

An analysis of the Great Pyramid gallery end walls

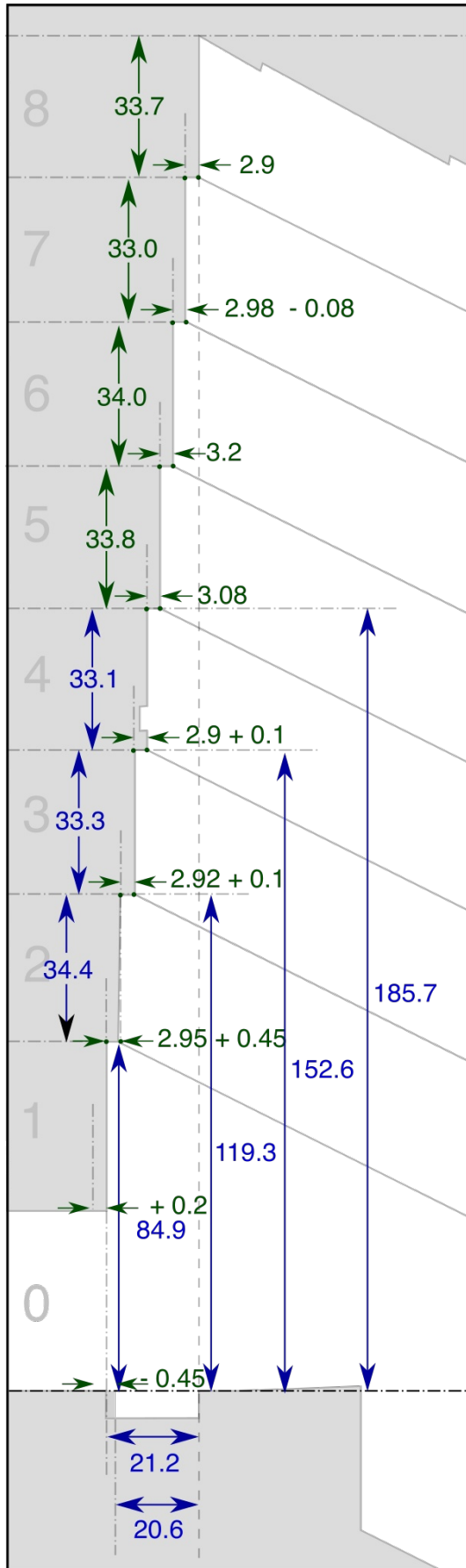
This document is an analysis of the architecture of the gallery end walls in the Great Pyramid and contains the original surveying measurements of the ends of the 'Grand Gallery' which are taken from the combined works of Piazzi Smyth and William Petrie.

1. Smyth, P. *Life and Work at the Great Pyramid*, vol. 2, Edinburgh: Edmonston and Douglas, 1867
2. Petrie, W. M. Flinders. *The Pyramids and Temples of Gizeh*. 1st ed. London: Field and Tuer; New York: Scribner & Welford, 1883. Republished online at The Pyramids and Temples of Gizeh Online. Ed. Ronald Birdsall, 2003. Rev. August 27, 2014 <http://www.ronaldbirdsall.com/gizeh>

The surveying measurements of the ends of the gallery are located within these works on the following pages

1. Page 89
2. Page 73

The south end of the Gallery



Blue - Smyth measurements

Green - Petrie measurements

Calculated

Measurements on the drawing are displayed in inches.

Each of the overlaps is $1/7$ of a cubit in width, which in inches is $20.6'' / 7 = 2.94''$

