DOI: 10.38027/ICCAUA2023EN0024

Chapter 9

Analysing the Divine Proportion or the Golden Ratio on the Plan and Façade of the Churches in the Walled City of Famagusta, North Cyprus

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Introduction

Religion had an important role in the culture and lives of the people during the Middle Ages. In Christian communities, churches are God's house and the symbol of earthly heaven. As God creates the world and human beings with proportions, the churches should have proportions too. It is a question to the author if the plan and Façade of the churches have the divine proportion or not. There is a research gap in the analysis of the proportions of the churches in the Walled City of Famagusta. This research aims to find out if the proportions of the aforementioned churches are built according to the divine proportion. The methodology of this historical research is qualitative, quantitative, and comparative. The data collection techniques are based on a literature review and personal observation of the author. The result of this research is expected to bring new perspectives for understanding the proportions of the churches for architects, historical researchers, and conservationists.

At first, the plan of the churches had two general forms; centralised plan, and rectangular forms, which were originally basilicas. Romanesque churches were built with the Latin cross or cruciform, symbolising the cross of Jesus Christ. He is the perfect man of God and the church is the house of God, therefore, the plan of the church should have the divine proportion. The Gothic period was an "age of vision", and the Gothic cathedral was described as an "illusionistic image" of the "Celestial City". The church is, "mystically and liturgically, an image of heaven", and it is the "house of God and the gate of Heaven" and the cathedral is the "symbol of the kingdom of God on earth gazed down upon the city" (Von Simson & von Simson, 1988, pp. xviii, xix, xx, xxi, 8). "A cathedral was the bishop's church, hence the city's church; and what the art of cathedrals meant first of all, in Europe, was the rebirth of the cities". "The inside arrangement of the cathedral differed from that of the monastic basilica; the cathedral space acquired greater unity within" (Duby, 1983, pp. 93, 284).

Churches are classified by "Mustafa Uysun" into five groups according to their plans in his books about the Churches of Cappadocia (2014; 2017): a) single-naved churches, b) double-naved (twin-naved) churches, c) three-aisled (basilica) churches, d) free-cross (cruciform) churches, d) cross-in-square churches. Single-naved churches consisted of a nave and a large apse where the main space was a simple rectangular chamber. This type was used particularly for churches and the simple rectangular plan was mainly used for chapels. Most of these churches have an East-West axis with an apse at the East end and the ceiling was generally in the form of barrel vaults along the main axis. Access to these types of churches is usually through a single door in the West wall, and most either have no separate narthex or only a small veranda with room for one or two people. The apse is generally higher than the nave and features a screen. Double-naved churches were used throughout the Byzantine Empire for centuries. The naves are separated from each other by one or more simple openings or by arcades of pillars and arches. Most have barrel vaults extending East to West and, there are apses at the end of both naves. The cruciform plan churches were built on sacred sites or over the relics of martyrs and for martyrions in the capital and other parts of the Byzantine Empire. Cross-in-square churches were typical of Medieval Byzantine architecture which gradually spread throughout the empire to become the standard church plan of the Middle Ages. Four columns support the dome over the central square area, and there are vaults on four sides of the dome that form the cross-plan roof. The

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How to Cite This Chapter:
Babazadeh-Asbagh, N. (2023). Analysing the Divine Proportion or the Golden Ratio on the Plan and Façade of the Churches in the Walled City of Famagusta, North Cyprus. In H. A. Nia & R. Rahbarianyazd (Eds.), *Convergence of Contemporary Thought in Architecture, Urbanism, and Heritage Studies*, (pp. 112-134) Cinius Yayınları. https://doi.org/10.38027/ICCAUA2023EN0024

areas between the arms of the cross are covered by a cross vault or small domes. The four columns define the central space that is dominated by the dome (Uysun, 2014, pp. 53-54; Uysun, 2017, pp. 18-19).

The proportions of the human body are believed to be divine as man is the image of God and man is the measure of everything (Steadman, 1979, p. 17). St Augustine in his book, "*City of God*", mentioned that the dimensions of the ark of Noah represented the human body proportions. The length of the human body, from the crown of the head to the sole of the foot, is six times its breadth from side to side, and ten times its depth or thickness, measuring from back to front. If you measure a man as he lies on his back or his face, he is six times as long from head to foot as he is broad from side to side and ten times as long as he is high from the ground. Therefore, the ark was made 300 cubits in length, 50 in breadth, and 30 in height (Schaff, 1890, pp. 439-440).

"Marcus Vitruvius Pollio" in the first Century B.C. developed the Golden Ratio with the human body proportions for the first time. In his "*Ten Books on Architecture*", he provided a list of proportions of the face and human body. He defined proportion as "a correspondence among the measures of the members of an entire work, and of the whole to a certain part as standard." In his proportions, the standard is either the height of a man or the height of his face. He believed that the ancients used the proportions of 1:3 (0.3333…), 1:4 (0.25), 1:6 (0.1666…), 1:8 (0.125), and 1:10 (0.1) as being proportions appropriate to man (Akhtaruzzaman & Shafie, 2011, p. 17).

Defining Golden Ratio

The Golden Ratio is found abundantly in nature and wondrously in the anatomy of the human body. It has been used for centuries in the construction of architectural masterpieces and by great artists, who, being able to see its beauty used it in their designs and compositions (Cole, 2010, p. 1). "Golden Ratio" is also called "Medial Section", "Golden Section", "Golden Number", "Golden Mean", "Divine Section", "Divine Proportion", and "Golden Proportion". It arises from dividing a line segment so that the ratio of the whole segment to the larger piece is equal to the ratio of the larger piece to the smaller piece. This was called "division in extreme and mean ratio" by "Euclid" which is commonly shown by the Greek letter "φ" which is 1.618033988749… (Markowsky, 1992, pp. 2-3).

A golden rectangle with a longer side "a" and shorter side "b", when placed adjacent to a square with sides of length "a", produces a similar golden rectangle with a longer side "a + b" and shorter side "a" (Figure 1. Left). For dividing a line segment by interior division, having a line segment "AB", construct a perpendicular "BC" at point "B", with "BC" half the length of "AB". Draw the hypotenuse "AC". Draw an arc with a centre "C" and radius "BC". This arc intersects the hypotenuse "AC" at point "D". Draw an arc with centre "A" and radius "AD". This arc intersects the original line segment "AB" at point "S". Point "S" divides the original segment "AB" into line segments "AS" and "SB" with length in the Golden Ratio (Figure 1. Middle).

"Phidias" (c. 490–430 B.C.), a Greek sculptor, used the Golden Ratio in the design of many of his sculptures for the "Parthenon" (Cole, 2010, p. 3). Later "Plato" (427–347 B.C.), a Greek philosopher, alluded to the proportional relationship in his work "Timaeus". It was in "*Euclid's Elements*" (c. 325–c. 265 B.C.) that the definition of the Golden Ratio was first written (Euclid & Joyce, 1996). "Euclid" explains that: "A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the less" (Figure 1. Right) (Livio, 2002).

The "extreme and mean ratio," as it was called, was not referred to as "golden" until the early 16th century A.D. In his book, "*La Divine Proportione*" ("The Divine Proportion"), "Luca Pacioli" wrote an in-depth study of the Golden Ratio (Cole, 2010, p. 3). On the other hand, "Markowsky" believes that the use of the term "Golden Section" or "Divine Proportion" for "φ" relatively happened in modern times, in the 19th century (Markowsky, 1992, p. 4). "Johannes Kepler" (1571–1630), the discoverer of the true elliptical nature of the orbits of the planets in the solar system, mentioned that: "Geometry has two great treasures: one is the Theorem of Pythagoras; the other, the division of a line into extreme and mean ratio. The first we may compare to a measure of gold; the second we may name a precious jewel".

In 1597, "Michael Maestlin" (30 September 1550–26 October 1631), a German professor, astronomer, and mathematician, known for being the mentor of "Johannes Kepler", in a letter to his former student, "Johannes Kepler", wrote that the inverse of the Golden Ratio is "about 0.6180340" (O'Connor & Robertson, 2001). "Johannes Kepler" went on to prove the Golden Ratio is the limit of the ratio of consecutive "Fibonacci Numbers" (Cole, 2010, p. 4). Since the 20th century, the Golden Ratio has been represented by the Greek letter "φ" – "Phi", after "Phidias", a sculptor who is said to have employed it - (Livio, 2002) by "James Mark McGinnis Barr" (May 18, 1871–December 15, 1950), who was an American mathematician, electrical engineer, physicist, inventor, and polymath known for proposing the standard notation for the Golden Ratio (Cole, 2010, p. 4).

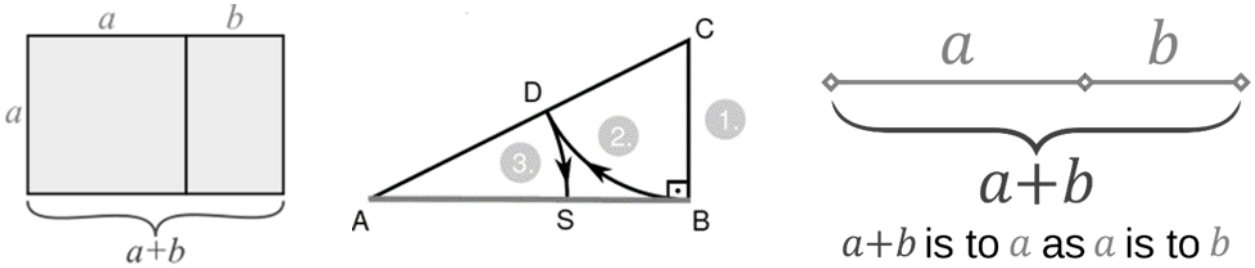


Figure 1. The Golden Ratio Proportions. A Golden Rectangle (Left). Dividing a Line Segment by Interior Division according to the Golden Ratio (Middle). Line Segments in the Golden Ratio (Right).

Golden Ratio and Fibonacci Numbers

English "Leonardo of Pisa", the original name "Leonardo Fibonacci" (c. 1170–1250 A.D.), Medieval Italian mathematician who wrote, "*Liber Abaci*" (1202, "Book of the Abacus"), the first European work on Indian and Arabian mathematics. "Leonardo Fibonacci", wrote about a series of numbers in his book: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, etc. continues to increase by adding the previous two numbers in the series. If a "Fibonacci Number" is divided by its immediate predecessor in the sequence, the quotient approximates "φ"; in fact, the bigger the pair of "Fibonacci Numbers", the closer the approximation. If we let "F" stands for a "Fibonacci Number" and "n" stands for the number of the term in the sequence, then "$F_n = F_{(n-1)} + F_{(n-2)}$". In the "Fibonacci Sequence", the ratios of the larger to the smaller consecutive numbers in the series approach the Golden Ratio (Beardon, 2010; Cole, 2010, p. 6) (Table 1).

Table 1. The Golden Ratio and the Fibonacci Numbers (Developed by Author).

1/1=1	2/1=2	3/2=1.5	5/3=1.666666
8/5=1.6	13/8=1.625	21/13=1.615384	34/21=1.619047
55/34=1.617647	89/55=1.618181	144/89=1.617977	233/144=1.618055
377/233=1.618025	610/377=1.618037	987/610=1.618032	1597/987=1.618034
2584/1597=1.618033	4181/2584=1.618034	6765/4181=1.618033	10946/6765=1.618033

Numerology and the Meaning of Numbers in the Christian Art

From the "Fibonacci Numbers" in design to mathematic sequencing, numbers play a significant role in the world. The Hebrew and Greek languages are numbers, and converting Greek letters into Greek numbers is known as "isopsephy". "Isopsephism" is the practice of adding up the number values of the letters in a word to form a single number; the total number is then used as a metaphorical bridge to other words evaluating the equal number. Similarly, in Hebrew, the practice is known as "gematria", where every letter corresponds to a number. It is the practice of assigning a numerical value to a name, word, or phrase according to an alphanumerical cypher. A single word can yield several values depending on the cypher that is used; the sum of these numbers gives a numeric value to a word or a name. When the values of the name "Jesus" are added together, it equals 888, and 666 is the numerical value of the "anti-Christ".

