

Reading Uncensored
Palladio in Light of
Australian Vernacular
Architecture

Reading Uncensored Palladio in Light of Australian Vernacular Architecture

By

Antonia Clarkeson

Cambridge
Scholars
Publishing



Reading Uncensored Palladio in Light of
Australian Vernacular Architecture

By Antonia Clarkeson

This book first published 2024

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Copyright © 2024 by Antonia Clarkeson

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN: 978-1-0364-1335-4

ISBN (Ebook): 1-0364-1335-7

CONTENTS

Introduction	vii
Principles	1
Order: Some Universal Rational Principle	48
Order: Palladio <i>Actual</i> : Un-Censored	68
Order: Serlio's Series	75
Order: Palladio's Series	78
Order: Palladio's P	87
Order: The Primary Referand	100
Whose Foot? ... Etruscan.....	106
Whose Foot? ... Vicentine	127
Whose Foot? ... Venetian	162
Applications: Book II, Plate XLVIII <i>villa Godi</i> <i>villa Godi</i> at Lonredo di Lugo (c.1537).....	168
Applications: Book II, Plate I: <i>palazzo Antonini</i> <i>Palazzo Antonini</i> , at Udine (c.1556) Palladio's tribute to Daniele Barbaro.....	179
Applications: Book II, Plate XXXVIII: <i>villa Emo</i> <i>villa Emo</i> at Fanzolo (c.1556).....	197
Applications: Book II, Plate XIII: <i>palazzo-villa Almerico</i> <i>Palazzo/Villa Almerico</i> (c.1550) <i>La Rotonda</i>	218

Applications: Book II, Plate LXIII: <i>villa Mocenigo</i> <i>Villa Mocenigo</i> at Dolo on the Brenta	245
Palladio's Measuring at Verona.....	253
<i>Piede antiquo</i> (Old Foot) Precedent and Consequent.....	266
<i>Palladio individuel: villa Cornaro</i> (c.1552) Plate XXXVI Book II.....	293
Of Triglyphs and Metopes: Towards Truly Indigenous rather than Vernacular Architecture.....	363
<i>Teatro Olimpico</i>	424
The austral-Asian Temple of Doric Type	469
Appendices	529
References	538

INTRODUCTION

Essays into Architecture

Rigorous censorship was a feature of Venice's long history as a colonial aggressor. Palladio's work would not, could not, escape the censor's notice and did not escape the censor's cut.

Palladio's *I quattro libri dell'architettura*—that is, Palladio's original uncensored work—is represented here as pursuing a cause: the case for architecture as vernacular; the antithesis of a colonial mentality that refers and defers to some principle other than **here**; framing a more specific cause: establishing an Italic identity for polyglot city states by affirming and illustrating its roots in traditional *praxis* that has consistent and articulate philosophical historicity and mathematical sophistication.

Active censorship of literary work offered for publication was a feature of the Venetian Republic. That such censorship might have impacted Palladio's literary work warrants attention. Censorship, coupled with the sanctions being attached to the recently promulgated *Index* of Forbidden Books, was a reality for Palladio, as it must be also for students of Palladio's literary product. The issue is particularly relevant for understanding Palladio's presentation of the length of *Vicentine* foot.

Palladio's full presentation of the *Vicentine* foot was censored and withheld from publication. A sanitised version was published, in 1570 and subsequently, under the Venetian *imprimatur* (*it may be printed*). Palladio's full presentation of the *Vicentine* foot finally appeared in print in 1738.

The architectural practice of Francis Howard Greenway and Mary Moore Greenway in Australia, begotten of a long line of architects and freestone masons and builders in Bristol, U.K., demonstrates that the Greenways knew and studied and applied the un-censored version of Palladio's famous Four Books of Architecture.

English-language students of Andrea Palladio's *I quattro libri dell'architettura* currently have ready access to two English translations: Isaac Ware's *Andrea Palladio The Four Books of Architecture*; and that of Robert Tavernor & Richard Schofield, *Andrea Palladio The Four Books on Architecture*.

Much hinges upon the choice.

Of particular relevance are the drawings presented by Palladio for *la meta* (1 of 2) of the *Vicentine* foot.

*

The uncensored version of Palladio's presentation of the *Vicentine* foot appears as extant historical/archaeological artefacts in two carefully crafted forms:

the lines for *la meta* of the *Vicentine* foot published in Isaac Ware's *Andrea Palladio The Four Books of Architecture*, completed in 1737 and published in 1738 (republished unabridged and unaltered by Dover Publications in 1965); and as

the scaled-up brick and mortar replicas of those line lengths at Goulburn's *Bradley Grange* industrial complex, extant still within Australia's Greenway architectural endowment of the built environment, marking the centenary of Isaac Ware's meticulous work.

*

Francis Howard Greenway and Mary Moore Greenway were well aware that their architectural practice in Australia was in service to a colonial aggressor, as intent upon conquest and pillage and rape and dispossession—and expiation—as any classical Greek colonial enterprise or republican Venetian counterpart.¹

¹ An interesting titbit for those researching Mary's background, neglected by historians to date: Mary Greenway's maiden name was Moore, possibly from a family having extensive shipping interests. Francis Greenway was transported by the *General Hewett*. "The Windham and General Hewett left England the 24th of August, in convoy with the *Wansted*, Capt. Moore, who sailed from hence last Thursday for Batavia; the *General Hewett* arrived at Rio the 17th of November, and sailed again the 2nd of December. Together with the military detachments, she received on board for this Settlement 300 male prisoners, of whom we are sorry to report the death of 35, whose names we shall endeavour to procure an account of, and publish in the next Gazette, for the information of their friends and families in Great Britain." *Sydney Gazette*, Sat 12 Feb 1814.

