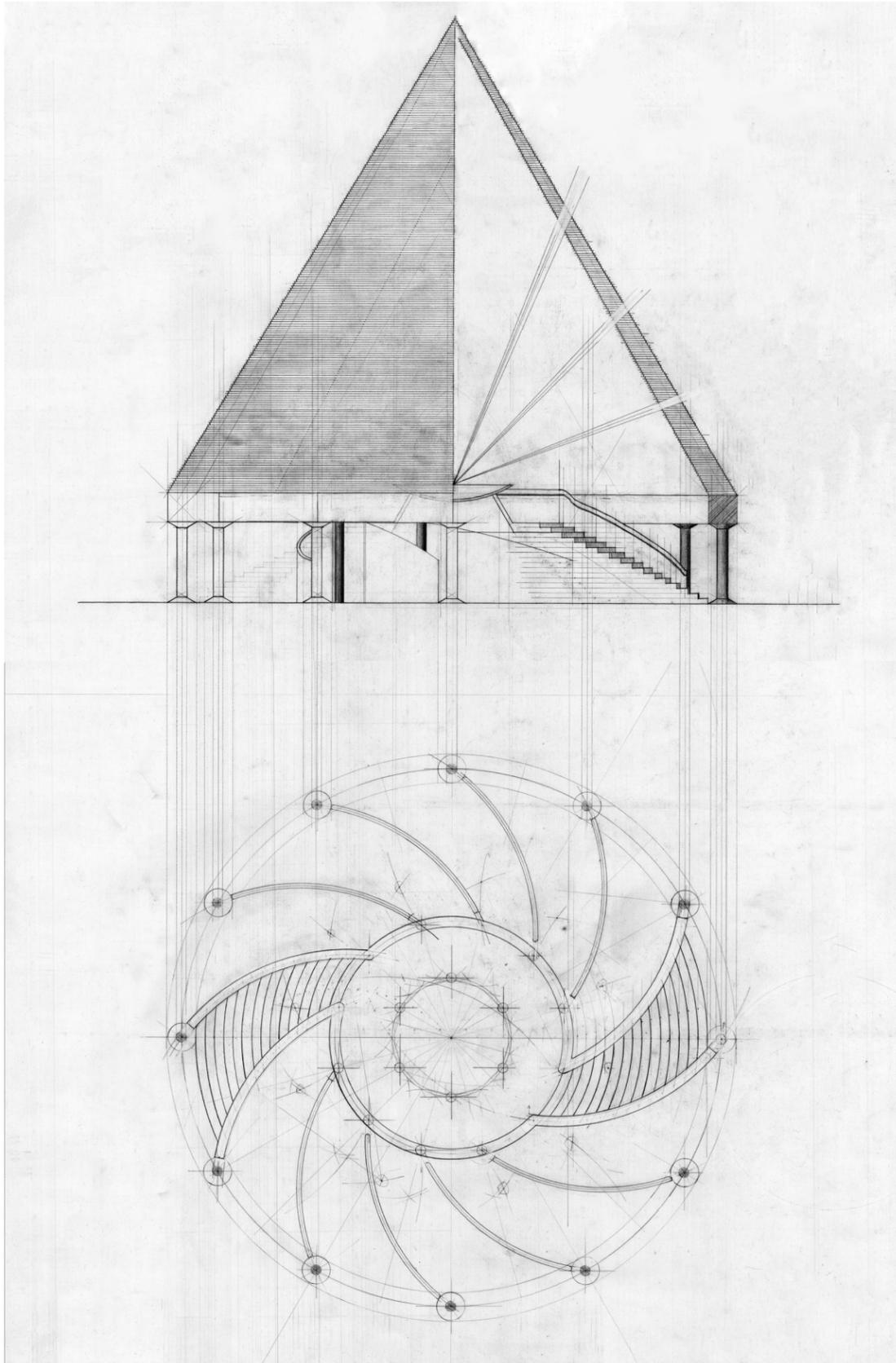


Figure 15

On a hill in Blacksburg, VA, a skewed, truncated cone reaches for the sky. Inside, a clear pool of water in a large transparent bowl is elevated in a dark conical room with an oculus far above the floor. In a moment, a ray of sunlight bursts into the room through a small aperture in the conical ceiling. The light strikes the rippling water surface and reflects on the curved sloped surface of the ceiling opposite the aperture. Light from the same ray refracts through the water and its transparent vessel onto the floor far below. The dancing pattern of light and shadow began to capture the imagination. Then the sun ray disappears as quickly as it appeared. The experience, the ray of the sun's light, and its reflected and refracted light and shadow, are now fading memories. This drawing is the first constructed drawing where the cone is neither truncated nor skewed, but symmetrical and complete.