One is the number of unity; "the Lord is one", and the symbol of God also represents a point in geometry. Two is the number of divisions, two natures of Jesus: fully man (human) and fully divine (God), number of testaments (Old and New) in the Bible, two vessels: one for honour and one for dishonour, two categories of people: a sheep (believer) or a goat (non-believer). Number two is diversity, antithetical pairs; it is the duality of many things in life like hot and cold, up and down, male and female, and it is the symbol of the line in geometry. Three is the number of divine perfection. While God is one, he is made up of three persons: the Father, the Son, and the Holy Spirit, which is called the Holy Trinity. Jesus fulfilled as a prophet, a priest, and a king as God's divine attributes are omniscient, omnipresent, and omnipotent. Three is the number of parts of the universe: space, time, and matter; each of them is broken down into three. Space is measured by length, width, and height; time is defined by the past, present, and future; matter is in the form of solid, liquid or gas. Number three refers to good, better, best; one, both, or all; and it is the symbol of the triangle in geometry. Number three is all (beginning, middle, end), it is the best (superlative), and it is holy (triads of Gods). Four is the number of earth, creation, compass directions (North, East, South, West), the seasons of a year (Spring, Summer, Fall, Winter), major prophets: Isaiah, Jeremiah, Ezekiel, and Daniel; Evangelists whom each wrote one of the four Gospels: Matthew, Mark, Luke, and John. Four is the number of the earth as it has four corners, four winds, and four seasons, a lunar month has four weeks. Five is the number of grace and it refers to the five fingers of a hand or the five wounds of Jesus Christ. Six is the number of imperfections,

humankind, and the day man was created. Number six refers to the crucifixion event which was on the sixth day of the week and creation was completed in six days. Seven is a sacred number; it is the spiritual perfection, the total number of days of a week, and colours in the rainbow. There are seven windows in the head, two nostrils, two eyes, two ears, and a mouth. Eight is the number of new beginnings, people on Noah's Ark and regeneration. Nine is the number of judgments and classes of angels. Number nine represents something that is almost 10 and thus it is almost complete; it is all-but-complete or all-but-perfect. Ten is the number of perfection, completeness, finality, the commandments given to Moses, and the plagues God poured out on Egypt. Twelve is the number of governmental perfection, minor prophets in the Old Testament, the apostles of Jesus, foundations and gates of the New Jerusalem city where each gate has twelve angels. One day is divided into twelve hours of daytime and twelve hours of night-time, and a year has twelve months. Thirteen is the number of betrayals and the people present at the Last Supper. As the number five represents a hand, the number 10 represents two hands, and the number twenty represents a man (having 10 fingers in two hands and 10 in two feet). Thirty-three is the number of years Jesus lived on this earth. Forty is the number of testing or trials, the days it rained upon the earth while Noah was in the ark, the days Moses spent on "Mountain Sinai", and the days Jesus spent in the wilderness (Uysun, 2014, pp. 83-85; Wilson, 2009, pp. 6-11, 18, 23).

Golden Ratio in Architecture (Before the 14th Century)

Various authors have claimed that early monuments have Golden Ratio proportions, often on conjectural interpretations, using approximate measurements, and only roughly corresponding to 1.618 (Markowsky, 1992, p. 2). It is claimed that "Stonehenge" (3100 B.C.–2200 B.C.) has Golden Ratio proportions between its concentric circles (Mainzer & Altmann, 1996, p. 118; Trivedi, 2005, p. 397). There is even evidence that the "Mayans" used the Golden Ratio in their calendar (Cole, 2010, p. 14). "The Great Pyramid of Khufu" ("Cheops") in "Giza", Egypt (constructed c. 2570 B.C. by "Hemiunu") is another example of an ancient structure where there seems to have been some knowledge and use of the Golden Ratio. It is one of the "Seven Wonders of the Ancient World" and its construction is a geometric wonder. Many of the proportions present adhere to the Golden Ratio and "Pi". The ratio of the slant height (height of the triangular face) to half of the base approximates "φ" (612.01/377.9=1.61950) (Figure 2. Up Left) (Cole, 2010, p. 10; Livio, 2002, appendix 3).

Assuming the perpendicular distance across the square base of the pyramid is two units, a right triangle can be formed within the pyramid that has a ratio of the sides being one to the square root of "Phi" to "Phi". The unit length is the base of the triangle; the square root of "Phi" represents the distance from the point of the pyramid to the ground, or the height of the right triangle; the distance "Phi" represents the slant height (Figure 2. Up Right) (Dimare & Saripalli, 2016, p. 9).

The ancient Greeks were very conscious of the aesthetic beauty of the Golden Ratio and used it in many of their architectural and artistic designs (Cole, 2010, p. 10). The "Parthenon" in Athens is a classic example of the Golden Ratio being used in architecture (Figure 2. Middle Left). The structure contains a multitude of Golden Rectangles. The height of the building compared to the roof is in the ratio as well as the distances between the columns on the roof to the actual columns. It was constructed between 448 and 432 B.C. as a temple for the "Goddess Athena" (Figure 2. Middle Right) (Dimare & Saripalli, 2016, p. 10).

The Greek sculptor, "Phidias" (c. 480–c. 430 B.C.), created many pieces in the temple that employed the Golden Proportion in their design (Hemenway, 2005, p. 96). "The Great Mosque of Kairouan" (built by "Uqba Ibn Nafi" c. 670 A.D.) has been claimed to use the Golden Ratio in the design including its plan, the prayer space, court, and minaret (Boussora & Mazouz, 2004, pp. 7-16) but the ratio does not appear in the original parts of the mosque (Brinkworth & Scott, 1999, p. 2). The Stupa of Borobudur in Java, Indonesia (built eighth–ninth century A.D.), the largest known Buddhist Stupa, has the dimension of a square base related to the diameter of the largest circular terrace as 1.618:1, according to "John Pile" (Pile, 2005, p. 88). "The Castle of Chichen Itza" was built by the "Maya" civilization between the 11th and 13th centuries A.D. as a temple to the "God Kukulcan". "John Pile" claims its interior layout has Golden Ratio proportions and the interior walls are placed so that the outer spaces are related to the central chamber by the Golden Ratio (Pile, 2005, p. 23). Many Medieval churches and cathedrals include evidence of the use of the Golden Ratio in their design. The "Notre Dame De Paris Cathedral" (1160)(Figure 2. Bottom Left), the "Chartres Cathedral" (12th century) (Cole, 2010, p. 11; James, 1991, p. 200; Obara, 2000) and the "Notre Dame of Laon Cathedral" (1157–1205)(Figure 2. Bottom Right) are designed according to the Golden Ratio as "Frederik Macody Lund" claims in his book "*Ad Quadratum*" (Chanfón Olmos, 1991). In 1992, "Kim Lloverasi Montserrat" made a complete study of the "Sénanque Abbey", one of the most beautiful works of Romanesque Cistercian in Provence, France. The "Sénanque Abbey" was founded in 1148 and consecrated in 1178. He argues that the abbatial church was designed using a system of measures founded in the Golden Ratio and the medieval squares used by the constructors, were both designed with the Golden Ratio.

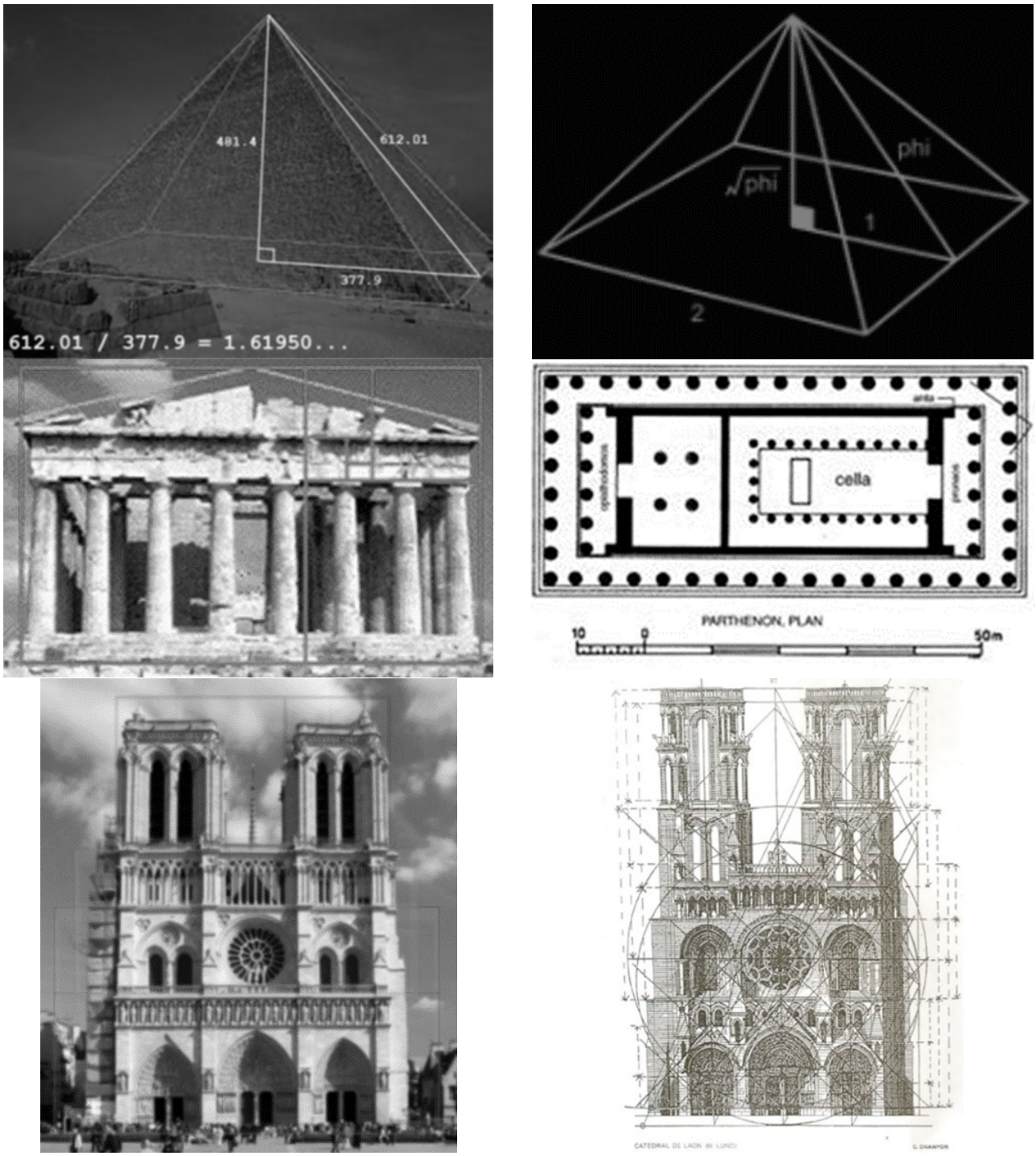


Figure 2. The Golden Ratio in Architecture: Proportions of the Pyramid of Cheops (Dimare & Saripalli, 2016. p. 9) (Up Left). Proportions of the Pyramid (Cole, 2010, p. 10; Obara, 2000) (Up Right). The Parthenon Fits into the Golden Rectangles (Dimare & Saripalli, 2016. p. 9) (Middle Left). The Plan of the Parthenon (Obara, 2000) (Middle Right). The Golden Ratio in the Façade of Notre Dame De Paris Cathedral (URL1) (Bottom Left). The Golden Proportions in the Façade of Notre Dame of Laon Cathedral (URL2) (Bottom Right).

Human Body Proportions

The human body exemplifies the mesmerising occurrence of the Golden Ratio. The total height of the body and the distance from the head to the fingertips make the same ratio as "Phi". The distances from head to naval and naval to hill also express the golden proportion. The bones of the fingers in the human hand are related to each other by a ratio of "Phi". The proportion between the forearm and upper arm also follows the rule of the Golden Ratio and the same ratio appears between the hand and forearm. Human faces are also comprised of this ratio within the relationships between the eyes, ears, mouth, and nose (Akhtaruzzaman & Shafie, 2011, pp. 11-12) (Figure 3).

The Golden Section was first developed by a Roman writer, architect, and engineer, "Marcus Vitruvius Pollio" (1st Century B.C.), which is most famously known from the drawing by "Leonardo Da Vinci", "The Divine Proportion" (Figure 4) (Akhtaruzzaman & Shafie, 2011, p. 17). "Leonardo Da Vinci" created the illustrations for "*De Divina Proportione*" (On the Divine Proportion), a mathematics book written by "Luca Pacioli" around 1498 and first published in 1509. In this book, "Luca Pacioli" writes about mathematical and artistic proportion, particularly the mathematics of the Golden Ratio and its application in art and architecture. The book contains dozens of beautiful illustrations of three-dimensional geometric solids and templates for script letters in calligraphy. The "Vitruvian Man" is the study of human physiology by "Leonardo Da Vinci". It was meant to be a perfectly proportionate rendering of the human form, as determined by the application of geometry and mathematics. It was originally drawn in 1490 and then collected with other "Leonardo Da Vinci" illustrations in the book of "Luca Pacioli" on mathematics, "*De Divina Proportione*", first printed in 1509 (Pacioli, 1509).

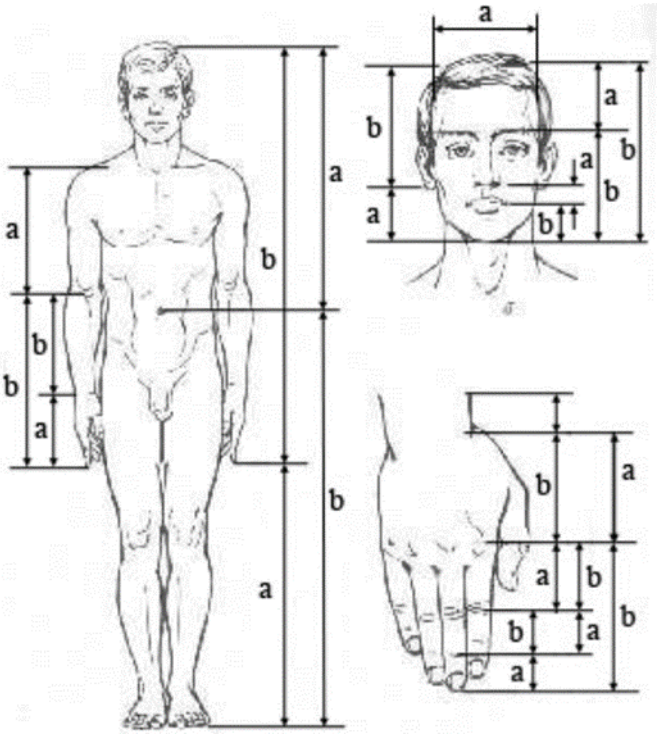


Figure 3. The Golden Proportion on Human Figure (Akhtaruzzaman & Shafie, 2011, p. 12).