But they knew, encouraged by the colonial governor Macquarie, that they could determine the form that expiation might take. That would come from their focus on fundamentals.

A study of actual built works that comprise the Greenway portfolio of architectural design in Australia (Herman 1970, Broadbent & Hughes 1999) prompts some observations which may serve to clarify:

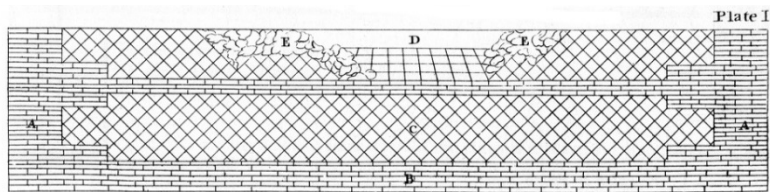
- a system of proportionality evident in Palladio's published and built works;
- length of the Vicentine foot;
- apparent discrepancies between designs-published and designs-executed;
- continuity with predecessors in the treatment of order;
- Palladio's contribution to the debate about adoption of a metric measure.

The opening discussion serves as introduction to each of the listed issues, which have cumulative effect.

*

In these *Essays into Architecture*, I invite you to join me in paying attention to Palladio's first choices.

Palladio begins his drawings in "The Four Books of Architecture" with Plate I of Book I



- A, the angles made of brick.
B, courses of bricks that bind the whole wall.
C, the net-work.
D, courses of bricks through the thickness of the wall.
E, the inner part of the wall, made of cement.

Inspired by examples of Palladio's work that are usually overlooked in current scholarship, Palladio's innovative orthogonal drawings are seen here as being carefully crafted, as having a coherent integrity in their own right; as articulating **movement** as the essential core of architectural theory and practice. The un-censored version of Palladio's representation of the *Vicentine* foot is seen here as the mathematical embodiment of oscillating **movement** that captures the reality of growth and decay, of change, over time.

Offering a fresh insight into Palladio's work from the viewpoint of the artisan, this study celebrates Palladio's neglected contribution to the discipline of metrology, crystallising the substance of Italian contributions to the development of a metric measure that could claim to be natural, universal, invariant and geodetically based. The designs in Palladio's *I quattro libri dell'architettura* are taken here as examples of vernacular architecture that are meant to be measured in their metric measure extension.

An echo might be heard in Tito Burattini's *Misura Universale*, published in 1675, subtitled *Treatise in which it is shown how in every Place of the World it is possible to find a UNIVERSAL MEASURE & WEIGHT having no relation with any other MEASURE and any other WEIGHT & anyway in every place they will be the same, and unchangeable and everlasting until the end of the WORLD*, proposing "The Catholic Meter is nothing but the length of a (free) Pendulum (and not those hanging from clocks), whose oscillations are 3600 in an hour", insisting on a unit of time as the necessary co-ordinating feature.

Burattini's *Treatise* contributed the usable language for the prevalent metric measure debates. Such a set of nomenclatures was not available to Palladio.

*

These essays assume active engagement with the Reader who will have to hand the complete uncensored edition of *Andrea Palladio's The Four Books of Architecture*, republished unabridged and unaltered by Dover Publications in 1965; and who will have the opportunity to consult Ottavio Bertotti Scamozzi's drawing on the Plan of Palladio's *Teatro Olimpico*, reproduced in Princeton Architectural Press's handsome edition of *The Buildings and Designs of Andrea Palladio*, translated by Emiliabianca Pisani, published in 2015.

*

Keywords: Palladio, indigenous, vernacular, architecture, Greenway, metrology, metric measure, free-form movement, Mesopotamian mathematics, Isaac Newton, Newton as architectural theorist, Doric symmetries, Isaac Ware.

PRINCIPLES

Nowhere in *The Four Books of Architecture* does Andrea Palladio explicitly explain the meaning of **P.** inscribed with a numeral on the wood-cuts of the designs.¹

However, Palladio is explicit that the inscribed lines, given in Book II and Book III for the extension of the Vicentine foot, indicate the standard “with which the following fabrics (edifices, temples) have been measured”; and it is instructive to actually do the measuring of the designed fabrics presented. Even so, one small matter niggles: why does Palladio present the lines differently?²

Vicentine measure does need to be specified, and Palladio does so via the inscribed lines. However, despite the fact that the extension of the Vicentine foot is explicitly inscribed as a line of length by Palladio, in characteristic stonemason fashion as ‘1 of 2’, in Book II and again in Book III, there is no figure agreed among scholars. Shinjiro Kirishiki (1985:85) even maintains:

...there has hardly been any serious argument about the actual length of the Vicentine foot. Most of the eminent modern scholars of Palladio seem to have carefully avoided this problem... This is rather an awkward situation, since any architectonic analysis cannot proceed without touching on the problem of measurement.

Agreement about the actual extension of the Vicentine foot is vital towards understanding the points being made by commentators on Palladio’s work. One of the purposes of this essay is to propose a resolution for the question about the extension of the Vicentine foot.³

¹ I rely on Isaac Ware’s carefully produced English edition of 1738, *Andrea Palladio’s The Four Books of Architecture*, which is also republished unabridged and unaltered by Dover Publications 1965.

² A small matter; but as O.B Scamozzi (2015:26) reminds: “In architecture, even the smallest observation can shed some light and bring some measure of benefit”.

³ The relationship between standards of measurement labelled as Vicentine/Venetian and/or Etruscan is dealt with towards the end of this discussion. For the

That leads to another question. Assuming that the extension of the Vicentine foot is agreed, and that the drawn designs are measured by it, then the inscribed lines should suffice for interpretation of the designs offered. If so, then why does Palladio superimpose numbers—sometimes with **P.** attached—on the drawn designs?