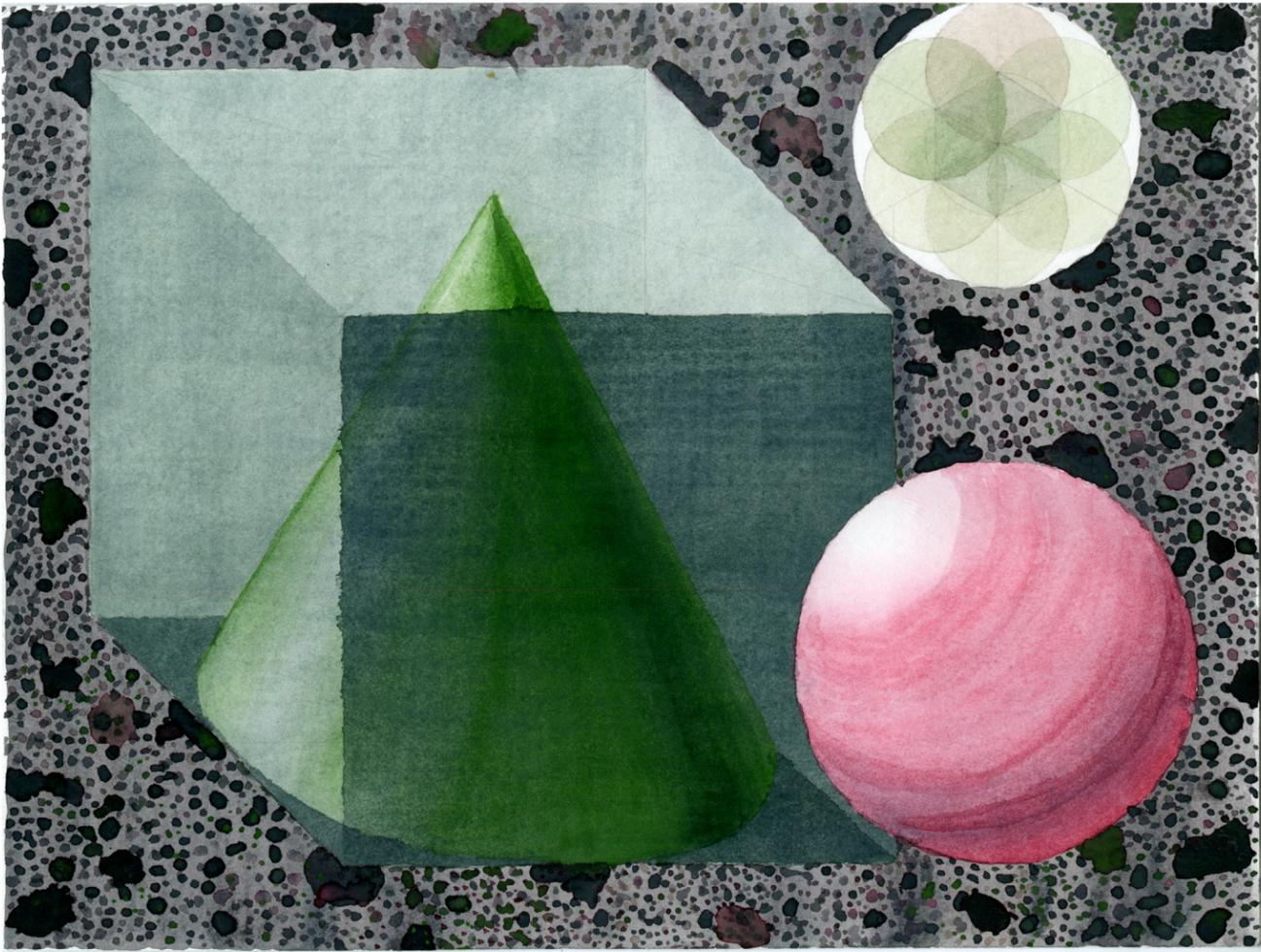


Figure 16

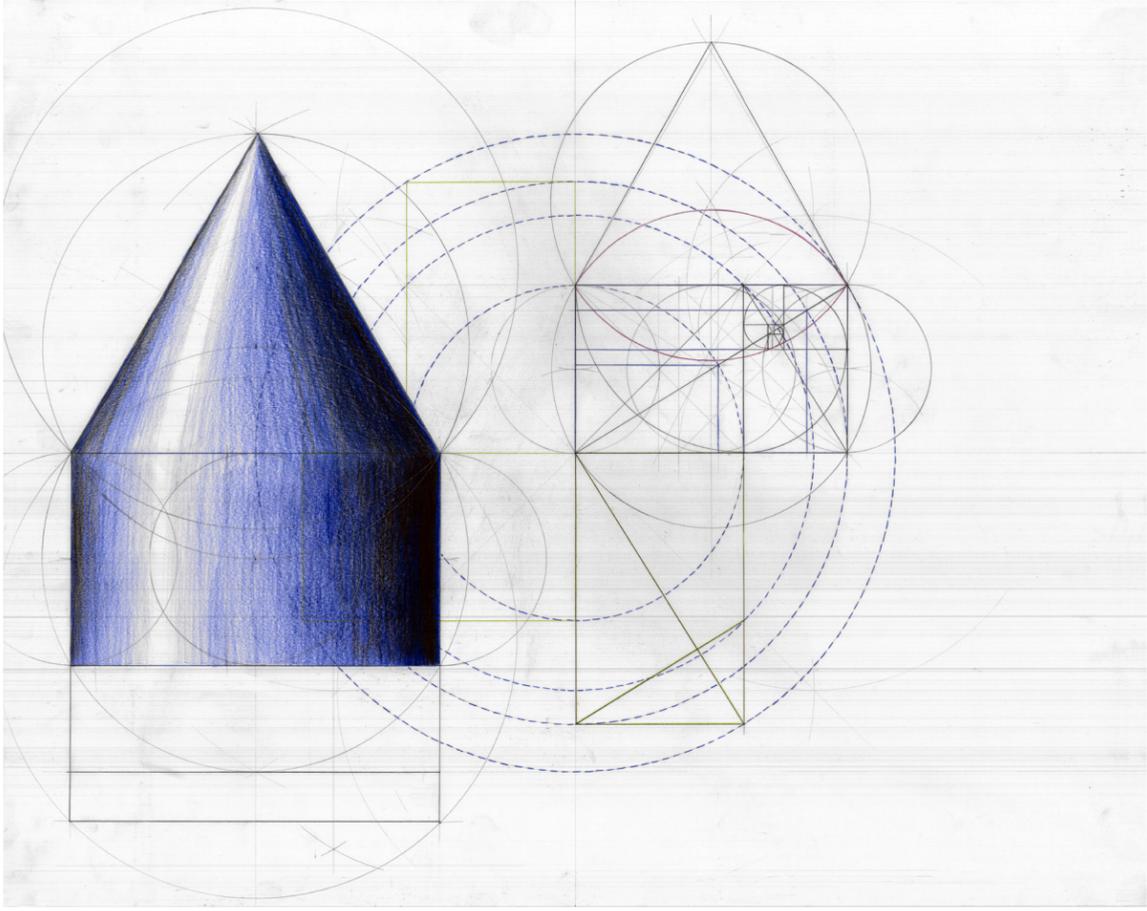


Figure 17

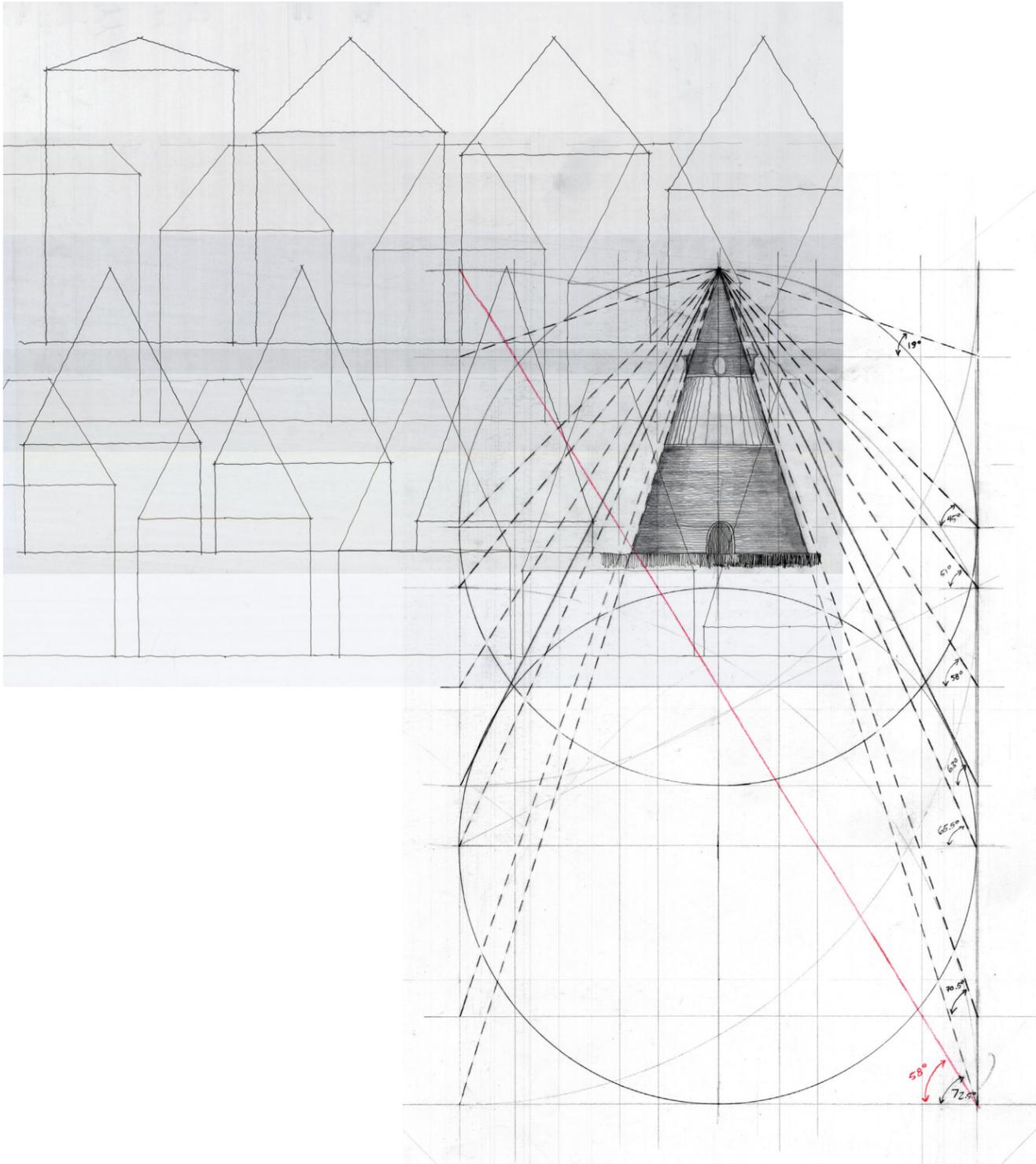


Figure 18

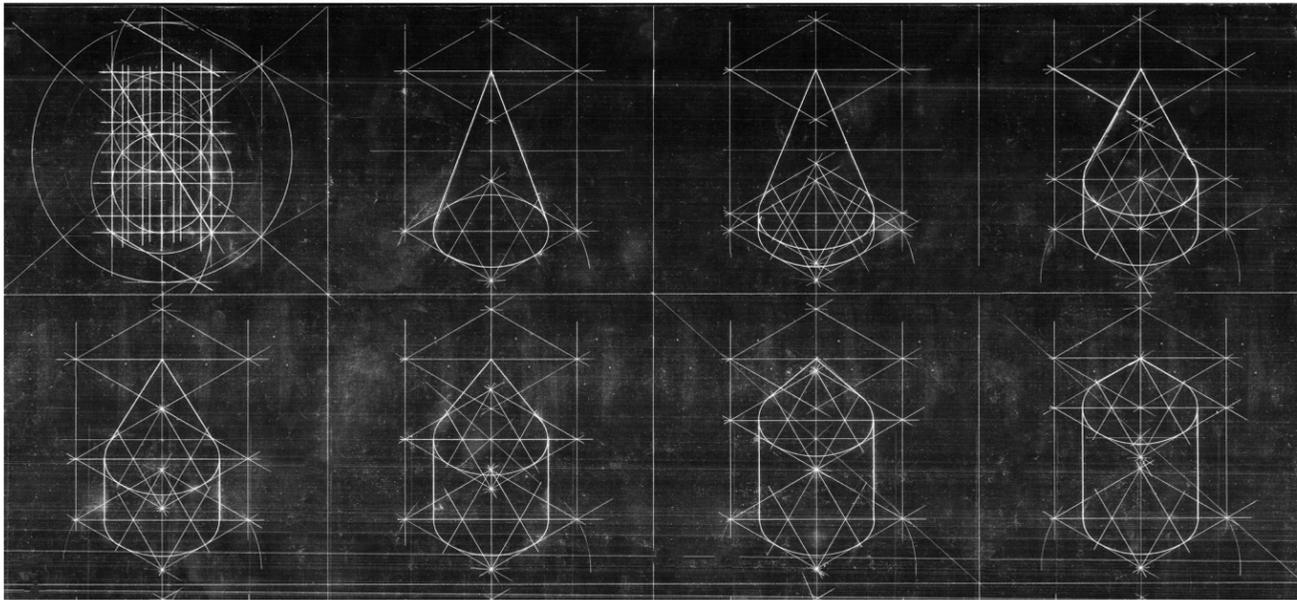


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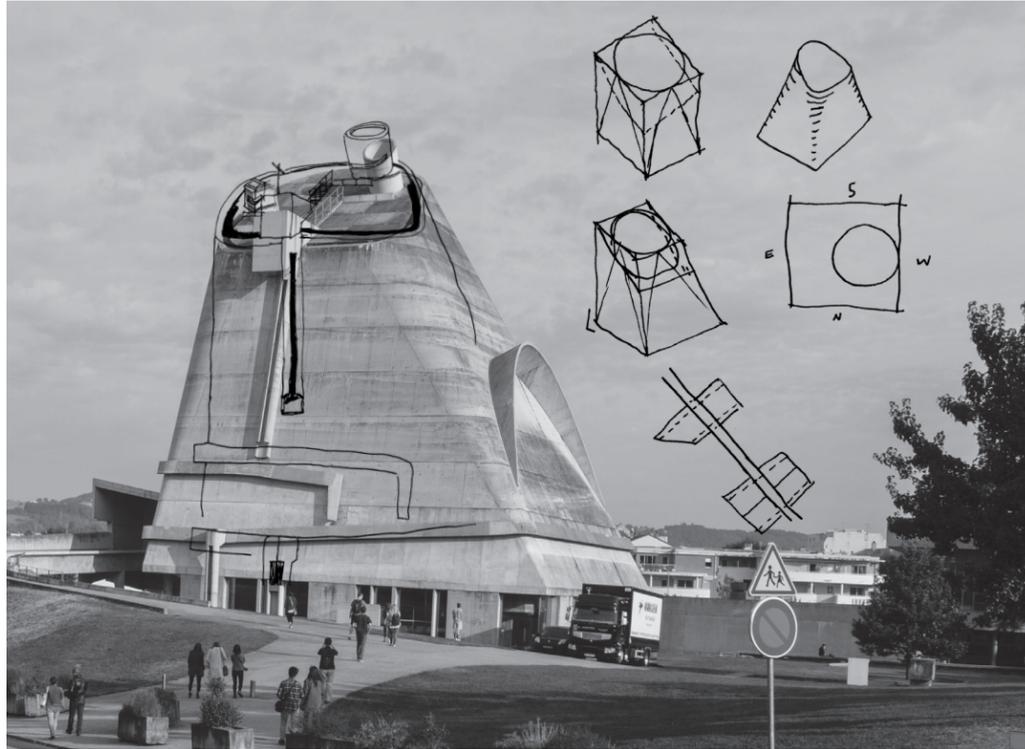


