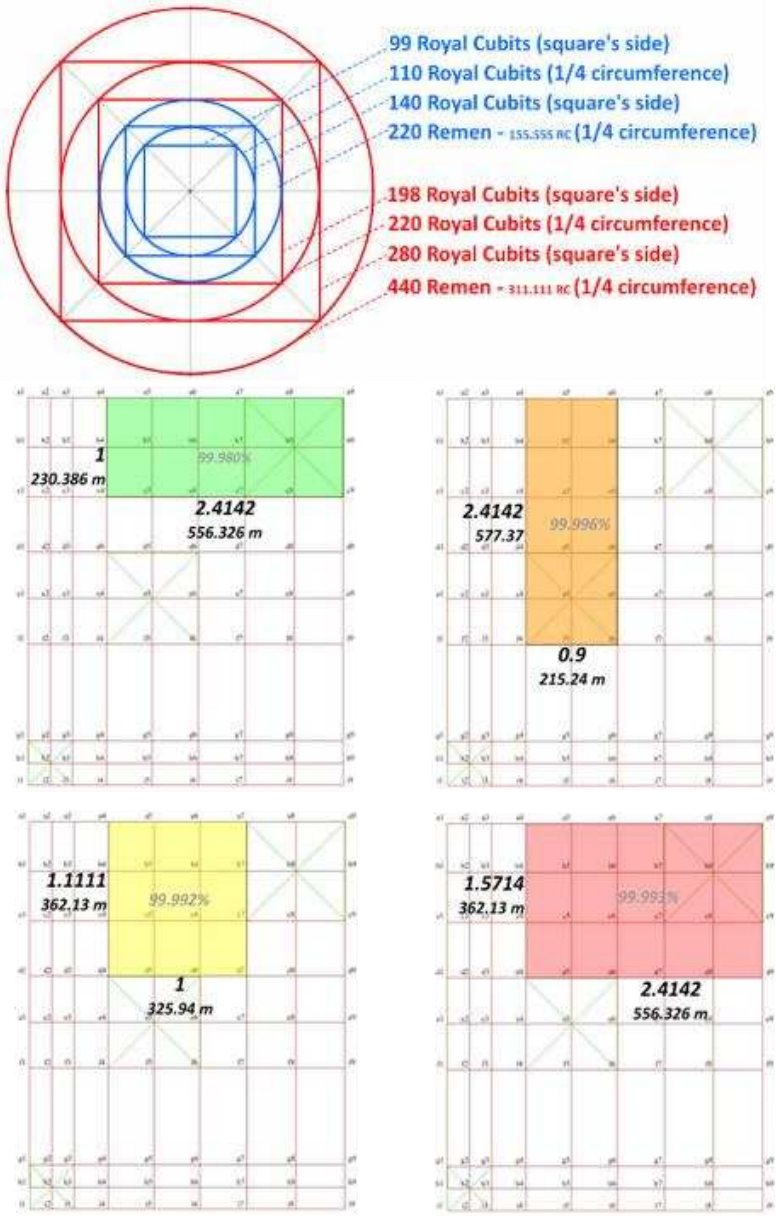


The ACST and the Giza Grid

CIRCLE AND SQUARE BETWEEN KHUFU AND KHAFRE, BASED UPON GLEN DASH'S MAPPING OF GPMP COORDINATES

Carl Balowski | November, 2024

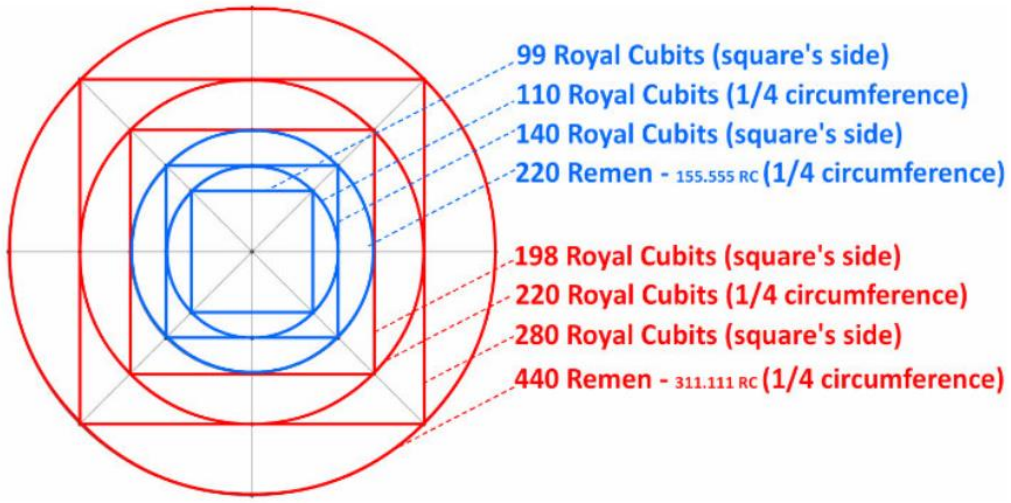
Introduction

In revisiting my earlier paper, *The Giza Grid*, which was grounded in Glen Dash's 2015 survey of the Great Pyramid and his integration of Petrie's 1881 coordinates for Khafre's and Menkaure's pyramids into the GPMP Grid, I re-evaluated the data through the lens of my new Approximated Circle-Square Template (ACST) hypothesis. Last year, I had identified a Silver Ratio proportion, which I now recognize as aligning closely with the ACST's emphasis on Silver Ratio principles, warranting a deeper investigation. This reassessment has uncovered additional proportions that align precisely with the ACST's dimensions. Below, I outline each of these findings.

All measurements fall within the margin of error specified in Dash's pivotal study, "Where, Precisely, are the Three Pyramids of Giza?" My "Giza Grid" is an 81-point grid derived from Dash's data, structured to detect any significant, underlying mathematical proportions on the plateau.

ACST Overview

The Approximated Circle-Square Template (ACST) offers a pragmatic solution for approximating the relationship between the circle and square, allowing ancient designers to incorporate cosmic and mathematical axioms into their architectural designs. Central to the ACST is the natural accord by which the arc of a circle, when placed over a square, segments the square's own diagonal into the Silver Ratio, or $(\sqrt{2} + 1):1$, approximated as 2.414:1, ad infinitum. This inherent relationship provides a harmonious bridge between circular and square forms, establishing a proportional foundation for complex architectural layouts.



