

The mirror of architecture:
or, The ground-rules of the art of building /
exactly laid down by Vincent Scamozzi ...

Vincenzo Scamozzi

1708

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THE
BOOKE
of
ARCHITECTURE
by
VINCENT SCAMOZZI
M^r Builder of Venice

*With Very large Additions by
other hands.*



THE
Mirror of Architecture :
OR THE
GROUND-RULES
Of the Art of Building,
Exactly laid down by
VINCENT SCAMOZZI,
Master-Builder of
V E N I C E.

Whereby the principal Points of *Architecture* are easily and plainly demonstrated for the Benefit of all Lovers and Ingenious Practitioners in the said Art.

With the Description and Use of a *Joynt-Rule*, fitted with Lines for the ready finding the *Lengths* and *Angles* of *Rafters*, and *Hips*, and *Collar-Beams*, in any Square or Beveling Roof at any pitch; and the ready drawing the *Architrave*, *Frize*, and *Cornice* in any Order. With other useful Conclusions by the said Rule. By *John Brown*.

The Fifth Edition.

Whereunto is Added, *A Compendium of the Art of Building*. Giving a Brief Account of the Names, Natures, and Rates of all the Materials, belonging to the Erection of an Edifice: And what Quantity of each sort will be needful for the Building of any House. Whereby Estimates, Valuations and Contracts may be made between Builder and Workman, without Damage to either. And how to measure the Works of the several Artificers belonging to Building; and what Method and Customs are observ'd therein.

By WILLIAM LETBURN.

London, Printed for John Sprint, at the Bell in Little-Brittain. 1708.

THE
 Mirror of Architecture
 OR THE
 GROUND-PLAN
 OF THE ART OF BUILDING
 EXACTLY Laid down by
 VINCENT SCAMONZI
 Master-Mason of
 NEWCASTLE

Whereby the principal Points of Architecture are fully and plainly demonstrated for the Benefit of all sorts of Learners and Masters in the Art.

With the Description and Use of a new and improved Method for the ready finding the Elements of Architecture, and the ready drawing the same in any Square or Round Plan, and the ready drawing the same in any Order, and the ready drawing the same in any other Condition by the said Vincent Scamozzi.

Whereunto is Added, A Copy of the new and improved Method for the ready finding the Elements of Architecture, and the ready drawing the same in any Square or Round Plan, and the ready drawing the same in any Order, and the ready drawing the same in any other Condition by the said Vincent Scamozzi.

By WILLIAM LESTER
 Printed for J. W. at the Sign of the Ship in St. Dunstons Church-yard.

TO THE
LOVERS
OF
ARCHITECTURE.

Reader,

AS in all things Order is to be observ'd, that we may avoid Confusion, or else they will be a Chaos, as the Poets fancy: So especially in this excellent Art of Architecture, it is requisite that every Part and Member have its right Order and due Proportion: And there having been many Masters who have with great Care and Industry brought this Art to a great Perfection, among whom this Famous Master Vincent Scamozzi, Chief Builder of the Magnificent City of Venice, deserves to be plac'd in the First and Chiefest Rank by the consent of all Judicious Artists, Therefore for the benefit of our own Nation, and that it may be made most useful for all Artificers in Building, and Lovers and Practitioners in this most Useful Art, and for the greater Splendor and Glory of Princes Courts, Gentlemen's Seats, and whole Cities, especially the most Famous City of London, you have the larger Book reduc'd into a smaller Volume, and the
Author

To the Reader:

Author his given Parts, divided into Minutes; whereby the Principal Rules of Architecture are made plain to ordinary Capacities by Joachim Schuym, an Ingenious Artist. And for your better Understanding take Notice, That by Model is signify'd the Measure of the whole Diameter of the Column; as for Example, let the Diameter be 18, 16, or 12 Inches, which shall be the Model divided into 60 Equal Parts or Minutes (as you may see in the Diagonal Scale ensuing) by using which Measure all the Parts of the said Column shall be Proportionable; and this dividing of the Column into 60 Equal Parts or Minutes shall be us'd to all the Columns. Also here is added the Description and Use of an Ordinary Joynt-Rule fitted with Lines for the ready finding the Lengths and Angles of Rafters and Hips, and Collar-Beams in any Square of Bevvelling-Roofs at any pitch, and the ready drawing the Architrave, Frize and Cornice in any Order, with other useful Conclusions by the said Rule. With the Ground-Rules of the Art of Building, by that Ingenious Gentleman Sir Henry Wooton, in his Elements of Architecture.

Also in this Fourth Edition is added, to make the whole the more Compleat, A Compendium of the Art of Building; containing many useful Things both for Builders and Workmen, too large to be inserted here; therefore I refer you to the Treatise it self, and remain a Lover of the Art of Building, and your hearty Well-wisher.

R. M.

The Description of the Scale, and its use in dividing of the Parts in the Column easily found out, agreeing with the Measure of the Author.

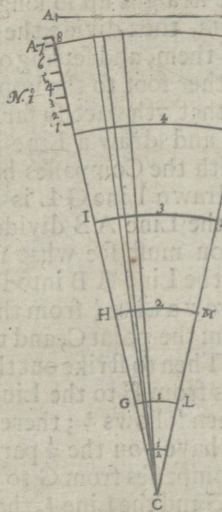
No. I. **T**HE heighth of the uppermost Line A B is taken from the *Tuscan* Cornice (in the 6th Plate) and is divided into $4\frac{7}{8}$ parts: draw a Line straight up so long as you will, as C A, and divide into 5 equal parts, then divide the uppermost 5th part into 8 parts, and take 7 of them, and setting one foot of the Compasses in the Point C, and the other foot to the uppermost 7th part, draw an Arch of a Circle from that 7th part so far as the Line A B may be set on it from A to B; and draw a Line sloping from B to C, and draw every 5th part with the Compasses between the 2 Lines A C and B C; the undermost drawn Line G L is 1 part, H M 2 parts, I N 3 parts, K O 4 parts of the Line A B divided into $4\frac{7}{8}$ parts: Then to divide the parts so, you must see what use you have thereof in your Cornice, and divide the Line A B into so many parts as there is occasion, as in 3 parts; so draw a Line $\frac{1}{3}$ from the point C, and into 4 parts, and draw a Line $\frac{1}{4}$ from the point C, and then into 5, and draw a Line $\frac{1}{5}$ from the point C. Then to strike out the small Members of the Cornice, set the Compasses from H to the Line $\frac{1}{7}$, the which will give $\frac{2}{7}$ parts of the Line A B, then follows $\frac{3}{7}$; therefore set your Compasses on F and the Line $\frac{1}{7}$, then have you the $\frac{4}{7}$ part, next follows the part 1; therefore set your Compasses from G to L, the which is 1 part; then set the Compasses on G and the Line $\frac{1}{7}$, the which is then $\frac{2}{7}$ part, then set your Compasses on F and $\frac{2}{7}$, and add that to G L, and it makes together $1\frac{1}{7}$ part, then follow two parts $\frac{2}{7}$, then set the Compasses from I to the Line $\frac{1}{2}$, the which is $\frac{3}{2}$ parts, then on F and $\frac{2}{7}$, which is $\frac{1}{2}$ part, then on H and $\frac{1}{7}$, which is $\frac{2}{7}$, and on G and the Line $\frac{1}{7}$, which is $\frac{2}{7}$, and do the like with every Member of the Cornice and the Base, as you may see plainly in the 6th Figure.

No. II. The slope Line P Q R is upon the Cornice of *Composita*, which is to be divided into 7 and $7\frac{1}{2}$ parts, and one half twelfth part $7\frac{1}{2} : \frac{1}{2}$, and may be drawn after the same manner, as with the *Doric*, *Ionick*, and *Corinthian*, as you see plainly in the 24th Figure.

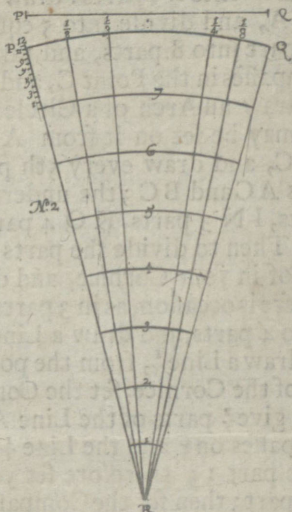
No. III. The Author gives well the dividing the Members in general of the Ornament, Impost, and Arch, with the Base and Cimacia, but not so plain in particular how much every Member must be. There have been several Lovers of the Art, who have endeavour'd to find out the dividing of the Minutes. So I thought necessary to put the Minutes to it, and of the same to make a Scale. And for to make the Scale right, divide your Model into 6 parts on one side, and divide the other side into 10 parts, and so draw your Lines diagonal ways, after the manner of the Draught of the Diagonal Scale in the next Leaf ensuing. So is your Scale made, by which all the Members are easily and rightly divided.

To

TVSCANA



COMPOSITA



5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0

The Mirror of Architecture.

The Description of the Five Orders of ARCHITECTURE, and first beginning with the Tuscan-Column.

Plate I.

HERE is shown how the Columns follow one another, and how high every one must be.

The *Tuscan* must be eleven Models and one fourth high ; whereof the Pedestal must be one Model seven eighths, or one Model and fifty two Minutes and a half : The Column must be seven Models and a half, the Ornament must be one Model and seven eighths : and so the Ornament is one fourth of the height of the Column, and the Pedestal also is one fourth of the height of the Column.

The *Dorick* must be twelve Models and fifty three minutes and a half high ; whereof the Pedestal must have two Models and sixteen minutes : the Column must be eight Models and a half ; the Ornament must be two Models and one eighth : So the Ornament is one fourth of the height of the Column, and the Pedestal is three and three fourths of the height of the Column.

The *Ionick* must be thirteen Models high ; whereof the Pedestal must have two Models and a half ; the Column must have eight Models and three fourths ; and so the Ornament comes to be one fifth part of the height of the Column, and the Pedestal three and a half of the height of the Column.

The *Roman* or the *Composita* must be fourteen Models and seven tenths high, or fourteen Models forty two Minutes ; whereof the Pedestal must be three Models ; the Column nine Models and three fourths ; and the Ornament must have one Model and nineteen twentieths, or one Model and fifty seven Minutes : so the Ornament comes to be one fifth part of the height of the Column, and the Pedestal three and one fourth of the height of the Column.

The *Corinthian* must be fifteen Models and one third high ; whereof the Pedestal must be three Models and one third, the Column must be

ten Models; the Ornament must have two Models: And so the Ornament comes to be the fifth part of the height of the Column, and the Pedestal one third of the height of the Column.

Plate II.

If you would make Galleries without the Pedestal, you must take the height of nine Models and three eighths to make the Work the more stately; so you may make one gross Base under of half-Model: the breadth must be eleven Models and two thirds; the middle inter-Column must be three Models; the inter-Column of either side must be two Models and one third. But if you will make them of six Columns, they must be eighteen Models and one third; and of eight Columns, they must be twenty five Models: the height for the lights of the Gate must be four sevenths of the height of the Column, with his Architrave and Frize, and comes to four Models and fifty nine Minutes; and the breadth is two sevenths; the height is two Models and twenty nine Minutes and a half: The Ornament must be one fourth of the height of the lights, the Door is one Model and one fourth.

Plate III.

The *Tuscan* Arch must be three Models and fifty two Minutes wide; the Pilasters under to the Foot of the Column must be thirty four Minutes; the height to the top of the Impost is five Models and sixteen Minutes; the Impost is twenty seven Minutes high, divided into eight parts and one fourth; the small Arch, or Bow, is twenty six Minutes divided into eight parts: the Arch must make an half Circle, and somewhat more than one eighth of the Model, and for the projecture of the Impost to diminish the sight. Upon the right and left-side, you must make Windows; of the middle Gate the Key-piece is forty Minutes high.

Plate IV.

If you will make the *Tuscan*-Gallery with the Pedestal, the whole height must be eleven Models and one fourth, and the breadth thirteen Models and two thirds of both the outermost Columns distance, whereof the middle inter-Column must be three Models forty Minutes; the inter-Columns on the right and the left side must be three Models: But if you make the Gallery of six Columns, they must be twenty one Models and two thirds; and if they be of eight Columns, they must be twenty nine Models and two thirds: The height for the lights of the Gate must be four seventh parts of the under-edge of the Pedestal, to the upper edge of the Frize, and six Models and three Minutes and two thirds; and the breadth is two seventh parts, and is three Models and

and one Minute and five sixths : The Ornament must be one fourth of the height of the lights of the Door, and is one Model and thirty one Minutes, whereof the Architrave must have thirty Minutes and one third ; the Frise twenty four Minutes and one fourth ; the Cornish thirty six Minutes and a half.

Plate V.

The *Tuscan* Arch is in distance from one Pedestal to the other four Models and twenty Minutes ; the Pedestal on the Foot of the Column is forty Minutes ; the height from under the Pedestal, to the upper edge of the Impost, is six Models and twelve Minutes and a half ; the height of the Impost is forty one Minutes and five sixths ; the Arch or Bow is twenty nine Minutes ; the Key-piece in the Arch is fifty Minutes high ; the Arch is higher half a Circle and ten Minutes for the projection of the Impost : There the Arch begins, divided into five parts ; four of the same are for the lights of the Door of the principal Gate, and are five Models and five Minutes ; the breadth of the lights is two Models and thirty two Minutes and a half ; the Ornament is one Model and sixteen Minutes and a half high, whereof the Architrave must have twenty five Minutes and one third ; the Frise twenty Minutes and five twelfths ; the Cornish thirty Minutes seven twelfths : Or divide the Ornament one Model sixteen Minutes in fifteen parts, and give five to the Architrave, four the Frise, six the Cornish.

Plate VI.

Shews the particular members of the *Tuscan* Column : On the right-side have we the Pedestal and the Base : The Pedestal is one fourth of the height of the Column, and comes to one Model seven eighths, which must be divided into five parts ; whereof give the under-Cimacium and the Plinth one and one third of Troco, or make two and two thirds the upper Cimacium one part, the upper Cimacium is 22 Minutes and a half : divided in parts, 5 parts and 7 and twenty fourths, the Base is half a Model, and is to be divided into 5 parts. Under the body of the Column is one small list of one half part, making three Minutes : of the left side is the Ornament and the Capital ; the Capital is half a Model high, and is to be divided in ten parts ; the like part hath also the Astragal ; the Ornament is one fourth high ; the Column gives one Model and seven eighths, this divided in seventeen parts and one third, whereof give the Architrave five parts, the Frise six parts and one third ; the Cornish six parts ; the Architrave five parts, is thirty two Minutes and a half, divided in eight parts and seven eighths ; the Frise is forty one Minutes, with his uppermost list, which is plac'd

right over the middle of the Column, so high as the Frise is, and the breadth thirty Minutes: after this breadth the Frise jets out seven Minutes and a half. Here is also after the Frise the List of two Minutes and a half; the Ornament is thirty nine Minutes high, divided in four parts and seven eighths, so you may this Column, and all its members, with the Impost; and also all the other four Columns must be divided after the same manner with minutes; whereof the Column must be divided into sixty minutes, and made after this manner: The Scale is made in the first Figure, and the rule wherewith you divide your parts shall be set P, and for minutes an M: it may be easily understood.

Plate VII.

Here followeth the great and small Impost with his Arch and Ornament of the principal Gates; upon the right side is the Impost and Arch; the Impost and Arch of the small Arch stands beneath, mark'd with the Letter K; the Impost is twenty seven minutes high, divided in eight parts and one fourth; the like part hath Astragal of the Impost: the small Arch or Bow is twenty six Minutes, divided in eight parts and seven eighths; the height of the great Impost is forty one Minutes and five sixths, divided in six parts; the great Arch or Bow is twenty nine Minutes high, divided in eight parts and seven eighths. Of the left side is the Ornament of the principal Gate, and is one Model sixteen Minutes and a half high, whereof cometh twenty five minutes and a half: the Architrave divided into 8 parts and one third; the Frise is 20 Minutes and five twelfths high; the Cornish is 30 Minutes and seven twelfths high, divided in four parts and seven twelfths.

Plate VIII.

If you will make the Dorick-Gallery without the Pedestal, then you must divide the whole height into ten Models and thirty seven Minutes and a half; and to make the Work appear the statelier, you may make one gross Base under of half a Model high, and of four Columns breadth must be nine Models forty five Minutes, whereof the middle inter-Column must be two Models and three fourths; in the inter-Columns of either side must be one Model and a half; of four Columns breadth in the Frise must be eight Trigliffs, and seven Methops: But if you will make them of six Columns, you must divide the breadth into fourteen Models and three fourths; and there must be in the Frise of the six Columns twelve Trigliffs, and eleven Methops: Also if you will make the Gallery of eight Columns, then must the breadth be 19 Models and three fourths; the height of the lights of the Door, is four sevenths of the height of the Column, with his Architrave and Frise,

Frise, and comes to five Models and one third ; and the breadth of the light of the Door must be two Models forty Minutes ; the Ornament must be one fourth of the height of the lights of the Door ; and is one Model twenty Minutes divided in fifteen parts ; give five to the Architrave, four to the Frise, six the Cornish ; and so the Architrave is twenty six Minutes and two thirds, the Frise twenty one Minutes and one third, the Cornish thirty two Minutes.

Plate IX.

The Dorick-Arch must be six Models and fifteen minutes wide from the middle of one Column to the middle of the other ; and must stand a little more than half out of the Pilaster : The Pilaster is thirty two minutes broad under on the Foot of the Column ; the Impost is twenty seven minutes and a half high, divided in eight parts and five sixths : The like part also hath the Astragal : Underneath the height of the Arch or Bow is twenty seven minutes and one fourth, divided into six parts and one third ; the Key-piece in the Arch is high forty minutes ; the Arch is higher than half a Circle ten minutes for the projecture of the Impost ; the height to the top of the Impost from the Base, is six Models and four minutes and a half.

Plate X.

The Dorick-Gallery with the Pedestal, the whole height of the Column must be twelve Models and fifty three minutes and a half ; and four Columns must be thirteen Models and a half broad, whereof the middle inter-Column must be four Models ; the inter-Column of the side two Models and three fourths : Upon the four Columns must be 11 Triglyphs, and 10 Methops ; but six Columns must be 21 Models broad, and seventeen Triglyphs, and sixteen Methops ; but eight Columns must be the breadth of twenty eight Models and a half, twenty three Triglyphs, and twenty two Methops : The light of the Door is four sevenths of the under-edge of the Pedestal, to the uppermost edge of the Frise, and is six Models fifty seven minutes and three fourths ; the breadth is three Models twenty four minutes and three fourths ; the Ornament is high one fourth of the height of the lights, and one fourth, which is one Model thirty eight minutes and one sixth, whereof the Architrave must have thirty two minutes and three fourths ; the Frise twenty six minutes and one sixth, the Cornish thirty nine minutes and one fourth.

Plate XI.

If you would make the Dorick-Gallery with the Pedestal, then must the distance from one Pilaster to the other be 5 Models and one fourth ;
the.

the height from the under-edge of the Pedestal to the upper-edge of the Impost, is seven Models six Minutes; the Impost is fifty Minutes high; the Arch or Bow thirty four Minutes; the Corner-piece is fifty Minutes; the Arch is higher than one half Circle and twelve Minutes and a half for the projecture of the Impost; the height of the lights for the Doors is five Models and fifty two Minutes; the breadth of the lights is two Models and fifty two Minutes: The Ornament is one Model twenty three Minutes and a half high, of which the Architrave hath twenty seven Minutes and five sixths; the Frise is twenty two Minutes and one fourth, the Cornish is thirty three minutes and five twelfths: or divide the Ornament in fifteen parts, five the Architrave, four the Frise, six the Lift.

Plate XII.

Here is shown the particular Members of the Dorick Column: On the right-side we have the Pedestal and the Base; the Pedestal is three and three fourths of the height of the Column, and comes to two Models and sixteen Minutes, divided into six parts; whereof give the under-Cimacium two parts, the body of the Column makes three parts; the upper-Cimacium one part, the under-Cimacium is forty five Minutes: There hath the Plinth thirty Minutes; the other members in fifteen Minutes, divided in three parts and three fourths; the upper Cimacium is twenty two Minutes and a half, divided in five parts nineteen twenty fourths; the Base is one half Model, divided in five parts and two thirds; the Lift upon the Base is one third, or two minutes, and stands off from the Column: On the left side is the Ornament and Capital; the Capital is one half Model high, divided in eleven parts and seven twelfths; and the like part hath the Astragal: the Ornament is one fourth high of the height of the Column, as is two Models seven Minutes and a half divided in eighteen parts and one sixth; thereof give the Architrave five parts, is thirty five minutes divided in seven parts and two thirds; the Frize six parts and one third, is forty five Minutes; the Lift above the Frize one third is five Minutes; the Cornish six parts is forty two Minutes, divided in six parts and seven twenty fourths (the Author gives six parts and one fourth) that it may come forth more: In the Cornish must come in ten Dentils, besides the Grape that hangeth on each side.

Plate XIII.

Here is shewn the great and small Impost with his Arch and Ornament of the principal Gate of the Dorick order: On the right-side is the Impost and Arch, the Impost and the Arch of the smaller Bow,
standing

standing below, mark'd with the letter K : the Impost is twenty seven Minutes and a half high, divided in eight parts and five sixths ; a like part hath also the Astragal of the Impost ; the small Arch or Bow is twenty seven Minutes and one fourth, divided in six parts and one third ; the height of the Impost Major, or greater Impost, is fifty Minutes, divided into nine parts and three eighths ; the great Arch or Bow is thirty four Minutes high, divided in six parts and two thirds : On the left-side is the Ornament of the principal Gate, and is high one Model twenty three Minutes and a half ; whereof the Architrave hath twenty seven Minutes and five sixths, divided in six parts and two thirds ; the Frize is twenty two Minutes one fourth ; the Cornish is thirty three Minutes and five twelfths, divided in four parts and three fourths.

Plate XIV.

If you would make the Ionick Gallery without the Pedestal, then must you divide the whole height in ten Models and a half, to make the Work shew the more stately ; and under it make one gross Base of half a Model high, and of four Columns breadth must be ten Models and twenty one Minutes ; whereof the middle inter-Column must have two Models and a half ; the inter-Columns that stand on the right and left side must be one Model fifty five Minutes and a half ; on the middle of each Column and the Pilaster must be one Modillon ; in the outermost inter-Column shall be five spaces, in the middlemost six spaces ; the four Columns have from the middle of the first to the middle of the last Column sixteen Spaces and Modillons : but if Men will make them of six Columns, then must they divide the breadth in sixteen Models and one sixth ; and there comes on the six Columns between the Modillons twenty six spaces ; and of eight Columns must the breadth be twenty two Models, and there come on the Columns thirty six spaces between the Modillons : the height of the lights of the Doors is four sevenths of the height of the Column, with his Architrave and Frize above the Modillons ; and the light comes to 5 Models and five sixth ; the breadth of the lights of the Doors comes to two Models forty eight Minutes and a half ; the Ornament must be one fourth and one half of the height of the lights of the Doors, and is one Model and eighteen minutes, divided in fifteen parts ; give five to the Architrave, four the Frize, six the Cornish ; and the Architrave is twenty six minutes and three fourths, the Frize twenty minutes, the Cornish thirty one minutes and one fourth.

Plate XV.

The Minor or smaller Ionick Arch must be wide from one Pilaster to the other three Models fifty Minutes, and must stand more than one half

out of the Pilaster; the Pilaster is thirty Minutes under on the breadth of the Column; the Impost is high twenty eight Minutes and a half, divided in nine parts and a half; such like parts hath also the Astragal there under the height of the Arch or Bow twenty four Minutes and one fourth, divided in seven parts and one twenty fourth; the Key-piece in the Arch is fifty Minutes high; the Arch is higher than one half Circle twelve Minutes; the height from above the Impost to the under-edge of the Base, is six Models and eighteen Minutes.

Plate XVI.

The Ionick-Gallery with the Pedestal, the whole height of the Column must be thirteen Models, and the four Columns breadth must be twelve Models and two thirds, whereof the middle inter-Column must be three Models and two thirds, the inter-Column on the side must be two Models and a half; on the four Columns from the middle of the first to the middle of the last Column, cometh twenty Spaces and Modillions, of six Columns breadth, is nineteen Models and two thirds, and hath thirty two spaces between the Modillions; and of the eight Columns breadth is twenty six Models and two thirds, and hath forty four spaces between the Modillions: the light of the Door is four sevenths from the under-edge of the Pedestal of the Column, Architrave and Frize, to the upper edge of the Modillions, and is seven Models seventeen Minutes; the breadth of the Door of the lights is three Models thirty Minutes and three eighths; the Ornament must be one fourth and one half of the height to the lights of the Doors, and is one Model five eighths divided in fifteen parts; give five to the Architrave, four to the Frize, six the Cornish; the Architrave is thirty two Minutes and a half, the Frize twenty six Minutes, the Cornish thirty nine Minutes.

Plate XVII.

If you would make the Ionick Arch with the Pedestal, then must the distance from one Pilaster to the other be four Models and fifty Minutes; the height from the under edge of the Pedestal, to the upper edge of the Impost, is 7 Models and 35 Minutes; the Impost is fifty Minutes and one fourth high; the Arch or Bow thirty Minutes and a half; the Corner-piece one Model; the Arch is higher than one half Circle 15 Minutes; the height of the lights of the Doors is 6 Models 16 Minutes and a half; the breadth of the lights is three Models and two Minutes; the Ornament is high one Model twenty five Minutes and a half thereof; the Architrave hath twenty eight Minutes and a half, the Frize hath twenty two Minutes and four fifths; the Cornish thirty four Minutes and one fifth; the Pilaster is thirty five Minutes broad under on the Column.

Plate

Plate 18.

Here is shewn the particular Members of the Ionick Column : On the right-side you have the Pedestal and Base ; the Pedestal is three and a half of the height of the Column, and comes to two Models and a half of the height, divided into six and two thirds, thereof give the under-Cimatum two parts, the Trunk or the Neck three parts and two thirds ; the upper Cimatum is one part ; the under Cimatum forty five Minutes thereof ; give the Plinth thirty Minutes, the other fifteen Minutes, divided in four parts and one fourth ; the upper Cimatum is twenty two Minutes and a half, divided in six parts and five eighths ; The Base is half a Model, divided in five parts and seven twelfths ; on the Column be two members divided out with the aforesaid parts, is three minutes, and three fourths : On the left-side is the Capital and Ornament ; the Capital is thirty one Minutes and a half high of the under-edge of the Scroll, or more ; the Astragal on the upper-edge of the Abacus is eighteen Minutes and five sixths, divided in seven parts and one fortieth ; the Ornament is one Model and three fourths high, and is one fifth of the height of the Column, divided in fifteen parts ; give the Architrave five, the Frise four, the Cornish six ; the Architrave five parts and thirty five Minutes, divided in eight parts and one fourth ; the Frise is twenty eight Minutes, and must have one List on one fourth part, such-like part as the Cornish hath of one minute and a half ; the Cornish is forty two minutes, divided in seven parts and five twelfths, and one half twelfth part, or in seven parts and eleven twenty fourths ; but if you are to make great or Royal Work, then commonly is the Frise carved : So must the ornament be between one fourth and one fifth part of the height of the Column, and divided in sixteen parts and two thirds ; give the Architrave five parts, the Frise five and two thirds, the Cornish six parts.

Plate 19.

Here is shewn the great and small Impost, with his Arch and Ornament of the principal Gate of the Ionick Order. On the right-side is the Impost and Arch ; the Impost and Arch of the small Bow, standing beneath the Impost, is twenty eight minutes and a half high, divided in nine parts and a half ; such-like parts hath also the Astragal ; the Arch or Bow is twenty four Minutes and one fourth, divided in seven parts and one twenty fourth ; the great Impost is high fifty minutes and one fourth, divided in eight parts eleven twenty fourths ; the great Arch or Bow is high thirty minutes and a half, divided in seven parts and a half : On the left-side is the Ornament of the principal Gate,

C

and

and is high one Model twenty five minutes and a half; the Architrave is high twenty eight minutes and a half, divided in seven parts; the Frise is high twenty two minutes and four fifths; the Cornish is high thirty four minutes, divided in five parts and seventeen twenty fourths; under and above the Frise is one of one fourth part of the aforesaid parts.

Plate XX.

If you would make the Roman Gallery without the Pedestal, then must you take the height of eleven Models and seven tenths, and make one gross Base under of one half Model high; and of four Columns breadth must be nine Models forty minutes, whereof the middle inter-Column must have two Models and one fourth: The inter-Column standing on the right and left-side, must be one Model forty two minutes and a half: On the middle of each Column must come one Modillon; and in the outward inter-Column must come five spaces; in the middle inter-Column six spaces: the four Columns have from the middle of the first to the middle of the last Column, sixteen spaces and Modillions; but if you make them six Columns, then must the breadth be fifteen Models and one twelfth; and there comes on the six Columns between the Modillions twenty six spaces; and of eight Columns the breadth must be twenty Models and a half, and there comes on the eight Columns thirty six spaces between the Modillions: The height of the Lights of the Doors is four sevenths of the height of the Column, with his Architrave and Frise: From the upper-edge of the Modillions, and the lights, is of six Models thirty Minutes; and the breadth of the lights of the Doors, of three Models twenty five minutes; the Ornament must be three parts and one fourth of fifteen Parts of the height of the Lights, and is one Model twenty four minutes and a half, divided in fifteen parts; five for the Architrave, four the Frise, six the Cornish; and the Architrave is twenty seven and a half, the Frise twenty two, the Cornish thirty three without the Gola and Orle, the which next belongs to the Cornish of the Frontispiece.

Plate XXI.

The small Roman Arch must be from one Pilaster to the other four Models and thirty four minutes, and must stand somewhat more than half out of the Pilaster; the Pilaster is twenty eight minutes; under on the breadth of the Column, the Impost is high thirty one minutes and one ninth, divided in eleven parts and one twelfth; such-like parts hath also the Astragal; there under the height of the Arch or Bow is twenty eight minutes, divided in seven parts and two thirds; the Key-piece in the Arch is high fifty minutes; the Arch is higher than one half-

half-Circle fourteen minutes ; the heighth from above the Impost, from the under-edge off from the Base, is six Models fifty four minutes.

Plate XXII.

The Roman-Gallery with the Pedestal, the Column must be fourteen Models and forty two minutes high ; and the breadth of four Columns must be eleven Models and fifty minutes ; whereof the middle inter-Column must be three Models and one third ; the inter-Column on the side two Models fifteen minutes : On the fourth Column from the middle of the first to the middle of the last Column, cometh twenty spaces and Modillions ; of six Columns breadth is eighteen Models twenty minutes, and hath thirty two spaces between the Modillions ; and of eight Columns breadth is twenty four Models and fifty minutes, and hath forty four spaces between the Modillions : the lights of the Doors is high four sevenths from the under edge of the Pedestal with his Column ; the Architrave and Frise to the upper-edge of the Modillions, comes to eight Models twelve minutes and four fifths ; the breadth of the lights of the Doors is three Models fifty three minutes and a half ; the Ornament must be three fourteenths and one fourth ; for the Architrave, Frise and Cornish of the heighth of the lights of the Doors, and comes to one Model and fifty three minutes, divided in five parts ; give five to the Architrave, four the Frise, six the Cornish ; and the Architrave is thirty seven minutes and two thirds ; the Frise thirty minutes and one sixth ; the Cornish is forty five minutes and one sixth.

Plate XXIII.

If you make the Roman Arch with the Pedestal, then must the distance from one Pilaster to the other be five Models and a half ; the heighth from the under-edge of the Pedestal, to the upper-edge of the Impost, is eight Models forty two minutes and a half ; the Impost is high fifty five minutes and a half ; the Arch or Bow is thirty three minutes ; the Corner-piece one Model high ; the Arch is higher than one half Circle seventeen minutes and a half ; the lights of the Doors is seven Models eighteen minutes high ; the breadth of the lights is three Models twenty six minutes and a half ; the Ornament is high one Model twenty four minutes ; thereof the Architrave hath thirty one minutes and one third ; the Frise is twenty five minutes and one twelfth ; the Cornish is thirty seven minutes and seven twelfths, the Pilaster under on the Column is thirty two minutes and a half broad ; the Architrave thirty one minutes and one half broad ; the Architrave thirty one minutes and one third, divided in 7 parts and two thirds ; the Cornish is thirty seven minutes and seven twelfths, divided in five parts twenty three twenty fourths ; above the Frise is one List of one fourth part that goes off from the Frise.

Here is shewn the particular members of the Roman Column: On the right-side you have the Pedestal and Base; the Pedestal is three and one fourth of the Column's heighth, and comes to three models; which divided in eight parts, give thereof the under-Cimacium two parts, the neck five parts, the upper-Cimacium one part, the under-Cimacium forty five minutes; thereof give the Plinth thirty minutes; the other fifteen minutes, divided in four parts and one sixth; the neck of the Pedestal is high one model and seven eighths, and the breadth is one model twenty four minutes; the upper-Cimacium is twenty two minutes and a half, divided in six parts and four fifths; the Base is one half-model, divided in six parts: On the Column be two members, and are to be divided out with the aforesaid parts, three minutes and three fourths: On the left side is the Capital and Ornament; the Capital is high one model and one sixth, or seventy minutes, which divided in 23 parts and 1 third, to make the ground of the Capital, take one Square of 1 model and a half, each side of the Square draw one round Circle of six sevenths of a model, or fifty one minutes, (or so thick as the Column is above, (and all the other jettings over the like, as he made in *Corinthi*; but the Scrolls are made after the Ionick manner: The Ornament is one model fifty seven minutes, and is one fifth of the heighth of the Column, divided in fifteen parts; thereof give the Architrave five parts, the Frise four parts, the Cornish six parts; the Architrave five parts is thirty nine minutes, divided into nine parts; the Frise 31 minutes and one fourth; the Cornish forty six minutes and three fourths, divided in seven and eleven twelfths, and a half part, or in seven twenty three twenty fourths.

Plate XXV.

Here follows the great and small Impost with his Arch and Ornament of the principal Gate of the Roman Order: On the right-side is the Impost and Arch; the Impost and Arch of the small Bow standing beneath; the Impost is high thirty one minutes and one third, divided in eleven parts and one twelfth; such like part hath also the Astragal; the Arch or Bow is high twenty eight minutes, divided in seven parts and two thirds; the great Impost is high fifty five minutes and a half, divided in eight parts and eleven fifteenths; the great Arch is high thirty three minutes and seven eighths, divided in seven parts and two thirds: On the left side is the Ornament of the principal Gate, and is high one model twenty four minutes; the Architrave is high thirty one minutes and one third, divided in seven parts and two thirds; the Frise is high twenty five minutes and one twelfth; the Cornish is high thirty

thirty seven minutes and seven twelfths; divided in five parts and twenty three twenty fourths; under on the Frise is one list of one fourth part and one half minute.

Plate XXVI.

If you will make the Corinthian-Gallery without a Pedestal, then must you divide the whole height in twelve Models, and you shall place under it one gross Base of one half Model high, and of the four Columns breadth must be nine Models, whereof the middle inter-Column must have two Models; they that stand on the right and left side must have the inter-Column of one Model and a half: On the middle of each Column and Pilaster must be one Modillon; in the outermost inter-Column shall be five spaces, and in the middle six: The four Columns have from the middle of the first to the middle of the last Column sixteen spaces and Modillions; but if you make them of the breadth of six Columns, then must you divide the breadth into fourteen Models; and there comes on the six Columns between the Modillions twenty six spaces; and of the eight Columns the breadth must be nineteen Models, and there comes on the eight Columns thirty six spaces between the Modillions: The height of the Lights of the Doors is four sevenths of the flat of the Column that comes under the spaces of the Modillions, or in six parts under to the Architrave; and the Light is of six Models and two thirds; the breadth of the Lights is three Models and five minutes; the Ornament must be one fifth of the height of the Light, and divided likewise in fifteen of the like parts; give five to the Architrave, four the Frise, and six the Cornish; and the Architrave it twenty six minutes and two thirds, the Frise twenty one minutes and one third, the Cornish thirty two minutes: So the whole one Ornament is one Model twenty minutes.

Plate 27.

The small Corinthian Arch must be four Models eight minutes wide from one Pilaster to the other; the Pilaster is twenty six minutes broad under on the Column; the impost is thirty three minutes and one third high, divided in seven parts and nineteen twenty fourths: The height of the Arch or Bow is twenty five minutes, divided in nine parts and eleven twelfths; the Key-peace in the Arch is fifty minutes high; the Arch is higher than one half Circle sixteen minutes; the height from above the Impost to the under edge off of the Base, seven Models and twenty minutes.

Plate 28.

The Corinthian Gallery with the Pedestal, the Column must be fifteen Models and one third high; and the breadth of four Columns eleven

eleven Models, whereof the middle inter-Column must be three Models; the inter-Column on the side must be two Models; on the four Columns from the middle of the first to the middle of the last, cometh twenty spaces and Modillions; of six Columns breadth is seventeen Models, and hath thirty two spaces between the Modillions; of the breadth of eight Columns is twenty three Models, and hath forty four spaces between the Modillions; the light of the Door is four sevenths of the under-edge of the Pedestal with his Column to the upper-edge of the Modillon, and is eight Models thirty two minutes and one third high; the breadth of the Lights of the Door is three Models fifty nine minutes and one sixth; the Ornament must be one fifth of the height of the Lights of the Door, and is one Model forty two minutes and two fifths, divided into fifteen parts; thereof the Architrave hath five parts, and the Frise four, and the Cornish six; and the Architrave is thirty four minutes, the Frise twenty seven minutes, the Cornish forty one minutes.

Plate XXIX.

If you will make the *Corinthian-Arch* with the Pedestal, then must the distance from one Pilaster to the other be five Models; the height from the under-edge of the Pedestal, to the upper edge of the Impost, is nine Models and a half; the Impost is high fifty five minutes and one twelfth; the bigness of the Arch must be one tenth of the breadth, like the foregoing Arch, and is thirty minutes; the Corner-piece one Model: The Arch is higher than one half Circle twenty minutes; the height of the Light of the Door is three Models forty five minutes; the Ornament is high one Model thirty six minutes; thereof the Architrave hath thirty two minutes, divided in nine parts and five sixths; the Frise is twenty five minutes and a half, and hath one list of one fifth part under the Cornish, the Cornish is thirty eight minutes and a half, divided in five parts and two fifths, the Pilaster under on the Column is thirty minutes broad.

Plate XXX.

Here followeth the particular Members of the *Corinthian Column*: On the right side you have the Pedestal and Base, the Pedestal is one third part of the height of the Column, and is three Models and one third, which divided in eight parts, thereof give the under *Cimacium* two parts, the neck of the Pedestal five parts and seven eighths; the upper *Cimacium* one part, the under *Cimacium* is forty five minutes; thereof give the *Plinth* thirty minutes, the other Member is fifteen minutes, divided in four parts and one eighth: On the *Cimacium* is also two Members, one *Torus* of three fourths, and one list of one third part:

part: of the aforesaid parts the upper Cimacium is twenty two minutes and a half, divided in seven parts and three eighths, there under is one List of three eighth parts goes off from the neck; the Base is one half Model, divided in six parts and one third, and must go off the shaft of the Column one fourth part and a half part: On the left side is the Ornament and the Capital; the Capital is high one Model and one sixth, or seventy minutes, which divided in twenty three parts and one third; the Astragal is one part and two fifths of the parts of the Capital; the Ornament is one fifth part of the Columns height, and is two Models; this divided in fifteen parts, give five to the Architrave, four to the Frise, six to the Cornish; the Architrave is forty minutes, divided in twelve parts and one twelfth; the Frise is thirty two minutes; the Cornish is forty eight minutes, divided in seven parts and twenty three one hundred and twentieths: So much it projects, and is just 7 parts and one 5th.

Plate XXXI.

Here followeth the great and small Impost with his Arch and Ornament of the principal Gate of the Corinthian Order. On the right side is the Impost and Arch; the Impost and Arch of the small Bow stands mark'd with the Letter K; the Impost is high thirty three minutes and one third, divided in seven parts and nineteen twenty fourths; the small Arch or Bow is high twenty five minutes, divided in nine parts and eleven twelfths; the height of the great Impost is fifty five minutes and seven twelfths, divided in seven and fifty three one hundred twentieths; the great Arch or Bow is thirty minutes, divided in nine parts and eleven twelfths: On the left side is the Ornament of the principal Gate, and is high one Model thirty six minutes; thereof the Architrave hath thirty two minutes, divided in nine parts and five sixths, the Frise is twenty five minutes, the Cornish thirty eight minutes and a half, divided in five parts and two fifths.

Plate XXXII.

Here is shewn how you shall lessen the Columns; the Tuscan Column is one fourth smaller above than beneath; the Dorick one fifth; the Ionick one sixth; the Roman or Composita is one seventh; the Corinthian is one eighth: which are to be divided in twelve equal parts, three of which must go up in a straight Line in the Tuscan Column, of the Ionick three and a half go up in a straight Line; and the Corinthian four parts go strait up; of the Dorick and Roman or Composita, is a measure between the Tuscan and Ionick, and between the Ionick and Corinthian; the other lessnings Men may easily see how they shall make them in the Figure here set down.

Plate XXXIII.

Shews how you may make the Corinthian Base, and the upper and under Cimacium, with his Diagonal Lines for the enlarging the Projecture.

Plate XXXIV.

Sheweth how the Corinthian Ornament is to be made, as the Architrave, Frise and Cornish, with his Diagonal Lines for enlarging the Projecture, easy to be understood; so draw one Diagonal Line after a perfect Quadrat of the whole projecture of the Cornish; and in these Diagonal Lines must all the perpendicular Lines come for the members that are in the projecture; and this outermost end must we then after this measure draw with the said
Diagonal

Diagonal, so that in the crossing, you make right Angles; that the height of the drawing members be parallel near to the Diagonal.

Plate 35.

This is the Ornament of the Corinthian Order of the principal Gate, and is one model thirty six minutes high, (as before is declared) thereof the Architrave hath thirty two minutes; the Frieze twenty five minutes and a half; the Cornish thirty eight minutes and a half, the Architrave thirty two minutes, divided into nine parts and five sixths; thereof sticks farther out as the outer edge of the Door-sill seven parts and two thirds, or eight minutes and a half farther for cornishing; and let the Ears of the Architrave be seventeen parts long; of the foregiven parts, or fifty five minutes and a half to underneath, besides all other the cornishing of the Architraves, as you may see in the Figure; the Frise is twenty five minutes and a half, divided in seven parts for making the Voluta or Scroll, and draw one Line up: The fourth part, or fourteen minutes and a half from above off right parallels; so there remains three parts or eleven minutes for the standing out beneath, and the eye of the Scroll is one seventh part, or three minutes and nine fourteenths of the height of the Frise; and draw a Line perpendicular from above to the under edge of the Ear of the Architrave, and where the Lines cut cross each other, here is the middle of your Eye: Stick out cross four parts sixteen minutes and a half near to the outside, and three parts and a half, or twelve minutes and a half to the inside, and draw your Scroll then after this manner here drawn: The Scroll or Voluta beneath is one fifth part five and a half smaller, as the upper Scroll is, and is high twenty minutes, and the breadth twenty two minutes and a half: Divide the height in eight parts, and draw a parallel Line of four parts and a half, or eleven minutes and one fourth from beneath to above, and there the parallel Line cut cross the perpendicular is the middle of the Eye, sticks out cross three parts and one half, or eight minutes and three fourths to above, and four parts or ten minutes to the outside; and there remains over five parts or twelve minutes and a half to the inside; farther all that belongs to it may you in the Figure here plainly see; as, for the breadth of the Scroll in two parts and five eighths of the Cornishes given parts, or nineteen minutes; the other Members before may be seen in the Figure.

Plate XXXVI.

Here is shown two Chimny-Mantils, with their Profile.

Plate XXXVII.

Here is shown the ground of the building of the Lord Strozzi standing at Florence, the like is describ'd in the Author's third Book in the seventh Chapter.

Plate XXXVIII.

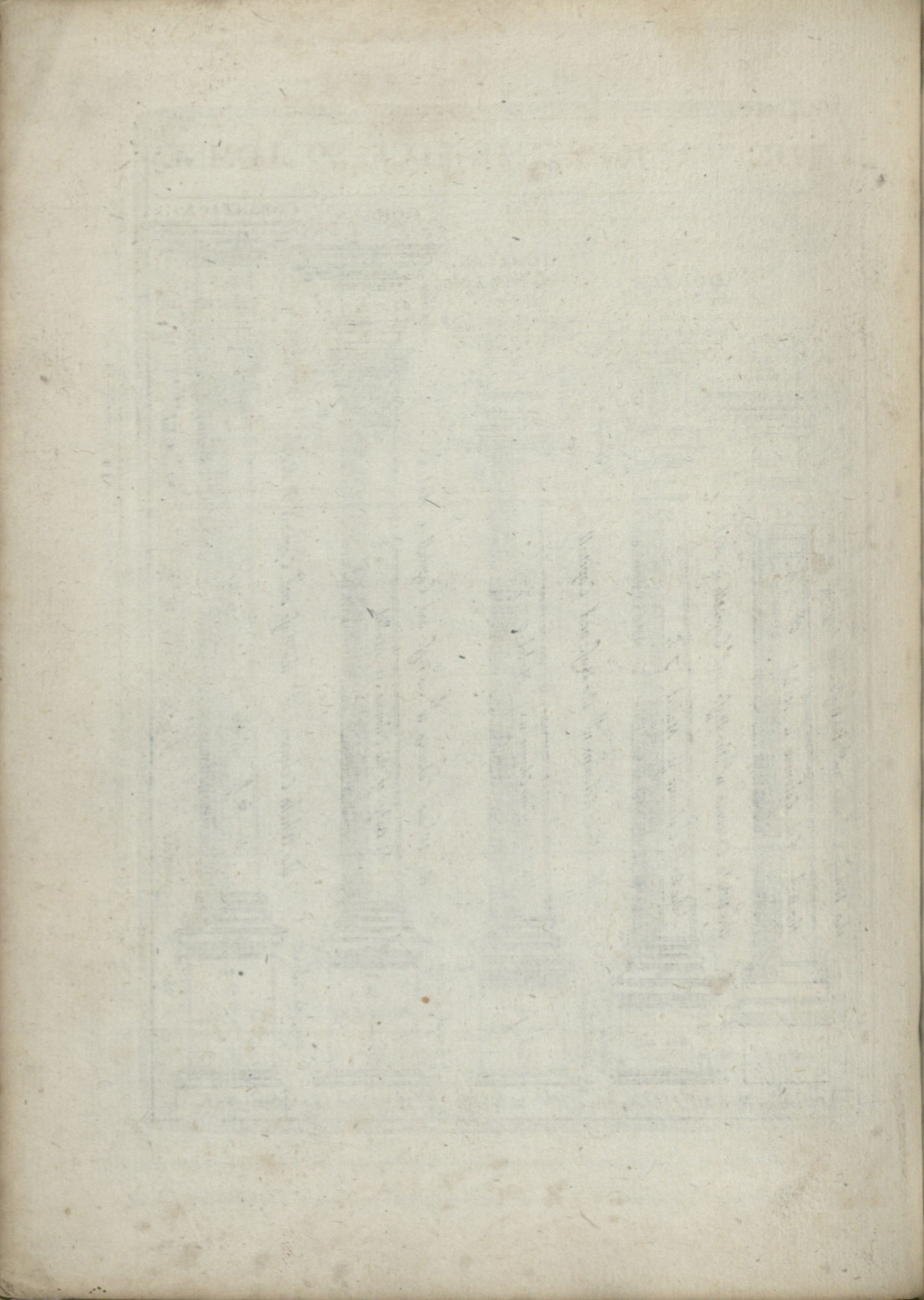
The half of the Building on the Ground to be seen inwards of the Building of the Lord Strozzi.

Plate XXXIX.

The other half with the uprising to be seen with the foreside of the foresaid Building.

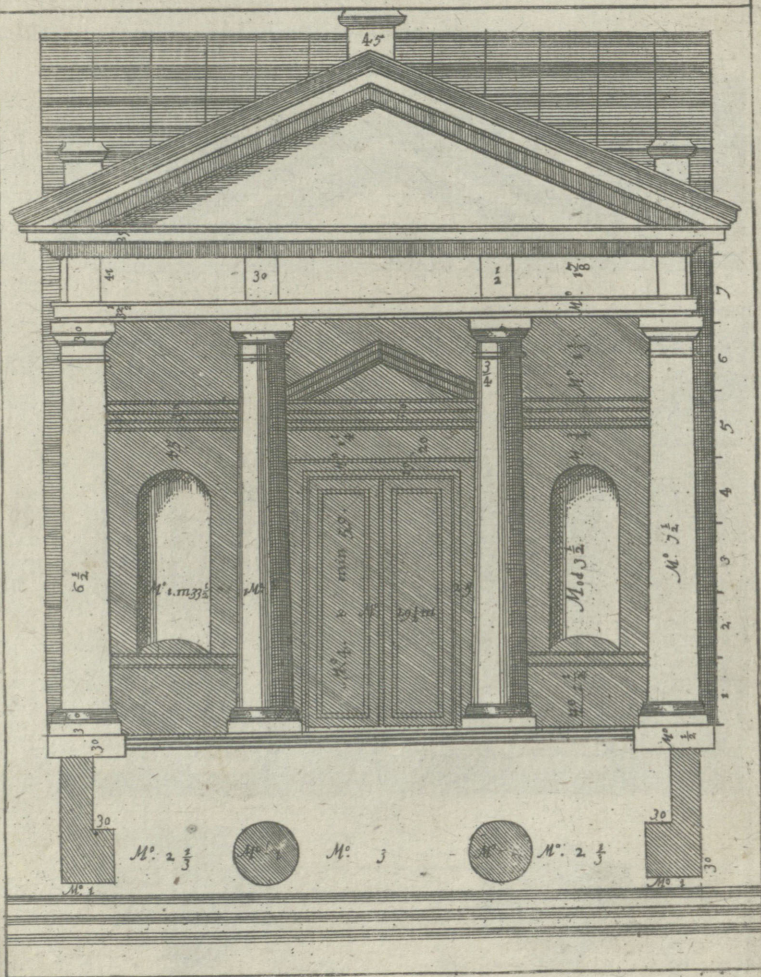
Plate XL.

Here we have the underside of the Cornish of all the Five Columns, A of the Tuscan, B of the Dorick, C the Ionick, D the Roman or Composita, E the Corinthian.