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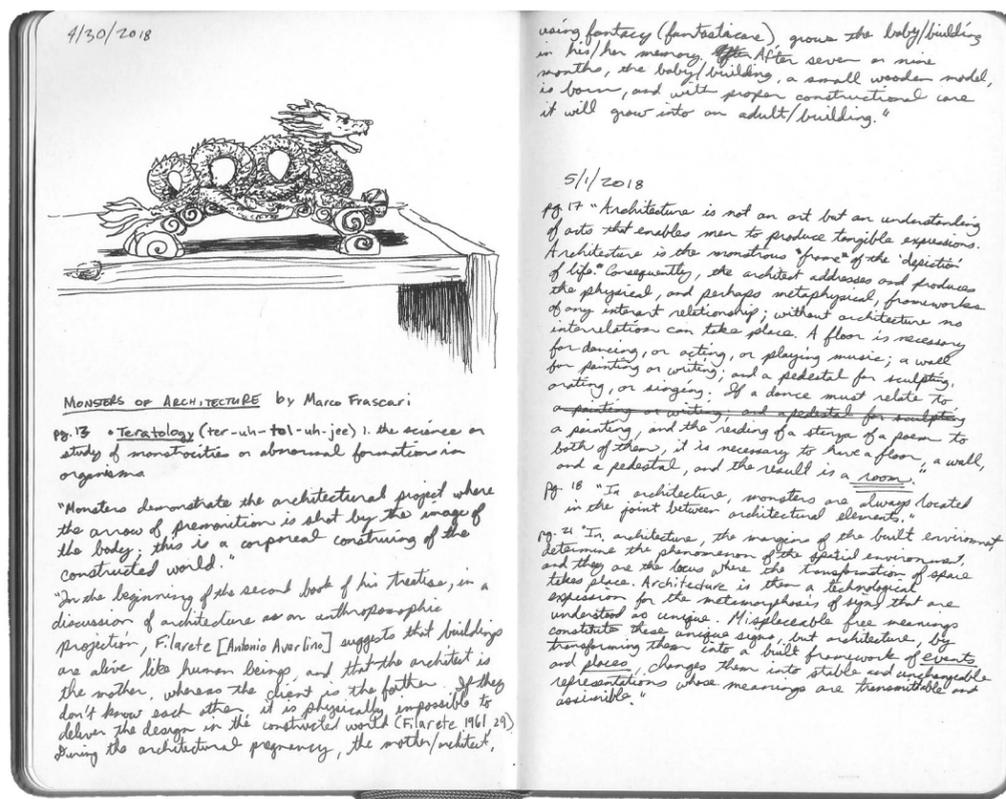


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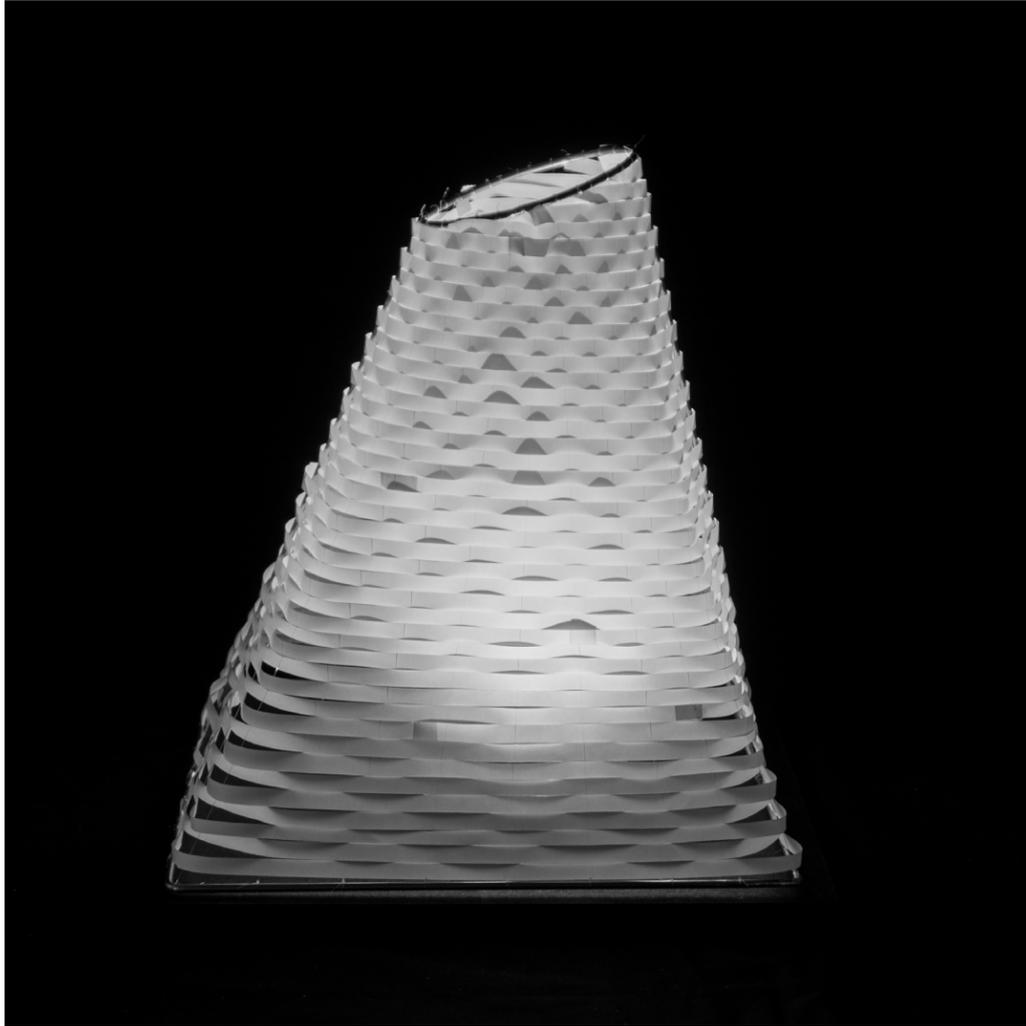