Perhaps his numbers, with or without **P.**, intend something else; offering a different path through the selected designs; a different thread among those from which the fabrics are woven? Perhaps Palladio's **P.** refers *aliquid altera*, something else, beyond the particularity of the Vicentine measure, as an example of Vitruvius's *analogos* (Vitruvius: Book III, Chapter 1,1)?

If Palladio's **P.** refers something other than the Vicentine foot, then that **P.** must also be specified. Accordingly, I make an offering that requires consideration of

an ancient artefact from the 1st Dynasty of Egypt, and
a nineteenth-century brick;

facilitated by insights from study of Australian vernacular architecture.

*

In the beginning... Principles as beginnings

At the outset, it is necessary to state and clarify certain positions that are to be understood as, and at the beginnings of, this study: The Principles.

Isaac Newton's *Philosophiae Naturalis Principia Mathematica* or "Mathematical Principles of Natural Philosophy" was titled in reference to Rene Descartes's *Principia Philosophiae*, published in 1644. Newton's *Principia* is really quite a short work, insofar as the statement of the Principles (the *Principia* of the title) extends a mere 15 pages. The bulky remainder of the publication consists of applications of the Principles: two books about the Motion of Bodies and one book about the System of the World. As such, Newton's *Principia* is about more than the motion of bodies. It is about how bodies, *corpora*, corporations of any sort, come about, and how they are built.

current purpose, I take the Venetian foot to extend 347.6...mm and the Etruscan foot to extend 357.142857mm.

The *principia*, the principles that he espouses are architectural.

A persistent theme of the French philosopher and mathematician René Descartes (1596–1650) is that preconceived opinions are a bane on the sciences and on philosophical enquiry.

All the mistakes made in the sciences happen, in my view, simply because at the beginning we make judgements too hastily, and accept as our first principles matters which are obscure and of which we do not have a clear and distinct notion.⁴

Our senses provide a reliable basis for our innate grasp of first principles “when the occasion for thinking about them arises, provided that we are not blinded by preconceived opinions”.⁵

Disputes about first principles are to be avoided by setting aside, at the outset of enquiry, preconceived opinions.⁶

...there is nothing which causes so much effort as making our perception of the primary notions clear and distinct. Admittedly, they are by their nature as evident as, or even more evident than, the primary notions which the geometers study; but they conflict with many preconceived opinions derived from the senses which we have got into the habit of holding from our earliest years, and so only those who really concentrate and meditate and withdraw their minds from corporeal things, so far as possible, will achieve perfect knowledge of them.⁷

Descartes then develops his method of doubt, followed by his affirmation of the thinking self, encapsulated in *cogito ergo sum*.

*

The artisan: conduit of transformations

Andrea Palladio and Francis Howard Greenway were stonemasons; Inigo Jones, to whom the Anglo-speaking world is indebted for interpretation of Palladio, was a joiner; and his close collaborator, Ben Jonson, was a

⁴ “*The Search for Truth*” in C. Adam & P. Tannery (eds), *Oeuvres de Descartes*, Paris (Vrin)1904 Vol.10 p.526 in English as *The Philosophical Writings of Descartes*, (Descartes 1984).

⁵ “*Principles of Philosophy*”, *ibid.* Vol.8a p.24

⁶ Letter dated 1643, *ibid.* Vol.8b p.37

⁷ “*Replies*”, set 2, *ibid.* Vol.7 pp. 156–7

bricklayer. Their backgrounds suggest other, perhaps more fundamental, bases for interpretation of their designs than the currently conventional systems of proportionality.

The architectural collaboration of Mary Moore Greenway and Francis Howard Greenway (in Australia, from 1814 through to 1832) has left an enduring legacy that celebrates vernacular architecture as the expression of (first) principles, illustrating the mathematical sophistication contained there, focussed on the dimensionality of brick.

Theirs was the first professional architectural practice in continental Australia, embarked upon within the ambit of Anglo-French rivalry in geopolitics and commercial interest (Frost 1975:606–611), but initiated from within an intellectual ferment of practical endeavour that had long and fascinating roots (Becker 1875; Johnson 1940).

The Greenways' designs of Sydney's Hyde Park Barracks residential complex⁸ and Goulburn's *Bradley Grange* steam-powered industrial complex,⁹ which embody their first and last opportunity to plan in the grand manner, are crafted from a *milieu* in which 'the mason's module' stands supreme, and present as the embodiment of the geometry of the standard brick.

Palladio's ethos in design stems from the same source and represents the same interest in the geometric form exhibited in standard building materials and in the standard measurements which enable composition of such materials into meaningful wholes, by skilled artisans. Their *praxis* is grounded in the archetypal ideal of the primordial city, the first of the 3 cities of Plato's *Republic* 370d: the City of Artisans, in which each pursues a characteristic τέχνη *tekne* (Baracchi 2015:376) or protocol of ποιησις

⁸ Hyde Park Barracks is a UNESCO World Heritage Site. Much of this commentary is based on the Scale 1: 100 @ A1 of architectural drawings, by *the archivist* (2017) supplemented by reference to the original Site Notes of actual measurements upon which the Drawings are based.

⁹ Goulburn's *Bradley Grange* is an item of State Significance on the NSW State Heritage Register. The measurements of Goulburn's *Bradley Grange* used here derive from the actual annotated metric measurements written on drawings of the current structures recorded by Coupe Hewitt + Cserhalmi Architects, held in the archives of Goulburn's *Bradley Grange*. Their measuring was done to the nearest 5 millimetres. Analysis of the measurements can be found in O'Halloran (2006).

poiesis ‘making’ (Baracchi 2015:371), such that the needs of all are satisfied.¹⁰



Sydney's Hyde Park Barracks
the Dormitory



Goulburn's *Bradley Grange*
steam-powered industrial complex

Palladio respects the artisan and honours their learning by offering his designs as the systematic expression of traditional lore handed down from an ancient source, representing the ‘bulk stuff’ of masonry, as grounds for the transformations involved in any ‘making’.¹¹

That, I suggest, is what Palladio's **P.** notation is about; but what does that mean in practice?

