

# The upper roof chambers within the Great Pyramid

## Abstract

The Great Pyramid of Giza is a well known ancient monument on the outskirts of Cairo. Its upper chamber is considered to be the principal chamber of the building, and above this chamber are a series of similarly sized roof chambers, commonly known as the 'relieving chambers' or 'chambers of construction'.

The positions of these roof chambers have never been surveyed due to the almost inaccessible nature of the chambers, accessed via an arbitrarily carved out twisting vertical tunnel which prevents any surveying attempts to connect the roof chambers to the rest of the pyramid's internal architecture. The roof chambers are currently assumed to be directly above the upper chamber of the pyramid only because they have the approximate same internal dimensions as that chamber.

In this paper I show that by examining the red vertical paint marks that are present on these roof chambers' walls, the precise location, shape and orientation of all of the roof chambers can be established relative to the rest of the internal architecture of the building. In so doing I establish that the red paint marks in the roof chambers are architect's marks which are present for the purpose of allowing anyone examining the building to determine the positions of the roof chambers, and that they are not builder's marks that were used during the construction process, as is currently assumed.

As part of the analysis I also determine that the side holes in the gallery room of the Great Pyramid, which to date have never been understood, are a model of the upper roof chambers from which the vertical position of the roof chambers' ceilings can be established, and that these ceilings fall on integer or half-integer cubit altitudes when measure from the base level of the pyramid.

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The Great Pyramid papers

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# The upper chamber roof within the Great Pyramid

The area of the Great Pyramid above the upper chamber contains a series of vertically short chambers, referred to variously as the 'relieving chambers', 'chambers of construction' or 'roof voids', which are currently assumed to be located directly above the upper chamber of the pyramid and to have the same general form as the upper chamber, that being a rectangular shape. They are drawn in detail in the work of Maragioglio and Rinaldi<sup>1</sup>, and one could easily be mistaken in thinking that this area of the pyramid has been thoroughly surveyed and resolved. This is not the case.

On the drawings just mentioned, the vertical distances between these various roof chambers is shown as being approximate, and furthermore the access to these chambers is via a precarious tunnel which has been excavated from the core masonry of the pyramid. This tunnel is of such a perilous construction that in the published work of William Petrie<sup>2</sup> he describes how the local guides refused to ascend the structure, such was its dangerous state and considerable height. Implicit in this description is the fact that these upper chambers have never been surveyed accurately to connect them to the main body of the internal structure of the building, and that their vertical height above the upper chamber and their conformity to a rectangular shape has not been determined. Their vertical position has only been estimated from measurements taken inside the twists and turns of the carved out tunnel.

As was described in an earlier paper in this series<sup>3</sup>, *The vertical chamber stack of the Great Pyramid - part I*, the first roof chamber contains a secondary tunnel section on its south side which has allowed its vertical height above the upper chamber roof to be determined to a high degree of accuracy because the sides of the roof beams of the upper chamber are visible within this southern tunneled out section and the distance to the roof chamber can be accurately measured. This is the one and only known fact about all the roof chambers, and from chamber two upwards the vertical and horizontal location of each chamber is as yet unknown, despite numerous drawings showing what appears to be their definitive positions.

## The architect's marks and glyphs

Many of the roof chambers contain precisely located red painted marks and glyphs of various types. These marks and glyphs have been published in detail in the works of Perring<sup>4</sup>, Petrie<sup>5</sup> and Maragioglio and Rinaldi<sup>1</sup>, and from these three works a summary of the locations of them can be presented. In descending order of roof chamber they are:

	<u>North wall</u>	<u>West wall</u>	<u>South wall</u>	<u>East wall</u>
<b>Chamber 5</b>	Builder's marks Glyphs	Builder's marks	Builder's marks Glyphs	Glyphs
<b>Chamber 4</b>	Builder's marks Glyphs	Glyphs	Builder's marks Glyphs	---
<b>Chamber 3</b>	Builder's marks	Builder's marks Glyphs	---	---
<b>Chamber 2</b>	---	Glyphs	Builder's marks	Builder's marks Glyphs
<b>Chamber 1</b>	---	---	---	---

These marks and glyphs have been accurately documented by the respective authors because, although the roof chamber's relative positions are unknown, within each roof chamber the locations of the marks has been referenced to the ends of that roof chamber's walls and measured to 1/10th of an inch.

It has been assumed in the past that these red marks were builder's marks and that they were painted onto the stonework of the roof chamber walls to assist the builders when constructing the pyramid, but it can be shown that this is not the case and that they are in fact architect's marks which allow the relative positioning of the roof chambers to be determined without the need for surveying. They are a necessity when reconstructing the roof chambers locations because the roof area above the upper chamber is specifically designed to be un-surveyable.

## The roof plans

In addition to the architect's red marks in the roof chambers, there is also a plan of the north and east elevations of the roof chambers cleverly concealed within the gallery of the pyramid. The side holes that are built into the gallery benches are shown in diagram D1.

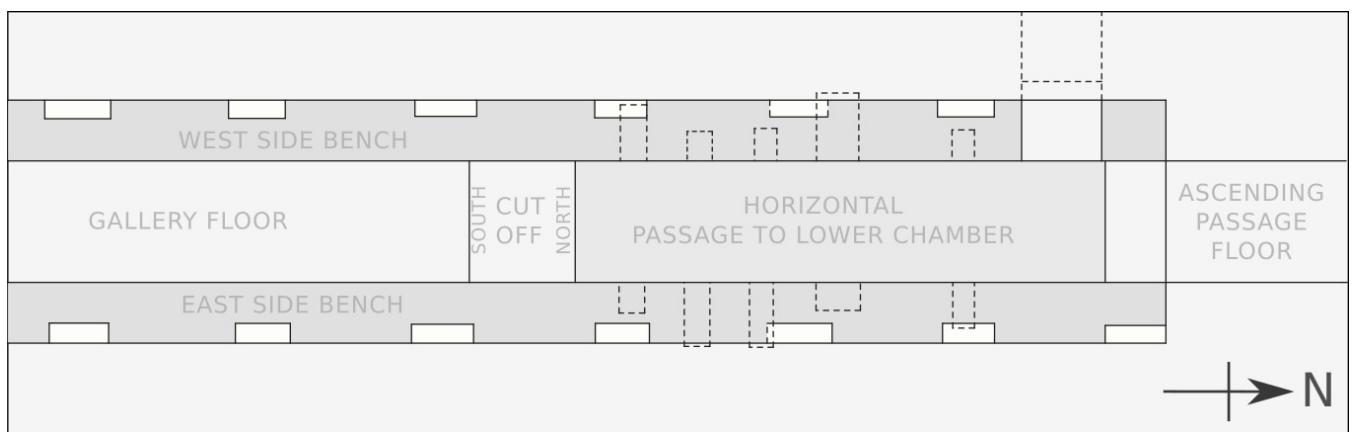


Diagram D1 - A plan view of the start of the gallery

The diagram shows the start of the gallery with the ascending passage coming in from the right side, then the floor of the horizontal passage which runs through to the lower chamber, and the continuation of the gallery floor with its vertical cut off, the north side of which is the vertical face and the south side being the shallow indentation in the gallery floor. The side benches show regularly placed holes as white rectangles, and the side holes that are of interest, which are cut underneath the benches, are shown by the dotted lines.

The four southern most side holes are an exact copy of the roof chambers of the pyramid, and when scaled up correctly allow the precise vertical locations of the roof chambers to be determined. The scaling of the gallery's architecture that is required to align the roof chambers conforms to the system that has already been determined within the vertical chamber stack of the building and is  $5+n$ , where  $n$  is the stack constant that was determined previously<sup>6</sup> with a value of 153/748 cubits.

Once the gallery section has been scaled up, it needs to be viewed from below and then placed vertically with the cut off of the gallery floor aligned to the ceiling of the first roof chamber, which was the final position that was determined in the vertical stack<sup>7</sup> at a height above the pavement of 98.5 cubits.

The vertical positioning is shown in diagram D2 next to the drawing of the roof chambers that was drawn by Maragioglio and Rinaldi which contains their *estimated* vertical positions of the roof chambers, as shown by the ~ character before the vertical dimensions between the roof chambers on their drawing.

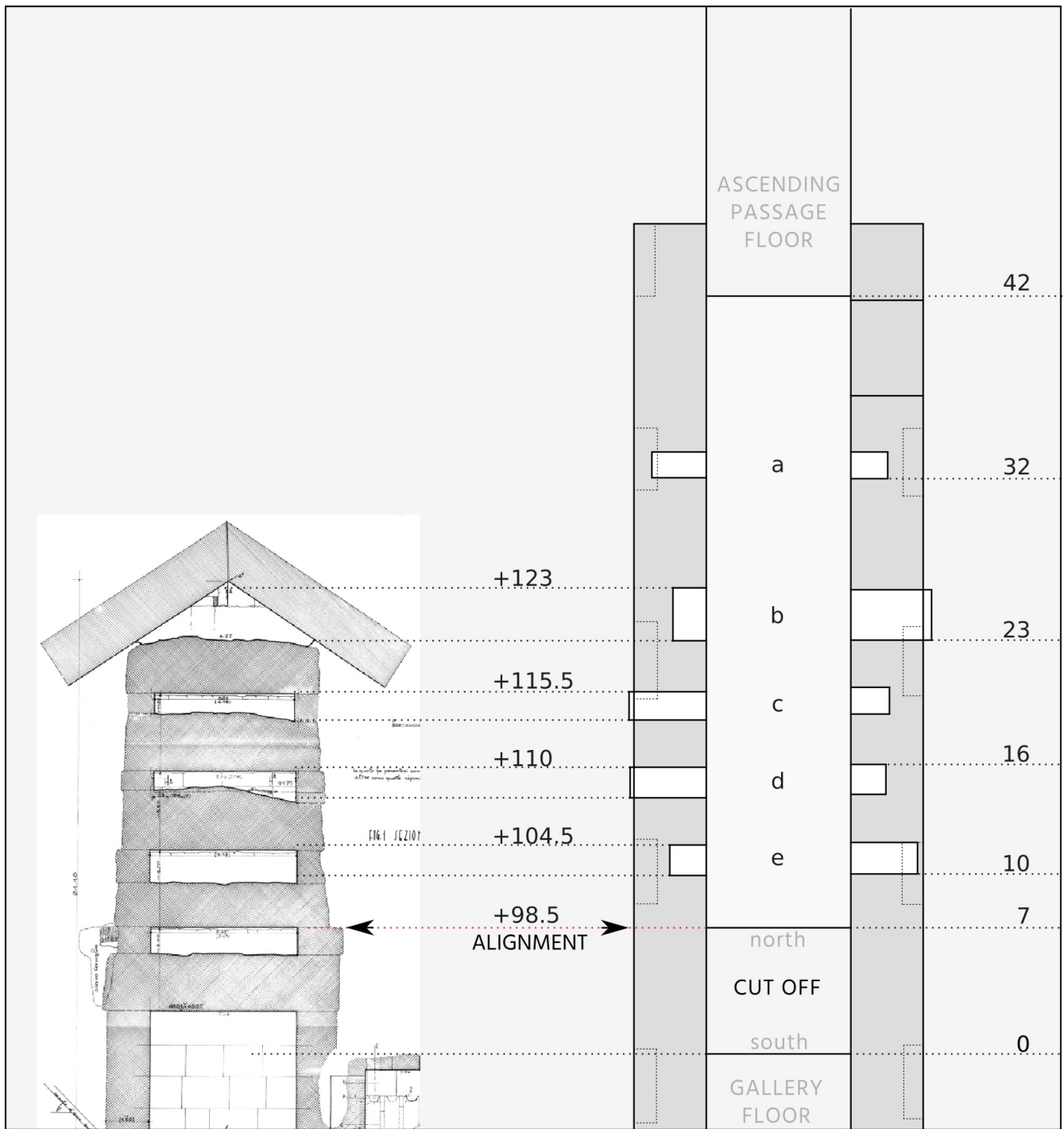


Diagram D2 - The scaled up gallery compared to Maragioglio and Rinaldi's east elevation of the roof chambers

The letters a-e on the gallery plan view refer to the letters that professor Smyth allocated to the five side holes in his work<sup>8</sup>. There are two series of numbers shown on the illustration. On the right side of diagram D2 is a series of integer values which start at 0 at the bottom on a line which appears not to match up with any feature of the building but which runs along the 4th level of wall stones in the upper chamber. The series of numbers continues with integer values 7,10,16,23,32 and 42 and all of these numbers are determined from the distances defined between the 0 , 7 and 10 lines - that is to say that the numbers are proportional values and not absolute, and the scale of the drawing makes no difference to these integers.

