# ESTIMATING

NICHOLS

AMERICAN SCHOOL of CORRESPONDENCE
CHICAGO ILLINOIS

**RESIDENCE OF MR. WARREN HICKOX, KANKAKEE, ILL.**

Frank Lloyd Wright, Architect, Oak Park, Ill. Built in 1902.

# Estimating

*A Guide to*

SYSTEMATIC METHODS IN TAKING OFF QUANTITIES AND MAKING UP ESTIMATES OF COST IN BUILDING OPERATIONS, WITH QUOTATIONS OF CURRENT PRICES FOR MATERIALS AND LABOR

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ILLUSTRATED


CHICAGO
AMERICAN SCHOOL OF CORRESPONDENCE
1908

# Foreword

IN recent years, such marvelous advances have been made in the engineering and scientific fields, and so rapid has been the evolution of mechanical and constructive processes and methods, that a distinct need has been created for a series of *practical working guides*, of convenient size and low cost, embodying the accumulated results of experience and the most approved modern practice along a great variety of lines. To fill this acknowledged need, is the special purpose of the series of handbooks to which this volume belongs.

¶ In the preparation of this series, it has been the aim of the publishers to lay special stress on the *practical* side of each subject, as distinguished from mere theoretical or academic discussion. Each volume is written by a well-known expert of acknowledged authority in his special line, and is based on a most careful study of practical needs and up-to-date methods as developed under the conditions of actual practice in the field, the shop, the mill, the power house, the drafting room, the engine room, etc.

¶ These volumes are especially adapted for purposes of self-instruction and home study. The utmost care has been used to bring the treatment of each subject within the range of the com-

mon understanding, so that the work will appeal not only to the technically trained expert, but also to the beginner and the self-taught practical man who wishes to keep abreast of modern progress. The language is simple and clear; heavy technical terms and the formulæ of the higher mathematics have been avoided, yet without sacrificing any of the requirements of practical instruction; the arrangement of matter is such as to carry the reader along by easy steps to complete mastery of each subject; frequent examples for practice are given, to enable the reader to test his knowledge and make it a permanent possession; and the illustrations are selected with the greatest care to supplement and make clear the references in the text.

¶ The method adopted in the preparation of these volumes is that which the American School of Correspondence has developed and employed so successfully for many years. It is not an experiment, but has stood the severest of all tests—that of practical use—which has demonstrated it to be the best method yet devised for the education of the busy working man.

¶ For purposes of ready reference and timely information when needed, it is believed that this series of handbooks will be found to meet every requirement.

# Table of Contents

**FRONT AND REAR VIEWS OF RESIDENCE OF MR. H. T. LOOMIS, MAGNOLIA DRIVE, CLEVELAND, OHIO**

Watterson & Schneider, Architects, Cleveland, Ohio.

Cost, about $35,000. First-Story Walls of McCausland Brick, Made at Akron, Ohio. Roofs of Combination Red Tile.

# ESTIMATING*

## PART I

**Introductory.** The ability to estimate may be considered as the dividing line between the journeyman and the master builder, for, no matter how skilful a mechanic may become, he can never "hang out his shingle" and invite patronage in his distinctive line of work, unless he becomes able to make reliable estimates of material and labor to be furnished. To do this something more than mere accuracy and quickness in figures or a mastery of mathematics is needed; namely: experience and judgment, an understanding of the more or less complicated details which go to make up a building, and a knowledge of current prices and discounts in the trade. It is the object of this paper to point the way toward the acquirement of such of these needs as may be imparted by words or figures; that is, to put in condensed form some of the common methods by which estimates are made up, and to point out some of the things which are to be avoided.

**Prices.** As prices of labor and materials are constantly shifting, those quoted in this paper must be taken only as proportionate, to be used in comparison with known quantities and methods. All prices given are as current in Boston, Mass., in December, 1906, and are subject to immediate change. On account of the variableness in price of labor and materials, it is better, in general, to make estimates on the basis of days or hours, and quantities of materials, so that they may be used for comparison in future work. To this end all estimates should be carefully labelled and filed away for future reference. This should be done whether the bids were successful or otherwise. If a successful bid, there will arise a good opportunity to compare the estimates of cost of the different items, with the actual cost of execution; and if a bid fails to win the job, satisfaction and experience may be gained by noting the items which may have been priced too high or too low. This data may be of great service in preparing future estimates, especially in the comparisons between estimated and actually executed work.

*There is no such a thing as a universal or permanent standard price for anything. Prices vary in different localities at the same time and in the same locality at different times. The estimator must therefore acquaint himself with local market conditions in every case.

**Catalogues.** Catalogues and price lists of all standard articles are easily obtained and should be kept at hand, properly indexed, for ready reference, as they contain a great deal of specific information. For close figuring, however, it will not do to rely upon these prices, as the amounts of trade discounts are not always included. These vary greatly from time to time, and often there are two or more discounts, a trade discount, a cash discount, and a variation in discounts made by different merchants, all of which the contractor must become aware of to obtain bottom prices.

All data of this sort should be carefully tabulated for constant reference, in such a form that it may be easily revised and kept, so far as possible, up to date.

The manner and time of payments is a matter to be considered in this connection, as it will permit the contractor to take advantage of cash discounts, which often make a great difference in the cost of certain materials.

**Profit.** To the actual price of labor and materials must be added the profit and this will need careful consideration. A common method is to add a lump sum to the estimated cost of labor and materials, varying with locality and customer, with the probable sharpness of competition and the circumstances of the contractor. This is a careless method, as it leaves no means for future comparison and no certain knowledge of just what the profits of a given job are.

**Percentage.** A better way is to base the profits upon a percentage of the estimated cost. This will vary, in ordinary cases, from ten to fifteen per cent, ten per cent being the least that should be expected on any work, and this is not enough for small contracts of two or three thousand dollars; but for large work, where there is a great duplication of parts and processes, it will be enough in most cases. Some contractors, whose workmen are required to perform especially skilful labor, figure fifteen per cent on all labor and ten per cent on materials.

**Duplicate Parts.** The matter of duplication is an important factor in estimating, as a considerable saving is often made if large quantities of material, either worked or unworked, are required; this is especially true in manufactured parts, such as doors and windows, columns, balustrades, etc. Modern machines are capable of duplication with astonishing rapidity, and workmen can put together

similar parts more quickly and cheaply than variable members.

**Transportation.** The distance of the work from the shop of the contractor, or from centers of manufacture, will affect the cost to a marked degree, as much time is consumed in teaming and especially in handling material a number of times.

If communication between the works and the building site can be established by water, it will usually save considerable expense for freight and handling, with perhaps less risk of damage, and consequently less expense for crating and boxing. A careful study should be made of the means of transportation to each different building site from the shop, the office, and the mill, and the data kept for future reference, subject to varying rates and conditions, to change of seasons, and amounts to be transported.

These are some of the more important matters which require preliminary consideration as affecting all estimates, and are only a small part of the real questions involved, as different localities and customs require different treatment, and numerous questions will arise to confront the contractor, all of which may be successfully met, as we have seen, by the exercise of care and judgment.

**Methods.** Estimates are formed by many and varying methods, depending upon the degree of accuracy required, the capability of the contractor, and the character of the building. A broad division may be made between approximate estimates and accurate detailed estimates, only the latter of which should be considered when it is the intention to actually carry out the work under a definite contract.

**Approximate Estimates.** Approximate estimates are obtained with varying degrees of accuracy by several methods, the most convenient and reliable of which is the system of *cubing*; i.e., the cubical contents of the proposed building is obtained and multiplied by a given price per cubic foot. This rate is obtained by careful comparison of the plans and requirements with similar buildings which have been erected under conditions as like as possible to the conditions under which the proposed building can be erected.

Several methods are used to determine the cubical units, depending upon the size and shape of the proposed building. One method is to multiply the square feet in the plan of the building by the height from half-way the depth of foundations to half-way up the roof. Another system uses the height from the bottom of the

foundation, and another obtains the actual cubical contents. Any of these may be used if the data for comparison is obtained in the same way, but all are subject to important variations which experience and judgment alone will determine. For instance, if the contour of the building is very uneven, with low portions, such as porches and sheds, and high portions, such as towers and cupolas, these must either be omitted from the whole and compared separately, or a lump sum be added or subtracted according to the size and elaboration of these members.

Another variation arises in the size of rooms, giving a ratio of partitions and division walls which is not constant, and of course a large building with many duplicate parts will require a different rating from a smaller one, so that the method of estimating by cubing is at best approximate, and its degree of accuracy depends largely upon the experience and judgment of the contractor. Even long experience will afford no safe-guard against unusual elaboration of interior or exterior, so that cube rates can only be applied to buildings of ordinary character, and comparisons are only reliable between buildings of like description and uses, as the treatment of even the same materials will vary largely in buildings of varying uses.

The height of the building will not increase the cube rate proportionately, unless the internal voids are alike, although it is certain that the higher one builds from the ground, the more time and expense it requires to put the material in place, to say nothing of thicker walls and necessarily heavier construction.

**Estimating by the Square.** A convenient method of estimating is by the square of one hundred surface feet. This is especially applicable to office buildings, schools, mills, stables, and all buildings where the floors are few in number or similar in plan. For one story buildings the price per square is taken to include the roof, walls, floor, and foundations, but for buildings of two or more stories the price per square should be taken separately for each floor, the lower floor being priced to include the foundations and the top floor to include the roof.

This method of estimating by the square is not so accurate as by cubical contents, but the results are often more convenient and adaptable, because the tabulation of the square area of the various floors may be easily reduced to terms of accommodation for public

buildings or shops. For instance, a given floor area in a school house means accommodation for a certain number of pupils; in a church, a certain number of sittings; in factories for the manufacture of staple goods, a certain number of machines and operatives.

This unit of accommodation is sometimes carried further, and, by the reverse process, made the basis of another method of estimating the approximate cost of such buildings as the above mentioned, i.e., schools, churches, factories, hospitals, etc. This is also a method by comparison, the known data being supplied by previous experience or calculation, and it is often valuable as a means of determining the approximate cost of buildings necessary to accommodate a given number of individuals or machines, even before any definite plans have been drawn. All of these methods are approximate, with varying degrees of accuracy, and should never be advanced as accurate, or used as the basis of a contract, unless the contractor has had a long and varied experience and feels absolutely certain of his judgment, or unless a proper margin is added for possible variations.

**Estimating by Quantities.** The only sure and correct method of estimating is by taking off the actual quantities in detail and carrying out the prices accurately with the cost of labor, the percentage for profit, and contingencies added.

For this, accurate and complete drawings and specifications are necessary to give the absolute quantity and quality of materials and labor. The various items are then taken off, similar portions grouped, the amount of labor estimated, and a complete and classified schedule prepared and priced at current rates; the cost of transportation, board of men, and any other contingencies noted, a percentage of profit added, and a sum total reached which should be correct if faithfully done.

This, of course, takes considerable time, but is well worth the expense and trouble if a definite contract is to be made.

**Preparation.** In order to estimate to a sufficient degree of accuracy, some things other than the possession of plans and specifications are necessary. A visit to the site should be made, to ascertain the nature of the soil, the levels of the lot, the distance from railroad or wharf, the condition of the roads, if a long haul is necessary, and the preparation of the site necessary to receive and dispose of materials. Some knowledge should be obtained of the nature of

the sub-soil, the presence of ledges or water below the surface which will require especial or costly treatment, etc. Often a deposit of sand will be found upon the site which will not only save carting away of material excavated, but, if of proper quality, it may be used for the work. Such items are constantly occurring so that a knowledge of existing conditions will be of great advantage to the estimator.

Regarding underground conditions, there is always an element of chance, as the most thorough examination will not always reveal hidden perils; the author knows of a case where a mason had contracted for the building of a sewer, and was in a fair way to make a good profit, when a narrow vein of quicksand was uncovered, to overcome which not only took away all the anticipated profit but caused a severe loss to the contractor besides.

Ground water is another source of danger and it will be well for the contractor to closely examine his contract, to see to what extent he is to furnish protection from this source, as a vein of water which may have been temporarily stopped or diverted by the operation of building, will sometimes unexpectedly make its presence known during or after the completion of the work, when it may become a source of great annoyance and expense to the contractor if he has agreed to insure a waterproof job. Numerous illustrations could be given of the danger from unforeseen causes which can at best be only partially obviated by the most careful examination.

In order to accurately take off a building either by quantities, square or cube, a good knowledge of arithmetic is necessary; and, while we may assume that the reader already possesses this knowledge, it may be well to include some of the essential rules of that branch of arithmetic which is known as mensuration.

This consists primarily in the science of obtaining definite data regarding given figures or surfaces, such as areas, solids, capacity, linear dimensions, and comparisons of bodies.

**Definitions.** The *area*, or superficial dimension of any figure is the measure of its surface, without regard to its thickness or any other dimension.

The *cubical contents* of any figure is the measure of its solidity, or whole capacity, and has reference to the three dimensions, length, breadth, and thickness.

If the figure is considered as hollow, then the cubical contents becomes its *capacity* or capability of containing matter.

The *linear dimension* of a figure is expressed by its length in a direct line in any direction and has no regard to breadth or thickness.

**Units.** The application of these dimensions is made by fixing a unit by which the figure may be compared and the required dimension obtained; thus, for calculating the area of a figure the unit is usually a square, one side of which is the unit of length, and the area becomes the square measure of the figure.

This is expressed in common terms by square inch, square foot, square yard, or any other given unit and the measure of the surface is computed by obtaining the number of these square units which are contained in the figure, the process being called squaring.

In a similar manner the cubical contents or solidity of a figure is obtained by computing the number of cubical units which it contains, which is called cubing it.

**Rules.** Numerous rules have been adopted for obtaining these dimensions when given dimensions are known, and a tabulation of some of the more important and useful of these follows, by means of which it is hoped that the student may be able to solve most of the ordinary problems which will arise in common practice.

## RULES AND TABLES

### TABLE OF MULTIPLES

| | | |
|---|---|---|
| Circumference | of a circle | = diameter × 3.1416 |
| Area | of a circle | = square of the radius × 3.1416 |
| Area | of a circle | = square of the diameter × 0.7854 |
| Area | of a circle | = square of the circumference × 0.07958 |
| Area | of a circle | = half the circumference × half the diameter |
| Radius | of a circle | = circumference × 0.159155 |
| Radius | of a circle | = square root of the area × 0.56419 |
| Diameter | of a circle | = circumference × 0.31831 |
| Diameter | of a circle | = square root of area × 1.12838 |
| Side of an inscribed square | | = diameter × 0.7071 |
| Side of an inscribed square | | = circumference × 0.2251 |
| Side of an equal square | | = diameter × 0.8862 |
| Area of a triangle | | = base by ½ the altitude |

| | |
|---|---|
| Area of an ellipse | = product of both diameters × .7854 |
| Surface of a sphere | = circumference × diameter |
| Surface of a sphere | = square of the diameter × 3.1416 |
| Surface of a sphere | = square of the circumference × 0.3183 |
| Solid contents of a sphere | = surface × $\frac{1}{6}$ of its diameter |
| Solid contents of a sphere | = cube of diameter × 0.5236 |
| Diameter of a sphere | = square root of surface × 0.56419 |
| Diameter of a sphere | = cube root of solidity × 1.2407 |
| Circumference of a sphere | = cube root of solidity × 3.8978 |
| Solid contents of a cone or pyramid | = area of base × $\frac{1}{3}$ altitude |
| Surface of a cube | = six × area of one side |
| Area of trapezoid | = altitude × $\frac{1}{2}$ sum of parallel sides |

NOTE—Volumes of similar solids are to each other as the cubes of their similar lines.

## MEASURE OF LINES AND SURFACE

1. To find the area of a parallelogram: *Rule*—Multiply the length by the breadth or perpendicular height. See Fig. 1

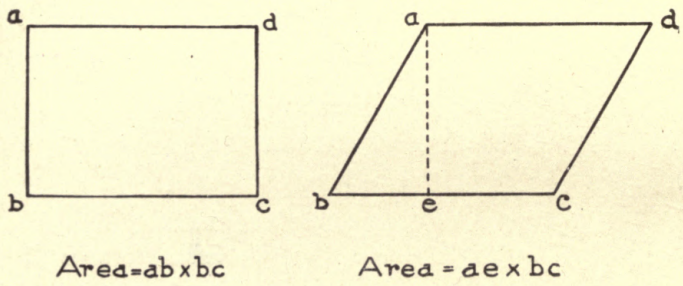
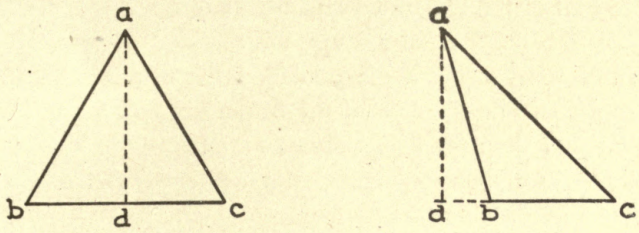



Fig. 1.

2. To find the area of a triangle: *Rule*—Multiply the base by half the altitude. See Fig. 2.

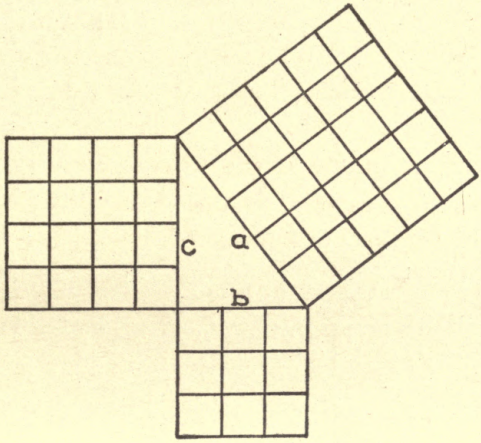
3. To find the hypothenuse of a right-angled triangle when the base and perpendicular are known: *Rule*—Add together the square of the known sides and extract the square root of the sum. See Fig. 3.

4. To find one side of a right-angled triangle when the hypothenuse and the other side are known: *Rule*—From the square of the hypothenuse subtract the square of the given side, and



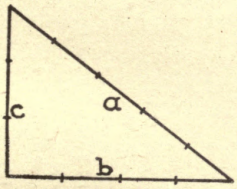

$$\text{Area} = bc \times \tfrac{1}{2} ad$$

Fig. 2.



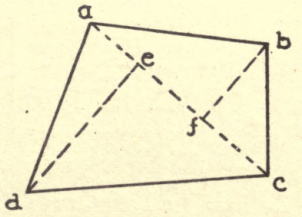

$$a = \sqrt{b^2 + c^2}$$

Fig. 3.




$$b = \sqrt{a^2 - c^2}$$
$$c = \sqrt{a^2 - b^2}$$

Fig. 4.



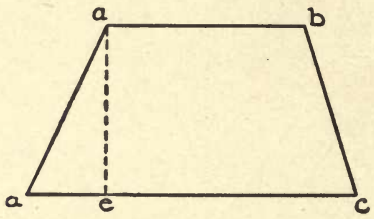

$$\text{Area} = \left(ac \times \tfrac{1}{2} bf\right) + \left(ac \times \tfrac{1}{2} de\right)$$

Fig. 5.

the square root of the remainder will be the other side. See Fig. 4.

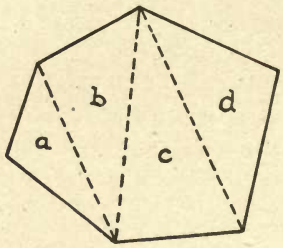
5. To find the area of a trapezium: *Rule*—Divide the figure into triangles by drawing a diagonal and the sum of the areas of these triangles will be the area of the trapezium. See Fig. 5.

6. To find the area of a trapezoid: *Rule*—Add the two parallel sides and mutliply by one-half the perpendicular distance between them. See Fig. 6.




$$\text{Area} = \tfrac{1}{2}\, ae(ab+dc)$$

Fig. 6.




$$\text{Area} = a+b+c+d$$

Fig. 7.

7. To find the area of a regular polygon: *Rule*—Multiply one side by half its perpendicular distance from the center, and this product by the number of sides.

**Table of Multiples to Compute Measurements of Regular Polygons, the Side of the Polygon Being Unity**

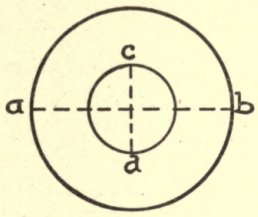
| Name of Polygon | No. of Sides | A Area | B Radius of Circumscribing Circle | C Length of the Side. | D Radius of Inscribed Circle |
|---|---|---|---|---|---|
| Triangle | 3 | 0.433013 | 0.5773 | 1.732 | 0.2887 |
| Tetragon | 4 | 1 | 0.7071 | 1.4142 | 0.5 |
| Pentagon | 5 | 1.720477 | 0.8506 | 1.1756 | 0.6882 |
| Hexagon | 6 | 2.598076 | 1 | 1 | 0.866 |
| Heptagon | 7 | 3.633912 | 1.1524 | 0.8677 | 1.0383 |
| Octagon | 8 | 4.828427 | 1.3066 | 0.7653 | 1.2071 |
| Nonagon | 9 | 6.181824 | 1.4619 | 0.684 | 1.3737 |
| Decagon | 10 | 7.694209 | 1.618 | 0.618 | 1.5383 |
| Undecagon | 11 | 9.36564 | 1.7747 | 0.5634 | 1.7028 |
| Dodecagon | 12 | 11.196152 | 1.9319 | 0.5176 | 1.866 |

8. To find the area of a regular polygon when the length of a side only is given: *Rule*—Multiply the square of the side by the number opposite the name of the polygon in Column A.

9. To find the radius of a circumscribing circle when the

length of a side only is given: *Rule*—Multiply the length of a side of the polygon by the number in Column B.

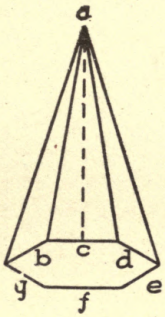
10. To find the length of side of a polygon that is contained in a given circle, when the radius of the circle is known: *Rule*—Multiply the radius of the circle by the number opposite the name of the polygon in Column C.




$$\text{Area} = (ab)^2 = (cd)^2 \times .7854$$

Fig. 8.

11. To find the radius of a circle that can be inscribed in a given polygon, when the length of a side is given: *Rule*—Multiply the length of a side of the polygon by the number opposite the name of the polygon in Column D.




$$\text{Lateral Area} = \tfrac{1}{2}\, ac \times (b+c+d+e+f+g)$$

Fig. 9.

12. To find the area of an irregular polygon: *Rule*—Divide the polygon into triangles and add the areas of all the triangles. Fig. 7.

Fig. 10. Frustrum of Pyramid.

13. To find the area of a ring included between the circumferences of two concentric circles: *Rule*—Square the diameters and multiply difference between the squares by .7854. Fig. 8.

14. To find the area of an ellipse: *Rule*—Multiply the two axes together and the product multiplied by .7854 will be the area.

15. To find the circumference of an ellipse: *Rule*—Square

## AREAS OF CIRCLES

| Size | Area | Size | Area | Size | Area | Size | Area |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.0123 | 10 | 78.54 | 30 | 706.86 | 65 | 3318.3 |
| 1/4 | 0.0491 | 1/2 | 86.59 | 31 | 754.76 | 66 | 3421.2 |
| 3/8 | 0.1104 | 11 | 95.03 | 32 | 804.24 | 67 | 3525.6 |
| 1/2 | 0.1963 | 1/2 | 103.86 | 33 | 855.30 | 68 | 3631.6 |
| 5/8 | 0.3067 | 12 | 113.09 | 34 | 907.92 | 69 | 3739.2 |
| 3/4 | 0.4417 | 1/2 | 122.71 | 35 | 962.11 | 70 | 3848.4 |
| 7/8 | 0.6013 | 13 | 132.73 | 36 | 1017.8 | 71 | 3959.2 |
| 1 | 0.7854 | 1/2 | 143.13 | 37 | 1075.2 | 72 | 4071.5 |
| 1/8 | 0.9940 | 14 | 153.93 | 38 | 1134.1 | 73 | 4185.3 |
| 1/4 | 1.227 | 1/2 | 165.13 | 39 | 1194.5 | 74 | 4300.8 |
| 3/8 | 1.484 | 15 | 176.71 | 40 | 1256.6 | 75 | 4417.8 |
| 1/2 | 1.767 | 1/2 | 188.69 | 41 | 1320.2 | 76 | 4536.4 |
| 5/8 | 2.073 | 16 | 201.06 | 42 | 1385.4 | 77 | 4656.0 |
| 3/4 | 2.405 | 1/2 | 213.82 | 43 | 1452.2 | 78 | 4778.3 |
| 7/8 | 2.761 | 17 | 226.98 | 44 | 1520.5 | 79 | 4901.6 |
| 2 | 3.141 | 1/2 | 240.52 | 45 | 1590.4 | 80 | 5026.5 |
| 1/4 | 3.976 | 18 | 254.46 | 46 | 1661.9 | 81 | 5153.0 |
| 1/2 | 4.908 | 1/2 | 268.80 | 47 | 1734.9 | 82 | 5281.0 |
| 3/4 | 5.939 | 19 | 283.52 | 48 | 1809.5 | 83 | 5410.6 |
| 3 | 7.068 | 1/2 | 298.64 | 49 | 1885.7 | 84 | 5541.7 |
| 1/4 | 8.295 | 20 | 314.16 | 50 | 1963.5 | 85 | 5674.5 |
| 1/2 | 9.621 | 1/2 | 330.06 | 51 | 2042.8 | 86 | 5808.8 |
| 3/4 | 11.044 | 21 | 346.36 | 52 | 2123.7 | 87 | 5944.6 |
| 4 | 12.566 | 1/2 | 363.05 | 53 | 2206.1 | 88 | 6082.1 |
| 1/2 | 15.904 | 22 | 380.13 | 54 | 2290.2 | 89 | 6221.1 |
| 5 | 19.635 | 1/2 | 397.60 | 55 | 2375.8 | 90 | 6361.7 |
| 1/2 | 23.758 | 23 | 415.47 | 56 | 2463.0 | 91 | 6503.8 |
| 6 | 28.274 | 1/2 | 433.73 | 57 | 2551.7 | 92 | 6647.6 |
| 1/2 | 33.183 | 24 | 452.39 | 58 | 2642.0 | 93 | 6792.9 |
| 7 | 38.484 | 1/2 | 471.43 | 59 | 2733.9 | 94 | 6939.7 |
| 1/2 | 44.178 | 25 | 490.87 | 60 | 2827.4 | 95 | 7088.2 |
| 8 | 50.265 | 26 | 530.93 | 61 | 2922.4 | 96 | 7238.2 |
| 1/2 | 56.745 | 27 | 572.55 | 62 | 3019.0 | 97 | 7389.8 |
| 9 | 63.617 | 28 | 615.75 | 63 | 3117.2 | 98 | 7542.9 |
| 1/2 | 70.882 | 29 | 660.52 | 64 | 3216.9 | 99 | 7697.7 |

To find the circumference of a circle when diameter is given, multiply the given diameter by 3.1416.

To find the diameter of a circle when circumference is given, multiply the given circumference by .31831.

the two axes and multiply the square root of half their sum by 3.1416.

## AREAS OF SOLIDS

16. To find the lateral surface of a prism: *Rule*—Multiply the perimeter of the base by the altitude.

17. To find the lateral surface of a regular pyramid: *Rule*—Multiply the perimeter of the base by one-half the slant height. Fig. 9.

18. To find the lateral surface of the frustrum of a regular pyramid: *Rule*—Multiply the perimeters of the two ends by one-half the slant height. Fig. 10.

### SOLID CONTENTS

19. To find the solid contents of a pyramid: *Rule*—Find the area of the base and multiply this by $\frac{1}{3}$ height.

20. To find the solid contents of a cylinder: *Rule*—Multiply the area of the base by the height.

21. To find the solid contents of a cone: *Rule*—Multiply the area of the base by $\frac{1}{3}$ of the height.

22. To find the solid contents of a sphere: *Rule*—Multiply the cube of the diameter by .5236.

## SCALE OF WAGES

The item of cost of labor, on construction of any kind, is at best a variable quantity, dependent to a large degree upon competition, demand, and labor organization.

The cost of labor is steadily on the increase, while the hours of labor are continually decreasing. The tendency in both directions operates to a certain degree to lessen the effective power of labor, so that the amount of work done in a day is not what it represented a few years ago.

The various schedules given in the following pages are based upon the current price of labor in Boston, Mass., in 1906, and while this is likely to be upset somewhat by a general advance in 1907, there is not likely to be a great difference for some time. Blank spaces are left in these columns so that the student or contractor can fill in local or varying prices of labor.

**Wages, Per Day of Eight Hours, in Various Trades, Boston, Mass., 1906**

| | |
|---|---|
| Carpenters | $3.28..... |
| Stone Masons | 4.50..... |
| Brick Masons | 4.80..... |
| Hod Carriers | 2.40..... |
| Plasterers | 5.00..... |
| Plasterers' Helpers | 3.00..... |
| Lathers | 4.50..... |
| Quarrymen (9-hour day) | 2.50..... |
| Stone Cutters | 4.00..... |
| Tile Setters | 4.80..... |
| Tile Helpers | 2.60..... |

| | |
|---|---|
| Roofers | $3.50 |
| Roofers' Helpers | 2.25 |
| Steam Fitters | 4.40 |
| Steam Fitters' Helpers | 2.25 |
| Plumbers | 4.40 |
| Plumbers' Helpers | 1.50 |
| Gas Fitters | 4.40 |
| Gas Fitters' Helpers | 2.25 |
| Electricians | 3.60 |
| Painters | 3.00 |

## EXCAVATION

Many considerations, seen and unforeseen, enter into the cost of excavations, of which the unforeseen conditions can, at best, be only judged of, making it more important that known circumstances should be carefully considered. Among these may be mentioned the varying kinds of soil and rock, the depth to which the excavation can be carried without shoring, the distance to which the excavated material is to be carried, and whether pumping or bailing will be necessary. Material excavated to a depth of six feet can be thrown on to the surface, but below this depth a stage will be necessary, or else it must be carted or wheeled out.

In taking off quantities for excavation, work in trenches should be kept separate from large areas, as the cost will be greater on account of lack of room for working.

Where the nature of the soil is uncertain, borings should be made or test pits dug, not only to reveal the character of the material, but to determine the depth at which "hard pan" is to be found. This is especially necessary when the specifications call for the foundations of any structure to be carried to hard pan, without reference to the drawings, or when no definite depth of footing is shown.

In the absence of full instructions, it is best to figure to excavate a foot outside of all walls or footings, to give ample working room; and trenches for pipes, etc., should be enough wider than the pipe to allow of working all around. Hollows should be made where hubs rest, so as to give a full bearing for the pipe.

In taking quantities in irregular ground, the plot should be divided into a number of definite squares and the contents of each square taken separately. See Fig. 11.

**Cost of Excavating.** The cost of excavating varies in different localities and under differing conditions, no two cases agreeing in details or in execution. The governing factors are experience and judgment. Excavating is usually priced by the cubic yard and will average about as follows:

| | |
|---|---|
| Picking—12 cu. yds. per day at $2.40 | $0.20 |
| Throwing out—12 cu. yds. per day at $2.40 | .20 |
| Wheeling 50 ft. away | .10 |
| | $0.50 |

Excavations in clay or very hard soil may cost from $0.50 to $1.00 while rock excavations will cost from $2.00 to $10.00, or more, according to the nature and position of the rock. Re-filling and packing around walls will cost usually from $\frac{1}{4}$ to $\frac{1}{2}$ of the price of earth excavations. Excavation of sand or loose gravel, which can be done by means of a horse scraper, will cost $0.30 per cu. yd.

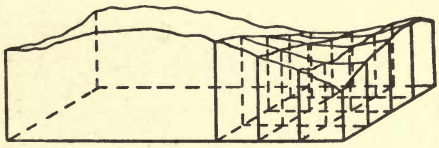


Fig. 11. Division of plot.

**Pile Foundations.** The cost of piling varies with the nature of the soil and the length of pile necessary. Taking a 30-ft. pile as an average length, then piles 30 ft. long, driven and cut off level to receive footings, will cost $3.50 to $4.00 per pile.

## STONE WORK

Stone walls are figured either by the perch or the cubic yard.