Figure 22



Figure 23

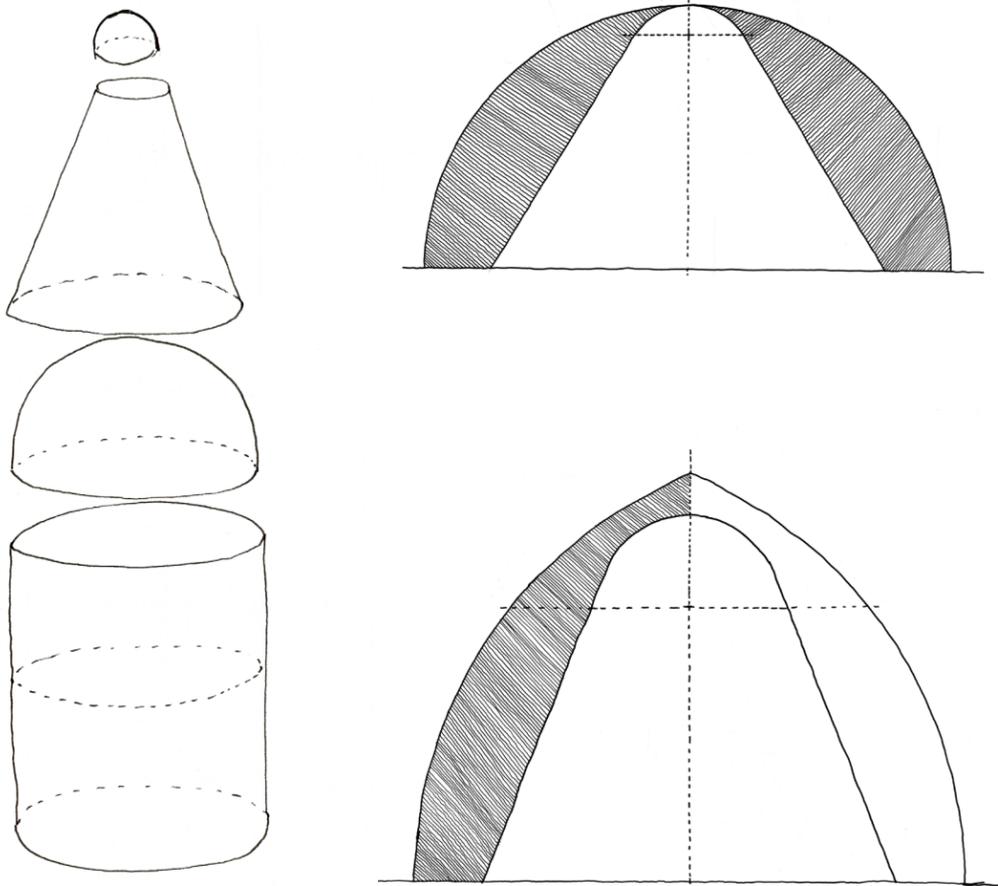


Figure 24



Figure 25

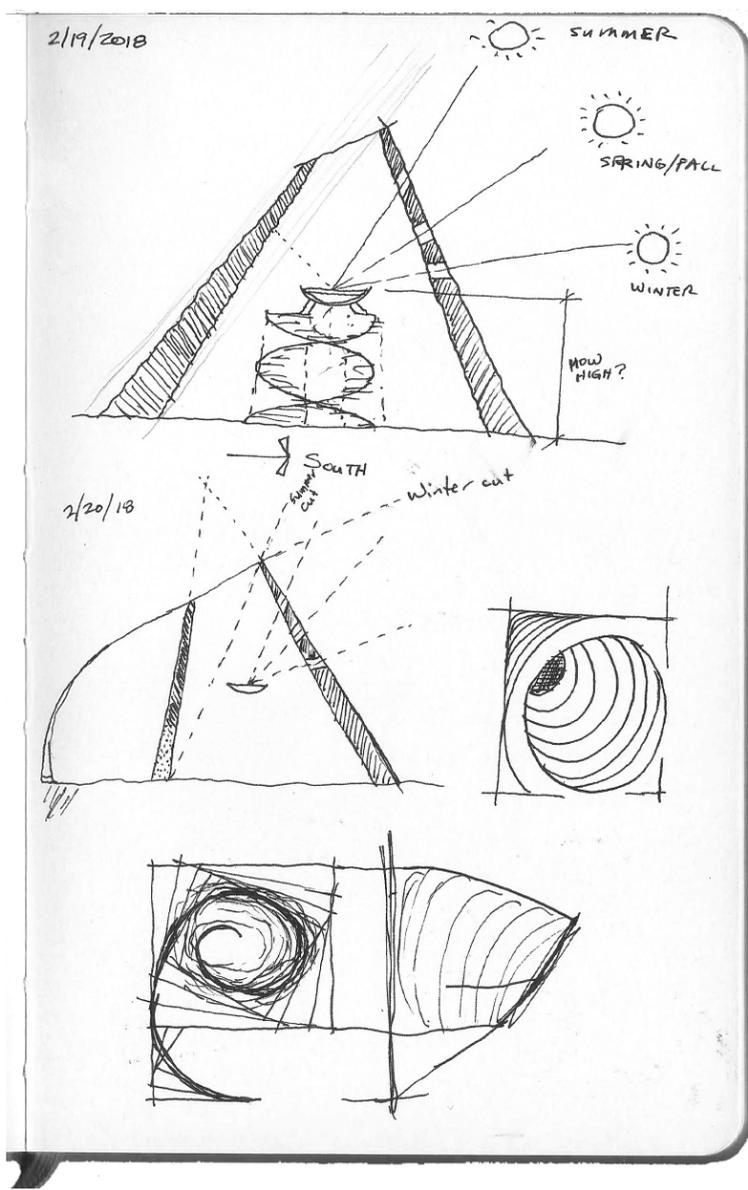


Figure 26

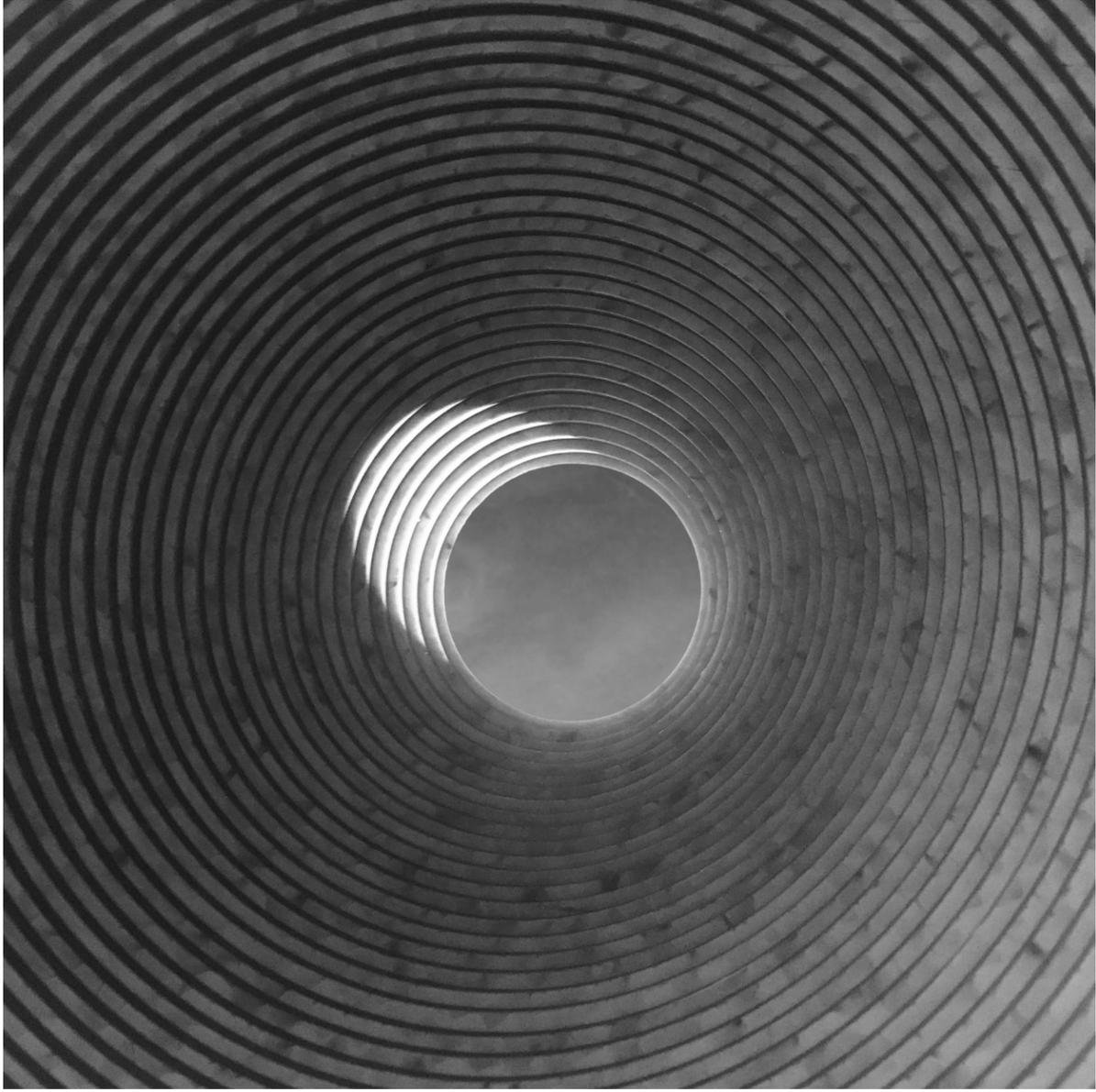


Figure 27

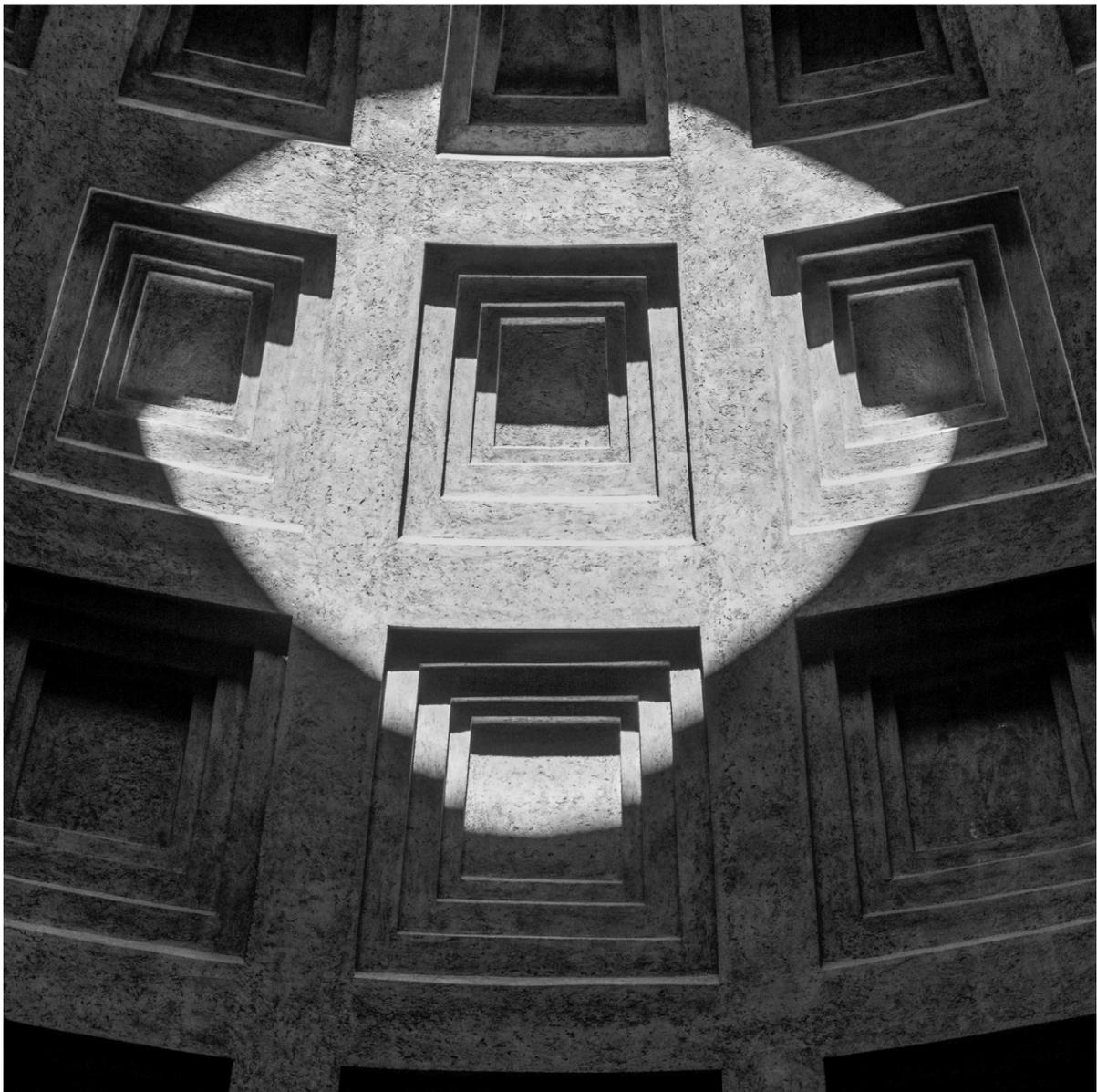