When one follows the notations on Palladio's Plan and Elevation, from the point of view of the mason/brick-maker-layer, there is a host of interesting consequence which takes one beyond merely Roman antiquity; perhaps into unfamiliar territory:

¹⁰ I realise that I leave myself open to the same criticism that Alberti made of Vitruvius's inclusion of Greek words in his Latin text. Alberti (1512:VI,1) criticises Vitruvius for using Greek terms, such as *αναλογος*, in his discourse, but Vitruvius is predicating cultural continuity, such as Alberti himself was to value in his promotion of Italic order, reflective of an Etruscan primitivity, writing at times in Etruscan language for which he compiled a grammar comparable to Latin grammar: *Grammatica della lingua toscana*.

¹¹ The suggestion that Palladio represented his designs as examples of vernacular architecture may appear to be confronting: “... common to all vernacular buildings is that they are positioned by architects and architectural historians outside of what is considered ‘architecture’. They are ‘other’. The vernacular is removed from the self-authorized discourse and practice of the architectural mainstream ...” (Brown, Maudlin 2008: 342)

Ancient-Egyptian religion, art and architecture have profoundly affected Græco-Roman and Christian civilisations in ways that, to a very great extent, have been ignored by historians and commentators....
(Curl 1994: xix).

The Greenways' architecture, however, has a distinctive Egyptian ethos, encouraged by the colonial Governor, Lachlan Macquarie, who had spent 12 months in Egypt, studying its antiquities (Ritchie 1986:48–61).

A similar Egyptian ethos pervades Palladio's published work which depends from interest in (and perhaps prosecution of) the cause of Italic identity founded on Etruscan heritage of Egyptian lineage.¹²

*

Antipodean vernacular

The parsimonious circumstance of public building in Australia's British colonial penal settlement necessitated reliance upon its available artisans, but the Greenways¹³ revelled in the challenges that allowed and even dictated focus upon fundamentals.

Francis Greenway senior died when his fourth son, also Francis, was in his sixteenth year, after which young Francis continued his architectural education in London¹⁴ at a time of renewed architectural interest in the

¹² Although Palladio does not canvas Egyptian themes, they do have deep and explicit roots in the Italian Renaissance (Curran 2007).

¹³ In referring the Greenway legacy and Greenway design, I am unable to distinguish the contributions made by Mary Greenway (nee Moore; d.1832) and by her husband Francis (Howard) Greenway (1777–1837). I am minded that a researcher for historian Sue Rosen recounts a memory of Valerie Ross (1932–2009), genealogical writer about the Hawkesbury River settlement, to the effect that Mary Greenway applied to come to NSW to join Francis “because she was the person who drew her husband's plans!!” (letter from P.C. McIntyre dated 30th March, 1999).

Hence, I consider that since there is insufficient information to distinguish them, I want it to be understood that both are included in the commentary.

¹⁴ Sometime during the period of his London education, the young architect changed his name, adding Howard, endorsing the ancient *gematria* (O'Halloran 2006:21–2), following the example of (Leo) Baptista Albertus, and Giangiorgio Trissino's allocation of Andreas Paladius to Padua's Andrea dalla Gondola (March 1998:264).

work of Inigo Jones, stimulated by Thomas Hardwick's engagement on a 10-year restoration programme for Jones's church of St Paul at Covent Garden (1788–1798), in an intellectual and political environment that was not only enthusiastically Newtonian but also, perhaps paradoxically, decidedly Francophile, in which the ideas of French clergy such as Jean-Louis de Cordemoy and Marc-Antoine Laugier were continuing subjects of debate (Summerson 1980:90–94). The debates fostered reconsideration of the role or even necessity of the classical orders, exalting the role of the primitive hut of Vitruvius. And all this in the context of the French action to determine the protracted debate, which had been going on since Palladio's time, about the need for, and desirability of, a universally applicable geodetically based standard of measurement, by legislating the (French) metre, based on measurements in decimal multiples of their *pied du roi* of the meridian of Earth passing through Paris; and then, the Revolution.

For the Greenways, such context, portending the crumbling of social order, augmented by their colonial circumstance, reinforced their conviction that the primitivity being referred was the primitivity of (first) principles rather than a quaint poesy of tree-trunks and creeping ivy depicted in the 1755 edition of Laugier's book.

In other words, the vernacular fundamentals of architecture were to be celebrated; and that entailed revision of what order in architecture might mean; especially so in an antipodean environment in which the traditional lore gloried in something other than built fabric fixed to place.¹⁵

For the Greenways, in the antipodes where literally feet are opposite, it meant, in part, serious consideration of Sebastiano Serlio's focus on "men's feet" (Serlio 1619: Book IV, Chap.5, Fol.5).

Time for contemplation and reflection upon such basic issues is a luxury rarely afforded to busy practitioners, but Francis (Howard) Greenway made the most of the opportunity afforded him when the family's architectural firm was bankrupted during the economic recession of the early 1800s, when he himself was charged and convicted of forgery in 1812, in regard to a contract at issue in the bankruptcy proceedings.

¹⁵ The Greenways' architecture urges architecture as "definition of place", as traditionally understood. The quality of their appreciation of traditional lore of the indigenous inhabitants might be assessed through the work of their son, the Reverend Charles Capel Greenway (1910).