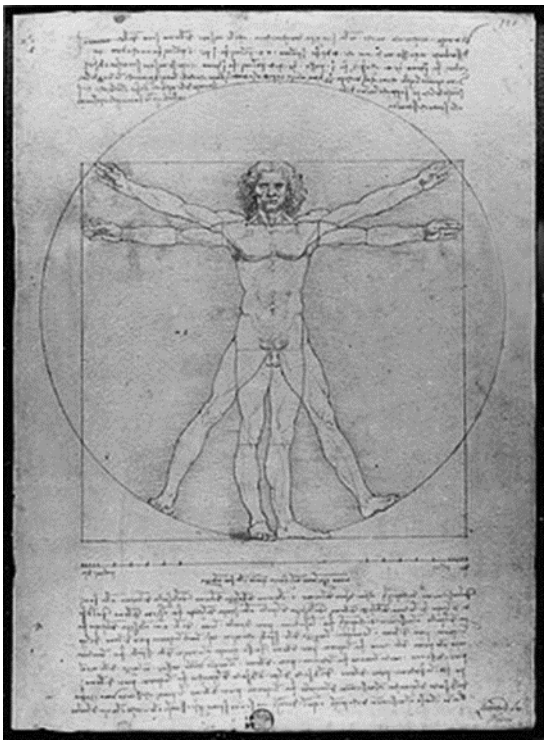


Figure 4. The Divine Proportion of Vitruvian Man by Leonardo Da Vinci (c. 1490) (Cole, 2010, p. 16).

Little is known about the life of "Vitruvius", except what can be gathered from his writings, which are somewhat obscure on the subject. Although he nowhere identifies the emperor to whom his work is dedicated, it is likely that "the first Augustus" is meant and that the treatise was conceived after 27 B.C. Since "Vitruvius" describes himself as an old man, it may be inferred that he was also active during the time of "Julius Caesar". "Vitruvius", tells of a basilica he built at "Fanum" (now "Fano"). He is the author of the celebrated treatise "*De Architectura*" (On Architecture), a handbook for Roman architects. "*De Architectura*" was based on his own experience, as well as on theoretical works by famous Greek architects such as "Hermogenes". The treatise covers almost every aspect of architecture, but it is limited since it is based primarily on Greek models, from which Roman architecture was soon decisively to depart to serve the new needs of proclaiming a world empire. "*De Architectura*" is divided into ten books dealing with city planning and architecture in general; building materials; temple construction and the use of the Greek orders; public buildings (theatres, baths); private buildings; floors and stucco decoration; hydraulics; clocks, mensuration, and astronomy; and civil and military engines. The outlook of "Vitruvius" is essentially Hellenistic. His wish was to preserve the classical tradition in the design of temples and public buildings, and his prefaces to the separate books of his treatise contain many pessimistic remarks about contemporary architecture. It is at the beginning of Book III, in his discussion on the building of temples, where the concept of "Vitruvian Man" emerges. Similarly, in the members of a temple, there ought to be the greatest harmony in the symmetrical relations of the different parts to the general magnitude of the whole. Then again, in the human body, the central point is naturally the navel. For if a man can be placed flat on his back, with his hands and feet extended, and a pair of compasses centred at his navel, the fingers, and toes of his two hands and feet will touch the circumference of a circle described therefrom. And just as the human body yields a circular outline, so too a square figure may be found from it. For if we measure the distance from the soles of the feet to the top of the head, and then apply that measure to the outstretched arms, the

breadth will be found to be the same as the height, as in the case of a complete square plane surface (Marcus Vitruvius, De Architectura, Book III, Chapter 1, p. 3). "Vitruvius", in his "*Ten Books on Architecture*", provides a list of proportions of the face and the body. He says "Proportion is a correspondence among the measures of the members of an entire work, and of the whole, to a certain part as standard." In the proportions given below standard is the height of a man or the height of the face.

❖ The Face:

• From the chin to just under the nostril is 1/3 of the face;
• From just under the nostril to the eyebrows is 1/3 of the face;
• From the eyebrows to the hairline is 1/3 of the face.

❖ The Body:

• The face, chin to the hairline is $1/10^{th}$ the height of a man;
• The head, chin to crown, is $1/8^{th}$ the height of a man;
• From the breast to the hairline is $1/6^{th}$ the height of a man;
• From the breast to the crown is $1/4^{th}$ the height of a man;
• The length of the foot is $1/6^{th}$ the height of a man;
• From the wrist to the tip of the fingers is $1/10^{th}$ the height of a man;
• The length of the forearm is $1/4^{th}$ of the height of a man;
• The breadth of the breast is $1/4^{th}$ of the height of a man;
• From fingertip to fingertip equals the height of a man.

This tells us that the ancients considered the proportions of 1:3 (0.3333…), 1:4 (0.25), 1:6 (1.1666…), 1:8 (0.125), and 1:10 (0.1) as being proportions appropriate to man. Without elaboration, "Vitruvius" states that architects also used the proportions of other parts of the body, so this list is not complete. "Vitruvius" gets into the perfect numbers, but he gets there by going back to using man as a standard for measurement. The Greeks, like every other culture, used their body parts to measure things. They used fingers, palms, forearms, and feet. The number ten was considered perfect because we have ten fingers connected to our palms (and feet). Likewise, mathematicians considered six to be the perfect number, but this was reinforced by the fact that there were six palms to the cubit (the forearm) and the man was as tall as six of his feet. So, they considered both ten and six to be perfect, and adding two perfect numbers should also yield a perfect number, therefore sixteen was perfect too. These three numbers formed special proportions 6:10 (0.6), 6:16 (0.375), and 10:16 (0.625), all theoretically derived from man. It was practical to have rooms in the proportions of 6:10 (such as a 12-foot by 20-foot room). Since there were three numbers you could even put the width, length, and height all into perfect proportions. You could for instance have a room 15 feet wide by 24 feet with a 9-feet ceiling, which is in the proportions of 10:16:6. "Andrea Palladio" (1508–1580), in his "*The Four Books on Architecture*" reintroduced these same proportions to a new generation. The rooms of his houses often had these proportions. In "*De Architectura*" at 3.1.2-3, "Vitruvius Pollio" writes: For the human body is so designed by nature that the face, from the chin to the top of the forehead and the lowest roots of the hair, is a tenth part of the whole height; the open hand from the wrist to the tip of the middle finger is just the same; the head from the chin to the crown is an eighth, and with the neck and shoulder from the top of the breast to the lowest roots of the hair is a sixth; from the middle of the breast to the summit of the crown is a fourth. If we take the height of the face itself, the distance from the bottom of the chin to the underside of the nostrils is one-third of it; the nose from the underside of the nostrils to a line between the eyebrows is the same; from there to the lowest roots of the hair is also a third, comprising the forehead. The length of the foot is one-sixth of the height of the body; of the forearm, one-fourth; and the breadth of the breast is also one-fourth. The other members, too, have their symmetrical proportions, and it was by employing them that the famous painters and sculptors of antiquity attained great and endless renown. These proportions are seen in Leonardo's notes on the drawings accompanying text, written in mirror writing. It was made as a study of the proportions of the (male) human body as described in "Vitruvius":

• A palm is the width of four fingers;
• A foot is the width of four palms (i.e., 12 inches);
• A cubit is the width of six palms;
• A pace is four cubits;
• A man's height is four cubits (and thus 24 palms);
• The length of a man's outspread arms (arm span) is equal to his height;
• The distance from the hairline to the bottom of the chin is one-tenth of a man's height;
• The distance from the top of the head to the bottom of the chin is one-eighth of a man's height;
• The distance from the bottom of the neck to the hairline is one-sixth of a man's height;
• The maximum width of the shoulders is a quarter of a man's height;
• The distance from the middle of the chest to the top of the head is a quarter of a man's height;
• The distance from the elbow to the tip of the hand is a quarter of a man's height;
• The distance from the elbow to the armpit is one-eighth of a man's height;

- The length of the hand is one-tenth of a man's height;
- The distance from the bottom of the chin to the nose is one-third of the length of the head;
- The distance from the hairline to the eyebrows is one-third of the length of the face;
- The length of the ear is one-third of the length of the face;
- The length of a man's foot is one-sixth of his height (Thayer, 2009).

Relationship of Human Body Proportions to the Architecture

"Francesco Maurizio Di Giorgio Martini", "Francesco", or "Di Martino" (baptized Sept. 23, 1439, Siena, Republic of Siena [Italy] –d. 1502, Siena), early Italian Renaissance painter, sculptor, architect, and designer combined the bold investigation of the humanist scholars with the conservative lyricism of the Sienese school. His early works were manuscript illuminations, furniture panels, and two monumental altarpieces: the "Coronation of the Virgin" (1471) and "The Nativity" (1475). "The Nativity" shows that "Francesco" was greatly influenced by Florentine artists of the period, especially "Andrea Del Verrocchio" (c. 1435–1488), born "Andrea di Michele di Francesco de' Cioni", who was a sculptor, Italian painter and goldsmith, a master of an important workshop in Florence. "Francesco" is remembered chiefly as an architect and an architectural theorist. He translated "Vitruvius" and wrote an original work on architecture, "*Trattato di Architettura Civile e Militare*", which discusses city planning and military architecture, anticipating some of the architectural theories of the high Renaissance. By 1477, he was in the service of "Duke Federico da Montefeltro" (7 June 1422–10 September 1482), (also known as Federico III da Montefeltro, who was one of the most successful mercenary captains of the Italian Renaissance, and lord of Urbino from 1444 - as Duke from 1474 - until his death) in "Urbino" (a Walled City in the Marche region of Italy), where he may have participated in the design and decoration of parts of the palace of "Urbino", and built 136 military fortresses. His architectural masterpiece is "Santa Maria del Calcinaio", in "Cortona" (a town and comune in the province of Arezzo, in Tuscany, Italy) (commissioned 1484), which, however, is now greatly altered. As a sculptor, he is best known for four bronze figures for the high altar of "Siena Cathedral" (1489–1497) and a series of bronze reliefs showing Verrocchio's influence. (They have also been attributed to the young "Leonardo Da Vinci".) He also designed fortifications, battle machinery, and weapons and is thought to have originated the land mine. His image of "Vitruvian Man" was used in another edition of "*De Architectura*" in 1525 (Figure 5). A lesser-known but equally illustrative contemporary of "Leonardo Da Vinci", "Francesco Di Giorgio", sketched his version of the "Vitruvian Man" in his notebooks as well (Figure 6). "Fra Giovanni Giocondo" (c. 1433–1515) was an Italian friar, architect, antiquary, archaeologist, and classical scholar who would eventually take over Bramante's post as a superintendent for the building of "St. Peter's" in Rome. In his work as a scholar, he provided the first printed and illustrated edition of "*De Architectura*" in 1511 (Figure 7 & Figure 8). In 1521, "Cesare Cesariano" or "Cesare di Lorenzo Cesariano" (December 10, 1475–March 30, 1543), an Italian painter, architect and architectural theorist, translated "*De Architectura*" into Italian and also added commentary and illustrations. Two images try to convey the idea of the "Vitruvian Man" in Cesariano's edition. However, the attempt to show the proportions of man fails, as the arms are too long for the rest of the body (Figure 9 & Figure 10). "Mariano di Lacopo" or "Mariano di Jacopo" (1382–c. 1453), also known as "Taccola" ("the jackdaw"), was an Italian polymath, administrator, artist, and engineer-author of the early Renaissance who kept notebooks of drawings and sketches like those of "Leonardo Da Vinci". In his notebooks, there is his version of the "Vitruvian Man" (Figure 11). Renaissance architects seem to have truly believed that "Man is the measure of all things". "Since man was made in the image of God, so it was believed the proportions exemplified in the human form would reflect a divine and cosmic order" (Steadman, 1979, p. 17). Drawings by "Francesco Di Giorgio" illustrate such proportional concepts directly and vividly. "Francesco Di Giorgio" demonstrates through the inscribed human figure how to weld together organically the centralised and the longitudinal parts of such a church design. The centralised Eastern end is developed from the basic geometrical figures of circle and square (Rawlins, 1951, p. 10) (Figure 12). The Vitruvian Man was very much a part of this order and the need for proper proportion; order stands at the centre of the received character of the Italian Renaissance. The circle is the image of divine perfection, the five Platonic solids the building blocks of the cosmos, and the human figure, the microcosm of that universe, a figure whose extensions area encompassed by the circumscribed shapes of the circle and the square. At one level, it is urged that the layout of the building matches the body part for part (Figure 13). For example, Vasari (1511–1574), an Italian painter, architect, and writer in his recommendations for the design of an ideal palace, compares the façade with the face, the central door with the mouth, the symmetrically placed windows with eyes, the courtyard with the body, staircases with the legs and arms. The typical proportional ratios to be detected in the measurements of the human figure and limbs are to be employed for sizing the elements of the building, without any sense at all of the plan or façade corresponding to the body in general disposition (Steadman, 1979, p. 17) (Figure 14 & Figure 15). "Fingesten" believes that the form and design of Gothic cathedrals have allegorical and symbolic meanings. He compares the interior of the cathedrals to the anatomy of the human body in essence, as symbols of Christ and/ or the Virgin Mary. The floor plan of a basilica can mimic the form of the cross or even the body of Christ, the allegorist "William Durandus" (also sometimes written as "Guillaume Durandi" or "William Durand") said as much in the 13th century. "Fingesten" asserts this point and even cites "Vitruvius" and

the Renaissance artist "Pietro Cataneo's Vitruvian Figure" (1554), which is depicted within the basilica floor plan (Figure 16). Although the "Vitruvian Man" is often shown in connection with the Golden Ratio, the proportions of the figure do not match it, and the text only mentions whole number ratios (Figure 17). The 16th-century philosopher "Heinrich Cornelius Agrippa von Nettesheim" (14 September 1486–18 February 1535), a German polymath, physician, legal scholar, soldier, theologian, and occult writer, drew a man over a pentagram inside a circle, implying a relationship to the Golden Ratio (Figure 18). Using biblical references, "Fingesten" argues that the cathedral interior was originally intended to symbolise the body of Jesus Christ who is recorded in the New Testament to have compared his own body to a temple. With the increase of devotion to the Virgin Mary in the 12th century and afterwards, the cathedral also came to symbolise her body. Virgin Mary's body traditionally has been compared to a "temple of God". "Fingesten" described how "the pointed ribbed vault system suggests the rib-cage of a gigantic mother bending over her son" and how "cathedrals increased in size until they bulged like a woman with child" (Fingesten, 1961).