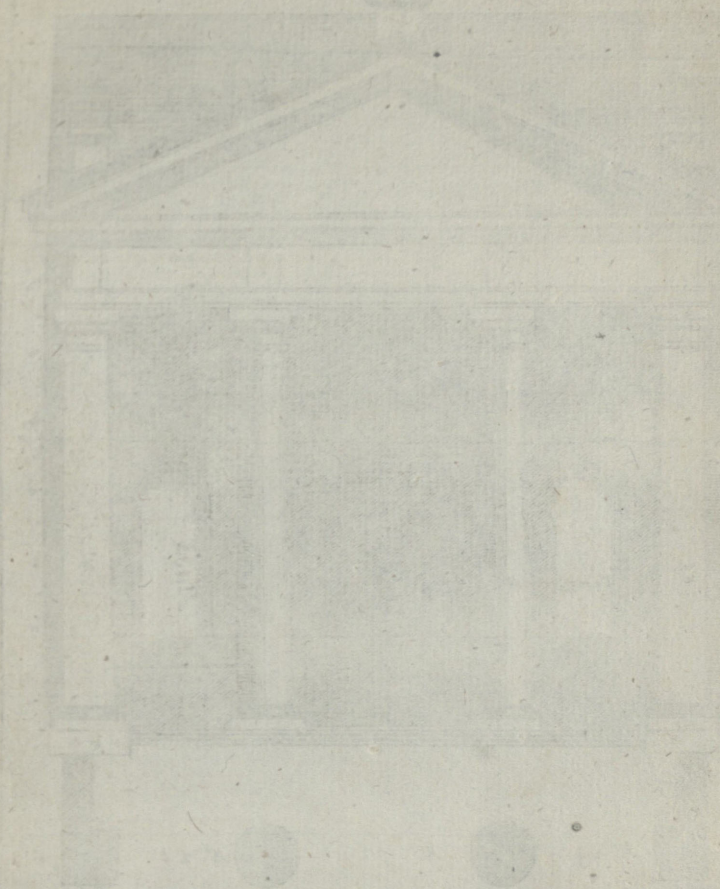


The TUSCAN Colonne

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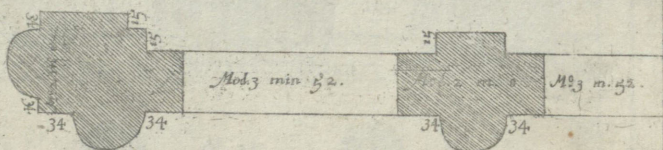
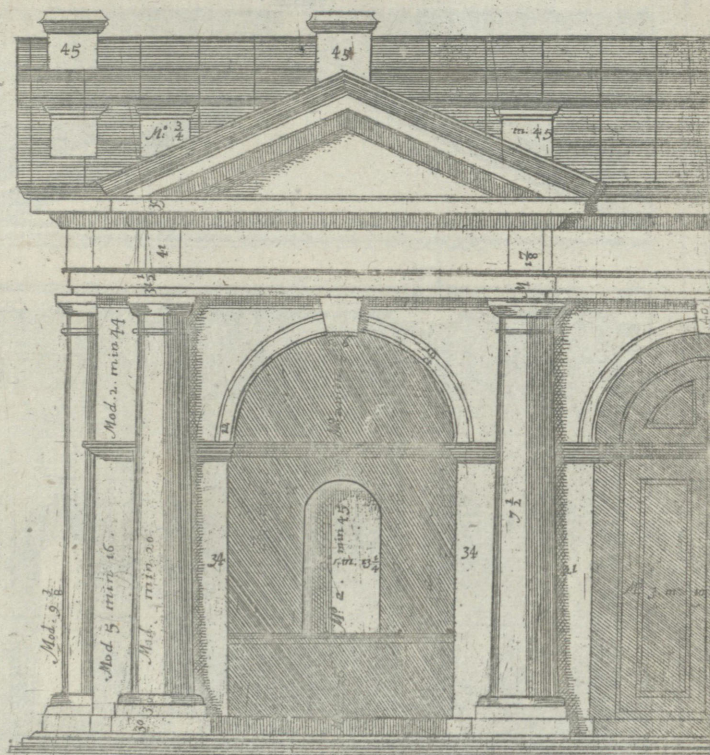


THE TROYAN COLLEGE

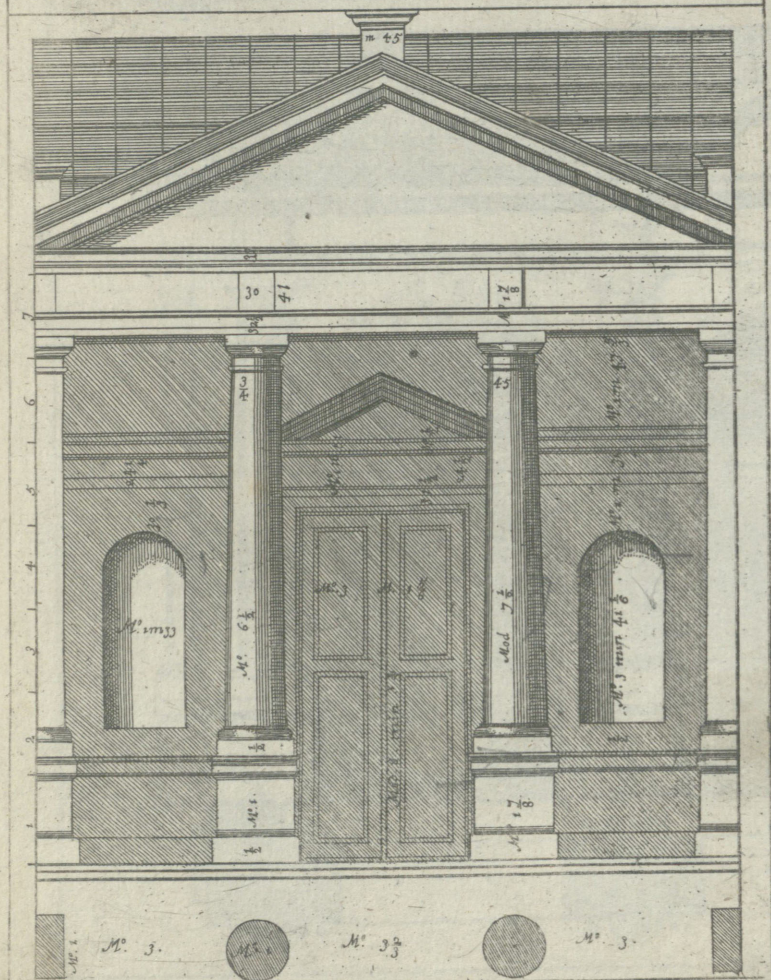


The TUSCAN Arch

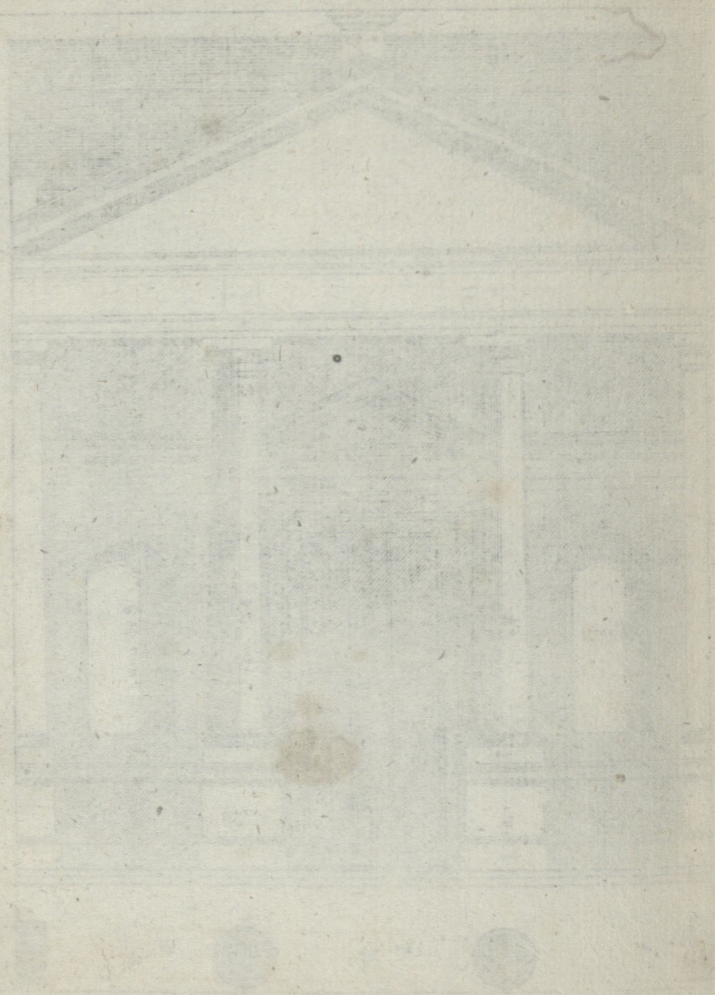
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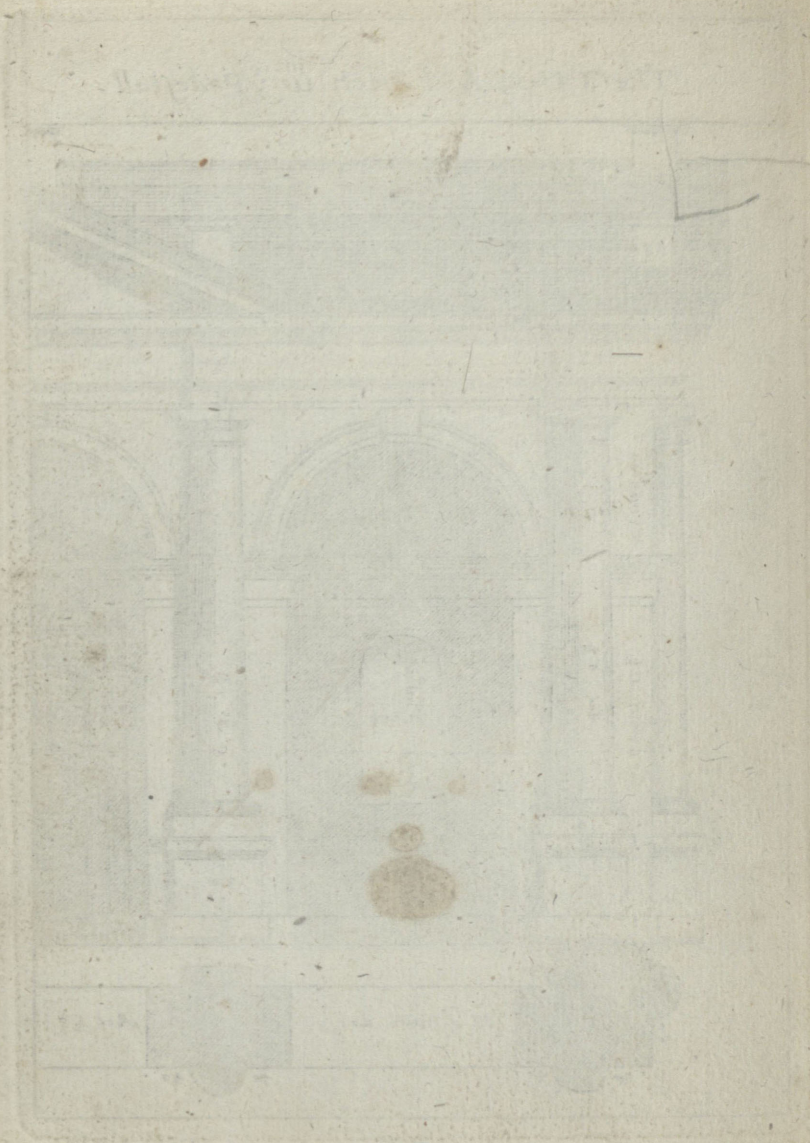


The TUSCAN Colomne with y^e Pedestall

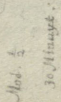


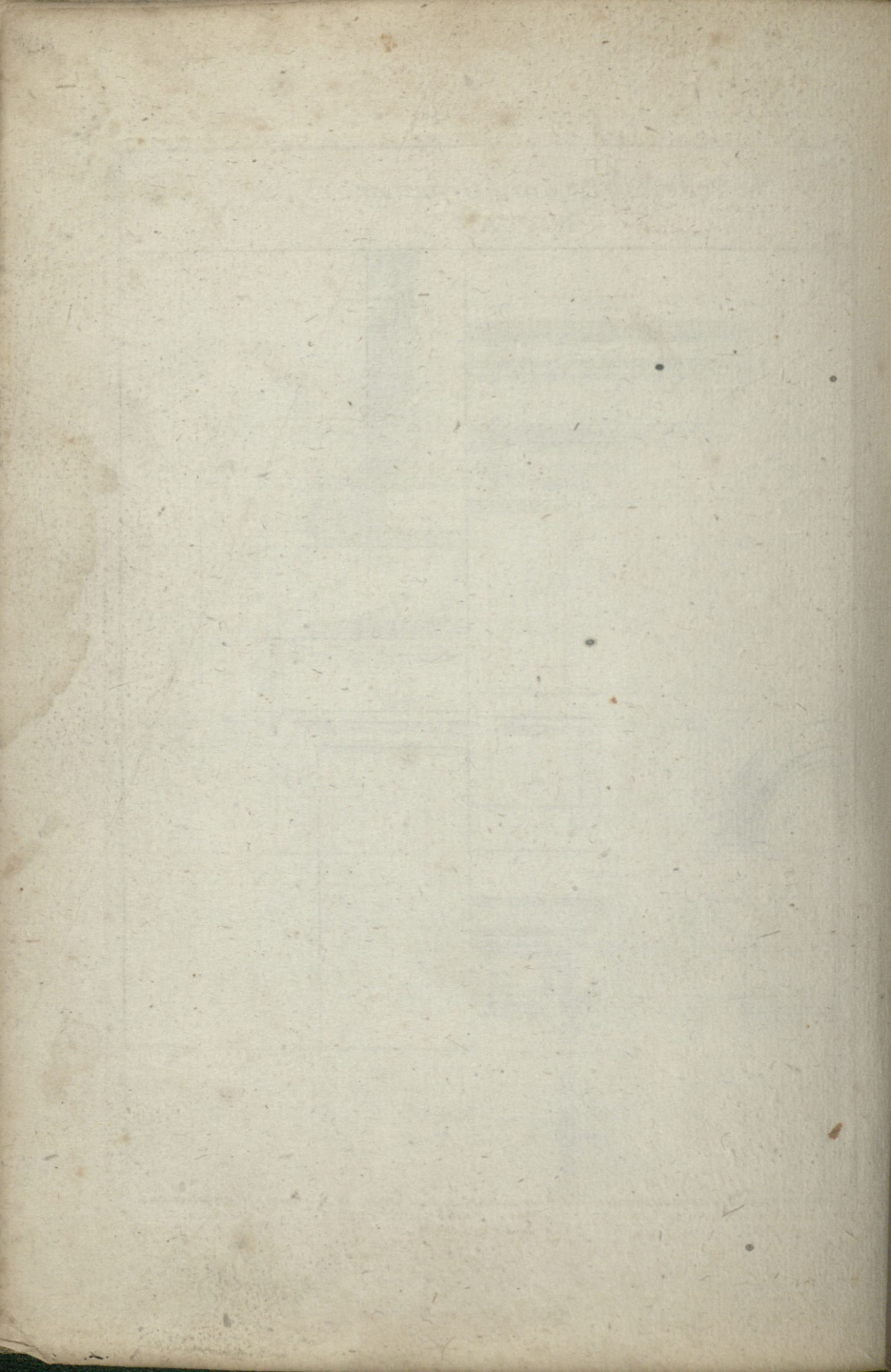
THE TUDOR CHURCH OF ST. PETER



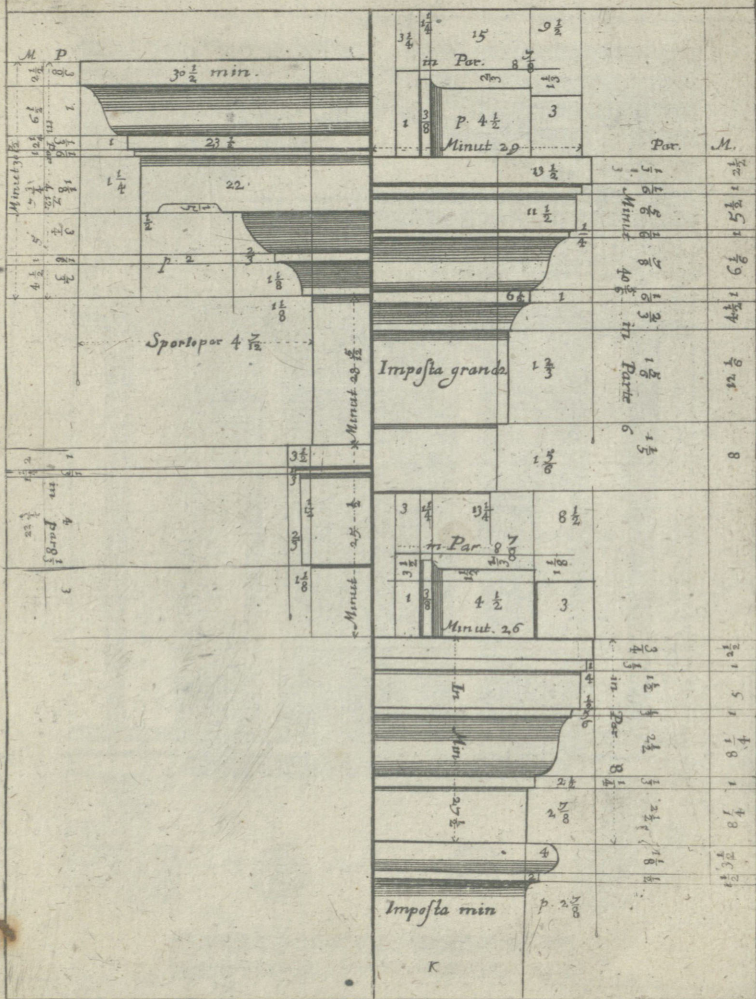


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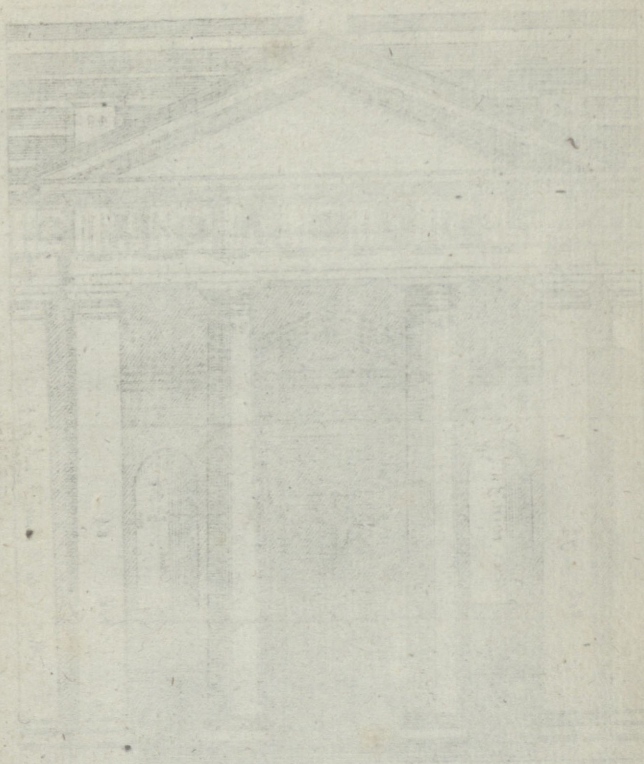




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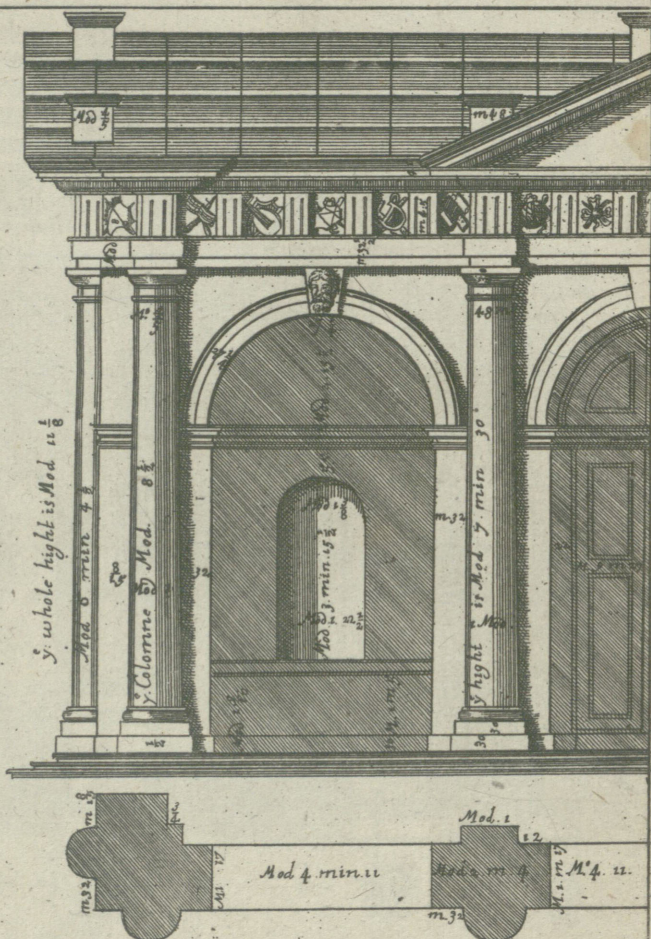


THE DORICK COLLEGE

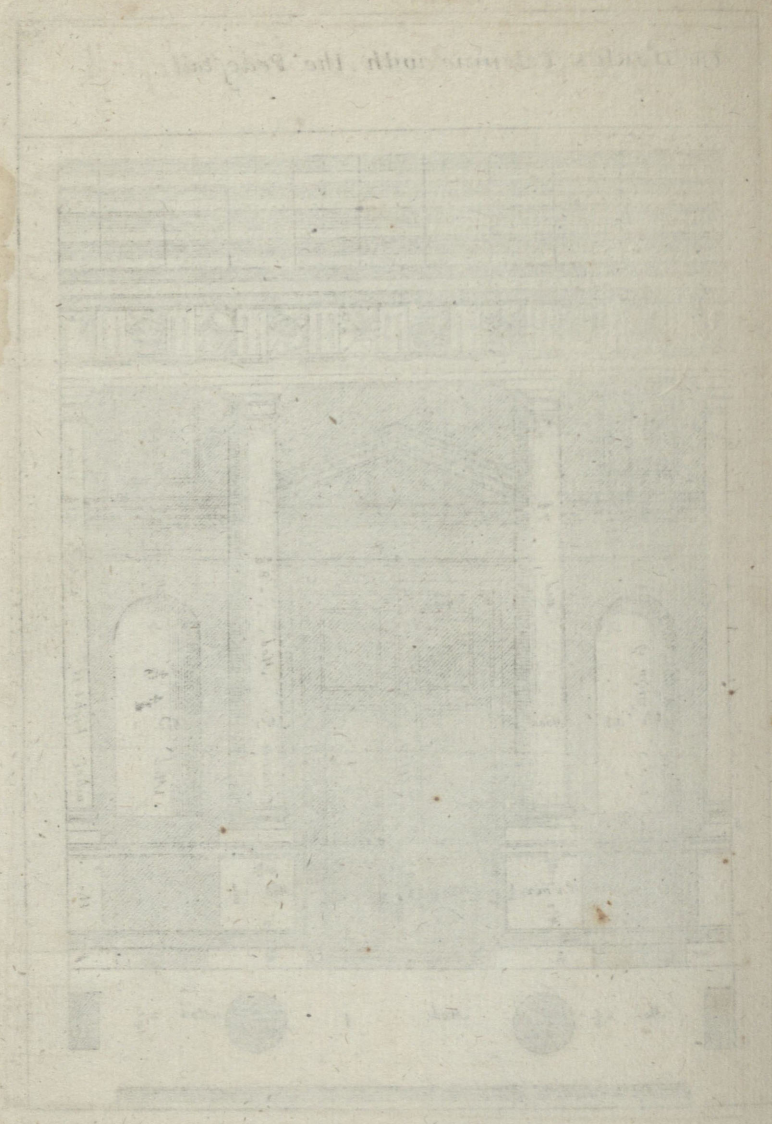


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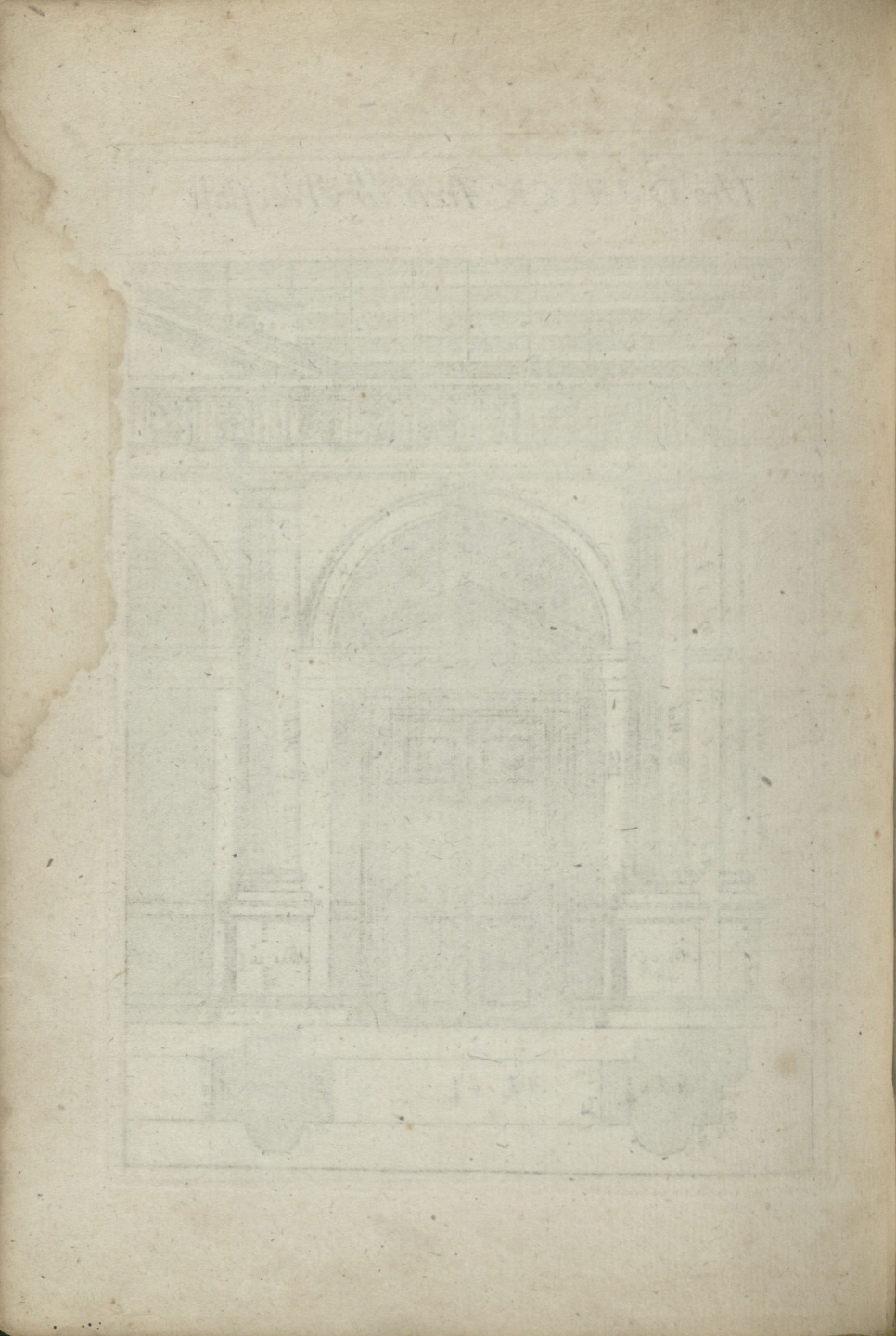
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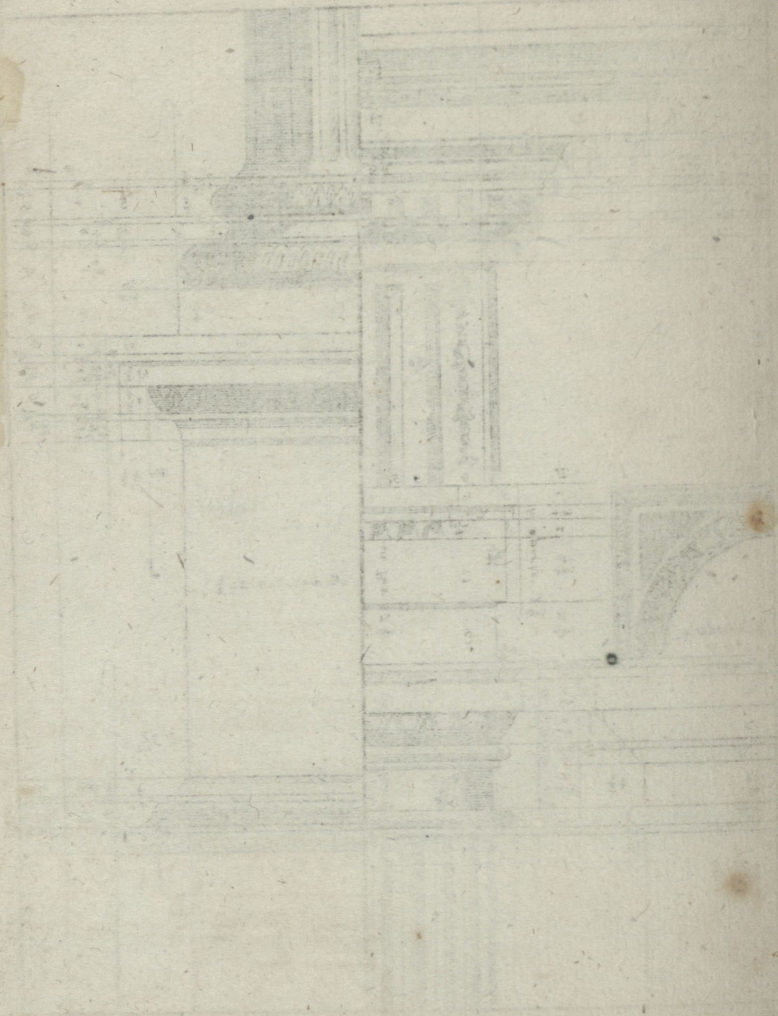




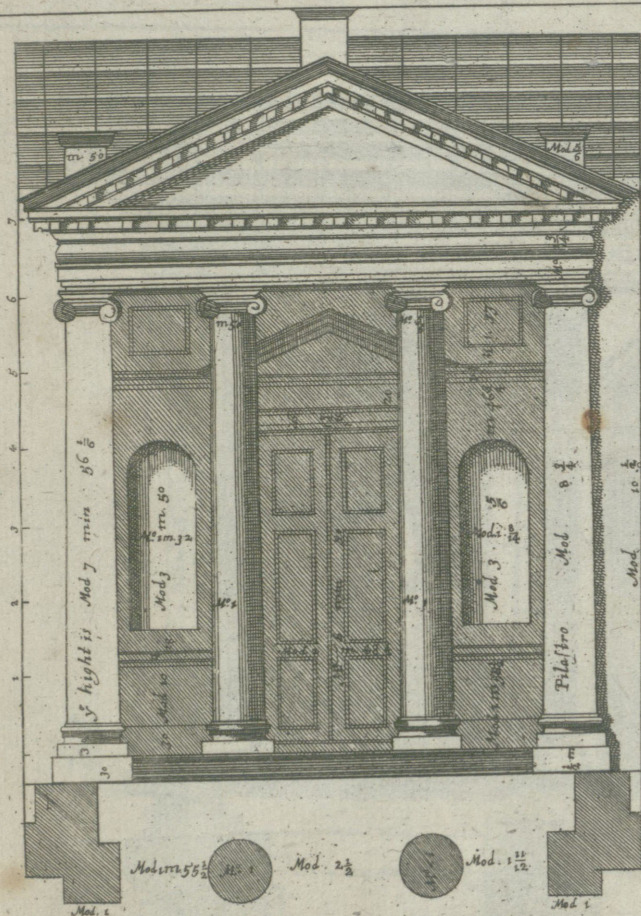
The building is shown with the text...



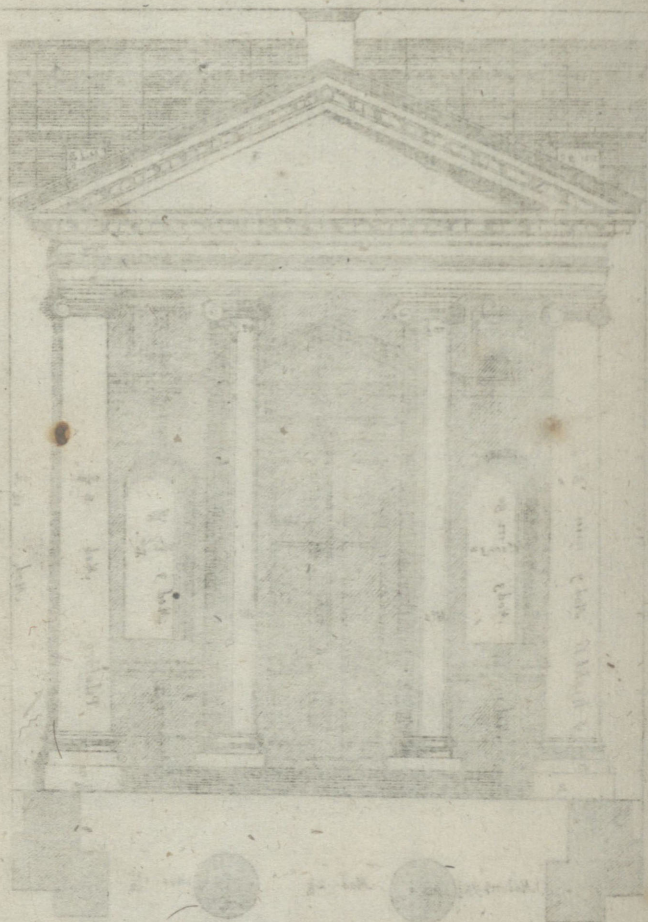
THE UNIVERSITY OF CHICAGO



The IONICK Colonne

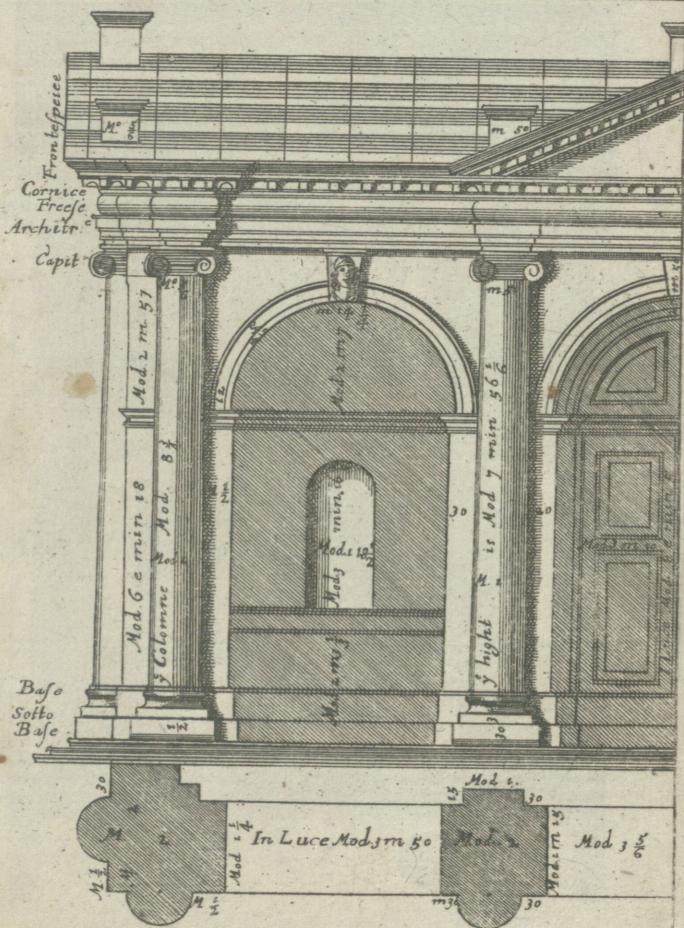


The IONICK Colonnade

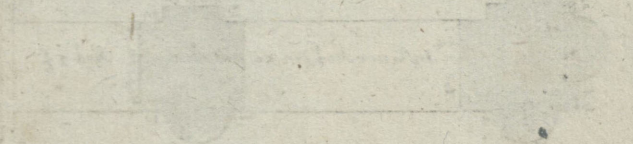
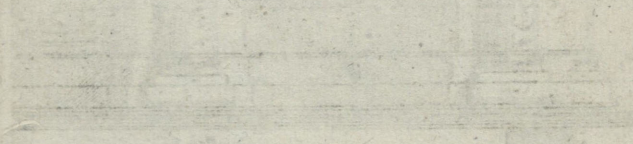
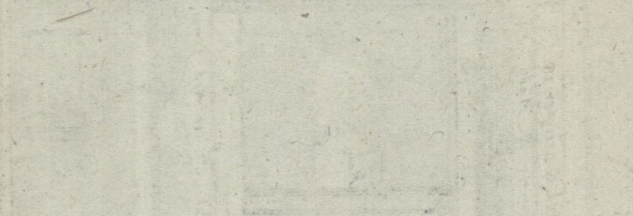
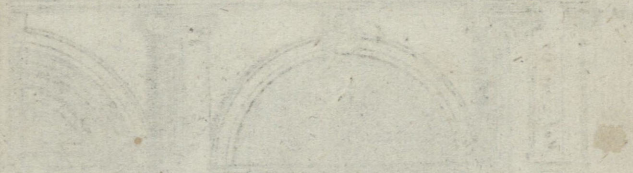
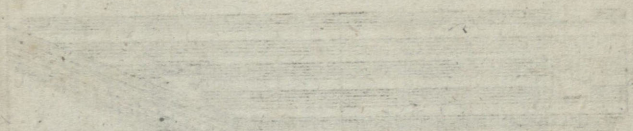


The IONICK Arch

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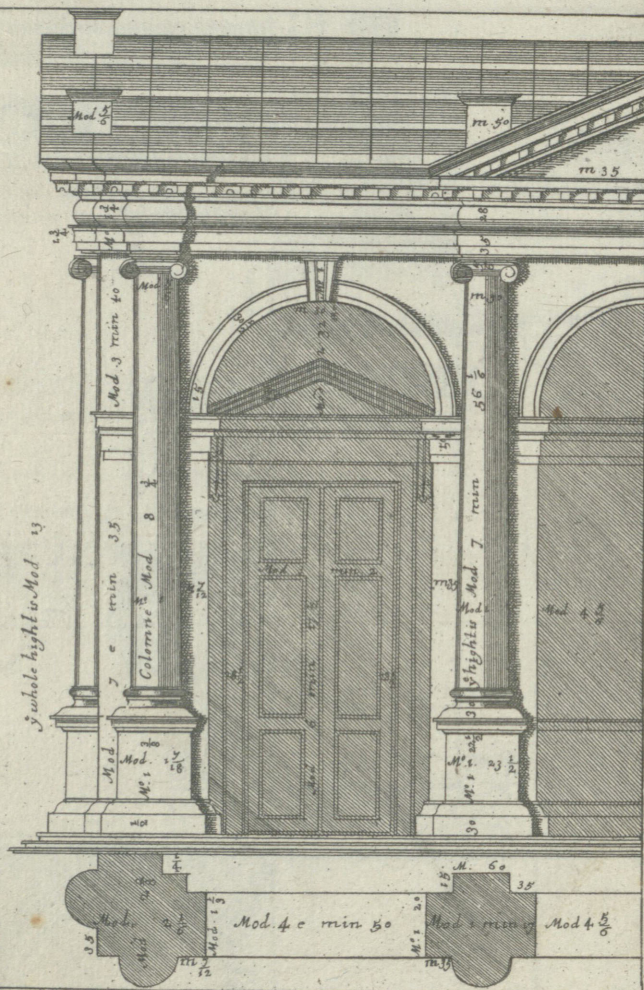
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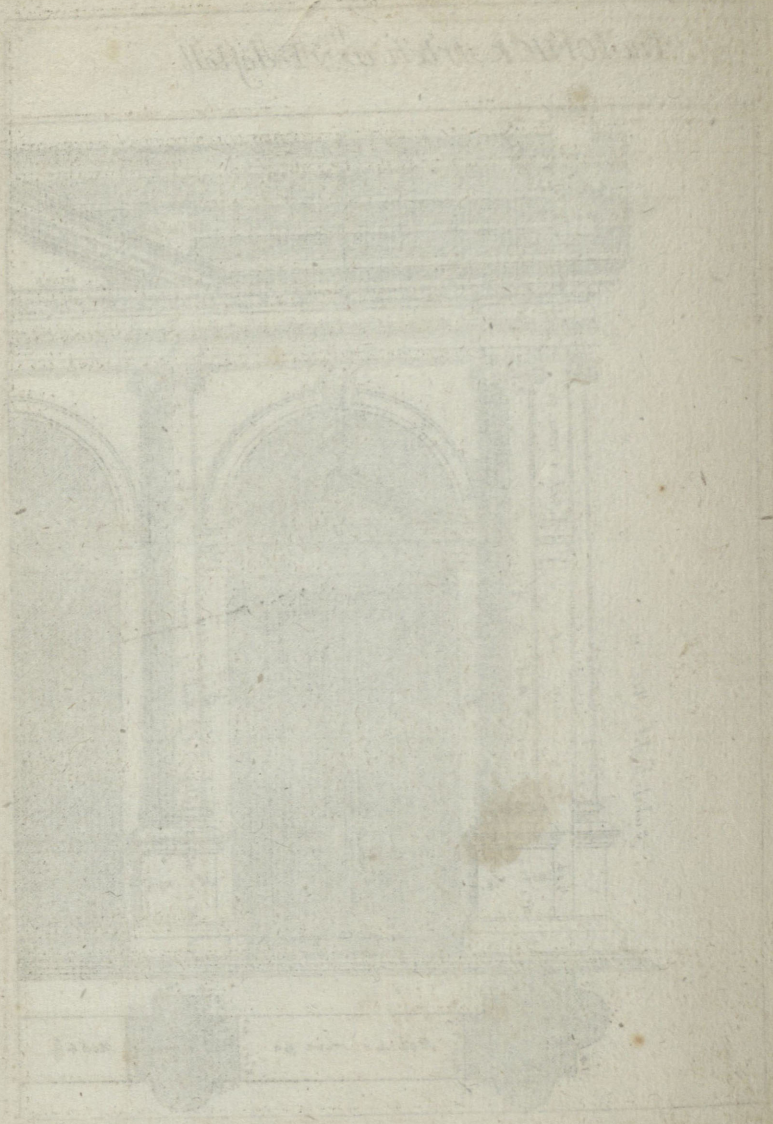


The IONICK Column in the Pedestal.

The IONICK Arch wth Pedestall

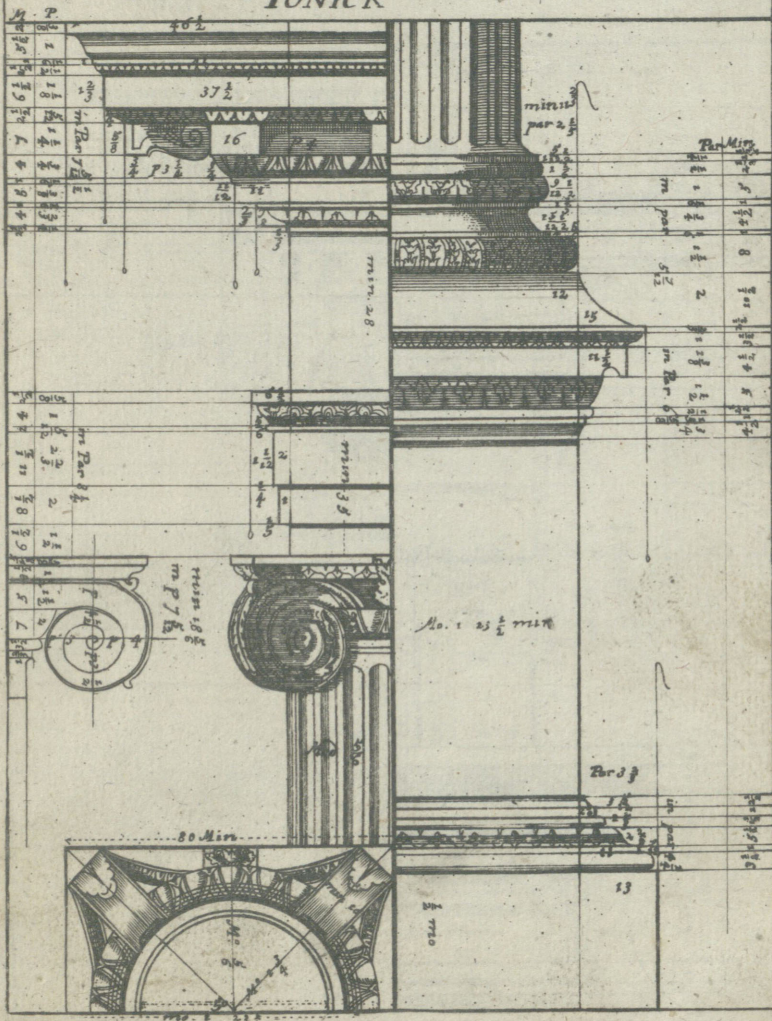
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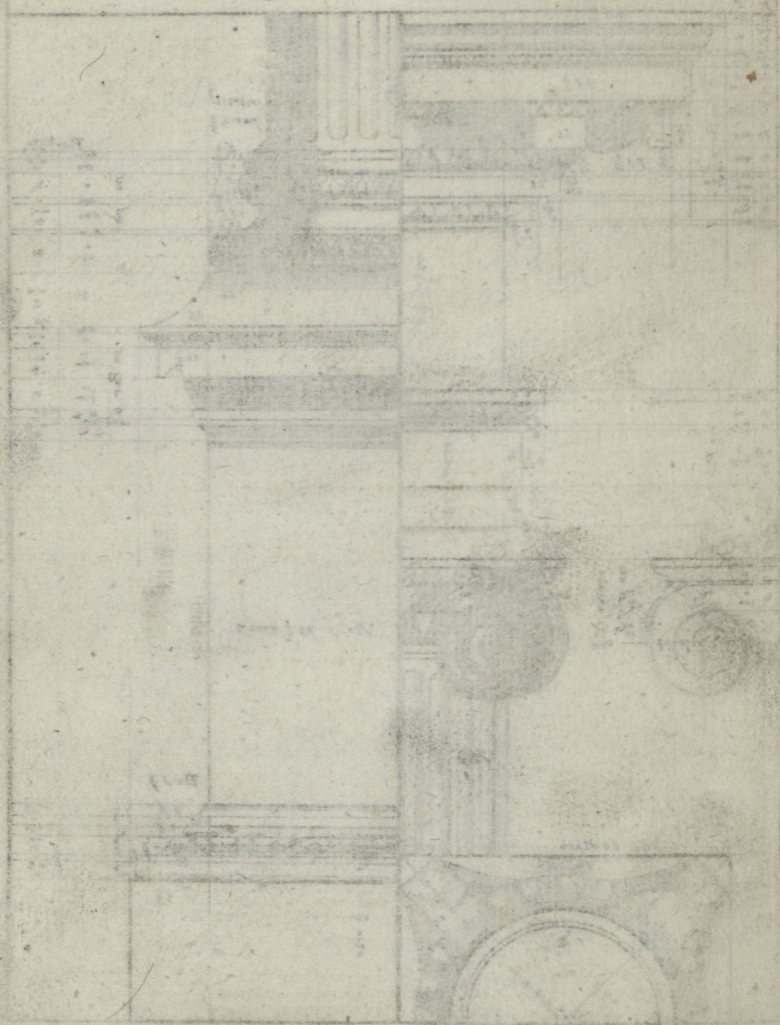


Pedestall Base and Ornament of the IONICK

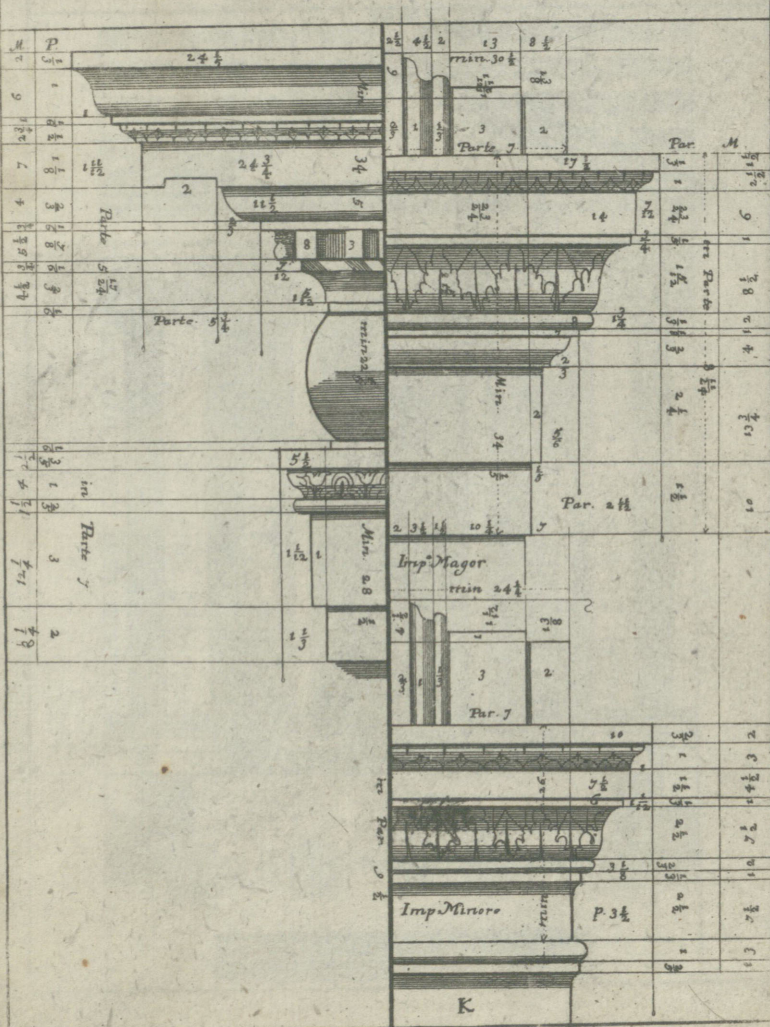
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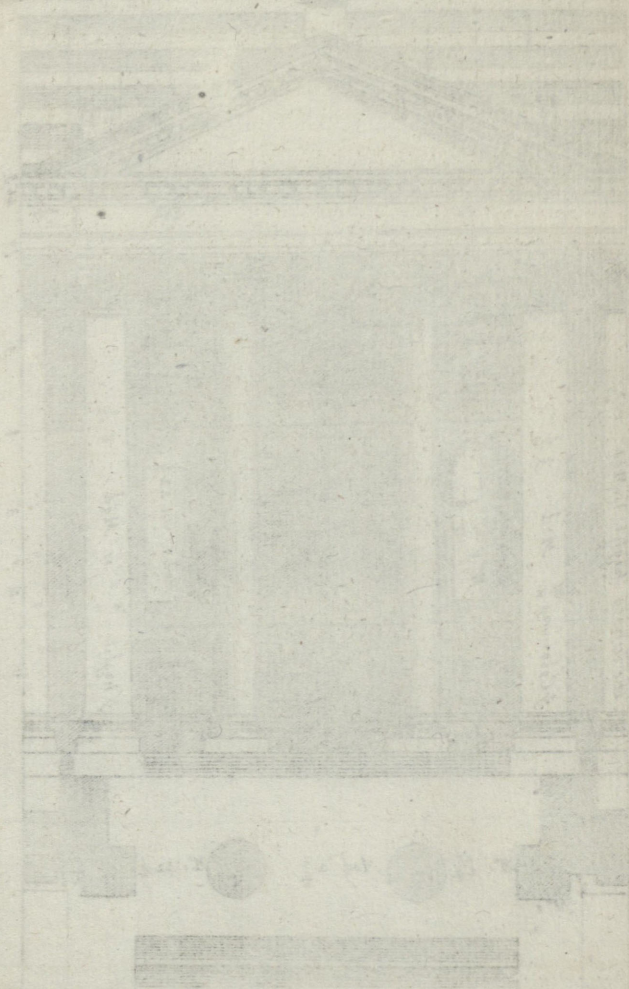
Red Hall Base and Ornament of the
Tower



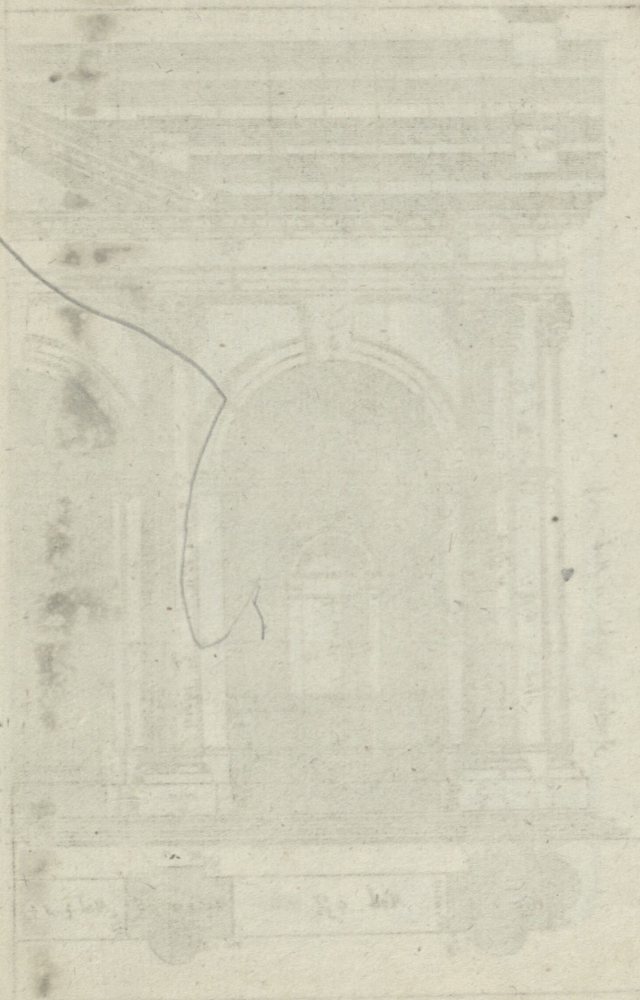
Imposts and Ornament of y^e IONICK order



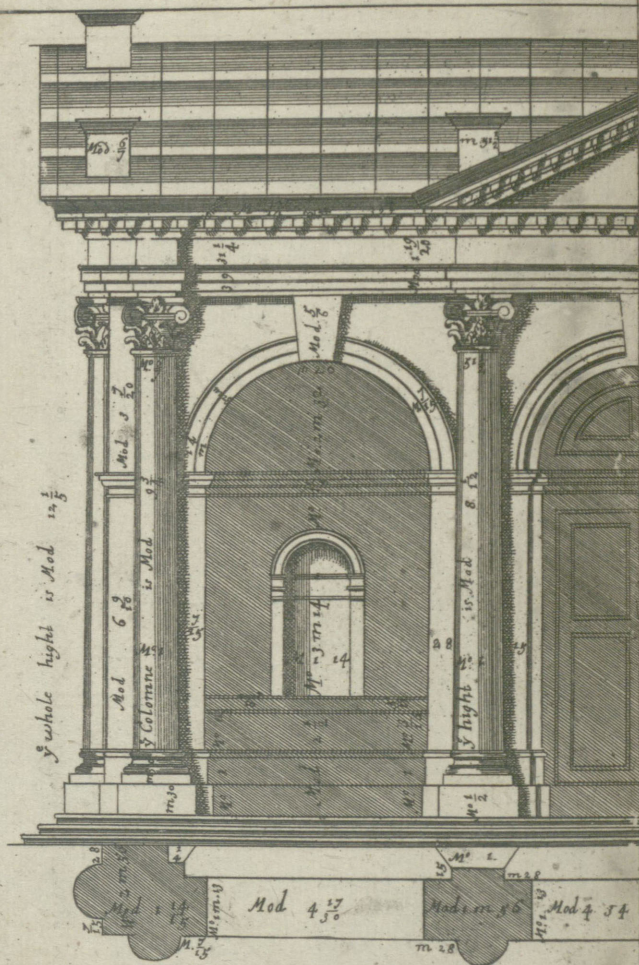
THE ROMAN EXHIBITION



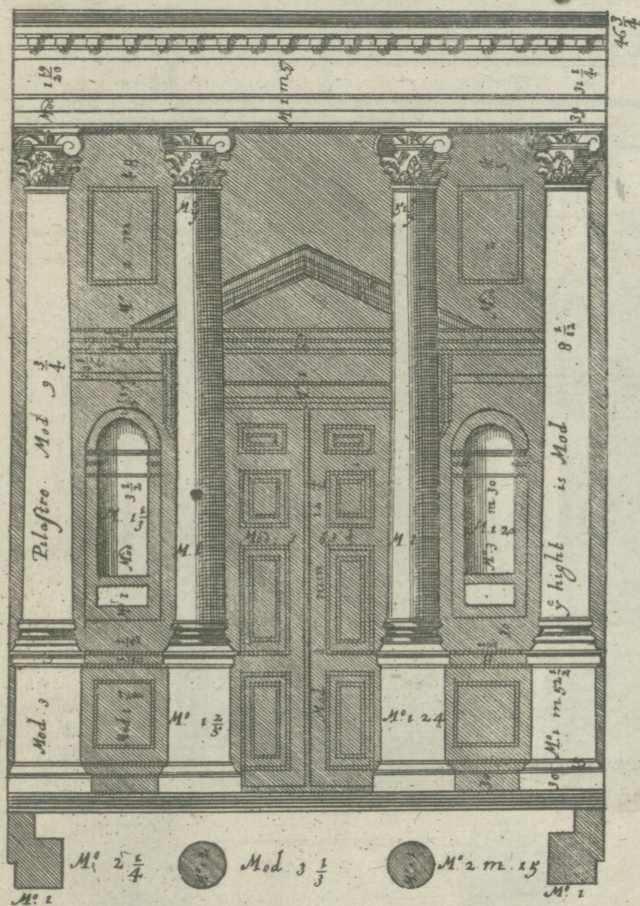
THE ROMAN ARCH

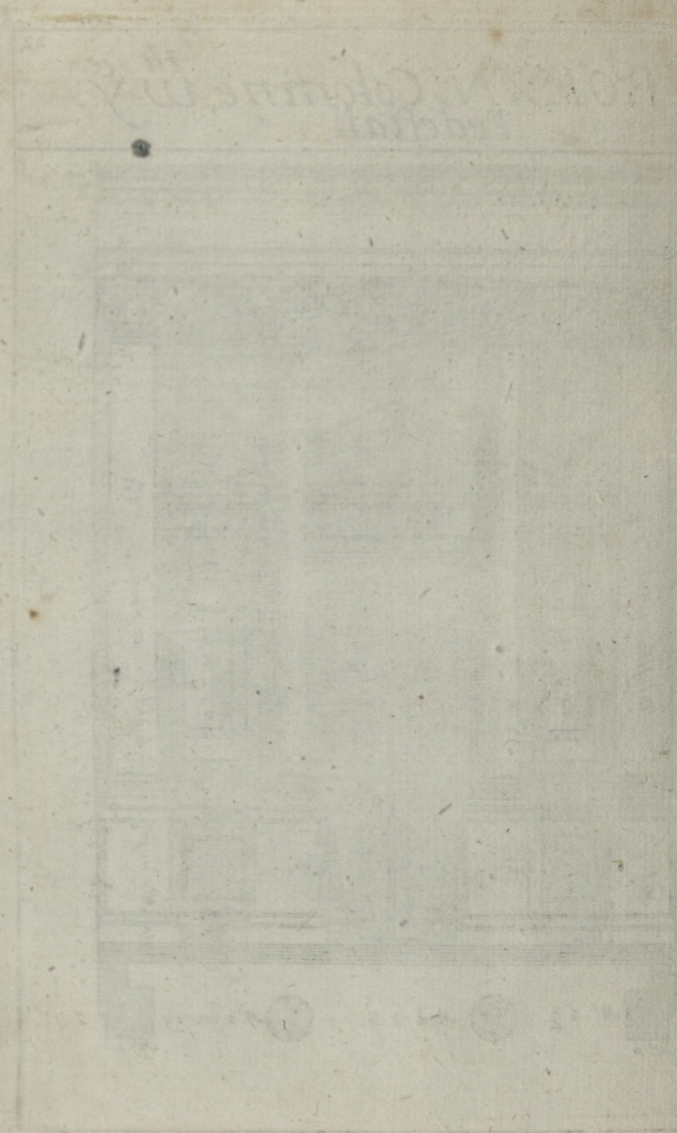


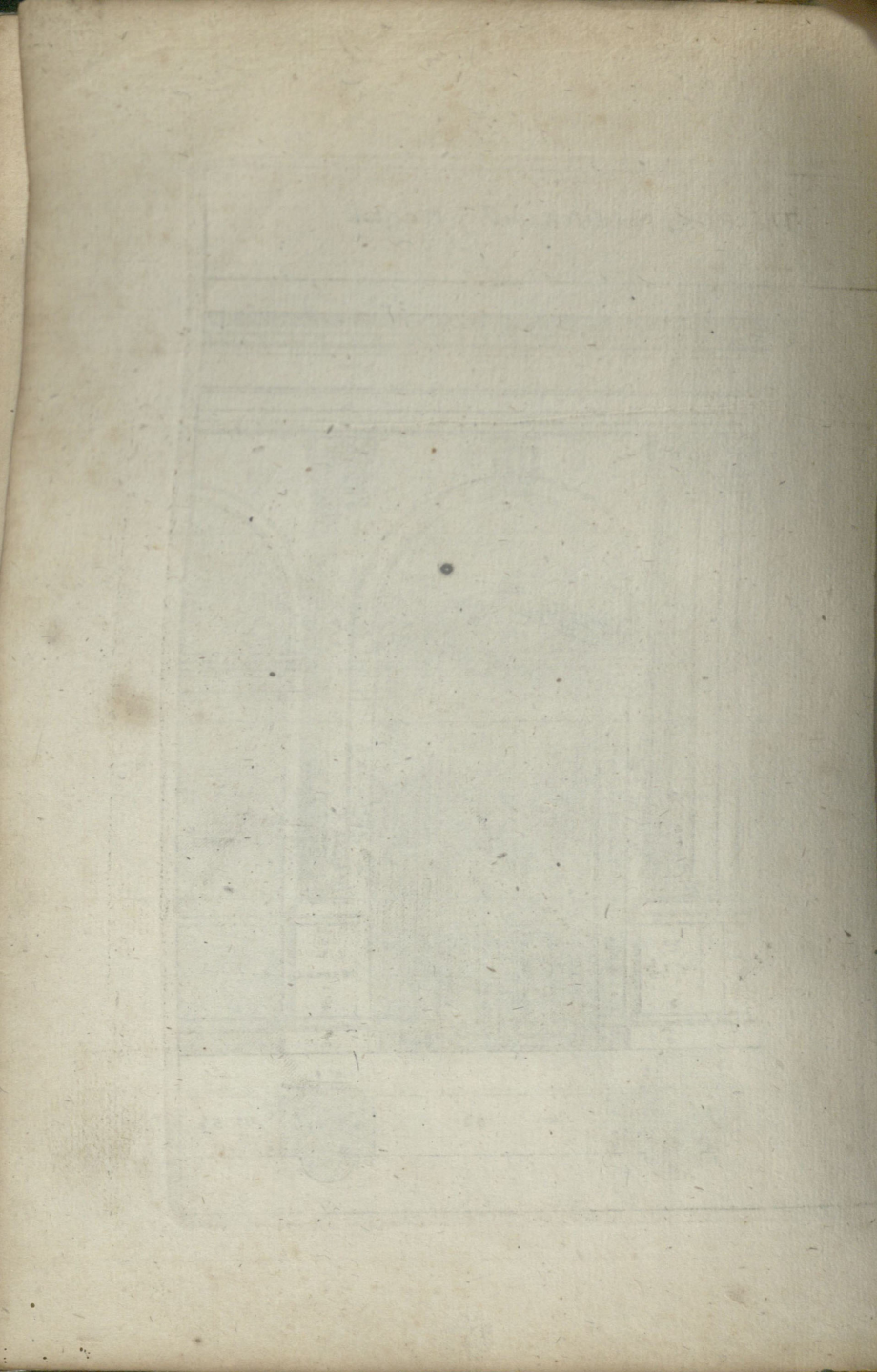
The ROMAN Arch



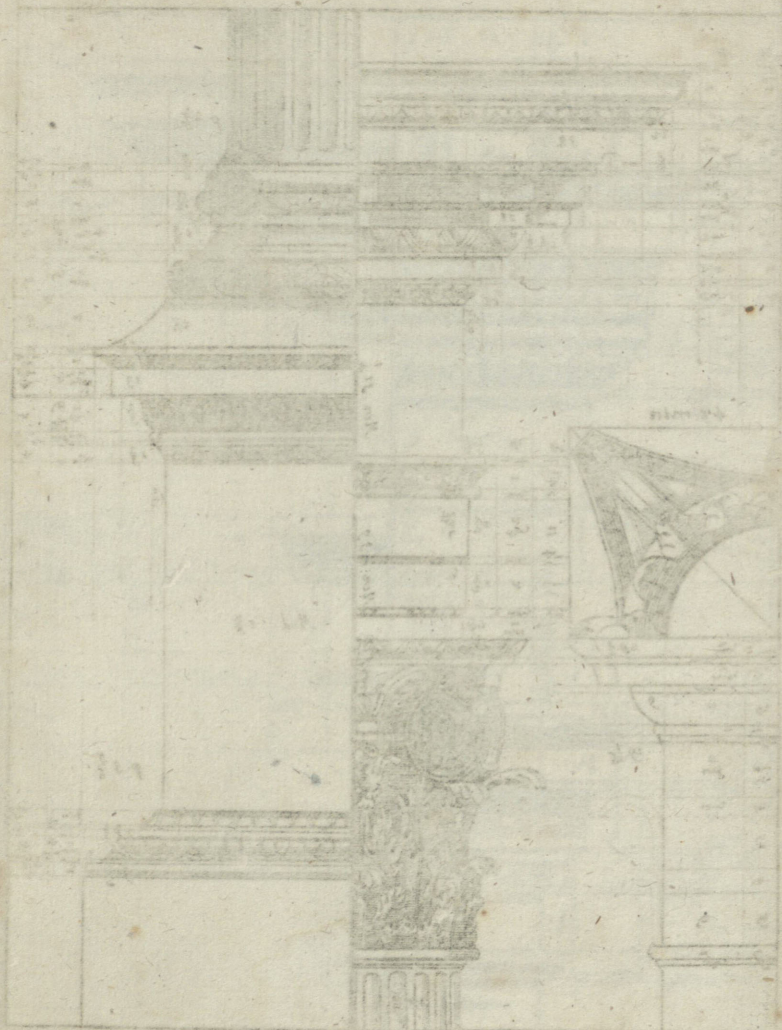
y: ROMAN Colomne th w. y:
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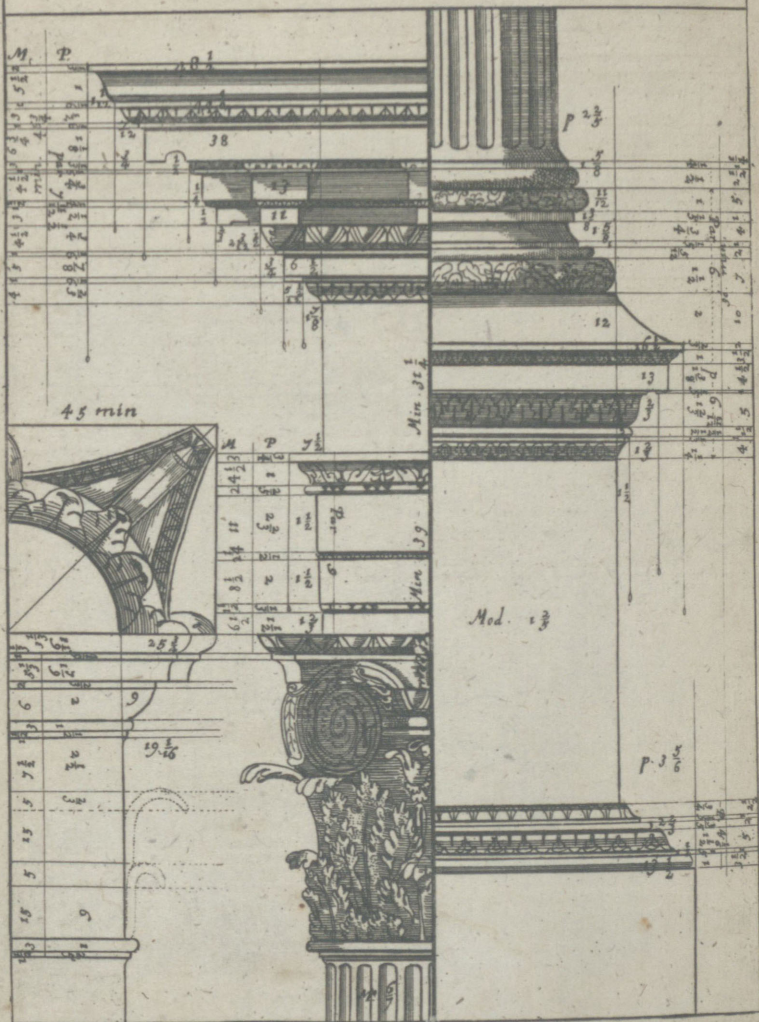