The second set of numbers on the left of diagram D2 are the vertical heights of the roof chamber ceilings above the pavement level of the pyramid when the north cut off line in the gallery is aligned with the ceiling of the first roof chamber at an altitude of 98.5 cubits above the pavement base level.

The following table, D3, which is taken directly from a spreadsheet shows the original measurements within the gallery taken by professor Smyth<sup>9</sup> which correspond to the the five elevation lines on diagram D2 and the value of these measurements when scaled up by a factor of 5+n in order to show the accuracy of the architect's system and the surveying errors in Smyth's work.

Incline 26 16' 40"			26.27778 (deg)						
			0.458634 (rad)						
Scale 5+n			5.204545						
Cubit			20.603149 (inches)						
<b>East Side Holes</b>	Reference and direction	Units	a	b	c	d	e	cut off*	
Distance along incline to north side	From north wall, north	(inches)	72.5	115.7	148.7	172.7	197.4	223.7	
Distance along incline to south side	From north wall, north	(inches)	80.7	132.5	157.7	182.4	207.1	263.8	
Distance horizontally to north side	From north wall, north	(inches)	65.01	103.74	133.33	154.85	177.00	200.58	
Distance horizontally to south side	From north wall, north	(inches)	72.36	118.81	141.40	163.55	185.70	236.54	
Distance horizontally to north side	From north wall, north	(cubits)	3.16	5.04	6.47	7.52	8.59	9.74	
Distance horizontally to south side	From north wall, north	(cubits)	3.51	5.77	6.86	7.94	9.01	11.48	
Scaled distance horizontally to north side	From north wall, north	(cubits)	16.42	26.21	33.68	39.12	44.71	50.67	
Scaled distance horizontally to south side	From north wall, north	(cubits)	18.28	30.01	35.72	41.31	46.91	59.75	
Scaled distance horizontally to north side	From cut off, south	(cubits)	34.25	24.46	16.99	11.55	5.96	0.00	
Scaled distance horizontally to south side	From cut off, south	(cubits)	32.39	20.66	14.95	9.35	3.76	-9.08	
Rebased to 98.5 cubits to north side	From cut off, south	(cubits)	<b>132.747</b>	<b>122.962</b>	<b>115.488</b>	<b>110.052</b>	<b>104.457</b>	<b>98.500</b>	
Rebased to 98.5 cubits to south side	From cut off, south	(cubits)	130.9	119.2	113.4	107.9	102.3	89.4	
Nominal value on north side	From cut off, south	(cubits)	<b>132.75</b>	<b>123</b>	<b>115.5</b>	<b>110</b>	<b>104.5</b>	<b>98.5</b>	
Survey error scaled back down		(inches)	0.01	0.15	0.05	-0.20	0.17	0.00	

\* Petrie's measurements

Table D3 - The calculations to scale up the gallery side holes from Smyth's survey measurements

From this table it can be seen that when the north sides of the holes are rationalised to their nominal values as shown on diagram D2 then the errors in the surveying measurements range from 1/100th of an inch to 2/10ths of an inch, and are within the margins that would be expected from Smyth's measurements.

With the vertical locations of the roof chamber ceilings established, it is now possible to reconstruct the section of the pyramid's internal architecture at the top of the building by reference to these values and the architect's red marks inside each roof chamber

## Reconstructing the roof chambers

The reconstruction of the roof chambers needs to be performed in one particular manner in order for the logic of the architect's system to manifest itself. The east elevation needs to be constructed first, roof section by section up to the gabled ceiling of the top roof chamber, then the construction lines that have been formed during this process can be attached to the north elevation of the chamber, using the system shown in the previous paper in this series regarding the horizontal chamber stack<sup>9</sup>, from which juncture the north elevation chamber placements can be performed. The system is entirely logical and positions many of the architect's red construction lines at integer cubit distances from the central axis of the pyramid and also aligns to the architect's gallery plan of the roof chambers in both vertical and horizontal directions.

### East elevation - Roof chamber 1

(Known as Davidson's chamber)

This chamber is located directly above the upper chamber of the pyramid. It contains no architect's marking or glyphs, by which the architects are indicating that there are no adjustments to be made to its horizontal location in either a north-south or east-west direction. From the analysis of the vertical

chamber stack the altitude of this roof chamber's ceiling was determined as being 98.5 cubits above the pavement outside the building, and the final part of the vertical chamber stack calculation indicated that this first roof chamber is in effect a continuation of the upper chamber. Additionally the tunnel on the south side of this chamber that exposes the roof beams of the main chamber below exists so that the alignment of the upper chamber and first roof chamber can be visually inspected and measured with accuracy.

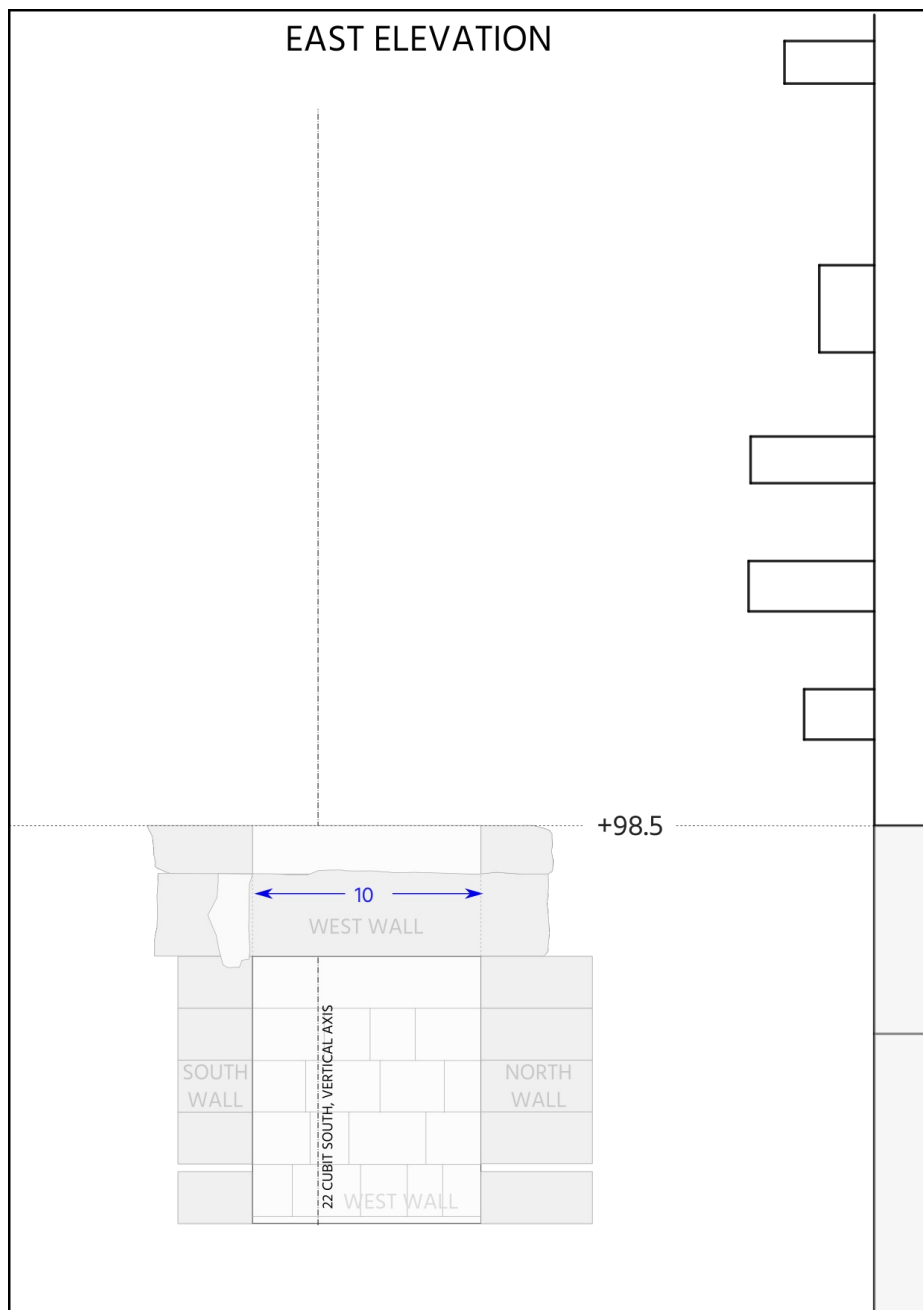


Diagram D4 - The first roof chamber

On diagram D4 the scaled up plan of the gallery side holes is shown on the right of the illustration which has been simplified so as to be easier to view. The width of the gallery floor was set to 0.5 cubits before being scaled up onto the diagram. On the left side of the diagram is the east elevation of the upper chamber with the first roof chamber placed directly above it. The vertical axis line that was established by analysing the horizontal chamber stack in the previous paper<sup>10</sup> is shown running through the chamber and continuing upwards. This vertical axis line is shown behind the roof chamber simply to keep the diagram clean and easy to view, and its positioning at the rear of the drawing is of no architectural significance. The altitude of the first roof chamber's ceiling, which was established at 98.5 cubits above the pavement outside the pyramid, is shown along with a dotted horizontal line which runs through the ceiling line and connects with the scaled up gallery plan at the point where the gallery floor has its vertical cut off.

## East elevation - Roof chamber 2

(Known as Wellington's chamber)

On the east elevation the architect's marks and glyphs in the second roof chamber are found only on the east wall, there are none on the west wall, and to keep the drawings of the building rational and also easier to understand it is best to view the east wall from the east side of the pyramid, in other words from behind the wall. As a consequence it is necessary to reverse the drawings of the glyphs and lines that are presented in the work of Perring<sup>4</sup> before rendering them onto a drawing. Diagram D5e shows the first roof chamber's east elevation east wall viewed from the east.

The red painted vertical architect's marks are positioned according to the measurements of Petrie and not from the drawings of Perring, and this is the case in all subsequent diagrams in this work, although I have found that any discrepancies between the two works to be inconsequential. The outer architect's lines on diagram D5e are spaced 10 cubits apart, and approximately in the center of these outer marks is a third vertical red line.

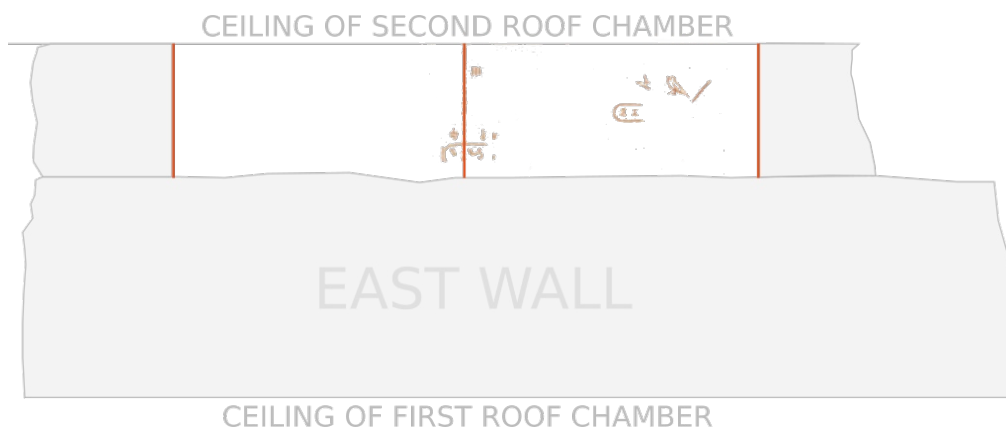


Diagram D5e - The east wall of the 2nd roof chamber (viewed from east)

This second roof chamber can only be positioned in one manner, and that is to align the central vertical architect's red line with the vertical axis that runs up from the upper chamber of the pyramid and which is located 22 cubits south of the central vertical axis of the building.