In taking off a stone foundation, it is customary to take the corners twice, that is, each different face of the wall is measured from out to out, thus doubling the corners. This makes up for the extra labor of laying up the corners.

The cost of a perch of rubble foundations laid in Rosendale cement mortar, 1 to 3, may be taken as follows:

| | | |
|---|---|---|
| 1 perch of stone | | $1.25 |
| ½ barrel cement at $1.20 | | .60 |
| ⅙ load sand | at 1.75 | .29 |
| ⅓ day, mason | at 4.50 | 1.50 |
| ¼ day, laborer | at 2.40 | .60 |
| Total cost per perch | | $4.24 |

A perch of rubble wall laid in Portland cement mortar, 1 to 3, will cost:

| | | |
|---|---|---|
| 1 perch of stone | | $1.25 |
| ½ barrel Portland cement at $2.10 | | 1.05 |
| ⅙ load sand | at $1.75 | .29 |
| ⅓ day, mason | at 4.50 | 1.50 |
| ⅓ day, laborer | at 2.40 | .80 |
| Total cost per perch | | $4.89 |

**Cut Stone.** Cut stonework is figured by the cubic foot, the prices differing according to the amount of labor involved in the cutting; and this will depend somewhat upon the nature of the stone, a hard stone being more expensive to prepare than a soft one. The principal kinds of stone used in building are granite, limestone, sandstone, marble, and bluestone.

**Granite.** Granite is one of the hardest stones to quarry and prepare, and, on account of its cost it is not so freely used as limestone or marble. Granite in rough blocks from the quarry will cost 45 to 60 cents a cubic foot, the cutting of beds and joints will cost 25 cents for each square foot of surface so treated. If the face is pitched off to a line with rock face, it will cost 25 cents per square foot, while hammering in 8-cut work will cost 70 cents per square foot. Quincy granite will cost, in the rough, about double this, or $1.20 per cubic foot; the cutting will cost one-third more.

From this data we may deduce the following scale:

| | | |
|---|---|---|
| Granite, in rough blocks at quarry, | per cu. ft. | $0.60 |
| Add for beds and joints | per sq. ft. | .25 |
| Add for rock face, pitched off to a line, | per sq. ft. | .25 |
| Add for 8-cut work | per sq. ft. | .70 |

Hence the facing of an average wall with 8 inches of granite

will cost, if the stones are about 2 feet x 3 feet, or 6 surface feet in each block:

| | | |
|---|---|---|
| Stock, 4 cu. ft. | at .60 | $2.40 |
| Beds and end joints $2\frac{2}{3}$ sq. ft. | at .25 | .67 |
| Rock face 6 sq. ft. | at .25 | 1.50 |
| Cost of 6 superficial ft. | | $4.57 |

or $76\frac{1}{6}$ cents per square foot.

If the same were finished in 8-cut work, the cost of finishing the surface would be 70 cents a square foot instead of 25 cents, making the cost per square foot 45 cents more, or about $1.21 a square foot.

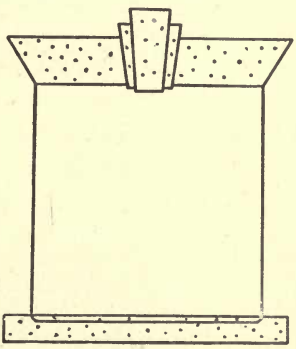


Fig. 12. Limestone Window Set.

**Limestone.** Limestone is used to a large extent, especially in conjunction with brick, for trimmings for various kinds of buildings. Limestone will cost at the quarry about 30 cents a cubic foot; this will apply to Indiana limestone only. Lake Superior redstone will cost 35 cents; Ohio sandstone, 50 cents. In estimating, about 20 per cent should be added for waste, 5 per cent quarry waste, and 15 per cent for cutting waste:

***Prices of Common Shapes of Limestone**

| | | |
|---|---|---|
| Water table, 8 in. x 12 in. | per lineal foot | $1.50 |
| Steps, 7 in. x 14 in. without nosing, | per lineal foot | 1.50 |
| Steps, 7 in. x 14 in. with nosing | per lineal foot | 2.50 |
| Door sills, 8 in. x 12 in. | per lineal foot | 1.25 |
| Window sills, 5 in. x 12 in. | per lineal foot | 1.00 |
| Window sills, 5 in. x 8 in. | per lineal foot | .75 |
| Window caps, 4 in. x 10 in. | per lineal foot | .70 |
| Window caps, 8 in. x 12 in. | per lineal foot | 1.00 |
| Wall coping, 5 in. x 20 in. | per lineal foot | 1.50 |
| Platforms and large slabs, 6 in. thick, | per sq. ft. | 2.00 |

***Window Sets.** A common use of limestone is in the form of window sets, consisting of a flat arch in three pieces with keystone, and a light sill, as shown in Fig. 12.

*These prices are based on a freight charge of $0.55 per cu. ft. to Boston.
The freight on Lake Superior stone is .55
The freight on Ohio stone .41

The rise of these caps is about 10 inches, and the rise of the sill 5 inches. These sets for an average sized window, say 4-foot opening, will cost for a 4-inch reveal $10, and for an eight-inch reveal $15.

**Sandstone.** The cost of dressed sandstone is about 10 per cent more than that of limestone.

**Setting.** The cost of setting cut stone may be taken at 15 cents a running foot for window trimmings and ashlar work, and

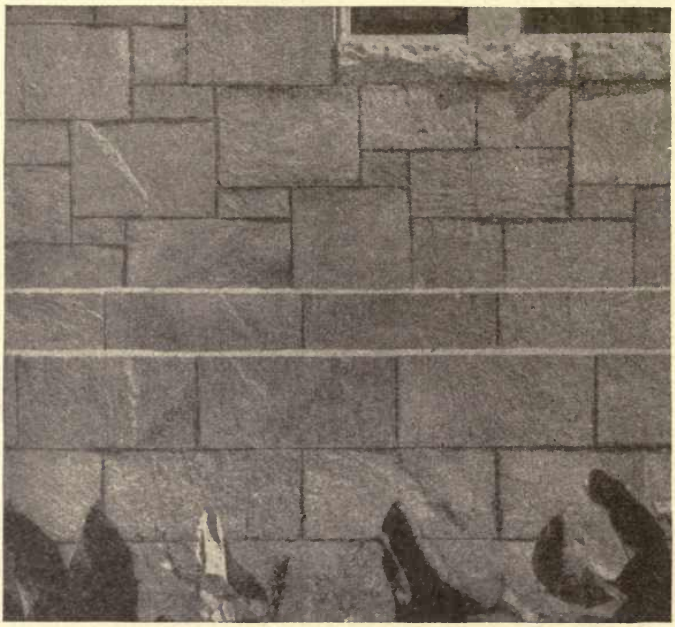


Fig. 13. Seam-Faced Granite Wall.

20 cents for platforms, water table, steps, etc. Trimming and fitting at the building will cost about 10 cents per cubic foot.

The foregoing prices are based upon quarry-men's wages at $2.50 per day, and stone cutters' wages at $4.00 per day.

Much of the cutting and finishing of stone is done by machinery, so that the question of wages will not enter into the preparation of the stock so largely as in many other branches.

**Marble.** A more expensive stone to use is marble, which can be obtained in a variety of colors, in different parts of the country. The price of marble differs in different localities but for general purposes

may be taken as about double the figures which we have quoted for limestone.

**Bluestone.** Bluestone is used in the East mainly for flagging, copings, etc., but is used to a considerable extent for building, in Central and Western sections. The price of bluestone flagging 3 inches thick with trimmed joints and face planed and dressed, will be 65 cents a square foot; with natural face, 35 cents to 45 cents. Bluestone ashlar 8 inches thick with natural face and dressed joints, will cost $1.00 per square foot, and 15 cents a square foot for setting.

**Seam-Faced Granite.** In some localities granite, lying in upturned strata with open weathered seams, is to be obtained. This is used for facing walls in ashlar work, being set on edge in the wall with the seam-face showing; this will cost, in place, 4-inch to 8-inch thick, from 60 cents to 75 cents a superficial foot. See Fig. 13.

## BRICKWORK

Brickwork is usually estimated by the thousand bricks, but is sometimes priced by the cubic foot at 40 cubic feet to a thousand. A mason in one day will lay from 800 to 1,000 common bricks, or 300 to 400 face bricks.

The number of bricks in a wall may be found by multiplying the superficial area by $7\frac{1}{2}$ for each 4 inches of the thickness of the wall. Openings of the size of ordinary windows are generally deducted, but very small openings will cost more to make than the deduction. An allowance for breakage should be made of 5 per cent.

**Mortar.** Bricks are laid in mortar made of *lime* or *cement*, according to the strength required. Lime mortar should not be used in damp situations, or where great strength is required. The difference in cost of lime and cement mortar is so little that cement mortar is generally used.

The building laws of some cities require brick work to be laid in cement mortar for a certain part of the height.

Cement mortar makes a darker joint, but where a white joint is required it can be obtained, without loss of strength, by using Portland cement and lime mortar.

**Cost.** The cost of brickwork by the thousand in various kinds of mortar may be analyzed as follows:

| | |
|---|---|
| In 1 – 3 lime mortar, | |
| 1,000 bricks | $ 9.00 |
| 3 bu. lime at $.36 per bu. | 1.08 |
| ½ load of sand at $1.75 per load | .88 |
| 10 hours, mason at $.60 per hour | 6.00 |
| 10 hours, tender at $.30 per hour | 3.00 |
| | $19.96 |
| In 1 – 3 Rosendale cement mortar: | |
| 1,000 bricks | $9.00 |
| 1½ bbl. Rosendale cement at $1.20 | 1.80 |
| ½ load sand | .88 |
| 10 hours, mason at $.60 per hour | 6.00 |
| 10 hours, tender at $.30 per hour | 3.00 |
| | $20.68 |
| In 1 – 3 Portland cement mortar: | |
| 1,000 bricks | $ 9.00 |
| 1¼ bbl. Portland cement at $2.10 | 2.62 |
| ½ load sand at $1.75 | .88 |
| 10 hours, mason at $.60 per hour | 6.00 |
| 10 hours, tender at $.30 per hour | 3.00 |
| | $21.50 |

From these tables we may deduce an approximate estimate in round numbers as follows:

| | |
|---|---|
| 1,000 bricks laid in 1 – 3 lime mortar | $20.00 |
| 1,000 bricks laid in 1 – 3 cement mortar | 21.00 |
| 1,000 bricks laid in 1 – 3 Portland cement mortar | 22.00 |

So that, on a job of ordinary size, the difference between lime and cement mortar ought not to be considered, where cement mortar will give assurance of greater stability.

**Face Bricks.** Face bricks in great variety, are to be had either plain or moulded, and in a variety of colors. On ordinary face brickwork a mason with tender will lay about 300 to 400 bricks in a day.

Faced bricks cost from $25.00 to $50.00 per thousand; a good average brick can be secured for $32.00. This will make the price for a thousand, laid, about as follows:

| | |
|---|---|
| 1,000 face bricks | $32.00 |
| 1¼ bu. lime at $.36 | .45 |
| ½ load fine sand at $1.75 | .88 |
| 3 days, mason at $4.80 | 14.40 |
| 1½ days, tender at $2.40 | 3.60 |
| | $51.33 |

From this we find that 1,000 face bricks can be laid in the wall for $51.33 of which $33.33 goes for stock and $18.00 for labor.

Enameled bricks are to be had in various colors, white and buff being the most common. These bricks cost from $50.00 to $60.00 per M.

**Concrete.** Concrete is used to a great extent now for footings, walls, piers, etc. The cost of concrete is not a great deal different from stone for foundations and if there is uncovered a deposit of suitable sand and gravel, as is sometimes the case, it can be put in at a less price than a granite footing.

Concrete with a reinforcement of steel is used in various forms for piers, floors, and walls.

The cost of a cubic yard of concrete, using the proportion of 1 – 3 and 6, may be summarized as follows:

| | |
|---|---|
| 1 bbl. Portland cement | $2.10 |
| 3 bbl. sand | .75 |
| 6 bbl. broken stone | 2.00 |
| Mason, 2 hours at $.60 per hour | 1.20 |
| Laborer, 4 hours at $.30 per hour | 1.20 |
| | $7.25 |

Cellar concrete 3 inches thick will cost $.60 to $.75 per square yard in place. Concrete of Rosendale cement can be put in at less cost, being for foundation walls about $6.00 per cubic yard; for piers $6.50 per cubic yard.

## MISCELLANEOUS DATA

### CHIMNEYS

Chimneys may be quickly estimated by the lineal foot of height, as follows:

| | | | | | |
|---|---|---|---|---|---|
| 1 flue | 8 in. x 8 in. per foot | $0.90 | with flue lining | | $1.10 |
| 1 " | 8 in. x 12 in. per foot | 1.00 | " " | " | 1.25 |
| 1 " | 12 in. x 12 in. per foot | 1.20 | " " | " | 1.50 |
| 2 flues | 8 in. x 8 in. per foot | 1.40 | " " | " | 1.80 |
| 2 " | 8 in. x 12 in. per foot | 1.75 | " " | " | 2.20 |

### FLUE LINING

Net price per foot, outside dimensions.

| | | | |
|---|---|---|---|
| 4½ in. x 8½ inches | $.10 | 8½ in. x 17½ inches | $.32 |
| 4½ in. x 13 " | .16 | 13 in. x 13 " | .30 |
| 8½ in. x 8½ " | .16 | 13 in. x 18 " | .42 |
| 8½ in. x 13 " | .22 | 18 in. x 18 " | .70 |

For openings add one-third.

### MASONS' SUPPLIES

| | |
|---|---|
| Portland Cement | $ 2.10 per bbl. |
| Rosendale Cement | 1.20 " " |
| Extra Lime for Skimming | 1.15 " " |
| No. 1 Lime for Mortar | 1.05 " " |
| Vermont Lime | 1.20 " " |
| Plaster, 250 lb. bbls. | 1.60 " " |
| Mortar Color, Red, in bbls. | .01¼ per lb. |
| Mortar Color, Red, in 100 or 200 lb. keg | .01½ " " |
| Mortar Color, black | .03½ " " |
| Philadelphia Pressed Brick, for fireplaces | 35.00 per M. |
| Fire Brick | 35.00 " " |
| Best Plastering Hair | .25 per bush. |
| Mortar Hods | 1.50 each |
| Brick Hods | 1.25 " |
| 10-in. Mortar Hoes | .50 " |
| Good No. 2 Shovels, square point, plain back | .75 " |
| Sand Screens, wood leg | 6.00 " |
| Bolted Dump Barrows | 2.00 " |

| | |
|---|---|
| Metal Corner Bead | $0.04 per ft. |
| Iron Rim and Cover, 20 in. diameter | 3.50 each |
| " " " 18 in. " | 3.00 " |
| " " " 15 in. " | 2.50 " |

## CELLAR COLUMNS

For cellar supports, in place of brick piers, pipe columns consisting of a steam pipe filled with cement, under a patent, are coming into general use in many localities.

These columns cost less, and take up less room than a brick pier of equal strength. The prices are as follows:

| Size, | 7 Ft. | 8 Ft. | 9 Ft. | 10 Ft. |
|---|---|---|---|---|
| 3 in. | $1.65 | $1.90 | $2.20 | $2.65 |
| 3½ in. | 1.90 | 2.20 | 2.65 | 3.15 |
| 4 in. | 2.75 | 3.25 | 3.80 | 4.40 |
| 4½ in. | 4.00 | 5.00 | 5.50 | 6.00 |
| 5 in. | 5.00 | 5.85 | 6.65 | 7.55 |
| 6 in. | 6.00 | 6.95 | 8.00 | 9.30 |

## EARTHEN DRAIN PIPE

For sewer and cesspool connections and general drainage, earthen vitrified drain pipes are used. These are laid in cement and, if well below frost or danger of breaking, make a more durable pipe than cast iron, besides being much less costly.

### Net Price of Standard Vitrified Pipe

| Inside Diameter | Price per Foot | Bends and Curves | Weight per Foot |
|---|---|---|---|
| 2 in. | $0.05 | $0.17 | 6 lbs. |
| 3 in. | .05 | .17 | 8 " |
| 4 in. | .07 | .23 | 10 " |
| 5 in. | .08¾ | .30 | 12 " |
| 6 in. | .10 | .38 | 16 " |
| 8 in. | .17 | .70 | 24 " |
| 10 in. | .26 | 1.00 | 34 " |
| 12 in. | .35 | 1.40 | 45 " |
| 15 in. | .47 | 1.90 | 67 " |
| 18 in. | .60 | 2.38 | 86 " |

## CARPENTRY

**The Carpenter-Work** of a building includes, in general, the skeleton or frame, if a wooden building, the floor timbers, studs of partitions and walls, rafters, the covering in of the frame, with its exterior finish and clapboards, siding or shingles, the flooring, furring, grounds, and beads. This practically covers the constructive woodwork or carpentry proper, while to the term joinery belongs the outside and inside finish, windows and doors, sheathing and dado, stairs and fixtures.

In many sections the general term carpentry covers all woodworking and covering, while in others the distinction between the carpenter and the joiner is more distinctly drawn.

For the purposes of this work it will not be necessary to hold this distinction, and so for convenience, the term carpentry will be used to cover all branches of woodworking.

Two distinct elements enter into the carpenter-work of any structure; the *Material* and the *Labor*, and the cost of both is subject to fluctuation to a great extent. The trend in both is in the direction of increased cost in varying degrees in different localities, but the state of the market in both labor and materials is never quiescent, so that any printed prices must be considered as comparative only, and must be carefully compared with local and known data before being accepted as accurate or final.

The material with which the carpenter works, consists in the main of three principal divisions, the *Frame*, the *Covering*, and the *Finish*, and each of these has further subdivisions as will be noted.

**Board Measure.** All lumber which has not been wrought or moulded, is sold by "board measure" that is, the stock in each piece is reduced to a unit of a square foot of board one inch thick. This is called board measure and is expressed by the abbreviation B. M. Prices of lumber are usually rated by the thousand feet, so that the expression "Twenty-five dollars a thousand" means twenty-five dollars for a thousand square feet of stock one inch thick. To reduce stock of greater thickness than one inch, to its equivalent in board measure, several rules may be used.

A convenient method is to divide the product of the width and thickness in inches by 12, and multiply by the length in feet.

## TABLE OF BOARD MEASURE

| Size in Inches | LENGTH IN FEET | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 |
| 2 x 3 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 2 x 4 | 6⅔ | 8 | 9⅓ | 10⅔ | 12 | 13⅓ | 14⅔ | 16 | 17⅓ | 18⅔ | 20 | 21⅓ |
| 2 x 5 | 8⅓ | 10 | 11⅔ | 13⅓ | 15 | 16⅔ | 18⅓ | 20 | 21⅔ | 23⅓ | 25 | 26⅔ |
| 2 x 6 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 |
| 2 x 7 | 11⅔ | 14 | 16⅓ | 18⅔ | 21 | 23⅓ | 25⅔ | 28 | 30⅓ | 32⅔ | 35 | 37⅓ |
| 2 x 8 | 13⅓ | 16 | 18⅔ | 21⅓ | 24 | 26⅔ | 29⅓ | 32 | 34⅔ | 37⅓ | 40 | 42⅔ |
| 2 x 9 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | 48 |
| 2 x 10 | 16⅔ | 20 | 23⅓ | 26⅔ | 30 | 33⅓ | 36⅔ | 40 | 43⅓ | 46⅔ | 50 | 53⅓ |
| 2 x 12 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| 2 x 14 | 23⅓ | 28 | 32⅔ | 37⅓ | 42 | 46⅔ | 51⅓ | 56 | 60⅔ | 65⅓ | 70 | 74⅔ |
| 2 x 16 | 26⅔ | 32 | 37⅓ | 42⅔ | 48 | 53⅓ | 58⅔ | 64 | 69⅓ | 74⅔ | 80 | 85⅓ |
| 3 x 4 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 |
| 3 x 5 | 12½ | 15 | 17½ | 20 | 22½ | 25 | 27½ | 30 | 32½ | 35 | 37½ | 40 |
| 3 x 6 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | 48 |
| 3 x 7 | 17½ | 21 | 24½ | 28 | 31½ | 35 | 38½ | 42 | 45½ | 49 | 52½ | 56 |
| 3 x 8 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| 3 x 9 | 22½ | 27 | 31½ | 36 | 40½ | 45 | 49½ | 54 | 58½ | 63 | 67½ | 72 |
| 3 x 10 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 |
| 3 x 12 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 |
| 3 x 14 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 | 112 |
| 3 x 16 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 |
| 4 x 4 | 13⅓ | 16 | 18⅔ | 21⅓ | 24 | 26⅔ | 29⅓ | 32 | 34⅔ | 37⅓ | 40 | 42⅔ |
| 4 x 5 | 16⅔ | 20 | 23⅓ | 26⅔ | 30 | 33⅓ | 36⅔ | 40 | 43⅓ | 46⅔ | 50 | 53⅓ |
| 4 x 6 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| 4 x 7 | 23⅓ | 28 | 32⅔ | 37⅓ | 42 | 46⅔ | 51⅓ | 56 | 60⅔ | 65⅓ | 70 | 74⅔ |
| 4 x 8 | 26⅔ | 32 | 37⅓ | 42⅔ | 48 | 53⅓ | 58⅔ | 64 | 69⅓ | 74⅔ | 80 | 85⅓ |
| 4 x 9 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 |
| 4 x 10 | 33⅓ | 40 | 46⅔ | 53⅓ | 60 | 66⅔ | 73⅓ | 80 | 86⅔ | 93⅓ | 100 | 106⅔ |
| 4 x 12 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 |
| 4 x 14 | 46⅔ | 56 | 65⅓ | 74⅔ | 84 | 93⅓ | 102⅔ | 112 | 121⅓ | 130⅔ | 140 | 149⅓ |
| 6 x 6 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 |
| 6 x 8 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 |
| 6 x 10 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 |
| 6 x 12 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 | 156 | 168 | 180 | 196 |
| 6 x 14 | 70 | 84 | 98 | 112 | 126 | 140 | 154 | 168 | 182 | 196 | 210 | 224 |
| 6 x 16 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 | 208 | 224 | 240 | 256 |
| 8 x 8 | 53⅓ | 64 | 74⅔ | 85⅓ | 96 | 106⅔ | 117⅓ | 128 | 138⅔ | 149⅓ | 160 | 170⅔ |
| 8 x 10 | 66⅔ | 80 | 93⅓ | 106⅔ | 120 | 133⅓ | 146⅔ | 160 | 173⅓ | 186⅔ | 200 | 213⅓ |
| 8 x 12 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 | 208 | 224 | 240 | 256 |
| 8 x 14 | 93⅓ | 112 | 130⅔ | 149⅓ | 168 | 186⅔ | 205⅓ | 224 | 242⅔ | 261⅓ | 280 | 298⅔ |
| 10 x 10 | 83⅓ | 100 | 116⅔ | 133⅓ | 150 | 166⅔ | 183⅓ | 200 | 216⅔ | 233⅓ | 250 | 266⅔ |
| 10 x 12 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 |
| 10 x 14 | 116⅔ | 140 | 163⅓ | 186⅔ | 210 | 233⅓ | 256⅔ | 280 | 303⅓ | 326⅔ | 350 | 373⅓ |
| 10 x 16 | 133⅓ | 160 | 186⅔ | 213⅓ | 240 | 266⅔ | 293⅓ | 320 | 346⅔ | 373⅓ | 400 | 426⅔ |
| 12 x 12 | 120 | 144 | 168 | 192 | 216 | 240 | 264 | 288 | 312 | 336 | 360 | 384 |
| 12 x 14 | 140 | 168 | 196 | 224 | 252 | 280 | 308 | 336 | 364 | 392 | 420 | 448 |
| 12 x 16 | 160 | 192 | 224 | 256 | 288 | 320 | 352 | 384 | 416 | 448 | 480 | 512 |
| 14 x 14 | 163⅓ | 196 | 228⅔ | 261⅓ | 294 | 326⅔ | 359⅓ | 392 | 424⅔ | 457⅓ | 490 | 522⅔ |
| 14 x 16 | 186⅔ | 224 | 261⅓ | 298⅔ | 336 | 373⅓ | 410⅔ | 448 | 485⅓ | 522⅔ | 560 | 597⅓ |

*Example.* How many feet, B. M., are there in a joist 2 in. x 9 in., 20 ft. long?

$$\frac{2 \times 9}{12} \times 20 = 30 \text{ ft. B. M.}$$

When the sizes are fractional, or produce a product not easily divided by 12, the operation may sometimes be simplified by varying the process and multiplying the length in feet, and the thickness and width in inches together, and dividing the whole product by 12.

*Example.* How many feet are there in a joist $2\frac{1}{2}$ in. x 9 in., 16 ft. long?

$$\frac{16 \times 2\frac{1}{2} \times 9}{12} = 30 \text{ ft. B. M.}$$

## MISCELLANEOUS PRICES OF LUMBER

### LUMBER

Dimension spruce lumber up to 9 inches of depth will cost at present per M., board measure. $26.00

| | |
|---|---|
| 10-inch stock, per M. | 30.00 |
| For long lengths, add per M. | 2.00 |
| Hemlock boarding | 24.00 |
| Spruce boarding | 25.00 |
| Spruce boarding matched | 27.00 |
| Spruce upper floor | 45.00 |
| Extra shingles | 4.00 |
| Clear shingles | 3.50 |
| Spruce clapboards | 50.00 |
| Siding cypress | 30.00 |
| Drop or novelty siding | 55.00 |
| Laths | 5.00 |
| Georgia pine timbers 12 in. | 35.00 |
| Georgia pine timbers 14 in. | 40.00 |
| Georgia pine timbers 16 in. | 50.00 |

### FLOORS AND FINISH

| | |
|---|---|
| Georgia pine, heart face rift | $70.00 |
| Georgia pine, common rift | 45.00 |

| | |
|---|---|
| Maple flooring | $ 55.00 |
| Quartered oak flooring | 125.00 to 150.00 |
| North Carolina pine, rift stock | 40.00 |
| North Carolina pine, slash stock | 33.00 |

**FINISH**

| | |
|---|---|
| Georgia pine | $ 45.00 |
| Cypress No. 1 | 80.00 |
| Cypress No. 2 | 75.00 |
| Oak, plain | 90.00 |
| Oak, quartered | 120.00 |
| Birch | 65.00 |
| Whitewood | 52.00 |
| Ash | 55.00 |
| Elm | 40.00 |

**INSIDE DOOR FRAMES**

| | |
|---|---|
| 2 ft. 8 in. x 6 ft. 8 in. | $1.00 |
| 2 ft. 10 in. x 6 ft. 8 in. | 1.10 |
| 3 ft. 0 in. x 7 ft. 0 in. | 1.15 |
| For transom bars add | .75 |

**Calculating the Frame.** In taking off the rough frame of a house for the purposes of estimating, the most accurate method is to take a schedule of every piece of timber from the framing plans, but as it often happens that the estimates are asked for from the general drawings, before framings are made, it has become the custom in many sections to estimate the cost of the walls and floors by the square of 100 superficial feet, making separate allowance for sills, girders, plates, and other large timbers.

If it is desired to take off the frame separately in the absence of framing plans the following data may be of use.

The sills of an ordinary house will usually be from 6 in. x 6 in. to 6 in. x 10 in., girders from 6 in. x 8 in. to 8 in. x 10 in., and floor joists from 2 in. x 8 in. to 3 in. x 12 in. generally 16 in. on centers. Wall studding of outside frame and bearing partitions will usually be 2 in. x 4 in. – 16 in. on centers. Studding of clos-

ets and light walls will usually be 2 in. x 3 in., plates 4 in. x 4 in. and 4 in. x 6 in., sometimes two 2 in. x 4 in. doubled, rafters from 2 in. x 6 in. to 2 in. x 12 in. and 18 in. to 24 in. on centers.

In taking off the frame, the sills and plates will of course be measured by the linear feet in the outside wall. The position of the main bearing partitions will usually give the number and location of the girders. Studs are doubled at openings and at corners, and fireplaces and stair openings will call for timbers of a large size, say from 6 in. to 8 in. width.

Assuming that the joists are 16 in. on centers, the number of joists on a floor will be given by taking $\frac{3}{4}$ of the length of the building in feet, and adding one joist. The number of studs in the outside frame at 16 in. on centers may be found by taking $\frac{3}{4}$ of the number of lineal feet in the outside of the building, adding one stud for each corner, and one for each door and window. To this must be added any gables or bay windows or other projections. Three quarters of the number of lineal feet of partitions will give the number of studs in the inside frame at 16 in. on centers. This allows for doubling of studs at openings and corners.

For the number of rafters take the length of the building divided by the distance of the rafters apart and add 1, this gives the number of pairs of rafters if a plain gable roof, while the number of rafters in a hip roof can be found by dividing the whole distance around the building by the distance apart.

**Cost of Frame.** Spruce lumber is generally used for framing, but Georgia pine must sometimes be used for large girders.

The cost of spruce lumber is from $26.00 to $28.00 per M., for sizes 9 in. and under; $30.00 for 10 in. stock, with a corresponding increase for large sizes. Hard pine lumber, 12 in. and under, will cost $35.00 per M.; 14 in. sizes $40.00; 16 in. sizes $50.00, and so on. Hard pine from the South by shipload will cost about $5 00 less per M.

The labor of framing sills, girders, etc., will cost about $10.00 per M.; plates, rafters, etc. $12.00. From this we estimate that a section of sill 30 ft. long, containing 90 ft. B. M. will cost as follows:

| | |
|---|---|
| Stock, 90 ft. B. M. of 6 in. x 6 in. spruce at $26.00 per M. | $2.34 |
| Labor of framing at $10.00 per M. | .90 |
| | $3.24 |

Dividing this by 30, the length in feet, we get $10\frac{8}{10}$ cents, or about 11 cents a running foot. In this same way the posts, girts, and other special timbers may be figured.