Figure 28

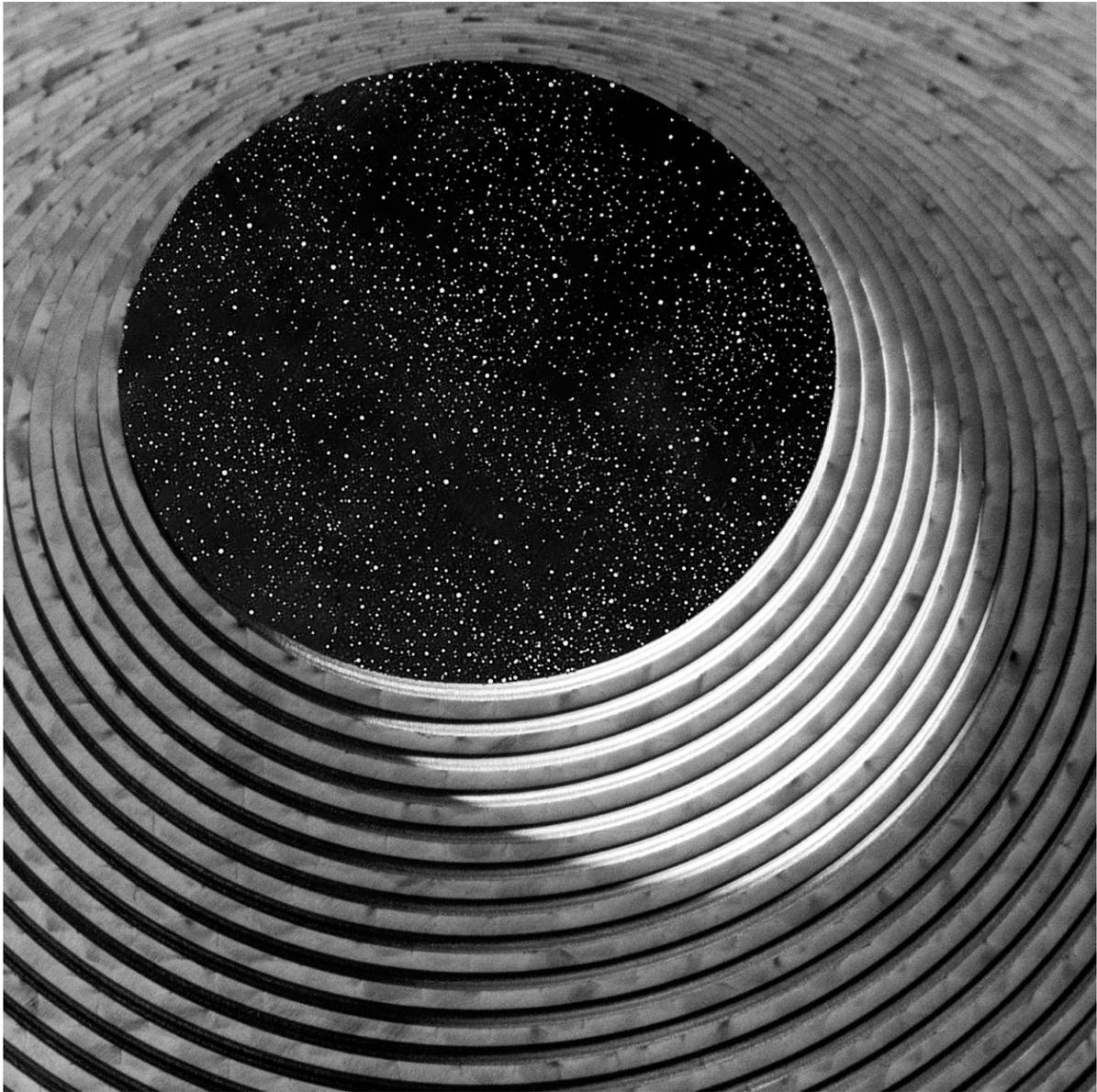


Figure 29



Figure 30

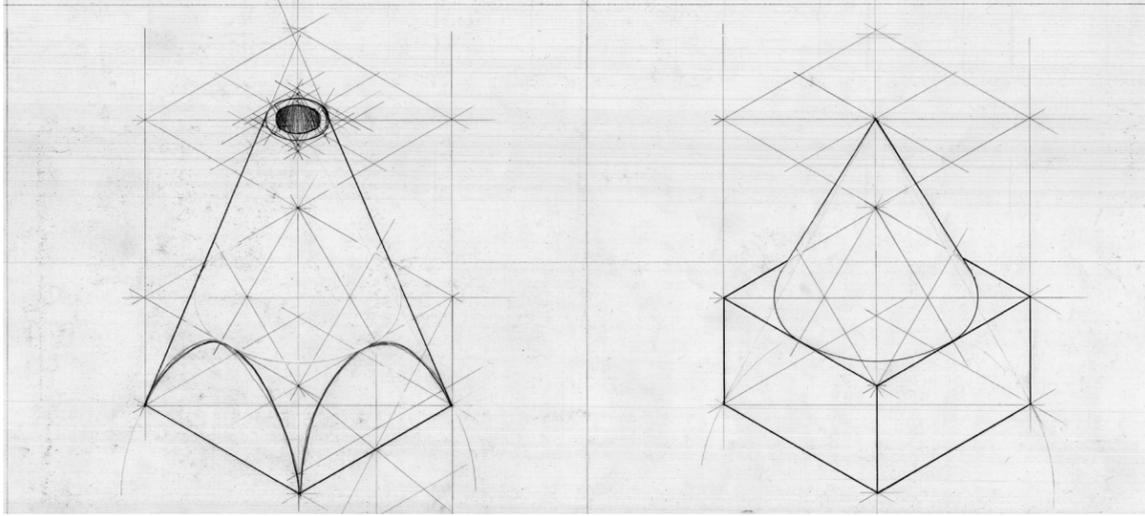


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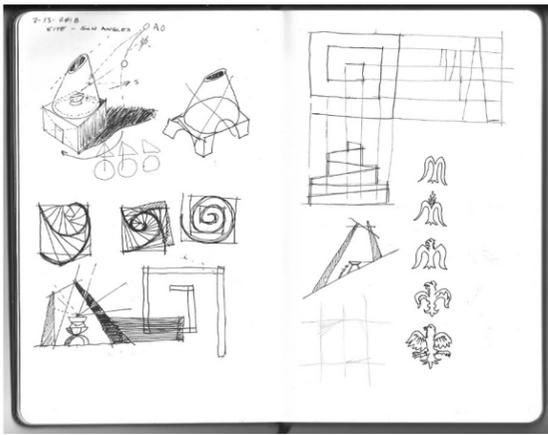