The result when positioning the second roof chamber in this manner is shown in diagram D5 in which the ceiling of the second roof chamber is located 104.5 cubits above the pavement of the pyramid and the dotted horizontal line runs through the ceiling line and connects to the north end of the southern most side hole on the scaled up gallery floor plan.

It is important to note that the alignment of the second roof chamber that has just been performed is to the architect's central mark *on the east wall* and that the west wall cannot be assumed to be aligned in a similar manner until proven otherwise. This is the case because the roof chambers have not been thoroughly surveyed, they have only been measured, and the assumption that the roof chambers are rectangular cannot be made.

The south side tunnel of the 1st roof chamber has been removed from diagram D5 and all subsequent diagrams only to keep the graphics easy to view, and there is no architectural significance to this.

# EAST ELEVATION

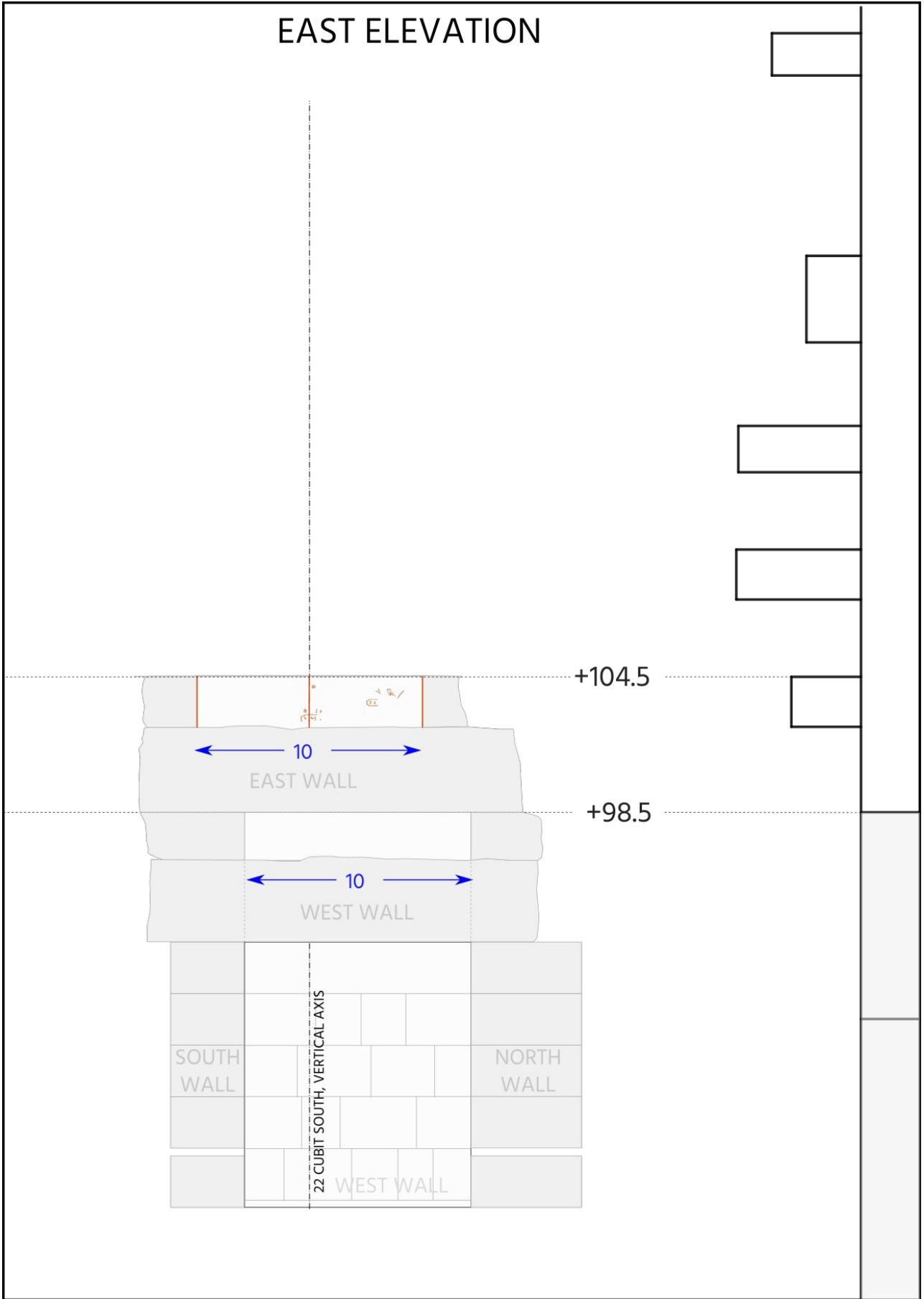


Diagram D5 - The 2nd roof chamber construction



## East elevation - Roof chamber 3

(Known as Nelson's chamber)

The first point of note about this chamber is that it has architect's marks on the west wall only, which is the opposite of the 2nd roof chamber which had architect's marks only on the east wall only, suggesting that the two roof chambers are complementary to each other and that the information required to determine whether the chamber is rectangular or not can be gleaned from the two chambers when considered together.

On the west wall of the third roof chamber there are two vertical architect's marks as shown in diagram D6e. The distance between the two marks is 7.14 cubits and of no significance, the distance from the north wall to the right side architect's mark is 1.85 cubits and also of no significance, and the distance from the left architect's mark to the the south wall is exactly 1 cubit.

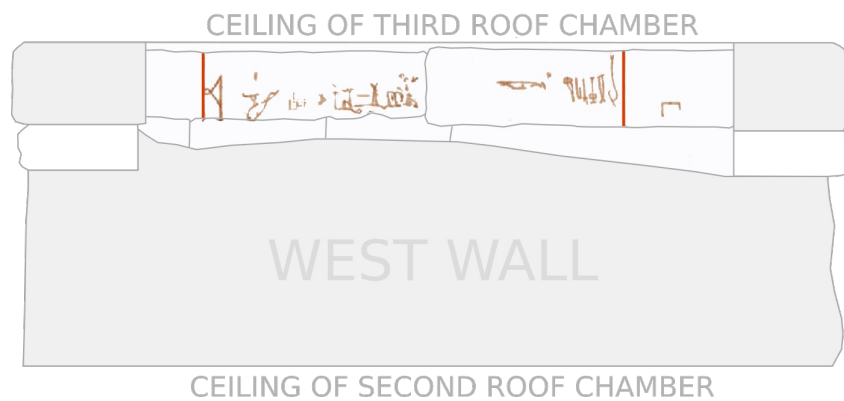


Diagram D6e - The west wall of the third roof chamber

To reconstruct the east elevation, the southern end architect's mark that is 1 cubit from the south wall must be placed directly above the architect's mark found at the southern end of the chamber below. When this is done, the second architect's mark towards the northern end of the third roof chamber falls exactly on the central vertical axis of the upper chamber of the pyramid, as shown in diagram D6.

The reason that the southern architect's vertical red line is set exactly one cubit from the south wall is because by aligning the southern vertical architect's lines from roof chamber's two and three, the central axis of roof chamber three must now fall on a vertical axis line which is precisely 23 cubits from the pyramid's central vertical axis. This supplementary vertical axis line is shown on diagram D6 starting in the upper chamber and running up the drawing.

If you now consider the alignment of the east and west ends of the 3rd and 2nd roof chambers, the roof chambers cannot be rectangular in plan view if the north and south walls are aligned, because the east and west end walls are marked off as being 1 cubit offset from each other in a southerly direction. So either the plan view of the roof chambers is a parallelogram, or it is a rectangle with the roof chambers rotated relative to the upper chamber.

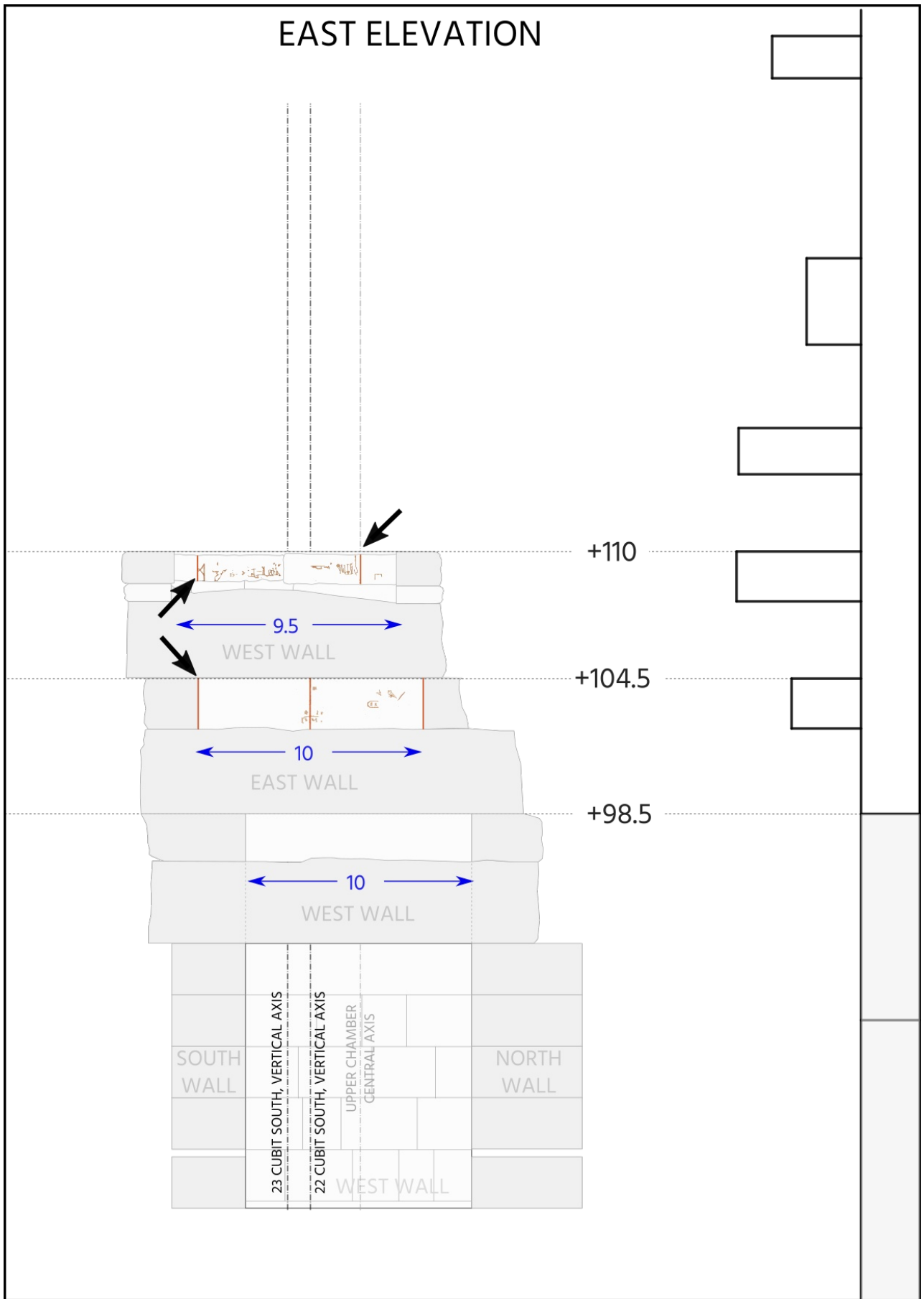


Diagram D6 - The 3rd roof chamber construction

## East elevation - Roof chamber 4

(Known as Lady Arbuthnot's chamber)

There are no architect's vertical red lines on either the west or east walls of this roof chamber, and the west wall contains numerous glyphs as shown in diagram D7e.