The ACST explores these geometric relationships, particularly in how ancient structures reflect the circle-square relationship without requiring exact calculations of irrational numbers like $\sqrt{2}$ or π. Through the ACST, specific practical ratios naturally emerge, revealing inherent proportional relationships. For example, the silver ratio 198 : 82 corresponds to $(\sqrt{2} + 1) : 1$, or 2.414 : 1, elegantly uniting square and circular forms. Similarly, 220 : 140 simplifies to 11 : 7, or 1.5714 : 1, which matches $\pi/2$ and incorporates circular references within linear design. Additionally, 220 : 198 equates to 10 : 9, or 1.1111 : 1, reflecting the linear relationship of a square circumscribed by a circle, while 14 : 11, or 1.2727 : 1, corresponds to a circle circumscribed by a square. These nesting relationships extend 'ad infinitum', creating a continuous interplay of proportions.

The ACST's inherently segmented proportions allowed ancient designers to use a diverse palette grounded solely in the relationship between circle and square, achieved through precise yet pragmatic approximations. By doubling and halving these ratios, designers could adapt and scale their designs with coherence. For instance, the ratio 280 : 220 or, $(70 \times 4) : 220$, aligns with the 'seked', or slope, of the Great Pyramid, while $220 : (99 \times 2)$ directly relates to the pyramid's half-diagonal to height ratio. Additionally, $(70 \times 4) : (99 \times 2)$ matches the pyramid's height to the height of the King's Chamber floor below the apex, while 880 Remen—the lateral distance between the western bases of Khufu's and Khafre's pyramids—underscores how these ratios could unify large-scale layouts. Through the ACST, ancient builders achieved an axiomatic harmony in their monumental designs, incorporating the precise, adaptable relationship between circle and square.