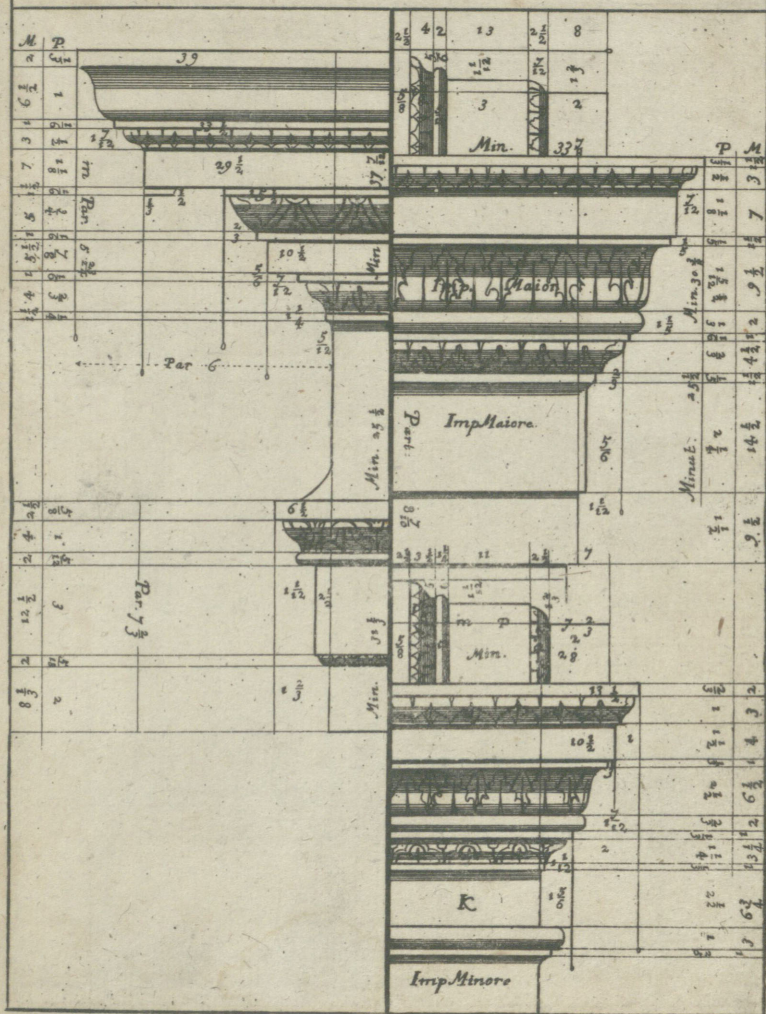
Part II Plate and Ornament of
ROMAN



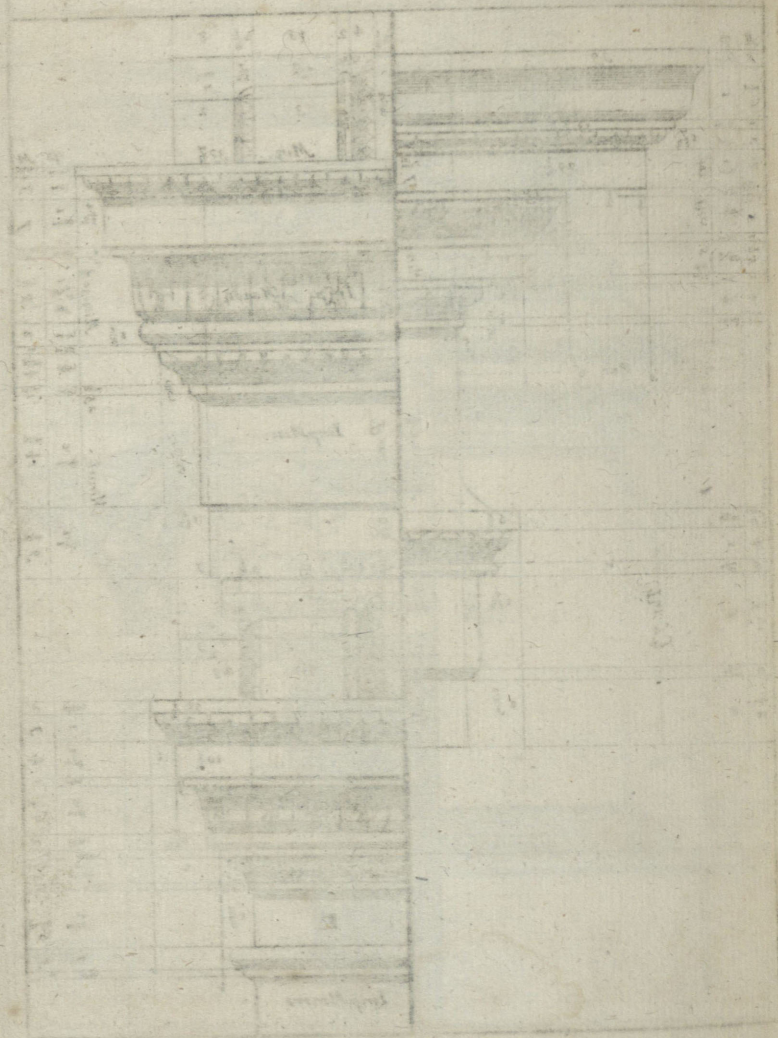
24



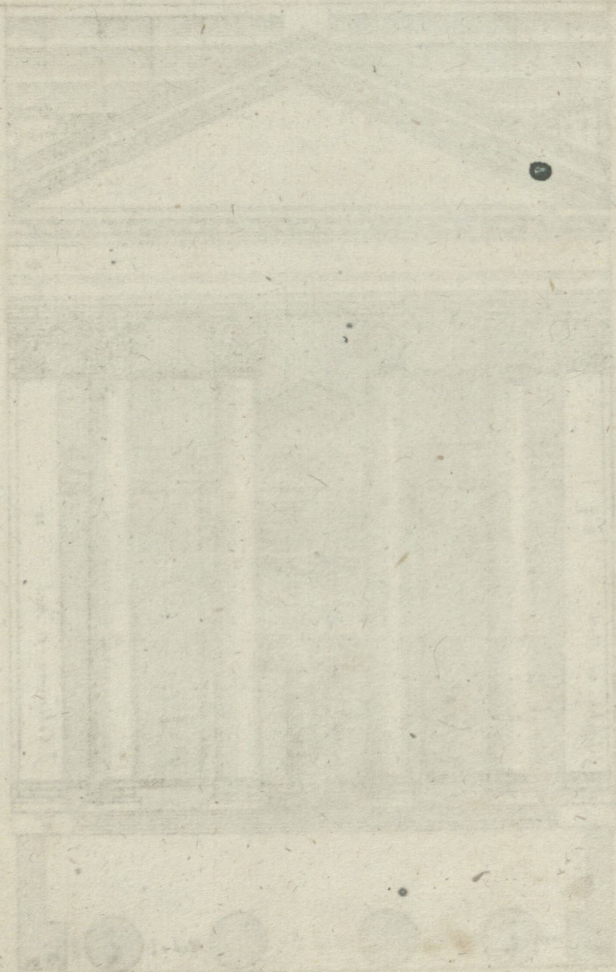
Imposts and Ornament of y^e 25
ROMAN



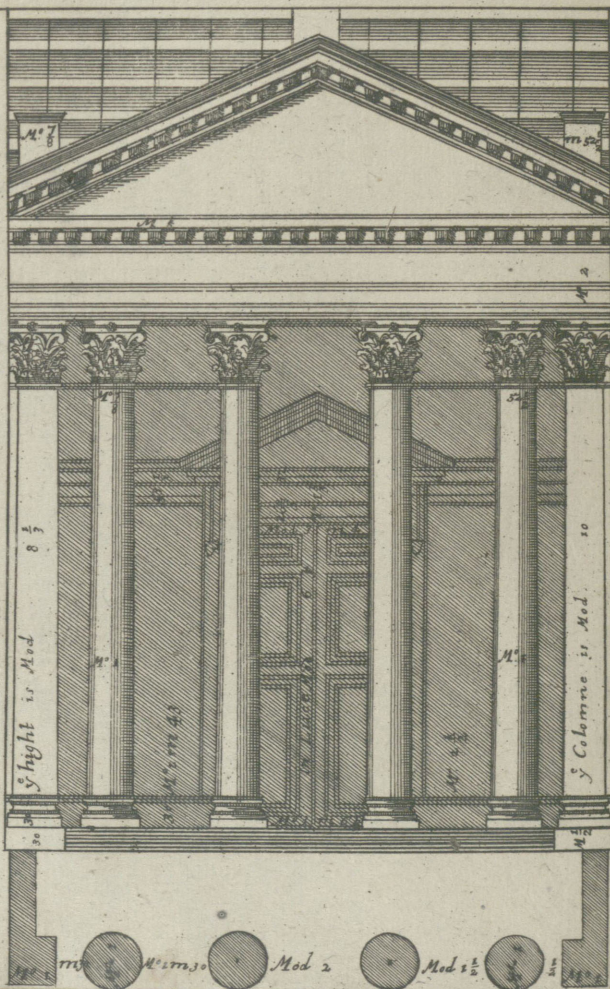
Implements and Ornament of ROMAN

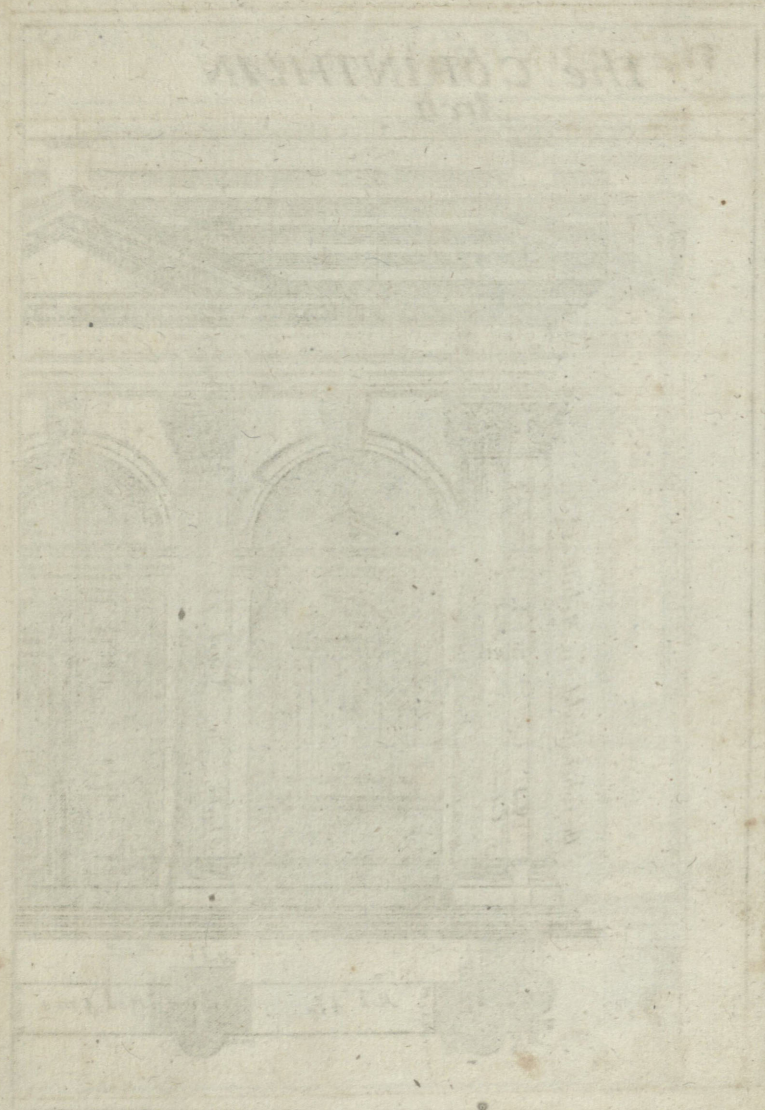


THE CORINTHIAN COLONADE

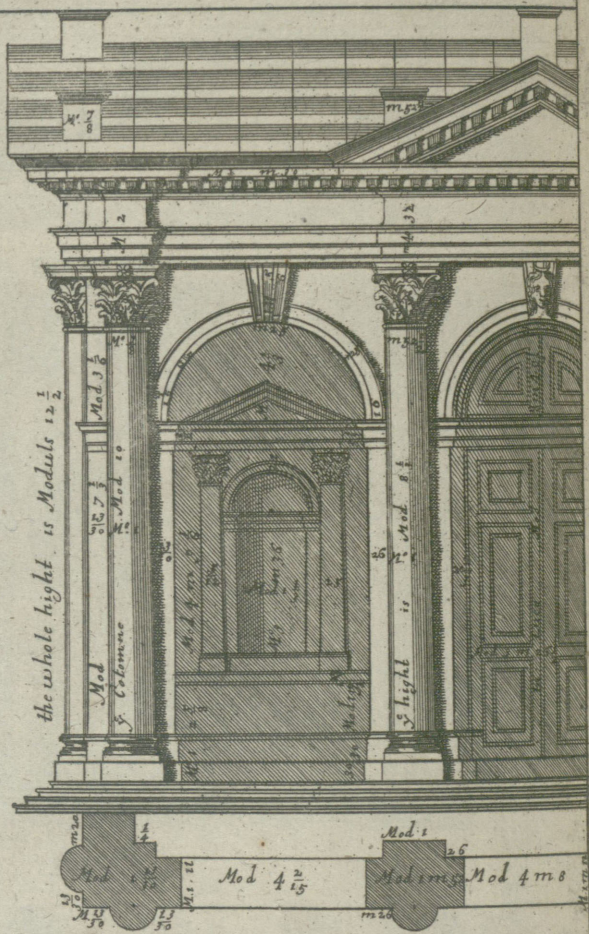


The CORINTHIAN Colomne





The CORINTHIAN Arch



the whole height is Modules 12 1/2

Mod 3 1/2

Mod 10

Mod 8 1/2

Mod 1 1/2

Mod 1/2

Mod 1/4

Mod 1/8

Mod 1/16

Mod 1/32

Mod 1/64

Mod 1/128

Mod 1/256

Mod 1/512

Mod 1/1024

Mod 1/2048

Mod 1/4096

Mod 1/8192

Mod 1/16384

Mod 1/32768

Mod 1/65536

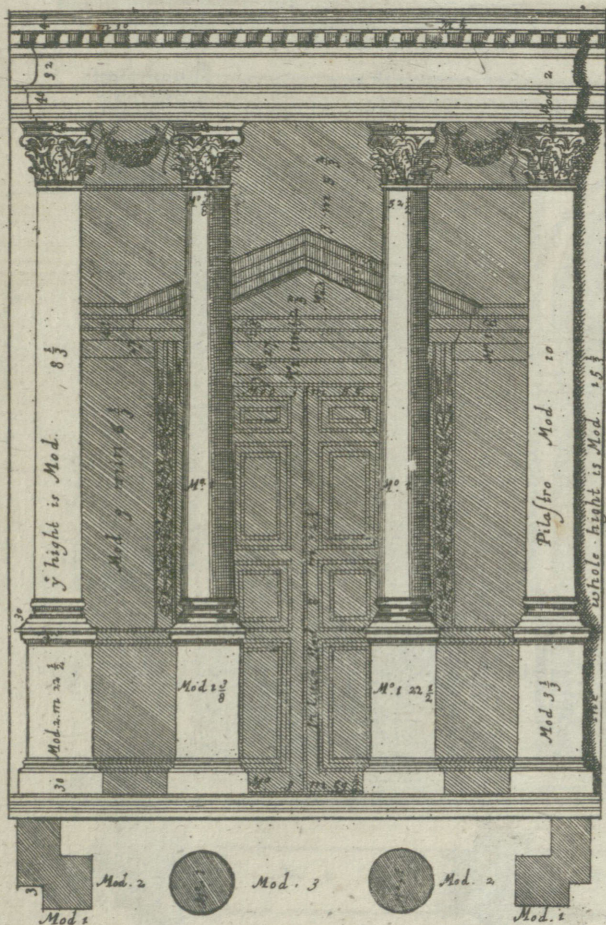
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Mod 1/262144

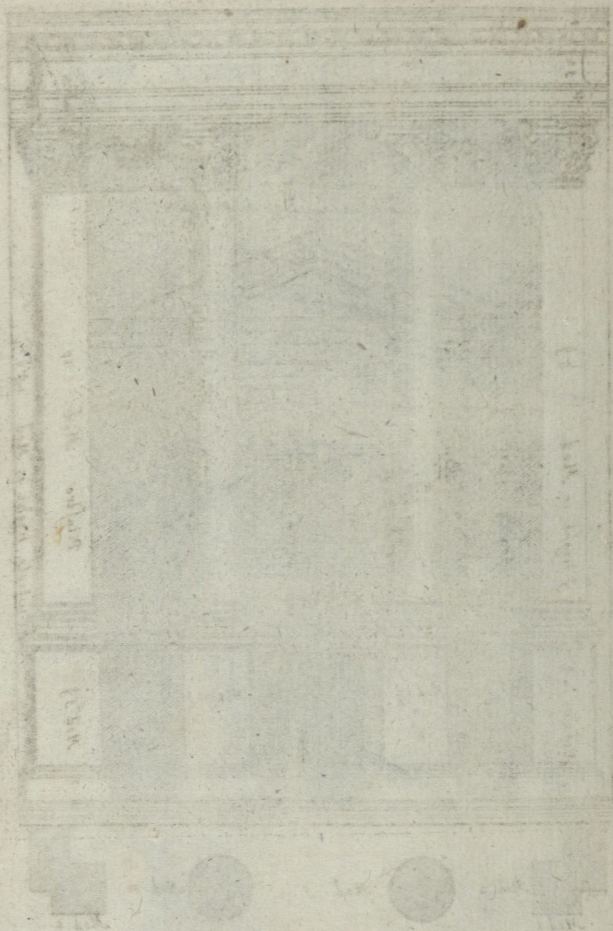
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The CORINTHIAN Colomne w.
the Pedestall 28

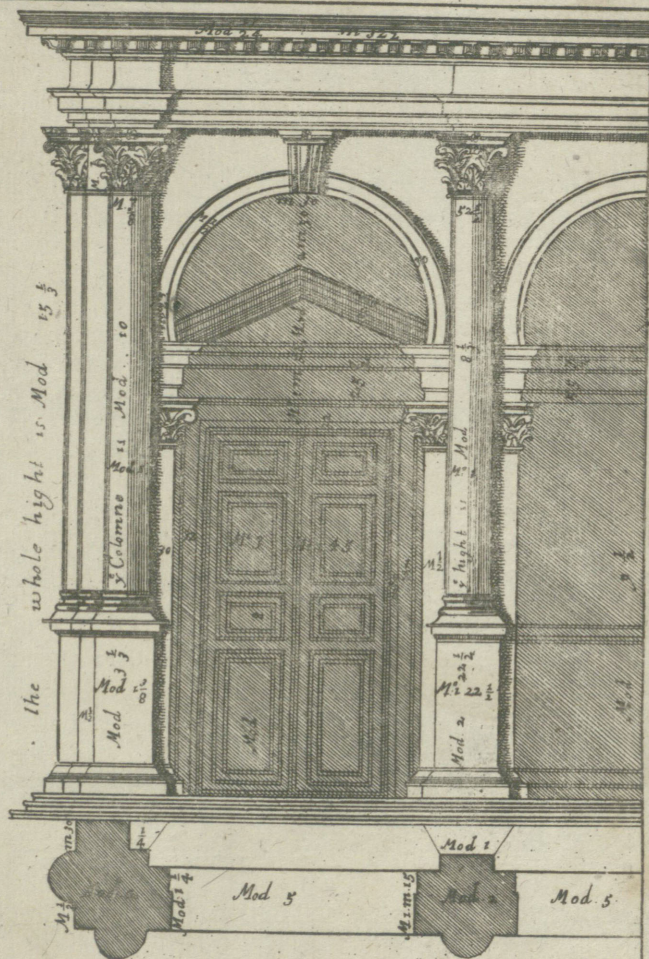


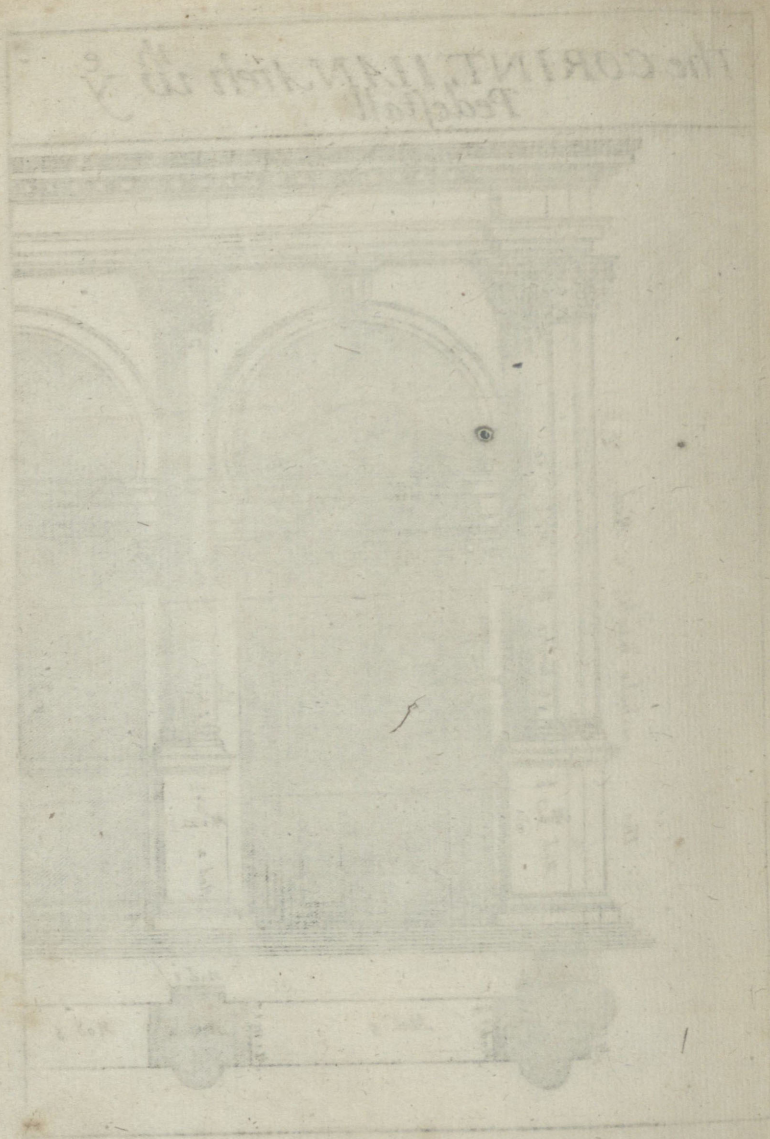
THE CORINTHIAN COLONADE
the Pedestal



The CORINTHIAN Arch wth y^e Pedestall

29

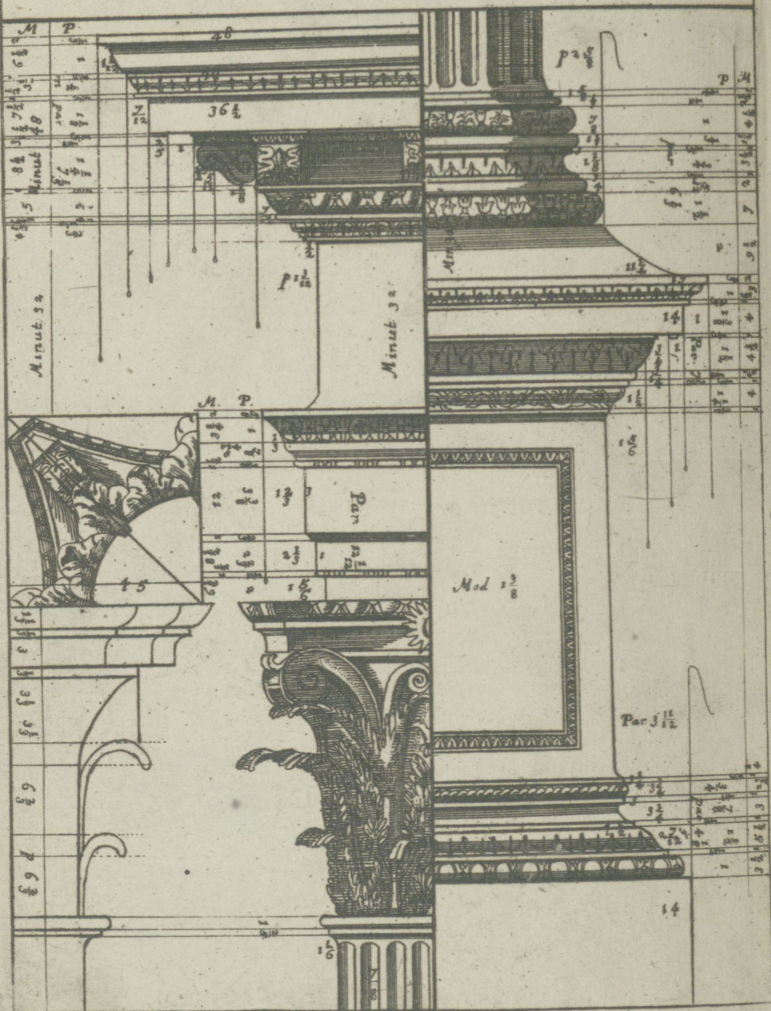




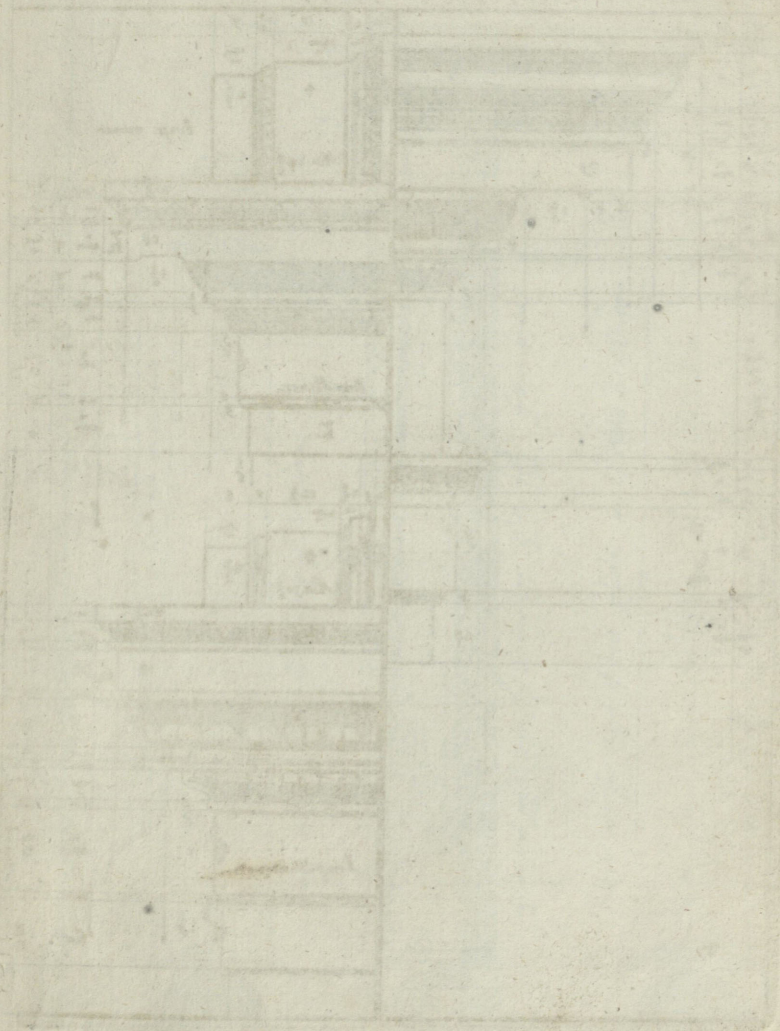
Practical Boole and Ornament of
Carpentry

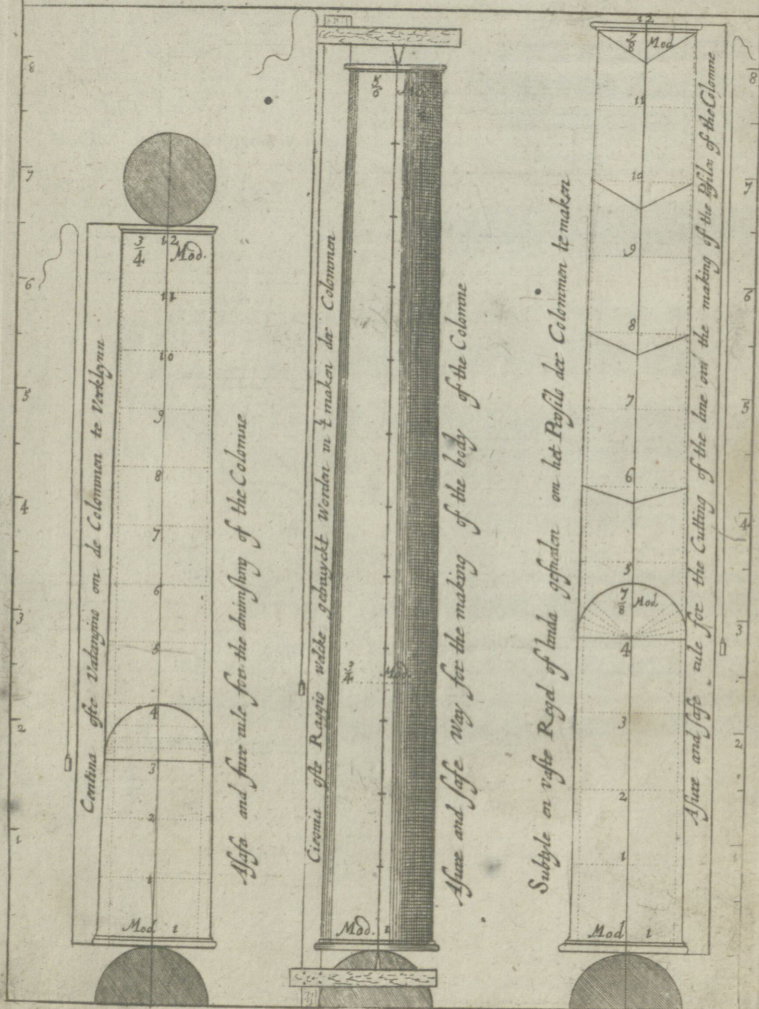


Pedestall Base and Ornament of y.^e 30 CORINTHIAN

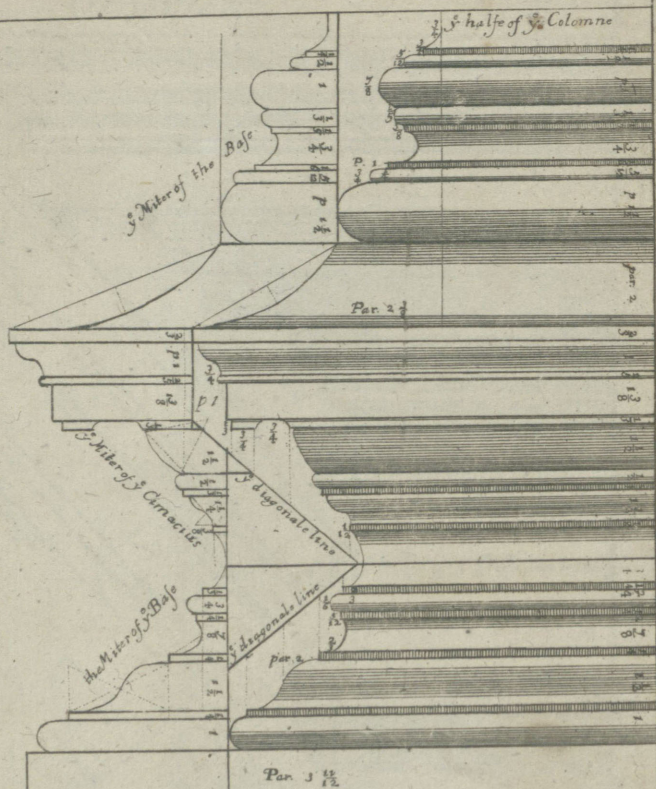


THE HISTORY OF THE CITY OF BOSTON

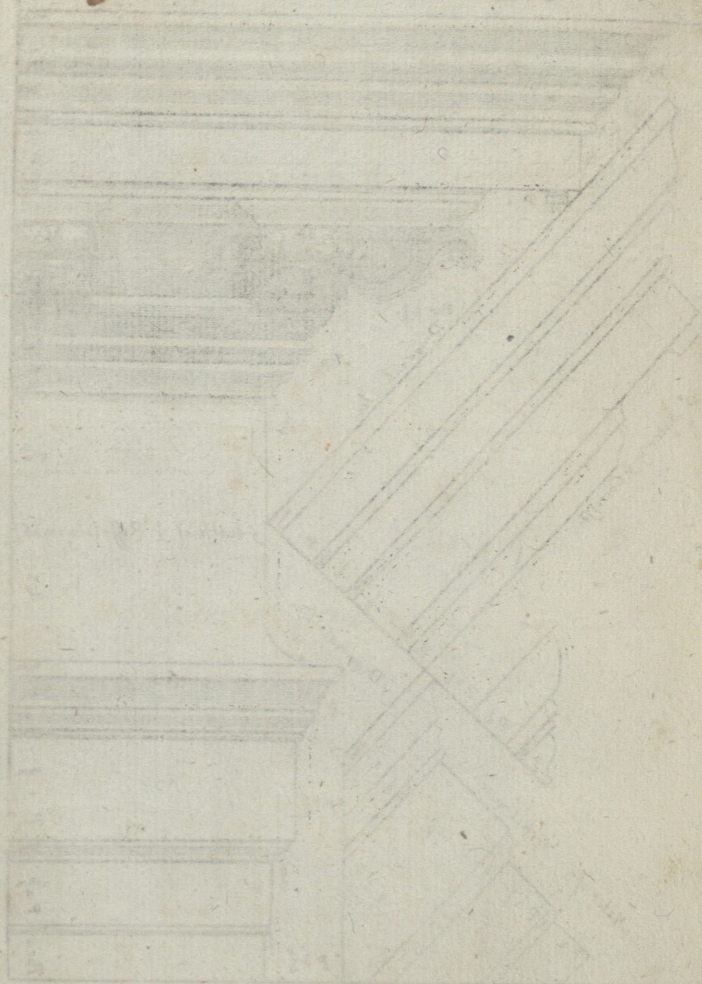




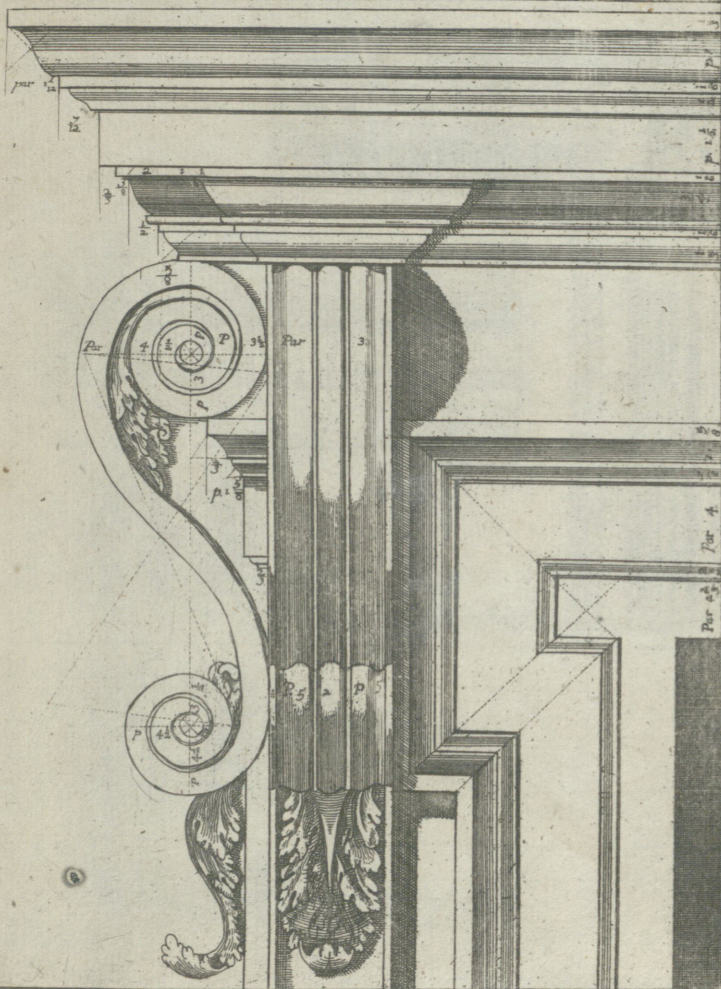
The Base of the CORINTHIAN order

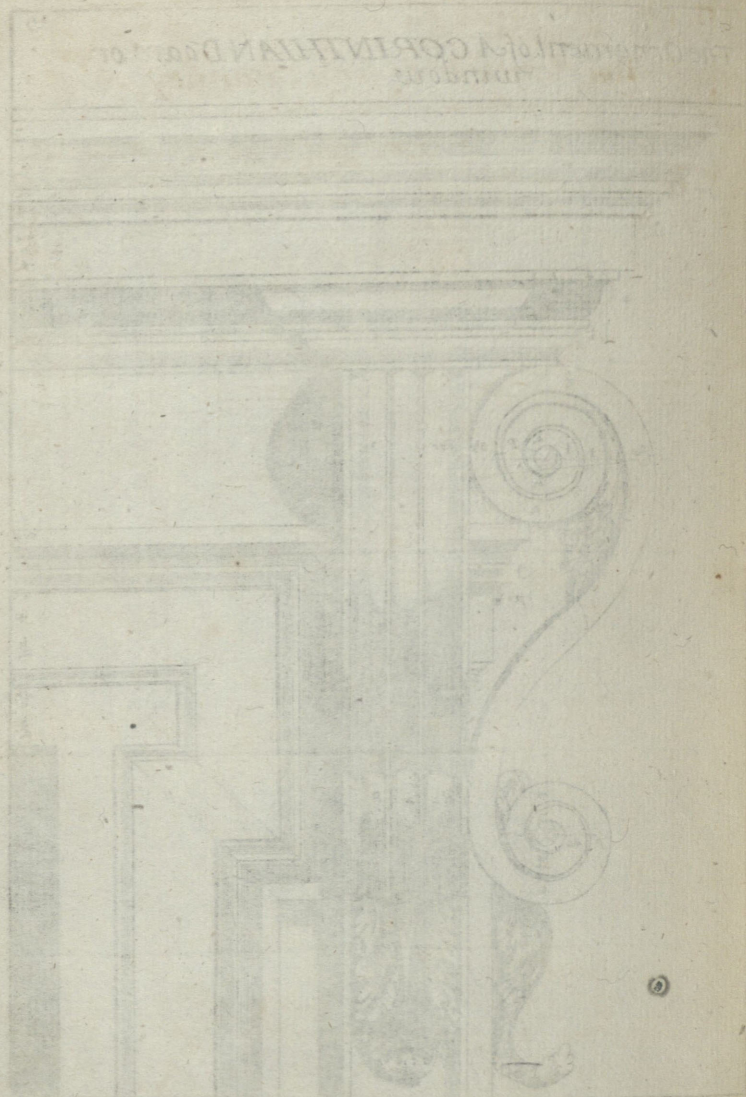


THE CORINTHIAN
ORIENTAL



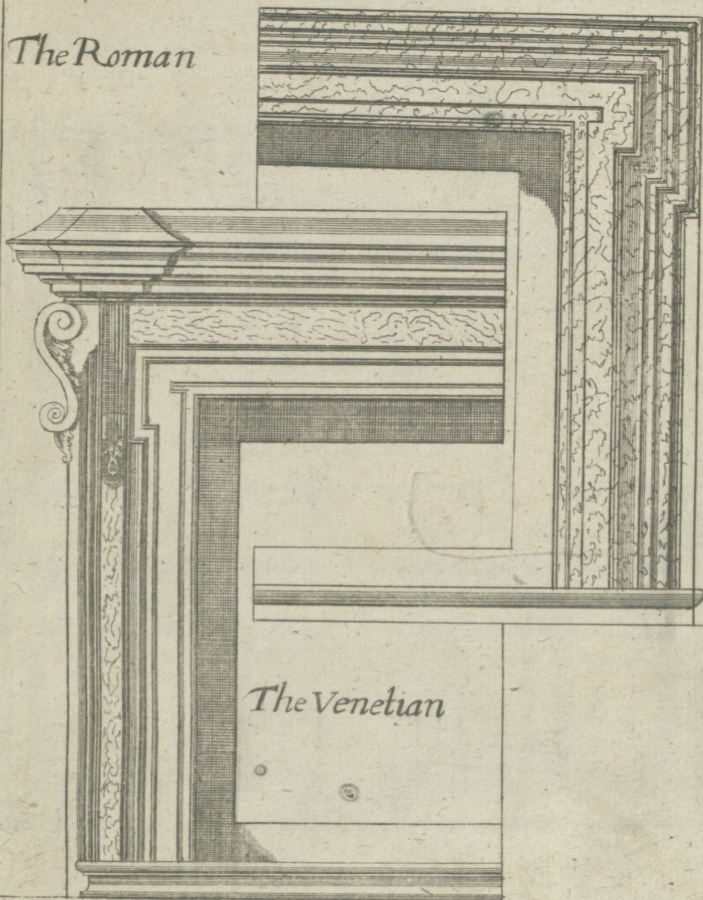
The Ornament of A CORINTHIAN Doare or
window

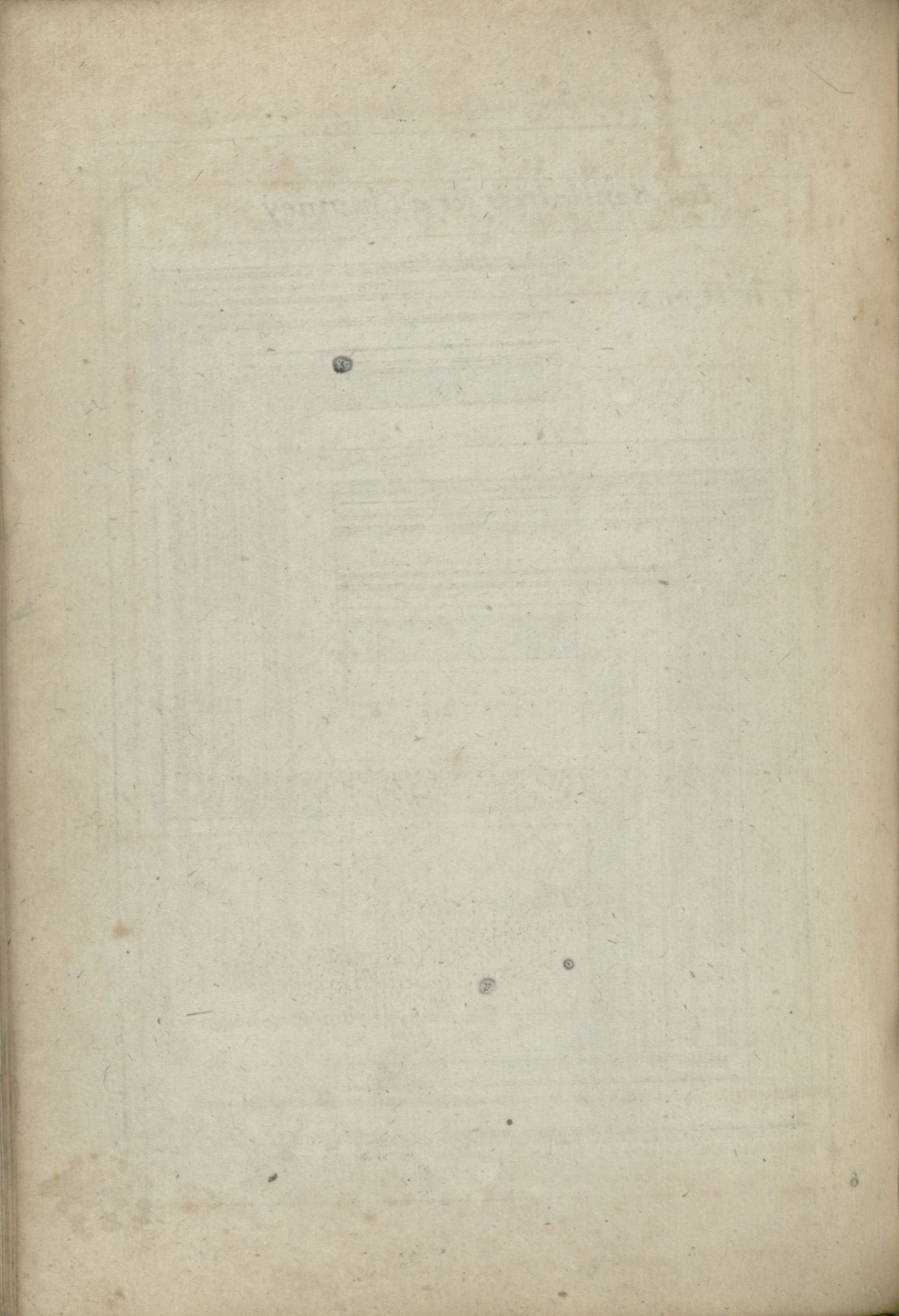




Two Mantle trees for a Chimney:

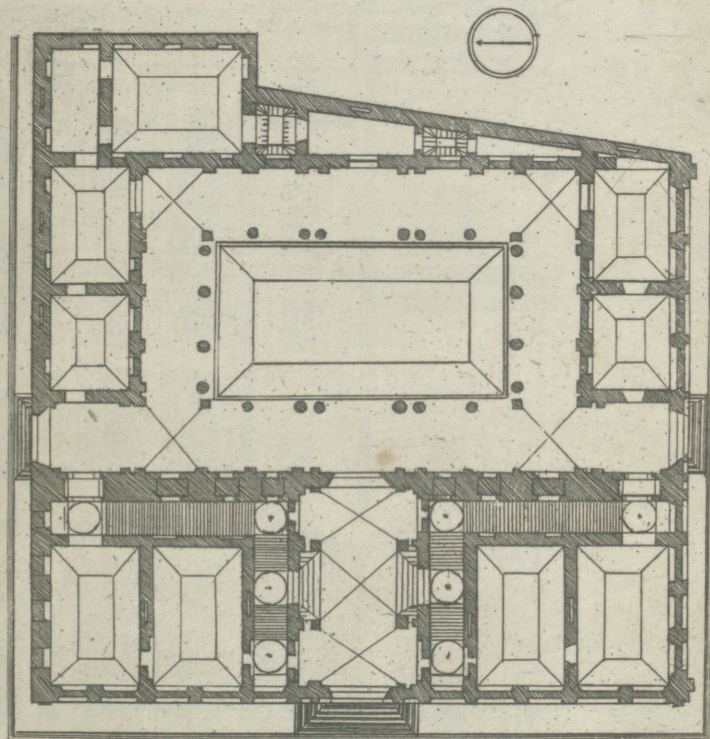
The Roman



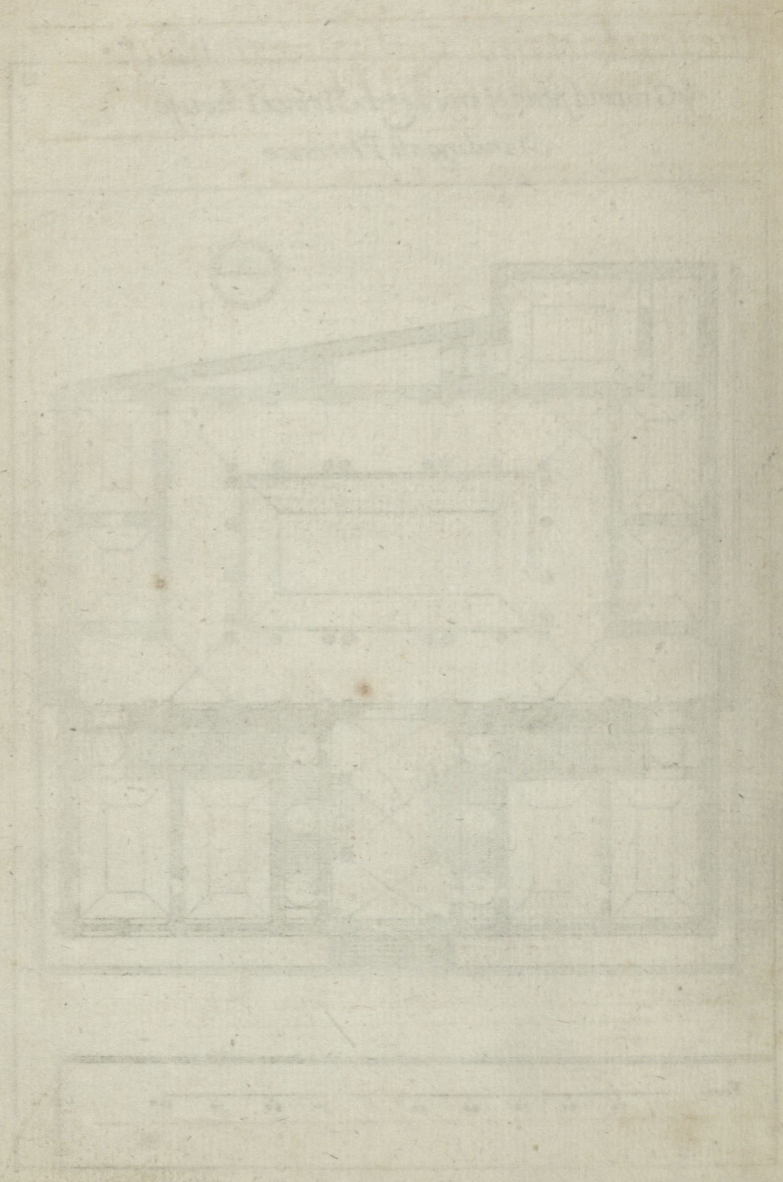


*ḡ Groundplatt of my Lord Strozzi house
Standing att Florence*

37

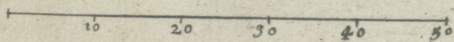
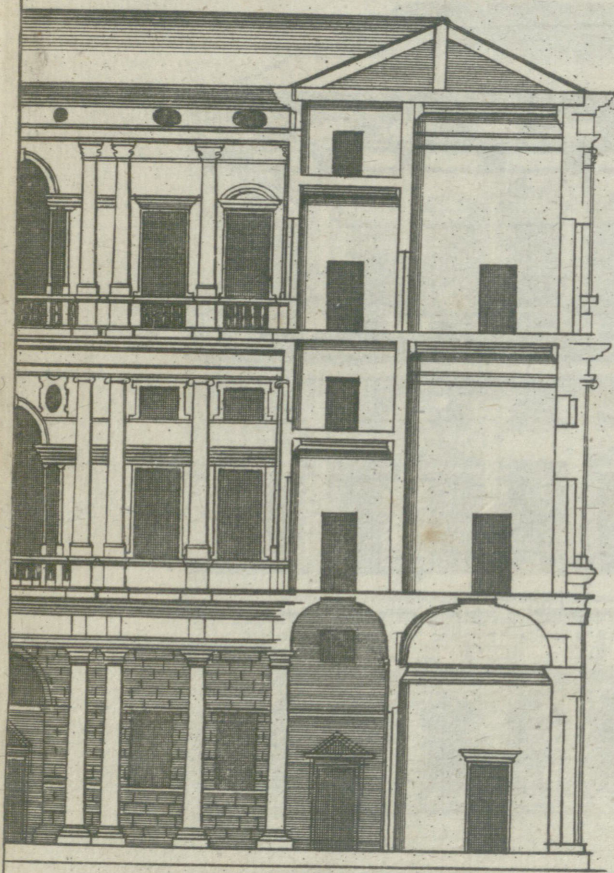


Feet. 10 20 30 40 50 60 70 80 90 100

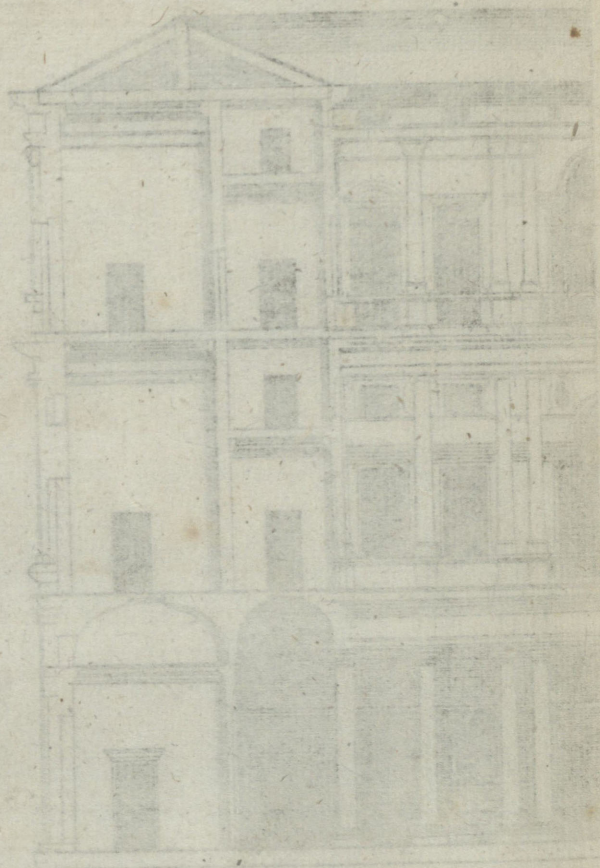


*The Inside of my Lord Strozzi house
standing at Florence*

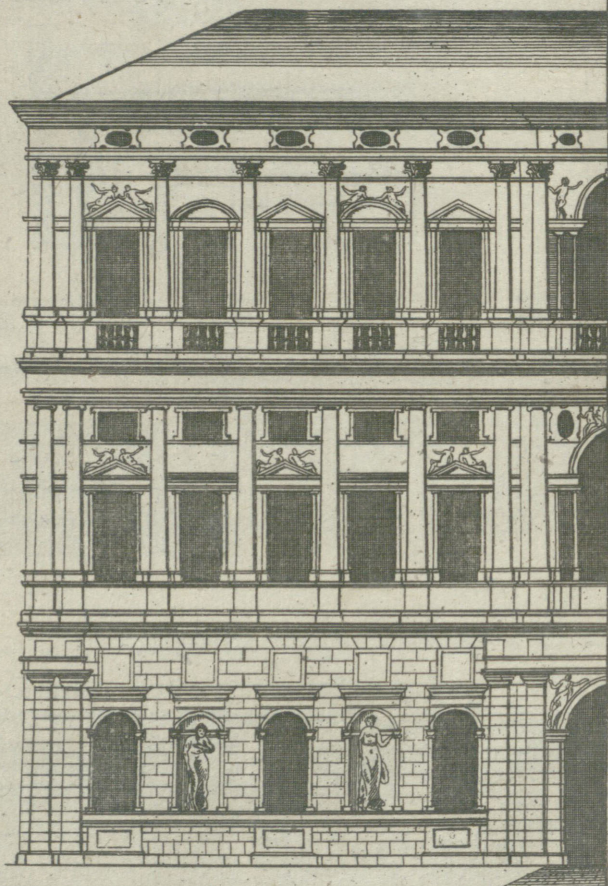
38



The Independent Lord Street house
standing at present

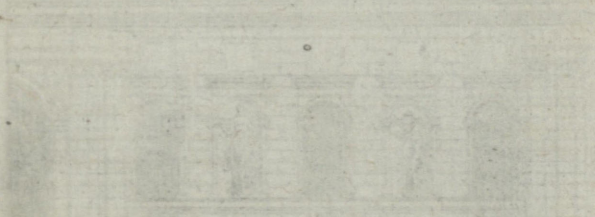
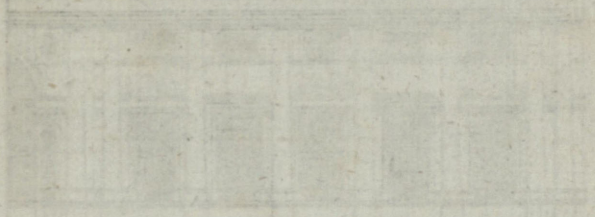
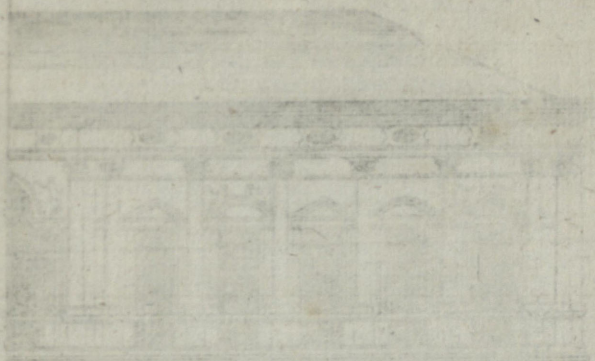


The front of my Lord Strozzi house ³⁹
standing att Florence



10 20 30 40 50

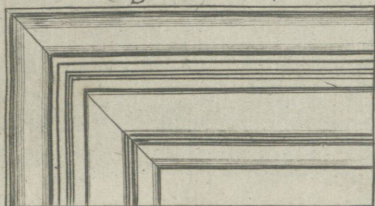
THE FIRST OF THE FIVE BOOKS OF THE
HISTORICAL COLLECTION



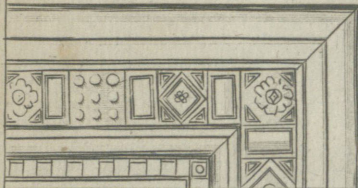
The Vnder side of y^e Cornish

40

Toscana



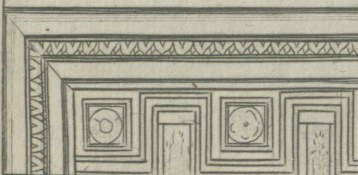
Dorica



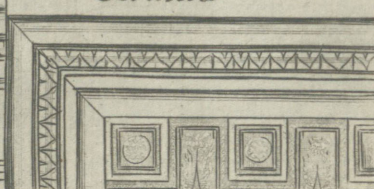
Ionica



Romana



Corintia

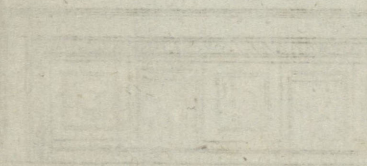


The Inside of a Church

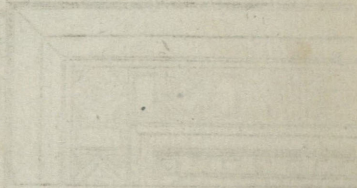
Plan



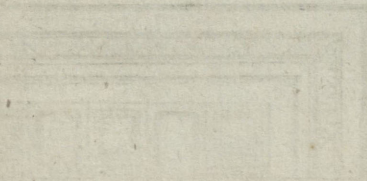
South



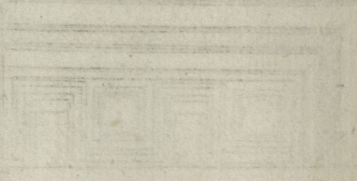
North



West



East



The Description and Use of an Ordinary Joynt-Rule fitted with Lines for the ready finding the Lengths and Angles of Rafter and Hips, and Collar-Beams in any Square or Beveling Roofs at any Pitch, and the ready Drawing the Architrave. Frise and Corner useful Con-

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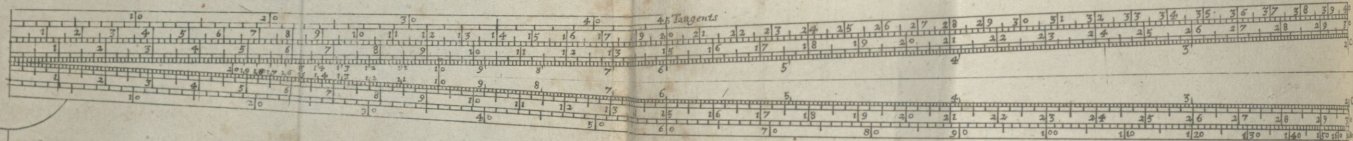
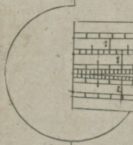
le of a Foot long when
o a straight Line. And

from a Center on both legs
manner, and every single Integer of the 30 is divided into 12 parts,
to represent every particular Inch of the 30 Foot, according to the
common reckoning by Feet and Inches.