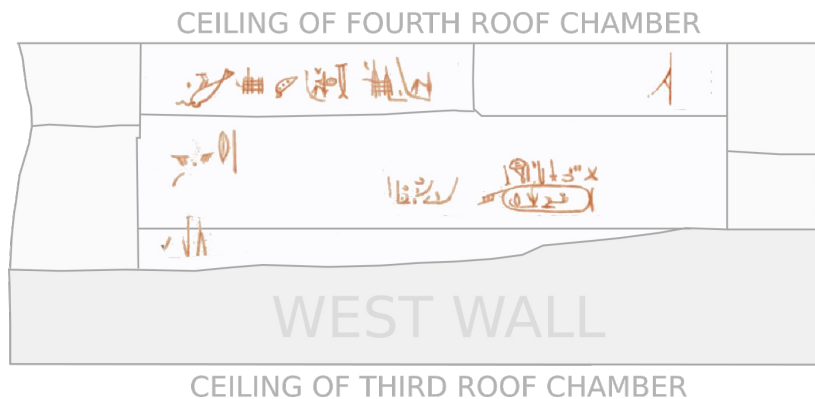


Diagram D7e - The west wall of the fourth roof chamber

Because there are no architect's alignment marks, as with the first roof chamber, this roof chamber needs to be placed directly above the chamber below it, or to be more specific it needs to be aligned with the previous roof chamber for which there is a known alignment, which happens to be the roof chamber below as the reconstruction is being performed from the lowest roof chamber upwards.

## East elevation - Roof chamber 5

(Known as Campbell's chamber)

The final upper chamber is the gabled roof chamber, and on the west wall is a distinct red architect's line at the top of the chamber which has a small triangle attached to it which points towards the south, or to the left on the diagram. This architect's mark lines up with the vertical axis line that is 23 cubits south of the pyramid's central vertical axis, and the west end of the upper roof chamber is directly above that of the roof chamber below. This distinct architect's mark signifies the 23 cubit south axis line.

The east wall of the fifth chamber contains only glyphs, and the complete reconstruction of the east elevation of the roof chambers is shown in diagram D8 where the altitude of the fourth roof chamber ceiling of +115.5 cubits above the pavement, and that of the top of the fifth chamber which is at +123 cubits above the pavement are shown with dotted lines which attach to the scaled up gallery plan.

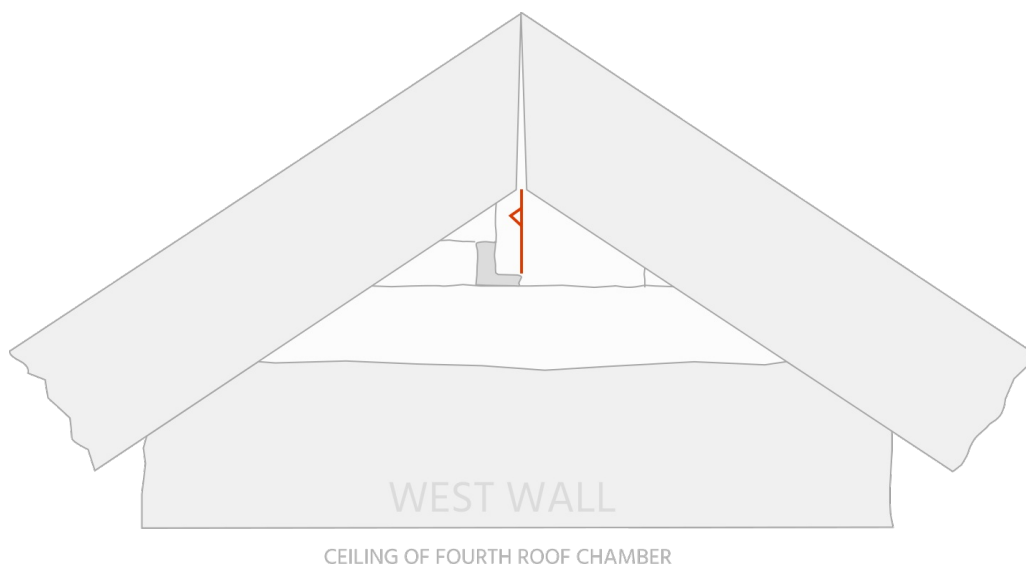


Diagram D8w - The west wall of the fifth roof chamber

# EAST ELEVATION

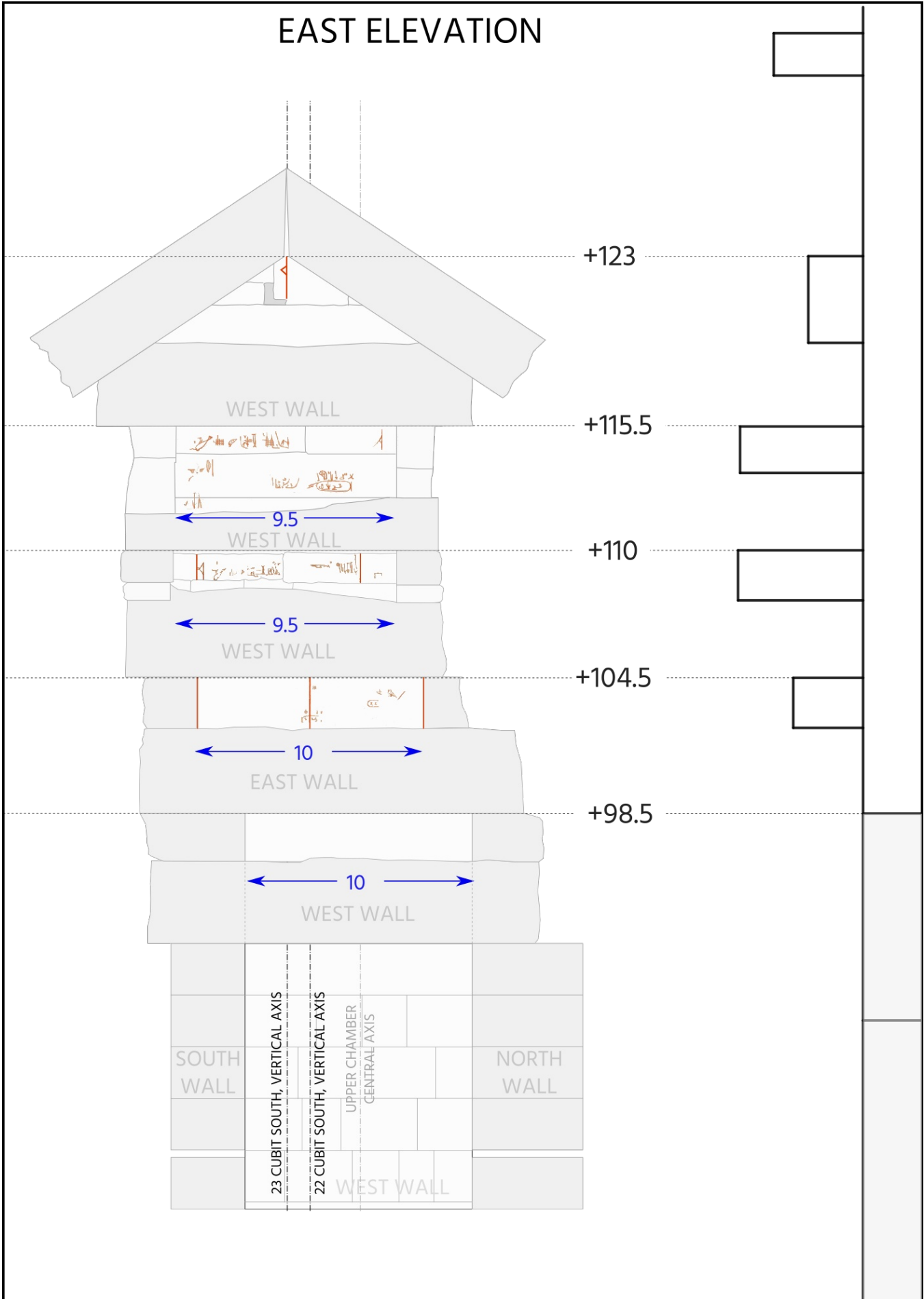


Diagram D8 - The west wall of the fourth and fifth roof chambers - the full east elevation roof stack

## Connecting the east and north elevations

The next step in the logical reconstruction is to use the information that was determined when analysing the horizontal chamber stack in the previous paper<sup>10</sup>, and move the east elevation of the upper chamber into its locked together position with the north elevation. It is vital when performing this part of the construction to keep the two vertical axis of the the east elevation, one at 22 cubits and one at 23 cubits from the central vertical axis of the pyramid on the east elevation, attached to the chamber when it is moved as these axis are required to correctly reconstruct the north elevation. The result of horizontally stacking the upper chamber's east and north elevations is shown in diagram D9 on which the east and north elevation walls overlap by a distance of 'n', or one stack constant.

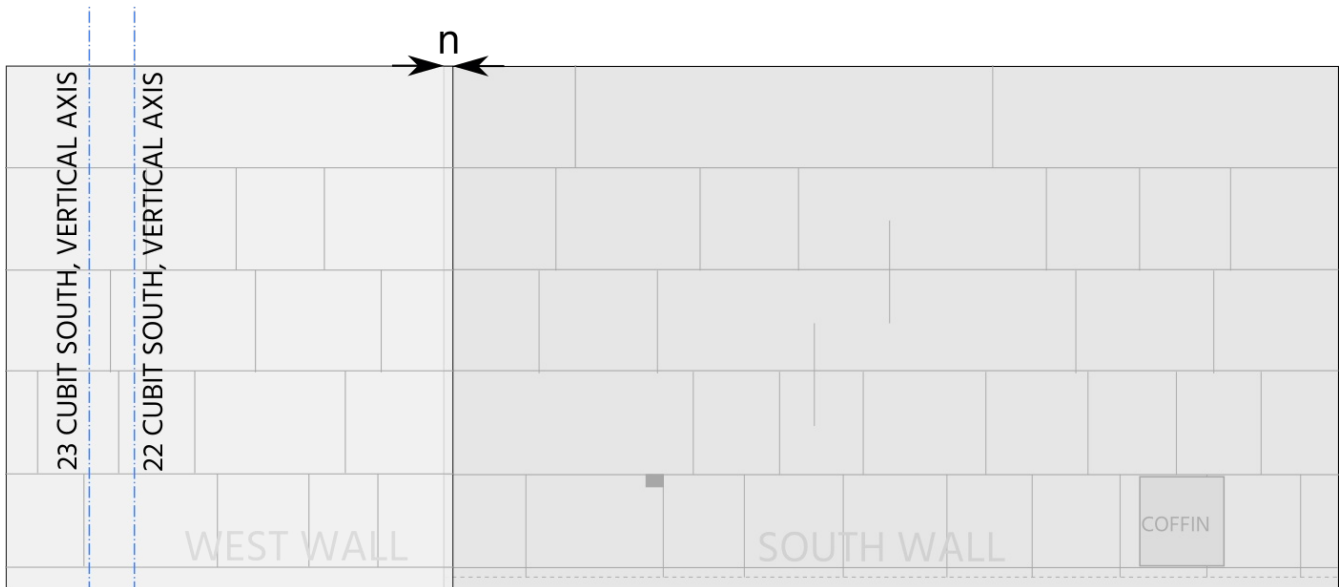


Diagram D9 - The horizontal stack of the upper chamber's east and north elevations

## North elevation - Roof chamber 4

(Known as Lady Arbuthnot's chamber)

Surprisingly, the reconstruction of the north elevation does not start at the lowest roof chamber, but rather at the fourth roof chamber. Diagram D10s shows the south wall of the 4th roof chamber which contains a mixture of glyphs and architect's vertical and horizontal red lines.

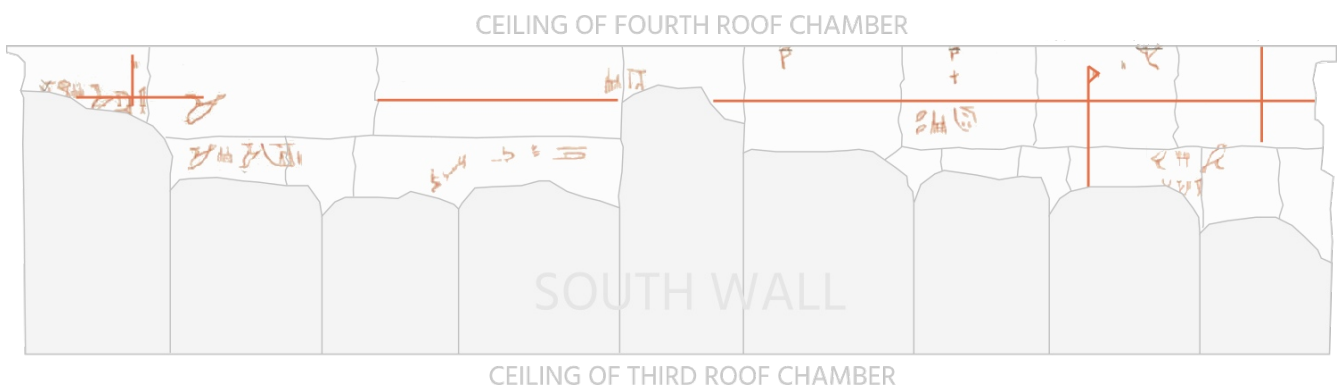


Diagram D10s - The south wall of the fourth roof chamber

The north wall of the 4th roof chamber has a similar collection of architect's marks and glyphs and is shown in diagram D10n.