Figure 32



Figure 33

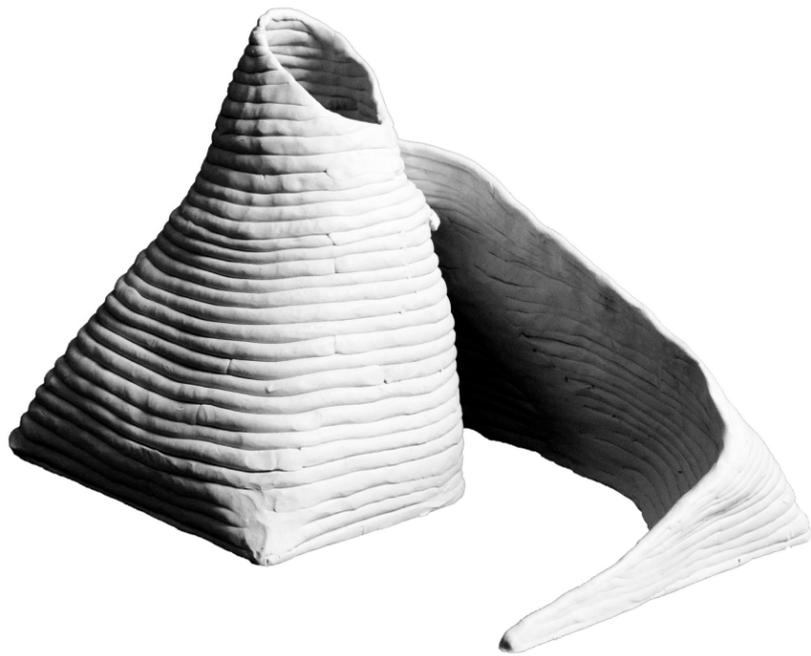


Figure 34

How does a square (or rectangle) transform into a cone

Oculus angle

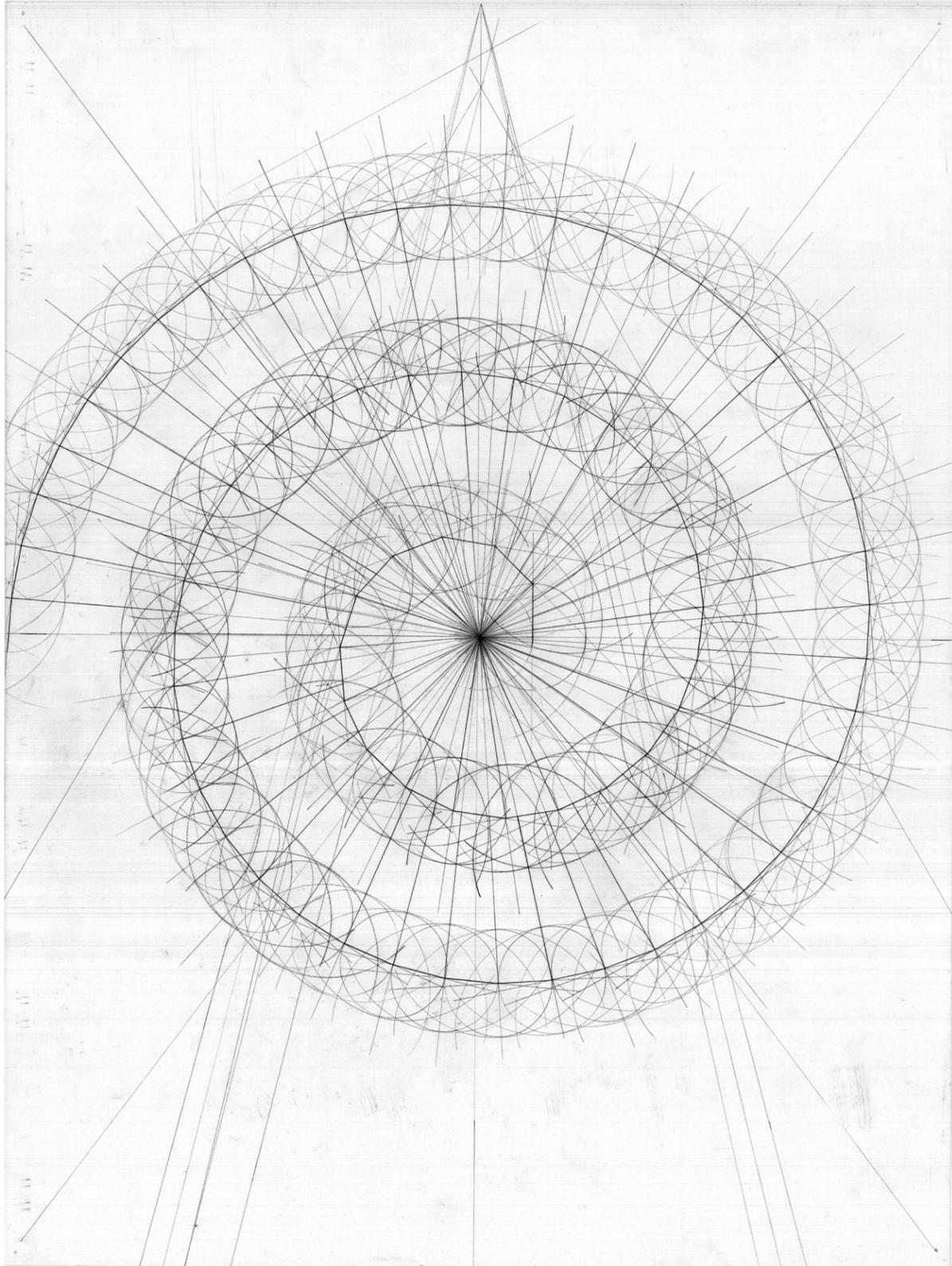


Figure 35

A study of constructed spirals. This demonstration of the square root spiral is drawn to demonstrate that the spiral does not close on itself to approximate a circle.

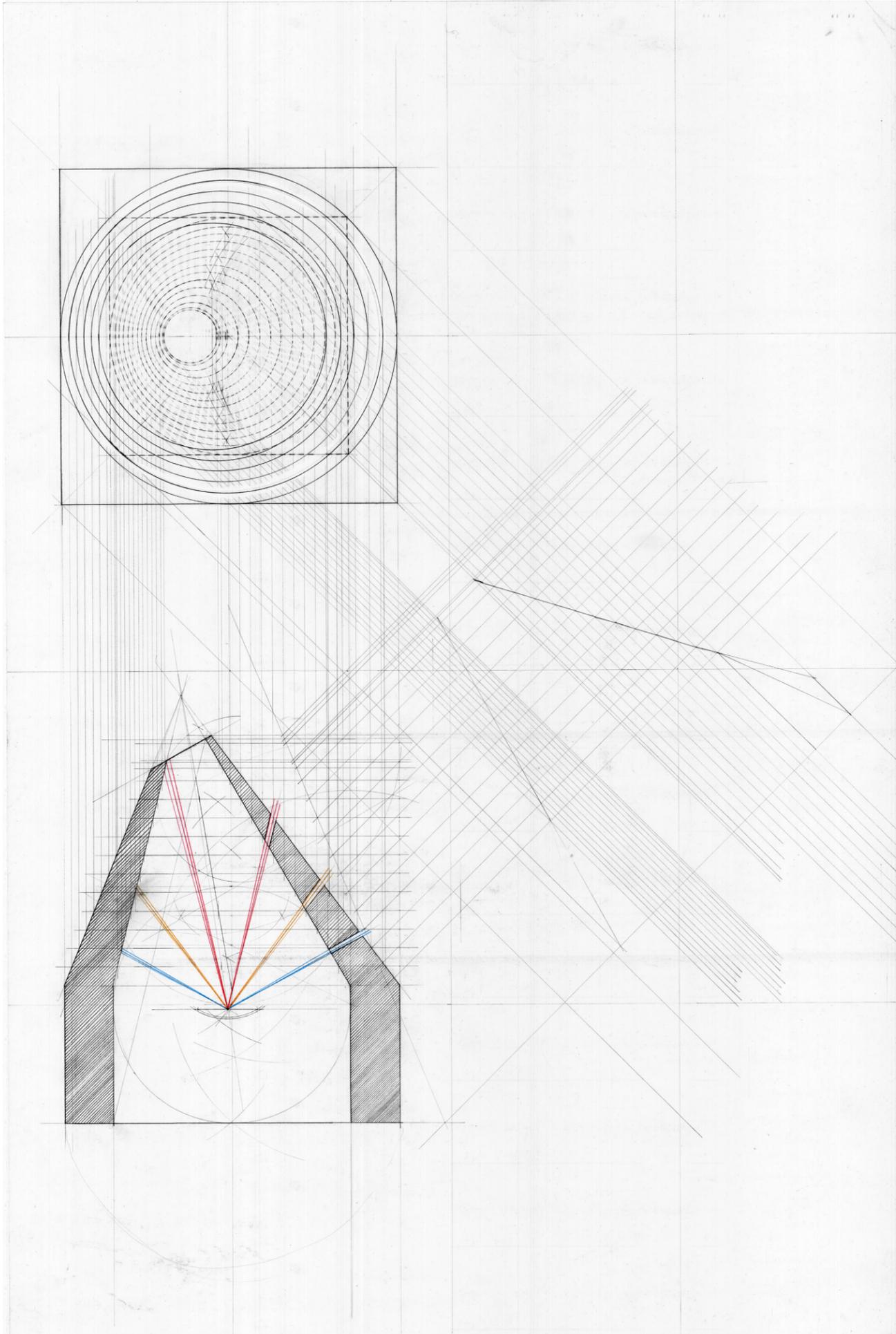


Figure 36

Skew Angle and Oculus Cut Defined by Sun Angles

Sunlight through the oculus only reaches floor at solar noon on the summer solstice. Throughout each day of the rest of the year the sun beam sweeps across the northern interior conical surface. The red, yellow, and blue lines represent sun angles at solar noon on the summer solstice, spring/fall equinoxes, and winter solstice at solar noon, respectively, that pass through the apertures on the southern wall of the cone and reflect off the pool of water in a transparent bowl (elevated within the volume to the height shown). This drawing also is the constructed to rectify the base of the cone as a square. The skewed cone is constructed of horizontal circular sections. This drawing attempts to transform the cone into a rectified base at a uniform height.