2. There is another Scale of equal parts also, of the same length
lying as near to the other of 30 as may be, on one leg only, which is
divided into 40 parts, to represent 40 Feet; each of those 40 Feet,
parted into 6 parts to represent every two Inches only, because the
room for one Foot, will not admit of more parts.

3. In the same place on the other leg is divided a Line of natural
Sines and Tangents to 45, but numbered as a Line of Chords to 180
Degrees, to set the Rule to; or to find the quantity of any Angle, in the
proper terms of Expression (all the World over) degrees and minutes.

4. On the innermost Line of the 30 Scale that runs to the Center,
is set 20 pricks, beginning at 2 at the Center-pin at 30, and so pro-
ceeding



The Description and Use of an Ordinary Joynt-Rule fitted with Lines for the ready finding the Lengths and Angles of Rafters and Hips, and Collar-Beams in any Square or Beveling Roofs at any Pitch, and the ready Drawing the Architrave, Frise and Cornish in any Order. With other useful Conclusions by the said Rule.

By JOHN BROWN.

First, The Rule is an ordinary Jointed-Rule of a Foot long when shut together, or two Foot being opened to a straight Line. And the Lines delineated thereon for this purpose.

1. A Line of Lines, drawn Sector-wise from a Center on both legs of the Rule, but continued to 30 at the end instead of 10 the old usual manner, and every single Integer of the 30 is divided into 12 parts, to represent every particular Inch of the 30 Foot, according to the common reckoning by Feet and Inches.

2. There is another Scale of equal parts also, of the same length lying as near to the other of 30 as may be, on one leg only, which is divided into 40 parts, to represent 40 Feet; each of those 40 Feet, parted into 6 parts to represent every two Inches only, because the room for one Foot, will not admit of more parts.

3. In the same place on the other leg is divided a Line of natural Sines and Tangents to 45, but numbered as a Line of Chords to 180 Degrees, to set the Rule to, or to find the quantity of any Angle, in the proper terms of Expression (all the World over) degrees and minutes.

4. On the innermost Line of the 30 Scale that runs to the Center, is set 20 pricks, beginning at 2 at the Center-pin at 30, and so proceeding

ceeding with 3, 4, 5, and 6 at the Center-pin at 15, and then 7, 8, 9, 10, and so forwards to 20, towards the Center, which serves to divide a Circle into any number of parts, very useful and ready in the practice of Drawing or Architecture.

Thus much for Description, the Uses follow.

The uses of this Line of Lines, or Scale of equal parts to 30, drawn from the Center is of a general and manifold use; as *Gunter* in his Book of the *Sector* hath shewed.

A brief touch whereof take in the first place, as by the way, and then the use of the Rule to the business intended.

And for the better doing hereof, it is needful to explain three or four Terms, for the avoiding of many words, and needless repetitions in this brief, and yet plain Discourse.

1. By the word Lateral is meant any distance taken, either in feet and inches, on the 30 Scale; or degrees and minutes on the Chords, taken and counted from the Center, in the midst of the head of the Joynt-Rule, along any one leg; As thus, suppose I would take out 15 foot Laterally, set one point of the Compasses in the Center at the head, and open the other to 15 on any one leg on the 30 Scale; this extent I call a Lateral extent of 15 foot. Also if you take the Lateral Chord of 60 degrees, you shall find the extent of the Compasses from the Center to 60 to be the same as from the Center to 15 foot, on the 30 Scale of feet and inches.

2. By a word Parallel, I mean any distance taken, by setting one point of the Compasses in any number of feet and inches on one leg, and the other point in the same, or any other number on the other leg, across from one leg to the other; as thus the Rule being opened, then the extent of the Compasses from 20 on one leg, to 20 on the other leg, is a Parallel extent.

3. In all Parallel extents, you must set one point of the Compasses in the common Line on one leg, to the common Line on the other leg, which common Line is that only of the 30 Scale which runs to the Center, in which the Center-pins at 15 and 30 are.

4. The nearest distance from a point to a Line is only thus: Set one point of the Compasses in the point given, and open or shut the other being turned about, till the other will but just touch or cleave the Line, that I call the nearest distance.

Use I. To lay down a Line, that shall represent any Number of Feet and Inches given or required.

Take the Number given laterally from the 30, or 40 Scale from the Center, and that is the Line required.

But

But if these Scales are too great, or too small, then take your Number of parts, and the length thereof laterally.

As for *Example*; Suppose I would have 3 inches to represent 30 foot, take out 3 inches between your Compasses, and make it a parallel in 30 and 30, and the 30 Scale is set to your desire.

Use II. To increase or diminish a Line to any Proportion.

Take the given Line between your Compasses, and make it a Parallel in the parts thereof; then the Parallel extent of the parts you would have it increased or diminished to, is the Augmentation, or Diminution, which was required.

Example. Let 3 inches represent 8 foot, and to the same proportion I would have 10 foot, or 5 foot, *viz.* more, or less.

Take 3 inches between your Compasses, and make it a Parallel in 8, and 8 on the 30 Scale; then the Parallel distance between 5 and 5, doth diminish the Line, and the parallel between 10 and 10 doth increase the Line to the proportion required.

Use III. To divide a Line into any Number of Parts or Models under 30.

Take the given Line, and make it a parallel in the parts on the 30 Scale into which you would have it divided, then the parallel extent between 1 and 1 shall divide the Line accordingly.

Example. Let 4 Inches be a Line to be divided into 9 parts, take 4 inches (or any distance whatsoever) and make it a parallel in 9 and 9 on the 30 Scale; then the parallel distance between 1 and 1 shall divide 4 inches into 9 parts required: Note, That for more exactness and conveniency, you may double 9, or triple 9, *viz.* 18, or 27, and then if you make the Line to be divided, a parallel in triple the number you must take out 3 instead of 1, and that shall divide the Line into the parts required.

Example. I would have 5 inches put into 10 parts, take 5 inches between your Compasses and make it a parallel in 30, and 30 the triple of 10, then take out parallel 3, and 3 the triple of 1; and that shall divide the Line given being 5 inches, into 10 parts or Models exactly; the like for any other. And note, as the Rule stands you may take out any Number of parts or Models whatsoever to that Scale.

Use IV. Any two Lines given, to find the Proportion one to another, according to any other Number.

Take the Lines severally, and lay them laterally from the Center, on the 30 or 40 Scale, which you please, and the numbers of feet and inches,

inches, to which they reach, shall shew their proportion one to another of the parts of the Line on which they are measured.

Example. I have 2 Lines, suppose one is 2 inches long, and the other 5, or any other unknown part.

Take 2 inches the measure of one Line, and measure it laterally on the 30 Scale, and it gives 5 foot and $\frac{1}{2}$ an inch, then take out 5 inches the supposed length of the other Line, and it gives laterally 12 foot 8 inches; then I say one Line is 5 foot and $\frac{1}{2}$ an inch, and the other is 12 foot 8 inches of a Scale of 30 foot in 11 inches $3\frac{1}{4}$ length.

Or if you conclude on the Term or Number of one Line, then make that Line, a parallel in the parts thereof, then take the other Line and carry it parallelly till it stay in like parts, on both legs in the common Line, and that shall be the Denomination of the other Line.

Use V. Two Lines being given to find a third in continual Proportion to them.

Take both the Lines, and lay them laterally on both legs, and note the feet and inches to which they do extend as in the last.

Then take out the lateral extent of the second Line, and make a parallel in the terms of the first Line, keeping the common Line at that opening, then the parallel extent from the terms of the second Line, shall be the lateral third term or Line in Proportion.

Example. Suppose I have one Line 3 foot long, and another 5 foot, and I would have another to bear proportion to 5, as 3 doth to 5 increasing, being in Numbers thus; as 3 is to 5, so is 5 to what? Here note that 3 is the first Number, and 5 the second.

The first Line laid from the Center on the 30 Scale, extends to 7 foot 7 inches, and 5 inches, the second Line gives 12 foot 8 inches.

Now the lateral second Line, viz. 5, or 12 foot 8 inches, made a parallel in 7 foot 7 inches the terms of the first Line, then take out the parallel extent from 12 foot 8 inches (the measure of 5) and it shall give 21 foot 1 inch laid laterally from the Center, for a third proportional required; which measure on the inches, is 8 inches and a third, the answer required; for as 3 is in proportion to 5, so is 5 to 8 and a third part.

But by the Line of Numbers, having the quantity of the Lines given in Numbers, do thus:

The extent of the Compasses from the first Number 3, to the second Number 5, shall reach the same way from the second Number 5, to 8, 33 the third proportional Number required.

Use VI. To divide a Line in such sort as another Line is divided.

Take the whole Line that is divided, and lay it laterally on both legs,

legs, and fit the Line that is to be divided parallelly in the ends thereof, then lay every part of the divided Line laterally in like manner, as the whole Line was laid, and the parallel extent between those parts shall divide the Line accordingly: As for Example;

Suppose I would divide a Line of 8 inches $\frac{1}{4}$ long in such sort as the Line of Circles on the inside of the 30 Scale is divided.

Take out 8 inches $\frac{1}{4}$, and make it a parallel in 2 and 2, the divided Line, then take out the parallel distance from 3 and 3, and that shall give the point 3 from the end of the Line you would divide, and so consequently all the rest in order; as far as you please.

Use VII. To find a Mean Proportional between two Lines or Numbers.

Open the 30 Scale to a right Angle, by making lateral 21 foot 2 inches a parallel in 15 foot.

Then find the Sum and half Sum, the Difference and half Difference, between your two Numbers; and having the half Sum between your Compasses, set one point to the half difference counted laterally on one leg; and wheresoever the other point shall touch the common Line on the other leg, is the mean Proportional required.

Example. Suppose a piece of Timber be 10 inches one way, and 18 inches another, what is the Square equal, which is the mean Proportional between them? The sum of 10 and 18 is 28, the half sum is 14, the difference between 10 and 18 is 8, the half difference is 4. Now the 30 Scale standing square, taking 14 the half sum between your Compasses, and then set one point in 4 on the leg; and turn the other point of the Compasses toward the common Line, and there it shall shew 13 $\frac{1}{5}$ near the square equal required.

Use VIII. To work the Rule of Three by the Line of Lines to 30, or to 3 Numbers given, to find a fourth, in Geometrical Proportion direct.

Make the lateral second, a parallel in the first, then the parallel third shall give the lateral fourth Number required.

Example. If one foot of Timber cost 10 d. what shall 6 foot cost? Facit 60 d.

Make lateral 10 a parallel in 10 counted as 1, then the parallel extent between 6 and 6 shall reach to lateral 60, the answer required (in pence.) Again another Example:

If 50 foot, or a load of Timber cost 44 s. what shall 1 foot cost?

Take the lateral extent from 22 the half of 44 s. and make it a parallel in 25 the half of 50, then the parallel distance between 2 and 2 counted

2 counted as 4 foot, shall give the lateral Number of 3 s. 6 d. the price of 4 foot, whose 4th part is 10 d. $\frac{1}{2}$ the price of one foot. Note, This help is used, to avoid the nearness to the Center where the work is inconvenient.

Use IX. To measure Flat Measure by the Scale of 30.

At any inches broad to find how much in length makes a foot.

Take lateral 12, make it a parallel in the breadth given, then take out parallel 12 again, and it shall give the length of a foot required:

Example. At 9 inches broad, a lateral 12, to parallel 9, so is parallel 12, to lateral 16, the length required.

Use X. The breadth of a Board given in Inches, and the length in Feet, to find the Content in Feet and Inches required.

Take the lateral length in feet, and make it a parallel in 10, then the lateral distance between the inches broad, shall give the parallel Content. *Example.* Of 15 foot 3 inches long, and 9 inches broad.

Take lateral 15 foot 3 inches, and make it a parallel in 12, then take out parallel 9 and 9, and it shall give lateral 12 foot and a half, the Content.

Use XI. To measure Timber by the Line of Lines to 30.

At any Inches square to find how much makes a foot of Timber.

If the Piece be not square, then by the 8th Use make it square: Then thus: Take the lateral Side of the Square in inches, make it a parallel in 12, then take out the parallel Side of the Square, and it shall give a lateral 4th Number.

Then take out lateral 12, and make it a parallel in the 4th Number, and then take out parallel 12 again, and it shall shew the answer in inches laid laterally from the Center.

Example. At 9 inches square, what makes a foot?

As lat. 9 to par. 12, so is par. 9 to lat. $6\frac{3}{4}$: Again,

As lat. 12 to par. 4, viz. $6\frac{3}{4}$, so is par. 12 to 21 inches $\frac{1}{4}$ the length to make one foot required.

Use XII. The Inches square, and length given in Feet, to find the Content in Feet and Inches.

As the lat. Side of the Square, to parallel 12, so is the par. length to a lat. 4th: Again,

As the lat. 4th to parallel 12, so is the par. side of the Square, to lateral Content. *Example.*

Example. At 9 inches square and 20 foot long.

As lat. 9 to par. 12, so is par. 20 to lateral 15, a fourth Number :
Again,

As lat. 15 the 4th, to par. 12 : So is parallel 9 to lat. $11\frac{1}{4}$, the Content required.

Thus much for the general Use, being too long a Digression from the matter mainly intended.

Use XIII. The breadth of any Frame being given, to find the length of the Rafter and Perpendicular by Inspection only.

It being a general received Rule, that the length of the Rafter should be three quarters the breadth of the House (or Frame) for true pitch, and 40 the feet in one Scale, being equal in length to 30 the Number of feet in another Scale, and 30 being $\frac{3}{4}$ of 40. Therefore, If you seek for the breadth of the House on the 40 Scale, then right against it, on the 30 Scale, is the length of the Rafter required. Also if you seek the length of the Rafter on the 40 Scale, on the 30 Scale right against it, is the height of the Perpendicular required, viz. from the Railing piece to the top of the Gable end or Rafter required.

Example. If a House be 30 foot broad, the Rafter ought to be 22 foot 6 inches, and the Perpendicular 16 foot 9 inches and $\frac{1}{2}$, for right against 30, counted on the 40 Scale, on the 30 Scale is 22 - 6 the Rafter, and right again 22 - 6 on the 40 Scale on the 30 is 16 - 9 $\frac{1}{2}$, the Perpendicular.

1. Also by the Line of Numbers, the extent of the Compasses, from 20 to 15, will reach the same way from the breadth of any House to his proportionable Rafter at true pitch.

2. And the extent from 20 to 18, turned the same way from any breadth of a House to his proportionable Hip Rafter, in square Frames.

3. Also the extent from 20 to $11\frac{18}{100}$ will reach the same way from the width of any House to his proportionable Perpendicular, at square and true pitch.

4. And the extent from 23 to 28 - 28, will reach from any other House breadth to his proportional whole Diagonal Line required, at square and true pitch.

5. And the extent from 20 the breadth to 16 - 63 the nearest distance at that breadth, shall reach from any other breadth to his proportional nearest distance required, if it were needful. But the Angles in all Roofs great or small, if true pitch and square, as the same in all Frames.

Use

Use XIV. The breadth of the House, and the height of the Perpendicular being given to find the Rafter's length, the Hips length, the Diagonal Line, from Corner to the King-post, and any Angle required, in square Frames. What the Perpendicular height of the Gable end ought to be at true pitch by the last Rule you may readily see, and the better make estimate of the quantity of alteration. Which being once resolved on, then thus proceed.

First open the two 30 Scales to a right Angle, by making lateral 21 foot 2 inches $\frac{1}{2}$ a parallel in 15, and 15 in the Brass Center-pins.

1. Then count half the breadth of the House on one leg, and the length of the Perpendicular resolved on, on the other leg, then the parallel distance between them, measured laterally from the Center, shall give the true length of the Rafter required.

2. For the Hips length count the length of the Rafter last found on one leg, and the half breadth of the House on the other leg, and take the parallel distance between, and measure it from the Center laterally, and it shall be the true length of the Hips required.

3. For the Diagonal Line, count the half breadth of the House on both legs, and take the parallel distance between, and measure it from the Center, and it shall be the length of the Diagonal Line, from the Corner to the King-post.

4. Again, for the Hips count the Diagonal Line last found on one leg, and the Perpendicular height on the other leg, and the parallel distance between shall be the Hips true length measured as before from the Center.

Example. In a House of 20 foot wide at true pitch. See *Fig. 1.* Let A B C D represent a Frame of a House 20 foot wide, B I the half width, B A and C D equal to B C, the whole width being 2 points to draw the Diagonal Line by. I E being equal to I B, and the half E I laid from E to G, gives I G the length of the Rafter, and G B or G C the length of the Hips.

Or thus, Three quarters of CB, *viz.* CH, gives C F and B F, the Rafter's length: The same extent also laid upon the middle Line from I to G, gives C G and B G the Hips length. I F is the Perpendicular height, E is the point of the Diagonal Line or King-post, perpendicularly opposite to, or right under the meeting point of the 2 Hips, and the 2 Rafter, when raised and set in their places.

Thus much for Illustration what to do, now for Application how to do.

The width of the House is always given, the length of the Rafter; or

or the height of the Perpendicular is next resolved on, which in our Example being true pitch also resolved on, either by inspection, as before, or else by Operation in this manner.

1. The breadth of the House being 20 Foot, and the Perpendicular resolved on to be 11 foot 2 inches $\frac{1}{2}$ to find the Rafters length, work thus: Open the 30 Scale to right Angle (by use the 7th) count 10 the half breadth of the House on one leg, and the Perpendicular height 11 2 $\frac{1}{2}$ on the other leg, (*viz.* both on the 30 Scale from the Center) and take the parallel distance between them (on the common Line) and measure it from the Center, and it shall give just 15 foot, the length of the Rafter required C F.

2 But if according to the Width of any Frame, you resolve on the Rafters length, and would have the Perpendicular height of the Gable end; then thus: Count the length of the Rafter from the Center, and take the lateral point thereof (being 15) between your Compasses, the Compasses being so set, set one Point in 10, the half width of the Frame, and turn the other point parallelly to the common Line, and there it shall shew 11 foot 2 $\frac{1}{2}$ inches, the true height of the Perpendicular at true pitch required, I F 11 foot 2 inches $\frac{1}{2}$.

3. For the length of the Hips count the half breath of the House on one leg, and the Rafters length on the other leg, and take the parallel distance between, and it shall give the true length of the Hips required. As here, the parallel distance between 15 and 10, shall be lateral 18, the true length of the Hips required in a square Frame 20 foot wide true pitch. C. G.

4. For the Diagonal Line from the corner to the King-Post. Count the half width of the House, *viz.* 10 foot on both legs, and take the parallel extent between, and it shall reach from the Center to 14 foot 1 inch $\frac{1}{2}$ being the Line C E in the Figure.

5. Otherwise for the Hips length, count the half Diagonal on one leg, 14 1 $\frac{1}{2}$ and the Perpendicular 11 foot 2 inches, 2 $\frac{1}{2}$ on the other leg, and the parallel distance between measured from the Center, will give the true Hips length 18, *viz.* the Line C G.

Thus much for the Rafters and Hips in square Frames at true pitch, the measure of whose Angles and lengths are as followeth,

The breadth of the House being 20 foot, and the two ends square, and the Rafter at true pitch, the Lengths and Angles of the Frames are

	F. Inc. 100 p. F. 100 p.				d. m.			
C F Rafter	15	00	00	15	000	Raf-ter	Top	41 50
C G Hip	18	00	00	18	000		Foot	48 10
I F Perpendicular	11	02	17	11	180	Hips	Top	51 38
B E Diagonal	14	01	68	14	140		Foot	38 22
B I Half Breadth	10	00	00	10	000			
B C Whole Breadth	20	00	00	20	000	Difference		
K G Nearest Dist.	16	07	50	16	624			
B D Whole Diag.	28	03	36	28	281	Outside Ang.		

The Rule to find the Angles of the Rafters and Hips.

1. For the Angles that the Rafters make at foot, and head, with the Raising-piece and King-Post, do thus; When the Rule stands square in the 30 Scale, then lay any strait piece to the Compass points, when one stands in the half breadth, and the other point in the Perpendicular; then if you apply a Bevel severally, to that strait edge, and the 30 Scale at each end, the one is the Angle at foot 48-10; and the other the Angle at head, viz. 41-50.

2. For the Angle at head or King-Post and foot of the Hips, do thus, the 30 Scale being set square, set one point of the Compasses in the half Diagonal Line; on one 30 Scale, and the other point in the Perpendicular on the other 30 Scale, and to those points lay any strait piece, then set a Bevel to that strait piece, and each 30 Scale, and the one shall be the Angle at foot 38-22, and the other the Angle at the head, viz. 51-38; then this last Angle doubled, and difference between the Angle at head and foot, viz. 13-16 added, makes 116-12 the Angle of the out-side of the Hip-side in a square Frame at true pitch required.

3. A general way to find this outward Angle of the Hip or Mould is thus, in any pitch.

First, You must find the nearest distance from one corner to the opposite Hip set up, or from a point in the raising piece, as far from one corner as the House end is broad, as the point K or L in the Figure may be done thus. Count the length of the Hip on one leg, (and also take it between your Compasses) and count the Breadth of the House on the other leg, and set one point of the Compasses in the Hips length on one leg, and the other point in the breadth of the House on the other leg altering the 30 Scales, but not your Compasses; then when the

the 30 Scales are so set, one represents the Raising-Piece, and the other the Hip set up.

Then the nearest distance from the breadth of the House on one 30 Scale, to the common Line on the other 30 Scale, is the nearest distance requir'd, being measur'd from the Center 16 - 7 $\frac{1}{2}$.

Then take the whole Diagonal Line, viz. CL, or BK from the Center laterally, and make it a parallel in the nearest distance last found: and that shall set the 30 Scales to the Angle of the out-side of the Hip requir'd, which you may measure in degrees thus: Take parallel 15 as the Rule stands, and lay it from the Center, and it shall reach to 116 degrees on the Chords, next one 30 Scale, the Angle of the outside of the Hips requir'd.

Example, and more briefly in a House 20 Foot broad

The House end is 20 foot broad, the whole Diagonal Line is 28 foot 3 inches $\frac{1}{2}$, the Hip-Rafter 18 foot.

Take 18 foot between your Compasses, and set one point in 20, and open or shut the Rule till the other fits 18, then the nearest distance from 20 to the common Line, will be 16 foot 7 Inches $\frac{1}{2}$.

Then take 28 foot 3 inches $\frac{1}{2}$, the whole Diagonal Line, and make it a parallel in 16 foot 7 inches; $\frac{1}{2}$ the nearest distance, and the 30 Scales are Set to the Angles requir'd: For,

If you take out parallel 15 the Chord of 60, and measure it laterally from the Center, it shall reach to 116, the Angle in degrees and minutes requir'd.

Note, If the whole breadth and whole Diagonal Line is too large for your Compasses, then the half breadth and half Diagonal will do as well, (taking the half length of the Hip also between your Compasses, and on the Scale also) and that shall set the Scales to the same Angle as before.

Use XV. To find the Lengths and Angles of the Rafters and Hips, or Sleepers, in Bevelling Frames at any Pitch.

1. For the length of the Rafter, set the 30 Scales square, than count the half length of the Bevel end on one leg, being always more then the half breadth) and the Perpendicular resolv'd on, on the other leg; Then the parallel distance between, measur'd laterally, shall be the length of the Rafter requir'd, and a Ruler laid to the two points of the Compasses so set on the 30 Scales, and a Bevel set, as before in square Frames is shew'd, shall give the Angles at head and foot requir'd.

2. For the Hips length, count the Rafters length on one leg, and

the half breadth of the Bevel end of the House, more by half the number of inches bevelling on the other leg, and take the parallel distance between, and measure it laterally from the Center, and it shall be the length of the longest Hip-Rafter. And for the shortest Hip count less than the Bevel end, by half the number of inches bevelling, and that shall be the short Hip requir'd

3. The inches, or feet and inches of Bevelling being given, to find how much one corner is under, and the other over 90 degrees (or just square) open the 30 Scales, and take the breadth of the House over at the nearest distance, between your Compasses, from the 30 Scale from the Center laterally, and make it a parallel in 15 and 15 for 60 of the Chords.

Then take the feet and inches Bevelling from the same 30 Scale laterally, and carry it parallelly till it stay in like parts; then just against it on the degrees or Tangents are the degrees and minutes requir'd that one corner is more, and the other less than 90 degrees.

4. To find the Diagonal Line.

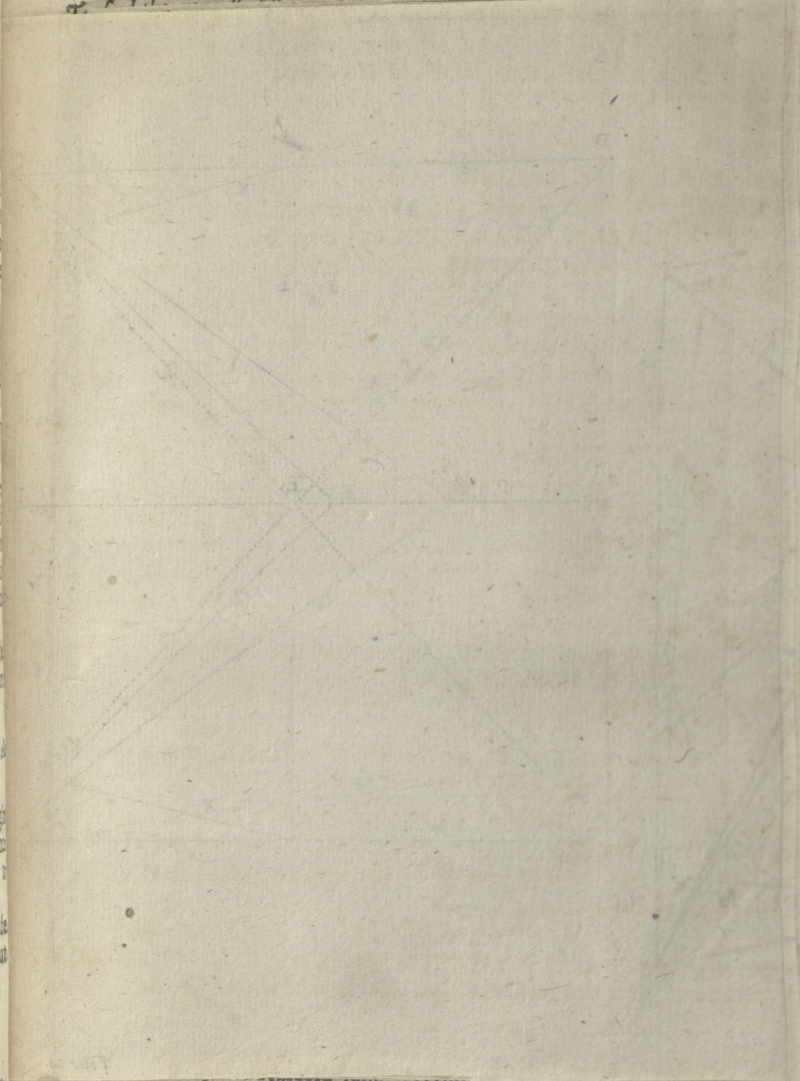
Take the distance in the Chords to the degrees above, or under 90 last found; from the Center laterally, and make it a parallel in 15 and 15, and then the 30 Scales are set to the Angle; the end is over, or under 90 degrees: Then count the whole or half Bevel end on both legs, and the parallel distance between shall shew the length of the whole, or half Diagonal Line measur'd from the Center.

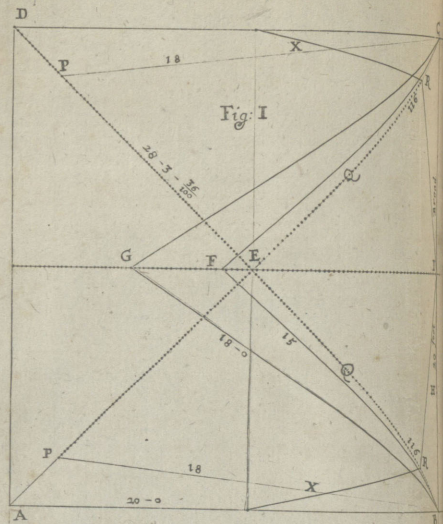
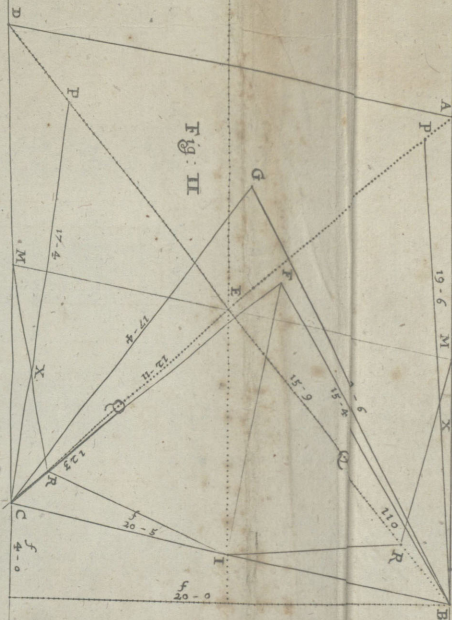
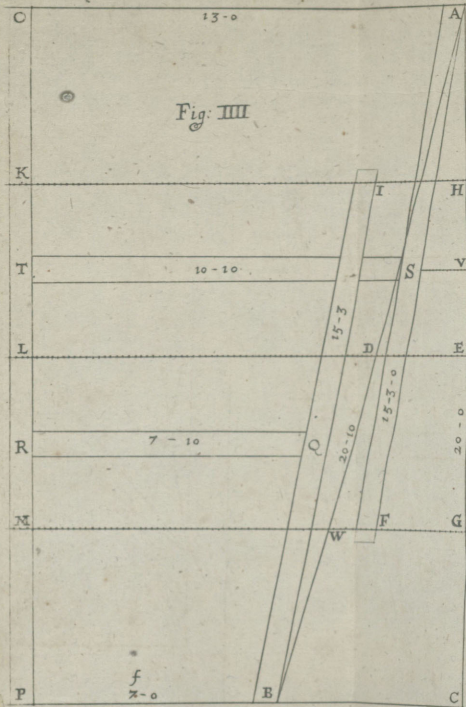
Note, that when the Rule stands at the Blunt Angle, it gives the longest Diagonal Line, and when it stands at the sharp Angle, it gives the shortest Diagonal Line.

5. By the Diagonal Line and Perpendicular to find the Hips length, and the Angles at Head and Foot of the Hip or Sleeper.

Count the half Diagonal on one leg, and the Perpendicular height on the other leg (the 30 Scales being square) then the parallel distance between, shall be the length of the Hip requir'd, being longer or shorter, as the Diagonal Line is.

Also a Rule laid to the two points of the Compasses measuring the parallel extent, and a Bevel laid to the Rule, and the two 30 Scales at each end, gives the Angles at head and foot of Hips requir'd.





To find the nearest distance from the Corner of the Rombus to the opposite Hip set up in his true place.

6. Count the length of the Hip on one 30 Scale, and take that distance also between your Compasses laterally, count also on the other 30 Scale the length of the Bevel end, and there set one point of the Compasses, and open or shut the Rule, till the other point falls in the length of the Hip-Rafter first counted, (then one 30 Scale represents the Raising Piece, and the other set up) then the nearest distance from the breadth of the Frame over, at the Bevel end and more, or less, by half the feet and inches Bevelling, to the common Line of the other 30 Scale, being measur'd from the Center shall be the nearest distance requir'd.

To find the Angle on the Outside of the Hip.

7. To find the Outside Angle of the longest Hip, take the shortest Diagonal Line between your Compasses, and make it a Parallel in the nearest distance belonging to that Hip, and the 30 Scales will be set to the Angle requir'd, and to measure it take Parallel 15 and 15, and measure it laterally from the Center in the Chords; and you shall have the measure of the Angle requir'd.

Examp. In a House of 20 foot over at nearest distance, and 4 foot or 48 inches Bevelling out of square. See Fig. II.

Let ABCD represent a Frame 20 foot over, and 4 foot Bevelling; the Bevel-end BC is longer than right over by 5 inches; for if you set the Rule square, and take the Parallel extent from 20 the measure over, to 4 foot the measure of Bevelling, and measure it laterally, you shall find it reach laterally to 20 foot and 5 inches, the true length of the Bevel end.

The Bevel end being 20. 5. inches the Perpendicular resolv'd on which at true pitch ought to be about 11 foot 5 inches, *Eere*. Then first for the Rafters length,

1. Set the 30 Scales square, and set one point in 11. 5 the Perpendicular, and the other point in 10 foot 2 $\frac{1}{2}$ the half Bevel end; (and to the Compass points, lay a Rule, and to the Rule and the 30 Scales at both ends set a Bevel, and one shall be the Angle at foot the other the Angle at the top of the Rafter: And the one Angle will be 42 degrees for the foot, and the other 48 for the top of the Rafters) and the measure between the Compasses measur'd from the Center shall be 15 foot 4 inches, the Rafters length requir'd.

As by Inspection on the 40 and 30 Scales you may see.

2. For the longest Hip set one point 12 foot 2 inches and $\frac{1}{2}$ more by 2 foot, then 10 foot 2 inches $\frac{1}{4}$ the half Bevel end, and the other point in 15. 4 the Rafter's length, and measure it from the Center, it gives 19 foot 6 inches the longest Hip.

Again, Set one point in 8 foot 2 inches $\frac{1}{2}$ 2 foot shorter than the half Bevel end, by 2 foot the half of 4 foot the Bevelling, and the other point in 15 foot the Rafter's length, and measure it from the Center, it gives 17 foot 4 inches the length of the shortest Hip.

3. For the length of both Diagonal Lines, set the Scales of 30 to the Angle of the Frame at each corner, and the measure from the half, or the whole Bevel end taken parallelly, shall be the length requir'd of the half or whole Diagonal Line, according as you take the whole or half Bevel-end.

As here in our Example the Blunt end is 101 gr. 30 min. or 11 30 more than 90 gr. therefore take the distance from the Center to 101. 30 on the Chords, and make it a parallel in (15 and 15) the Chord of 60, then is the 30 Scales set to the Angle of the Blunt end of the Frame and the parallel distance between 20 - 5 the whole Bevel end gives 31 foot 6 inches, the whole Diagonal Line B L, or the parallel between 10 - 2 $\frac{1}{2}$ give 15 - 90 inches B E the half.

Again, The sharp end is 78. 30 11 deg. 30 less than 90, then the lateral Chord of 78. 30. made a parallel Chord of 60 (at 15 :) then is the Rule set to the sharp end of the Frame, for the shorter Diagonal Line, and the parallel distance between 10 - 2 $\frac{1}{4}$ gives 12 foot 11 the half, or 25 foot 10 inches the whole Diagonal Line C E, whose half is C E the shortest, whole, and half Diagonal Lines.

4. For the Hips length, and Angles at foot and head.

Set the 30 Scales square, and count the shortest half Diagonal 12 foot 11 on one leg, and the Perpendicular 11 foot 5 on the other leg, then the Compass points to set, lay a Rule and take the Bevel at both ends, and it shall give the two Angles at head and foot of the shortest Hip, and the same distance of the Compass points shall be 17 foot 4 inches *ferè*, the Hip length, as before and the Angle at the top 48. 30 and at foot 41. 30 is his Complement.

Again set one point in 15 foot 10 the longest half Diagonal, and the other point in 11 foot 5 inches the Perpendicular, and lay a Rule to them, and set the Bevel to both ends, and you shall find 54 gr. the Angle at the top, and 36 the Angle at foot, and the distance between the Compasses laid from the Center, gives 19 foot 6 inches the longest Hip.

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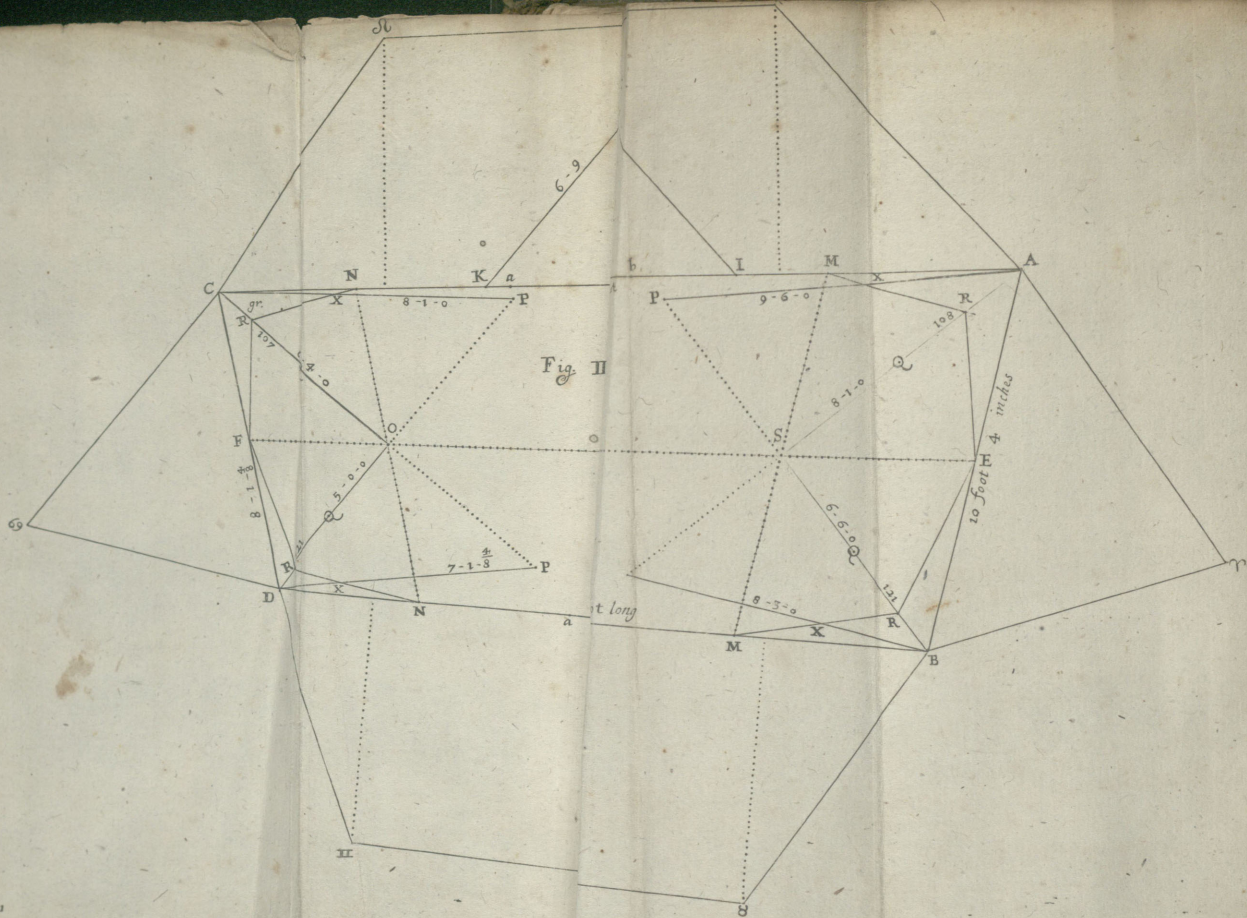
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5. For the Outside Angles of both Hips, the longest first.

Take 19. 6 between your Compasses, the Hips length from the 30 Scale; Set one point in 20 foot 5 the Bevel end, and close the Rule till the other point touches 19 foot 6 the Hips length.

Then take the nearest distance from 18 foot 5 (2 foot less than 20 foot 5 the breadth of the Bevel end of the Frame) to the other 30 Scale, and it is the nearest distance from the point of the *Rombus* A to the Hip BG set up, 16 foot 9 inches.

Then take out 25 foot 10 the shortest Diagonal, and make it a Parallel in 15. 9 the nearest distance, and then the 30 Scales are set to the Angles required; for the Outside of the long Hip, being 110 deg. for Parallel 15 measured laterally on the Chord, gives 110-00.

6. For the Outside Angle of the shortest Hip.

Take 17 foot 4 inches between your Compasses, and set one point in 20 foot 5 the Bevel end, and open or shut the Rule till the other point reaches 17. 4 on the other 30 Scale. Then the nearest distance from 22 foot, 2 foot more than the breadth of the Bevel end of the Frame to the common Line on the other 30 Scale, and that shall be the nearest distance from L to CG the shortest Hip set up, which is 18 foot 9 inches.

Then take out 15 foot 10 inches the half greater Diagonal Line, (because 31 foot 8 inches is more than the Scale of 30) and make it a Parallel in 9. 00 the half of 18 foot, and the 30 Scales are set to the Angle required, viz. 122 deg. for if you take out Parallel 15, and measure it in the Chords laterally, it shall be 122 the Angle required.

Note here by the way, the length of the Bevel end, and the two Diagonal Lines, and the halves of them, and the blunt and sharp Angles of the Frame, are given by the draught of the Frame, and they being first known, the work is half done; but if not given, then use these Directions, which will help you to see the reason of Plain Triangles, and the use of the Scales.

Use XVI. To find the Rafters, Hips and Angles in Bevel and Taper Frames, being broader at one end than the other See Fig. III.

First, When the Frame is broader at one end than the other, then the middle breadth is to be the guide for the Rafters length, and the Perpendicular to be equal to the middle Rafters Perpendicular on both ends; though one pair of Rafters is longer than another, and the Roof in winding thereby: Which winding may many times be remedied by some convenient Artifice or other, as the Ingenious Workman will soon perceive. As thus in brief:

Let

Let ABCD represent the Frame of a House Bevelled at both ends, and broader by 2 foot at one end than the other ; as here in the Beveling Figure, being 20 foot on one side, and 24 foot on the other side at one Bevel end 10 foot 4 inches, and at the other end 8 foot 1 inch $\frac{1}{2}$ but at the nearest distance over, only 10 foot, and 8 foot.

First, For your more apparent satisfaction, draw the true form of the Frame by as large a Scale as you conveniently can, with the Sides and Angles as exact as you can, as ABCD ; then draw the middle Line EF quite through the length, and GH through the breadth of the Frame Perpendicular one to the other, then measure GH as suppose 9 foot, then lay off the half of GH from H to I and K, then take out $\frac{1}{2}$ of GH, and lay it from K and I to L 6 foot 9 inches for a pair of middling Rafters for this Taper House, LG being the common Perpendicular at the middle and both ends of the Roof, 5 foot 0 inch $\frac{1}{2}$ of an inch.

And for principal Rafters, or other Rafters open the 30 Scale square, and then count the Perpendicular 5 0 $\frac{1}{2}$ on one leg, and half the distance between the Rafter-feet or half breadth of the Frame at that place on the other leg ; and the Parallel distance between shall be the true length of the Rafter required.

Then for the Hips length, first, make AM and BM equal to AE or BE at one end, and make CN and DN equal to DF or CF, and draw the Lines MM and NN at both ends, also make Ab and Bb equal to AB, and Ca and Da equal to CD, and draw the Diagonal Lines AS and BS, and CO, and DO, at each end extended, and set down the measures of them.

These Lines being drawn, you have the half Diagonal Lines AS and BS, and CO, and DO, and may measure them by your Scale, to find their lengths, or set the Rule to the Angles AES and BES, find them by the 30 Scale ; also you have the Bevel ends of the Frame and the nearest distance over from side to side of the Frame.

Then for the Hips length and Angles thus.

Set the 30 Scales square, and count the Perpendicular height LG on one leg 5-0- $\frac{1}{2}$ and each half Diagonal Line, &c. one after another on the other leg, and the Parallel distance between shall be the true length of the several Hips required. *Example.*

The Parallel distance between 5 foot-0-inches $\frac{1}{2}$ the common Perpendicular counted on one 30 Scale, and 8 foot 1 inch, the longest Diagonal Line AS counted on the other 30 Scale, shall give 9 foot 6 inches for the length of one Hip AP laterally. And

And the Parallel distance between $5 - 0 - \frac{1}{8}$ the common Perpendicular, and 6 foot 6 inches the other Diagonal Line B S, shall give the lateral measure of 8 foot 3 inches, the length of B P, the other Hip-Rafter for the broadest end of the Frame A B.

Again, The Parallel distance between $5 - 0 - \frac{1}{8}$ the common Perpendicular, and 6 foot 4 inches the greater Diagonal Line C O at the narrowest end, shall give 8 foot 1 inch for the Hip-Rafter C P. And the Parallel distance between $5 - 0 - \frac{1}{8}$ the Perpendicular and 5 foot $0 - 0 - \text{inch}$ the lesser Diagonal Line D O shall give 7 foot 2 inches for the Hips length D P to stand over the Diagonal Line D O.

Note also, That if to the Compass points, standing parallelly, you lay a Rule, and to the Rule so laid, and the 30 Scales at each end a Bevel, and set it according to the Rule and 30 Scales, it shall give the true Angle of the Hips at the Raising-piece and King-post, which 8 Angles in these 4 Hips, are express'd by the Lines and Letters in the Scheme thus: P A S and P B S, P D O and P C O, the 4 Angles at the Raising-piece. And S P A and S P B O P C and O P D, the 4 Angles at the King-Post.

Whose length you may prove by Mr. Pope's excellent way, making S P and O P equal to L G on the extended Diagonal Line, and drawing the Lines A P, B P, C P, D P for the 4 Hip-Rafters length requir'd.

Or for more proof, thus also by the Rule, as before in square Roofs. Set the 30 Scales square, and take the Parallel extent, from 7 foot $2 - \frac{3}{4}$ the Rafters length at the broader end, and one 30 Scale, to 6 foot 2 inches more, then $\frac{1}{2}$ the Bevel end by 1 foot the half quantity of Bevelling, and it shall give 9 foot 6 inches for the Hip A P, and from $7 - 2 - \frac{3}{4}$ to $4 - 2$, one foot less than the half Bevel end, to 8 foot $\frac{3}{4}$ the Hip B P. Also the Par. extent from 6 foot $5 - \frac{1}{2}$ the Rafters length at the lesser end, to 5 foot $0 - \frac{3}{4}$ one foot more than $4 - 0 - \frac{3}{4}$ the half little Bevel end, shall give $8 - 1 - \frac{1}{2}$ for the Hip P C. And the extent from $6 - 5 - \frac{4}{8}$ the Rafters length, to $3 - 0 - \frac{3}{4}$ 1 foot less than the half Bevel end, gives $7 - 1 - \frac{1}{2}$ the Hip D P, as before.

Note, That by the working these 3 ways, you may be sure to prevent any mistakes that may happen in working one way only.

Lastly, For the Angles on the outside or backs of the Hips. Take every several Hips length laterally between your Compasses, and set one point in the length of the Bevel end, (or rather in a mean between A B the Bevel end, and M M at the greater end, or C D and N N at the lesser end) and open or shut the 30 Scales till the other point falls on the Hips length that you work for, then for the longer Hip count
F
more,

more, and for the shorter Hip less, by half the Inches Bevelling, then the whole breadth over, at the end, and take the Parallel nearest distance from thence to the 30 Scale for a nearest distance, which nearest distance you must keep.

Then take the whole Diagonal Line Perpendicular to the Hip, wrought for (*viz.* the shortest Diagonal Line for the longest Hip at each end) between your Compasses, and make it a Parallel in the nearest distance last found, and then the 30 Scales are set to the Angle of the back of the Hip required.

③
Example in this Figure for the longest Hip.

Take 9 foot 6 inches, the Hips length A P between your Compasses, and set one point in 10 foot 1 inch (a mean between A B 10 foot 4, and M M $9 - 10 - \frac{1}{2}$.) and open or shut the Rule, till the other point stands in 9 foot 6, the Hips length first taken. Then the nearest distance from 9 foot 4 inches, 1 foot less than 10 foot 4 inches, the Bevel end distance over, to the other 30 Scale shall give 7 - 10 a nearest distance from the Point b to A P the Hip raised over A S the Diagonal.

Then the lateral extent B b of the whole Diagonal Line 12 foot 7 inches being made a Parallel in 7 - 10 the nearest distance last found, shall set the 30 Scales to the Angle at R the back of the Hip required, measured by taking Parallel 30, and measuring it laterally on the Chords, it is about 108 degrees.

Secondly, Take 8 foot 4 inches, the other Hips length between your Compasses, and setting one point in 10 foot 1 inch as before, open or shut the Rule till the other point falls in 8. 4 the Hips length.

Then the nearest distance from 11 foot 4 inches, 1 foot more than 10 foot 4 inches, the distance of the Bevel end to the common Line of the other 30 Scale, shall be when measured laterally from the Center 2 foot *ferè*, for a nearest distance.

Then 15 foot 8 inches the longer Diagonal Line being made a Parallel in 9 foot *ferè*, the nearest distance last found, sets the 30 Scales to 121 deg. the Angle required, the back of the shorter Hip required.

The same work serves for the other end, being near the same Angles: Which you may prove by Mr. Will. Pope's excellent way thus: Find the middle between S and A, or S and B at Q, then the nearest distance from Q to B P or A P near lay to R, and draw the Lines R E, R M for the Angles at R, the back of the Hips required.

Moreover, if you raise 4 Perpendiculars cutting the points O and S, the 2 places of the King-Posts being Perpendicular to the Raising-Pieces

Pieces A C and B D, as the 4 Prick-lines γ S, \mathfrak{m} S, Ω O, and Π O do shew, and lay the length of each Hip from his proper corner A B C D as A P from A to γ and \mathfrak{m} . B P from B to γ and γ , D P from D to Π and \mathfrak{S} , C P from C to Ω and \mathfrak{S} , then draw Lines from point to point, as in the Figure.

Then \mathfrak{m} Ω and γ Π are the two Ridges when turned right over O S, and C \mathfrak{S} D is the least Hip, and A γ B is the greater Hip, as Mr. Pope hath well shewed. Thus much for Hipt Roofs.

Use XVII. To find the length and Angles of every Principal Particular Rafter in Frames, broader at one end than the other.

The Perpendicular, as before was hinted, is to be the same all over the Roof. Therefore open the Rule square, and take from the Perpendicular on one leg, to the half breadth of the Frame on the other leg, measure it from the Center, and that is the length required. For the Angles lay a Rule to the Compass points, and set a Bevel, as before is shewed, and you have the Angles at the Raising-Piece, (and Ridge of the House) to cut the Rafter's feet by.

The same Rule serves to draw out a pair of Well-Stairs, to give Hypothenusas, or Strings, at any particular height and breadth; for the 30 Scales set square, and the Perpendicular height counted on one leg, and the breadth on the other leg, the measure between is always the Hypothenufa, or String in flying Stairs, as may plainly appear.

Use XVIII. To find the Length and Angles of Collar-Beams in any Roof.

Take the whole breadth of the Frame between your Compasses, and set one point in the length of the Rafter on one leg, and the other point in the same place on the other leg: Then the two legs represent the two principal Rafter, and a Rule laid to the Compass points represents the Raising-piece; then at any height that you please above the Raising-piece, apply a Rule parallel to it, and the measure between laid from the Center, gives the length, (remembering to add Wood for the Tenons) and a Bevel laid to the 30 Scale and Rule, gives the true Angle to cut it by, (where the Timbers be square.)

Use XIX. To find the Lengths and Angles of Rafter, and Purloyns in Bevel Frames.