Figure 1: By assigning the base of Khufu's pyramid a value of 1 (equal to 230.386 meters), the distance measured westward from the eastern base at point A9 to point A4 marks Khufu's western boundary. This span, 556.326 meters, represents the Silver Ratio of 2.4142 with 99.98% accuracy relative to Khufu's base, and can corresponds to a ratio of 198 : 82 in ACST terms.

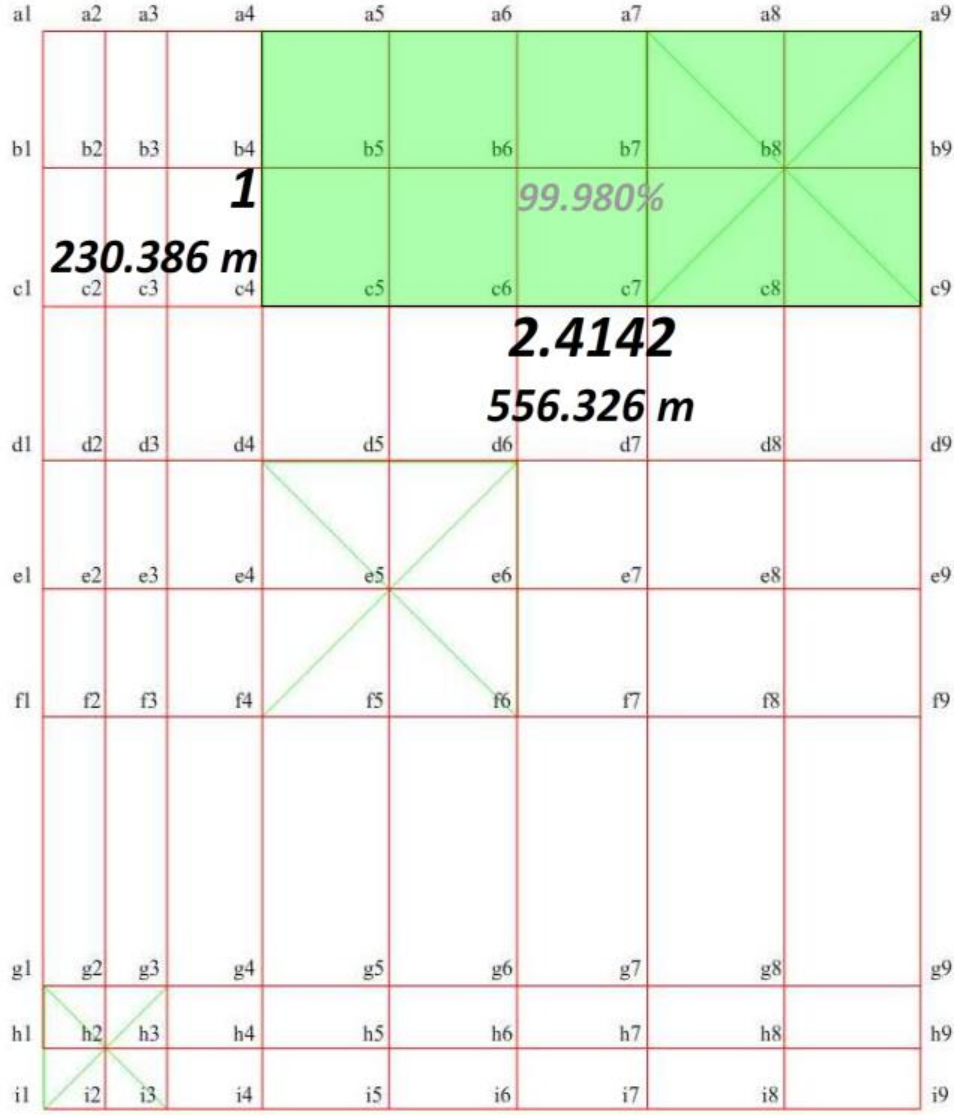


Figure 1

Figure 2: Moving southward from point A4 to D4, while maintaining the Silver Ratio measurement of 556.326 as 2.4142, accurately marks Khufu's northwest corner. This shift expands the original 2.4142 : 1 rectangle to a 2.4142 : 1.5714 rectangle, where 1.5714 (or 362.13 meters) represents π/2 in ACST terms. In ACST notation, this forms a (√2 + 1) / (π/2) rectangle, which can be expressed as (198/82) / (110/70).