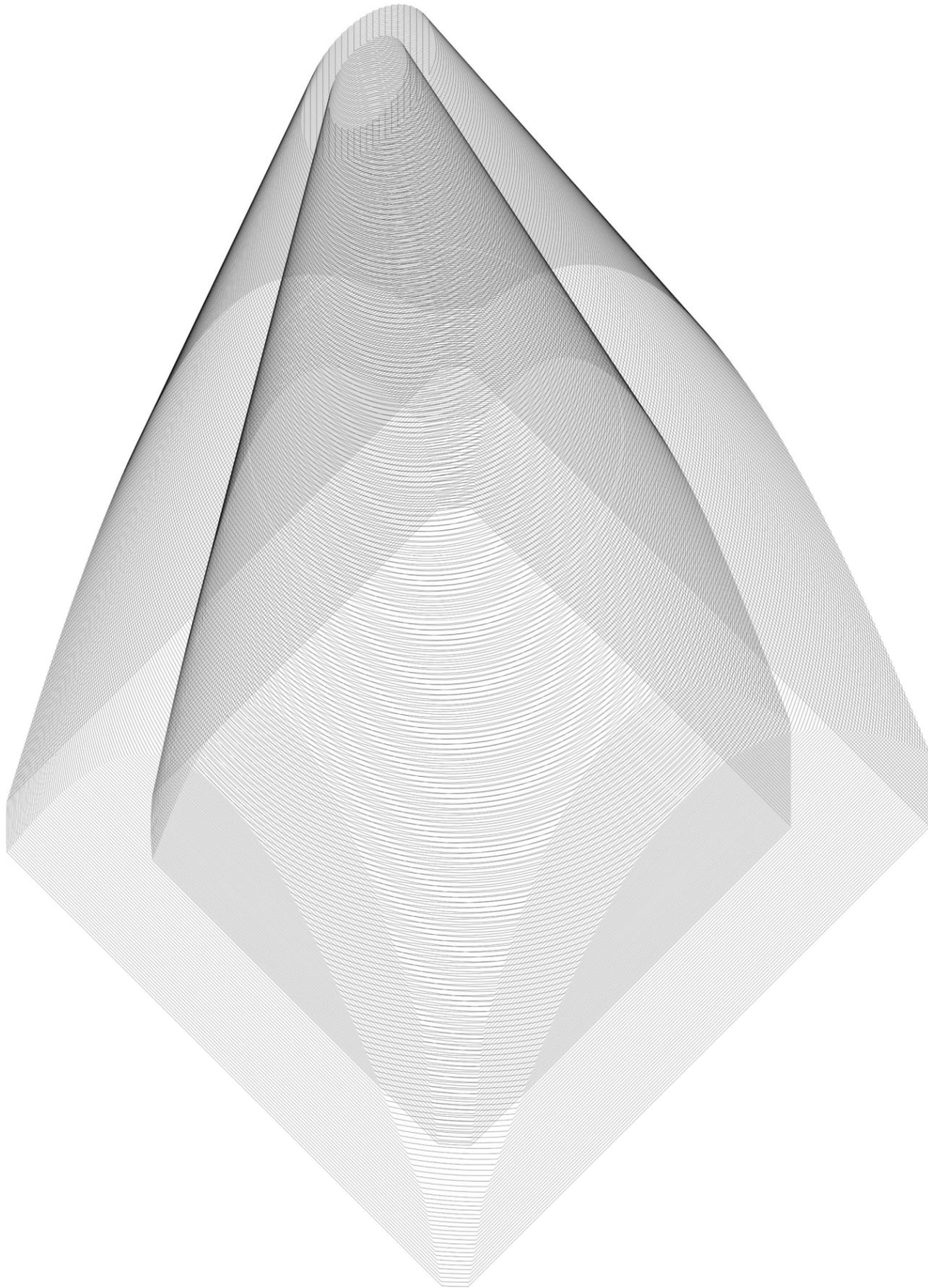


Figure 37

This second attempt at the skewed cone with an angled oculus uses the same defining geometry, but attempts to resolve the intersecting geometry between the rectified base and the conical top. The base is rotated forty-five degrees to place the corners on the cardinal points (rather than the four faces). This computer aided drawing is used to make a study model used to optically demonstrate the light cast through the oculus on the northern corner of the interior.

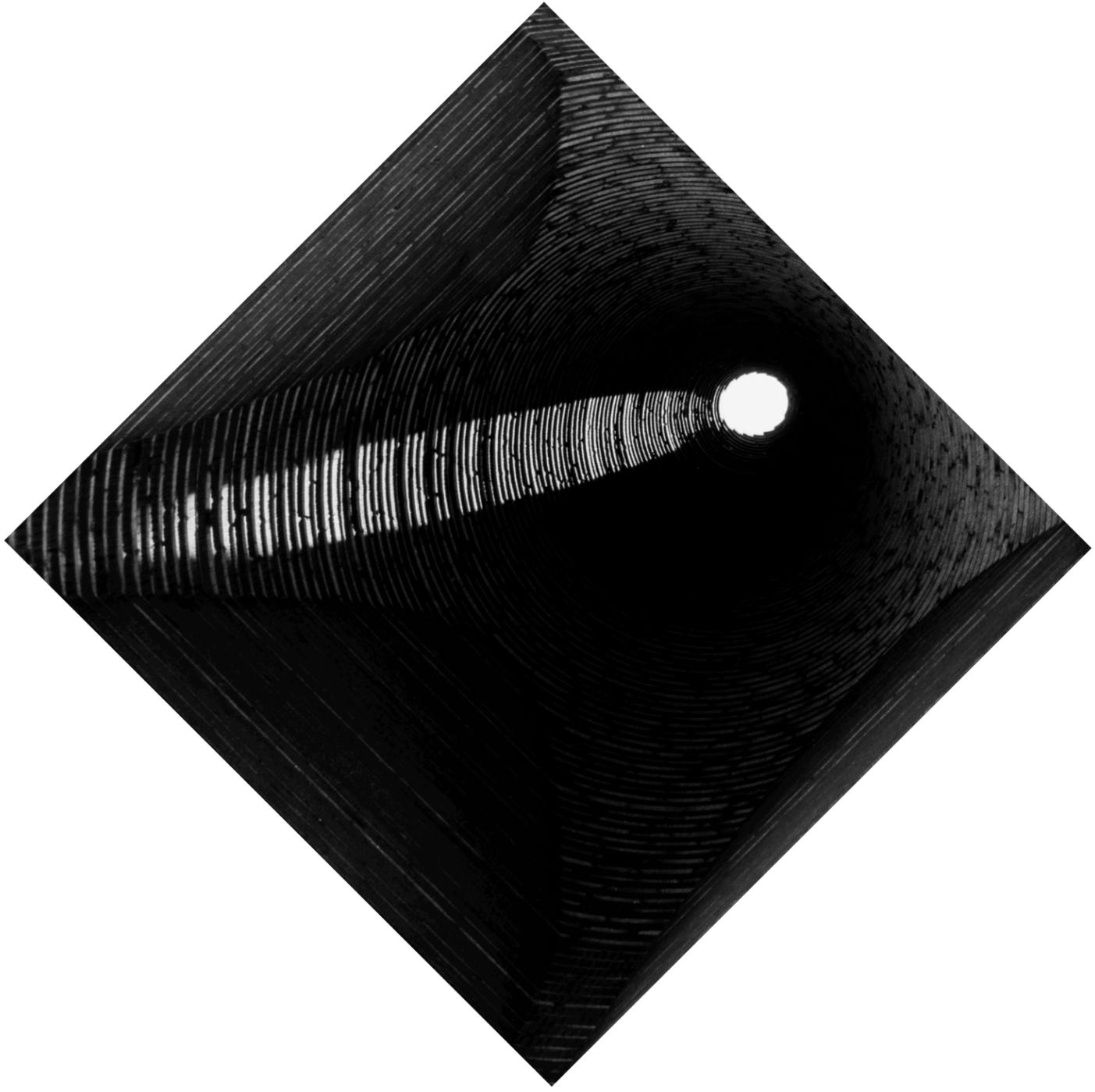


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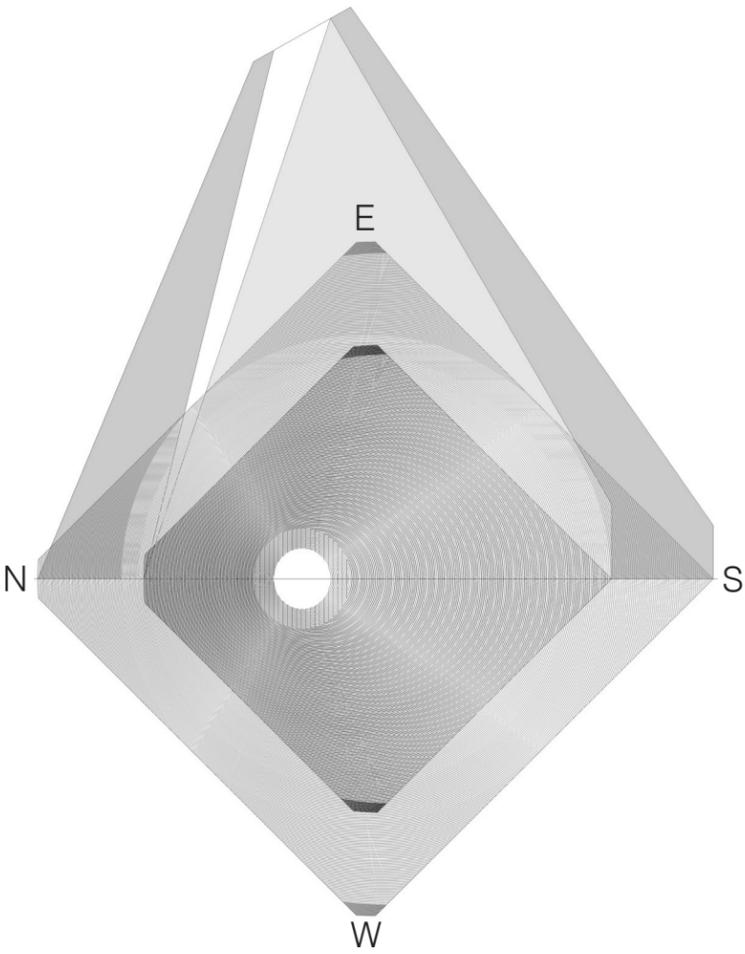