Languishing in Bristol's Newgate prison, and in the prison hulks on the Thames, he was eventually transported to the British colonial settlement of the new South Wales, where, from 1814 he was recruited by the Governor, Lachlan Macquarie, a veteran of the British rout of Napoleon's adventure into Egypt, to advise, and in due course, design and oversee the construction of the public infrastructure of the infant colony.¹⁶

*

The Greenways' architecture, their "regular method of making beginning", returns to that which makes place sacred; returns to the Latin *focus*, to the bricks of the fire altar; and to area, and place as sanctuary, returning to the beginning of Vitruvius (Vitruvius 1999: II,1). Having written in Book I about the duties of the architect and the technical terms of the art, Vitruvius opens his discourse in Book II "with the principles of construction: where they (the principles) had their beginning", following "the initial steps of ancient science" and of subsequent researchers as traditionally taught.¹⁷

Vitruvius begins by reference to the human experience of fire.¹⁸

In the Latin world the hearth is *focus*, and *aedis*, the house that encloses fire, that attempts to control and direct its radiance, that displays the *phantasmata* of its Movement, presenting Movement for contemplation, facilitating *fantasia*. Vitruvius presents architecture as *sumum templum*, as a lofty sanctuary; its house as an *aedis sacra*, holy hearth.¹⁹

¹⁶ In a Despatch to Earl Bathurst, 24th March, 1819: "*In consequence of Mr Greenway's Scientific Skills, Judgment and Superior Taste, the Government Buildings Erected by him are not only Strong, durable and Substantial, but also Elegant and good Models of Architecture.*" Macquarie's *Despatches 1819*, A1192 p.189.

¹⁷ *de aedificiorum rationibus*; Vitruvius, *de Architectura*, Book II, Preface V; translated by Rowland (Vitruvius 1999:33): "the principles of construction", although the Greenways' reading of Palladio might lean more towards "the ratios", precedent of/consequent upon/arising from, building hearths.

¹⁸ *ergo cum propter ignis inventionem conventus initio apud homines et concilium et convictus esset natus*, Vitruvius, *de Architectura*, Book II, Chapter 1,2 translated by Rowland (Vitruvius 1999:34) as: "The beginning of association among human beings, their meeting and living together, thus came into being because of the discovery of fire."

¹⁹ *Pervenerint ad sumum templum architecturae*; Vitruvius, *de Architectura*, Book I, Chapter 1,11 translated by Rowland (Vitruvius 1999:23) as: "to reach the

Some fourteen hundred years later, when he determined to rewrite Vitruvius's ten books on architecture for a contemporary audience, (Leo) Baptista Albertus (1512) titled his work *...de re aedificatoria...: literally how to build a hearth*.

Housing a hearth draws attention to the units of construction: bricks.

In traditional practice, the number arrangement and proportions of the bricks to be used for constructing a hearth have meaningful resonance (Fitzgerald 2009:20–21).

In the Hindu tradition which informs Etruscan civilisation, the Vedic altar is a fire altar: an open fire pit encased by bricks. There are 10,800 bricks in the Vedic fire altar, reflecting the 10,800 stanzas in the *RigVeda*; the 40 x 10,800 syllables of the *RigVeda* (40 per stanza); the 10,800 duration of the *Aion* or “Great Age” according to the Greek Heraclitus; the 40 x 10,800 units of the Babylonian Great Year; and the number of man: 1080mm to the *umbilicus* (enshrined in Le Corbusier's architectural practice).

10,800 is the volumetric number that Palladio, as interpreted here, presents to the reader in the opening design of Book II of his “The Four Books of Architecture”: fabric for the house of Floriano Antonini at Udine, Plate I, as an expression of the cubed Venetian foot. The fabric depends from the Hindu tradition of the Vedic fire altar portending the Etruscan origin of Italic identity.

Palladio's final fabric in Book II, Plate LVIII, is an invention for a site belonging to *cavalier* Leonardo Mocenigo, offering the cubed Venetian foot again, and encompassing the constructional units of Etruscan tombs as Jewish feet by which the temple of Solomon was built, presaging the eschatology of heavenly Jerusalem for an Italic identity.²⁰

*

loftiest sanctuary of Architecture”. For *templum*, as *aedis sacra*, cf. Rowland's Vitruvius 1999:152 note 56.

²⁰ Palladio and Alberti can be considered to be in general accord on these themes: cf. (Tanner 2010); and when Alberti turns “to the earliest buildings from ‘ancient times, in the primitive days of our religion’, ... he means the Italic temple that developed from the sepulchres of the Etruscans.” (Westfall 2016:33)

The notion of brick as archetype is central towards appreciation of vernacular architectural practice.

Archetypal brick is formed from the clay dug in discovery of the water table during the rite of orientation; pressed into a mould constructed from the standard foot determined in the ceremonial definition of **place** for the house of the hearth, derived from the radius of human Earth-bound horizontal vision.²¹

The creation and enforcement of standards for bricks facilitated their taxation.

*

Greenway practice assumes that the statutory English brick

“1776 Statute 17 George III 8½ x 4 x 2½

every part of England” (Lloyd 1925:12)

is dimensionally unspecified, and takes the bulk brick and its modular double as the primary reference. The Statute is taken to reflect the archetype: a generality, transcending particulars.

Greenway design in Australia posits a bulk 8.5 x 4 x 2½ and its module/double 17, 8, 5 as the fundament of proportionality found in vernacular architecture. Vernacular architecture was championed by L-B. Alberti who designed sant’Andrea in Mantua as an Etruscan shrine (Tavernor 1991:159), where brick is the principal constructional material.