Figure 5. Francesco Di Giorgio's Vitruvian Man. Scanned from *Architectural Principles in the Age of Humanism* by Rudolf Wittkower.

Figure 6. Francesco Di Giorgio's Vitruvian Man. Scanned from *Trattato di Architettura di Francesco Di Giorgio Martini* by Francesco Di Giorgio.

Figure 7. Fra Giovanni Giocondo's Vitruvian Man. Scanned from *Architectural Principles in the Age of Humanism* by Rudolf Wittkower.

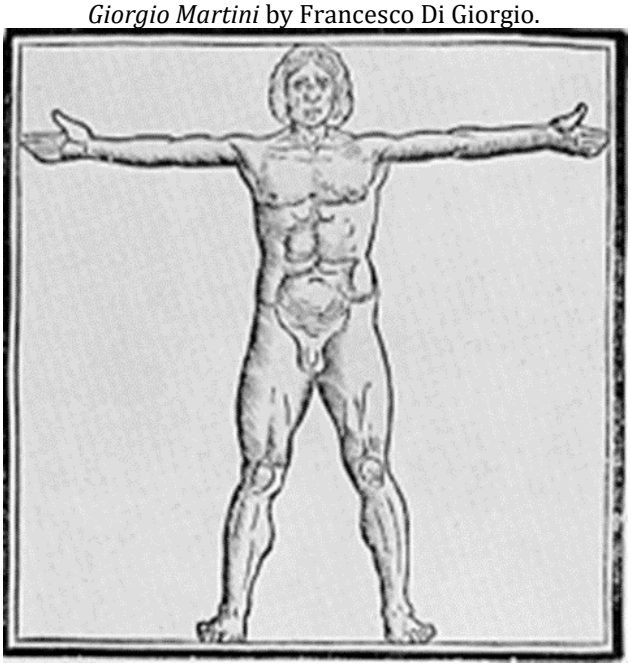


Figure 8. Fra Giovanni Giocondo's Vitruvian Man. Scanned from *Architectural Principles in the Age of Humanism* by Rudolf Wittkower.

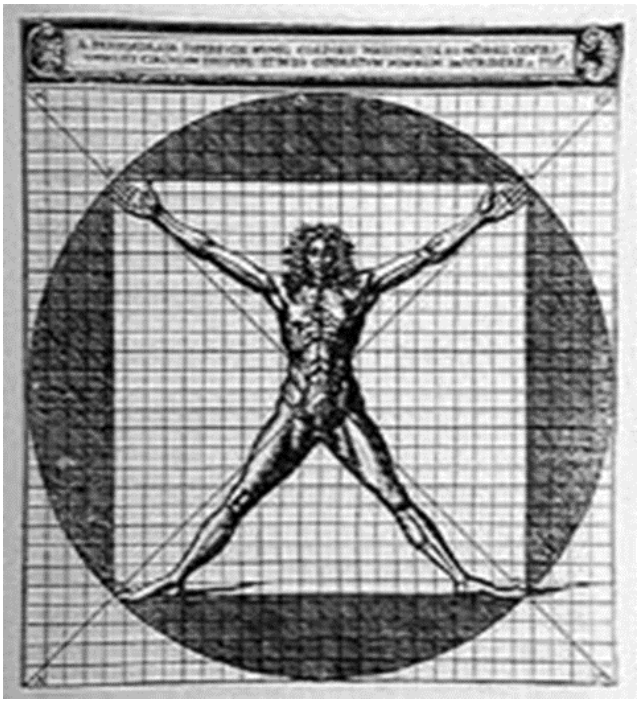


Figure 9. Cesare Cesariano's Vitruvian Man. Source: Scanned from Vitruvius Pollio's *De Architectura* translated and with commentary by Cesariano, Facsimilie reproduction 1968.

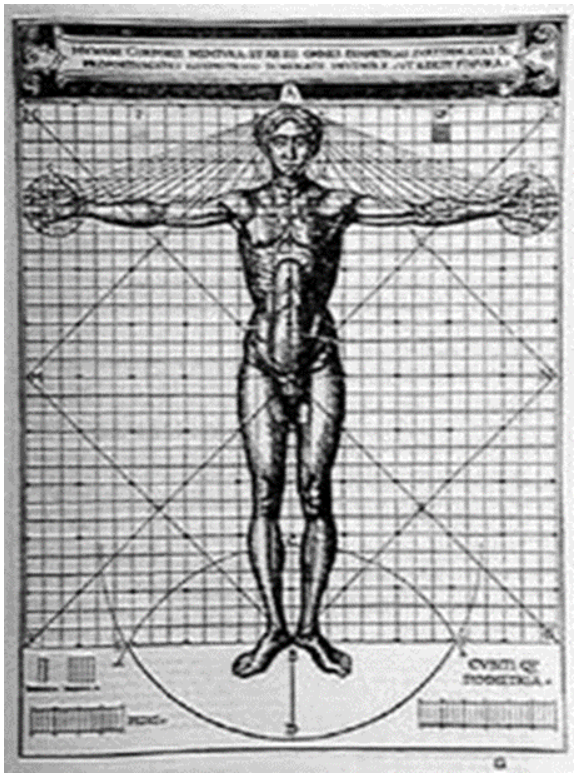


Figure 10. Cesare Cesariano's Vitruvian Man (1521). Scanned from Vitruvius Pollio's *De Architectura* translated and with commentary by Cesariano, Facsimilie reproduction 1968.

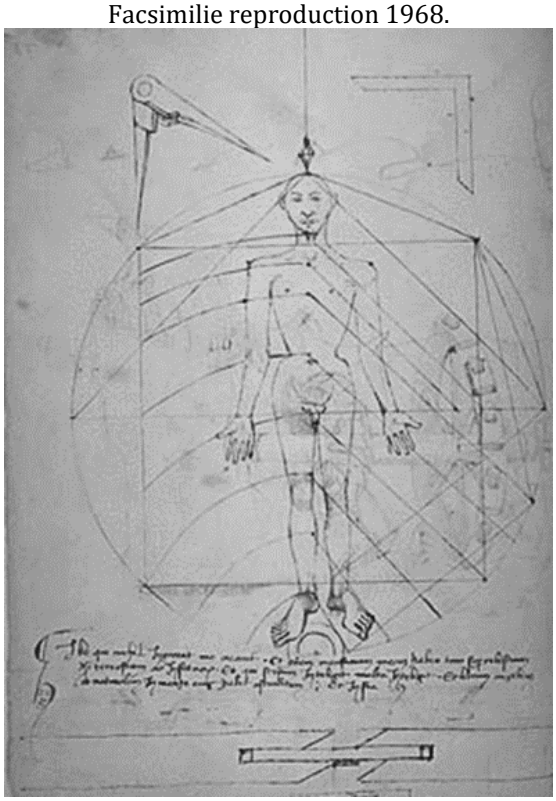


Figure 11. Taccola's Vitruvian Man. Source: Instituto e Museo di Storia della Scienza, Florence, Italy.

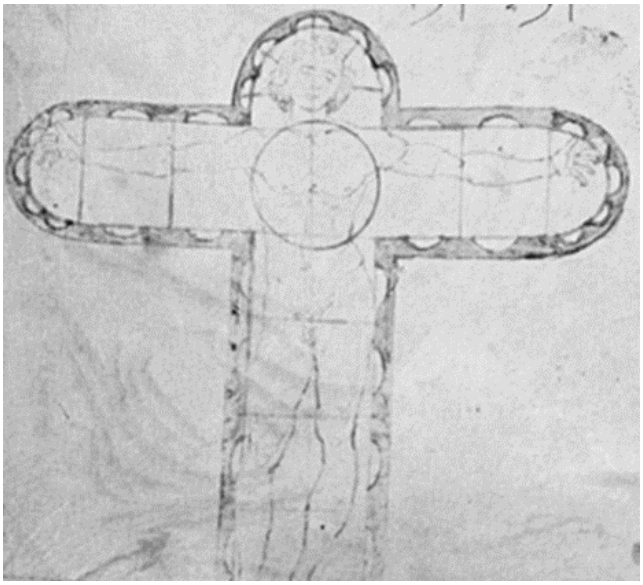


Figure 12. The ground plan of a church corresponds to the proportions of the human figure (Biblioteca Laurenziana, Florence). Scanned from *Trattato di Architettura di Francesco Di Giorgio Martini* by Francesco Di Giorgio (Von Simson & von Simson, 1988, plate 8).

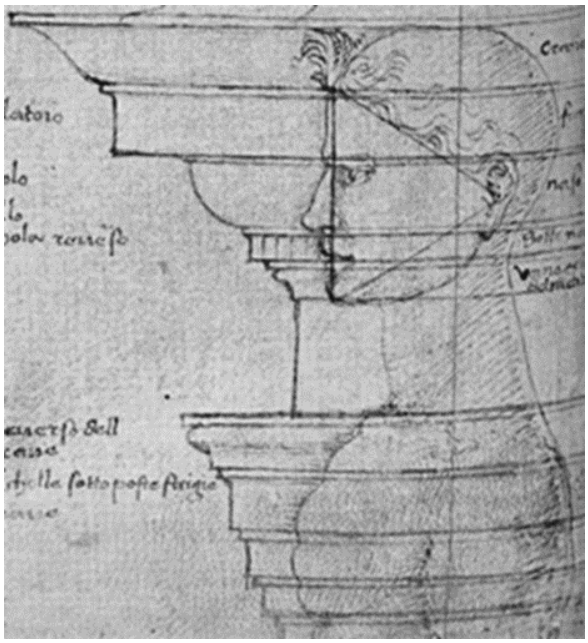


Figure 13. Matching a building layout with the human body. Scanned from *Trattato di Architettura di Francesco Di Giorgio Martini* by Francesco Di Giorgio.

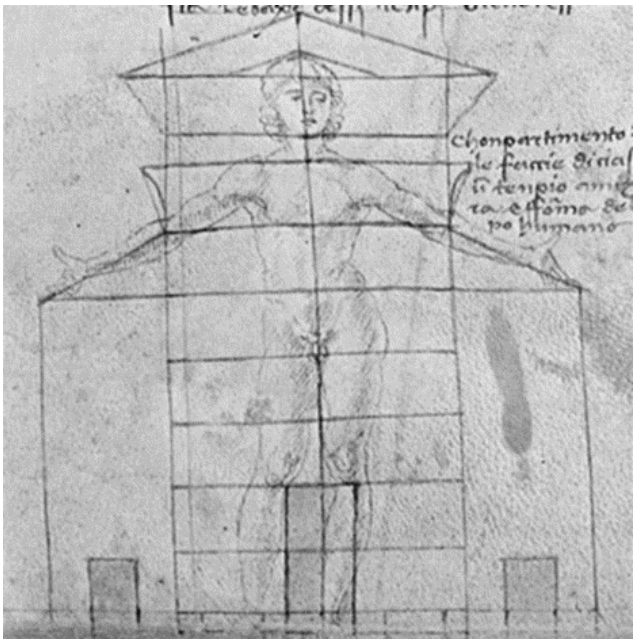


Figure 14. The human body corresponds to the façade of a building. Scanned from *Trattato di Architettura di Francesco Di Giorgio Martini* by Francesco Di Giorgio.