**Floors.** Having disposed of the large timbers separately we can now take up the floors by the *square of* 100 *feet.* An analysis of this gives us a result as follows:

Cost of a Square of Flooring:

| | |
|---|---|
| Joists 2 in. x 9 in., 16 in. on centers, 112½ ft. B. M. at $26.00 | $2.92 |
| Labor, per square of 100 sq. ft. | 1.50 |
| Nails | .10 |
| Bridging | .50 |
| Under floor, 100 ft. Hemlock at $24.00 | 2.40 |
| Waste ⅓ of stock | .80 |
| Labor | .75 |
| Nails, 5 lbs. at 3 cents per lb. | .15 |
| Strapping for ceiling 1 in. x 2 in., 16 in. on centers | .40 |
| Nails | .10 |
| Labor | 1.00 |
| Upper floor, 100 ft. of Spruce at $40.00 | 4.00 |
| Waste | 1.30 |
| Labor | 1.50 |
| Nails | .15 |
| Paper, labor, and stock | .25 |
| Total per square | $17.82 |

In the same way we may estimate the cost of the walls as follows:

Outside Walls, boarded:

| | |
|---|---|
| Studding 2 in. x 4 in., 16 in. on centers, 50 ft. B. M. at $26.00 | $ 1.30 |
| Waste ⅓ stock | .43 |
| Nails | .25 |
| Labor, per square, studding | 1.50 |
| Beads and grounds | .25 |
| Boarding, 100 ft. hemlock at $24.00 | 2.40 |
| Waste ¼ stock | .60 |
| Labor per square, boarding | .75 |
| Nails | .15 |
| **Total cost per square** | **$ 7.63** |

Shingling the outside walls will cost·

| | |
|---|---|
| Shingles, 850 at $4.25 | $3.61 |
| Paper and laying | .50 |
| Nails | .25 |
| Labor on shingling per square | 2.18 |
| Total cost of shingling | $6.54 |

Roofing with 2 in. x 6 in. rafters spaced 20 in. on centers will cost:

| | |
|---|---|
| 2 in. x 6 in. rafters 20 in. on centers at $26.00 | $1.56 |
| Waste $\frac{1}{4}$ | .39 |
| Labor | 2.00 |
| Nails | .10 |
| Boarding | 2.40 |
| Waste | .60 |
| Labor | 1.00 |
| Nails | .15 |
| Total cost per square | $8.20 |

Inside studding ready for lathing will cost:

| | |
|---|---|
| Studs, 2 in. x 4 in., 16 in. on centers, 50 ft. B. M. at $26. | $1.30 |
| Waste $\frac{1}{2}$ stock | .65 |
| Nails | .15 |
| Labor, per square | 1.50 |
| Beads and grounds | .40 |
| Total cost per square | $4.00 |

Windows of average size in place will cost approximately:

| | |
|---|---|
| Window frame | $1.20 |
| Sashes 3 ft. x 5 ft. | 1.75 |
| Blinds | 1.00 |
| Blind fastenings | .15 |
| Weight, 30 lbs. at $1\frac{1}{4}$ cents per lb. | .38 |
| Sash cord, 20 ft. at 1 cent per ft. | .20 |
| Sash fast | .25 |
| Inside casings, 20 ft. at $3\frac{1}{2}$ cents per ft. | .70 |
| Stop beads, 16 ft. at $1\frac{3}{4}$ cents per ft. | .28 |
| Labor, 8 hours at 41 cents per hour | 3.28 |
| Total cost of window in place | $9.19 |

Inside doors of average size will cost, complete:

| | |
|---|---|
| Door 2 ft. 8 in. x 6 ft. 8 in. x 1½ in. pine, to paint | $2.40 |
| Frame | 1.00 |
| Casings | 1.33 |
| Threshold | .15 |
| Nails | .05 |
| Hardware | 1.25 |
| Labor, 8 hours at 41 cents | 3.28 |
| Total cost of door in place | $9.46 |

Rift hard pine upper floors will cost, per square of 100 square feet:

| | |
|---|---|
| Rift hard pine flooring, 100 ft. B. M. at $65.00 | $ 6.50 |
| Waste and matching ⅓ of stock | 2.16 |
| Labor | 2.00 |
| Nails, 5 lbs. at 3 cents per lb. | .15 |
| Paper | .25 |
| Total cost of floor per square | $11.06 |

| | |
|---|---|
| Approximate cost per square ft. | 11 cents |
| Finishing with shellac and wax | 3 cents |
| Total per square foot finished | 14 cents |

| | |
|---|---|
| Quartered oak floor, per square ft. | 25 cents |
| Finishing with shellac | 4 cents |
| Total cost per square foot | 29 cents |

A common front door will cost:

| | |
|---|---|
| Door 3 ft. 4 in. x 7 ft. 0 in. x 1⅞ in. | $ 5.75 |
| Frame | 4.50 |
| Plate glass | 2.50 |
| Casings, 20 ft. at 4 cents | .80 |
| Hinges | .68 |
| Lock and knobs | 4.50 |
| Labor | 4.00 |
| Total cost of door | $22.73 |

A pair of sliding doors, fitted complete, will average about as follows:

| | |
|---|---|
| 2 doors 3 ft. 0 in. x 7 ft. 0 in. x $1\frac{3}{4}$ in. each | $6.00 |
| 44 feet casings, at $4\frac{1}{2}$ cents | 1.98 |
| 40 feet grounds, at 1 cent | .40 |
| 40 feet stop beads, at 2 cents | .80 |
| Astragal | 1.00 |
| Chafing strip | .20 |
| Lock | 4.50 |
| Hangers and track | 4.50 |
| Sheathing pocket, 84 ft. at 40 cents | 3.36 |
| Labor, 40 hours at 41 cents | 16.40 |
| Total cost of doors | $39.14 |

These are some of the principal parts of a house analyzed and will serve to show how the cost of any portion may be obtained by dividing it into parts and pricing each portion by itself.

Following are some miscellaneous details of carpenter work: Two carpenters working in pairs can put up in a day about

300 ft. B. M. of studding.
300 ft. B. M. of rafters.
600 ft. B. M. of floor joist.
800 ft. B. M. of wall or roof boarding.
600 ft. B. M. of matched boarding.
500 ft. B. M. of diagonal matched boarding.

## MISCELLANEOUS ITEMS

### CELLAR WINDOW

| | |
|---|---|
| Frame | $1.50 |
| Sash | 1.20 |
| Hardware | .15 |
| Labor | .50 |
| | $3.35 |

### CELLAR DOORS

| | |
|---|---|
| Stock door, 2 ft. 8 in. x 6 ft. 8 in. x $1\frac{1}{2}$ in. | $2.25 |
| Frame | 1.00 |
| Finish, 36 ft. $4\frac{1}{2}$ in. finish | 1.62 |

| | |
|---|---|
| Threshold | $0.15 |
| Hardware | .85 |
| Labor | 3.00 |
| | 8.87 |

Paper on walls under clapboards or shingles per square:

| | |
|---|---|
| Paper | $0.20 |
| Laying | .05 |
| | $0.25 |

**Inside Finish.** Inside finish in white wood or cypress, cost in place:

| | |
|---|---|
| 8 in. base board with 2 in. moulding, per running ft. | $0.12 |
| 4 ft. wainscot of narrow sheathing, per running ft. | .40 |
| Plain wall sheathing, per square foot | .05 |
| $3\frac{1}{2}$ in. cap for wainscot | .06 |
| 2 in. picture moulding | .06 |
| 4 in. chair rail | .07 |
| 3 ft. panelled dado, per sq. ft. | .35 |
| 1 case of 3 drawers complete | 8.00 |

**Finishing Stock.** White wood or cypress stock which has been moulded will cost one cent for every square inch of section a foot long, less a trade discount, which at present is 30 per cent off, so that a 5 in. casing will cost 5 cents per foot less 30 per cent, or $3\frac{1}{2}$ cts. per foot.

| | |
|---|---|
| Casings, 5 in. | $0.03$\frac{1}{2}$ |
| Base, 8 in. | .05$\frac{1}{2}$ |
| Plinth blocks, 5 in. x 8 in. x $1\frac{3}{8}$ in. | .05 |
| Corner blocks 5 in. x 5 in. x $1\frac{1}{8}$ in. | .05 |
| Mouldings $\frac{7}{10}$ cent per sq. in. of section | |
| Stock pattern stair rail $2\frac{1}{2}$ in. x $2\frac{3}{4}$ in., per foot | .17 |
| Balusters, $1\frac{3}{8}$ each | .09 |
| Newels, 5 in. stock pattern | 5.00 |
| Newels, 6 in. stock pattern | 6.00 |
| Plate rail and picture moulding per foot | .09 |
| Picture moulding per foot | .01$\frac{1}{2}$ to .03 |
| Stock drawer case, 3 drawers | 3.50 |
| Panelled draw case, 5 drawers | 13.00 |

**Inside Doors five cross panels in pine to paint**

| | |
|---|---|
| 2 ft. 8 in. x 6 ft. 8 in. x 1½ in. | $2.40 |
| 2 ft. 10 in. x 6 ft. 10 in. x 1½ in. | 2.50 |
| 3 ft. 0 in. x 7 ft. 0 in. x 1½ in. | 2.80 |

**Window Frames**

| | |
|---|---|
| 2½ ft. x 4½ ft. | $1.10 |
| 3 ft. x 5 ft. | 1.20 |

## STAIRS

The trade of stair-building, while a part of the general work of joinery, is usually taken up as a separate trade and is done by men who do nothing else. For this reason it is better, if possible, to have the stairs figured and built by a regular stair-builder, who will have the special tools, moulds, and stock necessary for this branch of carpenter work.

There are usually in every house, two sets of stairs, one in the front part of the house and one in the back part. Sometimes the stairs are so arranged as to land together in the second story, but divide somewhere in their height upon a common landing, one part, the more ample and elaborate, running from the front hall, and the other from the back hall or kitchen. This is called a combination staircase and is often an economical solution of the problem of front and back stairs. See Fig. 14.

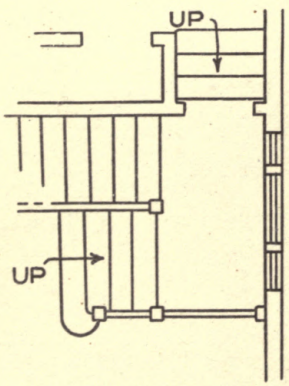


Fig. 14. Combination Staircase.

When two separate staircases are put in, each will have a distinct character, and it is this condition that we shall consider.

**Front Stairs.** The front stairs of ordinary width and elaboration, say from 3 ft. to 4 ft. wide with turned balusters and moulded rails and posts, in white wood or North Carolina pine, may be approximated at $3.50 to $4.50 per step, complete. This is on the basis $1.50 per step for labor, the remainder for the stock. Panelling in connection with the stairs should be figured at $.40 to $.50 per sq. ft. of which one-half will be labor and the other half the stock. For ash add 50 per cent, for oak 75 per cent.

Winding steps will cost about double the price of straight steps for material, but the labor will be increased only about 50 per cent. This price will allow of hard pine treads and plain moulded rail with $1\frac{1}{2}$ in. turned balusters, two to a tread.

No more definite data can be given as to front stairs, as there is such a wide variation in design and finish, and such a wide range in selection of posts, rails, and balusters.

In general a good moulded and panelled newel may be had for $5.00 to $8.00, landing posts $3.00 to $4.00, rail 15 to 18 cents per lineal foot, balusters 9 to 12 cents each. Balusters turned in colonial pattern with an upper shaft, a square, and an urn-shaped turning at the base, will cost, turned to detail, about 18 cents; if twisted, add 30 cents. See Fig. 15.

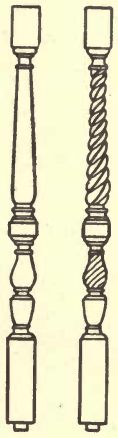


Fig. 15. Balusters in Colonial Pattern.

These prices are for open string stairs, if brackets are used on the outside stringer, it will add 12 to 15 cents per step.

**Back Stairs.** Common box stairs, for general use in the back and attic portions of a house, will cost about $1.60 per step, this includes 85 cents for stock and 75 cents for labor. Winders will be used more frequently here than in front stairs and will cost about double the price of a straight step. Open cellar stairs of plank with no risers will cost about 65 cents per step, giving 20 cents for labor and 45 cents for stock.

**Summary.** From the foregoing it will be found that a flight of front stairs in white wood will cost, at the average run of 16 steps, about $64.00; and the same in ash $96.00; in oak $112.00. This is a fair price for good plain work and will give a satisfactory result.

The back stairs at 15 steps would cost $24.00 and the cellar stairs $7.80. Under conditions where much of the handrailing could be done away with, the prices could be reduced considerably.

### DAY'S WORK

A carpenter in one day can do any one of the following items:

400 running feet of plaster grounds

40 pairs of bridging

1 window, complete, frame, sash, and fittings

1 door, setting frame, hanging, casing, and fitting with hardware
Casing windows, 4 per day
Hanging and fitting blinds, 10 pairs per day
Hanging and fitting doors, 5 per day
Casing doors, 5 per day

Cost of labor per square of 100 feet:

| | |
|---|---|
| Framing of floors, per square | $1.50 |
| Framing of walls | 1.50 |
| Framing of plain roofs | 1.50 |
| Framing of hip and valley roofs | 2.00 |
| Heavy framing | 1.20 |
| Boarding walls | .75 |
| Boarding walls with matched boards | 1.00 |
| Boarding walls diagonally | 1.00 |
| Boarding roofs | 1.00 |
| Laying rough floor | .75 |
| Laying rough floor diagonally | 1.00 |
| Bridging floors | .50 |
| Furring brick walls 12 in. on centers | 1.50 |
| Furring brick walls 16 in. on centers | 1.00 |
| Laying spruce upper floor, 6 in. stock | 1.50 |
| Laying spruce upper floor, 4 in. stock | 2.00 |
| Laying hardwood floors, 2½ in. stock | 2.50 |
| Shingling walls and roofs | 2.18 |
| Clapboarding walls | 2.18 |
| Papering walls under shingle or clapboards | .25 |

Work by the piece; labor:

| | |
|---|---|
| Making window frames | $1.25 |
| Making door frames | 1.00 |
| Door frame with transom | 1.50 |
| Setting window frames, each | .30 |
| Setting window frames in brickwork, each | .50 |
| Hanging blinds, per pair | .32 |
| Fitting and hanging sashes per pair | .50 |
| Hanging transoms | .40 |
| Casing windows | .80 |

| | |
|---|---|
| Large size windows | $1.50 |
| Attic and cellar windows | .75 |
| Casing door opening, one side | .32 |
| Casing door opening, both sides | .65 |
| Fitting, hanging, and trimming door | .65 |
| Fitting, hanging, and trimming outside door | 1.00 |
| Pair of sliding doors, double | 13.00 |
| Work in common closet | 1.50 |

**Exterior Finish.** The exterior finish of a house will consist, in the main, of the water table at the bottom, the belt midway, and the cornice at the top.

Prices of labor per lineal foot:

| | |
|---|---|
| Water table, 3 members at 3 cents | $0.09 |
| Corner boards | .03 |
| Belt | .08 |
| Cornice, 3 to 6 cents each member, or per ft. | .50 |
| Gable finish, lineal foot | .60 |

**Piazzas and Porches.** An ordinary piazza will cost, complete, about 75 cents a square foot, making for an 8 ft. piazza a cost of $6.00 per running foot.

Shingled piazza columns each:

| | |
|---|---|
| 28 ft. boards at 2 cents | $0.56 |
| 11 ft. studding at 2¼ cents | .28 |
| 1 bunch shingles | 1.00 |
| Nails | .13 |
| Labor | 4.00 |
| | $5.94 |

Square cased columns 8 in. x 8 in. will cost, each:

| | |
|---|---|
| Stock | $1.50 |
| Labor | 1.50 |
| Erecting | .50 |
| | $3.50 |

A simple balustrade of straight square balusters $1\frac{1}{8}$ in. will cost per running foot:

| | | |
|---|---|---|
| Top rail | 3 in. x 4 in. | $0.12 |
| Bottom rail | 2 ft. x 4 in. | .08 |
| Balusters, four to a foot | | .12 |
| Labor | | .32 |
| | | $0.64 |

Piazza ceiling per square:

| | |
|---|---|
| Sheathing | $4.00 |
| Waste | 1.25 |
| Furring | 1.50 |
| Nails | .25 |
| Labor | 1.50 |
| | $8.50 |

Piazza Finish:

| | | |
|---|---|---|
| Stock pattern, 5 in. turned columns | 8 ft. long | $ 2.00 |
| Stock pattern, 6 in. turned columns | 8 ft. long | 2.75 |
| Stock pattern, 8 in. Colonial columns | 9 ft. long | 3.50 |
| Stock pattern, 10 in. Colonial columns | 9 ft. long | 5.50 |
| 8 in. Doric Column from detail | 9 ft. long | 6.50 |
| 10 in. Doric Column from detail | 9 ft. long | 8.50 |
| 10 in. Fluted Column from detail | 9 ft. long | 15.00 |
| Short Posts, 5 in. x 5 in. x 4 ft. 0 in. | | 1.00 |
| Short Posts, 6 in. x 6 in. x 4 ft. 0 in. | | 1.50 |
| Piazza balusters $1\frac{3}{4}$ in., 14 in. to 16 in. long, .06 to | | .10 |
| Piazza rail $1\frac{3}{4}$ x $3\frac{3}{4}$ in. per ft. | | .06 |
| Piazza rail $2\frac{1}{4}$ x $3\frac{3}{4}$ in. per ft. | | .07 |
| Tin roof per square | | 10.00 to 12.00 |

Conductors:

| | |
|---|---|
| 15 ft. pipe at 15 cents | $2.25 |
| Gooseneck and labor | .65 |
| Putting up | .50 |
| | $3.40 |

## HARDWARE

The best way to get at the cost of hardware is to get a schedule and price for each job from the dealer. The price of hardware is constantly changing. Prices are given here for a few staple articles of ordinary value.

| | |
|---|---|
| Nails per cwt. | $2.50 to $4.00 |
| Front door set (bronze metal) | 7.00 to 10.00 |
| Vestibule door set | 6.00 to 8.00 |
| Inside door set | 1.00 to 1.50 |
| Store door set | 6.00 to 10.00 |
| Single sliding door set | 1.50 to 2.00 |
| Double sliding door | 2.00 to 3.00 |
| Double acting floor hinge per pair | 3.50 up |
| Double acting spring hinge " | 2.00 up |
| Window fixture, weights, etc. | 1.10 up |
| Sash fast each | .25 to .35 |
| Transom fixture | .30 to .50 |
| Cupboard door set | .60 |
| Folding door bolts | 1.25 to 3.00 |
| Flush bolts per pair | 1.50 |
| Butts, small size per pair | .25 |
| Butts, ordinary size, per pair | .30 to .40 |
| Double coat and hat hooks, per dozen | 2.50 |
| Screws, per gross, bronze | .85 |
| Single sliding door hanger | 2.50 to 3.75 |
| Double sliding door hanger | 3.50 to 5.50 |

### NAILS

Nails are priced from a base price per hundred weight adopted by the manufacturers, which includes certain sizes of the more common kinds. From this base the different kinds of nails are priced by means of extras, as agreed upon. The present base includes common, fence, and sheathing nails in sizes from 20 penny to 60 penny.

Following is a schedule of all kinds of cut and wire nails in general use and the extra price of each kind per cwt. above the base, which is $2.50 per cwt., for cut nails and $2.45 per cwt. for wire nails.

**National List of Extras per cwt. for Cut Nails in Fair Assortment. Adopted Dec. 1, 1896**

| Common, Fence, and Sheathing | |
|---|---|
| Base 20d to 60d | $2.50* |
| *(Variable. July, 1907, $2.65.) | |
| | Extras |
| 10d to 16d | $0.05 |
| 8d and 9d | .10 |
| 6d and 7d | .20 |
| 4d and 5d | .30 |
| 3½d | .40 |
| 3d | .45 |
| 3d fine | .65 |
| 2d | .70 |
| Spikes, all sizes | .10 |

| Fine Finishing | Extras |
|---|---|
| 10d and larger | $0.25 |
| 8d and 9d | .35 |
| 6d and 7d | .45 |
| 4d and 5d | .65 |

| Barrel, Roofing, and Cottage | |
|---|---|
| 1½ inch | $0.30 |
| 1⅜ inch | .40 |
| 1¼ inch | .50 |
| 1⅛ inch | .60 |
| 1 inch | .70 |
| ⅞ inch | .85 |
| ¾ inch | 1.00 |

| Casing, Box, and Floor | |
|---|---|
| 10d and larger | $0.15 |
| 8d and 9d | .25 |
| 6d and 7d | .35 |
| 4d and 5d | .50 |
| 3d | .70 |
| 2d | 1.00 |

| Clinch | |
|---|---|
| 3 in. and larger | $0.45 |
| 2¾ and 2½ in. | .55 |
| 2¼ and 2 in. | .65 |
| 1¾ and 1½ in. | .75 |
| 1¼ in. | .95 |
| 1 in. | 1.15 |
| 10 cents for each ½ keg | |

| Slating | |
|---|---|
| 6d | $0.40 |
| 4d and 5d | .50 |
| 3d | .75 |
| 2d | 1.00 |

| | |
|---|---|
| 4d Swedes Genuine | $1.30 |
| 4d Swedes Common | .80 |
| Galvanizing | 2½ cts. per lb. |
| Tinning | 3 cts. per lb. |

| Size | 2d | 3d | 3½d | 4d | 5d | 6d | 7d | 8d | 9d | 10d |
|---|---|---|---|---|---|---|---|---|---|---|
| Length | 1 | 1¼ | 1⅜ | 1½ | 1¾ | 2 | 2¼ | 2½ | 2¾ | 3 |

| Size | 12d | 20d | 30d | 40d | 50d | 60d |
|---|---|---|---|---|---|---|
| Length | 3½ | 4 | 4½ | 5 | 5½ | 6 |

## WIRE NAILS

**Adopted Dec. 1, 1896.**

| Common, Fence, and Flooring | |
|---|---|
| Base 20d to 60d | $2.45* |

* (Variable. July, 1907, $2.55.)

| | Extras |
|---|---|
| 10d to 16d | $0.05 |
| 8d and 9d | .10 |
| 6d and 7d | .20 |
| 4d and 5d | .30 |
| 3½d | .40 |
| 3d | .45 |
| 3d fine | .50 |
| 2d | .70 |

Barbed Common and Barbed Car Nails

15c. advance over common

Slating

| | |
|---|---|
| 2d | $0.80 |
| 3d | .60 |
| 4d and 5d | .40 |
| 6d | .30 |

Casing and Smooth Box

| | |
|---|---|
| 10d and larger | $0.15 |
| 8d and 9d | .25 |
| 6d and 7d | .35 |
| 4d and 5d | .50 |
| 3d | .70 |
| 2d | 1.00 |

Barbed box, 15 cts. advance over smooth

| Smooth Finishing Nails | Extras |
|---|---|
| 10d and larger | $0.25 |
| 8d and 9d | .35 |
| 6d and 7d | .45 |
| 4d and 5d | .65 |
| 3d | .85 |
| 2d | 1.15 |

Barrel

| | |
|---|---|
| ¾ in. | $1.00 |
| ⅞ in. | .85 |
| 1 in. | .70 |
| 1⅛ in. | .60 |
| 1¼ in. | .50 |
| 1⅜ in. | .40 |
| 1½ in. | .30 |

Clinch Nails

| | |
|---|---|
| 2d | $1.05 |
| 3d | .85 |
| 4d and 5d | .65 |
| 6d and 7d | .55 |
| 8d and 9d | .45 |
| 10d | |
| 12d and 16d | .35 |
| 20d | |

Wire Spikes

| | |
|---|---|
| All sizes | $0.10 |

### MISCELLANEOUS DATA

| | |
|---|---|
| Broken stone filling cu. yd. | $ 2.50 |
| Cesspool 6 ft. diam. and 8 ft. deep, 8 in. brick | 60.00 |
| Blind drains per lineal ft. | .12 |

| | |
|---|---|
| Earthen drains 4 in. diam. per foot | $ .20 |
| Arch brick laid in wall per M. | 100.00 |
| Marble mosaic per sq. ft. | .75 |
| Marble threshold, exterior | 5.00 |
| Marble base per foot | .50 |
| Granolithic per sq. ft. | .25 |
| Steel beams per lb. | .03 |
| Cast iron per lb. | .02 |
| Copper skylights per sq. ft., heavy | 1.75 to 2.50 |
| Plastering 2 coats on wire lath | .65 |
| Wooden balustrade per ft. | 1.50 |
| Outside blinds for a house will average per pair | .85 |
| Inside doors, 5 cross panels, pine to paint, average | 3.25 |
| Store sash $1\frac{3}{4}$ in. per lineal foot | .30 |
| Storm sash for house will average | 1.55 |
| Outside door frame with transom | 3.50 |
| Inside door frames will average | 1.10 |
| Same with transoms | 1.85 |
| Factory window complete 4 ft. 0 in. × 8 ft. 0 in. | 13.00 |
| Framing heavy lumber per M. | 12.00 |
| Planing lumber per M. | 2.00 |
| Laying plank floors per M. | 9.00 |
| Common bricks per M. | 9.00 |
| Common bricks laid in wall per M. | 20.00 |
| Concrete foundations per cu. yd. | 7.25 |
| Shingling on roof per square | 6.54 |
| Slating | 11.80 |
| Tar and gravel roof per square | 6.00 |
| Tin roofing per square, average | 11.00 |

### ROOFING

**Description.** Many kinds of material are used for covering roofs, depending upon the nature of the work, the pitch of the roof, the desired appearance, and the availability of material.

**Shingles.** The roof covering of an ordinary wooden house is generally of shingles. These are either shaved or sawed, but sawed shingles are generally used. Sawed shingles come in bundles of 250, or four bundles to the thousand. These quantities are based on a width

of 4 in. to each shingle so that if they are wider they will be numerically less and consequently, if narrower, there will be more in number. Common shingles are 16 in. to 18 inches in length.

**Measuring.** In measuring for shingles the quantities are usually taken by the square; equal to 100 sq. ft., and the number of shingles required will depend upon the lap or exposure which is given to the shingles. On roofs the exposed length is usually 4½ inches, and on walls 5 or 6 inches is the usual exposure, although in the carrying out of special designs a greater or less exposure may be given.

**Quantities.** The covering capacity of 1000 shingles at various exposures is as follows:

| | | |
|---|---|---|
| 4 inches to the weather | 111 sq. ft. | = 900 per square |
| 4½ inches to the weather | 125 sq. ft. | = 800 per square |
| 5 inches to the weather | 139 sq. ft. | = 720 per square |
| 6 inches to the weather | 167 sq. ft. | = 600 per square |
| 7 inches to the weather | 194 sq. ft. | = 514 per square |
| 8 inches to the weather | 222 sq. ft. | = 450 per square |

**Cost.** Sawed cedar shingles of best quality marked "Extra" will cost from $4.00 to $5.00 per thousand, and clear shingles, that is, having the exposed lower third of clear stock, will cost $3.50 to $4.00 per thousand, and it will require 5 pounds of 4 penny nails. These will cost 3 cents a pound if plain, or 5 cents, galvanized.

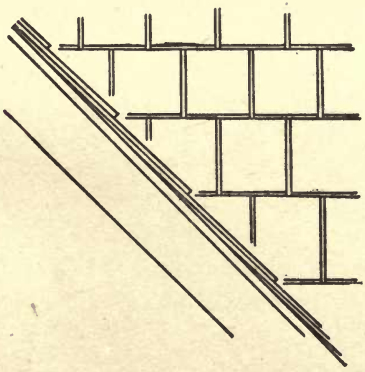


Fig. 16. Slating.

A carpenter in one day of 8 hours will lay 1500 shingles on plain work or 1000 if surface is much cut up. This will cost at $3.20 per day from $2.14 to $3.00.

In estimating shingling an allowance will be necessary for waste; this should be about 5 per cent on plain roofs and 8 to 10 per cent on roofs with many hips, valleys, or dormers.

**Slating.** Slates are made in different sizes from 6 x 12 up to 16 x 24 and larger sizes for special work. They are laid with reference to head-cover rather than exposure, that is: the lap of cover of each course by the second above

it, gives the gauge to which slates should be laid, Fig. 16; this lap is usually 3 inches, so that the exposed length of any slate may be found by subtracting this lap from the length of the slate and dividing by 2. This exposure multiplied by the width of the slate gives the exposed area of the slate, and the number of slates in a given area may be found by dividing the area in square inches by the exposed area of the slate.

*Example.* How many slates will be required per square to cover a roof if 8-in. x 14-in. slates are used?

$$\frac{(14 \text{ in.} - 3 \text{ in.})}{2} = 5\tfrac{1}{2} \text{ in.}\ ;\ 8 \text{ in.} \times 5\tfrac{1}{2} \text{ in.} = 44 \text{ sq. in.};\ \frac{14400 \text{ sq. in.}}{44 \text{ sq. in.}} = 327.$$

In measuring a slate roof it is usual to allow an extra width of from 6 inches to a foot, according to localities, on hips, valleys, eaves, and wall cuttings, to allow for the extra work involved.

Extra charge should be made for towers and all varied forms of roof.

**Quantities.** The number of slates required to cover a square of roofing is given for various sizes in the following table:

| | | | |
|---|---|---|---|
| 6 x 12 | 533 | 10 x 20 | 165 |
| 7 x 14 | 377 | 11 x 22 | 138 |
| 8 x 16 | 277 | 12 x 24 | 114 |
| 9 x 18 | 214 | 14 x 28 | 83 |

The cost of slating per square is as follows:

| | | |
|---|---|---|
| Slates | 10 in. x 16 in. | $ 7.50 |
| Labor 1 day, slater | | 3.50 |
| Nails | | .15 |
| Roofing paper | | .50 |
| Labor on paper | | .15 |
| | | $11.80 |

| | |
|---|---|
| Tin roof per sq. ft., average | $0.11 |
| Gutters per ft., galv. iron | .90 |
| Galv. iron conductors per ft., put up | .18 to .25 |
| Copper roof, plain per square | 40.00 |
| Copper roof, with battens per square | 50.00 |
| Gravel roofing, 5-ply per square | 6.00 |

Zinc flashing, 1½ cents per inch of width, per foot.

**Tiles.** Where a special feature is to be made of the roof, tiles are often used but these are found in such a variety of shapes, sizes, and prices, that a roof of this sort should always be given to a roofer to estimate.

**Metal Roofs.** Copper or tin is generally used for roofs where a metal covering is desired. Copper roofs, if steep enough to show as a feature of the building, are usually laid with ribs over battens. This makes a handsome and durable roof the cost being not greatly increased.

Copper roofing will cost from $35.00 to $40.00 per square.
Flashings around skylights and balustrades, 30 to 50 cents a lineal foot.

For a cheaper metal roof, tin is generally used; this may be used on steep or flat roofs. Tin for roofing should be painted on the under side and carefully soldered on the top.

Tin roofing will cost from $10.00 to $12.00 a square.

**Composition Roofs.** For flat roofs, a composition of tar and paper in layers finished with a protective coat of gravel, is often used; the cost of this depends upon the number of layers of paper and "moppings" of tar required, but a 5-ply roof will give good service and will cost about $6.00 a square.

**Gutters and Conductors.** Gutters and conductors are both made of wood or metal, metal being preferred in all cases. For metal gutters copper and galvanized iron are used.

| | |
|---|---|
| Copper gutters will cost about | $1.25 a lineal foot. |
| Copper conductors | .50 to .75 a foot |
| Goosenecks | 5.00 to 10.00 each |
| Moulded conductor heads | 4.00 to 10.00 each |
| Straps | 1.00 each |

Galvanized iron gutters will cost about 90 cents a lineal foot, and conductors, 18 to 25 cents a foot according to size.

## PLASTERING

Plastering is measured by the square yard and is usually done in 2-coat or 3-coat work. In taking off plastering it is customary to deduct only one-half of the area of openings to allow for the extra work of plastering to the grounds.

In some localities no openings are deducted unless more than 7 yards in area, but in close figuring this is not generally followed.

Narrow strips, such as chimney breasts, if less than a foot wide, are generally called a foot. Round corners, beads, and arrises must be taken separately by the lineal foot.

Raking surfaces require additional work and should be taken at about one-half more than plain work. Circular or elliptical work should be charged at two prices and domes, groins, and intersecting soffits, at three prices. Cornices are taken by the square foot of girth with enrichments charged separately by the lineal foot.

**Lathing.** Lathing is generally included in the plasterer's price although put up by a different set of men. Lathing is estimated by the square yard or by the thousand laths, the price being $2.75 to $3.25 a thousand.

**Labor.** Two plasterers requiring one helper will do from 40 to 50 square yards of three-coat plastering, or 60 to 70 square yards of two-coat work, in a day of 8 hours, and 1,200 to 1,500 laths makes a day's work for one lather. 100 sq. yds. of lath and plaster will cost about as follows, for two-coat work:

| | |
|---|---|
| 1,500 laths at $4.75 per M | $ 7.12 |
| 10 lbs. 3d. nails at $3.20 per cwt. | .32 |
| Labor on laths | 4.50 |
| 10 bushels lime at .48 per bu. | 4.80 |
| 6 lbs. hair at .04 | .24 |
| 1 load sand | 1.80 |
| Plasterer 3 days at $5.00 | 15.00 |
| Helper 1½ days at $3.00 | 4.50 |
| Cartage | 1.00 |
| | $39.28 |

Cost of a square yard of two-coat work, $39.28 ÷ 100 = 39 to 40 cents.

This is a price which is on the increase and, while plastering is done in the country towns as low as 35 cents per yard it will not be safe to use this price any length of time.

For three-coat work we may take the following schedule:

| | |
|---|---|
| Laths and putting on, as above | $11.94 |
| 13 bush. lime at .48 | 6.24 |
| 8 lbs. hair at .04 | .32 |
| 1½ loads sand at $1.80 | 2.70 |
| 1 bbl. plaster Paris | 1.70 |
| Plasterer 4 days at $5.00 | 20.00 |
| Helper 2 days at $3.00 | 6.00 |
| Cartage | 1.00 |
| | $49.90 |

Cost of a sq. yd. of three-coat work, $49.90 ÷ 100 = 50 cents.

**Rules.** In some portions of the country a set of rules has been adopted governing the valuing of plasterer's work which are in the main as follows:

"*First.* Measure on all walls and ceilings the surface actually plastered, without deducting any grounds or any openings of less extent than seven superficial yards.

*Second.* Returns of chimney-breasts, pilasters, and all strips of plastering less than twelve inches in width, measure as twelve inches wide; and where the plastering is finished down to the base, surbase, or wainscoating, add six inches to height of walls.