The length of the Rafter is shewed before, to find it by the half breadth of the Square or Bevel end, and the Perpendicular answerable to that Roof, as afterward in the Example.) And the Angle of the

Foot, and Outsides or Backs of the Bevel end Rafters, and the upright of the Gable end, must be to an Angle less and more than 90 deg. by the Angle at the Corner of the Frame where that Rafter is to stand, being more at the sharp Angle and less at the blunt Angle, as in Fig. IV. you may see; the true quantity of which Angle is thus found by the Rule.

Take the length of the Rafter for the Bevel end in feet and inches, and make it a parallel in 15, then half the quantity of feet and inches Beveling, taken from the same Scale and carried parallelly till it stay in like parts, shall shew right against it in the Tangents the deg. and min. required.

And this is the Angle that the blunt Corner is to be laid in Legement more than a square, and the sharp Angle less than a square or 90 deg. both out of level, and out of square also, when you tumble or stripe in, the Tenons of the Purloyns, the thing desired.

Examp. Let A B represent the Bevel end of a Frame, being out of square from the Line A C 6 foot, as the Line C B sheweth, then if A C be 20 foot, A B will be 20 foot 10 inches. Then draw E L the middle Line of the Frame, and G M and H K, the Lines at three quarter of the breadth of the Frame, then take E D the half Bevel and lay it from G to F and from H to I, and draw the Lines A F and B I, for the outside Lines of the two Bevel end Rafters; and the two other Lines parallel to them, according to the breadth or scantling of your Bevel end Rafters, as here in the Fig. 8 inches broad. Thus the Lines A F, and B I, represent the two end Rafters, laid in Legement to fit in the Purloyns, as for their lying out of square from the Raising-pieces. And to the same Angle they are to be laid out at Level, that the cutting of the Purloyns ends may fit the Rafter sides, when erected in their places, according as the ends F and I of the Bevel end Rafters are, according to the Angles A F G and A F M the one being 11 deg. and 20 min. under, and the other 11, 20 above 90 degrees.

Also Note, That if P K, and O M do represent a pair of square Rafters, at any intended distance from A, then T S and R Q will give the true length of the Purloyns fit for those places, R Q being the shortest Purloyn, and T S the longest Purloyn.

To find by the Rule only how long the Purloyn must be on the outside more or less than the distance on the Raising-pieces, where you intend the two square Rafters feet shall stand, do thus: Set the 30 Scales the same Angle that the Bevel end Rafters lie out of square, when they lie in Legement, to Frame which here is to 11 deg. and 20 min.

Then

Then count from the Center the quantity of feet and inches you intend to make the Mortise-holes from the Rafter Foot, in the Rafters, for the Tenons of your Purloyns; and take from thence to the nearest distance to the other Line, and that shall shew the quantity that the one Purloyn is to be longer, and the other shorter, than the distance between the Rafters Feet on the Raising-pieces; Example thus:

Set the 30 Scales to the Angle G A F, then count A S the place for the Mortise-hole from A on the Rafter, and take the nearest distance from thence to the other 30 Scale that shall give S V, the quantity how much T S is shorter than A O, and how much R Q is longer than P B.

Note, That if you count three quarters of 20 foot 10 inches, being the length of the Bevel end, that then you will make the Rafters too long by 4 inches and a half, as in the Figure you may see: Therefore the surest way to find the Rafters length is to set the Scales to a square, and then to take the parallel extent from the common Perpendicular, to the half breadth between the place for the Rafters Feet on the Raising-piece: So that the length of the Rafters for the Bevel end at true pitch, is A F 15 foot 3 inches, and not A W 15 - 7 - $\frac{1}{2}$, which is just 3 quarters of A B the Bevel end over which the two Rafters are to stand. For then the top of the Bevel end Rafters would be too high for the top of the square Rafters being cut just 15 foot, three quarters of 20 foot the breadth of the Frame.

Use XX. The Use of the Scales to lay down or measure out on Paper, or Board, the Members and parts of the fine Columns, and their Ornaments, with their Names and Measures, digested into a Table, for the more ease and use of Workmen.

For the drawing of the fine Columns and their Ornaments, is largely before treated of in the former Part, by Models, Minutes and Quarters, and considering the Harmony between it and our Scales to 30, that are parted into 12 parts, so that when every Figure or Foot, on the Scales to 30 represent a Model, then every inch is 3 minutes; and for small Paper draughts, that way of counting is near enough, but when you use it for a bigger draught, that the whole Scale of 30 may represent 3 Models only: Then every Figure will represent 6 minutes, and the 12 inches between are half minutes: But in very great Work, as in Temples or Castles, then the whole Foot or Scale to 30 may represent half of one Model only, and then every Figure or Foot is a minute, and every inch or small division is the 12th part of

of a minute; for 1 count it to be a large Column, whose Diameter at the base (which is a Model) is above 3 foot, and by this manner of computation which is natural to most Scales, the Scales to 30 may be rendred convenient for small, or moderate, or large uses, as in the following Examples may somewhat appear.

In reading of which you must have recourse to the former Figures, whose Members are marked with 1 2 3 4 5 6 7 8 9 10, and which Figures direct you to the Names in every of the Columns which I found to be wanting in the former part, so that the method here used is thus;

1. The first Column in the Table is 1 2 3 4 5 6 7 8 9 10 11 12, &c. answerable to the Figures on the 6th Figure, in our present Example, which will strait-way guide you to the meaning of the Names or Terms in the Table, by comparing it and the Figure together, whereby you may readily find every Part or Member and its proper Name.
2. The second Column is the Names of the Part or Member in the Gross and Particular also, as the Pedestal, the Base, the Shaft, the Capital, the Architrave, Frieze, and the Cornish, are the Names in Gross; the other are the Names of the Members in particular.
3. The third Column in the Table, is the severall Measures of the particular Members in Models, Minutes, and Quarters, as in the Figure, though more easily to be seen than in the Figures, because of the straitness of the room there.
4. The fourth Column in the Table, is the Measure of every particular Part and Member, from the Pedestal Base or Bottom to the Top of the Cornish, being useful in small Draughts where the whole Pillar is exprest.
5. The fifth Column in the Table, is the severall Measures of every particular Member of each Gross Part, being useful when you draw large Draughts of any Work or Part thereof.
6. The sixth Column in the Table, is the Measure of the Projecture of every particular Part, from the middle line of the Column (or from the smallest or most inward Part of the Pillar, the rest being subtracted) but I judge the middle line to be the best Epocha to begin the account of Projecture for the conveniency of the Compasses: And this Table of Projectures, as all the rest, is to Models, Minutes and Quarters; as by tryal you may see at one view what each Gross Part and every particular Part is.

The Names and Number of the Members of the Tuscan Column
in Height and Projecture.

in Height and Projecture.

A Table for the <i>Tuscan</i> Order		Each part from the Base.				Each gross the proj. part alone fr. middle.				
N.	Names of the Parts and Members.	mo.	mi.	q.	M.	m.	q.	M.	m.	q.
1	The lower Faece, or Plint, of the Pedestal	0	30	0	0	30	0	0	30	0
2	The Pedestal Body, or Stilobatum	1	0	0	1	30	0	1	30	0
3	Abacus, the Casement, or hollow	0	5	2	1	35	2	1	35	2
4	Tinea, the List, or Square, or Rabbit	0	1	2	1	37	0	1	37	0
5	The Architrave or Faece	0	12	0	1	49	0	1	49	0
6	The upper List of the Pedestal	0	3	2	1	52	2	1	52	0
7	The Plint, of the Base of the Column	0	18	0	2	10	2	0	18	0
8	The Thorus, or Rondel, or Brest	0	12	0	2	22	2	0	30	0
9	The List, or Fillet, or Spira	0	3	0	2	25	1	0	33	0
10	The Shaft or Body of a Col.	at the Base				6	22	0	8	47
		at the Capital				2	6	22	0	0
11	The List	0	1	2	8	49	0	0	1	20
12	The Rondel, or Astragal	0	3	2	8	52	0	0	5	00
13	The Neck, or Frieze	0	8	2	9	1	00	13	20	22
14	The List	0	1	2	9	2	20	15	00	24
15	The Rondel, or Bead-moulding	0	2	2	9	5	00	17	20	26
16	The Echinus, or Half-round	0	7	2	9	12	20	25	00	30
17	The Plint of the Capital	0	10	0	9	22	20	35	00	31
18	The first Faece	0	10	0	9	32	20	10	00	22
19	The second Faece	0	15	2	9	48	00	25	20	24
20	The List or Supercilium	0	1	2	9	49	20	27	00	26
21	The Plint	0	3	2	9	53	00	30	20	27
22	The Zoporus Epistylum, or Frieze	0	40	0	10	33	01	10	20	22
23	The List, or Supercilium	0	2	0	10	35	01	12	20	23
24	The Scimatum, or little OG	0	5	0	10	40	01	17	20	26
25	The Supercilium or List	0	1	1	10	41	11	18	30	30
26	The Scima, or greater OG	0	8	2	10	49	31	27	10	35
27	The List	0	1	2	10	51	11	28	30	49
28	The Corona, or Crown	0	9	3	11	1	01	38	20	50
29	The List	0	1	2	11	2	21	40	00	52
30	The upper Scima, or OG	0	8	0	11	10	21	48	00	56
31	The Supercilium, List, Tinea, or Eyebrow	0	1	0	11	12	01	49	21	00
32	The upper List, or Plint of the Cornish for the <i>Tuscan</i> Column or Order.	0	3	0	11	15	01	52	01	2

Thus I have given you an Example of the Tuscan Order of the Measure of every Part and Member: The like may you make, from the Figures in the Book, of all the other Orders, for your particular Use and Occasion.

The Ground-Rules of Architecture, Collected from the best Authors and Examples, by that Learned and Ingenious Gentleman Sir Henry Wotton, in his Elements of Architecture. Now Contracted for Publick Benefit.

THere are several Rules or Precepts laid down by Architects concerning the Art of well Building, some respecting the Situation or total Posture of the Building; as that it be in a good and healthy Air, not subject to Foggy Noisomness, or Mineral Exhalations, or Malign Influence; that it be not far from some Navigable River or Arm of the Sea; that it have a pleasant Prospect, and the first Salutation of the Spring: But I pass over these, accounting them rather Wishes than Precepts.

Other Rules there are touching the placing of the several parts of the Building; as that all the principal Chambers of Delight, all Studies and Libraries be towards the East, the Morning being a Friend to the Muses; all Offices that require heat, as Kitchens, Stillatories, Stoves, Rooms for Baking, Brewing, Washing, or the like, towards the South. All that need a cool and fresh Temper, as Cellars, Pantries, Butteries, Granaries, to the North: As also Repositories for Works of Rarities in Pictures, or other Arts that require a steady Light. But in this, regard is to be had to the Nature of the Region, every Nation being tied above all Rules, to a Discretion of Providing against their own Inconveniencies.

The Rules concerning the Work it self, some respect the Materials, and some the Form; as concerning the Material part it will not disgrace an Architect, which doth so well become a Philosopher, to look into the Properties of Stone and Wood, as that Firr-trees, Cypress, Cedars, and such other aspiring Plants (which being naturally inflexible downwards) are fittest for Posts and Pillars, or such upright use; on

the other side Oak and the like true hearty Timber being strong in all positions, may be better trusted in cross and traverse work for Sommers, or girding and binding Beams, as they are termed. And so likewise to observe of Stone, that some are better within than others to bear Weather; nay to descend lower, to examin Sand, Lime and Clay, of all which things *Vitruvius* and other new Writers have discoursed without any daintiness. And in this the *Italians* are very careful, burning their firmest Stone, and even fragments of Marble where it is plenty, which in time become almost Marble again, or at least of indissoluble durity, as appeareth in their standing Theatres: Whereas to make Lime of any refuse Stuff, as we too commonly do in *England*, is an error of no small moment in our Buildings. I shall close with this principal caution, That sufficient Stuff and Money be ready before we begin to build; for when we build now a piece and then another by fits, the work dries and sinks unequally, whereby the Walls grow full of chinks and crevices; this pausing humour is condemned by all Authors. In the form is to be considered the general figuration, and then the several Members. Figures are either simple or mixed, the simple Figures are either circular or angular, and of circular either compleat or deficient, as oval: Now the exact circle is in truth a very unprofitable Figure in private Buildings, being the most chargeable, and much room being lost in the bending of the Walls, besides an ill distribution of the Light, except from the Center of the Roof, so as it is not usual, save in some Temples and Amphitheatres; the oval and other imperfect circular Forms have the same exceptions and less benefit of capacity.

Touching the Angular it is a true observation, that this Art doth neither love many Angles nor few, for first the Triangle which hath of all others the fewest Sides and Corners, is of all other the most condemned, being indeed both incapable and infirm, and likewise more soluble into any other Form than it self in the inward Partitions: As for Figures of five, six, seven or more Angles, they are fitter for Military Architecture, where the Bulwarks may be laid out at the Corners, and the Sides serve for the Curtains than for civil use, tho' there is famous piece of *Caparola* belonging to the House of *Farnese*, cast by *Baraccio* into the form of a Pentagone with a circle inscribed; where the Architect did ingeniously wrestle with divers Inconveniencies in disposing of the Lights and in saving the vacuities: But such designs as these do aim more at Rarity than Commodity, and are rather to be admired than commended. Therefore by the Precepts and Practice of the best Builders we resolve upon Rect-angular Squares, as a mean between

tween too few and too many Angles, and are through the equal inclination of the Sides (which make the right Angle) stronger than the Rhomb or any other irregular Square; but whether the exact Quadrat or the long Square be the better, is not well determined, tho' I prefer the latter, provided the length do not exceed the Latitude above one third part, which would much diminish the Aspect; as shall appear when I come to speak of Symmetry and Proportion of mixed Figures, partly Circular, and partly Angular. There is a proper Objection, that they offend Uniformity, yet these seeming opposites, Uniformity and Variety, may be reconciled; as we see in our Bodies, the great Pattern of Nature, which are most Uniform in the whole Figuration, each side agreeing with the other in the Number, the Quality and Measure of the parts, and yet some are round as the Arms, some flat as the Hands, some prominent, and some more retired, so the Limbs of a Noble Fabrick may be correspondent enough though they be various, provided always we do not run into certain extravagant Inventions, whereof I shall speak more largely when I come to the parting and casting of the whole Work. We ought likewise to avoid enormous heights of six or seven Stories, as well as irregular Forms, and the contrary fault of low distended Fronts is as unseemly; or again when the Face of the Building is narrow and the Flank deep. Thus much for the general Figuration or Aspect of the Work.

Now concerning the Parts in several, all the Parts of every Fabrick may be according to *Baptista Alberti* comprised under five Heads, and they be these.

The Foundation. The Walls. The Appertions, or Overtures. The Compartment. And the Cover.

About all which I purpose to gather the principal Rules, and as I pass along, touch the natural Reasons of Art.

First, Concerning the Foundation, which requireth the exactest Care; for if that happen to dance, it will mar all the Mirth in the House. Therefore that we may found our Habitation firmly, we must first examin the Bed of Earth upon which we will build, and then the Underfilings and Substraction, as the Ancients did call it, advising us not to rest upon any appearing Solidity, unless the whole Mould through which we cut have likewise been solid. But how deep we should go in this search, is not certainly determined, depending more upon Discretion than Regularity, according to the weight of the Work; yet *Andrea Palladio* alloweth a sixth part of the height of the whole Fabrick, unless the Cellars be under ground; in which case he would have us found somewhat lower.

Some *Italians* do prescribe, that when they have chosen the Floor or Plot, and laid out the limits of the Work, we should first of all dig Wells and Cisterns and other Under-conduits and Conveyances for the Suillage of the House, whence may arise a double benefit; for both the nature of the Mould or Soil would be safely searched, and moreover those open Vents will serve to discharge such Vapours, as having otherways no issue, might peradventure shake the Building; this is enough for the natural grounding, which though it be not a part of the solid Fabrick, yet it is here fittest to be handled.

Now followeth the Substruction or Ground-work of the whole Edifice, which must sustain the Walls, about which are these Rules, first that the bottom be precisely level, where the *Italians* therefore commonly lay a Platform of good Board; then that the lowest ledge or row be meely of Stone, and the broader the better, closely laid without Morter, which is a general caution for all parts in Building that are contiguous to Board or Timber, because Lime and Wood are infociable, and if any where unfit confiners, then most especially in the Foundation; thirdly, that the breadth of the Substruction be at least double to the insistent Wall, and more or less as the weight of the Fabrick shall require; for Discretion may be freer than Art.

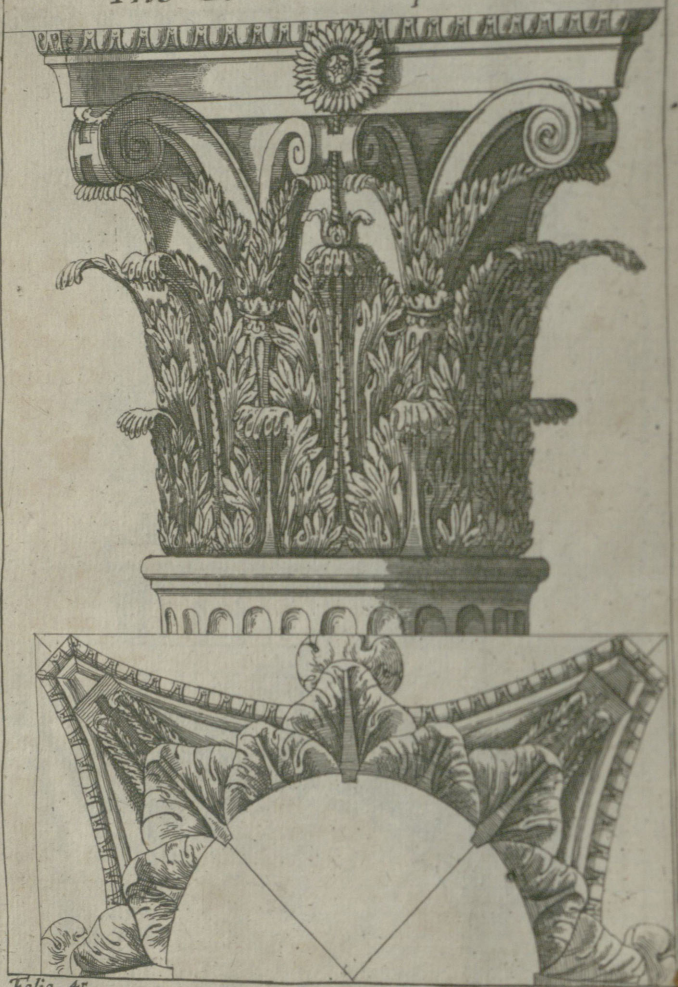
Now the Foundation being search'd, and the Substruction laid, we must next speak of the Walls.

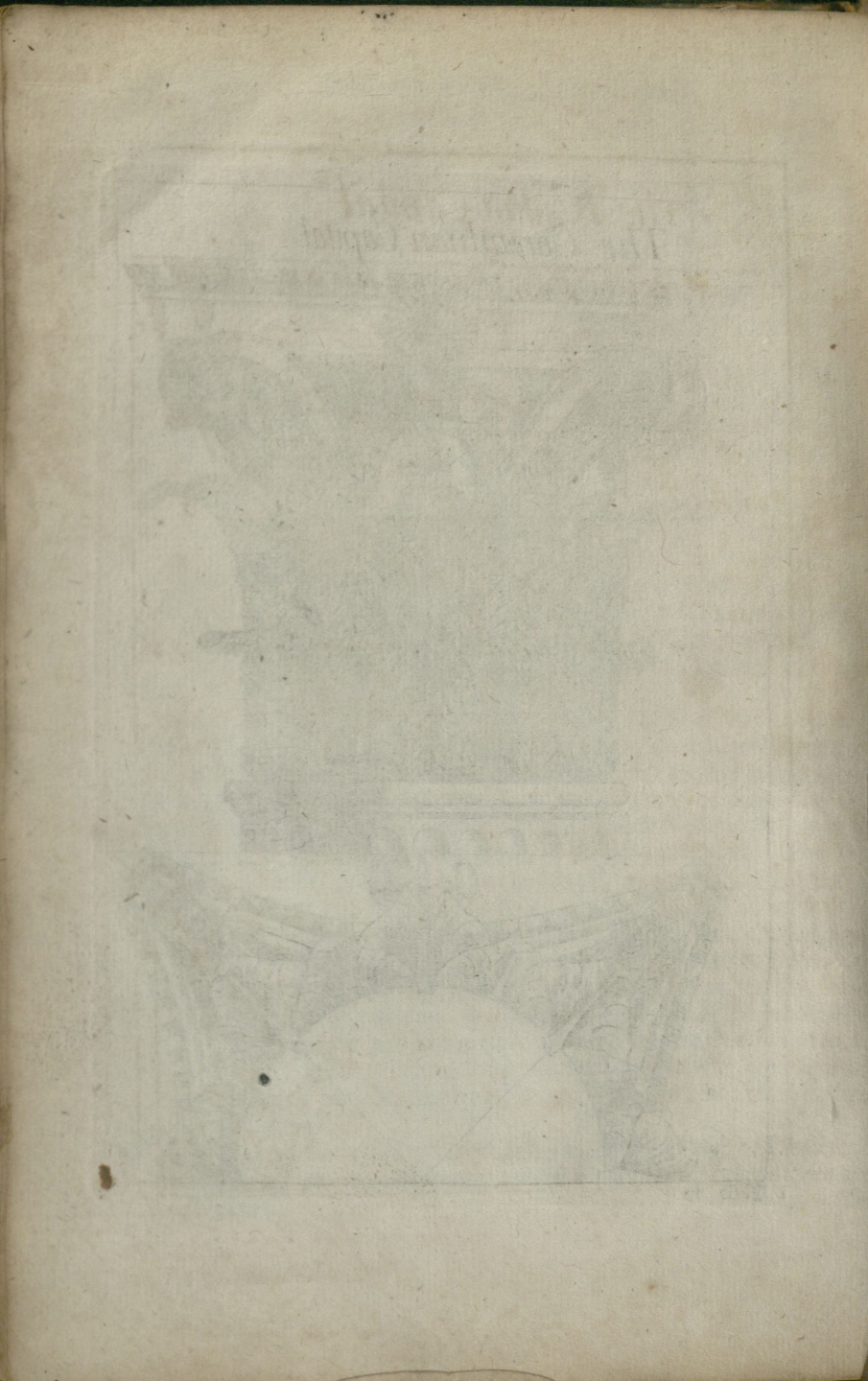
Walls are either entire and continual, or intermitted, and the Intermissions be either Pillars or Pilasters; concerning the entire Walls there are these Considerations. That the Walls be most exactly perpendicular to the ground-work; for the right Angle (thereon depending) is the true cause of Stability both in Artificial and Natural Positions, a Man likewise standing firmest when he stands uprightest. That the massiest and heaviest Materials be the lowest, as fitter to bear than to be born: That the Work as it riseth, diminisheth in thickness proportionably for ease both of weight and of expence. That certain ledges of more strength than the rest, be interlay'd like Bows to sustain the Fabrick from total ruin, if the under parts should decay. Lastly, That the Angles be firmly bound, which are the Nerves of the whole Edifice, and therefore are commonly fortified by the *Italians* even in their Brick Buildings, on each side of the Corners with well squared Stone, yielding both Strength and Grace. And so much touching the entire or solid Wall.

The Intermissions (as hath been said) are either Pillars or Pilasters:

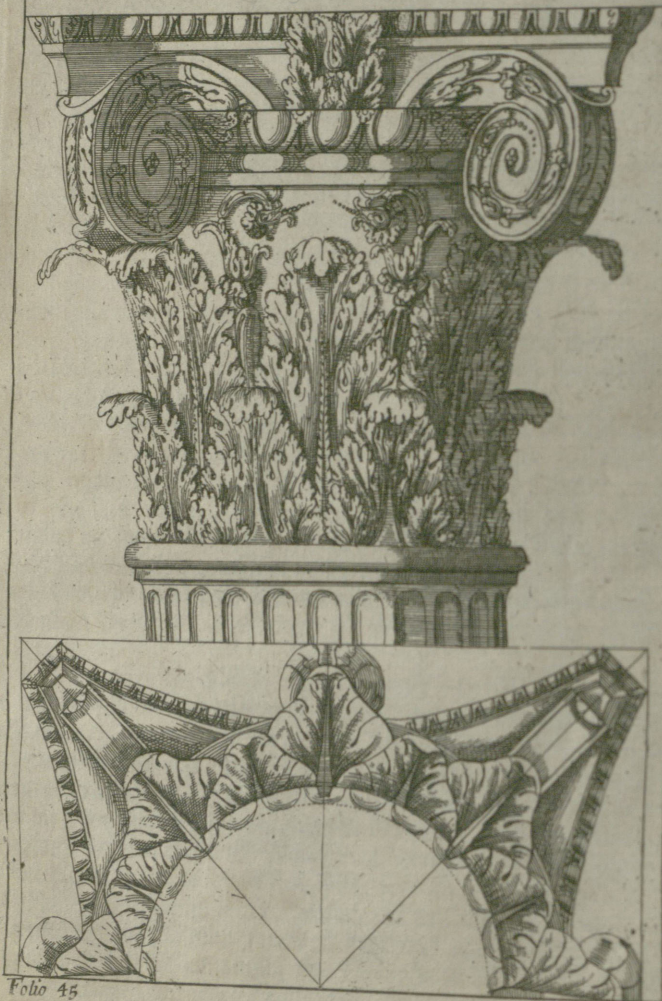
Pillars, which are commonly called Columns, of them there are
five Orders. *The*

The Corinthian Capital.





The Roman Capital



The Tuscan. The Dorick. The Ionick. The Corinthian.

And the *Compound Order*, or as some call it, the *Roman*, others more generally the *Italian*.

In which five Orders I will first consider their Communities, and then their Proprieties.

Their Communities (as far as I observe) are principally three: First, they are all round; for tho' some conceive *Columna Atticurgae* mentioned by *Vitruvius*, to have been a squared Pillar, yet we must pass it over as irregular, never received among these Orders, no more than certain other licentious Inventions of wreathed and vined and figured Columns.

Secondly, They are all diminished or contracted insensibly more or less, according to the proportion of their heights from one third part of their Shaft upwards, which *Philander* doth prescribe by his own precise measuring of the Ancient Remains as the most graceful Diminution. And here I must blame a Practice familiar in some places, of making Columns swell in the middle as if they were sick of some Timpany, unseemly to the very Judgment of sight, and contrary to the Original and Natural Type in Trees, which at first was imitated in Pillars, as *Vitruvius* himself observeth.

Thirdly, They have all their Undersettings or Pedestals in height, a third part of the whole Column comprehending the Base and Capital, and their upper Adjuncts, as Architrave, Frieze and Cornish, a 4th part of the said Pillar. Which Rule of singular use and facility I find settled by *Jacobo Baraccio*, a very good Author. These are their most considerable Communities and Agreements.

Their Proprieties or Distinctions will best appear by some reasonable and plain Description of them all with their Architrave, Frieze and Cornishes.

First, Therefore the *Tuscan* is a plain-massy rural Pillar, resembling some sturdy well-limb'd Labourer homely clad, as *Vitruvius* makes the Comparison: The length thereof shall be six Diameters, or as *Scamozzi* makes it, six and a half of the grossest of the Pillar, being a very natural Proportion. The distance or Intercolumniation may be near four of his own Diameters, because the Materials commonly laid over this Pillar, were rather of Wood than Stone through the lightness whereof the Architrave could not suffer though thinly supported, nor the Column it self being so substantial. The Contraction aloft shall be (according to the most received Practice) one fourth part of his thickness below. To conclude, the *Tuscan* is of all the rudest Pillar, and his principal Character simplicity.

The

The *Dorick* Order is the graveſt that hath been received into civil uſe, preſerving in compariſon of thoſe that follow a more maſculine Aſpect, and little trimmer than the *Tuſcan* that went before; ſave a ſober Garniſhment now and then of Lyons heads in the Corniſh, and of Triglyphs and Metopes always in the Friſe, ſometimes likewiſe, but rarely channelled, and a little ſlight Sculpture about the Hypotrachelion or Neck under the Capital: the length ſeven Diameters, and according to *Scamozzi*, ſeven and a half, his rank or degree is the loweſt by all congruity, as being more maſſy than the three, and ſo better able to ſupport. The Intercolumniation thrice as much as his thickneſs below; the contraction aloſt one fifth of the ſame meaſure, he is beſt known by his place when he is in Company, and by the peculiar Ornament of his Friſe before-mentioned when he is alone.

The *Ionick* Order doth repreſent a kind of Feminine ſlenderneſs, not like a light Huſwife, but in a decent Matron-like dreſſing. The length eight Diameters in degree as in ſubſtantialneſs next above the *Dorick*, ſuſtaining the third, and adorning the ſecond ſtory, the Intercolumniation two of his own Diameters, the Contraction above one ſixth part. And is beſt known by his Trimmings, for the body of this Column is perpetually channelled like a thick plaited Gown: the Capital dreſſed on each ſide, not much unlike Womens Wires in a ſpiral wreathing, which they call the *Ionian Voluta*; the Corniſh indented; the Friſe ſwelling like a Pillow, theſe are his beſt Characters.

The *Corinthian* is a Column laſciviouſly decked like a Curtizan, and therein participating (as all Inventions do) of the place where they were firſt born, *Corinth* having been without controversy one of the wantoneſt Towns in the World. This Order is of nine Diameters, his degree one ſtage above the *Ionick*, and always the higheſt of the ſimpleſt Orders. The Intercolumniation two of his Diameters, and a fourth part more, which is of all other the comlieſt diſtance. The contraction one ſeventh part. In the Corniſh both Dentils and Modiglians. The Friſe adorned with all kinds of Figures and various Compartments. The Capital cut into one of the beautifulleſt Leaſs that Nature doth yield, which is the *Acanthus* or *Branta Urfina*, Bear's Foot. In ſhort, as Plainneſs did characterize the *Tuſcan*, ſo muſt Delicacy and Variety the *Corinthian* Pillar, beſides the height of his Rank.

The laſt is the Compounded or *Roman* Order; his Name being a brief of his Nature; for this Pillar is nothing in effect but a medly of all the precedent Ornaments, and though, the moſt richly trimmed, yet the pooreſt in this that he is a borrower of all his Beauty. His

length

length a mean between the *Ionick* and *Corinthian*, according to *Scamozzi*; though some will have him the highest, as of 10 Diameters, the Intercolumniation somewhat less than two Diameters, the contraction one eighth part less above than below, his degree should be the highest, but few Palaces ancient or modern exceed the third of the Civil Orders; you may easily know him by the mixture of his Ornaments. And so much touching the five Orders of Columns, which I shall conclude with two or three not impertinent Cautions.

First, That where more of these Orders than one shall be set in several Stories or Contignations, there must be an exquisite care to place the Columns precisely one over another, that so the solid may answer to the solid, and the vacuities to the vacuities; as well for Beauty as Strength of the Fabrick; and by this Caution the consequence is plain, that when we speak of the Intercolumniation or Distance which is due to each Order, we mean in a *Dorick*, *Ionical*, *Corinthian* Porch, or Cloister, or the like of one Contignation, and not in storied Buildings.

Secondly, Let the Columns above be a fourth part less than below, saith *Vitruvius*; which doth appear a strange Precept, and would seem reasonable rather to make them a fourth part bigger, because according to the Optick Rule that the higher they are the less the Diminution aloft should be, because the Eye doth naturally contract all Objects more or less according to their distance; but *Vitruvius* acquits himself like a wise Mechanick; the Natural reason before the Mathematical.

That therefore they above should be a fourth part less, that those beneath may better sustain them.

A third Caution shall be, That all the projected or jutting parts (as they are termed) be very moderate, especially the Cornishes of the lower Orders; for while some think to give them a beautiful and royal Aspect, by their largeness they sometimes hinder both the Light within, and likewise detract much from the view of the Front without. I need say no more concerning Columns and their Adjuncts, only answer one familiar Objection: It will perchance be said, that this Doctrine touching the five Orders were fitter for the Quarries of *Asia*, which yielded 127 Columns of 60 foot high to the *Ephesian* Temple, or for *Numidia* where Marbles abound, than for the Spirits of *England*, who must be contented with more ignoble Materials. To which I answer, that this need not discourage us. For I have often at *Venice* viewed with much Pleasure an Antiporch after the *Greek* manner, raised by *Andrea Palladio* upon eight Columns of the Compounded Order, the Basis of Stone without Pedestals, the Shafts or Bodies of
meer.

meer Brick 3 foot and half thick in the Diameter below, and consequently thirty five foot high, than which mine Eye hath never yet beheld any Columns more stately of Stone or Marble; for the Bricks having been first formed in a Circular Mould, and then cut before their burning, into four quarters or more, the sides afterwards joyn so closely, and the points concenter so exactly, that the Pillars appear one entire Piece; which short Description I could not omit, that thereby may appear how in truth we want rather Art than Stuff to satisfy our greatest Fancies.

After Pillars the next in Order are Pilasters, touching which I will briefly collect these Notes. Pilasters must not be too tall and slender, lest they resemble Pillars; nor too dwarfish and gross, lest they imitate the Piles or Peers of Bridges; smoothness doth not so naturally become them as a rustick Superficies, for they aim more at State and Strength than Elegancy. In private Buildings they ought not to be narrower than one third, nor broader than two parts of the whole vacuity between Pilaster and Pilaster; but to those that stand at the Corners, may be allow'd a little more Latitude by discretion for strength of the Angles: In Theatres and Amphitheatres, and such weighty Works, *Palladio* observeth them to have been as broad as the half, and now and then as the whole vacuity; he noteth otherways, and others consent with him, that their true proportion should be an exact square; but for lessening expence and enlarging of room, they are commonly narrower in Flank than in Front. Their principal Grace doth consist in half or whole Pillars apply'd unto them; in which case it is well noted by Authors, that the Columns may be allow'd somewhat more than their ordinary length, because they lean unto so good Supporters. And thus much shall suffice touching Pilasters, which is a cheap, and a strong, and a noble kind of Structure.

Now because they are oftner both for Beauty and Majesty found Arched than otherwise: I am here orderly led to speak of Arches, and under the same Head of Vaults, for an Arch is nothing indeed but a contracted Vault, and a Vault is but a dilated Arch.

Therefore to handle this business both compendiously and fundamentally, I will resolve the whole business into a few Theorems.

Theorem 1. All solid Materials free from impediment do descend perpendicularly downwards, because Ponderosity is a natural inclination to the Center of the World, and Nature performeth her Motions by the shortest Lines.

Theorem 2.

Theorem 2. Bricks moulded in their ordinary Rectangular form, if they shall be laid one by another in a level row between any Supporters, sustaining the two ends, then all the pieces between will necessarily sink even by their own natural gravity, and much more if they suffer any depression by other weight above them, because their sides being parallel they have room to descend perpendicularly without impeachment, according to the former *Theorem*: Therefore to make them stand, we must either change their posture, or their figure; or both.

Theorem 3. If Bricks moulded, or Stones squar'd *cuneatim* (that is wedg-wise, broader above than below) shall be laid in a row level with their ends supported as in the precedent *Theorem*, pointing all to one Center, then none of the pieces between can sink till the Supporters give way; because they want room in that figuration to descend perpendicularly: But this is yet a weak piece of Structure, because the Supporters are subject to much impulsion, especially if the Line be long; for which reason this form is seldom us'd but over Windows or narrow Doors; therefore to fortifie the Work, as in this third *Theorem* we have supposed the Figure of all the Materials different from those in the second, so likewise we must now change the Posture, as will appear in the *Theorem* following.

Theorem 4. If the Materials figured as before, wedg-wise, shall not be disposed levelly, but in form of some Arch or Portion of a Circle pointing all to the same Center: In this Case neither the pieces of the said Arch can sink downwards through want of room to descend perpendicularly, nor the Supporters or Butments (as they are term'd) of the said Arch can suffer so much violence as in the precedent flat Posture, for the roundness will always make the incumbent weight rather to rest upon the Supporters than to shove them; whence may be drawn an evident Corollary, that the safest of all Arches is the Semicircular, and of all Vaults the Hemisphere, though not absolutely exempted from some natural weakness, as *Barn. Baldi*, Abbot of *Guaftalla*, in his Comment upon *Aristotle's* Mechanicks doth very well prove; whence I note, That when any thing is Mathematically demonstrated weak, it is much more Mechanically weak; errors evermore occurring more easily in the Management of gross Materials than lineal designs.

Theorem 5. As Semicircular Arches or Hemispherical Vaults being rais'd upon the Total Diameter be of all other the roundest, and consequently the surest by the precedent *Theorem*; so those are the gracefulest, which keeping precisely the same height, shall yet be di-

stended one fourteenth part longer than the said entire Diameter, which addition of distent will confer much to their Beauty, and detract but little from their strength. This Observation I find in *Leon. Baptista Alberti*; but the Practice how to preserve the same height, and yet distend the ends of the Arch, is in *Albert Durers* Geometry, who taught the *Italians* many an excellent Line of great use in this Art.

Upon these five *Theorems* all the skill of Arching and Vaulting is grounded: As for those Arches which our Artizans call of the third and fourth point, and the Tuscan Writers *di terzo* and *di quarto acuto*, because they always concur in an acute Angle, and do spring from the division of the Diameter into three, four, or more parts at pleasure; I say, these both for the natural imbecility of the sharp Angle it self, and likewise for their very uncomeliness, ought to be exiled from judicious Eyes, and left to their first Inventors the *Goths* or *Lumbards*, amongst other Reliques of that barbarous Age.

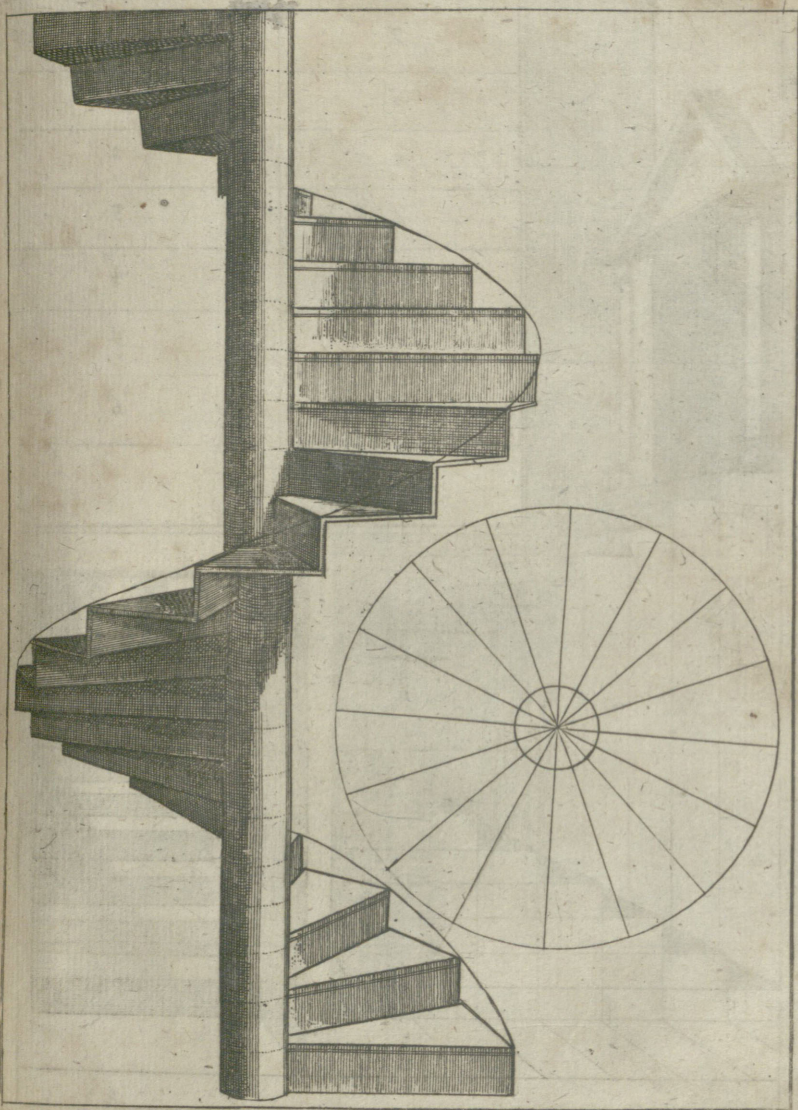
Thus of my first Partition of the parts of every Fabrick into five Heads; having gon through the two former, and been incidently carried into this last Doctrine touching Arches and Vaults, the next now in order are the Apertions, under which term I do comprehend Doors, Windows, Stair-Cases, Chimnaies, or other Conducts; in short, all Inlets or Outlets, to which belongs two general Cautions.

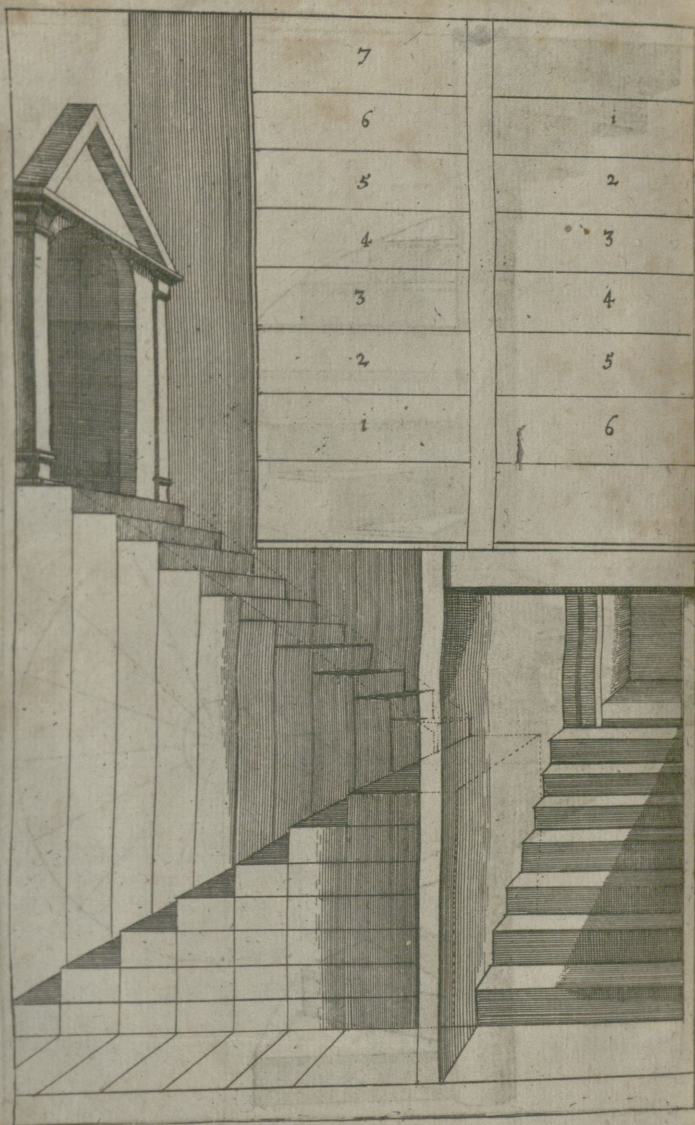
First, That they be as few in number, and as moderate in dimension, as possibly may consist with other due respects; for in a word, all openings are weakenings.

Secondly, That they do not approach too near the Angles of the Walls, for it were indeed a most essential Solœcism to weaken that part which must strengthen all the rest: A Precept will be recorded but ill practised by the *Italians* themselves, particularly at *Venice*, where I have observ'd divers *Pergoli* or *Meniana* (as *Vitruvius* seemeth to call them, which are certain ballised Outstandings to satisfy curiosity of sight) very dangerously set forth upon the very point it self of the Mural Angle.

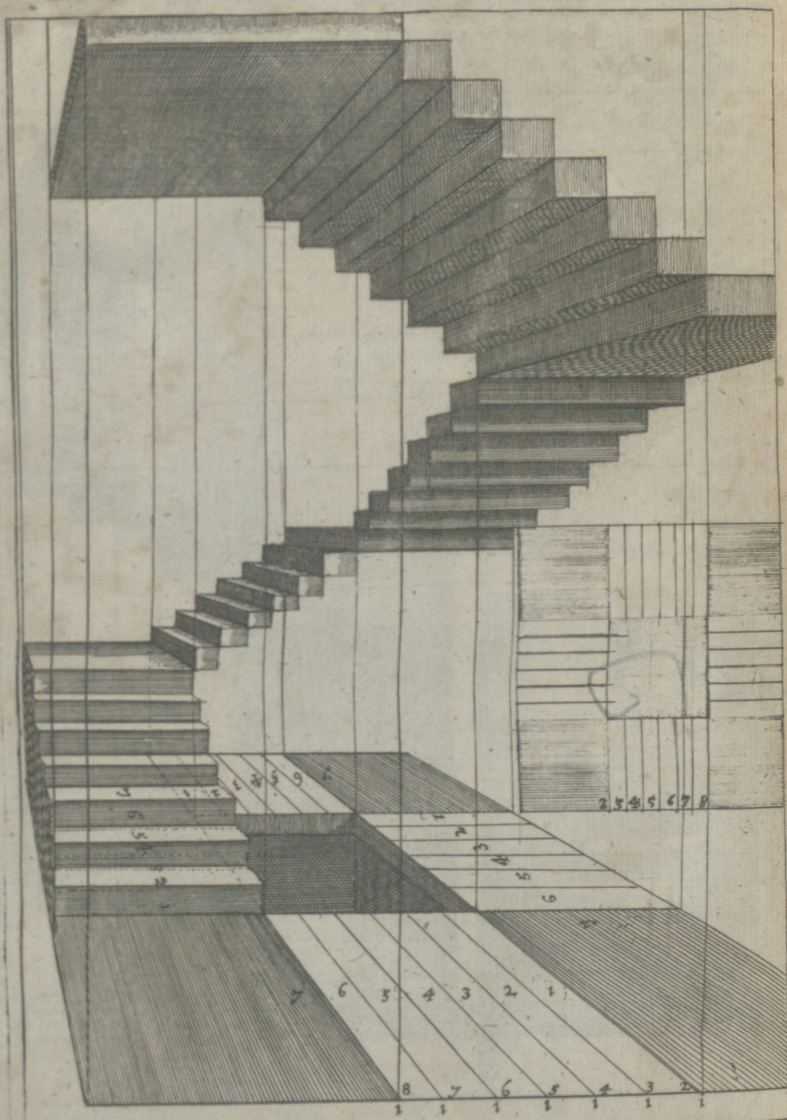
Before I come to the casting and comparting of the whole work (being indeed the very definitive sum of this Art, to distribute usefully and gracefully a well chosen Plot) I shall collect some Notes belonging to these particular Overtures.

Of Doors and Windows. These Inlets of Men and Light I couple together, because I find their due dimensions brought under one Rule, by *Leon. Alberti* (a learn'd searcher) who from the School of *Pythagoras* (where it was a fundamental Maxim, that the Images of all things are latent









latent in numbers) both determine the comliest proportions between breadths and heights, namely the Symmetry of two or three in their breadth and length, in others the double, as 2 to 4, there will indubitably result from either a graceful and harmonious contentment to the Eye. Our Master *Vitruvius* seems to have been an extream lover of luminous Rooms, and indeed I must confess that a frank light can misbecome no Edifice, yet on the other side we must take heed not to make a House all Eyes like *Argus*, which in Northern Climates would be too cold, in Southern too hot. Besides there is no part of Building more expenceful than Windows, or more ruinous, not only for that vulgar reason as being exposed to all Wind and Weather, but because consisting of so different and unsociable pieces, as Wood, Iron, Lead and Glass, and those small and weak, and easily shaken.

Of Doors there is this distinction; some were called *Fores*, some *Valve*; Those, as the word may seem to import, did open outwards: these inwards, and were commonly of two Leaves or Panes (as we call them) thereby requiring indeed a lesser circle in their unfolding, and therefore much in use among the Italians at this day. But I charge them with an Imperfection, for though they let in as well, yet they keep out worse.

Of Stair-Cases. To make a compleat Stair-Case is a curious piece of Architecture; the vulgar cautions are these.

That it have a liberal light against all Casualties of slips and falls.

That the space above the Head be large and airy, because a Man doth spend much breath in breathing.

That the half paces be well distributed at competent distances, for reposing on the way.

That to avoid encounters, and besides to gratifie the beholder, the whole Stair-Case have no niggard Latitude, that is, for the principal Ascent in Royal Building at the least ten foot,

That the breadth of every single step or stair be never less than one foot, nor more than 18 inches.

That they exceed by no means half a foot in their height or thickness, for our legs do labour more in elevation than in distention.

That the steps be laid where they joyn somewhat sloping, that the foot may in a sort ascend and descend together; which though observed by few, is a secret and delicate deception of the pains in mounting.

Lastly, To reduce this Doctrine to some Natural, or at least Mathematical ground, *Vitruvius* borroweth these proportions that make the sides of a Rectangular Triangle; that is, three for the Perpendicular

from the stair-head to the ground, 4 for the ground-line it self or recession from the Wall, and 5 for the whole Inclination or slopeness in the Ascent. There are likewise Spiral or Coclestairs, and sometimes running about a Pillar, sometimes vacant, wherein *Palladio* (a Man very expert in this point) was wont to divide the Diameter of the 1st sort into three parts, yielding one to the Pillar and two to the steps of the second, into 4 whereof he gave 2 to the Stairs, and 2 to the Vacuity, which had all their Light from above, and this in exact Oval is a Master-piece. You have here inserted the Types of several Stair-Cases with their Ichnography; one whereof is a piece of Rarity, being a pair of double Stairs, whereon 2 Persons, the one ascending, the other descending, shall not come at one another, made by *Piedro del Bergo*, and *Jehan Coffin* at *Sciamburg* in *France* in the King's Palace.

Describe a Semicircle for the Ichnography, which divide in 12 equal Parts, and in it describe a smaller Circle as at C. For the bigness of the Newel draw lines from those Divisions in the great Semicircle into the Semicircle made for the bigness of the Newel, so will that Semicircle also be divided into 12 equal parts; then on every of the points in the great Semicircle erect Perpendiculars, and those Perpendiculars shall shew the ends of each respective step; as the Perpendicular at 11 bounds the outward end of the first step, the Perpendicular at 22 bounds the 2d. step, &c. to 24, which makes good a whole Circle in the Ichnography, and Perpendiculars erected from the inner Semicircle, mark on the Newels the ends of the same steps: Work the same way with the steps on your Right-hand. The Newel is pierced through in divers places to let in light.

Of Chimneys. The *Italians*, who make frugal Fires, are not in this case the best Counsellors, therefore from them we may better learn how to raise fair Mantles within, and how to disguise gracefully the shafts of Chimneys abroad; therefore I shall lay down the Observations of *Phil. de l'Orme*, a Man diligent in this part of Work.

First he observeth, that who in the disposition of the Building will consider the Region and the Winds that ordinarily blow from this or that Quarter, might so cast the Rooms, which need most fire, that he should little fear the incommodity of Smoke. But if the error lies in the Structure it self, then he makes a Logical Enquiry, That either the Wind is too much let in above at the mouth of the Shaft, or the Smoke stifled below. If none of these, then there is a repulsion of the Fume by some higher Hill or Fabrick that overtops the Chimney; if likewise not this, then he concludes that the Room is little and close, so as the
Smoke

Smoke cannot issue wanting a supply of Air; and so having a Natural Reason of the Cause, we may apply suitable Remedies.

Touching Conducts for the Suillage and other Necessities of the House, which how base soever in use, yet for the health of the Inhabitants are as considerable as the rest) I find in Authors this Counsel, that Art should imitate Nature in those ignoble Conveyances, and separate them from sight (where there wants a running Water) into the most remote, and lowest, and thickest part of the Foundation, with secret vents posting up through the Walls, like a Tunnel to the wide Air aloft.

Thus, having consider'd the Apertions and Overtures according to their particular Requisites, I come to the Contexture of the whole Work under the term of Compartition, into which (being the mainest piece) I cannot enter without a few general Precautions.

First, Let no Man that intendeth to build, settle his fancy upon a Draught of the Work in Paper, how exactly soever measured or neatly set off in perspective, without a Model or Type of the whole Structure, and of every parcel or partition in Board or Wood.

Next, That the said Model be as plain as may be without Colours or other beautifying, lest the Pleasure of the Eye preoccupate the Judgment.

Lastly, The bigger this Type is, the better; not that I would persuade a Man to such an Enormity, as that Model made by *Ant. Labacco* of *St. Peter's Church in Rome*, containing 22 foot in length, 16 in breadth, and 13 in height, and costing 4184 Crowns, the price of a reasonable Chappel. Yet in a Fabrick of 30 or 40000 *l.* 30 *l.* may be expended in an exact Model; for a little Penury in the Premises may easily breed some Absurdity of far greater Charge in the Conclusion.

Now after these Premonishments, I come to the Compartition it self, by which is understood a graceful and useful Distribution of the whole Ground-plot, both for Rooms of Office, and of Reception or Entertainment, as far as the Capacity thereof, and the Nature of the Country will comport.

The Gracefulness will consist in a double Analogy or Correspondency, 1st. between the parts and the whole, whereby a great Fabrick should have great Partitions, great Lights, great Entrances, great Pillars or Pilasters; in sum, all the parts great. The next between the parts themselves, not only considering the breadth and length, as before, when we spake of Doors and Windows, but likewise their height, a point hardly reducible to any general Precept.

True it is, the Ancients did determine the Longitude of all Rooms which were longer than broad, by the double of their Latitude; and the height half as much more as the Latitude, which Dimensions modern Architects vary upon discretion: sometimes squaring the Latitude, and then making the Diagonal or overthwart Line from Angle to Angle of the said square; the measure of the height sometimes more, but seldom lower, than the breadth it self.

The usefulness consists in a sufficient number of Rooms of all sorts, and their apt coherence without distraction, without confusion, that it may be well united, and may appear airy and spirituous, fit for the welcome of cheerful Guests; about which the greatest difficulty will be in contriving the Lights and Stair-Cases: in which respect the ancient Architects were at much ease; for both the Greeks and Romans (of whose private Dwellings *Vitruvius* hath left some description) had commonly two cloistered open Courts, one serving for the Womens side, and the other for the Men, who now-a-days would perchance take so much separation unkindly. Howsoever by this means the reception of Light into the Body of the Building was very prompt both from without and from within, which we must now supply by some open form of the Fa-
brick, or among graceful refuges by Tarrasing any Story which is in danger of Darkeness, or lastly, by perpendicular Lights from the Roof, of all others the most natural: For the second difficulty, which is casting in the Stair-Case, which is no hard point of it self, but as they are incumbrances of room for other use, I have marked a willingness in the Italian Artizans to distribute the Kitchin, Pantry, Bake-house, Washing-rooms, and even the Buttery likewise under ground, next above the Foundation, and sometimes level with the Floor of the Cellar, raising the first Ascent into the House fifteen foot or more for that end, which besides removing Annoys out of sight, and gaining much room above, doth also by the Elevation of the Front add Majesty to the whole Aspect; and with such a disposition of the principal Stair-Case which commonly doth deliver us into the plain of the second Story, there may be wonders done with a little room. But though Petty Offices may be well enough so remote, yet by the natural Hospitality of *England* the Buttery must be more visible, and we need perchance for our Raunges a more spacious and illuminous Kitchin than the afore-said Compartment will bear, with a more competent nearness to the Dining-Room. It is likewise necessary to contrive a Room for a Conservatory of the Meat that is taken from the Table till the Waiters eat, which with us by an old fashion is more unseemly set by in the mean time.

Now

Now touching the distribution of Lodging Chambers, I must here reprove a Fashion, which hath prevailed through *Italy*, without ancient Examples: Namely, that they so cast their Partitions, as when all Doors are open, a Man may see through the whole House; which doth necessarily put an intolerable servitude upon all the Chambers, save the inmost, whence none can arrive but through the rest, or else the Walls must be extream thick for secret Passages. And yet this will not serve the turn, without at least three Doors to every Room, a thing most insufferable in cold and windy Regions, and every where no small weakning to the whole Work; being only grounded upon the fond Ambition of displaying to a Stranger all our Furniture at one sight: there being another defect, which necessarily follows such a servile disposing of inward Chambers, that they must be forced to make as many common great Rooms as there shall be several Stories; which (besides that they are usually dark, a point hardly to be avoided, running as they do through the middle of the whole House) do likewise devour so much Place, that thereby they want other Galleries and Rooms of Retreat. Thus having given you general Lights and Directions, and discover'd some Faults, the rest must be committed to the Sagacity of the Architect, who will be often put to divers ingenious shifts, when he is to wrestle with Scarcity of Ground: as sometimes to damn one Room (though of good use) for the benefit and beauty of all the rest; another while to make those fairest which are most in sight, and to leave the other (like a cunning Painter) in shadow. I will close this part, touching Compartmention, as cheerfully as I can, with a short Description of a feasting or entertaining Room after the *Egyptian* manner, who seem (at least till the time of *Vitruvius*) from the ancient *Hebrews* and *Phenicians* (whence all knowledge did flow) to have retained with other Sciences in a high degree also the Principles and Practice of this magnificent Art; there being no form for such a Royal use comparable imagined like that of the aforesaid Nations.

Let us conceive a Floor or Area of goodly length (for example at least of 120 foot) with the breadth somewhat more than half of the Longitude: About the two longest sides and head of the said Room, shall run an Order of Pillars, which *Palladio* doth suppose *Corinthian*. supplying that point out of *Greece*, because we know no Order proper to *Egypt*; the fourth side I will leave free for Entrance: On the foresaid Pillars was laid an Architrave, which *Vitruvius* mentioneth alone. *Palladio* adds thereunto (and with reason) both Frise and Cornish, over which went up a continued Wall, and therein half or three quarter Pillars, answering directly to the Order below, but a fourth part less; and between these half Columns above, the whole Room was windowed round about.