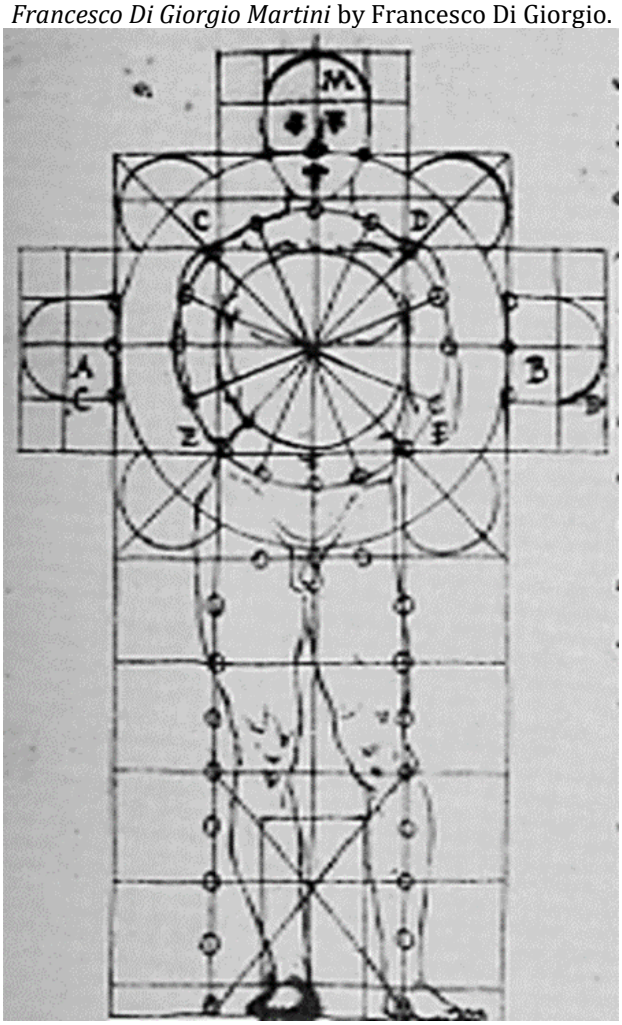


Figure 15. The human body corresponds to the Plan of a church. Scanned from *The Evolution of Designs: Biological Analogy in Architecture and the Applied Arts* by Philip Steadman.

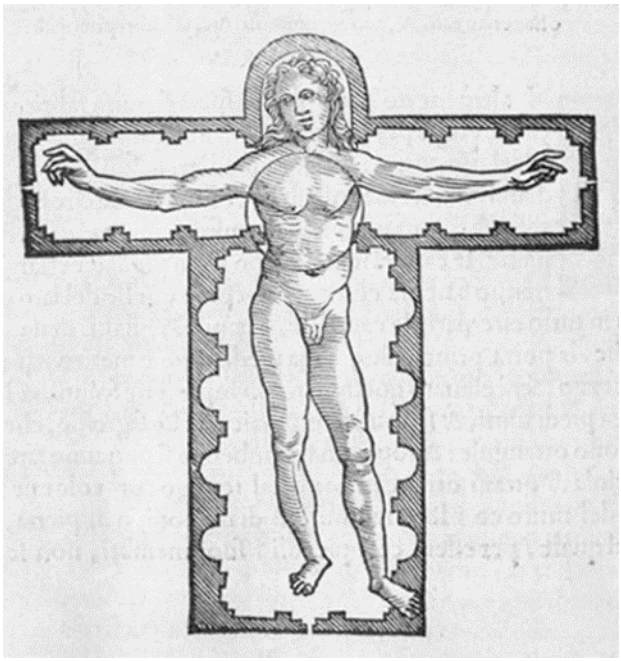


Figure 16. Pietro Cataneo's Vitruvian Man corresponds to the Plan of a church (in 1554).

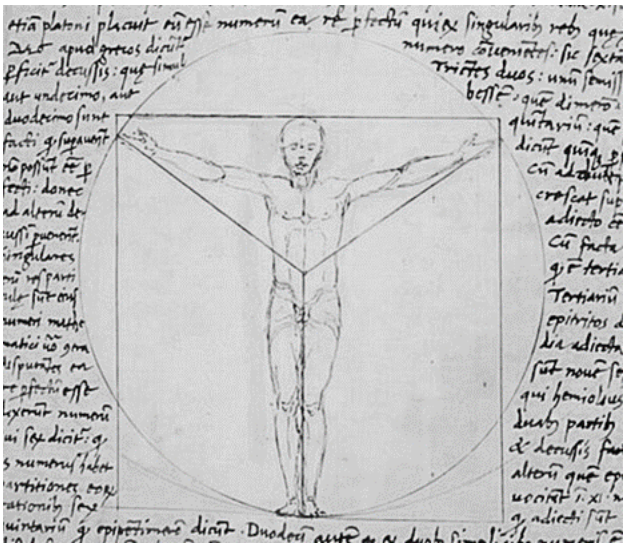


Figure 17. A Vitruvian Man prototype by Giacomo Andrea, in 1490.

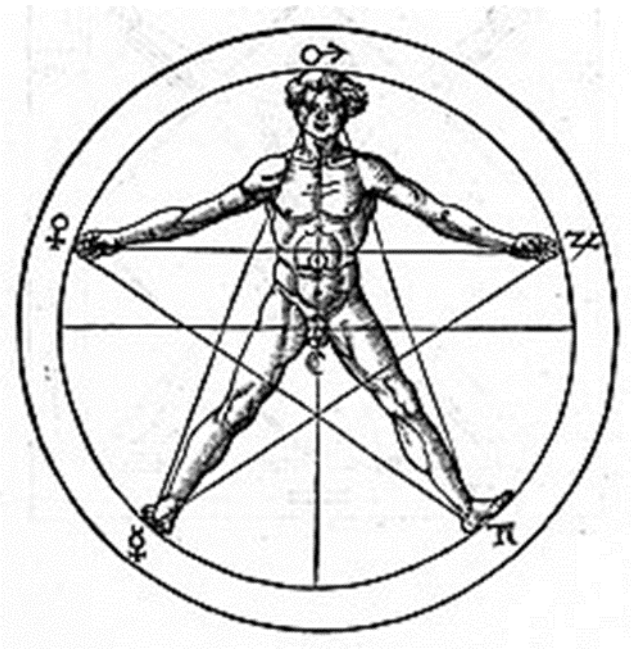


Figure 18. The drawing of a man's body in a pentagram suggests relationships to the Golden Ratio by Heinrich Agrippa.

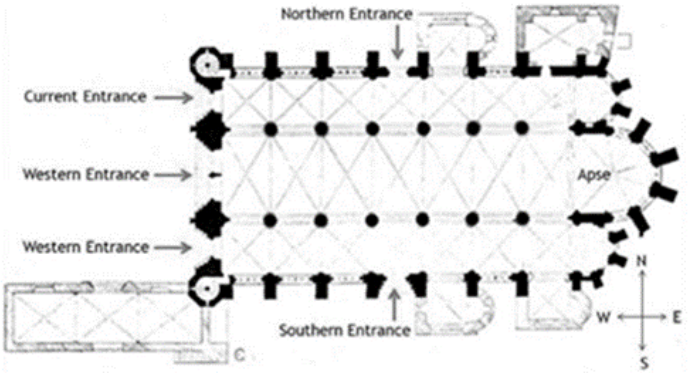
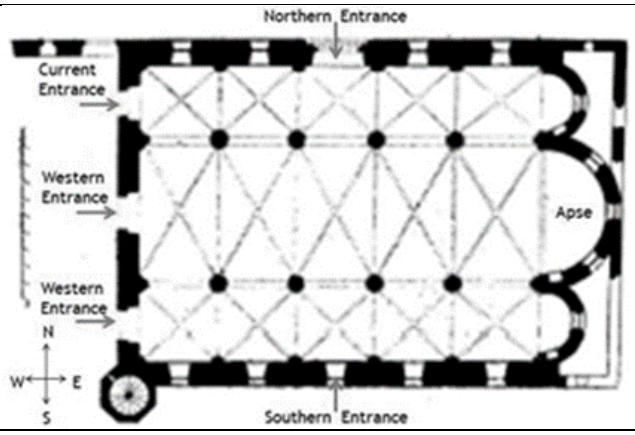
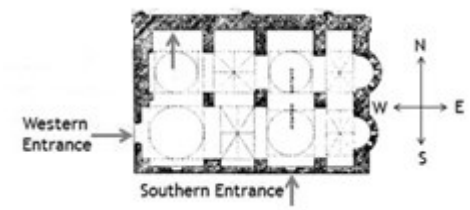
The Golden Ratio on the Plan, Façade, Elevation, and Section of the Churches in the Walled City of Famagusta

The case studies of this research, the churches and cathedrals in the Walled City of Famagusta, North Cyprus are as follows: the Cathedral of St Nicholas (Lala Mustafa Pasha Mosque), the Church of SS Peter and Paul (Sinan Pasha Mosque, Buğday Mosque), the Cathedral of St George of the Greeks (S Giorgio Duomo dei Graci, Ayios Yeorgios), the Church of St Symeon (St Epiphanios Church), the Church of St George of the Latins (S Giorgio Lat Church, Church of Mehti, St Catherine Church), the Church and Monastery of the Franciscans (Franciscan Church, St Francis Church, St François Church, Frères Minor Church, Church of the Friars Minor), the Church of St Mary of Carmel (Carmelite Church, S Carmine Church), St Anne Church (S Anna Church, Maronite Church), the Nestorian Church (Ayios Yeorghios Xorinos Church, Church of Agios Georgios Exorinos, St George the Exiler Church), the Armenian Church (St Mary of Armenian Church, Saint Marie Church), Churches of Templars and Hospitallers (Twin Churches), Jacobean Church (Tabakhane Mosque, Tanners' Mosque, Jacobite Church), Mustafa Pasha Mosque (Stavros Church), Unnamed Church No: 1 (Ruined), Unnamed Church No: 3 (Ruined), Unnamed Church No: 4 (Ruined), Haia Fotou Church/ Crypt (St Clare Church, Ayia Photou Church, St Dominic Crypt) (Ruined), and St Mary of Bethlehem Underground Church (Babazadeh-Asbagh & Uluca-Tümer, 2022, pp. 61-101). There are also several unnamed ruined churches in the Walled City of Famagusta that unfortunately there is no evidence of their plans, façades or elevations in reliable sources like the books of "Camille Enlart", "George Jeffery", and "Edward l'Anson". There are also a few underground churches inside and outside the Walled City of Famagusta either carved out of rock or manmade, with masonry. Some of the aforementioned churches in the Walled City of Famagusta were converted into a mosque after the conquer of the Ottomans in 1570–1571. Some others were used with different functions than the original use as a religious one and most were abandoned without any function and have not been used for a very long time. As mentioned above, one of the limitations of the author is the lack of access to the original plans, façades, elevations, sections and even the photographs of the ruined churches; some of them are also nameless and unknown even not being mentioned in the old original references and resources. Therefore, the author selects only the churches that are currently available inside the Walled City of Famagusta, measures their plan with a laser meter and updates all of their plans based on the original available maps of "Camille Enlart", "George Jeffery", and "Edward l'Anson" digitalised via the AutoCAD programme.

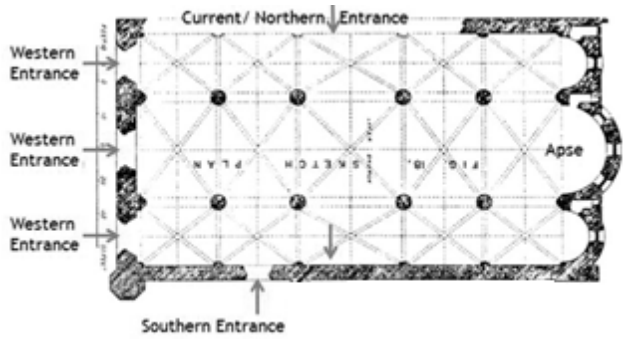
"The plan of the churches in the Walled City of Famagusta has two general forms; cruciform shape and square plan. The churches with the basilica or axial form plan have a rectangular form of a cross and the circular, octagonal or central type has a square form plan. Most Gothic churches have a cruciform-shaped plan which is derived from the symbol of the Latin cross. The axis of these plans is East-West emphasising the West façade externally as the main entrance and the internal emphasis is on the Eastern apses. The East side is the direction of the rising sun which is believed to be the direction of the Holy Jesus Christ rising like the sun. Some other Gothic churches that were affected by Byzantine Architecture have the Greek cross plan. In these churches, the apse is usually on the East

side and opposite to that there is the main entrance on the West front" (Babazadeh-Asbagh & Uluca-Tümer, 2018, p. 419). "The plan of the churches in the Walled City of Famagusta has two general forms; rectangular and square form. The rectangular-shaped plans have two categories; cruciform shaped with a nave and a transept, or East-West axial plan with a nave and two aisles. As the plan of cruciform-shaped churches looks like the cross, there is usually one entrance on the West façade, one on the North and one on the South elevation. The churches with square-shaped plans usually have three entrances, the main one on the West façade, one on the North and one on the South elevation" (Babazadeh-Asbagh & Uluca-Tümer, 2018, pp. 438-439). For more information about the entrances of these churches, you can study the published article by the author titled "Analysing the Entrances of Churches in Famagusta Walled City" (Babazadeh-Asbagh & Uluca-Tümer, 2018, pp. 418-444). Moreover, to obtain more information about the windows of the aforementioned churches you can read the published article by the author entitled "Analysing the Windows of Churches in Famagusta Walled City" (Babazadeh-Asbagh & Uluca-Tümer, 2019, pp. 466-485). A comprehensive study of the churches in the Walled City of Famagusta is done by the author in her PhD dissertation entitled "Interpretation Problems and Proposals for the Churches in the Walled City of Famagusta" (Babazadeh-Asbagh, 2023). Furthermore, the video of the tour inside the Walled City of Famagusta prepared for the high school students led by the author is available on her YouTube channel in the Turkish Language and the English Language Subtitle (Babazadeh-Asbagh, 2021).