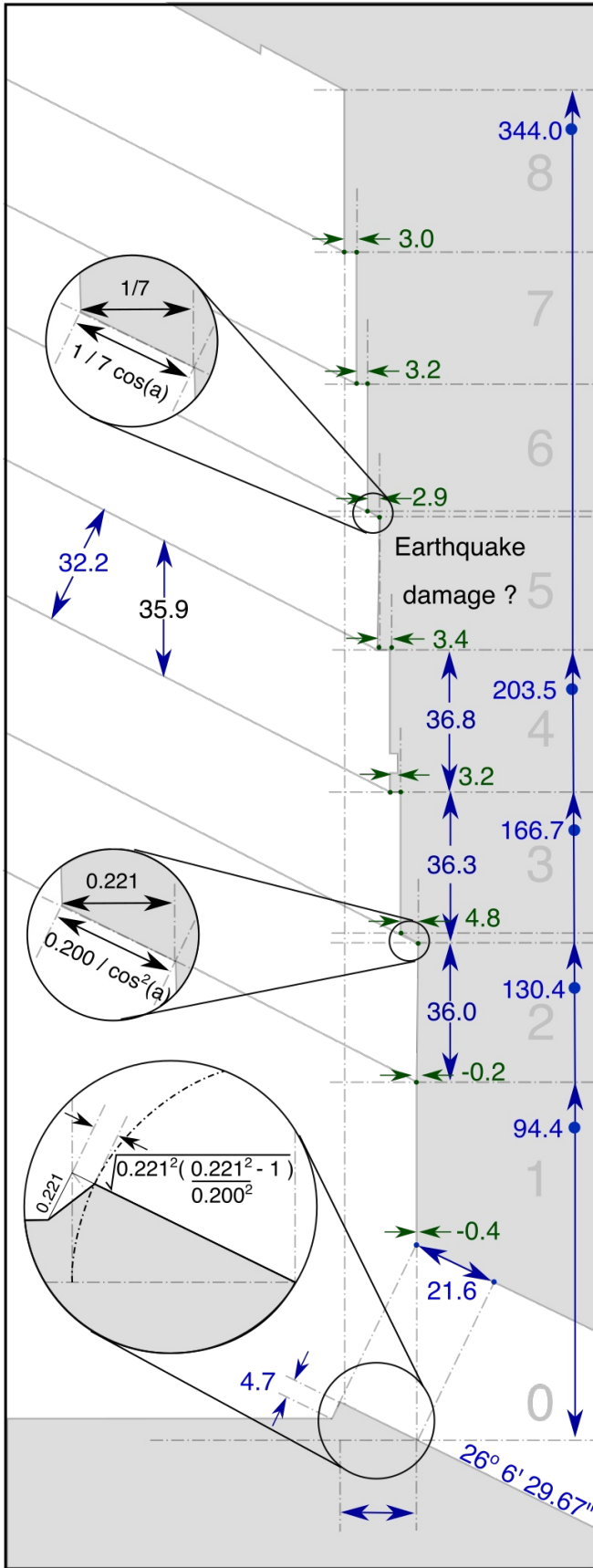
The additional length along the slope of each overlap is $1 / 7 * \cos(a) = 3.27''$ compared to the overlap above, where $\cos(a)$ is the cosine of the lower overlap.

The 2nd overlap is not vertical. The indent at the bottom is $0.45''$ south (left) of the top of the overlap.

The 1st overlap is not vertical, the bottom of the overlap is $0.20''$ south (left) of the top.

The lowest overlap is not vertical and protrudes $0.45''$ north (right) at its base.

The north end of the Gallery



The table of lengths on page 89 of Smyth's work contains an error in the table headings. Column 2 states "Vertical height above floor, following its incline" but the table data in that column is the height above a fixed floor level. This is clear from the 4th column of vertical heights, and also from cross checking the geometry of the system.

There is a typesetting error in Petrie's work on the overlap 2 (for the north wall) where the overlaps are 19.7" and 19.5" but the difference is listed incorrectly as 0.1" - should be 0.2".

The inclined extension of the ascending passage floor into the gallery is documented by Smyth in two places. On page 61 of his work he measures the maximum length as 23.2" and on page 45 he lists, in summary, the maximum and minimum lengths as 20" and 23". The end is angled therefore, and in the passage center, the length is $(20+23.2)/2 = 21.6"$.

The absolute position of the plumb line used on the north wall by Petrie was an unknown, and so the top overlap value of 3.0" is approximate.

Overlap 1 is not vertical. The bottom of the overlap is offset to the south (left) by $0.45" = 0.0221$ cubits.

The total overlap on the north wall is an addition of all of the overlaps, less the incline width of overlap 0.
 $3.0+3.2+3.1+3.4+3.0+4.7=20.4$
 $0.6+0.4=1.0$
 $20.4-1.0=19.4"$

The horizontal overlap total matches the inclined floor length: $19.4 / \text{Cos}(26^\circ 6' 29.67") = 21.6$

The unusual 4.8" surveyed horizontal overlap difference between overlaps 3 and 2 is 0.221 cubits = 4.55" (from the master triangle).

All calculations need to be performed using fractions.

- Blue - Smyth measurements
- Green - Petrie measurements
- Calculated / corrected