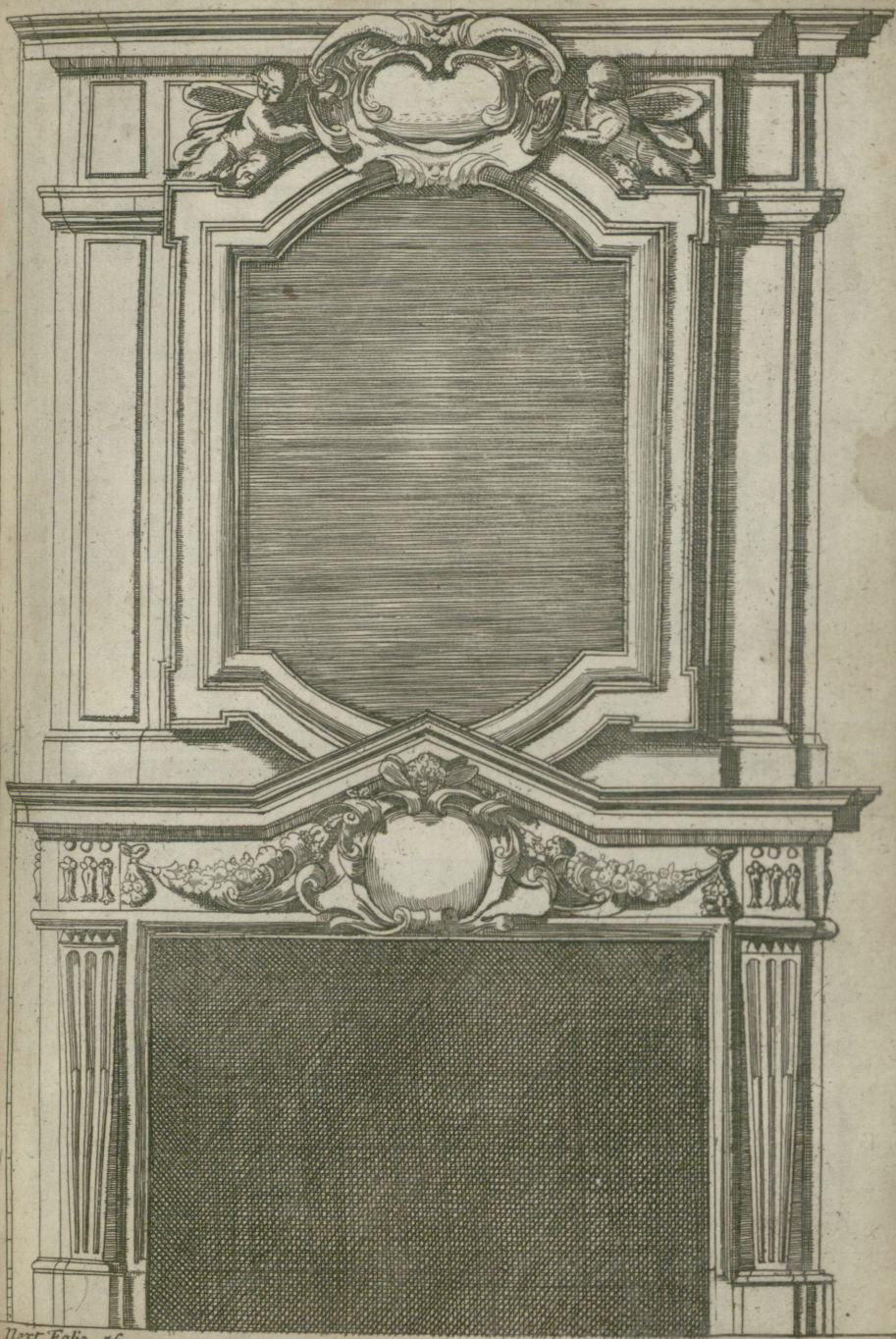
Now from the lowest Pillars there was laid over a Contignation or Floor born upon the outward Wall, and the head of the Columns with Tarace and Pavement *sub dio*, saith our Master, and so indeed he might safely determine the matter in *Egypt*, where they fear no Clouds; therefore *Palladio* (who leaveth this Tarace uncovered in the middle and ballis'd about) did perchance construe him rightly, though therein discording from others: Always we must

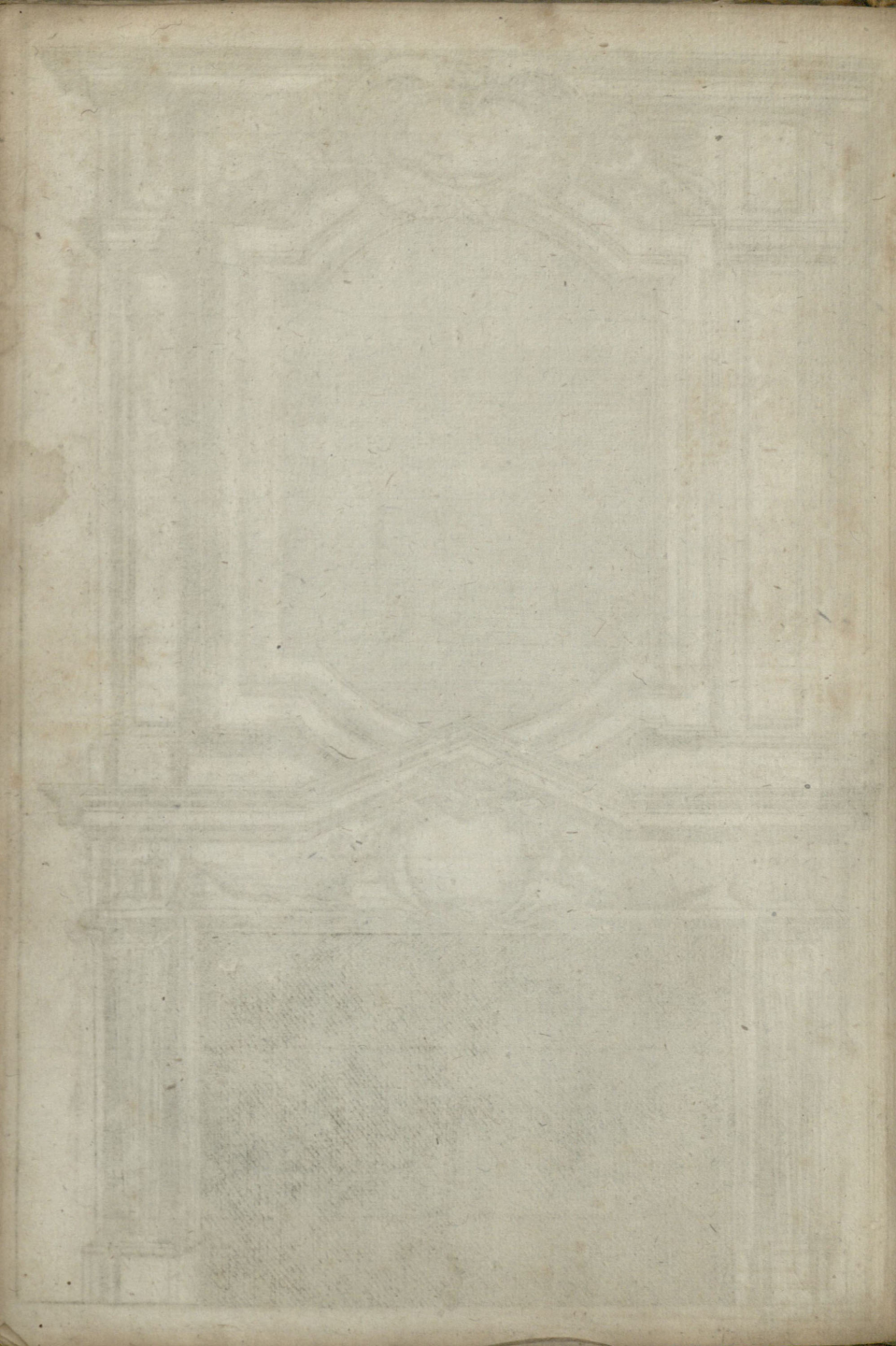
must understand a sufficient breadth of Pavement left between the open part of the Windows, for some delight of Spectators that might look down into the Room. The Latitude I have supposed contrary to some former Positions a little more than half the length; because the Pillars standing at a competent distance from the outmost Wall, will by interception of the sight, somewhat in appearance diminish the breadth: In which case (as I have said before) Discretion may be more licentious than Art. This is the Description of an *Egyptian* Room for Feasts and other Jollities; about the Walls whereof we must imagine intire Statues placed below, and illuminated by the descending Light from the Tarace, as likewise from the Windows between the half Pillars above. So as this Room had abundant and advantageous Light; and besides other garnishing must needs receive much State by the height of the Roof, that lay over two Orders of Columns.

And so having run through the four parts of my first general Division, namely, Foundation, Walls, Apertions, and Compartment: The House may now have leave to put on his Hat, having hitherto been uncover'd itself, and consequently unfit to cover others; which point, though it be the last of this Art in Execution, yet it is always in Intention the first; for who would build but for shelter? I shall now only deliver a few of the properest, and (as I may say) Naturalist Considerations that belong to this remaining Piece.

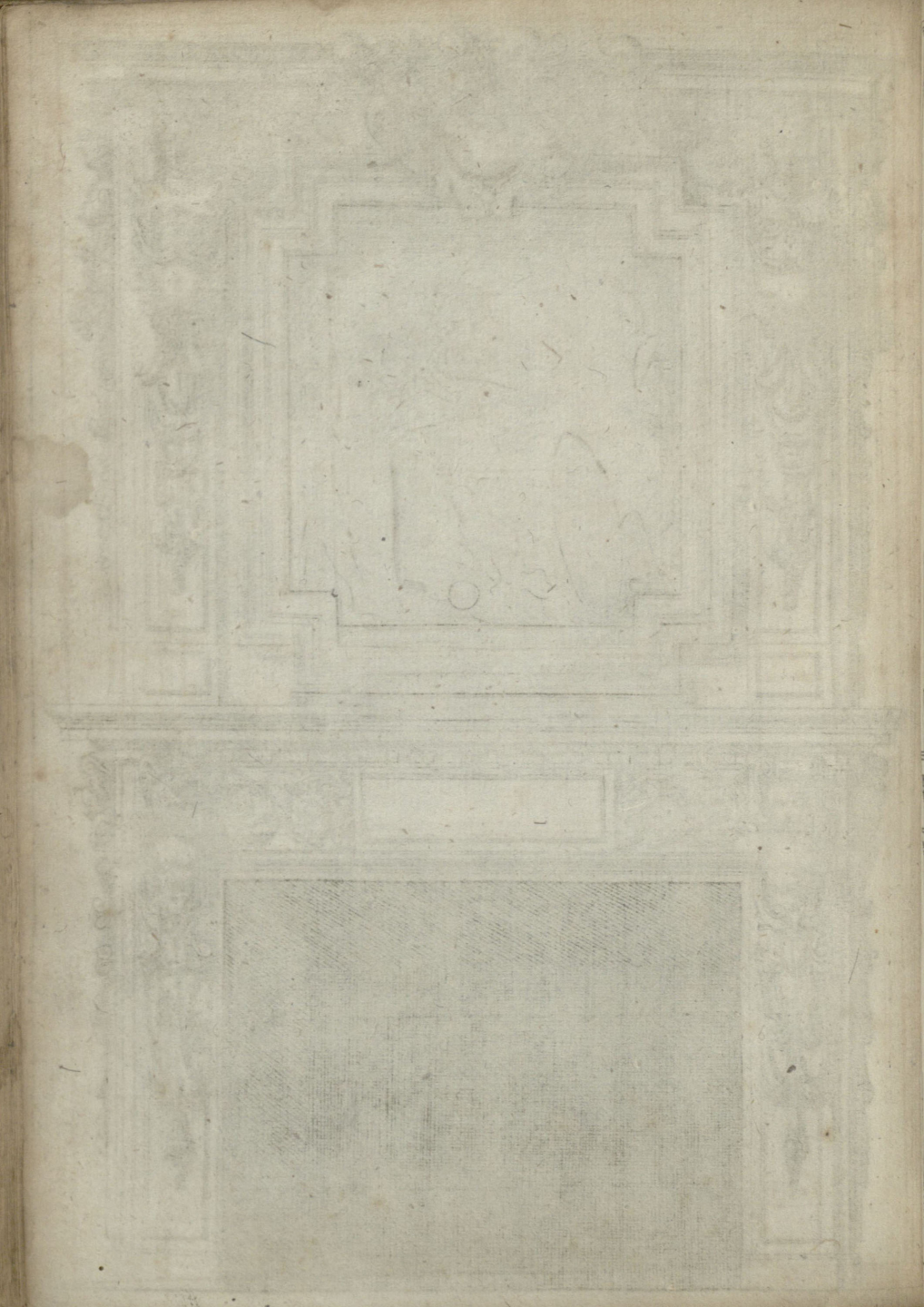
There are two Extremities to be avoided in the Cover or Roof, that it be not too heavy nor too light, the first will suffer a vulgar Objection of pressing too much the Under-work. The other containeth a more secret Inconvenience; for the Cover is not only a bare Defence, but likewise a kind of a Band or Ligature to the whole Fabrick, and therefore would require some reasonable weight; but of the two, a House-top heaviest is the worst; next, there must be a care of equality, that the Edifice be not pressed on the one side more than on the other. And here *Palladio* doth wisely advise that the inward Walls might bear some good share in the Burden, and the outward be the less charged. Thirdly, the *Italians* are very careful in giving the Cover a graceful Pendence or Slopeness, dividing the whole breadth into nine parts, whereof two shall serve for the Elevation of the highest Top or Ridge from the lowest. But in this point, the quality of the Region is considerable; for as our *Vstruvius* insinuateth, those Climes that fear the falling and lying of much Snow, ought to provide more inclining Pent-houses, and Comliness must yield to Necessity.

Thus have you briefly laid down, from the best Authors, the Ground-Rules of the Art of Building; which being well consider'd, may be of great use to the Ingenious Architect in the managing of any Royal or Noble Design.

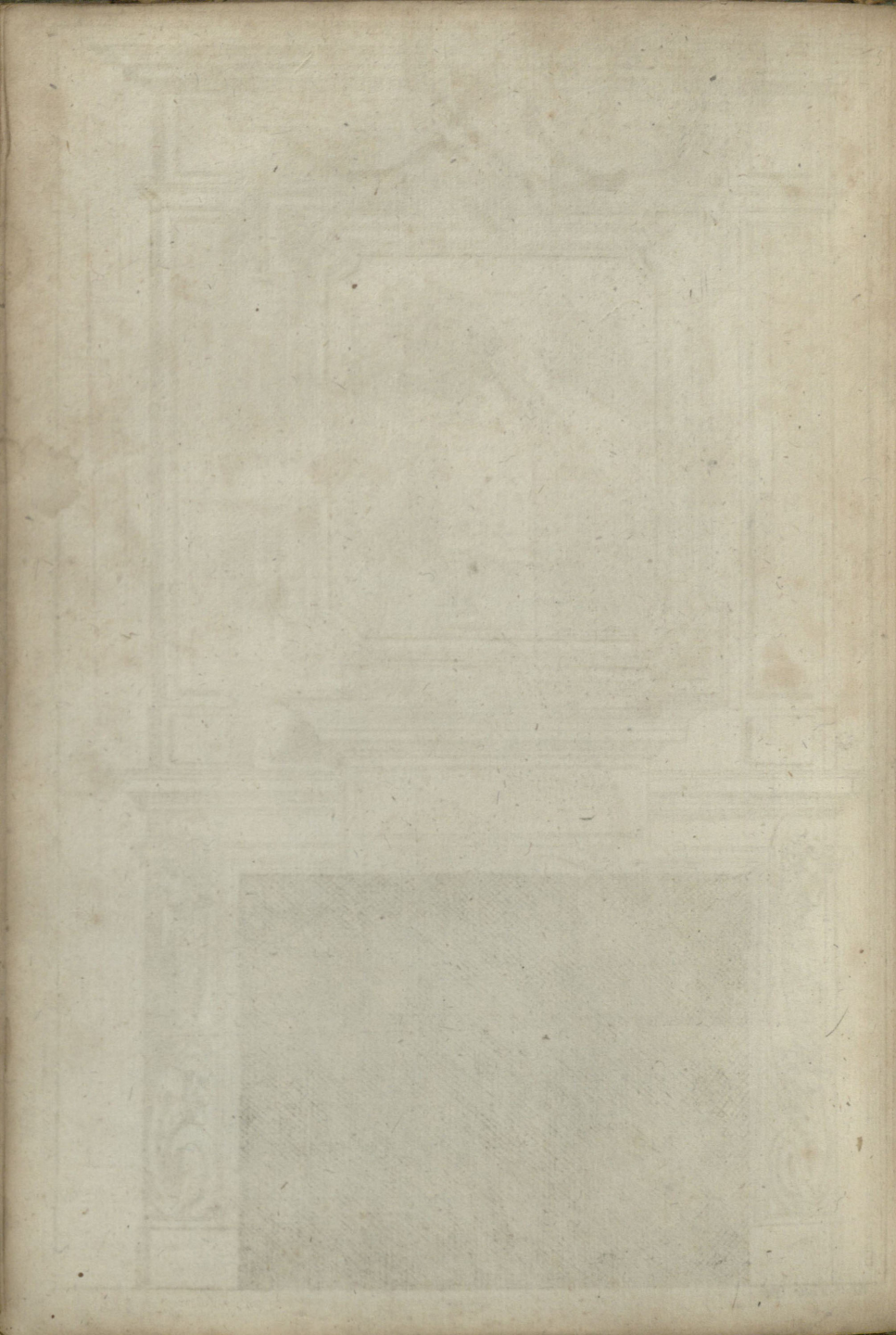


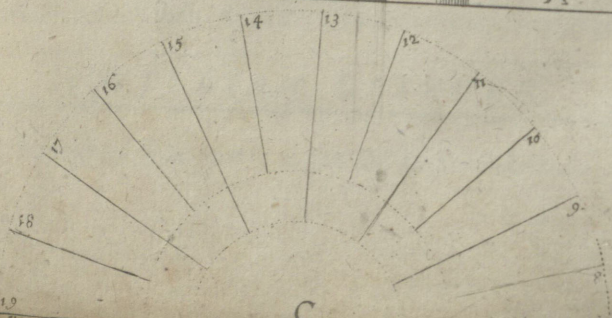
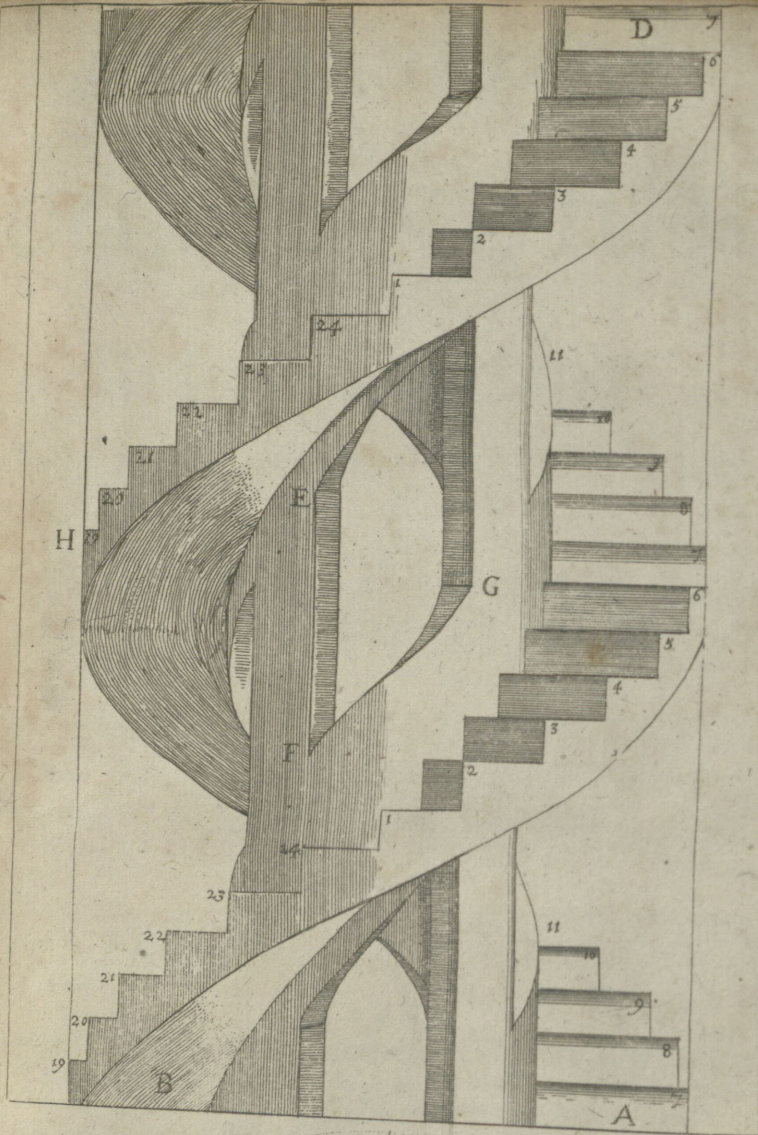


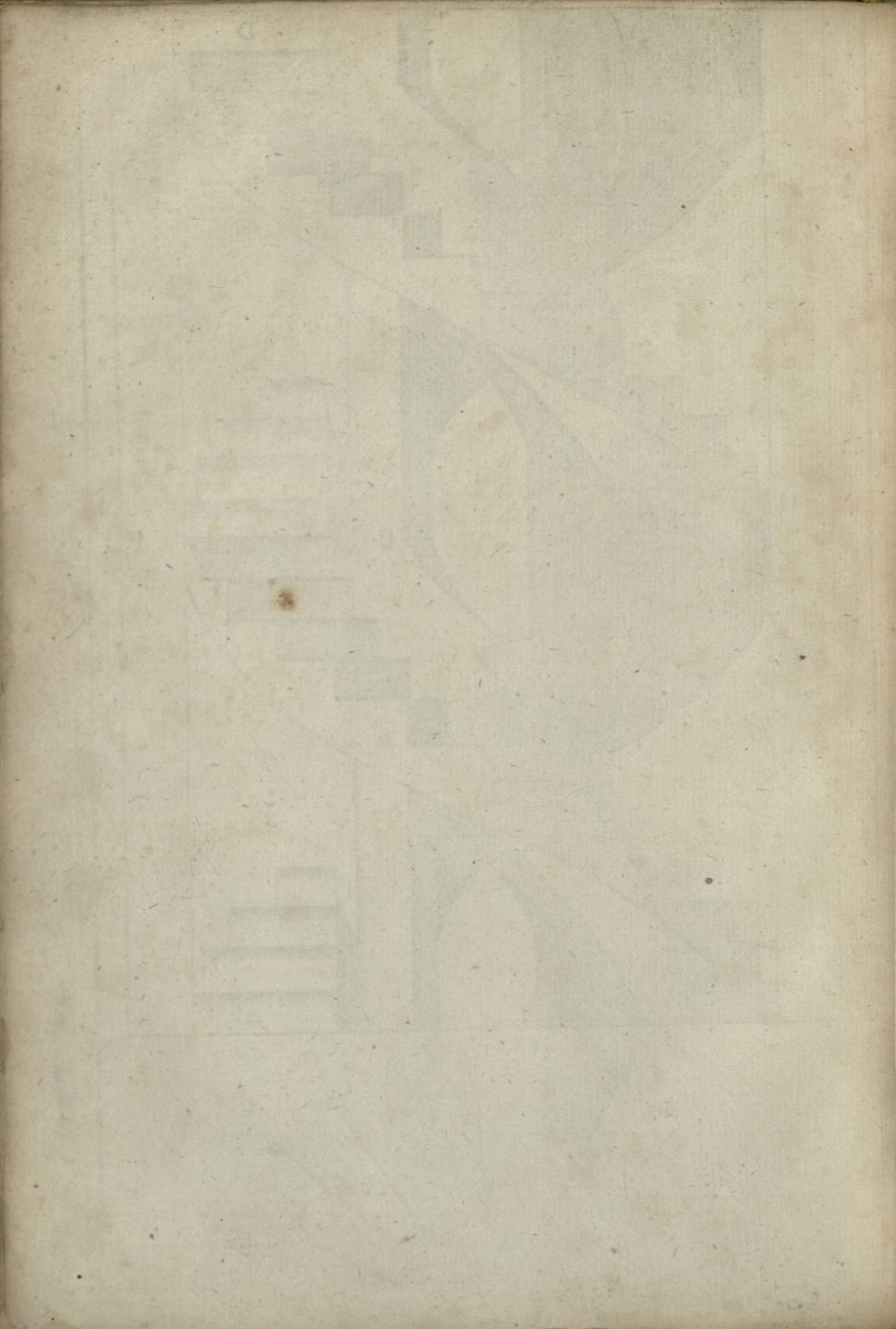












ARCHITECTONICE:

O R, A

COMPENDIUM

OF THE

Art of Building.

Giving a Brief Account of the Names, Natures, Qualities, Quantities and Rates of all the Materials belonging to the Erection of any Edifice: And what Quantity of each sort will be needful for the Building of any House, Great or Small.

Whereby Estimates, Valuations and Contracts may be made between Builder and Workman, without any great Damage to either.

And also,

How to Measure the Works of the several Artificers belonging to Building; and what Method and Customs are observed therein.

WITH

The Description and Use of a Convenient Five or Ten Foot Rod; in taking Dimensions, and casting up of the Contents of all Artificers Works. And in the Measuring of Angles; whereby the true Ground-Plot of any Building, with Yards, Gardens, &c. may be made.

By WILLIAM LETBURN.

London: Printed for John Sprint, at the Bell in Little-Brittain. 1707.

ARCHITECTONICE: Or a Compendium of the Art of Building, &c.

Of Timber, and Carpenters Work.

THE *Timbers* most useful for Building, are *Oak*, *Fir* and *Elm*, but chiefly the two first, namely *Oak* for Outfides and Roofs, and *Fir* for Partitions, Doors and Floors: These Timber-Trees ought to be Felled in *Autumn*, and any time of the Winter Season; because then, the Trees recover from the Roots, that strength and soundness, which in the Spring and Summer, was dilated into Leaves and Fruits. And the best time for to Fell Timber for Building, is in the Wane of the *Moon*; because the Moisture (which is most apt to rot Wood) is then consumed.

Your Timber being Felled, let it be removed to some place free from the extremity of the *Sun's* heat; and also from the Wind and Rain.

Timber ought not (especially *Oak*) to be wrought very wet, nor too dry; for too wet makes it more apt to rot, and too dry, more hard to work: And it will not be dry enough to saw into Planks for Door-Cases and Windows, in less than Three Years.

Timber is sold by the Load, which contains Fifty Cubical (or Solid) Foot, and each Foot 1728 Cubical (or Solid) Inches. And 20 Solid Foot of Timber, sawed into such Scantlings as shall be hereafter prescribed, will compleat a Square of 10 (which is 100 Foot) of the Outside Carcass of an ordinary Timber Building.

For the Price of the Load of Rough Timber fit for Building, it is very uncertain; as from 20 Shillings to 50 or 55 s. the Load.

Rough Timber bought for Building, is to be sawed into several Scantlings; Greater or Lesser, according to the bigness of the Structure therewith to be erected. And the several Members (or Timbers) belonging to the Erection of any Building whatsoever, are,

Summers, or *Girders*.

Gyfts, or *Joysts* at full length, to bear in the Wall.

Binding

Binding } Joysfs.
Trimming }
Wall-Plates or Beams.
Purlines } of Oak.
Principal Rafters }
Single Rafters.

Principal Dischargers to rest upon Peers.

These several Members (whether Oak or Fir) are to be sawed in their Squares, according to their Lengths, as the largeness of the Building shall require: And these Scantlings following, are fitted for all Edifices Great or Small: As

Summers
Or
Girders

In Length, from 14 to 16 Foot, must be in their Squares 11 and 8 Inches.
In Length, from 16 to 20 Foot, must be in their Squares 15 and 9 Inches.
In Length, from 20 to 25 Foot, must be in their Squares 14 and 10 Inches.
In Length, from 25 to 26 Foot, must be in their Squares 16 and 12 Inches.
In Length, from 26 to 28 Foot, must be in their Squares 17 and 14 Inches.

Joysfs, at full length
(to bear in the Wall.)

In Length, 12 Foot, must be in their Squares 8 and 3 Inches.
In Length 11 Foot 6 Inches; must be in their Squares, 7 and 3 Inches.
In Length, 10 Foot 6 Inches; must be in their Squares 6 and 3 Inches.

Binding
Or
Trimming

} Joysfs.

In Length 7 Foot, must be in their Squares 6 and 5 Inches.
In Length 9 Foot, must be in their Squares 7 and 5 Inches.
In Length 11 or 12 Foot, must be in their Squares 8 and 5 Inches.

A Compendium

Wall-Plates and
Beams.

- In Length 15 Foot, must be in their Squares 7 and 5 Inches.
- In Length 16 Foot, must be in their Squares 10 and 6 Inches.
- In Length 17 Foot, must be in their Squares 8 and 6 Inches

Purlynes.

- In Length, from 15 Foot 6 Inches, to 18 Foot 6 Inches, must be in their Squares 9 and 8 Inches.
- In Length, from 18 Foot 6 Inches, to 21 Foot 6 Inches, must be in their Squares 12 and 9 Inches.

Principal Rafters.

- In Length, from 12 Foot 6 Inches, to 14 Foot 6 Inches; one side cut Taper, from 8 to 5 Inches; and thick on the other side 6 Inches.
- In Length, from 14 Foot 6 Inches, to 18 Foot 6 Inches; one side cut Taper, from 9 to 7 Inches; and thick on the other side 7 Inches.
- In Length from 18 Foot 6 Inches, to 21 Foot 6 Inches; one side cut Taper, from 10 to 8 Inches; and thick on the other side 8 Inches.
- In Length, from 21 Foot 6 Inches, to 24 Foot 6 Inches; one side cut Taper, from 12 to 9 Inches; and thick on the other side 8 Inches and an Half; and thick on the other side 8 Inches and a quarter.
- In Length, from 24 Foot 6 Inches, to 26 Foot 6 Inches; one side cut Taper, from 13 to 9 Inches; and thick on the other Side 9 Inches.

Single Rafters.

- In Length, 6 Foot 6 Inches, must have in their Squares 4 and 3 and an half, Inches.
- In Length, 8 Foot, must have in their Squares 4 and a half, and 3 and 3 quarters, Inches.

Single

Single Rafter.

{ In Length, 9 Foot 6 Inches; must have in their Squares 5 and 4 Inches.

Principal Dischargers.

{ Of any Length, from 10 Foot and upwards (to rest upon Peers of Wood or Stone, in the first Story of Brick-Buildings) must have in their Squares 13 and 12 Inches, or 15 and 13 Inches.

The Timber Members for your Building being thus prepared, these Rules are to be observed in the disposing of them.

1. That no Timber be laid within 12 Inches of the fore-side of any Chimney Jamb.
2. That all Joysts on the back of any Chimney be laid with a Trimmer, at 6 inches distance from the Back.
3. That no Timber be laid within the Tunnel of any Chimney.
4. That no Joysts or Rafter be laid at greater distance from each other than 12 Inches; and no Quarters at greater distance than 14 Inches.
5. No Joyst ought to bear at longer length than 10 Foot; Nor single Rafter at more than 9 Foot.
6. All Roofs and Frames for Windows ought to be of Oak.
7. No Summers or Girders ought to lie over the Head of Doors or Windows in Brick-Buildings.
8. No Summer or Girder to lie less than 10 Inches into the Brick-Wall; nor no Joysts less than 8 Inches.

It is said before, That about 20 solid Foot of Timber will compleat one Square; or 100 Foot of the Timber work of any Edifice great or small, that is of the Out-side Frame Partitions, the Roof, and the Floors; for Workmanship whereof and Timber, it is various, from 15 or 20 Shillings the Square, to 30 or 40 Shillings the Square, according to the goodness and largeness of the Timbers, and convenience of the Place where it is wrought. And farther Note, That the Framing of the Roof is valued at 4 or 5 Shillings in the Square, more than the Sides, Floors and Partitions.

The Boarding of Floors is a Work distinct from the Timber Flooring, and this is measured by the Square of 10 Foot also, but within the Walls.

Floors for the most part are laid with Deal Boards, which are sold by the Hundred, 120 to the Hundred, at various Prices, according

to their length and goodness; as from 4 and 5 Pounds to 8, 9 or 10 Pounds, and upwards the Hundred: But for laying of Floors, in Plaining, Joyning and laying the Boards, the common Allowance is 4 or 5 Shillings the Square; besides Nails, of which 200, that is 240, is a competent Allowance.

Of other Carpenter Works in Houses, both Great and Small.

1. *Of Doors.*] Doors made of plain whole Deal, and Rabited, are for Stuff, Nails and Workmanship, valued at 3 Pence or 4 Pence the superficial Foot: But double Doors, Battoned and made Wain-scot fashion, they may be worth 7 Pence the Foot: For the Cases of such Doors above-mentioned, in the Price of these you may rise or fall at Pleasure.

2. *Shop-Windows.*] These will be afforded at the same Rate as Plain or Battoned Doors, besides the Iron-Work, as Bolts, Staples, Hinges, Locks, Keys, Latches, Chains, &c.

3. *Window-Frames.*] These are usually agreed for by the number of Lights contained in each Frame; so that if a Window-Frame of Oak should have 6 Lights in it, and be double Rabited, it would be worth 18 Shillings; that is 3 Shillings for one Light, for Stuff and Workmanship: And the same for Frames consisting of more or fewer Lights.

4. *Of Stairs and Stair-Cases.*] An ordinary Pair of Stairs, of about 6 or 4 Foot, with Flyers and Winders made of Elm Boards, are accounted to be worth 2 Shillings 6 Pence, or 2 Shillings 8 Pence the Step, for Boards, Workmanship and Nails. But if the Materials be found, then 9 pence and 10 pence a Step is sufficient. But for Stair-Cases, which have an open Newel from the Top to the bottom, with a Landing at every sixth or eighth Step; and the going being about three Foot and a half all the way: These Stairs, with Rails, Ballastars, String-Boards, Posts, Balls, Pendants, and such other Ornaments, may very well be worth 4 shillings 6 pence, 5 shillings, or 6 shillings the Step.

There are divers others Timber-Works belonging to some Buildings, which are done by the Carpenter, Carver and Joyner, as these, viz.

Door and Door-Cases, with their Ornaments; Chimney-Pieces, and their Ornaments; Outside Doors and Door-Cases; Corinces and Guttering; Cantaliver and Modellion; and plain Cornices; Pediments over Doors; Spurs, Peers, Pilasters, &c. Of these some are valued by the Piece, Dearer or Cheaper according to their largeness, goodness of the Stuff, and Curiosity in Workmanship: Others are measured

measured and rated by the Foot running Measure; of which more hereafter.

Of Bricks, and Bricklayers Work.

Bricks are made of a Reddish Earth, which ought to be digged before Winter, but not made into Bricks 'till the Spring-Season. The Goodness of Brick-Earth is various, and the well ordering of it as uncertain.

In every Brick-kiln (or Clamp) are Three sorts of Bricks: Those next the Fire are best burnt, and such as have naturally much Nitre, or Salt-Peter in them, will, with the violence of the Fire run, as if glazed over: and this sort, some call *Clinkers*. The next to these in the Kiln, or Clamp, are best for general Uses. The outermost in the Clamp are the *worst*; where the Salt-Petre is not digested for want of heat; and these will molder away like Dirt, with the least moisture: and this sort they call *Samel* (or *Sandal*) Bricks. And it is observable; That, while Bricks are burning, that side of the Clamp next the Wind are the worst of all; the heat being driven from thence.

Bricks are sold by the Thousand, which makes two Load.

The general Rates for making of Bricks, is 4 *d.* 5 *d.* or 6 *d.* the Thousand, for the Molder only; and a days Work is commonly 9000; but a dextrous Workman will make about 14 or 15 Thousand in a Day.

The Moulds, in which Bricks are moulded (or made) ought to be (by the Statute) within, in length 9 Inches, in breadth 4 Inches and a half, and in depth 2 Inches and a quarter. Bricks made in such a Mould (the Earth being first well tempered) dried and burnt, they will be less and lighter; yet they shrink in thickness but little, in breadth less, and in their length not discernable. The weight of Bricks is uncertain; the ponderosity of Earths being uncertain; yet commonly one Brick will weigh about 5 Pound; and will contain in solid Measure, 90 Cubical Inches, and from some Moulds 100. And these Bricks (one with another) laid in Morter, and well jointed, 13 of them will make a *Quine*, *Peer*, or *Pedestal*, one Foot solid, or equal thereto in solid Measure.

A Wall of one Brick and a half thick, with the Joynt, will be in thickness 14 Inches, or very near; and in this, according to the fore-mentioned Proportions, 150 or 160 Bricks will lay a *Yard* square, measured upon the Face of the Building; and to the Square of Ten Foot (which is 100 square feet) usually are allowed 1700 or 1800 Bricks; and 4600, or 5000 Bricks, will compleatly lay, erect or build

build one Rod, Pole or Perch square: which Rod, Pole or Perch contains in length (according to the Statute) 16 Foot and a half; whose square is 272 Foot and a quarter, superficial Measure, which is 30 Yards and a quarter.

I have herein delivered Numbers, according to each Quadrat or Quantity; because in this, there can be no exactness discovered; and that for several Causes (altho' from one and the same Mould and Clamp) as the Bricklayer's Hand and Morter may vary: Many Bricks are warp'd in Burning; some miscarry in every Load, or 500 Bricks. The Tally or Tale (for the most part) too little, if not well look'd after: And besides all these Uncertainties, when *Bricks* are *dear*, and *Lime cheap*, the Workmen (by the Great) will use more Morter, and make the ampler *Joynts*, which is much worse for the Building.

These things being considered; when all Materials are ready, a Workman with his Labourer, (in whole Work upon a solid Plain) will lay in one day 1000 Bricks, and some 12 or 1500.

The Value of Bricklayers Task-work is various, according to the Place and Charge of the Materials; the Rates being uncertain every Year. But,

In New Work five Pound, or five Pound ten Shillings the Rod square, (or 272 Foot superficial Measure upon the face of the Wall) is usual.

Or two Pound ten Shillings the Rod, and the Bricks laid in at the Builder's Charge.

But to Erect new Structures, by taking down old Walls; it may be worth three Pound, or three Pound ten Shillings the Rod square: For that in taking down the Walls, and clearing of the Bricks, there is much time spent, and also more Morter used in laying them again, than in New Work.

All Brick-Work (according to these Rules and Rates) are supposed to be 14 Inches (or one Brick and half) thick, which is the Standard thickness. ——— If they be thicker or thinner, they must be reduced to that thickness, as shall be taught how to do, when we come to treat of Measuring of Brick-work.

But, (in the mean time) note, That in Buildings that are not above two Stories with the ground Room, and not exceeding 20 foot to the Rayson-Plate, and upon a good Foundation, the length of two Bricks or 18 Inches for the Heading-Course, will be sufficient for the Ground-work of any common Structure; and 6 or 7 Courses above the Earth, to a Water-Table, where the thickness of the Walls are abated (or taken in) on either side the thickness of a Brick, namely two Inches and a quarter.

But

But for large and high Buildings, of three, four or five Stories with the Garrets: the Walls of such Edifices ought to be, from the Foundation to the first Water-Table, three Heading course of Bricks (or 28 Inches) at the least; and at every Story a Water-Table, or taken in on the inside for the Summers and Joyst to rest upon, laid into the middle, or one quarter of the Wall at least for the better Bond. But as for the innermost or Partition Walls, one Brick and half will be a sufficient thickness: And for the upper Stories a nine Inch (or Brick at length) Wall will very well suffice.

The Rate and Price of Bricks by the Thousand is very uncertain, in respect of Workmen's Wages, the convenience of Carriage, and the Price of Fuel to burn them with: But I never did know them cheaper than 9, nor dearer than 18 shillings the Thousand, delivered in any Port of London: And at this time Bricks made at home, will stand the Maker of them (besides his Ground) for digging, molding, Straw and Fuel to burn them in, between 5 and six shillings the Thousand.

Chimneys in Buildings, are sometimes measured and paid for by the Rod, as other Brick-work is; or else paid for by the Fire-Hearths, at so much a Fire-Hearth, which is various, as from 20 to 50 shillings the Hearth.

Of Laths and Lathing for Tyling.

Laths for Tyling ought to be heart of Oak, of which the Statute approves of two sorts, the one of 5; the other of 4 Foot in length, and sold by the Bundle, not differing in Price or Quality, but in Quantity, the longer sort having but five score to the Hundred, the shorter six score.

To the longest Laths, 500 Lath-Nails is the common Allowance, and to the shorter 600, that is 720 Nails to each Bundle of Laths, six score to the Hundred, and ten Thousand Nails to a Sum, in Number 12000. One Bundle of the longest Laths extended makes 500 Foot, the other 480. Every of these Laths ought to be in breadth one Inch, and a half, in thickness half an Inch, but are usually less, and never exact, either in their Tale or Measures. Both these sorts of Laths are necessary, because all Rasters are not spaced alike, nor yet the Proportions strictly observed in every one and the same Roof.

Of Laths there are three kinds; namely, Heart of Oak, Sap-Laths and Deal-Laths; from one shilling, to two shillings six pence the 100, or Bundle. The two last sorts are used for Cieling and Partitioning; and the first for Tyling only.

The Proportions for the Tyler's Lathing is various; as sometimes 3 inches and a half, sometimes 4 inches; and in both, there ought to be a Counter-Lath between every two Rafters: To every 1000 of Tyles is allowed usually one Peck of Tyle-Pins, from 2 Shillings to 4 Shillings the Bushel. — Four Bushels of Lime, and 6 or 8 Bushels of Sand will make Morter sufficient to lay 1000 Tyles: And sixty Tyles will cover one square Yard at a seven inch Gauge, and 12 foot square (which is 144 foot) will require near 1000 Tyles: but the square of 10 foot (which is 100 foot) and the usual Measure for Tying in Task-Work, will require but 660 or 666 Tyles: And commonly one of these Squares is accounted a days work. — Moreover, the Barge Courses, and Gable Ends of all Buildings, ought to be struck with Lime and Hair-Morter, to prevent the Wind from ripping up the Tyles.

Of Tyles.

TYLES are of several sorts, but all made of the same Earth, but better than Brick-Earth, and something near the Potters-Earth. According to the Statute of 17 Edw. 4. Cap. 4. Earth for Tyles shall be cast up before the first of *November*, shired and turned before the first of *February*, and not made into Tyle before the first of *March*, and shall likewise be tried and severed from Stones, Marline, Marle and Chalk.

Of Plain Tyles.

By the fore-mentioned Statute, a plain Tyle shall contain in length ten inches and a half, in breadth six inches and a quarter, and in thickness half an inch and half a quarter at the least. One of these Tyles will contain in superficial Measure 65 inches, in solid Measure 48 inches; and one of them will weigh about 2 Pounds and a half: One Thousand of these Tyles go to one Load. And for the making of 1000 of these Tyles, 2 Shillings, and 2 Shillings six Pence is a usual Price; but the price of 1000 Tyles is various.

Of Roof or Ridge Tyles.

These Tyles are made of the same Earth as the Plain Tyles, and one of them (by the fore-mentioned Statute) should contain in length thirteen inches, and in thickness the same with the Plain Tyles, in some places, 5, 6 or 7 of them are allowed into every thousand of Plain Tyles: but if bought by themselves, they are sold at 20 or 25 Shillings the Hundred. Their form are like unto a Pannel, and their breadth between the Points 8 or 9 inches.

Of Gutter-Tyles.

Besides these, there are other Tyles made properly for Gutters in Cross-Buildings, in Vallys, and gather'd Ends, &c. They are in the form of Triangles, Circular at their Bases, they are about 10 inches deep. There are Corner-Tyles also, which are more flat than the other, and rounded off at the upper Angle, to lie the better and closer on the Sleeper; they have Pin-holes in them at their Acute Angle. These are usually sold at two Pence or three Half-pence the Tyle, or for between 10 and 15 Shillings the 100.

Of Crooked, Pan or Flemish-Tyles.

These Tyles are used in covering of Shades, Lean-too's, and all kind of flat Roof'd Building. These Tyles are for the most part laid dry, without any Morter; yet sometimes pointed within-side.

These Tyles are usually in length 14 inches and a half, in breadth 10 and a half. The Laths whereon they hang, by a knot of their own Earth, are 10 or 12 foot in length, in breadth one inch and a half, and in thickness one inch. These Laths are usually sold at 2 Pence or 3 Pence the Lath, or at 10 or 13 Shillings the 100.

The Gauge for nailing these on with Four-penny Nails, is 10 inches and a half; their breadth when laid 8 inches. One Lath serves for one Yard square of Tyling; and 150 Tyles and 10 Laths will cover one Square, (or 100 Foot) of this kind of Tyling.

A great covering of these spends but little Morter (if pointed) and but little time in laying. The price of these Tiles in most places is about 7 or 8 Shilling the 100.

Of Lime, Sand, and Morter.

STones whereof Lime is made, are either digg'd out of the Hills, or taken out of the Rivers: That Lime must be best which is made of the hardest, sound and white Stone; and being burnt, remains a third part lighter than the Stone. All digg'd Stones are better to make Lime than gathered Stones, and from a shady and moist Pit than from a dry. All Stones are sooner or later burnt, according to the Fire which is given them; but ordinarily they are burnt in three-score hours. Stones being burnt, wet them; but pour not all the Water on at once, but at divers times, and frequently (that they may not burn) till they be well tempered. Afterwards, put them in a moist and shady place without any moisture, only cover them lightly with Sand; and by how much the more they are steeped, so much the more tough and better they will be.

Of Sand there are three sorts; that is to say, Pit-Sand, River-Sand, and Sea-Sand; Pit-Sand is, of all, the best: Of all Pit-Sand the White is the worst; and of River-Sand, that from the Stream, which is found in the Falls of Water is the best, because it is most purged: The Sea-Sand is worst of all. The Pit-Sand, because it is fat and tough, is therefore used in Walls and Vaults. The River-Sand is very good for covering or rough-casting of Walls. All Sand is good in its kind, if being squeezed and handled it crackles; and if being put upon a white Cloth, it neither stains nor makes it foul. That Sand is bad, which mingled with Water, makes it dirty and muddy, and which hath been a long time in the Air; because it will retain much Earth and rotten humour.

For to make Morter, you must so mix the Sand, that taking of Pit-Sand, you must put three parts thereof to one of Lime: If River or Sea-Sand, two parts to one of Lime will be sufficient.

The common Allowance for Lime is, one quarter, or eight Bushels heap'd measure, to every Thousand of Bricks; or One hundred and a half to a Rod square. One hundred of Lime, is in many Places 25 Bushels, valued from 8 to 12 Shillings; to which, the usual Allowance for Morter, is Two Load of Sand, and that at one Shilling, or one Shilling and Six-pence the Load bringing in: And for digging a Cubical Yard Four-pence or Six-pence.

Of Slate and Slating.

COVERING with Slate is very neat, especially the blue Slate, cut into long Squares or Scallops, and is usual in Summer and Banqueting-Houses in Gardens: But as this Covering is neat and handsom, so also it is very chargeable; for Roofs covered with Slate must be first Boarded over, the Slates hang'd upon Tacks, and laid with finer Morter than Tyles.

This kind of Covering with Slate, is valued by some from 3 to 6 shillings the Yard square; or by the square of 10 Foot (that is 100 Foot) at one pound ten shillings, at two pounds five shillings, and at three pound the Square (or more) in some places.

But if these Slates be rudely cut and carelessly laid (in respect of Form) it is then accounted a cheaper Covering than with Plain Tyles, especially in those Countries where the Earth affordeth plenty of them.

Of Shides or Shingles.

SHINGLES, called also Slate or Shides of Wood, are quarter'd Oaken Boards, saw'd to a certain Scantling, but usually rift about an Inch thick at one end, and made like Wedges about 4 or 5 Inches in breadth,

breadth, and 8 or 9 Inches long. This kind of Covering is very chargeable, and seldom used, but in covering of the Roofs of Churches, and Pyramidal Steeples.

For the Covering with these, first, they must be well boarded over; that done, the Shingles are fastened to those Boards with four-penny or six-penny Nails in every Course, at a certain Gauge; as admit four Inches from under one another. Then supposing the Shingle four Inches broad, and laid at four Inches Gauge, the Square is 16 Inches; by which divide 1296 (the Number of Inches in a Square Yard) the Quotient will be 31, the numble of Shingles allowable to every square Yard of Covering; and the like Number of Nails will serve to tack them on.

Of Lead.

OF Lead there are three sorts; White, Black and Ash-colour: The White is more perfect and precious than the Black; and the Ash-colour between both. Lead is digg'd either in great Lumps, found by themselves, or in small pieces which shine with a certain blackness, or else in very thin Fleaks amongst the Rocks. All sorts of Lead will easily run, because, with the heat of the Fire it melts before it be red-hot; and put it into a very hot Furnace it loseth its Nature and Strength; for one part is changed into Litharge, and the other into Dross. Of these sorts of Lead, the Black is soft, and therefore easily wrought with a Hammer or Mallet: it dilates much, and is very heavy: The White is harder and lighter: The Ash-colour is much harder than the White, and of middle weight between both.

Covering with Lead is the most Magnificent, and is generally used for the Covering of Churches, Princes Palaces, Castles, and Great Men's Houses. It is generally laid almost flat to walk upon, allowing the Water a little Fall to the Battlements, thence privately to descend in Pipes.

This Material is often used for Gutters in ordinary Tyled Buildings, to conduct the Water from the House unto some convenient place to fall into: And Sheets of Lead for this service are always run the thinnest, being more Pliable for the Plummer. Every square Foot of such Lead is valued to weigh 6 or 7 pound if old, 8 or 9 pound a Foot if New: But as for the other Sheets for Covering, each square Foot is estimated to weigh 8, 9, 10 or 11 pound if old, and 11 or 12 pound the Foot square if new, and if very good; and 12 pound, or one hundred Grosß will cover one Yard: or 9 Foot square.

The

The worth of Lead in Piggs is uncertain; as from 10 to 20 Shillings the Gross Hundred, that is from 10 to 20 Pounds the Tun: But in Exchanging of old Lead for Sheets new run, there is commonly allowed 3 Shillings in every Hundred weight Gross, for Waste and Workmanship.

Covering with Lead is valued at 13, 14 or 15 Shillings the Yard square; or between 7 and 8 Pound the square of 10 foot, besides Sawder, at 9 Pence or 10 Pence the Pound weight, as it is allay'd with Lead, and Seal'd: For Tin is 10, 11 or 12 Pence the Pound Neat.

Of Iron.

IRon is no where found and digg'd pure; but when digged, it is purged by Fire, to the end it may be so melted, that it may run; so that before it be cool, the foulness may be taken away: But after it is purged and cooled, it heats well, and becomes soft and easie to be wrought, and beat out with the Hammer; but it will not easily melt. It is a sign of the goodness of Iron, if in the Mass, you see the Veins continued streight without interceptions; and if the ends of the piece be clean and free from soil; because the said Veins shew if the Iron be without Knots and Puffs: Thus may you understand the middle by the ends: But being wrought into Plates, either square or other form, if the sides be even, you may conclude it to be all alike good, the Plate having equally endured the Hammer.

The Uses of this Metal in Building are many; for of it are made Nails, Hinges, Door-Chains, Doors, Grates, Dogs, Hangers for Signs, Balconies, &c.

This Metal being wrought by the Smith into Dogs, Iron Bars, Staples, large Hooks and Hinges, Grates, &c. The usual Rate is 3 Pence half-penny, or 4 Pence the Pound. But for small and neat Hooks, Hinges, Bolts, Staples, &c. various, as from 4 Pence to 8 Pence the Pound.

Casements are not usually made by the Pound weight, but valued according to their bigness, largeness, strength and goodness of their Locks, as from 3 Shillings to 20 Shillings the Casement.

Diverse other Works about Building are made of Iron, as Locks and Keys, Balconies, Gates, Sign-Irons, all whose Prices are as various as they can be made in substance, goodness and neatness.

Of Pargetting.

Pargetting or Plaistering is of divers kinds. As, (1.) With Lime and Hair-Morter laid upon bare Walls, at 3 Pence or 4 Pence the Yard.

Yard. (2.) Upon bare Laths, as in partitioning and plain Cielings, from 8 Pence to 14 Pence the Yard square. (3.) Rendring in Partitions, at 2 Pence or 3 Pence the Yard. (4.) Rough-Cast upon Heart-Laths, from 1 Shilling to 3 Shillings the Yard square. (5.) Plastering upon Brickwork, with finishing Morter, in imitation of Stonework, from one Shilling to 18 Pence, or 2 Shillings the Yard square, or more. (6.) And the like upon Heart-Laths, at 18 Pence, 2 or 3 Shillings the Yard square.

In all these Works, the Scaffolding is to be considered; and the quantity of Lime and fine Sand for finishing Morter must be equal.

Of Priming, or Painting of Outside-works.

Painting of Outside-works; as Doors, Shop-Windows, Window-Cases, Pediments, Architraves, Friezes and Cornices, and all other Timber-works which are exposed to the Weather, ought at first setting up to be primed with Spanish Brown, Spanish White, and Red Lead (about a 5th part) to make the other two Colours to dry, well grown'd with Lintseed Oyl, will make excellent Primer: then afterwards with the same Colour (but much more whiter) for second Primer; and lastly, with fair white, made of White Lead, and about a fifth part in quantity (not in weight) of Spanish White.

Outside-Work thus coloured, may be afforded for 3 Pence, or 3 Pence half-penny the Yard square, for every time laid over.

Window-Frames of 2, 4 or 6 Lights, are not usually measured, except they be very large; but valued at 3 Pence, 4 Pence and 6 Pence a Light; and every Casement at three half-pence or 2 Pence the Casement; and Iron Bars at 1 Penny, or more, if very large.

Of Glass, and Glasing.

Glass, when melted, is run into Tables; those in England of an equal size, containing about 5 square feet; five and forty of these Tables are called a Case of Glass, which weighs about two hundred Pound weight. The Price uncertain; as from 30 to 40 Shillings the Case: and to cut one Case into Quarries Diamond fashion, with halves and quarters, will be worth 6 or 7 Shillings. These Quarries, for the most part, are 6 inches in length from one Acute Angle to the other, and in breadth from Obtuse Angle to Obtuse Angle 4 inches; so that each Quarrie contains 12 superficial inches: For Glasing with these Quarries, Lead, banding and setting up, the Joynts sawdered, and Casements pinned, being included, the usual Rate is about 5 Pence the foot Square.

Normandy, or French Glass, is much thinner, clearer, and more transparent than English Glass: This Glass is much dearer, as quantity for quantity, for there are but Twenty-five Tables in a Case.

This French Glass is, for the most part cut into long Squares; not only for common Windows, but for Sash-Lights also; which are much dearer than the Glasing with Lead.

Of Paving, the several sorts thereof.

Paving with Rough or Rag-Stone is the cheapest of all Pavements; valued from 12 pence to 15 pence the Yard.

Paving with Pebble-Stones laid in Gravel; for Materials and Workmanship may be worth 15 or 18 pence the Yard square.

Paving with common Bricks. This kind of Paving is usual for Cellars, Wash-houses, Sinks, Fire-hearths, and such like: Of Bricks, 30 of them (if made by the Statute) will pave 1 Yard square.

Paving with Flemish Brick. The Paving with these Bricks is far neater and stronger than common, or Clay Bricks: They are of a yellowish Colour; they must be laid in Sand: Each Brick is 6 Inches and a quarter long, 2 inches and a half broad, and 1 Inch and a quarter thick: Now allowing one quarter of an Inch for the Joynt; then 72 of them will pave a Yard square; but if they be set edg-ways, then to pave a Yard square, will require one hundred Bricks. —These Bricks are usually sold at 2 shillings the 100, and 4 pence, 5 pence or 6 pence the Yard square for laying them.

Paving with square Tyles: These are made in Moulds as Bricks are, and are of several sizes, viz. 6, 8, 10 and 12 Inches square, in value, from 6 shillings to 20 shillings the hundred; and to know how many of either of these sorts of Tyles will pave any Pavement.

Note that $\left\{ \begin{array}{l} 36 \\ 21 \\ 13 \\ 9 \end{array} \right\}$ Tyles of $\left\{ \begin{array}{l} 6 \\ 8 \\ 10 \\ 12 \end{array} \right\}$ Inches square, will pave one square Yard.

Paving with broad Stone, taken out of Quarries (commonly called Free-Stone) and cut into Lengths and Breadths promiscuously, and in thickness about 2 or 3 Inches. This kind of Paving is laid in common Yards and Passages, before Shop-Doors and Stalls, &c. and is worth for the Stone fitting, and laying in Morter about 6 pence, 7 pence or 8 pence the Foot square, or 4 shillings 6 pence, 5 shillings 3 pence, or 6 shillings the square Yard. Some there are of these Stones cut perfectly square, as Paving Tyles are, but much bigger, as 18, 20, 24 Inches square, and upwards: But these, as they are neater, so they are

are dearer; some Pavings with these, being worth 12 Pence the Foot, or 9 Shillings the Yard square; but 15 or 16 Pence the Foot, if the Stones be good and well polished, as they ought to be for Kitchens, Daries, and neat private Places.

Paving with (Rigate) commonly called Fire-Stone; is good for Chimney Fire-Hearths, Ovens, Stoves, &c. And this is somewhat dearer than common Purbeck Pavement.

Paving with Marble, is of all other the most beautiful; of which there are several sorts; as White, Black and Gray: some Pavements (as in Foot Paces before Chimnies) are, laid all of one sort or colour, and in one entire Stone, others of two Colours laid square, or Chequer-wise, the side of one by the side of the other; others are laid Arrace-wise of two Colours, laid Angle to Angle; and this last is the neater: but there may be diverse Forms contrived to lay them in. As you may see in several Chancels, in the Quire of St. Paul's Cathedral, and in the Royal Exchange in London, and divers other Places: This kind of Pavement is valued from 2 Shillings to 3 Shillings the Foot square, and upwards, according as it is well laid and polished.

How to measure the Works of the several Artificers relating to the Building of any Edifice, Great or Small.