*Third.* In closets, add one-half to the measurement. Raking ceilings and soffits of stairs, add one-half to the measurement; circular or elliptical work, charge two prices; domes or groined ceilings, three prices.

*Fourth.* For each twelve feet of interior work done farther from the ground than the first twelve feet, add five per cent; for outside work, add one per cent for each foot that the work is done above the first twelve feet."

Stucco-work is generally governed by the following rules; viz., "Mouldings less than one foot girt are rated as one foot, over one foot, to be taken superficial. When work requires two moulds to run same cornice, add one-fifth. For each internal angle or mitre, add one foot to length of cornice, and, for each external angle, add two feet. All small sections of cornice less than twelve inches long measure as twelve inches. For raking cornices, add one-half; circular or elliptical work double price; domes and groins, three prices.

For enrichments of all kinds a special price must be charged. The higher the work is above ground, the higher the charge must be; add to it at the rate of five per cent for every twelve feet above the first twelve feet."

### PAINTING

Painting is estimated by the yard, doors and windows being taken solid to make up for the extra labor of cutting in the sashes and mouldings.

Railings, fences, grilles, and similar surfaces are taken solid.

A painter in one day will cover 100 yds. of outside work one priming coat, or 80 yds. of the second coat. Ten pair of blinds will make a day's work.

On first coat, one pound of paint will cover about 4 sq. yds. and 6 sq. yds. on the subsequent coats. One pound of putty for stopping will cover 20 yds.

Shingle stains require a gallon for every 500 shingles if dipped two-thirds in, and for a brush coat after laying, a gallon will cover about 200 feet of surface, or 1500 shingles.

| | |
|---|---|
| 1 gallon of priming color | will cover 50 yards |
| 1 gallon of zinc white | will cover 50 yards |
| 1 gallon of white paint | will cover 44 yards |
| 1 gallon of black paint | will cover 50 yards |
| 1 gallon of stone color | will cover 44 yards |
| 1 gallon of yellow paint | will cover 44 yards |
| 1 gallon of green paint | will cover 45 yards |
| 1 gallon of emerald green | will cover 25 yards |
| 1 gallon of bronze green | will cover 75 yards |

The following table gives the comparative covering of paints by weight on various surfaces.

### COVERING OR SPREADING POWER OF TYPICAL PAINTS* ON WOOD

| | First Coat | Second Coat |
|---|---|---|
| Red lead | 112 | 252 |
| White lead | 221 | 324 |

*The figures represent square feet covered by 100 lbs. of paint of the usual consistency, applied evenly with a brush.

| | First Coat | Second Coat |
|---|---|---|
| Oxide of zinc | 378 | 453 |
| Red oxide | 453 | 540 |
| Raw linseed oil | 756 | 872 |
| Boiled linseed oil | 412 | 540 |

**ON METAL**

| | | |
|---|---|---|
| Red lead | 477 | |
| White lead | 648 | |
| Oxide of zinc | 1134 | |
| Red oxide | 870 | |
| Raw linseed oil | 1417 | |
| Boiled linseed oil | 1296 | |

**ON PLASTER**

| | | |
|---|---|---|
| Red lead | 324 | |
| White lead (on sized wall) | 362 | |
| Oxide of zinc | 594 | |
| Raw linseed oil (unsized wall) | 55 | 99 |

**Cost.** The cost of painting varies under different conditions but in general the following table will be found an average price:

**INSIDE WORK**

| | |
|---|---|
| 1 coat per sq. yd. | $0.12 |
| 2 coats per sq. yd. | .20 |
| 3 coats per sq. yd. | .25 |
| 1 coat shellac per sq. yd. | .10 |
| 1 coat size and 2 coats paint | .20 |
| 1 coat size and 3 coats paint stipple | .30 |

**INSIDE FINISH**

| | |
|---|---|
| 1 coat liquid filler, 1 coat varnish | $0.20 |
| 1 coat " filler, 2 coats varnish | .25 |
| 1 coat " filler, 3 coats varnish | .30 |
| 1 coat paste filler, 1 coat varnish | .25 |
| 1 coat " filler, 2 coats varnish | .30 |
| 1 coat " filler, 3 coats varnish | .35 |

Tinting walls in distemper will cost 15 cents per sq. yd. for small amounts and 10 cents per sq. yd. for 50 yds. or more. Finishing hard wood floors with filler, shellac, and 2 coats of varnish or wax finish will cost 30 cents per sq. yd.

### OUTSIDE PAINTING

| | |
|---|---|
| 1 coat new work per sq. yard | $0.10 |
| 2 coats new work per sq. yard | .18 |
| 3 coats new work per sq. yard | .25 |

### SANDING

| | |
|---|---|
| 2 coats paint, 1 coat sand per sq. yd. | $0.28 |
| 3 coats paint, 1 coat sand per sq. yd. | .35 |
| 3 coats paint, 2 coats sand per sq. yd. | .50 |

Painting on brick will cost 12 cents per yard for the first coat, but subsequent coats will cost no more than on wood. Tin roofs can be painted one coat for 5 cents a yard.

1000 shingles dipped two-thirds of their length will cost $3.00 and a brush coat in addition costs 50 cents. Blinds are rated at $1.50 per pair for an average size.

### HEATING

The heating of a building is generally made the subject of a special contract.

The three usual methods for house heating are, the Hot Air Furnace, the Hot Water Boiler, or the Steam Boiler. Sometimes a combination system of hot air and steam, or hot air and hot water is used.

Estimates of the cost of heating should be obtained from contractors who follow this particular branch of construction.

In general, for an ordinary class of building such as residences, apartments, stores, etc., the heating will range according to the system used, from 6% to 12% of the cost of the building, as follows:

| | |
|---|---|
| Hot air furnace | 6 to 7 per cent. |
| Steam | 8 to 10 per cent. |
| Hot water | 10 to 12 per cent. |

These figures are approximate and the only reliable way to obtain the actual cost is by taking off the items and figuring each job by itself.

**Quantities.** The hot air heating of an ordinary house can be approximated closely by the builder on the basis of cubic contents to be heated; and the area of piping and capacity of the furnace can be approximated by means of the following general rules:

To determine the size of pipe for any room, find the cubic contents of the room in cubic feet and divide this by 25 for rooms on the first floor, and by 35 for rooms on the second and third floors.

Make the cold air box at least $\frac{3}{4}$ of the combined area of pipes, none of which should be smaller than 7 inches in diameter.

*Example.* For a small house of seven rooms the quantities may be as follows:

**FIRST FLOOR**

Parlor 12 x 15 x 9 ft. high 1624 cu. ft. divided by 25 = 65 sq. in. or 9 in. pipe

Hall 8 x 20 x 9 ft. high 1440 cu. ft. divided by 25 = 58 sq. in. or 9 in. pipe

Add 40% for second story hall space making 81 sq. in. = 10 in. pipe

Dining Room 14 x 15 x 9 ft. high 1890 cu. ft. divided by 25 = 76 sq. in. or 10 in. pipe

**SECOND FLOOR**

Chamber 13 x 15 x $8\frac{1}{2}$ = 1658 cu. ft. ÷ 35 = 48 sq. in. or 8 in. pipe

Chamber 11 x 12 x $8\frac{1}{2}$ = 1122 cu. ft. ÷ 35 = 32 sq. in. or 7 in. pipe

Chamber 14 x 16 x $8\frac{1}{2}$ = 1904 cu. ft. ÷ 35 = 55 sq. in. or 8 in. pipe

Bath Room 8 x 10 x $8\frac{1}{2}$ = 680 cu. ft. ÷ 35 = 20 sq. in. or 7 in. pipe

Total pipe area:

| | |
|---|---|
| 2 – 10 in. pipes 78 sq. in. each | 156 sq. in. |
| 1 – 9 in. pipe 64 sq. in. | 64 sq. in. |
| 2 – 8 in. pipes 50 sq. in. | 100 sq. in. |
| 2 – 7 in. pipes 38 sq. in. | 76 sq. in. |
| Total pipe area | 396 |

From this scale we can determine the size of the furnace and the cost of piping.

A furnace to carry say 400 to 500 sq. feet of pipe area would cost, set in place, from $100 to $125. The labor on pipes, registers, and furnace $20 to $24.

The cost of piping will depend on the distances to run but the material can be estimated as follows:

Round tin pipes will cost; from A. A. charcoal plates, as follows:

| Size of Pipe | 6" | 7" | 8" | 9" | 10" | 11" | 12" | 13" | 14" | 15" | 16" | 18" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Per Foot | .09 | .10 | .12 | .14 | .16 | .18 | .23 | .25 | .27 | .28 | .30 | .32 |
| Hot Air Damper | .12 | .12 | .12 | .15 | .15 | .15 | .18 | .18 | .18 | .20 | .20 | .25 |
| Furnace Collars | .10 | .10 | .10 | .12 | .12 | .14 | .18 | .18 | .18 | .20 | .20 | .25 |
| Tin Elbows | .12 | .15 | .18 | .20 | .25 | .30 | .35 | .40 | .45 | .50 | .60 | .70 |

## *REGISTERS

| Size | 6x10 | 7x10 | 8x10 | 8x12 | 9x12 | 10x14 | 12x15 | 12x16 | 14x18 | 16x20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Black Register | .50 | .52 | .52 | .58 | .64 | 1.08 | 1.37 | 1.70 | 2.74 | 3.75 |
| Slate Stone | .38 | .42 | .44 | .50 | .63 | .70 | .93 | 1.00 | 1.50 | 2.35 |
| Register Box | .14 | .16 | .17 | .20 | .23 | .27 | .33 | .35 | .38 | .50 |
| Netting | .05 | .05 | .06 | .06 | .07 | .07 | .08 | .08 | .10 | .12 |
| Totals | 1.07 | 1.15 | 1.19 | 1.34 | 1.57 | 2.12 | 2.71 | 3.13 | 4.72 | 6.72 |

* July, 1906.—Add one-third.

Galvanized smoke pipe will cost 9c per lb. and will weigh per lineal foot as follows:

| Size No. | 4" | 5" | 6" | 7" | 8" | 9" | 10" | 11" | 12" | 13" | 14" |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | $1\frac{3}{4}$ | $2\frac{1}{8}$ | $2\frac{5}{8}$ | 3 | $3\frac{3}{8}$ | $3\frac{1}{4}$ | $4\frac{1}{8}$ | $4\frac{1}{2}$ | 5 | $5\frac{1}{4}$ | $5\frac{3}{4}$ |
| 24 | $1\frac{1}{4}$ | $1\frac{5}{8}$ | $1\frac{7}{8}$ | $2\frac{1}{8}$ | $2\frac{1}{2}$ | $2\frac{3}{4}$ | 3 | $3\frac{3}{8}$ | $3\frac{5}{8}$ | $3\frac{7}{8}$ | $4\frac{1}{4}$ |

## GALVANIZED ELBOWS

| Size | 4" | 4½" | 5" | 5½" | 6" | 7" | 8" |
|---|---|---|---|---|---|---|---|
| Pound | 1 | $1\frac{1}{4}$ | $1\frac{1}{2}$ | $1\frac{3}{4}$ | $2\frac{1}{4}$ | $2\frac{3}{4}$ | $3\frac{1}{4}$ |
| Cost | .18 | .20 | .23 | .25 | .28 | .32 | .35 |

### Tin, per Sheet

| | | |
|---|---|---|
| DC | $12\frac{1}{2}$ x 17 | .05 |
| IX | 14 x 20 | .07 |
| IXX | 14 x 20 | .08 |
| IX | 20 x 23 | .12 |
| IX | 20 x 26 | .13 |
| IX | 20 x $29\frac{1}{2}$ | .16 |
| IX | 20 x $32\frac{1}{2}$ | .17 |

### Miscellaneous Data

| | |
|---|---|
| Galvanized sheet iron per lb. | $0.05 |
| Common sheet iron per lb. | .04 |

| | |
|---|---|
| Zinc per lb. | $0.10 |
| Wrought iron per lb. | .04 |
| Galvanized piping per lb. | .09 |
| Galvanized cold air box per lb. | .09 |
| Galvanized furnace shields per sq. ft. | .08 |
| Register box netting per sq. ft. | .05 |
| Asbestos paper at 1½ lbs. per sq. yd. | .05 |

Figure cold air supply ¾ combined area of piping.

Register grilles take up ⅓ of area of register.

Locate registers nearest convenient point to furnace, inside part of room preferred. Locate furnace so that all pipes will be as nearly equal in length as possible.

Estimate pipes by lineal foot, but elbows and dampers separately, also registers with boxes and borders.

Allow from $1.00 to $1.25 for flange connection of cold air box to furnace casing.

Cover all risers with asbestos paper in partitions.

### HOT WATER AND STEAM HEATING

In estimating for heating with hot water, all pipes and fittings must be taken off and listed, all standard radiators priced by the square foot of radiation, and special radiators listed separately, also tanks, valves, hangers, etc.

Radiators are listed in the trade catalogues, together with the number of square feet in each section.

These prices are subject to varying discounts which can be obtained of the manufacturers.

**Radiation.** The amount of radiation necessary for each room depends upon so many varying conditions that all rules are in a way approximate.

Certain formulae may be used, which will give good results in ordinary cases, but just what allowances are necessary must be determined by the heating engineer.

The same is true of making the estimates of hot water or steam and the contractor should in all cases have the job figured by an expert.

In ordinary cases the amount of radiation may be determined

from the cubic contents of the rooms to be heated by the following tables which give the proportions of one square foot of radiating surface to the cubic contents of the various rooms in cubic feet.

**STEAM**

| One Square Foot of Radiation Will Heat | Dwellings, Cubic Feet | Halls, Stores, Etc. Cubic Feet | Churches and Auditoriums, Cubic Feet |
|---|---|---|---|
| By direct radiation— | | | |
| On first floor | 35 to 60 | 75 to 100 | 125 to 200 |
| On upper floors | 50 to 80 | ..... | ..... |
| By indirect radiation— | | | |
| On first floor | 25 to 40 | 50 to 70 | 80 to 135 |
| On upper floors | 40 to 50 | ..... | ..... |

**HOT WATER**

| One Square Foot of Radiation Will Heat | Dwellings, Cubic Feet | Halls, Stores, Etc. Cubic Feet | Churches and Auditoriums, Cubic Feet |
|---|---|---|---|
| By direct radiation— | | | |
| On first floor | 15 to 25 | 30 to 45 | 50 to 85 |
| On upper floors | 25 to 40 | | |
| By indirect radiation— | | | |
| On first floor | 17 to 40 | 45 to 65 | 80 to 125 |
| On upper floors | 25 to 35 | | |

Having determined the amount of radiation, piping, and fittings, the labor may be obtained by adding about 20 per cent to the cost of materials.

**PLUMBING**

So wide a range is possible in the selection and price of plumbing fixtures that no very useful data can be given for a complete installation.

For instance, in one house the price of a single bathroom, fitted up to meet the fancies and purse of the owner, may cost more than the whole plumbing outfit of his more modest neighbor.

Nevertheless, it is a fact that the plumbing of a house is a poor place to practice economy, as no part of the construction of a building needs more careful attention in execution or in selection.

In general, a good job of plumbing will cost about 10 per cent of the cost of the building, and of this outlay about 30 per cent will represent the labor.

In taking off plumbing the contractor should begin at the sewer

or cesspool, if the drains are included, or, if not, at the outer end of the soil pipe, and take off carefully every pipe with its fittings, which should be itemized carefully as this data will be useful in getting at the amount of caulking, fitting, etc.

**Soil Pipes.** Soil pipes should be estimated by the lineal foot, allowing in each joint ¾ of a pound of lead for every inch in diameter of the pipe.

List prices of pipe and fittings can be obtained from the dealers, which are subject to discount; these vary from time to time, but the present discounts will be found to bring the prices of the more common materials about as follows:

**DRAINAGE**

| | |
|---|---|
| 4-in. extra heavy soil pipe per ft. | $ .30 |
| 3-in. extra heavy soil pipe per ft. | .22 |
| 2-in. extra heavy soil pipe per ft. | .15½ |

For fittings add 35 per cent to the cost of pipe.

| | |
|---|---|
| 4-in. running trap | 2.00 |
| 4-in. brass ferrule cleanout | .50 |
| 4-in. lead bend | 1.50 |
| 4-in. brass ferrule | .50 |
| 2-in. brass ferrule | .20 |
| Solder per lb. | .22 |

**WATER SUPPLY**

| | |
|---|---|
| 40 gal. galvanized boiler and stand | $15.00 |
| 1-in. brass pipe per ft. | .60 |
| 1-in. galvanized pipe per ft. | .09 |
| ¾-in. galvanized pipe per ft. | .06 |
| ½-in. galvanized pipe per ft. | .05 |
| 1-in. stop and waste cock | 1.50 |
| ¾-in. stop and waste cock | .90 |
| ½-in. stop and waste cock | .80 |
| Sill cock | 1.00 |

For fittings, add 30 per cent to cost of pipes.

**WATER**

| | |
|---|---|
| 1 cu. ft. | 7.48 gallons |
| 1 cu. ft. | 29.92 quarts |

| | |
|---|---|
| 1 cu. ft., 62.321 lbs. | 1004 oz. |
| 1 cu. yd. | 1692 lbs. |
| 1 gal., 231 cu. in. | 8⅓ lbs. |
| 1-foot cylinder | 49.1 lbs. |
| 1-inch cylinder | .028 lbs. |

Pressure per sq. in. = depth in feet x 433.

Each 27.72 inches of depth gives a pressure of 1 lb. to a square inch.

A barrel 31½ gal.

Contents in cu. ft. x 2375 = barrels.

Head of water = pressure in lbs, per sq. in. x 2.31.

Number of gallons in a foot of pipe = Diam. in. inches 2 x .04.

Supply for one person is 15 gallons a day.

Actual use 6 gallons to 12 gallons.

Water 34 feet high has a pressure of 15 lbs. per sq. in. equal to atmosphere.

## CAPACITY OF CISTERNS

### In Gallons, for Each Foot in Depth

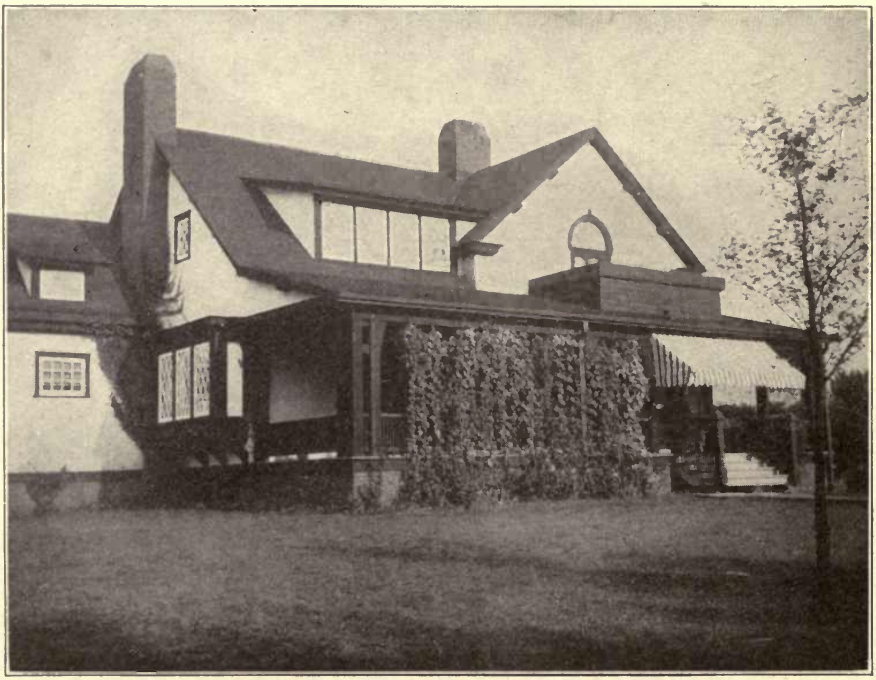
| Diameter in Feet | Gallons | Diameter in Feet | Gallons |
|---|---|---|---|
| 2. | 23.5 | 9. | 475.87 |
| 2.5 | 36.7 | 9.5 | 553.67 |
| 3. | 52.9 | 10. | 587.5 |
| 3.5 | 71.96 | 11. | 710.9 |
| 4. | 94.02 | 12. | 846.4 |
| 4.5 | 119. | 13. | 992.9 |
| 5. | 146.8 | 14. | 1,151.5 |
| 5.5 | 177.7 | 15. | 1,321.9 |
| 6. | 211.6 | 20. | 2,350.0 |
| 6.5 | 248.22 | 25. | 3,570.7 |
| 7. | 287.84 | 30. | 5,287.7 |
| 7.5 | 330.48 | 35. | 7,189. |
| 8. | 376. | 40. | 9,367.2 |
| 8.5 | 424.44 | 45. | 11,893.2 |

The American Standard gallon contains 231 cubic inches, or 8⅓ pounds of pure water. A cubic foot contains 62.3 pounds of water, or 7.48 gallons. Pressure per square inch is equal to the depth or head in feet multiplied by .433. Each 27.72 inches of depth gives a pressure of one pound to the square inch.

For tanks that taper, take diameter $\frac{4}{10}$ from large end.

## FIXTURES

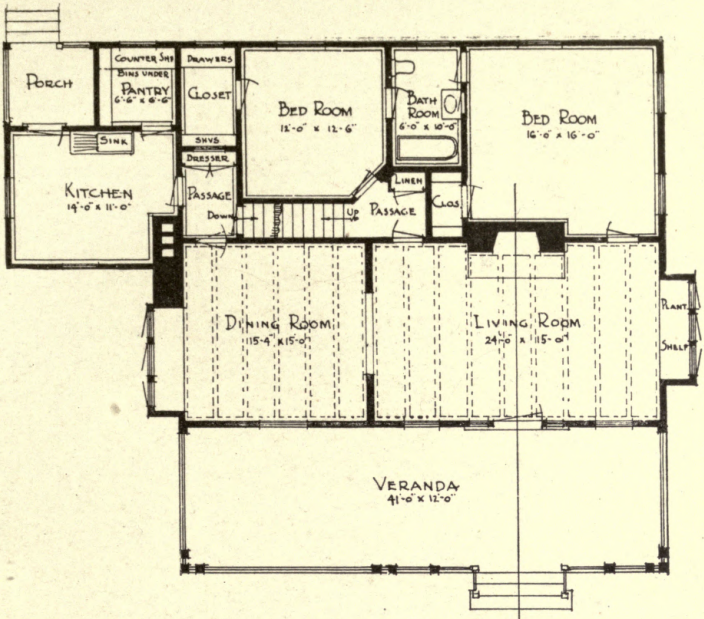
| | |
|---|---|
| 3-ft. soapstone sink complete | $30.00 to $40.00 |
| 14-in. x 17-in. lavatory with marble slab and back piece fitted complete | $35.00 to $50.00 |



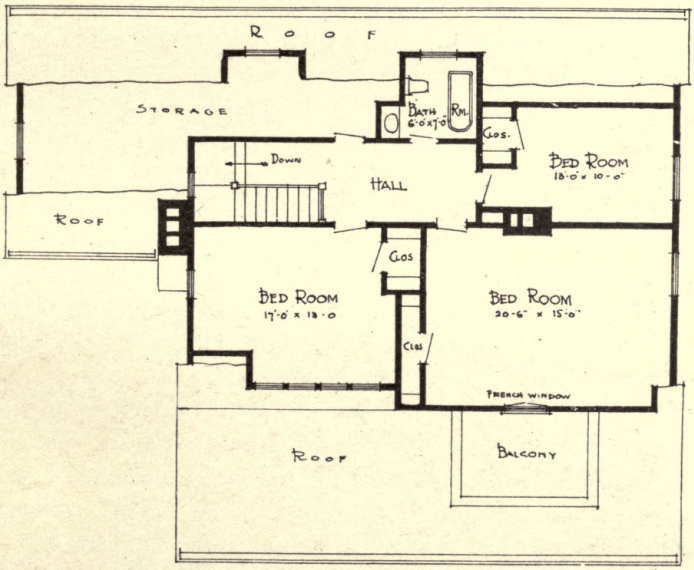
**HOUSE AT WASHINGTON, ILL.**

Herbert Edmund Hewitt, Architect, Peoria, Ill.

Walls of Cement on Metal Lath. Roofs Covered with Shingles Stained Green. All Outside Woodwork Stained Dark Brown. No Paint on Outside except on Sash.




FIRST FLOOR PLAN




SECOND FLOOR PLAN

**HOUSE AT WASHINGTON, ILL.**

Herbert Edmund Hewitt, Architect, Peoria, Ill.

Built in 1904. Cost, about $4,500. House was Built for a Summer House, but Constructed the Same as if for All Year-Round Use, and Provided with Heating Plant.

| | |
|---|---|
| Enamelled iron lavatory complete | $25.00 to $40.00 |
| 5-ft. 6-in. enamelled iron bath complete | $60.00 to $100.00 |
| Bath tub only | $25.00 to $35.00 |
| Soapstone laundry trays complete | |
| One part | $15.00 to $18.00 |
| Two parts | $30.00 to $35.00 |
| Three parts | $45.00 to $60.00 |

List prices of fittings may be obtained from all dealers, subject to large discounts, which should be considered frequently as they are constantly changing.

**Labor.** Having made a complete list of pipe, fittings, and fixtures, the labor of construction of an ordinary job of plumbing will run from 20 to 40 per cent of the cost of materials.

### GAS FITTING

As in plumbing so in gas fitting, the wide range of selection and cost in fixtures, makes it impossible to give satisfactory data in regard to cost.

The piping only, of an ordinary house will cost from $1.75 to $2.00 an outlet, and the whole outfit should cost from 3 to 5 per cent of the cost of the house.

Pipes of usual size cost as follows:

| | |
|---|---|
| $\frac{3}{8}$-in. gas pipe per foot | $0.03 |
| $\frac{1}{2}$-in. gas pipe per foot | .04 |
| $\frac{3}{4}$-in. gas pipe per foot | .05 |
| $1\frac{1}{2}$-in. main | .08 |

Fittings 25 per cent of cost of pipe.

### ELECTRIC WORK

The original contract for a house usually provides for the wiring for electric lighting and bells, but fixtures are generally left to be provided for by a later agreement, as there is such a great latitude in selection and cost.

For electric light wiring one of two systems is usually employed: the conduit system, where the wires are all run in pipes or conduits, and the knob and tube system, where the wires are run in the clear space between timbers, secured to porcelain knobs, or passing through short tubes of the same material.

In general, the rough wiring of a house may be reckoned at $4.00 per outlet for conduit work, and $2.00 per outlet for knob and tube work.

This is for every time the wires are brought to the surface, whether for switches, cutouts, or fixtures. Another way is to allow $1.50 for each lamp or switch.

**Switches.** Various kinds of switches are used, the two principal kinds being the push button, and the rotary switch.

These vary in price according to make and finish.

A good rotary switch can be had at from 90 cents to $1.00.

Push button switches from $1.00 to $1.10.

Snap switches from 30 to 40 cents.

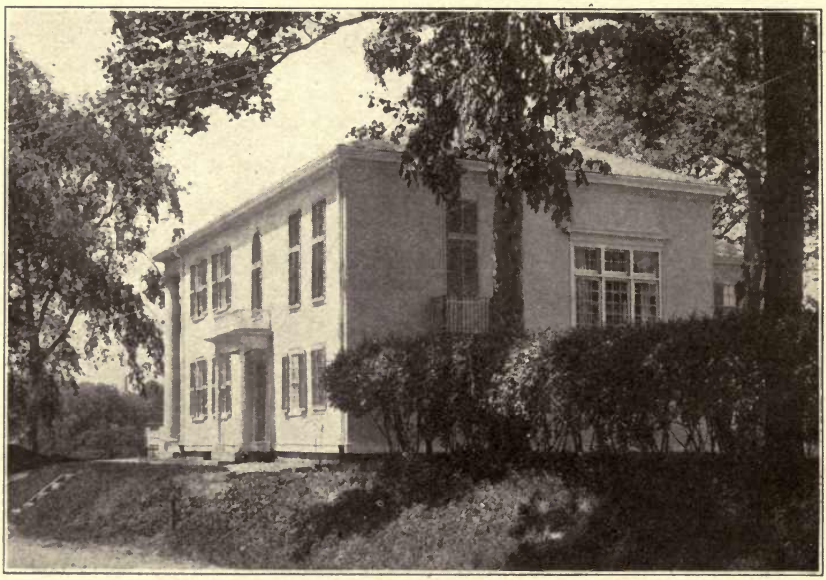
Wires are sold in coils which are marked with the gauge and manufacturer, and should bear the label of inspection acceptable to the local Insurance board.

The cost of wire will vary with the gauge and the insulation but for usual house work should cost, for No. 14 wire, 2 cents a foot.

It is well to remember that, in electric wiring, the larger the house, the more per outlet the wiring will cost. This seems contrary to expectation but is occasioned by the smaller percentage of lights to length of wire.

**Bells.** The number of call bells in a dwelling will vary according to the plan and choice of the owner.

For an ordinary house the number would range from six to ten, and the cost should be from $18.00 to $25.00 or about $3.00 per bell.



**HOUSE AT FRAMINGHAM, MASS., AS REMODELED FOR C. LA VERNE BUTLER, ESQ.**

Frank Chouteau Brown, Architect, Boston, Mass.

Alterations on this Plaster House Completed in the Spring of 1906 at a Cost of $8,000. Taking into Consideration the Changes Made in the House and the Work Put in on Repairing and Raising the Roof, etc., an Entirely New House of this Size Could be Built for Nearly this Sum—Certainly within $9,000.

# ESTIMATING

## PART II

The taking-off of quantities and making-up of an actual estimate, is the end toward which our efforts are now directed. This is done, as has been said, in a number of ways, no two persons arriving at the same conclusion or following exactly the same methods. To give the student a practical idea of how estimates are made, we shall now demonstrate the method of procedure in an actual instance. For this purpose, we shall take the case of the wooden Colonial residence of which the plans and working drawings, and the method of making these, are fully described in the course on "Architectural Drawing," and of which the details are also described to a certain extent in the chapters on "Building Superintendence;" and shall proceed at once to take off the quantities and make up an estimate of cost.

**Method.** The usual method followed is to take off the quantities in the order in which they occur in the specification or in the operation of building, beginning with the Excavation and ending with the Painting.

Two methods of procedure are open to the Contractor, which he may avail himself of according to his experience or confidence. He may take off simply his own particular branch of the work, relying on each sub-contractor to give him a price for the detailed portions of the work; or, if he is a general contractor, he may, with the requisite knowledge of general building operations, take off all the quantities, pricing them according to his knowledge, and may submit his proposition on the basis of his own figures. The latter method requires great experience, and is followed generally by large contractors, who have in their employ men whose business is mainly to take off quantities and make up estimates.

The following estimate has been carefully made up on the basis of the data given in Part I as to prices of materials and labor. In actual practice, details of more or less importance will vary in different localities and among different contractors; but the example here given illustrates the process fully.