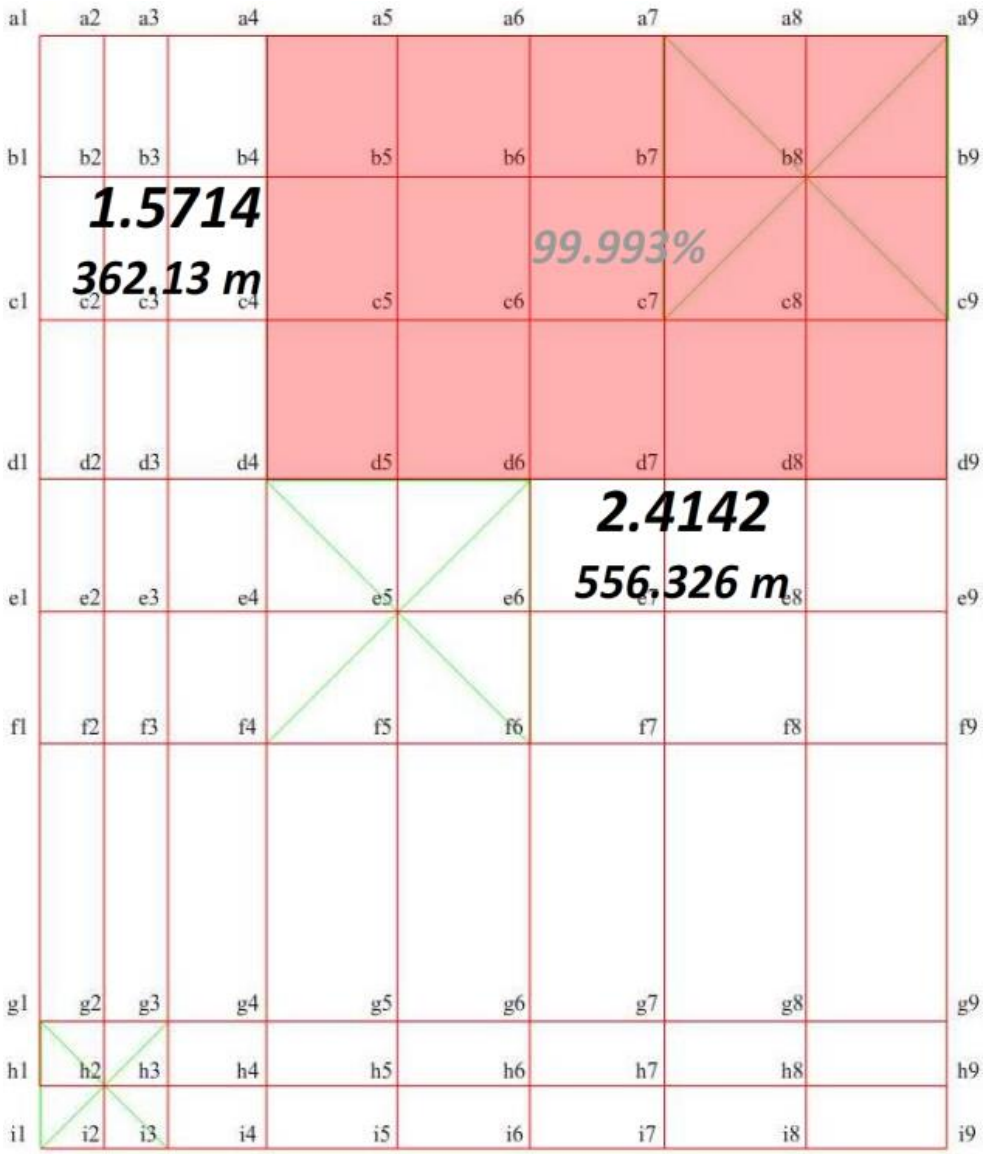


Figure 2

Figure 3: Using the 362.13-meter measure, the shared northwest space between Khufu's and Khafre's pyramids defines a 1.1111 : 1 rectangle. Here, the 362.13-meter distance between Khufu's and Khafre's northern faces represents 1.1111, and the distance from Khufu's to Khafre's western faces represents 1, or in ACST terms a ratio of 110 : 99.