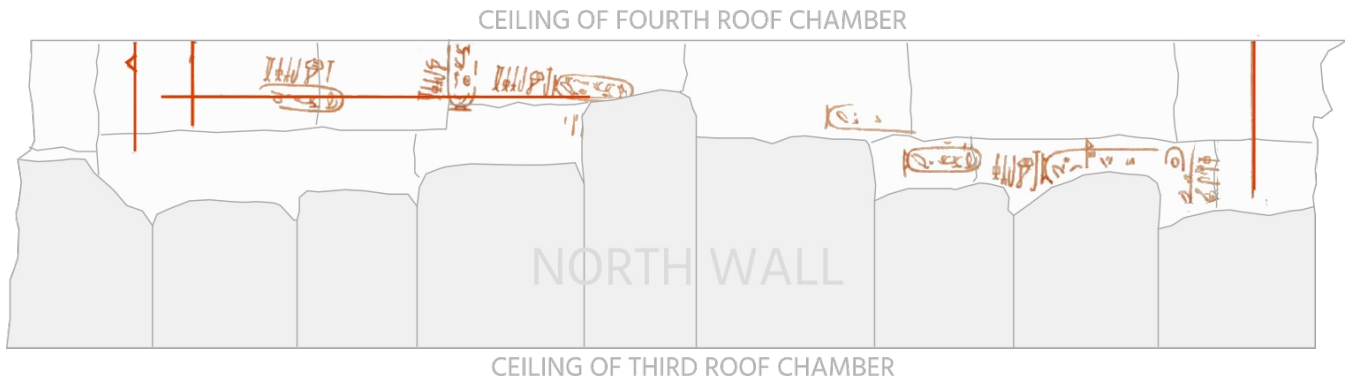


Diagram D10n - The north wall of the fourth roof chamber (viewed from the north)

The architect's vertical red line on the left of diagram D10n contains a left pointing triangle, identical to that in the upper roof chamber of the east elevation, and exactly one cubit to the right of this is another vertical architect's mark. It is explicit that the left of the two marks needs to line up with the 23 cubit south vertical axis line on the horizontally stacked chambers, and the right line with the 22 cubit south vertical axis. These two alignments when combined with the knowledge of the altitude of the 4th roof chamber's ceiling taken from the scaled up gallery plan allows the position of this roof chamber to be fully resolved.

Diagram D10 shows the 4th roof chamber with the glyphs and builders marks from both the north and south walls combined onto one drawing. The details of this drawing are fundamental to correctly reconstructing the roof chamber's north elevation and are worth going through in detail.

On the gallery side holes drawing the width of the gallery floor that is shown is 0.5 cubits scaled up, and the west end of the upper chamber on the north elevation is butted up against this line in the drawing. The side holes of the gallery are shown as before, with the exception that the black lines which represent the holes' depths have been removed from the drawing because the architect's vertical red marks in the roof chambers are positioned to align with the end of these gallery holes.

The two vertical axis lines that come from the upper chamber's east elevation are drawn as two blue dotted lines and they pass behind the 4th roof chamber and can be seen to align with the architect's marks at the eastern end of the roof chamber. On the north elevation a pair of similar looking vertical axis lines are drawn, the right of which is the central vertical axis of the upper chamber when viewed from the north and which is located at 5 cubits east of the pyramid's central vertical axis, and a second line 1 cubit to the east of it which is 6 cubits east of the central vertical axis of the pyramid and which mimics the left axis line in the east projection.

The pyramid's central vertical axis is drawn on the diagram as a black dotted line, and this line matches up with the depth line of the gallery side hole 'b', that which aligns with the 5th roof chamber.

Importantly, the outer vertical architect's red lines shown in diagrams D10s and D10n are designed to be aligned with each other and therefore only show up once at each end on the combined north and south wall drawing because they overlap each other. This alignment allows the shape of the chamber to be completely resolved because the north and south walls are now known to be in line with each other when viewed from the north, and the east and west walls have already been shown to be 1 cubit out of line.

Therefore the roof chambers must form a parallelogram in plan view.

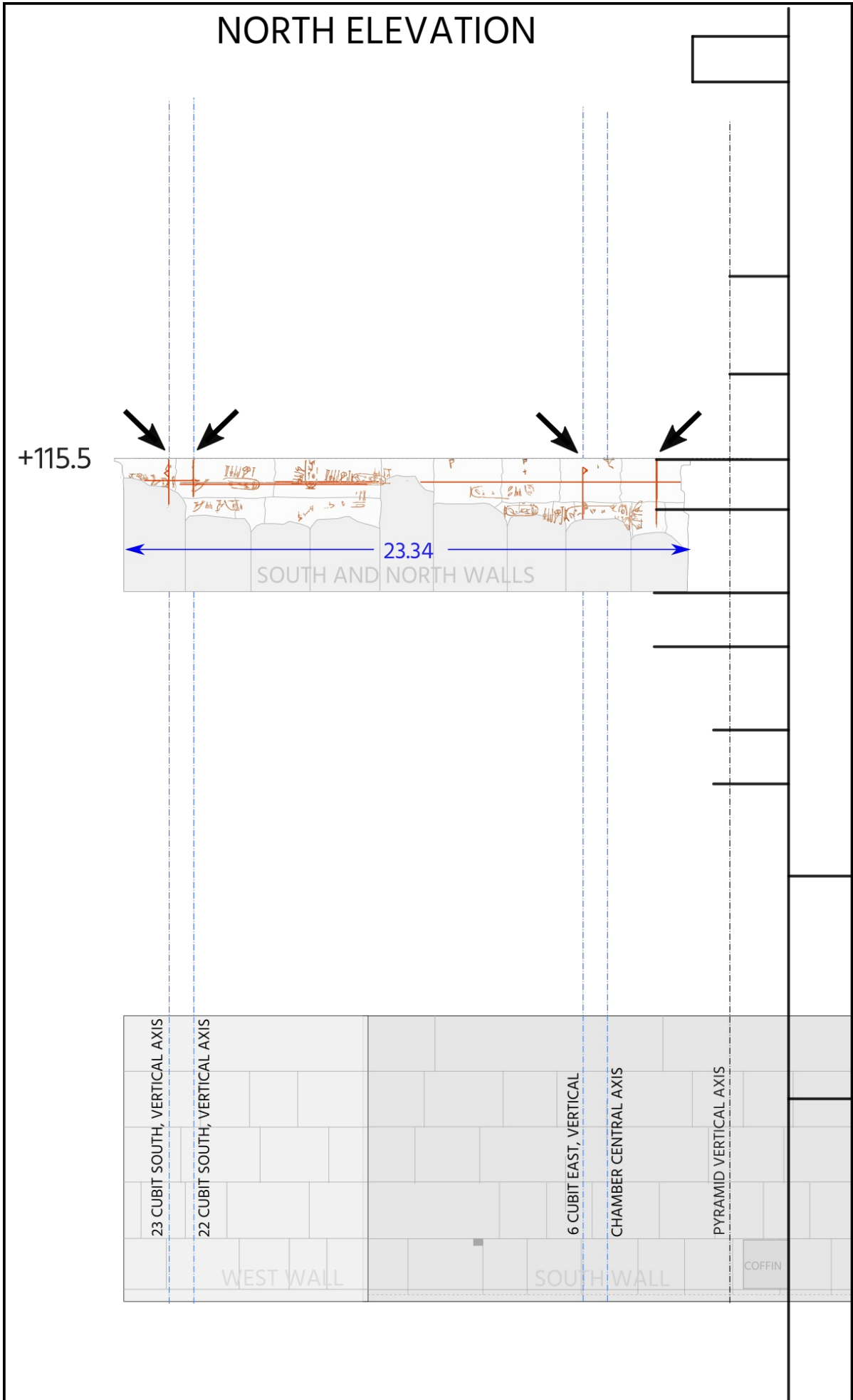


Diagram D10 - The 4th roof chamber north elevation with glyphs and architect's lines from south and north walls.

## North elevation - Roof chamber 3

(Known as Nelson's chamber)

There are only two architect's vertical red lines on the north elevation of this roof chamber both of which are found on the north wall, one which is located 0.49 cubits from the west wall and a second which is located 12.61 cubits from the west wall and 10.63 cubits from the east wall.

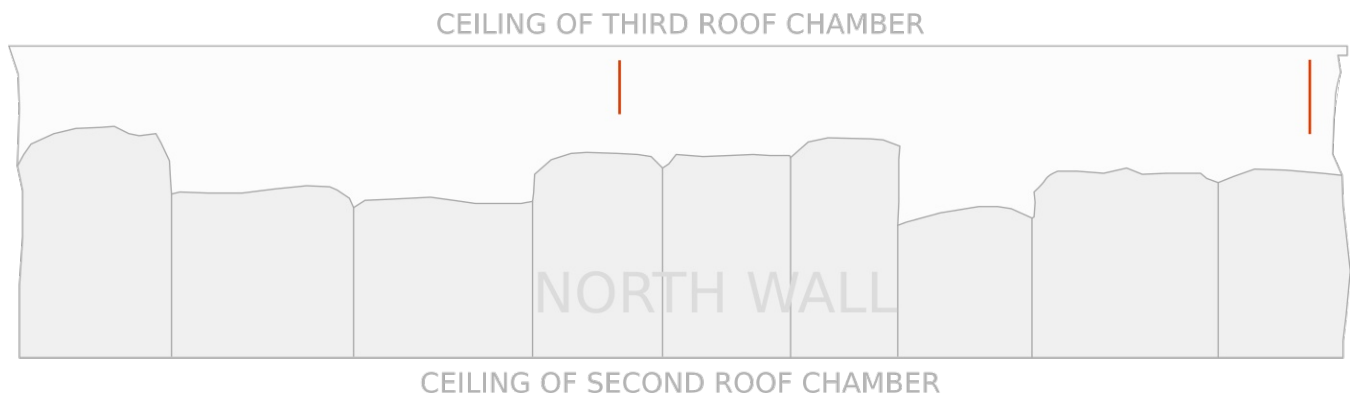


Diagram D11n - The north wall of the third roof chamber (viewed from the north)

If the line on the west is aligned with the west end line from the roof chamber above then it is located concurrently with the depth of the corresponding hole in the scaled up gallery plan. The second architect's line towards the center of this roof chamber then aligns perfectly with the east end of the upper chamber of the north elevation as shown on diagram D11.

## North elevation - Roof chamber 2

(Known as Wellington's chamber)

The second roof chamber contains architect's marks on the south wall only and there are three vertical red lines. The western end line is 1.08 cubits from the west wall, the next line is 3.42 cubits from the west wall and the line towards the east end of this roof chamber is 21.15 cubits from the west wall, the west wall position being defined from Petrie's measurements at the intersection of the roof and the side wall.

To reconstruct this roof chamber, the second line that is at 3.42 cubits from the west wall needs to be aligned with the western line from the chamber above and this alignment then places the west most architect's line at the depth line of the scaled up gallery ramp hole, and the east most line aligned with a vertical line on the east elevation that is exactly 1 cubit south of the upper chamber's central axis line as shown in diagram D12 on which these additional vertical lines have been added on the east elevation as blue dotted lines. The west wall of this roof chamber then aligns with the pyramid's central vertical axis.