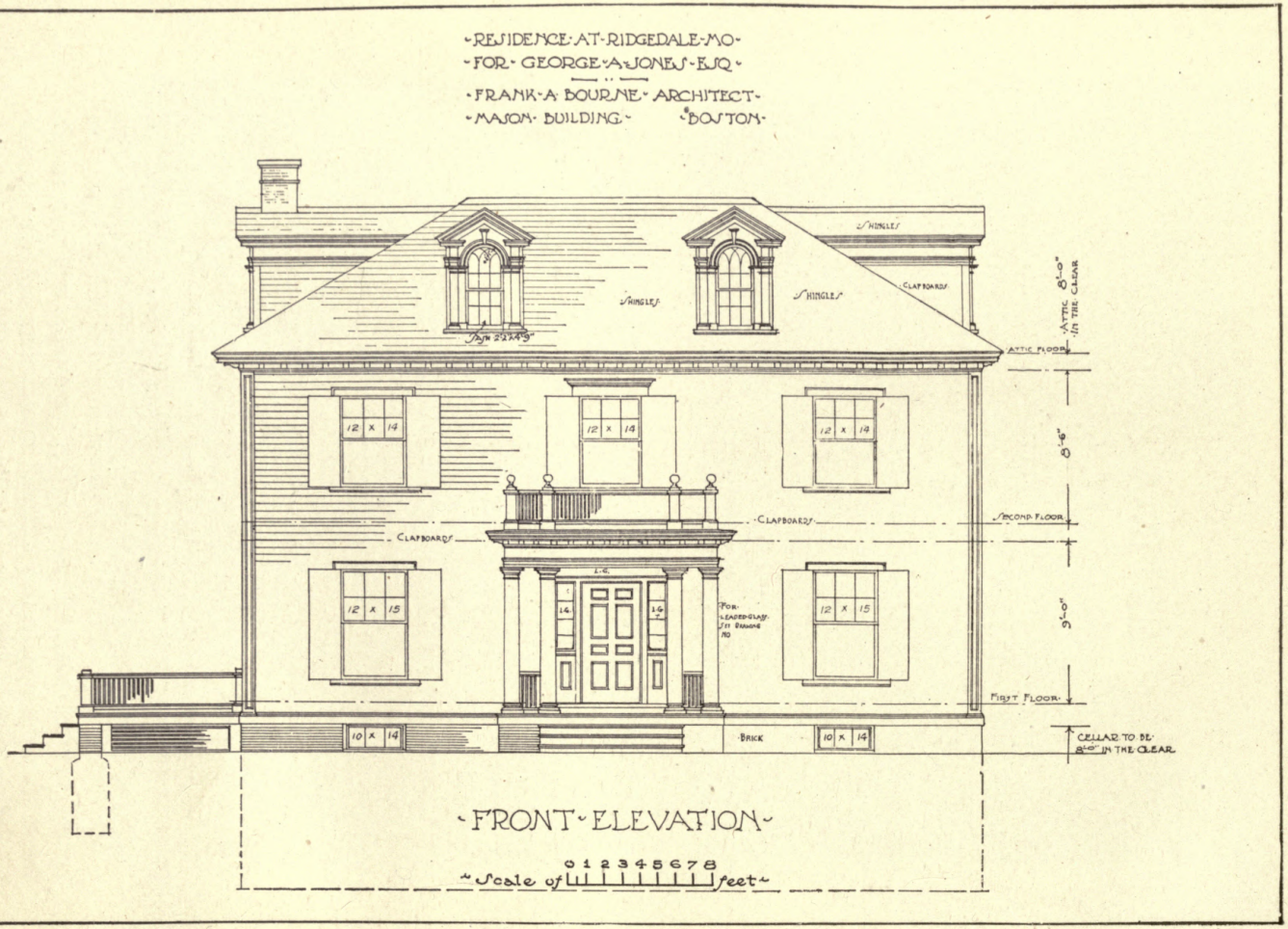

RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
FRANK A BOURNE ARCHITECT
MASON BUILDING BOSTON
SHINGLES
CLAPBOARDS
ATTIC FLOOR
ATTIC 8'-0" IN THE CLEAR
SECOND FLOOR
FIRST FLOOR
CELLAR TO BE 8'-0" IN THE CLEAR
BRICK
12 x 14
12 x 15
10 x 14
FRONT ELEVATION
Scale of feet
0 1 2 3 4 5 6 7 8

Fig. 1.

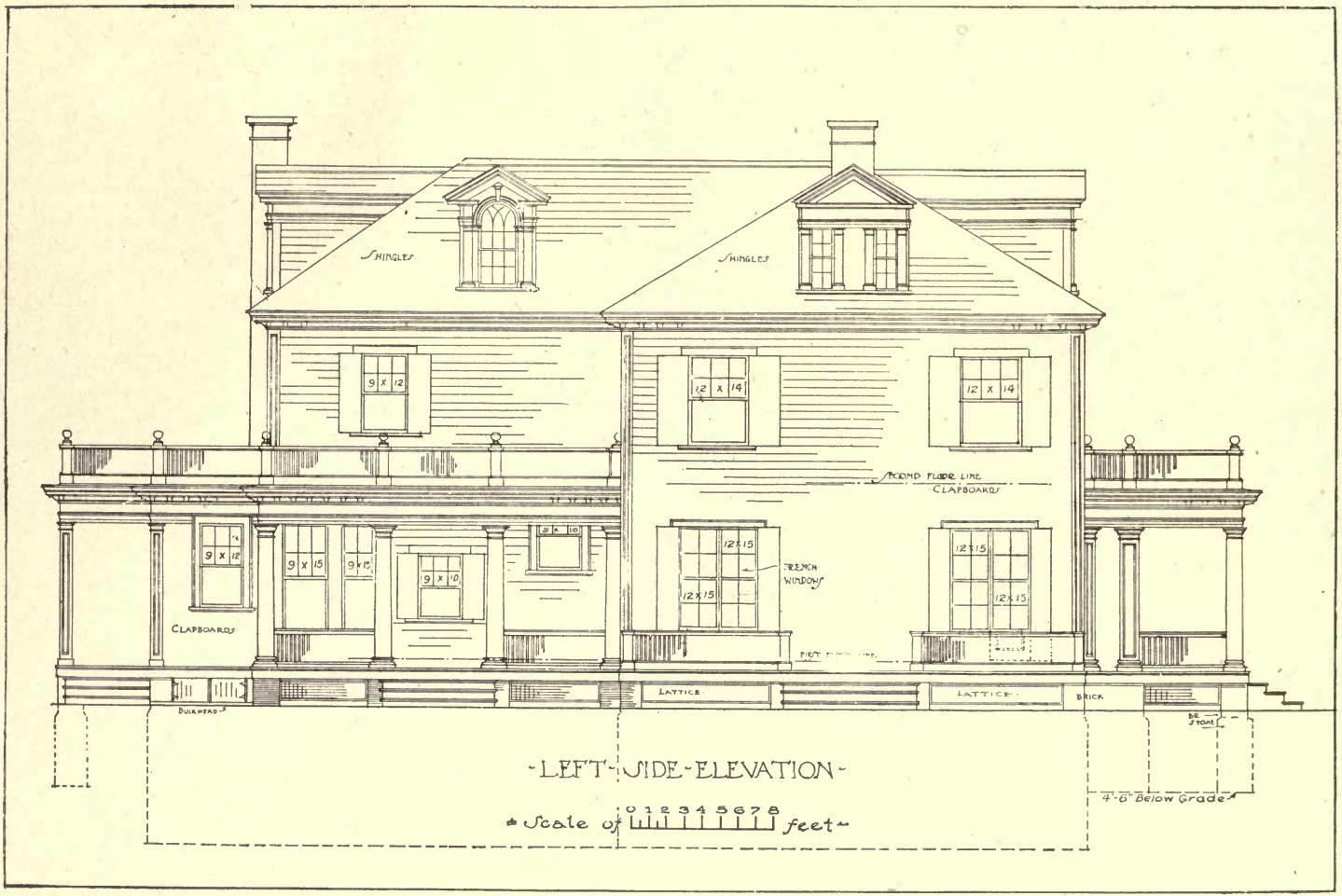

SHINGLES
SHINGLES
9 X 12
12 X 14
12 X 14
SECOND FLOOR LINE
CLAPBOARDS
9 X 12
9 X 15
9 X 15
9 X 10
9 X 10
12 X 15
FRENCH WINDOWS
12 X 15
12 X 15
12 X 15
CLAPBOARDS
BULKHEAD
LATTICE
LATTICE
BRICK
BR. STONE
4'-6" Below Grade
LEFT SIDE ELEVATION
Scale of 0 1 2 3 4 5 6 7 8 feet

Fig. 2

# ESTIMATE

OF

## RESIDENCE AT RIDGEDALE, MO.

## FOR GEORGE A. JONES, ESQ.

| | |
|---|---|
| Staking-out and setting batter-boards | $15.00 |
| Water supply during construction | 10.00 |
| | $25.00 |

### EXCAVATION

NOTE.—Excavation is priced by the cubic yard; and in this regard, the distance to which the excavated material must be carted will be an important consideration. In the present case, the material is to be carried only a short distance, so that no unusual conditions will have to be considered.

As before mentioned, it is usually well to dig a cellar at least a foot larger all around than the sill line, so that plenty of room may be afforded to the mason to plaster the outside of the wall. This should be done without regard to the specifications. As this extra excavation lies entirely outside the line of the house, it may be well to take it off separately, remembering that it will extend down into the trench below the wall, making about 8 feet of height.

| QUANTITIES— | CU. FT. |
|---|---|
| 42 ft. 0 in. × 8 ft. 0 in. × 1 ft. 0 in. | 336 |
| 34 ft. 0 in. × 8 ft. 0 in. × 1 ft. 0 in. | 272 |
| 10 ft. 4 in. × 8 ft. 0 in. × 1 ft. 0 in. | 83 |
| 17 ft. 6 in. × 8 ft. 0 in. × 1 ft. 0 in. | 140 |
| 68 ft. 0 in. × 8 ft. 0 in. × 1 ft. 0 in. | 544 |
| 41 ft. 0 in. × 8 ft. 0 in. × 1 ft. 0 in. | 328 |
| CELLAR EXCAVATIONS— | |
| 28 ft. 0 in. × 43 ft. 0 in. × 5 ft. 6 in. | 6,622 |
| 12 ft. 6 in. × 3 ft. 0 in. × 5 ft. 6 in. | 206 |
| 26 ft. 0 in. × 20 ft. 6 in. × 5 ft. 6 in. | 2,931 |
| 9 ft. 0 in. × 6 ft. 6 in. × 5 ft. 6 in. | 322 |
| *Carried forward* | 11,784 cu. ft. |


RESIDENCE AT RIDGEDALE MISSOURI FOR
GEORGE A JONES ESQUIRE
Frank A Bourne Architect Mason Building Boston
SHINGLES
CLAPBOARDS
SHINGLES
CLAPBOARDS
T B
TURNED BALUSTERS
T B
BRICK
DETAIL OF FRONT ELEVATION
Scale of 0 1 2 3 4 5 6 feet

Fig. 3

*Brought forward* 11,784 cu. ft.

MISCELLANEOUS QUANTITIES—

Piers

2 ft. 0 in. × 2 ft. 0 in. × 3 ft. 6 in. × 12 168

Trench

185 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in..... 308

Area

14 ft. 0 in. × 2 ft. 8 in. × 3 ft. 6 in..... 129

Drains

123 ft. 0 in. × 3 ft. 6 in. × 1 ft. 6 in. ..... 645

Cesspools

5 ft. 6 in. × 5 ft. 6 in. × 8 ft. 0 in..... 242

10 ft. 0 in. × 10 ft. 0 in. × 8 ft. 0 in..... 800

Dry Wells

6 × 2 ft. 0 in. × 2 ft. 0 in. × 5 ft. 0 in. 120

Total, 14,196 cu. ft.

Total, 14,196 cu. ft., or 525 cu. yds., at 50 cents ....$262.50

## STONEWORK

DRY WALLS IN TRENCH— CU. FT.

16 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in..... 27

16 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 27

12 ft. 6 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 20.8

3 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in. ... 5

23 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in..... 38

16 ft. 6 in. × 1 ft. 8 in. × 1 ft. 0 in..... 27.5

28 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 46

28 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 46

14 ft. 6 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 24

4 ft. 6 in. × 1 ft. 8 in. × 1 ft. 0 in..... 7.5

23 ft. 0 in. × 1 ft. 8 in. × 1 ft. 0 in. ..... 38

Total, 306.8 cu. ft.

307 cu. ft. ÷ 25 = 12 perches of dry wall.

MORTAR WALLS—

16 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. ..... 175

16 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. ..... 175

9 ft. 6 in. × 8 ft. 3 in. × 1 ft. 8 in. ..... 130

*Carried forward* 480 cu. ft.

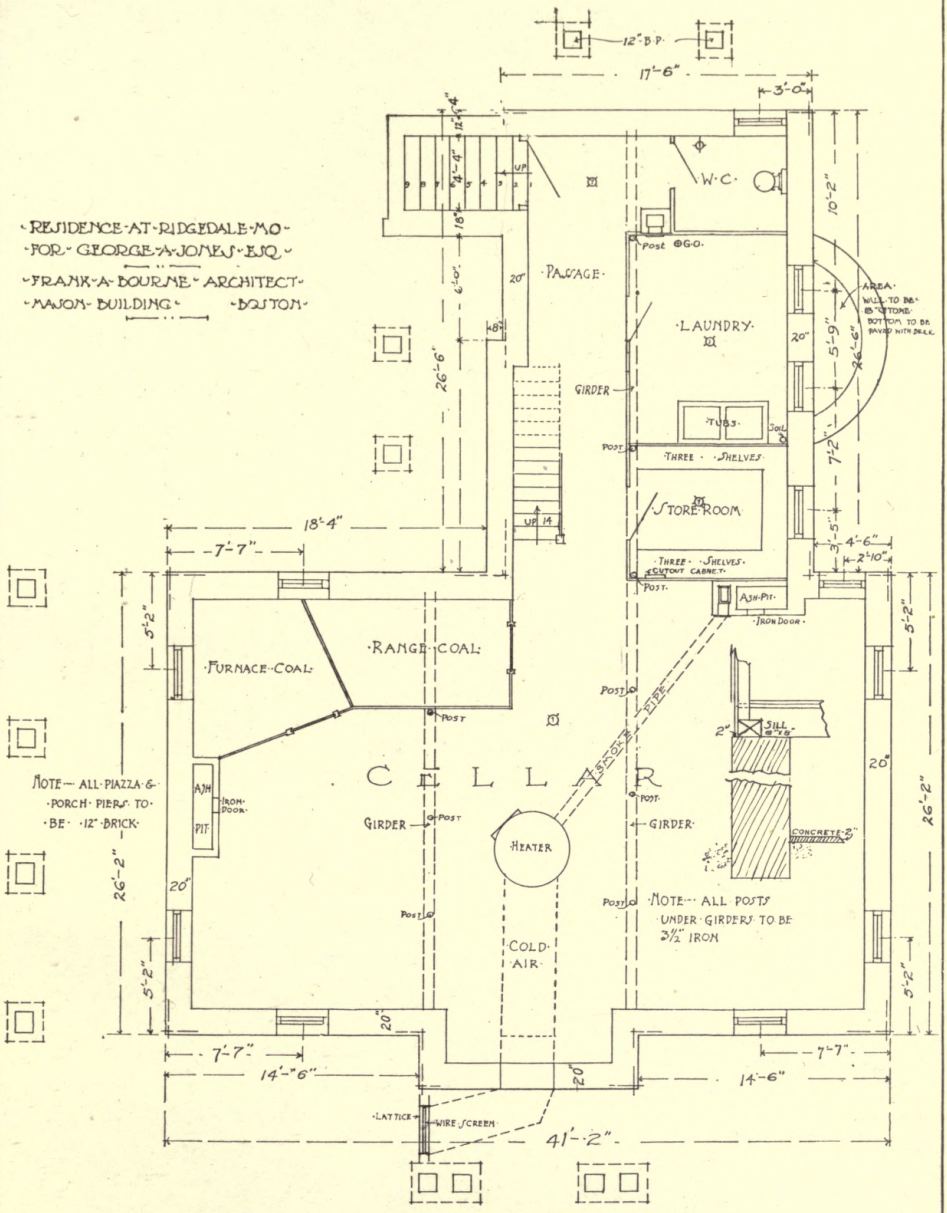

RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
FRANK A BOURNE ARCHITECT
MASON BUILDING BOSTON
12" B.P.
17'-6"
3'-0"
W.C.
LAUNDRY
PASSAGE
TUBS
THREE SHELVES
STORE ROOM
RANGE COAL
FURNACE COAL
ASH PIT
IRON DOOR
CELLAR
HEATER
COLD AIR
GIRDER
POST
NOTE ALL PIAZZA & PORCH PIERS TO BE 12" BRICK
NOTE ALL POSTS UNDER GIRDERS TO BE 3½" IRON
LATTICE
WIRE SCREEN
41'-2"
BASEMENT PLAN
0 1 2 3 4 5 6 7 8
Scale of feet

**Fig. 4.**

| | | |
|---|---|---|
| | *Brought forward* | 480 cu. ft. |
| 23 ft. 0 in. × 8 ft. 3 in. × 1 ft. 8 in. | | 316 |
| 12 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. | | 132 |
| 28 ft. 0 in. × 8 ft. 3 in. × 1 ft. 8 in. | | 385 |
| 6 ft. 0 in. × 6 ft. 7 in. × 1 ft. 6 in. | | 59 |
| 10 ft. 0 in. × 6 ft. 7 in. × 1 ft. 0 in. | | 66 |
| 8 ft. 6 in. × 6 ft. 7 in. × 1 ft. 8 in. | | 93 |
| 9 ft. 0 in. × 8 ft. 3 in. × 1 ft. 8 in. | | 123 |
| 25 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. | | 274 |
| 6 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. | | 66 |
| 23 ft. 0 in. × 6 ft. 7 in. × 1 ft. 8 in. | | 252 |
| PIERS— | | |
| 2 ft. 6 in. × 5 ft. 6 in. × 1 ft. 0 in. | | 14 |
| 2 ft. 6 in. × 5 ft. 6 in. × 1 ft. 0 in. | | 14 |
| 2 ft. 0 in. × 2 ft. 0 in. × 1 ft. 0 in. | | 4 |
| 12 ft. 0 in. × 3 ft. 6 in. × 2 ft. 0 in. | | 84 |
| 12 ft. 0 in. × 3 ft. 6 in. × 2 ft. 0 in. | | 84 |
| AREA— | | |
| 14 ft. 0 in. × 3 ft. 6 in. × 1 ft. 6 in. | | 73 |
| | Total, | 2,519 cu. ft. |

2,519 cu. ft ÷ 25 = 101 perches of mortar wall.

| UNDERPINNING— | CU. FT. |
|---|---|
| 16 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 45 |
| 16 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 45 |
| 6 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 17 |
| 12 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 34 |
| 6 ft. 0 in. × 1 ft. 0 in. × 1 ft. 0 in. | 6 |
| 8 ft. 6 in. × 1 ft. 8 in. × 1 ft. 8 in. | 23 |
| 25 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 70 |
| 6 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 17 |
| 23 ft. 0 in. × 1 ft. 8 in. × 1 ft. 8 in. | 64 |
| 14 ft. 0 in. × 2 ft. 0 in. × 1 ft. 6 in. | 42 |
| Total, | 363 cu. ft. |

363 cu. ft. ÷ 25 = 14½ perches of underpinning.

*Summary of Stonework—*

| | |
|---|---|
| 12 perches of dry wall, at $3.00 | $ 36.00 |
| *Carried forward* | $ 36.00 |

| | | |
|---|---|---|
| | *Brought forward* | $ 36.00 |
| 101 perches of mortar walls, at $4.25 | | 429.25 |
| 14½ perches of underpinning, at $6.50 | | 94.25 |
| Total cost of Stonework, | | $559.50 |

## PLASTERING WALLS WITH CEMENT

192 ft. 0 in. × 6 ft. 7 in. = 1,264 sq. ft. = 140 sq. yds., at $.40 $ 56.00

## CESSPOOLS

LEACHING CESSPOOL—

23 ft. 6 in. × 8 ft. 0 in. × 1 ft. 6 in. = 282 cu. ft. ÷ 25 = 11⅓ perches.

| | | |
|---|---|---|
| 11⅓ perches at $3.50 | $39.65 | |
| Cover | 2.50 | 42.15 |

TIGHT CESSPOOL—

11 ft. 6 in. × 8 ft. 0 in. = 92 sq. ft. × 15 bricks = 1,380 bricks.

| | | |
|---|---|---|
| 1,380 bricks at $20.00 per M. | $27.60 | |
| Iron cover | 3.00 | 30.60 |

## DRY WELLS

2 ft. 0 in. × 2 ft. 0 in. × 5 ft. 6 in. × 12 = 264 cu. ft. ÷ 25 = 11 perches

| | | |
|---|---|---|
| 11 perches at $2.50 | | 27.50 |

## DRAINS

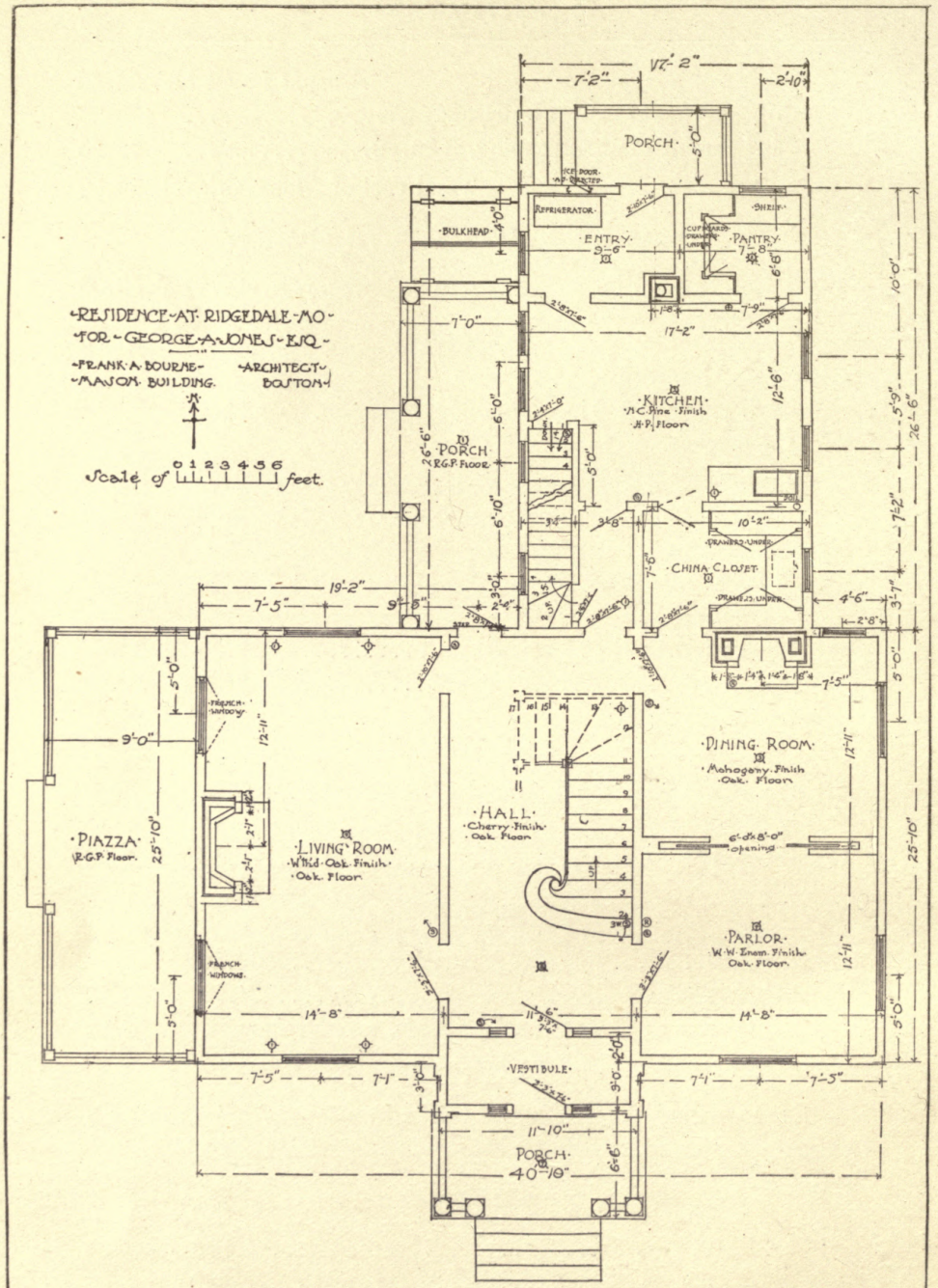
| | | |
|---|---|---|
| 171 ft. at $.20 | $34.20 | |
| 14 bends at $.30 | 4.20 | 38.40 |
| Total cost of Stonework, Cesspools, and Drains | | $754.15 |

## BRICKWORK

NOTE.—Find the number of bricks in a foot of height in each chimney or pier, reckoning five courses to the foot of height.

CELLAR—

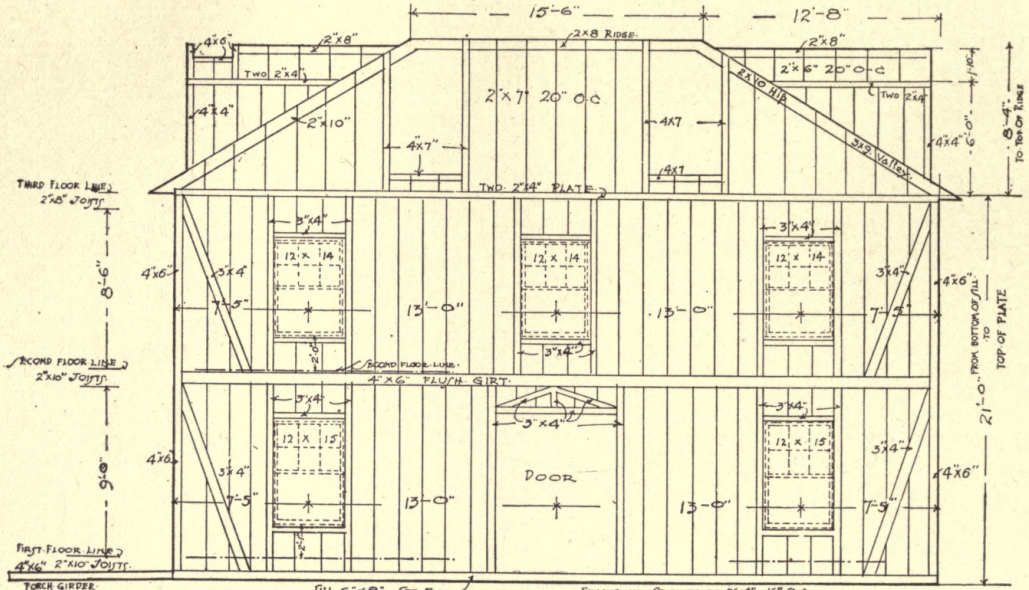
| | | |
|---|---|---|
| 35 × 8 | 280 | |
| 107½ × 8 | 860 | |
| 55 × 8 | 440 | |
| *Carried forward* | 1,580 | bricks |




PLAN OF FIRST FLOOR

Fig. 5.

RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
Frank A Bourne Architect Mason Building Boston

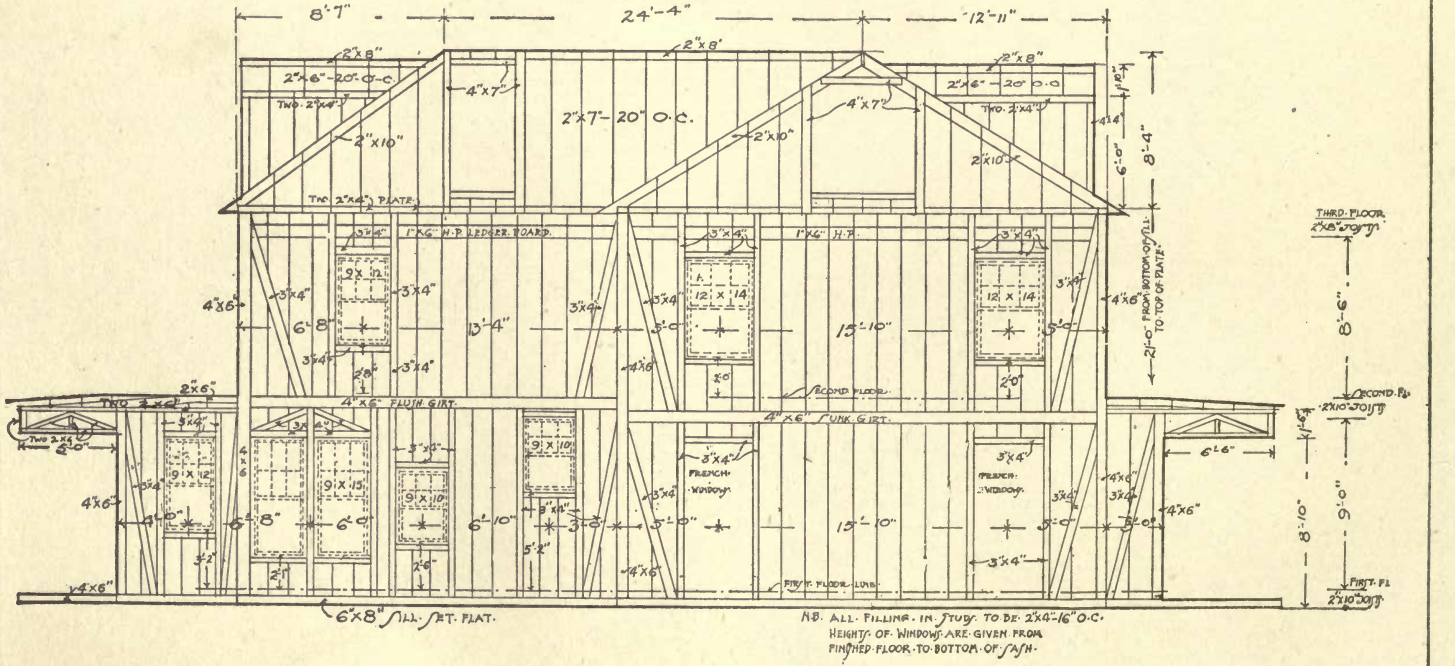



N.B. WINDOWS ARE FIGURED FROM FINISHED FLOOR TO SASH

FRAMING OF FRONT ELEVATION

Scale of 0 1 2 3 4 5 6 7 8 feet

Fig. 6.