²¹ There the universe is centred; there the world turns, pivoting on a point determined by the celestial co-ordinates of Latitude and Longitude. Geographical co-ordinates tell the shape of turning Earth, expressing and dividing in their ratio the distance from ‘this’ centre that the light of any star will appear on the horizon as Earth turns. Light disappears on the horizon, or appears, at a distance of 3,570m from an observer whose eye is positioned 1m from surface (Tompkins 1997:262-4). Such a distance corresponds to 10,000 ancient Etruscan feet, each of which extends 0.35714285m.

On that basis, the passage of stellar light can be tracked along Earth’s horizon, allowing the measure of sidereal time, which is 462m per second. Such is the time of the vault of heaven, set in masonry as the 4.62m walled height of the central buildings at Goulburn’s *Bradley Grange*, designed on a foursquare as 100 Etruscan cubits or 200 Etruscan feet.

In Australia, at the Hyde Park Barracks, the dimensionally specified metric equivalent Greenway brick is 225mm x 66mm x 62mm, and in its mortared constructional unit as face-brick drop is (225units x 76 units x 62 units), with a volume of 1060200 units (*the archivist* 2017).²²

$(225 \text{ units} \times 76 \text{ units} \times 62.05894737 \text{ units}) = 102^3 = (2.55 \times 40)^3$.

The volumetric²³ affirms/introduces three features:

the factor 1.02 which is the key towards understanding how Palladio conceives of Movement architecturally;

the **ratio** 1: 2.55 that architectural activist Morten Herman (1970:52) attributes as the key to Greenway success and elegance in design; and

reliance upon the work of Isaac Newton in determining the elements of design, insofar as the foot measure that comprises 12 x 25.5mm extends 306mm, which is the *pes Anglicorum* or English foot that Isaac Newton chooses as his referand for determining the standard length of the (shorter) Roman foot.²⁴

Greenway architecture depends from a thorough understanding of Newton's work as an architectural theorist, insofar as Newton's abiding interest was determination of the regular method by which the world is made.²⁵

Guidelines for interpretation of buildings, based on the standards of measurement employed in their design, were laid down by Isaac Newton in his *Dissertation on the Sacred Cubit of the Jews and other Nations...*,²⁶

²² The elaborated brick structure of the Dormitory at Sydney's Hyde Park Barracks, for example, presents as an expression of that proportionality embedded in the typical brick identified in *the archivist*'s measuring.

²³ The volumetric is to be taken as reference to precedent: articulating the relationship between brick and tile, insofar as bulk Greenway brick equates in its volume to **area** covered by typical Roman tile, given as 28cm x 38cm:

$28 \times 37.90028572 \times 10^x = 1,061,208 = 225 \text{ units} \times 76 \text{ units} \times 62.05894737 \text{ units}$
 $= 102^3$.

Carlo Roccattelli: "Beside brick, very naturally, tiles were manufactured for roofing, both curved and flat, the dimensions of which varied from 38–77 cm. [15–30 in.] in length and from 28–56 cm. [11–22 in.] in breadth." Part 1: Brick in Roman Antiquity, p.1 <http://www.giorgiozanetti.ca/bricks/bricks.html>

²⁴ Newton (1737:406) implies the geographic foot extending 0.30779567m as his "English foot" referand for the longer Roman foot of 0.2976...m.

²⁵ Newton's emphasis in his *Dissertation* on the importance of bricks is to be seen in the ancient context of edification of the sanctuary around the altar.

²⁶ Written originally in Latin, it appeared in English translation for the first time in 1737 as "A DISSERTATION Upon the *Sacred Cubit* of the *Jews* and the *Cubits* of

forming the basis for the so-called Newton Method of enquiry into artefacts of the built environment, which flourished until the anti-Jewish sentiment that prevailed in European scholarship from the late-nineteenth and early-twentieth centuries rendered Newton's contribution unacceptable.²⁷

It will be necessary to explain Newton's representation of the Hebrew foot/cubit in order to understand the extension of the Vicentine foot/cubit.

It will be necessary also to follow Newton's method in relation to bricks as the stuff of construction and design as interpreted in the antipodes by the Greenways.

More needs to be said about the actual method of construction for bricks: what makes a brick such; to be found in subsequent discussion.

Measuring

Why is it that measurement is seen so often as a problem (*cf.* Kirishiki 1985:85 “any architectonic analysis can not proceed without touching on the problem of measurement”)? After all, measuring, as *praxis*, is instinctive and even definitive for self-consciously based mechanical practice; and, as *poiesis*, is constructive; the *sine qua non*, for architectural survey—after all, “perception is a measuring operation” (Brisson 1999:155).

Each of the definitions with which Newton begins his beginnings (his *Principia*) begins as *mensura*: a measuring. In effect, *mensura*, a measuring, is *vis insita*: in Newton's phrase, an innate quantity.

If there is some difficulty, it lies somewhere else than the innate *praxis*.

There seem to be two strands to such *aliquid altera*: firstly, the reluctance of modern scholars to accept *mensura*, a measuring, as a theological exercise; and secondly, the consequent failure to construct, accept and

the several Nations; in which, from the Dimensions of the greatest *Egyptian* Pyramid, as taken by Mr. *John Greaves*, the antient Cubit of *Memphis* is determined”. It was published in the *Miscellaneous Works of John Greaves, Professor of Astronomy in the University of Oxford*, ed. Thomas Birch, (London, 1737), pp.405–433. As the title suggests, Newton's work was based on Greaves' book *Pyramidographia, or a Description of the Pyramids in Egypt*, published in 1646.

²⁷ Chronicled by Livio Catullo Stecchini in the Introduction to his *A History of Measures*, published online through metrum.org.

adhere to a canon of standards of measurement that has its roots in the *mathesis*, the traditional learned lore which allows convergent interpretations of measurements once they have been taken.