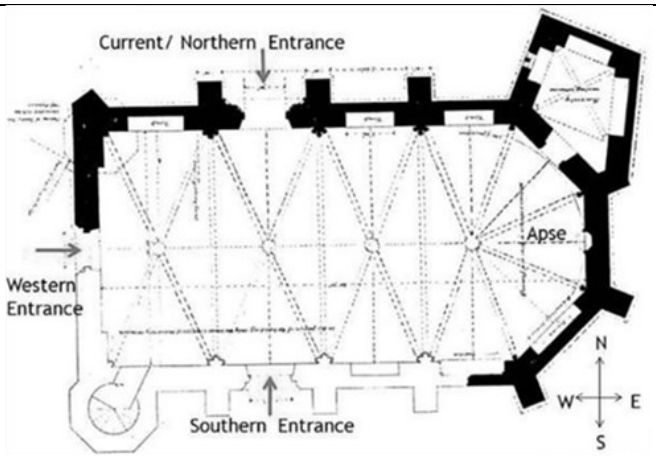
Table 2. Analysing the Golden Ratio (the Golden Rectangle) on the Plan of the Churches in the Walled City of Famagusta (Developed by Author).

Name	St Nicholas Cathedral	
Plan Type	Three-Aisled (Basilica form)	
Built Date	1298–1308 & 1310–1328	
Total Length	55.9429 m	
Total Width	29.7815 m	
Internal Length	48.8701 m	
Internal Width	21.8386 m	
The Ratio of the Various Rectangles	55.9429/29.7815=1.8784 48.8701/21.8386=2.2377 55.9429/43.2128=1.2945 43.2128/29.7815=1.4509 39.3169/21.8386=1.8003	
Reference	Enlart, 1987, p. 230.	
Name	SS Peter & Paul Church	
Plan Type	Three-Aisled (Basilica form)	
Built Date	Between 1300–1310	
Total Length	29.1203 m	
Total Width	20.2763 m	
Internal Length	26.4536 m	
Internal Width	16.9985 m	
The Ratio of the Various Rectangles	29.1203/20.2763=1.4361 26.4536/16.9985=1.5562 35.0751/20.2763=1.7298 22.2861/16.9985=1.3110 23.7695/20.2763=1.1722	
Reference	Enlart, 1987, p. 247.	
Name	St Symeon Church	
Plan Type	Double-Naved (Twin Naved)	
Built Date	1310–1330	
Total Length	18.3895 m	
Total Width	10.7107 m	
Internal Length	14.7934 m	
Internal Width	8.0542 m	
The Ratio of the Various Rectangles	18.3895/107107=1.7169 14.7934/8.0542=1.8367 18.3895/12.9074=1.4247 16.3641/12.9074=1.2678 16.3641/10.7107=1.5278	
Reference	l'Anson, 1883, p. 20.	

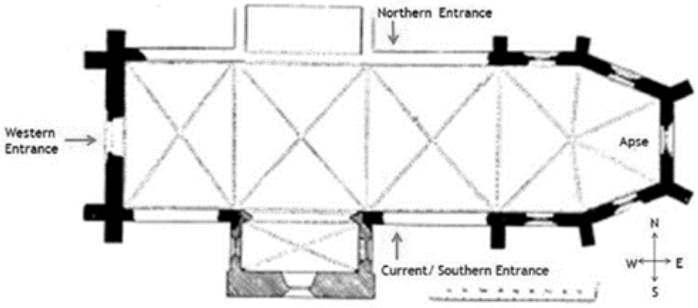
Name	St George of the Greeks Cathedral
Plan Type	Three-Aisled (Basilica form)
Built Date	At the end of the 14th century
Total Length	37.5141 m
Total Width	19.9652 m
Internal Length	34.8561 m
Internal Width	17.4290 m
The Ratio of the Various Rectangles	37.5141/19.9652=1.8789 34.8561/17.4290=1.9998 37.5141/30.6760=1.2229 33.1127/17.4290=1.8998 31.3224/17.4290=1.7971
Reference	l'Anson, 1883, p. 20.



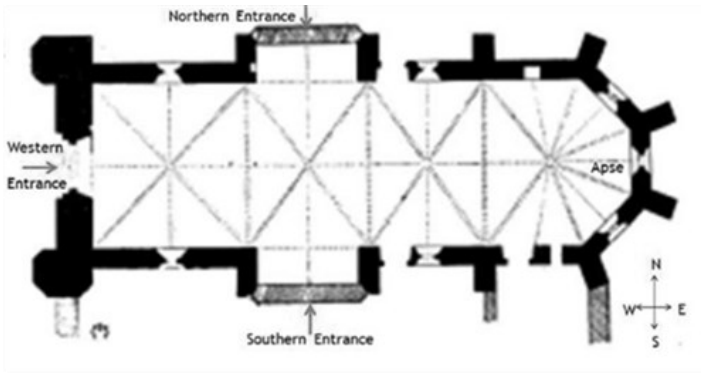
Name	St George of the Latins Church
Plan Type	Single-Naved
Built Date	At the end of the 13th century
Total Length	23.8240 m
Total Width	15.7711 m
Internal Length	20.5596 m
Internal Width	9.3981 m
The Ratio of the Various Rectangles	23.8240/15.7711=1.5106 20.5596/9.3981=2.1876 20.5596/15.7711=1.3036 17.0641/9.3981=1.8156 20.5596/9.3981=2.1876
Reference	Jeffery, 1906, p. 488.



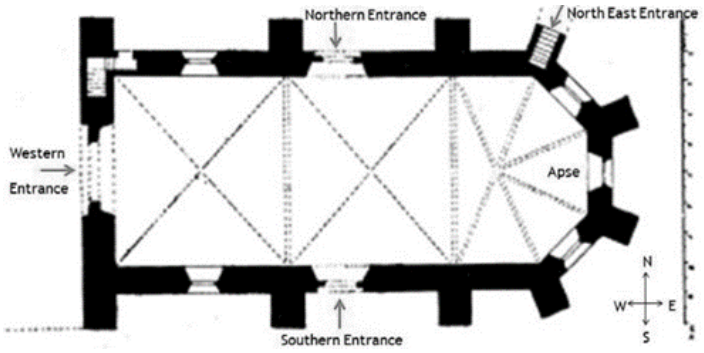
Name	Franciscans Monastery
Plan Type	Free-Cross (Cruciform)
Built Date	At the end of the 13th century (in 1292)
Total Length	36.9633 m
Total Width	17.9488 m
Internal Length	32.3340 m
Internal Width	8.9138 m
The Ratio of the Various Rectangles	36.9633/17.9488=2.0593 32.3340/8.9138=3.6274 17.9488/9.0310=1.9874 32.3340/17.9488=1.8014 17.9488/8.9138=2.0135
Reference	Enlart, 1987, p. 264.



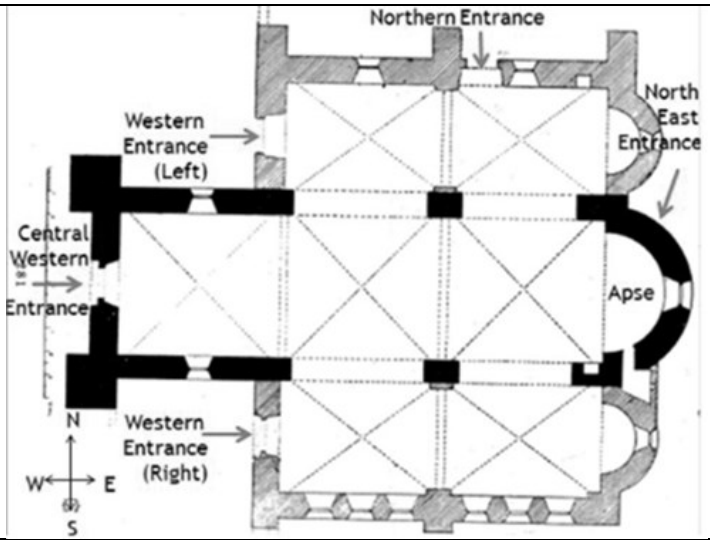
Name	St Mary of Carmel Church
Plan Type	Free-Cross (Cruciform)
Built Date	Around 1360
Total Length	42.9863 m
Total Width	18.1823 m
Internal Length	35.7974 m
Internal Width	10.8991 m
The Ratio of the Various Rectangles	42.9863/18.1823=2.3641 35.7974/17.4322=2.0535 32.6531/10.8991=2.9959 42.9863/17.4322=2.4659 35.7974/18.1823=1.9688
Reference	Enlart, 1987, p. 267.



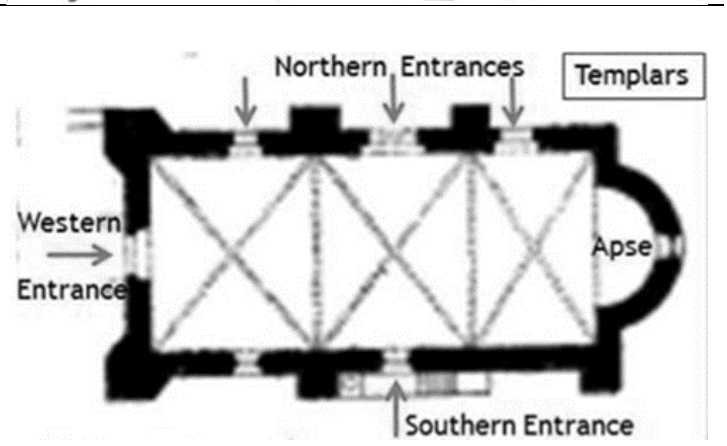
Name	St Anne Church
Plan Type	Single-Naved
Built Date	In the 14th century
Total Length	18.4254 m
Total Width	10.2883 m
Internal Length	15.5983 m
Internal Width	6.1205 m
The Ratio of the Various Rectangles	18.4254/10.2883=1.7909 15.5983/6.1205=2.5485 18.4254/15.5983=1.1812 13.9576/6.1205=2.2804 15.5983/10.2883=1.5161
Reference	Enlart, 1987, p. 278.



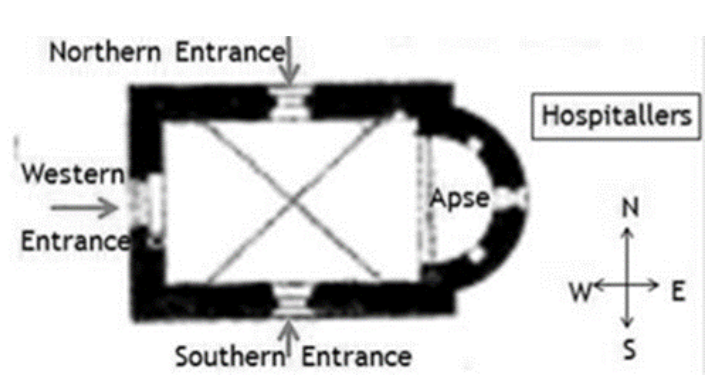
Name	Nestorian Church
Plan Type	Single-Naved (Originally) Three-Aisled (both aisles on the North & South sides were added later)
Built Date	In 1360
Total Length	27.1551 m
Total Width	22.1486 m
Internal Length	23.6013 m
Internal Width	17.5483 m
The Ratio of the Various Rectangles	27.1551/22.1486=1.2260 23.6013/17.5483=1.3449 23.6013/11.1100=2.1243 22.1486/11.1100=1.9935 27.1551/11.1100=2.4442
Reference	Enlart, 1987, p. 281.



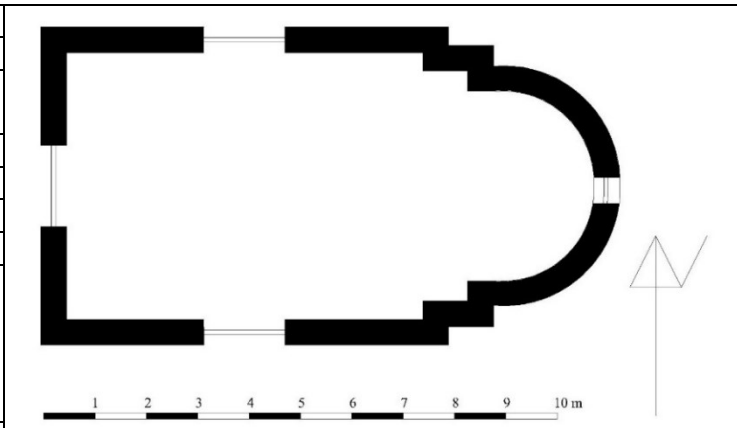
Name	Templars' Church
Plan Type	Single-Naved
Built Date	At the end of the 13th century or the beginning of the 14th century
Total Length	19.6314 m
Total Width	9.9606 m
Internal Length	17.2698 m
Internal Width	6.6995 m
The Ratio of the Various Rectangles	19.6314/9.9606=1.9709 17.2698/6.6995=2.5777 17.2698/9.8588=1.7517 19.6314/9.8588=1.9912 15.1424/6.6995=2.2602
Reference	Enlart, 1987, p. 291.