FRAMING OF LEFT SIDE ELEVATION

Fig 7.

| | | |
|---|---|---|
| | *Brought forward* | 1,580 bricks |
| VERANDA PIERS— | | |
| $58\frac{1}{2} \times 10$ | | 585 |
| CHIMNEYS— | | |
| $107\frac{1}{2} \times$ 6 ft. 6 in. | | 700 |
| 105 × 11 ft. 0 in. | | 1,155 |
| 35 × 11 ft. 0 in. | | 385 |
| 35 × 4 ft. 6 in. | | 157 |
| $127\frac{1}{2} \times$ 5 ft. 6 in. | | 701 |
| 35 × 19 ft. 0 in. | | 665 |
| $57\frac{1}{2} \times$ 4 ft. 0 in. | | 230 |
| $127\frac{1}{2} \times$ 11 ft. 0 in. | | 1,402 |
| | | 7,560 bricks |

*Summary—*

| | |
|---|---|
| 7,560 bricks at $20.00 per M., laid | $ 151.20 |
| 3 fireplaces at $30.00 each | 90.00 |
| FLUE LININGS— | |
| 26 ft., 13 in. × 13 in., at $.35 | 9.10 |
| 36 ft., 9 in. round, at $.30 | 10.80 |
| 68 ft., $8\frac{1}{2} \times$ 13, at $.30 | 20.40 |
| Total cost of Brickwork and Flue Linings, | $ 281.50 |

## CONCRETING

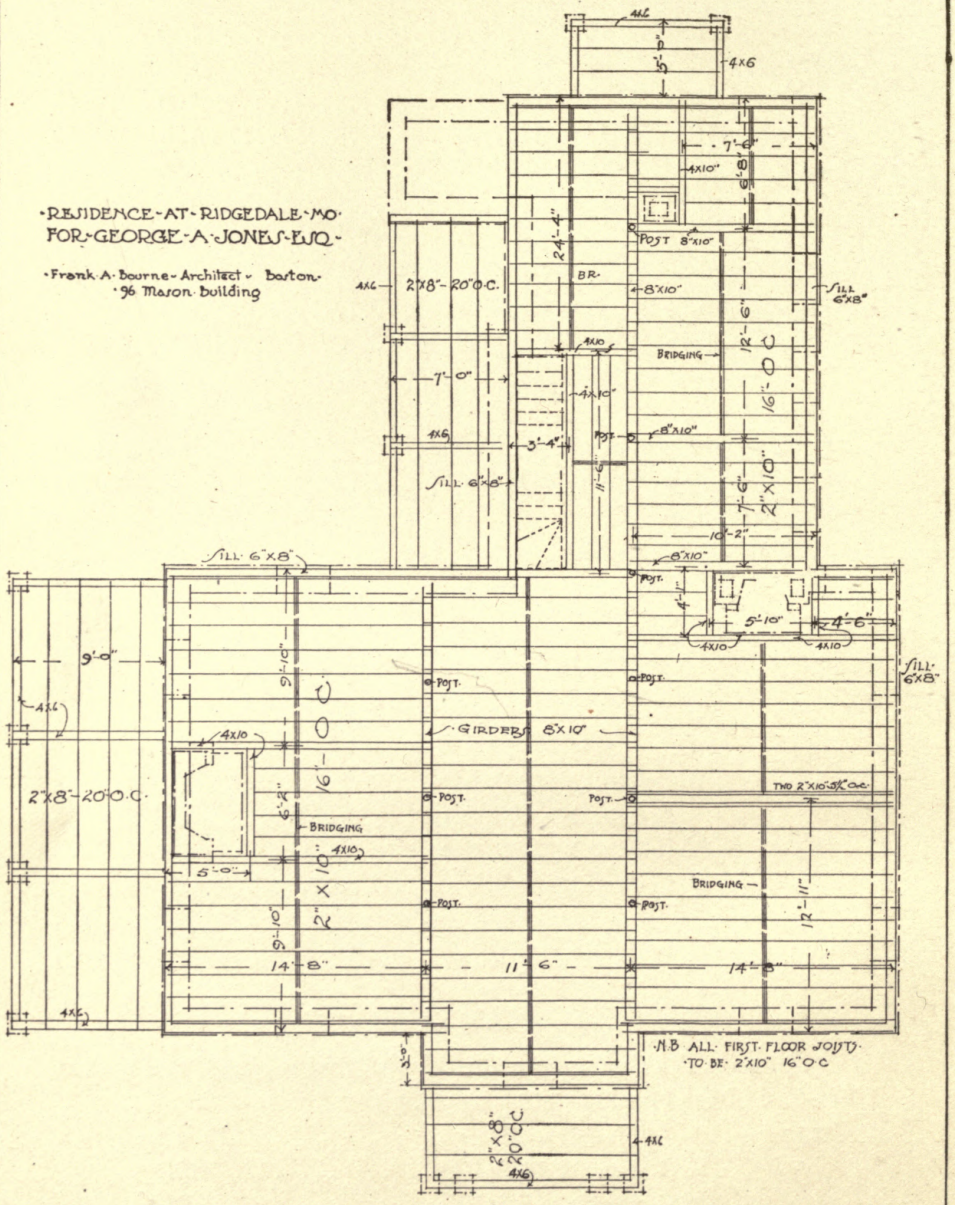
| | Sq. Ft. |
|---|---|
| 23 ft. 0 in. × 38 ft. 0 in. | 874 |
| 3 ft. 0 in. × 9 ft. 6 in. | $28\frac{1}{2}$ |
| 15 ft. 0 in. × 26 ft. 0 in. | 390 |
| 4 ft. 0 in. × 7 ft. 0 in. | 28 |
| | 1,320 sq. ft. |

Total, 1,320 sq. ft. = 147 sq. yds., at $.60 ..... $88.20

## PLASTERING

NOTE.—Take off square feet of plastered surfaces, and deduct one-half of the openings, after reducing to sq. yds.

| CELLAR— | Sq. Ft. |
|---|---|
| 23 ft. 0 in. × 38 ft. 0 in. | 874 |
| 9 ft. 6 in. × 3 ft. 0 in. | 28 |
| *Carried forward* | 902 sq. ft. |




FRAMING PLAN OF FIRST FLOOR

Scale of feet 0 1 2 3 4 5 6 7

B-23

Fig. 8.

| | | |
|---|---|---|
| | *Brought forward* | 902 sq. ft. |
| 15 ft. 6 in. × 26 ft. 0 in. | | 403 |
| 30 ft. 0 in. × 8 ft. 0 in. | | 240 |
| | | 1,545 sq. ft. |

First Story—

| | | |
|---|---|---|
| 25 ft. 0 in. × 40 ft. 0 in. | | 1,000 |
| 11 ft. 0 in. × 3 ft. 0 in. | | 33 |
| 25 ft. 6 in. × 16 ft. 6 in. | | 420 |
| 490 ft. 0 in. × 9 ft. 0 in. | | 4,410 |
| | | 5,863 sq. ft. |

Second Story—

| | | Sq. Ft. |
|---|---|---|
| 25 ft. 0 in. × 40 ft. 0 in. | | 1,000 |
| 16 ft. 6 in. × 19 ft. 0 in. | | 313 |
| 520 ft. 0 in. × 8 ft. 6 in. | | 4,420 |
| | | 5,733 sq. ft. |

Total amount of plastered surfaces, 13,141 sq. ft.

Outs—

| | | |
|---|---|---|
| 32 doors, average 40 sq. ft. | | 1,280 |
| 34 windows, average 15 sq. ft. | | 510 |
| | | 1,790 sq. ft. |

1,790 sq. ft. ÷ 2 = 895 sq. ft.

13,141 sq. ft. less 895 sq. ft. = 12,246 sq. ft. = 1,361 sq. yds.

Total cost of Plastering 1,361 sq. yds., at $.40 ..... $ 544.40

## CARPENTER WORK

Frame—

| | | Ft. B. M. |
|---|---|---|
| 188 linear ft., 6 × 6 in. sill | | 564 |
| 136 " " 4 × 6 in. " | | 272 |
| 74 " " 8 × 10 in. girders | | 494 |
| 250 " " 4 × 6 in. posts | | 500 |
| 188 " " 4 × 6 in. girts | | 376 |
| | | 2,206 |

2,206 ft. B. M. at $38.00 per M. ..... $ 83.82

First-Story Frame, Bridging and Under Floor—

| | | |
|---|---|---|
| 25 ft. 0 in. × 40 ft. 0 in. | | 1,000 |
| | *Carried forward* | $ 83.82 |

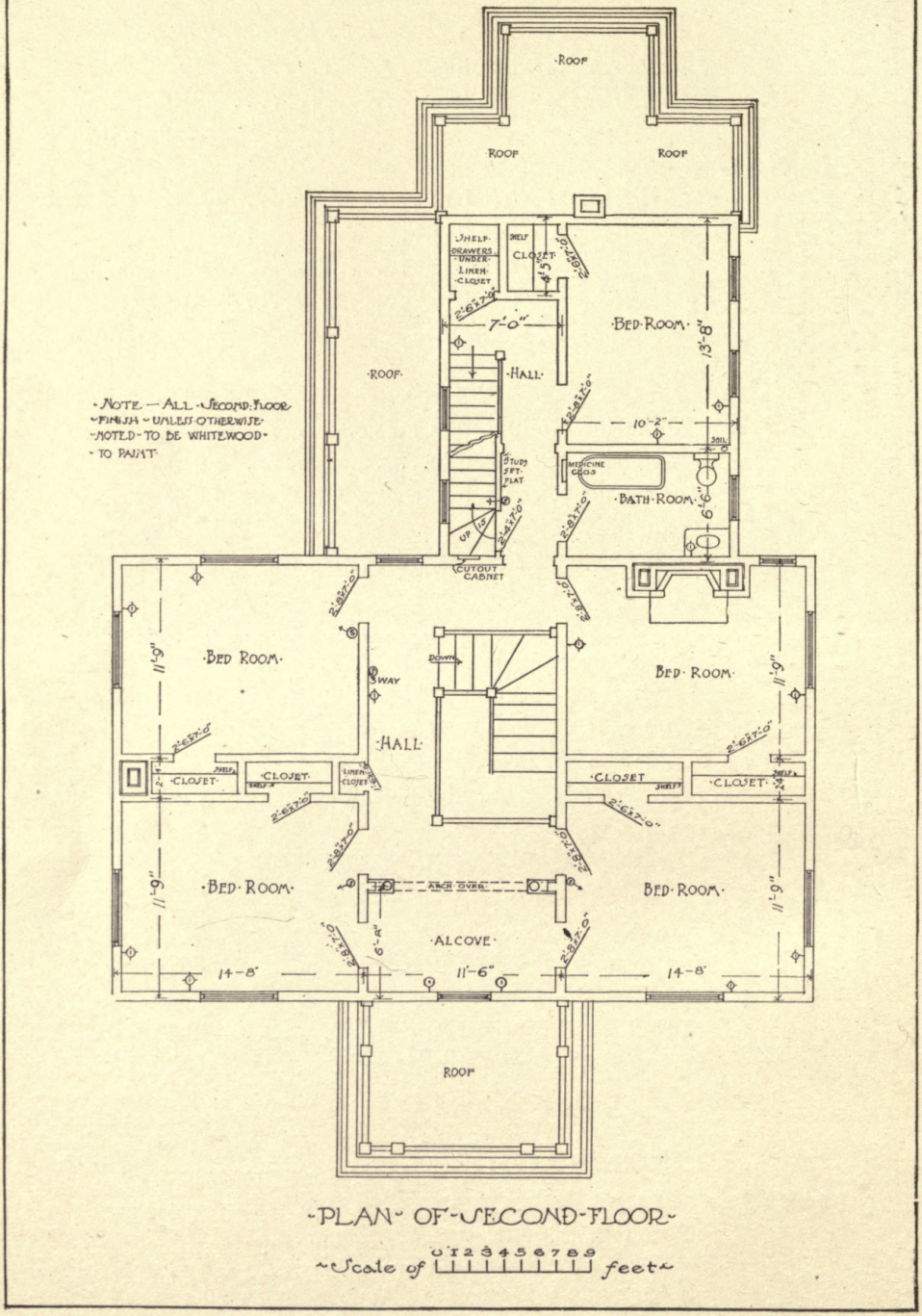
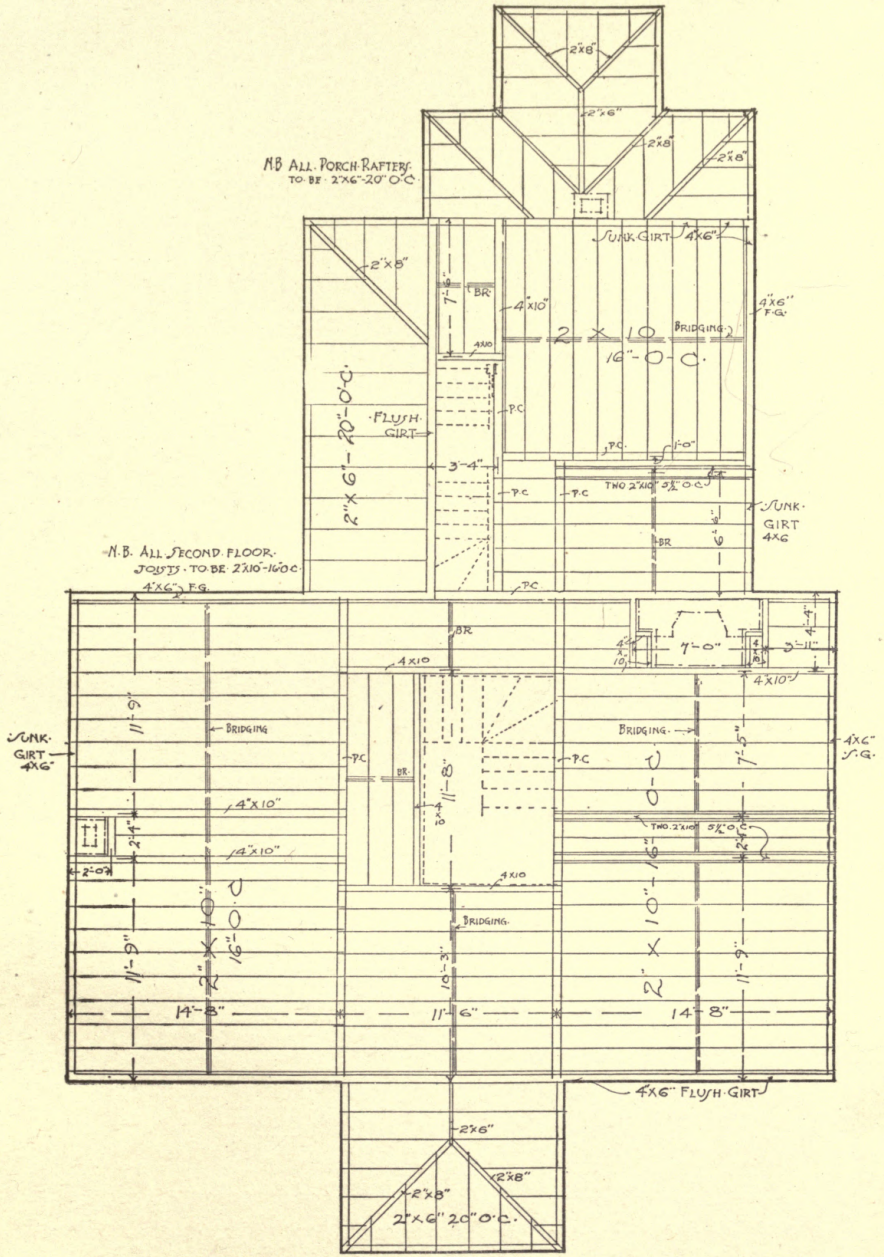

ROOF
ROOF
ROOF
SHELF
DRAWERS UNDER LINEN CLOSET
CLOSET
7'-0"
BED ROOM
13'-8"
ROOF
HALL
10'-2"
SOIL
MEDICINE CLOS
BATH ROOM
6'-6"
STUDY 3FT. FLAT
UP
CUTOUT CABINET
NOTE — ALL SECOND FLOOR FINISH UNLESS OTHERWISE NOTED TO BE WHITEWOOD TO PAINT
BED ROOM
SWAY
DOWN
BED ROOM
11'-9"
HALL
CLOSET
LINEN CLOSET
CLOSET
CLOSET
CLOSET
BED ROOM
ARCH OVER
BED ROOM
ALCOVE
14'-8"
11'-6"
14'-8"
ROOF
PLAN OF SECOND FLOOR
Scale of 0 1 2 3 4 5 6 7 8 9 feet

Fig. 9.




FRAMING PLAN OF SECOND FLOOR.

Scale of 0 1 2 3 4 5 6 feet

**Fig. 10.**

*Brought forward* $ 83.82

11 ft. 0 in. × 3 ft. 0 in. ..... 33

26 ft. 0 in. × 16 ft. 6 in. ..... 429

1,462 sq. ft.

1,462 sq. ft. = 14.62 squares, at $9.35 per square ..... $ 136.70

UPPER FLOOR—

Hard Pine

25 ft. 6 in. × 16 ft. 6 in. = 421 sq. ft., at $10.50 per square ..... $ 44.21

Oak

25 ft. 0 in. × 40 ft. 0 in. = 1,000 sq. ft.

11 ft. 0 in. × 3 ft. 0 in. = 33 "

1,033 sq. ft.

1,033 sq. ft. at $20.00 per square ..... $ 206.60

PORCH FLOOR—

6 ft. 0 in. × 11 ft. 0 in. = 66 sq. ft.

9 ft. 0 in. × 5 ft. 0 in. = 45 "

PIAZZA FLOOR—

26 ft. 0 in. × 9 ft. 0 in. = 234 "

20 ft. 6 in. × 7 ft. 0 in. = 144 "

489 sq. ft.

489 sq. ft. at $12.35 per square ..... $ 60.39

SECOND-STORY FRAME, BRIDGING AND STRAPPING FLOORS—

40 ft. 0 in. × 25 ft. 0 in. ..... 1,000 sq. ft.

20 ft. 0 in. × 17 ft. 0 in. ..... 340 " "

1,340 sq. ft.

1,340 sq. ft. at $18.00 per square ..... $ 241.20

THIRD STORY—

1,340 sq. ft. at $10.10 per square ..... $ 135.34

ROOF FRAME, BOARDING AND SHINGLES–

30 ft. 0 in. × 16 ft. 6 in. × 2 sides .. 990 sq. ft.

34 ft. 0 in. × 16 ft. 6 in. × 2 sides .. 1,122 " "

2,112 sq. ft.

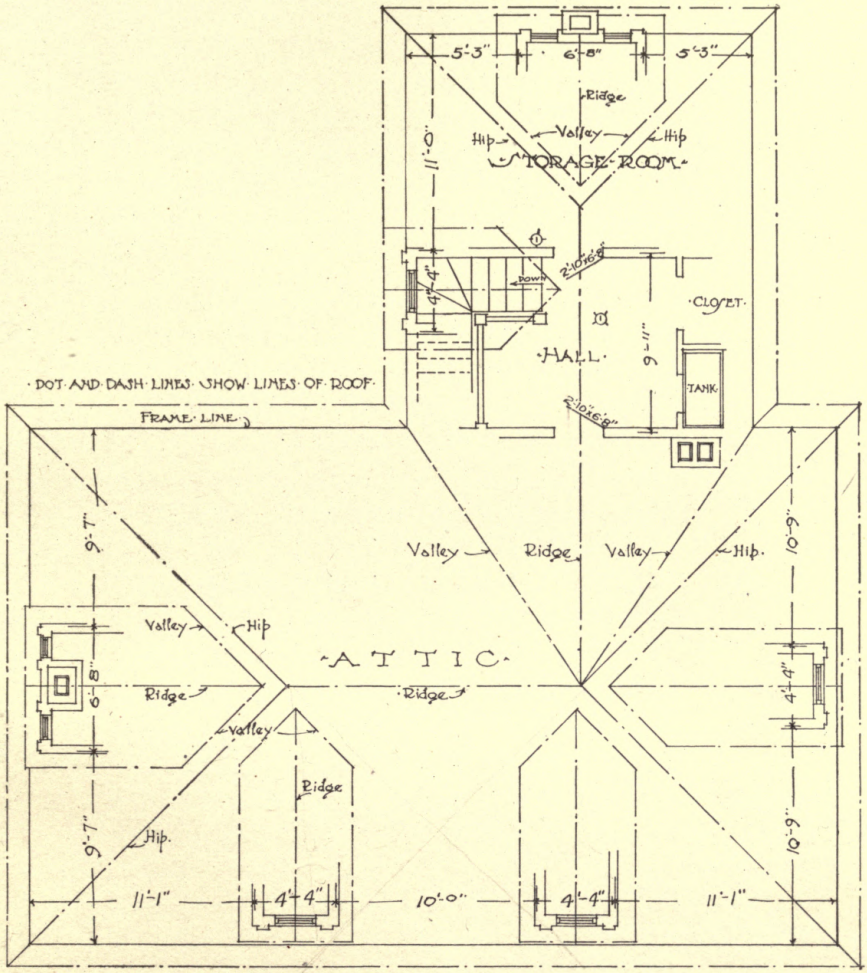
2,112 sq. ft. at $16.67 per square ..... $ 352.07

FLASHING ..... $ 40.00

TIN ROOF, FRAME AND BOARDING—

21 ft. 0 in. × 7 ft. 6 in. ..... 157 sq. ft.

*Carried forward* $1,300.33




PLAN OF THIRD FLOOR & ROOF

Scale of 0 1 2 3 4 5 6 7 8 feet

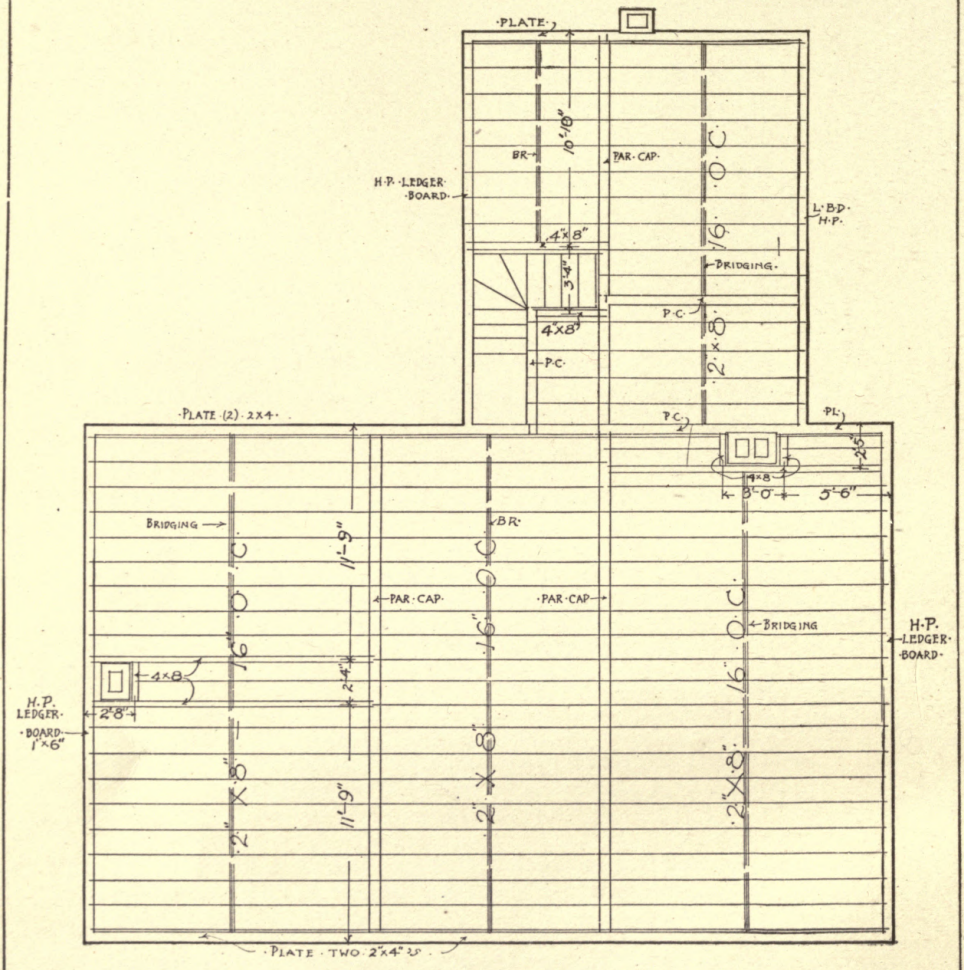
**Fig. 11.**

| | | |
|---|---|---|
| *Brought forward* | | $1,300.33 |
| 19 ft. 0 in. × 6 ft. 6 in. | 124 sq. ft. | |
| 11 ft. 0 in. × 5 ft. 6 in. | 60 " " | |
| 14 ft. 0 in. × 9 ft. 6 in. | 133 " " | |
| | 474 sq. ft. | |
| 474 sq. ft. at $20.92 per square | | $ 99.16 |
| OUTSIDE WALLS, STUDDING AND BOARDING— | | |
| 172 ft. 0 in. × 20 ft 0 in. | 3,440 sq. ft. | |
| 6 ft. 6 in. × 10 ft. 0 in. × 2 sides | 130 " " | |
| 3 ft. 0 in. × 9 ft. 0 in. × 2 sides | 54 " " | |
| | 3,624 sq. ft. | |
| 3,624 sq. ft. at $8.30 per square | | $ 300.79 |
| INSIDE STUDDING— | | |
| 180 ft. 0 in. × 9 ft. 0 in. | 1,620 sq. ft. | |
| 196 ft. 0 in. × 8 ft. 6 in. | 1,666 " " | |
| 28 ft. 0 in. × 8 ft. 0 in. | 224 " " | |
| | 3,510 sq. ft. | |
| 3,510 sq. ft., at $4.00 per square | | $ 140.40 |
| CLAPBOARDING— | | |
| 44 ft. 0 in. × 19 ft. 0 in. × 2 sides. | 1,672 sq. ft. | |
| 6 ft. 0 in. × 8 ft. 0 in. × 2 sides. | 96 " " | |
| 2 ft. 0 in. × 9 ft. 0 in. × 2 sides. | 36 " " | |
| 39 ft. 0 in. × 19 ft. 0 in. × 2 sides. | 1,482 " " | |
| | 3,286 sq. ft. | |
| 3,286 sq. ft. at $7.95 per square... | $261.23 | |
| Deduct for stock only, 36 windows = 54 sq. ft., at $4.70 per square | 25.38 | $ 235.85 |

**MISCELLANEOUS**

| | | |
|---|---|---|
| DORMERS— | | |
| 6, at $50 each | | $ 300.00 |
| MAIN CORNICE— | | |
| 180 ft., at $1.25 per ft. | | 225.00 |
| BALUSTRADE ON ROOF— | | |
| 96 ft., at $0.50 per ft. | $48.00 | |
| 18 posts, at $1.50 each | 27.00 | 75.00 |
| *Carried forward* | | $2,676.53 |

| | | |
|---|---|---|
| PIAZZA FINISH— | *Brought forward* | $2,676.53 |
| *Cornice*— | | |
| 102 ft., at $2.00 per ft. | | 204.00 |
| *Columns*— | | |
| 9 in place, at $10.00 each | | 90.00 |
| *Corner Pilasters*— | | |
| 2½ in place, at $8.00 each | | 20.00 |
| *Balustrade*— | | |
| 76 ft., at $.50 per ft. | $38.00 | |
| *Small Posts*— | | |
| 8½, at $1.00 each | 12.00 | 50.00 |
| *Outside Steps* | | 25.00 |
| *Lattice*— | | |
| 55 ft. 0 in. × 1 ft. 6 in. = 82½ sq. ft., at $.15 per sq. ft. | | 12.37 |
| *Porch Ceiling*— | | |
| 111 sq. ft., at $10.00 per square | | 11.10 |
| BULKHEAD STEPS | | 25.00 |
| CORNER BOARDS— | | |
| 252 ft. 0 in. × 8 in. = 168 sq. ft., at $.30 per sq. ft. | | 50.40 |
| WATER TABLE— | | |
| 117½ linear ft., at $.20 per ft. | | 23.50 |
| WINDOWS AND FRAMES— | | |
| *Attic*— | | |
| 4 windows, circular top, at | $11.20 each | $ 44.80 |
| 4 windows, square, at | $5.25 each | 21.00 |
| *Second Story*— | | |
| 8 windows, 3 ft. 6 in. × 5 ft. 0 in., at | $13.33 each | $106.64 |
| 7 windows, 2 ft. 6 in. × 4 ft. 6 in., at | $11.44 each | 80.08 |
| *First Story*— | | |
| 1 window, 2 ft. 6 in. × 4 ft. 6 in. | | $ 11.44 |
| 2 windows, 2 ft. 6 in. × 5 ft. 6 in., at | $12.00 each | 24.00 |
| 2 windows, 2 ft. 6 in. × 3 ft. 9 in., at | $11.00 each | 22.00 |
| 2 pairs French windows (oak), 4 ft. 6 in. × 7 ft. 6 in., at | $18.24 each | 36.48 |
| 1 window, 3 ft. 4 in. × 5 ft. 6 in. (oak finish) | | 16.57 |
| | *Carried forward* | $3,550.91 |



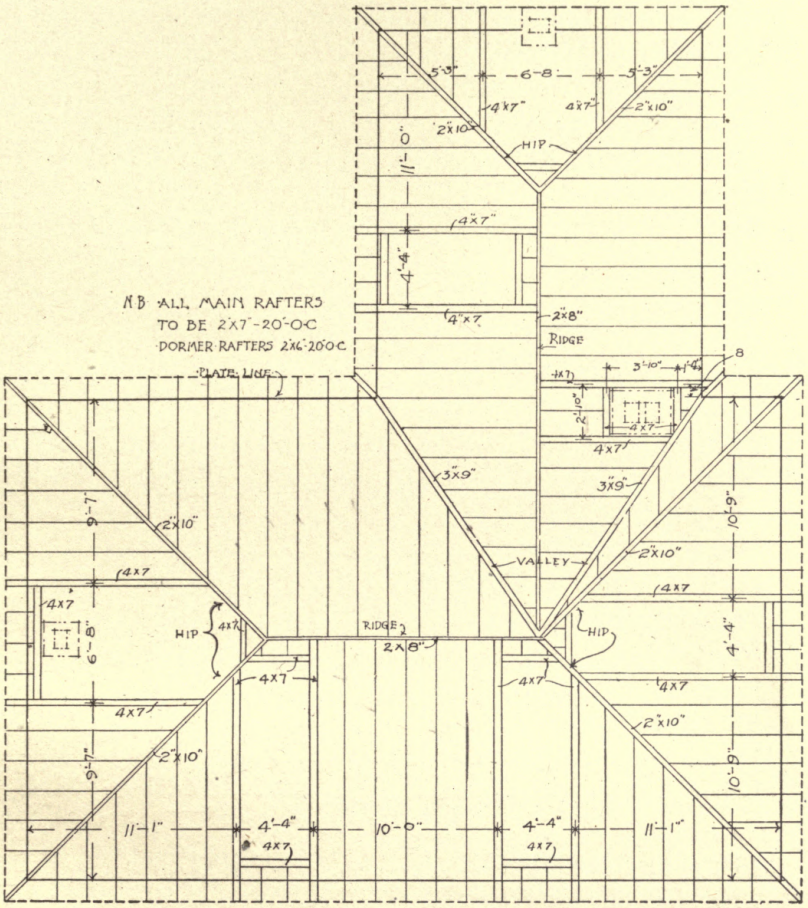

FRAMING PLAN OF THIRD FLOOR

Scale of 0 1 2 3 4 5 6 7 8 feet

**Fig. 12.**

| | | |
|---|---|---|
| | *Brought forward* | $3,550.91 |
| 1 window, 3 ft. 4 in. × 5 ft. 6 in. (birch finish) . . | | 16.57 |
| 1 window, 2 ft. 6 in. × 5 ft. 6 in. (birch finish) . . | | 14.45 |
| 2 windows, 3 ft. 4 in. × 5 ft. 5 in. (whitewood), at . . . . . $13.33 each | | 26.66 |
| 4 windows, 2 ft. 6 in. × 4 ft. 6 in. (N. C. pine), at . . . . . $11.44 each | | 45.76 |
| FRONT DOOR, with side and top lights— | | |
| 3 ft. 3 in. × 7 ft. 6 in. . . . . | | 56.33 |
| REAR DOOR— | | |
| 2 ft. 10 in. × 7 ft. 6 in. . . . . | | 13.46 |
| CELLAR SASHES— | | |
| 12, at $3.25 each . . . . . | | 39.00 |
| INSIDE FINISH— | | |
| Coal bins in basement, 240 sq. ft. | | |
| Studding 240 sq. ft. at $3.00 per square $ 7.20 | | |
| Boarding 240 " " $4.75 " " 11.40 | | |
| Labor on 2 doors, one day . . . . . 3.25 | | 21.85 |
| COLD-AIR BOX— | | |
| 3 ft. 0 in. × 1 ft. 0 in., 25 ft. long, at $.62 per linear ft. . . . | | 15.50 |
| BASEMENT PARTITIONS— | | |
| 46 ft. 0 in. × 8 ft. 0 in., 368 sq. ft., at $8.75 per square . . . | | 32.20 |
| 3 doors, at $8.87 each . . . . . | | 26.61 |
| 67½ ft. shelving, at $.15 per ft. . . . . | | 10.12 |
| 1 door to bulkhead . . . . . | | 10.00 |
| FIRST STORY— | | |
| 1 door, 2 ft. 8 in. × 7 ft. 6 in. (whitewood and birch finish) | | 20.67 |
| 1 pair sliding doors (whitewood and birch finish) . . . . . | | 53.52 |
| 40 ft. birch base at $.20 per ft. . . . . | | 8.00 |
| 1 door, 3 ft. 3 in. × 7 ft. 6 in. (whitewood and oak) . . . . | | 22.67 |
| 1 door, 2 ft. 10 in. × 7 ft. 6 in. (whitewood and oak) . . . . | | 20.67 |
| WOOD CORNICE IN DINING ROOM— | | |
| 56 ft., 6 in. × 6 in. (birch), at $.48 per ft. . . . . $26.88 | | |
| 56 ft. picture moulding, at $.06 per ft. . . . . 3.36 | | 30.24 |
| WOOD CORNICE IN LIBRARY— | | |
| 82 ft., 6 in. × 6 in. (oak), at $.48 per ft. . . . . $39.36 | | |
| | *Carried forward* $39.36 | $4,035.19 |

| | | |
|---|---|---|
| *Brought forward* | $39.36 | $4,035.19 |
| 82 ft. picture moulding, at $.06 per ft. | 4.92 | 44.28 |
| OAK BASE— | | |
| 72 ft. at $.20 per ft. | | 14.40 |
| 1 door, 3 ft. 0 in. × 7 ft. 6 in (whitewood) | | 12.59 |
| VESTIBULE DOOR, side lights and top light, same as front door. | | 56.33 |
| WHITEWOOD BASE, 101 ft., at $.10 per ft. | | 10.10 |
| 5 doors (N. C. pine), at $9.48 each | | 47.40 |
| CHINA CLOSET FINISH | | 100.00 |
| PANTRY | | 50.00 |
| KITCHEN AND BACK ENTRY SHEATHING— | | |
| 65 linear ft., at $.40 per ft. | | 26.00 |
| MANTELS— | | |
| Allowance | $125.00 | |
| Labor of setting | 6.50 | $131.50 |
| SECOND STORY— | | |
| 16 doors stock, at $9.48 each | | $151.68 |
| 1 arch in hall | | 10.00 |
| 2 wood columns, at $10.00 each | | 20.00 |
| 5 closets, at $3.50 each | | 17.50 |
| 1 linen closet | | 25.00 |
| 1 linen closet | | 20.00 |
| THIRD STORY— | | |
| 2 doors, finished one side, at $7.04 each | | $ 14.08 |
| 1 closet door | | 7.04 |
| Tank | | 10.00 |
| Finished floor, 100 sq. ft. | | 7.25 |
| Base, 14 ft., at $.10 per ft. | | 1.40 |
| CONDUCTORS— | | |
| 120 ft., at $.13 per ft., put up | $15.60 | |
| 6 goosenecks, at $1.00 each | 6.00 | $ 21.60 |
| CUTTING AND FITTING FOR PLUMBING AND HEATING | | 35.00 |
| FREIGHT, FARES AND EXPENSES | | 50.00 |
| INSURANCE | | 10.00 |
| Total cost of Carpenter Work | | $4,928.34 |




"FRAMING-PLAN-OF-ROOF"

"Scale of 0 1 2 3 4 5 6 7 8 feet."