Firstly, as a theological exercise, measuring requires θεός *theos*, a reference point for ranking, as in “theodolite” for surveying:

The word *theos*, as in ‘theology’, has the same derivative meaning as the word ‘theatre’, as in ‘thesis’, and in the definite article ‘the’. All of them connote the action of ‘looking at’. They all have to do with the function of sight, and so are dependent upon light. The Greek *theon* (in the accusative) is ‘a being looked at or looked upon or on’. The definite article ‘the’ focusses the attention, the gaze, the sight, upon a subject. A ‘thesis’ sheds light on a matter or exposes a subject to the light of scrutiny (O’Halloran 2002:31).

Theos is otherwise known as Pharaoh Akhenaten’s *Aten*, the Greek *omphalos*, the Latin *umbilicus*, the Egyptian ibis whose tympanic rumbling begets the word *thoth* transposed as the Germanic *god*.

By choosing the word ‘god’ to translate ancient texts we in fact import into those texts a **prejudice** which then infects them irrevocably and throughout. The prejudice is that ancient people were religious as we understand the term today. The prejudice is that they were superstitious. The prejudice is that they were less developed than ourselves, less sophisticated, less advanced, less mature. We liken them to children; and we see ourselves as adults (O’Halloran 2002:27).

It is worth remembering that Alberti, for example, was a clergyman, an ordained minister of the church, and that his discussion about proportion and church architecture is conducted, and is to be understood, within an over-arching and generally all-embracing (*ie.* catholic) theological context that is foreign to disciplinary compartments.

Secondly: Newton’s *Dissertation* was drafted as a presentation of cross-cultural historically relevant standards of measurement that might serve as a canonic basis for a geodetically-based, universally applicable metric standard of measurement aimed at recapturing or revivifying the ancient metre (as in Tito Burattini’s quest for *metro catolico*).

Newton’s *theos*, his standard reference point for such, was *pes Anglicorum* “English foot”, whatever that might mean.

The issue was current in Palladio's day, as it was for Inigo Jones, and for French scholars such as Roland Fréart de Chambray who completed the first French translation of Palladio's *I quattro libri* ... in 1641, and Antoine Desgodets, who spent much time analysing Palladio's work on Roman antiquities (c.1677); and for whom the French standard *pied du roi* was the preferred referend for such a metre, rather than the Roman foot, let alone the English one. Newton points out, and quantifies, the deficiency of the then proposed French metre that disqualifies *pied du roi* from being accepted as a truly geodetic standard that might allow universal applicability (Newton 1737:429–430). That deficiency complicates the task of evaluating these French scholars' critiques of Palladio's work. The modern French-based metre compounds the deficiency somewhat beyond Newton's calculation, and bedevils comparative study of pre-French metric texts.

In Italy, which lacked the unity of the body politic that supported English and French claims, scholarly impetus was lulled by the initial supposition that the Roman foot would be the preferred referend for a universally applicable metre, because of the pervasive influence of the Roman empire. Nevertheless, the local standards of measurement were still relevant to the debate, such as the Venetian/Vicentine foot, and, since Alberti's prosecution of its cause, the Etruscan foot. What might be the measured extension of these is another matter; as is whether the locality-based nomenclature is appropriately applied.

Such are some of the issues that are to be considered here as we trace the Greenways' conviction that Palladio, above all else, was **a measurer**, always faithful to his craft as artisan-stonemason.

*

But, what is it that a measurer measures?

There are some fundamental issues that I would like to clarify:

- the action engaged in by an agent in doing 'a measuring';
- the difference between units and number;
- number as ratio, of quantity;
- time as number of Movement;
- that a measurer measures Movement,
- as "that something in between" set limits;
- the two varieties of standards of measurement as bulk entities.

Isaac Newton's Latin *mensura* and Andrea Palladio's Italian *misura* refer to active states, implied in the English continuous present tense 'a measuring'; requiring action/involvement of an agent.

The agent sets limits and assigns number.

Both of these actions are specified by Newton who employs a method of limits to provide the terms for inquiry/measuring, and who defines number

By number we understand not so much a multitude of unities, as the abstracted ratio of any quantity to another quantity of the same kind, which we take for unity.²⁸

Aristotle presents the issues as expressions of **Time** and of **Movement**, insofar as he proposes that limits/terms are (that is, have ontological status as) 'the before' and 'the after'.

Time, according to Aristotle (*Physics* 219b1), is a number, but not just any number: it is a number with a specific quality; that is, a number "in respect of the before and after":

αριθμος κινήσεως κατά το προτερον και υστερον.

"Time is number of Movement in respect of the before and the after".

The focus is on Time as number.

Number of what?

Number of **Movement**.

Apparently, Aristotle is the only one to have ever come up with a definition of Movement.²⁹ Much earlier than Aristotle, Anaximander described Movement as "that something in between". Aristotle is concerned to establish the ontological status of Movement; that is, whether/how/to what extent Movement 'is', exists, has 'being'.

²⁸ I. Newton, (1728). *Universal Arithmetic: Or, a Treatise of Arithmetical Composition and Resolution*. In D.T. Whiteside (Ed.), *The mathematical Works of Isaac Newton*, Vol. 2 (Article 1. p.3). New York: Johnson Reprint C 1967.

²⁹ Remi Brague suggests, "instead of speaking of 'the *Aristotelian* definition of motion', as if there were others, one should simply speak of *the* definition of motion, which happens to have been formulated by Aristotle" (Brague 1990: 2).