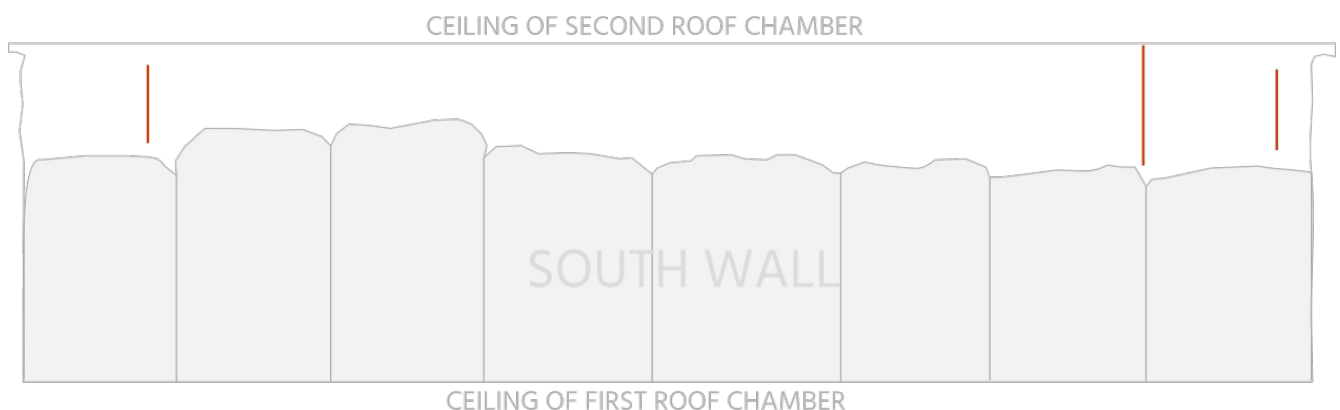


Diagram D12s - The second roof chamber on the north elevation



# NORTH ELEVATION

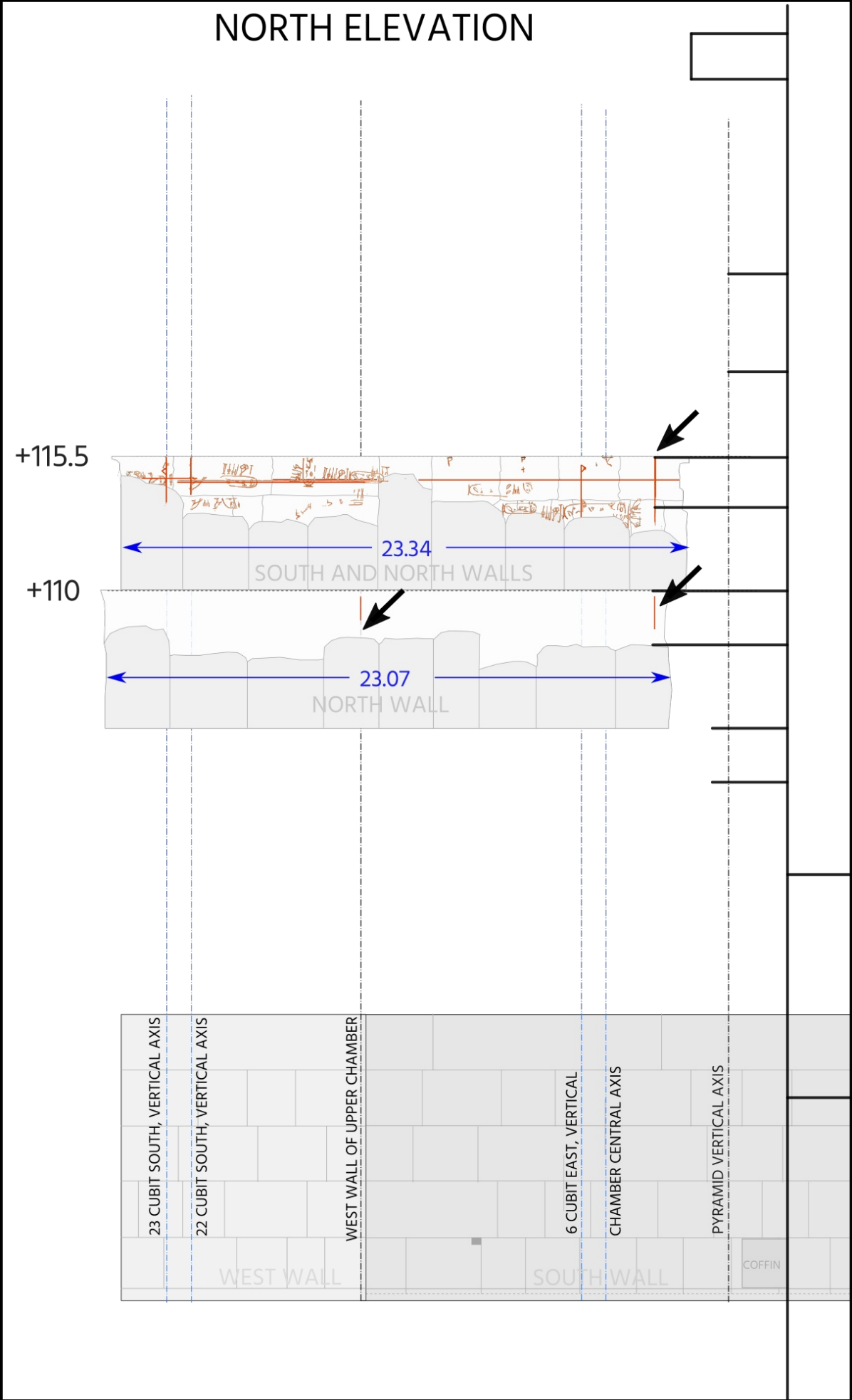


Diagram D11 - The third roof chamber on the north elevation

# NORTH ELEVATION

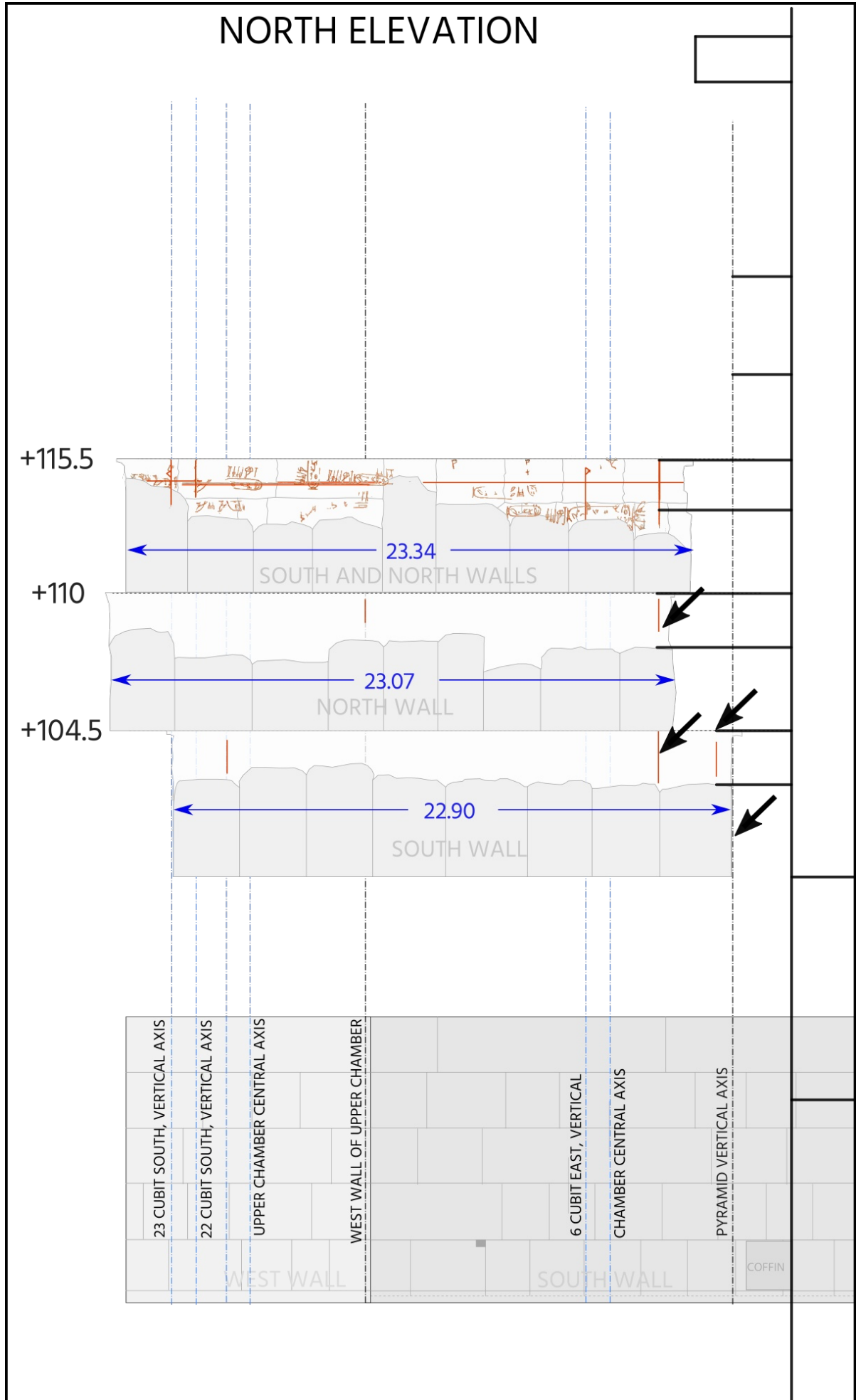


Diagram D12 - The second roof chamber on the north elevation

# North elevation - Roof chamber 1

(Known as Davidson's chamber)

The first roof chamber contains no markings of any sort, and therefore needs to be placed directly in line with the previous chamber. Because the re-construction of the roof chambers on the north elevation descend from roof chamber four downwards, rather than upwards from the upper chamber as was the case on the east elevation, then roof chamber one must be in line with roof chamber 2 as shown on diagram D13 with its west end aligned with the central vertical axis of the pyramid.

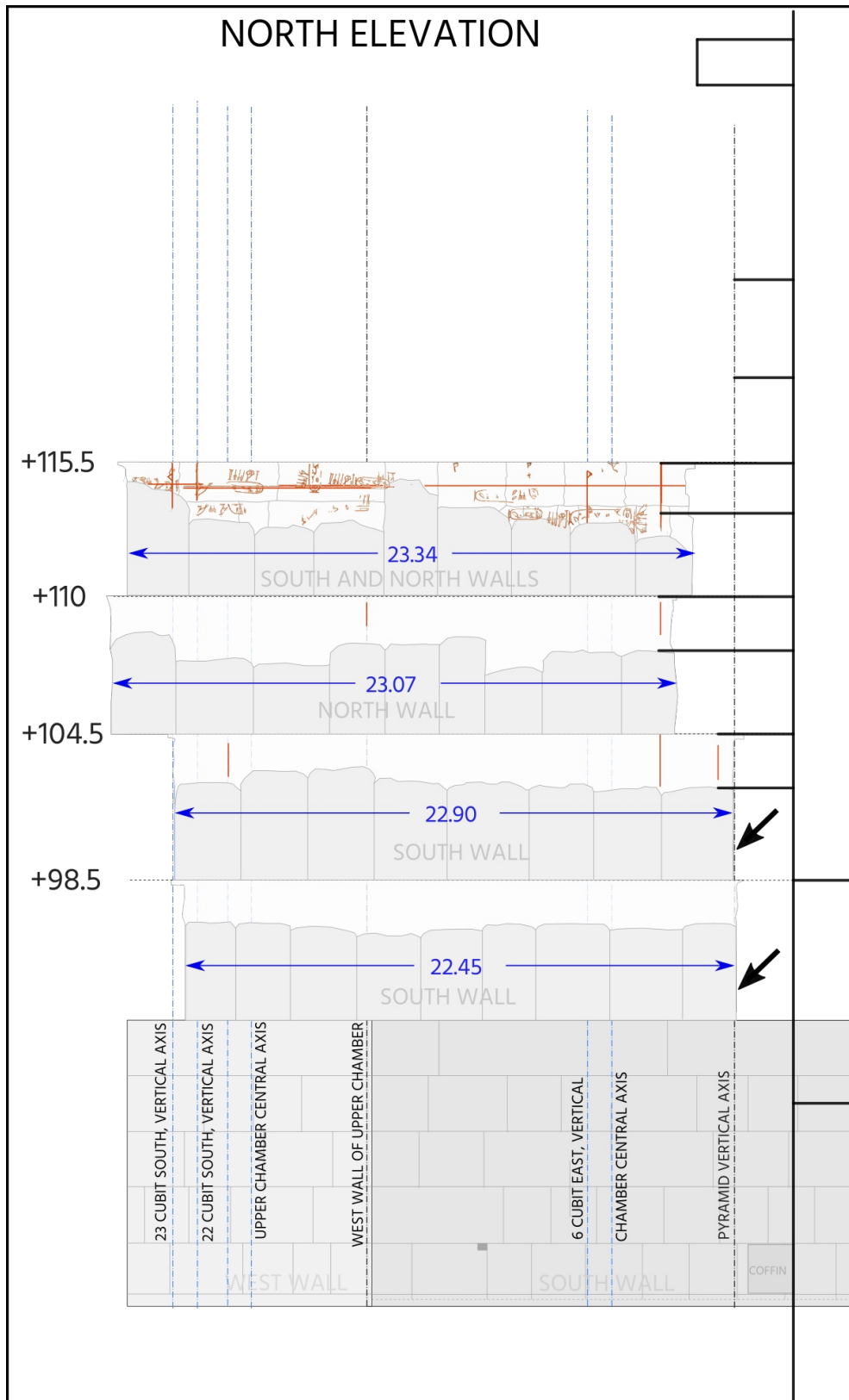


Diagram D13 - The first roof chamber on the north elevation

## North elevation - Roof chamber 5

(Known as Campbell's chamber)

The upper, fifth roof chamber has just one architect's vertical red line which is found on the south wall, and there are a selection of glyphs located on the gabled roof stones and side walls on both the north and south end of the chamber as shown on diagrams D14s and D14n.