Fig. 15.

## STAIRS

| | | |
|---|---|---|
| FRONT STAIRS— | | |
| 128 ft. spruce, at $30 per M. | 3.84 | |
| 120 ft. whitewood, at $70 per M. | 8.40 | |
| 85 ft. quartered oak, at $150 per M. | 12.75 | |
| 30 ft. mahogany rail and turn | 24.00 | |
| 5 paneled posts at $5.00 each | 25.00 | |
| 105 balusters at $.15 each | 15.75 | |
| 11 nosings at $.06 each | .66 | |
| 25 scotias at $.03 each | .75 | |
| Nails, glue, etc. | 1.00 | |
| Labor | 56.00 | $148.15 |
| BACK STAIRS— | | |
| *First Flight*— | | |
| 55 ft. spruce, at $30 per M. | $ 1.65 | |
| 105 ft. N. C. pine, at $60 per M | 6.30 | |
| 16 scotias at $.03 each | .48 | |
| Nails, etc. | .75 | |
| Labor | 16.00 | 25.18 |
| *Second Flight*— | | |
| 54 ft. spruce, at $30 per M. | $ 1.62 | |
| 110 ft. N. C. pine, at $60 per M | 6.60 | |
| 17 scotias at $.03 each | .51 | |
| Nails, etc. | .75 | |
| 1 post | .75 | |
| 4 ft. rail, at $.12½ per ft. | .50 | |
| 12 balusters at $.06¼ each | .75 | |
| Labor | 17.00 | 28.48 |
| CELLAR STAIRS— | | |
| 40 ft. spruce, at $30 per M. | $ 1.20 | |
| 75 ft. N. C. pine, at $60 per M. | 4.50 | |
| Post | .50 | |
| Rail | 1.20 | |
| Labor | 5.00 | 12.40 |
| | | $214.21 |
| Framing | | 2.00 |
| Total cost of Stairs | | $216.21 |

## HARDWARE

NOTE.—This estimate is based upon a fair quality of hardware, the butts being of bronze-plated steel, the knobs of struck-up bronze metal, with rose and escutcheon combined; the sash fasts of solid bronze metal, also lifts and catches.

### BASEMENT

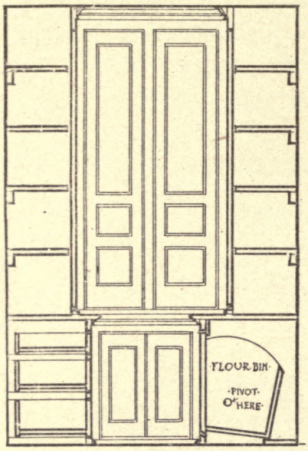
| | | |
|---|---|---|
| BULKHEAD, OUTSIDE— | | |
| 2 pairs extra heavy galv. T hinges, 8-inch at $.85 each | $1.70 | |
| 2 hooks and staples, 5-inch, at $.10 each | .20 | |
| Labor | 1.00 | |
| BULKHEAD, INSIDE— | | |
| 1 pair heavy T hinges, 8-inch | .15 | |
| 1 thumb-latch | .10 | |
| Labor | .50 | |
| THREE DOORS— | | |
| 3 pairs butts, 3½ × 3½-inch, at $.15 each | .45 | |
| 3 sets locks at $.45 each | 1.35 | |
| Labor | 1.50 | |
| HINGED WINDOWS— | | |
| 12 pairs butts, 1¼-inch, at $.06 each | .72 | |
| 12 hooks and eyes, at $.02 each | .24 | |
| 12 buttons, at $.02 each | .24 | |
| Labor | 1.50 | $ 9.65 |

### FIRST FLOOR

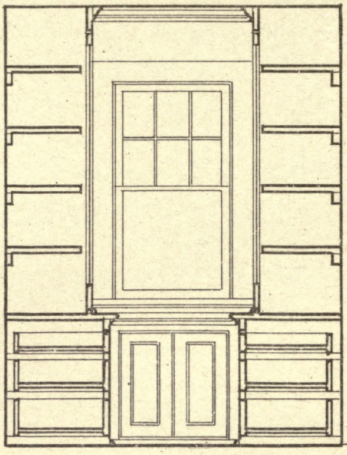
| | | |
|---|---|---|
| ENTRANCE DOOR— | | |
| 1½ pairs butts, 4½ × 4½-inch, at $.38 each | $ .57 | |
| 1 set locks, bronze metal | 9.50 | |
| Labor | 2.00 | |
| SEVEN INSIDE DOORS, FRONT— | | |
| 7 pairs butts, 3½ × 3½-inch, at $.30 each | 2.10 | |
| 7 sets locks at $1.00 each | 7.00 | |
| Labor | 5.25 | |
| *Carried forward* | $26.42 | $9.65 |

# DETAILS OF KITCHEN PANTRY ETC

RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ

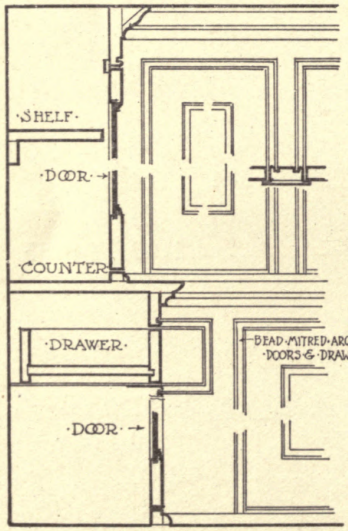



SECTION THRO' KITCHEN PANTRY

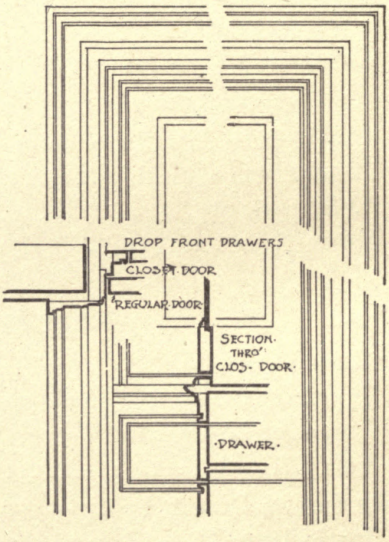


SECTION THRO' CHINA CLOSET

SCALE.
12 6 0 1 2 3 FEET.




DETAIL OF PANTRIES




DETAIL OF LINEN CLOSET

SCALE.
12 9 6 3 0 1 FOOT.

Fig. 14.

| | | |
|---|---|---|
| *Brought forward* | $26.42 | $9.65 |
| SIDE ENTRANCE DOOR— | | |
| 1½ pairs butts, 4½ × 4½-inch, at .....$.38 each | .57 | |
| 1 set locks | 2.25 | |
| Labor | 1.00 | |
| ONE PAIR SLIDING DOORS, 5 ft. 0 in.— | | |
| 1 set hangers, 5 ft. 0 in, Double | 3.50 | |
| 1 set S. D. locks | 2.50 | |
| Labor | 2.00 | |
| SIX INSIDE BACK PORTIONS— | | |
| 6 sets lock sat .....$.45 each | 2.70 | |
| 6 pairs butts, 3½ × 3½-inch, at .....$.15 each | .90 | |
| Labor | 4.00 | |
| BACK DOORS— | | |
| 1½ pairs butts, 4½ × 4½-inch, at .....$.20 each | .30 | |
| 1 set locks | 2.25 | |
| Labor | 1.00 | |
| ICE-CHEST DOOR— | | |
| 1 pair butts, 3 × 3-inch | .40 | |
| 1 IH lever, galvanized | .60 | |
| 1 brass hasp and padlock | 1.50 | |
| Labor | .50 | |
| CHINA CLOSET— | | |
| 2 pairs glass doors— | | |
| 2 pairs butts, 2½ × 2½-inch, at .....$.26 each | .52 | |
| 2 elbow catches, at .....$.06 each | .12 | |
| 2 cupboard catches, at .....$.15 each | .30 | |
| 1 pair cupboard doors— | | |
| 2 pairs butts, 2½ × 2½-inch, at .....$.10 each | .20 | |
| 1 elbow catch | .06 | |
| 1 cupboard catch | .15 | |
| 20 drawer-pulls, at .....$.06 each | 1.20 | |
| Labor | 2.50 | |
| PANTRY— | | |
| 4 cupboard doors— | | |
| 4 pairs butts, 2½ × 2½-inch, at .....$.10 each | .40 | |
| *Carried forward* | $57.84 | $9.65 |

| | | | |
|---|---|---|---|
| | *Brought forward* | $57.84 | $9.65 |
| 4 cupboard catches, at | $.15 each | .60 | |
| 1 bbl. swing | | .75 | |
| 10 drawer-pulls, at | $.06 each | .60 | |
| Labor | | 2.00 | |
| WINDOWS— | | | |
| 15 sash fasts, at | $.30 each | 4.50 | |
| 30 sash lifts, at | $.06 each | 1.80 | |
| Labor | | 7.50 | |
| CASEMENT WINDOWS, | | | |
| 4 pairs butts, 3 × 3-inch, at | $.50 each | 2.00 | |
| 2 pairs flush bolts, at | $1.00 each | 2.00 | |
| 2 casement fasts, at | $.45 each | .90 | |
| Labor | | 1.00 | $81.49 |
| **SECOND FLOOR** | | | |
| SIXTEEN DOORS— | | | |
| 16 pairs butts, 3½ × 3½-inch, at | $.30 each | $ 4.80 | |
| 16 sets locks, at | $.90 each | 14.40 | |
| Labor | | 10.40 | |
| WINDOWS— | | | |
| 14 sash fasts, at | $.30 each | 4.20 | |
| 1 sash fast | | .35 | |
| 28 sash lifts, at | $.06 each | 1.68 | |
| 2 sash lifts, at | $.10 each | .20 | |
| Labor | | 7.00 | |
| SIX DRAWERS IN LINEN CLOSET— | | | |
| 12 drawer-pulls, at | $.06 each | .72 | |
| Labor | | .25 | $44.00 |
| BATHROOM— | | | |
| 1 pair butts, 3½ × 3½-inch (nickel-plate) | | .40 | |
| 1 set locks (nickel-plate) | | 1.25 | |
| Labor | | .75 | $ 2.40 |
| **ATTIC** | | | |
| TWO DOORS— | | | |
| 2 pairs butts, 3½ × 3½-inch, at | $.12 each | $.24 | |
| 2 sets locks, at | $.45 each | .90 | |
| Labor | | 1.00 | |
| | *Carried forward* | $2.14 | $137.54 |

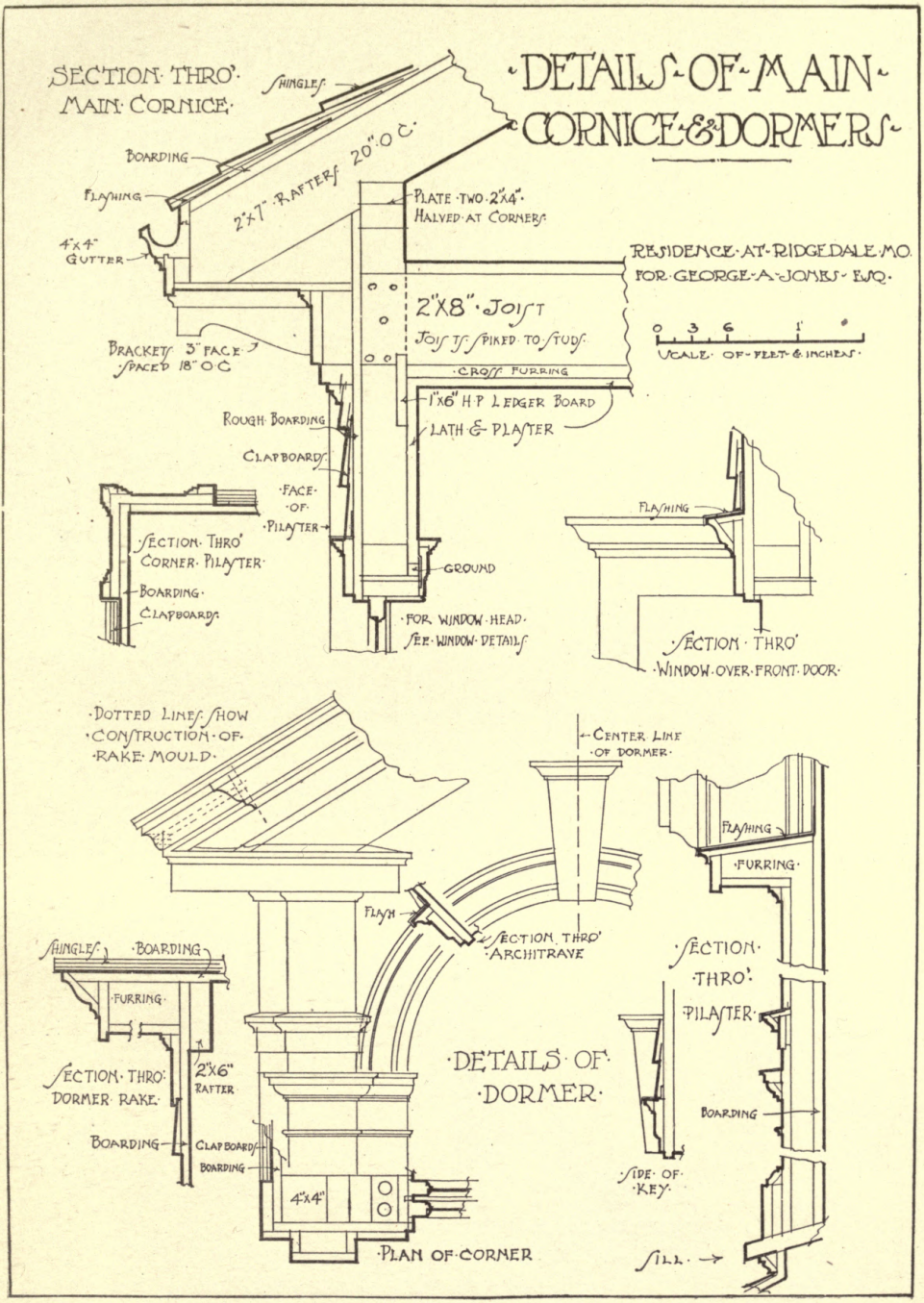

DETAILS OF MAIN CORNICE & DORMERS
SECTION THRO' MAIN CORNICE
SHINGLES
BOARDING
FLASHING
2"X7" RAFTERS 20" O.C.
4"X4" GUTTER
PLATE TWO 2"X4" HALVED AT CORNERS
RESIDENCE AT RIDGEDALE MO.
FOR GEORGE A. JONES ESQ.
2"X8" JOIST
JOIST IS SPIKED TO STUDS
0 3 6 1'
SCALE OF FEET & INCHES
BRACKETS 3" FACE SPACED 18" O.C.
CROSS FURRING
1"X6" H.P. LEDGER BOARD
ROUGH BOARDING
LATH & PLASTER
CLAPBOARDS
FACE OF PILASTER
SECTION THRO' CORNER PILASTER
BOARDING
CLAPBOARDS
GROUND
FOR WINDOW HEAD SEE WINDOW DETAILS
FLASHING
SECTION THRO' WINDOW OVER FRONT DOOR
DOTTED LINES SHOW CONSTRUCTION OF RAKE MOULD
CENTER LINE OF DORMER
FLASHING
FURRING
FLASH
SECTION THRO' ARCHITRAVE
SHINGLES
BOARDING
FURRING
SECTION THRO' DORMER RAKE
2"X6" RAFTER
BOARDING
CLAPBOARD
BOARDING
4"X4"
PLAN OF CORNER
DETAILS OF DORMER
SECTION THRO' PILASTER
BOARDING
SIDE OF KEY
SILL

Fig. 15.

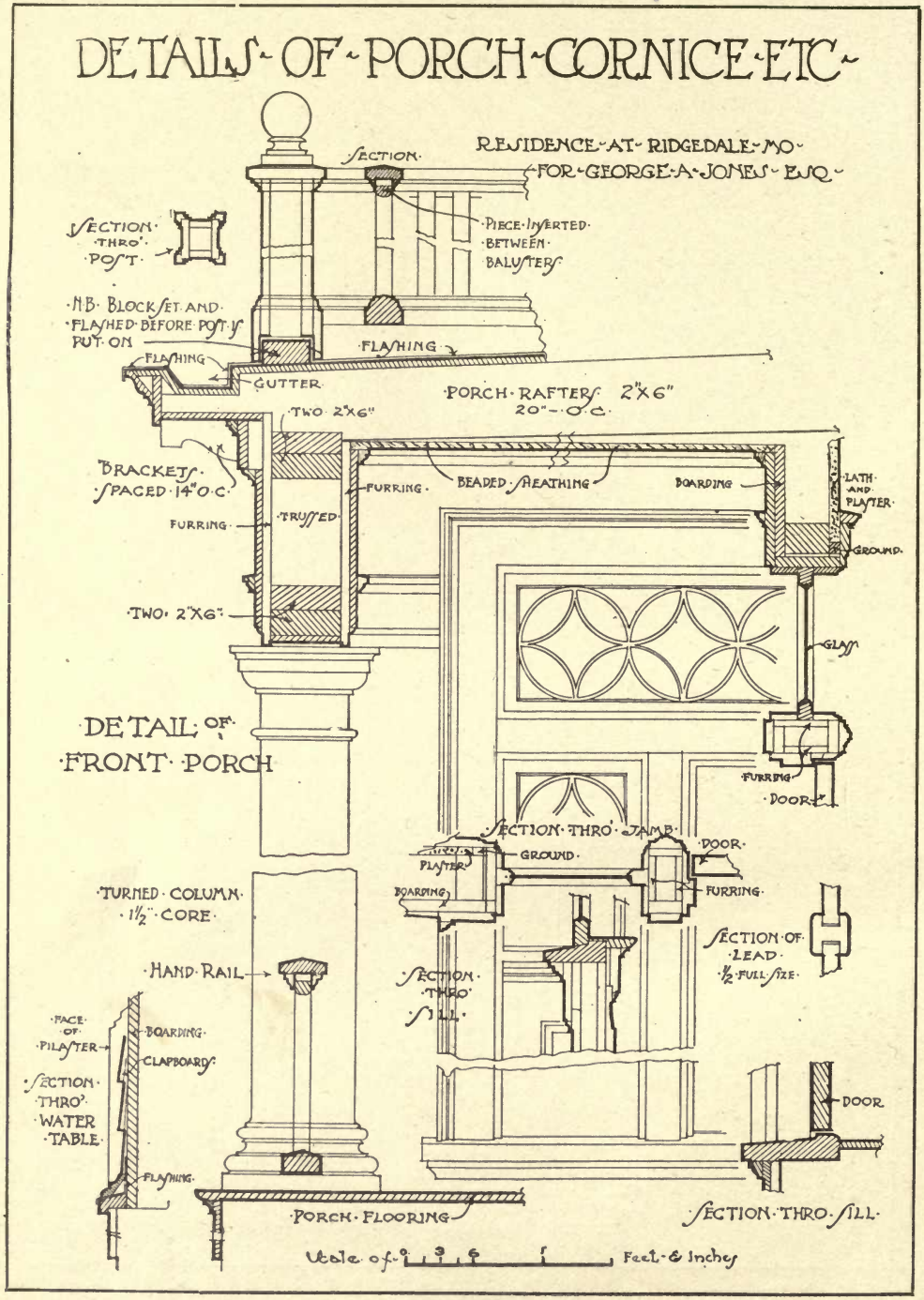

DETAILS OF PORCH CORNICE ETC
RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
SECTION
SECTION THRO' POST
PIECE INVERTED BETWEEN BALUSTERS
N.B. BLOCK SET AND FLASHED BEFORE POSTS PUT ON
FLASHING
FLASHING
GUTTER
PORCH RAFTERS 2"X6" 20"-O.C.
TWO 2"X6"
BRACKETS SPACED 14"O.C.
FURRING
TRUSSED
FURRING
BEADED SHEATHING
BOARDING
LATH AND PLASTER
GROUND
GLASS
TWO 2"X6"
DETAIL OF FRONT PORCH
FURRING
DOOR
SECTION THRO' JAMB
DOOR
PLASTER
GROUND
BOARDING
FURRING
TURNED COLUMN
1½" CORE
SECTION OF LEAD
½ FULL SIZE
HAND RAIL
SECTION THRO' SILL
FACE OF PILASTER
BOARDING
CLAPBOARD
SECTION THRO' WATER TABLE
FLASHING
DOOR
PORCH FLOORING
SECTION THRO. SILL
Scale of 0 3 6 1 Feet & Inches

Fig. 16.

| | | |
|---|---|---|
| *Brought forward* | $2.14 | $137.54 |
| TWO LOW DOORS— | | |
| 2 pairs butts, 2½ × 2½-inch, at ....$.10 each.... | .20 | |
| 2 cupboard turns, at .....$.35 each.... | .70 | |
| Labor ..... | 1.00 | |
| WINDOWS— | | |
| 8 sash fasts, at .....$.30 each.... | 2.40 | |
| 16 sash lifts, at .....$.06 each.... | .96 | |
| Labor ..... | 4.00 | |
| 6 doz. H. & C. hooks, 639½, at ....$.50 doz.... | 3.00 | |
| 3 doz. base knobs, at .....$.35 doz.... | 1.05 | |
| Labor ..... | 2.50 | $ 17.95 |
| Total cost of Hardware put on ..... | | $155.49 |

## HEATING

| | | |
|---|---|---|
| FURNACE— | | |
| 1 No. 28 Crawford furnace (28-in. firepot) .. | $125.00 | |
| 22 ft. 8-in. galv. iron smoke-pipe, 55 lbs., at.....$.09 lb. | 4.95 | |
| REGISTERS— | | |
| 1 14 × 18-in. register, stone, box and netting, | 4.72 | |
| 4 9 × 12-in. registers, stone, box and netting, at..... $1.57 each | 6.28 | |
| 4 8 × 10-in. registers, stone, box and netting, at ..... $1.19 each | 4.76 | |
| 4 8 × 10-in. registers, stone, box and netting, at..... $1.15 each | 4.60 | |
| PIPING, including dampers, collars, and elbows— | | |
| 12 ft. 14-in. tin pipe, at.....$.27 per ft... | 3.24 | |
| 64 ft. 9-in. " " at.....$.16 " " .. | 10.24 | |
| 278 ft. 7-in. " " at.....$.10 " " .. | 27.80 | |
| COVERING FOR RISERS (6 lbs. asbestos paper per pipe)— | | |
| 5 risers, 30 lbs., at $.05 lb. ..... | 1.50 | |
| PLASTERING RINGS IN CELLAR— | | |
| For 13 pipes at $.20 each..... | 2.60 | |
| | $ 195.69 | |
| Office expense and profit ..... | 48.92 | $244.61 |
| *Carried forward* | | $244.61 |

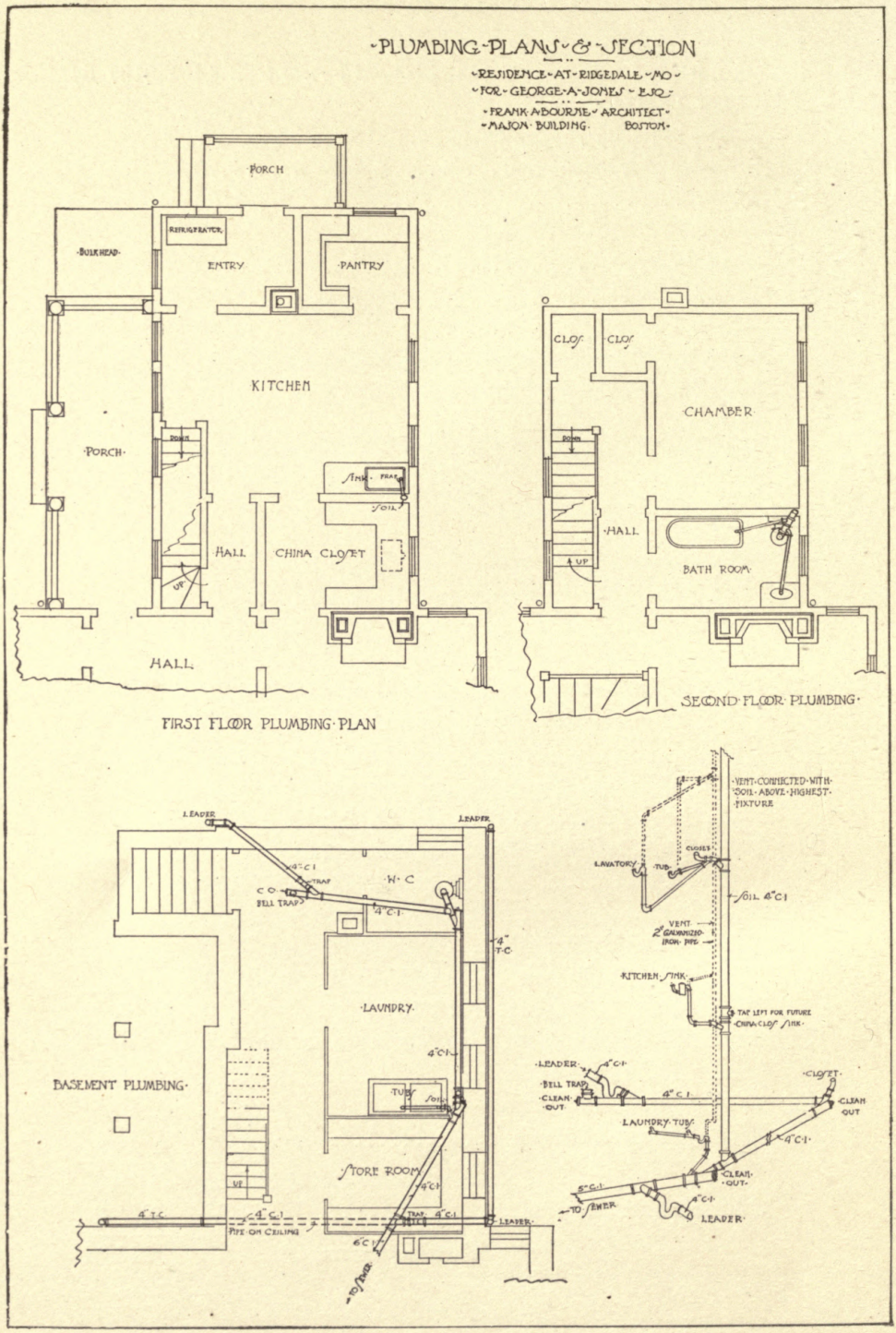

PLUMBING PLANS & SECTION
RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
FRANK ABOURNE ARCHITECT
MASON BUILDING BOSTON
PORCH
REFRIGERATOR
BULKHEAD
ENTRY
PANTRY
KITCHEN
PORCH
DOWN
SINK
TRAP
SOIL
HALL
CHINA CLOSET
VENT
HALL
FIRST FLOOR PLUMBING PLAN
CLOS
CLOS
CHAMBER
DOWN
HALL
UP
BATH ROOM
SECOND FLOOR PLUMBING
LEADER
LEADER
4" C I
TRAP
W C
C O
BELL TRAP
4" C I
4" T C
LAUNDRY
4" C I
TUBS
SOIL
BASEMENT PLUMBING
STORE ROOM
4" C I
VENT
4" T C
4" C I
PIPE ON CEILING
TRAP
4" C I
LEADER
6" C I
TO SEWER
VENT CONNECTED WITH SOIL ABOVE HIGHEST FIXTURE
CLOSET
LAVATORY
TUB
SOIL 4" C I
VENT 2" GALVANIZED IRON PIPE
KITCHEN SINK
TAP LEFT FOR FUTURE CHINA CLOS SINK
LEADER
4" C I
BELL TRAP
CLEAN OUT
4" C I
CLOSET
CLEAN OUT
LAUNDRY TUBS
4" C I
5" C I
CLEAN OUT
4" C I
TO SEWER
LEADER

Fig. 17.

| | | |
|---|---|---|
| *Brought forward* | | $244.61 |
| LABOR— | | |
| Measuring and laying out risers, man 1 day . | $4.80 | |
| Erecting risers, man 2 days, helper 1 day.... | 12.00 | |
| Laying out and erecting cellar pipes and furnace, man 3 days, helper 2 days..... | 19.20 | |
| Finishing, man 1 day ..... | 4.80 | |
| Carting and expenses ..... | 10.00 | 50.80 |
| Total cost of Heating Apparatus..... | | $ 295.41 |

**PLUMBING**

| | | |
|---|---|---|
| WASTE AND SOIL PIPES— | | |
| 2 4-in. lead bends, at $1.10 each..... | $2.20 | |
| 2 4-in. sleeves, at $.65 each ..... | 1.30 | |
| 5 2-in. " at $.28 each ..... | 1.40 | |
| 2 3 × 2-in. sleeves, at $.45 each ..... | .90 | |
| 1 1½-in. Pemberton trap..... | 6.80 | |
| 30 lbs. solder, wiping, at $.25 lb. ..... | 7.50 | |
| 2 trap plugs, at $.42 each ..... | .84 | |
| 2 6-in. traps, at $2.35 each ..... | 4.70 | |
| 1 6-in. cesspool ..... | 3.00 | |
| 4 1½-inch solder nipples, at $.15 each..... | .60 | |
| 1 4-in. roof flashing ..... | 1.35 | |
| Soil pipe ..... | 47.87 | |
| 15 ft. 1½-in. lead pipe, No. 55 ..... | 3.24 | |
| 50 ft. 2-in. iron pipe<br>40 ft. 1½-in. " " } ..... | 8.96 | |
| Soil fittings, ⅓ cost of pipe ..... | 15.96 | |
| Cast-iron fittings, 20 per cent ..... | 1.79 | $ 108.41 |
| MISCELLANEOUS FITTINGS— | | |
| 3 4-in. b ass C. O..... | $ 2.70 | |
| 1 5-in. brass C. O ..... | 1.50 | |
| Refrigerator waste ..... | 12.50 | |
| Local vents ..... | 12.00 | |
| 1 ball-cock ..... | 1.25 | |
| 2 sill cocks ..... | 2.00 | |
| Tank overflow ..... | 6.50 | |
| 4 ¾-inch S. & W. cocks ..... | 3.24 | |
| *Carried forward* | $41.69 | $108.41 |

| | | |
|---|---|---|
| *Brought forward* | $ 41.69 | $ 108.41 |
| 1 boiler valve and chain | .70 | |
| 25 lbs. tinned copper, at $.32 lb. | 8.00 | |
| 6 3-part hangers, brass | 6.30 | |
| 2 ¾-in. hose bibs | 1.50 | |
| 3 ¾-inch plain bibs | 2.10 | |
| Street connections | 55.00 | |
| 1 lb. putty | .05 | |
| 2 lbs. grafting wax | .50 | |
| Calking lead, 380 lbs. | 22.80 | |
| Oakum | 1.60 | $ 140.24 |
| FIXTURES— | | |
| 1 36 x 24 x 8-in. sink, 12-in. back | $11.40 | |
| 1 24 x 14-in. pantry sink | 14.00 | |
| 1 pair pantry cocks | 3.60 | |
| 2 24 x 48-in. trays, 12-in. back | 14.10 | |
| 1 5-ft. bathtub, complete | 41.00 | |
| 1 lavatory, complete | 32.50 | |
| 1 water-closet, complete | 60.00 | |
| 1 40-gallon boiler | 16.75 | |
| 1 " " " stand | .85 | |
| 12 lbs. fine solder | 3.12 | |
| Clamps and hooks | 2.70 | |
| Tinned tacks | .15 | |
| Fuel | 1.95 | $ 202.12 |
| SUPPLIES AND LABOR— | | |
| 126 ft. ¾-inch galv. water pipe | $4.41 | |
| 22 ft. ½-inch " " " | .62 | |
| Fittings, ⅓ cost of pipe | 1.67 | |
| 74 ft. ¾-in. brass $23.49 | | |
| 56 ft. ½-in. " 16.24 | 39.73 | |
| Fittings, 20 per cent | 7.95 | |
| Painting of iron pipes | 9.75 | |
| Stop-cocks | 3.54 | |
| Sink and tray legs | 4.72 | |
| Lead, oil, etc. | .65 | |
| *Carried forward* | $ 73.04 | $ 450.77 |

| | | | |
|---|---|---|---|
| | *Brought forward* | $ 73.04 | $ 450.77 |
| | Clamping brass and screws | .25 | |
| | Cartage and fares | 5.00 | |
| | Labor, 40 days, at $6.00 per day | 240.00 | 318.29 |
| | | | $ 769.06 |
| | Profit, 10 per cent | | 76.90 |
| | Total cost of Plumbing | | $ 845.96 |

## ELECTRIC WIRING

| | | |
|---|---|---|
| 75 ft. | No. 4 S. B. R.C. wire | $ 4.80 |
| 150 ft. | No. 1 S. B. R. C. wire | 4.26 |
| 40 | Large porcelain tubes, 5 cents | 2.00 |
| 30 | " " knobs, 5 cents | 1.50 |
| 1 | 3-pole 50-amp. fused switch | 1.50 |
| 1 | Main cabinet (meter) | 3.50 |
| 1 | 8-circuit cut-out panel | 16.00 |
| 2,500 ft. | No. 14 S.B. R.C. wire | 28.60 |
| 500 ft. | 1 4-in. circular loom | 20.00 |
| 800 | 5½ knobs | 3.20 |
| 1,600 | 5-in. porcelain tubes | 4.00 |
| 100 | Fire stops | 9.00 |
| 100 | 12-in. porcelain tubes | 10.00 |
| 18 | Ceiling boxes | 1.80 |
| 30 | Bracket boxes | 3.00 |
| 11 | Switch boxes | 2.20 |
| 11 | " " | 12.10 |
| | Labor on No. 14 wire | 55.00 |
| | " " mains | 15.00 |
| | " " finish | 15.00 |
| | Teaming and freight | 5.00 |
| | Sundries | 5.00 |
| | Nails, leatherheads, etc | 3.00 |
| | | $ 225.46 |
| | Office expense, 10 per cent | 22.55 |
| | | $ 248.01 |
| | Profit, 20 per cent | 49.60 |
| | Total cost of Electric Wiring | $ 297.61 |

NOTE.—This estimate is figured on outlet boxes at all outlets; and includes a main cabinet and main switch to connect with the meter and to cover the meter, on an eight-circuit panel-board, which allows one spare circuit. The panel-board is to be made of slate, with slate gutters and linings, with good wood door and trim.