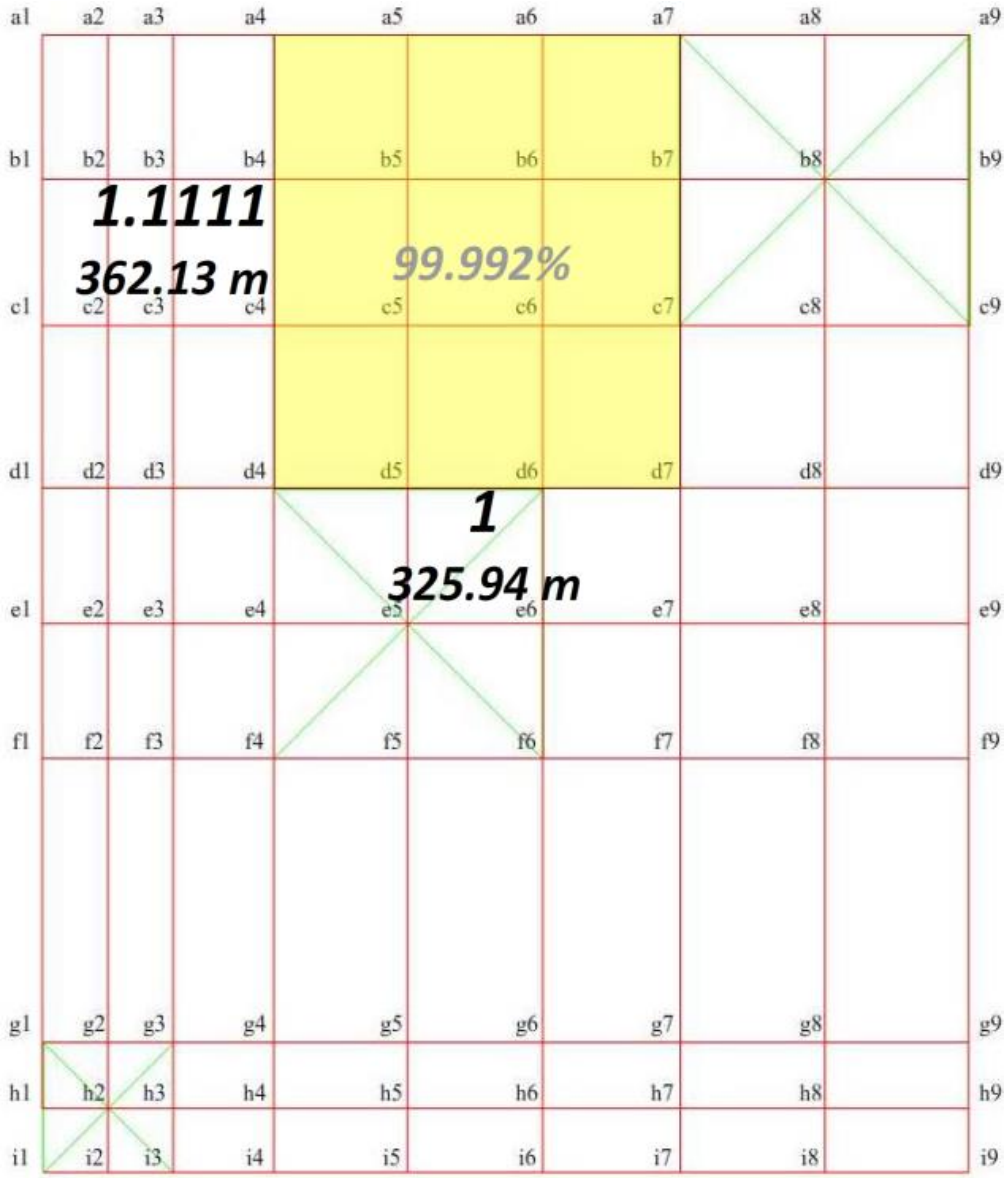


Figure 3

Figure 4: If the total span from Khafre's southern base to Khufu's northern base is taken as 2.4142, then Khafre's base neatly correlates with 0.9, or 169 : 63 in ACST terms.