He takes up Anaximander's point and defines Movement as $\eta\ \tau\omicron\upsilon\ \delta\upsilon\nu\alpha\mu\epsilon\iota\ \omicron\nu\tau\omicron\varsigma\ \epsilon\nu\tau\epsilon\lambda\epsilon\chi\epsilon\iota\alpha,\ \eta\ \tau\omicron\iota\omicron\upsilon\tau\omicron\nu,\ \kappa\iota\nu\eta\sigma\iota\varsigma\ \epsilon\sigma\tau\iota\nu.$ ³⁰

Whole forests have been denuded in attempts to explain what that means. Aristotle seems to be saying that $\kappa\iota\nu\eta\sigma\iota\varsigma$ (*kinesis* 'Movement') is as real as (has an ontological status proportional to) the sort of quantitative purposive forcefulness required to make something happen or to bring something about; and is as real as that something itself.

Within Movement, Aristotle includes any and all forms of alteration and change, not just locomotion or change of place.

Aristotle's definition of Movement/alteration/change underpins Newton's eight Definitions and the Three Laws published as his *Principia*. Newton then wrote three Books to explain how such *Principles*, which define quantity of Movement, apply, as such, to the movements of bodies (recall that Newton deals with number as a ratio of quantity).

Movement is "that something in between" "the before" and "the after". Matter, for Aristotle, $\upsilon\lambda\eta$, is the stuff that is/exists before Movement, and is the stuff that is/remains after Movement.

In other words, the limits/terms of Movement are, simply, stuff/matter.

The limits of 'a measuring' have the status of stuff/matter; and 'a measuring' aims to ascertain the Movement that effects transition from one state of matter to another state of matter, from one numbered limit to another numbered limit.

A measurer measures Movement as "that something in between" set limits. What might be said about such limits, that are as the stuff/matter of 'a measuring'? Usually, limits of 'a measuring' present as a number; that is, as a ratio of quantities (of the same kind). Number is the ratio of stuff/matter, the ratio of limits, allotted by the agent, which bounds (confines/describes/defines) the Movement-that-is as the subject of 'a measuring', producing a measurement.

That having been said, it becomes possible to understand something more about standards of measurement.

³⁰ Aristotle, *Physics* III, 201a 10f.

Standards of measurement are traditionally conceived as bulk Magnitudes, in the form of cubes whose bases/side lengths are taken as standard foot measures.

Such standards are not singular.

Traditionally, standards are conceived and represented, in stonemason fashion, as '1 of 2'.

According to metrologist Livio Catullo Stecchini (1971: II.6), "All units of length ... exist in two varieties related as the cube root of 24 divided by the cube root of 25, which I call trimmed and natural versions".

So, in the discipline of metrology, ancient measures are conceived as appearing in two varieties, related as 25:24 in their bulk Magnitude, arising from a notional side length conceived as (cube root 25): (cube root 24), which translates as variant by a factor of 1.041666.

Consider, then, the metrologist: "All units ... exist in two varieties ..."
In the business/action of 'a measuring', the stuff/matter are such units, which set the limits/boundary as "the before" and as "the after" of the Movement which is as subject of 'a measuring', as "that something in between".

The supposition is that there is a change-of-state, from state before to state after; or, in the metrologist's terms, from the trimmed to the natural variety: variant as growth/increase by the factor 1.041666 or by the ratio 1: 24/25; or variant as decay/decrease by the factor 1.041666 or by the ratio 1: 25/24. The change-of-state being referred is the change-of-state of the unit:
 $2(2^3 \times \frac{1}{2}) \times (1: 24/25) = 2(4 \times 1.041666...) = 2 \times 4.1666... = 8.3333...$

The *terminus a quo*/beginning of a measuring's Movement is a foursquare of unit area.

The *terminus ad quem*/culmination of a measuring's Movement is a grown/generated foursquare of unit area.

In Newton's thesis, elaborated in his *Dissertation*, his choice for standard of measurement sits in the middle of such limits.

The limits are units of **Time**: "the before"; and "the after" of 'a measuring' which culminates in a measurement, which is the numbered unit

consequent upon an action effecting change-of-state of a unit that now is, as stuff/matter for a measuring: **Movement**.³¹

That further action requires doubling of the cube, evoking the age-old preoccupation with periodic outbreaks of the plague and their consequence.³² All of which appears as elementary and assumed in discourse; which it is, but there are consequences if the elements are overlooked.

The business of ‘a measuring’ relies upon the profound insights of Aristotle about Time and Movement, consolidated and articulated by Newton, adopted and applied by the great surveyors and architects who guide our way through the *phaenomena* of Nature’s way.

*

The architecture of standard brick

Newton’s Method of archaeological inquiry relies upon bricks and blocks, as the physical embodiments of foot and cubit standards of measurement, for understanding artefacts of the built environment and for understanding the civilisations/cultures that crafted them.

³¹ The data/matter, which is as the focus of our reflective inquiry or of our scientific analysis or of our measuring, always and inevitably refers to the passed event/movement embodied in the present state-of-affairs.

³² The reference is to the so-called Delian Problem which originally, and properly, is a problem in stereometry or bulk geometry (*cf.* Huffman 2005:342 ff.). It was reduced to being a problem in flat-plane geometry by Hippocrates of Chios with the aim of finding a solution using only rule and compass. The solution proposed by Archytas is especially elegant and rigorous in its focus on the 3-dimensional conjunction at point P. of a cylinder, a torus and a cone, displaying the intersection of three surfaces of revolution. As such, Archytas’s solution expresses and supports the stonemason-artisan’s fundamental and archetypal interest in **movement**, the movement of spatial surfaces-with-thickness, as encapsulated in the mason’s module of 2 in its doubling raiment, explored by Plato.

Palladio’s architectural use of **P**, might be seen in the same context.

Reference to doubling the cube might be taken as suggesting that the reader focus on **the measuring of movement** as the primary (and even primal) stuff of architectural practice. The Delian Problem arose as an oracular utterance from the Oracle of Apollo at the Temple of Delphi, ομφάλος: the *omphalos* of the universe, represented as covered—entwined—in measuring cords, which even today we call the net of meridians and parallels.