Figure 39

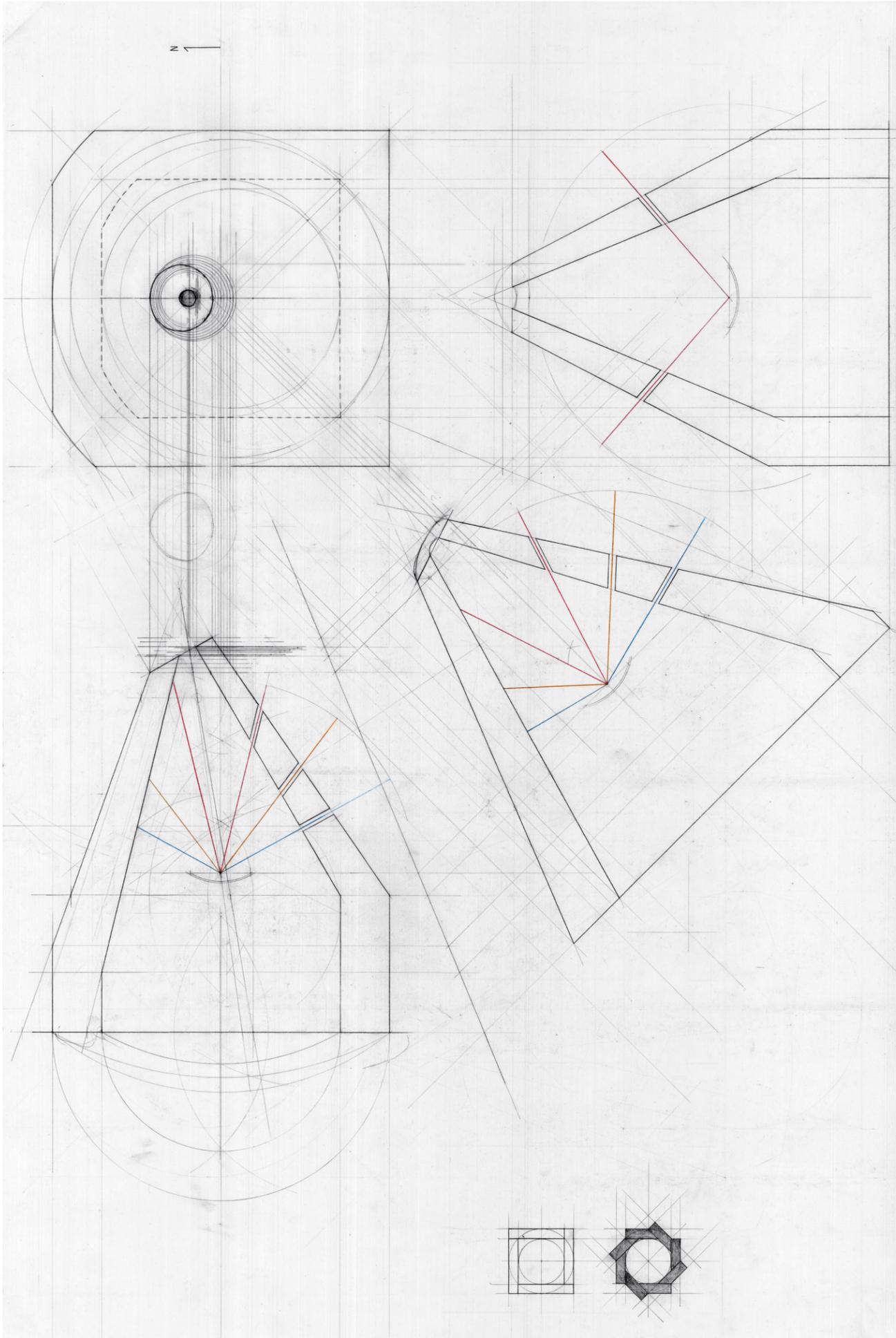


Figure 40

This drawing uses descriptive geometry to resolve issues discovered in the first two drawings. These changes include an accurate collocation of the centers of the describing inner and outer circles of the cone along the same axis and a more accurate description of the oculus. This cone is oriented with the faces to the cardinal positions and two additional sections are drawn to verify the geometry. Geometry of the apertures is also described in the lower margin.

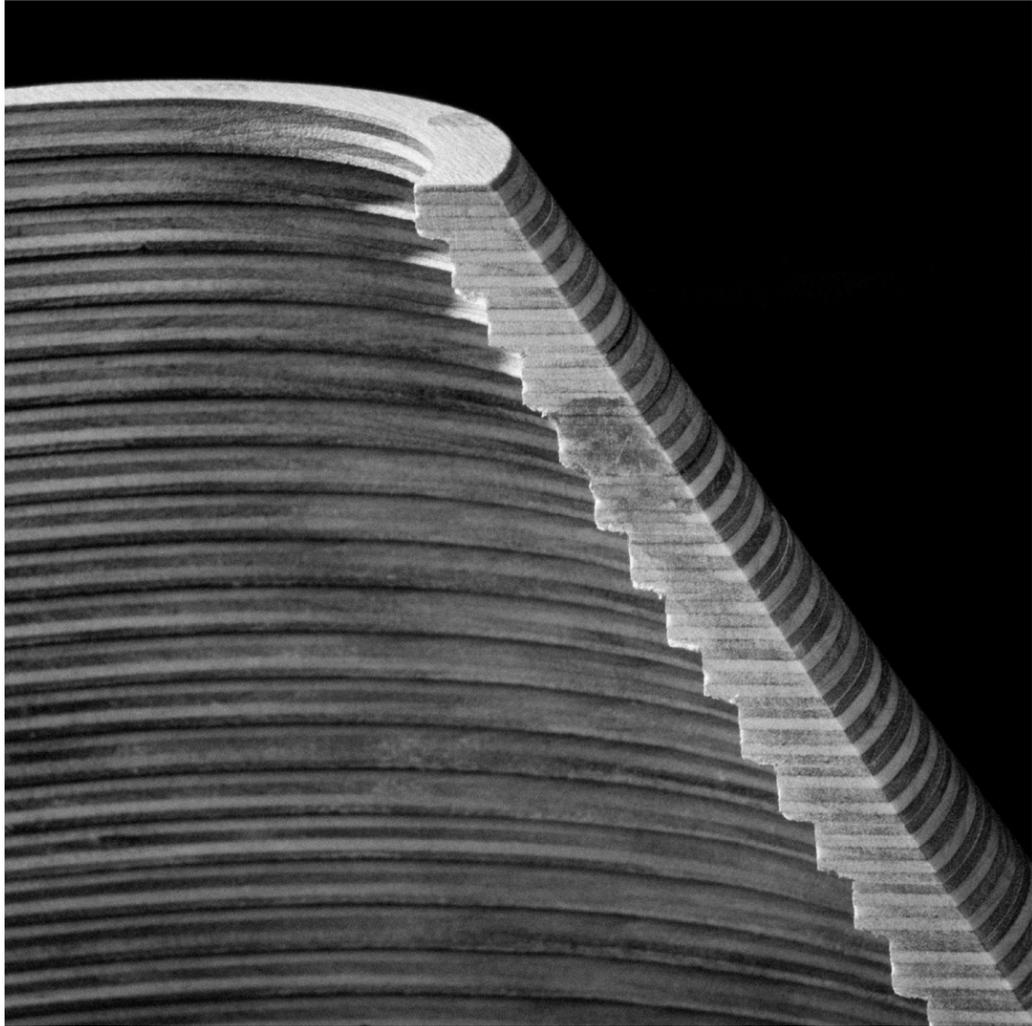


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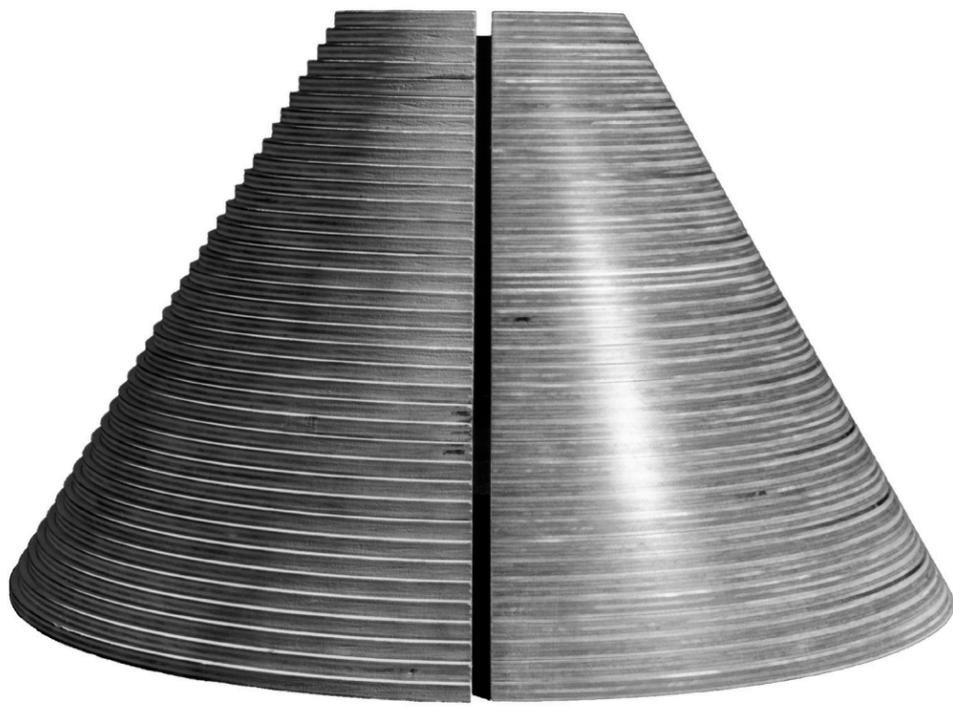


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All photographs, objects and drawings are original works of the author.

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