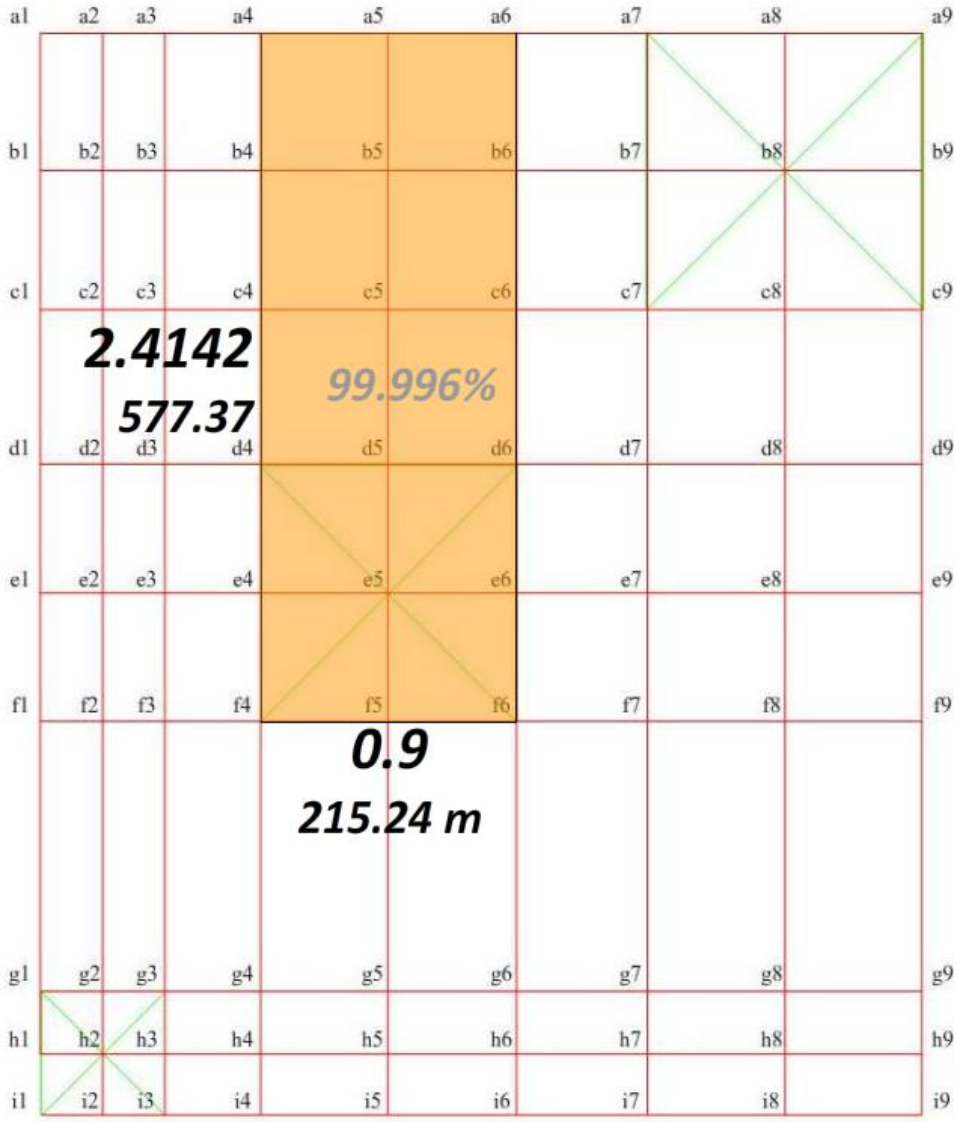


Figure 4

In summary, by using Dash's coordinates within his stated margins of error, the layout, positioning, and dimensions of Khufu's and Khafre's pyramids display a striking alignment with the proportions defined by the ACST, warranting further investigation into their potential deliberate incorporation in the design and arrangement on the Giza Plateau.