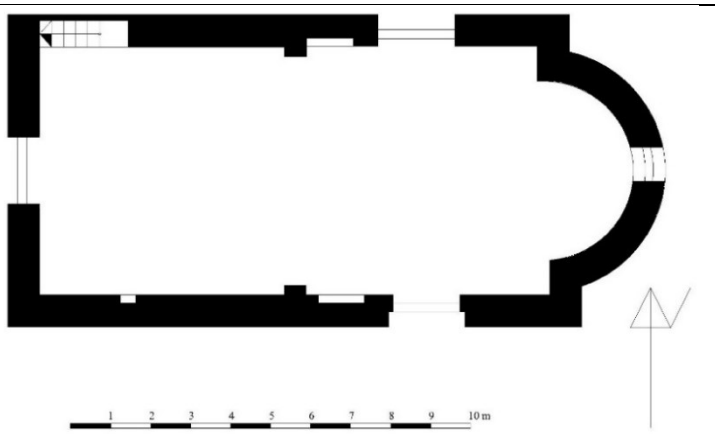
Name	Hospitallers' Church
Plan Type	Single-Naved
Built Date	From the 14th century
Total Length	13.1983 m
Total Width	8.0572 m
Internal Length	11.2075 m
Internal Width	5.6371 m
The Ratio of the Various Rectangles	13.1983/8.0572=1.6380 11.2075/5.6371=1.9881 11.2075/8.7943=1.2744 13.1983/5.6371=2.3413 8.7943/5.6371=1.5600
Reference	Enlart, 1987, p. 291.



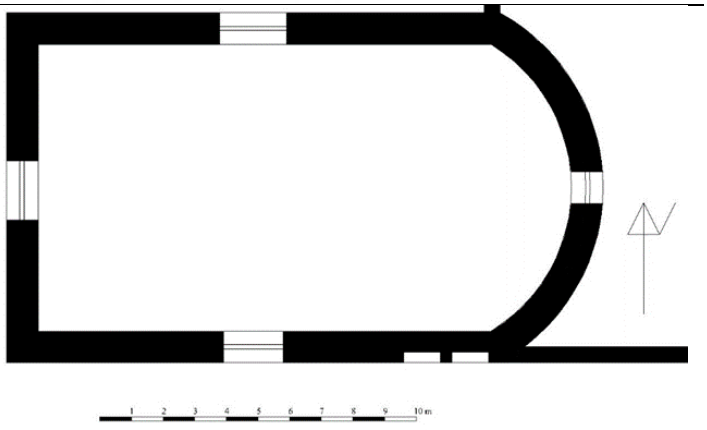
Name	The Armenian Church
Plan Type	Single-Naved
Built Date	Between the 14th-15th century
Total Length	11.2881 m
Total Width	6.1910 m
Internal Length	10.2870 m
Internal Width	5.1910 m
The Ratio of the Various Rectangles	11.2881/6.1910=1.8233 11.2881/5.1910=2.1745 10.2870/5.1910=1.9816 10.2870/4.4800=2.2962 7.8180/4.4800=1.7450
Reference	Developed by Author.



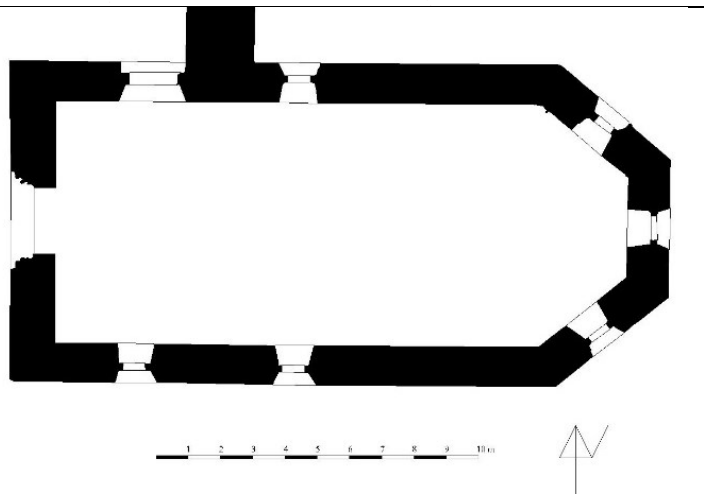
Name	Jacobean Church
Plan Type	Single-Naved
Built Date	During the 15th century
Total Length	16.4460 m
Total Width	7.8240 m
Internal Length	14.8407 m
Internal Width	6.2200 m
The Ratio of the Various Rectangles	16.4460/7.8240=2.1019 14.8407/6.2200=2.3859 16.4460/6.2200=2.6440 14.8407/5.7130=2.5977 12.4420/5.7130=2.1778
Reference	Developed by Author.



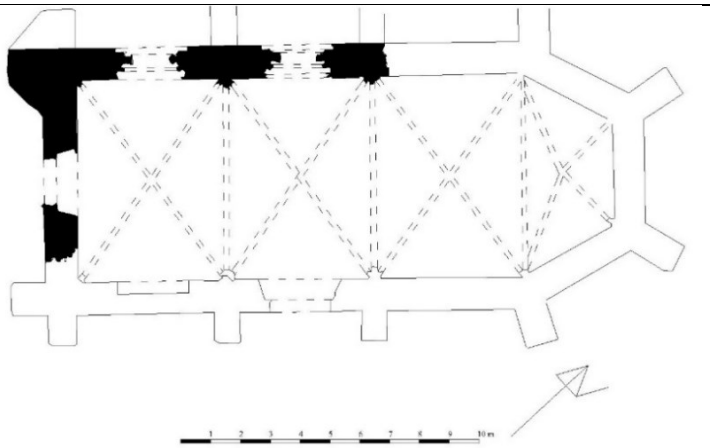
Name	Mustafa Pasha Mosque
Plan Type	Single-Naved
Built Date	During the 15th century
Total Length	18.8682 m
Total Width	11.0550 m
Internal Length	17.8680 m
Internal Width	10.0550 m
The Ratio of the Various Rectangles	18.8682/11.0550=1.7067 17.8680/10.0550=1.7770 17.8680/11.0550=1.6162 18.8675/10.0550=1.8764 15.4678/10.0550=1.5383
Reference	Developed by Author.



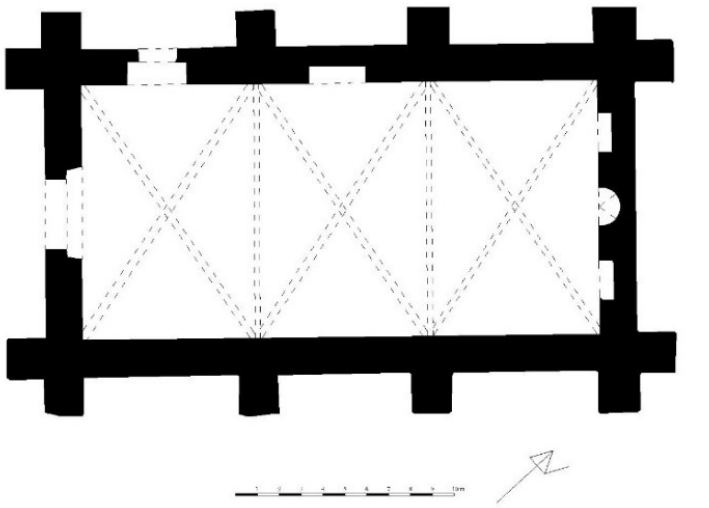
Name	Unnamed Church No: 1 (Ruined)
Plan Type	Single-Naved
Built Date	From the end of the 14th century to the beginning of the 15th century
Total Length	20.4718 m
Total Width	12.0214 m
Internal Length	17.7170 m
Internal Width	7.5146 m
The Ratio of the Various Rectangles	20.4718/12.0214=1.7029 17.7170/7.5146=2.3576 20.4718/10.0381=2.0394 17.7170/10.0381=1.7649 14.9723/7.5121=1.9930
Reference	Enlart, 1987, p. 297.



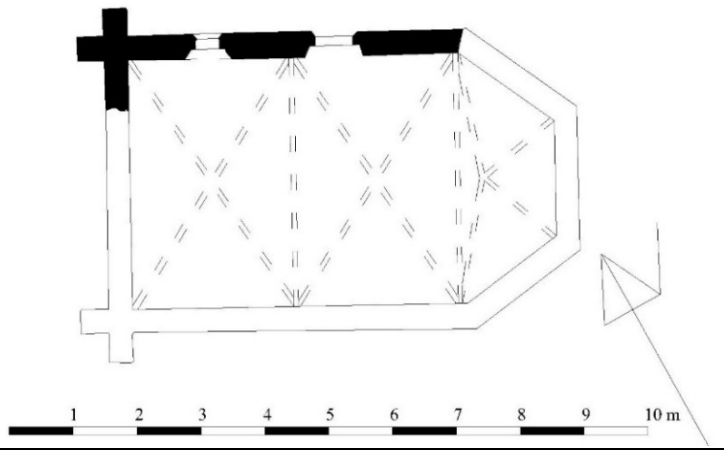
Name	Unnamed Church No: 3 (Ruined)
Plan Type	Single-Naved
Built Date	During the Latin period
Total Length	22.5187 m
Total Width	11.1777 m
Internal Length	17.9708 m
Internal Width	6.7388 m
The Ratio of the Various Rectangles	22.5187/11.1777=2.0146 17.9708/6.7388=2.6667 22.5975/11.3174=1.9967 20.1525/8.9685=2.2470 22.5187/17.9708=1.2530
Reference	Enlart, 1987, p. 295.



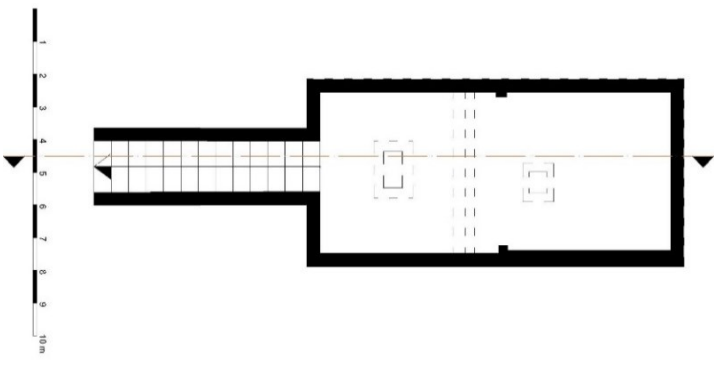
Name	Unnamed Church No: 4 (Ruined)
Plan Type	Single-Naved
Built Date	From the end of the 14th century to the beginning of the 15th century
Total Length	30.6327 m
Total Width	18.5612 m
Internal Length	23.6429 m
Internal Width	11.6214 m
The Ratio of the Various Rectangles	30.6327/18.5612=1.6503 23.6429/11.6214=2.0344 30.6327/15.0388=2.0369 27.0420/15.0388=1.7981
Reference	Enlart, 1987, p. 296.

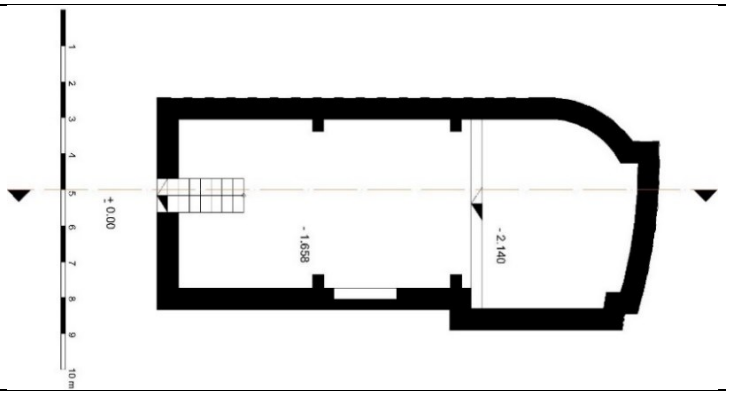


Name	Haia Fotou Church (Ruined)
Plan Type	Single-Naved
Built Date	During the Latin period
Total Length	7.7365 m
Total Width	5.5090 m
Internal Length	6.6613 m
Internal Width	3.9007 m
The Ratio of the Various Rectangles	7.7365/5.5090=1.4043 6.6613/3.9007=1.7077 7.7365/3.9007=1.9833 7.8142/5.5256=1.4141 7.3848/4.6724=1.5805
Reference	Enlart, 1987, p. 294.