THE Artificers relating to Building, are, (1.) The Bricklayer, (2.) The Carpenter, (3.) The Plasterer, (4.) The Painter, (5.) The Glasier, (6.) The Joyner, (7.) The Mason: And all their Works are measured, either with a ten or five Foot Rod, and a two Foot Rule, and sometimes with a Line; (but best of all, by such a sliding Rod of 5 or 10 Foot, as is described and treated of at the end of this Book) and the Dimensions so taken are set down in Feet, Inches, and quarters of Inches: And when so taken and cast up, those Feet and Inches, and parts of Inches (if any be taken in your Measure) must be reduced into Rods, Poles or Perches; into Squares of 10, that is, into 100 superficial Feet; into Tards or 9 superficial Feet; into single superficial Feet: And some Works are measured by their length in Feet only (commonly called Running Measure.) Now when any Dimension taken as before, and set down in Feet, Inches, and Quarters of Inches. It will be necessary to shew how to reduce Inches and quarters of Inches into Decimal Parts of a Foot: And for the ready Performance thereof, you are to note, That one, two or three Inches, &c. is the one twelfth, two twelfths, three twelfths, &c. of a Foot. —And that one quarter of an Inch, two quarters of an Inch, &c. is the one forty eight, two forty eight Parts of a Foot; such as the whole Foot contains 100: and so of

any other Number of *Inches* and *quarters* of *Inches*; and what *Decimal* or *Centesimal* Number doth represent any Number of *Inches* and *quarters* of *Inches*, this small *Table* following doth plainly shew.

A Table, shewing what Decimal Number doth represent every Inch and quarter of an Inch, in one Foot.				
100 Parts of a Foot.		One quarter of an Inch.	Two quarters, (or half) an Inch.	Three quarters of an Inch.
Inches.	100 Parts of a Foot.	100 Parts of a Foot.	100 Parts of a Foot.	100 Parts of a Foot.
0	.00	.02	.04	.06
1	.08	.1	.12	.14
2	.16	.18	.2	.22
3	.25	.27	.29	.31
4	.33	.35	.37	.39
5	.42	.44	.46	.48
6	.5	.52	.54	.56
7	.58	.6	.62	.64
8	.66	.68	.7	.73
9	.75	.77	.79	.81
10	.83	.85	.87	.9
11	.92	.94	.96	.98
1 Foot.	100			

How to set down any Number of Feet, Inches, and Quarters of Inches in a Decimal Fraction.

Suppose you had taken the Measure of the *Length* or *Breadth* of any thing, and found it to be 27 Foot 9 Inches and 3 quarters of an Inch.

To set this down in a *Decimal*, you must first set down the 27 Foot making a Point, Prick, or Comma after it in this manner, 27. then look in this first Column of the Table towards the left hand for 9 Inches, and at the head of the Table for 3 quarters of an Inch, and against 9 Inches, and under 3 quarters of an Inch you shall find .81, which set after 27. Foot, which will make it 27.81 which is the *Decimal* representing 27 Foot 9 Inches and 3 quarters of an Inch; and in the same manner you may find, That

32 Foot

32 Foot 7 Inches, must be set down thus	32.58
426 Feet 3 Inches 1 quarter, thus	426.27
61 Foot 1 Inch and a quarter, thus	61.01
3 Feet 11 Inches and a half, thus	3.96

And the like of all other Numbers; as in the Table plainly doth appear.

This Table ought to be learned by heart, as the Table of *Multiplication*, but may be more easily effected: If you remember that .08 parts is 1 *Inch*, .16 parts 2 *Inches*, .25 parts is 3 *Inches*, &c. and also, that .02 parts is 1 quarter of an *Inch*, .04 is half an *Inch*, .06 is 3 quarters of an *Inch*; then is .08 1 *Inch*, 1.1 is 1 *Inch* and a quarter, 1.12 1 *Inch* and a half, &c.

How to Multiply Feet, Inches, and quarters of Inches, by Feet, Inches and quarters of Inches.

Examp. 1. Let it be required to Multiply 232 Foot 9 Inches by 72 Foot 6 Inches.

The <i>Decimal</i> of 232 Foot 9 Inches	232.75
The <i>Decimal</i> of 72 Foot 6 Inches	72.5

	116375
	46550
	162925

The *Product* 16874.375

Multiply 232.75 by 72.5 as in common *Multiplication*, the *Product* will be 16874.375, from which cut off 3 Figures to the right hand (because there were 3 places of parts in the two given Numbers) and it will be 16874.375, which is 16874 Foot, 4 Inches and a half; the 37 (rejecting the 5 as superfluous) being the *Decimal Part* of 4 Inches 2 quarters, as in the Table you will find it to be.

Examp. 2. Let it be required to Multiply 23 Foot 7 Inches and a half, by 9 Foot 3 Inches and 1 quarter.

The *Decimal* of 23 Foot 7 Inches and a half, is 23.62, and the *Decimal* of 9 Foot 3 Inches and a quarter is 9.27; these two multiplied together, the *Product* will be 218.9574, from which cut off four Figures towards the right hand, (for the four Figures of parts in the given Number) and the *Product* will be 218.9574, as in the Margin; which is 218 Foot 11 Inches and a half.

23.62
9.27
16534
4724
21258
218.9574
<i>Examp.</i>

Examp. 3. Multiply 406 Foot 5 Inc. and a quar. by 9 Inch. a quar.

The *Decimal* of 406 Foot 5 Inches and a quarter;
 406.44 is 406.44; and the *Decimal* of 9 Inches and a quar-
 .77 ter, is .77; these multiplied together, their Pro-
 duct is 312.9588, from which, four Figures being cut
 off, it will be 312 Foot 11 Inches and a half.

284508
 284508

Other Examples ready wrought.

(1.) 16 Foot 3 Inch. and a quar. by 7 Inch. 3 quar.

(2.) 46 Foot 11 Inches 1 quart. by 14 Foot.

(3.) 9 Foot 11 Inch. and 3 quar. by 9 Foot 11 Inch. and 3 quarters.

(1)
 16.27
 .64

(2)
 46.94
 14

(3)
 9.98
 9.98

6508
 9762

18776
 4694

7984
 8982
 8982

10.4128
 10 F. 5 In. ferè.

657.16
 657 F. 2 Inch.

99.6004
 99 F. 7 $\frac{1}{4}$ Inch.

Note: If it be objected, that there are more Figures used in this *Decimal* way of *Multiplying*, than in *Multiplying Feet and Inches* by *Cross-Multiplication*: I Answer; First, In this way *Division* is wholly omitted, which would require many Figures not here set down: And Secondly, *Feet, Inches, and Parts of Inches*, are multiplied by *Feet, Inches, and Parts of Inches*, as easily (and with the same number of Figures) as *Feet and Inches* only are; and all without any *Division*. And Thirdly, though there be 3 or 4 Figures in the *Product* cut off, the two first of them are sufficient for any occasion.

A Comparative Example, between *Cross-Multiplication* and this way by *Decimals*.

Let it be required to multiply 5 Foot 3 Inches and a half, by 2 Foot 4 Inches and a half.

I. By

I. By Cross-Multiplication.

F. In. Par.

Set down the Numbers thus, $\begin{array}{r} 05 \ 3 \ 6 \\ 02 \ 4 \ 6 \end{array}$

- 1.) Multiply 5 Foot by 2 Foot, it makes 10 Foot, which set under Feet $\begin{array}{r} 10 \ 0 \ 0 \end{array}$
- 2.) 2 times 3 Inches is 6 Inches, which set under Inches $\begin{array}{r} 00 \ 6 \ 0 \end{array}$
- 3.) 5 times 4 Inches is 20 Inches, or 1 Foot 8 Inches, which set under Feet and Inches $\begin{array}{r} 01 \ 8 \ 0 \end{array}$
- 4.) 4 Inches by 3 Inches is 12 parts, or one Inch, which set under Inches $\begin{array}{r} 00 \ 1 \ 0 \end{array}$
- 5.) Multiply the Parts into the Feet, saying 6 times 2 is 12, or one Inch, which set under Inches $\begin{array}{r} 00 \ 1 \ 0 \end{array}$
- 6.) 6 Parts by 5 Foot make 30 Parts, and that is 2 Inches and 6 Parts, and these set under Inch. and Parts $\begin{array}{r} 00 \ 2 \ 6 \end{array}$
- 7.) Multiply 6 Parts into 3 Inches it makes 18 Parts, or 1 Part and a half, the which set under Parts $\begin{array}{r} 00 \ 0 \ 1\frac{1}{2} \end{array}$
- 8.) Multiply 6 Parts by 4 Inches, and that makes 24 Parts, that is 2 Parts; set under Parts $\begin{array}{r} 00 \ 0 \ 2 \end{array}$
- 9.) Multiply 6 Parts by 6 Parts, which makes 36 Parts which is $\frac{3}{4}$ of a Part, which set under Parts $\begin{array}{r} 00 \ 0 \ 1\frac{3}{4} \end{array}$

The Sum 12 6 $9\frac{1}{4}$

II. The same Decimally.

The Decimal of 5 Foot 3 Inches and a half is —

5.29

The Decimal of 2 Foot 4 Inches and a half is —

2.37

Let any Man judge, which of these ways ought to be embraced; the *Product* of this Multiplication 12.5373 being the *Decimal* of 12 Foot 6 Inches and a half. For my part I shall in all my *Examples* follow this way, as most easie and general.

Having here delivered my Opinion concerning the Multiplying of Feet and Inches, or of Feet, Inches, and Parts of Inches, by Feet, Inches, and Parts of Inches: I now come to apply the same in Measuring the Works of the several Artificers belonging to Building, and I shall begin with

I. Car-

I. Carpenters Works.

The Carpenters Works measurably are principally these three. (1.) Flooring. (2.) Partitioning. (3.) Roofing. And all these are measured by the Square of 10 Foot, so that one Square of any of these Works contains 100 Square Feet.

I. Of Flooring.] If a Floor be 57 Foot 3 Inches (or 57.25) Long, and 28 Foot 6 Inches (or 28.5) Broad; How many Square of Flooring is there in that Room?

57.25	Multiply 57.25, by 28.5, the Product will be 1631.625;
28.5	which is, 16 Square 31 Foot, 7 Inches and a half, or 16
<hr style="width: 100px; border: 0.5px solid black;"/> 28625	Square, one quarter 6 Foot and 6 $\frac{1}{2}$ Inches: And here
45800	note, that in Decimals,
11450	.25 } is { One Quarter
<hr style="width: 100px; border: 0.5px solid black;"/>	.5 } { One Half
1631.625	.75 } { Three Quarters

} of any thing, { Square
 whether { Foot
 { Yard
 { Rod, &c.

And thus you shall find that if a Floor be 23 Foot 6 Inches (or 23.5) Long, and 16 Foot 6 Inches (or 16.5) Broad; there will be 37 Square, 1 Foot, and 1 Quarter of a Foot (or 3 Inches) contained therein.

II. Of PARTITIONING.] If the Length of the Partitioning between Rooms be 217 Foot 3 Inches (or 217.25) and the height thereof 10 Foot 7 Inches (or 10.58) How many Square is there in that Partition?

217.25	Multiply 217.25 the Length, by 10.58 the Height;
10.58	the Product will be 2298.5050, that is, 22 Square, 98
<hr style="width: 100px; border: 0.5px solid black;"/> 173800	Foot, and half a Foot; or 23 Square, wanting one
108625	Foot and a half, as in the Margin.
217250	Also, If a Partition (or Partitions) be 96.23 Foot a-
<hr style="width: 100px; border: 0.5px solid black;"/>	bout, and 13.62 Foot high, you will find 13 Square, 10
2298.5050	Foot and 8 Inches to be contained therein.

III. Of Roofing.] It is a Rule, generally observed among Workmen, That the Ground-Plot of any House, taken from Out to Out, both in Length and Breadth; the Superficial Content of that Ground-Plot being taken once and a half, shall be equal to the Roof that will cover that House, the Rafters being true pitch, or if the Roof be Hypped off at one or both ends.

Thus, If a House be 36 Foot deep, and 18 Foot broad, how much Roofing will there be to cover that House?

The Depth multiplied by the Breadth, produceth the Flat or Ground-Plot.

For

For 36 multiplied by 18, Produceth 646, superficial Feet, the half whereof is 324 Foot; the Sum of these two is 972 superficial Feet: That is, 9 square, 72 Foot, or 9 square and a half, and 22 Foot; or 9 square 3 quarters wanting 3 Foot.

Depth of the House	36
Breadth of the House	18
	<hr/>
	288
	<hr/>
	36

This way of measuring of Roofs, is generally received; but the more exact way, is by measuring the length of the Rafters by the length of the Houses; and the Hys (if any be) by themselves.

The Ground-Plot.	646
Half thereof.	324

The Roof. 972

Cieling Joysts, and Ashlering, are a sort of Work done by the Carpenter, and these are also measured by the square of 10 Foot, as Flooring and Partitioning were.

There are other Works about a Building, done by the Carpenter, which are measured only by the Foot-running Measure; that is, by the Number of Feet, in length only: And such are these, viz.

Cantiliver Cornices
Modillion Cornices
Plain Cornices
Guttering
Lintelling
Brest-somers

Skirt-Board
Rales and Balasters
Timber Fronts
Paint-houses
Shelving
Benching with Bearers, &c.

There are also,

Doors and Door-Cases
Window Lights
Lutheren or Dormer-Lights
Balcony-Doors and Cases
Celler-Doors and Cases

Pediments
Columbs or Pillers
Pillasters
Stairs and Stair-Cases
Mantle-trees and Tassels

All which are rated at ——— per Piece.

Note. 1. In the measuring of Flooring, after that you have measured the whole Floor, you must make Deduction out of the same for the Well-holes for the Stairs, and for the Chimney-ways. — And in Partitioning, you are to make Deductions for Doors and Door-Cases, and for Windows if there be any; except (by contract) they are to be included.

Note. 2. In measuring of Roofing, there are seldom any Deductions made for the Holes for the Chimney-Shafts to pass; the vacancies for

for Lutheren-Lights and Sky-Lights; for they are more trouble to the Carpenter than the Stuff which would make them good is worth.

Note. 3. In measuring of the Timber-Frame of any Floor, you must add 9 Inches to the length or breadth, where the Joysts are let into the Brick-work; and one Foot of Timber for every Girders End let into the Wall.

II. Of Plaisterer's Works.

The Plaisterer's Works are principally of two sorts; namely, (1.) Work Lathed and Plaistered, which they commonly call Cieling. (2.) Work Rendered, which is of two sorts, viz. Rendring upon Brick-work, and Rendring between Quarters, as in the Partitions between Rooms: And all these are measured by the Yard square, or the square of 3, which is 9 square Feet to the Yard.

I. Of Cieling, or Work Lathed and Plaistered.] *If a Cieling be 58 Foot 9 Inches, (or 58.75) long, and 23 Foot 7 Inches (or 23.58) broad; how many square Yards doth that Cieling contain?*

Multiply 58.75 the length, by 23.58 the breadth, the	58.75
Product will be 1385.32 square Feet; which divided by	23.58
9, the Quotient will be 153.92, and so many square	
Yards is contained in that Cieling; that is 154 Yards	47000
<i>ferè.</i>	29375
	17625

Or, you may find the quantity of Yards without Division, in this manner, by taking one third part of the length and breadth, and multiply them together, that Product shall give the Content of the Cieling in Yards and 100 parts of a Yard.

One third part of 58.75, is	19.58
One third part of 23.58, is	7.86

	11748
	15664
	13706
	153.8988

The Content of the Cieling in square Yards.

II. Of Rendring upon Brick-work.] *If the Rendring upon the Brick Walls about a House be 1377 Foot, and the height of the Walls 27 Foot; how many Yards of Rendring is there on those Walls?*

Multi-

Multiply 1377 foot, (the Girt about,) by 27, (the height of all the Stories) the Product will be 37179, the Number of square feet in that Rendring: which divided by 9, the Quotient will be 4131, and so many square yards of Rendering is there upon those Walls.

$$\begin{array}{r} 1377 \\ \times 27 \\ \hline 9639 \\ \times 2754 \\ \hline \text{Feet } 37179 \\ \text{Yards } 4131 \end{array}$$

Or, if you multiply 459 (which is one third part of the Girt) by 9, (which is one third part of the height of all the Stories) the Product will be 4131 yards as before, without dividing by 9; as in the Margin.

$$\begin{array}{r} 459 \\ \times 9 \\ \hline \text{Yards } 4131 \end{array}$$

Note. 1. If there be any Chimney-ways in your Cieling, or Door-ways, or Windows in your Partitioning, you must make Deduction for such Defects.

Note. 2. When you Measure Rendring upon Brick-work, you are to make no deductions for Doors or Windows, for the Jaums and Heads of such do commonly exceed the vacancies.

Note. 3. When you Measure Rendring between Quarters, you may very well deduct one fifth part of the Rendring for the Quarters, Braces, Intertices, &c. and sometimes one fourth part, if the Workman find Stuff; but if the Workmanship only, no Deduction ought to be made.

Note. 4. That Whiting and Colouring, are both Measured as Cieling and Rendring were, viz. by the Yard square: But, whereas in rendring between Quarters, you deducted a fourth or fifth Part; so in Whiting and Colouring between Quarters, you ought to add a fourth or fifth Part at least, for the sides of the Quarters and Braces, &c.

There other Works done by the Plaisterers, as Work laid with Lime and Sand, in imitation of Stone-Work, and such like; all which are to be Measured by the Square of 3, or 9 square feet to the yard.

III. Of Joyner's Works.

Joyners do Measure their Work by the Yard Square of 9 foot, as the Plaisterers do; but in taking the Dimensions of their Work they differ: For the Joyners have a Custom, and say, we ought to Measure all parts of our Work that our Plane touches. Wherefore, in the taking the height of any Room, where there is a Cornice about, and swelling Pannels and Mouldings; they use (with a Line) to girt over every Member of such Cornice and swelling Mouldings; which will make the Room to Girt higher than in reality it is: But for Measuring about the Room, they only Measure it as it is only as flat. As,

M

Example

Example 1. If a Room of Wainscot (which being girt downwards) doth contain in height 15 Foot 7 Inches (or 15.58) and the Compass about the same Room 286 Foot: How many square Yards of Wainscoting is in that Room?

	15.58
	286
	<hr/>
Multiply 15.58 by 286, the Product will be	9348
4455.88, and so many square feet are there in that	12464
Room: the which being divided by 9, will give in	3116
the Quotient 495.09, which is 495 yards and 1 foot;	<hr/>
and so much Wainscoting is there in that Room	Feet 4455.88
contained.	Yards 495.09

Example 2. If a Room be 56 Foot 9 Inches about, and the Girt downwards be 10 Foot 3 Inches: That Room will be found to contain 64 Yards and 6 Foot; which is 2 Third Parts of a Yard.

In measuring of Joyner's Work, there is another thing to be observed: And that is, In the measuring of Doors, Window-Shutters, Cupboard-Doors, Drawers, and such like Works, as are wrought on both sides of the same Stuff; as Pews in Churches, &c. For these they account to be paid for Work and half Work; and so they are measured: For indeed, the Work is (tho' not half, yet) more, altho' the Stuff be the same.

Example 3. If the several Window-Shutters about a large Room (being Measured upon the Superficies on one side) should be 78 Foot 4 Inches (or 78.33) and the height of those Shutters 7 Foot 6 Inches (or 7.5) how many Yards is contained in those Window-Shutters, at Work and half Work.

	78.33
	7.5
	<hr/>
Multiply 78.33 by 7.5, the Product will be	39165
587.475, the half whereof is 293.737; the	54831
Sum of these two is 881.212 (or 881 Foot)	<hr/>
the .212 we reject: And 881 being divided	Product 587.475
by 9, will give in the Quotient 97, and 8 re-	Half Product 293.737
maining; which is 97 Yards and 8 Foot,	<hr/>
(which you may call 98 Yards, for the Con-	Product 587.475
tent of those Window-Shutters, at Work	Half Product 293.737
and half Work.	<hr/>
	Their Sum 881.212

Note. That in Measuring of Joiner's Works, you are to make Deductions for all Window-Lights; but you must measure the Window-Boards,

Boards, Sapheta-Boards, Cheeks or Jaums, and Skirt-Boards by themselves. And for Chimney-Pieces and Ornamental Works about Door-Cases, over Windows, Pediments, Cupboards, Skreens, &c. they for the most part (there being Carvers Work intermixed) are valued *per Peice*, *per Foot*, running; or otherwise, according to contract.

IV. Of Painters Work.

The taking of the Dimensions for the Painters Works within Doors, is the same with that of the Joyners, by girting about the Mouldings and Members of Cornices, &c. And it is but reason they should be paid for that, upon which both their time and Colours are expended.

The Dimensions so taken, the casting up, and the reducing the Feet into Yards, is altogether the same with the Plaisterers and Joyners; but the Painter never requires Work and half Work as the Joyners do; but reckons his Work once, twice, or thrice Primed or Coloured over. *Examples* in the several Works of Painters were superfluous; those foregoing being sufficient: Only take notice, That Window-Lights, Window-Bars, Casements, and such like things, they do by Tale at so much *per Piece*: And so do they (sometimes) Cantalivers, Modillions, and the Ornaments between them.

V. Of Glasiers Works.

Glasiers do measure their Work by the Foot Square; so that the length of any Pane of Glass being multiplied by the breadth of the same, the Product produceth the Quantity of Square Feet contained in that Pane or Window-Light.

Example 1. If a Pane of Glass be 3 Foot 9 Inches and a quarter (or 3.77) Foot long, and 2 Foot 5 Inches 3 quarters (or 2.43) Foot broad; How many Square Foot of Glass is there in that Pane?

Length ——— 3.77
Breadth ——— 2.48

Multiply 3.77 Foot the length, by 2.48 Foot the breadth, the Product will be 9.35, which is 9 Foot 4 Inches and a quarter of an Inch for the true Quantity or Content of that Pane of Glass.

3016
1508
754

Content ——— 9.3496

Example 2. If the breadth of several Panes of Glass about a large Room being taken together, should contain 32 Foot 6 Inches, (or

M 2

32.5)

32.5) and the common height of all those Panes were 6 Foot 3 Inches and 3 quarters, (or 6.31) How many Foot of Glafs is there in all those Panes?

If you Multiply 32.5 Foot (the breadth of all the Panes taken together) by 6.31 Foot (the common height of all those Panes) the Product will be 205.07, which is 205 Foot and 3 quarter and half quarter of an Inch; and so many Square Foot of Glafs is contained in all those Panes.

32.5
6.31

325
975
1950

205.075

Note, That when Windows have half Rounds at the Top, they Measure them at the full height, as if they were Square. Also, Round or Oval Windows, are Measured at the full length of their Diameters; likewise Crocket Windows in Stone-work, are all Measured at their full Squares; and there is good reason for so doing: For the trouble in taking Measures to make them by, the Waste of Glafs in cutting them, and the extraordinary time expended in setting of them up, is far more valuable than the Glafs which would fill up a Square of the same bigness.

VI. Of Masons Works.

Masons do Measure all their Works by the Foot, either Superficial or Solid.

I. Of Superficial Measure.

Example 1. There is a Kitching Paved with Purbeck-Stone, whose length is 19 Foot 6 Inches (or 19.5) and breadth 14 Foot 9 Inches, (or 14.75) How many Square Foot of Pavement doth that Kitching contain?

14.75
19.5

Multiply 14.75 Foot by 19.5 Foot, the Product is 287.62 Foot; this is 287 Foot 7 Inches and a half; and so much Pavement doth that Kitching contain.

7375
13275
1475

287.625

Example

Example 2. There is an Isle in a Church that is 42 Foot 6 Inches (or 42.5 Foot) long, and 8 Foot 3 Inches and 3 quarters (or 8.31 Foot) broad, which is Paved with Squares of Purbeck and Black Marble; How many Square Feet doth it contain?

Length—42.5
Breadth—8.31

The length 42.5 Foot Multiplied by the breadth 8.31 Foot, giveth in the Product 353.175, which is 353 Foot and 2 Inches; and so many Foot doth that Pavement contain.

425
1275
3400

Product—353.175

Example 3. There is a Wharf which is faced with Ashlar set in Terras, and is in length 372 Foot 8 Inches (or 372.66 Foot) and in the Scarpe (or Depth) 12 Foot 9 Inches, (or 12.75 Foot) How much Ashlar is contained therein?

Ashlar is laid as it is cut out of the Quarries, of several lengths and different thicknesses (as 9 Inches is a common thickness) but this is not allowed in the Measure, but the Superficies on the outside is only to be regarded: Wherefore,

372.66
12.75

Multiply 372.66 Foot, the length of the Wharf, by 12.75 the Scarpe (or Depth) of the Wharf; the Product will be 4751.41, which is 4751 Foot, and almost 5 Inches; which is the Content of the Wharf in Superficial Feet.

186330
260862
74532
37266
4751.4150

II. Of Solid Measure.

Example 1. There is a Block of Marble (or other Stone) whose length is 6 Foot 3 Inches, (or 6.25 Foot) and the breadth thereof 3 Foot 2 Inches and a quarter, (or 2.18 Foot) and the depth thereof is 2 Foot 7 Inches and a quarter, (or 2.6 Foot) How many Solid Foot of Stone is contained in that Block?

Length ——— 6.25
Breadth ——— 2.18

If you Multiply 6.25 Foot the length, by 2.18 Foot the breadth, the Product will be 13.6250 Foot, which is the Superficies; and that Product multiplied by 2.6 Foot the depth, will produce 35.42500 (or 35.42 Foot) which is 35 Foot 5 Inches for the Solidity of the Marble Block, or Stone. Or if you multiply 2.18 Foot the breadth, by 2.6 Foot the depth, the Product 5.668 will be the Superficial Content of the end of the Stone; and that multiplied by 6.25 Foot the length, will give in the Product 35.42500; or 35 Foot 5 Inches for the Solid Content of the Stone, as before.

5000
625
1250
13.6250
Depth 2.6
817500
27250
35.42500

VII. Of Bricklayers Works.

The Principal Works done by Bricklayers about a Building, are *Tyling, Walling, and Chimney-Works*, to which I may add *Paving with Bricks or Tyles*.

I. Of Tyling.

Tyling is measured by the Square of 10 Foot; as *Flooring, Partitioning and Roofing* in the Carpenters Work were: So that in a House covered with a Plain Roof, the difference between the Roofing and the Tyling will not be much, yet the Tyling will be most; for that the Tyles go beyond the Roof at both ends over the Gable-ends, and are struck with Lime and Hair-Mortar; and they also hang somewhat over the Eves-Boards on either side, if the House stand alone: And again, in some Roofs there are many Hips and Valleys, for which the Bricklayer will require running measure; for the which (in some Cases) he ought to be allowed; but for the most part he is not, except he do the Work by the Day.

To give Examples hereof were needless; For the breadth of the Tyling on both sides, multiplied by the length of the Tyling (both being taken in Feet and Inches) will give the Content in superficial Feet; every hundred whereof is one Square, 25 a quarter, 50 half, and 75 three quarters of a Square.

II. Of Walling.

Bricklayers do Measure their Walls (and other their Works) by the Rod Square, each Rod, Pole or Perch (for by all these Names it is called) containing 16 Foot and a half in length, so that one Rod in length and one in breadth, do make one Square Rod, containing upon the

the Superficies of any Wall 272 Superficial feet, and one quarter of a foot (or 272.25 foot) for 16.5 foot multiplied by 16.5 foot will produce 275.25 foot, which is is one Superficial Rod.

There is moreover to be observed in Brick-work, the reducing thereof from any thickness to a Standard thickness: For in Walls and Foundations of Houses, the Walls are of different thicknesses; all which must be reduced to one, viz. to one Brick and a half thick; as by Examples following.

Example 1. *If a Brick Wall be 192 Foot long, and 12 Foot high, How many Rod of Brick-work is contained therein?*

Multiply 192 the Length, by 12 the Height, the Product will be 2304, and so many Superficial feet are contained on the outside of the Wall; which divided by 272 (the number of Superficial feet in one Rod, for the quarter of a Foot, it is always rejected as of no validity) the Quotient will be 8, and 128 remaining, which is 8 Rod and 128 foot, which 128 foot, divided by 68 (the number of feet contained in one quarter of a Rod) the Quotient will be one quarter of a Rod, and 60 foot remaining; so that the whole Wall contains 8 Rod one quarter, and 60 foot, which is 8 Rod and a half wanting 8 Foot.

$$\begin{array}{r}
 192 \\
 12 \\
 \hline
 384 \\
 192 \\
 \hline
 272)2304(8 \text{ Rod} \\
 \hline
 2176 \\
 128 \text{ Rem.} \\
 68)128(1 \text{ Quar.} \\
 \hline
 68 \\
 60 \text{ Foot}
 \end{array}$$

Example 2. *If a Wall, or the Side of a House be 24 Foot 6 Inches (or 24.5 Foot) long, and 37 Foot 8 Inches (or 37.66 Foot) high; How many Rod is contained therein?*

Multiply 37.66 by 24.5, the Product will be 922.67; that is, 922 Foot 8 Inches, the which you may call 923 Foot; which being divided by 272, the Quotient will be 3 Rod, and 107 Foot remaining, which divide by 68, and the Quotient will be one Quarter of a Rod, and 39 Foot remaining. And this would be the true Content of the Wall, if the Wall were all of one thickness (namely one Brick and a half) from the bottom to the top.

$$\begin{array}{r}
 37.66 \\
 24.5 \\
 \hline
 18830 \\
 15064 \\
 7532 \\
 \hline
 922.670 \\
 272)923(3 \text{ Rod} \\
 \hline
 816 \\
 68)107(1 \text{ Quar} \\
 \hline
 68 \\
 39 \text{ Foot}
 \end{array}$$

But

But there is something more to be considered in the Measuring of Brick-work, namely, the thickness of the Wall; for the thicker the Wall is, the more Rods are contained therein: For if the Wall be thicker than one Brick and a half, a square Rod (or 272 Foot) Measured upon the Superficies of the Wall, will contain more than one Rod of Brick-work: And a Rod, (or 272 Foot) of Wall, which is less than one Brick and half thick, will contain less than one Rod of Brick-work when reduced to the Standard of one Brick and half thick. So that if a Wall be three Bricks thick, every Rod (or 272 Foot) thereof, measured upon the Superficies of the Wall, will contain two Rods of Brick-work. — And if the Wall be thicker, as 4 Bricks and a half; then one Rod measured on the face of the Wall, will contain three Rods of Brick-work, &c. and therefore, for the ready reducing of Brick-work of any Number of Bricks and half Bricks thick, to the Standard thickness of one Brick and a half thick, take this

GENERAL RULE.

Multiply the Number of Superficial Feet, that are found to be contained upon the Superficies of any Wall, by the Number of half Bricks which that Wall is in thickness: One Third Part of that Product shall be the true Content of that Wall, reduced to the Standard thickness of one Brick and a half.

This Rule Explained.

Example 3. If a Wall be 72 Foot long, 19 Foot high, and Five Bricks and a half thick; how many Rod of Brick-Work is contained therein when reduced to Standard thickness?

Multiply

Multiply 72 by 19; the Product will be 1368, and so many superficial Feet doth that Wall contain. — This Number, multiplied by 11 (the Number of half Bricks the Wall is thick) produceth 15048; one third part whereof is 5016: And so many Feet doth that Wall contain; it being reduced to Standard thickness, of one Brick and half. Lastly, Divide 5016, by 272, the Quotient will be 18 Rod, and 120 Foot remaining; which Divided by 68, gives in the Quotient one quarter of a Rod; and 52 Foot remaining: So, that the true Content of this Wall, when reduced, as aforesaid, is 18 Rod, 1 Quarter and 52 Foot, as in the Margin. And so of any other length, height, or thickness: As,

72	
19	
—	
648	
72	
—	
Sup. F.	1368
	11
—	
	1368
	1368
—	
	15048
272)	5016 18 Rod.
—	
	272
	2296
—	
	2176
68)	120 (1 Quar.
—	
	68
	52 Feet.

	Long	High	Thick			R.	Q.	F.
If a Wall be	327 .	16 .	2	It will be found to contain.	{	29 .	0 .	48
	45 :	35 :	3½			13 .	2 .	03
	120 .	20 .	1			5 :	3 .	36

III. Of Chimneys.

The Chimneys in most Buildings are agreed for by the Fire-Hearth in each Room: And sometimes they are included in the rest of the Brick-work in the Building, and Paid for by the Rod, and Measured with the rest of the Brick-work of the Building; in manner following.

First, If the Chimney to be Measured stand single, and alone, the usual way is to girt it about; and if the Jaums are but one Brick thick, and wrought upright over the Mantletree to the next Floor; then girt it about for a length, and the height of the Story for a breadth, at one Brick thick.

But secondly, If the Chimney stand against a Wall that is before measured; then, the breadth of the Breast, and the depth of the two Jaums is the length, and the height of the Story the breadth, at one Brick and a half (if the Jaums be so thick) and nothing to be deducted for the Area between the Hearth and Mantletree, because of the Wyths, and Gatherings of the Breast and Wings, to make room for the Hearth in the next Story above.

Thirdly, the Shafts of Chimneys, to Measure them you must girt them about with a Line in the smallest place, and that shall be your breadth, and the height of the Shaft your length, at one Brick, if the Shaft be but 4 Inch Work; but at Brick and half, if the Shaft be 9 Inches.

IV. Other Bricklayers Works, which are Measured by the Foot, Running Measure; are these, viz.

Cornices of all sorts.

Facioes.

Water-Tables wrought.

} } Straight } Arches.
 } } Skeen }
 } } Hyps and Valleys.

Water-Courses, &c.

In the Measuring of which; note, that when you Measure Arches, either Streight, Skeen or Circular, you must take your Measure in the middle of them, as a mean between their Tops and Bottoms.

V. Other Works valued per Piece, viz.

Peers,

Pilasters.

} Plain or Rustick } } Pediments.
 } } Grotto's, &c.

All these are valued according to their largeness, and goodness of the Work and Stuff; and so indeed ought all Ornamental Works.

VI. Of Paving.

There often comes to the Bricklayers Hands, the Paving of Kitchens, Cellers, Grotto's, &c. with Bricks, Tyles, Flanders Bricks, &c. All which are measured by the Yard Square, or 9 Foot, as Plaisterers Work is measured; of which take one Example.

Example. *There is a Celler which is Paved with Bricks (or Tyles) which is 32 foot 6 inches (or 32.5 foot) long, and 21 foot 9 inches (or 21.75 foot) broad; How many Yards of Paving is there in that Celler?*

Multiply 32.5 foot, by 21.75 foot; the Product will be 709 foot: Which divided by 9, gives in the Quotient 78 yards, and 7 foot remaining, which is about 3 quarters of a yard for the Content.

Note, That in the measuring of Brickwork: If you take the Dimensions of any Building on the outside, from end to end, on the Front thereof; you must take the depth thereof on the inside.

Note,

Note also, That you must make Deductions for all Doors, Window-Lights, &c. in Brick-work, according to the thickness of the Walls, in which they are.

Of Digging.

The Digging of the Ground for Cellars, and for the Laying of the Foundations for Buildings, is often put upon the Bricklayers. This Work is done by the Yard solid, which contains 27 solid Feet; and that is usually counted a Load. Now,

Example. If a Celler be to be Digged, which shall be 27 Foot long, 16 Foot broad, and 8 Foot deep: How many Yards of Digging will there be?

$$\begin{array}{r}
 27 \\
 16 \\
 \hline
 162 \\
 27 \\
 \hline
 432 \\
 8 \\
 \hline
 27 \overline{) 3456} \begin{array}{l} \text{Yards} \\ 128 \end{array} \\
 \hline
 27 \\
 75 \\
 \hline
 54 \\
 216 \\
 \hline
 216 \\
 000
 \end{array}$$

Multiply 27 by 16, the Product will be 432: And that multiplied by 8, (the depth) the Product will be 3456, by 27 (the Number of solid Feet in one solid Yard) the Quotient will be 128, and so many solid Yards of Digging will there be required to sink such a Celler.

How to Estimate the Charge of the Erection of any House of any Height and Bigness, Built of Brick and Timber.

THAT you may give a near Estimate of the Charge of the Erection of any Edifice, you must have given you, (1.) The Dimensions thereof, not only in length and breadth, but also in height, in respect of the Number of Stories: For (2.) By the length and breadth you may find the quantity of Squares upon every Floor, and also in the Roof and Tiling: And (3.) By the height you may give a near Estimate of the Roes of

Brickwork, contained in the *Walls* round about, and in *Partition Walls*, if any be; and also in the *Chimneys*: Then (4.) Consider how many Pairs of *Stairs*, and of what kind. (5.) What *Partitions* of Timber with *Doors*. (6.) What *Timber-Front*. (7.) What Number of *Window-Frames* and *Lights*. (8.) *Iron-Work*, &c. Of all which, I have already discoursed in general: But now to descend to a particular Example.

What will be the Charges of Erecting of a Fabrick, of Brick-Walls and Timber, which shall be 20 Foot in Front, 44 Foot deep; to consist of Cellars, Three Stories, and Garrets? Supposing the Prices of Materials to be as followeth, viz.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
For Bricks the Thousand	00	16	00
Tyles the Thousand	01	05	00
Lime the Hundred	00	10	00
Sand the Load	00	03	00
Oak, or Fir-Timber the Load	02	15	00
Deal Boards the Hundred	07	10	00
Laths the Bundle	00	01	00

Then for the Plasterers Works.

For Lathing, Plastering, Rendring, and Washing with	}	00	01	02
White and Size, the Yard		00	00	10
Lathing and Plaistering, the Yard		00	00	06
Plaistering and Sizing, the Yard		00	00	06

Smiths Work.

For Iron Balconies, the Pound	00	00	05
Folding Casements, the Pair	00	16	00
Ordinary Casements	00	04	06

Then, For Window-Frames; the Light.

Glazing with Squares ordinary, the Foot	00	00	05
Wrought Lead, the Hundred Gros	00	18	00

For Painting.

Window-Lights	00	00	06
Shop-Windows, Doors, Pails, &c. the Yard	00	01	00

Now, From these Rates of Materials for Building, and for Workmanship: Such a House as is here proposed, will amount unto about 360 *l.* which is near 41 *l.* per Square.

The Description of a Five or Ten Foot Rod, very useful in taking the Dimensions, and Casting up of the Works of the several Artificers, relating to Building: And also thereby to Measure Angles; whereby the true Ground-Plot of any Building, with Yards, Gardens, &c. may be laid down upon Paper or Vellum.

THE Rod (whether of Five, or Ten Foot long) consisteth of two Square pieces of Box, or other Wood, each of them the half length of the Rod, when drawn out at its full length: — These two Pieces, have (each of them) a *Brass Socket* at one end, through which the two pieces or Rulers are to pass, or to slide one by the other, in all respects as those Rules are made, which *Glasiers* commonly use to take their Measures with: And it would be convenient to have a *Screw* to one of the *Sockets*, to keep the two Rulers (when drawn out to any determined length) from moving from that Position or Place: And a *Tooth* or *Check* at the end of the other Rulers to keep it from dropping through the other *Socket*.

Upon the two outermost edges of each *Ruler*, let there be divided *Feet* and *Inches*, with halves and quarters; and also *Foot-Measure*, (that is, one foot divided into a 100 equal parts) and let these face each other so, that you may take any Dimension either in *Feet*, *Inches*, and Parts of *Inches*, or in (*Foot-Measure*, or) *Decimal Parts*, at one and the same time.

The two inner Edges of each *Ruler*, are also divided in the same manner as the outward Edges were, but the Numbers for the Feet, (which ought to be of large Figures) must be so ordered that when the *Rulers* are drawn out to any Measure, or accidentally, the Numbers on the inside shall tell you readily (in *Feet*, *Inches*, and parts of *Inches*, and also in *Foot-Measure*) how much is contained between the two ends of the Rod when so drawn out.

The two *Rulers* thus divided on both sides, you may take the Measure of any thing (less than half the length of the Rod when drawn out) by the *Divisions* on the outer Edge; but any *Dimensions* greater than half the length of the Rod, must be taken by drawing out of the *Rulers*, and then the *Divisions* on the inside will give the length.

On one of the *Flat Sides* of either *Ruler* let there be a *Double Line* of *Numbers*, such as is usually put upon *Carpenters Ruler*, but let them be

as large as the length of the *Rulers* will conveniently permit: Let the Divisions of these two *Lines* be placed as near the inner Edges of the two *Rulers* as may be, so that they face one the other, and so is your *Rod* finished— But if you please, you may have on the other *Flat Side* one other whole *Line of Numbers*, and another *Broken Line* which will serve for the *Extraction* of the *Square Root* by Inspection; and for other Purposes, of which we shall have no need in this place. Or instead thereof, you may furnish that other side with Scales of Chords and *Equal Parts*, which will be necessary for drawing of *Draughts* or *Designs*, &c.

The Use of the Sliding-Rod.

THE *Rod* being thus prepared, I will now shew you how to work *Multiplication*, *Division*, and the *Golden-Rule* (or *Rule of Three*) upon the same, and that without *Compasses*; whereby you may cast up any *Dimensions* taken in *Feet* and *Inches*, or in *Foot-Measure*, according to former *Directions*.

I. *Multiplication by the Rod.*

The two *Sides* of the *Rod*, although both of them have the same *Line of Numbers* upon them; yet (in working of any *Question* in *Arithmetick* upon them) they must upon necessity have some *Names* or *Terms* given, to distinguish one from the other; which two *Names* shall be only THE FIRST and THE SECOND, so that when you hold the *Rod* in both your hands, or lay it upon a *Table* before you; [Always] call that *Line of Numbers* which lies next to you, THE FIRST, and that farthest from you THE SECOND. This being premised, I will proceed to Practice by *Examples*.

Example 1. *Let it be required to Multiply 8 by 6.*

Bring 6 (in the Second) to stand against 1 (in the First) then will 8 (in the First) stand against 48 (in the Second) which is the Product of 6 multiplied by 8. Or,

If you bring 8 (in the Second) to stand against 1 (in the First) then will 6 (in the First) stand against 48 (in the Second) as before.

Example 2. *Let it be required to Multiply 24 by 5.*

Bring 5 (in the Second) to stand against 1 (in the First) then 24 (in the First) will stand against 120 (in the Second) which is the Product of 24 multiplied by 5. Or,

If you bring 24 (in the Second) against 1 (in the First) then will 5 (in the First) stand against 120 (in the Second) as before.

Example 3. *Let it be required to Multiply 37 by 19.*

Bring

Bring 37 (in the Second) against 1 (in the First) then will 19 (in the First) stand against 703 (in the Second) which is the *Product* of 37 Multiplied by 19. Or

If you bring 19 (in the Second) to stand against 1 (in the First) then will 37 (in the First) stand against 703 in the Second.

Example 4. *Let it be required to multiply 45 by 29.*

Bring 45 (in the Second) against 1 (in the First) then will 29 (in the First) stand against 1305 (in the Second) which is the *Product* of 45 multiplied by 29.

Now this *Product* consisting of *Four Figures*, it will be something difficult to give an exact Determination of the last Figure, the Lines shewing only the three First Figures exactly, and therefore the Fourth must be only estimated: But to direct you to the just Number of Places that any *Product* must consist of, and also, what the last Figure ought to be: Observe these Two RULES.

I. There will be as many *Figures* in the *Product* as there are *Figures* in the *Multiplicand* and *Multiplier*, as here, in 1305 are four *Figures*, and so many were in 45 and 29; Thus it is, when the two first *Figures* of the *Product* are less than the *Figures* of the *Multiplicand* or *Multiplier*; as here 13, (the two first *Figures* of 1305) are less than either 29 or 45——But, when the two first *Figures* of the *Product* are more than the *Multiplicand* or *Multiplier*; then the *Product* will consist but of *Three Places*: As for Example, If you multiply 81 by 12, the *Product* will be but 972 (consisting but of *Three Places*) because 97, the two first *Figures* of 972, is more than either 12 or 81.

II. Observe that when a *Product* consists of *Four Figures*, (as the *Product* of 136, multiplied by 19, will be 2584) because 25 is greater than 13 or 19, by the foregoing Rule.

But to estimate the last *Figure* rightly, multiply in your Mind 6 (the last *Figure* of the *Multiplicand* 136) by 9 (the last *Figure* of the *Multiplier* 19) the *Product* will be 54; wherefore, the last *Figure* therefore 4 will be the last *Figure* of 2584.

Example 5. *If a Marble Pavement in a Summer-House (or other thing whatsoever) be 7 Foot 9 Inches (or 7.75 Foot) long, and 6 Foot 6 Inches (or 6.5 Foot) broad; How many Foot is contained therein?*

Bring 6.50 (in the Second) to 1 (in the First) then against 7.75 (in the First) you shall find 50.37 Foot (in the Second) for the Content.

Example 6. *If a Board or Plank be 12.4 Foot long, and 3.7 Foot broad; How many Foot is contained therein?*

Bring

Bring 12.4 (in the Second) to 1 (in the First) then against 3.7 (in the First) stands 45.8 (in the Second); which is 45 Foot, 8 Tenths of a Foot, or 45 Foot 10 Inches.

II. Division by the Rod.

As in *Common Arithmetick*, the best Proof of *Multiplication* is by *Division*; and of *Division* by *Multiplication*; I shall therefore frame my *Examples* in *Division*, to answer those in *Multiplication*. Wherefore,

Example 1. Let it be required to Divide 48 by 6.

Bring 6, (the Divisor) counted in the Second, to stand against 1 (counted in the First;) then will 48, (the Dividend) counted in the first, stand against 8 (counted in the Second) which is the Quotient.

Example 2. Let it be required to Divide 120 by 24.

Bring 24 (in the Second) to stand against 1 (in the First) then will 120 (in the Second) stand against 5 (in the First) which is the Quotient required.

Example 3. Let it be required to Divide 703 by 37.

Bring 37 (in the Second) to 1 (in the First) then will 703 (in the Second) stand against 19 (in the First) which is the Quotient.

Example 4. Let it be required to Divide 1305 by 45.

Bring 45 (in the Second) against 1 (in the First) then will 1305 (counted in the Second) stand against 29 (in the First) which is the Quotient required.

Example 5. Let it be required to Divide 50.37 Foot, by 7.75 Foot.

Bring 7.75 (counted in the Second) to stand against 1 (counted in the First) then will 50.37 (counted in the Second) stand against 6.5 (counted in the First) and that is the Quotient.

Example 6. There is a Piece of Square Ground, which is 12 Pole broad, and it contains 156 square Poles or Perches: How long is that piece of Ground? Divide 156 by 12: Therefore,

Bring 12 (counted in the second) against 1 (counted in the first) then against 156 (counted in the Second) stands 13 (in the first) which is the length of the piece of Ground in Perches.

III. The Golden Rule, or Rule of Three by the Rod.

To work the *Golden Rule* or *Rule of Three* by the Rod, is no other than to multiply and divide by the Rod; and therefore I will be but brief therein. Only in working, observe this

RULE. Count the first term of your Proportion, upon the first, and the second term upon the second: And then, the third term, counted upon the first, will give you the fourth term (which is that required) upon the second: Examples will make this plain.

Exam-

Example 1. *If one Foot of Glass will cost 5 Pence, what will 29 Foot and a half (or 29.5) Foot cost?*

Count 1 upon the first, and to it, bring 5 in the second; then count 29.5 upon the first, and against it (upon the second) you shall find 147.5; and so many Pence will 29 Foot and a half cost, which is 12 Shillings, 3 Pence, 2 Farthings.

Example 2. *If one Square (or 100 Foot square) of Tyling, cost 37 Shillings; what will 18 Foot of the same Tyling come to?*

Count 1 in the middle of the first, for 1 Square or 100 Foot: to which bring 37 Shillings (the Price thereof) counted on the second; then against 18 (the number of Feet) counted upon the first, stands 6.66, which is 6 Shillings 8 Pence, for the worth of 18 Feet.

Example 3. *If 1 Yard (which is 9 Foot) of Plaistering, will cost 9 Pence; what will 125 Yards come to?*

Count 1 Yard in the first, and to it bring 9 in the second, then count 125 in the first, and against it in the second, you shall find 1125 Pence, which is 4 Pound, 13 Shillings and 9 Pence, for the Price of the 125 Yards.

Example 4. *The Circumference of a Circle being given, viz. 355 Foot, to find the Diameter of that Circle.*

The Proportion of the Circumference of any Circle, to the Diameter of that Circle, is as 22 is to 7. Wherefore,

Count 22 upon the first, and bring against it 7, counted in the second: Then count 355 (the Circumference given) in the first, and against it, in the second, you shall find 113, which is the Diameter of that Circle, whose Circumference is 355.

Example 5. *The Diameter of a Circle being given, viz. 113 Foot, to find the Circumference.*

The Proportion.] As 7, is to 22, so is the Diameter, to the Circumference.

Count 7 in the first, to which bring 22 counted in the second; then against 113 counted in the first, you shall find 355 in the second; and that is the Circumference.

In like manner, if the Diameter of a Circle were 35, the Circumference will be found to be 110: And so of any other.

Example 5. *The Diameter of a Circle 8 Foot being given, to find the Area, or Superficial Content of that Circle.*

The Proportion.] As 28, is to 22; so is the Square of the Diameter 8, viz. (64) to the Area.

Count 28 in the first, to which bring 22 in the second; then count

O

64 in

64 in the first, and against it, in the second, you shall find 50 28, which is 50 Foot, 3 Inches and a quarter, for the *Area* of that Circle, whose *Diameter* is 8 Inches.

Example 6. The Circumference of a Circle 50 Foot, being given, to find the Area.

The Proportion.] As 88 is to 7, so is the square of the Circumference to the Area.

Bring 50 the Circumference, counted in the second, to 1 in the first; then against 50 in the first, stands 2500, which is the square of the Diameter (or 50 multiplied in it self.) Then,

Count 88 in the first; to which bring 7 in the second; then count 2500 in the first, and against it in the second you shall find 199 Foot, for the Area of that Circle, whose Circumference was 50 Foot.

The Use of the Sliding-Rod, in Measuring of Angles.

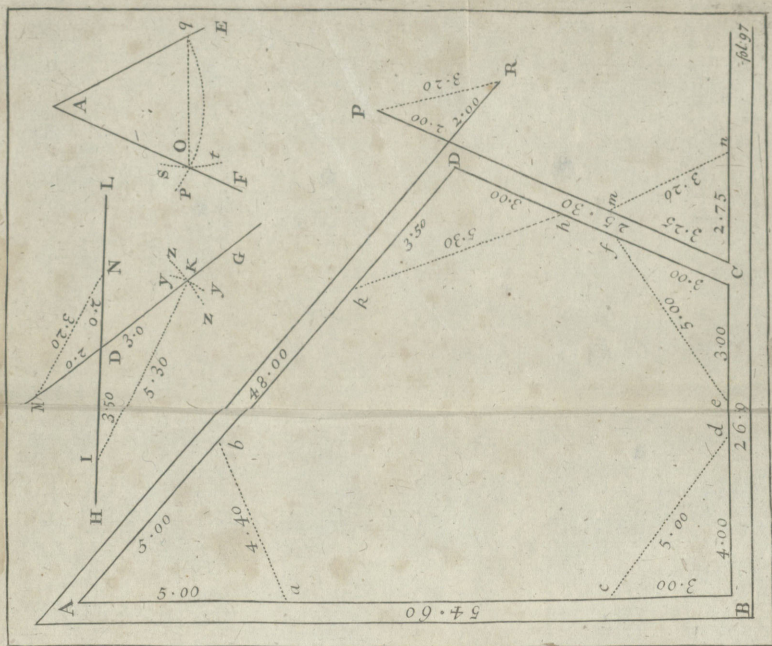
IT is usual with *Artificers*, in setting out of a Right Angle, for the Erection of any Building standing alone, to measure out eight Foot in the Front, and then six Foot on the side, moving the six Foot Rod on the one side to and fro, till a ten Foot Rod being put to the end of the eight Foot in the Front, doth justly touch the end of the six Foot on the side; and then the Angle included between the eight and six Foot Rods, is a Right Angle. This is true, for eight, six and ten, are but the double of *Pythagorus* his three Numbers, 3, 4 and 5, which joyned will make a Right Angle: But,

I. To set out a Right Angle by this Rod.

Set four Foot of this Rod on the Front, and open the Rod to its full length of five Foot; then lay the end of the five Foot to the end of the four Foot; and with the other end sweep an Arch upon the Ground, then shut the Rod to three Foot, and bring it to the other end of the four Foot; and where it crosses the Arch, made by the five Foot, that is the Point, and a Right Line drawn by it (or a Line strained) will make a Right Angle.

But for to set out Right Angles for Foundations, is not it that I commend this Rod so much for, but for its ready taking of Dimensions in all Cases, and especially in Vacancies, as in breadths of Doors, Windows, between Chimney-Jaums, Heights of Stories, &c. wherein a ten Foot Rod is too cumbersome, and a two Foot Rule too deficient.

And this is not all neither: But the chief thing I commend it for, is for the exact taking of the Angles in any Building, and so to lay them



them down upon Paper, by which you may make a true Draught of any House, or Houses, Yards, Gardens, &c. And that shall be the Work of this Section: As in Example following.

Let ABCD be an irregular Building, a true Plot whereof you would lay down upon Paper or Vellum.

First, Upon a Sheet of Paper draw Lines according as you see the Walls to run, or bear one from another; and take notice, where any Doors, Chimneys, Stair-Cases, and such things stand, and make Signs thereof in your waste Paper, whereabouts any such things are. It matters not how defective the Lines on this Paper be drawn, in respect of their lengths; but let there be so many of them, as there are in the Building, and no more nor less. Call this waste Paper your *Eye-Draught*: Which prepared as afore said,

Secondly, Measure the length of the Walls on the inside of the House, as from A to B 54 Foot 6 Inches, from B to C 26 Foot 5 Inches, from C to D 25 Foot 3 Inches, and from D to A 48 Foot: Setting these Numbers down as you measure them, upon the correspondent Lines in your *Eye-Draught*: And, if there be any Chimneys, Stair-Cases, Doors and Windows, take notice of them also, and their respective Dimensions, setting all down in your *Eye-Draught*.

Thirdly, Then go to the several Angles in the Building (or as many of them as you can conveniently come at) and measure them in this manner. (1.) Go to the Angle A; and with your Rod opened to any length, as here it is to its full length of 5 Foot, which distance mark upon the Walls A B and A D, from A to a, and from A to b: Then with your Rod, put one end of it to a, and open it till the other end touch the mark at b, and look how much it is opened from end to end, which we will suppose 4 Foot (or 4.00 of the Foot-Measure.) Draw a Line as a b in your *Eye-Draught*, and set to it 4.00, and 5.00 to the sides A a, and A b, just as you see it done in the Diagram here annexed. (2.) Go to the Angle B, and measure 3.00 Foot from B to c, and 4.00 Foot from B to d, (or any other Measures as the place will best permit) and take with your Rod the distance between c and d, which finding to be the just length thereof, viz. 5.00, you may conclude, that the Angle at B is a true Square (or Right) Angle: Mark this also in your *Eye-Draught*. And (3.) Go to the Angle C, where measure out upon the Walls from C to e and f 3.00 Foot; and then finding the distance between e and d to be 5.00 Foot, note that down in your *Eye-Draught* also. —And, (4.) Go to the Angle D, where measure out from D to h 3.00 Foot, and

and from D to k 3.50 Foot: and then finding the distance between h and k to be longer than your Rod, you may strain a Line from h to k (or supply it by a two Foot Rule) and you find it to be 5.30 Foot, which note down in your *Eye-Draught* also: And thus have you taken all the *Angles*, and *measured* all the *Lines* on the inside of this *Building*.

But it may sometimes so fall out that you cannot conveniently come to the Angular Points of all the Angles that will be requisite to be taken within the House; as suppose you could not come to the Point of the Angle at C within the House, (then in such Case) get leave of the next Neighbour, and go in and take it there, measuring upon the other side of the Wall from C to m, 3.25 Foot, and from C to n 2.75 Foot, and take the distance between m and n 3.20 Foot, and note it in your *Eye-Draught*.

Again, suppose that the Angle at D were the Corner of a Street, and that you could not measure the Angle at D within the House, for that there was a Chimney in that Angle: In such Case, (1.) Apply a Rod or any freight Piece to the Wall A D, and another to the Wall C D, letting the ends of those two Rods extend beyond the Angle of the Wall at D, any Measure whatsoever (as here I have made them to extend, 2.00) from D, to P and R. — (2.) Take the Distance between P and R, with your Rod, and you finding it be 3.20 Foot, Note that also down in your *Eye-Draught*, as you did the Measures of other Angles: And thus may you take any Angles whatsoever by this Rod, and that more exactly than by any other way I can at present think of; I am sure far more exactly than by such ways, as I have seen some Artificers practise, by opening of their Joynt-Rule, &c. Having shewed you how to take any *Angle*, either *within*, or on the *outside* of any *Building*, it resteth now that I teach how to *protract* or lay down any *Angle* so taken, upon *Paper*, *Parchment*, or the like.

An Angle being taken as aforesaid, how to Protract, or lay it down.

Example 1. Suppose the Angle at A.

First, Upon your Paper draw a Right Line at pleasure, as A E.

Then, out of any Scale, take 5.00 (the Number that you set upon the Walls) and with that Distance, setting one Foot of the Compasses in A, with the other describe the obscure Arch p q, and with the same Distance of the Compasses (because the Distance set upon both Walls were equal) one Foot being set in q, with the other describe the obscure Arch t s, crossing the former Arch in the Point O, then through O, draw another Right-Line, as A F; so shall the Angle F A E be equal to the Angle of the Building B A D.

Example 2.

Example 2. *Let it be required to Protract, or lay down the Angles at D.*

First, Draw a Right-Line at pleasure, as HL : And upon any part thereof, as at D , make a Point representing the Angle of the Building at D ; and because in your Building you set 3.50 from D to k , take 3.50 from any Scale, and set it from D to l upon your Paper.