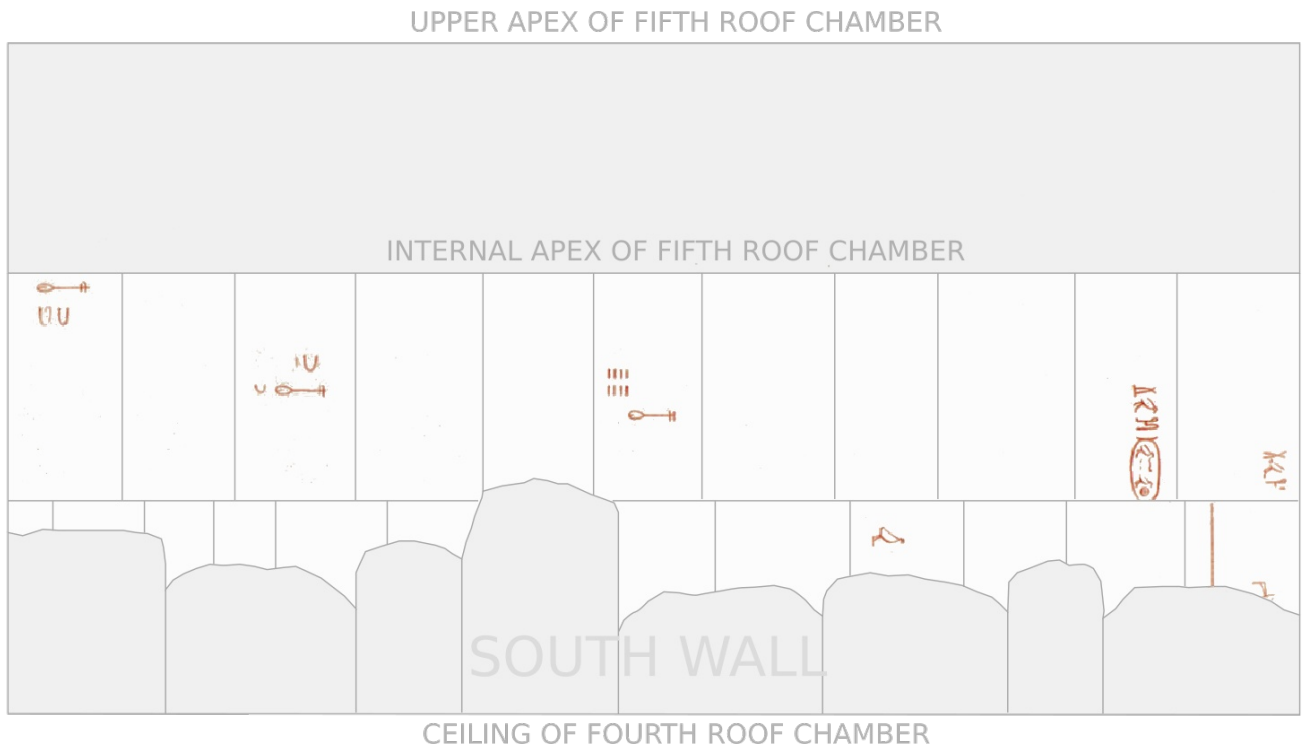


Diagram D14s - The south wall and gabled ceiling of the fifth roof chamber

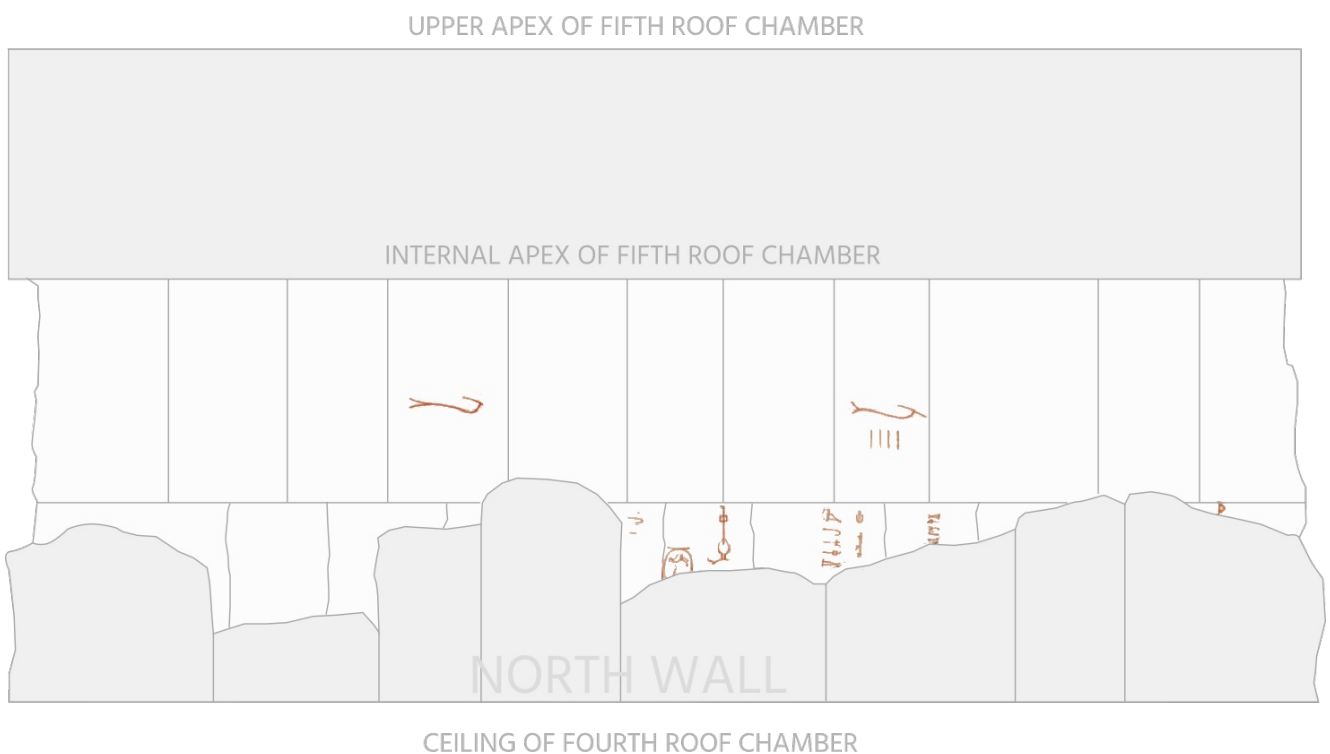


Diagram D14n - The north wall and gabled ceiling of the fifth roof chamber, viewed from the north

The re-construction of this upper roof chamber relies entirely on the scaled up gallery side hole, so the west end of the roof chamber, which is vertical, is aligned with the depth line of the gallery hole, which is in turn already known to align with the central vertical axis of the pyramid.

This roof chamber has an important feature in the final floor beam. From the scale drawing of the stones by Perring<sup>11</sup> the west most beam on the south side is 56.5 inches or 2.73 cubits in width from east to west, and

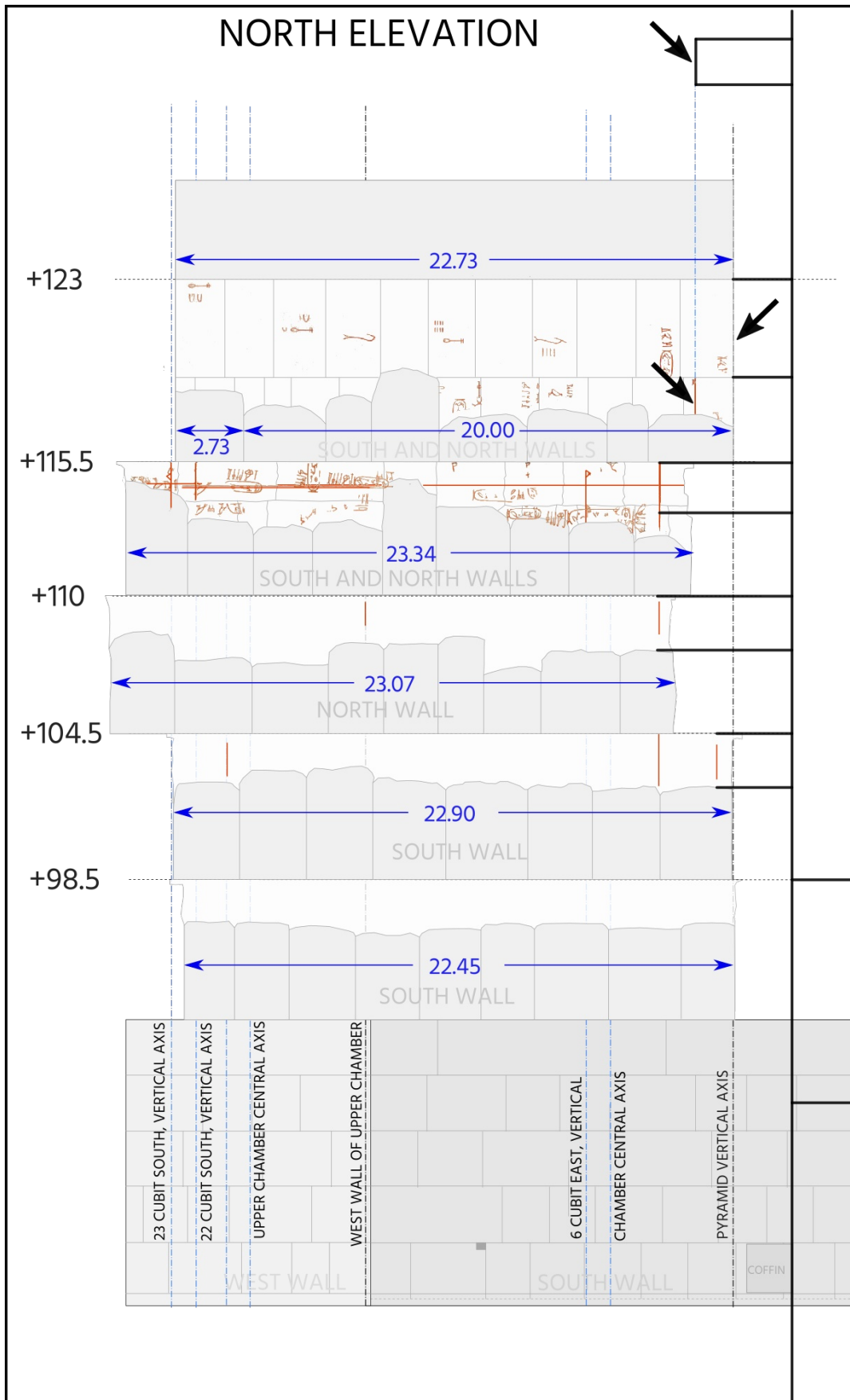


Diagram D14 - The south wall and north walls glyphs of the fifth roof chamber

the chamber's width in that direction is 22.73 cubits, so the distance from the west wall of the chamber on the pyramid's central vertical axis to this stone's west side is exactly 20 cubits, as shown on diagram D14. As this is the last piece of architecture that you come across in all of the roof chambers, and that it uses a method that has not been previously seen up to this point in the analysis, its significance need to be noted.