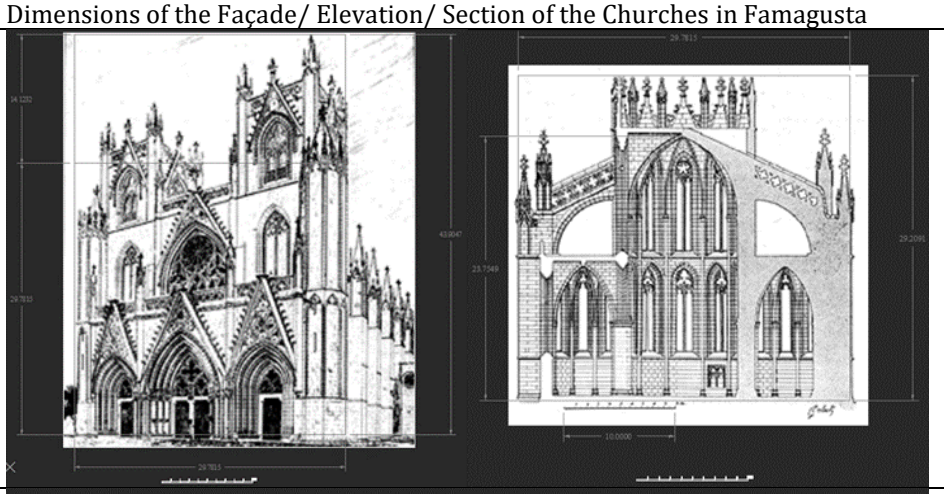
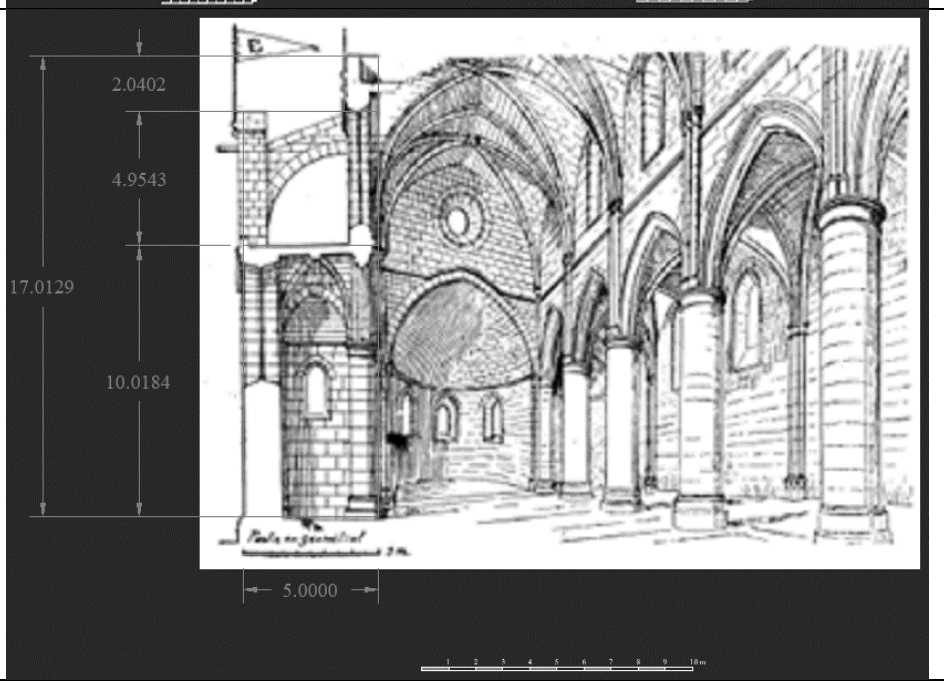
Name	St Dominic Crypt (Underground)
Plan Type	Single-Naved
Built Date	During the Latin period
Internal Length	10.7330 m
Internal Width	4.9330 m
The Ratio of the Various Rectangles	10.7330/4.9330=2.1757 10.7330/5.7330=1.8721 11.5330/5.7330=2.0116 10.7330/4.5300=2.3693 11.5330/4.5300=2.5459
Reference	Developed by Author.



Name	St Mary of Bethlehem Church (Underground)	
Plan Type	Single-Naved	
Built Date	Not Known.	
Internal Length	12.7241 m	
Internal Width	4.7020 m	
The Ratio of the Various Rectangles	12.7241/4.7020=2.7061 12.7241/3.9850=3.1929 12.7241/5.2676=2.4155	
Reference	Developed by Author.	

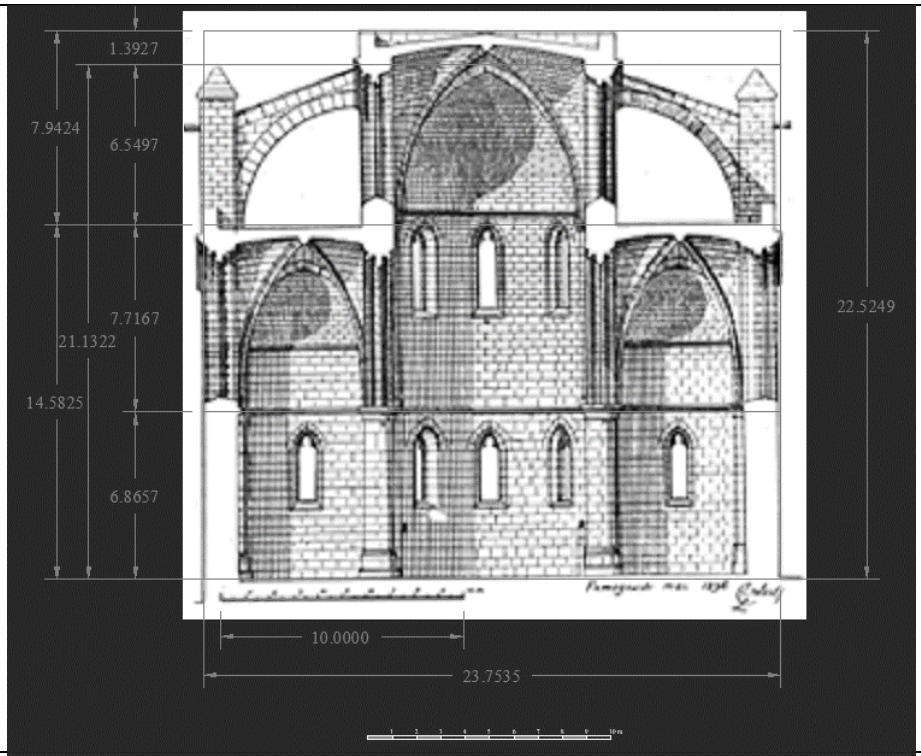
On average, the ratio of the total length to the total width of the plan of the churches in the Walled City of Famagusta is 1.8377. However, the total average of the various rectangles of the plan of the aforementioned churches is 1.9377 (Table 2).

Table 3. Analysing the Golden Ratio (the Golden Rectangle) on the Façade/ Elevation/ Section of the Churches in the Walled City of Famagusta (Developed by Author).

Name & Ratio (L/W)	Dimensions of the Façade/ Elevation/ Section of the Churches in Famagusta
West Façade (Left) & Section (Right) of St Nicholas Cathedral (Enlart, 1987, pp. 231, 232). 43.9047/29.7815=1.4742 29.7815/14.1232=2.1089 29.7815/29.2091=1.0195 29.7815/23.7549=1.2536	
Section of SS Peter & Paul Church (Enlart, 1987, p. 247). 17.0129/10.0184=1.6981 10.0184/4.9543=2.0221 17.0129/16.9985=1.0008 20.2763/17.0129=1.1918	

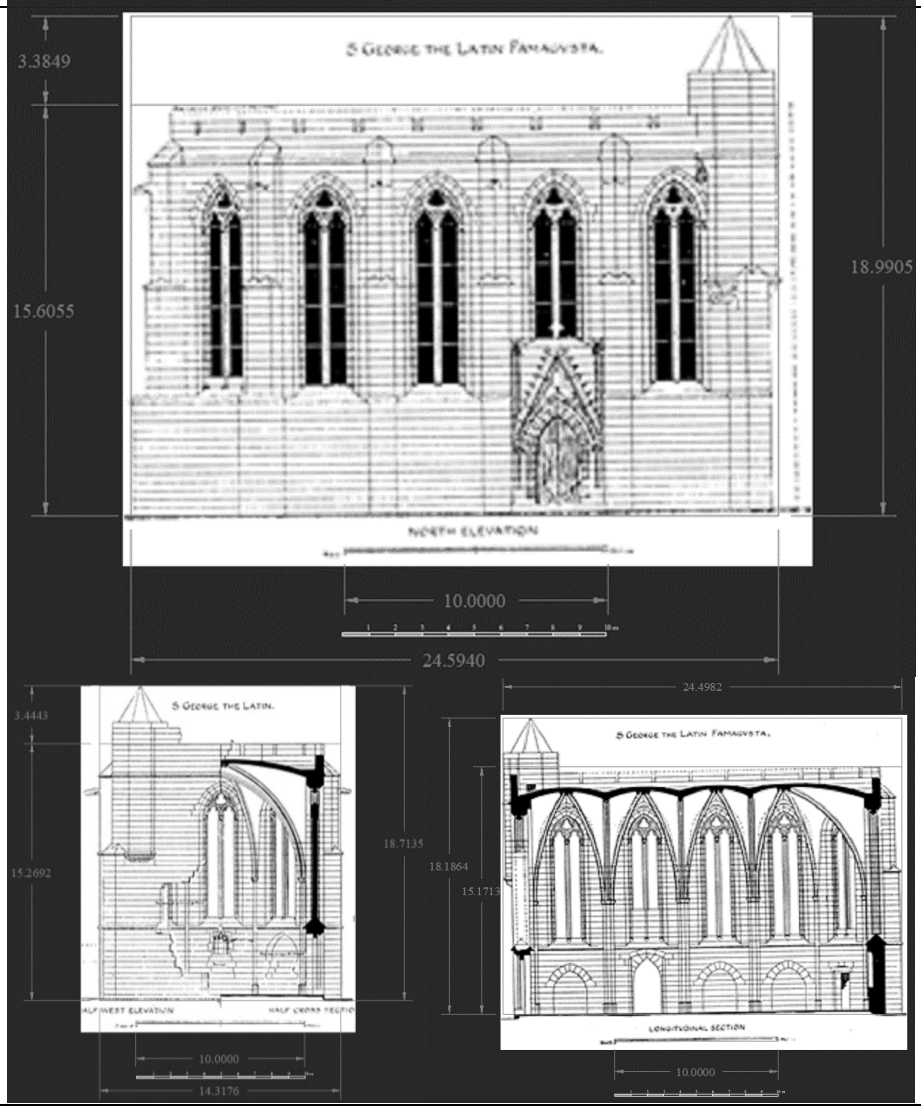
Section of St George of the Greeks Cathedral (Enlart, 1987, p. 254).

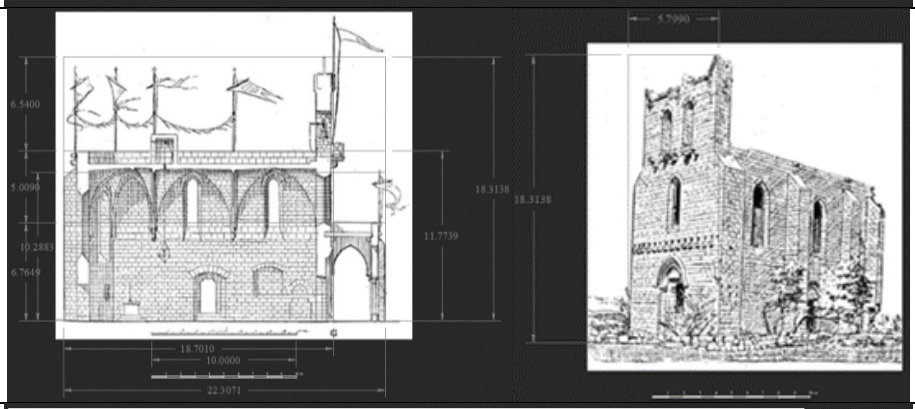
23.7535/22.5249=1.0545
14.5825/7.9424=1.8360
7.7167/6.8657=1.1239
23.7535/21.1322=1.1240



North Elevation (Up), West Façade (Bottom Left), & Section (Bottom Right) of St George of the Latins Church (Jeffery, 1906, pp. 488, 489).

24.5940/18.9905=1.2950
24.5940/15.6055=1.5759
18.7135/14.3176=1.3070
15.2692/14.3176=1.0664
24.4982/18.1864=1.3470
24.4982/15.1713=1.6147



West Façade of St Mary of Carmel Church (Enlart, 1987, p. 268). 49.3010/40.3021=1.2232	
Section (Left) & South-West View (Right) of St Anne Church (Enlart, 1987, pp. 275, 277). 22.3071/18.3138=1.2180 22.3071/11.7739=1.8946 18.7010/11.7739=1.5883 18.7010/10.2883=1.8176 18.3138/11.7739=1.5554 18.3138/10.2883=1.7800	
North Elevation of Nestorian Church (Enlart, 1987, p. 282). 27.1551/22.1486=1.2260 27.1551/17.4078=1.5599 22.1486/11.1100=1.9935 11.1100/9.0131=1.2326	

On average, the ratio of the length to the width of the rectangles on the façade/ elevation/ section of the selected churches in the Walled City of Famagusta is 1.4552 (Table 3).

Conclusion

Churches were considered the holy house of God which represented the perfect proportions of Holy Jesus Christ and/ or Holy Virgin Mary during the Medieval era. The Golden Ratio is supposed to have the divine proportion, the perfect ratio of the length to the width of a rectangle. When the precise dimensions of the case studies in this research are measured, the ratio of the total length to the total width on the plan of the churches in the Walled City of Famagusta is 1.8377 on average. Moreover, the total average of the various rectangles of the plan of these churches is 1.9377, and the ratio of the length to the width of the rectangles on the façade, elevation, and section of the aforementioned churches is 1.4552 on average which is almost "φ" (1.618033988749…). It can be concluded that the selected churches in the Walled City of Famagusta are built according to the Golden Ratio and the people who built these churches paid precise attention to the Divine Proportion for aesthetic reasons. Even if these churches were not built according to the Golden Ratio, they need to be respected by all the people all over the world no matter what their religion or nationality is, because all the cultural heritage is the precious souvenirs of our ancestors to us and also to all the future generations too. These churches, just like all other precious historic buildings and sites all over the world are belongings of all the people in the world no matter what their nationality or religion, race or sect are as they do not just belong to their builders in the past time, but also, they all belong to the present time people worldwide as they all belong to all the future generations too.

Acknowledgement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. I would like to acknowledge Associate Professor Dr Netice Yıldız, an Architecture Faculty Member of Eastern Mediterranean University in Famagusta, North Cyprus, for suggesting and providing some of the references.

Conflict of Interests

The author declares no conflict of interest.

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