Then, from the same Scale, take the Distance which you measured upon the Wall, from D to h , namely 3.0, and with that Distance, one Foot being set in D , with the other describe an obscure Arch zz ; also from the same Scale, take 5.30 (the Distance which you found in the Building to be between k and h) and setting one Foot in l , with the other describe the obscure Arch yy , crossing the Arch zz in the Point K , then through this Point K , drawn the Right-Line DG ; so shall the Angle IDG upon the Paper, be equal to the Angle ADC in the Building.

Example 3. *Let it be required to Protract the Outward Angle at D.*

In the Figure above, the Line DH represents the Wall AD , and the Line DG , represents the Wall DC , on the Outsides of them; to which two Walls two Rods being applied, and extended 2.00 Foot beyond D , namely, to M and N , the Distance between them, *viz.* M and N) being found to be 3.20 Foot, set 2.00 from D to M and to N , and then will the Distance DM be equal to DP , and DN equal to DR , and MN equal to PR of the Building; and consequently, the Angle MDN in the Draught, equal to the Angle ADC in the Building. And let thus much suffice for the *Measuring and Protracting of Lines and Angles*, for I intended here not to Treat of *Surveying*, more than so much thereof as may be serviceable to such as have any Concerns in Building, or setting out Foundations for that purpose, or to make Ground-Plots of Houses, &c. already Built.

Here followeth a TABLE in which (by Inspection only) you may find how many Square (or Superficial) Feet, Yards, Squares, Rods, Quarters of Rods, and odd Feet, are contained in any Piece of Artificers Work, the Length and Breadth thereof being given in Feet.

1 Foot Long, or Broad.

	Feet.		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	1		0	1	0	0	1	0	0	1
2	2		0	2	0	0	2	0	0	2
3	3		0	3	0	0	3	0	0	3
4	4		0	4	0	0	4	0	0	4
5	5		0	5	0	0	5	0	0	5
6	6		0	6	0	0	6	0	0	6
7	7		0	7	0	0	7	0	0	7
8	8		0	8	0	0	8	0	0	8
9	9		1	0	0	0	9	0	0	9
10	10		1	1	0	0	10	0	0	10
11	11		1	2	0	0	11	0	0	11
12	12		1	3	0	0	12	0	0	12
13	13		1	4	0	0	13	0	0	13
14	14		1	5	0	0	14	0	0	14
15	15		1	6	0	0	15	0	0	15
16	16		1	7	0	0	16	0	0	16
17	17		1	8	0	0	17	One 16 Part.		
18	18		2	0	0	0	18	0	0	18
19	19		2	1	0	0	19	0	0	19
20	20		2	2	0	0	20	0	0	20
21	21		2	3	0	0	21	0	0	21
22	22		2	4	0	0	22	0	0	22
23	23		2	5	0	0	23	0	0	23
24	24		2	6	0	0	24	0	0	24
25	25		2	7	0	0	25	0	0	25
26	26		2	8	0	0	26	0	0	26
27	27		3	0	0	0	27	0	0	27
28	28		3	1	0	0	28	0	0	28
29	29		3	2	0	0	29	0	0	29
30	30		3	3	0	0	30	0	0	30
31	31		3	4	0	0	31	0	0	31
32	32		3	5	0	0	32	0	0	32
33	33		3	6	0	0	33	0	0	33
34	34		3	7	0	0	34	One 8 Part.		
35	35		3	8	0	0	35	0	0	35
36	36		4	0	0	0	36	0	0	36
37	37		4	1	0	0	37	0	0	37
38	38		4	2	0	0	38	0	0	38
39	39		4	3	0	0	39	0	0	39
40	40		4	4	0	0	40	0	0	40
41	41		4	5	0	0	41	0	0	41
42	42		4	6	0	0	42	0	0	42
43	43		4	7	0	0	43	0	0	43
44	44		4	8	0	0	44	0	0	44
45	45		5	0	0	0	45	0	0	45
46	46		5	1	0	0	46	0	0	46
47	47		5	2	0	0	47	0	0	47
48	48		5	3	0	0	48	0	0	48
49	49		5	4	0	0	49	0	0	49
50	50		5	5	0	0	50	0	0	50

1 Foot Long, or Broad.

	Feet.		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	51		5	6	0	2	1	0	0	51
52	52		5	7	0	2	2	0	0	52
53	53		5	8	0	2	3	0	0	53
54	54		6	0	0	2	4	0	0	54
55	55		6	1	0	2	5	0	0	55
56	56		6	2	0	2	6	0	0	56
57	57		6	3	0	2	7	0	0	57
58	58		6	4	0	2	8	0	0	58
59	59		6	5	0	2	9	0	0	59
60	60		6	6	0	2	10	0	0	60
61	61		6	7	0	2	11	0	0	61
62	62		6	8	0	2	12	0	0	62
63	63		7	0	0	2	13	0	0	63
64	64		7	1	0	2	14	0	0	64
65	65		7	2	0	2	15	0	0	65
66	66		7	3	0	2	16	0	0	66
67	67		7	4	0	2	17	0	0	67
68	68		7	5	0	2	18	0	0	68
69	69		7	6	0	2	19	0	0	69
70	70		7	7	0	2	20	0	0	70
71	71		7	8	0	2	21	0	0	71
72	72		8	0	0	2	22	0	0	72
73	73		8	1	0	2	23	0	0	73
74	74		8	2	0	2	24	0	0	74
75	75		8	3	0	3	0	0	0	75
76	76		8	4	0	3	1	0	0	76
77	77		8	5	0	3	2	0	0	77
78	78		8	6	0	3	3	0	0	78
79	79		8	7	0	3	4	0	0	79
80	80		8	8	0	3	5	0	0	80
81	81		9	0	0	3	6	0	0	81
82	82		9	1	0	3	7	0	0	82
83	83		9	2	0	3	8	0	0	83
84	84		9	3	0	3	9	0	0	84
85	85		9	4	0	3	10	0	0	85
86	86		9	5	0	3	11	0	0	86
87	87		9	6	0	3	12	0	0	87
88	88		9	7	0	3	13	0	0	88
89	89		9	8	0	3	14	0	0	89
90	90		10	0	0	3	15	0	0	90
91	91		10	1	0	3	16	0	0	91
92	92		10	2	0	3	17	0	0	92
93	93		10	3	0	3	18	0	0	93
94	94		10	4	0	3	19	0	0	94
95	95		10	5	0	3	20	0	0	95
96	96		10	6	0	3	21	0	0	96
97	97		10	7	0	3	22	0	0	97
98	98		10	8	0	3	23	0	0	98
99	99		11	0	0	3	24	0	0	99
100	100		11	1	0	0	0	0	0	100

2 Foot Long, or Broad.

Feet	Yards.		Squares.			Rods.		
	Feet	T. F.	S. Q. F.	R.	Q. F.	R.	Q. F.	
1	2	0 2	0 0 2	0	0 2	0	0 2	
2	4	0 4	0 0 4	0	0 4	0	0 4	
3	6	0 6	0 0 6	0	0 6	0	0 6	
4	8	0 8	0 0 8	0	0 8	0	0 8	
5	10	1 1	0 0 10	0	0 10	0	0 10	
6	12	1 3	0 0 12	0	0 12	0	0 12	
7	14	1 5	0 0 14	0	0 14	0	0 14	
8	16	1 7	0 0 16	0	0 16	0	0 16	
9	18	2 0	0 0 18	0	0 18	0	0 18	
10	20	2 2	0 0 20	0	0 20	0	0 20	
11	22	2 4	0 0 22	0	0 22	0	0 22	
12	24	2 6	0 0 24	0	0 24	0	0 24	
13	26	2 8	0 1 1	0	0 26	0	0 26	
14	28	3 1	0 1 3	0	0 28	0	0 28	
15	30	3 3	0 1 5	0	0 30	0	0 30	
16	32	3 5	0 1 7	0	0 32	0	0 32	
17	34	3 7	0 1 9	0	0 34	0	0 34	
18	36	4 0	0 1 11	0	0 36	0	0 36	
19	38	4 2	0 1 13	0	0 38	0	0 38	
20	40	4 4	0 1 15	0	0 40	0	0 40	
21	42	4 6	0 1 17	0	0 42	0	0 42	
22	44	4 8	0 1 19	0	0 44	0	0 44	
23	46	5 1	0 1 21	0	0 46	0	0 46	
24	48	5 3	0 1 23	0	0 48	0	0 48	
25	50	5 5	0 2 0	0	0 50	0	0 50	
26	52	5 7	0 2 2	0	0 52	0	0 52	
27	54	6 0	0 2 4	0	0 54	0	0 54	
28	56	6 2	0 2 6	0	0 56	0	0 56	
29	58	6 4	0 2 8	0	0 58	0	0 58	
30	60	6 6	0 2 10	0	0 60	0	0 60	
31	62	6 8	0 2 12	0	0 62	0	0 62	
32	64	7 1	0 2 14	0	0 64	0	0 64	
33	66	7 3	0 2 16	0	0 66	0	0 66	
34	68	7 5	0 2 18	0	0 68	0	0 68	
35	70	7 7	0 2 20	0	0 70	0	0 70	
36	72	8 0	0 2 22	0	0 72	0	0 72	
37	74	8 2	0 2 24	0	0 74	0	0 74	
38	76	8 4	0 3 1	0	0 76	0	0 76	
39	78	8 6	0 3 3	0	0 78	0	0 78	
40	80	8 8	0 3 5	0	0 80	0	0 80	
41	82	9 1	0 3 7	0	0 82	0	0 82	
42	84	9 3	0 3 9	0	0 84	0	0 84	
43	86	9 5	0 3 11	0	0 86	0	0 86	
44	88	9 7	0 3 13	0	0 88	0	0 88	
45	90	10 0	0 3 15	0	0 90	0	0 90	
46	92	10 2	0 3 17	0	0 92	0	0 92	
47	94	10 4	0 3 19	0	0 94	0	0 94	
48	96	10 6	0 3 21	0	0 96	0	0 96	
49	98	10 8	0 3 23	0	0 98	0	0 98	
50	100	11 1	0 3 25	0	0 100	0	0 100	

2 Foot Long, or Broad.

Feet	Yards.		Squares.			Rods.		
	Feet	T. F.	S. Q. F.	R.	Q. F.	R.	Q. F.	
51	102	11 3	0 3 1	0 1	34	0	1 34	
52	104	11 5	0 3 3	0 1	36	0	1 36	
53	106	11 7	0 3 5	0 1	38	0	1 38	
54	108	12 0	0 3 8	0 1	40	0	1 40	
55	110	12 2	0 3 10	0 1	42	0	1 42	
56	112	12 4	0 3 12	0 1	44	0	1 44	
57	114	12 6	0 3 14	0 1	46	0	1 46	
58	116	12 8	0 3 16	0 1	48	0	1 48	
59	118	13 1	0 3 18	0 1	50	0	1 50	
60	120	13 3	0 3 20	0 1	52	0	1 52	
61	122	13 5	0 3 22	0 1	54	0	1 54	
62	124	13 7	0 3 24	0 1	56	0	1 56	
63	126	14 0	0 3 27	0 1	58	0	1 58	
64	128	14 2	0 3 30	0 1	60	0	1 60	
65	130	14 4	0 3 33	0 1	62	0	1 62	
66	132	14 6	0 3 36	0 1	64	0	1 64	
67	134	14 8	0 3 39	0 1	66	0	1 66	
68	136	15 1	0 3 42	0 1	68	0	1 68	
69	138	15 3	0 3 45	0 1	70	0	1 70	
70	140	15 5	0 3 48	0 1	72	0	1 72	
71	142	15 7	0 3 51	0 1	74	0	1 74	
72	144	16 0	0 3 54	0 1	76	0	1 76	
73	146	16 2	0 3 57	0 1	78	0	1 78	
74	148	16 4	0 3 60	0 1	80	0	1 80	
75	150	16 6	0 3 63	0 1	82	0	1 82	
76	152	16 8	0 3 66	0 1	84	0	1 84	
77	154	17 1	0 3 69	0 1	86	0	1 86	
78	156	17 3	0 3 72	0 1	88	0	1 88	
79	158	17 5	0 3 75	0 1	90	0	1 90	
80	160	17 7	0 3 78	0 1	92	0	1 92	
81	162	18 0	0 3 81	0 1	94	0	1 94	
82	164	18 2	0 3 84	0 1	96	0	1 96	
83	166	18 4	0 3 87	0 1	98	0	1 98	
84	168	18 6	0 3 90	0 1	100	0	1 100	
85	170	18 8	0 3 93	0 1	102	0	1 102	
86	172	19 1	0 3 96	0 1	104	0	1 104	
87	174	19 3	0 3 99	0 1	106	0	1 106	
88	176	19 5	0 3 102	0 1	108	0	1 108	
89	178	19 7	0 3 105	0 1	110	0	1 110	
90	180	20 0	0 3 108	0 1	112	0	1 112	
91	182	20 2	0 3 111	0 1	114	0	1 114	
92	184	20 4	0 3 114	0 1	116	0	1 116	
93	186	20 6	0 3 117	0 1	118	0	1 118	
94	188	20 8	0 3 120	0 1	120	0	1 120	
95	190	21 1	0 3 123	0 1	122	0	1 122	
96	192	21 3	0 3 126	0 1	124	0	1 124	
97	194	21 5	0 3 129	0 1	126	0	1 126	
98	196	21 7	0 3 132	0 1	128	0	1 128	
99	198	22 0	0 3 135	0 1	130	0	1 130	
100	200	22 2	0 3 138	0 1	132	0	1 132	

3 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	3	0	3	0	0	0	3	0	0	3
2	6	0	6	0	0	0	6	0	0	6
3	9	1	0	0	0	0	9	0	0	9
4	12	1	3	0	0	0	12	0	0	12
5	15	1	6	0	0	0	15	0	0	15
6	18	2	0	0	0	0	18	0	0	18
7	21	2	3	0	0	0	21	0	0	21
8	24	2	6	0	0	0	24	0	0	24
9	27	3	0	0	1	0	27	0	0	27
10	30	3	3	0	1	0	30	0	0	30
11	33	3	6	0	1	0	33	0	0	33
12	36	4	0	0	1	0	36	0	0	36
13	39	4	3	0	1	0	39	0	0	39
14	42	4	6	0	1	0	42	0	0	42
15	45	5	0	0	1	0	45	0	0	45
16	48	5	3	0	1	0	48	0	0	48
17	51	5	6	0	2	0	51	0	0	51
18	54	6	0	0	2	0	54	0	0	54
19	57	6	3	0	2	0	57	0	0	57
20	60	6	6	0	2	0	60	0	0	60
21	63	7	0	0	2	13	63	0	0	63
22	66	7	3	0	2	16	66	0	0	66
23	69	7	6	0	2	19	69	0	1	1
24	72	8	0	0	2	22	72	0	1	4
25	75	8	3	0	3	0	75	0	1	7
26	78	8	6	0	3	3	78	0	1	10
27	81	9	0	0	3	6	81	0	1	13
28	84	9	3	0	3	9	84	0	1	16
29	87	9	6	0	3	12	87	0	1	19
30	90	10	0	0	3	15	90	0	1	22
31	93	10	3	0	3	18	93	0	1	25
32	96	10	6	0	3	21	96	0	1	28
33	99	11	0	0	3	24	99	0	1	31
34	102	11	3	0	3	27	102	0	1	34
35	105	11	6	0	3	30	105	0	1	37
36	108	12	0	0	3	3	108	0	1	40
37	111	12	3	0	3	6	111	0	1	43
38	114	12	6	0	3	9	114	0	1	46
39	117	13	0	0	3	12	117	0	1	49
40	120	13	3	0	3	15	120	0	1	52
41	123	13	6	0	3	18	123	0	1	55
42	126	14	0	0	3	21	126	0	1	58
43	129	14	3	0	3	24	129	0	1	61
44	132	14	6	0	3	27	132	0	1	64
45	135	15	0	0	3	30	135	0	1	67
46	138	15	3	0	3	33	138	0	2	2
47	141	15	6	0	3	36	141	0	2	5
48	144	16	0	0	3	39	144	0	2	8
49	147	16	3	0	3	42	147	0	2	11
50	150	16	6	0	3	45	150	0	2	14

3 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	153	17	0	0	3	2	3	0	2	17
52	156	17	3	0	3	2	6	0	2	20
53	159	17	6	0	3	2	9	0	2	23
54	162	18	0	0	3	2	12	0	2	26
55	165	18	3	0	3	2	15	0	2	29
56	168	18	6	0	3	2	18	0	2	32
57	171	19	0	0	3	2	21	0	2	35
58	174	19	3	0	3	2	24	0	2	38
59	177	19	6	0	3	2	27	0	2	41
60	180	20	0	0	3	2	30	0	2	44
61	183	20	3	0	3	2	33	0	2	47
62	186	20	6	0	3	2	36	0	2	50
63	189	21	0	0	3	2	39	0	2	53
64	192	21	3	0	3	2	42	0	2	56
65	195	21	6	0	3	2	45	0	2	59
66	198	22	0	0	3	2	48	0	2	62
67	201	22	3	0	3	2	51	0	2	65
68	204	22	6	0	3	2	54	0	3	0
69	207	23	0	0	3	2	57	0	3	3
70	210	23	3	0	3	2	60	0	3	6
71	213	23	6	0	3	2	63	0	3	9
72	216	24	0	0	3	2	66	0	3	12
73	219	24	3	0	3	2	69	0	3	15
74	222	24	6	0	3	2	72	0	3	18
75	225	25	0	0	3	2	75	0	3	21
76	228	25	3	0	3	2	78	0	3	24
77	231	25	6	0	3	2	81	0	3	27
78	234	26	0	0	3	2	84	0	3	30
79	237	26	3	0	3	2	87	0	3	33
80	240	26	6	0	3	2	90	0	3	36
81	243	27	0	0	3	2	93	0	3	39
82	246	27	3	0	3	2	96	0	3	42
83	249	27	6	0	3	2	99	0	3	45
84	252	28	0	0	3	2	102	0	3	48
85	255	28	3	0	3	2	105	0	3	51
86	258	28	6	0	3	2	108	0	3	54
87	261	29	0	0	3	2	111	0	3	57
88	264	29	3	0	3	2	114	0	3	60
89	267	29	6	0	3	2	117	0	3	63
90	270	30	0	0	3	2	120	0	3	66
91	273	30	3	0	3	2	123	0	3	69
92	276	30	6	0	3	2	126	0	3	72
93	279	31	0	0	3	2	129	0	3	75
94	282	31	3	0	3	2	132	0	3	78
95	285	31	6	0	3	2	135	0	3	81
96	288	32	0	0	3	2	138	0	3	84
97	291	32	3	0	3	2	141	0	3	87
98	294	32	6	0	3	2	144	0	3	90
99	297	33	0	0	3	2	147	0	3	93
100	300	33	3	0	3	2	150	0	3	96

4 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	4		0	4	0	0	4	0	0	4
2	8		0	8	0	0	8	0	0	8
3	12		1	3	0	0	12	0	0	12
4	16		1	7	0	0	16	0	0	16
5	20		2	2	0	0	20	0	0	20
6	24		2	6	0	0	24	0	0	24
7	28		3	1	0	1	3	0	0	28
8	32		3	5	0	1	7	0	0	32
9	36		4	0	0	1	11	0	0	36
10	40		4	4	0	1	15	0	0	40
11	44		4	8	0	1	19	0	0	44
12	48		5	3	0	1	23	0	0	48
13	52		5	7	0	2	2	0	0	52
14	56		6	2	0	2	6	0	0	56
15	60		6	6	0	2	10	0	0	60
16	64		7	1	0	2	14	0	0	64
17	68		7	5	0	2	18	0	1	0
18	72		8	0	0	2	22	0	1	4
19	76		8	4	0	3	1	0	1	8
20	80		8	8	0	3	5	0	1	12
21	84		9	3	0	3	9	0	1	16
22	88		9	7	0	3	13	0	1	20
23	92		10	2	0	3	17	0	1	24
24	96		10	6	0	3	21	0	1	28
25	100		11	1	1	0	0	1	32	
26	104		11	5	1	0	4	0	1	36
27	108		12	0	1	0	8	0	1	40
28	112		12	4	1	0	12	0	1	44
29	116		12	8	1	0	16	0	1	48
30	120		13	3	1	0	20	0	1	52
31	124		13	7	1	0	24	0	1	56
32	128		14	2	1	1	3	0	1	60
33	132		14	6	1	1	7	0	1	64
34	136		15	1	1	1	11	0	2	0
35	140		15	5	1	1	15	0	2	4
36	144		16	0	1	1	19	0	2	8
37	148		16	4	1	1	23	0	2	12
38	152		16	8	1	2	2	0	2	16
39	156		17	3	1	2	6	0	2	20
40	160		17	7	1	2	10	0	2	24
41	164		18	2	1	2	14	0	2	28
42	168		18	6	1	2	18	0	2	32
43	172		19	1	1	2	22	0	2	36
44	176		19	5	1	3	1	0	2	40
45	180		20	0	1	3	5	0	2	44
46	184		20	4	1	3	9	0	2	48
47	188		20	8	1	3	13	0	2	52
48	192		21	3	1	3	17	0	2	56
49	196		21	7	1	3	21	0	2	60
50	200		22	2	2	0	0	0	2	64

4 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	204		22	6	2	0	4	0	3	0
52	208		23	1	2	0	8	0	3	4
53	212		23	5	2	0	12	0	3	8
54	216		24	0	2	0	16	0	3	12
55	220		24	4	2	0	20	0	3	16
56	224		24	8	2	0	24	0	3	20
57	228		25	3	2	1	3	0	3	24
58	232		25	7	2	1	7	0	3	28
59	236		26	2	2	1	11	0	3	32
60	240		26	6	2	1	15	0	3	36
61	244		27	1	2	1	19	0	3	40
62	248		27	5	2	1	23	0	3	44
63	252		28	0	2	2	2	0	3	48
64	256		28	4	2	2	6	0	3	52
65	260		28	8	2	2	10	0	3	56
66	264		29	3	2	2	14	0	3	60
67	268		29	7	2	2	18	0	3	64
68	272		30	2	2	2	22	1	0	0
69	276		30	6	2	3	1	1	0	4
70	280		31	1	2	3	5	1	0	8
71	284		31	5	2	3	9	1	0	12
72	288		32	0	2	3	13	1	0	16
73	292		32	4	2	3	17	1	0	20
74	296		32	8	2	3	21	1	0	24
75	300		33	3	3	0	0	1	0	28
76	304		33	7	3	0	4	1	0	32
77	308		34	2	3	0	8	1	0	36
78	312		34	6	3	0	12	1	0	40
79	316		35	1	3	0	16	1	0	44
80	320		35	5	3	0	20	1	0	48
81	324		36	0	3	0	24	1	0	52
82	328		36	4	3	1	3	1	0	56
83	332		36	8	3	1	7	1	0	60
84	336		37	3	3	1	11	1	0	64
85	340		37	7	3	1	15	1	1	0
86	344		38	2	3	1	19	1	1	4
87	348		38	6	3	1	23	1	1	8
88	352		39	1	3	2	2	1	1	12
89	356		39	5	3	2	6	1	1	16
90	360		40	0	3	2	10	1	1	20
91	364		40	4	3	2	14	1	1	24
92	368		40	8	3	2	18	1	1	28
93	372		41	3	3	2	22	1	1	32
94	376		41	7	3	3	1	1	1	36
95	380		42	2	3	3	5	1	1	40
96	384		42	6	3	3	9	1	1	44
97	388		43	1	3	3	13	1	1	48
98	392		43	5	3	3	17	1	1	52
99	396		44	0	3	4	21	1	1	56
100	400		44	4	4	0	0	1	1	60

5 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	5	0	5	0	0	0	5	0	0	5
2	10	1	1	0	0	0	10	0	0	10
3	15	1	6	0	0	0	15	0	0	15
4	20	2	2	0	0	0	20	0	0	20
5	25	2	7	0	1	0	0	0	0	25
6	30	3	3	0	1	5	0	0	0	30
7	35	3	8	0	1	10	0	0	0	35
8	40	4	4	0	1	15	0	0	0	40
9	45	5	0	1	20	0	0	0	0	45
10	50	5	5	0	2	0	0	0	0	50
11	55	6	1	0	2	5	0	0	0	55
12	60	6	6	0	2	10	0	0	0	60
13	65	7	2	0	2	15	0	0	0	65
14	70	7	7	0	2	20	0	1	0	70
15	75	8	9	0	3	0	0	1	0	75
16	80	8	8	0	3	5	0	1	0	80
17	85	9	4	0	3	10	0	1	0	85
18	90	10	0	0	3	15	0	1	0	90
19	95	10	5	0	3	20	0	1	0	95
20	100	11	1	1	0	0	0	1	0	100
21	105	11	6	1	0	5	0	1	0	105
22	110	12	2	1	0	10	0	1	0	110
23	115	12	7	1	0	15	0	1	0	115
24	120	13	3	1	0	20	0	1	0	120
25	125	13	8	1	1	0	0	1	0	125
26	130	14	4	1	1	5	0	1	0	130
27	135	15	0	1	1	10	0	1	0	135
28	140	15	5	1	1	15	0	2	0	140
29	145	16	1	1	1	20	0	2	0	145
30	150	16	6	1	2	0	0	2	0	150
31	155	17	2	1	2	5	0	2	0	155
32	160	17	7	1	2	10	0	2	0	160
33	165	18	3	1	2	15	0	2	0	165
34	170	18	8	1	2	20	0	2	0	170
35	175	19	4	1	3	0	0	2	0	175
36	180	20	0	1	3	5	0	2	0	180
37	185	20	5	1	3	10	0	2	0	185
38	190	21	1	1	3	15	0	2	0	190
39	195	21	6	1	3	20	0	2	0	195
40	200	22	2	2	0	0	0	2	0	200
41	205	22	7	2	0	5	0	3	0	205
42	210	23	3	2	0	10	0	3	0	210
43	215	23	8	2	0	15	0	3	0	215
44	220	24	4	2	0	20	0	3	0	220
45	225	25	0	2	1	0	0	3	0	225
46	230	25	5	2	1	5	0	3	0	230
47	235	26	1	2	1	10	0	3	0	235
48	240	26	6	2	1	15	0	3	0	240
49	245	27	2	2	1	20	0	3	0	245
50	250	27	7	2	2	0	0	3	0	250

5 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	255	28	3	2	2	5	0	3	0	51
52	260	28	8	2	2	10	0	3	0	52
53	265	29	4	2	2	15	0	3	0	53
54	270	30	0	2	2	20	0	3	0	54
55	275	30	5	2	3	0	0	0	0	55
56	280	31	1	2	3	5	1	0	0	56
57	285	31	6	2	3	10	1	0	0	57
58	290	32	2	2	3	15	1	0	0	58
59	295	32	7	2	3	20	1	0	0	59
60	300	33	3	3	0	0	1	0	0	60
61	305	33	8	3	0	5	1	0	0	61
62	310	34	4	3	0	10	1	0	0	62
63	315	35	0	3	0	15	1	0	0	63
64	320	35	5	3	0	20	1	0	0	64
65	325	36	1	3	1	0	1	0	0	65
66	330	36	6	3	1	5	1	0	0	66
67	335	37	2	3	1	10	1	0	0	67
68	340	37	7	3	1	15	1	0	0	68
69	345	38	3	3	1	20	1	0	0	69
70	350	38	8	3	2	0	1	1	0	70
71	355	39	4	3	2	5	1	1	0	71
72	360	40	0	3	2	10	1	1	0	72
73	365	40	5	3	2	15	1	1	0	73
74	370	41	1	3	2	20	1	1	0	74
75	375	41	6	3	3	0	1	1	0	75
76	380	42	2	3	3	5	1	1	0	76
77	385	42	7	3	3	10	1	1	0	77
78	390	43	3	3	3	15	1	1	0	78
79	395	43	8	3	3	20	1	1	0	79
80	400	44	4	4	0	0	1	1	0	80
81	405	45	0	4	0	5	1	1	0	81
82	410	45	5	4	0	10	1	2	0	82
83	415	46	1	4	0	15	1	2	0	83
84	420	46	6	4	0	20	1	2	0	84
85	425	47	2	4	1	0	1	2	0	85
86	430	47	7	4	1	5	1	2	0	86
87	435	48	3	4	1	10	1	2	0	87
88	440	48	8	4	1	15	1	2	0	88
89	445	49	4	4	1	20	1	2	0	89
90	450	50	0	4	2	0	1	2	0	90
91	455	50	5	4	2	5	1	2	0	91
92	460	51	1	4	2	10	1	2	0	92
93	465	51	6	4	2	15	1	2	0	93
94	470	52	2	4	2	20	1	2	0	94
95	475	52	7	4	3	0	1	2	0	95
96	480	53	3	4	3	5	1	3	0	96
97	485	53	8	4	3	10	1	3	0	97
98	490	54	4	4	3	15	1	3	0	98
99	495	55	0	4	3	20	1	3	0	99
100	500	55	5	5	0	0	1	3	0	100

6 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	6		0	6	0	0	6	0	0	6
2	12		1	3	0	0	12	0	0	12
3	18		2	0	0	0	18	0	0	18
4	24		2	6	0	0	24	0	0	24
5	30		3	3	0	0	30	0	0	30
6	36		4	0	0	0	36	0	0	36
7	42		4	6	0	0	42	0	0	42
8	48		5	3	0	0	48	0	0	48
9	54		6	0	0	0	54	0	0	54
10	60		6	6	0	0	60	0	0	60
11	66		7	3	0	0	66	0	0	66
12	72		8	0	0	0	72	0	0	72
13	78		8	6	0	0	78	0	0	78
14	84		9	3	0	0	84	0	0	84
15	90		10	0	0	0	90	0	0	90
16	96		10	6	0	0	96	0	0	96
17	102		11	3	0	0	102	0	0	102
18	108		12	0	0	0	108	0	0	108
19	114		12	6	0	0	114	0	0	114
20	120		13	3	0	0	120	0	0	120
21	126		14	0	0	0	126	0	0	126
22	132		14	6	0	0	132	0	0	132
23	138		15	3	0	0	138	0	0	138
24	144		16	0	0	0	144	0	0	144
25	150		16	6	0	0	150	0	0	150
26	156		17	3	0	0	156	0	0	156
27	162		18	0	0	0	162	0	0	162
28	168		18	6	0	0	168	0	0	168
29	174		19	3	0	0	174	0	0	174
30	180		20	0	0	0	180	0	0	180
31	186		20	6	0	0	186	0	0	186
32	192		21	3	0	0	192	0	0	192
33	198		22	0	0	0	198	0	0	198
34	204		22	6	0	0	204	0	0	204
35	210		23	3	0	0	210	0	0	210
36	216		24	0	0	0	216	0	0	216
37	222		24	6	0	0	222	0	0	222
38	228		25	3	0	0	228	0	0	228
39	234		26	0	0	0	234	0	0	234
40	240		26	6	0	0	240	0	0	240
41	246		27	3	0	0	246	0	0	246
42	252		28	0	0	0	252	0	0	252
43	258		28	6	0	0	258	0	0	258
44	264		29	3	0	0	264	0	0	264
45	270		30	0	0	0	270	0	0	270
46	276		30	6	0	0	276	0	0	276
47	282		31	3	0	0	282	0	0	282
48	288		32	0	0	0	288	0	0	288
49	294		32	6	0	0	294	0	0	294
50	300		33	3	0	0	300	0	0	300

6 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	306		34	0	0	0	306	0	0	306
52	312		34	6	0	0	312	0	0	312
53	318		35	3	0	0	318	0	0	318
54	324		36	0	0	0	324	0	0	324
55	330		36	6	0	0	330	0	0	330
56	336		37	3	0	0	336	0	0	336
57	342		38	0	0	0	342	0	0	342
58	348		38	6	0	0	348	0	0	348
59	354		39	3	0	0	354	0	0	354
60	360		40	0	0	0	360	0	0	360
61	366		40	6	0	0	366	0	0	366
62	372		41	3	0	0	372	0	0	372
63	378		42	0	0	0	378	0	0	378
64	384		42	6	0	0	384	0	0	384
65	390		43	3	0	0	390	0	0	390
66	396		44	0	0	0	396	0	0	396
67	402		44	6	0	0	402	0	0	402
68	408		45	3	0	0	408	0	0	408
69	414		46	0	0	0	414	0	0	414
70	420		46	6	0	0	420	0	0	420
71	426		47	3	0	0	426	0	0	426
72	432		48	0	0	0	432	0	0	432
73	438		48	6	0	0	438	0	0	438
74	444		49	3	0	0	444	0	0	444
75	450		50	0	0	0	450	0	0	450
76	456		50	6	0	0	456	0	0	456
77	462		51	3	0	0	462	0	0	462
78	468		52	0	0	0	468	0	0	468
79	474		52	6	0	0	474	0	0	474
80	480		53	3	0	0	480	0	0	480
81	486		54	0	0	0	486	0	0	486
82	492		54	6	0	0	492	0	0	492
83	498		55	3	0	0	498	0	0	498
84	504		56	0	0	0	504	0	0	504
85	510		56	6	0	0	510	0	0	510
86	516		57	3	0	0	516	0	0	516
87	522		58	0	0	0	522	0	0	522
88	528		58	6	0	0	528	0	0	528
89	534		59	3	0	0	534	0	0	534
90	540		60	0	0	0	540	0	0	540
91	546		60	6	0	0	546	0	0	546
92	552		61	3	0	0	552	0	0	552
93	558		62	0	0	0	558	0	0	558
94	564		62	6	0	0	564	0	0	564
95	570		63	3	0	0	570	0	0	570
96	576		64	0	0	0	576	0	0	576
97	582		64	6	0	0	582	0	0	582
98	588		65	3	0	0	588	0	0	588
99	594		66	0	0	0	594	0	0	594
100	600		66	6	0	0	600	0	0	600

7 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	7	0	7	0	0	0	7	0	0	7
2	14	1	5	0	0	0	14	0	0	17
3	21	2	3	0	0	0	21	0	0	21
4	28	3	1	0	1	3	0	0	0	28
5	35	3	8	0	1	10	0	0	3	35
6	42	4	6	0	1	17	0	0	4	42
7	49	5	4	0	1	24	0	0	4	49
8	56	6	2	0	2	6	0	0	5	56
9	63	7	0	0	2	13	0	0	5	63
10	70	7	7	0	2	20	0	1	2	70
11	77	8	5	0	3	2	0	1	9	77
12	84	9	3	0	3	9	0	1	16	84
13	91	10	1	0	3	16	0	1	23	91
14	98	10	8	0	3	23	0	1	30	98
15	105	11	6	1	0	5	0	1	37	105
16	112	12	4	1	0	12	0	1	44	112
17	119	13	2	1	0	19	0	1	51	119
18	126	14	0	1	1	1	0	1	58	126
19	133	14	7	1	1	8	0	1	65	133
20	140	15	5	1	1	15	0	2	4	140
21	147	16	3	1	1	22	0	2	11	147
22	154	17	1	1	2	4	0	2	18	154
23	161	17	8	1	2	11	0	2	25	161
24	168	18	6	1	2	18	0	2	32	168
25	175	19	4	1	3	0	0	2	39	175
26	182	20	2	1	3	7	0	2	46	182
27	189	21	0	1	3	14	0	2	53	189
28	196	21	7	1	3	21	0	2	60	196
29	203	22	5	2	0	3	0	2	67	203
30	210	23	3	2	0	10	0	3	6	210
31	217	24	1	2	0	17	0	3	13	217
32	224	24	8	2	0	24	0	3	20	224
33	231	25	6	2	1	6	0	3	27	231
34	238	26	4	2	1	13	0	3	34	238
35	245	27	2	2	1	20	0	3	41	245
36	252	28	0	2	2	2	0	3	48	252
37	259	28	7	2	2	9	0	3	55	259
38	266	29	5	2	2	16	0	3	62	266
39	273	30	3	2	2	23	1	0	1	273
40	280	31	1	2	3	5	1	0	8	280
41	287	32	8	2	3	12	1	0	15	287
42	294	32	6	2	3	19	1	0	22	294
43	301	33	4	3	0	1	1	0	29	301
44	308	34	2	3	0	8	1	0	36	308
45	315	35	0	3	0	15	1	0	43	315
46	322	35	7	3	0	22	1	0	50	322
47	329	36	5	3	1	4	1	0	57	329
48	336	37	3	3	1	11	1	0	64	336
49	343	38	1	3	1	18	1	1	3	343
50	350	38	8	3	2	0	1	1	10	350

7 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	357	39	6	3	2	0	7	1	1	17
52	364	40	4	3	2	0	14	1	1	24
53	371	41	2	3	2	0	21	1	1	31
54	378	42	0	3	3	0	3	1	1	38
55	385	42	7	3	3	10	1	1	45	385
56	392	43	5	3	3	17	1	1	52	392
57	399	44	3	3	3	24	1	1	59	399
58	406	45	1	4	0	6	1	1	66	406
59	413	45	8	4	0	13	1	2	5	413
60	420	46	6	4	0	20	1	2	12	420
61	427	47	4	4	1	2	1	2	19	427
62	434	48	2	4	1	9	1	2	26	434
63	441	49	0	4	1	16	1	2	33	441
64	448	49	7	4	1	23	1	2	40	448
65	455	50	5	4	2	5	1	2	47	455
66	462	51	3	4	2	12	1	2	54	462
67	469	52	1	4	2	19	1	2	61	469
68	476	52	8	4	3	1	1	3	0	476
69	483	53	6	4	3	8	1	3	7	483
70	490	54	4	4	3	15	1	3	14	490
71	497	55	2	4	3	22	1	3	21	497
72	504	56	0	5	0	4	1	3	28	504
73	511	56	7	5	0	11	1	3	35	511
74	518	57	5	5	0	18	1	3	42	518
75	525	58	3	5	1	0	1	3	49	525
76	532	59	1	5	1	7	1	3	56	532
77	539	59	8	5	1	14	1	3	63	539
78	546	60	6	5	1	21	2	0	2	546
79	553	61	4	5	2	3	2	0	9	553
80	560	62	2	5	2	10	2	0	16	560
81	567	63	0	5	2	17	2	0	23	567
82	574	63	7	5	2	24	2	0	30	574
83	581	64	5	5	3	6	2	0	37	581
84	588	65	3	5	3	13	2	0	44	588
85	595	66	1	5	3	20	2	0	51	595
86	602	66	8	6	0	2	2	0	58	602
87	609	67	6	6	0	9	2	0	65	609
88	616	68	4	6	0	16	2	1	4	616
89	623	69	2	6	0	23	2	1	11	623
90	630	70	0	6	1	5	2	1	18	630
91	637	70	7	6	1	12	2	1	25	637
92	644	71	5	6	1	19	2	1	32	644
93	651	72	3	6	2	1	2	1	39	651
94	658	73	1	6	2	2	2	1	46	658
95	665	74	8	6	2	15	2	1	53	665
96	672	74	6	6	2	22	2	1	60	672
97	679	75	4	6	3	4	2	1	67	679
98	686	76	2	6	3	11	2	2	6	686
99	693	77	0	6	3	18	2	2	13	693
100	700	77	7	7	0	0	2	2	20	700

8 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	8		0	8	0	0	8	0	0	8
2	16		1	7	0	0	16	0	0	16
3	24		2	6	0	0	24	0	0	24
4	32		3	5	0	1	7	0	0	32
5	40		4	4	0	1	15	0	0	40
6	48		5	3	0	1	22	0	0	48
7	56		6	2	0	2	6	0	0	56
8	64		7	1	0	2	14	0	0	64
9	72		8	0	0	2	22	0	1	4
10	80		8	8	0	3	5	0	1	12
11	88		9	7	0	3	13	0	1	20
12	96		10	6	0	3	21	0	1	28
13	104		11	5	1	0	4	0	1	36
14	112		12	4	1	0	12	0	1	44
15	120		13	3	1	0	20	0	1	52
16	128		14	2	1	1	3	0	1	60
17	136		15	1	1	1	11	0	2	0
18	144		16	0	1	1	19	0	2	8
19	152		16	8	1	2	2	0	2	16
20	160		17	7	1	2	10	0	2	24
21	168		18	6	1	2	18	0	2	32
22	176		19	5	1	3	1	0	2	40
23	184		20	4	1	3	9	0	2	48
24	192		21	3	1	3	17	0	2	56
25	200		22	2	2	0	0	0	2	64
26	208		23	1	2	0	8	0	3	4
27	216		24	0	2	0	16	0	3	12
28	224		24	8	2	0	24	0	3	20
29	232		25	7	2	1	7	0	3	28
30	240		26	6	2	1	15	0	3	36
31	248		27	5	2	1	22	0	3	44
32	256		28	4	2	2	6	0	3	52
33	264		29	3	2	2	14	0	3	60
34	272		30	2	2	2	22	1	0	0
35	280		31	1	2	3	5	1	0	8
36	288		32	0	2	3	13	1	0	16
37	296		32	8	2	3	21	1	0	24
38	304		33	7	3	0	4	1	0	32
39	312		34	6	3	0	12	1	0	40
40	320		35	5	3	0	20	1	0	48
41	328		36	4	3	1	3	1	0	56
42	336		37	3	3	1	11	1	0	64
43	344		38	2	3	1	19	1	1	4
44	352		39	1	3	2	2	1	1	12
45	360		40	0	3	2	10	1	1	20
46	368		40	8	3	2	18	1	1	28
47	376		41	7	3	3	1	1	1	36
48	384		42	6	3	3	9	1	1	44
49	392		43	5	3	3	17	1	1	52
50	400		44	4	4	0	0	1	1	60

8 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.			
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.	
51	408		45	3	4	0	0	8	1	2	0
52	416		46	2	4	0	0	16	1	2	8
53	424		47	1	4	0	0	24	1	2	16
54	432		48	0	4	1	7	1	2	24	32
55	440		48	8	4	1	15	1	2	32	40
56	448		49	7	4	1	23	1	2	40	48
57	456		50	6	4	2	6	1	2	48	56
58	464		51	5	4	2	14	1	2	56	64
59	472		52	4	4	2	22	1	2	64	72
60	480		53	3	4	3	5	1	3	4	80
61	488		54	2	4	3	13	1	3	12	88
62	496		55	1	4	3	21	1	3	20	96
63	504		56	0	4	3	0	4	1	3	28
64	512		56	8	5	0	12	1	3	36	36
65	520		57	7	5	0	20	1	3	44	44
66	528		58	6	5	1	3	1	3	52	52
67	536		59	5	5	1	11	1	3	60	60
68	544		60	4	5	1	19	2	0	0	68
69	552		61	3	5	2	0	2	0	0	76
70	560		62	2	5	2	0	10	2	0	84
71	568		63	1	5	2	0	18	2	0	92
72	576		64	0	5	3	1	2	0	32	100
73	584		64	8	5	3	9	2	0	40	
74	592		65	7	5	3	17	2	0	48	
75	600		66	6	6	0	0	2	0	56	
76	608		67	5	6	0	8	2	0	64	
77	616		68	4	6	0	16	2	0	72	
78	624		69	3	6	0	24	2	0	80	
79	632		70	2	6	1	7	2	1	20	
80	640		71	1	6	1	15	2	1	28	
81	648		72	0	6	1	23	2	1	36	
82	656		72	8	6	2	0	6	2	1	44
83	664		73	7	6	2	14	2	1	52	
84	672		74	6	6	2	22	2	1	60	
85	680		75	5	6	3	5	2	2	0	68
86	688		76	4	6	3	13	2	2	76	
87	696		77	3	6	3	21	2	2	84	
88	704		78	2	7	0	4	2	2	92	
89	712		79	1	7	0	12	2	2	100	
90	720		80	0	7	0	20	2	2		
91	728		80	8	7	1	3	2	2		
92	736		81	7	7	1	11	2	2		
93	744		82	6	7	1	19	2	2		
94	752		83	5	7	2	2	2	3		
95	760		84	4	7	2	10	2	3		
96	768		85	3	7	2	18	2	3		
97	776		86	2	7	3	1	2	3		
98	784		87	1	7	3	9	2	3		
99	792		88	0	7	3	17	2	3		
100	800		89	8	8	0	0	2	3		

9 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet.		T.	F.	S.	Q.	F.	R.	Q.	F.
1	9		3	0	0	0	9	0	0	9
2	18		6	0	0	0	18	0	0	18
3	27		9	0	0	0	27	0	0	27
4	36		12	0	0	0	36	0	0	36
5	45		15	0	0	0	45	0	0	45
6	54		18	0	0	0	54	0	0	54
7	63		21	0	0	0	63	0	0	63
8	72		24	0	0	0	72	0	0	72
9	81		27	0	0	0	81	0	0	81
10	90		30	0	0	0	90	0	0	90
11	99		33	0	0	0	99	0	0	99
12	108		36	0	0	0	108	0	0	108
13	117		39	0	0	0	117	0	0	117
14	126		42	0	0	0	126	0	0	126
15	135		45	0	0	0	135	0	0	135
16	144		48	0	0	0	144	0	0	144
17	153		51	0	0	0	153	0	0	153
18	162		54	0	0	0	162	0	0	162
19	171		57	0	0	0	171	0	0	171
20	180		60	0	0	0	180	0	0	180
21	189		63	0	0	0	189	0	0	189
22	198		66	0	0	0	198	0	0	198
23	207		69	0	0	0	207	0	0	207
24	216		72	0	0	0	216	0	0	216
25	225		75	0	0	0	225	0	0	225
26	234		78	0	0	0	234	0	0	234
27	243		81	0	0	0	243	0	0	243
28	252		84	0	0	0	252	0	0	252
29	261		87	0	0	0	261	0	0	261
30	270		90	0	0	0	270	0	0	270
31	279		93	0	0	0	279	0	0	279
32	288		96	0	0	0	288	0	0	288
33	297		99	0	0	0	297	0	0	297
34	306		102	0	0	0	306	0	0	306
35	315		105	0	0	0	315	0	0	315
36	324		108	0	0	0	324	0	0	324
37	333		111	0	0	0	333	0	0	333
38	342		114	0	0	0	342	0	0	342
39	351		117	0	0	0	351	0	0	351
40	360		120	0	0	0	360	0	0	360
41	369		123	0	0	0	369	0	0	369
42	378		126	0	0	0	378	0	0	378
43	387		129	0	0	0	387	0	0	387
44	396		132	0	0	0	396	0	0	396
45	405		135	0	0	0	405	0	0	405
46	414		138	0	0	0	414	0	0	414
47	423		141	0	0	0	423	0	0	423
48	432		144	0	0	0	432	0	0	432
49	441		147	0	0	0	441	0	0	441
50	450		150	0	0	0	450	0	0	450

9 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet.		T.	F.	S.	Q.	F.	R.	Q.	F.
51	459		153	0	4	2	9	1	2	51
52	468		156	0	4	2	18	1	2	60
53	477		159	0	4	3	3	1	2	1
54	486		162	0	4	3	11	1	3	10
55	495		165	0	4	3	20	1	3	19
56	504		168	0	5	0	4	1	3	28
57	513		171	0	5	0	13	1	3	37
58	522		174	0	5	0	22	1	3	46
59	531		177	0	5	1	6	1	3	55
60	540		180	0	5	1	15	1	3	64
61	549		183	0	5	1	24	2	0	4
62	558		186	0	5	2	8	2	0	13
63	567		189	0	5	2	17	2	0	22
64	576		192	0	5	3	1	2	0	31
65	585		195	0	5	3	10	2	0	40
66	594		198	0	5	3	19	2	0	49
67	603		201	0	6	0	3	2	0	58
68	612		204	0	6	0	12	2	0	67
69	621		207	0	6	0	21	2	1	8
70	630		210	0	6	1	5	2	1	17
71	639		213	0	6	1	14	2	1	26
72	648		216	0	6	1	23	2	1	35
73	657		219	0	6	2	7	2	1	44
74	666		222	0	6	2	16	2	1	53
75	675		225	0	6	3	0	2	1	62
76	684		228	0	6	3	9	2	2	4
77	693		231	0	6	3	18	2	2	13
78	702		234	0	7	0	2	2	2	22
79	711		237	0	7	0	11	2	2	31
80	720		240	0	7	0	20	2	2	40
81	729		243	0	7	1	4	2	2	49
82	738		246	0	7	1	13	2	2	58
83	747		249	0	7	1	22	2	2	67
84	756		252	0	7	2	6	2	3	8
85	765		255	0	7	2	15	2	3	17
86	774		258	0	7	2	24	2	3	26
87	783		261	0	7	3	8	2	3	35
88	792		264	0	7	3	17	2	3	44
89	801		267	0	8	0	1	2	3	53
90	810		270	0	8	0	10	2	3	62
91	819		273	0	8	0	19	3	0	3
92	828		276	0	8	1	3	3	0	12
93	837		279	0	8	1	12	3	0	21
94	846		282	0	8	1	21	3	0	30
95	855		285	0	8	2	5	3	0	39
96	864		288	0	8	2	14	3	0	48
97	873		291	0	8	2	23	3	0	57
98	882		294	0	8	3	7	3	0	66
99	891		297	0	8	3	16	3	1	7
100	900		300	0	9	0	0	3	1	16

10 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
1	10		1	0	0	0	10	0	0	10
2	20		2	0	0	0	20	0	0	20
3	30		3	0	0	0	30	0	0	30
4	40		4	0	0	0	40	0	0	40
5	50		5	0	0	0	50	0	0	50
6	60		6	0	0	0	60	0	0	60
7	70		7	0	0	0	70	0	0	70
8	80		8	0	0	0	80	0	0	80
9	90		9	0	0	0	90	0	0	90
10	100		10	0	0	0	100	0	0	100
11	110		11	0	0	0	110	0	0	110
12	120		12	0	0	0	120	0	0	120
13	130		13	0	0	0	130	0	0	130
14	140		14	0	0	0	140	0	0	140
15	150		15	0	0	0	150	0	0	150
16	160		16	0	0	0	160	0	0	160
17	170		17	0	0	0	170	0	0	170
18	180		18	0	0	0	180	0	0	180
19	190		19	0	0	0	190	0	0	190
20	200		20	0	0	0	200	0	0	200
21	210		21	0	0	0	210	0	0	210
22	220		22	0	0	0	220	0	0	220
23	230		23	0	0	0	230	0	0	230
24	240		24	0	0	0	240	0	0	240
25	250		25	0	0	0	250	0	0	250
26	260		26	0	0	0	260	0	0	260
27	270		27	0	0	0	270	0	0	270
28	280		28	0	0	0	280	0	0	280
29	290		29	0	0	0	290	0	0	290
30	300		30	0	0	0	300	0	0	300
31	310		31	0	0	0	310	0	0	310
32	320		32	0	0	0	320	0	0	320
33	330		33	0	0	0	330	0	0	330
34	340		34	0	0	0	340	0	0	340
35	350		35	0	0	0	350	0	0	350
36	360		36	0	0	0	360	0	0	360
37	370		37	0	0	0	370	0	0	370
38	380		38	0	0	0	380	0	0	380
39	390		39	0	0	0	390	0	0	390
40	400		40	0	0	0	400	0	0	400
41	410		41	0	0	0	410	0	0	410
42	420		42	0	0	0	420	0	0	420
43	430		43	0	0	0	430	0	0	430
44	440		44	0	0	0	440	0	0	440
45	450		45	0	0	0	450	0	0	450
46	460		46	0	0	0	460	0	0	460
47	470		47	0	0	0	470	0	0	470
48	480		48	0	0	0	480	0	0	480
49	490		49	0	0	0	490	0	0	490
50	500		50	0	0	0	500	0	0	500

10 Foot Long, or Broad.

	Feet		Yards.		Squares.			Rods.		
	Feet		T.	F.	S.	Q.	F.	R.	Q.	F.
51	510		51	0	0	0	510	0	0	510
52	520		52	0	0	0	520	0	0	520
53	530		53	0	0	0	530	0	0	530
54	540		54	0	0	0	540	0	0	540
55	550		55	0	0	0	550	0	0	550
56	560		56	0	0	0	560	0	0	560
57	570		57	0	0	0	570	0	0	570
58	580		58	0	0	0	580	0	0	580
59	590		59	0	0	0	590	0	0	590
60	600		60	0	0	0	600	0	0	600
61	610		61	0	0	0	610	0	0	610
62	620		62	0	0	0	620	0	0	620
63	630		63	0	0	0	630	0	0	630
64	640		64	0	0	0	640	0	0	640
65	650		65	0	0	0	650	0	0	650
66	660		66	0	0	0	660	0	0	660
67	670		67	0	0	0	670	0	0	670
68	680		68	0	0	0	680	0	0	680
69	690		69	0	0	0	690	0	0	690
70	700		70	0	0	0	700	0	0	700
71	710		71	0	0	0	710	0	0	710
72	720		72	0	0	0	720	0	0	720
73	730		73	0	0	0	730	0	0	730
74	740		74	0	0	0	740	0	0	740
75	750		75	0	0	0	750	0	0	750
76	760		76	0	0	0	760	0	0	760
77	770		77	0	0	0	770	0	0	770
78	780		78	0	0	0	780	0	0	780
79	790		79	0	0	0	790	0	0	790
80	800		80	0	0	0	800	0	0	800
81	810		81	0	0	0	810	0	0	810
82	820		82	0	0	0	820	0	0	820
83	830		83	0	0	0	830	0	0	830
84	840		84	0	0	0	840	0	0	840
85	850		85	0	0	0	850	0	0	850
86	860		86	0	0	0	860	0	0	860
87	870		87	0	0	0	870	0	0	870
88	880		88	0	0	0	880	0	0	880
89	890		89	0	0	0	890	0	0	890
90	900		90	0	0	0	900	0	0	900
91	910		91	0	0	0	910	0	0	910
92	920		92	0	0	0	920	0	0	920
93	930		93	0	0	0	930	0	0	930
94	940		94	0	0	0	940	0	0	940
95	950		95	0	0	0	950	0	0	950
96	960		96	0	0	0	960	0	0	960
97	970		97	0	0	0	970	0	0	970
98	980		98	0	0	0	980	0	0	980
99	990		99	0	0	0	990	0	0	990
100	1000		100	0	0	0	1000	0	0	1000

The Explanation and Use of the TABLE.

IT consisteth of ten Pages: At the head of each Page is [1 Foot broad.] [2 Foot broad] [3 Foot broad, &c.] to [10 Foot broad.]

Then, on the Side of each Page, in the first Row, or Column thereof, (that next the left hand) is set down the number of Feet that any thing measured is in Length, beginning at One Foot, 2 Foot, 3 Foot, &c. to 50 Foot Long: And in another Row (or Column) in the Middle of the Page, the same number of Feet Long is continued from 50, 51, 52, 53, &c. to 100 Foot Long.

Then in the other Columns are contained.

1.	} How } many	Square Feet	} Any thing } measured } doth con- } tain.
2.		Square Yards and Feet	
3.		Square Squares, Quarters, and odd Feet	
4.		Square Rods, Quarters, and odd Feet	

As for Example.

I. A Walk or Causeway, Paved with Free Stone, is 7 Foot Broad, and 39 Foot Long, How many Square Feet is contained in that Walk?

Look for 7 Foot at the Head of the Table; and for 39 Foot in the first Column; then, under 7 Foot, and against 39 Foot, you shall find this Number 273, And so many Square Feet is contained in that Walk or Pavement.

II. There is a Room Wainscoted which is 8 Foot High, and the Girt about the same Room is 71 Foot; How many Yards of Wainscot doth that Room contain?

Look for 8 Foot at the Head of the Table; and for 71 Foot in the Column in the middle of the Page, and against 71 and under 8 Foot, you shall find 63 Yards 00 Quarters, and 1 Foot: And so much doth the Room contain.

III. There is a Room or Gallery Floor'd with Boards, which is 97 Foot Long, and 9 Foot Broad; How many Square of Flooring is there in that Room?

Look for 9 Foot in the Head of the Table, and for 97 Foot in the Column in the middle of the Page; and right against 97, and under 9 Foot you will find these Numbers, 8. 2. 23 which is 8 Square, 2 Quarters (or half) and 23 Foot; (which is 8 Square and three Quarters, wanting 2 Foot) and so much Flooring is in that Room or Gallery.

IV. There is a Brick-wall which is 45 Foot Long, and 9 Foot High; How many Rods of Brick-work is contained therein?

Look for 9 Foot at the Head of the Table, and under it against 45 Foot in the first Column, you shall find these Numbers, 1. 1. 67, that is, one Rod, one Quarter, and 67 Foot; (which is one Rod and a half, wanting but one Foot) and so much Brickwork is contained in that Wall; which if it be a Brick and a half thick, it needs no Reducement; but if it be either thicker or thinner, then it must be reduced to that thickness by the Rules before given.

These are the general Uses of this Table: But

Note I. If either the Length or the Breadth of the thing measured, be greater than the Numbers at the Head or Side of the Table; then take the half of that Number which is greater, and work with that as before; and the Number so found doubled, will be the true Content: As 87 Foot long, and 16 Foot broad, the half of 16 is 8, look for 8 at the Head of the Table, under which and against 87 you shall find 696, the double of which is 1392 Foot, and so much is the true Content.

Note II. But if both the Numbers be greater than those in the Table, as 168 Foot long, and 18 Foot broad, then take the half of both the Numbers, and work as before, and the Number so found will be one Quarter of the true Content: So, the half of 168 is 84, and the half of 18 is 9; Now, under 9, and against 84, you will find 756 Foot, which is one Quarter, and that taken 4 times, makes 3024 Foot, for the whole Content in Feet.

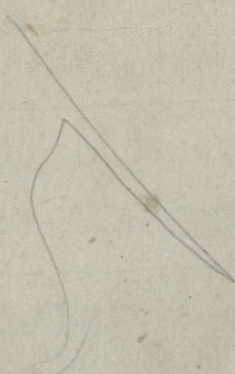
Note III. You are not obliged to take the just half of that Number which is greater than the Table; but for 18 you need not take 9, but 10 and 8. And for 13 take 7 and 6, or 8 and 5, &c.

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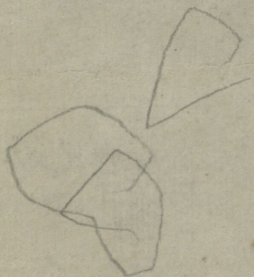
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