The single red vertical architect's line in this roof chamber aligns with the depth line from the top most of the scaled up gallery holes and this alignment is indicated with another dotted blue line at the top right of diagram D14. There is clearly another roof chamber above the gabled roof which has not yet been entered into by anyone other than the original builders.

## North elevation - Roof chamber 6

The sixth, as yet unexplored, roof chamber's location and dimensions can be determined. On diagram D2 which shows the scaled up vertical gallery with the side holes of both the east and west sides, the total distance between the ends of these holes is a known quantity because the gallery floor area is exactly 2 cubits wide and the hole depths have been measured. Therefore the distance from the eastern end of a hole on the east side to the western end of the corresponding hole on the west side can be determined.

An analysis of these lengths shows that they are proportional to the roof chamber's lengths to which they correspond with a average scaling factor of 6.5. The exact scale values for holes b,c,d and e being 6.35 , 6.48 , 6.52 and 6.68 when compared to Petrie's reported roof chamber lengths, with the variance being attributed to the difficulty in measuring the lengths of the roof chambers which have irregular end walls.

Gallery side hole 'a' has a width of 67.21 inches according to the measurements of Smyth, which when scaled up by 6.5 and transferred into cubits gives the length of the sixth roof chamber as 21.23 cubits. Diagram D15 shows the sixth roof chamber placed according to this measurement and aligned with the gallery side hole depth line and the architect's mark from the chamber below.

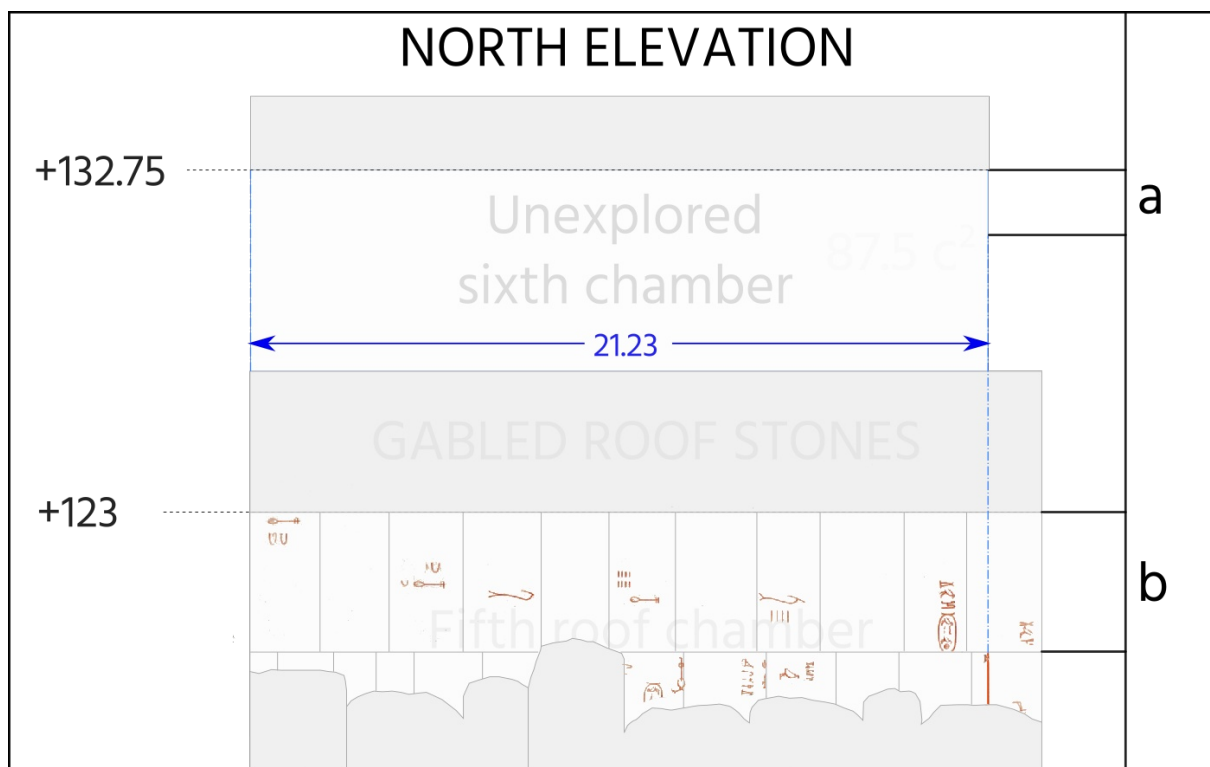


Diagram D15 - The unexplored sixth roof chamber

The length of this unexplored roof chamber precisely corresponds to that of the known fifth roof chamber below it with the east wall aligning to perfection with the east wall of the fifth chamber, showing that the sixth roof chamber conforms to the logical construction seen throughout the upper chambers.

## The plan view of the upper roof chambers

With all of the roof chambers' vertical and horizontal locations resolved it is possible to now draw the plan view of these chambers which is shown on diagram D16.

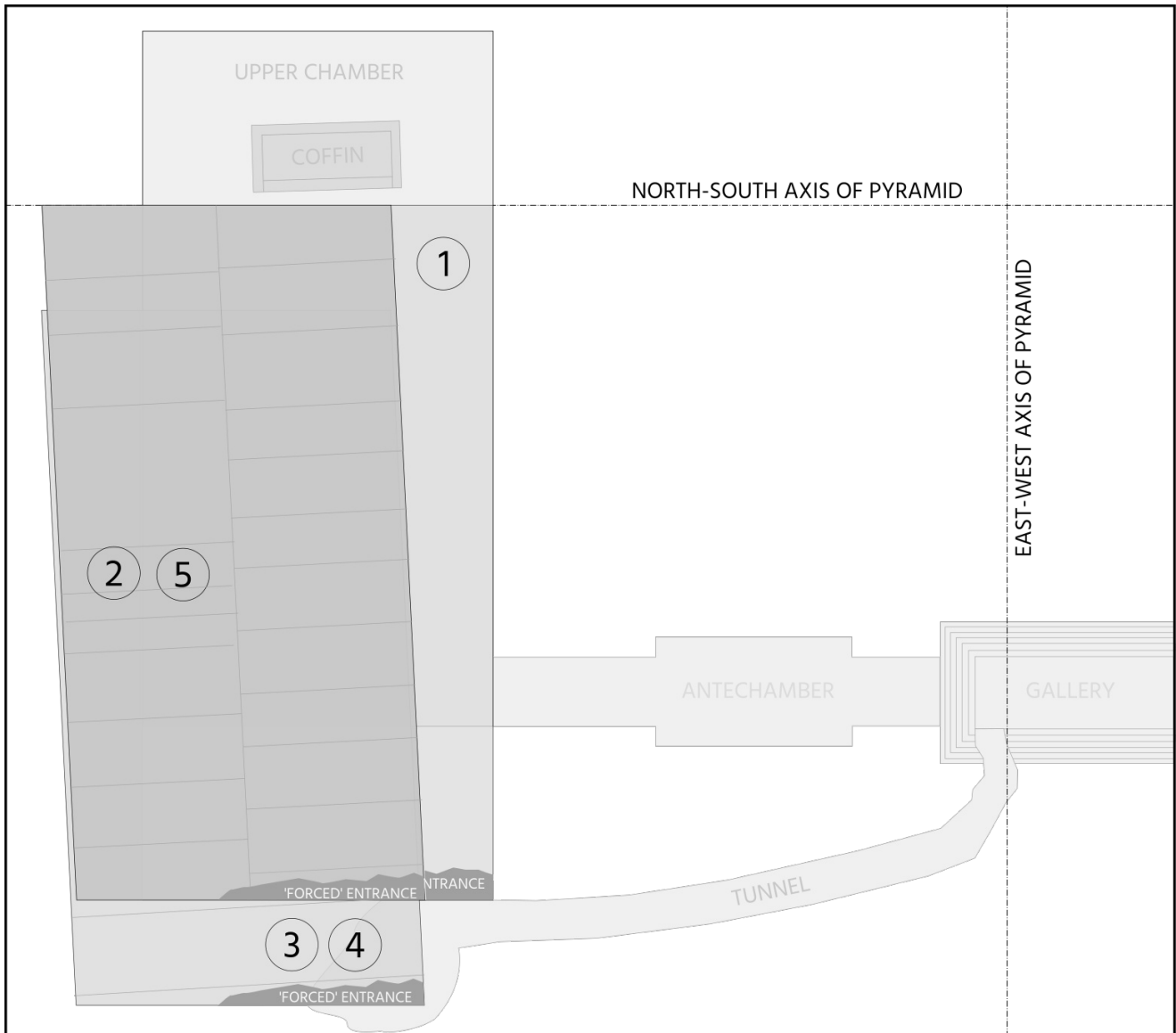


Diagram D16 - Plan view of the upper roof chamber area of the pyramid

This diagram shows the upper chamber with the coffin, above which are the roof chambers numbered accordingly with chambers 2 and 5 above each other and chambers 3 and 4 also above each other. Chamber 1 is rectangular, its north and south sides concurrent with the chamber's, and its west wall is aligned with the central north south axis of the pyramid, 5 cubits east of the west end of the upper chamber.

The 'forced' entrances to each roof chamber show how the architects have managed to disguise the parallelogram shape of the chambers by constructing the tunnel that leads to the chambers so that the north east corner of each roof chamber is damaged. Implicit in this design is that the tunnel is an original part of the pyramid.

The coffin in the upper chamber, which is drawn in the position that it was found by Petrie, appears on first inspection to be aligned with the angle of the roof chamber's parallelogram north side, but that is not actually the case. The angle of the coffin reported by Petrie was 2.02 degrees and the side angle of the parallelogram roof chambers is 2.86 degrees.

## References

1. Maragioglio, Vito and Celeste Ambrogio Rinaldi. *L'Architettura delle Piramidi Menfite IV. Le Grande Piramide di Cheope. Tavole.* Tipografia Canessa: Rapallo, 1965. Pages 7 and 8
2. Petrie, W. M. Flinders. *The Pyramids and Temples of Gizeh.* 1st ed. London: Field and Tuer; New York: Section 62, Page 91
3. Brabin, S.H. *The vertical chamber stack of the Great Pyramid - part 1* , <http://www.giza-pyramids.com/documents/pdf/VerticalChamberStack1.pdf> , Diagram B7.
4. Perring, J.E. *The pyramids of Giza* London: James Fraser, 1839 Plates 5,6,7,10 & 11
5. Petrie, W. M. Flinders. *The Pyramids and Temples of Gizeh.* 1st ed. London: Field and Tuer; New York: Section 63, Page 92
6. Brabin, S.H. *The vertical chamber stack of the Great Pyramid - part 1* , <http://www.giza-pyramids.com/documents/pdf/VerticalChamberStack1.pdf> , Diagram B8.
7. Brabin, S.H. *The vertical chamber stack of the Great Pyramid - part 1* , <http://www.giza-pyramids.com/documents/pdf/VerticalChamberStack1.pdf> , Page 9.
8. Smyth, P. *Life and Work at the Great Pyramid*, vol. 2, Edinburgh: Edmonston and Douglas, 1867 Pages 72 & 73
9. Brabin, S.H. *The horizontal chamber stack of the Great Pyramid*, <http://www.giza-pyramids.com/documents/pdf/horizontalStack.pdf> , Diagram C11.
10. Brabin, S.H. *The horizontal chamber stack of the Great Pyramid*, <http://www.giza-pyramids.com/documents/pdf/horizontalStack.pdf> , Page 8.
11. Perring, J.E. *The pyramids of Giza* London: James Fraser, 1839 Plate 7