The labor is estimated on wages being $3.60 per day for a journeyman, and $2.00 per day for helper. This price is above that paid in small places, but is below what is paid in some cities.

## ELECTRIC LIGHTING FIXTURES

NOTE.—While the electric lighting fixtures are not generally made a part of the building contract, it may be worth while to consider them in relation to the cost of the house; although, as has been stated, there is such a wide range in design and cost, as well as in personal preference, that any data given can be at best only approximate.

The following estimate is based upon simple designs of moderate cost in "old brass" finish:

### FIRST STORY

| | |
|---|---|
| LIVING ROOM— | |
| 1 4-light electrolier | $17.50 |
| 4 1-light wall brackets, at $3.25 each | 13.00 |
| HALL— | |
| 2 2-light ceiling pieces, at $2.50 each | 5.00 |
| VESTIBULE— | |
| 1 3-light cluster | 5.00 |
| PORCH— | |
| 1 1-light ceiling-piece | 1.75 |
| PARLOR— | |
| 1 4-light electrolier | 17.50 |
| 2 1 " wall brackets | 6.50 |
| DINING ROOM— | |
| 1 4-light electrolier | 10.00 |
| 2 1 " wall brackets | 5.00 |
| CHINA CLOSET, REAR HALL, KITCHEN— | |
| 3 1-light ceiling-pieces, at $.75 each | 2.25 |
| 2 1 " wall brackets, at $1.35 each | 2.70 |
| *Carried forward* | $86.20 |

| | |
|---|---|
| *Brought forward* | $ 86.20 |
| PANTRY— | |
| 1 1-light ceiling-piece | .75 |
| ENTRY— | |
| 1 1 " " " | 1.35 |
| PIAZZA— | |
| 1 1 " " " | 1.75 |
| **SECOND STORY** | |
| HALL— | |
| 2 1-light ceiling-pieces, at $1.50 each | $3.00 |
| ALCOVE— | |
| 2 1-light ceiling pieces, at $2.50 each | 5.00 |
| BEDROOMS— | |
| 13 1-light brackets, at $2.50 each | 32.50 |
| BATHROOM— | |
| 1 1-light ceiling-piece | 1.35 |
| REAR HALL— | |
| 1 1-light bracket | 1.35 |
| **THIRD STORY** | |
| HALL— | |
| 1 1-light wall bracket | $1.35 |
| ATTIC— | |
| 1 3-ft. drop-cord | .85 |
| **BASEMENT** | |
| LAUNDRY— | |
| 1 1-light wall bracket | $1.15 |
| CELLAR— | |
| 4 3-ft. drop-cords, at $.85 each | 3.40 |
| | $ 140.00 |
| **LABOR** | |
| Installing above fixtures with all necessary trimmings | $ 12.00 |
| Total cost of Electric Lighting Fixtures in place | $152.00 |
| **PAINTING** | |
| OUTSIDE PAINTING— | |
| 17 pairs blinds, three coats painting, at $1.50 pair | $ 25.50 |
| 1,068 yds. three coats painting, windows and woodwork, at $.20 yd. | 213.60 |
| *Carried forward* | $239.10 |

| | |
|---|---|
| *Brought forward* | $239.10 |
| 54 yds. two coats metallic paint, upper side tin roofs, at $.15 yd. | 8.10 |
| 62 yds. two coats oiling on floors, porch, and piazza, at $.10 yd. | 6.20 |
| INTERIOR PAINTING— | |
| 166 yds. filling, staining, and shellacing, and two coats hard oil finish, at $.20 yd. | $33.20 |
| 245 yds. filling and two coats spar varnish, first coat rubbed, at $.25 yd. | 61.25 |
| 403 yds. one coat shellac, three of paint, two coats zinc and white varnish. Rubbed with pumice and water, ivory white finish, at $.80 yd. | 322.40 |
| 294 yds. treat with potash, one oil filler, clean, four coats shellac, last coat rubbed with pumice and oil, oak and birch, at $.35 yd. | 102.90 |
| 109 yds. filling, four coats shellac, last coat rubbed with pumice and oil, floors at $.30 yd. | 32.70 |
| 114 yds. size and three coats paint, last coat with varnish, walls, at $.20 yd. | 22.80 |
| 5 yds. three coats paint and one enamel gloss, bath-tub, at $.25 yd. | 1.25 |
| 100 yds. three coats paint, last with zinc, flat, white-wood, at $.25 yd. | 25.00 |
| 10 yds. one coat shellac on pipes, at $.10 yd. | 1.00 |
| 299 yds. size and tint in water-colors, ceilings, at $.15 yd. | 44.85 |
| Total cost of Painting | $ 900.75 |

## GENERAL SUMMARY

| | | |
|---|---|---|
| Batter-Boards and Water Supply | $ 25.00 | |
| Excavation | 262.50 | |
| Stonework, Cesspools, and Drains | 754.15 | |
| Chimneys and Brickwork | 281.50 | |
| Concreting | 88.20 | |
| Plastering | 544.40 | |
| Carpenter Work | 4,928.34 | |
| *Carried forward* | | $6,884.09 |

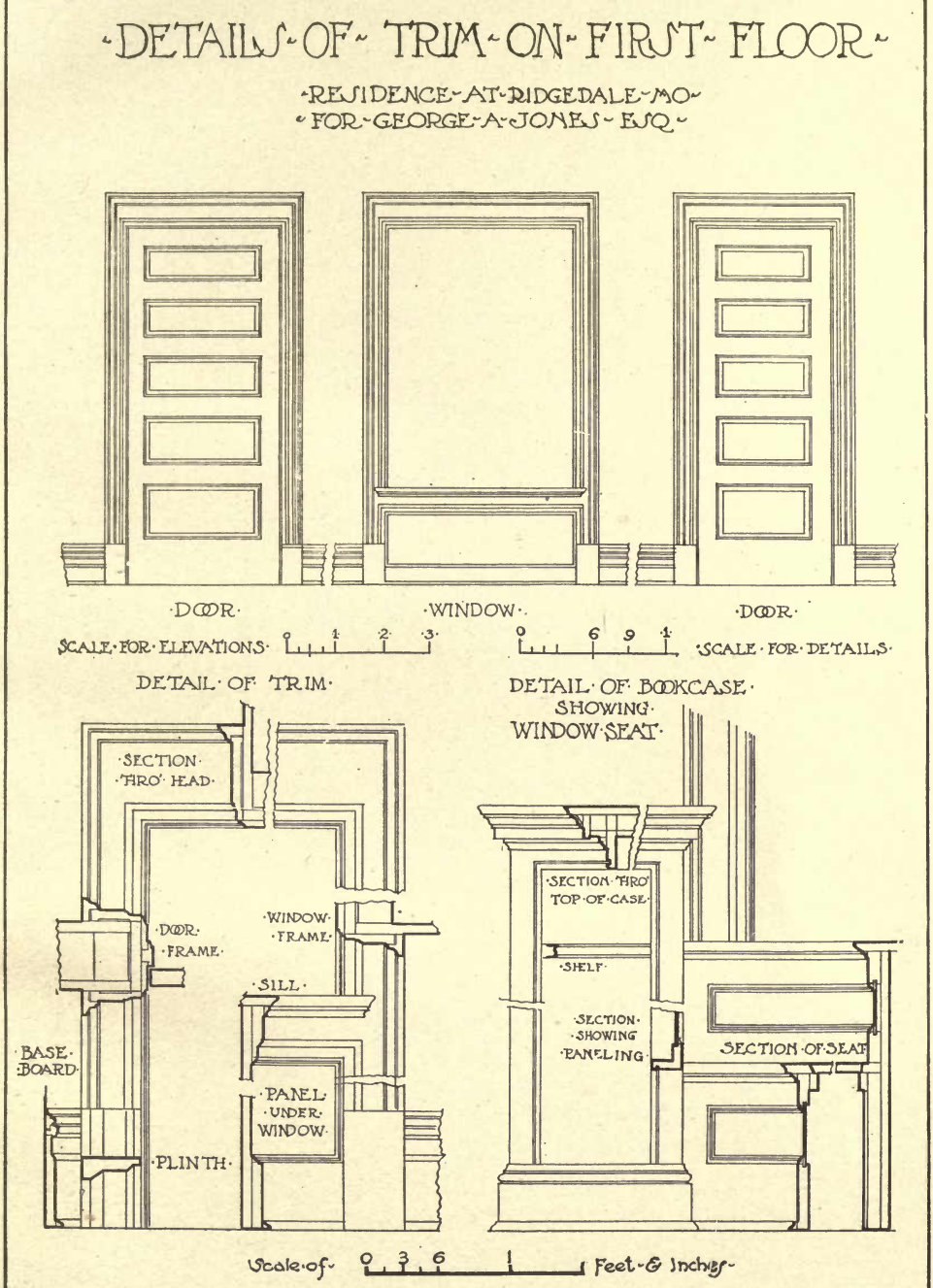

DETAILS OF TRIM ON FIRST FLOOR
RESIDENCE AT RIDGEDALE MO
FOR GEORGE A JONES ESQ
DOOR
WINDOW
DOOR
SCALE FOR ELEVATIONS
0 1 2 3
0 6 9 1
SCALE FOR DETAILS
DETAIL OF TRIM
SECTION THRO HEAD
DOOR FRAME
WINDOW FRAME
SILL
BASE BOARD
PANEL UNDER WINDOW
PLINTH
DETAIL OF BOOKCASE SHOWING WINDOW SEAT
SECTION THRO TOP OF CASE
SHELF
SECTION SHOWING PANELING
SECTION OF SEAT
Scale of 0 3 6 1 Feet & Inches

Fig. 18.

| | |
|---|---|
| *Brought forward* | $6,884.09 |
| Stairs | 216.21 |
| Hardware | 155.49 |
| Heating | 295.41 |
| Plumbing | 845.96 |
| Electric Wiring | 297.61 |
| Electric Fixtures | 152.00 |
| Painting | 900.75 |
| Total, | $9,747.52 |

# SCHEDULES

## ANALYSIS OF CARPENTER WORK

Following is a section devoted to the analysis of the different portions of carpenter work in the foregoing estimate. These show how the prices are obtained, and will be very useful for comparison, as the changes in cost of parts can be noted and kept up to date.

First Floor, price per square of 100 sq. ft., including the floor beams, bridging, and under floors, but no furring for plaster—

| | | |
|---|---|---|
| Joists, 2 × 10-in., 16 inches on centers | $3.25 | |
| Labor | 1.50 | |
| Nails | .10 | |
| Bridging | .50 | |
| Under floor, hemlock, at $24.00 | 2.30 | |
| Waste, one-third | .80 | |
| Labor | .75 | |
| Nails | .15 | $ 9.35 |

Hard Pine Upper Floor, per square of 100 sq. ft.—

| | | |
|---|---|---|
| Stock | $6.00 | |
| Waste, one-third | 2.00 | |
| Labor | 2.25 | |
| Nails | .25 | $10.50 |

Quartered Oak Upper Floor, per square of 100 sq. ft.—

| | | |
|---|---|---|
| Stock | $10.00 | |
| Waste | 3.30 | |
| Labor | 6.50 | |
| Nails | .25 | $20.05 |

| | | |
|---|---|---|
| Porch or Veranda Floor, per square of 100 sq. ft.— | | |
| Joists, 2 × 8-in., 16 inches on centers | $2.60 | |
| Labor | 1.00 | |
| Hard pine flooring, at $55. | 5.50 | |
| Waste | 1.80 | |
| Labor | 1.25 | |
| Nails | .20 | $12.35 |
| Second Floor, per square of 100 sq. ft.— | | |
| Joists, 2 × 10-in., 16 inches on centers | $3.25 | |
| Labor | 1.50 | |
| Bridging | .50 | |
| Furring | 1.50 | |
| Under-floor stock | 2.30 | |
| Waste, one-third | .80 | |
| Labor | .75 | |
| Nails | .15 | |
| Upper-floor stock | 4.00 | |
| Waste | 1.30 | |
| Labor | 1.75 | |
| Nails | .20 | $18.00 |
| Third Floor, per square of 100 sq. ft.— | | |
| Joists, 2 × 8-in., 16 inches on centers | $ 2.60 | |
| Labor | 1.50 | |
| Under floor | 4.00 | |
| Furring | 1.50 | |
| Bridging | .50 | $10.10 |
| Shingled Roof, per square of 100 sq. ft— | | |
| Rafters, 2 × 7-in, 20 inches on centers | $ 2.17 | |
| Labor | 2.25 | |
| Matched spruce boarding | 2.50 | |
| Waste, one-third | .80 | |
| Labor | 1.25 | |
| Nails | .20 | |
| Shingles | 4.00 | |
| Labor | 3.25 | |
| Nails | .25 | $16.67 |

| | | |
|---|---|---|
| Tinned Roof, per square of 100 sq. ft.— | | |
| Rafters, 2 × 7-in., 20 inches on centers | $ 2.17 | |
| Labor | 1.50 | |
| Matched boarding, as above | 4.75 | |
| Paper | .50 | |
| Tinning | 12.00 | $20.92 |
| Wall Frame and Boarding, per square of 100 sq. ft.— | | |
| Studding, 2 × 4-in., 16 inches on centers | $ 4.00 | |
| Boarding | 2.30 | |
| Waste | .80 | |
| Labor | 1.00 | |
| Nails | .20 | $ 8.30 |
| Inside Studding, per square of 100 sq. ft.— | | |
| Stock, 2x4-in., 16 inches on centers | $ 1.30 | |
| Waste, one-half stock | .65 | |
| Labor | 1.50 | |
| Nails | .15 | |
| Grounds and beads | .40 | $ 4.00 |
| Clapboarding, per square of 100 sq. ft.— | | |
| Clapboards, 80, at $.05 each | $ 4.00 | |
| Labor | 3.25 | |
| Paper | .50 | |
| Nails | .20 | $ 7.95 |
| Main Cornice, per linear foot— | | |
| Gutter, per ft. | $ .12 | |
| Upper fascia | .03 | |
| Fillet | .01 | |
| Lower fascia | .04 | |
| Planceer | .08 | |
| Bed-mould | .02 | |
| Frieze | .06 | |
| Architrave moulding | .04 | |
| Brackets | .25 | |
| Labor | .50 | |
| Rough furring | .10 | $ 1.25 |
| Piazza Cornice, per linear foot— | | |
| Upper fascia | $ .03 | |
| *Carried forward* | $ .03 | |

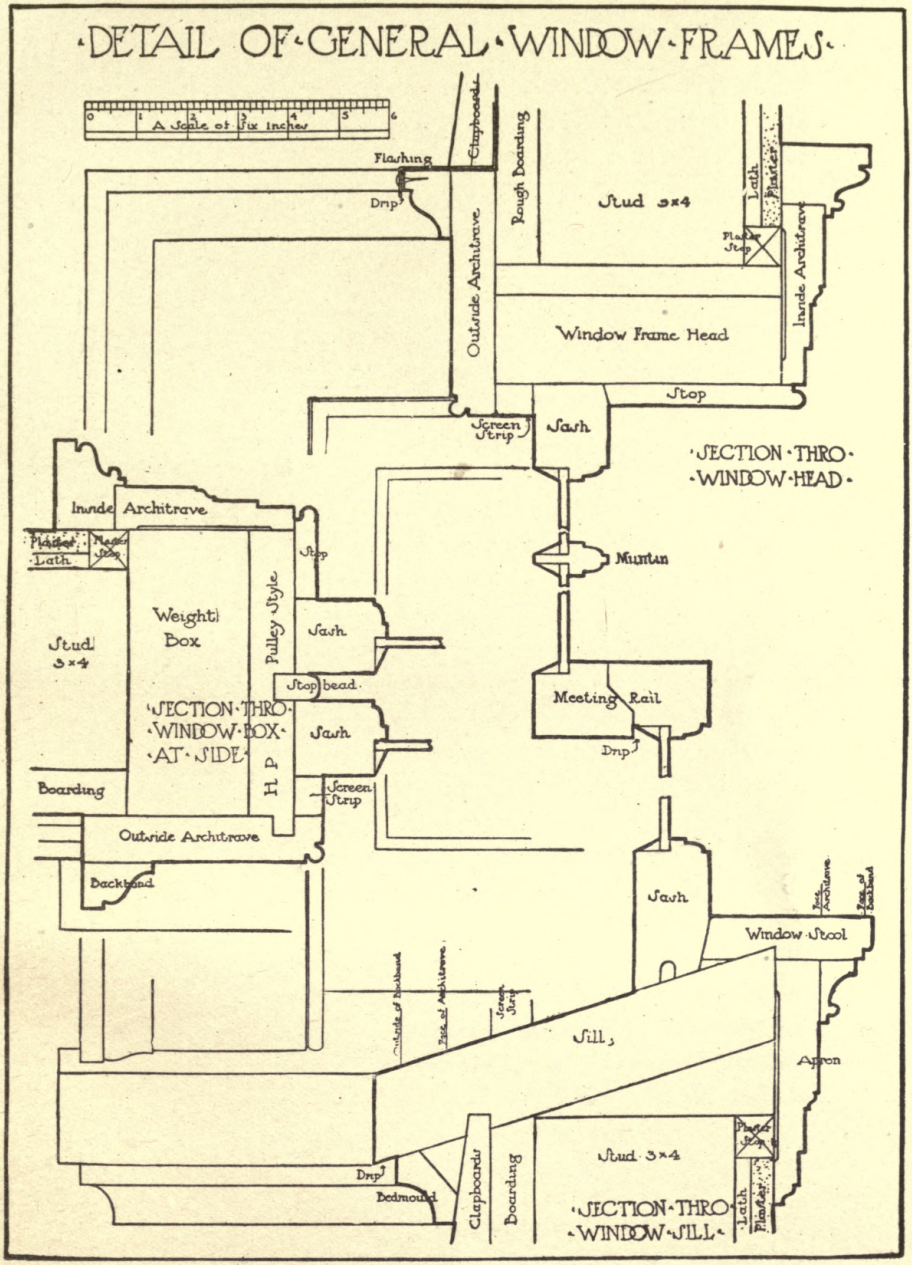

DETAIL OF GENERAL WINDOW FRAMES
A Scale of Six Inches
Flashing
Drip
Clapboards
Outside Architrave
Rough Boarding
Stud 3×4
Lath
Plaster
Plaster Stop
Inside Architrave
Window Frame Head
Stop
Screen Strip
Sash
SECTION THRO WINDOW HEAD
Inside Architrave
Plaster
Lath
Plaster Stop
Stop
Mullion
Weight Box
Pulley Style
Sash
Stud 3×4
Stop bead
Meeting Rail
SECTION THRO WINDOW BOX AT SIDE
Sash
Drip
Boarding
H P
Screen Strip
Outside Architrave
Backband
Sash
Window Stool
Outside of Backband
Face of Architrave
Sash Stop
Sill
Apron
Plaster Stop
Drip
Bedmould
Clapboards
Boarding
Stud 3×4
Lath
Plaster
SECTION THRO WINDOW SILL

Fig. 19.

| | | |
|---|---|---|
| *Brought forward* | $ .03 | |
| Gutter | .10 | |
| Lower fascia | .03 | |
| Fillet | .01 | |
| Planceer | .08 | |
| Bed-mould | .02 | |
| Brackets | .25 | |
| Frieze | .15 | |
| Architrave mould | .03 | |
| Soffit | .05 | |
| Inside frieze | .10 | |
| Labor | 1.00 | |
| Rough furring | .15 | $ 2.00 |
| Attic Windows, circular top, each— | | |
| Frame | $ 6.00 | |
| Sash | 2.50 | |
| Inside finish | 1.00 | |
| Weights and cord | .45 | |
| Labor | 1.25 | $11.20 |
| Second-Story Windows, 3 ft. 6 in. × 5 ft., each— | | |
| Frame | $ 3.50 | |
| Sashes, 17½ sq. ft., at $.20 per sq. ft. | $ 3.50 | |
| Blinds | 1.00 | |
| Blind fasts | .15 | |
| Inside finish | 1.19 | |
| Nails and screws | .10 | |
| Weights and cord | .64 | |
| Labor, 1 day | 3.25 | $13.33 |
| Inside Finish for Window, as above— | | |
| Architrave, 21 ft., at $.03½ per ft. | $ .73 | |
| Back-band, 21 ft., at $.03 " " | .63 | |
| Beads, 17 ft., at $.02 " " | .34 | $ 1.70 |
| 30 per cent off | | .51 |
| | | $ 1.19 |
| Weights and Cord for Window, as above— | | |
| Weights, 17½ ft., 2 lbs. per ft., 35 lbs., at $.01¼ per lb. | $ .44 | |
| Cord, 20 ft., at $.01 per ft | .20 | $ .64 |

Cost of Window, 2 ft. 6 in. x 4 ft. 6 in., each—

| | | |
|---|---|---|
| Frame | $ 3.50 | |
| Window, 11¼ sq. ft., at $.20 per sq. ft | 2.25 | |
| Blinds | .75 | |
| Blind fastenings | .15 | |
| Screws and nails | .10 | |
| Weight, 22½ lbs., at $.01¼ per lb. | .28 | |
| Cord | .15 | |
| Inside Casing, 18 ft., at $.03½ per ft. | .63 | |
| Back-band, 18 ft., at $.03 per ft. | .54 | |
| Stop-beads, 14 ft., at $.02 per ft. | .28 | |
| Labor | 3.25 | $11.88 |

French Windows, 4 ft. 6 in × 7 ft. 6 in., each—

| | | |
|---|---|---|
| Frame | $ 5.00 | |
| Sash, 4 ft. 6 in. × 7 ft. 6 in., 34 sq. ft., at $.20 per sq. ft. | 6.80 | |
| Astragal | .50 | |
| Nails and screws | .10 | |
| Inside finish | .96 | |
| Labor | 4.88 | $18.24 |

Window, 3 ft. 4 in. × 5 ft. 6 in. (oak finish), each—

| | | |
|---|---|---|
| Frame | $ 3.50 | |
| Window, 18 sq. ft., at $.20 per sq. ft. | 3.60 | |
| Blinds | 1.00 | |
| Blind fasts | .15 | |
| Nails and screws | .10 | |
| Weights | .70 | |
| Finish (oak) | 2.64 | |
| Labor, 1½ days | 4.88 | $16.57 |

Rear Door, 2 ft. 10 in. × 7 ft. 6 in.—

| | | |
|---|---|---|
| Frame | $4.00 | |
| Door, 21 sq. ft., at $.25 per sq. ft. | 5.25 | |
| Finish | .91 | |
| Labor | 3.25 | |
| Nails | .05 | $13.46 |

| | | |
|---|---|---|
| Front Door, 3 ft. 3 in. × 7 ft. 6 in., with top and side lights— | | |
| *Frame*— | | |
| Sill, 7 ft., at $.25 per ft. | $1.75 | |
| Jambs, 23 ft., at $.07 per ft. | 1.61 | |
| Mullions and transom bar, 20 ft., at $.10½ per ft. | 2.10 | |
| Outside casing, 23 ft., at $.03½ per ft. | .81 | |
| Mullion casing, 20 ft., at $.02 1/10 per ft. | .42 | |
| Labor, ½ price of stock | 3.32 | |
| | $10.01 | |
| *Door*, 3 ft., 3 in. × 7 ft. 6 in.— | | |
| 21 sq. ft., at $.25 per sq. ft. | $5.25 | |
| Side-light panels, 6 ft., at $.25 per ft. | 1.50 | |
| 3 sash rims, at $.50 each | 1.50 | |
| Leaded glass, 10⅝ sq. ft., at $2.50 per sq. ft. | 27.00 | |
| | $35.25 | |
| *Inside Finish*— | | |
| Stop-beads | $ .28 | |
| Architrave, 24 ft., at $.04½ per ft. | 1.08 | |
| Labor, 3 days | 9.75 | |
| | $11.11 | |
| Total cost of front door and frame | | $56.37 |
| Door, 2 ft. 8 in. × 7 ft. 6 in. (N. C. pine)— | | |
| Stock door | $3.00 | |
| Frame | 1.25 | |
| Threshold | .15 | |
| Nails | .05 | |
| Finish, 39½ ft., at $.04½ per ft. | 1.78 | |
| Labor | 3.25 | $9.48 |
| Pair of Sliding Doors, 6 ft. × 8 ft. (whitewood and birch)— | | |
| Doors, 48 sq ft., at $.50 per sq. ft. | $24.00 | |
| Architrave, 24 ft., birch | 2.34 | |
| " 24 ft., whitewood | 1.05 | |
| Jambs, 22 ft., birch | 1.82 | |
| " 22 ft., whitewood | .85 | |
| Grounds, 22 ft., birch | .50 | |
| *Carried forward* | $30.56 | |

| | | |
|---|---|---|
| *Brought forward* | $30.56 | |
| Grounds, 22 ft., whitewood | .23 | |
| Chafing strip, 22 ft., birch | .33 | |
| 22 ft., whitewood | .15 | |
| Astragal, birch and whitewood | 1.50 | |
| Sheathing pockets, 96 ft., at $4.75 per square. | 4.50 | |
| Labor, 5 days' work | 16.25 | $53.52 |

**Schedule of Rooms, and Memoranda from which Heating Estimate is Made Up**

| First Floor Rooms | Size | Contains Cu. Ft. | Divide by | Equals | Size of Register | Area of Pipes | Feet of Tin Pipe, including Elbows |
|---|---|---|---|---|---|---|---|
| Living Room. | 14×25×9 | 3,150 | 25 | 2 9-in. pipes | 2 9×12 | 128 | 34 |
| Hall | 11×25×9 | Add 40% for space above, 3,465 | 25 | 14-in. " | 14×18 | 154 | 12 |
| Parlor | 12×14×9 | 1,512 | 25 | 9-in. " | 9×12 | 64 | 14 |
| Dining Room. | 12×14×9 | 1,512 | 25 | 9-in. " | 9×12 | 64 | 16 |
| China Closet. | 7×10×9 | .... | .. | 7-in. " | 7×10 | 38 | 24 |
| Second Floor | | | | | | | |
| Bedroom .... | 11×14×8½ | 1,309 | 35 | 7-in. " | 8×10 | 38 | 38 |
| " .... | 11×14×8½ | 1,309 | 35 | 7-in. " | 8×10 | 38 | 26 |
| " .... | 11×14×8½ | 1,309 | 35 | 7-in. " | 8×10 | 38 | 40 |
| " .... | 11×14×8½ | 1,309 | 35 | 7-in. " | 8×10 | 38 | 40 |
| Alcove | 6×11×8½ | .... | .. | 7-in. " | 7×10 | 38 | 32 |
| Bathroom.... | 6×10×8½ | .... | .. | 7-in. " | 7×10 | 38 | 38 |
| Rear Bedroom | 10×13×8½ | 1,105 | 35 | 7-in. " | 7×10 | 38 | 40 |

Smoke pipe, 22 ft.—Heat-pipe area, 714 sq. in.—Cold-air box, 534 sq. in., or ¾ of heat-pipe area.—Use 28-in. firepot furnace.

**Location Sheet of Electric Outlets**

| Location | Ceiling | Bracket | Sw. | Total Outlets | Total Lights |
|---|---|---|---|---|---|
| *Basement—* | | | | | |
| Passage | 1 | | | | 1 |
| Furnace | 1 | | | 1 | 1 |
| Laundry | | 1 | | 1 | 1 |
| Furnace Room | 2 | | | 2 | 2 |
| | 4 | 1 | | 4 | 5 |
| *First Floor—* | | | | | |
| Entry | | 1 | | 1 | 1 |
| Pantry | 1 | | | 1 | 1 |
| Kitchen | 1 | 2 | 2 | 5 | 3 |
| Porch | 1 | | 1 | 2 | 1 |
| China Closet | 1 | | | 1 | 1 |
| Dining Room | 1 | 2 | | 3 | 8 |
| Parlor | 1 | 2 | | 3 | 10 |
| Hall | 1 | | | 1 | 1 |
| Hall | 1 | | 2 | 3 | 2 |
| Vestibule | 1 | | | 1 | 1 |
| Porch | 1 | | | 1 | 1 |
| Living Room | 1 | 4 | 2 | 7 | 13 |
| | 11 | 11 | 7 | 29 | 43 |
| *Second Floor—* | | | | | |
| Back Hall | | 1 | 2 | 3 | 1 |
| Bedroom | | 1 | | 1 | 1 |
| Bath | | 1 | | 1 | 1 |
| Bedroom | | 3 | | 3 | 3 |
| " | | 3 | | 3 | 3 |
| Alcove | | 2 | | 2 | 2 |
| Front Hall | 2 | | 2 | 4 | 2 |
| Bedroom | | 3 | | 3 | 3 |
| " | | 3 | | 3 | 3 |
| | 2 | 17 | 4 | 23 | 19 |
| *Attic—* | | | | | |
| Hall | | 1 | | 1 | 1 |
| Attic | 1 | | | 1 | 1 |
| | 1 | 1 | | 2 | 2 |

# INDEX

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